

Why does MnDOT build noise barriers?

Noise barriers generally prove to be quite effective in providing noise reduction at receptors near transportation facilities. In 1972, the U.S. Congress passed legislation requiring the states to provide mitigation for highway noise (considered an environmental impact) at impacted locations where it was found to be reasonable and feasible as a part of all Type I Federal Aid projects. MnDOT Metro District also has a Highway Noise Abatement Program. This program is entirely state funded (without Federal-aid funds), therefore no FHWA review or approval is required. Metro noise barrier locations are ranked in priority order and included in MnDOT's Metro District Highway Noise Abatement Study, directed by the Minnesota Legislature in 1996 and updated in 2002, 2007, 2011 and again in 2015.

What is a Type I project?

A Type I project is a proposed Federal or Federal-aid highway project for the construction of a highway meeting one or more of the following conditions:

1. The construction of a highway on a new location; or,
2. The physical alteration of an existing highway where there is either:
 1. 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,
 2. Substantial Vertical Alteration: A project that removes shielding, therefore, exposing 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 (not including the addition or removal of vegetation) between the highway traffic noise source and the receptor; or
3. Bridge replacement projects that satisfy item 2. above.
4. The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a HOV lane, contraflow lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,
5. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane.
6. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
7. Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or
8. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

If a project is determined to be a Type I project as defined above, then the entire project area as defined in the environmental document is a Type I project.

What is an impacted location?

A “noise sensitive receiver” (defined as homes, parks, schools, businesses, etc.) is considered impacted by noise if either the future (generally a 20-year traffic projection) noise levels exceed the State Noise Rules and/or FHWA Noise Abatement Criteria, or if there is a substantial increase (greater than or equal to 5 db(A)) in future noise levels over existing noise levels from a proposed MnDOT project as described above. These are the noise levels that are experienced at commonly used exterior portions of the property.

Table 1 lists Minnesota's noise level standards. Table 2 lists the FHWA's Noise Abatement Criteria.

Table 1

Minnesota Pollution Control Agency State Noise Standards					
Land Use	Code	Day (7:00 a.m. - 10:00 p.m.) dBA		Night (10:00 p.m. - 7:00 a.m.) dBA	
Residential	NAC-1	L10 of 65	L50 of 60	L10 of 55	L50 of 50
Commercial	NAC-2	L10 of 70	L50 of 65	L10 of 70	L50 of 65
Industrial	NAC-3	L10 of 80	L50 of 75	L10 of 80	L50 of 75
Notes					
<ol style="list-style-type: none"> 1. NAC-1 includes household units, transient lodging and hotels, educational, religious, cultural entertainment, camping and picnicking land uses. 2. NAC-2 includes retail and restaurants, transportation terminals, professional offices, parks, recreational and amusement land uses. 3. NAC-3 includes industrial, manufacturing, transportation facilities (except terminals), and utilities land uses. 4. From Minnesota Pollution Control Agency, Minn. Rules sec. 7030.0040 					

Table 2

Federal Highway Administration Noise Abatement Criteria			
Activity Category	Activity Criteria (1,2) L10(h), dBA	Evaluation Location	Activity Description
A	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(3)	70	Exterior	Residential

C(3)	70	Exterior	Active sport areas, amphitheaters, 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	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(3)	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

Notes

(1) L10(h) shall be used for impact assessment.

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

(3) Includes undeveloped lands permitted for this activity category.

In addition, Minnesota Statute 116.07 states *"No standards adopted by any state agency for limiting levels of noise in terms of sound pressure which may occur in the outdoor atmosphere shall apply to (1) segments of trunk highways constructed with federal interstate substitution money, provided that all reasonably available noise mitigation measures are employed to abate noise; (2) an existing or newly constructed segment of a highway, provided that all reasonably available noise mitigation measures, as approved by the commissioners of the Department of Transportation and Pollution Control Agency, are employed to abate noise; and (3) except for the cities of Minneapolis and St. Paul, an existing or newly constructed segment of a road, street,*

or highway under the jurisdiction of a road authority of a town, statutory or home rule charter city, or county, except for roadways for which full control of access has been acquired. . .”

The FHWA interprets its noise abatement criteria as guideposts for the need of noise abatement, rather than absolute limits. Minnesota's noise level standards are regarded as absolute limits which carry the weight of law. Due to the guidepost interpretation of its criteria, the FHWA requires that states give numerical meaning to the phrase "approach the criterion." MnDOT defines a level as "approaching" the criterion level when it is 1 dBA, or less, below the criterion level.

Why was the Minnesota daytime residential standard set at an L10 of 65 dBA and an L50 of 60dBA?

These standards are based on the present body of knowledge for the preservation of public health and welfare. These standards are consistent with speech intelligibility and annoyance requirements for receivers within the impacted areas.

How does MnDOT determine where to place noise barriers?

A computerized noise model program is used for all Type I projects to predict design year (usually twenty years in the future) traffic noise levels. All locations that are predicted to have impacts are then considered for noise mitigation. Analysts make every attempt to qualify these impacted locations for noise barriers based on the reasonable, feasible and cost effectiveness criteria. For barriers built under MnDOT's Metro District Highway Noise Abatement Program, areas are identified by their ranking in the Highway Noise Abatement Study. Noise barriers are not typically placed along highways that have uncontrolled access points due to the loss of effectiveness from numerous openings in the barriers.

How does MnDOT determine if a noise barrier is feasible, reasonable or cost effective?

Some of the factors that MnDOT uses to determine if a noise barrier can be placed are:

- Does MnDOT have the required right of way to construct the barrier?
- Safety concerns such as sight distances.
- Will the barrier meet a cost effectiveness factor of \$43,500 per benefited receptor?
- Will the barrier provide a substantial reduction (at least 5 dBA with one receptor receiving 7 dBA) in noise?
- Soil types and wetland areas in the proposed project area.
- Will hydraulics or drainage features on Mn/DOT right of way be impacted?
- Buried utilities or utility relocation needs

How is the height of the barrier determined?

Noise barriers are generally designed to provide noise reductions of 8 dBA or more. However, a minimum reduction of at least 5 dBA (with at least one receptor getting a 7 dBA reduction) is

required in order for the noise barrier to be considered minimally effective. The goal is a 10 dBA reduction of the average traffic noise levels for the majority of the first row of residences directly abutting the highway right-of-way. The reasonableness criteria places a practical cost limitation on the height of any noise barrier. The maximum allowed average height for a noise barrier is 20 feet.

Why not plant trees instead of putting up a barrier?

When highway noise mitigation strategies were first being researched there was some thought that dense plantings of vegetation might provide effective blocking of sounds from the highway. However, to be effective at blocking sound there must be complete blockage of the line of sight from the receiver to all noise sources and a great enough mass density to stop the transmission of sound. If the height of the trees is at least 15 feet tall or more, and the vegetation has a depth of 100 feet, then a 5 dBA attenuation may be achievable. Most vegetative plantings near highways have not been found to meet these prerequisites.

How effective are noise barriers?

Generally the effectiveness of a noise barrier depends on (1) the distance between the listener and the noise source, (2) the distance between the listener and the noise barrier and (3) the height of the noise barrier above the line-of-sight between the listener and the noise source. Typically, the benefit due to the noise reduction by a noise barrier will be greatest for the listeners nearest the noise barrier. For residences located directly behind a 20 foot noise barrier, a reduction of about 10 dBA would be typical. This benefit decreases as the listener moves farther away from the barrier and is barely perceptible at distances greater than 300 feet.

How much do concrete post/wood plank noise walls cost?

Current construction costs on an average are \$20.00 per square foot. This translates into a 20-foot high wall costing approximately \$2.11 million dollars per mile.

Does MnDOT have a program to provide insulation of private residences?

Adding sound insulation (windows and sound deadening materials or acoustical insulation) achieves interior noise attenuation only and does not address exterior receptor areas where Minnesota's noise standards apply. The costs for acoustical insulation of typical single residences are considered disproportionate for the amount of attenuation achieved and the number of receptors affected. There may be cases involving schools, hospitals, nursing or convalescent homes, or other public buildings where the number of receptors and the noise sensitivity of the receptors may justify the expense of insulating for noise mitigation.

Who pays for the noise barriers?

For Type I projects, noise barriers are built alongside Trunk Highways and Interstates, in which case the federal government pays the majority, and the State of Minnesota pays the remainder.

What types of barriers are there?

Noise barrier materials used by MnDOT include earth berms, concrete and wood. Earthen berms work the best and are the least expensive, but a lack of available right-of-way usually makes noise walls the most practical solution.

Does the public have any input?

The design and planning offices will work closely with the impacted residents and city staff through the public involvement process to ensure that reasonable requests regarding the design of the barriers are considered for the project plan. If a noise barrier meets the feasible and reasonable criteria (including cost-effectiveness), the barriers' benefited residents (those residents that receive a minimum of a 5 dBA reduction if the barrier is built) will be solicited for their opinion.

You can vote for or against the noise barrier that affects your property, unit or business. MnDOT uses a weighted voting system to ensure residents and property owners are given appropriate influence on the outcome of the noise barrier. How much you influence the outcome of the noise barrier is based on how much your property/unit is affected by the noise barrier and whether or not you own the property/unit.

If 50 percent or more of all possible voting points from eligible voters are received after the first request for votes, the majority of votes received determine the outcome of the noise barrier. If less than 50 percent of the possible voting points for a barrier are received after the first request, a second ballot will be mailed to the eligible voters who did not respond.

If 25 percent or more of all possible points for a barrier are received after the second request for votes, then the outcome is determined by the majority of votes received. If less than 25 percent of total possible points for a noise barrier are received after the second request for votes, then the barrier will NOT be constructed. In the case of a tie, where there are equal numbers of points for and against a noise barrier, the noise barrier WILL be constructed. (See [MnDOT Noise Policy, 2015](#) for further information regarding solicitation of benefited receptors.)

Can a municipality build its own noise barrier?

If a municipality wishes to construct a barrier on MnDOT's right of way, they must submit plans certified by a registered engineer or landscape architect to be reviewed by MnDOT before constructing. Per State Statute 429.021 subdivision 1, the municipalities are given the power to make these improvements.

How many miles of noise walls have been constructed?

As of December 2013, MnDOT has constructed approximately 118 miles of noise walls and berms located throughout the state.