§551-2

Section 550
STRUCTURES

SECTION 551 - PILES AND PILE DRIVING EQUIPMENT

551-1 DESCRIPTION

551-1.01 Piles. Under this work, the Contractor shall furnish and place piles of the type and size and at the locations indicated on the Plans, or where ordered by the Engineer. The Contractor shall furnish equipment and personnel for dynamic pile tests as required. Timber piles are not covered under this specification.

551-1.02 Splices for Steel Bearing Piles. This is a contingent item and shall apply only when the Engineer directs the Contractor to drive a pile more than one and one-half meters beyond the estimated length provided in the Contract Plans. Pile splices shall be constructed as shown on the Plans, or as approved by the D.C.E.S.

551-1.03 Furnishing Equipment for Driving Piles. Under this work, the Contractor shall furnish equipment at the site for driving piles. The Contractor shall submit to the D.C.E.S., Form BD 138, “Pile Driving Equipment Data,” for approval. The D.C.E.S. shall be allowed 15 working days upon receipt for review. Each separate combination of pile and pile driving equipment proposed by the Contractor shall require the submission of a corresponding Form BD 138.

551-2 MATERIALS. Materials for piling shall conform to the requirements of the following Subsections:

Bar Reinforcement, Grade 420 709-01
Casings for Cast-In-Place Concrete Piles 720-03
Steel Bearing Piles 720-04
Pile Shoes 720-05

In addition to the requirements specified in the preceding Subsections, the following shall apply:

551-2.01 Cast-In-Place Concrete Piles

A. Concrete for Cast-In-Place Piles. Concrete placed in the Cast-In-Place Piles shall comply with requirements specified for Class A Concrete in Section 501, Portland Cement Concrete.

B. Paint for Exposed Piles and Pile Casings. The paint shall be in accordance with the Contract Documents. The color shall be as specified on the Plans and Proposal, or as required by the Engineer.

C. Cast-In-Place Concrete Pile Dimensions. Pile dimensions, including the rate of taper for tapered piles, shall be as shown on the Plans, or as approved by the D.C.E.S.. In no case, however, shall the outside diameter at the toe be less than 200 mm nor shall the outside diameter at the section to be cut off be less than 300 mm.

The Contractor shall furnish the particular type of pile casing shown on the Contract Plans. No used pipe or shell will be permitted.

Pile casings which do not hold their original form during driving, which fracture, or fail during driving, due to manufacturer defect, fabrication, or Contractor's operations, unless otherwise directed, shall be withdrawn and removed from the site at the Contractor's expense. If, at any time during the driving or placing of the pile casings, the D.C.E.S. determines from the results of the
driving that the pile casings of the type or thickness being used cannot be satisfactorily placed, the Contractor shall remove same from the site and furnish casings of a different type or greater thickness at the expense of the State.

551-3 CONSTRUCTION DETAILS

551-3.01 General

A. Storage, Handling and Inspection. The method of storing and handling of piles shall be such as to avoid damage to the piles.

B. Site Preparation. Piles shall not be driven until after the excavation is completed to the elevation required for the bottom of the footing or bottom of tremie. Unless otherwise shown on the Plans, any material forced up or depressions made by the driving shall be removed or filled and the correct elevation of foundation established before any concrete is placed.

C. Preparation Of Piles

1. Shoes

   a. Steel Bearing Piles. Steel Bearing Piles shall be furnished with a shoe. These shall be fabricated as detailed on the Plans, or as approved by the D.C.E.S. Substitution of commercial shoes for those detailed on the Plans may be permitted subject to the approval of the D.C.E.S. Unless shown on the Plans, the shoes shall be attached by a NYSDOT Certified Welder with a 8 mm thick minimum fillet weld along the entire outside edge of the flanges.

   b. Cast-In-Place Concrete Piles. The ends of all pile casings shall be perpendicular to the longitudinal axis of the casings. All pile casings for "Cast-In-Place Concrete Piles" shall be equipped with a round plate with a diameter of not more than 15 mm larger than the diameter of the pile, and a minimum thickness of 18 mm, unless otherwise indicated on the Plans.

2. Splices

   a. General. Full length piles shall always be used where practicable. Where splices are unavoidable, their number, locations, and details shall be subject to the approval of the D.C.E.S.

      Splices to steel piles, and steel pile casings shall be welded in conformance with the provisions of the S.C.M. These requirements include, but are not limited to, a NYS certified welder and a D.C.E.S. approved welding procedure.

   b. Cast-In-Place Concrete Piles. Where design considerations and soil characteristics permit, the D.C.E.S. may approve the use of mechanical splices in lieu of the welded splice herein specified under §551-3.01.C.2.a. The mechanical couplings used for such splices shall be subject to the provisions of §715-01, Structural Steel. A seal weld shall be provided completely around the pile casing.

D. Equipment for Driving Piles

1. General. Piles shall be driven only with equipment which has the prior approval of the D.C.E.S. in accordance with §551-1.03. All malfunctioning equipment, as determined by the Engineer, shall be removed from the site and be replaced with equipment which is satisfactory to the D.C.E.S. The minimum rated striking energy of the hammer to be used in driving Steel Bearing Piles and Cast-In-Place Concrete Piles shall be 17.6 KJ per blow.

   Hammers having greater striking energy may be used upon approval by the D.C.E.S. These hammers shall produce a minimum of 20 blows/300 mm and a maximum of 120 blows/300 mm
at the Ultimate Pile Resistance shown on the Contract Plans. However, if, in the opinion of the D.C.E.S., satisfactory results are not obtained with the hammer furnished by the Contractor, a hammer meeting the approval of the D.C.E.S. shall be furnished and used.

2. **Air/Steam Hammers.** Sufficient boiler or compressor capacity shall be provided at all times to maintain the rated speed of air/steam hammers during the full time of pile driving. The valve mechanism and other parts of a single or double-acting hammer shall be maintained such that the number of blows per minute for which the hammer is designated, is satisfied.

3. **Diesel Hammers.** The valves, pumps, ports, rings, and other hammer parts shall be maintained such that the following condition for which the hammer is designated is satisfied:

<table>
<thead>
<tr>
<th>Hammer Type</th>
<th>Designated Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Acting</td>
<td>Length Of Stroke Or Blows Per Minute</td>
</tr>
<tr>
<td>Double Acting</td>
<td>Bounce Chamber Pressure</td>
</tr>
</tbody>
</table>

All Diesel Hammers shall be provided with an acceptable means of measuring hammer energy. When pressure gages are included as normal equipment, they shall be furnished and maintained in operable condition. Manufacturer's Charts and Graphs, required to calibrate hammer energy, shall be furnished to the Engineer by the Contractor. The Contractor shall also arrange easy access to the pressure gages so that readings may be conveniently taken by the Engineer.

A double acting hammer not operating at the required bounce chamber pressure shall be removed promptly from the work site. It shall be replaced by a hammer acceptable to the Engineer at no cost to the State.

4. **An approved hammer cushion block shall be used to transfer pile hammer energy to the pile.** Each hammer shall be equipped with a helmet/drive head to fit the type of pile to be driven.

5. **Pile driver leads shall be constructed in such a manner as to afford freedom of movement of the hammer.** The use of either swinging or hanging leads will be permitted provided the pile or leads are properly supported during driving and the required final position and batter of pile is achieved. In the event the Engineer determines that the use of swinging or hanging leads is producing unsatisfactory results, the Engineer may require the Contractor to hold the leads in position with guys or braces to give the required support. The Contractor may, as an alternative, replace the unsatisfactory equipment with equipment having fixed leads.

Pile driving leads shall be of sufficient length so that the use of a follower will not be necessary. The driving of piles with followers will generally not be permitted and shall be done only with written permission and direction of the D.C.E.S.

When directed by the Engineer, either approved steel or wooden spuds shall be used to penetrate consolidated material or obstructions in the upper three meters in order to assist in driving the piles to the required depth and resistance. Augers may be used for this purpose when written permission is obtained from the D.C.E.S.

6. **Water jets and vibratory hammers shall not be used in driving any pile, unless written approval is given by the D.C.E.S.** Piles installed with a water jet or vibratory hammer shall be impact driven to secure the final penetration.

**E. Methods of Driving.** The driving of piles shall be done with an air/steam, diesel, or hydraulic hammer. Piles shall be driven starting from the center of the foundation and proceeding outward from this point, or starting at the outside row and driving progressively across the foundation.

**F. Length of Piles.** The length of piles will be determined in the field by driving to the driving criteria determined by the D.C.E.S. Piles may be completely driven in one operation or, if directed by the D.C.E.S., be partially driven and allowed to set from 2 to 24 hours (or as indicated on the
§551-3

Plans) before driving is resumed.

**G. Allowable Variation in Pile Alignment.** Piles shall be truly vertical or accurately battered as indicated on the Contract Plans. The top of any pile driven its full length into the ground shall not vary from the plan location by more than 100 mm, unless otherwise shown on the Plans. The top of any pile partially exposed or included in an integral abutment shall not vary from the plan location by more than 25 mm, unless otherwise shown on the Plans. In addition, piles may have a variation at their tip of not more than 20 mm per meter from the vertical or from the batter shown on the Plans or permitted by the D.C.E.S.

**H. Defective Piles.** All piles forced up by any cause shall be driven again, as directed by the Engineer.

The following shall be causes for rejection of a pile:

- Pile location or batter is incorrect.
- Pile damaged from any cause whatsoever.
- Pile fails to attain the driving resistance determined by the D.C.E.S., or the driving resistance set forth in the Contract Documents.
- Pile tip elevation is not within the limits called for on the Plans, or specified by the Engineer.
- Pile is determined by the Engineer to be unserviceable for other reasons related to the furnishing and installing of the pile.
- Cast-In-Place Concrete Pile Casing not free from water.

No footing concrete shall be placed until all piles within the footing are inspected by the Engineer. The Contractor shall remove such rejected piles, or, at the option of the Engineer, a second pile may be driven adjacent thereto, if this can be done without impairing the structure.

**I. Cutting Off Piles and Pile Casings.** The tops of all piles and pile casings shall be cut off at the elevation indicated on the Plans, or as established by the Engineer. The cut shall be clean and to a true plane, in accordance with the detail shown on the Plans.

**J. Included Work**

1. **Voids.** All cavities, left by the pile driving operation, shall be backfilled, as specified by the Engineer.

2. **Concrete.** Cast-In-Place Concrete Pile casings shall be inspected immediately prior to placing concrete in the casing. The Engineer may require that all casings in the footing be satisfactorily placed and dry before concrete is placed. Each casing shall be filled with a continuous pour of concrete, mixed and placed in accordance with the Specifications for Concrete for Structures Class A, Section 555, except that the slump of the concrete shall not exceed 125 mm.

   Special care shall be exercised in filling the piles to prevent honeycomb and air pockets from forming in the concrete. Internal vibrators and other means shall be used to the maximum depth practicable, as determined by the Engineer, to consolidate the concrete.

3. **Reinforcement.** Cast-In-Place Concrete Piles shall be reinforced as shown on the Plans and the reinforcement secured in such a manner as to insure its proper location in the finished piles.

**K. Painting of Exposed Piles and Pile Casings.** All exposed pile or pile casing surfaces not embedded in concrete shall be painted as described in the Contract Documents.

**L. Furnishing Equipment And Personnel - Dynamic Testing Of Piles.** The Contractor shall furnish pile driving equipment, a source of electrical power, and a suitable test enclosure to perform field testing of piles and evaluate pile hammer efficiency. All incidental labor and material
necessary to make the work area accessible shall also be supplied by the Contractor.

The actual tests shall be conducted by the Engineer under the direction of the D.C.E.S.. The Contractor's responsibility is limited to the supplying of support services for the individual tests. Tests shall be performed at the locations indicated on the Contract Plans and where ordered by the Engineer.

A Dynamic Testing Procedure, known as the "Impact Driving Method", will be used. This Procedure entails the following steps:
1. Prior to being struck with the pile driving hammer, each pile to be tested will be instrumented with strain and acceleration transducers by State personnel, aided by the Contractor's forces.
2. Dynamic measurements resulting from the pile hammer blows will be automatically recorded on a pile driving analyzer supplied by the State. State personnel will operate the pile driving analyzer.
3. Upon determination by the Engineer that valid data has been recorded, State personnel, assisted by the Contractor's forces, will remove the instrumentation.

The Contractor will schedule equipment movements to ensure that testing is done as part of the normal driving schedule, insofar as it is possible.

551-4 METHOD OF MEASUREMENT

551-4.01 Piles. The quantity of piles to be paid for under the work specified for Steel Bearing Piles or Cast-in-Place Concrete Piles, will be the number of meters of driven, acceptable piles, measured below cut off elevation, remaining in the finished structure in accordance with the Plans, Specifications, and orders of the Engineer.

The length of piles will be determined in the field by driving to the resistance required by the Plans, Specifications, or D.C.E.S. at the time of driving. The pile lengths indicated on the Plans are for estimating purposes only.

551-4.02 Splices for Steel Bearing Piles. The quantity of splices paid for will be the number of piles that exceed the estimated length by more than one and one half meters. A second splice may be utilized at 8 m beyond the estimated length subject to D.C.E.S. approval.

551-4.03 Dynamic Pile Tests. The quantity of Dynamic Pile Tests will be made for the number of piles tested. If the pile requires redriving within 28 hours after the initial test, this shall be considered as one Dynamic Pile Test. If redriving is more than 28 hours, this shall be considered as an additional test.

551-5 BASIS OF PAYMENT.

551-5.01 Furnishing Equipment for Driving Piles. The Lump Sum Price Bid shall include the cost of furnishing all labor, materials, and equipment necessary for transporting, erecting, maintaining, making any ordered equipment replacement, dismantling and removing the pile driving equipment.

The furnishing of equipment for driving sheet piling is not included in this work.

Payment will be made at the Lump Sum Price Bid for this Item, as follows: Seventy-five percent (75%) of the amount bid will be paid when the equipment for driving piles is furnished and driving of satisfactory piles has commenced. The remainder will be paid when the work of driving piles is completed.

551-5.02 Piles. The Unit Price Bid Per Meter for each of the respective Pile Items shall include the cost of furnishing all labor, (including the manipulation of pile driving equipment and materials), materials and equipment (excluding pile driving equipment) necessary to complete the work as prescribed in the Specifications, including the following additions:
§551-5

A. Structure Excavation. Payment for removal of any material forced up above the foundation by the driving of piles shall be included in the cost of the pile.

B. Defective Piles. No payment will be made for piles rejected in accordance with requirements under §551-3.01H, Defective Piles.

C. Backfilling. Payment for backfilling of all cavities left by the extraction of damaged piles or from auger holes or soil deformations necessary to place piles shall be included in the work for the respective Pile Item.

D. Redriving Piles. The cost of driving piles that are forced up by any cause shall be included in the Unit Price Bid for the respective Pile Item.

E. Pile Shoes, Etc. The cost of furnishing and using pile shoes, followers, augers, or spuds shall be included in the Unit Price Bid. Partial payment for pile shoes on the pile shall be in accordance with the requirements of §109-04 Partial Payments.

F. Reinforcement and Splices for Cast-In-Place Concrete Piles. Concrete Piles shall be included in the Unit Price Bid for Cast-in-Place Concrete Piles.

G. Progress Payments for Steel Piles. Progress payments will be made when the piles are properly installed in accordance with the Plans, Specifications, and orders of the Engineer. Payment will be made, at the Unit Price Bid, for 80% of the quantity properly installed, exclusive of cutting off piles, placing concrete in Cast-In-Place Piles and pile casings, and painting of exposed piles and pile casings. The balance of the quantity will be paid for upon completion of the work, including the cutting off, placing concrete in the pile, and painting of the pile and pile casings.

§551-5.03 Splices. The Unit Price Bid shall include the cost of furnishing all labor, materials, and equipment necessary to complete each splice to the satisfaction of the Engineer.

§551-5.04 Dynamic Pile Test. The cost of furnishing equipment and personnel to perform Dynamic Tests shall be included in the Unit Price Bid.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>551.10XXM</td>
<td>Steel Bearing Piles</td>
<td>Meter</td>
</tr>
<tr>
<td>551.11M</td>
<td>Cast-In-Place Concrete Piles</td>
<td>Meter</td>
</tr>
<tr>
<td>551.12XXM</td>
<td>Splices for Steel Bearing Piles</td>
<td>Each</td>
</tr>
<tr>
<td>551.13M</td>
<td>Furnishing Equipment for Driving Piles</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>551.14M</td>
<td>Dynamic Pile Testing</td>
<td>Each</td>
</tr>
</tbody>
</table>

Refer to the Standard Contract Pay Item Catalog for full Item Number and full Description.

SECTION 552 - SUPPORT AND PROTECTION SYSTEMS

552-1 DESCRIPTION

552-1.01 Permanent Sheeting. Under this work, the Contractor shall furnish and place permanent sheeting of the type, at the locations and to the elevation(s) shown on the plans.

All the sheeting and supports will be left in place as a finished structure unless removal of waling and bracing is called for on the plans.

552-1.02 Temporary Sheeting. This work shall include the requirements specified in §552-1.01 Permanent Sheeting with the following addition:

The Contractor shall be required to maintain the sheeting while in place, and remove it from the job site after its function has been accomplished or when ordered by the Engineer. It may be left in place
only with the written permission of the Engineer.

552.1.03 Interim Sheeting. Under this work, the Contractor shall furnish and place sheeting of the type, at the locations and to the elevation(s) shown on the plans.

The Contractor shall be required to maintain the sheeting while it is serving its function.

The interim sheeting shall be cut off and removed only to the elevation shown on the plans. The remaining material shall be left in place.

552.1.04 Excavation Protection System. Under this work, the Contractor shall design, furnish, place, maintain and remove an excavation protection system (EPS) at locations shown on the plans or as ordered by the Engineer. Details of the EPS must conform with the requirements of 29CFR1926 and installation shall be in accordance with the State and Federal Safety Codes. A sloping (layback) option will not be allowed.

Sheeting, shoring, a shield system, i.e. trench box or trench shield or other pre-engineered protective system may be used to prevent cave-ins. The requirements of any protective system shall be as contained in 29CFR1926. It may be left in place only with the written permission of the Engineer.

552.1.05 Alternate Design. The Contractor may submit to the Department a construction alternate other than that presented in the contract documents. Slope lay back will not be allowed. Any geotechnical analysis for a flexible support system shall be done in accordance with the procedures contained in the appropriate departmental publication which is current on the date of advertisement for bids. This publication is available upon request to the Regional Director or the Director, Geotechnical Engineering Bureau. All of the requirements and conditions contained in §104-10 Value Engineering Change Proposal shall apply.

552-2 MATERIALS

552-2.01 Permanent Sheeting

A. Permanent Timber Sheeting. Timber sheeting shall be new and unused and consist of any acceptable species which can be placed satisfactorily. The sheeting shall have a preservative treatment conforming to the American Wood-Preservers Association (AWPA) Standard C-2, Soil Contact. The timbers shall not be less in actual cross section or stress grade than that shown on the plans. Stress grading and acceptance shall be in accordance with the requirements and provisions of §712-14, Stress Graded Timber and Lumber. The timbers shall be sound and free from any defects which might impair its strength or tightness. The materials shall include all necessary waling and bracing required.

B. Permanent Steel Sheeting. Steel sheeting shall be new and unused conforming to the requirements of ASTM A328M unless otherwise indicated on the plans. Waling and bracing shall be new and unused conforming to the requirements of ASTM A36M unless otherwise indicated on the plans. The sheeting shall not have a section modulus less than that shown on the plans. Stock steel may be used. The Contractor shall furnish to the Engineer, certified copies of physical and chemical test results which shall include a sworn statement by a qualified mill representative to the effect that the subject material conforms to the requirements of the steel specified.

552-2.02 Temporary Sheeting

A. Temporary Timber Sheeting. The provisions of §552-2.01A Permanent Timber Sheeting shall apply with the following modifications:

The timber sheeting may consist of new or used, treated or untreated material but must be in satisfactory condition and suitable for the intended use. The Engineer may disapprove and reject used materials regarded to be unsatisfactory.

B. Temporary Steel Sheeting. The steel sheeting, waling and bracing may consist of new or
§552-2

used material but must be in satisfactory condition and suitable for the intended use. The section modulus of the sheeting shall not be less than that shown on the plans. The materials shall include all necessary waling and bracing required. The Engineer may, disapprove and reject used materials regarded to be unsatisfactory.

552-2.03 Interim Sheeting

A. *Interim Timber Sheeting.* The provisions of §552-2.02A Temporary Timber Sheeting shall apply.

B. *Interim Steel Sheeting.* The provisions of §552-2.02 B Temporary Steel Sheeting shall apply.

552-2.04 Excavation Protection System. The selection of EPS materials shall be the Contractor's option. The Engineer may disapprove and reject materials regarded to be unsatisfactory.

552-3 CONSTRUCTION DETAILS

552-3.01 General. Any material which stops the driving of sheeting within a depth of three meters from the ground surface at the time of driving, shall be removed by the Contractor. Payment for removal of such material will be made under the appropriate excavation item. If very compact material or boulders prevent the progression of the sheeting to the design tip elevation at a greater depth, the Contractor shall notify the Engineer.

552-3.02 Temporary Sheeting. The requirements of §552-3.01 General shall apply with the following addition:

Upon completion of the structure, the Contractor will remove the sheeting placed under this work or with the written permission of the Engineer, leave it in place after cutting off the tops at an agreed elevation.

552-3.03 Interim Sheeting. The provisions of §552-3.01 General shall apply with the following modification:

The interim sheeting shall be cut off and removed only to the elevation shown on the plans. The remaining material shall be left in place.

552-3.04 Excavation Protection System. The EPS installed under this item shall be of sufficient size and strength to meet the requirements of Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction (OSHA), and the Live Load requirement as contained in the Standard Specifications for Highway Bridges adopted by AASHTO. Prior to use, the Contractor shall supply the Engineer with documentation of compliance.

All damage to the adjacent pavement or ground caused by the use of the chosen EPS (e.g. Voids beneath the pavement or shoulder, pavement or shoulder cracking or subsidence, ground settlement) shall be repaired to the satisfaction of the Engineer at no additional cost to the State. Severe damage which directly affects the safety of the public shall be immediately repaired to the satisfaction of the Engineer. The operation shall be halted until a satisfactory prevention method is instituted.

552-4 METHOD OF MEASUREMENT

552-4.01 Permanent Sheeting. The quantity of sheeting to be paid for shall be the number of square meters obtained by multiplying the vertical length of sheeting measured between the payment lines herein described, by the horizontal length of sheeting shown on the plans or approved by the Engineer. The vertical length of sheeting is that length measured between the upper and lower payment lines. The upper payment line, unless otherwise specified on the plans or approved by the Engineer, shall be the original ground at the time of commencing work. The lower payment line shall be the elevation shown on the Plans as the minimum embedment depth unless otherwise authorized in writing by the Engineer.
The horizontal length shall be measured along a projection of the sheeting on a plane parallel to and midway between the front and rear face of the sheeting wall.

**552-4.02 Temporary Sheeting.** The provisions of §552-4.01 Permanent Sheeting shall apply.

**552-4.03 Interim Sheeting.** The provisions of §552-4.01 Permanent Sheeting shall apply.

**552-4.04 Excavation Protection System.** The quantity of protection system to be paid for shall be the number of square meters obtained by multiplying the vertical length measured between the payment lines herein described, by the horizontal length of EPS shown on the plans or approved by the Engineer. The vertical length is that length measured between the upper and lower payment line. Unless otherwise specified on the plans, the upper payment line shall be the ground surface existing at the site prior to the beginning of the work, or as ordered, in writing, by the Engineer. Unless otherwise indicated on the plans or in the proposal, the lower payment line shall be the bottom of the excavation shown on the plans immediately adjacent to the protection system. The horizontal length shall be the actual length of protection system installed measured along the payment lines as shown on the contract plans. Both sides of the excavation shall be measured and computed for payment.

**552-4.05 Stage Construction.** When the support system is used in stage construction, the quantity of support system to be paid shall be the maximum number of square meters satisfactorily installed between the payment lines shown in the Contract Documents measured on either, but not both sides, of adjacent construction stages.

**552-5 BASIS OF PAYMENT**

**552-5.01 Permanent Sheeting.** The unit price bid, per square meter, for this work shall include the cost of furnishing all labor, materials and equipment necessary to complete this work, including driving equipment, waling, bracing and design services when employed. The cost of maintaining the excavated area free from earth, water, ice, and snow will be included in the price bid for the appropriate excavation item.

**552-5.02 Temporary Sheeting.** The provisions of §552-5.01 Permanent Sheeting shall apply except that estimate payments in the amount of 75% of the bid amount shall be made upon installation of the sheeting with the remainder paid upon its satisfactory removal. If the Contractor leaves all or part of the sheeting in place, it will be at their own expense and the remaining 25% of the bid amount shall be paid after its function is no longer required.

**552-5.03 Interim Sheeting.** The provisions of §552-5.01 Permanent Sheeting shall apply except that estimate payments in the amount of 75% of the bid amount shall be made upon installation of the sheeting with the remainder paid upon satisfactory removal of that portion specified in the contract documents. If the support system is to be left in place in its entirety, the remainder shall be paid after its function is no longer required. The cost of any work necessary to cut off and remove the specified portion shall be included in the unit price bid.

**552-5.04 Excavation Protection System.** The unit price bid, per square meter, for this work shall include the cost of furnishing all labor materials and equipment necessary to complete this work, including driving equipment, waling, bracing, and design services when employed.

If the Engineer, in writing, orders that the EPS be left in place, this will be classified as extra work and will be paid for in accordance with §104-03, Contingencies, Extra Work, and Deductions.

*Payment will be made under:*
§552-5

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>552.10 M</td>
<td>Permanent Timber Sheeting</td>
<td>Square Meter</td>
</tr>
<tr>
<td>552.11 M</td>
<td>Permanent Steel Sheeting</td>
<td>Square Meter</td>
</tr>
<tr>
<td>552.12 M</td>
<td>Temporary Timber Sheeting</td>
<td>Square Meter</td>
</tr>
<tr>
<td>552.13 M</td>
<td>Temporary Steel Sheeting</td>
<td>Square Meter 5</td>
</tr>
<tr>
<td>552.14 M</td>
<td>Interim Timber Sheeting</td>
<td>Square Meter</td>
</tr>
<tr>
<td>552.15 M</td>
<td>Interim Steel Sheeting</td>
<td>Square Meter</td>
</tr>
<tr>
<td>552.16 M</td>
<td>Excavation Protection System</td>
<td>Square Meter</td>
</tr>
</tbody>
</table>

SECTION 553 - COFFERDAMS AND WATERWAY DIVERSION STRUCTURES

553-1 DESCRIPTION

553-1.01 General. All work done under this Section shall conform to all Federal, State, County and Local Regulations and permit conditions.

553-1.02 Cofferdam. Under this work, the Contractor shall design, furnish, place, maintain, and remove cofferdams together with all necessary waling and bracing, and dewatering equipment within the limits shown on the plans. The Contractor shall also construct, maintain, stabilize, backfill and restore adequate sediment removal area(s) for water discharge control at location(s) shown on the plans or where allowed by the Engineer in accordance with all applicable permits.

If a waterway diversion structure is proposed as a substitution, approval of the Engineer must be obtained. A review by the appropriate permitting agency(ies) will be required. Any delay due to this review and approval process will not be a basis for an extension of time.

553-1.03 Temporary Waterway Diversion Structure. Under this work, the Contractor shall design, furnish, install, maintain, and remove a temporary water diversion structure at the location(s) shown on the plans or as ordered by the Engineer.

553-1.04 Submittals

A. Cofferdams. Cofferdams shall be designed by a Professional Engineer, licensed and registered to practice in New York State. All systems submitted shall be designed for the static water pressure plus stream pressure and ice pressures as appropriate. Stresses shall not exceed the allowable given in AASHTO Standard Specifications for Highway Bridges. The Contractor shall indicate the water elevation above which the system should be flooded to avoid overloading. The Contractor's Engineer shall design the cofferdam to conform to all Federal, State, County and Local Regulations and Permits.

1. Cofferdams (Type 1). The Contractor shall submit the design, including computations and method of installation, to the Engineer for review by the Deputy Chief Engineer Structures (D.C.E.S.). The D.C.E.S. shall be allowed 20 working days for review. Permission to proceed must be received, prior to beginning construction of any cofferdam. The furnishing of such information and receipt of permission to proceed shall not serve to relieve the Contractor of its responsibility for the safety of the workers, the need to meet permit conditions, and the successful completion of the work.

2. Cofferdams (Type 2). Prior to beginning construction of any cofferdam, the Contractor shall submit the methods to be employed to the Engineer for review and approval. Ten working days shall be allowed for review. Construction shall not be started prior to receipt of approval.

B. Temporary Waterway Diversion Structure. Prior to beginning construction/installation of any temporary waterway diversion structure, the Contractor shall submit the methods to be
employed to the Engineer for review and approval. Ten working days shall be allowed for review. Construction shall not be started prior to receipt of approval.

553-2 MATERIALS. The materials shall be timber or steel sheeting of a quality equivalent to that specified in §552-2.02 Temporary Sheetin of Support and Protection Systems, tightly sealed impermeable earth filled bags, precast concrete, a commercially designed system manufactured specifically for the control of water, or other material as indicated in the cofferdam design submitted for review.

553-3 CONSTRUCTION DETAILS

553-3.01 Cofferdams. Cofferdams shall be constructed so as to keep the excavations free from earth, water, ice, or snow, and to permit excavations to be carried to the depths indicated on the plans. Cofferdams, when used in conjunction with a tremie pour, shall be designed and constructed to automatically flood by non-mechanical means such as over topping or flooding ports. The automatic flooding elevation shall be as indicated by note in the plans.

In the event that permanent or temporary sheeting is required by the plans at the location of the cofferdam, the Contractor may elect to incorporate this material into the cofferdam system. Additional bracing may be required to satisfactorily perform excavation, dewatering, and other required construction operations. The permanent sheeting system shall be returned to its intended condition after all cofferdam equipment and material, including any additional bracing, has been removed. All damage done to the temporary system, if still required, or permanent sheeting, shall be repaired at the Contractor's expense, to the satisfaction of the Engineer.

Unless otherwise indicated on the plans, cofferdams shall be maintained in a dewatered condition during foundation construction. The placement of foundation concrete shall not be impeded by water standing or flowing within the cofferdam.

If a waterway diversion structure is approved as a substitution, all of the requirements of §553-3.02 Temporary Waterway Diversion Structure shall apply.

Dewatering equipment and any additional bracing shall be of adequate quality and capacity and shall be so arranged as to permit their proper functioning in connection with the cofferdam. Dewatering equipment and bracing shall be so located to permit construction of the structure in accordance with the plans.

All damage caused by the failure of a cofferdam to perform its proper functions shall be the responsibility of the Contractor. It shall also be the Contractor's responsibility to protect all stream banks from erosion by reason of restriction of the channel caused by the erection of the cofferdam to limits greater than that shown on the plans for the Contractor's own convenience. In that situation, all material which erodes from the banks during that time the cofferdam is in place shall be replaced by the Contractor at the Contractor's own expense. The Engineer, in consultation with the regulatory permit agency(ies) representative(s), will be the sole determiner of the nature and extent of all damages and mitigation requirements. The Engineer shall approve all repair methods proposed by the Contractor prior to the Contractor beginning any remedial activities for which they are liable.

It shall be the Contractor's responsibility to place the cofferdam so that it will not interfere with any batter piles.

The Contractor shall establish and maintain a sediment removal area(s) to retain the discharge for a sufficient period of time using equivalent best management practices as approved by the Engineer, in order that the discharge entering the stream will be as clear as the flowing stream.

553-3.02 Temporary Waterway Diversion Structure. Waterway diversion structures shall be constructed at the locations(s) as shown on the plans so as to divert the flow of water. The structure shall be continuous and constructed in accordance with any regulatory agency permit conditions.

If a system commercially designed and manufactured specifically for the control of water is used, it shall be installed and maintained in accordance with the manufacturer's recommendations.
§553-3

All damage caused by the failure of the temporary water diversion structure to perform its proper function shall be repaired by the Contractor at no cost to the State.

553-3.03 Removal. The Contractor shall remove the temporary portion of the cofferdam installation or the waterway diversion structure, including anchor spuds if used, after such time that it is determined by the Engineer to be no longer necessary. The removal shall be sequenced to minimize turbidity and the discharge of materials into the waterway. Additional temporary erosion control measures, as determined by the Engineer, may need to be employed to facilitate removal.

553-4 METHOD OF MEASUREMENT

553-4.01 Cofferdams. Measurement will be for each cofferdam actually established where indicated on the plans.

In those cases where approval is given to construct a waterway diversion structure in lieu of a cofferdam, the cost of the diversion will be paid at the unit price bid for the cofferdam work.

553-4.02 Temporary Waterway Diversion Structure. Measurement will be for each temporary waterway diversion structure actually constructed in accordance with the requirements of the contract documents and to the satisfaction of the Engineer.

553-5 BASIS OF PAYMENT

553-5.01 Cofferdams. The unit price bid for each cofferdam shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work, including pile driving equipment, waling, and bracing, anchor spudding, maintaining in a dewatered condition, and final removal. No separate payment will be made for any additional temporary erosion control measures required to facilitate removal. In addition, all costs associated with the removal of any sediment deposited in the waterway due to the Contractor’s operations shall be included. When a cofferdam is installed incorporating permanent or temporary sheeting required by the plans, payment will be made for each cofferdam established, including any miscellaneous sheeting, additional bracing, anchor spudding, or other material necessary to complete the work. The permanent or temporary sheeting, if used as part of the cofferdam, will be paid for under a separate item. The cost of establishing, maintaining, stabilizing, backfilling and restoring the sediment removal area(s) shall also be included in the price bid. No separate payment will be made for any repairs of damage required due to the failure of a cofferdam to perform its proper function.

Progress payments will be made. Seventy-five percent of the bid price will be paid after cofferdam installation, construction of the sediment removal area(s) and initial dewatering. The remaining percentage will be paid upon satisfactory removal of the cofferdam and restoration of the sediment removal area(s).

553-5.02 Temporary Waterway Diversion Structures. The unit price bid for each diversion structure shall include the cost of furnishing all labor, equipment, and materials necessary to satisfactorily install, maintain, and remove the diversion structure and any additional temporary erosion control measures required to facilitate removal.

No separate payment will be made for any repairs of damage required due to the failure of a waterway diversion structure to perform its proper function.

In the event that the Contractor is required to extend the temporary waterway diversion structure beyond the limits shown on the plans, changes to the respective diversion structure will be classified as extra work and will be paid for in accordance with §104-03, Contingencies, Extra Work, Deductions.

When the waterway diversion structure is satisfactorily installed, seventy-five percent of the bid price will be paid. The remaining percentage will be paid when all temporary equipment and material have been removed and the waterway satisfactorily restored to its permanent location.
Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>553.01nnn M</td>
<td>Cofferdams (Type 1)</td>
<td>Each</td>
</tr>
<tr>
<td>553.02nnn M</td>
<td>Cofferdams (Type 2)</td>
<td>Each</td>
</tr>
<tr>
<td>553.03nnn M</td>
<td>Temporary Waterway Diversion Structure</td>
<td>Each 5</td>
</tr>
</tbody>
</table>

NOTE: nnn denotes serialized pay item, see §101-02 Definitions of Terms under "Specifications".

SECTION 554 - MECHANICALLY STABILIZED EARTH SYSTEM

554-1 DESCRIPTION. Construct a Mechanically Stabilized Earth System (MSES) at the locations indicated on the plans. A Mechanically Stabilized Earth System is comprised of an unreinforced concrete leveling pad, facing units, earth backfill, and a reinforcing material used to stabilize the backfill. Obtain all necessary materials, except backfill and leveling pad material, from the approved wall system designer-supplier. Approved designers-suppliers, wall systems, and the components of each wall system appear on the Department's approved list located in the office of the Director, Materials Bureau. Obtain from the designer-supplier a Mechanically Stabilized Earth System design stamped by a Professional Engineer licensed and registered to practice in New York State. Submit the MSES design package, including working drawings of the wall design, design calculations, working drawings for all job-specific facing panels not previously approved by the D.C.E.S., and the designer-supplier's Installation Manual to the D.C.E.S. at least 30 working days before starting work. After receipt of all pertinent information, the D.C.E.S. requires 20 working days to review the submission and reply to the Engineer. Begin work only after receiving D.C.E.S. written approval.

Supply on-site technical assistance from a representative of the designated designer-supplier during the beginning of the installation until such time as the Engineer determines that outside consultation is no longer required.

554-1.01 Definitions. The following definitions apply:

A. Wall System. A marriage of a specific facing unit, a specific reinforcing and the backfill described in §554-2.09 of this specification.

B. Facing Unit. A precast concrete panel incorporating a means for attaching the reinforcing, forming part of the face area of the mechanically stabilized earth system. A corner unit is a facing unit having two faces.

C. Reinforcing. A metal strip, wire mesh, geogrid or other similar material connected to the facing unit for the purpose of fill stabilization.

D. Attaching Devices. Anything cast into the facing unit to provide a means for attaching reinforcing.

E. Fastener. Anything used to connect the reinforcing to the attaching device.

F. Joint Filler. Material used to fill the joints between units.

G. Slip Joint. A vertical joint specific to the wall system used as a stress relief at wall step locations.

H. Identification Markers. Signs or marking tape buried near the finished grade to identify and prohibit excavation of the reinforced backfill.

554-2 MATERIALS. Not all materials listed are required for each Mechanically Stabilized Earth System. Ensure that the proper materials are supplied for the chosen system design. Provide materials meeting the following requirements:
§554-2

554-2.01 Facing Units. Fabricate in accordance with the requirements of §704-14 Precast Concrete Panel Units.

Fabricate Precast concrete coping and other incidental precast units in accordance with the requirements of §704-14 Precast Concrete Panel Units. Architectural treatment of the Precast Concrete Panels may be required by special notes shown on the plans.

554-2.02 Reinforcing Strips. Manufacture the reinforcing strips from recognized ASTM Designated metal grades and galvanize in accordance with the requirements of §719-01, Type I. The reinforcing strips associated with each approved wall system appear on the Department’s approved list under wall system components.

554-2.03 Reinforcing Mesh. Shop fabricate the reinforcing mesh from cold drawn steel wire conforming to the requirements of §709-09 and weld into the finished mesh fabric in accordance with the requirements of §709-02. Galvanize in accordance with §719-01, Type I. The reinforcing mesh associated with each approved wall system appear on the Department’s approved list under wall system components.

554-2.04 Geogrid Reinforcing. Provide geogrid reinforcing tested and certified to meet the minimum requirements for geosynthetic products in accordance with AASHTO Specifications for Highway Bridges, Section 5.8.6.1.2, Geosynthetic Reinforcement. Submit the geogrid manufacturer’s certification with the material. Include in the certification: the geogrid manufacturer’s name, the geogrid name, the test lot number, the minimum average roll value for Ultimate Tensile Strength, the long-term design tensile strength, and the reduction factors used to calculate the long-term design tensile strength. The grid(s) associated with each approved wall system appear on the Department’s approved list under wall system components.

554-2.05 Fasteners and Attaching Devices. The fasteners and attaching devices are specific to each wall system and provided by the wall system supplier. The fasteners and attaching devices associated with each approved wall system appear on the Department’s approved list under wall system components.

554-2.06 Joint Fillers. Fill joints with material approved by D.C.E.S. and supplied by the approved wall system supplier.

554-2.07 Slip Joints. The type of slip joints are specific to each wall system and are designed and supplied by the wall system supplier.

554-2.08 Leveling Pad. Provide leveling pad material meeting the requirements of Section 501, Class A concrete.

554-2.09 Backfill. Provide backfill material for any Mechanically Stabilized Earth System from a single source unless prior approval for use of designated multiple sources is obtained from the Director, Geotechnical Engineering Bureau. Any mineral (inorganic) soil, blasted or broken rock, or similar materials of natural origin, including mixtures thereof, may be suitable materials subject to the following:

A. Tests, Control and Acceptance Methods. Perform material tests and control methods pertaining to the backfill requirements in conformance with the procedures contained in the appropriate Departmental publications in effect on the date of the advertisement for bids. These publications are available upon request to the Regional Director, or the Director, Geotechnical Engineering Bureau.

Acceptance of the backfill will be made in accordance with the procedural directives of the Geotechnical Engineering Bureau.

B. Backfill Material. Stockpile the backfill material in accordance with the latest "Geotechnical
Control Procedures for the Control of Granular Materials”, and grade in accordance with TABLE 554-1.

<table>
<thead>
<tr>
<th>TABLE 554-1 BACKFILL GRADATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size Designation</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>100 mm</td>
</tr>
<tr>
<td>6.3 mm</td>
</tr>
<tr>
<td>425 μm</td>
</tr>
<tr>
<td>75 μm</td>
</tr>
</tbody>
</table>

C. Plasticity Index. If the State elects to test for plasticity, the Plasticity Index shall not exceed 5

D. Durability. If the State elects to test for durability, material having a Magnesium Sulfate Soundness loss in excess of 30 percent will be rejected and shall not be placed in the work.

E. Corrosion Potential (Metal Reinforcing and/or Connectors Only). The State will test for the corrosion potential of any system with exposed metal in the backfill. All stockpiled backfill materials will be tested for resistivity and pH, and may be tested for sulfides at the Department's discretion. Material failing to meet the following requirements of Table 554-2, for those tests that are performed, will be rejected except as specified below:

Material failing to meet the resistivity criterion may be tested for sulfate and chlorides. Material meeting the criteria for both sulfates and chlorides and having a resistivity greater than 10 ohm-m will be acceptable.

<table>
<thead>
<tr>
<th>TABLE 554-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistivity $\rho \geq 30$ ohm-m</td>
</tr>
<tr>
<td>$5 \leq \text{pH} \leq 10$</td>
</tr>
<tr>
<td>Sulfides $\leq 300$ mg/kg</td>
</tr>
</tbody>
</table>

554-2.10 Identification Markers

A. Signs. These will be 180 mm x 250 mm (minimum) fiberglass.

B. Marking Tape. This will be polyethylene material 75 mm wide, 100 μm thick. Signs and marking tape are provided by the chosen designer-supplier.

554-2.11 Basis of Acceptance

A. Facing Units. Accepted in accordance with the requirements of §704-14, Precast Concrete Panel Units.

B. Cast-in-Place Concrete. The requirements of Section 501, Class A concrete, apply.

C. Other Materials. These will be accepted by certification. The State, however, reserves the right to sample, test and reject certified material in accordance with Departmental written instructions.

554-3 CONSTRUCTION DETAILS
§554-3

554-3.01 Excavation and Disposal. Excavate and dispose of all excavated material in accordance with the requirements of Section 203, except as modified herein.

A. Placement Area. Grade the area under the Mechanically Stabilized Earth System, level for a width equal to, or in excess of, the reinforcing length. Prior to wall system construction, thoroughly compact this area to the satisfaction of the Engineer. Treat all soils found to be unsuitable, or incapable of being satisfactorily compacted because of moisture content, in a manner directed by the Engineer, in conjunction with the recommendations of the Regional Geotechnical Engineer.

B. Rock. Remove rock to the limits indicated on the plans.

C. Depth of Excavation. The depth of excavation for the leveling footing is indicated on the plans. Include the cost of this excavation in a separate excavation item.

554-3.02 Facing Unit Inspection, Storage, Repair and Rejection

A. Precast Concrete Facing Units. Precast concrete facing units will be inspected upon arrival at the work site to determine if damage occurred during shipment. An additional inspection will be made prior to installation to determine any damage which may have occurred during storage. Handle and store the units with extreme care to prevent damage.

B. Tolerances. Units not meeting dimensional tolerances, as determined by the Engineer, will be rejected. Replace rejected units with units acceptable to the Engineer.

C. Damaged Units. Repair damaged units in a manner approved by the Engineer. Units that the Engineer determines are not repairable will be rejected. Replace rejected units with units acceptable to the Engineer.

D. Rejection Responsibility. Responsibility for the rejection of units delivered to the job site rests solely with the Engineer.

554-3.03 Structure Erection

A. Methods and Equipment. Install units in accordance with the designer-supplier's working drawings and Installation Manual, unless otherwise modified by the Contract Documents, or the Engineer. Prior to installation of the units, furnish the Engineer with detailed information concerning the proposed construction method, as well as the specific construction equipment planned for use. Begin work only after receiving the Engineer's written approval of the proposed construction methods.

B. Unreinforced Concrete Leveling Pad. Provide an unreinforced concrete leveling pad as required by the plans. Place the concrete in accordance with the requirements §555-3. The Engineer may waive any part of §555-3, that the Engineer determines is impractical.

C. Unit Installation

1. Place units such that, after completion of compaction, the requirements of TABLE 554-3 are not exceeded. After placement, maintain each unit in position by a method acceptable to the Engineer. If wedges are used, do not allow them to remain in place below three panel unit heights during installation, and compaction. Remove all wedges remaining in the top three panel unit heights upon completion of the Mechanically Stabilized Earth System. External braces may be required for initial placements. Install joint fillers in the manner indicated by the Installation Manual.

2. Correct all misalignments of installed units in excess of the tolerances allowed by Table 554-3, in a manner satisfactory to the Engineer at no additional cost.
3. Govern the operations and procedures to prevent misalignment of the installed panel units. Precautionary measures include, but are not limited to, keeping vehicular equipment a minimum of one meter from the panel units. Within one meter of the panel units use compaction equipment meeting the requirements of 203-3.12B6.

<table>
<thead>
<tr>
<th>TABLE 554-3 FACING UNIT ALIGNMENT AND JOINT OFFSET TOLERANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal Alignment</td>
</tr>
<tr>
<td>Joint Offset per Unit</td>
</tr>
<tr>
<td>Overall Vertical Plumbness (Top to Bottom of Wall System)</td>
</tr>
</tbody>
</table>

D. Backfill

1. Place backfill materials, other than rock, at a moisture content less than, or equal to, the Optimum Moisture Content. Rework or replace, as determined by the Engineer, all backfill material placed at a moisture content in excess of the Optimum Moisture content. Determine the Optimum Moisture Content in accordance with the latest Geotechnical Test Methods for compaction that incorporate moisture content determination. Rework or replace backfill material at no additional cost to the State.

2. Place granular backfill material in uniform layers not exceeding 300 mm loose lift thickness per layer. Compact each layer to a minimum of 95 percent of Standard Proctor Maximum Density in accordance with §203-3.12.

3. Place rock backfill in uniform layers not exceeding 400 mm loose lift thickness. Compact in accordance with requirements determined by the Engineer.

E. Reinforcing

1. Place reinforcing in accordance with the designer-supplier’s recommendations or as described in the designer-supplier’s Installation Manual.

2. Prior to placement of the steel reinforcing, backfill the area within one meter of the panel units horizontally to within 25 mm or less, below the required reinforcing elevation. Roughly grade the backfill beyond the one meter line to the reinforcing elevation. Roughly grade the backfill for the geogrid reinforcing to the reinforcing elevation.

3. Before attaching the reinforcing to the panel units, repair all damage to the zinc coating in accordance with the requirements of §719-01.

4. Prior to the attachment of the reinforcing, as required, fill all openings, or attachment locations, with grease, or other protective material. Obtain the grease, or other protective materials from the chosen designer-supplier.

5. Place reinforcing normal to the panel units unless indicated otherwise by the plans. Take care to avoid breaking, distorting, or disturbing the reinforcing. Replace reinforcing which is broken, or distorted, as determined by the Engineer.

6. Connect geogrid reinforcing to the facing before placement of subsequent facing units, or as directed by the approved construction drawings.

7. Operate rubber tired equipment on top of geogrid reinforcing only at low speeds (less than 5mph) and without making sharp turns or braking sharply. Do not operate tracked equipment directly on geogrid reinforcing. Cover geogrid with a minimum 150 mm thick soil layer prior
§554-3

to operating tracked equipment over reinforced areas.

8. Repair or replace damaged geogrid in strict accordance with the designer-supplier's written instructions.

554-4 METHOD OF MEASUREMENT. Determine the quantity as the total number of square meters of face area computed from the plans using the following limits:

A. Vertical

1. Topmost surface of the leveling footing.

2. Topmost surface of the facing units.

B. Horizontal. Limits indicated on the plans.

When computing quantity, take into consideration the possible variation in the elevations of the footing and top of facing units. No field measurements will be made unless the Engineer specifies in writing a change to the limits indicated on the plans.

554-5 BASIS OF PAYMENT

554-5.01 Mechanically Stabilized Earth System. Include in the unit price bid the cost of all labor, equipment, technical representation from the designer-supplier, and materials, including backfill, reinforcing, leveling footing, joint fillers, and coping, unless otherwise modified by the Contract Documents.

554-5.02 Excavation and Disposal. Excavation and disposal of excavated material will be paid for under a separate item.

554-5.03 Damaged Units. No payment will be made for damaged units, nor for units that do not meet dimensional tolerances. Repair, or replace such units as determined by the Engineer, at no additional cost to the State.

554-5.04 Reinforcing. No payment will be made for reinforcing that the Engineer orders replaced. Replace such reinforcing at no additional cost.

554-5.05 Water. Include the cost of adding water for backfill compaction in the unit price bid for the Mechanically Stabilized Earth System, unless items for Furnishing Water Equipment and Applying Water are included in the Contract. If these items are included, include the cost of adding water in their bid prices.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>554.01XX M</td>
<td>Mechanically Stabilized Earth System, No Color</td>
<td>Square Meter</td>
</tr>
<tr>
<td>554.02XX M</td>
<td>Mechanically Stabilized Earth System, Integral Color</td>
<td>Square Meter</td>
</tr>
<tr>
<td></td>
<td>Surface</td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>Plain Concrete Surface</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>Textured Surface (hand tooled, raked, etc.)</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Exposed Aggregate Surface</td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>Architectural Pattern (form liner or stamped)</td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>As Shown on Plans</td>
<td></td>
</tr>
</tbody>
</table>