

## Appendix C

# NDOT Traffic and Construction Noise Analysis and Abatement Policy







STATE OF NEVADA  
DEPARTMENT OF TRANSPORTATION

TRAFFIC AND CONSTRUCTION NOISE  
ANALYSIS AND ABATEMENT POLICY

Effective May 15, 2018

## INTRODUCTION

This document presents the State of Nevada, Department of Transportation (NDOT) *Traffic and Construction Noise Analysis and Abatement Policy* (Policy) for highway traffic and construction noise. The Policy defines NDOT's application of the FHWA Noise Standard as contained in 23 Code of Federal Regulations (CFR) Part 772 and current *Highway Traffic Noise: Analysis and Abatement Guidance* (FHWA Traffic Noise Guidance).

The 23 CFR Part 772 and FHWA Traffic Noise Guidance are key to directing a traffic noise study. These are incorporated by reference to the Policy and provide the foundation for a traffic noise study. They can be accessed on the FHWA Highway Traffic Noise website: [http://www.fhwa.dot.gov/environment/noise/regulations\\_and\\_guidance/](http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/).

Refer to these for additional information on definitions, applicability, traffic noise prediction, analysis of traffic noise impacts, analysis of traffic noise abatement, federal participation, information for local officials, and construction noise. The 23 CFR Part 772, FHWA Traffic Noise Guidance, and this Policy shall be used to conduct the appropriate study.

Consultants conducting traffic noise analysis for NDOT or Federal and Federal aid projects shall work closely with the NDOT Environmental Services Division as early as practical in the project process. Additional information on completing a traffic noise study is in the referenced 23 CFR Part 772 and the FHWA Traffic Noise Guidance.

## PURPOSE

The Policy presents NDOT's program to define and implement 23 CFR Part 772. The standards include requirements for highway traffic noise analysis, impact assessment, and abatement evaluation, noise abatement criteria, and requirement for providing information to local officials. This policy describes NDOT's approach implementing those areas where FHWA has given state highway agencies flexibility.

## APPLICABILITY

The Policy uniformly applies to all Type I Federal and Federal-aid highway projects as outlined in 23 CFR Part 772.7 and the FHWA Traffic Noise Guidance. This includes Federal and Federal-aid projects that are administered by Local Public Agencies (LPAs). For assistance in evaluating the applicability of the Policy, consult the NDOT Environmental Services Division.

## PROJECT TYPES

As defined in 23 CFR Part 772, the Policy applies to all Type I Federal or Federal-aid projects. Type II projects are a proposed Federal or Federal-aid project for traffic noise abatement on an existing roadway where there is no improvement to the roadway itself that increases the vehicle-carrying capacity. Type II programs are voluntary and at the discretion of the state highway agency. Nevada does not have a Type II program or policy. Any Federal-aid project that does not currently fit into a Type I or Type II project, is a Type III project.

## DEFINITIONS

Definitions are presented in 23 CFR 772.5, the FHWA Traffic Noise Guidance and this Policy and shall be used. Additional NDOT-defined terminology includes:

*Approach level:* 1 dB(A)- $L_{eq}(h)$  less than the Noise Abatement Criteria (NAC) for Activity Categories A to E when determining a traffic noise impact

*Noise reduction design goal:* 8 dB(A)- $L_{eq}(h)$ . This shall be the level of traffic noise reduction achieved, if all criteria are satisfied. Each project shall be evaluated for achieving this goal, or as close to this goal that can be attained. The acoustical feasibility is a minimum requirement that will allow constructing a traffic noise abatement measure (TNAM) but may not be the final design.

*Substantial noise increase:* 12 dB(A)- $L_{eq}(h)$  over existing noise levels.

## TRAFFIC NOISE PREDICTION

The traffic noise prediction is described in 23 CFR 772.9 and the FHWA Traffic Noise Guidance. The FHWA Traffic Noise Model, TNM 2.5, or the most current version of TNM, will be used to predict traffic noise. If other models are found acceptable to FHWA and pursuant to 23 CFR 772.9, they may be proposed and will be evaluated on a case-by-case basis. FHWA-approved traffic noise screening tools and processes shall be used when applicable. NDOT does not allow the use of noise contour lines. The posted speed limit shall be used to predict highway traffic noise levels.

## ANALYSIS OF TRAFFIC NOISE IMPACTS

The traffic noise impact analysis is described in 23 CFR 772.11 and the FHWA Traffic Noise Guidance. NDOT has established the “approach level” to be 1 dB(A) less than the NAC for Activity Categories A to E when determining a traffic noise impact. NDOT has defined the “substantial noise increase” to be 12 dB(A)- $L_{eq}(h)$  over existing noise levels. The “substantial noise increase” is independent of the absolute noise level. The noise analysis will determine all traffic noise impacts from the project.

Receptor locations for highway traffic noise analysis shall typically be at ground level, or first-floor; and, at an exterior area where frequent human activity occurs, between the right-of-way line and building. Impacted receptors shall be identified or grouped by unique identification numbers. Activity Category B, multi-family dwelling units, shall be analyzed by identifying exterior areas of frequent human use and ascertaining the number of dwelling units.

NDOT shall evaluate eligible Activity Categories C and D areas by utilizing the “equivalent number of residences” method. This shall be completed in the manner of the example below taken from the FHWA Traffic Noise Guidance.

*This approach involves identifying the representative lot size of residential development and dividing the land area of portion of the park that is within the study area by the area of the representative lot size. For example, the typical lot size in a community is 60'x120' or 7,200 square feet (SF). Noise modeling predicts noise impacts from the project to a distance of 350 feet. A park in the community is adjacent to the project and has 1000' of frontage. The total impacted area of the park is 350,000 (SF). Dividing this by the typical lot size of 7,200 SF for an equivalent number of receivers, results in 48.6. Therefore, the park is representative of 49 receivers.*

Activity Category E shall be analyzed in the manner applied to Activity Category B, multi-family residences.

In addition, Activity Categories C, D, and E shall be evaluated considering a use factor, as available. This will examine the actual amount of time used, the time of day used, and seasonal use at the Activity Category. Determining subsequent traffic noise impacts and any resulting TNAM shall be weighted accordingly.

### ANALYSIS OF TRAFFIC NOISE ABATEMENT

Analysis of traffic noise abatement is described in 23 CFR 772.13 and the FHWA Traffic Noise Guidance. NDOT will primarily consider noise barriers, typically concrete, for traffic noise abatement. Absorptive treatments will not be considered. NDOT will utilize cost averaging as allowed in 23 CFR 772.13(k). NDOT does not participate in the FHWA Quieter Pavement Program. Pavement type cannot be considered in analysis nor used as a TNAM.

### FEASIBILITY

The feasibility of traffic noise abatement is described in 23 CFR 772.13(d)(1) and the FHWA Traffic Noise Guidance. NDOT considers a TNAM that achieves at least a 5 dB(A) reduction for 50% of the first, or front, row of impacted receptors as acoustically feasible. This is the minimum requirement and does not preclude achieving the noise reduction design goal. The noise reduction design goal shall be achieved if criteria can be satisfied.

Engineering feasibility affecting the final design and placement of sound barriers may be controlled by numerous factors including: topography, barrier height, structural capabilities, access requirements, existing roadways, utilities, drainage, maintenance, other noise sources, safety considerations, or other project specific factors. Engineering feasibility will be evaluated according to the current edition of the American Association of State Highway Transportation Officials (AASHTO) publication "A Policy on Geometric Design of Highways and Streets", (a.k.a. AASHTO Green Book). Sound barrier design requirements are also addressed in project contract documents and per the NDOT Structure Division's *Structures Manual*, 2008. Contact the NDOT Structural Design Division at 1-775-888-7540.

### REASONABLENESS

Reasonableness is described in 23 CFR 772.13(d)(2) and the FHWA Traffic Noise Guidance. Three of the criteria used to evaluate the reasonableness of eligible mitigation under consideration are: the points-of-view of the benefitted property owners and residents, the cost effectiveness of the TNAM, and the noise reduction design goal. NDOT has defined the traffic noise reduction design goal as 8 dB(A).

The TNAM (e.g., noise barriers) will be constructed as modeled and designed unless enough benefitted receptors are opposed to their construction, as described below. The viewpoints of the benefitted receptors will be solicited during the NEPA public involvement process and before the date of public knowledge. After the date of public knowledge, benefitted receptors cannot petition to alter the proposed TNAM. The proposed TNAM will be constructed as refined during project final design. Non-benefitted receptors cannot participate and cannot alter a proposed TNAM. Benefitted receptors of one TNAM cannot participate and cannot alter other proposed TNAMs from which they do not receive a qualifying benefit.

To be considered, responses from benefitted receptors shall be submitted in writing or documented in the record during a public hearing and/or meeting. The respondent's status with the property shall be clearly identified and their standing validated to allow participation. In the case of rental properties, views of both the owner and the legal resident(s) will be considered in the decision-making process. However, if opposing views over the TNAM develop between the property owner of a benefitted property and its legal occupant(s), the preference of the property owner will take precedence.

To alter a proposed TNAM, two criteria must be met. First, to initiate reconsideration of the proposed TNAM, a qualifying response from a majority (50%, plus one [1]) of all the valid identified benefitted receptors of that TNAM must be received prior to the date of public knowledge.

On meeting the first criteria, a ballot will then be sent via U.S. certified mail to the benefitted receptors for that TNAM. It will request their vote on retaining or removing the proposed TNAM. A TNAM must retain all other criteria necessary to allow it to be funded. If a ballot is not received from a benefitted receptor after 30 calendar days from mailing, a second ballot will be sent under the same conditions. If no response is received or the U.S. Postal Service could not deliver a ballot and it is returned, it will be noted in the administrative record and further attempts will not be made.

The following scoring system will be used for returned, valid ballots and the tallied results must support any change to the proposed TNAM. The area of the removed TNAM will not be eligible for future consideration of a TNAM. If a valid change is enacted and the proposed TNAM is altered, the final voting results will be sent to all the identified benefitted receptors for that TNAM.

The preferences of benefitted receptors will be evaluated and tallied as follows per returned ballot:

- Those receiving a 7 or greater dB(A) reduction in projected traffic noise levels shall receive three points.
- Those receiving a 6 dB(A) reduction in projected traffic noise levels shall receive two points.
- Those receiving a 5 dB(A) reduction in projected traffic noise levels shall receive one point.
- Those receiving less than a 5 dB(A) reduction in projected traffic noise levels are not a benefitted receptor and shall not participate.

A cost-benefit analysis will be prepared to evaluate the TNAM. A maximum construction cost of \$50,000 (2018 U.S. dollars [USD]) is allotted per benefitted receptor (i.e., dwelling, equivalent unit) that satisfies criteria. This allowance will be evaluated at least every five years.

The range of cost-to-construct values are dependent on type of TNAM (e.g., precast concrete versus cast-in-place concrete noise barrier). Proposed noise barrier type shall meet prescribed specifications of reducing traffic noise. Precast concrete barriers, i.e., post and panel, are the most commonly used TNAM. To satisfy the cost effectiveness for a precast

concrete noise barrier, \$35 per square foot (SF) (2018 USD) is used in the cost reasonable calculation. The cost effectiveness is evaluated only on factors to construct (e.g., materials and labor). It does not require considering other costs, such as engineering/design, acquiring right-of-way, drainage, traffic control, or utility relocation. Deviations from this will be evaluated on a case-by-case situation as allowed per regulation, guidance, policy, and practice. The cost-to-construct value will be reevaluated at least every five years.

As provided in 23 CFR 772.13(k) on Type I projects, FHWA delegates to the highway agency the option to cost average traffic noise abatement among benefitted receptors within common noise environments. NDOT allows the cost averaging option as outlined in the CFR.

### FEDERAL PARTICIPATION

Federal participation is described in 23 CFR 772.15 and the FHWA Traffic Noise Guidance.

### INFORMATION FOR LOCAL OFFICIALS

Information for local officials is described in 23 CFR 772.17 and the FHWA Traffic Noise Guidance. Local officials will be informed of potential traffic noise impacts to land adjacent to a proposed highway project to protect future noise sensitive land development from becoming incompatible with traffic noise levels. This will be performed during the NEPA process and available on NDOT's website.

Traffic noise abatement for development adjacent to the highway occurring after the date of public knowledge is the responsibility of local municipalities. Provision for such noise abatement becomes the responsibility of local communities and private developers. After the date of public knowledge, NDOT will be available for analyzing changes in traffic noise impacts, when appropriate and deemed necessary.

### CONSTRUCTION NOISE

Construction noise is described in 23 CFR 772.19. Procedures to minimize construction noise impacts, while considering traffic impacts, will be addressed on a project-by-project basis. When reasonable and feasible, project TNAM will be constructed as early in the project as possible to provide mitigation from construction noise.

### QUALIFICATIONS TO PERFORM TRAFFIC NOISE ANALYSIS

Only personnel qualified in the field of highway traffic noise analysis shall be responsible for the highway traffic noise analysis on FHWA/NDOT transportation improvement projects or within NDOT right-of-way. If junior personnel don't have this experience, they must be working under more senior personnel who have all required training and experience.

Personnel shall have demonstrated experience in conducting traffic noise analyses for transportation improvement projects and must have exhibited a working knowledge of the procedures and policies outlined in:

- The Federal regulation (23 CFR 772) and its accompanying noise guidance material developed by FHWA (current version);



- The NDOT Traffic and Construction Noise Analysis and Abatement Policy (current version);
- Report Number FHWA-PD-96-046, "Measurements of Highway-Related Noise," <http://www.fhwa.dot.gov/environment/noise/measurement/measure.cfm>; and,
- Any subsequent regulation, procedure, guidance or policy issued.

The qualified individual must have successfully completed, been involved in the development and/or instruction of and demonstrate equivalent and proficient experience with the following:

- Highway traffic noise analysis training provided by FHWA and/or the National Highway Institute (NHI); and,
- Training on the most currently approved FHWA traffic noise analysis computer model(s), through a qualified provider.

Refresher and additional training may be necessary because of advanced highway traffic noise modeling technology or changes in highway traffic noise policy and/or procedure. A copy of the certificate of training and documentation of equivalent experience shall be included in their employer's prequalification packet and with submitted analysis and reports.

### POLICY REVISIONS

The Policy was originally issued April 18, 2011 and approved for use beginning July 13, 2011. It was revised as follows.

- August 1, 2012: added qualifications necessary to preform traffic noise analysis as an appendix;
- September 26, 2012: removed appendices containing 23 CFR 772 and the FHWA Noise Guidance and replaced with a weblink;
- June 1, 2016: added statement in *Analysis of Traffic Noise Abatement* section allowing cost averaging per 23 CFR 772.13(k);
- March 1, 2017: moved from appendix and incorporated qualifications to perform noise analysis and cost averaging into body of policy;
- December 1, 2017: clarified language and updated values under *Traffic Noise Prediction, Analysis of Traffic Noise Abatement* and *Reasonableness* sections; and,
- May 15, 2018: added clarifying language.

The latest revised Policy shall apply to projects requiring a traffic noise study that were initiated after the effective revision date. It may also apply to other studies not yet completed before the effective revision date and will be evaluated for applicability, satisfying criteria, and enhancements to proposed TNAM for those ongoing studies.