

# MDOT Highway Noise Analysis and Abatement Handbook

Special Notes *are in Italics*

## 4.0 STEP 4 – ADDITIONAL CONSIDERATIONS FOR FINAL DESIGN HIGHWAY TRAFFIC NOISE BARRIER ANALYSIS

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## 4.0 STEP 4 – Additional Considerations for Final Design Highway Traffic Noise Barrier Analysis

### 4.1 Final Design Considerations and Measures

The need for a project to move into a final design noise study is dependent upon the extent of noise impacts, likelihood for providing abatement, and potential for design changes that may affect the acoustics and findings of the NEPA study. The majority of Type I projects should proceed into a final design noise study to ensure that design changes do not alter impacts. In addition, land use changes (e.g., conversion from residential to commercial) may preclude a barrier's construction or potentially create the need for a barrier that was not evaluated in the NEPA phase (e.g., new residential development that meets the "Date of Public Knowledge" test). The level of effort required for the final design noise study should be commensurate with potential for design change, land use modifications, and impact severity/abatement potential as outlined in the environmental clearance documents. The majority of final design noise assessments will involve a detailed reanalysis of the project using refined engineering based on data provided from the EPE Phase noise analysis, public involvement through the Context Sensitive Solutions (CSS) process, and concurrence from FHWA.

Highway traffic noise abatement shall be reconsidered in light of more exact designs and project alignment refinements during the PE Phase. Abatement shall then be considered based on reanalysis of the roadway/noise receptor relationships and community input.

A highway traffic noise analysis conducted during the PE Phase shall primarily be concerned with abatement of noise impacts identified during the EPE Phase in the environmental documentation. The goals of a final design noise analysis are to:

- determine if the proposed highway traffic noise abatement measures from the EPE Phase noise analysis remain feasible and reasonable;
- determine if the benefiting receptors want the noise abatement;
- determine the desires of the stakeholders (local officials and affected property units) through the CSS process to incorporate appropriate aesthetic treatments (this does not include the desirability for or against the abatement measure); and
- finalize any maintenance agreements that were made with the local authorities.

**NOTE-** *Affected Property Units*

Affected property units are those dwelling units or commercial properties that may or may not receive a benefit from the noise abatement but are located behind or aside the abatement as such that it has an unobstructed view of the noise barrier; this includes rental units.

The highway traffic noise analysis data file from the EPE Phase shall be reviewed as the first step in the refinement process for final design abatement. Close attention should be paid to the public coordination and comments conducted during the EPE Phase (particularly in areas where abatement is warranted). When final alignment boundaries are set, the final design study should

commence according to the procedures set forth in this Handbook. The draft version of the Final Design Highway Traffic Noise Report should be compiled and submitted to the Region or TSC Office, (whichever is appropriate) and the Lansing Office for concurrence prior to conducting public meetings where barrier options and recommendations are presented.

The first public meeting should occur after concurrence between FHWA and MDOT with the draft version of the Final Design Highway Traffic Noise Report. If the benefiting residents and property owners choose to accept the highway traffic noise abatement being recommended, then the process proceeds through the CSS process and Preliminary Design stage where the aesthetics and structural details of highway traffic noise abatement will be refined. After the community accepts the final highway traffic noise abatement design at a second stakeholder engagement meeting, noise abatement proceeds to the final design stage and construction phases.

**NOTE** – *Final Design Refusal of the Proposed Noise Barrier:*

At any time during this process, the benefiting residents and property owners have the option of refusing highway traffic noise abatement, at which time the decision is documented in the Final Design Highway Traffic Noise Report and the process ends.

If, as a result of refined engineering, the project limits become extended, the noise-sensitive receptors within the extended areas need to be assessed for highway traffic noise impacts. The justification for extending the project limits must be discussed in the Final Design Highway Traffic Noise Report. **The project limits are not to be extended solely for providing additional noise abatement to noise-sensitive receptors.** Noise abatement will not be considered for noise-sensitive receptors where there is no traffic noise impact from the project.

#### **4.2 Date of Public Knowledge**

Developed and undeveloped lands are required to have been permitted by the *Date of Public Knowledge* to be eligible for abatement consideration during the PE Phase. 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 of a CE, date of the issuance of the Finding of No Significant Impact for an EA, or the date of the Record of Decision for an EIS). The evaluation, design, and/or construction of any noise abatement after this date become the responsibility of local communities and private developers.

The Date of Public Knowledge and a thorough discussion of undeveloped lands (those permitted or not) must be documented within the text of the Final Design Highway Traffic Noise Report. Refer to Section 7.2 *Final Design Highway Traffic Noise Report: Format, Content, and Processing* for documentation details. This is in addition to the documentation required on the Noise Abatement Details Forms.

If substantial changes are made to the selected alignment (e.g., horizontal/vertical as defined in 23 CFR 772.5 *Type I Projects* [2][i]and [ii]) during the PE Phase that may result in changes to the noise environment, MDOT is responsible for assessing impacts only where the substantial

alignment occurs. This must be done for developed lands as well as undeveloped lands which are considered permitted at the time the change is assessed in the PE Phase noise analysis.

### 4.3 Context-Sensitive Solutions (CSS)

The MDOT Roadside Development Unit will lead the CSS process during the PE Phase, and will coordinate stakeholder meetings in regard to CSS. The CSS process will require a voting survey of all the stakeholders in regard to its determinations. Refer to *Step 6 – Public, Municipality, and Agency Involvement* in this Handbook for assistance on the public involvement process.

**NOTE** – *Stakeholder in Noise Abatement Aesthetics*

Stakeholders in the context sensitive design of noise abatement include: local officials, local, state and federal agencies, public and private organizations, and affected property units. The stakeholders should involve representatives from each of these groups. Coordinate with MDOT Roadside Development in identifying specific groups or organizations.

In order to achieve a successful noise barrier design, a noise barrier must be acoustically effective, structurally sound, safe for the motorist, durable, and visually attractive. Moreover, a noise barrier should complement the community for which it is abating noise. The relationship of the proposed noise barrier to the environment is a primary factor in the aesthetics that cannot be ignored. Location, color, texture, material, shape, placement, and detail all influence the effect of the barrier on the environment. The landscape, which provides a basis for the highway's character, will impact the style of the barrier. All of these factors and their incorporation in the noise barrier design will determine the aesthetics and, ultimately, the public acceptability of the noise barrier. Below are only a few considerations that each Region Office or TSC may consider on a project-by-project basis. Reference the FHWA *Highway Noise Barrier Design Handbook*, February 2000 for a more comprehensive discussion of a wide variety of considerations.

- Texture details and color of the noise barrier.
- Tree/shrub plant material and ground covers should be considered where planting space is available, while also considering maintenance requirements. Tree replacements should be considered as a minimum requirement to offset vegetative losses for construction of the wall. The appropriate Region/TSC Office should coordinate with the Roadside Development Unit to determine the type, amount, and placement of plant material on the highway side of the noise barrier. Although not necessary, community and municipality input can be considered. **It must be understood that vegetation is not a substitute for noise abatement.**
- Consider providing a barrier kick plate for protection from landscaping equipment and snow removal machinery.
- Consider providing a cap on the top of the noise barrier or integrally cast into the barrier panels. When a noise barrier varies in height, angled or sloped barrier panel tops may be considered as a way to smooth out and “blend” the noise barrier into the surrounding environment.

**NOTE - *Community Specific Icons, Seals, or Shields***

Funding from the community or local government may be used for aesthetic enhancements such as specific wall graphics (e.g. city seals), plantings, etc. However, third party funding cannot be used to contribute funds when the reasonableness cost criteria is not met. See section 6.5 *Third-Party Funding Options* on page 40.

#### **4.4 Value Engineering and Contractor-Suggested Changes**

Highway traffic noise abatement measures shall be evaluated with respect to current MDOT value engineering policies during Base Plan Preparation and prior to construction and/or changes proposed by the contractor. This shall be done in order to determine if the application of value engineering concepts are warranted. The currently approved noise model program is an excellent tool to optimize the noise abatement being proposed. Specific information regarding highway traffic noise abatement value engineering will be distributed to MDOT Lansing Office and to the Regions, as appropriate.

**NOTE – *Value Engineering Effects on Acoustical Profiles and Aesthetic Commitments:***

Value engineering should not jeopardize the proposed noise barrier in terms of its acoustical profiles, aesthetics, or contractor-suggested changes. Changes to roadway profile or alignment may affect the acoustical profile. Typically, commitments to acoustical profiles and aesthetics (i.e., sloped top panels, full panels, post type, landscaping, etc.) occur during the public involvement process and therefore cannot be removed from the project as the result of value engineering or as the result of the contractor requesting alternatives. The Regions or TSCs should coordinate with the professional(s) designing the noise barrier to determine, through the use of the currently approved computer-modeling program, if value engineering changes are compatible with the abatement commitments made during the public involvement process.

#### **4.5 Applications for Absorptive Noise Barrier**

Depending on the specifics of the transportation improvement project, an absorptive-faced noise barrier may be analyzed for parallel barrier configurations (a barrier located on both sides of the freeway), or for locations where there are parallel communities and only one side gets a barrier, and where the ratio of the distance between the barriers to barrier-height is less than 10:1 (e.g. a configuration such that a 100-foot cross section is flanked on both sides by noise barriers at least 10 feet high). Coordination with the Lansing Office is required for these situations.

The final determination for the use of an absorptive treatment will be made in consultation with the Lansing Office and FHWA personnel based upon review of the noise data. Under no circumstances should the use of absorptive treatment be presented to the public until approval from the Lansing Office and FHWA has been obtained.