



MONTANA DEPARTMENT OF TRANSPORTATION

TRAFFIC NOISE ANALYSIS AND ABATEMENT POLICY

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This policy document replaces the Montana Department of Transportation (MDT) *Traffic Noise Abatement Policy* and *Traffic Noise Analysis and Abatement Manual*, both dated June 2001.

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ACRONYMS USED IN THIS DOCUMENT

ADT: Average Daily Traffic

ANR: Average noise reduction

ANSI: American National Standards Institute

BR: Benefited receptor

CE: Categorical Exclusion (as defined in 23 CFR Part 771, *Environmental Impact and Related Procedures*)

CEI: Cost-Effectiveness Index

CFR: Code of Federal Regulations

dB: Decibel

dB(A): Decibel when referring to an A-weighted sound level

DHV: Design Hourly Volume

EA: Environmental Assessment (as defined in 23 CFR 771)

EIS: Environmental Impact Statement (as defined in 23 CFR 771)

FHWA: Federal Highway Administration

FHWA TNM: Federal Highway Administration Traffic Noise Model

FONSI: Finding of No Significant Impact (as defined in 23 CFR 771)

LOS: Level of Service

L_{eq} : Equivalent sound level in dB(A)

$L_{eq}(h)$: One-hour equivalent sound level in dB(A)

MDT: Montana Department of Transportation

MEPA: Montana Environmental Policy Act

NAC: Noise Abatement Criterion

NEPA: National Environmental Policy Act

ROD: Record of Decision (as defined in 23 CFR 771)

SEE: Social, environmental and economic

1. INTRODUCTION

This document contains the Montana Department of Transportation (MDT) noise policy on highway traffic noise and construction noise. The policy describes MDT's implementation of the requirements of the Federal Highway Administration (FHWA) Noise Standard at 23 Code of Federal Regulations (CFR) Part 772 (copy contained in Appendix A). This policy was developed by MDT and reviewed and approved by FHWA.

During the rapid expansion of the Interstate Highway System and other roadways in the 20th century, communities began to recognize that highway traffic noise and construction noise had become important environmental impacts. In the 1972 Federal-aid Highway Act, Congress required FHWA to develop a noise standard for new Federal-aid highway projects. While providing national criteria and requirements for all highway agencies, the FHWA Noise Standard gives highway agencies flexibility that reflects state-specific attitudes and objectives in approaching the problem of highway traffic and construction noise. This document contains the MDT policy on how highway traffic noise impacts are defined, how noise abatement is evaluated, and how noise abatement decisions are made.

As part of the general environmental review process associated with all projects, MDT or its consultants are required to evaluate whether the project needs a noise analysis, and if it does, whether predicted noise levels could result in traffic noise impacts. For Federal-aid projects, if noise impacts are identified, then the consideration of reasonable and feasible noise abatement measures is required.

By complying with 23 CFR 772 and this policy, the noise analysis and abatement requirements stemming from these State and Federal environmental statutes are met:

- National Environmental Policy Act (NEPA), as implemented in 23 CFR 771
- Montana Environmental Policy Act (MEPA), Montana Codes Annotated Title 75

1.1. Noise Compatible Planning

Noise compatible land use planning has long been recognized as one prong of a three-pronged approach to traffic noise abatement, the other two prongs being source control (noise emission standards for vehicles) and traffic noise mitigation. Because MDT has no authority to regulate land use, we have developed a guide that may assist local planners and decision-makers in developing pro-active noise-mitigating solutions.¹ It provides local planners and decision-

¹ This document is called *Growing Neighborhoods in Growing Corridors – Land Use Planning for Traffic Noise* and can be found on MDT's website: http://www.mdt.mt.gov/research/docs/research_proj/noise_plan/final_report.pdf.

makers with the tools they need to begin considering traffic noise in the planning and zoning process, hopefully reducing future conflicts between noise sensitive land uses and MDT highways. In cases where conflicts cannot be avoided, local governments should encourage developers to consider traffic noise in the layout of the site and the placement of sleeping areas within the building structures to minimize exposure of the noise-sensitive rooms and indoor or outdoor activities to traffic noise. When noise impacts are considered in planning at the local level, millions of dollars in taxpayer money can be saved by avoiding the construction of costly noise barriers.

1.2. Type I Projects

As defined in 23 CFR 772, this policy manual applies to all Type I Federal-aid projects. Projects meeting this definition are described in further detail later in this document.

1.3. Type II Projects

A Type II project is often referred to as a retrofit project. It is a proposed Federal or Federal-aid project for noise abatement on an existing highway where there is no improvement to the highway itself that increases its vehicle-carrying capacity. Type II programs are voluntary, at the discretion of the state highway agency. At this time, MDT does not have a Type II program.

2. PURPOSE

This policy describes the MDT program to implement the FHWA Noise Standards found at 23 CFR 772. The standards include requirements for noise analysis, impact assessment, and abatement evaluation, noise abatement criteria, and requirements for informing local officials. Where FHWA has given highway agencies flexibility in implementing the standard, this policy describes the MDT approach to implementation.

This policy is not to be used for determination of compensation (for damage) on a remainder of a parcel during right-of-way negotiations.

3. DEFINITIONS

A-Weighted Sound Level - The sound level in decibels measured with a frequency weighting network corresponding to the A-scale on a standard Type 1 or 2 sound level meter as specified by ANSI S1.4-1983 (R2006)/ANSI S1.4a-1985 (R2006), *American National Standard Specification for Sound Level Meters* (or latest version). The A-scale tends to suppress lower frequencies (below 1,000 hertz) and higher frequencies (above 6,000 hertz), and best approximates the sound as heard by the normal human ear. It is the most widely used weighting system for assessing transportation-related noise.

Acoustically Representative - A receptor location that represents the same type and magnitude of noise as another location. For good acoustical representation roadway geometry, topography, traffic flow, distance from source to receptor should all be nearly the same.

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

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

Date of Development – The date at which land is permitted for development. See definition “Permitted” below.

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).

Decibel (dB) - A unit of sound pressure level which denotes the ratio between two sound pressures; the number of decibels is 10 times the base 10 logarithm of this ratio. The reference level is 20 microPascals, or the threshold of human hearing.

Design Hourly Volume (DHV) - The 30th highest hourly volume of the future year traffic assigned for the design, expressed in vehicles per hour.

Design Year - The future year used to estimate the probable traffic volume for which a highway is designed. MDT defines design year as a time, usually 20 years, from the completion of construction.

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.

L_{eq} - 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 L_{eq}(h) being the hourly value of L_{eq}.

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 Contour - A line on a map representing points of equal sound level, similar to contour lines on a topographic map.

Noise Level: Unless otherwise indicated, “noise level” as used in this policy refers to the worst hour L_{eq}(h).

Noise Reduction Design Goal - The minimum desired sound level reduction determined by calculating the difference between future build noise levels with and without abatement. For MDT, the noise reduction design goal is 7 dB(A).

Permitted - A definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of a building permit. In Montana, in cases where building permits and zoning do not exist, “permitted” is considered as the date at which a developer has shown a definite interest to develop the land within a reasonable period of time and has reached a point where the plans can no longer be practically changed (circumstances such as these will be examined on a case-by-case basis in consultation with FHWA).

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

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

Receiver - A modeling point in the FHWA Traffic Noise Model (FHWA TNM), at which sound levels are predicted.

Receptor - A discrete or representative location, such as a residence, on any of the land uses listed in Table 1 at which impacts are assessed. A receptor does not necessarily need to be a modeled receiver in FHWA TNM or a field noise measurement point.

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 Noise Increase - One of two types of highway traffic noise impacts. For a Type I project, MDT defines substantial noise increase as an increase in design year noise levels of 13 or more dB(A) over the existing noise level.

Traffic Noise Impacts - Design year build condition noise levels that create a substantial noise increase over existing noise levels; or design year build condition noise levels that approach or exceed the Noise Abatement Criteria (NAC) listed in Table 1 for the future build condition. MDT defines “approach” one decibel (dB(A)) below the NAC.

Type I Project - A proposed Federal or Federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes. Specific definitions of Type I projects from 23 CFR 772 are in Section 4, *Applicability*.

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 23 CFR 772.7(e). MDT does not have a Type II program.

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

Worst Noise Hour - A period of 60 minutes throughout a 24-hour day that reflects the noisiest hour resulting from the maximum amount of traffic traveling at the greatest speed. Sometimes the worst noise hour may be when the vehicle mix is dominated by truck traffic, not necessarily a high volume of automobile traffic.

4. APPLICABILITY

4.1. *Type I Projects*

The requirements of this policy apply uniformly and consistently to all Type I projects in the State of Montana; that is, any projects that receive Federal-aid funds or are otherwise subject to FHWA approval. They include Federal or Federal-aid projects that are administered by Local Public Agencies as well as MDT.

MEPA, like NEPA, ensures that any project that has the potential to increase traffic noise impacts at receptors be evaluated. However, noise abatement, such as barriers or berms will not be considered for non-Federal aid projects due to high costs. MDT does not currently extend the Federal noise regulations to 100% state-funded projects, nor does MDT have any influence over locally-funded projects.

Per 23 CFR 772, Type I projects are defined as:

1. The construction of a highway on new location; or,
2. The physical alteration of an existing highway where there is either:
 - a. 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,
 - b. Substantial vertical alteration. A project that removes shielding, therefore is 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 lane, high-occupancy toll - lane, bus lane, or truck climbing lane; or,
4. The addition of an auxiliary lane, except for turn lanes; 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.

4.2. Type II Projects

These projects are referred to as retrofit projects – noise abatement projects in the absence of any other federal aid project. The program is entirely voluntary for state highway agencies. MDT does not have a Type II program.

4.3. Type III Projects

MDT has no federal requirements to conduct a noise analysis or consider abatement for Type III projects.

5. ANALYSIS OF TRAFFIC NOISE IMPACTS

5.1. Qualifications Necessary To Do Noise Analysis

Only qualified personnel can perform highway traffic noise analysis for MDT. Qualified personnel are those who have successfully completed training in the area of highway noise analysis and the use of the FHWA-approved traffic noise modeling software through a qualified provider, and who are proficient in the use of the latest version of that software.

The persons must also have demonstrated experience in conducting noise analysis studies for highway transportation projects and must have a working knowledge of procedures outlined in this policy and 23 CFR 772, plus the relevant parts of FHWA's *Measurement of Highway-Related Noise* (FHWA Report Number FHWA-PD-96-046, 1996)², and FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance* (latest version).³

MDT advises consultants conducting noise analyses for the department to work closely with the MDT Environmental Scientist.

² This report may be found on-line at: <http://www.fhwa.dot.gov/environment/noise/measurement/measure.cfm>

³ This document is available on-line at:
http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/guidance_doc.pdf

5.2. Highway Traffic Noise Analysis, Type I Projects

Due to the long lead time needed to complete a traffic noise study, it is important to determine early on in project scoping if a noise study is necessary. An initial determination of a proposed project's need for a noise analysis should be made as soon as the project has been programmed and a preliminary field review has been conducted. While very little project information may be available at that time, early review may alert design engineers that traffic noise could be a problem on the project. By considering traffic noise before there are preliminary plans, MDT may be able to shift alignment or look at other considerations to avoid traffic noise impacts altogether.

For Type I projects, a traffic noise analysis is required for all build alternatives under detailed study in the NEPA 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. Build alternatives are all reasonable alternatives that have been retained for detailed analysis in the CE documentation, Environmental Assessment (EA) or Environmental Impact Statement (EIS) and NOT rejected during the alternatives screening process. For 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.

A Type I traffic noise analysis basically consists of the following steps, which are described in more detail in subsequent sections of this policy:

1. Identify study area and receptors by land use Activity Category (to be described later) and distance to the edge of the closest travel lane of the proposed project.
2. Determine existing noise levels at a representative subset of receptors.
3. Predict future "build" noise levels at a larger representative subset of receptors.
4. Determine traffic noise impacts.
5. Evaluate abatement feasibility and reasonableness if there are traffic noise impacts.
6. Address coordination with local officials, including simple modeling of distance-based future "build" noise levels out to 60 and 64 dB(A) for undeveloped Activity Category G lands. Address construction noise.
7. Prepare the noise study report (Appendix D).

For noise modeling and abatement evaluation and design, MDT requires the use of the latest approved version of the FHWA Traffic Noise Model (FHWA TNM) or other model found acceptable to FHWA, pursuant to 23 CFR 772.9.

Only those abatement measures that are reasonable and feasible are included in the final noise report and carried forward for public survey. A conceptual design of approved noise abatement will be included in the project's Scope of Work Report. For projects involving noise abatement, an additional report will be developed later on in project development. This report refines the conceptual design and takes into consideration comments received during the public involvement process. While the NEPA document will have a statement of likelihood for noise abatement, this additional noise report is not a requirement of the NEPA process.

Final design of noise abatement is reevaluated by an acoustical expert when final plans of the entire project are ready. This reevaluation may require refinement of the modeling in the noise study to ensure the noise abatement placement and heights are correct to meet the commitments in the environmental document.

5.3. Land Use Activity Categories

To determine under what conditions noise impacts occur, FHWA has designated land use Activity Categories A through G and associated noise abatement criteria (NAC) as appropriate. The NAC values are hourly equivalent A-weighted sound levels in decibels. The Activity Categories and their respective NAC are described and listed in Table 1. The NAC are for impact determination only; they are not design goals or design standards for noise abatement measures.

The noise analysis must address each Activity Category present in the study area. If undeveloped land has been permitted for development (that is, a building permit has been issued on or before the date of public knowledge), that land should be assigned to the appropriate Activity Category and analyzed in the same manner as developed lands in that category.

Activity Category A (lands on which serenity and quiet are of extraordinary significance and serve an important public need). MDT must submit justifications to FHWA on a case-by-case basis to designate any lands as Category A. Proposals and justifications for designating land as Category A will be submitted through the state's FHWA Division Office and FHWA Headquarters.

Activity Category B (exterior areas of single-family and multifamily residences). The location for modeling or measuring at a Category B receptor is an exterior area of frequent human use, typically an area between the right-of-way line and the building, such as a patio or play area in the backyard of the residence. When that location cannot be determined from field review or aerial photography, an area mid-way between the residence and the right-of-way line should be chosen. For residences and structures that face the highway, choose an area of frequent use in the front, or a point midway between the front of the building and the right-of-way line. For apartment buildings, second-floor balconies may be used for the purpose of assessing impacts and abatement benefits.

Activity Category C (exterior areas of non-residential lands such as schools, parks, cemeteries, etc., as listed in Table 1). The locations for Category C receptors are in the exterior areas of frequent human use. Category C includes a wide variety of public and private land uses. See Table 1 for examples of Category C land uses.

See Section 6.5.1.1 and 6.5.1.2 for a discussion of analyzing Category C receptors

Table 1 – Noise Abatement Criteria

Activity Category	Activity Criteria¹ L_{eq}(h), dB(A)	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B ²	67	Exterior	Residential
C ²	67	Exterior	Active sport areas, amphitheatres, 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 stations, 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 L_{eq}(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement.

² Includes undeveloped lands that have been permitted for this activity category.

Activity Category D (interiors of certain Category C facilities). Activity Category D is for those Category C land uses that have facilities with only interior human use. 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, as listed in Table 1). The location for Category E receptors are in the exterior areas of frequent human use.

Activity Category F (land uses that are not sensitive to highway traffic noise). There is no noise abatement criterion for these land uses, and no highway noise analysis is required under 23 CFR 772. The noise study report should identify any Category F land uses, by name, location and type of land use.

Activity Category G (undeveloped land). Undeveloped land may be either permitted for development or not permitted. For land that has been permitted for development, MDT will assign that land to the appropriate Activity Category A-F and analyze accordingly. For land that has not been permitted for development by the date of public knowledge of the project, MDT will determine future design year noise levels as described in Section 5.4.3, document them in the project environmental documentation and in the noise study report, and provide this information to the appropriate local officials. Federal participation in noise abatement measures will not be considered for Category G lands unless another future Type I project is planned adjacent to such lands.

5.4. Analysis of Noise Impacts for Type I Projects

5.4.1. Identification of Study Boundaries, Noise Study Areas, and Receptors

Through a combination of a review of project reports, available aerial photography and mapping, and a field review, the project limits and noise study boundaries are determined, for confirmation by the MDT Environmental Scientist. Typically, the noise study boundaries extend 500 feet on either side of proposed project; however some geometric conditions and traffic volumes and mixes may cause noise impacts to extend beyond 500 feet. The analyst is responsible for determining project boundaries that encompass all potential impacts. Consideration may also need to be given to the potential for both benefits and impacts outside of the project limits caused by changes in traffic volumes and/or mix on other facilities due to traffic diversion or generation resulting from the proposed project.

All land uses within the noise study boundaries, are identified and assigned to the appropriate Activity Categories.

It is usually beneficial on large projects to group land uses together into smaller noise study areas for the purposes of noise modeling and abatement evaluation. Typically a noise study area is not longer than a mile. Decision factors for dividing a project into noise study areas include the extents of individual neighborhoods or residential subdivisions, major terrain features such as hills, mountains and river crossings, location of large tracts of undeveloped lands, and boundaries defining major changes in land use (e.g., going from a residential area to a commercial or industrial area).

Individual receptor locations within the land uses are also chosen, using the guidance mentioned above under *Land Use Activity Categories*. On lands that are permitted for development, use the filed plat to choose receptor locations representing the exterior areas of frequent human use. For residential plats, determine if each lot represents a single-family or multifamily dwelling. Choose representative receptor locations for second row residences as well (these receivers may be grouped two or three at a time).

5.4.2. Determination of Existing Noise Levels

For projects on new alignments, determine the worst-hour existing noise levels (including non-highway traffic noise sources) for developed land uses and activities by field noise measurements. For projects on existing alignments, existing noise levels can be determined by modeling, although field measurements are recommended.

5.4.2.1. Determination by Measurement

Noise measurements are done in accordance with the relevant procedures in FHWA's *Measurement of Highway-Related Noise* report (FHWA Report Number FHWA-PD-96-046, 1996). Noise measurement locations are generally a subset of all identified receptors, and should be chosen to be acoustically representative of a grouping of similarly located receptors.

Noise measurements typically consist of a series of 15-minute measurements (minimum of two at roughly the same time of day). Longer measurement times may be necessary to obtain desirable statistical accuracy. If these measurements differ by more than 3 dB(A), a third measurement is needed, unless the variation can be explained by other noise events occurring during the measurement period.

On many rural or smaller widening projects, there may be a small number of receptors, such that modeling of existing levels along the entire project may not be necessary. One approach is to make a longer term measurement (that includes peak traffic periods and daytime off-peak periods) at one measurement location close to the existing road, and use the results to determine the worst noise hour. During this longer term measurement, shorter term measurements may be made at other locations, and these levels can then be adjusted later to represent the worst hour based on the data at the longer-term measurement location. (Ideally, while ambient noise level measurements should be made during the worst case noise hour, it may not always be practical to

do so.) Then, it may be possible to use the worst-hour adjusted measured levels to approximate the existing noise levels at other nearby unmeasured study receptors.

5.4.2.2. Determination by Modeling

For projects on existing alignments where there are many receptors and where impacts are expected, the modeling is validated by measurements. For some projects such as very low volume roads with few receptors that are not close to the road – it may be possible to use the model without validation. These cases should be discussed with the MDT Environmental Scientist before such an approach is approved.

The modeling of existing noise levels for use in impact assessment is done for the worst noise hour. The worst noise hour may be determined in three ways:

1. By a longer term field noise measurement, as described above in *Determination by Measurement*.
2. By review of detailed traffic data.⁴
3. By simplified modeling of the detailed traffic data using FHWA TNM if it is not clear as to which hour is the worst noise hour. In this and all modeling, vehicle classes must include:
 - a. Automobiles – 2-axle, 4-wheel vehicles including pick-up trucks
 - b. Medium trucks – 2 axles, 6 wheels, plus automobiles pulling trailers
 - c. Heavy trucks – 3 or more axles

Vehicle classes may also include motorcycles and school buses.

5.4.2.3. Model Validation When Predicting Existing Noise Levels

When model validation is needed, it is done by comparing measured noise levels with modeled noise levels using same traffic volumes, mix and speeds tallied during the field noise measurements. Model validation does not have to be done for the worst noise hour.

⁴ Automated traffic data collectors around the state collect traffic volume and mix information and can be obtained through MDT's web site. In addition, MDT provides existing and design year traffic volume information for certain vehicle classes during the preconstruction phase of project development. Other assistance, such as counting and classifying large volumes of traffic, may be obtained through MDT Environmental Services.

Validation of the model for predicting existing noise levels along an entire project is done often enough to be representative of the affected neighborhoods. Consult with MDT regarding model validation. Validation measurement locations should be representative of first-row receptor locations and should not have intervening rows of houses between them and the road⁵.

Two to three measurements of at least 15 minutes in length are made at each measurement location. The measurements may be consecutive or done at different times of the day. The measurements do not have to be during the worst noise hour, and should not be made during periods of slow-moving traffic congestion. Validation measurements are done during daylight hours not close to sunrise or sunset (to avoid temperature inversions) and when winds are generally calm. For measurement locations within 100 feet of the edge of the nearest travel lane, wind speed may be as high as 12 mph, but the speed and direction must be noted. For distances over 100 feet, validation is not recommended because of meteorological effects on sound propagation, but if needed, should be done under lower wind speed conditions. Cloudy or partly cloudy days are preferred over sunny days, especially for distances beyond 200 feet because of meteorological effects not modeled in FHWA TNM.

Directional traffic classification counts of the five FHWA TNM vehicle types are made during each measurement. Average travel speeds are also determined by direction for each vehicle type for each measurement. Pavement type must be noted and used in FHWA TNM for validation purposes.

The FHWA TNM run of the existing conditions for each noise study area should contain each validation location. Separate runs are made for each measurement at each validation location using the traffic data collected during that measurement (with traffic counts factored up to hourly volumes).

For the FHWA TNM run of a noise study area to be considered valid, two of the three modeled levels at each validation location must be within +/- 3 dB(A) of the corresponding measured levels. When a difference is over 3 dB(A), the model input data is examined for errors and for the need for refinements to the modeling, in particular with regard to pavement widths and terrain.

If a measured/modeled difference remains over 3 dB(A) after revision of the model, the discrepancy is noted in the noise study report. Reasons for discrepancies may include contributions from noise sources other than the road during the measurements, atypical vehicle

⁵ The FHWA TNM algorithm for building rows reduces sound uniformly behind a row of buildings; it does not take into account the exact position behind the row, which would affect the measured sound level against which the model would be compared.

noise emission levels during the measurements, specific pavement conditions not in the model (tining, grooving, excessive roughness or wear, etc.), meteorological effects on the measured levels, or difficult-to-model terrain or ground characteristics.

If the model is consistently over-predicting or under-predicting by an amount greater than 3 dB(A) after attempts to refine the model and if measurement conditions have been ruled out as the likely cause of the discrepancies, calibration of the model (adjustment of modeled levels using the measured/modeled differences) may be considered, but only after consultation with the MDT Environmental Scientist. Any calibration of the existing case model must be clearly justified and documented.

Calibration of existing conditions model runs may not be applied to model runs of the future build case. Application of the calibration to a future no-build case may be considered, but only after consultation with the MDT Environmental Scientist.

5.4.3. Prediction of Future Noise Levels

Future condition noise predictions are made for each alternative under consideration, including the no-build alternative, using the latest version of the FHWA TNM program. Design year traffic conditions representing the worst noise hour (generally, Level of Service (LOS) C or D, with high heavy truck volumes) are used. In urban areas, rush hour may not represent the worst noise conditions; i.e., speeds may be low and heavy truck volumes may drop as truck drivers try to avoid congestion. Obtain design year ADT and design hourly volume from MDT, including percentages of medium trucks and heavy trucks. If buses and motorcycles are also being included in the modeling, obtain volume data for them as well.

Where appropriate, take into account seasonal variations in traffic volumes, such as using data from summer months; consult with the MDT Environmental Scientist for guidance.

Use the guidance in the previous sections of this policy on *Identification of Study Boundaries, Noise Study Areas, and Receptors* and *Land Use Activity Categories* for choosing receptors for modeling as receivers in FHWA TNM.

When predicting future noise levels, the analyst needs to account for any loss of shielding of the roadway due to topography, buildings, or vegetation that may be eliminated when roadway project is built. Alteration of physical shielding, such as a hill, may significantly change noise levels for receivers. Removal of vegetation, while it will generally have little effect on noise levels, may affect the residents' perception of the noise levels.

For design year modeling, use only the "Average" pavement type within FHWA TNM. Consultants should coordinate with the MDT Environmental Scientist with questions on the modeling of other FHWA TNM input parameters.

5.4.4. Determination of Traffic Noise Impacts

For Type I projects, noise impacts must be determined for all Activity Category A-E land uses. Impacts occur when a proposed highway project results in a substantial noise increase, or when the predicted design year noise levels approach or exceed the NAC.

As defined in Section 3, a “substantial noise increase” occurs when a design year noise level ($L_{eq}(h)$) is predicted to increase 13 or more dB(A) above the existing noise level. A substantial noise increase is independent of the absolute noise level. A substantial noise increase is a noise impact, even if the future noise level is lower than the NAC. As defined in Section 3 under Traffic Noise Impact, “approach” means that a design year noise level is predicted to be one decibel below the NAC shown for Activity Categories A-E in Table 1. A traffic impact may occur by this criterion even if the future noise level is lower than the existing noise level. Noise abatement measures for Type I projects are to be examined and evaluated when either or both of these conditions are met.

Discussion of impacts is grouped by noise study area. Impacts are identified by receptor type, name or address, Activity Category, number of dwelling units if residential (or other quantification of the existing activities if non-residential), existing and future noise levels, and type of impact (substantial noise increase and/or approaching or exceeding the NAC).

5.4.5. Determination of Future Noise Levels on Undeveloped Lands

Design year noise levels based on design hourly volumes need to be predicted for Activity Category G lands (undeveloped lands that have not been “permitted” for development). At a minimum, this analysis should report the distances from the proposed edge of the near travel lane out to where levels of 60 and 64 dB(A) are modeled to occur. These noise levels are provided to local public agencies to assist them in their planning in order to prevent traffic noise impacts at future developments along state highways. Creation of noise contours for undeveloped lands is considered on an individual project basis. Provide the results, along with a letter of explanation, to the local planning office. If the noise analysis is conducted by a firm outside MDT, submit the letter to MDT for review and approval. Noise contours may only be used for project alternative screening or for land use planning purposes, and NOT for determining highway traffic noise impacts.

6. ANALYSIS OF NOISE ABATEMENT MEASURES

Depending upon the date of public knowledge of the project and the Activity Category of the receptors, traffic noise abatement measures are to be considered when traffic noise impacts have been identified through the noise analysis process.

6.1. *Date of Public Knowledge*

The date of public knowledge of a proposed transportation project is used to determine if noise abatement should be considered as part of the project. This date is the date that a project's environmental analysis and documentation is approved, i.e., the date of approval of CEs, FONSI's, or RODs. MDT will only consider abatement if the receptor was developed or "permitted" for development before the date of public knowledge.

After the date of public knowledge, MDT will only re-evaluate traffic noise impacts if the project is re-designed so as to potentially cause additional traffic noise impacts that were not evaluated in the original environmental process.

6.2. *Abatement Considerations*

There are two main elements in the consideration of noise abatement: feasibility and reasonableness, both of which are described in detail later in this section. Noise abatement measures must be found to be both feasible and reasonable, for inclusion in a proposed project.

When evaluating the feasibility and reasonableness of noise abatement measures, a Noise Abatement Recommendation Worksheet is filled out as much as possible and included in the noise report. The worksheet is found in Appendix B.

For Type I Projects, MDT will examine and evaluate noise abatement when traffic noise impacts are predicted for Activity Categories A-E with some exceptions as noted below. For Category C/D land uses, if either the outdoor use area or the indoor use area is shown to be impacted by the proposed project, then exterior abatement strategies are evaluated first. If no exterior abatement measures are feasible and reasonable, sound insulation of the impacted indoor portions of the facility is evaluated next.

When impacts are identified for Activity Categories A-E, every effort will be made to mitigate those impacts during highway design first; then when those options are exhausted, noise barrier walls or berms will be evaluated.

6.3. *Possible Noise Abatement Measures*

Federal funds may be used for the following noise abatement measures when traffic noise impacts have been identified and abatement measures have been determined to be feasible and reasonable. 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.

At a minimum, MDT will consider noise abatement in the form of the construction of a noise barrier (wall or earth berm) within the highway project's right-of-way or easements. Other possible abatement measures that may be considered include:

1. Avoid the impact by using design alternatives that result in lessening the noise effect, such as altering the horizontal and/or vertical alignments.
2. 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.
3. Implement 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. Although these measures have never been shown to be reasonable or feasible in Montana, the FHWA noise regulations require that traffic management measures be considered in the abatement discussion. In rare cases, such as within city limits, it may be possible to restrict trucks on certain routes, provided there are similarly acceptable alternate routes for trucks. Speed limits are generally set by the Transportation Commission. Often, when speed limits are reduced, it is to address safety concerns, not noise impacts.
4. Insulate and/or install air conditioning in Activity Category D public use or institutional structures. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

Use of alternative pavements or alternative texturing on concrete pavements is not a FHWA-approved noise abatement measure for Federal-aid projects. Alternative pavements may provide some noise benefit in areas where noise abatement is not being pursued because it does not meet the requirements of reasonableness and feasibility. Consultants should contact MDT for information on alternative pavements, including issues related to rumble strips.

Landscaping is also not a FHWA-approved noise abatement measure for Federal-aid projects because it takes thick stands of non-deciduous vegetation of over 200 feet in width to achieve even small (4-5 dB(A)) noise reductions.

6.4. Feasibility

Feasibility deals primarily with acoustical and engineering considerations of the project such as topography, access, drainage, safety; other noise sources, and whether a substantial noise reduction can be achieved.

For the construction of noise barriers such as sound walls, berms or wall/berm combinations, the following requirements stand, unless written consent for a design exception is obtained from MDT Environmental Services.

6.4.1. Acoustical Feasibility

A noise reduction of 5 dB(A) at a minimum of 75% of the impacted front row receptors (homes directly impacted by the proposed abatement) is considered by MDT as the threshold for acoustical feasibility. This reduction is not the design goal. Instead, this threshold provides a noticeable noise reduction for at least three-quarters of the impacted receptors, making the benefits of providing noise abatement very strong. Yet, it does not rule out an abatement measure if some of the impacted receptors cannot meet the threshold, especially near the ends of the noise study area, in areas of difficult terrain, or on upper floors.

If significant non-highway noise sources exist in the project area, such as rail lines or airports, noise barrier effectiveness may be compromised. A careful evaluation of such a situation will be completed to determine if a noise barrier is feasible and reasonable for the highway noise sources.

6.4.2. Engineering Feasibility

Safety and maintenance considerations may dictate whether or not a noise barrier is feasible. Some safety and height limitations that would make a noise barrier, such as a wall, infeasible are excessive restriction of sight distance, continuous shadow causing icing of the driving lanes, severe drainage problems associated with the barrier, or flood-prone areas.

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.

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. 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.

From a highway safety standpoint, the 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. MDT'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. If the barrier is constructed in the clear zone, the barrier can be built on top of a jersey type barrier (other methods of crash protection may also be viable). If the barrier is located on the shoulder, the barrier (including any protective device) should be at least two feet from the edge of shoulder or ten feet from the shoulder stripe, whichever is greater. The slope between the edge of pavement and the barrier must be 10:1 or flatter.

When barriers are constructed at or near the shoulder line, safety, drainage, and ice and snow removal must be considered. The barrier may not be located within the intersection sight distance triangle for any approaches.

Other factors to consider are topography, utilities, maintenance access to adjacent properties, and access to adjacent properties on arterial widening projects. Consultants should seek guidance on engineering feasibility considerations from the MDT Highways Bureau and Bridge Design Bureau.

6.5. Reasonableness

The reasonableness evaluation involves an examination of costs, public support, and whether a certain amount of noise reduction can be achieved. These three factors must all be met, at a minimum, for a noise abatement measure to be considered reasonable.

Two other subjective factors may come into consideration as well, as described in the section of Optional Reasonableness Factors.

6.5.1. Cost Effectiveness

The cost effectiveness of noise abatement can be considered by calculating a Cost Effectiveness Index (CEI), which takes into consideration the noise reduction the barrier will provide and the number of benefited receptors. The CEI should be calculated for each barrier:

$$CEI = \frac{\text{Total barrier cost}}{ANR \times BR}, \text{ where:}$$

Total barrier cost =
Total barrier area (above ground) ×
a planning unit cost for materials and foundations (see Table 2 below)

ANR = *Average noise reduction of benefited receptors, in dB(A)*

BR = *Number of benefited receptors*

For example, the following illustrates the CEI calculation for 56 benefited receptors protected by a 3500 foot long wall, 10 feet high, with a planning cost of \$35/ft². The number of receptors with their corresponding noise reduction is:

28 @ 10 dB(A)
6 @ 8 dB(A)
8 @ 9 dB(A)
14 @ 7 dB(a)

$$\text{Average noise reduction (ANR)} = \frac{\text{sum product of receptors} \times \text{average noise reduction}}{\# \text{ benefited receptors}}$$

$$= (28 \times 10) + (6 \times 8) + (8 \times 9) + \frac{(14 \times 7)}{56} = 8.9 \text{ dB}$$

$$\text{Total wall cost} = 3500 \text{ ft} \times 10 \text{ ft} \times \$35/\text{ft}^2 = \$1,225,000$$

$$\text{CEI} = \frac{\$1,225,000}{(56 \times 8.9\text{dB})} = \$2,458$$

Depending on the planning unit cost used, a barrier that has a CEI greater than the corresponding value in Table 2 is not considered reasonable to build.

As of the date of this policy, a planning cost of \$35/ft² is used for noise barriers, which includes wall and foundation construction. MDT may choose to reassess the CEI and barrier planning for each proposed noise barrier project. Table 2 illustrates how CEI adjusts with changes in planning costs.

Table 2 – Planning Cost vs CEI

Planning cost (\$/sq. ft.)	CEI (\$/dB(A)*BR)
25	3500
30	4200
35	4900
40	5600
45	6300

6.5.1.1. Determination of Benefited Receptors for Non-Residential Land Uses

Benefited receptor equivalents for non-residential land uses are figured with the understanding that the residential land use represents an average lot size and exterior areas of frequent human use during daylight hours, on a year-round basis. To calculate the benefited receptor equivalents for non-residential land uses that have both indoor and outdoor uses, simply divide the square footage of the impacted area of the land use by the average lot size of nearby residential lots. If average lot size is unknown or indeterminable, use a default value of 5000 square feet.

Example 1: A 25,000 square foot indoor auditorium, all within the impacted area:

$$\frac{25,000 \text{ sq ft}}{5000 \text{ sq ft}} = 5 \text{ benefited receptor equivalents.}$$

Example 2: A 3000 square foot daycare center where average lot sizes are 5000 square feet = 1 benefited receptor equivalent (site is smaller than minimum lot size but still equivalent to 1 receptor).

6.5.1.2. Non-Residential Land Uses with Outdoor Only Seasonal Usage

Since many land uses in Table 1 Category C are outdoor only uses, the benefited receptor equivalents are determined by dividing the square footage of the impacted area by the average lot size of nearby residential neighborhoods and multiplying that result by a seasonal multiplier. The analyst determines the months of the year the land is used and calculates a seasonal multiplier for the months of use. This method assumes that the majority of outdoor usage is during daylight hours. If the analyst determines that a particular outdoor-only land use experiences significant usage after dark, then the analyst should use the actual hours of usage, not daylight-only hours.

Hours of sunlight for each month for many Montana communities were averaged and are listed in Table 3. Seasonal usage and seasonal multipliers (determined by dividing the sum of monthly hours of use by the year-round hours of daylight) are listed in Table 4. Seasonal multipliers should be determined for each land use in question based on the months of the year activity occurs.

Table 3 - Average Hours of Sunlight

January	9.00	July	15.50
February	10.33	August	14.25
March	12.00	September	12.50
April	13.67	October	10.83
May	15.25	November	9.25
June	16.00	December	8.50

Table 4 - Seasonal Multiplier

Season	Hours	Seasonal Multiplier
Year-round	147.08	none
Jun-Jul-Aug	45.75	0.31
Sept-June	101.33	0.69
Apr-Oct	98.00	0.67

NOTE: For Category C land uses that include areas where people sleep, such as campgrounds and RV parks, each camping site or RV unit is counted as one benefited receptor and then the total number of those in an impacted area is multiplied by the seasonal factor.

The following examples all assume an average residential lot size of 5000 square feet.

Example 1: *Outdoor Sports area with three tennis courts totaling approximately 12000 square feet impacted area and open in only the non-winter months, the equivalent number of*

benefited receptors would be $\frac{12,000 \text{ sq ft}}{5000 \text{ sq ft}} \times 0.67$ (seasonal weight) = 1.6 benefited receptor equivalents.

Example 2: Summer-use only campground with 12 of 18 campsites impacted: 12×0.31 (seasonal weight) = 3.7 benefited receptor equivalents.

Example 3: An RV park with 25 impacted units, in use all year except for winter months: 25×0.67 (seasonal weight) = 16.7 benefited receptor equivalents.

Example 4: A 1 1/2-acre school playground impacted:

$\frac{65,340 \text{ sq ft}}{5000 \text{ sq ft}} \times 0.69$ (seasonal weight) = 9 benefited receptor equivalents.

6.5.2. Noise Reduction Design Goal

Noise barriers must achieve a noise reduction design goal of 7 dB(A) to be considered reasonable. Sixty percent (60%) of first row benefitted receptors need to have a noise reduction of at least 7 dB(A) before MDT will carry the design forward. This requirement, in conjunction with the acoustical feasibility requirement, ensures that the majority of impacted and benefited receptors behind a noise barrier will experience a noticeable reduction in noise.

6.5.3. Public Support of Benefited Receptors

The viewpoints of benefited residents and property owners are considered in the decision to provide noise abatement, especially a visual obstruction such as a barrier or berm. A benefited receptor is one that receives a noise reduction from the abatement measure of at least 5 dB(A), whether or not that receptor has been found to be impacted. To simplify the discussion, viewpoints are counted as votes, with more weight given to property owners and renters of first-row receptors, as illustrated below.

- First row renter – 1.5 votes
- First row property owner (non-residing) – 2 votes
- First row owner-occupied – 3 votes
- Non-first row renter – 1 vote
- Non-first row owner-occupied – 1 vote
- Non-first row property owner (non-residing) – 1 vote

MDT will make every effort to solicit responses from affected residents, through neighborhood meetings, mailings and individual follow-up. In order to carry abatement forward, MDT requires approval of over half (51%) of the benefitted receptors. Non-responding benefited receptors will not be counted. Support of noise abatement will be based on the responses received, even if that response rate is very low.

If more than half of the respondents are opposed to the abatement, the abatement proposal will be dropped from consideration, and the area will not be eligible for future Type II noise abatement (23 CFR 772.15(b)(3)), if MDT ever considers a Type II program. This is an important point to make with residents when they are considering their preference for abatement.

6.5.4. Optional Reasonableness Factors

The following additional reasonableness factors can be considered to increase the CEI.

1. Local use of noise-compatible planning. If noise compatible planning concepts are in place and being practiced/encouraged by the local planning agency, \$100 is added to the CEI.
2. Exposure to high traffic noise levels. If build noise levels are predicted to be higher than 70 dB(A) for Category A or B receivers, or higher than 74 dB(A) for Category C/D receivers, \$100 is added to the CEI.

6.6. *Cost Averaging Among Benefitted Receptors*

MDT does not cost-average noise abatement among benefited receptors within common noise environments.

6.7. *Third Party Funding*

For Type I Federal-aid projects, third party funding cannot be used to reduce the cost in the numerator of the CEI formula to bring the CEI down below the cost reasonableness criterion. Third party funding can only be used to pay for additional features such as landscaping, aesthetic treatments, and functional enhancements, such as sound-absorbing treatment and access doors, for noise barriers already determined to be feasible and reasonable.

6.8. *Sound-Absorbing Noise Barrier Treatments*

The addition of sound-absorbing treatment to noise barriers or the use of integrated sound-absorbing barrier systems is sometimes necessary to reduce potential sound level increases due to reflections across from a single noise barrier wall or behind parallel noise barrier walls on either side of a road or ramp. Analysis of the need for and effectiveness of sound absorption should generally be done using the FHWA TNM program.

MDT's standard practice is to analyze the need for sound absorption when parallel barriers are proposed and the width to height ratio is less than 20:1. Use of sound absorption will be considered when there are modeled increases in the levels of more than 2 dB(A) behind one or both of the walls due to reflections at one or more of the receptors, and when the sound absorption will reduce the increases to less than one decibel.

For single barriers, sound absorbing materials will be analyzed in these cases:

1. A bike/pedestrian path is proposed for the highway side of a barrier.
2. Activity Category A, B or C receptors are across the roadway from the wall.
3. A frontage road is between the noise barrier and the receptors.

Use of sound absorption will be considered when there are modeled increases in the levels of more than 2 dB(A) due to reflections, resulting in a “with reflections” level of at least 64 dB(A), and when the sound absorption will reduce the increases to less than one decibel.

6.9. Use of Clear Panels in Noise Barriers

When noise barriers greater than nine feet in height substitute for, replace, or are immediately behind a backyard fence or lot line, and where the distance between the barrier and the exterior area of frequent active human use is less than approximately 25 feet, MDT will consider the installation of clear panels at the top of the barrier in the affected areas, and if the improvement can be made while still meeting the CEI. Landowner and resident approval is required.

6.10. Information Required for a NEPA Decision

Accurate and complete documentation of the noise analysis and any decisions to provide noise abatement is imperative. The noise analysis reports for Type I projects should be stand-alone documents. For a Type I project, a summarizing section is prepared to be included in the body of the EA or EIS. Appendix D gives details on reporting for Type I projects.

For a Type I project, whether or not noise abatement is recommended, MDT must make its intentions known during the NEPA process. Decisions to provide or not provide noise abatement must be well-explained and defensible. Prior to CE approval or issuance of a FONSI or ROD, MDT must identify in its NEPA documentation:

1. Where noise impacts occur.
2. The noise abatement measures that are feasible and reasonable, and are likely to be incorporated into the project.
3. Noise impact locations for which no abatement appears to be feasible and reasonable.

For noise abatement measures that have been found to be feasible and reasonable, a statement of likelihood, similar to the following, is included in the environmental document:

“Based on the studies thus far accomplished, the State intends to install highway traffic noise abatement measures in the form of a barrier at (location) . The preliminary indications of likely abatement measures are based on a preliminary design cost for a barrier of \$ (total barrier cost) that will reduce noise levels by to dB(A) for (#) dwelling units (residences or other sensitive

receptors). If it subsequently develops during final design that these conditions have substantially changed, the abatement measures might not be provided, or may be modified. A final decision of the installation of the abatement measure(s) will be made upon completion of the project's final design and the public involvement process.”

The noise analysis report should have a description of each abatement measure considered; a discussion of the anticipated costs, problems and disadvantages associated with that measure; and a discussion of the anticipated benefits. In many cases it is impractical to consider any noise abatement measures other than the construction of noise barriers. This discussion encompasses the reasonableness and feasibility of noise abatement. While the worksheet in Appendix B can be a guide to the decision making process, careful explanation and consideration of all the applicable criteria that provide the best, most defensible decision is needed in the report and environmental document. Reasonable and feasible abatement measures are incorporated into the project to minimize noise impacts and enhance the community to the extent practicable.

The FHWA will not approve Type I 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.

For design-build projects, the preliminary technical noise study provides details for all considered and proposed noise abatement measures for inclusion in the NEPA document. Design of design-build noise abatement measures is based on the preliminary noise abatement design developed in the technical noise analysis, and reevaluated /reanalyzed during the project's final design. Noise abatement measures are 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.

6.11. Inventory and Reporting of Abatement Measures

All state highway agencies are required by FHWA to maintain an inventory of all constructed noise abatement measures, and provide that information to FHWA on a periodic basis. The inventory parameters are listed in 23 CFR 772.13(f). MDT will compile the data in a spreadsheet on an ongoing basis as abatement measures are implemented.

7. INFORMATION FOR LOCAL OFFICIALS

Highway traffic noise must be reduced through a program of shared responsibility. Local governments can use their authority to regulate land development in such a way that noise-

sensitive land uses are either prohibited from being located adjacent to a highway, or that developments are planned, designed, and constructed in such a way that noise impacts are minimized, such as in noise mitigated developments.

It is MDT's policy to furnish the results of Type I highway traffic noise analyses to local government officials. With regards to undeveloped lands that have not been permitted for development, the results will include at a minimum the distances from the proposed edge of the traveled way to where the design year $L_{eq}(h)$ of 60 and 64 dB(A) are predicted to occur.

Information on planning neighborhoods that are more compatible with the highway environment can be found in these references:

1. *Growing Neighborhoods in Growing Corridors: Land Use Planning for Traffic Noise* (MDT, 2008):
http://www.mdt.mt.gov/research/docs/research_proj/noise_plan/final_report.pdf
2. *Noise Compatible Planning* (USDOT FHWA):
http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/
3. *Highway Traffic Noise: Analysis and Abatement Guidance* (USDOT FHWA), the latest version:
http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/
4. *Entering the Quiet Zone: Noise Compatible Land Use Planning*, (USDOT FHWA, 2002):
http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/land_use/index.cfm
5. *The Audible Landscape* (USDOT FHWA, 2001):
http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/index.cfm

Following each revision, copies of this policy are provided to all planning organizations, through email, web links and hard-copy. To aid in the understanding and dissemination of this policy, MDT will provide informational meetings and training sessions for local planning agencies and decision-makers. MDT's Outreach Program involves regular distribution of noise reports with letters of explanation, creation of noise contours for local use, one-on-one meetings with local planning organizations, and presentations at state and regional planning workshops.

8. CONSTRUCTION NOISE

Construction of a highway project may cause localized, short-duration noise impacts. Construction noise can annoy people living in the area. Analysis and mitigation of construction noise impacts will be addressed on a project-by-project basis for all Type I projects.

At a minimum, for all Type I projects, the noise study:

1. Identifies 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.
2. Determines the measures that are needed in the plans and specifications to minimize or eliminate adverse construction noise impacts to the community. This determination includes a weighing of the benefits achieved and the overall adverse social, economic, and environmental effects and costs of the abatement measures.
3. Incorporates the needed abatement measures in the plans and specifications.

Construction noise impacts can be minimized by using standard MDT specifications for the control of noise sources during construction (107.77.04, 1995 ed.). Local noise ordinances may prohibit construction activity between certain times of the day, or there may be other restrictions imposed on the contractor. Contractors are required to comply with all applicable regulations governing equipment source levels and noise resulting from construction site activities during improvement projects. Alternately, the Contractor may seek a variance to operate outside the local noise ordinance.

The following techniques can be used to reduce construction noise impacts:

1. Place stationary noise sources as far from sensitive receptors as possible.
2. Use portable noise barriers or take advantage of natural terrain features between the noise source and sensitive receptors to provide shielding.
3. Turn idling equipment off.
4. Drive equipment forward instead of backward whenever possible; lift instead of drag materials; and avoid scraping or banging activities by substituting quieter hand methods, if possible.
5. Confine work that does not have to be done at night to daylight hours. When work must be done at night, complete the noisiest work as early as possible.

Construction noise can be further reduced through the use of properly sized and maintained mufflers, engine intake silencers, less obtrusive backup alarms, engine enclosures, noise

blankets, and rubber linings. Additional information can be found in 23 CFR 772.19 and the *FHWA Highway Construction Noise Handbook*, Final Report No. FHWA-HEP-06-015 and DOT-VNTSC-FHWA-06-02, August 2006, on the FHWA web site at:

http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/

While construction noise modeling is rarely done for Type I noise studies, there is available a program for predicting noise levels from various types of equipment and construction activities, the FHWA Roadway Construction Noise Model (FHWA RCNM), on the FHWA web site at:

http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/

Construction equipment noise levels are usually measured at 50 feet from the source and some typical levels are shown in Table 2. Construction equipment noise levels typically decrease 6-8 dB(A) per doubling of distance if there is a clear view of the equipment, and more if there is shielding that interrupts that view. For example, a bulldozer creating 80 dB(A) of noise at 50 feet will have an observed value of approximately 72-74 dB(A) at 100 feet and approximately 64-68 dB(A) at 200 feet.

Consultants should seek approval from the MDT Environmental Scientist before doing construction noise modeling for a noise study.

Table 5 – Typical Construction Equipment Maximum Sound Levels

Equipment Description	Acoustical Use Factor, %¹	Maximum Sound Level at 50 feet, dB(A)²
Auger Drill Rig	20	84
Backhoe	40	78
Boring Jack Power Unit	50	83
Chain Saw	20	84
Clam Shovel (dropping)	20	87
Compactor (ground)	20	83
Compressor (air)	40	78
Concrete Mixer Truck	40	79
Concrete Pump Truck	20	81
Concrete Saw	20	90
Crane	16	81
Dozer	40	82
Drill Rig Truck	20	79
Drum Mixer	50	80
Dump Truck	40	76
Excavator	40	81
Flat Bed Truck	40	74

Table 5 – Typical Construction Equipment Maximum Sound Levels

Equipment Description	Acoustical Use Factor, % ¹	Maximum Sound Level at 50 feet, dB(A) ²
Front End Loader	40	79
Generator	50	81
Generator (<25KVA, VMS signs)	50	73
Gradall	40	83
Grapple (on backhoe)	40	87
Horizontal Boring Hydraulic Jack	25	82
Impact Pile Driver	20	101
Jackhammer	20	89
Man Lift	20	75
Mounted Impact hammer (hoe ram)	20	90
Pavement Scarafier	20	90
Paver	50	77
Pickup Truck	40	75
Pneumatic Tools	50	85
Pumps	50	81
Refrigerator Unit	100	73
Rivet Buster/chipping gun	20	79
Rock Drill	20	81
Roller	20	80
Sand Blasting (Single Nozzle)	20	96
Scraper	40	84
Shears (on backhoe)	40	96
Slurry Plant	100	78
Slurry Trenching Machine	50	80
Vacuum Excavator (Vac-truck)	40	85
Vacuum Street Sweeper	10	82
Ventilation Fan	100	79
Vibrating Hopper	50	87
Vibratory Concrete Mixer	20	80
Vibratory Pile Driver	20	101
Warning Horn	5	83
Welder/Torch	40	74

¹ The percentage of the time period under consideration when the equipment is at its maximum level, used to convert maximum sound levels to Leq, where Leq = Maximum Sound Level + 10 log (Acoustical Use Factor/100).

² Measured on "slow" response, as defined in ANSI S1.4-1983 (R2006)/ANSI S1.4a-1985 (R2006)

Source: FHWA Roadway Construction Noise Model User Guide.

9. UPDATES TO POLICY/MANUAL

Changes to the policy will be made as needed, or every 5 years. Additional copies of the policy can be obtained by telephoning or writing to:

Noise Specialist
Montana Department of Transportation
Environmental Services
PO Box 201001
Helena, MT 59620-1001
406-444-7659

The documents can also be found on MDT's web site under "Doing Business" / "Contracting/Consulting with MDT" / "Environmental" / "Air/Noise." See: <http://www.mdt.mt.gov/business/contracting/docs/npolicy.pdf>.

MDT attempts to provide reasonable accommodations for any known disability that may interfere with a person participating in any service, program or activity of the department. Alternative accessible formats of this document are available upon request. For further information call (406) 444-7659 (voice) or (406) 444-7696 (TTY).

APPENDIX A – 23 CFR 772

[Federal Register: July 13, 2010 (Volume 75, Number 133)] [Rules and Regulations]

[Page 39820-39839]

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DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

23 CFR Part 772

[FHWA Docket No. FHWA-2008-0114]

RIN 2125-AF26

Procedures for Abatement of Highway Traffic Noise and Construction Noise

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Final rule.

SUMMARY: This final rule amends the Federal regulations on the Procedures for Abatement of Highway Traffic Noise and Construction Noise. The final rule clarifies and adds definitions, the applicability of this regulation, certain analysis requirements, and the use of Federal funds for noise abatement measures.

DATES: Effective date: July 13, 2011.

Incorporation by reference: The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of July 13, 2011.

FOR FURTHER INFORMATION CONTACT: Mr. Mark Ferroni, Office of Natural and Human Environment, (202) 366-3233, or Mr. Robert Black, Office of the Chief Counsel, (202) 366-1359, Federal Highway Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590.

[Supplementary text in the Federal Register is not included in this appendix.]

In consideration of the foregoing, the FHWA revises part 772 of title 23, Code of Federal Regulations, to read as follows:

[Federal Register: July 13, 2010 (Volume 75, Number 133), pages 39820-39839]

PART 772--PROCEDURES FOR ABATEMENT OF HIGHWAY TRAFFIC NOISE AND CONSTRUCTION NOISE

Sec.

772.1 Purpose.

772.3 Noise standards.

772.5 Definitions.

772.7 Applicability.

772.9 Traffic noise prediction.

772.11 Analysis of traffic noise impacts.

772.13 Analysis of noise abatement.

772.15 Federal participation.

772.17 Information for local officials.

772.19 Construction noise.

Table 1 to Part 772--Noise Abatement Criteria

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 [*Typo, should be “levels”, not “impacts”*] by field measurements.
- (2) For projects on existing alignments, predict existing and design year traffic noise impacts. [*Typo, should be “levels”, not “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 permitted, 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 [Typo, should be "or", not "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. *[Typo, references to "(d)(5)" should be to "(d)(2)".]*

(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. *[Typo, reference to "(d)(5)" should be to "(d)(2)".]*

(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 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 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 Criteria \2\		Evaluation Location	Activity Description
	L _{eq} (h)	L ₁₀ (h)		
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, amphitheatres, 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 L _{eq} (h) or L ₁₀ (h) (but not both) may be used on a project. \2\ The L _{eq} (h) and L ₁₀ (h) Activity Criteria values are for impact determination only, and not design standards for noise abatement measures. \3\ Includes undeveloped lands permitted for this activity category.				

[FR Doc. 2010-15848 Filed 7-12-10; 8:45 am]

APPENDIX B – NOISE ABATEMENT RECOMMENDATION WORKSHEET

Montana Department of Transportation NOISE ABATEMENT RECOMMENDATION WORKSHEET			
Project #: Click here to enter text.	Project Desc: Click here to enter text.	UPN: Click here to enter text.	Receptors/Receivers: Click here to enter text.
A. FEASIBILITY:			
1.	Do at least 75% of impacted first row receptors receive a 5dBA minimum noise reduction?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2.	Are there any “fatal flaw” safety, maintenance or flood plain issues involved with the proposed noise barrier or berm?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, Describe: Click here to enter text.			
B. REASONABLENESS:			
1.	Does Cost Benefit Index meet reasonable criteria?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2.	Views of residents/property owners (at least 51% of benefitted receptors support noise abatement)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3.	Noise Reduction Design Goal (do at least 60% of first row benefitted receptors receive at least 7dB(A) noise reduction?)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
C. OPTIONAL REASONABLENESS FACTORS:			
1.	If local government practices noise compatible land use planning, add \$100 to CEI.	<input type="checkbox"/> Yes	<input type="checkbox"/> No

2.	If build noise levels are predicted to be higher than 70 dB(A) for Category A or B receivers, or higher than 74 dB(A) for Category C/D receivers, \$100 is added to the CEI.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
D. NOISE ABATEMENT DECISION:			
1.	Are noise mitigation measures feasible?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2.	Are noise mitigation measures reasonable?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3.	Will noise abatement (berms or walls) be provided?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
E. DECISION DESCRIPTION AND JUSTIFICATION: Click here to enter text.			
F. FORM COMPLETED BY:			
Printed Name	Signature	Title	Date
Click here to enter text.		Click here to enter text.	Click here to enter a date.
IN CONSULTATION WITH:			
Name	Signature	Title	
Click here to enter text.		Click here to enter text.	Click here to enter a date.
Click here to enter text.		Click here to enter text.	Click here to enter a date.

APPENDIX C – NOISE STUDY DOCUMENTATION

The noise analysis report should be a stand-alone document, and a summarizing section will be included in the body of the EA or EIS. All supporting documentation (TNM run files and Excel spreadsheets of formatted input and data and results, CEI calculations (in Excel), noise abatement worksheets, measurement results, site sketches and photographs (electronic) are included with the report in electronic format. A generalized report format is provided below.

D.1 Report Format for Type I Projects

To maintain consistency and to better incorporate the noise report into the Environmental Document, the following report format is used:

1. Introduction – Description of project, need for noise analysis.
2. Determination of activity categories and applicable noise abatement criteria for adjacent land uses.
3. Methodology /Assumptions – Includes ambient noise measurements, verification and calibration (if necessary) of the noise model.
4. Affected Environment – Determination of existing noise levels and description of other noise sources.
5. Environmental Consequences - Prediction of future noise levels for all study alternatives, including construction noise, and identification of traffic noise impacts.
6. Mitigation Considerations – Identification and consideration of highway traffic noise abatement, including reasonableness and feasibility of abatement. The discussion of mitigation should include all mitigation considered even if rejected; such as shifting of vertical/horizontal alignment
7. Coordination with Local Officials – Includes a section on noise compatible planning, noise mitigated development, explanation of noise contours or set-back distances to ensure no future noise impacts with sensitive land uses. If noise contours are provided, they should include the 60 and 64 dB(A) contours.
8. Other considerations.
9. TNM data files and the CEI calculations must be in Excel (or equivalent) spreadsheets. All report data, spreadsheets and text need to be provided in electronic format.

D.2 Distribution of Reports

Draft report:

- MDT Environmental Services
- Lead Design Office

Final report distribution:

- Environmental Services
- Lead Design office (further distribution may include Right-of-Way, District Engineering Services)
- Local Planning Agency
- Check with Environmental Services for specific distribution instructions