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 with either precast concrete or galvanized steel posts. Support the barriers by drilled piles or drilled shafts.

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

When required on specific noise barriers as determined by the final design noise analysis or NEPA commitment , 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 drilled pile foundations in accordance with Supplemental Technical Specification SC-M-716-1.

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

Use steel H-piles, steel pipe piles, prestressed concrete piles, or combination piles (prestressed concrete piles with steel pile extensions). If steel piles are extended and used as posts, detail the post portions of the piles with a precast concrete encasement that extends to at least 2 feet below the finished ground line or use galvanized piles in accordance with the special provisions.

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 at the edge of the roadway shoulder (common in fill sections) or within the clear zone, protect the noise barrier with either guardrail or a concrete roadside barrier. Noise barrier design and placement, including protection treatment, shall not reduce the required roadway shoulder width. Where guardrail is located in front of a noise barrier, provide a minimum offset of 7 feet from face of guardrail to face to noise barrier to allow for guardrail deflection and pave the area between guardrail and face of noise barrier as directed in the Roadway Design Technical Provisions. Provide concrete roadside barrier in front of noise barrier in accordance with the “Rigid Barrier Adjacent to Wall” details in the Technical Provision 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 drilled shafts and drilled piles to support ground-mounted noise walls for this project in accordance with the GDM.

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.

3.4 Seismic Design

For the Acceleration Coefficient (A), use the Peak Ground Acceleration (PGA) for the Functional Evaluation Earthquake as modified by the appropriate Site Class.

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 1 ½ inches.

3.7 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.