

**STATE OF NEW HAMPSHIRE**  
**BRIDGE DESIGN MEMORANDUM**

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**FROM:** Loretta Girard Doughty, PE  
Administrator



**DATE:** December 19, 2022  
**AT (Office):** Bureau of Bridge Design

**SUBJECT:** Design Memorandum 2022-02  
NHDOT Precast Concrete Soundwall

**TO:** Bureau of Bridge Design Staff, Bridge Design Consultants, FHWA, NHDOT Bureaus

Through: Peter E. Stamnas, PE  
Director of Project Development

Approved PES Not Approved \_\_\_\_\_  
Date 12/21/2022

The Bureau of Bridge Design is updating the Bridge Design Manual. During this process, certain design decisions are being issued for immediate implementation. Consequently, the Bridge Design Manual, Bridge Details, and Bridge Detail Sheets have been modified as follows:

**A. Bridge Design Manual:**

- Revised Chapter 10, Section 10.7 Soundwalls

**B. Bridge Detail Sheets:**

- Precast Concrete Soundwall (Sheets 1-4)
- Retrofit Precast Concrete Panel, Soundwall (1 Sheet)

**C. Special Provision:**

- Item 529.6 – Precast Concrete Sound Abatement Wall
- Item 529.61 – Precast Concrete Sound Abatement Wall Retrofit Panel

**D. Summary:** The above noted revisions are being implemented to specify the following:

- NHDOT guideline for use of precast concrete soundwalls has been added and *replaces* the timber panel soundwall guideline.
- Bridge Detail Sheets (.dgn and .pdf format) for use on bridge projects are located on the Bureau of Bridge Design web page:  
<https://www.nh.gov/dot/org/projectdevelopment/bridgedesign/detailsheets/index.htm>
- The MicroStation drawing is in V8i format. The CONNECT format will be posted on the webpage once it is created.

**E. Background:**

This memorandum incorporates modifications to current NHDOT Bridge Design Manual and Bridge Detail Sheets and provides the modified details on the NHDOT Bridge Design Website.

The existing sound abatement wall consists of precast concrete posts, timber soundwall panels, and precast concrete leveling pads supported on concrete drilled shafts spaced at 12'-9". The post spacing for the existing soundwall is limited by the use of 12-ft. long timber panels.

Based on a field review of several existing soundwalls, the timber panels and timber strong-backs tend to split, crack, and warp after 10 to 15 years in service. These issues cause the timber strong-backs to fall off, produce gaps between panels, and allow for vegetation growth through the wall.

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## BRIDGE DESIGN MEMORANDUM

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Due to the high cost of constructing concrete drilled shaft foundations spaced at 12'-9" and the short service life of timber, an alternatives analysis was performed to evaluate life cycle cost for a 50-year longevity.

Increasing the post spacing would increase the timber thickness from 2-in. to 4-in. The high cost and lack of availability for thicker lumber with a longer length made the increased spacing with timber panels not a preferred alternative.

Based on life cycle costs, initial costs, aesthetics, and long-term sound abatement performance, the alternatives analysis determined precast concrete panels with a 20-ft. post spacing will provide a longer service life and a lower life cycle cost.

The new soundwall Detail Sheets consist of precast concrete panels set on a precast concrete leveling panel and supported by precast concrete posts and cast-in-place drilled shafts spaced at 20-ft. maximum for wind exposure height up to 40-ft. and 18-ft. for wind exposure height 40.1-ft. to 60-ft. The details are designed for wall heights up to 25-ft. The precast concrete panels will have an architectural finish (AC Ashlar Stone) on both sides, that matches the finish on NHDOT MSE walls.

If any part of a proposed soundwall does not meet the design criteria of the precast concrete panel soundwall shown on the plans, the proposed soundwall will need to be designed by the Bureau of Bridge Design or the design Consultant.

The following items shall be used with the new precast concrete soundwalls:

Item 509.1, Mobilization and Demobilization of Drilled Shaft Drilling Equipment	UNIT
Item 509.2, Drilled Shaft	LF
Item 509.3, Obstruction Removal	LF
Item 509.4, Rock Socket Excavation	LF
Item 529.6, Precast Concrete Sound Abatement Wall (F)	SF

As with the current soundwall, the 509 Items will be site specific and designed by a Licensed New Hampshire geotechnical engineer. The designer shall work closely with the Geotechnical Engineer for the design of the drilled shaft lengths based on project specific information.

In addition to the Bridge Detail Sheets, the designer shall develop contract plan sheets that include a soundwall layout in plan and elevation view, and a chart noting wall layout information (e.g., post number, coordinates, ground and top of wall elevations, wall height, post spacing). The designer shall also determine the lower surrounding ground elevation (wind exposure height) to layout post spacing based on the table shown on the Bridge Detail Sheets.

If an existing soundwall with timber panels have deteriorated and need replacement, the timber panels shall be replaced with precast concrete panels using the retrofit Bridge Detail Sheet and Item 529.61, Precast Concrete Sound Abatement Wall Retrofit Panel (F), measured by the SF.

The retrofit item includes the new precast concrete panels, incidental materials required, and removal and disposal of the existing wood panels and tiebacks. If only a portion of the existing soundwall timber panels need replacement between posts, the precast concrete panels can be installed within the existing timber soundwall.

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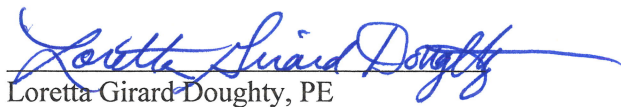
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Until more bid item costs have been received from projects, designers can use the following recommended estimate item costs:

Estimated Unit Costs for Precast Concrete Soundwall (12/2/22)			
Item	Description	Unit	Estimated Cost
509.1	Mobilization and Demobilization of Drilling Equipment	Unit	\$500,000/unit
509.2	Drilled Shaft	LF	\$630/LF
509.3	Obstruction Removal	LF	\$200/LF
509.4	Rock Socket Excavation	LF	\$630/LF
529.6	Precast Concrete Sound Abatement Wall	SF	\$46/SF
529.61	Precast Concrete Sound Abatement Wall Retrofit Panel	SF	\$45/SF

**F. Implementation:**

This update to the Bridge Design Manual and Bridge Detail Sheets shall be implemented as of the date of this memorandum and shall be used on all applicable projects.



Loretta Girard Doughty, PE  
Administrator, Bureau of Bridge Design

Enclosures

**PROJECT NAME**  
**PROJECT NUMBER**

November 30, 2022

## **SPECIAL PROVISION**

### **SECTION 529 -- PRECAST CONCRETE SOUND ABATEMENT WALL**

#### **Item 529.6, Precast Concrete Sound Abatement Wall** **Item 529.61 Precast Concrete Sound Abatement Wall Retrofit Panel**

##### **Description**

**1.1** This work shall consist of manufacturing, storing, transporting, and erecting a precast concrete sound abatement wall or precast concrete sound abatement wall retrofit panels at the location(s) shown on the plans or as ordered.

**1.1.1** Precast concrete sound abatement walls consist of precast concrete soundwall panels, precast concrete leveling panels, and precast concrete posts and shall conform to the details shown on the plans.

**1.1.2** Precast concrete sound abatement wall retrofit panels consist of precast concrete soundwall panels installed between existing precast concrete posts and on top of existing precast concrete leveling panel.

**1.1.3** Removal of the existing timber panels at retrofit locations shall be included in the Precast Concrete Sound Abatement Wall Retrofit Panel Item 529.61.

**1.2 Definitions.** For the purposes of this special provision, the following terms are as defined:

**1.2.1 Fabricator:** Self-performing Contractor or Precast Plant Fabricator.

**1.2.2 Shop:** Self-performing Contractor's Yard/Construction Site or Precast Fabricator's Plant.

##### **Materials**

###### **2.1 Precast Concrete.**

**2.1.1** Concrete materials shall conform to the requirements of Section 520 for Class AA with a minimum 28-day compressive strength of 4,000 psi, unless otherwise noted on the plans.

**2.1.2** Concrete shall be controlled, mixed, and handled as specified in the pertinent portions of Section 520, unless otherwise specified herein.

**2.1.3 Mix Design.** The Contractor shall submit a concrete mix design for approval conforming to the requirements of Section 520.

**2.1.4 Corrosion Inhibitor.** All precast concrete components shall have corrosion inhibitor (calcium nitrate) admixture added at the rate of 3 gallons per cubic yard.

**2.2 Reinforcement.** Reinforcing steel and welded wire fabric shall conform to the requirements of Section 544. Reinforcing steel shall be billet-steel bars conforming to AASHTO M31, Grade 60. Welded wire fabric shall conform to AASHTO M 55.

**2.2.1** Vertical post reinforcing shall be galvanized along their entire length and after fabrication in accordance with Section 2.6 of this document. Tie bars in posts shall be galvanized or epoxy coated in accordance with Section 544. All other reinforcing and welded wire fabric shall be black (uncoated) steel.

**2.3 Form Liner.** All precast concrete soundwall panels shall have a “SC – Ashlar” architectural finish cast using a Pattern No. 1515 form liner manufactured by SPEC Formliners Inc. Precast concrete leveling panels and posts shall receive a Class 1, Ordinary Finish.

**2.4 Base Plates.** Base plates shall conform to the requirements AASHTO M223 (ASTM A572), Grade 50 and shall be galvanized in accordance with Section 2.6 of this document.

**2.5 Hardware.** Anchor bolt nuts shall conform to the requirements of AASHTO M31, Grade 60. All hardware shall be galvanized in accordance with Section 2.6 of this document.

**2.6 Galvanizing.** When galvanizing is specified, components shall be galvanized after fabrication in accordance with AASHTO M111 (ASTM A123) for fabricated steel products and AASHTO M232 (ASTM A153) for hardware items. Reinforcing steel shall be galvanized in accordance with AASHTO M 111 or ASTM A767.

**2.7 Closed Cell Expansion Material.** The closed expansion material is to be used as joint filler between the base plate and drilled shaft. The material shall be a pre-formed, low-density, closed cell, cross-linked, EVA polyethylene co-polymer or polyethylene (XLPE) material that is flexible, waterproof, and chemical resistant. The product shall be resistant to abrasion, oxidation, oils, gasoline, salt, and other materials that in may come in contract with. The material shall conform to ASTM D-1056, 2B2 and be a product as listed under Section 559 E. on the Qualified Products List.

**2.8 Neoprene Bearing Pads.** Neoprene bearing pads shall be manufactured as a single sheet approximately 1/8” thick, in the required dimensions shown on the plans. Bearing pad shall conform to AASHTO M251 meeting the elastomer properties of 50 Shore A-durometer (minimum) material, adequate for 1,000 psi design compression stress, and meeting Level I test requirements with no cracks after the compressive load test.

**2.9 Polyethylene Rod.** Polyethylene Rod shall be expanded closed cell polyethylene, conforming to the requirements of ASTM D5249.

**2.10 Water repellent** shall conform to Section 534.2.2.

## Construction Requirements

### 3.1 General.

**3.1.1 Specifications.** Fabrication, transportation and erection of precast concrete components shall conform to the applicable requirements of the current: *AASHTO LRFD Bridge Construction Specifications, Section 8: Concrete Structures; AASHTO LRFD Bridge Design Specifications, Section 5: Concrete Structures; AASHTO LRFD Guide Specification for Accelerated Bridge Construction; PCI MNL-116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products; and PCI MNL-135 Tolerance Manual for Precast and Prestressed Concrete Construction; PCINE-14-ABC*

*Guidelines for ABC Using Precast/Prestress Concrete* except as modified herein. In the case of conflicting specifications, the most stringent shall apply.

**3.1.2 Approval.** Prior to performing any work under 529, the Contractor must have received approval for all shop drawings and any special contract requirements. The Contractor shall bear full responsibility and costs for all materials ordered or work performed prior to approval of the shop drawings or written authorization from the Engineer.

### **3.2 Qualification of Precast Concrete Fabricator.**

**3.2.1** All shops manufacturing the precast concrete posts, precast concrete soundwall panels, and precast concrete leveling panels herein referred to as “units” or “components” shall satisfy the following minimum requirements:

**3.2.2 Certification.** The precast concrete manufacturing plant shall be certified by the Prestressed Concrete Institute Plant Certification Program in product Group B, certification category B1 or higher or National Precast Concrete Association (NPCA) Plant Certification. The Fabricator shall submit proof of certification prior to the start of production. This requirement is waived for self-performing Contractors.

**3.2.3 Engineering/Drafting.** The Fabricator shall have trained, knowledgeable, and experienced drafting personnel available who can produce and check legible, complete, and accurate shop detail drawings.

**3.2.4 Specifications.** The Fabricator shall have available in the shop all pertinent specifications governing the work.

**3.2.5 Technician.** The Fabricator shall provide a technician having a minimum of five (5) years continuous experience in the manufacture of precast components, who shall supervise the work.

**3.2.6 Quality Control.** The Fabricator shall perform quality control functions to ensure that the product is fabricated in accordance with contract documents and specifications.

**3.3 Shop Drawings.** The Contractor shall prepare and submit shop details, and all other necessary working drawings for approval in accordance with the requirements of 105.02. The Shop Drawings shall show reinforcement, and all information required for proper fabrication and handling of the units.

**3.3.1** The details of all inserts, anchors, and any other items required to be cast into concrete components (whether detailed on the contract drawings or provided for the Contractor's convenience) shall be shown on the shop drawings.

**3.3.2** Fabrication shall not begin until written approval of the submitted shop drawings has been received from the Engineer.

**3.3.3** Deviation from the approved shop drawings will not be permitted without written approval of the Engineer.

**3.3.4** All necessary modifications to components to resist handling stresses resulting from the proposed method of handling and erection.

**3.3.5** Description of method of curing, handling, storing, and transporting the components.

**3.4 Shop Inspection.** A Department Representative will inspect the fabrication of the units for quality assurance. This inspection will include the examination of materials, work procedures, and the final fabricated product.

**3.4.1** Fabrication shall only be done in the presence of an authorized inspector representing the Department. The Department's authorized quality assurance inspector is herein referred to as the "Inspector".

**3.4.2 Notice.** At least fourteen (14) days prior to the scheduled start of casting on any member or test section, the Fabricator shall contact the Department's Bureau of Materials and Research to provide notice of the scheduled start date. The Bureau of Materials and Research will assign an Inspector to the scheduled work to provide quality assurance testing. The Inspector will coordinate directly with the fabricator to determine the casting schedule.

**3.4.2.1** In addition to the requirements of 3.5.2, the Fabricator shall contact the Bureau of Materials and Research at least two (2) days before the actual work begins to allow scheduling of independent assurance testing by the Department.

**3.4.3 Cooperation.** The Fabricator shall fully cooperate with the Inspector in the inspection of the work in progress.

**3.4.3.1** The Fabricator shall allow the Inspector unrestricted access to the necessary areas of the shop during work hours. Work done while the Inspector has been refused access shall be automatically rejected.

**3.4.4 Authority.** The Inspector shall have the authority to reject any material or workmanship that does not meet the requirements of the contract documents.

**3.4.4.1** Inspection at the shop is intended as a means of facilitating the work and avoiding errors. It does not constitute final approval and will not relieve the Contractor from any responsibility in regard to imperfect material or workmanship and the necessity for replacing same.

**3.4.5 Acceptance.** The Inspector shall affix an acceptance stamp to units ready for shipment. This mark shall be made by paint or ink stamp in a location that will not be visible when the structure is completed.

**3.4.5.1** The Fabricator shall present the Inspector with a copy of the shipping invoice to be stamped for verification of inspection and approval prior to shipment.

**3.4.5.2** The Inspector's acceptance implies that, in the opinion of the Inspectors, the units were fabricated from accepted materials and processes and loaded for shipment in accordance with the contract requirements. The Inspector's stamp of acceptance for shipment does not imply that the units will not be rejected by the Engineer if subsequently found to be defective.

### **3.5 Fabrication of Components**

**3.5.1 Reinforcing.** Reinforcing shall be furnished, handled, and installed in accordance with Section 544.

**3.5.1.1** All reinforcing shall be free of dirt, rust, oil, grease, and other deleterious substances.

**3.5.1.2** Clearance from the forms shall be maintained by supports, spacers, or hangers in accordance with 544.3.4, and shall be of approved shape and dimension.

**3.5.1.3** Minimum clear cover on reinforcement shall be as shown on the plans.

**3.5.2 Inserts and Hardware.** All items cast in the concrete shall be accurately placed in the position shown on the approved shop drawings and firmly held during the placing and setting of the concrete.

**3.5.2.1** Recesses shall be provided around lifting devices to facilitate removal and grouting after erection.

**3.5.2.2** Components shall not be drilled into for attachment purposes.

**3.5.2.3** All inserts and hardware shall be galvanized,

**3.5.3 Forms.** Forms shall conform to 520.3.2 and shall be subject to approval of the Engineer.

**3.5.3.1** Forms shall be made and maintained true to the shapes and dimensions shown on the approved shop drawings. The surface of forms shall be smooth, and if necessary, joints shall be treated so that a minimum of joint marks are evident in the finished unit.

**3.5.3.2** Forms shall be of steel or wood and shall be supported without resort to ties or spreaders within the body of the unit. They shall be braced and stiffened so that no deflection or curvature occurs during concrete placement.

**3.5.3.3** Forms shall be cleaned before each use.

**3.5.3.4** Form liners shall be in accordance with Section 2.3.

**3.5.4 Concrete Placement and Curing.** Concrete shall be controlled, mixed, and handled in accordance with Section 520, unless otherwise specified herein.

**3.5.4.1** Concrete shall not be deposited in the forms until the Inspector has approved the placement of the reinforcing. Concrete shall be deposited only in the presence of the Inspector and in accordance with 520.3.5.

**3.5.4.2** Consolidation of concrete shall conform to 520.3.5.4 or as ordered.

**3.5.4.3** The Contractor shall include on the shop drawings the method of initial and final curing along with the proposed curing procedure.

**3.5.4.4** When the average daily temperature falls below 35°F for more than one day, protective measures shall be taken to prevent damage to the concrete by freezing. Components shall be protected from freezing temperatures (32°F) for five days or until attaining the minimum 28-day compressive strength indicated on the plans, whichever comes first.

**3.5.5 Removing Forms and Finish of Components.** Forms shall not be removed without approval. Proper care and precautions shall be exercised in removing forms so that no damage results to finished surfaces.



**3.5.5.1** Precast concrete leveling panels and posts shall receive a Class 1, Ordinary Finish in accordance with 520.3.12, unless otherwise noted on the plans.

**3.5.5.2** Precast concrete soundwall panels shall have a form liner finish on both sides in accordance with Section 2.1.6.

**3.5.5.3** All shear key and construction joint surfaces along the edges of abutting components shall be abrasive blast-cleaned prior to shipping.

**3.6 Dimensional Tolerances.** The PCI Northeast Region Guidelines for Accelerated Bridge Construction Using Precast / Prestressed Concrete Elements Including Guideline Details, Report Number PCINE-14-ABC, available online at: [www.pcine.org/PCINE](http://www.pcine.org/PCINE), shall be used in conjunction with this specification for determining appropriate dimensional fabrication tolerances for precast components.

**3.6.1** Construct all members to conform to the following tolerances:

**Post Dimensional Tolerances**

Total Height	+/- 1/2"
Flange Width	+/- 1/4"
Web Thickness	+/- 1/4"
Slot Depth and Location	+/- 1/8"
Vertical Sweep, Posts ≤ 15'	+/- 1/8"
Vertical Sweep, Posts 15' to 25'	+/- 1/4"

**Panel Dimensional Tolerances**

Length and Height	+/- 1/4"
Structural Thickness	+ 1/4", - 0"
Horizontal Sweep	+/- 1/2"
Vertical Camber	+ 3/8" max., - 0"
Out of Square	1/8" Per 10'-0", 3/8" Max.

**3.7 Component Damage / Cracking and Repair.** The PCI Northeast Region Bridge Member Repair Guidelines, Report Number PCINER-01-BMRG, at: [www.pcine.org/PCINE](http://www.pcine.org/PCINE), shall be used in conjunction with this specification to help identify damage and appropriate repair procedures, and determine the potential cause and remedial action.

**3.7.1** The Engineer may approve repairs to occasional, non-recurring, and isolated defects. The Contractor shall submit procedures and materials for repairs to the Engineer for approval.

**3.7.2 Rejection.** Any of the following are considered defects that may constitute cause for rejection of a precast concrete component:

- a. Fabrication not in conformance with the contract documents or plans.
- b. Concrete breakage, full-depth cracking, extensive partial-depth cracking, or other damage determined to be significant by the Engineer.

- c. Defects indicating concrete proportioning, placement and / or consolidation not in conformance with the contract documents or plans.
- d. Components not in conformity with the dimensional fabrication tolerances given herein.
- e. Discontinuity or crack in the concrete that would permit moisture to reach the reinforcing steel.
- f. Significant component damage sustained during handling, transportation, or erection as determined by the Engineer.
- g. Rock pockets or honeycombs over 1 square inches in area and/or over 1 inch deep.
- h. Any section having more than one honeycomb area per side or surface even though the area is of a smaller scope than defined above.
- i. Extensive fine hair cracks or checks.

### **3.8 Patching.**

**3.8.1** Patching of any surface irregularities, especially those resulting from honey-combing, shall be done only after inspection for determination as to whether or not the work is acceptable.

**3.8.2** When patching is allowed, it shall be done within 24 hours after stripping, and the patching shall be damp-cured for not less than a 3-day period and kept from freezing for the following 3 days.

**3.8.3** Patching of damaged units in lieu of required replacement will not be permitted.

### **3.9 Concrete Strength Testing.**

**3.9.1** Each component cast shall have a minimum of two cylinders made available for testing by the Department at 28 days for quality assurance. Acceptance of the concrete for strength will be based on successfully attaining the minimum 28-day compressive strength indicated on the plans for the two cylinders.

**3.9.2** The concrete test cylinders, prepared from fresh concrete at the time of placing, shall be cured under the same temperature and moisture conditions as the precast components.

### **3.10 Handling, Storing, and Shipping.**

**3.10.1** Components shall be lifted at the designated points by approved lifting devices embedded in the concrete and proper hoisting procedures.

**3.10.2** Storage areas shall be smooth, well compacted, and sufficiently rigid to prevent damage due to differential settlement. Stacks of components may be supported by means of continuous blocking located as indicated on the approved shop drawings. Intermediate blocking between components shall be located directly over the blocking below.

**3.10.3** Components may be loaded on a trailer as described above. Shock-absorbing cushioning material shall be used at all bearing points during transportation. Tie-down straps shall be located at the lines of blocking only.

**3.10.4** Components shall not be subject to damaging torsional or impact stresses. Damaged components shall be repaired or replaced as directed by the Engineer, at no cost to the Department.

**3.10.5 Shipping.** Components shall not be transported from the manufacturing plant until they have reached a minimum age of seven (7) days, and the concrete has attained the minimum 28-day compressive strength indicated on the plans, as verified by test cylinders in accordance with 3.10. Components ready for shipment shall have received an acceptance stamp in accordance with 3.5.5.

### **3.11 Erection of Precast Concrete Components.**

**3.11.1 Delivery and Field Inspection.** Material, workmanship, and condition after shipment will be inspected after delivery to the construction site, with this and any previous inspections constituting only partial acceptance.

**3.11.2** All work of erecting, supporting, adjusting, and grouting of precast components shall be in accordance with an approved assembly submitted by the Contractor.

**3.11.3** After components are in their final erected positions, they shall be subject to the inspection and approval of the Engineer. Furnish necessary facilities, including scaffolding and supports, to provide access to the structure to allow for inspection of workmanship.

**3.11.4** All precast concrete posts shall be set plumb.

**3.11.5** The bottom of the wall shall be constructed of precast concrete leveling panels. The top of the precast wall shall be set true and level between the posts.

**3.11.6** The panel ends shall be in a vertical straight line and shall fit tightly at the time of installation. Any panel that does not fit tightly shall be adjusted as approved by the Engineer.

**3.11.7 Sealing of Lifting Holes, Grout Ports, and Leveling Bolts.** After components are in their final erected positions, all lifting device recesses, grout ports, leveling bolt recesses, and other recesses used for erection purposes shall be filled with an approved high-strength non-shrink grout.

**3.11.8 Water Repellent.** Water repellent (Silane-Siloxane) treatment shall be applied to all precast concrete surfaces in accordance with Section 534.

**3.11.8.1** Existing concrete surfaces shall be washed. If the water beads, no coating needs to be applied. If the water does not bead, coat the surface with Silane-Siloxane (application rate = 150 SF/GAL).

### **3.12 Removal of Existing Wood Soundwall Panels.**

**3.12.1** The existing timber soundwall panels and other material to be removed shall become property of and disposed of by the Contractor. Removal and disposal shall be in accordance with Section 202, as applicable.

### **Method of Measurement**

**4.1** Precast Concrete Sound Abatement Wall will be measured by the square foot to the nearest 0.1 of a square foot. The area will be computed by multiplying the cumulative distance from center to center of post by the minimum wall height as given in the soundwall Post Locations and Elevations table in the Plans.

**4.1.1** The Precast Concrete Sound Abatement Wall consists of the precast concrete posts, precast concrete soundwall panels, precast concrete leveling panels, reinforcing steel, base plates, elastomeric

bearing pad, closed cell expansion material, neoprene bearing pads, polystyrene rods, silicone sealant, water repellent, and all hardware and incidentals necessary for construction of the soundwall as detailed on the plans.

**4.2** Precast Concrete Sound Abatement Wall Retrofit will be measured by the square foot to the nearest 0.1 of a square foot. The area will be computed by multiplying the cumulative distance from center to center of post by the minimum wall height as given in the soundwall Post Locations and Elevations table in the Plans.

**4.2.1** The Precast Concrete Sound Abatement Wall Retrofit consists of the precast concrete soundwall panels, closed cell expansion material, neoprene bearing pads, polystyrene rods, silicone sealant, water repellent, and all hardware and incidentals necessary for construction of the soundwall as detailed on the plans.

### **Basis of Payment**

**5.1** The accepted quantity of Precast Concrete Sound Abatement Wall will be paid for at the Contract unit price per square foot complete in place.

**5.2** The accepted quantity of Precast Concrete Sound Abatement Wall Retrofit Panel wall will be paid for at the Contract unit price per square foot complete in place.

**5.3** Reinforcing shall be subsidiary.

**5.4** Water repellent (silane/siloxane) treatment applied to all precast concrete surfaces shall be subsidiary.

**5.5** Excavation for precast concrete leveling panels shall be subsidiary.

**5.6** Concrete, reinforcing steel, anchor rods, template and installation of the drilled shafts will be paid for under Item 509.2.

**5.7** Modifications to components to resist handling stresses resulting from the proposed method of handling and erection, if necessary, shall be subsidiary.

**5.8** Grout shall be subsidiary.

**5.9** Baseplate, elastomeric bearing pad, and hardware shall be subsidiary.

**5.10** Form line shall be subsidiary.

**5.11** Closed cell expansion material, neoprene bearing pads, polystyrene rods, silicone sealant shall be subsidiary

### **Pay items and unit:**

529.6	Precast Concrete Sound Abatement Wall (F)	SF
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529.61      Precast Concrete Sound Abatement Wall Retrofit Panel (F)      SF

## 10.7 Soundwalls

### 10.7.1 General

Soundwalls shall be designed, fabricated, and constructed according to the current *AASHTO LRFD Bridge Design Specifications Section 15, Design of Sound Barriers*; *NHDOT Bridge Design Manual*, and *NHDOT Special Provision Section 529 – Precast Concrete Sound Abatement Wall*.

NHDOT current design is a precast concrete panel soundwall. The timber panel soundwall shall no longer be used for new or retrofit construction.

### 10.7.2 Types

#### A. Precast Concrete Soundwall Bridge Detail Sheets

A standard design for precast concrete panel soundwalls is provided on the NHDOT Bridge Detail Sheets located at:

<http://www.nh.gov/dot/org/projectdevelopment/bridgedesign/detail sheets/index.htm>.

- The precast concrete soundwall and foundation Detail Sheets provide a design for the soundwall system utilizing precast concrete panels, precast concrete posts, and drilled shaft foundations for wall heights up to **25-ft. (7.6 m)** meeting the design criteria noted on the Detail Sheets.
- If any part of the proposed soundwall does not meet these design criteria, the soundwall will need to be designed by the Bureau of Bridge Design or the design Consultant.
- Borings shall be requested by the lead Bureau.
- The designer (Bureau of Highway Design or Consultant) shall develop contract plan sheets that include a soundwall layout on plan and elevation view, and a chart noting wall layout information (e.g., post number, coordinates, ground and top of wall elevations, wall height, post spacing). The designer shall also determine the lower surrounding ground elevation (wind exposure height) to layout post spacing based on the table shown on the Detail Sheets.
- The designer shall provide the Bureau of Materials and Research Geotechnical Section with design loads at the top of each drilled shaft.
  - The soundwall foundation will be designed with the criteria specific to the project (i.e., exposure height, wind pressure), independent of the soundwall design. This allows more efficiency for the design length of the drilled shaft.
  - The designer shall work with the geotechnical engineer in determining what design criteria shall be used for calculating design loads at the top of the foundation.
  - The Geotechnical Section will determine the drilled shaft lengths required and provide them to the designer to place on the plans.
  - The designer shall create a plan with a soundwall location chart that includes the following:
    - Post/shaft number
    - Coordinates of post foundation
    - Finished grade elevation
    - Minimum top of wall elevation
    - Wall height
    - Post spacing

## B. Soundwall located on a MSE Wall

- If a soundwall is located over a MSE wall or some other obstruction where the drilled shaft foundation is not feasible, a concrete moment slab or spread footing shall be utilized.
- The concrete moment slab or spread footing, and anchorage system, shall be designed by Bridge Design or the design Consultant. If the wind exposure height is 60-ft. or less, the details for the soundwall can use the Detail Sheets and the design for the moment slab or spread footing and anchorage system shall follow the same design criteria as noted on the Detail Sheets. If the wind exposure height is greater than 60-ft., all the soundwall elements shall be designed by Bridge Design or the design Consultant.
- The designer shall provide the Bureau of Materials and Research Geotechnical Section, with the proposed moment slab or spread footing design and associated bearing pressures.
  - The Geotechnical Section will check whether there is sufficient bearing resistance for the design.
  - If necessary, the designer shall work with the geotechnical engineer in redesigns until the bearing resistance is obtained.
- If the moment slab or spread footing is transferred to an underlying structure, the structural designer shall check the underlying structure's capacity to support any loading applied.
- The soundwall shall be located outside the clear zone or behind barrier as noted in *AASHTO LRFD Section 15*. If the soundwall is located behind a barrier, and a vehicular collision to the soundwall (e.g., box truck tipping) would cause safety concerns regarding debris to the area below the MSE wall, the face of the soundwall panel shall be located more than 4-ft. behind the face of the MASH crash tested traffic barrier in accordance with *AASHTO LRFD 15.8.4*, unless the soundwall is designed for the vehicular collision load. Using the MASH TL-4 Box Zone of Intrusion (ZOI) tables from *NCHRP Report 1018, Zone of Intrusion Envelopes Under MASH Impact Conditions for Rigid Barrier Attachments 2022*, if a single slope concrete parapet (48-in tall) is used, the soundwall shall be placed a minimum 2'-8" behind the barrier for a MASH TL-4 ZOI. If the NHDOT T3 bridge steel railing (44-in tall) is used, the soundwall shall be placed a minimum 4'-4" behind the barrier. All barrier used in front of the soundwall shall meet a crash testing level of TL-4 in accordance with *AASHTO LRFD Section 13*.
- The designer shall create contract plans which include the following:
  - Design loads, materials and specification notes
  - Foundation design notes
  - Coordinates of post foundation
  - Plan and elevation sheets
  - Moment slab or spread footing masonry and reinforcing details
  - Anchorage system
  - Soundwall post and moment slab/spread footing locations and elevations
  - Summary of quantities
  - Post spacing
  - Wall heights

## C. Soundwall on a Bridge

- The soundwall detail sheet shall not be used for soundwalls located on a bridge. All soundwall components, including the anchor assembly, shall be designed by the Bureau of

- Bridge Design or the design Consultant for the project specific criteria (i.e., wall exposure height, wind pressure).
- The designer shall create contract plans that include information as noted in Section B above.
  - The concrete bridge deck overhang shall be designed for the soundwall loading in accordance with *AASHTO LRFD Bridge Design Specifications*.
  - If the soundwall is located behind a barrier, and a vehicular collision to the soundwall (e.g., box truck tipping) would cause safety concerns regarding debris to the area below, the face of the soundwall panel shall be located as noted above in *Section B, Soundwall located on a MSE Wall*. The T3 bridge steel railing meets the height requirements for a crash testing level of TL-4 (*AASHTO LRFD Section 13*).

#### D. Soundwall Sample Plans

- For soundwall examples, see NHDOT Sample Plans located at:  
<http://www.nh.gov/dot/org/projectdevelopment/bridgedesign/sampleplans/index.htm>.





**NHDOT Timber Soundwall  
on a Precast Leveling Panel**  
*(No longer used.)*

*Figure 10.7.2-1*



**NHDOT Soundwall on a  
Moment Slab**

*Figure 10.7.2-2*



**NHDOT Timber Soundwall  
on a Bridge**  
*(No longer used.)*

*Figure 10.7.2-3*

## GENERAL NOTES

- ITEM 529.6, PRECAST CONCRETE SOUND ABATEMENT WALL (F) SHALL INCLUDE, ALL PRECAST CONCRETE SOUNDWALL PANELS, POSTS, LEVELING PANELS, STEEL BASE PLATES, CLOSED CELL EXPANSION MATERIAL, AND ALL HARDWARE AND INCIDENTAL MATERIALS NECESSARY FOR CONSTRUCTION OF THE SOUNDWALL AS DETAILED ON THE PLANS.
- SEE SECTION 529 SPECIAL PROVISION FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
- THE ANGLE BETWEEN THE PRECAST CONCRETE POST AND WALL PANEL SHALL NOT EXCEED 10 DEGREES. POSTS SHALL BE HORIZONTALLY ALIGNED TO ACHIEVE THE PROPOSED WALL ALIGNMENT WITH ANGLE POINTS NOT TO EXCEED 20 DEGREES.
- TRANSITIONS IN TOP OF WALL ELEVATION SHALL BE AS DETAILED ON THE PLANS.
  - WHERE THE TOP OF WALL ELEVATION IS THE SAME ON BOTH SIDES OF A POST, THE MAXIMUM ALLOWABLE DISTANCE FROM THE TOP OF WALL TO TOP OF POST SHALL BE 6".
  - WHERE THE TOP OF WALL ELEVATION VARIES ON BOTH SIDES OF A POST THE MAXIMUM ALLOWABLE DISTANCE FROM THE TOP OF WALL TO TOP OF POST SHALL BE 12".
- ALL PANELS SHALL BE 4'-0" TALL, EXCEPT FOR THE UPPER TWO PANELS BETWEEN EACH POST, WHICH SHALL VARY IN HEIGHT TO ACHIEVE THE DESIRED TOP OF WALL ELEVATION.
- THE MAXIMUM POST SPACING SHALL BE 18'-0" OR 20'-0" BASED ON EXPOSURE HEIGHT OF WALL (SEE DETAIL AND TABLE THIS SHEET). ALL POSTS SHALL BE SPACED AT THE MAXIMUM POST SPACING UNLESS A REDUCED POST SPACING IS REQUIRED TO AVOID UNDERGROUND OR OTHER CONFLICTS.
- FOR LAYOUT OF SOUNDWALL (INCLUDING POST/SHAFT NUMBERS, WORKING POINT COORDINATES, AND WALL ELEVATIONS), SEE PLAN SHEETS INCLUDED ELSEWHERE IN THIS CONTRACT.
- VERTICAL REINFORCING STEEL FOR THE POSTS SHALL HAVE THE LAST 5" THREADED. ANCHOR RODS SHALL HAVE THE FIRST 8" THREADED. THREADING SHALL BE TO THE SIZE SPECIFIED ON THE PLANS AND IN ACCORDANCE WITH SECTION 550.
- COAT ALL PRECAST SURFACES (SOUNDWALL PANELS, POSTS, AND LEVELING PANELS) WITH WATER REPELLENT (SILANE-SILOXANE) IN ACCORDANCE WITH SECTION 534. ALL COSTS SUBSIDIARY TO ITEM 529.6.
- CLEAR COVER FOR REINFORCEMENT SHALL BE AS SHOWN ON THE PLANS.
- ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.
- PRECAST CONCRETE SOUNDWALL PANELS SHALL HAVE A SC - ASHLAR ARCHITECTURAL FINISH ON BOTH FACES, CAST USING PATTERN NO. 1515 FORM LINERS BY SPEC FORMLINERS, INC. PRECAST CONCRETE LEVELING PANELS SHALL BE CAST SMOOTH. SEE SECTION 529 SPECIAL PROVISION FOR MORE INFORMATION.
- LIFTING POINTS AND DEVICES SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED FOR APPROVAL. ALL UPWARD FACING RECESSES FOR LIFTING DEVICES SHALL BE FILLED WITH AN APPROVED NON-SHRINK GROUT AFTER OR DURING ERECTION.

## DESIGN CRITERIA

- SPECIFICATIONS: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH ED., 2020, SECTION 15 NHDOT 2016 STANDARD SPECIFICATIONS AS AMENDED, SPECIAL PROVISION SECTION 529 - PRECAST CONCRETE SOUND ABATEMENT WALL
- DESIGN LOADING: WIND PRESSURE (STRENGTH III):
  - 42 PSF (EXPOSURE HEIGHT = 40')
  - 46 PSF (EXPOSURE HEIGHT = 60')
 WHERE:
  - V = 123 MPH (AASHTO FIG. 3.8.1.1.2-1)
  - Kz(c) GROUND SURFACE ROUGHNESS CATEGORY C, OPEN TERRAIN
  - = 1.05 (EXPOSURE HEIGHT = 40')
  - = 1.14 (EXPOSURE HEIGHT = 60')
  - G = 0.85
  - C<sub>D</sub> = 1.2
- DESIGN DIMENSIONS: MAXIMUM WALL HEIGHT = 25'-0"  
MAXIMUM POST SPACING = 18'-0" OR 20'-0" (SEE GENERAL NOTE 6)
- MATERIALS:
  - CONCRETE FOR THE SOUNDWALL PANELS, POSTS, AND LEVELING PANELS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI AND SHALL CONFORM TO SECTION 520 FOR CLASS AA CONCRETE UNLESS NOTED OTHERWISE. ALL PRECAST CONCRETE SHALL HAVE CORROSION INHIBITOR (CALCIUM NITRATE) ADMIXTURE ADDED AT A RATE OF 3 GALLONS PER CUBIC YARD.
  - ALL REINFORCING STEEL SHALL CONFORM TO AASHTO M 31, (ASTM A615) GRADE 60. ALL WELDED WIRE FABRIC SHALL CONFORM TO AASHTO M55.
  - VERTICAL REINFORCING STEEL FOR THE POSTS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 529 SPECIAL PROVISION. TIE BARS IN POSTS SHALL BE GALVANIZED OR EPOXY COATED IN ACCORDANCE WITH SECTION 544. REINFORCING BARS AND WELDED WIRE FABRIC IN THE SOUNDWALL PANELS AND LEVELING PANELS SHALL BE BLACK (UNCOATED) STEEL.
  - STRUCTURAL STEEL FOR BASE PLATES SHALL CONFORM TO ASTM A572, GRADE 50 AND BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SPECIAL PROVISION SECTION 529.
  - ANCHOR RODS SHALL CONFORM TO AASHTO M 31 (ASTM A615), GRADE 60 AND SHALL BE FABRICATED IN ACCORDANCE WITH SECTION 550. ANCHOR RODS SHALL BE GALVANIZED IN ACCORDANCE WITH SPECIAL PROVISION SECTION 529.
  - NUTS SHALL CONFORM TO ASTM A563, GRADE DH AND WASHERS SHALL BE HARDENED AND CONFORM TO ASTM F436, TYPE 1. ALL HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH SPECIAL PROVISION SECTION 529.

## PRECAST CONCRETE TOLERANCES

- POST DIMENSIONAL TOLERANCES:
  - TOTAL HEIGHT = ±1/2"
  - FLANGE WIDTH = ±1/4"
  - WEB THICKNESS = ±1/4"
  - SLOT DEPTH AND LOCATION = ±1/8"
  - VERTICAL SWEEP POSTS ≤ 15.0' = ±1/8"
  - VERTICAL SWEEP POSTS 15.1' TO 25.0' = ±1/4"
- PANEL DIMENSIONAL TOLERANCES:
  - LENGTH AND HEIGHT = ±1/4"
  - STRUCTURAL THICKNESS = ±1/4", -0"
  - HORIZONTAL SWEEP = ±1/2"
  - VERTICAL CAMBER = +3/8", -0"
  - OUT OF SQUARE = 1/8" PER 10', WITH 3/8" MAX.

## DRILLED SHAFT NOTES

- ITEM 509.2, DRILLED SHAFT SHALL INCLUDE CONCRETE, REINFORCING, ANCHOR RODS, WATER REPELLENT AND ALL HARDWARE AND INCIDENTAL MATERIAL NECESSARY FOR THE CONSTRUCTION OF THE DRILLED SHAFTS AS SHOWN ON THE PLANS AND SPECIAL PROVISIONS.
- DRILLED SHAFT CONSTRUCTION METHODS, CONCRETE, AND REINFORCING REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE SECTION 509 SPECIAL PROVISION.
- WHERE FILL EMBANKMENT IS TO BE CONSTRUCTED ABOVE THE EXISTING GROUND, THE EMBANKMENT SHALL BE BUILT PRIOR TO CONSTRUCTING THE SHAFTS. PLACEMENT AND COMPACTION OF THE FILL SHALL BE IN ACCORDANCE WITH SECTION 203.
- SEE PRECAST CONCRETE SOUNDWALL SHEET (4 OF 4) IF BEDROCK IS ENCOUNTERED.
- CONCRETE FOR THE DRILLED SHAFTS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3,000 PSI CLASS A CONCRETE AND SHALL CONFORM TO SECTION 520 UNLESS NOTED OTHERWISE.
- ALL REINFORCING STEEL SHALL CONFORM TO AASHTO M 31, GRADE 60. ALL REINFORCING STEEL SHALL BE A MINIMUM OF 3" CLEAR FROM CONCRETE SURFACES UNLESS OTHERWISE.
- COAT CONCRETE SURFACES OF THE DRILLED SHAFTS TO 1'-0" BELOW FINISHED GRADE WITH WATER REPELLENT (SILANE-SILOXANE) IN ACCORDANCE WITH SECTION 534. ALL COSTS SUBSIDIARY TO ITEM 509.2, DRILLED SHAFT.

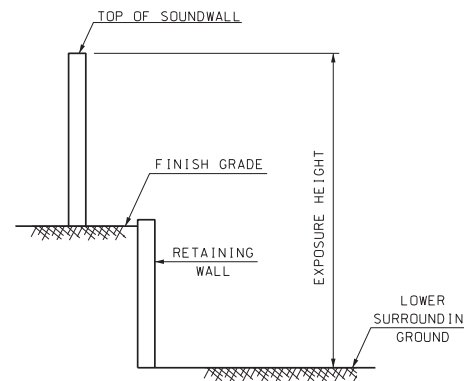
## TO BE COMPLETED BY DESIGNER:

### SUMMARY OF SOUNDWALL QUANTITIES

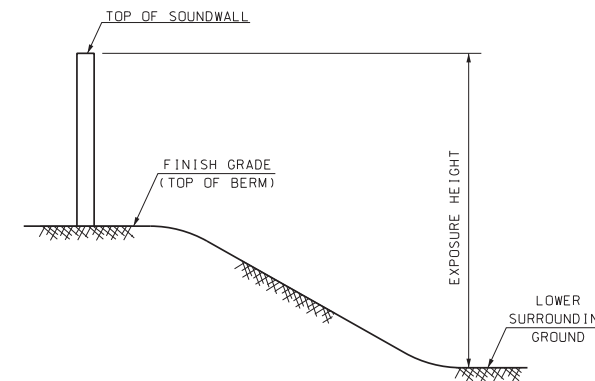
ITEM NO.	ITEM DESCRIPTION	SOUNDWALL LOCATION & QUANTITY			UNIT
		WALL 1	WALL 2	WALL 3	
509.1	MOBILIZATION AND DEMOBILIZATION OF DRILLED SHAFT DRILLING EQUIPMENT				UNIT
509.2	DRILLED SHAFT				LF
509.3	OBSTRUCTION REMOVAL				LF
509.4	ROCK SOCKET EXCAVATION				LF
529.6	PRECAST CONCRETE SOUND ABATEMENT WALL (F)				SF

## NOTES TO DESIGNER:

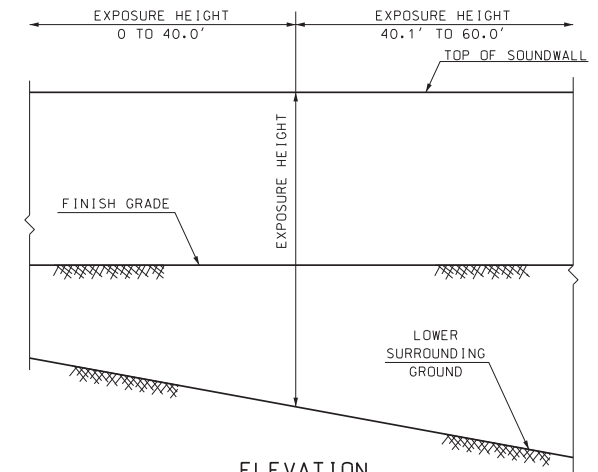
- THE SOUND ABATEMENT WALL AND DRILLED SHAFTS DETAILED ON THESE PLANS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE DESIGN CRITERIA NOTED ON THIS SHEET. IT IS THE DESIGNER'S RESPONSIBILITY TO DETERMINE THE SUITABILITY OF THESE DETAILS FOR EACH PROJECT BASED ON PROJECT SPECIFIC INFORMATION. IF A REDESIGN IS REQUIRED, NEW DETAILS SHALL BE DEVELOPED AND STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW HAMPSHIRE. THE TITLE BLOCK SHALL BE UPDATED WITH DESIGNER'S INITIALS.
- THE SOUND ABATEMENT WALL FOUNDATION SHALL BE DESIGNED (DRILLED SHAFT AND ROCK SOCKET LENGTHS) FOR EACH PROJECT BASED ON PROJECT SPECIFIC INFORMATION. THE DESIGNER SHALL WORK CLOSELY WITH THE GEOTECHNICAL ENGINEER FOR THE DESIGN OF THE DRILLED SHAFT FOUNDATIONS.
- THE DESIGNER SHALL COMPLETE PLAN SHEETS THAT INCLUDE A SOUNDWALL LOCATION CHART AND WALL LAYOUT DETAILS SUCH AS ELEVATION, SECTION, AND PLAN VIEWS. THE DESIGNER SHALL DETERMINE THE LOWER SURROUNDING GROUND ELEVATION AND LAYOUT POST LOCATIONS BASED ON THE MAXIMUM POST SPACING SHOWN IN THE TABLE BELOW.
- THE TOP OF WALL ELEVATIONS NOTED IN THE SOUNDWALL NOISE STUDY MAY REQUIRE ADJUSTMENT TO MAINTAIN THE 12" MAX. ELEVATION CHANGE FROM THE POST TO THE NEXT PANEL AS SHOWN ON SHEET 2 OF 4.
- WHEN WALL HEIGHT IS DIFFERENT BETWEEN ADJACENT SEGMENTS, USE HIGHER VALUE FOR SELECTION OF POSTS, BASE PLATES, FOUNDATIONS, ANCHOR BOLTS, AND POST SPACING.
- IF A REDUCED POST SPACING IS USED, THE DESIGNER SHALL CLEARLY NOTE THE REDUCED SPACING ON THE SOUNDWALL LAYOUT SHEETS SO THE FABRICATOR CAN ADJUST THE PANEL LENGTHS AS NEEDED.



SECTION - RETAINING WALL



SECTION - BERM



ELEVATION

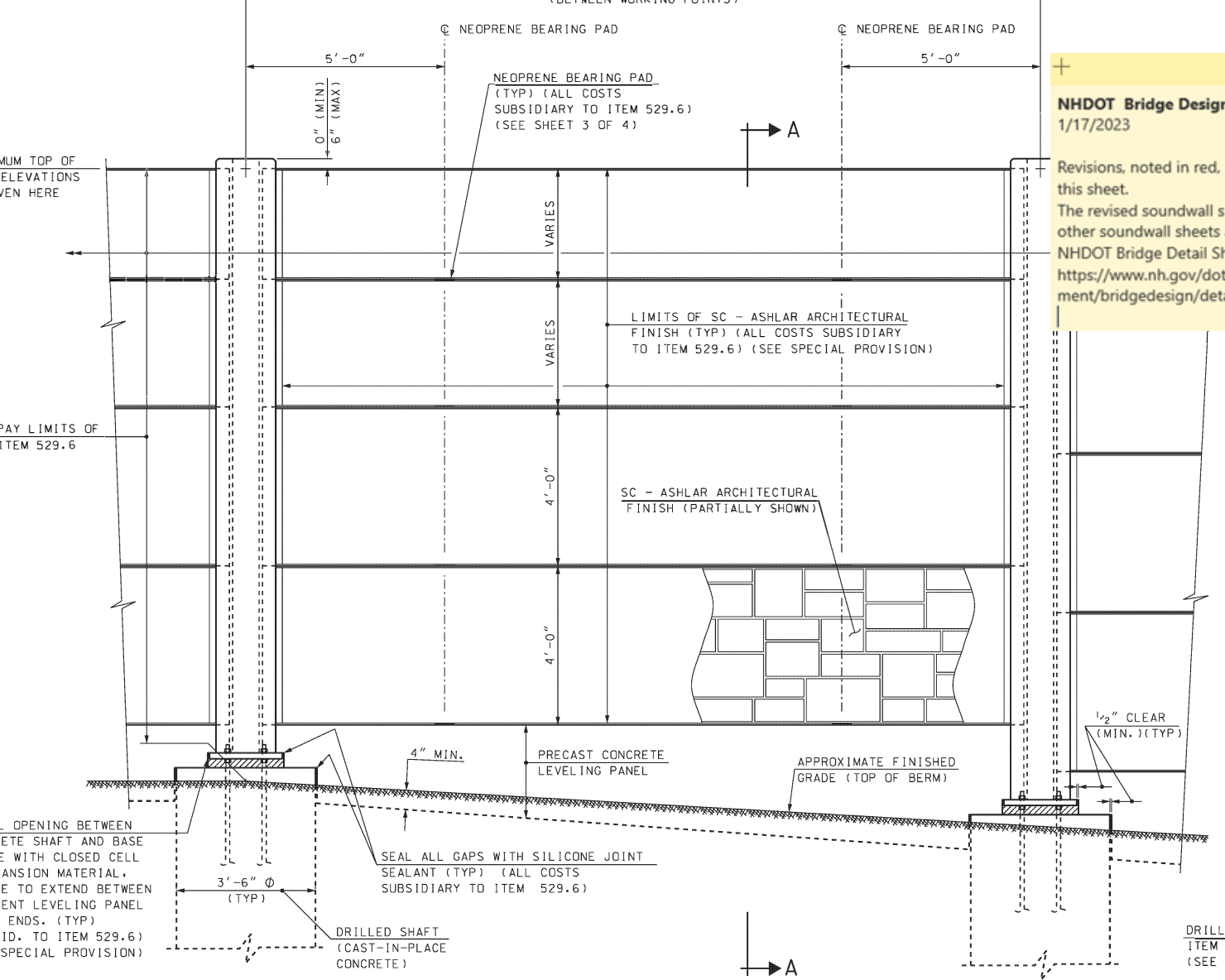
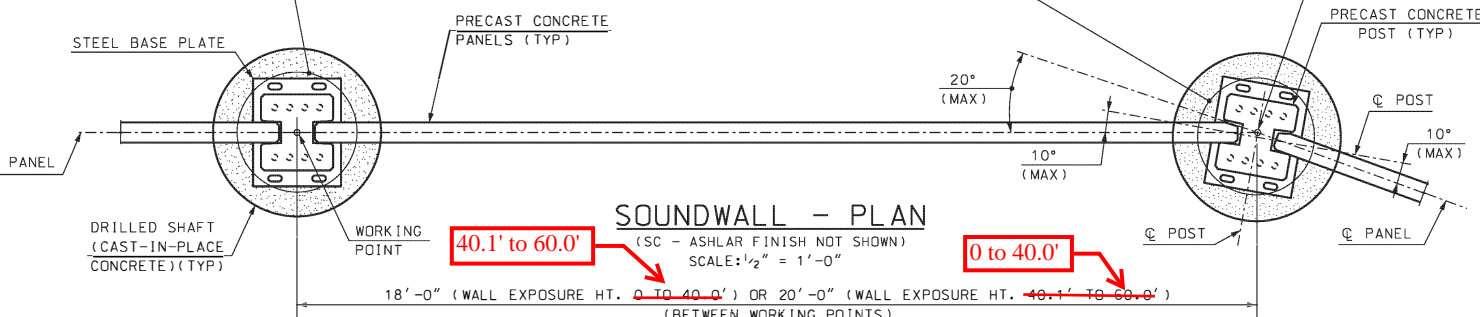
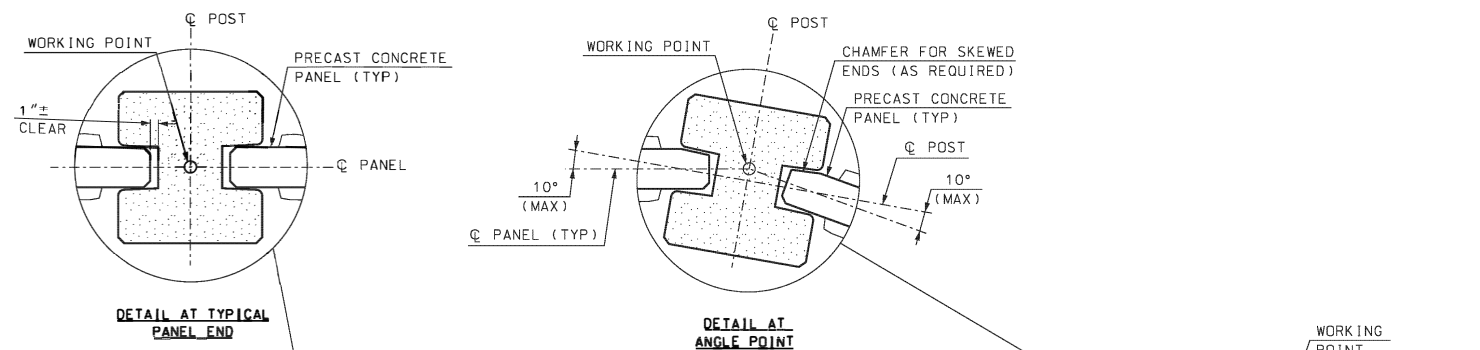
### MAXIMUM POST SPACING AND EXPOSURE HEIGHT DETAIL

MAXIMUM POST SPACING TABLE	
(SEE GENERAL NOTE 6)	
EXPOSURE HEIGHT	MAX. POST SPACING
0 TO 40.0'	20'-0"
40.1' TO 60.0'	18'-0"

SUBDIRECTORY	DGN LOCATOR	SHEET SCALE
English/SNDWALL	SOUNDWALL (1 OF 4)	AS NOTED

STATE OF NEW HAMPSHIRE						
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN						
TOWN	BRIDGE NO.		STATE PROJECT			
LOCATION						BRIDGE SHEET
PRECAST CONCRETE SOUNDWALL (1 OF 4)						OF
REVISIONS AFTER PROPOSAL	BY	DATE	BY	DATE	FILE NUMBER	
	DESIGNED	VHB	11/2022	CHECKED	JGM	11/2022
	DRAWN	BJM	11/2022	CHECKED	JGM/LRL	11/2022
	QUANTITIES		CHECKED			
	ISSUE DATE	12/21/2022	FEDERAL PROJECT NO.		SHEET NO.	TOTAL SHEETS
	REV. DATE					

NO MODIFICATIONS SHALL BE MADE TO THIS SHEET, EXCEPT AS NOTED IN CLOUDS. IF ANY MODIFICATIONS ARE MADE TO THIS SHEET, THAT PERSON SHALL BECOME THE DESIGNER AND ENGINEER OF RECORD.

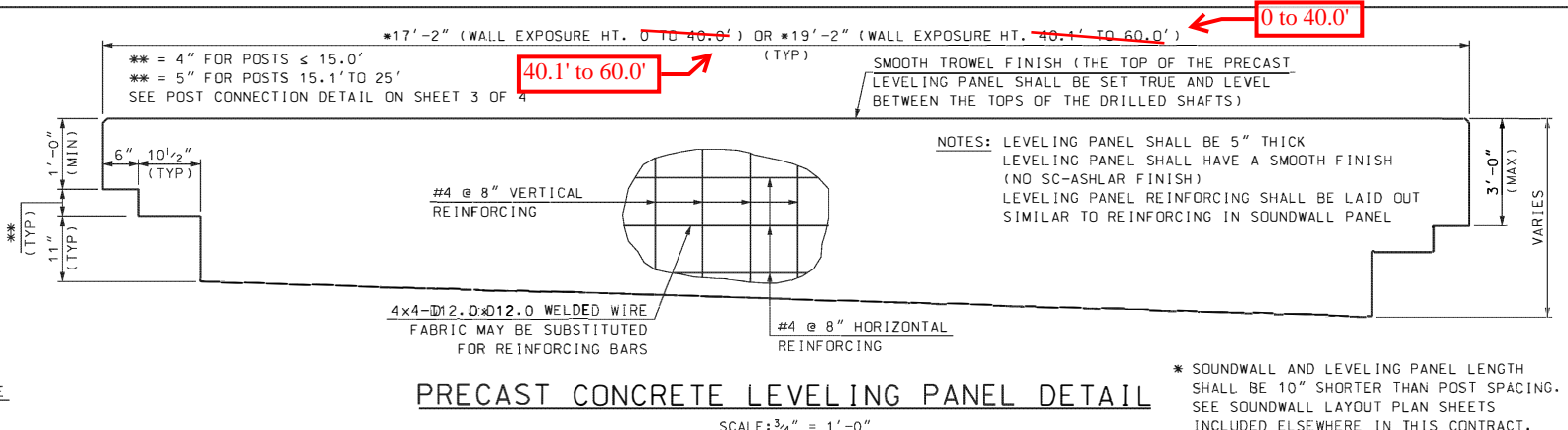


**SOUNDWALL - ELEVATION**  
(SC - ASHLAR FINISH PARTIALLY SHOWN)  
SCALE: 1/2" = 1'-0"

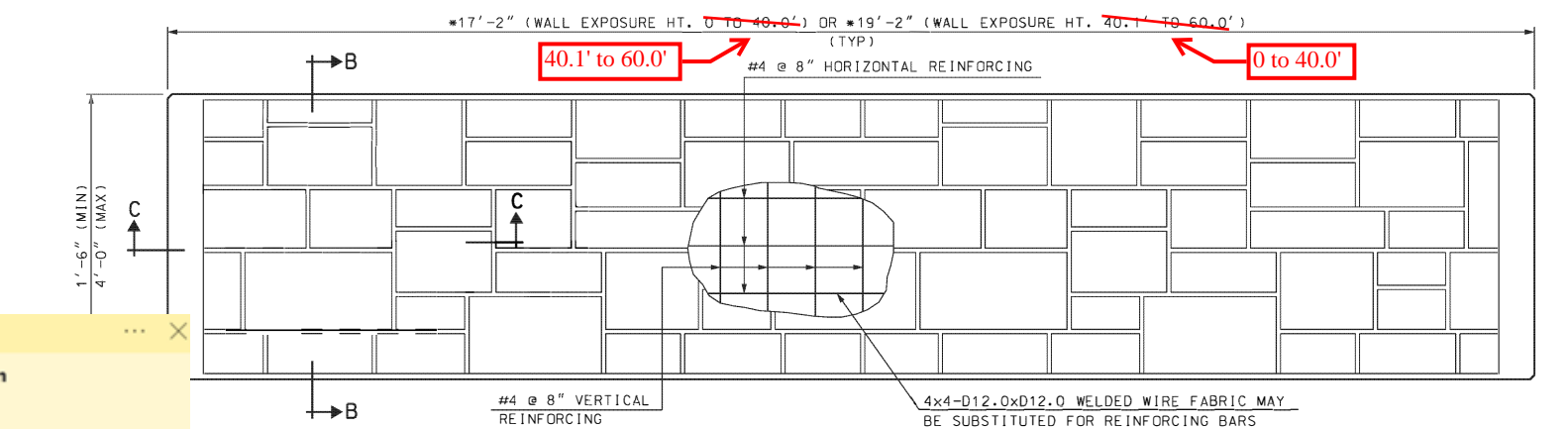
NO MODIFICATIONS SHALL BE MADE TO THIS SHEET. IF ANY MODIFICATIONS ARE MADE TO THIS SHEET, THAT PERSON SHALL BECOME THE DESIGNER AND ENGINEER OF RECORD.

**NHDOT Bridge Design**  
1/17/2023

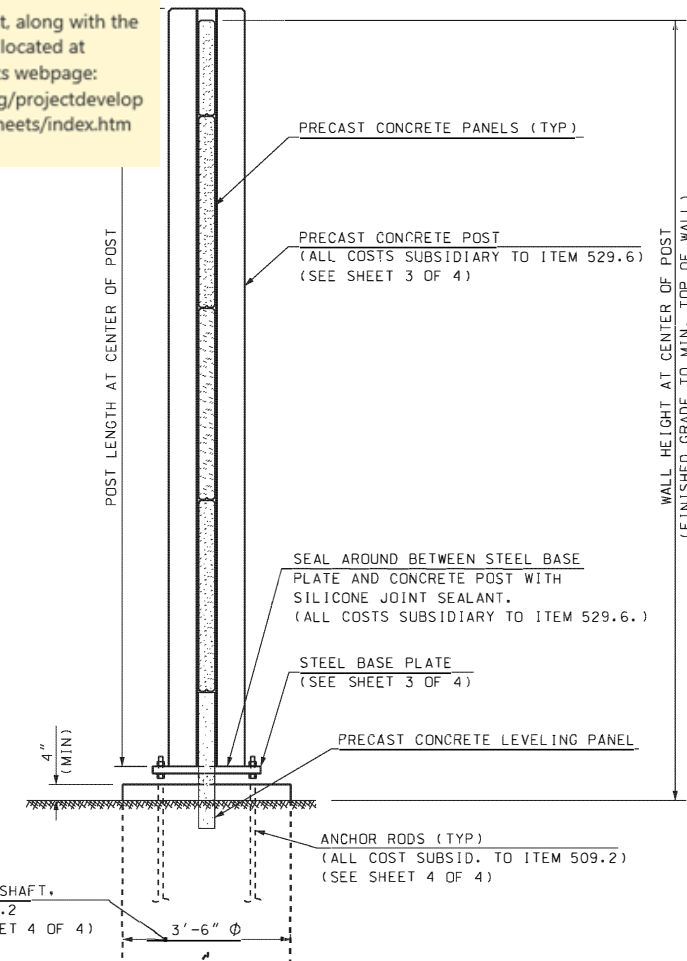
Revisions, noted in red, have been made to this sheet. The revised soundwall sheet, along with the other soundwall sheets are located at NHDOT Bridge Detail Sheets webpage: <https://www.nh.gov/dot/org/projectdevelopment/bridgedesign/detail sheets/index.htm>



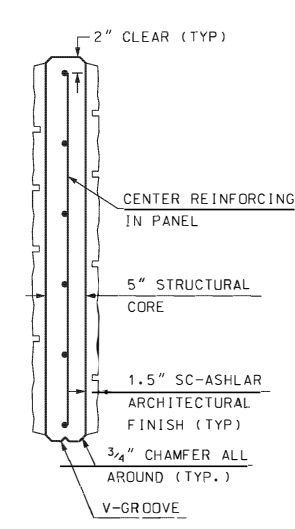
**PRECAST CONCRETE LEVELING PANEL DETAIL**  
SCALE: 3/4" = 1'-0"



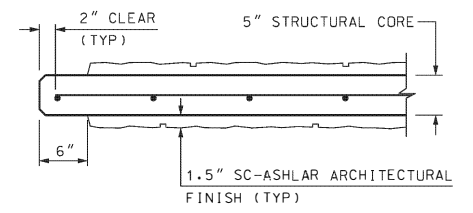
**PRECAST CONCRETE SOUNDWALL PANEL DETAIL**  
SCALE: 3/4" = 1'-0"



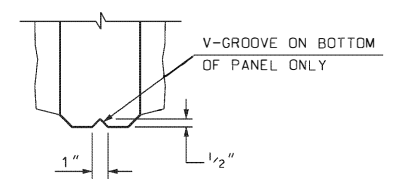
**SECTION A-A**  
(SC - ASHLAR FINISH NOT SHOWN)  
SCALE: 1/2" = 1'-0"



**SECTION B-B**  
SCALE: 1" = 1'-0"



**SECTION C-C**  
SCALE: 1" = 1'-0"

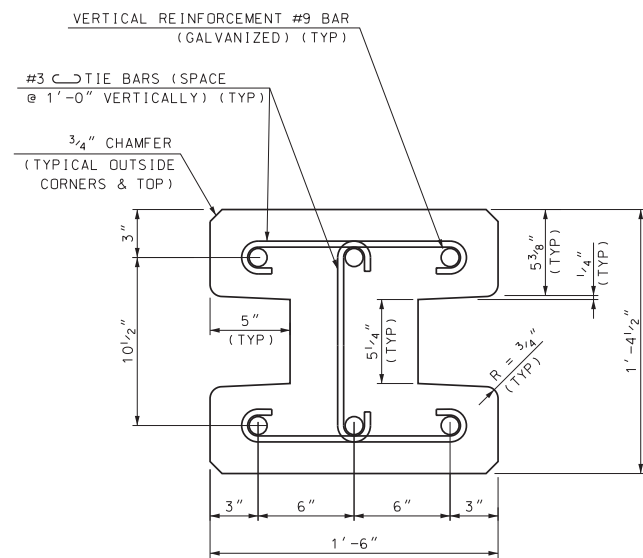


**V-GROOVE DETAIL**  
SCALE: 2" = 1'-0"

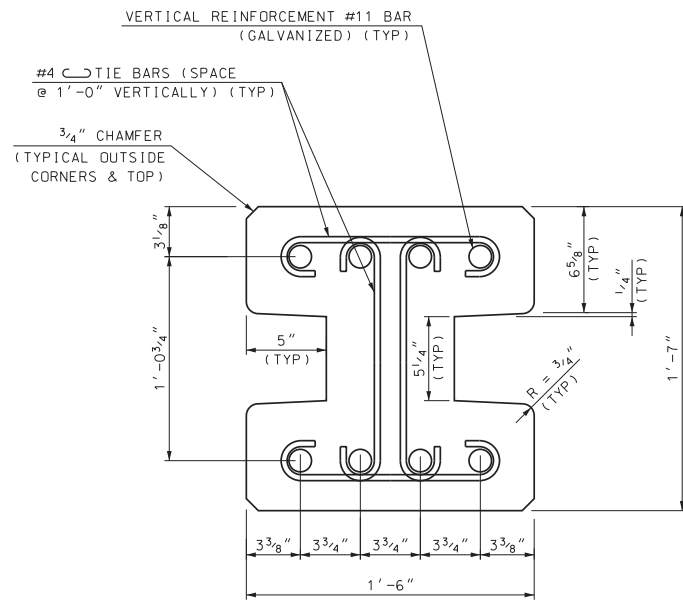
- NOTES:**
- SEE PRECAST CONCRETE SOUNDWALL (1 OF 4) SHEET FOR NOTES AND DESIGN CRITERIA.
  - REINFORCING SPACING SHOWN IS MAXIMUM. REINFORCING SHALL BE EQUALLY SPACED TO MAINTAIN 2 INCHES BETWEEN EDGE OF PANEL AND FIRST REINFORCING BAR.

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN									
TOWN		BRIDGE NO.			STATE PROJECT				
LOCATION									
PRECAST CONCRETE SOUNDWALL (2 OF 4)								BRIDGE SHEET	
REVISIONS AFTER PROPOSAL		BY		DATE		BY		DATE	
		DESIGNED		11/2022		CHECKED		11/2022	
		DRAWN		11/2022		CHECKED		11/2022	
		QUANTITIES				CHECKED			
ISSUE DATE		12/21/2022		FEDERAL PROJECT NO.		SHEET NO.		TOTAL SHEETS	
REV. DATE		1/17/23							

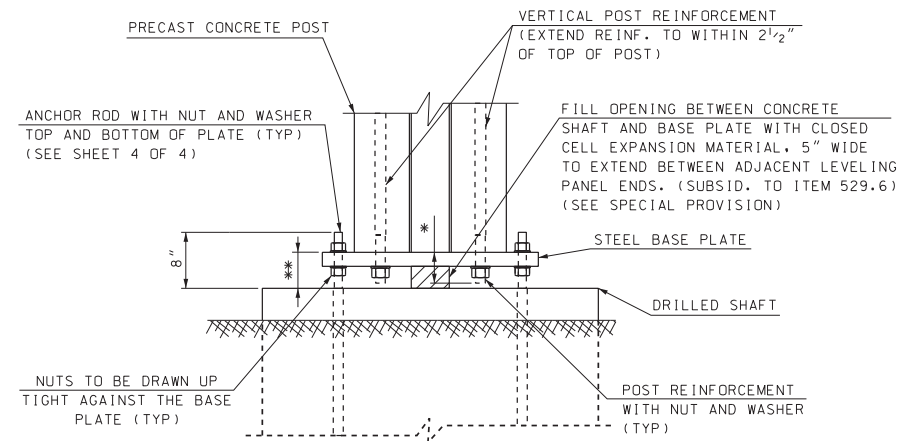
SUBDIRECTORY	DGN LOCATOR	SHEET SCALE
English/SNDWALL	SOUNDWALL (2 OF 4)	AS NOTED



POST SECTION DETAIL  
FOR POST LENGTHS ≤ 15.0'  
SCALE: 2" = 1'-0"



POST SECTION DETAIL  
FOR POST LENGTHS 15.1' TO 25.0'  
SCALE: 2" = 1'-0"

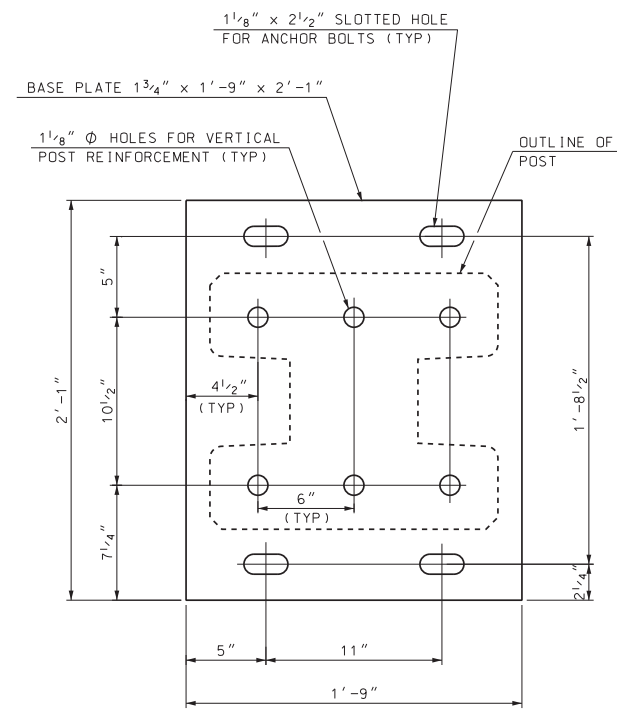


\* THREADS OF THE VERTICAL POST REINFORCEMENT SHALL EXTEND BEYOND THE BOTTOM OF THE POST:  
 3 1/2" FOR POSTS ≤ 15.0'  
 4 1/2" FOR POSTS 15.1' TO 25.0'  
 THE LAST 5" OF THE VERTICAL POST REINFORCEMENT SHALL BE THREADED FOR BOTH POSTS.

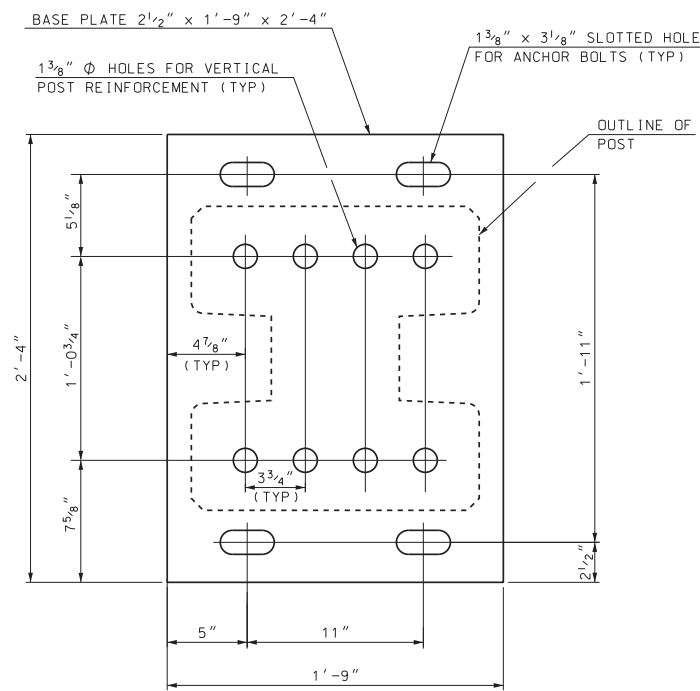
\*\* DISTANCE BETWEEN TOP OF DRILLED SHAFT AND TOP OF BASE PLATE:  
 4" FOR POSTS ≤ 15.0'  
 5" FOR POSTS 15.1' TO 25.0'

CUT THREAD SIZES SHALL BE : 1" - 8 UNC FOR #9 BARS  
 1 1/4" - 8 UN FOR #11 BAR

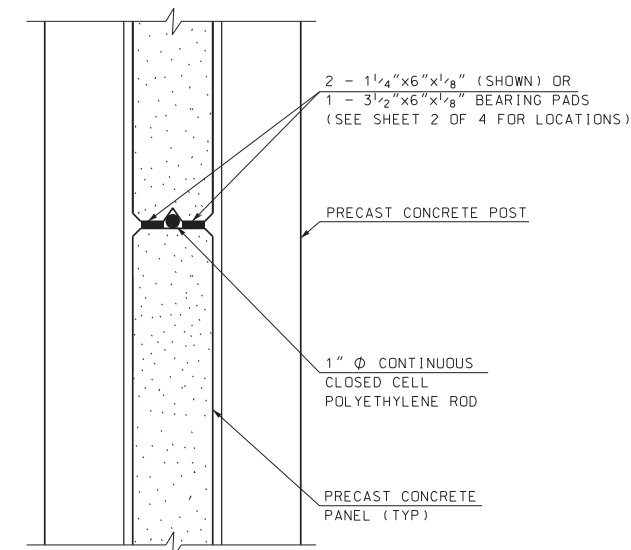
POST CONNECTION DETAIL  
SCALE: 1" = 1'-0"



POST BASE PLATE DETAIL  
FOR POST LENGTHS ≤ 15.0'  
SCALE: 2" = 1'-0"



POST BASE PLATE DETAIL  
FOR POST LENGTHS 15.1' TO 25.0'  
SCALE: 2" = 1'-0"



PANEL JOINT DETAIL  
(SC - ASHLAR ARCHITECTURAL FINISH NOT SHOWN)  
SCALE: 2" = 1'-0"

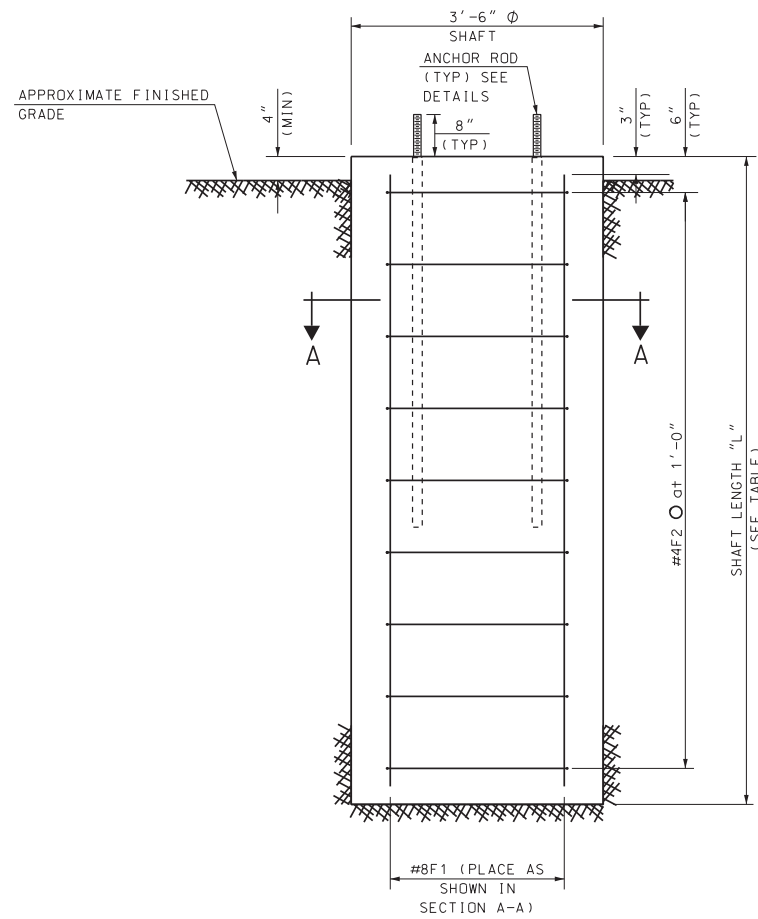
NOTES:

- SEE PRECAST CONCRETE SOUNDWALL (1 OF 4) SHEET FOR NOTES AND DESIGN CRITERIA.
- POLYETHYLENE ROD AND BEARING PADS SHALL BE ATTACHED TO BOTTOM OF PANEL USING SPRAY ADHESIVE OR SIMILAR DURING ERECTION.

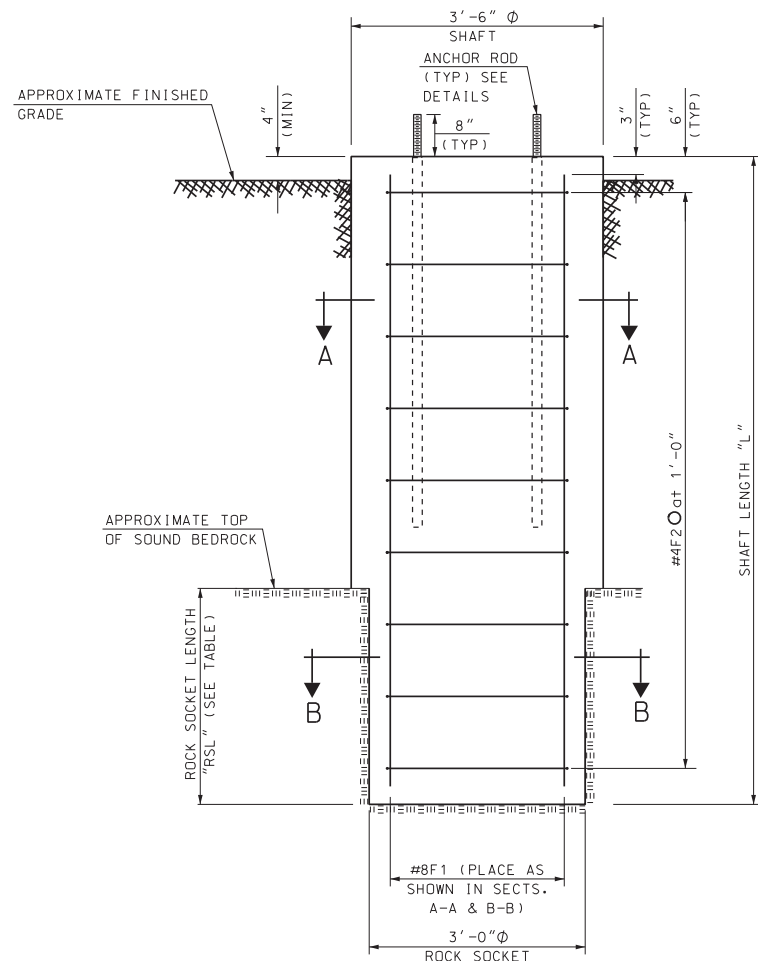
NO MODIFICATIONS SHALL BE MADE TO THIS SHEET. IF ANY MODIFICATIONS ARE MADE TO THIS SHEET, THAT PERSON SHALL BECOME THE DESIGNER AND ENGINEER OF RECORD.

STATE OF NEW HAMPSHIRE									
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN									
TOWN		BRIDGE NO.			STATE PROJECT				
LOCATION									
PRECAST CONCRETE SOUNDWALL (3 OF 4)								BRIDGE SHEET	
REVISIONS AFTER PROPOSAL								OF	
DESIGNED		BY		DATE		CHECKED		DATE	
DRAWN		BY		DATE		CHECKED		DATE	
QUANTITIES								FILE NUMBER	
ISSUE DATE								TOTAL SHEETS	
REV. DATE								FEDERAL PROJECT NO.	
SUBDIRECTORY								SHEET NO.	
DGN LOCATOR								TOTAL SHEETS	
SHEET SCALE								TOTAL SHEETS	
English/SNDWALL								TOTAL SHEETS	
SOUNDWALL (3 OF 4)								TOTAL SHEETS	
AS NOTED								TOTAL SHEETS	

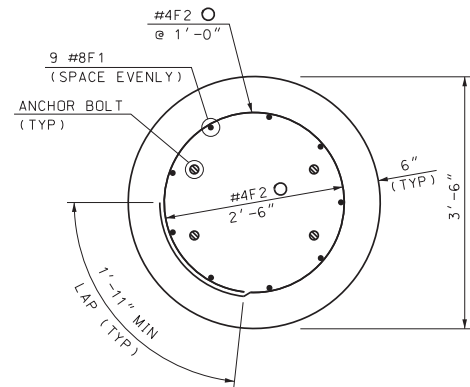
NO MODIFICATIONS SHALL BE MADE TO THIS SHEET, EXCEPT AS NOTED IN CLOUDS. IF ANY MODIFICATIONS ARE MADE TO THIS SHEET, THAT PERSON SHALL BECOME THE DESIGNER AND ENGINEER OF RECORD.



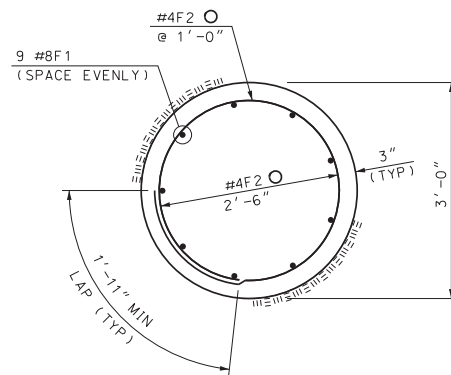
ELEVATION - DRILLED SHAFT IN SOIL  
SCALE: 3/4" = 1'-0"



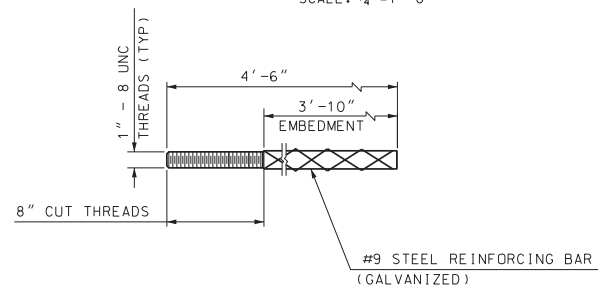
ELEVATION - DRILLED SHAFT IN ROCK  
SCALE: 3/4" = 1'-0"



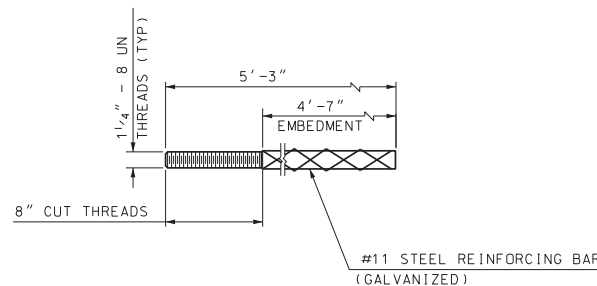
SECTION A-A  
(IN SOIL)  
SCALE: 3/4" = 1'-0"



SECTION B-B  
(IN ROCK)  
SCALE: 3/4" = 1'-0"



ANCHOR ROD DETAIL  
FOR POST LENGTH ≤ 15.0'  
NOT TO SCALE



ANCHOR ROD DETAIL  
FOR POST LENGTH 15.1' TO 25.0'  
NOT TO SCALE

TO BE COMPLETED BY DESIGNER:

SHAFT LENGTH SUMMARY TABLES

(FOR POST/SHAFT NUMBERS SEE PLAN SHEETS INCLUDED ELSEWHERE IN THIS CONTRACT)

WALL 1

POST/SHAFT NUMBERS	SHAFT LENGTH "L"	ROCK SOCKET LENGTH "RSL"	NUMBER OF POSTS/SHAFTS
x TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx

WALL 2

POST/SHAFT NUMBERS	SHAFT LENGTH "L"	ROCK SOCKET LENGTH "RSL"	NUMBER OF POSTS/SHAFTS
x TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx

WALL 3

POST/SHAFT NUMBERS	SHAFT LENGTH "L"	ROCK SOCKET LENGTH "RSL"	NUMBER OF POSTS/SHAFTS
x TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx
xx TO xx	xx' - x"	xx' - x"	xx

ESTIMATED SHAFT QUANTITIES

(PER INSTALLED FOOT OF 3'-6" Ø SHAFT)

ITEM	UNIT	QUANTITY
CONCRETE CLASS A	CY/LF	0.36
REINFORCING STEEL	LB/LF	30.60

FOR INFORMATION ONLY. ALL COST INCLUDED IN ITEM 509.2.

SHAFT REINFORCING SCHEDULE

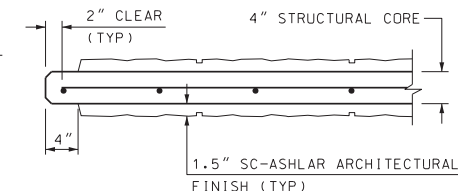
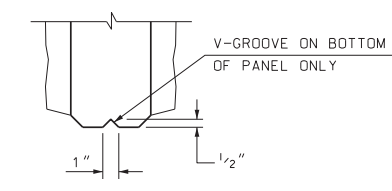
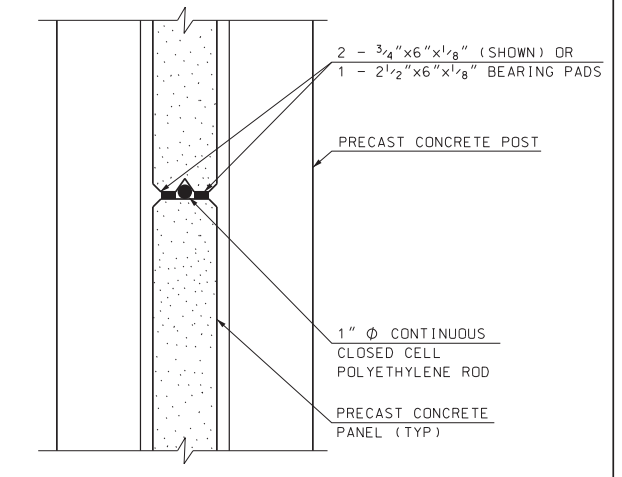
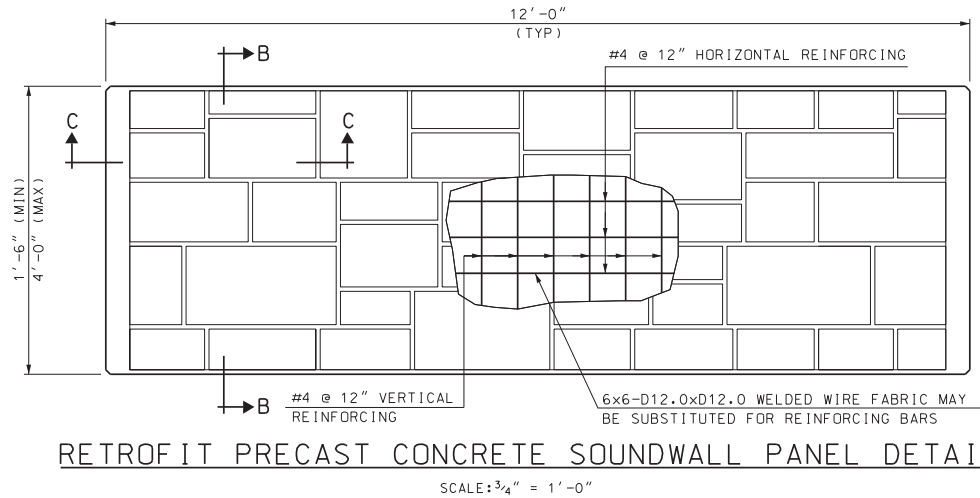
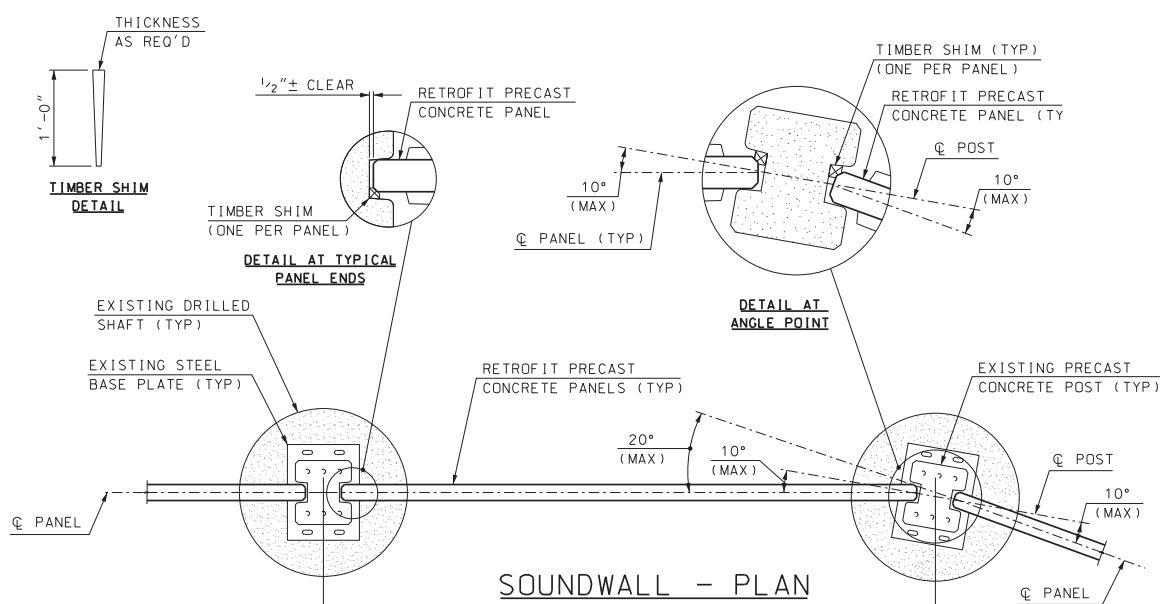
BAR MARK	SIZE	UNBENT LENGTH	TYPE
F1	#8	L-6"	—
F2	#4	9'-10"	○

NOTE:

- SEE PRECAST CONCRETE SOUNDWALL (1 OF 4) SHEET FOR NOTES AND DESIGN CRITERIA.

STATE OF NEW HAMPSHIRE									
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN									
TOWN		BRIDGE NO.			STATE PROJECT				
LOCATION									
PRECAST CONCRETE SOUNDWALL (4 OF 4)								BRIDGE SHEET	
REVISIONS AFTER PROPOSAL								OF	
DESIGNED		VHB	11/2022		CHECKED		JGM	11/2022	
DRAWN		BJM	11/2022		CHECKED		JGM/LRL	11/2022	
QUANTITIES								FILE NUMBER	
ISSUE DATE								TOTAL SHEETS	
SUBDIRECTORY		DGN LOCATOR		SHEET SCALE		ISSUE DATE		FEDERAL PROJECT NO.	
English/SNDWALL		SOUNDWALL (4 OF 4)		AS NOTED		12/21/2022		SHEET NO.	
REV. DATE								TOTAL SHEETS	

NO MODIFICATIONS SHALL BE MADE TO THIS SHEET, EXCEPT AS NOTED. IF ANY MODIFICATIONS ARE MADE TO THIS SHEET, THAT PERSON SHALL BECOME THE DESIGNER AND ENGINEER OF RECORD.



V-GROOVE DETAIL  
SCALE: 2" = 1'-0"

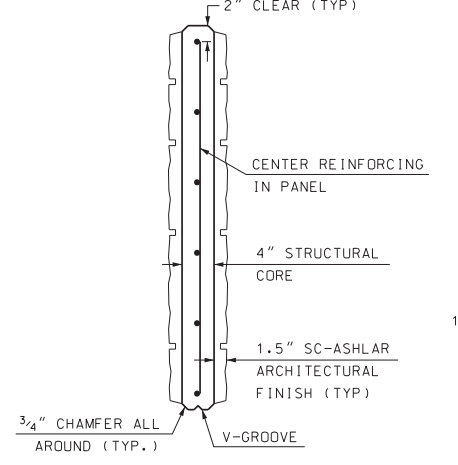
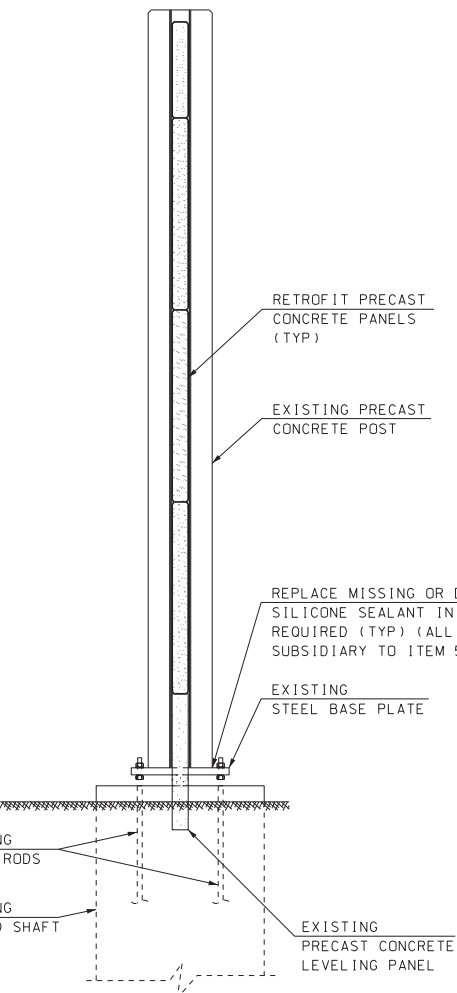
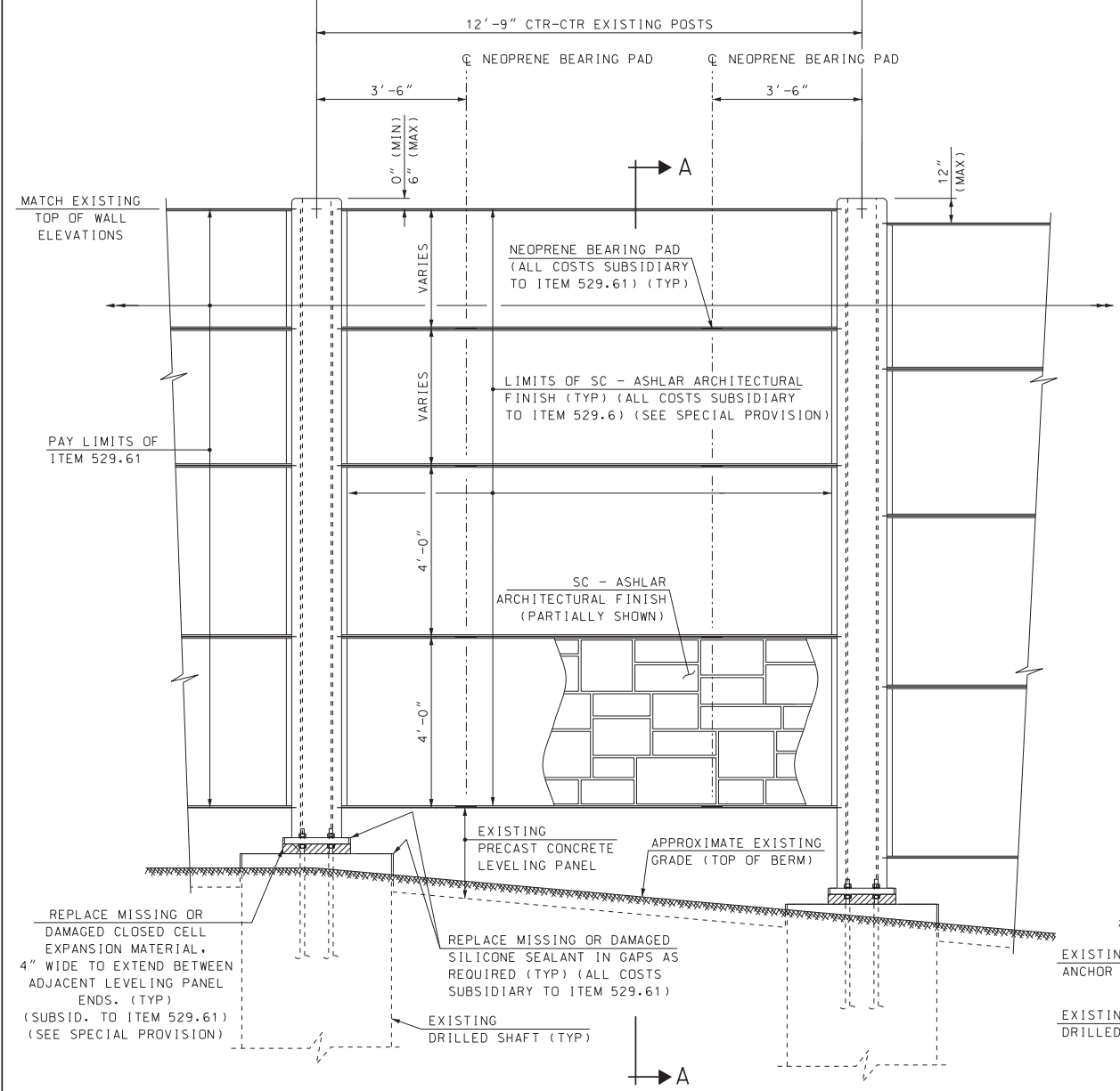
SECTION C-C  
SCALE: 1" = 1'-0"

**GENERAL NOTES**

- RETROFIT PRECAST CONCRETE SOUNDWALL PANEL SHOWN ON THIS SHEET SHALL ONLY BE USED TO REPLACE EXISTING WOOD PANELS ON EXISTING SOUNDWALLS.
- ITEM 529.61, PRECAST CONCRETE SOUND ABATEMENT WALL RETROFIT PANEL (F) SHALL INCLUDE, ALL PRECAST CONCRETE PANELS, INCIDENTAL MATERIAL, AND REMOVAL OF EXISTING WOOD PANELS NECESSARY FOR CONSTRUCTION OF THE SOUNDWALL AS DETAILED ON THE PLANS.
- SEE SECTION 529 SPECIAL PROVISION FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
- THE ANGLE BETWEEN THE PRECAST CONCRETE POST AND WALL PANEL SHALL NOT EXCEED 10 DEGREES. POSTS SHALL BE HORIZONTALLY ALIGNED TO ACHIEVE THE PROPOSED WALL ALIGNMENT WITH ANGLE POINTS NOT TO EXCEED 20 DEGREES.
- COAT ALL NEW AND EXISTING PRECAST SURFACES (SOUNDWALL PANELS, POSTS, AND LEVELING PANELS) WITH WATER REPELLENT (SILANE-SILOXANE) IN ACCORDANCE WITH SECTION 534. ALL COSTS SUBSIDIARY TO ITEM 529.61.
- REINFORCING SPACING SHOWN IS MAXIMUM. REINFORCING SHALL BE EQUALLY SPACED TO MAINTAIN 2 INCHES BETWEEN EDGE OF PANEL AND FIRST REINFORCING BAR. CLEAR COVER FOR REINFORCEMENT SHALL BE AS SHOWN.
- ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.
- ALL PANELS SHALL BE 4'-0" TALL, EXCEPT FOR THE UPPER TWO PANELS BETWEEN EACH POST, WHICH SHALL VARY IN HEIGHT TO ACHIEVE THE DESIRED TOP OF WALL ELEVATION.
- PRECAST CONCRETE SOUNDWALL PANELS SHALL HAVE A SC - ASHLAR ARCHITECTURAL FINISH ON BOTH FACES, CAST USING PATTERN NO. 1515 FORM LINERS BY SPEC FORMLINERS, INC. SEE SECTION 529 SPECIAL PROVISION FOR MORE INFORMATION.
- LIFTING POINTS AND DEVICES SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED FOR APPROVAL. ALL UPWARD FACING RECESSES FOR LIFTING DEVICES SHALL BE FILLED WITH A NON-SHRINK GROUT AFTER OR DURING ERECTION.

**DESIGN CRITERIA**

- (1) SPECIFICATION: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH ED., 2020, SECTION 15 NHDOT 2016 STANDARD SPECIFICATIONS AS AMENDED. SPECIAL PROVISION SECTION 529 - PRECAST CONCRETE SOUND ABATEMENT WALL
- (2) DESIGN LOADING: WIND PRESSURE = 46 PSF (STRENGTH III)  
WHERE:  
V = 123 MPH (AASHTO FIG. 3.8.1.1.2-1)  
Kz(c) = 1.14 GROUND SURFACE ROUGHNESS CATEGORY C, OPEN TERRAIN (TOP OF WALL MEASURED 60 FT ABOVE LOW GROUND SURFACE, TO REPRESENT A 25 FT SOUNDWALL ON A 35 FT HIGH MSE WALL)  
G = 0.85  
Cd = 1.2
- (3) MATERIALS:  
A. CONCRETE FOR THE SOUNDWALL PANELS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI AND SHALL CONFORM TO SECTION 520 FOR CLASS AA CONCRETE UNLESS NOTED OTHERWISE. ALL PRECAST CONCRETE SHALL HAVE CORROSION INHIBITOR (CALCIUM NITRATE) ADMIXTURE ADDED AT A RATE OF 3 GALLONS PER CUBIC YARD.  
B. ALL REINFORCING STEEL SHALL CONFORM TO AASHTO M 31 (ASTM A615), GRADE 60. ALL WELDED WIRE FABRIC SHALL CONFORM TO AASHTO M55. ALL REINFORCING IN PANELS SHALL BE BLACK (UNCOATED) STEEL.
- (4) PRECAST TOLERANCES: IN ACCORDANCE WITH SECTION 529 SPECIAL PROVISION.



SECTION A-A  
(SC - ASHLAR FINISH NOT SHOWN)  
SCALE: 1/2" = 1'-0"

SUBDIRECTORY	DGN LOCATOR	SHEET SCALE
English/SNDWALL	RET SOUNDWALL	AS NOTED

STATE OF NEW HAMPSHIRE									
DEPARTMENT OF TRANSPORTATION * BUREAU OF BRIDGE DESIGN									
TOWN		BRIDGE NO.			STATE PROJECT				
LOCATION									
RETROFIT PRECAST CONCRETE PANEL, SOUNDWALL (1 OF 1)									
REVISIONS AFTER PROPOSAL		BY	DATE	BY	DATE	BRIDGE SHEET OF			
		DESIGNED	VHB	04/2022	CHECKED	JGM	04/2022	FILE NUMBER	
		DRAWN	BJM	04/2022	CHECKED	JGM/LRL	04/2022		
		QUANTITIES			CHECKED				
		ISSUE DATE	12/21/2022	FEDERAL PROJECT NO.			SHEET NO.	TOTAL SHEETS	
		REV. DATE							