



**ARIZONA DEPARTMENT OF TRANSPORTATION**

**NOISE ABATEMENT POLICY**

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### Appendices

- Appendix A: 23 CFR 772  
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Appendix C: FHWA Report "Measurement of Highway-Related Noise"  
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## 1. INTRODUCTION

In the Federal-aid Highway Act of 1972, Congress required the Federal Highway Administration (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 objectives in approaching the problem of highway traffic and construction noise. In addition to defining traffic noise impacts, the FHWA Noise Standard requires that noise abatement measures be considered when traffic noise impacts are identified for Federal projects. Noise abatement measures that are found to be feasible and reasonable are eligible for Federal-aid participation in the same manner as other eligible project costs.

This document contains the Arizona Department of Transportation (ADOT) policy on highway traffic noise and construction noise and describes ADOT's implementation of the requirements of the FHWA Noise Standard at 23 Code of Federal Regulations (CFR) Part 772 (see Appendix A). This noise abatement policy was developed by ADOT and approved by FHWA.

## 2. APPLICABILITY

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

If there are any questions about whether a project is subject to this policy or the FHWA Noise Standard, contact the ADOT Environmental Planning Group Air and Noise Technical Team (602-712-7767). Due to the long lead time to complete a traffic noise study, these questions should be resolved early in the project development process.

In addition to Federal projects, this policy shall also apply to other State-funded projects that involve:

- 1) construction of a highway on new alignment; or
- 2) a significant change in the horizontal or vertical alignment of an existing highway; or
- 3) adding new through lanes to an existing highway.

The FHWA noise standard also outlines requirements for State transportation agencies that wish to develop voluntary programs to build noise barriers along existing highways, known as Type II projects. ADOT does not currently have a Type II program.

## 3. DEFINITIONS

*Abatement.* A reduction in noise level.

*Benefited Receptor.* The recipient of an abatement measure that receives a noise reduction of at least 5 dB(A).

*CFR.* The Code of Federal Regulations.

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

*Date of Public Knowledge.* The date of approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI), or the Record of Decision (ROD), as defined in 23 CFR 771. For State-funded projects, the Date of Public Knowledge is the date of approval of the appropriate environmental document.

*Decibel (dB).* A unit for measuring sound levels.

*Decibel, A-weighted Scale (dBA).* Sound levels are typically measured using a statistically weighted scale. Because the A scale most closely represents the range of human hearing, units of measurement for highway sound levels will use the A-weighted scale and be designated with dBA.

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

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

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

*FHWA.* Federal Highway Administration

*Impacted Receptor.* A receptor that has or is predicted to have noise levels higher than the noise impact threshold for their appropriate category or which is predicted to receive a substantial noise increase.

*Insertion Loss.* A term used in noise analysis to describe the projected noise reduction that results when a noise barrier is placed between a noise source and a receiver.

*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  $Leq$ .

*Level Of Service (LOS.)* A term that describes the relationship between traffic volume and traffic speed, consisting of six levels (A, B, C, D, E, and F)

*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.

*NEPA.* National Environmental Policy Act.

*Noise.* Unwanted sound.

*Noise Abatement Criteria (NAC).* Criteria established by FHWA based on land use that identify when a noise impact will occur.

*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 Impact Threshold.* The decibel level at which predicted noise levels approach the Noise Abatement Criteria (NAC)

*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.

*Predicted Noise Level.* The noise level likely to occur in the design year based on the worst expected traffic noise conditions.

*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 location used in noise modeling to represent the measured or predicted noise level at a particular point.

*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.

*Substantial noise increase.* An increase in noise levels of 15 dB(A) in the predicted noise level 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:
  - a. Substantial Horizontal Alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing conditions to the future build condition. For example, if a house is located 200' away from a transportation facility, altering the alignment of the roadway such that it is only 100' away from the house would qualify as a substantial alteration; or,
  - b. Substantial Vertical Alteration. A project that removes shielding therefore exposes 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.

*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.

#### **4. ANALYSIS OF TRAFFIC NOISE**

For Type I projects, a traffic noise analysis is required for all build alternatives under detailed study in the National Environmental Policy Act (NEPA) process. That is, all reasonable alternatives that have been retained for detailed analysis in the categorical exclusion documentation, environmental assessment or environmental impact statement and not rejected as unreasonable during the alternatives screening process. 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. This analysis must include an analysis of traffic noise impacts for each Activity Category present in the study area, and should follow the format presented in "*Traffic Noise Study Report Format Guide for Arizona Department of Transportation Projects*", included as Appendix D.

Through the traffic noise analysis and prior to the Date of Public Knowledge, ADOT will identify:

1. noise abatement measures that are feasible and reasonable; and
2. noise impacts for which no abatement appears to be feasible and reasonable; and
3. the need for further noise analysis, in the event that the design and public involvement processes are slated to continue after the approval of the NEPA documentation.

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

**a. Selection of Design Year and Logical Termini**

The Design Year for prediction of future noise levels should be the same as that used in the environmental document. Likewise, the limits of the noise impact study area should use logical termini that are in keeping with those used for the overall environmental analysis of the project. However, regardless of the logical termini used by the remainder of the project analysis, the noise impact study area must include all areas which are predicted by the noise model to be impacted by project activities.

**b. Areas of Use and Receiver Placement**

When determining locations for receiver placement when either measuring or predicting noise levels, primary consideration should be given to areas of frequent use. Balconies, patios, playgrounds, or ramadas are examples of such areas. In locations where it is not readily apparent where the areas of frequent use are located, receivers should be located near the building entrance or walkway. The noise study should indicate how many receptors are represented by each receiver.

**1. Non-Residential Land Use**

In non-residential areas such as many of the Category C, D, and E locations listed in Section 5 where the number of receptors is not easily defined, the number and placement of receivers should consider the size of the area as well as the amount and intensity of use, as follows:

- a. Determine the base number of receptors in the area: divide the total land area of the receiver by 7,500 square feet, roughly the average size of a residential lot in Arizona.
- b. Considering the intensity of use, assign one of the following values to each activity area:
  - i. .5 – Low Intensity Area. A part of an area that receives limited use, or which is used primarily during non-peak traffic hours. Possible Examples: A general use section of a park, an overflow section of a camping ground, etc.
  - ii. 1 – Moderate Intensity Area. A part of an area that receives use comparable to a standard residence. Possible Examples: a small youth activity center, a designated picnic area, etc.
  - iii. 2 – High Intensity Area. An area which is used by either a moderate amount of people constantly or by a large number of people at one time. Possible Examples: a community center or swimming pool, a busy playground, or a courtyard.
- c. Multiply the number of receivers from (a) by the intensity of use determined in (b), and place those receivers where the activity is most likely to occur. If this can't be determined, then the receivers should be distributed evenly across the area.

Example: A city park is located next to the transportation facility, and consists of an area 1000' long by 500' wide. It contains a youth swimming area (30,000 square feet, High Intensity), a picnic area (75,000 square feet, Moderate Intensity) and a Soccer Field (90,000 square feet, Moderate Intensity); the remaining 305,000 square feet of general use area is considered to be Low Intensity. The youth swimming area will be assigned 8 receptors (4 x 2), the picnic area and soccer field will be assigned 10 and 12 receptors respectively, and the remaining area will have 21 (41 x .5) receptors spread across it evenly.

### **c. Measurements of existing noise levels**

All measurements of existing noise levels must be done in accordance with “Measurements of Highway Related Noise” (FHWA-PD-96-046 DOT-VNTSC-FHWA-96-5). Noise measurements should use three sampling periods that are 15 minutes long at a minimum when determining the  $Leq(1h)$ ; in low traffic volume areas, the sampling period should be increased to 30 minutes in length.

### **d. Traffic Noise Prediction**

Pursuant to 23 CFR 772.9, the Traffic Noise Model (TNM) is the model approved by FHWA for predicting existing and future noise levels on transportation projects. Existing and future noise levels must be predicted for the no-build alternative as well as all reasonable build alternatives under consideration in the NEPA document; predictions are not required for those alternatives that have been determined to be not reasonable and therefore rejected for detailed analysis. The noise model run used to predict existing noise levels must have been validated as per 23 CFR 772.11(d)(2).

When predicting noise levels for the design year, a ‘worst-case’ approach should be used, wherein the traffic characteristics that produce the worst traffic noise impact should be used in the analysis. In general this should reflect LOS C traffic conditions during the peak noise hour, with traffic moving at 5 miles per hour above the posted speed limit; however, if future traffic volumes are less than maximum LOS C volumes then future traffic volumes will be utilized. If no other information is available, the peak hourly volume should be 10% of the predicted daily volume. An exception to this ‘worst-case’ approach is pavement type, as all TNM-noise level predictions must utilize ‘average’ pavement type unless FHWA approval to use a different pavement type has been obtained.

All noise level measurements and predictions should be rounded to the nearest whole number prior to impact determination or mitigation analysis.

### **e. Use of Noise Contour Lines**

Noise contour lines may not be used to predict future noise levels for either impact determination or abatement purposes. Upon request of the local land use planning agency or local public agency, noise contour lines may be produced during the noise analysis process for project alternative screening and use planning purposes only.

### **f. Activity Categories**

The activity categories, their NAC, and examples of receivers that fall into each category are presented in Table 1. Land which is permitted but which has not yet been developed will be considered under the appropriate category for the permitted development.

Considerations which apply only to certain categories are:

- Activity Category A: All Category A designations must be approved by FHWA on a case-by-case basis. Proposals and justifications for designating land as Category A will be submitted by ADOT to the Arizona FHWA Division Office and FHWA Headquarters.
- Activity Category B: There are no special considerations which apply specifically to Category B receivers.
- Activity Category C, Section 4(f) Properties: For properties subject to Section 4(f) protection, impacts must be evaluated by FHWA on a case-by-case basis to determine if there is a “substantial impairment” to the intended use of the property. Section 4(f) protections do not apply to state-funded projects.
- Activity Category D: An indoor analysis shall only be done after exhausting all outdoor analysis options. If there are indoor areas of use which are distinct from exterior areas of use

considered under Category C, both should be considered as separate receptors for determination of impact and cost-per-benefited receptor.

- Activity Category E: There are no special considerations which apply specifically to Category E receivers.
- Activity Category F: no highway noise analysis is required for this category.
- Activity Category G: pursuant to 23 CFR 772.17(a), predicted noise levels will be determined for each segment of undeveloped land within the study area of the project, using receivers located at and approximately 300' away from the proposed Right of Way line.

**g. Noise Impact Threshold**

While the FHWA traffic noise regulations do not define the point at which a noise level 'approaches' the NAC, each state highway agency is required to establish a definition that is at least 1 dBA less than the NAC for that land use category. The point at which noise levels approach the NAC is defined by ADOT as:

- 3 dBA for Categories A, B, C, D, and E
- There is no noise impact threshold for Category F or Category G locations.

## 5. NOISE ABATEMENT CRITERIA TABLE

Table 1 to Part 772—Noise Abatement Criteria  
[Hourly A-Weighted Sound Level decibels (dB(A))\*]

Activity Category	Activity Criteria**		Evaluation Location	Activity Description
	Leq(h)	L10(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***	67	70	Exterior	Residential
C***	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***	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

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

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

\*\*\* Includes undeveloped lands permitted for this activity category

## 6. ANALYSIS OF NOISE ABATEMENT MEASURES

When traffic noise impacts are identified, noise abatement shall be considered and evaluated for feasibility and reasonableness. Each analysis should consider the following abatement measures:

- Acquisition of Right-of-Way to provide a Buffer Zone
- Change to Horizontal or Vertical Alignment
- Insulation of Category D land use facilities when exterior noise abatement is not feasible and reasonable
- Traffic Management Measures
  - Control Devices
  - Traffic/Vehicle Restrictions
- Noise Barriers
  - Noise Walls
  - Noise Berms
  - Combination Wall/Berm

### a. Line-of-Sight

When feasible/reasonable to do so, abatement measures should be designed to at least break the line-of-sight between traffic and receivers so as to achieve the maximum noise abatement.

### b. Other Measures

1. Vegetation/Landscaping: As it requires 100' of dense evergreen vegetation to provide a noticeable reduction in noise levels, this may not be considered for abatement of highway noise.
2. Quiet Pavements: May not be used as an abatement measure on Federally funded or approved projects unless specifically included in an FHWA-approved Quiet Pavement Pilot Program.
  - a. ADOT and FHWA currently have an Agreement which allows ADOT to investigate the use of rubberized asphalt as a potential noise abatement measure for noise impacts on Type-1 projects. Application of this abatement measure is pending the results of the Quiet Pavement Pilot Program research project.

## 7. FEASIBILITY

### a. Engineering Feasibility

The initial consideration for each potential abatement measure should be the engineering factors that determine whether it is possible to design and construct the measure. These factors include:

1. Safety: abatement measures will not be constructed in such a way as to create a potential safety hazard or to inhibit response to a safety emergency.
2. Barrier height: Due to safety, structural and wind load considerations, ADOT will not normally construct noise barriers higher than 20 feet .
3. Topography: the topography of the local area may potentially preclude the use or reduce the effectiveness of certain noise abatement measures such as barriers and berms.
4. Drainage: any noise abatement measure constructed must provide for adequate drainage, both as a safety concern and to prolong the lifespan of the roadway.
5. Utilities: in the event of a conflict between existing or planned utilities and potential noise abatement measures, any extra cost involved with utility relocation or modification may be included in the wall cost when comparing against the cost-per-benefited-receptor.

6. Maintenance requirements: abatement measures must be designed and constructed in such a way as to allow access to perform maintenance activities both for the barrier and for adjacent properties.
7. Access to adjacent properties: abatement measures must not be designed or constructed in a manner that denies access to any property adjacent to the barrier.
8. Overall project purpose: the use of abatement measures must be consistent with the overall purpose of the project.

#### **b. Acoustic Feasibility**

The FHWA noise regulation at 23 CFR 772.13(d)(1)(i) requires each State highway agency to set a criterion for acoustic feasibility. In some instances, the noise level at a particular location may be affected by an alternate noise source such as other roadways/streets, railroads, industrial facilities, and airplane flight paths. In such locations, noise abatement for the proposed transportation project may not be acoustically feasible, since a substantial overall noise reduction cannot be achieved due to other noise sources. To be considered acoustically feasible, a noise abatement measure must achieve at least a 5 dB(A) reduction at 50% of impacted receptors. In such cases, the noise analysis for the location must consider the impact of the alternate noise source when determining acoustic feasibility. Regardless of the presence of alternate noise sources, barriers which are otherwise reasonable and feasible will be constructed.

### **8. REASONABLENESS**

There are three reasonableness factors or “tests” that must be met for a noise abatement measure to be considered reasonable:

#### **a. Viewpoints or Preferences of Property Owners and Residents**

The preferences of the property owners and residents of the benefited receptors of a noise barrier will be taken into account when determining whether the barrier is considered reasonable. Noise barriers that are otherwise feasible and reasonable will automatically be considered to be desired unless the public involvement aspect of the NEPA process indicates that a substantial portion of benefited receptors are opposed to the barriers. In that case, ADOT will make a good faith effort to determine the preferences of the property owners and/or legal occupants of each benefited receptor location through a survey process. If less than a 50% response rate of property owner and residents is achieved and a substantial portion of the received responses are opposed to the recommended abatement measures, then further outreach will be attempted through the use of public meetings until either a 50% response rate is achieved or it becomes apparent that such a level of response is not possible due to situational concerns. ADOT will make a decision as to the reasonableness of the recommended mitigation based on the results of this process.

#### **b. Noise Reduction Design Goal**

Noise barriers should be designed to reduce projected unmitigated noise levels by at least 7 dBA for benefited receptors closest to the transportation facility. To be considered reasonable, at least half of the benefited receptors in the first row shall achieve this level of noise reduction..

#### **c. Cost Effectiveness**

The maximum reasonable cost of abatement is \$49,000 per benefited receptor (cost-per-benefited-receptor) with barrier costs calculated at \$35 per square foot, \$55 per square foot if constructed on a structure. The cost of an abatement measure is the total cost of that measure

divided by all the benefited receptors protected by that abatement. The cost-per-benefited-receptor and barrier-cost-per-square-foot require FHWA approval, and will be re-calculated on a regular interval, not to exceed five years, in the following manner:

- The cost-per-benefited receptor is determined by taking the square-foot cost of barriers determined below and multiplying by 1400 square feet.
- The square-foot cost of barriers is determined by taking the greater of the current square-foot cost value or the average cost of construction of actual barriers for the preceding 5 years + 20%.

The current values were approved by FHWA on 07/13/2011.

### **1. Third Party Funding**

Third party funding cannot be used to make up the difference in cost between the reasonable cost-per-benefited-receptor and the actual cost of the barrier. Third party funding can only be used to pay for additional features such as landscaping, aesthetic treatments, alternative barrier materials, etc. for noise barriers that are feasible and already meet cost-effectiveness criteria.

## **9. INVENTORY AND REPORTING OF ABATEMENT MEASURES**

ADOT shall maintain an inventory of all constructed noise abatement measures, including 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 final noise analysis or most recent addendum;
- NAC category(s) protected;
- Material(s) used in construction (i.e., precast concrete, berm, block, cast in place concrete, brick, metal, wood, fiberglass, combination, plastic [transparent, opaque, other];
- Features (i.e., absorptive, reflective, surface texture);
- Foundation (ground mounted, on structure); and
- Project type (Type I, Type II, and optional project types such as State funded, county funded, tollway/turnpike funded, other, unknown).

This information shall be reported to FHWA as requested by either the FHWA Division office or FHWA Resource Center

## **10. INTERACTION WITH LOCAL JURISDICTIONS**

### **a. Consultation with Local Jurisdictions**

ADOT will consult with all local jurisdictions as part of the noise analysis process, and will consider the wishes of the local jurisdiction when considering noise abatement measures.

### **b. Use of Local Jurisdiction Noise Abatement Policies on FHWA Projects**

Any FHWA-funded or –approved project which is administered by a Local Public Agency and which meets the requirements for a Type I project will utilize the ADOT Noise Abatement

Policy for determination of traffic noise impacts and feasibility/reasonableness of potential noise abatement.

**c. Noise Compatible Land Use Planning**

For any project where there are Category G lands, future noise levels at and approximately 300' away from the right of way line will be predicted for each segment of undeveloped lands. Following FHWA approval of the Noise Study Technical Report, this information will be made available to the local officials with the responsibility for making zoning/permitting decisions for that location.

This information will be accompanied by the statement: "This information is presented purely to assist with noise-compatible land use planning decision making. Abatement for lands permitted after the Date of Public Knowledge for this project is not eligible for Federal Aid."

**11. FEDERAL PARTICIPATION**

For Type I projects, federal funds may be used for noise abatement measures when traffic noise impacts have been identified and abatement measures have been determined to be feasible and reasonable. These abatement measures which may be considered include noise barriers, traffic management measures, horizontal or vertical alignment alterations, acquisition of property to serve as a buffer zone, or noise insulation of activity category D land use facilities. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

**12. CONSTRUCTION NOISE**

ADOT's Standard Specifications for Highway and Bridge Construction (ADOT 2008b) stipulate that all exhaust systems on equipment should be in good working order and properly designed engine enclosures and intake silencers should be used where appropriate. The Standard Specifications also stipulate that ADOT employees and contractors will follow all local rules and ordinances; this includes any local ordinances related to construction site and equipment.

For all Type I Projects, ADOT will consider the effects of noise from project construction activities and will determine any additional measures that are needed in the plans or specifications to minimize or eliminate adverse impacts from construction noise. To minimize noise impacts during construction, each noise study should recommend that stationary or idling equipment be located as far away from receptors as possible. Any abatement measures dealing with construction noise determined to be necessary, reasonable, and feasible will be included in the project plans and specifications.