MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

SOUND BARRIER POLICY

May 11, 1998

POLICY SUMMARY

The Maryland State Highway Administration Sound Barrier Policy provides for the evaluation of sound barriers for communities adversely impacted by noise from state highways.

Sound barriers are evaluated in two separate categories. The first category is for the construction of new highways or capacity additions to existing highways (Type I). The second category is for existing highways not being expanded (Type II). The following eligibility criteria apply to each category.

Sound Barriers With New Construction or Expansion of a State Highway (Type I)

- Predicted noise levels equal or exceed 66 decibels or exceed existing noise levels by 10 decibels or more.

- A sound barrier can be constructed that would reduce noise levels by 7-10 decibels at the most severely affected residences.

- The cost of the sound barrier does not exceed $50,000/residence benefited.

- The majority of the impacted residences in the defined community must have existed prior to the date of approval of the proposed highway improvements. In making this determination, two cases will be examined.
    - Case 1

      If 50% or more of the impacted residences predate the approval of the proposed highway improvements, this criterion would be met. If less than 50% but more than 25% of the impacted residences existed before the approval date, SHA will look at the age of other residences in the community that are affected by highway noise under Case 2.

    - Case 2

      If more than 50% of the residences in the community that will be affected by highway noise in the design year as the result of the proposed highway improvements predate the approval of the highway improvements this criterion would be met. Affected is defined as experiencing noise levels in excess of 57 decibels. The use of the 57 decibels establishes the FHWA Category A criterion as the level at which noise begins to affect residential land uses for Case 2.

- Seventy-five percent of the residents that are impacted are in favor of a barrier.

Sound Barriers on Existing Highways (Type II)

- The majority of the impacted residences must have existed prior to the construction of the original highway. In making this determination, two cases will be examined.
    - Case 1

      If 50% or more of the impacted residences predate the original highway improvements, this criterion would be met. If less than 50% but more than 25% of the impacted residences existed before the approval date, SHA will look at the age of other residences in the community that are affected by highway noise under Case 2.

    - Case 2

      If 50% or more of the residences in the community affected by existing noise levels predate the original highway improvements, this criterion would be met. Affected is defined as experiencing noise levels in excess of 57 decibels. The use of 57 decibels establishes the FHWA Category A noise level criterion as the level at which noise begins to affect residential land uses for Case 2..

- Measured noise levels equal or exceed 66 decibels.

- A sound barrier can be constructed that would reduce noise levels by 7-10 decibels at the most severely affected residences.

- The cost of the sound barrier does not exceed $50,000/residence benefited.

- Seventy-five percent of the residents that are impacted are in favor of a barrier.

- Sound barriers will be approved only in counties that have enacted local noise controls, consistent with state requirements, to address noise impacts for future noise sensitive development adjacent to state highways.

- The local jurisdiction agrees to fund 20% of the project cost.

- Right of way that may be required for the construction or permanent location of a sound barrier is donated to the state.

- Highway is a limited access facility, where access is limited to interchanges.

It is the Maryland Department of Transportation, State Highway Administration's policy that decisions on where to provide sound barriers will be made after evaluation of the feasibility and reasonableness of barriers.

The Maryland State Highway Administration's (SHA) policy is applicable to projects funded with Federal and/or State funds. Sound barriers are evaluated in two separate categories. The first category (Type I) is for the construction of new highways or through lane capacity additions to existing highways. The second category (Type II) is for existing highways not being expanded.

SOUND BARRIER FEASIBILITY AND REASONABLENESS

The determination of feasibility and reasonableness of providing sound barriers will consider the following for both the Type I and Type II elements of the sound barrier program.

FEASIBILITY

Sound barrier feasibility is defined as the engineering and acoustical ability to provide effective noise reduction. Sound barrier feasibility will be based upon the following:

1. If noise levels cannot be reduced by at least 3 decibels at impacted receptors, a noise barrier will not be considered feasible. The noise reduction goal for receptors with the highest noise levels (first row receivers) is 7-10 decibels. If a noise reduction of 7-10 decibels cannot be achieved, the barrier will be considered not to be feasible.

   Noise sensitive receptors include residences, schools, churches, historical areas, cultural resources, and other places which people use that can be adversely affected by highway noise.

2. If the placement of a sound barrier will restrict pedestrian or vehicular access or would cause a safety problem, such as limiting sight distance or reduction of a vehicle recovery area, the barrier will not be considered feasible.

3. If the construction of a sound barrier will result in significant utility impacts, the barrier will not be considered feasible. Significant utility adjustments can have a major impact on barrier design options and construction costs.

4. If construction of a sound barrier will have an impact upon existing drainage, it could be considered not to be feasible. Drainage is an important element in the location and design of a sound barrier. The potential for impact to drainage patterns and systems and flooding will be considered in the overall decision on whether construction is feasible and reasonable.

Only barriers that are determined to be feasible will be approved.

REASONABLENESS

Each individual impact area will also be evaluated to determine if construction of a sound barrier is reasonable. Reasonableness will be based upon the following:

1. If 75% of the impacted residents do not approve the proposed sound barrier, the barrier could be considered not to be reasonable.

2. For Type I projects, if existing noise levels are expected to increase by 10 decibels or more, but will be less than 57 decibels, a sound barrier will be considered not to be reasonable.
3. For Type I projects, if a change over no-build levels of less than 3 decibels would result from a build condition, a sound barrier could be considered not to be reasonable. In the assessment of the no-build to build noise level change, consideration will be given to the cumulative effects of highway improvements made after the original highway construction. If the cumulative increase in design year build noise levels at noise sensitive receivers that existed when prior improvements were made is equal to or greater than 3 decibels, noise abatement could be considered reasonable.

If noise levels equal or exceed 72 decibels at impacted noise sensitive receivers, SHA will consider a sound barrier reasonable for any proposed highway expansion that will increase noise levels provided that other feasibility and reasonableness criteria are met.

4. If the cost of a sound barrier will exceed $50,000 per benefited residence, the barrier will be considered not to be reasonable. The cost/residence is determined by the dividing the cost of a sound barrier by the total number of benefited residences. The total number of benefited residences will be the sum of the following:

    a. The number of impacted residences that would receive a 3 decibel or greater noise reduction.
    b. The number of non-impacted residences (noise levels below 66 dBA Leq) that would receive a 5 decibel or greater noise reduction.

c. The number of impacted and non-impacted non-residential noise sensitive receivers (schools, churches, etc.) that would benefit from a sound barrier.

All benefited receptors will be included in the cost/residence calculation. Non-residential receptors such as schools, churches, historic areas, etc. will be considered as equivalent residences for cost/residence calculations, based upon 10 equivalent residences for each use.

Sound barrier cost is based upon the estimated cost of the barrier system, i.e. posts, panels, foundations and retaining walls required solely to support the sound barrier. The most recent five years of bidding experience will be used to calculate the square foot factor used to estimate barrier cost. If the cost of a barrier exceeds the $50,000 maximum, SHA will fund up to the maximum, if the balance is available from another source or sources. SHA will work with the local jurisdiction on options for alternative funding.

For Type I projects, SHA will look at both the cost/residence for individual noise sensitive areas and the average cost/residence for the entire project in determining reasonableness. Noise sensitive areas with a cost/residence of less than $100,000 would be included in the project cost averaging. If the average cost/residence for the project is less that $50,000, sound barriers will be considered reasonable. **See example in Attachment 1.**

5. If a very tall sound barrier would have to be located close to the impacted receptors, and would have a negative visual impact, construction of the barrier could be considered not to be feasible. The relationship of the location of a sound barrier to the receptors to be protected will be considered in making a reasonableness determination.
6. If the construction of a sound barrier will result in an impact to a Section 4(f) resource, it could be determined not to be reasonable. Section 4(f) resources include publicly owned recreation areas and parks, wildlife areas, conservation areas and historic sites that are either on or considered eligible for the National Register of Historic Places. Reasonableness will consider the significance of impact and the feasibility of avoidance. A 4(f) document will be prepared as required by federal regulations and consultation and coordination with those responsible for the resource will be carried out and documented.

7. The control of new development adjacent to state highways in high noise zones at the local level is critical to the overall abatement of highway noise. Sound barrier reasonableness will consider the local priority on approving new development adjacent to state highways in the determination of providing noise abatement for highway construction or reconstruction projects.

A feasibility and reasonableness worksheet will be completed for each noise sensitive area on both Type I and Type II projects. **See Attachment 2.** The worksheet for Type I projects will be initially completed during the environmental clearance phase of project development and finalized during and prior to the completion of final project engineering.

It is the SHA's policy to make final decisions on the construction of Type I sound barriers during the final design phase of project development, after final horizontal and vertical alignments are determined and a detailed engineering analysis of the feasibility and reasonability of noise abatement can be made. Barriers that meet the SHA criteria as accepted by FHWA will be constructed.

SHA will consider non sound barrier options for areas which meet the eligibility date criterion for consideration of a barrier but do not meet all of the remaining criteria for a barrier, including:

- Soundproofing of publicly owned noise sensitive structures, if interior noise levels equal or exceed 52 dBA, on a case by case basis consistent with Federal guidelines.

- Purchase of impacted residences on a case by case basis consistent with Federal guidelines.

SHA will consider the installation of landscape screening or privacy fencing for areas which meet the eligibility date criterion, but do not meet all of the remaining criteria for a barrier.

In addition to these general criteria, there are criteria that apply specifically to each of the two categories of sound barriers.

NEW HIGHWAY CONSTRUCTION OR RECONSTRUCTION (TYPE I)

The analysis of noise impacts for highway improvement projects will consider the following:

ANALYSIS OF FUTURE NOISE IMPACTS

Noise impacts will be analyzed for noise sensitive receptors (residences, schools, churches, historic sites) that existed prior to the approval of proposed highway improvements. Residences include all dwelling units. For buildings containing multiple housing units, each unit will be analyzed and considered as a separate receptor. Future noise levels will be projected for the design year, usually twenty years in the future, utilizing the latest approved FHWA noise prediction model.

Traffic noise analyses will be done for developed lands and undeveloped lands planned, designed and programmed if a noise sensitive land use, such as a residence, school, church, hospital, library, etc. has received a building permit from the local agency with jurisdiction at the time of project approval.

The date of public knowledge shall be the date that a project's environmental analysis and documentation is approved, i.e., the date of approval for the categorical exclusion, finding of no significant impact, or record of decision. After this date, the Maryland State Highway Administration is still responsible for analyzing changes in traffic noise impacts, when appropriate, but is no longer responsible for providing sound barriers for new development which occurs adjacent to the proposed highway project. Provisions for noise abatement for new development becomes the responsibility of the local jurisdiction and private developers.

IDENTIFICATION OF TRAFFIC NOISE IMPACTS

A sensitive receptor is impacted if design year noise levels are projected to equal 66 dBA or if existing noise levels are projected to increase by more than 10 dBA and exceed 57 dBA. The Noise Abatement Criteria are shown in **Attachment 3**.

ABATEMENT OF TRAFFIC NOISE IMPACTS

Noise abatement measures, i.e. sound barriers, earth berms or berm and wall combinations will be analyzed for all impacted receptors. For Type I projects, measures that are determined to be reasonable and feasible will be constructed with the highway project.

For Type I projects, SHA will consider constructing sound barriers, which meet the criteria for feasibility and reasonability, in advance of the highway project if:

- Existing noise levels at impacted receptors exceed 72 dBA;
- The local jurisdiction agrees to fund 20% of the sound barrier cost; and;
- All right of way required to construct the barrier(s) is donated to the State.

In making this decision, SHA will consider the timing of future improvements and the presence of local noise control ordinances for future developments.

SOUND BARRIERS ON EXISTING HIGHWAYS (TYPE II)

The State Highway Administration will consider sound barriers for noise sensitive areas along existing highways, with full controls of access, where existing noise levels equal or exceed 66 decibels and:

- The majority of the impacted receptors existed before the original highway was constructed.
- A sound barrier(s) is reasonable and feasible.
- The local jurisdiction agrees to fund 20% of the project cost.
- All right of way required for the construction or permanent location of the sound barrier(s) is donated to the state.

Programming of Type II sound barriers that are reasonable and feasible will be based upon the availability of funds in the Consolidated Transportation Program (CTP).

APPEALS

Appeals of decisions not to build sound barriers will be considered by the Secretary of the Department of Transportation, and the State Highway Administrator. An appeal would be reviewed when there is a question on interpretation or application of the Sound Barrier policy criteria or the preparation and accuracy of the technical noise analysis. The Sound Barrier policy criteria would not be a basis for appeal.

COORDINATION WITH LOCAL OFFICIALS

Preventing noise sensitive land uses from locating adjacent to state highways within high noise areas is the responsibility of local land use and zoning processes. The control of highway noise, to be effective and comprehensive, must be done in partnership between SHA and local land use planning officials. The Maryland SHA will furnish the results of all highway traffic noise analyses to local government officials and will encourage local communities and developers to practice noise compatible development. Local coordination will specifically be accomplished through the distribution of highway project environmental documents and noise study reports.

It is the policy of SHA that new Type II sound barriers will only be approved if the local jurisdiction has implemented controls to prevent the construction of new noise sensitive development adjacent to state highways. SHA has examples of existing noise ordinances that can be considered by local officials.

SHA will provide assistance to local jurisdictions in the development of local noise controls. This assistance may be in the form of any of the following:

- Review of comprehensive plans, rezoning and site development plans.
- Information on present and future noise levels adjacent to state highways.
- Technical support in the development of local noise control programs.

Attachment 1
Sound Barrier Cost Averaging Example

Ten communities will be impacted by highway traffic noise from proposed capacity improvements to an existing State highway. The noise analysis has determined that effective sound barriers can be constructed at all ten locations. The cost/residence at eight of the communities is less than $50,000. The cost/residence at two of the communities is between $50,000 and $100,000. Application of the cost averaging principle would result in an average cost/residence spread across all ten communities of less than $50,000. Barriers for all ten communities would be recommended.

Community	Residences Benefitted	Barrier Cost	Cost/ Residence
1	30	$800,000	$26,700
2	40	$1,100,000	$28,000
3	20	$820,000	$41,000
4	45	$1,500,000	$33,000
5	15	$975,000	$65,000
6	12	$750,000	$62,500
7	35	$800,000	$22,850
8	50	$1,500,000	$30,000
9	25	$750,000	$30,000
10	60	$2,500,000	$41,700
	332	$11,495,000	$34,600

The cost/residence for communities 1,2,3,4,7,8,9 & 10 is less than the State's maximum of $50,000 and all would be recommended for sound barriers. Communities 5 and 6 exceed the $50,000 maximum. When the costs of barriers for communities 5 & 6 are averaged in with the other eight communities, the average cost/residence for the project would be $34,600 and all ten barriers would be recommended.

Criteria for Determining Feasibility and Reasonableness of Noise Abatement

NOISE SENSITIVE AREA _____

FEASIBILITY CRITERIA	YES	NO
1. Noise Levels can be reduced by 7 dBA or more at impacted receptors		
2. Placement of a barrier will restrict pedestrian or vehicular access		
3. Construction of a barrier will cause safety or maintenance problems		
4. Noise barrier can be constructed given topography, drainage, utilities, etc.		
5. Noise barrier will have significant adverse impact on Section 4(f) resource		
6. There are non-highway noise sources the would reduce barrier effectiveness		
REASONABLENESS CRITERIA	**YES**	**NO**
1. Majority of impacted receptors will receive a 7 dBA or greater noise reduction		
2. 75% or more of impacted and benefited residents approve of the proposed noise abatement		
3. A 3dBA or greater change in design year build noise levels over design year no-build noise levels is expected to result from the proposed action, ***or*** the cumulative effects of highway improvements in the design year build noise levels at receptors that existed when prior improvements were made is equal to or greater than 3 dBA.		
3a. Noise levels equal or exceed 72 dBA at impacted receptors		
4. Noise barriers will have significant negative visual impact at impacted receptors		
5. The cost of noise abatement is equal to or less than $50,000 per residence, impacted and benefited		
6. There is special circumstances, i.e. historical/cultural significance at this NSA.		

Attachment 3

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

Activity Category	Leq (h)	L_{10}(h)	Description of Activity Category
A	57 (Exterior)	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	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties or activities not included in Categories A or B above
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

* Either L_{eq}(h) or L_{10}(h) (but not both) may be used on a project.

Note: These sound levels are only to be used to determine impact. These are the absolute levels where abatement must be considered. Noise abatement should be designed to achieve a substantial noise reduction - not the noise abatement criteria