

North Dakota Department of Transportation

Noise Policy and Guidance

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I. Introduction

This document contains the North Dakota Department of Transportation's (NDDOT) noise policy for highway traffic noise and construction noise. This policy describes NDDOT's implementation of the requirements of the Federal Highway Administration (FHWA) Noise Standard at 23 Code of Federal Regulations (CFR) Part 772. This policy was developed by NDDOT and reviewed and concurred with by FHWA.

The 1972 Federal-aid Highway Act 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 NDDOT flexibility that reflects state-specific attitudes and objectives in approaching the problem of highway traffic and construction noise. This policy contains NDDOT's policy on how highway traffic noise impacts are defined, how noise abatement is evaluated, and how noise abatement decisions are made.

In addition to defining traffic noise impacts, the FHWA Noise Standard requires that noise abatement measures be considered when traffic noise impacts are identified for Type I Federal projects. Noise abatement measures that are found to be feasible and reasonable must be constructed for such projects. Feasible and reasonable noise abatement measures are eligible for Federal-aid participation at the same ratio or percentage as other eligible project costs.

II. Purpose

The purpose is to provide procedures for noise analysis 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.

This policy describes NDDOT's program to implement 23 CFR 772. Where FHWA has given NDDOT flexibility in implementing the standard, this policy describes NDDOT's approach to implementation. This includes traffic noise prediction requirements, noise analyses, noise abatement criteria, and requirements for informing local officials.

III. Definitions (23 CFR 772.5)

Benefited Receptor. The NDDOT defines a benefited receptor as a recipient of an abatement measure that receives a noise reduction at or above 8 dB(A), but not to exceed NDDOT'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 771.

Design Year. The future year used to estimate the probable traffic volume for which a highway is designed. NDDOT currently uses 20 years.

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

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

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

Leq. The equivalent steady-state sound level 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. NDDOT's noise reduction design goal is 10 dB(A) for 80% of the first row of benefited receptors..

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, Noise Abatement Criteria.

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. For a Type I project the NDDOT defines a substantial noise increase as an increase in noise levels of 15 dB(A) in the design year over the existing noise level.

Traffic Noise Impacts. Design year build condition noise levels that approach (within 1 dBA) or exceed the Noise Abatement Criteria (NAC) in Table 1, Noise Abatement Criteria for the future build condition; or design year build condition noise levels that create a substantial noise increase (15 dBA) 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 High-Occupancy Vehicle (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 per § 772.5 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. NDDOT does not have a program for Type II Projects.

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.

IV. Applicability

This policy applies to all Type I Federal highway projects throughout the state of North Dakota; that is, any projects that receive Federal-aid funds or are otherwise subject to FHWA approval. They include Federal projects that are administered by Local Public Agencies (LPAs) as well as NDDOT.

If there are any questions about whether a project is subject to this policy or the FHWA Noise Standard, contact the Environmental and Transportation Services Division (ETS) through the technical support contact, as appropriate. Due to the necessary lead time to complete a traffic noise analysis, the need for a noise analysis should be determined with the project scoping. The requirements of this policy apply uniformly and

consistently to all Type I Federal projects throughout the State. NDDOT does not have a program for, or consider noise abatement for Type II Projects.

Type III projects do not normally require noise analysis or consideration of abatement measures.

V. Traffic Noise Prediction

All federal aid projects requiring analysis will utilize FHWA's current Traffic Noise Model.

Future noise levels must be predicted for all build alternatives under consideration in NEPA document (all reasonable alternatives, but not alternatives rejected for detailed analysis because they are not reasonable).

A. TNM Parameters

1. Pavement Type

TNM allows the input of different pavement types to better model "predicted" existing conditions when field measurements are not required. The use of these pavement types assist in the validation of the model. However, when inputting information the type of pavement for future conditions users must select "AVERAGE PAVEMENT" when analyzing future conditions unless there is prior authorization from FHWA.

2. Noise Contours

Noise contour lines are useful for screening and to provide information to local officials. Noise contours can only be used for project alternative screening or for land use planning purposes, NOT for determining highway traffic noise impacts. Noise analysts usually develop the noise contours using the Noise Contour function of the FHWA TNM, or by modeling discrete receiver points and extrapolating between them. Either method can result in an inaccurate portrayal of the noise environment. When using the Noise Contour function, users must ensure the grid spacing provides a sufficient resolution to provide good results. When using discrete receivers, the user must ensure the receivers are close enough together to enable relatively accurate extrapolation between receiver points.

3. Traffic Characteristics

In predicting noise levels and assessing noise impacts, traffic characteristics that would yield the worst hourly traffic noise impact for the design year shall be used. The worst hourly traffic noise impact is the period with the highest sound levels and *may not* be at the peak traffic hour but instead, during a period when traffic volumes are lower but the truck mix or vehicle speeds are higher. During the peak traffic hour speeds may be low and heavy truck volumes may drop as truckers try to avoid congestion. Analysts should use the posted speed limit to predict highway traffic noise levels.

VI. Analysis of Traffic Noise Impacts

A highway traffic noise impact occurs when the predicted existing or future highway traffic noise levels approach or exceed the NAC or when predicted existing or future highway traffic noise levels substantially exceed the existing highway traffic noise level, even though the predicted levels may not exceed the NAC. All human use areas including those in areas zoned for commercial use will be included in a traffic noise analysis.

A. Identification of Traffic Noise Impacts (new alignments and modification to existing alignments)

For Type I projects, a traffic noise impact analysis is required for all build alternatives under detailed study in the National Environmental Policy Act (NEPA) process. That is, all reasonable alternatives that have been retained for detailed analysis in the categorical exclusion documentation, environmental assessment or environmental impact statement and NOT rejected as unreasonable during the alternatives screening process. For Tier 1 Environmental Impact Statements or other studies that will examine broad corridors, the appropriate scope and methodology of the noise analysis should be discussed with FHWA and other participating agencies early in the project planning process.

If any segment or component of an alternative meets the definition of a Type I project, then the entire alternative is considered to be Type I and is subject to the noise analysis requirements. For Type I projects, the noise analysis area to be evaluated will be determined and agreed to with FHWA prior to completion of the noise analysis.

1. Determination of Existing Noise Levels

Existing noise levels will be determined by conducting field measurements for all Type I projects. Site conditions during the analysis should be documented including but not limited to: time of day; number and length of measurement periods; traffic count/speed methodologies; weather conditions and constraints. Standard measurement proceedings required should follow FHWA procedures and refer to FHWA guidance document Noise Measurement. An American National Standards Institute (ANSI) Type 1 or 2 integrating sound level meters are required for field measurements.

2. Predicted Future Noise Levels

To determine the predicted future highway traffic noise levels, analysts must use TNM or current FHWA approved noise model. Prediction sites should be located at all measurement sites. Not all prediction sites must have field measurements. Additional receiver sites may need to be added to the model to determine noise levels. For a project with a large number of residences, it is not necessary to have traffic noise predictions at every residence. However, sufficient noise predictions must be made to accurately represent the noise conditions that will occur.

B. Identification of Noise Sensitive Areas and Receptors

Analysis locations will vary depending upon the surrounding land use. Normally only, outdoor activities of frequent human use are considered for noise abatement. Receptor locations along the project corridor will be selected based on the activity category present in the study area. Generally, these locations will be at one and/or all of the following:

- at the Right-of-Way line;
- up close to the structure;
- where outdoor activities occur.

For NDDOT projects, receptor locations should be located where outdoor activities occur. Additional locations may be required and shall be determined on a project by project basis.

Traffic noise impact analysis will be done for developed lands and undeveloped lands when development is permitted. Development will be deemed to be permitted if a noise sensitive land, such as a residence, school, church, hospital, library, etc., has received a building permit from the local agency with jurisdiction at the time of the noise analysis.

The noise analysis must include analysis for each land use category present in the study area. For the purpose of identifying land uses within corporate boundaries (including the extra-territorial zone (ETZ) if applicable) noise analysts may use local zoning maps to identify the appropriate land use. The ETZ is the area outside of a city's legal corporate boundary (county jurisdiction) but remains regulated by the city through local ordinances and regulations.

Land Use Categories

When determining traffic noise impacts and considering noise abatement measures, primary consideration shall be given to exterior areas where frequent human use occurs for Activity Categories A, B, C and E. Traffic noise impacts and consideration of noise abatement measures for land uses within Activity Category D shall be predicted for interior areas only if no exterior use areas are identified. Use NDDOT's Equivalent Receptors Table, to determine the number of receptors that will be impacted and/or benefited for all Activity Categories. The Equivalent Receptors Table identifies potential sensitive land uses and the number of potential locations to be considered in the feasibility and reasonableness analysis.

Activity Category A - Lands on which serenity and quiet are of extraordinary significance and serve an important public need. Proposals and justifications for designating land as Category A will be submitted through the state's FHWA Division Office and forwarded to FHWA Headquarters.

Activity Category B – Those exterior areas where outdoor activity is likely to occur at single-family and multi-family homes.

Activity Category C - 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, schools , Section 4(f) properties, television studios, trails, and trail crossings.

Activity Category D (interiors of Category C facilities) - An indoor analysis shall only be done after exhausting all outdoor analysis options for 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. If the Category C land use has both an outdoor use area and an indoor use area, the outdoor use area should be analyzed for impact as Category C, unless the outdoor use area is far from or physically shielded from the roadway in a manner that prevents an impact on the outdoor activities. The indoor use area should be analyzed for impact as Category D. Analysis of interior noise levels should be done assuming an open-window condition unless there is firm knowledge that the windows are in fact kept closed almost all of the time during which the facility is in use.

Activity Category E (exteriors of developed lands that are less sensitive to highway noise) - Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F. When determining traffic noise impacts for Activity Category E developed lands, primary consideration will be given to exterior areas of frequent human use. Receptors should be placed at an outside activity area that best represents the worst expected traffic noise condition. Care should be taken to prevent shielding by objects or buildings. If no exterior areas of frequent human use are present on a Category E land use, no further noise analysis is required. Documentation of this finding shall be placed in the project file.

Activity Category F (land uses that are not sensitive to highway traffic noise) - No highway noise analysis is required under 23 CFR 772. These areas include 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.

Activity Category G (undeveloped land) - Land that is permitted for development (that is, a building permit has been issued on or before the date of public knowledge), that land shall be analyzed under the Activity Category for that type of development.

For land that is not permitted for development by the date of public knowledge, NDDOT shall determine future noise levels pursuant to 23 CFR 772.17(a). The results shall be documented in the project environmental documentation and in the noise analysis report. At a minimum, the analysis should report the distance – measured from the proposed edge of the traveled way – to the NAC for all exterior land use categories. Any noise abatement for such lands shall not be eligible for Federal-aid participation.

C. Identifying Impacted Receptors

The next step in the highway traffic noise analysis involves a comparison of the predicted noise levels for each project alternative with the highway traffic noise abatement criteria and existing noise levels. Highway traffic noise analyses should

recognize and consider absolute noise levels as well as substantial increases in noise levels when identifying highway traffic noise impacts and when considering highway traffic noise abatement measures. This comparison identifies any highway traffic noise impact associated with each alternative in terms of approaching or exceeding of the NAC or substantial increase in noise levels.

A receptor will be deemed impacted when either of the two conditions below is met.

- Traffic generated noise levels are within 1 dBA of the FHWA Noise Abatement Criteria,
- When an increase of 15 dB(A) is projected to occur, regardless of the absolute noise level, either upon project completion or projected twenty year hence.

VII. Abatement Analysis Measures

NDDOT will consider traffic noise abatement for Type 1 projects only. Abatement measures that will be considered may include items such as barriers (noise walls, noise berms), traffic management measures, alternation of horizontal or vertical alignment, and the creation of buffer zones. Landscaping or planting of vegetation or trees is not an acceptable noise abatement measure.

In order to be implemented, abatement must be determined to be feasible and reasonable. The objective of noise abatement is not to reduce predicted noise levels to the noise abatement criteria. The goal of noise abatement is to provide a 10dBA reduction in noise level as defined by the noise reduction design goal.

NDDOT does not have a Quiet Pavement Pilot Program; therefore the use of quieter pavements is not an acceptable Federal-aid noise abatement measure.

A. Feasibility of Noise Abatement

Feasibility generally deals with considering whether it is possible to build an abatement measure given site constraints and whether the abatement measure provides a minimum reduction in noise levels. Feasibility asks the question, can abatement measures be implemented?

To be considered feasible, the noise abatement measures must provide at least a 5 dBA reduction in highway noise for 80% of first-row impacted receptors and it must be determined the noise abatement measure can be designed and constructed.

Careful evaluation is needed regarding barrier placement, taking into consideration acoustics and maintenance of the barrier. Acoustically, the best locations for barriers are usually either close to the receiver, or close to the noise source, depending on the terrain. There are additional engineering and site factors that may influence the feasibility of the abatement measure. Those factors include; safety, topography, drainage and utilities, barrier height, and maintenance.

- **Safety**
An abatement measure would not be deemed feasible if it results in restricted sight distance, continuous shadow causing icing or snow accumulation of the driving lanes. Noise barriers should be placed as close as practical to the right-of-way line, and not placed off of the public road right-of-way. NDDOT's preference is to place the barriers outside of the highway clear zone; however, there are cases, i.e., fill situations, where this is not feasible. The barrier may not be located within the intersection sight distance triangle for any approaches.
- **Topography**
If the topography is such that an abatement measure cannot be built, then it will not be deemed feasible.
- **Drainage and Utilities**
A noise abatement measure is not feasible if access to drainage and utilities are not maintained.
- **Barrier Height**
The design of each proposed barrier will be considered on an individual basis when determining barrier height. Height of a wall that causes excessive shadowing of private property may make it undesirable to build and should be a topic of discussion with affected property owners and residents.
- **Maintenance of the Abatement Measure**
Maintenance access is needed to both sides of the barrier, unless agreements are made with landowners otherwise. It is undesirable for a barrier to be placed in an area where it would create a dark tunnel effect; for example, a narrow space between land owner fences and the barrier. Such an area must be large enough for maintenance vehicles to traverse and should be a topic of discussion with the affected property owners..

The feasibility determination will be made by the PCR (Project Concept Report) author and/or the noise analyst in conjunction with the ETS Division and technical support contact, as appropriate. The feasibility statement will be included in the PCR for NDDOT management concurrence. If abatement measures are not deemed feasible, include the statement of likelihood with the supporting documentation. A statement of likelihood will be included in the PCR, or environmental document (EA/EIS) as applicable stating the findings of the reasonable and feasible determination.

To provide standard structural design criteria for the preparation of noise barrier plans and specifications, the AASHTO Subcommittee on Bridges and Structures developed "Guide Specifications for Structural Design of Sound Barriers," which was published in 1989 and amended in 1992 and 2002. These specifications allow for more consistency and less conservatism in barrier design. The NDDOT is encouraged to apply realistic noise barrier structural design practices and to avoid overly conservative design procedures, especially those related to wind load criteria.

AASHTO has also published a "Guide on Evaluation and Abatement of Traffic Noise: 1993 (code GTN-3)." This report contains a good discussion of the problem of highway traffic noise and ways to address the problem in the United States. It presents a discussion very similar to that found in FHWA literature. Copies of the report are available on the AASHTO homepage:
<http://www.aashto.org/aashto/organization.nsf/homepage/overview>.

If significant non-highway noise sources exist in the project area (such as major rail line or airports) the acoustical effectiveness of the noise barrier may be compromised. Barriers will not be constructed when other noise sources result in the noise barrier not being acoustically feasible for the highway traffic noise impacts.

B. Reasonableness of Noise Abatement

Reasonableness is the combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure. Once the construction of noise abatement has been determined feasible, then the Department will determine whether noise abatement construction is reasonable by thoroughly considering a wide range of criteria as follows. Noise abatement will only be constructed by the Department if it has been determined reasonable. Reasonableness is a more subjective criterion than feasibility. No single optional reasonable factor shall be used to determine that a noise abatement measure is unreasonable.

NDDOT will coordinate project development with local officials such as the City Engineer, the Metropolitan Planning Office, the Mayor, members of the City Council, and other local officials if lands or structures they have jurisdiction over are in the project area.

Noise studies in which abatement was considered will be provided to local officials. Other noise studies will be made available to local officials upon their request. All studies will be made available to the public upon request

The reasonableness determination will be made by the PCR, or environmental document (EA, EIS) author and/or the noise analyst in conjunction with the ETS Division and technical support contact, as appropriate, analyzing several factors. There are three reasonableness factors or “tests”. All three must be met for a noise abatement measure to be considered reasonable:

- viewpoints of property owners and residents of the benefited receptors
- cost effectiveness
- noise reduction design goal

The reasonableness determination will be included in the final PCR or environmental document (EA, EIS) and include a decision item for FHWA and NDDOT management to concur with the reasonableness determination. A statement of likelihood will be included in the document stating the findings of the reasonable and feasible determination.

1. Viewpoints of Property Owners and Residents of the Benefited Receptors

The benefited receptors of a proposed noise barrier design are required to be notified by certified mail. The notification should include dimensions and location of the proposed noise barrier, and a survey, questionnaire or ballot as appropriate. The notification shall also indicate that after construction of a noise barrier, NDDOT will not consider perceived damages or loss of visibility to properties.

The presence of a noise barrier may present certain concerns such as excessive shading, constricting air-flow, safety risks for exterior activities, and creating a tunnel-like environment for benefited receptors. Therefore, in order to move forward with construction of a noise barrier, viewpoints are solicited in the form of ballots. One ballot is assigned to each property with the following weighted points.

- Benefited owner per residence / unit = 1 point
- Benefited tenant per residence / unit = 1 point

Non-responding benefited receptors are not counted. Support for or opposition of a noise barrier is based from responses received even if responses are low. A noise barrier shall be reasonable when 80% of the front row of benefited receptors respond indicating approval of the barrier.

In some cases, receptors cannot be represented as a residence; therefore the descriptions for different types of frequent human use as described within the FHWA Noise Abatement Criteria are defined with representative locations. Other circumstances with different interpretations for equivalent receptors must be within the spirit of FHWA regulations and intent, and the reasons shall be fully documented in the report. In all cases, the corresponding Activity Category Leq(h), applies. The following equivalent receptors table provides these definitions.

Equivalent Receptors Table	
Description	Method
Residences and Multi-Family Dwellings	Primary consideration is for exterior areas of frequent human use, usually back yards of single family homes. For multi-family dwellings, a receptor shall be placed at each exterior common area of frequent human use such as sitting area, pool, tennis court or other formalized outdoor activity area. If more than one outdoor activity area is present, one receptor shall be assigned to each formal activity area. If no common areas of outdoor activity are present, the receptor should be placed at individual exterior activity areas that face the noise source, such as balconies. If no exterior areas of frequent human use are present, no further noise analysis is required.
campgrounds	one receptor = ML for each year-round formal site one receptor = each formal site
day care centers and schools	one receptor = ML
parks	one receptor = each formal outdoor activity within boundary one receptor = ML if no outdoor activity areas
picnic areas	one receptor = cluster of tables
trails	one receptor = ML
trail crossings	one receptor = each formal trail crossing
amphitheaters and auditoriums active sports areas and recreation areas	one receptor = ML If utilized primarily in late hours, use appropriate traffic volume.
cemeteries (area for memorial services, not individual gravesites)	Each exterior area distinctly recognized for human activity is counted as one receptor if the area is adjacent to the highway.
hospitals and medical facilities	
libraries	
playgrounds	
places of worship, public or nonprofit institutional structures, and public meeting rooms	
radio studios, recording studios, television studios	
hotels and motels	
offices	
restaurants / bars	
<i>Because noise abatement is for areas of frequent use where lowered noise would be of benefit, seasonal use and hours of usage may be necessary. Primary consideration is for exterior areas of frequent human use.</i>	
<i>ML – Median Lot = 12,000 square feet</i>	

2. Cost-effectiveness

The cost effectiveness of the barrier shall not exceed \$20,000 per benefited receptor in 2011 dollars.

3. NDDOT Design Goal for Noise Abatement

The amount of noise reduction provided NDDOT's noise abatement is a 10 dBA reduction for 80% of the first row of benefited receptors. Other receptors not impacted but receiving a benefit are counted in the evaluation (non-impacted benefited receptors).

C. Benefited Receptors

Benefited receptors are those that receive reduction of 8 dBA or greater. When determining receiver units for the reasonableness criteria, include all benefited receptors, regardless of whether they are impacted.

D. Collection and Reporting of Constructed Noise Barrier Data

NDDOT 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); and project type (Type I, and optional project types such as state funded, county funded, tollway/turnpike funded, other, unknown).

E. Documentation of Noise Analysis Results

The final product of a highway traffic noise analysis should be a clear, concise written discussion of the study. This report gives the reader a detailed description of all the elements of the analysis done for the study including information on noise fundamentals and regulatory requirements. Please refer to Appendix B: Highway Traffic Noise Reporting, of FHWA's "Highway Traffic Noise: Analysis and Abatement Guidance".

Before adoption of a CE, FONSI, or ROD, the highway agency shall identify:

- Noise abatement measures which are feasible and reasonable, and which are likely to be incorporated in the project;
- Noise impacts for which no noise abatement measures are feasible and reasonable.
- 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 alternative(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 abatement measure(s) is determined during the completion of the project's final design and the public involvement processes.

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.

To provide standard structural design criteria for the preparation of noise barrier plans and specifications, the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Bridges and Structures developed "Guide Specifications for Structural Design of Sound Barriers," which was published in 1989 and amended in 1992 and 2002. These specifications allow for more consistency and less conservatism in barrier design.

Additional guidance on documentation of noise studies can be found in Appendix B: Highway Traffic Noise Reporting, of FHWA's "Highway Traffic Noise: Analysis and Abatement Guidance".

- 1. Statement of Likelihood** - A decision on the likelihood of the implementation of abatement will be made during the environmental clearance process. 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) is determined during the completion of the project's final design and the public involvement processes. An example statement of likelihood can be found in FHWA's "Highway Traffic Noise: Analysis and Abatement Guidance".

F. Design Build Requirements

NDDOT currently does not participate in a design-build program. If a situation would arise which would call for a design-build project, NDDOT would follow the provisions outlined in the current (time of analysis) CFR.

G. Funding

NDDOT may not use Federal-aid highway funds as payment or compensation for a highway traffic noise impact through the purchase of a noise easement from a property owner. The FHWA highway traffic noise regulations limit use of Federal funds to reducing traffic noise impacts and providing highway traffic noise abatement benefits. Monetary compensation accomplishes neither of these requirements.

To comply with environmental justice requirements, when a noise barrier's cost is higher than NDDOT's cost allowance, it is not acceptable to allow a third party to contribute funds to make up the difference. A third party may contribute funds to make functional or aesthetic enhancements to a noise barrier already determined to be feasible and reasonable. Third party funding is acceptable on a Federal or Federal-aid highway Type I 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.

VIII. Information for Local Government Officials

Control of land use surrounding high traffic corridors is the most effective means of preventing impact to residents. This control, however, is in the hands of local officials. For this reason, NDDOT will assist the local government by providing information that will help them recognize the incompatible land uses near the state highways.

NDDOT will apprise local officials as well as political representatives through the Department's public involvement process as outlined in the NDDOT Design Manual and may take additional measures as determined on a case-by-case basis. Local officials will also be included in all community meetings or noise related meetings and open houses.

NDDOT also provides officials with information regarding the anticipated noise levels to abutting properties for the purpose of reducing or eliminating future impacts to wayside residential use areas caused by traffic related noise.

NDDOT will coordinate project development with local officials such as the City Engineer, the Metropolitan Planning Office, the Mayor, members of the City Council, and other local officials if lands or structures they have jurisdiction over are in the project area.

Noise studies in which abatement was considered will be provided to local officials. Other noise studies will be made available to local officials upon their request. All studies will be made available to the public upon request.

IX. Construction Noise

Construction noise impacts can generally be addressed as temporary in the noise analysis. The analysis should indicate the anticipated types of construction and noise associated with these activities for Type I projects. Land uses and activities that may be affected by construction of the project is to be identified during the project development studies. Measures are required in the plans to minimize or eliminate adverse construction noise impacts to the community.

NDDOT incorporates a number of provisions that are to be used on NDDOT projects to reduce the impacts of construction noise. This includes but is not limited to limiting work hours, installation of mufflers on equipment, and requirements to receive the appropriate operation approvals from the appropriate local officials.

X. NOISE ABATEMENT CRITERIA TABLE

Table 1 Noise Abatement Criteria [Hourly A-weighted sound level decibels (dBA)]

Activity Category	Evaluation location		Activity description
	Leq(h)\1\		
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\2\	67	Exterior	Residential
	52	Interior	
C\2\	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\2\	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

\1\ The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

\2\ Includes undeveloped lands permitted for this activity category.

References

FHWA Highway Traffic - <http://www.fhwa.dot.gov/environment/noise/>