

Soundwalls

TRAFFIC NOISE STUDY AND ABATEMENT POLICY ILLINOIS STATE TOLL HIGHWAY AUTHORITY

1.0 PURPOSE AND OVERVIEW

On September 30, 2004 the Illinois Tollway's (Tollway) Board of Directors approved the 10-year, \$5.3 billion Congestion-Relief Plan (CRP): Open Roads for a Faster Future. The Tollway's Traffic Noise Study and Abatement Policy update provides an opportunity to evaluate traffic noise throughout the implementation of the CRP.

The Tollway's current policy addresses guidelines and procedures for initiating traffic noise studies and considering traffic noise abatement. The policy first establishes the eligibility requirements for a Traffic Noise Study. The policy then establishes the requirements for considering the construction of traffic noise abatement structures when they are feasible and reasonable.

The traffic noise analysis guidance provided in this policy is based largely on the regulatory material that is found in Title 23 Code of Federal Regulations Part 772 (23 CFR Part 772) entitled "Procedures for Abatement of Highway Traffic Noise and Construction Noise".

The initial traffic noise impact assessment for all projects will be a cursory review. This assessment would determine if noise sensitive receptors are within the project limits, if traffic noise impacts are already present, if future traffic noise levels are likely to increase and if future traffic noise impacts will occur. This review would include assessment of existing and proposed land use plans, review of aerial photography, a review of prior studies, and a representative number of short-term 15-minute Leq traffic noise measurements.

If initial traffic noise impact assessments indicate the possibility of future traffic noise impacts, then a Traffic Noise Study will be performed. A detailed technical memorandum will be prepared to document the assumptions, data, procedures, results and traffic noise abatement considerations and recommendations from

2.0 DEFINITIONS

Approach - For the purpose of this policy, approaching means within 1 decibel (dBA) of the appropriate Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC) as adopted by the Illinois State Toll Highway Authority.

dBA – A weighted decibel. The decibel is a unit of measurement on a logarithmic scale that describes the relative magnitude of sound levels with respect to a standard reference value. Decibels are defined as ten times the base-10 logarithm of the square of the ratio of the mean-square sound pressure to the reference mean-square sound pressure of 20 micro-Pascals, the threshold of human hearing. The A-weighting network is an electronic filter defined by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) that closely simulates the relative response of the human ear.

Date of Public Knowledge – This is the date that the Tollway's Congestion-Relief Plan (CRP): Open Roads for a Faster Future was approved. This date, September 30, 2004, establishes the "Date of Public Knowledge" and determines when the Illinois Tollway is no longer responsible for providing noise abatement for new developments adjacent to projects included in the CRP.

Exterior Traffic-Generated Noise – This is traffic-generated noise that is measured on the exterior of the receptor as opposed to the interior. The noise model (TNM®) and Policy generally refer to exterior noise only.

Front Line Land Use – The first line land use that is immediately adjacent to Tollway highway right-of-way (ROW).

Insertion Loss – Is the difference in traffic noise level at a receiver resulting from the implementation of traffic noise abatement measures between the source and the receiver.

Leq – The Equivalent Sound Level is the steady-state sound having the same A-weighted sound energy as that contained in the time-varying sound over a specific period of time. The Leq correlates reasonably well the effects of noise on people.

Leq(h) – Is the Equivalent Sound Level over a one-hour period.

Noise Abatement – A structure, land configuration, or object that attenuates or is intended to attenuate traffic noise. Generally considered to be a barrier or wall, abatement could also be in the form of earth berms, landscaping, or any combination of the aforementioned.

Noise Sensitive Receptor – Receptor sites with identified outdoor human activity including: residences, picnic areas, recreation areas, playgrounds, active sports areas, parks, motels, hotels, schools, churches, libraries, and hospitals.

Receptor – A point used in a traffic noise study for which the traffic-generated noise level is determined. A receptor is generally placed in an area of active outdoor human use, assumed to be at a point five feet above the ground at the first floor-level. Normally, the areas of active outdoor human use include areas such as, patios, swimming pools, porches, balconies, etc. Sites considered include homes, condominiums, apartments, permanent mobile home communities and parks. The associated type of outdoor human activity and the sensitivity to traffic noise will define which parks are considered receptors.

Substantial Increase – Traffic noise levels that are predicted to be more than 14 dBA over existing traffic noise levels.

Through Lane – A roadway traffic lane exceeding 1.5 miles in length.

Traffic Noise – Noise generated from vehicles traveling on the roadway. Noise is usually generated at the tire/pavement interface, from vehicle / truck engines, and from heavy truck exhaust systems.

Traffic Noise Study – A study of traffic-generated noise to determine: the existing traffic noise level conditions at receptors representative of normal outside human activity at the first floor-level of receptors; potential future traffic noise levels; an assessment of traffic noise impacts; and consideration of potential, feasible and effective economically reasonable traffic noise abatement. The study is conducted through the use of computer modeling. These studies would utilize the FHWA Traffic Noise Model (TNM® 2.5) or the most recent version. The methodology is consistent with 23 CFR 772 which explains processes to be followed in noise analyses and studies.

Type I Projects – A proposed project for the construction of a roadway on new location or the physical alteration of an existing roadway which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes.

Type II Projects – A Community Noise Abatement Retrofit Project proposed for traffic noise abatement on an existing roadway which is not associated with any Type I improvement.

Undeveloped Properties – Property that is currently vacant or is likely to be redeveloped into an approved-for-construction land use by the local governmental body having jurisdiction. To be considered

eligible for noise abatement the undeveloped property must have secured permits for construction by a governing body prior to September 30, 2004.

3.0 PROCEDURES FOR EVALUATING PROJECTS

The Tollway will review the project and evaluate the potential effects of the traffic noise on the environment. The following steps will be used to evaluate any traffic noise impacts:

3.1. Review existing and proposed land use plans, review aerial photography, review prior studies and any other pertinent information to identify potential noise sensitive receptors.

3.2. The Tollway, or a designated representative, will perform a qualitative assessment to evaluate traffic noise impacts on noise sensitive receptors. The assessment will determine qualitatively how implementation of the project will result in changes in traffic and typical roadway sections. Section 4.0 and the Illinois Tollway Noise Policy Generalized Traffic Noise Study and Abatement Decision Diagram in Appendix A provide details regarding the process and considerations for the evaluation. All viable alternatives for all study years (existing and design) will be examined using approved procedures incorporating the best available information and current professional judgment.

3.3. Determine if any of the factors in the qualitative assessment could likely cause an increase in traffic noise levels compared to the No-Action alternative. If it is determined a traffic noise impact can be reasonably expected, a Traffic Noise Study will be prepared. Some tollway locations will involve existing traffic noise levels that already approach or exceed the noise abatement criterion (NAC). Under these conditions, even if the proposed project will not cause the traffic noise levels to increase substantially above existing levels, traffic noise abatement will be considered.

3.4. If, after preparing a computerized traffic noise modeling and the corresponding Traffic Noise Study, it is determined that traffic noise levels will approach or exceed the noise abatement criteria (NAC) or the project will cause a substantial traffic noise increase, then traffic noise abatement measures will be considered. The feasibility and reasonableness factors for noise abatement consideration are outlined in Section 4.3.

4.0 PROCESS FOR DETERMINING WHEN A TRAFFIC NOISE STUDY AND ABATEMENT WILL BE CONSIDERED

4.1. Sites Eligible for Traffic Noise Study A Traffic Noise Study is warranted when all of the following conditions are present:

4.1.1. When the Tollway undertakes engineering studies or projects that increase capacity on the mainline of a Tollway by adding new through lanes; that propose new interchange ramps; that add new toll collection facilities where they did not previously exist; that reconfigure a toll collection plaza by adding Open Road Tolling lanes or I PASS lanes; or that substantially reconfigure an interchange by bringing through lanes or ramps closer to receptors. Projects that do not meet the requirements noted above may be considered eligible if the original roadway project did not consider the affect of traffic noise and the traffic volumes have, or are projected to, substantially increase (double) from the initial construction.

4.1.2. When the front line land use consists of identified outdoor human activity, including: residences, picnic areas, recreation areas, playgrounds, active sports areas, parks, permanent mobile home communities, motels, hotels, schools, churches, libraries, and hospitals. Also considered are locations where undeveloped adjacent properties have secured permits for construction of the above outdoor human activity land uses by the jurisdiction or municipality having permit and zoning authority prior to September 30, 2004. Only locations where seventy-five percent (75%) or more of the existing noise sensitive receptors within 500-feet of the Tollway right-of-way are platted or approved prior to September 30, 2004 will be deemed eligible.

4.1.3. When the location of potential study is no more than 500-feet from the proposed or existing edge of shoulder.

4.2. Sites Not Eligible for Traffic Noise Study A Traffic Noise Study is not warranted for sites meeting any of the following conditions:

4.2.1. Where the original design of the roadway provided traffic noise abatement and the design of the noise abatement considered the traffic-generated noise that would be created by planned future roadway widening.

4.2.2. Where traffic noise abatement

already exists and no work as described in Section 4.1.1. is currently included in a planning or design study.

4.2.3. Where a Traffic Noise Study has already been completed and it was determined that traffic noise abatement is not warranted.

4.3. Traffic Noise Abatement Considerations
Once a location has been studied, the following feasibility and reasonableness factors will be evaluated and considered to determine if traffic noise abatement is warranted.

Feasibility

Relationship of future levels to abatement criterion: Is the predicted future noise level from the project approaching or above 67 dBA Leq(h)? Will it be within 1dBA of the NAC or is it more on the order of 5dBA or more above the NAC? If the future levels are only expected to approach or barely exceed (1 to 3dBA above) the NAC, abatement may not be warranted as it would be if the impact were to be greater.

Insertion Loss (IL): The traffic noise abatement design goal will be 8dBA or more. However, the minimum acceptable insertion loss on the first row of receptors should be 5dBA. The more insertion loss achieved the better the traffic noise abatement, as long as the cost, visual impact, etc., do not become excessive. If a minimum 5dBA insertion loss cannot be achieved, a noise barrier may not be considered to be feasible.

Constructability: Can the noise barrier conceived actually be constructed using routine standard construction methods and techniques? Factors affecting this will include terrain, utilities, safety, bridges, overpasses, and similar difficulties.

Maintainability: Will the noise barrier be constructed in a location that inhibits or complicates proper maintenance?

Safety: A critical factor in determining whether abatement is viable is the impact it may have on safety.

Utilities: The impact of noise barriers on utilities and the reverse must be addressed early in the process. Overhead power lines, underground water, sewer,

gas, oil, fiber optics, etc. can have a significant impact on costs and design options.

Drainage: One of the most important elements in the physical location and design of noise abatement is drainage. Directing water along, under, or away from a noise abatement structure can be expensive and cause construction and long-term maintenance problems.

Cost: Cost factors will include the cost of construction (material and labor), the cost of the ROW (including easements, etc.), and any other associated costs. Traffic noise abatement must be achieved in a cost-effective manner. The Traffic Noise Study will include a cost per benefited residence analysis that will be used to assist in the final determination of traffic noise abatement recommendations. If traffic noise abatement cannot be achieved in a cost effective and economically reasonable manner, traffic noise abatement will not be included in the project.

Reasonableness

Land Use Stability: Is the land use for the area expected to change in the future, and if so how? Land uses tolerant of traffic noise may not warrant traffic noise abatement. Land uses where visual exposure is integral to their existence and vitality may not warrant traffic noise abatement.

Local Controls: What has the local governing or jurisdictional body done to control noise sensitive land uses from building adjacent to the tollway corridor or right-of-way? This implies that if no controls are used, traffic noise abatement is not a very high priority within the community.

Community Desires: Important in determining if traffic noise abatement should be built at any location is whether the affected community really desires abatement. This may require that a survey or community outreach efforts to be conducted to assess the community desires. If the community is not in favor of the noise abatement, the Tollway may choose not to build traffic noise abatement features. If access rights are required, the

Tollway will attempt to determine if the affected property owners are willing to trade those rights for the abatement without any exchange of money.

Views of Local Officials: Consideration should be given to the views of the local representative authorities who may be asked to represent the views of the citizens.

Seasonal Usage: Is the site occupied or utilized year round? The evaluation will consider usage rates throughout the year.

Noise Level Changes from Future Build and No-Action Conditions: This implies that traffic noise levels will be very similar, whether or not the project is built. If the difference between the future No-Action and the future Build is 3dBA or less, most people will not notice the change. If the change is 5dBA or greater than, traffic noise abatement consideration should be given more weight.

Antiquity: Who was there first, the noise sensitive site or the roadway? How long has the noise sensitive site been there relative to elevated traffic noise levels? Is the Tollway dealing with original owners or recent purchasers? This implies that someone who builds or buys at a noise sensitive site along an existing roadway (or within the corridor where a roadway is planned for construction) probably doesn't consider traffic noise a significant factor in their selection of the location.

Aesthetics: This refers to the physical appearance of the wall from both the roadway side and the community side. It also incorporates the landscaping concept, the opinions of the property owners and the local community desires.

Right-of-way Needs Including Access Rights, Easements for Construction and/or Maintenance, and Additional Land: Right-of-way (ROW) impacts can include the cost to obtain access rights, easements and land. It also includes the consideration of purchase, donation, etc. If access rights and easements are required, these will typically be by donation. This is in consideration of the construction of the traffic noise abatement wall for the benefit of the property owners.

Other Environmental Issues: This refers to impacts of traffic noise abatement installation that should be considered on a site-by-site basis. Examples include but not limited to unwanted reflection of sound, pedestrian, bicycle and trail disruption, wetland destruction, groundwater or surface water impacts, animal migration / flight paths, air quality, shading of vegetation, snow accumulation, etc.

5.0 Community Noise Abatement Retrofit Projects (Type II Projects)

The following establishes a cost-shared policy to consider requests for retrofitting noise abatement for projects that are not associated with any Type I improvement. Retrofit projects are subject to available funding and will be evaluated for their merits on a case-by-case basis.

In order for a retrofit project to be considered for Community Noise Abatement Retrofit Project (Type II) funding, the project must have a state or local government sponsor, i.e., a unit of government with the authority to levee taxes. This includes general-purpose units of local governments (e.g. cities, counties and townships) as well as specialized governing districts (e.g. sanitary districts, school districts, forest preserve districts, park districts, airport authorities and publicly owned universities or colleges).

For a project to be considered for Community Noise Abatement Retrofit Project (Type II) funding, the local agency sponsor must prepare documentation in accordance with the traffic noise impact assessment and Traffic Noise Study requirements outlined in Section 3.0 and 4.0 above. The local agency sponsor must pass local zoning ordinances regarding land use, provide all necessary right-of-way, demonstrate the ability and commitment to provide a minimum of 50% of the funding for the project, and agree to maintain the traffic noise abatement structure and right-of-way on the community side of the structure.

The Tollway will give priority consideration to those communities where the tollway was constructed through an existing neighborhood and where seventy-five percent (75%) or more of the existing noise sensitive receptors within 500-feet of the roadway preceded the roadway. Developments platted or approved after September 30, 2004 will not be eligible for Community Noise Abatement Retrofit Project (Type II) funding consideration.

6.0 Traffic Noise Abatement Techniques

Means and methods for implementation of traffic noise

abatement shall be considered based on effectiveness of traffic noise attenuation and cost.

Noise Walls: Noise walls are solid structures built between the highway and the noise sensitive receptors along the roadway. Noise walls are typically constructed of precast concrete panels, cast-in-place concrete, concrete masonry blocks, masonry or wood. Absorptive surfaces will also be considered in areas where noise sensitive receptors may be affected by reflected noise on either side of the wall or in instances where wall heights can be reduced to provide comparable effectiveness. Noise walls can reduce traffic noise levels effectively.

Earth Berms: Traffic noise barriers can be formed from earth mounds along the road -typically called earth berms. Earth berms have a natural appearance and offer opportunities for landscaping; however earth berms can require a significant width across land to accommodate the height necessary to provide the amount of insertion loss required.

Vegetation: If high enough, wide enough, deep enough and dense enough (cannot be seen through), vegetation can decrease the highway traffic noise at a noise sensitive receptor. A 200-foot depth of effective dense vegetation can reduce noise by 10dBA, which can cut the noise volume in half. It is often impractical to plant enough dense vegetation along a road to achieve such reductions; however if dense vegetation is already present possibilities exist where it could be saved with some insertion loss achieved.

Encouraging Compatible Adjacent Land Use: Traffic noise compatible land use planning is a community planning method and proactive responsibility that helps reduce or eliminate traffic noise levels at noise sensitive receptors along roadways. This type of planning means considering land use options and traffic noise issues more effectively so that compatible developments are set up next to the Tollway. Municipalities and counties have the power to encourage traffic noise compatible land use planning by developing effective land use plans, zoning or other legal means (such as subdivision or development standards, building or housing regulations), land or easement purchases and community education to inform citizens, developers and local planners about traffic noise compatible land use planning.

Promote Tollway Policy and Encourage Local Governments: The Illinois Tollway encourages those who plan and develop land,

and local governments controlling development or planning land use near existing or planned Tollway locations, to exercise their powers and responsibility to minimize the effect of roadway traffic noise on future sensitive receptors through appropriate land use control. Where such land use controls are not in place, municipalities, townships and counties may not be eligible for traffic noise abatement consideration for sensitive receptors by the Tollway.

Reduction of Traffic Noise at the Source:

Reduction of traffic noise impacts by design or treatment of the road surface is the most cost-effective traffic noise control available to the Tollway. Within the group of traffic noise abatement methods that are feasible and reasonable, and after life-cycle cost analysis have selected a pavement type and other technical and financial constraints, the Tollway will use the quietest surface texture available when repaving or reconstructing a roadway in traffic noise sensitive areas.

Traffic Noise Abatement by Others: All future planned developments adjacent to the Tollway should include a provision in the Subdivision Plat approval requirements that mandates the developer to place a covenant running with the land notifying prospective purchasers that traffic noise abatement will not be provided by the Illinois Tollway. The Tollway encourages developers and local governments to coordinate their efforts to mitigate roadway traffic noise. This must be done without encroachment on the Tollway right-of-way, unless it is determined to be necessary, and authority granted to permit others to construct a sound barrier, berm or landscape in the Tollway's right-of-way. The design must meet the Illinois Tollway's geometric, structural, safety and maintenance standards. The Tollway shall assume no liability review authority or responsibility of any kind for the structural integrity or acoustical effectiveness of traffic noise abatement sound barriers constructed by others.

**Noise Abatement Criteria (NAC)*
Hourly A-Weighted Sound Level -
decibels (dBA)**

Land Use Category	Leq(h) dBA	Description of Land Use Category
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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 purpose.
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.

* Title 23 Code of Federal Regulations Part 772 (23 CFR Part 772)

** Use of interior noise levels shall be limited (on a case-by-case basis) to situations where exterior noise levels are not applicable, i.e., where there are no exterior activities to be affected by traffic noise, or where exterior activities are far

from or physically shielded from the roadway in a manner that prevents an impact on exterior activities.

Note: The Noise Abatement Criteria (NAC) are noise impact thresholds for considering abatement. (Abatement must be considered when predicted traffic noise levels for the design year approach [i.e., are within 1 decibel of] or exceed the noise abatement criteria, or when the predicted traffic noise levels are substantially higher [i.e., are more than 14 decibels greater] than the existing noise level.) The Noise Abatement Criteria are not attenuation design criteria or targets. The goal of noise abatement measures is to achieve a substantial reduction in future noise levels. The reductions may or may not result in future noise levels at or below the Noise Abatement Criteria.

**ISTHA NOISE POLICY GENERALIZED
TRAFFIC NOISE STUDY AND ABATEMENT
DECISION DIAGRAM**

