NOISE BARRIER WALL DESIGN CRITERIA

1. DESIGN SPECIFICATIONS

Except as noted otherwise in these requirements, design noise barriers in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications.

For the design 3-second gust wind speed, in accordance with LRFD Article 3.8.1.1.2, use the following values:

SCDOT COUNTY	3-SECOND GUST WIND SPEED (MPH)
Horry, Georgetown, Charleston, Beaufort, Jasper	145
Dillon, Marion, Florence, Clarendon, Williamsburg, Dorchester, Berkeley, Colleton, Hampton	135
Marlboro, Darlington, Lee, Sumter, Calhoun, Orangeburg, Barnwell, Bamberg, Allendale	125
Chesterfield, Kershaw, Richland, Lexington, Aiken	115
Other counties not listed	110

2. MATERIALS

Construct ground-mounted noise barrier walls using precast concrete panels and precast concrete posts. Support the barriers by drilled shafts or concrete-filled steel pipe piles.

See noise barrier wall special provisions in TP Section 1000 for additional requirements.

For all noise barriers on this project, provide sound absorptive material integral with and on the interstate traffic face of the precast concrete panels.

Use Class 4000 concrete for cast-in-place concrete, Class 4000P concrete for non-prestressed precast concrete, Class 5000 concrete for precast, prestressed concrete, and Class 4000DS concrete for drilled shafts.

Use reinforcing bars conforming with the requirements of AASHTO M 31 Type W, Grade 60. Use Welded Wire Fabric meeting the requirements of AASHTO M 55 or AASHTO M 221. Use prestressing strands that are low-relaxation, 7-wire strands and that conform to AASHTO M 203, Grade 270.

Use structural steel in accordance with Section 709 of the Standard Specifications.

Construct drilled shaft foundations in accordance with Section 712 of the Standard Specifications, except CSL testing of drilled shafts supporting noise walls is not required.

Construct driven steel pipe pile foundations in accordance with Section 711 of the Standard Specifications.

Use elastomeric bearing pads conforming to the requirements of Section 724 of the SCDOT Standard Specifications.

3. DESIGN AND DETAILING REQUIREMENTS

3.1 General

The maximum permissible wall height is 25 feet from ground line to top of panels. Detail the top of wall not to exceed a 1-foot vertical step between adjacent panels. Detail the wall panels to extend a minimum of 12 inches below the finished ground line. If a leveling pad is used, construct the pad of reinforced concrete that is a minimum of 6 inches thick and that extends a minimum of 3 inches beyond each face of the panel.

Design and detail the wall to accommodate obstructions (drainage, light or sign foundations, utilities, etc.) in the foundation zone.

Do not use precast panels that are longer than 20 feet. Use a consistent panel length for the entire length of the wall. Detail panels located in a horizontal curve to follow the roadway alignment. To minimize the chording effect of panels in a horizontal curve, consider the need to use shorter length panels.

3.2 Horizontal Alignment of Noise Barrier

Where located along the roadway shoulder within the clear zone, protect the noise barrier with a concrete roadside barrier. Noise barrier design and placement, including protection treatment, shall not reduce the required roadway shoulder width. Provide concrete roadside barrier in front of noise barrier in accordance with the "Rigid Barrier Adjacent to Wall" details in TP Attachments. Noise barriers located behind the specified, 54" tall rigid barrier do not need to be designed for vehicular collision load.

Extend noise barriers past the end receiver at least four times the perpendicular distance from the receiver to the noise barrier. This distance may be shortened by bending the wall back toward the receiver.

Where a gap in a noise barrier is necessary, such as when providing an opening for emergency vehicle access, overlap the two segments. Provide an overlap ratio between the overlap distance and gap width (between noise barriers) of at least 4:1 to maintain the integrity of the noise mitigation.

Where available and when the noise barrier has a height of six feet or more, the noise barrier may act as control of access, in place of controlled access fencing. Where the noise wall has breaks/overlaps, provide fencing.

3.3 Foundation Design

Perform subsurface investigations for noise barriers in accordance with the requirements of Section 4.3.6 of the SCDOT Geotechnical Design Manual (GDM).

Design and detail drilled shafts or concrete-filled steel pipe piles (driven steel pipe piles, drilled piles are not permitted) to support ground-mounted noise walls for this project in accordance with the GDM, the BDM, Design Memos DM0107 and DM0111 (except as modified by TP700.3.1.18). For concrete-filled steel pipe piles, TP 700.3.1.16 applies. Extend the reinforced concrete infill inside the pipe pile, as a minimum depth, to the point where the moment demand is less than half of the maximum moment demand.

Additionally, extend the reinforced concrete infill below the bottom of liquefiable soil layers into competent soil.

Over the 75-year design life of the wall, limit the vertical settlement at any point of the wall to a maximum of 3 inches and limit the vertical differential settlement along the wall to a maximum of 1.25 inches in 50 feet. Limit the lateral displacement of the foundation at the base of the wall to a maximum of 1 inch.

For noise walls mounted on top of MSE Walls, ~~isolate the drilled shaft foundation (and concrete column extending from top of drilled shaft top of finished grade, if applicable), from reinforced backfill using a smooth wall or corrugated steel (SWCGS) pipe in accordance with supplemental technical specification SC-M-713. Backfill the pipe with A-1 sand. D~~do not connect soil reinforcement to noise wall foundation elements. Ensure the MSE Wall design accounts for any lateral pressure exerted on the wall facing from noise wall components.

Connect noise wall posts to wall foundation (drilled shaft with or without concrete column extending through wall backfill or concrete-filled steel pipe piles) above grade (at the top of wall where applicable), using anchor bolts.

3.4 Seismic Design

For the Acceleration Coefficient (A), use the Peak Ground Acceleration (PGA) for the Functional Evaluation Earthquake, in accordance with GDM Chapter 12.

3.5 Deflection

Limit the maximum deflection at the top of the wall due to service wind load to the lesser of 1/50 of the wall height or 5 inches (deflection measured relative to the point of fixity in the soil).

3.6 Concrete Cover

Provide concrete cover that meets or exceeds the requirements of Section 15.3.1.2 of the SCDOT Bridge Design Manual.

3.7 Panel Finish

Fabricate wall panels using modern fin finish, in accordance with the Wall Formliner Finish drawings provided in TP Attachments, on both the front side and back side of the panels. Provide a smooth finish on the top two-feet on both sides of the top panel. Fabricate posts using a smooth or brushed finish.

At the beginning and end of project on both sides of I-526, incorporate one State Inlay emblem, in accordance with the Wall Formliner Finish drawings provided in TP Attachments, into the outermost noise wall panel column (first and last column of panels encountered as a driver navigates the interstate). Do not include the inlay emblem on the back side of the noise walls.

3.8 **Anti-Graffiti Coating**

Apply an anti-graffiti coating to both sides of the concrete panels and to all exposed faces of the concrete posts, with the following exception. Where sound absorptive material is required on the interstate traffic face of the panels, omit anti-graffiti coating, which may alter the acoustical performance of the sound absorptive material.