V. Type I Projects

The ODOT conducts all highway noise studies in accordance with current FHWA guidelines and procedures, primarily the latest revision of the *FHWA Highway Traffic Noise Analysis and Abatement Guidance* and *23 CFR 772*. Table 2 is an outline that summarizes the general procedure utilized by ODOT when conducting a highway noise study.

The Project Initiation Package (PIP) should consider noise sensitive land uses within approximately 500’ of the edge of pavement of the proposed project. However, if highway noise impacts are identified during the Noise Analysis at the study area limit, the study area should be expanded.

Consideration for noise sensitive land uses should focus on exterior areas of frequent human use in accordance with the latest revision of the *FHWA Highway Traffic Noise Guidance and 23 CFR 772*. Exceptions for consideration of interior noise levels are limited to Activity Category D land uses per 23CFR772 (auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios). Regarding apartment buildings, only units that have frequent human exterior use (i.e. patios) and facing to the freeway (or exposed to the freeway) should be modeled and are considered receptors. Be aware of noise sensitive areas (NSAs) that are permitted to build after the noise analysis is approved but before NEPA is approved. These sensitive noise receptors must be analyzed for noise.

A. Noise Analysis Requirements per the Project Development Process (PDP)

▶ *see Appendix_B: Noise Analysis Process Flowchart*

Varying levels of noise work are necessary to comply with the PDP. Table 1 and the subsequent discussion explain the action and products required.
Table 2: Necessary levels of analysis for compliance with the PDP

<table>
<thead>
<tr>
<th>Product</th>
<th>Level of Analysis</th>
<th>Typical PDP Phase Product is Completed In</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Initiation Package (PIP)</td>
<td>Identify noise sensitive land uses in the project study area. The noise analysis process ends if there are no noise sensitive land uses within or adjacent to the project study area.</td>
<td>Planning (PL)</td>
</tr>
<tr>
<td>Noise Analysis Report</td>
<td>Noise Analysis of Feasible Alternatives or the Preferred Alternative. Estimate noise abatement costs using $25/SF and the $35,000 per benefited receptor threshold.</td>
<td>Preliminary Engineering (PE) or Environmental Engineering (EE)</td>
</tr>
<tr>
<td>Noise Barrier Design Table (NBDT)</td>
<td>Mitigation design and finalized cost estimate for noise abatement.</td>
<td>Environmental Engineering (EE)</td>
</tr>
</tbody>
</table>

1. Project Initiation Package (PIP): The PIP will identify all noise sensitive areas within the project study area. Provide aerial photography or other similar mapping with noise sensitive areas clearly identified and labeled. The narrative of the PIP will include a brief description of each noise sensitive area.

2. The Noise Analysis will investigate noise levels at representative receptors within each noise sensitive area and report the number of impacts resulting from each alternative. Analysts will use the latest version of the FHWA TNM (Traffic Noise Model) to complete the analysis. A complete series of noise readings as outlined in Section II.C.2 below is required for the Noise Analysis Report. The Noise Analysis must be prepared prior to NEPA approval and the results discussed in the environmental document.

1. The Noise Barrier Design Table (NBDT) includes barrier design information such as top of wall elevations, bottom of wall elevations, distance offset from roadway centerline, barrier heights, and wall stationing every 50’ or less.
B. Determination of existing noise levels

1. Noise measurements must be done with a meter (ANSI S1.4-1983, TYPE II or better) at representative receptor locations and capture the morning and/or evening rush hour traffic noise emissions period. Field measurements must be taken consistent with the guidelines contained in FHWA’s manual ‘Measurement of Highway Related Noise’, May 1996. In complex environments, the field measurement results can be used to determine the existing noise levels for the noise analysis. All noise reading locations must be placed in or represent areas of frequent exterior human use. Traffic counts (cars, medium trucks, and heavy trucks) must be taken during the measurement period. The field measurements must be used to validate the model predictions for existing levels. The analyst will run a noise model using the traffic volumes counted during the field measurements and compare the result to the field measurement. If the difference between the two exceeds 3 dB(A), the modeling site input parameters must be checked for consistency with actual site conditions, modified as appropriate, and the model recalibrated before prediction of the existing and design year noise levels. If there is still a difference of more than three decibels between measured and modeled noise levels, use the measured noise level to represent the existing noise level.

2. Field noise readings are required as a part of the Noise Analysis Report. However, if there is a change in the noise environment since the previous readings, then further readings may be warranted as part of an updated Noise Analysis. Noise readings establish a record of the actual noise level within a project study area and play a role in developing an accurate noise model. Counts of traffic on the monitored roadway during the measurement period are required. Multiple field noise readings are required at each neighborhood within the study area. The readings will consist of no more than two front row receptors (representing the length of a potential noise barrier location) and one additional reading at a second row receptor and one at the edge of the study area (i.e. 500’). However, if highway noise impacts are identified at the study area limit based on noise measurements, the study area should be expanded. The analyst will coordinate, with OES Noise staff, a Noise Measurement Plan (NMP) providing the location and number of noise measurements proposed for each project, prior to performing any field work. All noise reading locations must have a corresponding address or specific location (such as GPS coordinates) provided. Also, the distance from the edge of pavement to each noise reading location should be provided. Atmospheric conditions such as temperature, average wind, maximum wind, and wind direction must be recorded for each noise reading.
Aerial mapping in color and showing all field reading locations should be provided. The scale of the mapping should be approximately 1”=200’. Use of a field mapping grade global positioning system (GPS) can be used to record the location of all noise readings. Note that the following parameters should be met to ensure “good” quality data in a format compatible with the Department's Enterprise Database System Sybase:

a. Minimum of 5 satellites
b. Satellite elevation above 10 degrees
c. PDOP < 4
d. Collection rate of 1Hz
e. Minimum of 5 epochs (Method 1 and Method 2), 10 epochs (Method 3)

Projects involving new roadway on new alignment require field noise readings at noise sensitive land uses along the proposed alignment. The measured noise levels will serve as the existing noise level at all locations where the measured noise level differs from the existing modeled noise level by more than 3 dB(A).

C. Prediction of design year noise levels
Prediction of design year noise levels for all “Build” alternatives under consideration and the existing conditions for each representative receptor on each alternative is required. Category A-E receptors present in the study area must be analyzed for noise impacts. For Category A-C and E, no analysis is required if there are no exterior areas of frequent human use.

D. Identification of a noise impact
For Type I and II projects, identification of a noise impact involves a comparison of the predicted noise levels for each project alternative with the noise abatement criteria and the existing noise levels. This comparison identifies the traffic noise impacts associated with each alternative in terms of the change in existing noise levels and the amount by which criteria can be approached or exceeded. Impacts occur when the predicted traffic noise levels approach or exceed the applicable FHWA NAC (i.e. within one dB(A)) or when the predicted noise levels substantially exceed the existing noise levels defined as 10 dB(A) or more.
E. Feasibility and Reasonableness of Noise Abatement

Title 23 CFR 772.13 and 772.15 provide requirements for consideration for noise abatement and noise abatement techniques that must be evaluated for all projects where noise impacts are predicted to occur as a result of project construction. If feasible and reasonable, noise abatement must be incorporated into the project per 23 CFR 772.11(g). Reasonableness is addressed by the desires of the benefited receptors (see Section IV for Noise Public Involvement requirements) (772.13(d) (2) (i)), cost per benefited receptor (772.13(d)(2)(ii)), and achieving the noise reduction design goal (772.13(d)(2)(ii)).

To be feasible, a mitigation measure must be acoustically feasible and must meet engineering requirements for constructability. An acoustically feasible noise barrier provides a minimum 5 dB(A) reduction for 40% of the impacted receptors. Additionally, the barrier must meet requirements for safety in accordance with ODOT’s Location and Design Manual, Volume 1, Section 200, Roadside Design. Further, it may be determined that the barrier is not feasible to construct. Factors to consider are barrier height, topography, drainage, utilities, maintenance of the abatement measure, maintenance access to adjacent properties, and access to adjacent properties (i.e. arterial widening projects). For every noise wall determined to be feasible and reasonable in the Noise Analysis phase, the noise analyst must coordinate the noise wall location with the ODOT District Utility Coordinator or call OUPS to determine if there are any potential issues with existing or proposed utilities. The results of the coordination must be discussed in the Noise Analysis report. The noise analyst must coordinate the placement of a noise barrier with maintenance, utility and construction experts as much as possible. This helps to eliminate or minimize issues in the design and construction phases.

Reasonableness involves considering the combination of social, economic, and environmental factors in the evaluation of a noise abatement measure. A cost reasonable barrier does not exceed the current cost per benefited receptor for noise abatement. The cost reasonableness criterion is not a design goal for noise abatement. Reasonable cost per dwelling unit is presently considered to be $35,000 per benefited receptor receiving a minimum reduction of 5 dB(A) in the predicted noise level. The noise reduction design goal is a 7 dB(A) reduction for at least one (1) benefited receptor pursuant to 772.13(d)(2)(iii) and is a requirement. A benefited receptor is any receptor receiving at least a 5 dB(A) noise reduction. Other “benefited” receptors that receive a 5 or more dB(A) reduction in the average noise level shall be included in the cost/benefit calculation of each noise barrier regardless of whether or not the location is predicted to experience design year noise impacts. For example, if the mitigation measure would benefit ten receptors at a cost of $350,000, the noise abatement measure is cost reasonable. The ODOT uses a cost of $25 per square foot for Type I and Type II projects to estimate the cost of ground mounted noise barrier construction. When estimating the cost of a ground-mounted barrier, a figure of $25/sf should be used. When estimating the cost of a structure mounted barrier,
a figure of $100/SF should be used. This figure is based on higher fabrication costs, higher material costs, and bid histories. This additional cost must be included in the noise analysis phase when estimating the cost of a structure-mounted noise barrier. OES should be contacted when estimating the cost of a structure-mounted noise barrier. Any utility costs associated with the construction of a noise wall must also be included when estimating the cost of a noise barrier.

Noise abatement is offered at locations where design year build noise impacts are predicted to occur and noise abatement is determined feasible and reasonable. Consideration for whether or not noise abatement will be constructed is left to the benefited property owners and residences of the receptors. The ODOT does not require installation of noise abatement. Noise abatement is offered to the benefited receptors. For owner-occupied dwellings, one ballot shall be solicited per benefited receptor but is counted as 2 votes/tallies. Relative to benefited rental properties in the same noise sensitive area, one owner ballot and individual resident ballot shall be solicited and is counted as 2 votes/tallies (1 vote for the owner and 1 vote for the renter). The owner will have the same number of votes as there are number of dwelling units and each rental unit will have one vote per unit. An owner-occupied residence of an apartment complex will receive one owner vote (equaling the same number of votes as there are number of dwelling units) plus one additional vote as an occupant. An unoccupied rental that is livable receives 1 vote/tally from the owner. There is no tally for the occupant. For abatement to be designed and constructed, a minimum of 51% of the benefited property owners and residences must respond in favor of the abatement. If the first noise public involvement survey does not result in a minimum of 51% of the benefited property owners and residences responding in favor of the noise abatement, a resurvey should be conducted. When a multifamily dwelling has a common exterior area of frequent human use, each unit of the multi-family dwelling that has access to that common exterior area shall be included in the feasible and reasonable analysis. Apartment buildings or multi-family dwelling units with no frequent human exterior use will not require a noise analysis. Vacant/boarded up/condemned residential buildings requiring a permit to become livable are not considered noise sensitive areas.

Other Considerations

Use of the line of sight function in the TNM is required to help determine that the barrier is of sufficient height to block the line of sight. This function identifies locations where receivers are exposed to a noise source. This is often the top of the exhaust stack of heavy trucks. A successful abatement design will block the line of sight between first row receptors and sources, however, there may be cases where this is not possible. Examples of projects where a finding that noise abatement may not be cost reasonable or acoustically
feasible include widening or alteration of roadways involving isolated urban environments or rural residences, however, consideration of the measures listed in 23 CFR 772.15(c) is required in the Noise Analysis. Property access issues usually eliminate consideration for noise barriers and other measures are often infeasible due to the nature of the urban environment.

The current reasonable cost for noise abatement is $35,000 per benefited receptor, based on ODOT’s latest cost per benefiting receptor evaluation. The cost reasonableness criteria are reevaluated biennially as provided in IV, G. Noise abatement is often not reasonable to mitigate impacts for isolated receptors in rural areas. Using the cost estimating rules provided in II. B. 2., the cost to provide a noise barrier for a single receptor ranges from $100,000 - $200,000, which exceeds the reasonable cost of abatement.

Third party funding is not allowed on a Federal or Federal-aid Type I or Type II project if the noise abatement measure would require the additional funding from the third party to be considered feasible and/or cost reasonable. Third party funding is acceptable on a Federal or Federal-aid Type I or Type II project to make functional enhancements such as absorptive treatment or aesthetic enhancements, to a noise abatement measure already determined feasible and reasonable.

F. Noise Abatement Measures
Noise abatement measures as listed in 23 CFR 772.15c may be considered for incorporation into the project to reduce traffic noise impacts. They are (1) construction of noise barriers including acquisition of property rights, either within or outside the highway ROW; (2) traffic management measures; (3) alteration of horizontal and vertical alignments; (4) acquisition of real property or interests therein to serve as a buffer zone to preempt development that would be adversely impacted by traffic noise; and (5) noise insulation of Activity Category D land use facilities listed in Table 1.

G. Other Land Uses/Equivalent Receptors
see Appendix_C: Noise Analysis Process Flowchart for FHWA Categories C,D, and E

Representation of several types of land uses as more than one receptor is appropriate in some cases. These receptors typically include active sports areas, playgrounds, schools, pre-school and daycare facilities; churches, hospitals, retirement homes; parks, trails, campgrounds, cemeteries, and other exterior areas of frequent human use for the land uses found in the NAC activity category ‘C’.

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 (interior evaluation) as the basis of determining noise impacts.

Offering insulation as an abatement option is only available if exterior abatement is not feasible and reasonable and an interior impact has been established and the receptor will benefit from insulation. This is not left to the discretion of the owner or resident of the receptor.

To determine the effectiveness of a noise wall, an equivalent number of receptors is determined by using the following formula.

$$\text{Equivalent # Receptors} = \frac{\# \text{ Occupants}}{\left( \frac{\# \text{ People}}{\text{Receptor}} \right) \times \text{Usage}}$$

Where:

- $\# \text{ Occupants} = \# \text{ People} \ (\text{Students, Visitors, etc.}).$
- $3 = \text{Average # of People/ Residence (household size - Ohio Average)}$
- $\text{Usage} = \frac{\# \text{ of Daily Hours Used Outdoors}}{24 \text{ Hours Per Day}} \times \frac{\text{Days Used Per Year}}{\text{Days Per Year (or Days Used Per Week ÷ Days Per Week)}}$

**Example:** Equivalent Receptors at a park:

For a park operating year-round during the hours of sunlight for which the average daily patronage is 100 visitors, the Equivalent # of Receptors would be calculated as:

$$100 \text{ people} \div 3 \times \left( \frac{12 \text{ Average Daily Hours of Sunlight}}{24 \text{ Hours Per Day}} \right) = 17 \text{ Equivalent Receptors}$$

**Example:** Equivalent Receptors at a golf course:

For a golf course operating year-round during the hours of sunlight for which the average daily play is 27 rounds per day, the Equivalent # of Receptors would be calculated as:

$$27 \text{ rounds per day} \div 3 \times \left( \frac{12 \text{ Average Daily Hours of Sunlight}}{24 \text{ Hours Per Day}} \right) = 4.5 \text{ Equivalent Receptors}$$
Example: Equivalent Receptors at a school with recreational fields:

Number of Students = 678 per day, however, it was determined 1/3 of students (226) would use recreational fields.

Average Number of People / Residence (household size – Ohio Average) = 3

Number of Daily Hours Used = 8 hours (6.5 regular hours and 1.5 after school hours)

Days Used per Year = 180 instructional days

The equivalent number of receptors would be 12.4 (678/3/3x8/24x180/365) for the school.

1. Evaluate all other C, D, and E land uses using consistent methodology shown in the aforementioned examples. When calculating the equivalent receptors for a FHWA Category C, D, or E land use, consider the actual frequent human use and seasonal aspect of the land usage. Coordinate/contact OES to discuss the input data into the formula to determine equivalent receptors prior to report submission.

H. Eligibility for Insulation as a Noise Abatement Measure

► see Appendix_D: Sample Noise Insulation Work Agreement

► see Appendix_E: Noise Insulation Inspection Checklist

Noise abatement measures may include installation of central air conditioning; providing acoustical drapes, and installation of double-paned windows and solid-core doors. All Category D land uses qualify for insulation as a noise abatement measure. A structure that already has central air, double-paned windows and solid-core doors will benefit little from further insulation. In these cases the department will not offer insulation as a noise abatement measure. An inspection of Category D land uses is necessary to determine eligibility for insulation as a noise abatement measure. Please refer to the Noise Insulation Inspection Checklist (Appendix B). The owner of the land use must enter into a written agreement with ODOT to furnish acoustic insulation (see Appendix C). In no case will ODOT spend more to insulate a Category D site than it would cost to build a typical noise barrier to protect the same location. Offering insulation as a noise abatement measure is only available if exterior abatement is not feasible and reasonable and an interior impact has been established and the receptor will benefit from insulation. This is not left to the discretion of the owner or occupant of the Category D land use.
Places of worship, Libraries, Meeting Rooms and Schools: Consideration for noise insulation is limited to classrooms, libraries, and auditoriums (sanctuaries) with exterior windows or exterior doors facing the roadway.

NOTE: Insulation Materials Requirements: Windows and doors used for noise insulation must have a minimum Sound Transmission Class (STC) of 39. Acoustical Drapes must have a minimum STC of 27. Installation of central air conditioning is considered in cases where windows must be opened to cool a building during warm weather. Any modification to a historic structure should include a screening analysis to determine if the structure requires Section 106 coordination/consultation, prior to any modification to the structure.

I. Noise Analysis Format, Content, and Procedures

► see Appendix_F: Noise Analysis Report Checklist

A noise analysis will result in a Noise Analysis Report and Noise Barrier Design Table (NBDT). The amount and extent of noise assessment information, discussion, and disclosure in the environmental document should be consistent with that described in the latest revision of the FHWA Highway Traffic Noise Analysis and Abatement Guidance, Appendix B.

The noise analysis report will include the following sections, as applicable. Information should be provided in a format that is easy to understand. Use of tables is recommended.

a. Introduction: The introduction will provide a description of the study area and the project alternatives.

b. Noise Analysis Overview: Includes a discussion of the applicability of Federal regulation and guidance and the ODOT noise manual to the project; a discussion of analysis objectives to include a basic discussion of the noise model used for the analysis; a discussion of basic noise principles; a discussion of the categories of noise sensitive areas in the study area and a discussion of existing and design year traffic.

c. Noise Measurements: Includes a discussion of noise measurements for the project. Noise measurements establish a record of the actual noise level within a project study area and play a role in developing an accurate noise model. All noise reading locations must be placed in areas of frequent exterior human use. Counts of traffic (cars, medium trucks, and heavy trucks) during the measurement period are required. Field noise readings are required at each neighborhood within the study area. The readings typically consist of no more than two front row receptors (representing the
length of a potential noise barrier location) and possibly one additional reading at a second row receptor and one at the edge of the study area (i.e. 500’), however, the appropriate number of noise readings are determined on a project by project basis. If highway noise impacts are identified at the study area limit based on noise measurements, the study area should be expanded. The analyst shall coordinate, with OES Noise staff, a noise measurement plan providing the location and number of noise measurements proposed for each project, prior to performing any field work. Aerial mapping in color and showing all noise reading locations must be provided. All noise reading locations must have a corresponding address or specific location provided. All TNM receivers must be shown on aerial photos. Atmospheric conditions such as temperature, average wind, maximum wind, and wind direction must be recorded for each noise reading.

d. Noise Modeling: Title 23 CFR 772.9 requires use of TNM, Version 2.5 to conduct noise modeling and predict noise levels for any Federal-aid highway projects. The noise descriptor will be Leq (h). The noise analyst will set up the noise model in accordance with the TNM User’s Guide and with consideration given to additional information provided in the TNM Frequently Asked Questions (FAQ) provided by the FHWA at the following internet address: http://www.fhwa.dot.gov/ENVIRonment/noise/tnm/faq/faq_geninfo.htm.

Include a discussion of noise modeling for the project. Discuss the traffic volumes inputted into the model. Posted speed limit must be used in the model, unless it is determined that the operating speed is consistently higher. The typical method is to divide the study area into noise sensitive areas (NSAs) that represent neighborhoods or other logically grouped noise sensitive land uses based on proximity to each other. The modeling effort will include validation models based on noise measurements and traffic counts taken during the noise measurements as well as modeling of the existing condition and the design year build alternatives. This is where the analyst will report predicted noise levels and impacts in general terms. If a community has 50 homes or less, model every home. If a community has greater than 50 homes, then representative homes can be modeled. Always model the roadway side of a home, front yard or backyard facing the roadway

All receiver points in the noise model must have a corresponding address or location included in the noise analysis report. Addresses of all of the benefited receptors must be provided. All receiver point IDs must be shown on aerial photos. Report graphics must illustrate modeled receptors, impacted receptors, benefited receptors, impacted and benefited receptors, modeled noise barriers recommended and/or not recommended.
If it is required to model a noise barrier, a minimum of two noise barrier scenarios should be modeled relative to lateral placement and height and documented with the optimum barrier being recommended. Exceptions must be approved by OES. Relative to noise wall height and length, multiple scenarios must be modeled with the optimum acoustic scenario recommended. The noise analyst should design the minimum feasible and reasonable barrier first, then continue with other scenarios that are better acoustically. ODOT’s noise wall heights typically fall within the range of 10’-16’, however, noise wall heights outside of this range may need to be analyzed and potentially recommended. If a modeled noise wall that is feasible and reasonable falls outside of this range, contact OES before moving forward. To avoid undesirable acoustic end effects, the noise wall should extend 2 times as far in each direction as the distance from the end receiver to the barrier. Noise walls must be modeled on and off existing structures. If a noise wall is feasible and reasonable without requiring any portion of noise wall on structure, ODOT’s preference is no noise wall on structure. Barrier lengths are computed by TNM2.5. If a noise wall is modeled and determined to be feasible and reasonable or not, the noise consultant must provide ODOT with a “Noise Wall Preliminary Placement Plan (NWPPP)” for expedited review and approval BEFORE the noise report is finalized and submitted to ODOT for review. The NWPPP involves providing ODOT an aerial photo, electronically, showing all modeled noise wall location(s), feasible and reasonable or not, and associated wall information. Another option is for the noise analyst to submit an NWPPP to ODOT prior to beginning any modeling in an effort to minimize modeling iterations.

For each modeled noise wall, ODOT is looking for a consistent wall height (relatively flat), not a wide range of heights, particularly for walls at the edge of shoulder (EOS), where the top of wall profile should closely parallel the roadway profile. This allows for an easier transition into the design phase and avoids potential future post-construction complaints from benefited receptors.

Indicate if a modeled noise wall is at the EOS, ROW, both, or somewhere in between (i.e. edge of foreslope or backslope). If a noise wall is recommended at the EOS, indicate if the bottom of wall elevations are the edge of shoulder elevations.

Precise bottom of wall elevations (BOWE) are critical to the accuracy of the noise wall results and recommendations. BOWEs must be precise in the model. Also, the noise analyst must illustrate, describe, and discuss the precise placement of the noise wall relative to the adjacent roadway.
If a noise wall is feasible and reasonable, provide location and placement, average height, length, estimated cost, square footage, # of benefited receptors, cost per benefited receptor, # of impacted receptors, # of impacted and benefited receptors, total benefited receptors.

For every noise wall determined to be feasible and reasonable in the Noise Analysis phase, the noise analyst must coordinate the noise wall location with the ODOT District Utility Coordinator or contact OUPS to determine if there are any potential glaring issues with existing or proposed utilities. The results of the coordination must be discussed in the Noise Analysis report.

If an earthen mound noise barrier is determined to be feasible and reasonable to construct, this alternative shall be considered the first option. The noise analysis must include a discussion as to why an earthen mound noise barrier is or is not a feasible alternative material choice.

A detailed discussion of the type and number of noise impacts resulting from construction of each project alternative must be provided. Relative to showing noise levels, increases, and reductions in the report, show one decimal point. For Category B and C receptors, 65.5 dBA is an impact. 65.4 is not an impact.

▶ see Appendix_G: Flowchart for Noise Wall Placement in the Modeling Phase

e. Traffic Information: A discussion and spreadsheet showing the Existing and Design Year ADT, VPH, truck %, A/B/C vehicle volumes (both traffic counted during each noise measurement and certified traffic) is required. Posted speed limit must be used in the model, unless there is reason to believe operating speed is consistently higher.

f. Noise Abatement Measures: A discussion of the noise abatement alternatives in 23 CFR 772.15(c) to include an assessment of reasonableness and feasibility for each method and a description and cost estimate for selected noise abatement measures.

g. Undeveloped Lands: A discussion of noise levels on undeveloped lands and recommendations for local officials is required. The purpose of this discussion is to comply with 23 CFR 772.17 Information for Local Officials. This provision is intended to assist local officials to avoid land development adjacent to highways that is incompatible with highway noise. In accordance with 772.13(b)(3), ODOT will not consider a noise barrier as cost reasonable for future Type II projects at locations identified in a previous noise analysis as impacted by highway noise but previously
considered not cost reasonable and/or feasible. To minimize future traffic noise impacts on currently undeveloped lands of Type I projects, local officials within whose jurisdiction the highway project is located shall be informed of the best estimation of the future design year noise levels at various distances from the edge of the nearest travel lane of the highway improvement where the future noise levels meet ODOT’s definition of “approach” for undeveloped lands. At a minimum, identify the distance to the exterior noise abatement criteria in Table 1.

h. Construction Noise: Address construction noise in accordance with 23 CFR 772.19.

i. Conclusion: Provide a summary of the findings of the noise analysis.

j. Appendices: The appendices include the following supporting information:

1. Make, model, serial number and certificate of calibration for all noise meters and associated calibration units used for field noise readings. All devices must have been calibrated within the past twelve calendar months or in accordance with the manufacturer’s recommendation. Provide documentation of the manufacturer’s recommended calibration interval and calibration certificates.

2. TNM Roadways Input, Traffic Input, Receiver Input, Barrier Input, Sound Level Results Table. Depending on volume of data, this information can be placed on a CD.

3. TNM Barrier Description Table (if applicable)

4. TNM Barrier Segment Descriptions Table (if applicable)

5. TNM Plan Views

6. Traffic Data (certified traffic data is required for a Noise Analysis, however, planning level traffic may be acceptable. Contact OES if certified traffic is not available)

7. Legible aerial project mapping showing measured and modeled data points. Mapping provided must be in scale suitable to the size of the project and must clearly show modeled locations and proposed mitigation designs. Multiple maps may be necessary for larger projects. Use of aerial photographs with a project plan overlay is required. All receiver point IDs must be shown on aerial photos. Report graphics must illustrate modeled receptors, impacted receptors, benefited receptors, impacted and benefited receptors, modeled noise barriers recommended and/or not recommended. All recommended barriers must
include an aerial map showing points along the barrier corresponding to a wall height every 50’ or less.

8. A CDROM that includes a digital version of the noise analysis report and appendices. The CDROM will also include all TNM files used to prepare the noise analysis including all model runs and drawing interchange format (dxf) files used to develop the models will be provided on the CDROM as part of the noise analysis submission. All TNM scenarios will be easily identifiable by the name of the run. The CDROM will include a text file that provides a table of contents and an explanation of the naming convention used for the TNM models.

9. PI notification letters for field work.

10. Noise Barrier Design Table (NBDT) included (if applicable and scoped for)

11. Addresses of all benefited receptors (>5 dBA) (occupants and/or owners) for each noise wall determined to be feasible and reasonable included

The Noise Analysis can include a Noise Barrier Design Table (NBDT) which includes information such as top of wall elevations, bottom of wall elevations, distance offset from roadway centerline, barrier heights, and wall stationing every 50’ or less.