

SPECIAL PROVISION
SECTION 675
SOIL NAIL WALL

675.01 Description This work includes the design and construction of soil nail walls as described on the Plans and specified herein. Soil nail walls may be applied directly against soil or rock faces or may be applied to the face of existing retaining structures requiring reinforcement. The exposed finish of the wall may be shotcrete, formed cast-in-place concrete, precast concrete over cast-in-place concrete, or some other combination as shown on the drawings or described herein. Soil nails may be of a solid bar or hollow bar. The soil nail portion of the design engages the soil mass behind the wall face and supports the face of the wall according to the specifics of the individual design.

675.02 Design The Contractor shall prepare the design of the soil nail wall consistent with the parameters and depictions of the required wall shown on the Plans. Design of the wall shall be guided by and generally conform to the document FHWA-NHI-14-007, FHWA GEC 007, February 2015, "Soil Nail Walls Reference Manual" and the AASHTO LRFD Bridge Design Specifications, 10th Edition, 2024. Design for hollow bar corrosion shall be guided by and generally conform to the document FHWA-CFL/TD-10-002, August 2010, "Hollow Bar Soil Nails Review of Corrosion Factors and Mitigation Practice." A digital copy of FHWA-NHI-14-007, GEC 007, 2015, referred to subsequently as the "Manual" is provided on the MaineDOT webpage where bidding documents are provided. A digital copy of FHWA-CFL/TD-10-002, August 2010, referred to subsequently as "FHWA-CFL/TD-10-002" is provided on the MaineDOT webpage where bidding documents are provided. AASHTO LRFD Bridge Design Specifications, 10th Edition 2024 is subsequently referred to as "AASHTO LRFD BDS."

Design drawings and design calculations shall be submitted fully describing and detailing the Contractor's design, prepared by, and sealed by a Professional Engineer licensed in the State of Maine (Designer). Submitted designs shall conform to Section 105.7 Working Drawings of the Standard Specifications. The Contractor's Schedule of Work shall allow time for the review of design calculations and drawings as noted in Section 106.4.1.B, Approval. Design submissions shall include the following for plan submissions.

1. Plan view of walls and elevation view of walls complete with dimensions and elevation along with relationships to adjoining site elements and constraints.
2. Section views of the various wall sections showing nail embedment, nail slope, utilities and other elements in the soil mass, including but not limited to existing bin walls and existing lightweight fill materials, along with the surface treatment of the wall.
3. Details describing the soil nail head design, wall reinforcing, drainage elements, control joints, edge treatments and test apparatus.
4. Acceptable tolerances for soil nail head locations on the wall and for angles in both the vertical and horizontal directions from the plane of the wall.
5. Proposed locations of verification tests and proof tests for soil nails.

Design submissions shall include the following for calculation submissions.

1. A written narrative summarizing the design approach along with a statement that the design conforms to the Manual along with identifying any exceptions to that conformance.
2. Adopted design criteria including soil shear strength, soil unit weights, ground-to-grout pullout resistances for each soil strata, phreatic surface elevations, load and resistance factors conforming to AASHTO LRFD BDS, design software utilized, strength calculations for the wall including local shear around nail heads. Load factors are defined by AASHTO LRFD

- BDS Section 3. Resistance factors are defined by AASHTO LRFD BDS Articles 11.5.7 and 11.5.8.
3. Supporting calculations for internal and external stability of the wall and design of structural components.
 4. Hollow bar soil nails shall be sized to provide a service life of 30 years by increasing the size of the bar to account for sacrificial steel loss due to corrosion in accordance with Table 5 of FHWA-CFL/TD-10-002 considering a Corrosive [II] site. Show calculations.
 5. The soil nail wall design shall be designed to resist all loads and surcharges, and provide the required structural and geotechnical resistance without assuming any contributing resistance from the existing bin retaining wall that may be intended to be covered or reinforced. Design soil properties shall be established by the Contractor based upon subsurface exploration data provided by the Department, subsurface exploration data collected by the Contractor, or reasonable assumptions developed by the Contractor using their experience with similar conditions. When reasonable assumptions are developed by the Contractor using their experience, the Contractor shall provide case history data, published correlations, and/or test records as well as soil investigation records to justify assumptions.

The design submissions shall include calculations defining test loads for the various lengths of bonded soil nails in each representative soil condition for both verification and proof tests. Bonded and unbonded lengths of each case shall also be provided. See Section 9.4 of the Manual.

Design documents shall define required construction joint locations and details to allow for the practical limits of applied shotcrete areas for a typical work period.

Submitted documents shall describe the methods for obtaining unbonded soil nail sections for hollow bar soil nails.

Approved submittal documents shall become the basis for and guide the construction. These will be referred to herein, along with the Contract Documents, as the Design.

675.03 Qualifications The soil nail wall designer (Designer) shall provide evidence of the design of at least five (5) soil nail walls during the past three years. The soil nail Contractor shall provide evidence of the successful completion of at least five (5) soil nail projects of a permanent nature during the last three years. The Contractor's superintendent shall have a minimum of three (3) years' experience supervising soil nail wall construction. Soil nail crews shall be experienced in the installation of soil nails, soil nail wall drainage elements, soil nail wall shotcrete applications along with any associated forming, concrete reinforcing placement and securing and other associated work. All drill operators, shotcreters, grout equipment operators and on-site foremen shall have a minimum of one (1) year experience installing permanent soil nails.

675.04 Submittals The Contractor shall submit the following for review at least 45 days prior to mobilization for construction of soil nails. The Department shall have 14 days to review.

1. Design calculations (see Subsection 675.02, above)
2. Design drawings.
3. Experience evidence for Designer
4. Experience evidence for Contractor and Soil Nail Crew
5. Shotcrete and/or concrete mix designs (specify proposed air entrainment).
6. Grout mix designs for soil nails, including specific gravity with a tolerance of +/- 0.05.
7. Monitoring and Action Plan.

8. Concrete reinforcing.
9. Soil nail steel members, coatings, centralizers, fasteners, and steel fabrications.
10. Corrosion protection for bar, plate, nuts, and couplers.
11. Penetrating silane concrete sealant
12. Construction schedule showing the integration of the various elements of the soil nail wall construction into the greater project.
13. Soil nail wall work elements requiring coordination with earthwork, stages of earthwork, construction layout and elevation control, provision of water, cleanup, provision of power, compressed air and other elements of the work that require coordination between the Contractor and any soil nail subcontractor.
14. Soil nail testing methods and equipment, including details of jacking frames and reaction surfaces, and certified calibration records for load cells, jack pressure gauges to have been completed within 90 days of the Submittal.
15. Soil nail verification test locations, details of components, bonded and unbonded lengths, Verification Test Load, and nominal grout-to-ground bond strength. The Verification Test Load shall be defined as the nominal grout-to-ground bond strength multiplied by the surface area of the bond zone.
16. Certified mill test reports for bars and certifications of compliance for plates, washers, nuts, centralizers and wall drainage elements.

675.05 Meetings Prior to beginning work on the soil nail walls, a meeting shall be held to discuss the Contractor's approach to this portion of his work. The meeting shall be requested by the Contractor and organized by the Resident and shall include the Contractor's site superintendent and the soil nail subcontractor's superintendent/foreman, the soil nail Designer and the Department's project manager. The following will be discussed:

1. Schedule of the soil nail wall work.
2. Necessary coordination between trades.
3. Quality control and quality assurance.
4. Expected appearance of the finished wall.
5. Review of construction elements, designs, and access areas.
6. Constraints on the Contractor's operations.
7. Contractor monitoring start and instrumentation setup.
8. Other relevant issues.

675.06 Materials

1. Solid bar soil nails (SBSN's) shall conform to ASTM A615, steel, straight shaft, deformed continuous thread bar without splices or welds with appropriate coating systems to assure design service life.
2. Hollow bar soil nails (HBSN's) shall conform to ASTM A615 steel, straight shaft, deformed continuous thread bar without splices or welds, sized to consider a sacrificial steel loss in accordance with Table 5 of FHWA-CFL/TD-10-002 considering a Corrosive [II] site.
3. Bar, plate, nuts, and couplers shall be protected for corrosion.
4. Manufactured couplers rated for the rated tensile resistance of the bar may be used to extend the soil nail with the Resident's approval beyond the half-point of the embedded length where installation technique does not adversely affect the coupler.
5. Grout used to bond soil nails to the surrounding soil shall be a neat cement grout or a sand/cement mixture conforming to the following.
 - a. Maximum water/cement ratio 0.45

- b. Minimum 3-day compressive strength of 1,500 psi
 - c. Minimum 28-day compressive strength of 3,000 psi
 - d. Mixing water shall be potable.
 - e. The following admixtures are acceptable.
 - i. Expansive admixtures for secondary grouting only.
 - ii. Type K cement
 - iii. Retarders
 - iv. Bleed control
 - f. Grout strength accelerator admixtures are prohibited.
6. Cement shall conform to ASTM C150, Type I, II, or I/II.
 7. Steel for fabrications around the soil nail head shall be ASTM A36 or better
 8. Centralizers to retain the soil nail bar in the center of the drilled hole shall be made of schedule 40 PVC for SBSN and ASTM A36 steel for HBSN.
 9. Concrete for cast-in-place applications shall be Class A. Cast-in-place concrete shall meet the requirements of Standard Specification 502 – Structural Concrete.
 10. Drainage pipe inserted into the soil mass shall be 3-inch diameter, solid and perforated PVC pipe with a wall thickness equal to Schedule 40 PVC or SDR 35. Wrap slotted PVC with drainage geotextile conforming to Specification 722.02. Install wrapped PVC using temporary casing to prevent damage to the drainage geotextile. PVC shall be formulated with ultra-violet light damage inhibitors. PVC shall be placed into 4” diameter hole extending a length of 10’-0”. 5’-0” of the PVC shall be slotted with No. 10 well screen slots. PVC shall be installed with the slotted end in first.
 11. Geocomposite drainage strips shall be 12-inches wide, with a non-woven geotextile face against the wall or soil mass with a cellular plastic backing.
 12. Protective coating for concrete surfaces shall meet the requirements of Type 1c penetrating silane concrete sealers, and be listed on the Department Qualified Products List (QPL), conforming to Standard Specification Section 515.

All materials shall be carefully handled and stored according to the recommendations of the manufacturer. Improper storage or damage to any soil nail materials shall be repaired or replaced at the discretion of the Resident.

675.07 Soil Nail Testing and Acceptance Verification and proof testing will be required. Successful verification tests shall be performed prior to the start of production nail installation. Verification tests are required to verify the pullout resistance and grout-to-ground bond strength used in the soil nail designs. Verification tests shall not be performed until the nail grout has attained at least 70 percent of the 28-day compressive strength specified by the soil nail design. At a minimum, one verification test shall be conducted for different soil strata/ground types. No fewer than one verification test shall be performed at each wall.

Testing Methods and Equipment Perform both pre-production verification testing and proof testing of designated test nails. Perform pre-production verification nail tests on sacrificial test nails as specified herein and at locations denoted by the Contract Drawings. Perform proof tests on production nails as specified herein in locations as denoted by the Contract Drawings. Test nails shall not be loaded for a minimum of three (3) days after grouting.

Provide a jacking frame that is sufficiently rigid and of adequate size such that excessive deformation will not occur as the test load is applied. Ensure the jacking frame bears outside of the soil nail grout column to test the grout to ground bond opposed to the grout to steel bond. A dial gauge capable of measuring to 0.001 inch shall be used to measure movement. The dial gauges shall have

sufficient travel to allow complete testing without resetting the dial gauge. Gauges shall be supported independent of the nails, jacking frame and reaction frame. A hydraulic jack and gauge calibrated as a unit shall be used to apply the test load. The pressure gauge shall be graduated in 100 psi increments or less and used to measure the applied load. The test loads shall be applied incrementally. The jacking ram stroke length shall be sufficient to apply the loads without requiring the resetting of the equipment. Test nails shall have a minimum stressing length of 3 feet between the top of grout and point of testing application. This can be accomplished with temporary stickup of the hollow bar tendon or by having a temporary unbonded length prior to testing which is grouted after testing. Bar stickup shall be cut off to within 6 inches of the top of bar nut after completion of testing, at no additional cost to the Department.

Pre-production Verification Testing Pre-production verification testing shall be performed prior to installation of production nails to verify the Contractor's installation methods and nail pullout resistance. Perform pre-production verification tests at the locations and elevations shown on the plans or as specified herein. Perform a minimum of one (1) verification tests in each different soil / rock unit. Perform a minimum of one (1) verification test per wall. Verification test nails shall be sacrificial and shall not be incorporated as production nails. The Department shall have 7 days to review the results. If the results of the verification load test indicate that the minimum grout to ground bond is not achieved, the Contractor shall submit revised nail lengths. The means and methods shall not be revised once the verification test results have been approved by the Department and revised nail length are provided.

Perform the load test to the maximum test load indicated in this section or pullout failure, whichever occurs first. The test nails shall be installed and tested at each level at a rate consistent with construction operations. The test length of a soil nail shall be chosen to cause pullout failure prior to steel yield. The method of installation and size of the drill hole shall be the same as for production nails. Each test nail shall be grouted in place as part of a regular production grouting process.

Pre-production verification tests shall be performed by incrementally loading the nail per the loading schedule below. Dial gauges shall reset to zero after applying alignment load. At each increment of load, the nail movement shall be measured and recorded to the nearest 0.001 inch with respect to an independent fixed reference point. The applied load shall be monitored with a pressure gauge. The load hold period shall start as soon as each test load is applied. Movement shall be recorded at 1 minute, 2, 3, 4, 5, 6, and 10 minutes. If the load hold is extended, the nail movement shall be recorded at 15, 20, 30, 40, 50, and 60 minutes. The load shall be maintained during each load increment to within 2 percent of the intended load. Jack shall be repumped as needed to maintain load during hold times. The Contractor shall document the test results on a form substantially equal to that shown in Figures 9.4 and 9.5 of the Manual. Creep test results shall be presented in a manner-like Figure 9.6 of the Manual.

Verification tests shall be performed by incrementally loading the verification test nail to a maximum test load of the Verification Test Load (VTL).

VTL is defined as: $VTL = L_{B,VT} * r_{PO}$;

Where: $L_{B,VT}$ = bond length of the verification test nail,

r_{PO} = nominal pullout resistance (per unit length) of soil nail = $\pi * q_u * D_{DH}$,

q_u = bond strength,

D_{DH} = drill hole diameter.

The bond length of the verification test nail shall be assigned as provided by Section 9.4.3 of the Manual.

The VTL for each test nail shall be provided by the designer. Verification test nails shall have

bond lengths no longer than the longest planned production nail bond length and no shorter than the shortest planned production nail bond length of the given wall. Verification test nail unbonded lengths shall be no longer than the greater of 5 feet and the greatest unbonded length of planned production nails of the given wall.

Verification Test Loading Schedule

Load	Minimum Hold Time
Alignment Load, $AL \leq 0.03$ VTL	1 minute
0.13 VTL	10 minutes
0.25 VTL	10 minutes
0.38 VTL	10 minutes
0.50 VTL	10 minutes
0.63 VTL	10 minutes
0.75 VTL (Creep Test)	60 minutes
0.88 VTL	10 minutes
1.00 VTL (Max. Test Load)	10 minutes
0.50 VTL	2 minutes
Alignment Load, $AL \leq 0.03$ VTL	1 minute

A verification test nail shall be considered acceptable when:

- 1) For each respective test load except for the 0.75 VTL Creep Test, total creep movement does not exceed 0.04 inch between the 1- and 10-minute readings.
- 2) For the 0.75 VTL Creep Test, total creep movement does not exceed 0.08 inch between the 6- and 60-minute readings and the creep rate is linear or decreasing throughout the creep test load hold period.
- 3) The total movement measured at the VTL exceeds 80 percent of the theoretical elastic elongation of the unbonded length. The theoretical elastic elongation criterion is calculated by Equation 9.4 of Section 9.4.3 of the Manual.
- 4) A pullout failure does not occur. Pullout failure is defined as the load at which attempts to further increase the test load simply result in continued pullout movement of the test nail. The pullout failure load shall be recorded as part of the test data.

Unacceptable test results shall result in modifications to design and/or construction procedures. Unacceptable test results shall require additional verification testing representative of the modified design. Graphs shall be plotted during the test of deflection against load.

Production Proof Testing Perform proof testing of soil nails on no less than five (5) percent of production nails in each row and at least one (1) soil nail per every two rows. The Resident may elect to adjust proof test locations or assign additional proof tests in cases where detrimental conditions are observed during nail construction.

Proof tests shall be performed by incrementally loading the proof test nail to a maximum test load of the Proof Test Load (PTL).

PTL is defined as: $PTL = L_{B,PT} * r_{PO} * 0.75$;
 Where $L_{B,PT}$ = bond length of proof test

The maximum length of the proof test nail bond shall be determined according to the criteria provided by Section 9.4.4 of the Manual. The temporary unbonded length must be at least 3 feet within the drill hole.

Dial gauges shall reset to zero after applying alignment load. The nail movement at each load shall be measured and recorded in the same manner as for verification tests. At load increments other than the maximum test load, the load shall be held long enough to obtain a stable reading. The soil nail movements shall be recorded at each load increment. The Contractor shall document the test results on a form substantially equal to that shown in Figures 9.4 and 9.5 of the Manual. Creep test results shall be presented in a manner-like Figure 9.6 of the Manual. Incremental loading for proof tests shall be in accordance with the following loading schedule.

Proof Test Loading Schedule

Load	Hold Time
Alignment Load, $AL \leq 0.03$ PTL	Until Stable
0.17 PTL	Until Stable
0.33 PTL	Until Stable
0.50 PTL	Until Stable
0.67 PTL	Until Stable
0.83 PTL	Until Stable
1.0 PTL (Creep Test)	10 or 60 minutes ⁽¹⁾
Alignment Load, $AL \leq 0.03$ PTL	1 minute

⁽¹⁾A 10-minute creep test shall be performed at the maximum test load (1.0 PTL). The creep period shall start as soon as the maximum test load is applied and the nail movement shall be measured and recorded at 1 minutes, 2, 3, 4, 5, 6, and 10 minutes. If nail movement measured between 1 and 10 minutes exceeds 0.04 inch, 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.

The Contractor shall maintain stability of any unbonded lengths for subsequent grouting. The Contractor shall submit two (2) copies of test soil nail records within 24 hours of completing each proof test. The Department shall review the test nail records to determine if test nails are acceptable. The Department shall have 3 days to review the results of proof tests. A proof test nail shall be considered acceptable when:

- 1) Total creep movement does not exceed 0.04 inch between the 1- and 10-minute readings.
- 2) Total creep movement does not exceed 0.08 inch between the 6- and 60-minute readings and the creep rate is linear or decreasing throughout the creep test load hold period.
- 3) The total measured movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the test nail unbonded length. The theoretical elastic elongation criterion is calculated by Equation 9.8 of Section 9.4.5 of the Manual.
- 4) A pullout failure does not occur. Pullout failure is defined as the load at which attempts to further increase the test load simply result in continued pullout movement of the test nail. The pullout failure load shall be recorded as part of the test data.

The Department may require the Contractor to replace some or all failed proof test soil nails at no

cost to the Department.

Production Soil Nail Acceptance Production soil nails will be accepted if installed in accordance with the requirements and tolerances indicated herein, on the Contract Drawings, and in the approved submittals. If a soil nail does not meet this criterion, or if it cannot be satisfactorily grouted, the Contractor shall not incorporate the soil nail into the soil nail system and shall add another production soil nail to replace the soil nail at no cost to the Department.

675.08 Soil Nail Testing – Failed Tests In the event of failure of soil nail tests, the Designer must respond with adjustments to the design presented. Adjustments may involve additional soil nails and/or changes in the design of soil nails not yet installed. Additional testing to verify the intended result will be at the Contractor's expense. If pullout failure causes cracking in the initial shotcrete facing, the contractor shall remove and replace the effected shotcrete. If pullout failure causes raveling of the slope, the Contractor shall cover and restore existing grading by shotcreting.

675.09 Soil Nail Wall Tolerances The Designer shall indicate the tolerances acceptable in his/her design for soil nail head location on the wall, angle of inclination of the soil nail from the plane of the wall in both the vertical and horizontal directions.

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

675.10 Grout Testing Nail grout shall be tested as specified in ASTM C109 with (4) four test specimens. Testing frequency shall be the greater of the following.

1. One test per 50 cubic yards of grout.
2. One test per week.
3. Minimum of (2) two tests per soil nail wall design.
4. Prepare specimens for 3 day, 7 day, 28 day, and hold test.

675.11 Construction Requirements – General Coordination between trades is especially important for soil nail walls. Specialty contractors may be relying on other trades for timely work elements to be provided by others on the project team. Examples of some of these elements may include the following.

1. Provision of potable water.
2. Laydown areas and/or storage of equipment and materials during non-working periods.
3. Construction layout.
4. Excavation.
5. Scheduling of abutting work.
6. Construction materials testing.
7. Locations of potential interferences from utilities, foundations, and other items in the soil mass behind the wall.
8. Clearing and grubbing.
9. Dewatering.
10. Hazardous materials.
11. All-weather access.
12. Erosion control.
13. Railroad safety and clearances.

675.12 – Construction Requirements - Soil Nails

1. Solid bars and hollow bars are acceptable designs.
2. Conform to the requirements of the approved soil nail design prepared by the Contractor.
3. Conform to best practices as described in the Manual.
4. Drill holes of the specified diameter.
5. Cuttings shall be removed or incorporated into the project in acceptable ways.
6. Conform to the design locations and drill angles. Deviations outside of stated tolerances will be reviewed and adjusted by the Designer with the approval of the Resident.
7. Drilled holes for solid bars will be cased if the holes do not hold their shape without soil caving.
8. Bars shall be centered in drilled holes.
9. Pump grout into prepared holes around solid bars continuously without cold joints working from the bottom of the hole to prevent voids with the discharge end of the hose continuously immersed in fresh grout (tremie method).
10. Fill the “bird’s beak” with grout or mortar.
11. Hollow bar soil nails shall be installed as follows.
 - a. Hollow bars shall be fitted with a sacrificial drill bit to advance the hole and simultaneously injected with grout from the head of the drill bit.
 - b. Casing may be used to maintain a starting portion of the hole, such as to maintain the hole through the existing Bin Wall backfill. Where the casing is removed after grouting, the length of nail where casing was employed shall be excluded from the bonded length.
 - c. Centralizers shall be placed at regular intervals not to exceed 10 feet along the length of the nail and 18 inches from the drill bit.
 - d. The soil/grout mixture that falls from the drilled hole as the bit progresses will be collected and removed. When the mixture is 100 percent grout at the designed embedment of the soil nail the soil nail installation is complete.
 - e. Unbonded lengths required for soil nails to be tested shall be provided by a method defined by the Designer.

675.13 Construction Requirements – Construction Monitoring The Designer shall provide a Monitoring and Action Plan following the guidance provided by Section 9.5.3 of the Manual indicating the locations of instrumentation, instrumentation cut sheets, and frequency of readings. Instrumentation shall at a minimum include inclinometers behind the wall, survey points behind the wall, and survey points along the temporary shotcrete and/or existing bin wall facing. The Monitoring and Action plan shall provide criteria for Alerts and Shutdown. Vertical deformations of the retained ground surface shall be limited to 1 inch.

675.14 Field Quality Control – Soil Nails

1. Measure and record the specific gravity of the shotcrete taken from the mixer each hour. Make adjustments as necessary to ensure the specific gravity is maintained within the range provided by the Designer.

675.15 Measurement and Payment

Soil Nail Wall Design The unit of measurement for the design of the soil nail walls included in the project scope shall be lump sum. The lump sum payment shall be full compensation for all labor,

materials, equipment, and incidentals necessary to provide an acceptable soil nail wall design for each and every soil nail wall included in the project, in accordance with all Contract requirements. There will be no additional compensation for design modifications because of addressing review comments, failed tests or otherwise unsatisfactory performance of the soil nail walls.

Soil Nail Walls Soil Nail Walls will be measured by the square foot of face area computed using the Contract plans and Contract quantity. No adjustment in the pay quantity will be made if the computed quantity, based on the working drawings, varies from the Contract quantity, unless authorized in writing by the Resident. Payment will include all labor, equipment, materials, materials testing, submittals, reporting, soil nails, concrete reinforcing, shotcrete, cast-in-place concrete, precast panels, grouting, disposal of spoils, hardware, drainage elements and all other elements of the walls necessary to a complete soil nail wall installation.

Verification Test - Soil Nails Soil nail verification tests will be measured per each test satisfactorily completed and meeting the acceptance criteria as stated herein. Tests made at the option of the Contractor or to repeat an unaccepted or failed test shall not be measured for payment. Payment will include the cost of materials, equipment to construct and equipment to perform and record each test.

Proof Test - Soil Nails Soil nail proof tests will be measured per each test satisfactorily completed and meeting the acceptance criteria as stated herein. Tests made at the option of the Contractor or to repeat an unaccepted or failed test shall not be measured for payment. Payment will include the cost of materials, equipment to construct and equipment to perform and record each test.

The pay item quantity of Proof Test – Soil Nails listed by the Plans is anticipated to exceed the minimum quantity required by these specifications to enable assignment of additional tests at the discretion of the Resident.

Soil Nail Equipment Mobilization The lump sum price for Soil Nail Equipment Mobilization shall include the cost of furnishing all labor, materials, and equipment necessary for the transporting, erecting, dismantling, and removing all soil nail equipment to and from the project site, as many times as necessary for a complete project.

Payment will be made under:

<u>Pay Item</u>	Measurement Unit
675.400 Soil Nail Wall Design	Lump Sum
675.411 Soil Nail Walls	Square Foot
675.420 Verification Test - Soil Nails	Each
675.421 Proof Test – Soil Nails	Each
675.425 Soil Nail Equipment Mobilization	Lump Sum