

**State of Alaska**  
**Department of Transportation and Public Facilities**

# **Traffic Noise Abatement Guidance**



**April 2009**

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## I. INTRODUCTION

The Federal Highway Administration's (FHWA) Environmental Policy Statement includes a commitment to ensure that all feasible and reasonable mitigation measures are incorporated into projects to minimize noise impacts and enhance the surrounding noise environment to the extent practicable. This commitment to minimize noise impacts and enhance the noise environment is fulfilled through prudent application of FHWA's noise regulations – Title 23 CFR Part 772 – Procedures for Abatement of Highway Traffic Noise and Construction Noise, which is the primary regulatory authority regarding noise impact assessment and abatement. The guiding document for the Alaska Department of Transportation and Public Facilities (DOT&PF) analysis and abatement of highway traffic noise is the “FHWA Highway Traffic Noise: Analysis and Abatement Policy” which can be found at <http://www.fhwa.dot.gov/environment/noise/index.htm>. Additional relevant information describing the evaluation and abatement of traffic noise is presented in "Guide on Evaluation and Abatement of Traffic Noise" (AASHTO, 1993).

Title 23 CFR Part 772 requires that “...before adoption of a final environmental impact statement or finding of no significant impact, the highway agency shall identify noise abatement measures which are reasonable and feasible and which are likely to be incorporated in the project...”. DOT&PF will apply this same standard to Type I projects being processed as a categorical exclusion.

In general, only outdoor areas of frequent use are considered for traffic sound level analysis and abatement. Indoor locations may be used where outdoor activities do not exist. Establishment of indoor sound levels will be in accordance with the conditions delineated in the FHWA publication “Measurement of Highway – Related Noise” dated May 1996.

Traffic noise abatement recommendations developed during the environmental phase of project development are preliminary based on reconnaissance engineering, traffic projections and conditions as they exist at the time of analysis and should be reevaluated during the design phase of the project when a detailed design is developed and more current traffic information is available.

## II. DEFINITIONS

Approach - This term has been defined by DOT&PF as 1 dBA below the FHWA Noise Abatement Criteria.

dB(A) – A-Weighted Sound Level. A measure of sound pressure levels in decibels which has a frequency weighted network corresponding to the A-scale on a standard sound level meter as specified by ANSI S1.4-1971. The A-scale tends to suppress lower frequencies and best approximates sound as heard by the normal human ear.

Design Year - A point in time, usually 20 years from the year construction is scheduled to begin, that a project is designed for.

L<sub>eq</sub> – The equivalent steady-state sound level that, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the same period.

Noise Abatement Criteria (NAC) – FHWA determined noise levels for various activities or land uses which represent the upper limit of acceptable traffic noise level conditions. These levels are used to aid in identifying traffic noise impacts.

Severe Traffic Sound Level Impacts – Occurs when design year noise level is 75 dBA or higher or when there is an increase of 30 dBA or more over existing noise levels.

Worst Case Noise Hour – A period of one hour throughout a 24 hour period in the existing and future design year that reflects the peak traffic noise hour, usually associated with the peak traffic hour but not in every instance.

### **III. SCOPE OF COVERAGE**

This policy will apply to only Type I highway projects, where a highway is constructed on a new location or an existing highway is physically altered with significant changes resulting to the horizontal or vertical alignments, the number of through-traffic lanes is increased or an auxiliary lane is added such that the auxiliary lane is long enough to function as a through-traffic lane and/or increase capacity. An auxiliary lane that is added between interchanges to improve operational efficiency should be classified as a Type I project if the lane is at least 1.5 miles long or if the lane is made continuous through an interchange. A significant change in the horizontal alignment is defined as a halving of the distance between the centerline of the near travel lane and the noise receiver. A significant change in the vertical alignment is a change in height of ten feet or more. This policy applies to projects that are developed as “design-build” and “design-bid-build”. DOT&PF has elected not to participate in a Type II program to retrofit existing state highways with noise abatement.

In an effort to prevent future traffic noise impacts on currently undeveloped lands and to maintain compatibility between highways and future development, DOT&PF will inform local officials whose jurisdiction is within the highway project of the best estimation of future noise levels for both developed and undeveloped properties in the immediate vicinity of the project. This usually will be accomplished by providing a copy of either the project’s noise analysis or the approved environmental document to the local government. This information may also be provided through the plat review process.

### **IV. APPROPRIATE LEVEL OF HIGHWAY TRAFFIC NOISE ANALYSIS FOR CATEGORICAL EXCLUSION (CE), ENVIRONMENTAL ASSESSMENT (EA), AND ENVIRONMENTAL IMPACT STATEMENT (EIS)**

DOT&PF will:

- consider the level of analysis sufficient for a particular project scope if it is consistent with the FHWA guidelines promulgated in their Highway Traffic Noise Analysis and Abatement Policy and Guidance (1995 or newer version);
- determine existing and predicted worst hour noise levels using methods established in 23 CFR 772. (In most cases, worst hour is assumed to be peak hour; however, the analyst should check traffic reports to determine worst hour.);
- select measurement locations and times so the range of values obtained will be representative of the area(s) of interest; and
- include receivers from Activity Categories A through E, (Table 1) as appropriate in the study scope.

Existing noise levels can be determined by one of three methods:

1. Actual sound level measurements taken at representative receivers; these measurements should be performed at the worst hour.
2. Prediction by using the Traffic Noise Model provided there are no other noise sources present.
3. Combination of sound level measurements and prediction with the Traffic Noise Model after validation.

## **V. TYPES OF NOISE ABATEMENT MEASURES CONSIDERED**

Measures to provide noise abatement on projects may include the following:

- Traffic management measures (such as traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits and exclusive lane designations)
- Alteration of horizontal and vertical alignments
- Acquisition of property rights for construction of noise barriers
- Construction of noise barriers
- Acquisition of real property to serve as a buffer zone to prevent development which would be adversely impacted by traffic noise
- Noise insulation of public use or nonprofit institutional structures

Noise barriers should be designed such that they do not pose a hazard to birds or other wildlife (i.e. clear panel barriers should not be used unless there is some means incorporated into the panel to prevent bird collisions).

## **VI. BACKGROUND - FEASIBILITY AND REASONABLENESS**

The two relevant criteria to consider when identifying and evaluating noise abatement measures to be incorporated in a project are feasibility and reasonableness.

**A. Feasibility** deals primarily with engineering considerations (i.e. can a substantial noise reduction be achieved given the conditions of a specific location; is the ability to achieve noise reduction limited by factors such as topography, access requirements for driveways or ramps, the presence of cross streets, or other noise sources in the area). A proposed noise abatement measure that will not attenuate a minimum of a 5 dBA reduction under given conditions is not feasible.

In addition, preliminary and final design consideration should be given to the elements of safety, drainage, and maintenance. If a proposed noise abatement measure creates a safety hazard or poses potential significant maintenance complications, then the abatement measure will not be considered feasible.

**B. Reasonableness** is a more subjective criterion than feasibility. It implies that common sense and good judgment were applied in arriving at a decision. Reasonableness should be based on a number of factors, not just one criteria. A determination of reasonableness for noise abatement measures will consider the following:

1. Cost of abatement, which takes into account the number of receivers protected
2. Sentiments of impacted residents
3. Amount of development that occurred before and after the initial construction of the highway
4. Number of receivers that have been in place at least 10 years
5. Predicted future traffic noise levels
6. Difference between the predicted worst hour traffic noise levels and the existing worst hour traffic noise levels
7. Difference between the predicted traffic noise levels for the Build and the No-Build alternatives
8. Extent to which zoning or land use is changing or the effectiveness of land use controls implemented by local government officials to prevent incompatible development

## **VII. CRITERIA**

The decision on whether or not to provide a noise abatement measure must not be arbitrary or capricious. The reasoning must be documented and supportable, particularly if the decision is not to provide abatement and the affected residents want an abatement measure to be constructed. The decision must be based upon consistent and uniform application of this policy. This will result in DOT&PF using reasonable criteria, while maintaining a degree of flexibility in the decision making process.

**A. Feasibility will be based on the following factors:**

1. Noise abatement measures will be considered only when the existing or predicted future traffic noise levels approach or exceed the FHWA Noise Abatement Criteria (Table 1), or when the predicted traffic noise levels (design year) substantially exceed the existing traffic noise levels. DOT&PF considers a predicted noise level of 1 dBA below the FHWA Noise Abatement Criteria as the condition of “approach”. DOT&PF considers a 15 dBA increase in noise as “substantial”.
2. Noise abatement measures will not be provided for Activity Category D (undeveloped lands) unless it is necessary to protect adjacent sensitive uses (Activity Categories A or B). Undeveloped lands will include those lands for which there is a “planned, designed, and programmed” development with a valid building permit by the date that the environmental document is approved. DOT&PF will not provide abatement for commercial or industrial zoned (Activity C) properties.
3. Noise abatement measures are not feasible if a minimum of 5 dBA or more cannot be achieved. Noise abatement measures which do not achieve at least a 5 dBA reduction to most protected receivers are not prudent expenditures of public funds as any less of a reduction is not easily detected by most people.
4. Noise abatement measures are not feasible if they create a safety hazard to the driving public, protected receivers or maintenance personnel. The Regional Environmental Manager will consult with the Design and Maintenance & Operations Sections when making this decision. The abatement measure should be consistent with the following general design principles<sup>1</sup>:
  - a) A noise abatement measure should be located beyond the recovery zone of the traveled way; if a noise abatement measure is within 30 feet of the traveled way, a traffic barrier may be warranted
  - b) A noise abatement measure should not block the line-of-sight between vehicles and intersecting roadways or on/off-ramps
  - c) Protrusions on a noise abatement measure near a traffic lane should be avoided
  - d) Facings on a noise abatement measure that can become dislodged, or barrier components that could shatter during an accident, or facings that create excessive glare should be avoided
  - e) Access should be provided to all sides of the noise abatement measure to allow for

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<sup>1</sup> Design principles are from “Guide on Evaluation and Abatement of Traffic Noise, American Association of State Highway and Transportation Officials, 1993 and “FHWA Highway Noise Barrier Design Handbook”, Federal Highway Administration, December 2006.

- maintenance activities to take place
- f) Maintenance factors relating to replacement of materials damaged by impact, cleaning the noise barrier, and maintenance associated with adjoining landscape should be considered when determining feasibility
  - g) Barrier access points for emergencies or water sources needed during emergencies should be considered
  - h) Minimum setback distances and placement of noise abatement measures located at on/off-ramps and intersections should be based upon stopping sight distances, which depend on driver reaction time and deceleration rate
  - i) Placement of noise abatement measures should be a sufficient distance from the travel way to assure adequate space for storage of plowed snow and to assure that the abatement measure can withstand the additional loads that may result from plowed snow being both thrown and piled up against the noise abatement measure
  - j) Noise abatement measure design should minimize shading highways in critical areas so that sunlight can melt ice or snow on the shoulders and travel lanes

**B. Reasonableness will be based on the following factors:**

1. Cost per Benefited Receiver. The noise abatement measure cost is no more than \$32,000 (in 2006 dollars) per receiver, based upon the Design Engineer's estimate. This is determined by counting all receivers (including owner-occupied, rental units, mobile homes, businesses) benefited by the noise abatement measure in any subdivision and/or given development, and dividing that number into the total cost of the noise abatement measure. A benefited receiver is defined as any receiver that receives a minimum noise benefit of 5 dBA, regardless of whether or not they were identified as impacted. Each unit in a multi-family building will be counted as a separate receiver.

When the design engineer estimates abatement measure cost, the estimate will include all items necessary for the construction of the noise abatement measure. Examples of cost items that should be included are traffic control, drainage modification, foundations, retaining walls and right-of-way. Include a cost item only if it is directly related to the construction of the noise abatement measure. If a cost is a project feature for a reason other than the noise abatement measure, such as a retaining wall, then that cost will not be added into the noise abatement construction cost estimate. If the project incorporates visual mitigation such as the use of a transparent barrier with surface texture, the additional cost will not be included in the abatement construction cost estimate for the purpose of determining reasonableness. Aesthetic treatments, such as artwork, revegetation, landscaping and barrier treatments will not be included in the abatement measure cost estimate for the purpose of determining reasonableness.

The cost per benefited receiver must be adjusted for inflation. Use the most recent annual

composite price index available from the Federal Highway Administration Office of Program Administration [www.fhwa.dot.gov/programadmin/pricetrends.cfm]. Determine the ratio between the 2006 annual composite index (221.3) and the most recent annual composite index available at the time of the completion of the Noise Abatement Recommendation Worksheet and adjust the \$32,000 cost accordingly.

- a) Severe Noise Impact. In the event the noise abatement measure cost is greater than \$32,000 (in 2006 dollars) per receiver, the cost will be considered reasonable only if it can be demonstrated that a “severe” noise impact will occur. In order to satisfy this criteria, it must be shown that the predicted design year noise level is 75 dBA or higher or there is an increase of 30 dBA or more over existing noise levels. The Department will consider providing noise abatement in instances where the \$32,000 (in 2006 dollars) per benefited receiver is exceeded, and a “severe” impact exists, but implementation of noise abatement measures in these cases will require approval of the DOT&PF Regional Director with concurrence of the FHWA Alaska Division Administrator.
2. Residents’ Desires. At least 60 percent of residents that would be impacted by traffic noise from a project and benefit from construction of a noise abatement measure construction, want the noise abatement measure. “Impacted residents” would be those residences in a subdivision or a development where predicted traffic noise would approach or exceed the Noise Abatement Criteria, or where there is a predicted substantial increase in noise over the existing noise level as a result of the project. To determine the desires of affected residents, the Regional Environmental Manager should contact homeowners to determine whether most impacted residents desire a noise abatement measure.
3. Development vs. Highway Timing. At least 50 percent of impacted homes were built before initial construction of the highway. The date of development is an important part of the determination of reasonableness. More consideration is given to developments that were built before the highway was built.
4. Development Existence. At least 50 percent of impacted homes have existed for at least 10 years. More consideration is given to residents who have experienced traffic noise impacts for long periods of time.
5. Absolute Predicted Build Noise Level. The predicted future build noise levels are at least 66 dBA. More consideration should be given to areas with higher absolute traffic noise levels. Absolute noise levels typically found along highways, 60-75 dBA, are deemed undesirable and cause complaints from adjacent residents. In general, the higher the absolute noise, the more complaints.

6. Relative Predicted Build Noise Level. The predicted future build noise levels are at least 10 dBA greater than the existing noise levels. More consideration is given to areas with larger increases over existing noise levels. This gives greater consideration to projects for highways on new location and major reconstruction than it does to projects of smaller magnitude. For most people, a 3 dBA increase is barely perceptible, a 5 dBA increase is readily perceptible, and a 10 dBA increase doubles the perceived loudness of the noise.
7. Build vs. No-Build Noise Levels. The future build noise levels are at least 5 dBA greater than the future no-build noise levels. More consideration should be given to areas where larger changes in traffic noise levels are expected to occur if the project is constructed than if it is not.
8. Land use. Land use is not changing rapidly and there are local ordinances or zoning in place to control the new development of noise sensitive land uses adjacent to transportation corridors.

A noise abatement recommendation worksheet (Appendix A) will be filled out for each noise receiver in the noise study. The Regional Environmental Manager will approve and sign the worksheets. If an abatement measure is determined not feasible, then the reasonableness analysis section of the Worksheet does not need to be completed. DOT&PF will only provide a noise abatement measure if it has been determined both feasible and reasonable. The Regional Environmental Manager will recommend or not recommend that a noise abatement measure be implemented and forward that recommendation to the Preconstruction Engineer for concurrence. The Regional Environmental Manager will assure that the recommendation is included in the project's environmental document.

## **VIII. CONSTRUCTION NOISE**

Construction noise is a temporary disturbance that can interfere with day-to-day activities. The Regional Environmental Manager will work with the Design Engineering Manager to reduce construction noise by requiring the contract specifications include the statement that all construction equipment be properly maintained and have mufflers in acceptable working condition. Construction noises from drilling, blasting, and grinding operations should be limited to certain hours of operation, and may require additional noise attenuation devices. In addition, consideration should be given to the identification of noise-sensitive areas while the project is in the design phase(s) so that noise impacts may be minimized. Early coordination with project designers and construction staff can identify operations such as material site operations and haul roads so these types of operations may be located in less noise-sensitive areas.

In the event that construction noise complaints occur during the course of construction activities, measures will be taken by the Construction Project Engineer to resolve the problem to the extent practical. Measures might include locating stationary construction equipment as far from nearby noise sensitive receivers as possible, shutting off idling equipment, rescheduling construction operations to avoid periods of noise annoyance, notifying nearby residents whenever extremely noisy operations will be occurring, and installing permanent or portable acoustic abatement measures around stationary construction noise sources.

In some cases there are no alternatives to conducting construction activities during the night, on weekends or on holidays. When deemed necessary, the Department will make every effort to notify the public prior to conducting these activities. The public involvement in these cases should occur during design and throughout the construction duration. In some communities, local ordinances may restrict noise generating activities. Where this is the case, the Department and its contractor will comply with local noise ordinances and acquire any necessary noise permits for these activities prior to their initiation.

## **IX. STATE-FUNDED PROJECTS**

In general, the same methods are followed in the identification of noise impacts for state-funded projects as with federal-aid projects. Results of noise analyses will be documented in the State Projects Environmental Checklist. If noise abatement is determined to be feasible and reasonable, then the Regional Environmental Manager will make a recommendation to the Preconstruction Engineer. The Preconstruction Engineer will decide whether the recommended abatement measure will be constructed. Abatement will be provided only if it meets the feasibility and reasonableness criteria of this policy and the state funded appropriation can accommodate this expenditure.

Quieter pavement is currently not listed in federal regulations (23 CFR 772) as a noise abatement measure for which Federal funding may be used. DOT&PF may consider quieter pavement to reduce traffic noise on a state-funded project. However, the decision to provide such a measure will be decided by the Preconstruction Engineer as described in the preceding paragraph.

## **X. SUPERCEDEENCE**

This policy is effective upon signature and replaces the Department's March 1996 policy. This policy is applicable to any project that does not have an approved NEPA document prior to the date of implementation.

**TABLE 1**  
**FHWA NOISE ABATEMENT CRITERIA**

<b><u>Activity Category</u></b>	<b><u>L<sub>eq</sub>(h)</u></b>	<b><u>Description of Activity Category</u></b>
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

NOTES:

1. The Alaska DOT&PF definition of a noise impact is 1 dBA less than the FHWA Noise Abatement Criteria in every Activity Category.
2. While not specifically mentioned in Activity Category B a cemetery, campground/RV park, trail or trail crossings should be included in Activity Category B.

**Appendix A**

**ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES  
NOISE ABATEMENT RECOMMENDATION WORKSHEET**

Project Name: \_\_\_\_\_ Project No: \_\_\_\_\_

State-Funded  or Federal-Aid

Preparer's Name: \_\_\_\_\_ Date: \_\_\_\_\_

Receiver Name/Description: \_\_\_\_\_

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| <p><b><u>Feasibility Factors</u></b></p> <p>1. Does a noise impact exist or is one predicted to occur in the Design Year?</p> <p>If no, then noise abatement is not recommended. Proceed to the decision segment of this form.</p>                             | <input type="checkbox"/> | <input type="checkbox"/> |
| <p>2. Is the receiver a use typically defined within Activity Category A, B, C, or E in the FHWA noise abatement criteria?</p> <p>If no, then noise abatement is not recommended. Proceed to the decision segment of this form.</p>                            | <input type="checkbox"/> | <input type="checkbox"/> |
| <p>3. Is the receiver located within an Industrial or Commercial zoned area?</p> <p>If yes, then noise abatement is not recommended. Proceed to the decision segment of this form.</p>   | <input type="checkbox"/> | <input type="checkbox"/> |
| <p>4. Can effective noise abatement measures be constructed which provide a minimum 5 dBA reduction in noise levels?</p> <p>If no, abatement measures are not feasible and are not recommended at this site. Proceed to the decision segment of this form.</p> | <input type="checkbox"/> | <input type="checkbox"/> |
| <p>5. Can effective noise abatement measures be constructed without creating a safety hazard to users, residents and maintenance personnel?</p>  | <input type="checkbox"/> | <input type="checkbox"/> |

If no, abatement measures are not feasible and are not recommended at this site. Proceed to the decision segment of this form.

**Reasonableness Factors** (Numbering system matches numeric numbers in Section VII. B. of the Policy paper.)

YES NO

1. Cost Per Benefited Receiver

Engineer's estimate for the abatement measure divided by number of benefited receivers > \$ 32,000 (adjusted from 2006 dollars, if more recent annual construction price index calculations are available)

1a. Severe Noise Impact

i. Predicted noise level is 75 dBA or higher

ii. Predicted noise levels are 30 dBA or more over existing noise levels.

2. Residents' desires

3. Development vs. highway timing

4. Development existence

5. Build level greater than or equal to 66 dBA

6. Build level 10 dBA greater than existing

7. Build level 5 dBA greater than No-Build

8a. Land use is not changing

8b. Local ordinances or zoning is in place to control new development of noise sensitive land uses adjacent to transportation corridors

9. ADDITIONAL FACTORS

If an abatement measure is determined not reasonable, then go to the decision segment of this form (a feasibility determination is not necessary).

**Decision**

YES NO NA

- 1. Are abatement measures feasible?  YES  NO
- 2. Are abatement measures considered reasonable?  YES  NO  NA

REASONS FOR DECISION

**Signatures**

Recommend : or Not Recommend : Noise Abatement Measure

\_\_\_\_\_  
DOT&PF Regional Environmental Manager Date

Concurrence:

\_\_\_\_\_  
DOT&PF Regional Preconstruction Engineer Date

For projects with severe impacts:

Approved:

\_\_\_\_\_  
DOT&PF Regional Director Date

Concurrence:

\_\_\_\_\_  
FHWA Alaska Division Administrator Date