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1. Applicable Early Preliminary Engineering and Preliminary Engineering Steps:

Step 1 should occur when the Type I, Type II or Type III project is initially identified. The applicable sections of Step 2 through Step 7 should be addressed during both the Early Preliminary Engineering (EPE) Phase and the Preliminary Engineering (PE) Phase of a proposed transportation improvement project. Attention should be given to any changes that occurred in the project area between the time the environmental clearance document was approved and the completion of final design activities. When federal funds are associated with the project, coordination with FHWA should occur throughout the project's development.

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2. Mandatory Use of the FHWA Traffic Noise Model version 2.5 (TMN2.5[®]):

23 CFR 772.9(a) states that the TMN2.5[®] model must be used for traffic noise analysis, or “any other model determined by the FHWA to be consistent with the methodology of the FHWA TNM.”

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3. Substantial Horizontal or Vertical Alteration:

Definition from: FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance*:

“Changes in vertical alignment cover a variety of scenarios that are not limited to physical changes to the roadway. Changes to side slopes or other terrain features may also result in a Type I project. A project that exposes a receptor to a new noise source due to a vertical change or includes vertical changes that expose the receptor(s) to previously a shielded traffic source(s) is a Type I project. For example, a project that involves cutting back a slope that exposes a receptor to an existing highway is a Type I project. Similarly, a project that changes at grade intersection to an overpass is a Type I project, because it substantially alters the vertical alignment of the roadway, exposes receptors to a new noise source and the operational improvements likely result in increase speeds and more noise.

Changes in the horizontal alignment that reduces the distance between the source and receiver by half or more result in a Type I project.”

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4. Noise Analysis and Abatement Process Summary Tables are a quick view of the noise analysis processes for EA and EIS through the Early Preliminary Engineering and Preliminary Engineering Phases and are available as a separate document. A separate Categorical Exclusion (CE) flowchart is included in Appendix B.

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5. Controversy in itself related to non-noise issues does not dictate that a noise study is required.

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6. Developed and Developing Lands: Permitted Developments:

Highway traffic noise analyses will be performed for developed lands as well as undeveloped lands when they are considered permitted developments. Undeveloped lands will be deemed to be permitted if a noise-sensitive receptor listed in Table 1 (page 10) under Categories B, C and E has received a building permit from the local agency with jurisdiction at the time of the date of public knowledge. Undeveloped lands without building permits will be analyzed to identify a buffer zone to inform local officials where noise compatible land use zoning or development should be considered to avoid future traffic noise impacts for sensitive receptors.

In the case of a subdivision, if at least one building permit within the approved development plan has been received from the local agency with jurisdiction at the commencement of the EPE Phase highway traffic noise analysis, then the entire subdivision will be deemed to be permitted. When the proposed subdivision is a phased development, MDOT should only consider noise abatement when a building permit is issued within the phase within the traffic noise impact zone or buffer. If the phase with a permitted lot is outside of the traffic impact zone, then the subdivision will not be considered for abatement.

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7. Calibration of Noise Meters:

All highway traffic noise meters and acoustical field calibrators should be calibrated once a year or in accordance with manufacturers' specifications. A copy of the certificate of calibration for each piece of equipment used in the study for the period that highway traffic noise monitoring occurred for the proposed transportation improvement project should be included in the project technical files.

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8. Multi-family Dwelling Units:

When analyzing areas with multi-family dwelling units, such as apartments or condominiums, the analyst must identify all dwelling units' exterior areas of frequent human use which may experience highway traffic noise impacts. This may include units above the ground level, such as balcony/deck locations. Consider abatement for all identified highway traffic noise impacts and implement abatement that is feasible and reasonable.

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9. Exterior Areas of Frequent Human Use:

In accordance with Title 23 CFR 772.11(b):

“In determining traffic noise impacts, a highway agency shall give primary consideration to exterior areas where frequent human use occurs.”

and Title 23 CFR 772.11 (c)(2)(iv):

“Activity Category D... A highway agency shall conduct an indoor analysis after a determination is made that exterior abatement measures will not be feasible and reasonable. An indoor analysis shall only be done after exhausting all outdoor analysis options. In situations where no exterior activities are to be affected by the traffic noise, or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities, the highway agency shall use Activity Category D as the basis of determining noise impacts...”

Contact MDOT Lansing Office Environmental Staff prior to performing interior monitoring activities.

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10. MDOT’s Definition of a Noise Impact:

MDOT identifies a noise impact as:

- a 10 dB(A) increase between the existing and predicted sound levels, or
- a measured or modeled noise level 1 dB(A) less than the NAC standard (Table 1).

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11. Receptor Unit Soundproofing or Property Acquisition:

Soundproofing of Activity Category D land use facilities listed in Table 1 or acquisition of buffer property should not be considered without prior coordination with the Lansing Office. The MDOT Region Real Estate representative must be contacted during any discussions on land acquisition. This coordination must occur prior to any discussions with the public. **Property acquisition for the purpose of creating a buffer zone will be considered for unimproved property only and not for purchasing of homes or developed property.** This issue will be dealt with on a site-by-site basis.

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12. Three-Phased Approach of Noise Abatement Determination:

Noise abatement design is driven from the results of the noise analysis (i.e. noise levels). All analyzed noise barriers must progress to the “feasible” phase. All feasible noise barriers, regardless of the number of receptor units protected, must then progress to the “reasonableness” phase. Following the completion of both phases, a determination can be made related to the feasibility and reasonableness of noise abatement options.

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13. Non-Barrier Abatement Measures:

While noise barriers (walls and/or berms) are by far the most common forms of highway noise abatement, the “non-barrier” abatement measures listed in Section 3.2 should also be evaluated in terms of their feasibility and, if feasible, their reasonableness. TNM will be used in the evaluation of non-barrier noise abatement. Contact the Lansing Office for guidance.

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14. Not Having a Highway Traffic Noise Impact:

Noise abatement is required to be analyzed for all impacted receivers. A noise abatement measure is not required to extend to include receptors that are not identified as having a highway traffic noise impact. However, a non-impacted receptor could receive some benefit from noise abatement constructed to protect nearby impacted receptor(s) and must be included in the reasonableness determination.

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15. Category C and D Analyses:

If an enclosed facility in Category C has evidence of an exterior area of frequent human use then the exterior use area and the interior (using activity Category D standards) should be analyzed. If either exterior area or interior are impacted then exterior abatement measures (found in section 3.2 - *Highway Noise Abatement Measures*) should be considered and analyzed. Use Table 6 in FHWA’s *Highway Traffic Noise: Analysis and Abatement Guidance*, January 2011, to aid in predicting the interior noise impacts

If exterior abatement measures for Category C are found not to be feasible or reasonable, and there is a Category D impact, then consider sound insulation.

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16. Greater than 5 dB(A) Highway Traffic Noise Reduction:

A noise reduction of 5 dB(A) is required for a noise barrier to be determined to be feasible. Once the proposed noise barrier is determined to be feasible and reasonable, it should be optimized to provide a balance between the most obtainable insertion losses per additional cost. Refer to the “Barrier Optimization” section (Section 3.5.1) for further information and requirement on how to achieve an optimized noise barrier.

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17. Allowable Cost Per Benefited Receptor Unit (CPBU):

MDOT has chosen an allowable CPBU of \$44,187 (2013) where noise mitigation was determined to be feasible. The cost per benefited receptor unit is annually adjusted to the consumer price index (CPI). Although \$44,187 per benefited receptor unit is the allowable upper limit in the reasonableness determination, a reasonable (and possibly optimized) noise barrier may cost much less than \$44,187 per benefited receptor.

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18. Benefiting Receptor Unit Eligibility:

A receptor that receives a 5 dB(A) or greater insertion loss as a result of the proposed noise barrier will be considered a benefited receptor unit. Benefits to non-impacted receptors should be considered ancillary, and the proposed noise barrier measure will not be specifically designed to reduce noise levels at non-impacted receptors regardless of the resulting insertion losses.

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19. Analyzing Apartment, Condominium, and Single/Multi-Family Units:

Since apartment and condominium buildings often share common outdoor use activities, it may be difficult to determine and analyze impacts and benefits. Professional judgment should be used and the MDOT Lansing Office consulted when such difficulties arise in the project area. The type and size of the facility and its location in relationship to the residential units are factors to consider in determining the number of benefiting units. In some cases the apartment complex outdoor use area, such as a pool, will have a capacity limit posted, and that number limit will be used when determining the number of dwelling unit equivalents. See Appendix D for an example.

All single-family dwellings will be considered as one receptor unit regardless of the house or lot size.

Professional judgment should be used in determining the presence and location of outdoor activity areas for both apartments/condominiums and single-family dwellings.

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20. Abatement for Non-First/Ground Floors:

Highway traffic noise barriers are often unsuccessful in providing highway traffic noise reductions for any floor other than the first/ground floor of receptor units for structures at roadway level. This is due to the inability to construct a noise barrier to the height necessary to provide effective noise mitigation while still being reasonably cost-effective for those non-first/ground floors (i.e., not feasible or reasonable). Abatement for second or higher floors will be considered when the structure is below grade and the second or higher floors are level with the roadway.

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21. Construction and Technology Barrier Construction Tracking:

In accordance with 23 CFR 772.13(f), the FHWA asks all State Departments of Transportation to assist them in updating the Highway Traffic Noise Barrier Listing. MDOT's Construction and Technology Division will track the items as listed in the regulations.

22. Public Parks:

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A highway traffic noise impact on a public park, picnic area, recreation area, or playground may result in a constructive use of a Section 4(f) property determination. Contact the 4(f) specialist in the Lansing Office Environmental Section for consultation for input on definition of active use area.

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23. Land Use Category D:

Category D includes interior noise for certain facilities that are listed in Category C and have no observable exterior areas of frequent human use. One or two picnic tables do not necessarily indicate frequent human use. Professional judgment and discussions with the property owner should be used in determining the context and frequency of use. The number of receptors will be determined by the context, frequency of use, facility size and capacity limit or number of employees. See Appendix D for an example.

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24. Documentation of the Noise Abatement Worksheets:

The details form associated with each CNE's proposed noise barrier or noise barrier system must be incorporated into the Final Design Highway Traffic Noise Report. The final submissions of the final design documents must have the details forms signed by the Project Manager, a Lansing Office noise specialist, and the qualified professional(s) who performed the highway traffic noise analysis. The details forms do not have to be signed on draft final design document submissions. These details forms will document, within the administrative record, the feasibility and reasonableness of providing highway traffic noise abatement measures for the transportation improvement project. It will also provide the FHWA noise abatement inventory requirement as stated in 23CFR 772.13(f).

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25. Barrier Optimization:

When optimizing the proposed noise barrier, the three-tier set of abatement goals should be evaluated, when practical, in terms of establishing noise reductions for impacted receptors only (not for non-impacted receptors) within their area of frequent outdoor activity. The relationship between noise barrier cost and noise barrier performance is non-linear. This means that noise benefits typically increase with increased barrier height and/or length; however, at some point, further increases in barrier height and/or length result in smaller and smaller increases in benefit until a point of diminishing returns is reached. A point can be identified where a potential noise barrier provides the best balance between cost and benefit. Final design highway traffic noise barriers should seek to maximize benefits while minimizing cost, given the need to achieve predetermined design goals and maintain noise barrier feasibility and reasonableness.

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26. Noise Barrier Heights on Structures:

When optimizing noise barriers on bridge parapets, they must be in compliance with bridge design and bridge construction standards and shall be dealt with on a project-by-project basis. Coordinate with MDOT Bridge Design Unit when establishing noise barrier heights on bridge structures. This coordination should occur as early as possible in the project development process and, at the latest, prior to submitting the Final Design Highway Traffic Noise Report to MDOT Lansing Office for review.

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27. Statement of Likelihood:

All environmental clearance documents must have this general statement relating to proposed noise mitigation: “Based on the studies thus far accomplished, the Michigan Department of Transportation intends to install highway traffic noise abatement in the form of a barrier (or barriers) reflected in Table ____ in this document. The preliminary indications of likely abatement measures are based on preliminary design for barrier cost(s) and noise reduction as illustrated in Table ____ in this document. If it subsequently develops during final design that these conditions have substantially changed, the abatement measures might not be provided. A final decision of the installation and aesthetics of the abatement measures(s) will be made upon completion of the project’s final design and the Context Sensitive Design process.”

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28. 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.

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29. 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.

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30. 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.

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31. 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.

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32. 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.

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33. Construction Noise-Related Coordination with Locals:

When construction noise is an issue, the Region should coordinate with the communities and local municipalities to establish periods of time when construction activities that cause high noise levels should not occur. Any time construction noise specifications are required to be included, detailed coordination is suggested with MDOT and the local municipality. The residents adjacent to the barriers will be notified 2 weeks prior to any barrier construction activity.

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34. Final Design Noise Abatement Public Meeting(s):

Preliminary Engineering (PE) Phase noise abatement public meetings should not be conducted until the draft version of the Final Design Highway Traffic Noise Report is approved by the Region or TSC, Lansing Office and FHWA. Highway traffic noise abatement commitments and aesthetics will be finalized at the final design stakeholder engagement meeting(s). The results of the final design noise abatement public meeting(s) will be included in the final version of the Final Design Highway Traffic Noise Report.

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35. Local Officials Vote on Noise Abatement Construction:

Local officials as a body do not have a vote on the preference for or against noise abatement construction. The construction of noise abatement is solely based on the vote of property owners and residents of benefiting units. Local officials cannot override the desires of the property owners and residents benefiting units for or against noise abatement construction

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36. Voting Against Noise Abatement:

The property owners and residents of benefiting units will be informed before the vote that a decision against noise abatement at a specific location means no future noise abatement, including Type II, will be considered or approved for that specific location. Only a Type I scenario will trigger a future noise abatement assessment at that location.

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37. Rental Unit Owner and Tenant, and Activity Category C Areas Voting:

The property owner and tenant will receive notice of the public meetings regarding noise abatement. The property owner of a rental benefiting dwelling unit(s) will count as one (1) vote per benefiting unit for or against a noise barrier and/or a barrier's aesthetics. The owner may delegate this authority to an office/property manager if one is available. The tenant of an individual benefiting dwelling unit will count as a one-half (0.5) vote. For Activity Category C areas such as churches, schools, and park/recreational fields, the vote(s) will be accepted only from the governing authority that owns or manages the area in question.

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38. Condominium Complexes:

Condominium complexes will be viewed the same as residential properties.

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39. Screening Barrier or Walls:

MDOT Lansing Office, Region Office, and/or TSC may receive requests for a barrier (structure or vegetative) to screen traffic in lieu of noise abatement which did not meet feasibility and reasonableness. The term, "screening barrier" or "screening wall" is not noise abatement and should never be used in the context of noise abatement and MDOT discourages their use or to create the perception of noise abatement.

If the MDOT TSC or Region Office decides to use a screening wall or barrier for aesthetic purposes, then the adjacent property owners must be informed that this screening is not meant for noise abatement and may not provide the expected noise reduction. Screening walls are an enhancement for the adjacent properties. Screening walls should only block the line of sight of the majority of the traffic. The view of the top of tractor-trailer should not be taken into consideration in the design of a screening wall or barrier. MDOT Roadside Development should be contacted and utilized in regard to the use, design, and aesthetics of any screening activities such as walls or vegetative screens.

However, a screening wall or a vegetative screen can be kept in a project manager's toolbox for use in ROW negotiation with adjacent land owners. Contact an MDOT Real Estate representative and the Lansing Office Environmental Section before any ROW and enhancement negotiation.

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40. Example MDOT Traffic Noise Nuisance Calls or Type II Response Letter

Dear Resident:

This letter is in response to your interest in constructing noise barriers on existing highways. The Michigan Department of Transportation's (MDOT) noise abatement policy is currently limited to construction of warranted noise barriers as part of a highway projects listed in the federal regulation 23 CFR 772.5 definition of Type I projects which include a project on new alignment or for a major reconstruction project which adds travel lanes. There is no federal guidance requiring the construction of noise barriers on existing highways nor are there federal funds for these projects.

MDOT does have a Type II noise abatement program which is voluntary and provides for Federal-aided noise abatement for existing highways. However, due to budgetary constraints MDOT's Type II is suspended until further notice.

While we periodically receive requests for noise abatement along existing roadways, we have been unable to accommodate them due to resource constraints.

Thank you for your continuing interest in Michigan's Transportation Program. Please reference the federal regulation 23 CFR 772 and MDOT noise policy, rules and procedures handbook for further information. If you have any further concerns regarding this issue, please feel free to contact MDOT in the future.

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41. All discussions on background information (regulations, policy, guidance, noise basics, and analyses methodologies) should be the most basic information without elaboration.

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42. Maps and tables should be placed immediately following the text describing their subject. Tables for Barrier Description(s) and Barrier(s) could be combined if space allows.

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43. Cultural and Section 4(f) Resource Coordination:

Consultation and coordination with those responsible for the resource must be carried out and documented in the Environmental Clearance and Final Design Highway Traffic Noise Reports.

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44. Final Design Highway Traffic Noise Report Graphics:

The entire Final Design Highway Traffic Noise Report should follow the guidance in Section 7.1.1.2 *Map Elements*.

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45. FHWA Review Requirements:

Type I and Type II projects utilizing federal funds for noise barriers must be reviewed by FHWA.

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