



STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. Box 778
DOVER, DELAWARE 19903

JENNIFER COHAN
SECRETARY

VIA OVERNIGHT DELIVERY AND WEBSITE POSTING

May 22, 2019

Contract No. T201109001.01
Federal Aid Project No. IM-N056(041)
SR 141 Improvements, I-95 Interchange to Jay Drive
New Castel County

Ladies and Gentlemen:

Enclosed is Addendum No. 1 for the referenced contract consisting of the following:

1. The Bid Proposal Cover, revised, to be substituted for the same page of the Proposal.
2. Three (3) pages, Table of Contents, page xii through xiv, revised, to be substituted for the same pages in the Proposal.
3. Nine (9) page, Special Provision 607500 - Soil Nail Wall, has been revised and replaced with a fifteen (15) page Provision.
4. Four (4) pages, Special Provision 612500 - Precast Concrete Pier Cap has been revised and replaced with a three (3) page Provision.
5. One (1) page, Special Provision 612501 - PVC Pipe, 4, was improperly titled and contained the wrong information. This has been deleted and replaced with a two (2) page Special Provision, 612501 - Precast Concrete Pier Column.
6. Two (2) pages, Special Provision 615504 - Bridge Electrical System was improperly titled has been corrected.
7. One (1) page, Right of Way Statement, page 229, revised, to be substituted for the same page in the Proposal.
8. One (1) page, Bid Proposal Form, page 15, revised, to be substituted for the same page in the Proposal. Item No. 606003 has a revised quantity.
9. Seven (7) pages, Pre-Bid Meeting Presentation has been posted.
10. The Pre-Bid Meeting Sign In Sheet has been posted.

11. The Pre-Bid Meeting Transcript has been posted.

12. Expedite File, Addendum No. 1.

Please note the revisions listed above and submit your bid based upon this information.

Sincerely,

~signature on file~

Connie Ivins

Competitively Bid Contracts Coordinator
Delaware Department of Transportation

STATE OF DELAWARE



DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T201109001.01

FEDERAL AID PROJECT NO. IM-N056(041)

CFDA NO. 20.205

SR 141 IMPROVEMENTS, I-95 INTERCHANGE TO JAY DRIVE

NEW CASTLE COUNTY

ADVERTISEMENT DATE: April 29, 2019

COMPLETION TIME: 943 Calendar Days

PROSPECTIVE BIDDERS ARE ADVISED THAT THERE WILL BE A MANDATORY PRE-BID MEETING THURSDAY, MAY 16, 2019 AT 10:00 A.M. IN THE DelDOT ADMINISTRATION BUILDING, 800 BAY ROAD, DOVER, DELAWARE, 19903.

SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
DELAWARE DEPARTMENT OF TRANSPORTATION
AUGUST 2016

Bids will be received in the Bidder's Room at the Delaware Department of Transportation's Administration Building, 800 Bay Road, Dover, Delaware prior to 2:00 P.M. local time June 4, 2019

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Contract No. T201109001.01

607500 - SOIL NAIL WALL

Description:

This work consists of constructing a permanent soil nail wall as specified herein and as shown on the Plans. The Contractor shall furnish all labor, materials, and equipment required to complete the work.

The work shall include performing the following activities in accordance with the design plans, the required submittals by the Contractor and these specifications: excavating in staged lifts drilling of the soil nail drill-holes to the diameter and length required per design plans; grouting of soil nails; supplying and installing the specified drainage features; supplying and installing bearing plates, washers, nuts, and other required hardware and miscellaneous materials; and constructing the initial and final soil nail wall facing.

Materials:

Facing

Facing materials shall conform to the following sections and subsections.

Shotcrete Facing

Shotcrete facing shall meet the requirements of Section 24, "Pneumatically Applied Mortar" of the AASHTO LRFD Bridge Construction Specifications, 3rd 4th Edition ~~with 2016 Interim Revisions~~.

Shotcrete: $f_c=4.0$ ksi.

Cast-in-place Concrete

Cast-in-place (CIP) concrete shall meet the requirements of Section 610 of the DelDOT Standard Specifications.

Concrete: Class A - $f_c=4.5$ ksi

Reinforcing Steel

Reinforcing steel shall meet the requirements of Section 1037 of the DelDOT Standard Specifications.

~~Architectural Surface Finishes~~

~~Architectural surface finishes may include textured surfaces or a surface finish with color/stain application.~~

Soil Nails

Soil Nail Solid Bar

Solid nail bars shall meet the requirements of AASHTO M31/ASTM A615 for Grade 75 steel bars, and ASTM A 722 for Grade 150 steel. Soil nail bar shall be continuous without splices or welds, new, straight, undamaged, epoxy coated or galvanized ~~as shown on the Plans~~. The length of the threaded portion of the bar at the wall anchorage shall be as needed to allow proper attachment of the bearing plate and nut. If threads are cut into a soil nail bar, the contractor shall verify that the bar meets the minimum capacity required at the threaded section.

Bar Couplers

Bar couplers shall develop the full nominal tensile capacity of the soil nail bars as certified by the manufacturer.

Fusion Bonded Epoxy Coating

Fusion bonded epoxy coating shall meet the requirements of ASTM A 775 and have a minimum thickness of 12 mils (12 thousandths of an inch) as applied electrostatically. Bend test requirements are waived.

Zinc Coating

Zinc galvanized coating shall meet the requirements of Article 11.10.6.4.2a (AASHTO LRFD Bridge Design Specifications, 7th edition with 2015 and 2016 Interim Revisions) and have a minimum of 2.0 oz/ft² or 3.4 mil thickness applied in accordance with ASTM A123 for bars and structural steel shapes, and ASTM A153 for nuts, plates, and other hardware.

Other Soil Nail Components

Centralizers

Centralizers shall be manufactured from Schedule 20 or 40 PVC pipe or tube, steel, or other materials not detrimental to the soil nail steel bar. Wood shall not be used. Centralizers shall be securely attached to the soil nail bar and shall be sized to allow: (a) positioning of the soil nail bar within 1 in. of the center of the drill-hole; (b) tremie pipe insertion to the bottom of the drill-hole; and (c) grout to freely flow up the drill-hole. They shall be installed at regular intervals not to exceed 10 ft along the length of the nail and a distance of 1.5 ft from each end of the nail.

Grout

Grout shall be a neat cement or sand/cement mixture with a minimum 3 day compressive strength of 1,500 psi and a minimum 28 day compressive strength of 3,000 psi, meeting the requirements of AASHTO T106/ASTM C109. The specific gravity of the freshly prepared neat cement grout shall range between 1.8 and 1.9.

Sand

Sand for grout and/or shotcrete shall meet the requirements of AASHTO M6/ASTM C33.

Portland Cement

Portland cement for grout and/or shotcrete shall meet the requirements of AASHTO M85/ASTM C150, Type I, II, III, V, or Type I/II.

Admixtures

Admixtures shall meet the requirements of AASHTO M194/ASTM C494. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations. Accelerators shall not be permitted. Expansive admixtures shall not be permitted except where the grout is used as part of corrosion protecting encapsulation.

Film Protection

Polyethylene film for moisture loss control shall meet the requirements of ASTM C171.

Connection Components

Bearing Plates

Bearing plates shall meet the requirements of ASTM A709 Grade 50.

Nuts

Nuts shall meet the requirements of ASTM A563, Grade B, hexagonal, and fitted with beveled washer or spherical seat to provide uniform bearing.

Shear Connectors

Shear connectors of the soil nail head shall consist of headed-studs or anchor bolts.

Welded-Wire Mesh

Welded wire mesh (WWM) shall meet the requirements of AASHTO M55/ASTM A185 or A497.

Geocomposite Strip Drain

Geocomposite strip drain shall be manufactured with a drainage core (e.g., geonet) and a filtration geotextile attached to or encapsulating the core. Drainage core shall be manufactured from long-chain synthetic polymers composed of at least 85 percent by mass of polypropylenes, polyester, polyamine, polyvinyl chloride, polyoleofin, or polystyrene and have a minimum compressive strength of 40 psi when tested in accordance with ASTM D 1621 Procedure A. The drainage core with the geotextile fully encapsulating the core shall have a minimum flow rate of 0.1 gallons per second per foot of strip width under a gradient of 1.0 tested in accordance with ASTM D 4716.

~~Underdrain and Perforated Pipe~~

~~Pipe~~

~~Underdrain and perforated pipe shall meet the requirements of ASTM D1785 Schedule 40 PVC solid and perforated wall, cell classification 12454-B or 12354-C, wall thickness SDR 35, with solvent weld or elastomeric joints.~~

~~Fittings~~

~~Fittings for underdrain and perforated pipe shall meet the requirements of ASTM D3034, Cell classification 12454-B or C, wall thickness SDR 35, with solvent or elastomeric joints.~~

Initial Shotcrete

All materials, methods, and control procedures for initial shotcrete shall be submitted to the Owner's Engineer for review and approval.

CONTRACTOR QUALIFICATIONS

The soil nailing contractor shall meet the following qualification requirements:

1. Have completed at least three permanent soil nail wall projects during the past three years totaling at least 10,000 ft² of soil nail wall face area and at least 500 permanent soil nails.
2. Provide on-site supervisors and drill operators with experience installing permanent soil nail walls on at least three projects over the past three years.
3. Submit a brief description of at least three projects, including the owner agency's name, address, and current phone number; location of project; project contract value; and scheduled completion date and completion date for the project.

SUBMITTALS

Personnel

At least 30 calendar days before starting soil nail work, submit names of the Engineer, on-site supervisors, and drill operators assigned to the project, and a summary of each individual's experience. Only those individuals designated as meeting the qualifications requirements shall be used for the project. The Contractor cannot substitute for any of these individuals without written approval of the Owner or the Owner's Engineer. Work shall not be started nor materials ordered until the Contractor's qualifications have been approved by the Owner's Engineer. The Owner's Engineer may suspend the work if the Contractor substitutes unqualified personnel for approved personnel during construction. If work is suspended due to the substitution of unqualified personnel, the Contractor shall be fully liable for all additional costs resulting from the suspension of work, and no adjustment in contract time resulting from the suspension of the work shall be allowed.

Surveys

The Contractor shall be responsible for providing the necessary survey and alignment control during the excavation for each lift, locating drill holes and verifying limits of the soil nail wall installation.

Construction Plan

At least 45 days before starting soil nail work, the Contractor shall submit a Construction Plan to the Owner's Engineer that includes the following:

1. Project start date and proposed detailed wall construction sequence.
2. Drilling and grouting methods and equipment, including the drill hole diameter proposed to achieve the specified nominal pullout resistance values shown on the Plans.
3. Nail grout mix design, including compressive strength test results (per AASHTO T106/ASTM C109) supplied by a qualified independent testing lab verifying the specified minimum 3-day and 28-day grout compressive strengths. For neat cement grout include specific gravity test results of the fresh grout used for compressive testing.
4. Nail grout placement procedures and equipment.
5. Shotcrete facing materials and methods, including mix and anticipated strength.
6. Soil nail testing methods and equipment setup.
7. Identification number and certified calibration records for each test jack, pressure gauge, dial gauge and load cell to be used. Jack and pressure gauge shall be calibrated as a unit. Calibration records shall include the date tested, the device identification number, and the calibration test results and shall be certified for an accuracy of at least 2 percent of the applied certification loads by a qualified independent testing laboratory within 90 days prior to submittal.
8. Manufacturer Certificates of Compliance for the soil nail ultimate strength, nail bar steel, Portland cement, centralizers, bearing plates and epoxy coating.

9. Approval of the Construction Plan does not relieve the Contractor of his responsibility for the successful completion of the work.

At least 45 days before the planned start of the wall excavation, the Contractor shall submit shop drawings to the Owner's Engineer for review and approval. Include all details, dimensions, quantities, ground profiles and cross-sections necessary to construct the wall. The Contractor shall verify the limits of the wall and ground survey data before preparing the shop drawings. The working drawings shall be prepared to the DelDOT standards. The Contractor shall not begin construction or incorporate materials into the work until the submittal requirements are satisfied and found acceptable to the Owner's Engineer.

STORAGE AND HANDLING

Soil nail bars shall be stored and handled in a manner to avoid damage or corrosion. Soil nail bars exhibiting abrasions, cuts, welds, weld splatter, corrosion, or pitting shall be replaced. Bars exhibiting damage to epoxy coating shall be repaired or replaced at no additional cost. Repaired epoxy coating areas shall have a minimum 0.012-in. thick coating. Damaged galvanization shall be repaired by coating the damaged area with a field grade, zinc-rich paint.

EXCAVATION

The height of exposed unsupported final excavation face cut shall be established by contractor and shall not exceed the vertical nail spacing plus the required reinforcing lap or the short-term stand-up height of the ground, whichever is less. Excavation to the final wall excavation line and shotcrete application shall be completed in the same work shift, unless otherwise approved by the Owner's Engineer.

Excavation of the next-lower lift shall not proceed until soil nail installation, reinforced shotcrete placement, attachment of bearing plates and nuts, and nail testing have been completed and accepted in the current lift. Nail grout and shotcrete shall have attained at least their specified 3-day compressive strength before excavating the next underlying lift.

SOIL NAIL INSTALLATION

The soil nail length and drill hole diameter necessary to develop the load capacity and to satisfy design in accordance with the acceptance criteria for the design load required shall be provided, but not less than the lengths or diameters shown in the Plans FHWA Geotechnical Circular (GEC) No. 7 Soil Nail Walls - Reference Manual 2015.

Drill holes for the soil nails shall be drilled at the locations, elevations, orientations, and lengths ~~shown on~~ in accordance with the design Plans. The drilling equipment and methods shall be selected to be suitable for the ground conditions and in accordance with the accepted installation methods submitted by the Contractor. If caving ground is encountered, cased drilling methods shall be used to support the sides of the drill-holes. Soil nail bars shall be provided as ~~shown in~~ accordance with the Plans design.

Centralizers shall be provided and sized to position the soil nail bars to within 1 in. of the center of the drill hole. Centralizers shall be positioned ~~as shown on the Plans~~ in accordance with the design so that their maximum center-to-center spacing does not exceed 10 ft, and shall be located to within 1.5 ft from each end of the nail bar.

GROUTING

The drill hole shall be grouted after installation of the soil nail bar and within 2 hours of completion of drilling. The grout shall be injected at the lowest point of each drill-hole through a grout tube, casing,

hollow-stem auger, or drill rods. The outlet end of the conduit shall deliver grout below the surface of the grout as the conduit is withdrawn to prevent the creation of voids. The drill hole shall be filled in one continuous operation. Cold joints in the grout column shall not be allowed except at the top of the test bond length of proof tested production nails. The space above the bottom elevation of the inclined drill hole opening called a "bird's beak" due to its shape, shall be filled up with additional grout after a temporary cover is placed in front of the drill hole, or filled with shotcrete.

Final grout for hollow bar soil nails must meet the same specific gravity and strength requirements as for solid bars listed previously. Drilling grouts may have a specific gravity of 1.4 to 1.6. After the bar is installed to the desired depth, the final grout shall have a specific gravity of 1.8 to 1.9 as measured from the grout return at the top of the drill hole.

SOIL NAIL TESTING

Tests

The Contractor shall perform both verification and proof testing of designated test soil nails. Verification tests on sacrificial test nails ~~shall be conducted at locations shown on the Plans. Proof~~ and proof tests on production nails shall be conducted at locations selected by the Owner's Engineer or in accordance with the design. Testing of any nail shall not be performed until the nail grout and shotcrete facing have attained at least their specified 3-day compressive strength.

~~Refer to FHWA Geotechnical Circular No. 7 "Soil Nail Walls" for detailed guidance on soil nail testing.~~

The Contractor shall provide all necessary equipment to perform the soil nail testing including, but not limited to, dial gauges, dial gauge support, jack and pressure gauge, electronic load cell with machined platens placed at either end of the load cell, and a reaction frame. In non-creep susceptible soils and as approved by the Engineer, the use of a load cell may be replaced with a dual pressure gauge system with the low reading gauge being used for soil nail acceptance.

The pressure gauge shall be graduated in 100 psi increments or less. The soil nail head movement shall be measured with a minimum of 2 dial gauges capable of measuring to 0.001 inch. The Contractor shall have available calibrated back up gauges and test loading equipment to minimize down time due to testing equipment failure.

The Contractor shall not apply loads greater than 80 percent of the minimum ultimate tensile strength of the tendon for Grade 150 bars or 90 percent of the yield strength of the tendon for Grade 75 bars. Preliminary results shall be submitted to the Engineer within 24 hours of the test completion. A full report containing test load results shall be submitted to the Engineer within 5 working days of the test completion.

Verification Testing

~~The Contractor shall perform a number of verification tests~~ Verification testing shall be performed on sacrificial soil nail ~~as established~~ test soil nails at locations selected by the Owner's Engineer or in the project plans design. Verification testing shall be ~~conducted~~ performed prior to installation of production soil nails ~~on sacrificial soil nails~~ to confirm the appropriateness of the Contractor's drilling and installation methods, and verify the required soil nail pullout resistance.

Verification test soil nails shall have both bonded and unbonded lengths. Along the unbonded length, the soil nail bar shall not be grouted. The unbonded length of the test soil nails shall be at least 3 feet as measured from the back of the bearing plate to the top of the grout.

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Verification tests shall be conducted according to the loading schedule of Table 1. Each load increment shall be held for at least 10 minutes. The Contractor shall record soil nail movements at each load increment and the time intervals shown in the table for each load step. Creep tests shall be performed at 0.75 VTL. The alignment load (AL) should be the minimum load required to align the testing apparatus and shall not exceed 5 percent of the VTL. The dial gauges shall be set to "zero" after applying the alignment load. Following application of the maximum load, the load shall be reduced to the alignment load and the dial gauge readings recorded as the permanent set.

Each load increment shall be held for at least 10 minutes. The Contractor shall monitor the verification test soil nail for creep at the 0.75 VTL load increment by measuring and recording soil nail movement. The load shall be maintained during the creep test within 2 percent of the intended load by use of the load cell. The test results shall be presented for the Engineers review and acceptance prior to production. The Engineer shall have 10 working days to review the report and based on the results, design modifications may be required. The bonded length of the soil nail during verification tests ($L_{B\ VTL}$) shall be:

For Grade 75 and other mild steel in accordance with ASTM A615, the maximum bond length ($L_{B\ V_{Tmax}}$), is defined as:

$$L_{B\ V_{Tmax}} = \frac{A_t \cdot f_y \cdot C_{RTY}}{r_{PO}}$$

For Grade 150 and other high-strength steel in accordance with ASTM A722, the maximum bond length ($L_{B\ V_{Tmax}}$), is defined as:

$$L_{B\ V_{Tmax}} = \frac{A_t \cdot f_y \cdot C_{RTY}}{r_{PO}}$$

where:

CRTY = reduction coefficient for mild-grade steel = 0.9

CRTU = reduction coefficient for high-strength steel = 0.8

At = cross-sectional steel area of the test soil nail in square inches

fy = nominal yield strength of test soil nail (mild steel) in kips per square inch

fu = nominal tensile strength of test soil nail (high-strength steel) in kips per square inch

rPO = nominal pullout resistance in kips per foot of test soil nail per plans = ? × qu × DDH

qu = nominal bond strength in kips per square foot

DDH = drill hole diameter in feet

If $L_{B\ V_{Tmax}} \geq 10$ feet, select $L_{B\ V_{Tmax}}$ to be $10 \text{ feet} \leq L_{B\ V_{Tmax}} \leq L_{B\ V_{Tmax}}$

If $L_{B\ V_{Tmax}} < 10$ feet, to avoid tensile breakage, select $L_{B\ V_{Tmax}} = 10$ feet and increase the test soil nail bar size as needed, and recalculate $L_{B\ V_{Tmax}}$ until $L_{B\ V_{Tmax}} > 10$ ft.

The maximum (nominal) load during the verification test is defined as the Verification Test Load (VTL) and is calculated as $VTL = L_{B\ V_{Tmax}} \times r_{PO}$

<u>Table 1</u> <u>VERIFICATION TEST LOADING SCHEDULE</u>	
<u>Load</u>	<u>Hold Time (minutes)²</u>
AL ¹	10 (recorded at 1, 2, 4, 5, 10)
0.13 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.25 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.38 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.50 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.63 VTL	10 (recorded at 1, 2, 4, 5, 10)
0.75 VTL (Creep Test) ³	60 (recorded at 1, 2, 4, 5, 6, 10, 20, 30, 50, 60)
0.88 VTL	10
1.00 VTL ⁴	10
AL	1 ⁵
<p>1 AL = alignment load, which is less than or equal to 0.025 VTL.</p> <p>2 Soil nail movement shall be measured after each load increment has been achieved and at each time step.</p> <p>3 Maintain the load during the creep test within 2 percent of the intended load by use of the load cell.</p> <p>4 The Engineer may allow loading to failure to determine nominal soil conditions.</p> <p>5 Permanent soil nail movement shall also be recorded</p>	

The Design Load during the verification tests (DL) shall be calculated based on as-built bonded lengths per FHWA Geotechnical Circular No. 7 "Soil Nail Walls."

Proof Testing of Production Soil Nails

Successful proof testing shall be demonstrated performed on at least 5 percent of the production soil nails in each soil nail row or a minimum of one per row. ~~The Owner's~~ Verification tests shall not be included in the 5 percent; except that the Engineer ~~shall~~ may allow the verification tests to be included based on the design and site conditions. The Engineer will determine the locations and number of proof tests prior to soil nail installation in each row.

Production proof test soil nails shall have both bonded and temporary unbonded lengths. Fully grouted test soil nails shall not be proof tested. The Contractor shall maintain the stability of the hole for the temporary unbonded test length for subsequent grouting. If the unbonded test length of production proof test soil nails cannot be satisfactorily grouted subsequent to testing, the proof test soil nail shall become sacrificial and shall be replaced with an additional production soil nail installed at the Contractor's expense. The temporary unbonded length of the test soil nail shall be at least 3 feet as measured from the back of the bearing plate to the top of the grout.

Proof tests shall be conducted according to the loading schedule of Table 2. Unless the soil is susceptible to creep per subsection 504.15, each load increment shall be held until readings are stable as defined by three readings within 0.005 inches taken one per minute over three minutes. The Contractor shall record soil nail movements at each load increment and the time intervals shown in the table for each load step.

Creep tests shall be performed at 1.00 PTL. The alignment load (AL) shall be the minimum load required to align the testing apparatus and shall not exceed 5 percent of the PTL. Set dial gauges to "zero" after applying the alignment load. Following application of the maximum load, reduce the load to the alignment load and record the permanent set.

The creep period shall start as soon as the maximum test load (1.0 PTL) is applied and the soil nail movement shall be measured and recorded at 1 minute, 2, 3, 5, 6, and 10 minutes. Where the soil nail movement between 1 minute and 10 minutes exceeds 0.04 inch, the maximum test load shall be maintained for an additional 50 minutes and movements recorded at 20 minutes, 30, 50, and 60 minutes. All load increments shall be maintained within 5 percent of the intended load.

The bonded length of the soil nail during verification tests, $L_{B\ PT}$, shall be:

For Grade 75 and other mild steel in accordance with ASTM A615, the maximum bond length ($L_{B\ PTmax}$), is defined as:

$$L_{B\ PTmax} = \frac{A_t \cdot f_y \cdot C_{RTY}}{r_{PO} \cdot 0.75}$$

For Grade 150 and other high-strength steel in accordance with ASTM A722, the maximum bond length ($L_{B\ PTmax}$), is defined as:

$$L_{B\ PTmax} = \frac{A_t \cdot f_y \cdot C_{RTY}}{r_{PO} \cdot 0.75}$$

Select $L_{B\ PT}$ to be 10 ft or $L_{B\ PTmax}$, whichever is smaller, to avoid tensile breakage.

Production proof test soil nails that are shorter than 13 feet may be tested with less than the minimum 10 feet bond length. The maximum load in the proof test (PTL) is calculated as $PTL = L_{B\ PT} \times r_{PO} \times 0.75$

<u>Table - 2</u> <u>PROOF TEST LOADING SCHEDULE</u>	
AL ¹	1
0.17 PTL	Until Movement Stabilizes ³
0.33 PTL	Until Movement Stabilizes
0.50 PTL	Until Movement Stabilizes
0.67 PTL	Until Movement Stabilizes

0.83 PTL	Until Movement Stabilizes
1.0 PTL (Creep Test) ⁴	10 (recorded at 1, 2, 4, 5, 6, 10)
AL	1
<p>Notes:</p> <p>1 AL = alignment load, which is less than or equal to 0.025 PTL.</p> <p>2 Times are measured after the target load has been achieved in each increment.</p> <p>3 If the soils reinforced with soil nails are relatively susceptible to deformation of creep, it is recommended to hold each load increment for 10 minutes and to record the soil nail movement at 1, 2, 5, and 10 minutes.</p> <p>4 If the soil nail movement measured between 1 and 10 minutes exceeds 0.04 in., PTL must be maintained for 50 additional minutes and movements must be recorded at 20, 30, 50, and 60 minutes. The permanent soil movement must also be recorded.</p>	

The Design Load during the proof tests (DL) shall be calculated based on as-built bonded lengths per FHWA Geotechnical Circular No. 7 "Soil Nail Walls."

ACCEPTANCE CRITERIA OF TEST SOIL NAILS

A test soil nail shall be considered acceptable when ~~all~~ of the following criteria are met:

(A) Verification testing. The following criteria shall be met for acceptance of the soil nail:

- (1) Pullout shall not occur at loads less than 1.00 VTL.
- (2) The total movement (ΔVTL) measured at VTL shall exceed 80 percent of the theoretical elastic elongation of the unbonded length (L_{UB}), as defined by:

$$\Delta_{VTL} > 0.8 \frac{VTL \cdot L_{UB}}{E \cdot A_t}$$

where E = Young's modulus of steel (29,000 ksi).

- (3) The creep movement between the 1 and 10 minute readings at 0.75 VTL shall be less than 0.04 in.
- (4) The creep movement between the 6 and 60 minute readings at 0.75 VTL shall be less than 0.08 in.
- (5) The creep rate shall be linear or decreasing throughout the creep test load -hold period

(B) Proof testing. The following criteria shall be met to acceptance of the soil nail:

- (1) No oullout occurs.

- (2) The total soil nail movement (?PTL) measured at PTL shall be greater than 80 percent of the theoretical elastic elongation of the unbonded length, as defined by:

$$\Delta_{PTL} > 0.8 \frac{PTL \cdot L_{UB}}{E \cdot A_t}$$

- (3) The creep movement shall be less than 0.04 in. between the 1 and 10 minute readings.
- (4) If this movement is exceeded, PTL shall be maintained for an additional 50 minutes with readings recorded at 20, 30, 50, and 60 minutes.
- (5) If the creep test is extended, the creep movement between the 6 and 60 minute readings shall be less than 0.08 in.

- ~~1. For verification tests, the total creep movement is less than 0.08 in. between the 6- and 60-minute readings, and the creep rate is linear or decreasing throughout the creep test load hold period.~~
- ~~2. For proof tests, the total creep movement is less than 0.04 in. during the 10-minute readings or the total creep movement is less than 0.08 in. during the 60-minute readings, and the creep rate is linear or decreasing throughout the creep test load hold period.~~
- ~~3. For verification and proof tests, the total measured movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length of the test nail.~~
- ~~4. A pullout limit state does not occur at $2.0 \times DL$ under verification testing and $1.5 \times DL$ test load under proof testing. Pullout limit state is defined at a load level at which the test load cannot be further increased while there is continued pullout movement of the test nail. The load at the pullout limit state shall be recorded as part of the test data.~~
- ~~5. Maintaining stability of the temporary unbonded test length for subsequent grouting is the Contractor's responsibility. If the unbonded test length of production proof test nails cannot be satisfactorily grouted after testing, the proof test nail shall become sacrificial and shall be replaced with an additional production nail installed at no additional cost to the Owner.~~
- ~~6. Material for soil nail retaining walls will be accepted based on the manufacturer production certification or from production records. Construction of soil nail retaining walls will be accepted based on visual inspection and the examination of relevant production testing records by the Owner's Engineer.~~

REJECTION OF TEST SOIL NAILS

Verification Test Soil Nails

The Owner's Engineer will evaluate the results of each verification test. Installation methods that do not satisfy the nail testing requirements shall be rejected. The Contractor shall propose alternative methods for review by the Owner's Engineer and shall install replacement verification test nails. Replacement test nails shall be installed and tested at no additional cost ~~to the administration.~~

Proof Test Soil Nails

For proof test nails, the Owner's Engineer may require the Contractor to replace some or all of the installed production nails between a failed proof test soil nail and the adjacent passing proof test nail. Alternatively, the Owner's Engineer may require the installation and testing of additional proof test nails to verify that adjacent previously installed production nails have sufficient nominal pullout resistance. Installation and testing of additional proof test nails or installation of additional or modified nails as a result of proof test nail failure(s) shall be at no additional cost ~~to the administration.~~

WALL DRAINAGE NETWORK

All elements of the soil nail wall drainage network shall be installed and secured ~~as shown on~~ in accordance with the Plans design. The drainage network shall consist of geocomposite drain strips, PVC connection pipes, soil nail wall footing drains, and weep holes, ~~as shown on the Plans.~~ Exclusive of the wall footing drains, all elements of the drainage network shall be installed prior to shotcreting.

Geocomposite Drain Strips

Geocomposite drain strips shall be centered between the columns of soil nails, ~~as shown on the Plans.~~ Drain strips and shall be at least 12 in. wide and placed with the geotextile side against the ground. Strips shall be secured to the excavation face. Contamination of the geotextile with shotcrete shall be prevented. Drain strips shall be vertically continuous.

Footing Drains

Footing drains shall be installed at the bottom of the wall, ~~as shown on the Plans.~~ The and drainage geotextile shall envelope the footing drain aggregate and pipe and shall conform to the dimensions of the trench. The drainage geotextile shall overlap on top of the drainage aggregate ~~as shown on the Plans.~~ Damaged and damaged or defective drainage geotextile shall be repaired or replaced.

SHOTCRETE FACING

Initial shotcrete facing shall be provided ~~as shown in the plans~~ in accordance with Soil Nail Walls. Where shotcrete is used to complete the top ungrouted zone of the soil nail drill-hole near the face, the nozzle shall be positioned into the mouth of the drill-hole to completely fill the void.

Attachment of Nail Head Bearing Plate and Nut

A bearing plate, washers, and nut shall be attached to each nail head ~~as shown on the Plans.~~ While the

shotcrete construction facing is still plastic and before its initial set, the plate shall be uniformly seated on the shotcrete by hand-wrench tightening the nut. Where uniform contact between the plate and the shotcrete cannot be provided, the plate shall be set in a bed of grout. After grout has set for 24 hours, tighten the nut by hand with a wrench. The bearing plates with headed studs shall be ~~located within the tolerances shown on the Plans:~~ provided for final facing.

Shotcrete Facing Tolerances

Construction tolerances for the shotcrete facing from ~~plan~~ design location and ~~plan~~ design dimensions shall be as follows:

Horizontal location of welded wire mesh; reinforcing bars, and headed studs: 0.4 in.

Location of headed-studs on bearing plate: 1/4 in.

Spacing between reinforcing bars: 1 in.

Reinforcing lap: 1 in.

Complete thickness of shotcrete:

- If troweled or screeded: 0.6 in.
- If left as shot: 1.2 in.

Planeness of finish face surface-gap under 10-ft straightedge:

- If troweled or screeded: 0.6 in.
- If left as shot: 1.2 in.

Nail head bearing plate deviation from parallel to wall face: 10 degrees

REINFORCING STEEL

The Contractor shall submit all order lists and reinforcement bending diagrams to the Owner's Engineer, and shall fabricate reinforcing steel, ship and protect material, place, fasten, and splice reinforcing steel as required by the ~~Plans~~ design.

STRUCTURAL CONCRETE

The Contractor shall design the concrete mix, store, handle, batch, and mix material and deliver concrete, provide quality control, and construct concrete facing to meet the specified resistance.

~~ARCHITECTURAL SURFACE FINISHES~~

~~Textured form liners shall be furnished, form liners installed, and a surface finish (color/stain application) applied that will duplicate the architectural surface finish shown on the Plans. The Contractor shall submit detailed drawings of the form liner for approval by the Owner's Engineer at least 7 days before form liner work begins. Before production work begins, a 3-ft high, by 1.5-ft wide, by 10-ft long test panel shall be constructed on site using the same forming methods, procedures, form liner, texture configuration, expansion~~

~~joint, concrete mixture and color/stain application proposed for the production work.~~

BACKFILLING BEHIND WALL FACING UPPER CANTILEVER

If backfilling is required behind an extension of the wall facing at the top of a soil nail wall, compaction of the soil backfill performed within 3 ft of the wall extension shall be performed using light mechanical tampers.

ACCEPTANCE

Material for soil nail retaining walls will be accepted based on the manufacturer production certification or from production records. Construction of soil nail retaining walls will be accepted based on visual inspection and the examination of relevant production testing records by the Owner's Engineer.

MEASUREMENT AND PAYMENT

SOIL NAILS

Production soil nails shall not be measured and shall be incidental to "Soil Nail Wall" item. No separate measurement will be made for pullout test nails, which shall be considered incidental to "Soil Nail Wall" item.

STRUCTURE EXCAVATION

Structure excavation for the soil nail wall shall not be measured and shall be incidental to "Soil Nail Wall" item. No measurement will be made for using temporary stabilizing berms.

WALL FACE

The wall face of soil nail walls shall not be measured and shall be incidental to "Soil Nail Wall" item. No measurement or payment will be made for additional shotcrete or CIP concrete needed to fill voids created by irregularities in the cut face, excavation overbreak or inadvertent excavation beyond the Plan final wall face excavation line, or failure to construct the facing to the specified line and grade and tolerances.

Method of Measurement:

Payment for soil nail wall will not be measured but paid for at the contract lump sum price for "Soil Nail Wall" item.

Basis of Payment:

The quantity for soil nail will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for submitting design computation and detailed plans sealed and signed by a professional engineer licensed in the state of Delaware, furnishing, soil nail solid bars, bearing plates, nuts, shear connectors, welded-wire mesh, reinforcing steel, concrete for shotcrete and cast-in-place facing and all

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incidental expenses including all materials, equipment, tools, and labor incidental thereto, furnishing material and labor for excavation for soil nail wall, ~~furnishing material and labor for #57 stone backfill material, riprap~~ removal of portion of existing slope protection, hauling and disposal of excavated material, installing drainage system ~~behind~~ (except the wall underdrain drainage system - Item 709001) and Geocomposite strip drain, soil nail pullout testing and incidentals required to complete the work..

4/7/17

612500 - PRECAST CONCRETE PIER CAP**Description.**

Furnish and erect precast reinforced concrete pier cap members.

Materials.

- A. Provide Portland Cement Concrete in accordance with Section 1022 with a 28-day compressive strength as specified in the Contract Documents. For precast elements, if no strength is specified in the Contract Documents, provide concrete with a 28-day compressive strength of 5,000 pounds per square inch.
- B. Provide Bar Reinforcement in accordance with Sections 1037.
- C. Provide Closed-Cell Neoprene Sponge conforming to ASTM D1056, Type 2, Class D
- D. Provide Joint Wrap conforming to ASTM C877

Construction.

- A. Design
 - 1. For all other elements, design in accordance with the design Specification noted in the Contract Documents. Utilize AASHTO HL93 loading or Delaware Legal Load, whichever governs.
- B. Working Drawings
 - 1. Submit Working Drawings for review and concurrence, consisting of a complete set of detailed shop drawings for the precast concrete units to be provided. Include the following, as applicable:
 - a. An overall plan showing all units together.
 - b. Details of each type of unit.
 - c. A plan view of reinforcement for any irregularly shaped sections (skewed, curved, etc.)
 - d. Details of placement of all embedded accessories such as threaded inserts, post-tensioning ducts, vents, weep holes, anchorage reinforcement and hardware, dowel holes, anchor bolts, shear connectors, tie rods, lifting strands or eyes, form hangers, stay-in-place form plates, and other related items. Ensure that there will be no conflicts among the planned positions of embedded items and that the concrete cover will be adequate.
 - e. Reinforcing bar list
 - f. Bill of Materials including all accessories
 - 2. If the Contractor proposes an alternate design such as alternate structural dimensions or reinforcement, submit supporting calculations that meet the design criteria in Section 612.03.A. Submit load ratings for HL-93, HS-20, and Delaware legal loads using BRASS program in accordance with the latest version of the AASHTO Manual for Bridge Evaluation. The calculations will be certified by a registered Professional Engineer in the State of Delaware.

C. General Manufacturing Requirements

1. For precast elements, plants that are National Precast Concrete Association (NPCA)-certified and plants that have been inspected and approved by the Department, will be permitted to manufacture the units.
2. All Materials, Equipment, processes of manufacture, and the finished units, as well as handling, storage, transportation, and erection, will be subject to inspection and approval. Any defective construction, which may adversely affect the strength of a member or its performance in the bridge Structure, will be cause for rejection.
3. Follow the manufacturer's recommended procedures for handling and placing the precast units during the entire process of transporting, unloading, and installing the members. Handle precast units only by lifting devices provided especially for this purpose.

D. Precast Concrete Elements

1. Precast Element Fabrication

- a. Provide lifting devices as necessary. Placement of lifting devices must not come in conflict with prestressed strands. Show placement of lifting devices, material information, and details in Working Drawings.
 - i. Provide a maximum of four devices or holes in each unit for the purpose of handling.
- b. Determine the section lengths and location of joints. Do not exceed a length that causes any bending, distortion, or stress being induced therein during lifting, moving, and placing of the section.
- c. Joints
 - i. Provide neoprene gaskets at joints between all precast units in order to make the joints watertight.
- d. Prepare for forming and pouring of the concrete in accordance with Section 610.
- e. Provide reinforcement that meets or exceeds minimum area of steel per foot denoted in the Contract Documents.
 - i. Place bar reinforcement in accordance with Section 611. Place reinforcement beginning at 2 inches from the end of each unit.
- f. Provide a smooth finish all around.
- g. Cure precast concrete members that are manufactured in established plants with steam or radiant heat. Cure precast elements in accordance with ACI, PCI, or approved plant Quality Control Plans.
- h. Apply a water-miscible, penetrating, silane sealer to the top of each unit plus 2 feet - 0 inches down each side, and to all headwalls, end faces and exposed faces.
- i. Tolerances
 - i. Internal Dimensions - The internal dimension will meet PCI MNL 135-0; 10.25.

- ii. Slab and Wall Thickness - Any slab or wall thickness will not be more or less than the design dimensions by more than 5 percent.
- iii. Length of Opposite Surfaces - Variations in laying lengths of two opposite surfaces of any unit sections will not be more than 1/8 inch per foot of internal span, with a maximum of 5/8 inch for all sizes through 7 feet internal span, and a maximum of 3/4 inch for internal spans greater than 7 feet.
- iv. Length of Section - The variation in length will not be more than 1/8 inch per foot of length with a maximum of 1/2 inch in any unit.
- v. Position of Reinforcement - The maximum variation in the position of the reinforcement will be $\pm 3/8$ inch, except the cover over the reinforcement for the external surface of the top slab shall not be less than 2 inches for earth covers less than 3 feet.
- vi. Area of Reinforcement - Steel areas greater than those required will not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM specification for that type of reinforcement.

2. Precast Element Installation

- a. Construct foundation consisting of a layer of the type of coarse aggregate as specified in the Contract Documents. Carefully place and tamp coarse aggregate to form a solid, unyielding mass with the exposed surface conforming to the form and dimensions shown in the Contract Documents. The bedding areas on which the coarse aggregate will be placed shall be approved by the Engineer prior to installation of the precast elements.
- b. Exercise care to insure proper matching and aligning of joints of adjacent units. Assemble precast units in accordance with the recommendations of the manufacturer and as approved by the Engineer in the field. Place the precast sections so that when they are laid together, they will make a continuous line of units with a smooth interior free of appreciable irregularities. If necessary, shim units to maintain a difference of 1/2 inch or less between the soffits of adjacent units.
- c. Cover the joint exterior with a minimum of a 9 inches wide wrap centered on the joint. Exercise care to keep the joint wrap in its proper location during backfilling.
- d. Before backfilling, fill all post-tensioning pockets and ducts, lifting eyes, footing keyways, and any other holes or pockets with non-shrink grout. Cover all locations on the fill face with a minimum length and width of 9 inches of joint wrap Material.

Method of Measurement.

- A. The quantity of Precast Concrete Pier Cap will be measured as the number of cubic yards of concrete placed and accepted.
- B. The quantity of prestressed reinforced concrete members placed and accepted will not be measured.

Basis of Payment.

- A. The Engineer will pay for accepted quantities at the Contract Unit Price as follows:

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<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
612500	PRECAST CONCRETE PIER CAP	CY
B.	Price and payment will constitute full compensation for furnishing all Materials, including reinforcing bar, related to the precast units; designing, fabricating and installing the units on site; and for all labor, tools, Equipment and incidentals required to complete the Work. Accessories and associated elements will be incidental to the respective Item. Excavation, backfill, backfilling, and coarse aggregate will be paid separately under their respective Bid Items.	
C.	The removal and replacement of all precast members rejected due to defective construction or improper storing, handling, transporting, or installation will not be paid.	

4/2/2018

612500 - PRECAST CONCRETE PIER CAP

Description:

Furnish and erect reinforced precast concrete pier cap and other associated elements.

Materials. Provide Materials as specified in:

Precast Concrete Section 612.02

Corrugated Metal Pipe Section 1031.01

Construction:

Perform the work in accordance with Section 612.03, with the addition of:

A. Working Drawings.

Submit Working Drawings for review and concurrence. Working Drawings must be signed and sealed by a registered Professional Engineer in the State of Delaware. Submit Working Drawings a minimum of 30 days prior to the commencement of module fabrication. Do not order Materials or begin work until approval of the Working Drawings by the Engineer. In addition to the items listed in 612.03.B, include the following in the Working Drawings:

1. Thermal Control Plan in accordance with Section 610.03.A.1c.
2. Details of placement of all embedded accessories including corrugated metal pipe.
3. Method and sequence of erection. Include details of all Equipment to be used to lift elements consisting of: cranes, lifting slings, sling hooks, jacks, etc. Include locations of cranes and pick radii used to erect pier cap at the bridge site.
4. Methods and procedures for removing and patching locations of lifting devices, attachment points, and other inserts/blockouts, as applicable.
5. If the Contractor proposes an alternate design, such as alternate structural dimensions or reinforcement, the Contractor will submit supporting calculations that meet the design specifications noted in the Contract Documents, specifically listed in the bridge project notes of the design plans. The calculations must be signed and sealed by a registered Professional Engineer in the State of Delaware.

B. Precast Concrete Elements.

1. Precast Element Fabrication.
 - a. Control concrete temperature during curing in accordance with Section 610.03.J.
 - b. Provide a smooth finish on all surfaces except for the face adjacent to the cast-in-place closure pour connection between precast pier cap sections. Provide a roughened surface, up to 1/4 inch amplitude, along face of the pier cap adjacent to closure pour in accordance with the Contract Documents.

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- i. Provide shear key as shown in Contract Documents at location of transverse closure pour between adjacent pier caps.
 - c. Apply a water-miscible, penetrating silane sealer to all exposed surfaces, except for the face adjacent to the cast-in-place transverse pier cap closure pour and the area that will be in contact with the precast pier column.
 - d. Tolerances.
 - i. External Dimensions - No more than +/- 1/4 inch from the design dimensions.
 - ii. Length of Section - No more than 1/8 inch per foot of length with a maximum of 1/2 inch in any pier cap section.
 - iii. Position of Reinforcement - The maximum variation in the position of the reinforcement will be $\pm 3/8$ inch, except the cover over the reinforcement for the external surface of the pier cap will not be less than 2.0 inches. Refer to Contract Documents for pier cap reinforcement cover requirements.
2. Precast Element Installation.
 - a. Lift precast elements at the approved designated points and by approved lifting devices properly attached to the cap, utilizing proper hoisting procedures. The Contractor is responsible for design of the lifting devices and all necessary precast concrete modifications to accommodate handling stresses in the pier cap.
 - b. Exercise care to insure proper matching and aligning of joints of adjacent elements. Assemble precast elements in accordance with the recommendations of the manufacturer and as approved by the Engineer in the field. Place the precast sections so that when they are laid and after a closure pour occurs, they will make a continuous line of elements with a smooth exterior surface free of appreciable irregularities.
 - c. Use elastomeric leveling pads or other methods as approved by the Working Drawings, to ensure proper alignment and complete bearing contact between the precast cap and precast column. Elastomeric leveling pads will be a minimum of 1/8 inch thickness and a maximum of 1/4 inch.
 - d. After erection survey the top elevation of the pier cap element. Check for proper alignment and that elevations are within specified tolerances. Top elevations of the pier cap shall not deviate from the plans by more than +/- 1/4 inch.
 - e. Before pouring concrete closure pour between pier cap elements, clean the adjacent surfaces of all dirt, dust, and other foreign matter. Saturate the concrete surfaces prior to placement of concrete. Do not allow any standing water to remain in the area to receive concrete.
 - f. Fill all lifting device pockets and any other holes or pockets (excluding corrugated pipe void and transverse pier cap closure pour) with non-shrink grout.

Method of Measurement:

- A. The quantity of Precast Concrete Pier Cap will be measured as the number of cubic yards installed and accepted. The volume will be computed based on the plan dimensions as shown on the contract plans.

Basis of Payment:

- A. Payment will be made at the Unit Bid Price as follows:

ITEM	DESCRIPTION	UNIT
612500	PRECAST CONCRETE PIER CAP	CY

- B. Price and payment will constitute full compensation for furnishing all Materials related to the precast concrete pier caps including: reinforcing bar, corrugated metal pipe, lifting devices, silane sealer, anchor bolt blockouts; fabricating, storing, handling, transporting, and erecting the pier cap; and for all labor, Equipment, and incidentals required to complete the Work.
- C. No additional payment will be made if the Contractor elects an approved alternative design from what was provided in the Contract Documents.
- D. Separate payment will be made for furnishing and placing the closure pour Material between the pier cap and pier column and the transverse closure pour between pier caps from each phase of construction.
- E. All precast pier cap rejected due to defective construction or improper storing, handling, transporting, or installation will not be paid.

612501 - PVC PIPE, 4
612502 - PVC PIPE, 6
612503 - PVC PIPE, 8
612504 - PVC PIPE, 10
612505 - PVC PIPE, 12
612506 - PVC PIPE, 15
612507 - PVC PIPE, 18
612518 - PVC PIPE, 21

Description:

This work consists of furnishing and installing PVC pipe, including all fittings, in accordance with the locations, details, notes on the Plans and as directed by the Engineer. The PVC pipe shall be used for subsurface drainage or for serving as conduit as specified on the Contract Plans.

Materials and Construction Methods:

The PVC pipe and fittings shall be free from defects and shall conform to the applicable requirements of ASTM D3034 Type PSM, and pipe shall be of SDR-35 or SDR-41 or SDR-42 for subsurface drainage pipe of the nominal size required by the Plans.

The PVC pipe and fittings shall be free from defects and shall conform to the applicable requirements of ASTM D2466 PVC Pipe Fitting, Schedule 40 for conduit of the size required by the Plans.

The excavation and backfill for the pipe shall be performed in accordance with the applicable requirements of Section 612 of the Standard Specifications, unless otherwise modified on the Plans. The pipe shall be installed at the locations and to the lines, grades, and dimensions shown on the Plans or as directed by the Engineer.

Method of Measurement:

The quantity of PVC pipe will be measured as the actual number of linear feet (linear meters) of each size of pipe placed and accepted, measured from end to end of pipe, including structure wall thickness, but excluding structure interior.

Basis of Payment:

The quantity of PVC pipe will be paid for at the Contract unit price per linear foot (linear meter) for each size of pipe. Price and payment will constitute full compensation for furnishing, hauling, and installing pipe, for all cribbing or foundation treatment necessary to prevent settlement, for all shoring and sheeting, for the replacement of any pipe which is not true in alignment or which shows any settlement after laying, and for all material, labor, equipment, tools, and incidentals required to complete the work.

For pipe under 24 (600 mm) nominal inside diameter, the excavation, bedding, backfill and backfilling will be included in the price for this work. For pipe of nominal inside diameter 24 (600 mm and over), payment for excavation, bedding, backfill and backfilling will be in accordance with Section 208.

10/31/01

612501 - PRECAST CONCRETE PIER COLUMN

Description:

Furnish and erect reinforced precast concrete pier column and other associated elements.

Materials. Provide Materials as specified in:

Precast Concrete	Section 612.02
Elastomeric Leveling Pad	Section 623
Corrugated Metal Pipe	Section 1031.01

Construction:

Perform the work in accordance with Section 612.03, with the addition of:

A. Working Drawings.

Submit Working Drawings for review and concurrence. Working Drawings must be signed and sealed by a registered Professional Engineer in the State of Delaware. Submit Working Drawings a minimum of 30 days prior to the commencement of module fabrication. Do not order Materials or begin work until approval of the Working Drawings by the Engineer. In addition to the items listed in 612.03.B, include the following in the Working Drawings:

1. Details of placement of all embedded accessories including corrugated metal pipe.
2. Details of elastomeric leveling pads.
3. Method and sequence of erection. Include details of all Equipment to be used to lift columns consisting of: cranes, lifting slings, sling hooks, jacks, etc. Include locations of cranes and pick radii used to erect columns at the bridge site.
4. Methods and procedures for removing and patching lifting devices, attachment points, and other inserts/blockouts, as applicable.
5. If the Contractor proposes an alternate design, such as alternate structural dimensions or reinforcement, the Contractor will submit supporting calculations that meet the design specifications noted in the Contract Documents, specifically listed in the bridge project notes of the design plans. The calculations must be signed and sealed by a registered Professional Engineer in the State of Delaware.

B. Precast Concrete Elements.

1. Precast Element Fabrication.
 - a. Provide a smooth finish on all surfaces. Ensure bearing surfaces with pier footer and pier cap are level.
 - b. Apply a water-miscible, penetrating silane sealer to all exposed surfaces, except for the faces in contact with pier footer and pier cap.
 - c. Tolerances.
 - i. External Dimensions - No more than +1/4 inch from the design dimensions.
 - ii. Position of Reinforcement - The maximum variation in the position of the reinforcement will be $\pm 3/8$ inch, except the cover over the reinforcement for the external surface of the pier column will not be less than 2.5 inches.

Contract No. T201109001.01

Refer to Contract Documents for pier column reinforcement cover requirements.

2. Precast Element Installation.
 - a. Lift columns at the approved designated points and by approved lifting devices properly attached to the column, utilizing proper hoisting procedures. The Contractor is responsible for design of the lifting devices and all necessary precast concrete modifications to accommodate handling stresses in the column.
 - b. Exercise care to insure proper spacing and plumb alignment of precast columns. Erect precast columns in accordance with the recommendations of the manufacturer and as approved by the Engineer in the field.
 - c. Use elastomeric leveling pads or other methods as approved by the Working Drawings, to ensure proper vertical alignment and complete bearing contact of the precast columns between the pier footers and pier cap. Elastomeric leveling pads will be a minimum of 1/8 inch thickness and a maximum of 1/4 inch.
 - d. Before pouring concrete closure pours between pier footer and pier cap elements, clean the adjacent surfaces of all dirt, dust, and other foreign matter. Saturate the concrete surfaces prior to placement of concrete. Do not allow any standing water to remain in the area to receive concrete.
 - e. Fill all lifting device pockets and any other holes or pockets (excluding corrugated pipe void used for element connection) with non-shrink grout.

Method of Measurement:

A. The quantity of Precast Concrete Pier Column will be measured as the number of cubic yards installed and accepted. The volume will be computed based on the plan dimensions as shown on the contract plans.

Basis of Payment:

A. Payment will be made at the Unit Bid Price as follows:

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
612501	PRECAST CONCRETE PIER COLUMN	CY

- B. Price and payment will constitute full compensation for furnishing all Materials related to the precast concrete pier columns including: reinforcing bar, PVC air vents, elastomeric leveling pads, lifting devices, corrugated metal pipe, silane sealer; fabricating, storing, handling, transporting, and erecting the pier columns; and for all labor, Equipment, and incidentals required to complete the Work.
- C. No additional payment will be made if the Contractor elects an approved alternative design than what was provided in the Contract Documents.
- D. Separate payment will be made for furnishing and placing the closure pour Material between the pier footer, pier column, and pier cap.
- E. All precast pier columns rejected due to defective construction or improper storing, handling, transporting, or installation will not be paid.

5/17/2019

~~615504 - BRIDGE ELECTRICAL SYSTEM~~~~2746538 - BRIDGE ELECTRICAL SYSTEM~~
615504 BRIDGE ELECTRICAL SYSTEM

Description:

This work under this Section consists of furnishing and installing PVC conduit, fittings, junction boxes, and expansion joints on the bridges as shown on the Plans, as specified herein, and/or as directed by the Engineer. Any incidental apparatus, appliance, material, or labor not specifically mentioned or included in the Contract Documents that may be found necessary to comply with the requirements of the related documents and referenced standards or codes shall be furnished by the Contractor at no additional cost to the Delaware Department of Transportation (DelDOT).

Bridge 676

Materials:

Lighting - PVC Conduit - 3" schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

Junction Boxes - shall meet ANSI Specifications, U.L. requirements and listed as raintight (NEMA 4X rated), and shall accommodate the size and number of conduits shown on the Plans. Junction boxes/wells shall be galvanized steel alloy and constructed to the size indicated.

Shop drawings and/or catalog cuts for the above listed materials shall be submitted to the Engineer for approval.

Construction Methods:

Prior to placing the Parapet Wall concrete, the Contractor shall install 2 EA 3" PVC conduit for the lighting system in the parapet wall for the entire length of the structure. The conduit for lighting shall also sweep out of the parapet, under the approach slab, and exit to junction wells located outside the Bridge at both ends of the structure. The junction boxes to access the lighting conduits shall be spaced as shown in the plans, and at intervals not to exceed 300 feet. All conduits shall include a pull wire for future cable installation. Junction boxes in the bridge shall be positioned to avoid any fence posts and/or Guardrail to Bridge attachments and shall be flush with the front face of the parapet wall. Conduits exiting the structure shall be positioned to avoid all guardrail posts. Prior to placing approach slab and/or sleeper slab concrete, all conduits exiting the bridge must be installed beneath the concrete including any necessary sweeps to properly enter the junction well outside of the structure.

Bridge 677

Materials:

ITMS - PVC Conduit - 2" schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

ITMS - PVC Conduit - 4" schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

Junction Boxes - shall meet ANSI Specifications, U.L. requirements and listed as raintight (NEMA 4X rated), and shall accommodate the size and number of conduits shown on the Plans. Junction boxes/wells shall be galvanized steel alloy and constructed to the size indicated.

Shop drawings and/or catalog cuts for the above listed materials shall be submitted to the Engineer for approval.

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
PO BOX 778
DOVER, DELAWARE 19903

CERTIFICATE OF RIGHT-OF-WAY STATUS

STATE PROJECT NO. T201109001

F.A.P. NO. EIM-N056(041)

SR 141, I-95 TO JAY DRIVE

NEW CASTLE COUNTY

Certificate of Right-of-Way Status - Stipulated

Status - Level 3

As acquired by 23 CFR, Part 635, and other pertinent Federal and State regulations or laws, the following certificates are hereby made in reference to this highway project:

The acquisition or right of occupancy and use of some remaining parcels is not complete, but all occupants of the residences on such parcels has had replacement housing made available to them in accordance with 49 CFR 24.04. The parcels which are not available are:

<u>Parcel No</u>	<u>Owner</u>	<u>Status</u>	<u>Availability</u>
1-R	PMG CF LLC	In settlement	6/15/19
3-R	SROA Basin LLC	Waiting for mortgage release	6/15/19
7-R	7 Commons, LLC	In Negotiations	6/15/19
2-L	NCC/DRBA	Waiting/FAA	8/1/19
4-L	DP&L	Waiting on signatures and fence invoice	8/1/19

All necessary real property interests have been or shall be acquired in accordance with current FHWA/State directives covering the acquisition of real property.

No occupants were permanently displaced for this project and the State has physical possession and the right to remove, salvage, or demolish any personal property acquired as part of this project.

The State shall ensure that any occupants of residences, businesses, farms, or non-profit organizations and who have not yet moved from the right-of-way are protected against unnecessary inconvenience and disproportionate injury or any action coercive in nature.; and,

Anticipated clearance for all parcels is August 1, 2019.

RIGHT OF WAY SECTION



Monroe C. Hite, III
Chief of Right of Way

DELAWARE DEPARTMENT OF TRANSPORTATION
SCHEDULE OF ITEMS

PAGE: 15
DATE:

CONTRACT ID: T201109001.01 PROJECT(S): IM-N056(041)

All figures must be typewritten.

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1470	602030 MANHOLE, 48" X 30"	EACH 2.000				
1480	602031 MANHOLE, 48" X 48"	EACH 5.000				
1490	602032 MANHOLE, 66" X 30"	EACH 1.000				
1500	602033 MANHOLE, 66" X 48"	EACH 1.000				
1510	602130 ADJUSTING AND REPAIRING EXISTING DRAINAGE INLET	EACH 11.000				
1520	602132 ADJUSTING AND REPAIRING EXISTING MANHOLE	EACH 1.000				
1530	602505 PERSONAL SAFETY GRATE	EACH 2.000				
1540	606003 DRILLED SHAFT, 48"	LF 547.000				
1550	606004 DRILLED SHAFT, 60"	LF 584.000				
1560	606005 DRILLED SHAFT, 72"	LF 44.000				