Highway Traffic Noise Policy

State of Maine

Department of Transportation

Effective February 1, 2015

This policy cancels and replaces the previous version of July 18, 2011.

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EXECUTIVE SUMMARY

This document serves as the Maine Department of Transportation (MaineDOT) policy on the evaluation and abatement of highway traffic noise impacts. Pursuant to Federal Highway Administration (FHWA) regulation, MaineDOT's highway traffic noise policy was originally adopted in 1998 and revised in 2001, 2008, 2011, and 2014. This version incorporates minor revisions to the 2011 policy, including an updated cost estimate and reasonable cost threshold for abatement.

Noise abatement measures are evaluated in two separate categories. Type I highway noise evaluations are conducted for new highway or capacity-adding projects (i.e., additional travel lanes) on existing highways. Type II noise evaluations may be conducted for noise abatement measures along existing highways that are not being undertaken as a part of a highway improvement project. MaineDOT does not have a Type II Program[1].

The purpose of a highway traffic noise analysis is to identify impacted land uses (homes, schools, business, etc) and determine the feasibility and reasonableness of abatement measures. The terms "feasibility" and "reasonableness" are terms commonly used in highway traffic noise analysis to determine, among other things, the effectiveness (in terms of noise reduction) and the acceptable cost for any noise abatement measure. All noise abatement measures are evaluated based on the feasibility and reasonableness criteria identified in this policy.

Appropriate land use strategies along Maine's highways can be an effective means of avoiding highway traffic noise impacts. MaineDOT encourages municipalities to establish appropriate land use controls over undeveloped lands adjacent to highways to prevent the development of incompatible activities along existing highways.

Appendix A provides useful information regarding the basics of sound, the fundamentals of highway traffic noise, and strategies for highway traffic noise abatement and control. Appendix B provides a glossary of specific terms used throughout the policy.

[1] For a complete definition of Type I and II noise projects, please see Sections III. and IV.

I. INTRODUCTION

MaineDOT will use the following guidelines to determine the need, feasibility, and reasonableness of noise-abatement or -reduction measures along proposed highway construction projects. This policy is based on established principles, practices, and procedures used by federal and state transportation agencies to assess highway-related noise levels.

This policy fully incorporates by reference the requirements of Title 23, Part 772 of the U.S. Code of Federal Regulations (23 CFR 772), the FHWA Highway Traffic Noise: Analysis and Abatement Guidance, June 2010 (Revised January 2011), or the most current version, and the noise-related requirements of the National Environmental Policy Act (NEPA) of 1969. MaineDOT and FHWA will jointly review this policy every three years and adopt appropriate revisions when necessary. Any changes to this policy that are required as a result of federal or state statutory, regulatory, or policy changes will be incorporated into this policy and submitted to FHWA for approval within 60 days.

II. HIGHWAY TRAFFIC NOISE ANALYSIS

MaineDOT's Bureau of Planning will perform or oversee the highway traffic noise analysis for Type I projects[2]. Requirements for the analysis and abatement of highway construction noise are discussed in Section X. ***The purpose of a highway traffic noise analysis for either type of project is to identify impacted land uses based on the Noise Abatement Criteria (NAC), and to determine the feasibility and reasonableness of abatement measures.***

Highway traffic noise analysis will be performed for developed lands, and for undeveloped lands that are permitted for development, prior to the approval of the highway project's environmental document, i.e., the date of approval of the Categorical Exclusion (CE), Finding of No Significant Impact (FONSI) or Record of Decision (ROD). Subsequent to this date, the MaineDOT is not responsible for providing noise abatement for new development.

A highway traffic noise analysis will include the following steps.

A. Identification of Noise Sensitive Areas and Receptors

The first step in the highway traffic noise analysis is to identify areas with potential for noise impacts, the receptors of noise in each area, and the applicable noise abatement criteria (NAC)[3] for each receptor identified in the study area.

When determining the number of receptors in the study area, the following rules apply:

NAC Activity Category B: Single-family residential units are considered one receptor. Structures that contain multiple residential units (apartments, condominiums, and duplexes) are considered to have one receptor per residential unit.

[2] For a complete definition of Type I, II and III noise projects, please see Sections III, IV and VII.
[3] Refer to Appendix B, Table B-1 for more information on the NAC Activity Categories.

NAC Activity Categories C, D, and E: A single structure is considered a single receptor. For outdoor noise-sensitive land uses (parks, campgrounds, cemeteries, trails, etc.) the number of receptors will be determined by dividing the frontage of the land use by the average lot frontage in the study area.

B. Determination of Existing Noise Levels.

Existing noise levels will be determined through a combination of noise measurements and traffic noise modeling. All traffic noise modeling will be done using the most current readily available version of the FHWA Traffic Noise Model (FHWA TNM). Noise measurements and noise modeling will be conducted using equivalent continuous noise levels (leq) during the hour that is predicted to yield the greatest traffic noise levels.

C. Prediction of Future Noise Levels

Future highway traffic noise levels will be predicted for the design year, usually 20 years in the future, for each alternative under detailed study, including the "no-build" alternative, within the study area.

D. Determination of Impacts

All highway traffic noise impacts, associated with the project, will be identified during the highway traffic noise analysis. Type I project impacts occur when the predicted future highway traffic noise levels are within 1 dBA of, or exceed, the NAC, or when the predicted future highway traffic noise levels exceed the existing levels by at least 15 dBA (substantial increase). (See Appendix B, Table B-1 for the NAC)

In determining traffic noise impacts, primary consideration is to be given to exterior areas where frequent human use occurs, such as patios, porches, swimming pools, playgrounds, etc. If no exterior areas are present, the interior NAC will be used as the basis for determining noise impacts where applicable.

E. Evaluation of Abatement Measures

If a highway traffic noise impact is identified, the following abatement measures will be evaluated:

1. 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.
2. Alteration of the highway project's horizontal and/or vertical alignments.
3. Construction of noise barriers (including landscaping for aesthetic purposes and the acquisition of property rights) within or outside the highway ROW.
4. Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in Type I projects only.
5. Noise insulation of Activity Category D facilities only.

F. Incorporation of Feasible and Reasonable Criteria

All Type I noise abatement measures will be evaluated based upon Feasible and Reasonable criteria in Sections VI and VII.

G. Selection of Abatement Measures

The last step of the analysis will include selection of the noise abatement measures to be used, if abatement has met all the necessary criteria.

H. Documentation

The noise analyses completed under this policy, including project description, existing and future noise levels, impacts, evaluations, and abatement considered, will be documented in the project files. A Statement of Likelihood will 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 will include the preliminary location and physical description of noise abatement measures determined feasible and reasonable in the preliminary analysis.

I. Completion of Follow-up Measures

After abatement is complete, follow-up noise measurements will be taken to determine the effectiveness of the abatement and to verify the noise model analysis. MaineDOT will provide the necessary maintenance to ensure the effectiveness of any abatement measure. However, MaineDOT will not pay for maintenance or operational costs of the noise insulation of Activity Category D facilities or any other noise abatement measures not constructed by MaineDOT.

III. TYPE I PROJECTS

A Type I project includes the following types of proposed highway projects as defined in 23 CFR 772.5:

A. The construction of a highway on new location; or,

B. The physical alteration of an existing highway where there is either:

1. 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,
2. 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, High-Occupancy Toll (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.

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. Such federally funded projects require the completion of an approved Environmental Impact Statement, Environmental Assessment, or Categorical Exclusion to satisfy the requirements of the National Environmental Policy Act. As part of this analysis, the need for noise abatement is evaluated for each individual highway project. Noise abatement measures for Type I projects will be funded as part of the proposed highway project.

An area or site must satisfy the following criteria to be eligible for noise abatement for a Type I project:

C. Noise abatement must be feasible and reasonable as defined in Sections VI and VII.

D. The project must be eligible for federal aid construction funding.

IV. TYPE II PROJECTS

Type II or "retrofit" projects are noise abatement projects along existing highways. The implementation of a Type II program is not required by federal or state statute or FHWA regulation. MaineDOT does not have a Type II Program.

V. TYPE III PROJECTS

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

VI. FEASIBILITY CRITERIA

Feasibility is defined as the engineering and acoustical ability of abatement measures to provide effective noise reduction. When noise abatement measures are evaluated, feasibility criteria will include the following:

A. Noise Reduction

Can a 5 dBA or greater noise reduction be achieved? Abatement measures are not feasible if a 5 dBA noise reduction cannot be achieved for a majority (greater than 50%) of impacted receptors.

B. Safety

Will the barrier, or other measure, create a safety issue? If so, the abatement measures are not feasible. Safety factors that should be considered in the design of the barrier include maintaining a clear recovery zone, redirection of crash vehicles, adequate sight distance, and emergency vehicle access. MaineDOT will use the most recent version of the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* when making safety determinations.

C. Barrier Height

The maximum height of a noise barrier allowed under this policy is 20 feet based upon safety and engineering considerations.

D. Other Considerations

Other issues including, but not limited to, maintenance, drainage, snow removal, ROW acquisition, access to adjacent properties, and environmental impacts will also be considered when determining the feasibility of abatement. For any other considerations that may arise, MaineDOT will make a feasibility determination based on best engineering practices. For example, it is possible that a noise barrier, or other abatement measure, may satisfy Parts A, B and C of this Section, but, not be feasible if substantial wetland impacts and mitigation, other environmental impacts, or extensive fill and drainage are necessary to complete the project.

VII. REASONABLENESS CRITERIA

Reasonableness implies that common sense and good judgment have been applied in arriving at a decision. The overall noise abatement benefits must outweigh the overall adverse social, economic, and environmental effects and the costs of the abatement measures. When noise abatement measures are considered, reasonableness criteria will include the following:

A. Maximum Cost of Abatement

The maximum cost of abatement is $33,000 per benefited receptor All receptors within the study area, as defined in Section II A, attaining at least a 5 dBA reduction will be counted as "benefited" and included in the cost calculation.

For the purposes of developing the total barrier cost, a cost of $33.00 per square foot for Preliminary Engineering (PE), ROW, and construction will be used, realizing that actual costs will vary. However, additional project costs, not included in the $33.00 per square foot figure, may occur as a result of unique physical or natural conditions when modeling and designing a noise abatement barrier or other measure. Section VI. D of this policy addresses “other considerations” that will be evaluated when determining the feasibility of proposed noise abatement measures.

Abatement costs were estimated based on recent construction costs and historical data provided by FHWA. Both the unit cost and cost-per-benefited-receptor will be updated when the policy is reviewed, as defined in Section I, to reflect actual barrier costs.

B. Noise Reduction Design Goal

During the traffic noise modeling and design stage, MaineDOT will attempt to reduce predicted noise levels at impacted receptors by 10 dBA. Various factors, including topography or the limitation of barrier height (see Section VI C) may reduce the effectiveness of noise abatement for certain receptors. At a minimum, noise abatement measures will be designed to reduce noise levels at a majority (greater than 50%) of benefited receptors by 7 dBA. Abatement measures are not Reasonable if the 7 dBA design goal cannot be achieved for a majority of benefited receptors.

C. Third Party Funding

Third-party funding is not allowed on 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 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.

D. Residents' Desires

A noise barrier will not be considered reasonable if fewer than 75% of the benefitted receptors approve of the construction of a noise barrier. In the case of rental or leased properties, the views of both the owner and the residents will be solicited to determine reasonableness. MaineDOT will establish the approval rate of a noise barrier for benefitted receptors by conducting a survey through certified or registered mail and a self-addressed stamped envelope.

VIII. LOCAL COORDINATION AND COMMUNITY INVOLVEMENT

Coordination with local agencies and community involvement is an important part of highway traffic noise control and the prevention of future impacts. Highway traffic noise impacts can be most effectively reduced through a program of shared responsibility. Local governments should use their power to regulate land development in such a way that particularly noise sensitive land uses are either prohibited from being located adjacent to a highway, or that developments are planned, designed, and constructed so that highway traffic noise impacts are minimized.

Upon completion of the highway traffic noise analysis, information shall be provided to local government agencies within whose jurisdiction the highway project is located, as to the implications of the project on that particular local community in the future. At a minimum, this will include modeled future highway traffic noise levels for both developed and undeveloped lands in the immediate vicinity of the project[4]. The information will be disseminated through the distribution of highway project environmental documents and noise analysis reports, and informational public meetings. The overall goal of this effort will be to prevent future highway traffic noise impacts on currently undeveloped lands and to promote noise-compatible planning.

IX. LOCAL/PRIVATE PROJECTS

The use of MaineDOT's (ROW) for local/private noise abatement projects is prohibited.

X. CONSTRUCTION NOISE

The following general steps are to be performed for all Type I projects:

During the NEPA and design phases of transportation projects, MaineDOT will work with local public officials and community members to limit, minimize, or eliminate adverse construction-noise impacts to the community, as practicable. Construction noise control measures will be incorporated into the plans and specifications on a project-by-project basis.

[4] For a complete list of FHWA-required information for local officials see 23 CFR 772.17

APPENDIX A. HIGHWAY NOISE FUNDAMENTALS

The Basics of Sound

The decibel (dB) is the unit of measurement for sound. The decibel scale audible to humans spans approximately 140 decibels. A level of 0 decibels corresponds to the threshold of human hearing, while 140 decibels produces a sensation more akin to pain than sound, similar to standing near a jet engine as it takes off. Table A-1 shows sound levels for some common noise sources.

Table A-1 Typical Sound Levels[5]

NOISE SOURCE OR ACTIVITY	SOUND LEVEL dBA
Jet engine at takeoff	140
Fire engine siren	130
Jackhammer	120
Rock Concert	110
Circular Saw	100
Heavy truck or motorcycle	90
Garbage disposal	80
Busy restaurant	70
Normal Speech	60
Background music	50
Bedroom, Bird song	40
Quiet library, soft whisper	30
Quiet basement w/o mechanical equipment	20
Human breathing	10
Threshold of Hearing	0

The decibel scale is logarithmic rather than arithmetic. Consequently, traffic sound levels cannot be added by ordinary arithmetic means. For instance, two noise sources, each producing 90 dB, will combine to produce 93 dB, not 180 dB. In other words, a doubling of the noise source produces only a 3 dB increase in the sound pressure level. Studies have shown that this increase is barely detectable by the human ear. Furthermore, an increase or decrease of 5 dB would result in a clearly noticeable change in the sound level. A change of 10 dB in the sound pressure level will be perceived by an observer to be a doubling or halving of the sound.

The "A" weighting scale for decibel measurement is widely used in environmental work because it closely resembles the ear's sensitivity to noise. Therefore the unit of measurement for highway traffic noise becomes dBA. The noise descriptor used for environmental analysis is the equivalent sound level, Leq. The equivalent sound level is the steady sound level that has the same acoustic energy as the time varying sound level over the same time period.

Highway Traffic Noise

Sound can be either desirable or undesirable. Music is an example of desirable sound. Sound generated by motor vehicles traveling along highways is, generally, undesirable and is referred to in this policy as highway traffic noise.

Highway traffic noise is generated by four major sources: engine/drive-train, exhaust, aerodynamics, and tire-to-pavement friction. Recent research indicates that tires are the dominant noise source at speeds greater than 20 mph for cars and 30 mph for trucks. Tire sound levels increase with vehicle speed but also depend upon road surface, vehicle weight, tread design and wear. Changes in any of these factors can vary highway traffic noise levels. At lower

[5] Actual sound levels may vary depending on a number of factors, including the distance between source and receiver, intensity of the particular activity, and the degree of background noise.

speeds, especially in trucks and buses, the dominant noise source is the engine and related accessories.

The level of highway traffic noise depends on three things: (1) the volume of free flow traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of highway traffic noise is increased by heavier traffic volumes, higher speeds, and greater numbers of trucks. The loudness of highway traffic noise can also be increased by defective or modified exhaust systems and other faulty equipment on vehicles. Any condition (such as a steep incline) that causes heavy laboring of motor vehicle engines will also increase highway traffic noise levels. Other physical and environmental factors, such as distance from source to receptor, terrain, vegetation, and natural and manmade obstacles, also affect the loudness of highway traffic noise.

Highway Traffic Noise Strategies

Highway traffic noise can be addressed by a number of different strategies including: motor vehicle control, land use control, highway planning and design, and abatement. The responsibilities for implementing these strategies are shared by all levels of government: federal, state, and local.

Motor vehicle control

The State of Maine requires[6] that all automobiles (excluding motorcycles) must be equipped with a muffler in good working order, and prohibits amplification of exhaust noise above that emitted by the muffler originally installed on the vehicle. However, modifications are allowed if the muffler or exhaust system does not emit noise in excess of 95 decibels. In general, quieter vehicles would bring about a substantial reduction in highway traffic noise along Maine's roads and streets. MaineDOT does not have the authority to regulate motor vehicles. The Environmental Protection Agency (EPA) has issued regulations that limit the noise levels for new trucks with a gross vehicle weight rating (GVWR) of more than 10,000 pounds. In addition, many local governments have passed some form of community noise ordinance.

Land use control

Proper land use control along Maine's highways is an effective means of controlling the impacts of highway traffic noise. FHWA and MaineDOT encourage municipalities to plan, design, and construct new development projects and roadways that minimize potential highway traffic noise impacts. More specifically, municipalities are encouraged to establish building setbacks and vegetative buffer zones along existing highways. Noise-compatible planning encourages the location of less noise-sensitive land uses near highways, promotes the use of berms and open space separating roads from developments, and suggests special construction techniques that minimize the impact of highway traffic noise.

According to FHWA, there are several hundred thousand miles of existing highways in this country bordered by vacant land, which may some day be developed. Proper land use control can help to prevent many future highway traffic noise problems in these areas. For more information about noise compatible planning, visit FHWA's website at http://www.fhwa.dot.gov/environment/comgrwth.htm.

[6]MRSA 29-A§ 1912

Highway planning and design

Early in the highway planning and design stages, MaineDOT evaluates highway traffic noise and construction noise as part of the NEPA process. The purpose of this study is to determine if any of the proposed project alternatives will create noise impacts. MaineDOT will use the procedures outlined in Section II to identify noise impacts (if any) and evaluate potential abatement measures. Any noise abatement measures that satisfy all of the requirements of this policy will be implemented as part of a Type I project.

Abatement

Noise barrier walls and earth berms are frequently used to provide abatement for highway traffic noise. Noise barriers are solid walls built between the highway and noise-sensitive land uses (such as homes and schools) along the highway. Barriers can be formed from earth mounds along the road (earth berms) or from high, vertical walls. MaineDOT limits noise walls to a maximum of 20 feet in height for safety and structural concerns. Noise walls can be built from a variety of materials, including, but not limited to: wood, concrete, masonry, and metal.

Openings in noise walls for driveways, business entrances, or intersecting streets defeat the effectiveness of noise barriers. In many areas of Maine, homes are scattered too far apart to permit highway noise barriers to be built at a reasonable cost.

See Section II. D of this policy for the list of eligible noise abatement measures.

APPENDIX B. GLOSSARY

Abatement. A reduction in sound levels.

Benefited Receptor. A receptor that is expected to receive a minimum noise reduction of 5 dBA from the proposed abatement measure.

Biennial Capital Work Plan. The Biennial Capital Work Plan is a dynamic document that represents MaineDOT's entire two-year capital program and includes all existing projects in production.

dBA. A-weighted decibel unit used to measure sound that best corresponds to the frequency response of the human ear.

Design Year. The future year used to estimate the probable traffic volume for which a highway is designed.

Existing Noise Level. The worst noise hour, resulting from the combination of natural and mechanical sources and human activity present in a particular area.

Impacted Receptor. Any receptor that approaches (within 1 dBA) or exceeds the NAC for the corresponding land use category, or any receptor that exceeds existing noise levels by 15 dBA.

Leq. The equivalent steady-state sound level, which, in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period.

Leq (h). The hourly value of Leq.

National Environmental Policy Act (NEPA). Federal legislation that establishes environmental policy for the nation for federally funded projects. It provides an interdisciplinary framework to ensure that decision-makers adequately take environmental factors into account.

Noise Barrier. A natural or man-made object that interrupts the path of sound. A barrier could be a wall, an earth berm, or a combination of both.

Noise. Any unwanted sound.

Noise Abatement Criteria (NAC). FHWA-determined noise levels for various land uses and activities used to identify traffic noise impacts. The NAC are listed in Table B-1.

Table B-1 Noise Abatement Criteria (NAC)

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

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.

Highway Traffic Noise Impacts. Impacts that occur when the predicted highway traffic noise levels approach or exceed the noise abatement criteria (Table B-1 - above), or when the predicted highway traffic noise levels substantially exceed the existing noise levels.

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 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, High-Occupancy Toll (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.

(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 proposed project for noise abatement along an existing highway.

Receptor. The technical term used to describe the location of any properties included in the noise analysis.

Study Area. The study area is defined as 500' from the *proposed* edge of pavement for Type I analyses. However, if highway traffic noise impacts are identified at 500' then the study area will be expanded to identify all potential impacts.

Substantial noise increase. One of two types of highway traffic noise impacts. For a Type I project, an increase in noise levels of 15 dBA in the design year over the existing noise level.

APPENDIX C. FHWA HIGHWAY TRAFFIC NOISE REGULATION

23 CFR PART 772—PROCEDURES FOR ABATEMENT OF HIGHWAY TRAFFIC NOISE AND CONSTRUCTION NOISE

Section Contents

Authority: 23 U.S.C. 109(h) and (i); 42 U.S.C. 4331, 4332; sec. 339(b), Pub. L. 104-59, 109 Stat. 568, 605; 49 CFR 1.48(b).

Sec. 772.1 Purpose.
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 U.S.C.

Sec. 772.3 Noise standards.
The highway traffic noise prediction requirements, noise analyses, noise abatement criteria, and requirements for informing local officials in this regulation constitute the noise standards mandated by 23 U.S.C. 109(1). All highway projects which are developed in conformance with this regulation shall be deemed to be in accordance with the FHWA noise standards.

Sec. 772.5 Definitions.
Benefited Receptor. The recipient of an abatement measure that receives a noise reduction at or above the minimum threshold of 5 dB(A), but not to exceed the highway agency's reasonableness design goal.

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, cross-roads.

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 part 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.

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

Leq. The equivalent steady-state sound level which 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.

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.

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 shall be at least 7 dB(A), but not more than 10 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.

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.

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 construction 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 5 to 15 dB(A) in the design year over the existing noise level.

Traffic Noise Impacts. Design year build condition noise levels that approach 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.

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 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, High-Occupancy Toll (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.

(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, the highway agency must develop and implement a Type II program in accordance with section 772.7(e).

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.

Sec. 772.7 Applicability.

(a) 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.

(b) In order to obtain FHWA approval, the highway agency shall develop noise policies in conformance with this regulation and shall apply these policies uniformly and consistently statewide.

(c) This regulation applies to all Type I projects unless the regulation specifically indicates that a section only applies to Type II or Type III projects.

(d) The development and implementation of Type II projects are not mandatory requirements of section 109(i) of title 23, United States Code.

(e) If a highway agency chooses to participate in a Type II program, the highway agency shall develop a priority system, based on a variety of factors, to rank the projects in the program. This priority system shall be submitted to and approved by FHWA before the highway agency is allowed to use Federal-aid funds for a project in the program. The highway agency shall re-analyze the priority system on a regular interval, not to exceed 5 years.

(f) For a Type III project, a highway agency is not required to complete a noise analysis or consider abatement measures.

Sec. 772.9 Traffic noise prediction.

(a) Any analysis required by this subpart must use the FHWA Traffic Noise Model (TNM), which is described in ``FHWA Traffic Noise Model'' Report No. FHWA-PD-96-010, including Revision No. 1, dated April 14, 2004, or any other model determined by the FHWA to be consistent with the methodology of the FHWA TNM. These publications are incorporated by reference in accordance with section 552(a) of title 5, U.S.C. and part 51 of title 1, CFR, and are on file at the National Archives and Record Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. These documents are available for copying and inspection at the Federal Highway Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590, as provided in part 7 of title 49, CFR. These documents are also available on the FHWA's Traffic Noise Model Web site at the following URL: http://www.fhwa.dot.gov/environment/noise/index.htm.

(b) Average pavement type shall be used in the FHWA TNM for future noise level prediction unless a highway agency substantiates the use of a different pavement type for approval by the FHWA.

(c) Noise contour lines may be used for project alternative screening or for land use planning to comply with Sec. 772.17 of this part, but shall not be used for determining highway traffic noise impacts.

(d) In predicting noise levels and assessing noise impacts, traffic characteristics that would yield the worst traffic noise impact for the design year shall be used.

Sec. 772.11 Analysis of traffic noise impacts.

(a) The highway agency shall determine and analyze expected traffic noise impacts.

(1) For projects on new alignments, determine traffic noise impacts by field measurements.

(2) For projects on existing alignments, predict existing and design year traffic noise impacts.

(b) In determining traffic noise impacts, a highway agency shall give primary consideration to exterior areas where frequent human use occurs.

(c) A traffic noise analysis shall be completed for:

(1) Each alternative under detailed study;

(2) Each Activity Category of the NAC listed in Table 1 that is present in the study area;

(i) Activity Category A. This activity category includes the exterior impact criteria for 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 for the area to continue to serve its intended purpose. Highway agencies shall submit justifications to the FHWA on a case-by-case basis for approval of an Activity Category A designation.

(ii) Activity Category B. This activity category includes the exterior impact criteria for single-family and multifamily residences.

(iii) Activity Category C. This activity category includes the exterior impact criteria for a variety of land use facilities. Each highway agency shall adopt a standard practice for analyzing these land use facilities that is consistent and uniformly applied statewide.

(iv) Activity Category D. This activity category includes the interior impact criteria for certain land use facilities listed in Activity Category C that may have interior uses. A highway agency shall conduct an indoor analysis after a determination is made that exterior abatement measures will not be feasible and reasonable. An indoor analysis shall only be done after exhausting all outdoor analysis options. 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, the highway agency shall use Activity Category D as the basis of determining noise impacts. Each highway agency shall adopt a standard practice for analyzing these land use facilities that is consistent and uniformly applied statewide.

(v) Activity Category E. This activity category includes the exterior impact criteria for developed lands that are less sensitive to highway noise. Each highway agency shall adopt a standard practice for analyzing these land use facilities that is consistent and uniformly applied statewide.

(vi) Activity Category F. This activity category includes developed lands that are not sensitive to highway traffic noise. There is no impact criteria for the land use facilities in this activity category and no analysis of noise impacts is required.

(vii) Activity Category G. This activity includes undeveloped lands.

(A) A highway agency shall determine if undeveloped land is permitted for development. The milestone and its associated date for acknowledging when undeveloped land is considered permitted shall be the date of issuance of a building permit by the local jurisdiction or by the appropriate governing entity.

(B) If undeveloped land is determined to be perrmitted, then the highway agency shall assign the land to the appropriate Activity Category and analyze it in the same manner as developed lands in that Activity Category.

(C) If undeveloped land is not permitted for development by the date of public knowledge, the highway agency shall determine noise levels in accordance with 772.17(a) and document the results in the project's environmental clearance documents and noise analysis documents. Federal participation in noise abatement measures will not be considered for lands that are not permitted by the date of public knowledge.

(d) The analysis of traffic noise impacts shall include:

(1) Identification of existing activities, developed lands, and undeveloped lands, which may be affected by noise from the highway;

(2) For projects on new or existing alignments, validate predicted noise level through comparison between measured and predicted levels;

(3) Measurement of noise levels. Use an ANSI Type I or Type II integrating sound level meter;

(4) Identification of project limits to determine all traffic noise impacts for the design year for the build alternative. For Type II projects, traffic noise impacts shall be determined from current year conditions;

(e) Highway agencies shall establish an approach level to be used when determining a traffic noise impact. The approach level shall be at least 1 dB(A) less than the Noise Abatement Criteria for Activity

Categories A to E listed in Table 1 to part 772;

(f) Highway agencies shall define substantial noise increase between 5 dB(A) to 15 dB(A) over existing noise levels. The substantial noise increase criterion is independent of the absolute noise level.

(g) A highway agency proposing to use Federal-aid highway funds for a Type II project shall perform a noise analysis in accordance with Sec. 772.11 of this part in order to provide information needed to make the determination required by Sec. 772.13(a) of this part.

Sec. 772.13 Analysis of noise abatement.

(a) When traffic noise impacts are identified, noise abatement shall be considered and evaluated for feasibility and reasonableness. The highway agency shall determine and analyze alternative noise abatement measures to abate identified impacts by giving weight to the benefits and costs of abatement and the overall social, economic, and environmental effects by using feasible and reasonable noise abatement measures for decision-making.

(b) In abating traffic noise impacts, a highway agency shall give primary consideration to exterior areas where frequent human use occurs.

(c) If a noise impact is identified, a highway agency shall consider abatement measures. The abatement measures listed in Sec. 772.15(c) of this part are eligible for Federal funding.

(1) At a minimum, the highway agency shall consider noise abatement in the form of a noise barrier.

(2) If a highway agency chooses to use absorptive treatments as a functional enhancement, the highway agency shall adopt a standard practice for using absorptive treatment that is consistent and uniformly applied statewide.

(d) Examination and evaluation of feasible and reasonable noise abatement measures for reducing the traffic noise impacts. Each highway agency, with FHWA approval, shall develop feasibility and reasonableness factors.

(1) Feasibility:

(i) Achievement of at least a 5 dB(A) highway traffic noise reduction at impacted receptors. The highway agency shall define, and receive FHWA approval for, the number of receptors that must achieve this reduction for the noise abatement measure to be acoustically feasible and explain the basis for this determination; and

(ii) Determination that it is possible to design and construct the noise abatement measure. Factors to consider are safety, barrier height, topography, drainage, utilities, and maintenance of the abatement measure, maintenance access to adjacent properties, and access to adjacent properties (i.e. arterial widening projects).

(2) Reasonableness:

(i) Consideration of the viewpoints of the property owners and residents of the benefited receptors. The highway agency shall solicit the viewpoints of all of the benefited receptors and obtain enough responses to document a decision on either desiring or not desiring the noise abatement measure. The highway agency shall define, and receive FHWA approval for, the number of receptors that are needed to constitute a decision and explain the basis for this determination.

(ii) Cost effectiveness of the highway traffic noise abatement measures. Each highway agency shall determine, and receive FHWA approval for, the allowable cost of abatement by determining a baseline cost reasonableness value. This determination may include the actual construction cost of noise abatement, cost per square foot of abatement, the maximum square footage of abatement/benefited receptor and either the cost/benefited receptor or cost/benefited receptor/dB(A) reduction. The highway agency shall re-analyze the allowable cost for abatement on a regular interval, not to exceed 5 years. A highway agency has the option of justifying, for FHWA approval, different cost allowances for a particular geographic area(s) within the State, however, the highway agency must use the same cost reasonableness/construction cost ratio statewide.

(iii) Noise reduction design goals for highway traffic noise abatement measures. When noise abatement measure(s) are being considered, a highway agency shall achieve a noise reduction design goal. The highway agency shall define, and receive FHWA approval for, the design goal of at least 7 dB(A) but not more than 10 dB(A), and shall define the number of benefited receptors that must achieve this design goal and explain the basis for this determination.

(iv) The reasonableness factors listed in Sec. 772.13(d)(5)(i), (ii) and (iii), must collectively be achieved in order for a noise abatement measure to be deemed reasonable. Failure to achieve Sec. 772.13(d)(5)(i), (ii) or (iii), will result in the noise abatement measure being deemed not reasonable.

(v) In addition to the required reasonableness factors listed in Sec. 772.13(d)(5)(i), (ii), and (iii), a highway agency has the option to also include the following reasonableness factors: Date of development, length of time receivers have been exposed to highway traffic noise impacts, exposure to higher absolute highway traffic noise levels, changes between existing and future build conditions, percentage of mixed zoning development, and use of noise compatible planning concepts by the local government. No single optional reasonableness factor can be used to determine reasonableness.

(e) Assessment of Benefited Receptors. Each highway agency shall define the threshold for the noise reduction which determines a benefited receptor as at or above the 5 dB(A), but not to exceed the highway agency's reasonableness design goal.

(f) Abatement Measure Reporting: Each highway agency 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). The FHWA will collect this information, in accordance with OMB's Information Collection requirements.

(g) Before adoption of a CE, FONSI, or ROD, the highway agency 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 that final recommendations on the construction of an abatement measure(s) is determined during the completion of the project's final design and the public involvement processes.

(h) The FHWA will not approve project plans and specifications unless feasible and reasonable noise abatement measures are incorporated into the plans and specifications to reduce the noise impact on existing activities, developed lands, or undeveloped lands for which development is permitted.

(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.

(j) 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.

(k) On a Type I or Type II projects, a highway agency has the option to cost average noise abatement among benefited receptors within common noise environments if no single common noise environment exceeds two times the highway agency's cost reasonableness criteria and collectively all common noise environments being averaged do not exceed the highway agency's cost reasonableness criteria.

Sec. 772.15 Federal participation.

(a) Type I and Type II projects. Federal funds may be used for noise abatement measures when:

(1) Traffic noise impacts have been identified; and

(2) Abatement measures have been determined to be feasible and reasonable pursuant to Sec. 772.13(d) of this chapter.

(b) For Type II projects. (1) No funds made available out of the Highway Trust Fund may be used to construct Type II noise barriers, as defined by this regulation, if such noise barriers were not part of a project approved by the FHWA before the November 28, 1995.

(2) Federal funds are available for Type II noise barriers along lands that were developed or were under substantial construction before approval of the acquisition of the rights-of-ways for, or construction of, the existing highway.

(3) FHWA will not approve noise abatement measures for locations where such measures were previously determined not to be feasible and reasonable for a Type I project.

(c) Noise Abatement Measures. The following noise abatement measures may be considered for incorporation into a Type I or Type II project to reduce traffic noise impacts. The costs of such measures may be included in Federal-aid participating project costs with the Federal share being the same as that for the system on which the project is located.

(1) Construction of noise barriers, including acquisition of property rights, either within or outside the highway right-of-way. Landscaping is not a viable noise abatement measure.

(2) Traffic management measures including, but not limited to, 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.

(3) Alteration of horizontal and vertical alignments.

(4) Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in Type I projects only.

(5) Noise insulation of Activity Category D land use facilities listed in Table 1. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

Sec. 772.17 Information for local officials.

(a) To minimize future traffic noise impacts on currently undeveloped lands of Type I projects, a highway agency 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 the highway agency's definition of "approach" for undeveloped lands or properties within the project limits. At a minimum, identify the distance to the exterior noise abatement criteria in Table 1;

(3) Non-eligibility for Federal-aid participation for a Type II project as described in Sec. 772.15(b).

(b) If a highway agency chooses to participate in a Type II noise program or to use the date of development as one of the factors in determining the reasonableness of a Type I noise abatement measure, the highway agency shall have a statewide outreach program to inform local officials and the public of the items in Sec. 772.17(a)(1) through (3).

Sec. 772.19 Construction noise.

For all Type I and II projects, a highway agency 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.

TABLE 1 TO PART 772—NOISE ABATEMENT CRITERIA

[Hourly A–Weighted Sound Level_decibels (dB(A)) [1]]

Activity category	Activity Leq(h)	Criteria [2] L10(h)	Evaluation location	Activity description
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B [3]	67	70	Exterior	Residential.
C [3]	67	70	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	55	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 [3]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F.
F				Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G				Undeveloped lands that are not permitted.

[1] 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.