VII. Barrier Design Criteria

► see Appendix_N: Noise Wall Construction Plan Preparation-Review Checklist

► see Appendix_I: Post-Noise Analysis Process Flowchart

The following is a list of criteria that shall be incorporated into the design and construction of a noise barrier by the Department.

1. Portions of the noise barrier intended for use as noise abatement (hereafter referred to as the full height barrier) will have a minimum height of 8'-0” and a maximum height of 20'-0”. The maximum 20’ height is in accordance with ODOT Noise Barrier Specifications (NBS-1-09). OES must approve any requests to exceed the maximum 20’ height.

2. Changes in the top of wall elevation are limited to increments of 1'-0”. Relative to the transition sections, where feasible and practical, the barrier will step down in 4'-0” increments to a height of 5’-6’ per the ODOT Aesthetic Design Guidelines. If the wall approaches a structure, there should be no transition. In no case should the top elevation of the transition section be below the elevation of the adjacent roadway. For locations where transitioning to a 5’-6’ panel results in a top of wall elevation below the roadway elevation, end the barrier when the top of wall elevation is 5’-0” above the elevation of the adjacent roadway. Exceptions must be coordinated through the Office of Environmental Services. The additional wall area for the transition sections will not be added to the cost of abatement since this is for aesthetic purposes only. The final barrier design will include the full height barrier and the transition section on each end. To reduce the chances of interfering with future widening projects, the preferred location of noise barriers is along the right-of-way line where the noise barrier essentially replaces the existing ROW fencing and the existing ROW fencing is removed. Barriers should only be located adjacent to the shoulder in cases where the roadway is on significant fill or where the topography of the right-of-way line or other conflicting feature or utility would make construction of the noise barrier unfeasible.

3. Noise barriers will be designed according to the noise barrier standards available from the ODOT Office of Structural Engineering (BDM Section 800). All noise barrier design plans on conventional and/or design-build projects must be field reviewed by OES Noise staff, District staff, and the project manager/engineer(s) prior to being finalized. Prior to beginning a noise wall design, a conference call must be initiated by the consultant and held between the noise wall construction plan preparer/designer, the ODOT OES Noise Coordinator, ODOT District Environmental Coordinator, the ODOT Project Manager, and
structural staff as needed, to discuss the details and expectations of the design. The reason for this requirement is to help ensure the design will meet ODOT’s expectations in an effort to avoid/minimize potential revisions/comments to the design during ODOT review. The noise wall construction plan preparer/designer must adhere to ODOT’s Noise Wall Construction Plan Preparation/Review Checklist.

4. ODOT strongly desires a smooth top of wall profile for aesthetic purposes. It is acceptable for the noise wall construction plan preparer to raise the wall height of certain bays by 1’ or 2’ to achieve this goal. In some cases, it may be acceptable for the noise wall construction plan preparer to lower the wall height below the acoustical profile of certain bays by 1’ or 2’ to achieve this goal. Consultation with OES should occur in these cases to ensure that noise reductions are not negatively affected.

5. ODOT takes a sensitive approach to clearing and grubbing. Care shall be taken to design for the removal of only those trees that are absolutely necessary to perform the construction of the noise wall. A 25’ clear path about the centerline of the noise wall is the maximum clearing width permitted. The Project Engineer should coordinate with District Environmental Staff and OES Noise staff before any clearing and grubbing begins. For noise wall projects that involve substantial tree clearing but where many trees can potentially be saved, the development of a tree clearing plan will be warranted to ensure that only those trees that are absolutely necessary to perform the construction of the noise wall are removed. Trees identified for removal must be evaluated and coordinated as appropriate for potential as roosting trees for bat species or other endangered species concerns.

6. Concrete noise barriers have proven the most cost effective for recent projects and permit the greatest flexibility for aesthetic treatments. However, other noise barrier material types are available for use (i.e. fiberglass, aluminum, earthen mounding, etc).

7. Barrier must be placed in accordance with all ODOT safety design standards, relative to lateral clearance. When noise walls must be placed behind existing or proposed guardrail, the proposed noise wall should be placed as close to the guardrail as possible in order to maximize wall height and acoustic protection. Utilize a guardrail system that allows for minimum deflection.

8. ODOT will provide abatement to mitigate highway-related noise only. All noise barrier designs must have the written approval of the Office of Environmental Services (OES) and the Office of Structural Engineering (OSE).
9. Installation of sound absorptive noise barriers (i.e. the use of sound absorptive material) must be approved by OES. Typical uses for sound absorptive noise barriers have been where there are noise sensitive areas across from a proposed noise wall or where parallel barriers are proposed. However, if the width to height ratio of the roadway section to the noise barrier is at least 10:1, the use of sound absorptive material (SAM) on noise walls is not required, based on FHWA guidance and research. For example, this means that the use of SAM for two parallel barriers 10’ tall and 120’ apart, is not required.

10. Reflective barriers are required in isolated areas with no noise sensitive land use on the opposite side of the roadway. Locations where future development may result in a noise sensitive land use on the opposite side of the roadway should also have reflective barriers installed. Locations with industrial or commercial use on the opposite side of the roadway are locations for reflective barriers.

11. Prior to beginning a noise wall design, a conference call should be held between the noise wall construction plan preparer/designer, OES, and District, to discuss the details and expectations of the design. The reason for this requirement is to help ensure the design will meet ODOT’s expectations and to avoid/minimize potential revisions/comments to the design during ODOT review.

12. Ensure all noise analyses and current and future noise wall design plans address the following issues regarding highway lighting: Access to power for tower lighting and light poles (i.e. relocate the source to the highway side of the noise wall); Access to the actual tower lighting and/or light pole for maintenance; The potential need for a new ground-mounted or pole mounted “disconnect; system” on the highway side of the noise wall or an access door.; Not restricting the lowering of the luminaire ring during maintenance; Necessary relocation of tower lighting and/or light poles; Access to CCTV (closed circuit TV camera) and RWIS (road weather information system) systems.

13. In addition to smooth top of wall profiles, smoothen out all bottom of wall profiles to reduce SF where possible. Associated with that, where feasible, consider designing a higher proposed grade than existing grade to ensure bottom panels are buried at least 6” and no greater than 1’ in flat ground, wall SF is minimized, and bottom of wall profiles are smooth.
14. If applicable to the design, position icons 2.5’ or 3’ from the top of wall. The goal is to avoid any part of the icon being blocked by guardrail or safety barrier and/or to keep the bottom of the icon sufficiently away from the top of guardrail or safety barrier. It is ODOT’s preference that the top of the icon is NOT the top of the panel.

15. Show the adjacent roadway and/or ramp profile on the noise wall profile. This helps to ensure the height of the noise wall matches the requirements of the noise analysis.

16. Noise wall plans must indicate the federal color and color number and texture of posts and panels. Post cap, panel cap and/or finial details must be provided as well.

17. If an Ashlar stone texture is required, use the “Architectural Polymers Ashlar Stone Pattern 905O or engineered approved equal”. This pattern has a minimum 1” relief depth, which is an ODOT preference.

18. There must be little to no gap (vertical or horizontal) between a structure mounted barrier and a ground mounted barrier, to ensure an effective noise wall system. Design an overlap between a structure mounted barrier and a ground mounted barrier that maximizes acoustic protection. Contact OES as needed.

19. Overlapped ground mounted noise walls should have a 3:1 ratio of length of overlap to width of gap, excluding step downs. The back side wall toward the noise sensitive area should not have step downs. The front side wall closest to the highway should have step downs.