

SECTION 451 THRU 454 — RESERVED**SECTION 455 — NOISE BARRIERS**

455.01 DESCRIPTION. The Standard Noise Barrier System shall consist of precast concrete panels, steel or concrete posts, concrete foundations, fire hose connections, doors, and hardware necessary to construct a noise barrier as specified in the Contract Documents. The Contractor has the option of supplying steel or concrete posts, but the same type of post shall be used throughout an entire noise wall. All components shall be as specified unless prior approval for alternatives is obtained from the Administration.

When drilled shafts (caissons) are specified in the Contract Documents, they shall conform to Section 412.

Bidders may view samples of the proposed panel finishes by contacting the Office of Environmental Design, Noise Abatement Team Leader.

455.01.01 Special Bidding Instructions. When the Contract Documents permit optional post spacings, the Contractor shall place the bid in the appropriate items for the post spacing selected. Only the items pertaining to the selected post spacing shall be bid. All remaining items pertaining to the alternate post spacings not selected shall be filled in as "\$0.00". Only one alternate post spacing shall be bid per wall.

455.01.02 Preapproved Alternate Noise Barriers. Alternate noise barriers shall only be used when specified in the Contract Documents. When alternate noise barriers are included in the Contract Documents, only those noise barriers specified will be permitted, and only one type noise barrier shall be used per wall.

Alternate noise barriers are selected from the list of Preapproved Alternate Noise Barriers, which is maintained by the Office of Bridge Development. Procedures for adding products to the prequalified list may be obtained from the Office of Bridge Development.

455.01.03 Contract Documents for Preapproved Alternate Systems or Alternate Post Spacing. When the Contract Documents permit and the Contractor elects to use preapproved alternate noise barrier systems or alternate post spacing not shown on the Plans, the Administration will furnish substitute Plans and specifications to the Contractor within 30 days after issuing Notice to Proceed.

The substitute Plans may include other pertinent modifications and aesthetic changes necessitated by the Contractor's selection such as requiring tapered panels, higher panels, etc., if the changes in elevation between adjacent panels are determined to be too severe. No additional compensation will be given to the Contractor due to revisions detailed in the substitute Plans and specifications.

The substitute Plans will be issued as a Contract revision replacing the advertised Plans. All work under this Section including any changes required in grading, drainage, paving, utility locations, permits, etc., which is a direct result of the substitute Plans shall be done at no additional cost to the Administration.

After substitute Plans are issued as a redline revision, working drawings bearing the fabricator or supplier's title block shall be submitted for review and approval to the Administration or directly to the consulting engineer as directed by Section 499.

455.02 MATERIALS.

Reinforcement for Concrete	
Structures	421.02
Concrete Stain	450.02.03
Concrete	902.10
Pretensioning Strand	908.11, 1/2 in. diameter, seven wire bright
Elastomeric Bearing Pads	910.02.01
Elastomeric Shims	911.13
Fusion Bonded Polyester Coating	917.03, Color shall be as specified for stain on highway side of roadway
Anchor Assembly	
Plate	A 36
Rods	F 1554, Grade 55, S1 (Chemical Composition and Carbon Equivalent)
Nuts	A 563
Washers	F 436
Steel Posts (Including Plates and Shapes)	A 709, Grade 50W

Fire hose connections, fire doors, miscellaneous hardware, etc. shall be as specified in the Contract Documents.

455.02.01 Hardware. No material substitutions will be permitted for anchor rods, nuts, and washers. These items shall be hot dip galvanized in conformance with A 153.

455.02.02 Epoxy Zinc Rich Primer. The polyester coater shall provide an epoxy zinc rich primer to be used prior to the application of the polyester powder coating. The material shall withstand temperatures used for the polyester powder coating process and shall be subject to the approval of the Engineer.

455.02.03 Precast Concrete Panels. Each panel shall be cast with an embossed or impressed, legible and unique identification number located on a portion of the panel that will not be visible in the completed structure. Panels will be rejected at any phase if identification numbers appear to have been tampered with or altered in any manner. The concrete mix shall conform to Mix No. 6, except that the coarse aggregate shall be AASHTO size no. 5 washed quartz gravel and the design compressive strength shall be 5000 psi.

Textures. All panel surfaces shall be considered as having architectural finishes and care shall be taken to produce a consistent, high quality finish. When stacked panel systems are used, the Contractor shall take extreme care to ensure that the panels stacked within a single frame match in quality and appearance. Aesthetic inspections for all panels shall be made in out-door lighting conditions. Panels failing to conform to these requirements may be rejected.

Special care shall be taken to prevent cement laden spray and spatter created from the process of exposing the aggregate from adhering to the finish surfaces of other panels. Surfaces of all panels shall be washed to remove cement laden spray, dust, and all other foreign matter prior to shipping. Abrasive blasting is not an acceptable method for exposing the aggregate.

Unless otherwise specified in the Contract Documents, the finish for the panels shall be as follows:

- (a) An exposed aggregate finish shall be produced on the bottom side of each panel in the precast form.
- (b) A Double Rake shall be produced on the top side of each panel.

Sample Panels. Two sample panels, each 24 x 24 in. and a maximum of 2 in. thick, shall be prepared and delivered to the construction site. One panel shall represent the residential side (exposed aggregate) and the second panel shall represent the highway side (double rake with stain) except that the stain shall be omitted from the sample. The exposed

aggregate panels shall exhibit the color range and exposure of the gravel. The double rake panels shall display the appropriate finished texture. The Contractor shall notify the Office of Environmental Design, Noise Abatement Team Leader at least one week prior to the delivery of the sample panels. The Administration's approval of these panels shall be received before full-size panels are manufactured. Whenever the original sample panels are rejected, additional sample panels shall be submitted until the finish is approved.

After the sample panels and working drawings are approved by the Administration, a full-size panel shall be prepared for visual inspection and approval by the Administration at the precasting site. This panel shall have the textures specified in (a) and (b) above on the appropriate highway and residential sides. This panel shall be made available outdoors with both sides visible for inspection. Upon approval by the Administration, all subsequent panels shall be equal in appearance to this approved panel. This panel shall be transported to the project site and used as one of the panels in the noise barrier after all other panels have been accepted.

Reinforcement. Reinforcement bars and welded wire fabric in concrete wall panels that are less than 10 ft from the edge of paved surfaces (includes shoulders) shall be epoxy coated. Supports for epoxy coated reinforcement shall be coated the same as the reinforcement steel.

455.02.04 Concrete Posts. Concrete shall conform to Mix No. 6 except that the coarse aggregate shall be AASHTO size no. 5 washed quartz gravel, and the design compressive strength shall be 5000 psi. When concrete posts include base plates, plates and all hardware shall be galvanized in conformance with A 153.

Textures.

Unless otherwise specified in the Contract Documents, the finish for the posts shall be as follows:

- (a) An exposed aggregate finish shall be produced on the bottom side of each post in the precast form.
- (b) A Double Rake finish shall be produced on the top side of each post.

Sample Posts. When concrete posts are used, the Contractor shall submit a 24 in. long sample of the concrete post to the construction site for approval. The sample shall be submitted with the panel samples as specified in 455.02.03. The sample post shall exhibit the specified finishes. The Administration's approval of the post shall be received prior to manufacturing full size posts.

455.03 CONSTRUCTION. Refer to 450.03 for additional requirements for noise barriers mounted on top of retaining walls. All welding shall conform to AWS D1.1.

455.03.01 Galvanizing. All holes and welding required in the hardware shall be done before galvanizing. All hardware shall be free of oil or any mill coating. All welds shall be ground smooth, all weld spatter removed, and hardware shall be free of burrs, rust, or other surface imperfections.

455.03.02 Anchor Assemblies. Anchor assemblies shall be assembled and placed at the elevation and spacing specified in the Contract Documents. Templates shall be used for proper alignment and spacing of all anchor assemblies prior to concrete placement. The threads of the anchors shall be sufficient to provide for a 1 in. concrete encasement, leveling nuts, washers, base plate, and a 1/2 in. minimum protrusion through the top of the top nut when the noise wall is properly installed.

455.03.03 Posts. All posts shall be erected plumb at the specified alignment, and at the appropriate spacing.

Embedded Concrete Posts. When concrete posts are used, they shall be erected with a temporary support system to ensure the vertical and horizontal alignment and specified elevation. Temporary support systems shall include fixed ties between the post being set and a previously set post. The design of the temporary support systems shall be submitted to the Engineer on the concrete post working drawings for approval prior to erection. Temporary support systems shall remain in place for a minimum of 40 hours after the completion of the concrete placement for the drilled shaft (caissons) which encases the post.

Polyester Coated Steel Posts. Steel posts shall be completely fabricated, including base plates and all holes drilled before applying the polyester coating system.

All steel posts shall be free of oil and any mill coating. All welds shall be ground smooth, and all weld spatter removed. Steel posts shall be free of burrs, pits, rust, or other surface imperfections.

Steel posts and other nongalvanized items shall be abrasive blasted in conformance with SSPC-SP 10 to a surface condition of Near White. The cleaned surfaces shall be protected from conditions of high humidity, rainfall, or surface moisture, and shall not be allowed to flash rust. The epoxy zinc rich primer shall be applied and cured at a minimum dry film thickness of 3 mils prior to the application of the polyester powder coating. The coating process shall ensure that all solvents in the epoxy zinc rich primer are removed prior to the application of the polyester powder coating.

When galvanized surfaces are to be polyester coated, the galvanizing shall be roughened with a brush off blast cleaning conforming to SSPC-SP 7 prior to applying the polyester coating.

The polyester coating shall be applied as an electrostatically charged dry powder sprayed onto the grounded posts using an electrostatic spray system. The polyester coating thickness after cure shall be 6 ± 2 mils.

The total thickness of coating, primer plus polyester coating, shall be 7 to 12 mils when measured as specified in G 12.

After coating, the posts shall be randomly checked for continuity using a 67-1/2 volt wet sponge detector to check for holidays, pinholes, and discontinuities. The coating thickness shall be checked with a properly calibrated magnetic gauge. Posts requiring limited repair for minor defects shall be touched up with a liquid touch-up. All polyester coated posts shall be wrapped to ensure safe arrival at the job site. At the job site and during installation, the utmost care shall be taken to prevent damage to the posts.

455.03.04 Precast Concrete Panels. Precast concrete panels shall be constructed as shown in the Contract Documents.

The working drawings shall provide for all accessories, additional reinforcement steel, materials, and methods which are not specifically indicated, but which are essential for transportation, handling, and installation or construction of the panels.

Working drawings shall show the size, shape, and location of all panels and shall include complete reinforcement and connection details. When specified by the Contract Documents, the method and sequence of erection, method of plumbing panels and adjusting connections, and the loads and movements due to erection shall be shown on the working drawings.

All lifting devices or inserts used externally, or installed in the panel, shall have a factor of safety of four as determined under the loading conditions anticipated during the course of manufacture, storage, delivery, and erection. All inserts shall be included on the working drawings.

Defects and Tolerances. Concrete shall be placed in a manner so that there are no cold joints. Cracked panels or panels determined by the Engineer which cannot be repaired or do not conform to the following tolerances shall be rejected and replaced with acceptable panels at no additional cost to the Administration:

- (a) Panel dimensions shall be within 3/16 in. except for panels with an effective thickness of less than 4 in. where the thickness shall be within 1/8 in.
- (b) Panel squareness for rectangular panels shall not exceed 1/2 in. as determined by the difference between the two diagonals.
- (c) Panel surface defects on textured-finished surfaces shall not exceed 5/16 in. per 5 ft.
- (d) Tongue and groove joints shall be constructed within 1/8 in. of the dimensions shown on the details.

Shipping, Handling, and Erection. Panels shall be adequately protected by padding or other means to prevent cracking, staining, chipping, or spalling of the concrete during handling, storage, transporting, erection, etc. Panels shall be adequately supported or braced during installation to ensure safety. The bracing or supports shall be maintained until proper alignment and adequate permanent support have been provided. No panel shall be left in an unsafe support condition.

When a panel is damaged, it will be evaluated by the Engineer to determine whether or not it can be used. If acceptable by the Engineer, damaged panels shall be repaired in a manner approved by the Engineer.

Panels shall be erected centered between posts. Where a panel is not erected within the tolerances assumed in the connection design, the structural adequacy of the installation will be checked by the Office of Bridge Development and the connection design shall be modified as required. Changes, other than adjustments within the specified tolerances, shall be made only after approval by the Engineer.

The Engineer will inspect the panels again after erection to determine if they have been damaged.

455.03.05 Concrete Stain. Concrete stain shall be applied prior to backfilling. Two coats of concrete stain shall be applied in conformance with the manufacturer's recommendations and as directed by the Engineer. Concrete stain shall be applied to the top and full height of the noise wall panels but shall not be applied to exposed aggregate surfaces. Before application of the stain, all surfaces shall be defect free, structurally sound, clean, dry, fully cured, and free from dirt, dust, curing agents or form release agents, efflorescence, scale, or other foreign materials.

455.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all material, labor, equipment, tools and incidentals

necessary to complete the work. Modifications such as an increase or decrease in the size or number of grade beams, drilled shafts (caissons), or retaining walls, special anchorages, conflicts with utilities or other obstructions when the utilities or obstructions were noted in the Contract Documents, or any other modifications required due to the Contractor's selection of an alternate spacing, or a preapproved alternate noise wall when permitted, will be incidental to the item.

455.04.01 Noise Barrier System panels will be measured and paid for at the Contract unit price per square foot of wall including posts, panels, architectural and noise absorptive finishes, stains and coatings, base plates, anchor assemblies (except when noise barriers are mounted on retaining walls), construction templates, temporary supports, doors, fire hose connections, excavation, backfill, and hardware. Measurement will be based on the as-planned dimensions, using the length along the face of the wall times the panel height.

455.04.02 Grade Beams will not be measured but will be paid for at the Contract lump sum price, which shall also include excavation, reinforcement, concrete, and backfill.

455.04.03 Drilled Shafts (Caissons) will be measured and paid for as specified in 412.04.

455.04.04 Retaining walls will be measured and paid for as specified in 450.04.

SECTION 456 THRU 459 — RESERVED

SECTION 460 — EXPANSION JOINTS IN STRUCTURES

460.01 DESCRIPTION. This work shall consist of furnishing, fabricating, and installing preformed joint fillers, preformed elastomeric joint seals, troughs, structural steel and metal plates to be utilized in providing expansion and contraction capabilities in structures as specified in the Contract Documents.

460.02 MATERIALS.

Hardware for Drainage Troughs	909.06
Preformed Joint Fillers	911.02
Preformed Polychloroprene Elastomeric Compression Joint Seals	911.04