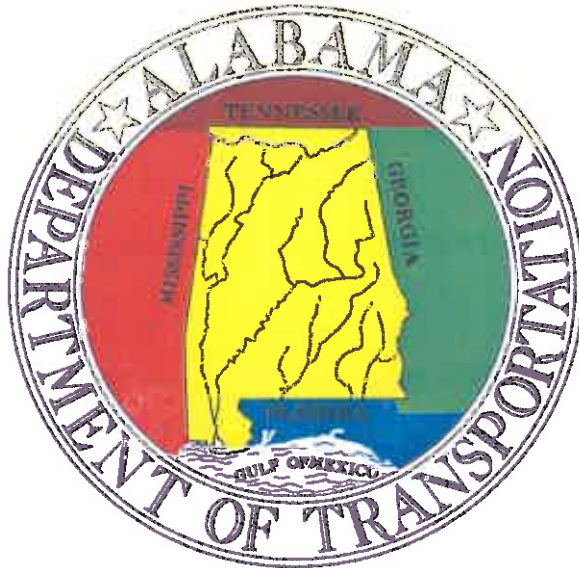


Alabama Department of Transportation



Highway Traffic Noise Analysis and Abatement

Policy and Guidance

As per 23 CFR 772

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This policy supersedes the ALDOT 2011 Policy

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1.0 Introduction

This document contains the Alabama Department of Transportation (ALDOT) noise policy on highway traffic noise and construction noise. This policy describes ALDOT's implementation of the requirements of the Federal Highway Administration (FHWA) Noise Standard per 23 Code of Federal Regulations (CFR) Part 772.

This policy applies to all projects that receive Federal-aid funds or are otherwise subject to FHWA approval, including federal projects that are administered by Local Public Agencies (LPAs) as well as ALDOT.

Projects planned in conjunction with the Alabama Toll Road, Bridge, and Tunnel Authority will be exempt from this policy unless the project requires federal approval.

2.0 Definitions

1. **Abatement** - measures used to reduce traffic noise levels.
2. **Approach**, as used in 23 CFR 772.11(e) - levels ($L_{eq}(h)$) which are one decibel (1 dB(A)) below Noise Abatement Criteria levels (See Section 15.0.).
3. **Benefited Receptor** - a recipient of an abatement measure that receives a noise reduction at or above the minimum of 5 dB(A) but not to exceed the ALDOT reasonableness design goal of 10 dB(A).
4. **Common Noise Environment** - a group of receptors within the same Activity Category that are exposed to similar noise sources and levels; traffic volumes, traffic mix, speed, and topographic features.
5. **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).
6. **Design Year** - the future year used to estimate the probable traffic volume for which a highway is designed, typically 20 years in the future.
7. **Existing Noise Levels** - the worst noise hour resulting from the combination of natural and mechanical sources and human activity usually present in the current year for a particular area.
8. **Feasibility** - the combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure.
9. **Impacted Receptor** - the recipient that has a traffic noise impact.

10. **Insertion Loss** - the predicted reduction in noise level resulting from the implementation of a noise abatement measure.
11. **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.
12. **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}.
13. **Multifamily Dwelling**: - a residential structure containing more than one residence. Each residence in a multifamily dwelling will be counted as one receptor when determining impacted and benefited receptors.
14. **NAC** - the Noise Abatement Criteria as shown in Section 15.0.
15. **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 standalone noise walls, noise berms (earth or other material), and combination berm/wall systems.
16. **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. ALDOT's noise reduction design goal will be 10 dB(A).
17. **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.
18. **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.
19. **Reasonableness** - the combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.
20. **Receptor** - a discrete or representative location of a noise sensitive area(s) for any of the land uses. (See Section 15.0.)
21. **Residence** - a dwelling unit. Either a single family residence or a multifamily dwelling as previously defined.
22. **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.

23. Substantial Construction - the granting of a building permit prior to right-of-way acquisition or construction approval for a highway.

24. Substantial Noise Increase - a highway traffic noise impact for a Type I project in which there is an increase in noise levels of 15 dB(A) or more in the design year over the existing noise level.

25. Traffic Noise Impacts - the impacts that occur when the predicted traffic noise levels approach or exceed the NAC listed in Section 15.0 or when the predicted traffic noise levels substantially exceed the existing noise levels.

26. Type I Project -

- (1) The construction of a highway on new location; or,
- (2) The physical alternation 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 through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a high-occupancy vehicle (HOV) lane, High Occupancy Toll (HOT) lane, bus lane, or truck climbing lane, or
- (4) The addition of an auxiliary lane except for when the auxiliary lane is a turn lane; or
- (5) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
- (6) Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,
- (7) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.
- (8) If a project is determined to be a Type I project under this definition then the entire project area as defined in the environmental document is a Type I project.

27. 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 23 CFR 772.7(e).

28. 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.

3.0 Traffic Noise Prediction

All federally funded Type I projects will require a noise analysis to be performed when potentially impacted receptors are present within 500' of the nearest travel lane. If there are impacts predicted at 500', the noise analyst must consider receptors beyond this distance until there are no additional impacts determined to be associated with the project. Traffic noise analysis for an individual project consists of computer modeled noise levels for existing and future conditions. In determining traffic noise impacts, ALDOT will give primary consideration to exterior areas where frequent human use occurs.

The FHWA Traffic Noise Model (TNM), version 2.5 (or the latest version approved at the time the modeling is performed) is required for use in all highway traffic noise analyses for federal-aid highway projects. TNM input procedures should follow FHWA's "Traffic Noise Model User's Guide" and "Noise Policy Frequently Asked Questions" guidance.

Future noise levels must be predicted for all build alternatives under consideration in the National Environmental Policy Act (NEPA) document that are reasonable alternatives. Future noise predictions are based on the design year and traffic conditions representing the perceived "worst hourly noise impact". Vehicular speed used in TNM for the future condition (build and no-build) is derived from the project design speed. For the existing condition, the posted speed limit in the study area should be used. Average pavement type will be used for future noise prediction.

The TNM Lookup Tables are not permitted for use in conducting noise modeling. In addition, noise contour lines are useful for alternative screening and to provide information to local officials per 23 CFR 772.17; however, they should only be used for these purposes and not for determining specific highway traffic noise impacts.

Traffic counts utilized in the TNM model should be originated by ALDOT. Any other traffic counts utilized must be approved by ALDOT to ensure accuracy and consistency with ALDOT methodology.

Actual measurements (with concurrent traffic counts identifying vehicle mix and volume) of existing or ambient noise levels should be taken in the field within the project study area for comparison to the modeled condition to ensure the accuracy of the study in accordance with 772.11(d)(2). FHWA accepts a tolerance of ± 3.0 dB(A) for TNM model validation. If the variation is greater than this, the analyst must identify the discrepancy and either make the correction in the model or take additional measurements as necessary.

In conducting the traffic counts required for validation, a simple manual count may be taken during the existing noise level measurement period. (The traffic will be counted for a minimum of 15 minutes and then equated to an hourly volume. For projects with low volume roadways, additional time may be required as determined

by the analyst to ensure accurate measurements.) The speed required in the validation process will be the posted speed limit. Any other methods for model validation must be approved by ALDOT prior to conducting the analysis. The results from the model validation will be summarized in the noise analysis report.

Existing noise level measurements should be taken during the time of the day that is perceived to be the worst hourly noise impact. FHWA's "Measurement of Highway Related Noise" report should be used in taking these measurements along with manufacturer specifications for the equipment. The number of locations for which the existing noise measurements should be taken will be at the discretion of the noise analyst based on the length of the project, number of actual receptors, topographic features, or unusual conditions.

4.0 Design-Build Projects

Design-build projects should follow regulations as described in 23 CFR 772.13(i). The preliminary technical noise study should document all considered and proposed noise abatement measures for inclusion in the NEPA document.

5.0 Proposed Highways on New Alignment

For proposed highways on new alignments, measurements must be taken at representative receptor locations. Each representative receptor corresponds to a noise sensitive area in which each receptor shares similar land use, similar distance to the roadway, and similar basic topography.

6.0 Noise Activity Categories

When a noise analysis is required, it must include each Noise Activity Category present in the study area. These categories (A through G) are shown below. (Their corresponding noise abatement criteria can be found in Section 15.0)

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. In the event that ALDOT believes it has a project specific land use that fits this category, ALDOT will coordinate with the FHWA for a formal determination.

Activity Category B:

This activity category includes the exterior impact criteria for single-family and multi-family homes.

Activity Category C:

This activity category includes the exterior impact criteria for non-residential lands (See Section 15.0). Noise levels will be measured or predicted at frequent human

use areas (for example camping areas, picnic tables, play areas, front of the structure, etc.) as determined by the noise analyst.

Activity Category D:

This activity category includes the interior impact criteria for certain Category C land use facilities. An indoor analysis will only be done after exhausting all outdoor analysis options. If there are no exterior activities to be affected by traffic noise, ALDOT will use Activity D as the basis of determining noise impacts instead of other Activity Categories. If Category C is impacted in the exterior condition, the specified noise reduction factor will be applied based on federal guidelines. If there is still a noise impact that exists based on NAC Category D impact criteria, then further investigation will be performed on the interior of the structure. Interior measurements should be taken as prescribed in FHWA guidance (Measurement of Highway Related Noise – 1996).

Activity Category E:

This activity category includes the exterior impact criteria for developed lands that are less sensitive to highway noise or any activity not included in Categories A through D or F. Commercial receptors should be counted in the same manner as residential receptors according to previously described procedures and definitions.

Activity Category F:

This activity category includes developed lands that are not sensitive to highway traffic noise. There is no impact criteria for this activity; therefore, no noise analysis is required.

Activity Category G:

This activity includes undeveloped lands. The following will be considered for this category:

(A) Whether undeveloped land is permitted for development. The milestone and its associated date for acknowledging when undeveloped land is considered permitted will 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 noise analyst will 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 noise analyst will determine noise levels in accordance with Section 13.0 of this policy and document the results in the project's environmental clearance documents. Noise abatement measures will not be considered for lands that are not permitted by the date of public knowledge.

7.0 Analysis of Noise Abatement Measures

The FHWA Noise Standard requires that noise abatement measures be considered and evaluated for feasibility and reasonableness when traffic noise impacts are identified for Type I Federal Projects.

ALDOT will determine and analyze noise abatement measures by giving weight to the benefits and cost of abatement and the overall social, economic, and environmental effects. In abating traffic noise impacts, ALDOT will give primary consideration to exterior areas where frequent human use occurs. It is ALDOT's policy not to use cost averaging among common noise environments in determining abatement measures.

When noise impacts are identified, the following are noise abatement measures that will be evaluated for reducing or eliminating noise impacts (these will be addressed in the environmental documentation):

- (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 the Noise Abatement Criteria Table (See Section 15.0). Post-installation maintenance and operational costs for noise insulation are not eligible for federal-aid funding.

The use of quieter pavements is an acceptable federal-aid noise abatement measure for federal projects if the highway agency has an FHWA-approved Quiet Pavement Pilot Program.

8.0 Feasibility and Reasonableness

In examining and evaluating whether noise abatement measures are feasible and reasonable for reducing traffic noise impacts, the following will be considered:

8.1 Feasibility

Feasibility deals with the engineering consideration which could produce a noise reduction for specific site conditions. In determining the feasibility of constructing a noise abatement measure, the abatement measure must:

- 1) Achieve a minimum of at least a 5 dB(A) highway traffic noise reduction for 70% or more of the impacted receptors.

The following are examples of additional considerations that may be used in determining the feasibility of noise abatement measures:

- 1) **Safety:** As to whether design for structural stability can be achieved. Also, as to whether the noise barrier conflicts with vehicle line-of-sight distances or clear zone requirements per the most current edition of "A Policy on Geometric

Design of Highways and Streets" (commonly referred to as the AASHTO Green Book) standards.

- 2) Topography: As to considerable changes in elevation from the roadway to the impacted receptors.
- 3) Drainage and utilities: As to whether these conflict with the design and placement of the noise abatement measure.
- 4) Maintaining access: As to whether access can be maintained when building a noise abatement measure.
- 5) Surrounding noise sources: As to whether other noise sources are present in the area such as trains, aircraft, factories, etc.

8.2 Reasonableness

The following factors in Sections 8.2.1 to 8.2.3 (based on 23 CFR 772.13(d)(2)(i), (ii) and (iii)) will be used in determining reasonableness. These three criteria must be collectively achieved in order for a noise abatement measure to be deemed reasonable. Failure to achieve all three of these criteria will result in the noise abatement measure being deemed not reasonable.

8.2.1 Cost Effectiveness of Highway Traffic Noise Abatement Measures

The cost of the abatement measures will be a consideration by ALDOT in determining the reasonableness. Abatement costing \$25,000/residence or less is deemed to be reasonable for cost. For purposes of determining the reasonable cost of highway noise barriers, an estimated cost of \$25 per square foot of barrier will be used. Each activity corresponding with Categories C, D, and E will be counted as one receptor. ALDOT will re-analyze the allowable cost for abatement on a regular interval, not to exceed five years per 23 CFR 772.13(d)(2)(ii).

8.2.2 Noise Reduction Design Goals

Another factor in determining reasonableness will be based on ALDOT's noise reduction design goal for highway traffic noise abatement measures. In abating highway traffic noise, a noise reduction of at least 10 dB(A) will be achieved by at least 65% of the benefited receptors.

8.2.3 Incorporating Viewpoints of Those Benefited

At a minimum, the viewpoints of the benefited property owners and residents (as to whether they support or oppose the measure) will be a consideration by ALDOT in determining the reasonableness of noise abatement measures. When ALDOT has determined the barrier is otherwise reasonable for the project based on the other requirements of reasonableness, ALDOT will meet the benefited property owners and residents and present information as available for the design of the proposed barrier. ALDOT will then solicit the views and opinions of the benefited property owners and residents. A 70% majority will constitute a majority viewpoint (as to whether an option is desired or not).

9.0 Inventory of Constructed Noise Abatement Measures

ALDOT will maintain an inventory of all constructed noise abatement measures. The inventory will include parameters as described in 23 CFR 772.13(f).

This information will be kept in a central location at ALDOT for submission to FHWA if requested.

10.0 Federal Participation

Type I Projects: Federal funds may be used for noise abatement measures for Type I projects when:

- (1) Traffic noise impacts have been identified; and
- (2) Abatement measures have been determined to be feasible and reasonable pursuant to 23 CFR 772.13(d).

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

11.0 Third Party Funding

Third party funding is not allowed on a Federal or Federal-Aid Type I 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 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.

12.0 Environmental Documentation

For Type I Projects, a traffic noise analysis is required for all build alternatives and the no-build alternative 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.

For Tier 1 Environmental Impact Statements or other studies that will examine broad corridors, the appropriate scope and methodology of the noise analysis will be discussed with FHWA and other participating agencies early in the project planning process.

Before adoption of a Categorical Exclusion (CE), Finding of No Significant Impact (FONSI), or Record of Decision (ROD), ALDOT will identify in the environmental document whether any noise impacts exist for a specific project and whether or not noise abatement measures are feasible or reasonable for those impacts. If the noise abatement measures are determined to be feasible and reasonable, a statement of likelihood should be included in the environmental document. FHWA's "Analysis and Abatement Guidance" should be utilized in developing this statement. The statement of likelihood should include the preliminary location and physical description of noise abatement measures determined feasible and reasonable in the preliminary

analysis. It should also indicate that the final recommendations on the construction of an abatement measure will be determined during the completion of the project's final design.

13.0 Information for Local Officials

For Type I Projects where there are undeveloped lands not permitted by the Date of Public Knowledge per Section 8.0 (G), ALDOT will provide to local officials a copy of the environmental document approved by the FHWA. Within the approved environmental document, information will be provided based on existing land use in the area and as to whether there is current potential for development as determined by the noise analyst. If there is potential for development, the information provided in the document should indicate the distances from the proposed highway edge of pavement to the approach noise level for the NAC.

If a noise analysis is not required in the environmental document for a particular project's environmental studies due to it not being a Type I Project, then local officials may make a formal request to ALDOT for this information prior to the Date of Public Knowledge. ALDOT is not responsible for providing highway traffic noise abatement for a development permitted after the "date of public knowledge".

14.0 Construction Noise

For Type I projects, receptors that are deemed sensitive to construction noise based on their land uses or activities can be considered for abatement measures such as but not limited to the following: restricting work hours within the area of the sensitive receptor, requiring contractors meet equipment muffler requirements, relocating haul roads, and requiring contractors to limit "tailgate banging". Any requirements necessary will be included in the environmental document and covered by ALDOT plans and specifications.

15.0 Noise Abatement Criteria

[Hourly A-Weighted Sound Level - decibels (dB(A)) ¹]

Activity Category	Activity Criteria ²		Evaluation Location	Activity Description
	Leq(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, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E ³	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	Undeveloped lands that are not permitted.

¹ Either Leq(h) or L₁₀(h) (but not both) may be used on a project.

² The Leq(h) and L₁₀(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

³ Includes undeveloped lands permitted for this activity category.