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Protecting the Human Environment

As suburban sprawl increases the need for expanded transportation systems, traffic noise continues to infiltrate our once-quiet communities. Studies have identified links between traffic noise and stress-related health issues such as hypertension, high blood pressure, and even heart disease. For this reason, legislation such as the Noise Control Act of 1972 seeks to “promote an environment for all Americans free from noise that jeopardizes their health and welfare.”

In July 1982, the Federal Highway Administration (FHWA) enacted regulations to assess and mitigate traffic noise within the Code of Federal Regulations (Title 23, Part 772). These regulations established a clear set of guidelines and procedures for the study and mitigation of traffic noise on all federally aided highway projects, thus forming the foundation of every individual state’s noise abatement policy.

The determination of noise impacts and the consideration for abatement has been simplified into a three-phase question: Is traffic noise mitigation *warranted*, is it *feasible*, and is it *reasonable*? The three parts of this question must be answered sequentially before mitigation will be proposed for a transportation project.



Increased travel demand continues to drive the need for thoughtful traffic noise abatement that considers the public’s needs and concerns.

Warranted Noise Mitigation

There are two primary considerations for determining whether noise abatement is warranted. The first is the Noise Abatement Criteria (NAC) established by the FHWA. The NAC for a site is determined by its land use. Table 1 shows a list of land use categories and their NACs expressed as “hourly equivalent A-weighted decibels” (dBA). “A-weighted decibels” measure noise levels on the A-weighted scale, which emphasizes the frequency range that is perceptible to human hearing. “Hourly-equivalent” refers to the

standardized method of calculating sound energy over a one-hour period. The most common land use of concern for transportation projects is certified as Category B, which addresses residential communities and other public-use structures sensitive to noise.

Through a protocol of field measurements and computerized modeling, comparative analysis of the existing traffic noise levels and the future predicted noise levels is accomplished. If future noise levels “approach or exceed” the state-specific

TABLE 1 FHWA Noise Abatement Criteria Hourly A-Weighted Sound Level – Decibels (dBA)		
Activity Group	One Hour Equivalent Level (Leq(h), dBA)	Description
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 purposes.
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.

Source: Title 23 Code of Federal Regulations, Part 772, “Procedures for Abatement of Highway Traffic Noise and Construction Noise.”

impact levels (derived from the federal regulations), noise abatement is considered warranted.

The second consideration for warranted noise mitigation is the substantial increase criterion. Special attention is provided for areas that experience an increase of 10 dBA or more due to future traffic levels even when they do not exceed the NAC for that land use category. A 10-dBA increase is significant in that the perceived noise level change seems twice as loud to the individual.

Feasible Noise Mitigation

Feasibility of noise abatement involves the deliberation of several factors. Is it possible to establish a perceptible reduction in noise levels in areas that warrant consideration? Does the proposed mitigation restrict access, or create safety or maintenance issues? These questions as well as consideration for utilities and drainage are all investigated when determining feasibility.

The primary concern begins with the ability for abatement to be effective. The minimum requirement for feasible mitigation varies by state, but generally the goal is the same: reduce noise to achieve levels below the NAC and by an amount that is noticeable to the majority of sites within

an affected area.

Coordination between noise analysts and design engineers throughout the project design process is a key component to feasible mitigation. This ensures the constructability of the proposed mitigation and allows proactive resolution of engineering conflicts or concerns. Additionally, some engineering design features can assist with traffic noise reductions without requiring noise barriers. Incorporation of earthen berms or alteration of the vertical profile can provide substantial acoustical benefit. Coordination with the roadway design team at an early stage has the potential to yield more efficient and beneficial results.

Reasonable Noise Mitigation

The final phase for considering noise abatement deals with the reasonableness of the proposed mitigation. The first determination focuses on the cost of the mitigation itself. For vertical barriers, the calculated cost of the wall is compared to the number of dwellings that receive a “benefit” from the barrier system. Similar cost considerations are utilized for earthen berms, but they are less commonly proposed given the need for increased right-of-way to accommodate berm slopes.


A dwelling must receive a noise reduction

directly from the proposed mitigation for it to be considered benefited. Design goals require that the majority of impacted sites within a community receive prescribed noise level reductions to be considered benefited. However, if a significant acoustical benefit can be achieved, noise level reductions may extend to non-impacted sites.

Community Outreach

Noise barriers are unique to the transportation process in that their inclusion in a project must to some extent be approved by the public. Noise barriers are designed to protect the adjacent communities, but must also be desired by the target community. As such, a voting process is typically employed to ensure that barriers are the preferred solution for the community. In cases where abatement is not uniformly desired, compromise solutions are sought. These can include reductions to barrier length or height as necessary (and as acoustically feasible), but most often these conflicts are resolved through community outreach forums.

In the end, noise abatement is all about the public. Its inclusion in the process is intended to lessen the impacts of necessary transportation enhancements for those living closest to these facilities. The design goals are established to provide noticeable noise reductions and maintain the public’s quality of life.



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FHWA Traffic Noise Model
2.5 Certification

Mr. Schiller has extensive experience with all phases of traffic noise analysis. These skills include design and traffic data evaluation, field monitoring, TNM modeling, project documentation, and public outreach.

