

GLOSSARY

23 CFR 772. (Title 23, Code of Federal Regulations, Part 772) “Procedures for Abatement of Highway Traffic Noise and Construction Noise”: FHWA regulations for highway traffic noise analysis and abatement during the planning and design of federally aided highway projects.

Abatement. Any positive action taken to reduce the impact of highway traffic noise.

Absolute Noise Levels. The predicted design-year noise level at the receptor without noise abatement.

Absorptive Noise Wall. Noise walls that tend to absorb noise.

Attenuation. The reduction of an acoustic signal.

Auxiliary Lane. The American Association of State Highway Transportation Officials (AASHTO) defines an auxiliary lane as the portion of the roadway adjoining the traveled way for speed change, turning, weaving, truck climbing, maneuvering of entering and leaving traffic, and other purposes supplementary to through-traffic movement (AASHTO, 2001).

The Department will take a broad approach to defining auxiliary lanes with respect to defining a Type I project for noise analysis. FHWA states that auxiliary lanes 2,500’ or longer should be considered a Type 1 project. For auxiliary lanes shorter than 2,500’ in length, consideration for auxiliary lanes should be limited to those that could be used as a through lane (including bus or truck lanes) rather than lanes used for parking, speed change, turning or storage for weaving. For interstates, auxiliary lanes considered to be Type 1 projects are those that are:

3. more than 2,500’ long, and;
4. are between two closely spaced interchanges or carried through one or more interchanges.

The final determination regarding Type 1 project classification will be left to the IDOT District and the Bureau of Design and Environment, on a case-by-case basis.

Average Daily Traffic (ADT). The total traffic volume during a given period divided by the number of days in that period. Current ADT volumes can be determined by continuous traffic counts or periodic counts.

A-Weighted Levels. Adjustment or weighting of sound frequencies to approximate the way that the average person hears sounds. This weighting system assigns a weight that is related to how sensitive the human ear is to each sound frequency. Frequencies that are less sensitive to the human ear are weighted less than those for which the ear is more sensitive. A-weighted sound levels are expressed in decibel units “dB(A)”.

Barrier. A solid wall or earth berm located between the roadway and receptor location which provides noise reduction.

Benefited Receptor. The recipient of an abatement measure that receives a noise reduction of 5 dB(A) or greater. A benefited receptor does not need to be an impacted receptor.

Build Condition. Projected traffic volumes using the proposed roadway configuration.

Clear Zone. Area adjacent to a roadway that is void of roadside hazards, and varies according to roadway and roadside conditions and design speeds.

Common Noise Environment (CNE). A group of receptors within the same Activity Category that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. Generally, CNEs occur between two secondary noise sources, such as interchanges, intersections, or cross-roads.

Context Sensitive Solutions (CSS). An approach that seeks involvement of the public early and throughout project development to consider a public input and a project's surroundings, or context, in decision making.

Date of Public Knowledge. The date of environmental approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI) for an Environmental Assessment (EA), or the Record of Decision (ROD) for an Environmental Impact Statement (EIS), as defined in 23 CFR Part 771.

Decibels (dB). Units for measuring sound. Decibels are logarithmic units.

Design Hourly Volume (DHV). The 30th highest hourly volume in a year.

Design Year. The future year used to estimate the probable traffic volume for which a highway is designed. For NEPA, IDOT uses the latest approved traffic projections from the appropriate Metropolitan Planning Organization (MPO). For locations outside the planning area of an MPO, the design year traffic volumes shall be consistent with the traffic projections used for design.

dB(A). Decibels measured using the A-weighted scale.

Engine Braking. The act of using the energy-requiring compression of an internal combustion engine to slow down a vehicle which typically results in noise pollution.

Existing Noise Levels. The worst hourly noise level resulting from the combination of natural and mechanical sources and human activity usually present in a particular area at the time the noise analysis is performed.

Facility or Existing Highway. Any of the freeways, expressways, or various classes of roads and streets that make up the highway system under the jurisdiction of IDOT.

Feasibility. The combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure. The acoustical criterion for feasibility requires a minimum 5 dB(A) traffic noise reduction at a minimum of two impacted receptor locations.

FHWA. Federal Highway Administration.

Front Row Receptor. Receptor whose property is adjacent to the proposed noise barrier (see Figure 4-3).

Frequencies. The number of cycles of a periodic motion in a unit of time. Noise frequencies are measured in Hertz (Hz).

ETA. Federal Transit Authority.

Fully Controlled-Access State Highway. A highway under IDOT jurisdiction with no at-grade intersections and no driveway access points.

Hard Site. Hard ground conditions, such as asphalt or concrete, that tend to reflect noise.

Heavy Trucks. All vehicles having three or more axles and designed for the transportation of cargo.

Hertz (Hz). The unit of frequency for sound; one Hertz has a periodic interval of one second.

Impact. See: Traffic Noise Impact.

Impacted Receptor. The recipient that has a traffic noise impact.

Insertion Loss. The actual noise level reduction derived from the construction of a noise barrier.

L_{dn} (Day/Night average sound level). Average sound exposure over a 24-hour period is often presented as a day-night average sound level (L_{dn}). L_{dn} values are calculated from hourly L_{eq} values, with the L_{eq} values for the nighttime period (10:00 p.m. to 7:00 a.m.) increased by 10 dB to reflect the greater disturbance potential from nighttime noises.

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} .

Level of Service (LOS). A quantitative stratification of a performance measure that represents quality of traffic flow, measured on an A to F scale, with LOS A representing the best operating traffic conditions from the traveler's perspective and LOS F the worst

Line of Sight (Barrier) An obstruction, generally a solid wall or an earth berm, located between a noise source and a receiver.

Line of Sight (Traffic). The line of vision between a receptor and a noise source.

Line Source. Many single noise sources close together (i.e., multiple vehicles on a roadway).

L_{max} . The maximum sound level measured over a time period.

L_{min} . Lowest sound level measured in a given environment over a specified period of time.

Logarithmic. A logarithm is a short hand way to represent large numbers. A logarithmic scale increases consecutive numbers by a factor of 10. For example; $\log 1,000 = 3$; $\log 10,000 = 4$; $\log 100,000 = 5$, etc.

Medium trucks. All vehicles having two axles and six wheels designed for the transportation of cargo.

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.

National Environmental Policy Act (NEPA). NEPA requires Federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. IDOT's Phase I project development includes NEPA and preliminary design. The completion of NEPA requires an approved Categorical Exclusion, a Finding of No Significant Impact (for an Environmental Assessment), or a Record of Decision (for an Environmental Impact Statement).

No-Action Condition. Modeling future (design year) traffic volumes using the existing roadway configuration.

Noise Abatement. Measures taken to mitigate or reduce traffic noise impacts (i.e., construction of berms or noise walls, shifting roadway alignment, etc.).

Noise Abatement Criteria (NAC). Noise impact thresholds for considering noise abatement for various land uses. Defined in 23 CFR Part 772.

Noise Barrier. A physical obstruction (i.e., stand alone noise walls, noise berms (earth or other material), and combination berm/wall systems) that is constructed between the highway noise source and the noise sensitive receptor(s) that lowers the noise level at the receptor location.

Noise Reduction Coefficient (NRC). A scalar representation of the sound absorbing capability of a material. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.

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. The noise reduction goal is at least 8 dB(A) for at least one benefited receptor location.

Octave Band. A group of frequencies whose lower boundary is one-half of the upper boundary. In acoustics, the first eight octave bands are identified by their center frequencies of 63, 125, 250, 500, 1,000, 2,000, 4,000, and 8,000 Hertz.

Parallel Noise Walls. Proposed noise walls that are located across from one another on opposite sides of a highway.

Peak Hourly Traffic. The highest hourly traffic volume of the day.

Peak Particle Acceleration (PPA). Maximum instantaneous particle acceleration associated with a vibratory event.

Peak Particle Velocity (PPV). Maximum instantaneous particle velocity associated with a vibratory event.

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.

Point Source. One single noise source (i.e., one vehicle).

Property Owner. An individual or group of individuals who hold(s) 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.

Receptor. A discrete or representative location of a CNE(s), for any of the land uses listed in Table 2-1.

Reflective Barriers. Barriers that tend to return noise to the direction of its source.

Residence. A dwelling unit. Either a single family residence or each dwelling unit in a multifamily dwelling.

Sight Screen. A structure that blocks the sight of a highway or roadway, i.e., a solid fence, landscaping, or vegetation. A sight screen would not be considered a noise abatement measure.

Soft Site. Soft ground conditions, such as grass, that tends to absorb noise.

Statement of Likelihood. A statement provided in the NEPA document based on the feasibility and reasonableness analysis completed at the time the NEPA document is being approved.

Stopping Sight Distance. Sum of the brake reaction distance (the distance traveled between the time the driver sees an obstruction to when the brake is applied) and the braking distance (the distance traveled while braking the vehicle to a stop).

Substantial Construction. The granting of a building permit by the local governing entity with permitting authority, prior to right-of-way acquisition or construction approval for the highway.

Substantial Noise Increase. One of two types of highway traffic noise impacts. For an IDOT project, this is defined as an increase in noise levels of greater than 14 dB(A) in the design year over the existing noise level.

TNM. Traffic Noise Model. FHWA's computer program for highway traffic noise prediction and analysis.

Traffic Noise Impacts. Design year build condition noise levels that approach or exceed the Noise Abatement Criteria (NAC) listed in Table 2-1 for the future build condition; or design year build condition noise levels that create a substantial noise increase over existing noise levels. For purposes of the IDOT policy, approach is defined as within 1 dB(A) of the NAC. Substantial increase is considered to be at least 15 dB(A).

Transmission Loss (TL). The accumulated decrease in acoustical intensity as an acoustic pressure wave propagates outwards from a noise source.

Type I Project.

The FHWA definition of a Type I Project includes the following:

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- The construction of a highway on new location; or,
- The physical alteration of an existing highway where there is either:
 - + *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,
 - + *Substantial Vertical Alteration*. A project that removes shielding and 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,
- The addition of a 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,
- The addition of an auxiliary lane⁷, except for when the auxiliary lane is a turn lane; or,
- The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
- Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,
- The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

If any part of a project is determined to be a Type I project under this definition, then the entire project area as defined in the NEPA document is a Type I project.

Type II Project. A Federal or Federal-aid highway project for noise abatement on an existing highway. IDOT does not maintain a Type II program.

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.

Undeveloped Lands. Those tracts of land or portions thereof that do not contain improvements or activities devoted to frequent human habitation or use (including low-density recreational use) and for which no such improvements or activities are permitted.

USEPA. United States Environmental Protection Agency.

Worst Hourly Traffic Noise. The noise level resulting from the highest hourly volume a facility can handle while maintaining stable flow. This traffic volume will be either the design hourly volume or the maximum volume that can be accommodated under Level of Service C (i.e., where high traffic volumes begin to restrict speed and drivers' maneuverability).

⁷ See glossary definition of auxiliary lane