

625.9**625.9 - PAY ITEMS:**

ITEM	DESCRIPTION	UNIT
625001-*	DRILLED CAISSONS " <u>D</u> " DIAMETER	LINEAR FOOT (METER)
625003-*	" <u>D</u> " ROCK SOCKET FOUNDATION	LUMP SUM
625004-*	" <u>D</u> " DRILLED CAISSON TEST HOLE	LUMP SUM
625005-*	PREINSTALLATION CORE HOLE	LINEAR FOOT (METER)

* Sequence number

D = Diameter of drilled caisson, in inches (millimeters)

SECTION 626 RETAINING WALL SYSTEMS

626.1 - DESCRIPTION:

This work shall consist of furnishing the design, wall construction plans, materials, and construction of cast-in-place reinforced concrete or Mechanically Stabilized Earth (MSE) walls in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions shown in the plans.

626.2 - GENERAL:

Unless specified otherwise in the contract documents the wall may be, at the Contractor's option, any one of the wall systems on the approved vendor list corresponding to the applicable pay Item. The approved Vendor Lists are available through the Materials Section of the Contract Administration Section.

The Contractor shall indicate which wall system is to be constructed by the bid alternative chosen in the proposal. No change of the wall system indicated in the bid proposal shall be permitted after the bid opening unless approved by the Engineer.

The wall design and detail plans for construction shall be submitted to the Engineer for approval. The time required for preparation and review of these submittals shall be charged to the allowable contract time. Delays caused by untimely submittals or insufficient data will not be considered justification for time extensions. No additional compensation will be made for any additional material, equipment, or other items found necessary to comply with the project specifications as a result of the Engineer's review. The proposed wall design shall be compatible with the Contractor's proposed method of construction, and shall be compatible with any method of construction shown in the plans. The Division does not assume nor warrant any wall system's compatibility with any particular construction methods.

626.3 - DESIGN CRITERIA:

626.3.1 - General: The size of all structural elements shall be determined such that the design load stresses do not exceed the allowable

stresses found in the AASHTO LRFD Bridge Design Specifications, latest edition.

Analysis of external stability of the in-place retaining wall system will be the responsibility of the Division. Any staged or temporary construction affecting wall stability shall be the responsibility of the Contractor.

The parapets on any portion of the retaining walls as shown in the plans shall be designed to resist traffic loads in accordance with the AASHTO LRFD Bridge Design Specifications, latest edition.

626.3.2 - Mechanically Stabilized Earth: The design for the MSE wall shall consider the internal stability of the wall mass. The design shall conform to the requirements found in AASHTO LRFD Bridge Design Specifications, latest edition.

External loads, which affect the internal stability such as those, applied through piling, bridge footings, temporary construction, etc. shall be accounted for in the design. A design life of 100 years shall be used throughout the design. The factor of safety for pullout resistance shall not be less than 1.50 based on pullout resistance at $\frac{3}{4}$ inch (19 mm) deflection.

The allowable bearing pressure under the stabilized mass shall be as shown in the plans. The minimum length of the soil reinforcing system, as measured from the back of the front face to the end at the back of the soil stabilized mass, shall be as shown in plans, and shall be the same from top to bottom of the wall at any cross section.

All appurtenances behind, in front of, under, mounted upon, or passing through the wall such as drainage structures, utilities, or other items shown in the plans must be accounted for in the design of the wall.

626.3.3 - Cast-in-Place Reinforced Concrete: When a Cast-in-Place Reinforced Concrete option is included in the plans the following shall be applicable.

The information shown in the plans for the cast-in-place alternative is schematic; however, all dimensions shown in the plans shall be considered minimums.

The allowable bearing pressure of the foundation soils, the unit weight of the retained soils, and the characteristics of the retained soils necessary for design purposes shall be as shown in the plans.

626.4 - SUBMITTALS:

626.4.1 - General: The Contractor shall submit complete design calculations, explanatory notes, and detail plans for the proposed wall system. The detail plans shall include all details, dimensions, quantities, and cross sections necessary to construct the wall and shall include but not be limited to the following items:

626.4.1

A plan and elevation sheet or sheets for the wall which shall contain the following:

1. An elevation view of the wall which shall indicate the elevations at the top of the wall at all horizontal and vertical break points and at least every 50 ft. (15 m) along the face of the wall, all steps in the footings or leveling pads, the original and final ground lines, the maximum bearing pressures, and the summary of quantities for each wall.
2. A plan view of the wall which shall indicate the offsets from the construction centerline to the face of the wall at all changes in horizontal alignment and the centerline of any drainage structure or drainage pipe behind, passing through, or under the wall.
3. A typical cross section or cross sections showing elevation relationship between existing ground conditions and proposed grades.
4. All general notes required for constructing the wall. The required batter to compensate for the elongation of the soil reinforcing during erection shall be shown for each different required height.
5. All horizontal and vertical curve data affecting the wal.
6. All details for footings or leveling pads shall be shown including details for steps in the footings or leveling pads.
7. All details for construction of walls with appurtenances behind, under, mounted upon, or passing through the wall such as drainage structures or utilities shall be clearly indicated.
8. Required architectural treatments shall be as indicated and as detailed in the plans. All details for any required architectural treatments shall be shown including:
9. Product data and installation instructions for manufactured form systems, form liners, release agents, ties, and accessories. The release agent manufacturer shall certify that the products supplied comply with regulations controlling the use of volatile organic compounds (VOC's).
10. Shop drawings for fabrication and erection. These drawings shall show all items that visually affect the exposed concrete, including, but not limited to, general form construction, jointing, specially formed joints or reveals, and patterns of placement. The Engineer's review will be for general architectural applications and features only. Formwork design for structural stability and sufficiency is the Contractor's responsibility and shall not be submitted for the Engineer's review.

11. The wall manufacturer shall submit copies of their Quality Assurance/Quality Control Manuals on each project.
12. Mockup or Sample Panels. The Contractor shall construct a mockup or sample panel using the proposed formwork and facing materials in order to demonstrate the required finishes and textures. Actual construction of concrete shall not proceed until the Engineer has accepted the sample units.

At the time the detail plans are submitted for review, they shall be accompanied by design calculations and explanatory wall notes. These documents shall be legible and shall demonstrate that the design criteria have been met. Specified minimum factors of safety and the maximum soil pressure beneath the wall footing or earth stabilized mass shall be clearly indicated.

The plans shall be prepared on reproducible sheets 22 x 34 inches (550 mm x 850 mm) including borders. Each sheet shall have a title block in the lower right hand corner. The title block shall include the sheet number of the drawing, name or designation of the wall, the project designation, and the Contractor. Design calculations and notes shall be prepared on sheets 8½ x 11 inches (216 mm x 280 mm), and shall contain the project designation, wall designation, date of preparation, initials of designer and checker, and page number at the top of the page. The Detail Plans, Design Calculations, and Explanatory Notes shall be signed and stamped by a Professional Engineer registered in West Virginia and knowledgeable in the proposed alternative wall system.

The initial submission shall include three sets of the detail plans, calculations, and notes. One set of notes and plans will be returned to the Contractor with any indicated corrections. When the plans and notes are stamped approved by the Engineer, the Contractor shall furnish the Engineer with the requested number of sets of prints and a Mylar set of the plans for distribution by the Division. The Contractor shall perform no work or ordering of materials for the structures until the Engineer has approved the submittal.

626.4.2 - Mechanically Stabilized Earth: The details and material specifications for the wall panels and incidental accessories shall be included with the detail plans for approval by the Engineer.

The designation as to the type of panel, the length of the soil reinforcing systems, the distance along the face of the wall where changes in lengths of the soil reinforcing systems occur, and the limit of widest mesh, strip, or anchor shall be clearly shown in the plans.

All wall panels shall be detailed. The details shall show all dimensions necessary to construct the element, all reinforcing steel in the element, and the location of soil reinforcing system devices embedded in the panels.

626.4.3 - Cast-in-Place Reinforced Concrete: The plans for the cast-

626.5

in-place wall shall contain a complete reinforcing bar schedule showing all bending details and bar marks. The plans shall also show the location of all construction joints, expansion joints, or other joints in the wall. All wall thickness shall be shown and transition details at wall thickness changes.

626.5 - MATERIALS:

626.5.1 - Mechanically Stabilized Earth Components: The Contractor shall make arrangements to purchase the facing elements, reinforcing mesh or strips, attachment devices, joint materials, and all other necessary components. Materials not conforming to this section of the specifications or from sources not listed in the contract documents shall not be used without written consent from the Engineer.

626.5.1.1 - Reinforced Concrete Facing Panels: The panels shall be fabricated in accordance with Section 601 of the Standard Specifications with the following exceptions and additions:

- A. Concrete for the precast facing panels shall attain a minimum compressive strength of 4,000 psi (27 Mpa) at 28 days. All concrete shall have air entrainment of 7 % plus or minus 2.5 % with no other additives. Specified concrete properties are to be tested in accordance with applicable provision of Section 601.4.1 of the Standard Specifications. Acceptance of a Production LOT will be made if the compressive strength test result is greater than or equal to, 4,000 psi (27 Mpa). A Production LOT is defined as a group of panels that will be represented by a single compressive strength sample and will consist of a single day's production. A minimum of two cylinders shall be required for every compressive strength sample.
- B. The units shall be fully supported until the concrete reaches a minimum compressive strength of 1,000 psi (97 Mpa).
- C. Unless otherwise indicated in the plans or elsewhere in the specifications, the concrete surface for the front face shall have a Class 1 finish as defined in Section 601.11 and a uniform surface finish for the rear face. The rear face of the panel shall be screeded to eliminate open pockets of aggregate and surface distortions in excess of ¼ inch (6 mm). The panels shall be cast on a flat area. The clevis loops, tie strip guide, or other galvanized devices shall not contact or be attached to the face panel reinforcement steel.
- D. The date of manufacture, the production LOT number, and the piece mark shall be clearly scribed on an unexposed face of each panel.

E. All units shall be handled, stored, and shipped in such a manner as to eliminate the dangers of chipping, discoloration, cracks, fractures, and excessive bending stresses. Panels in storage shall be supported in firm blocking to protect the panel connection devices and the exposed exterior finish.

F. All units shall be manufactured within the following tolerances:

1. Panel Dimensions: Position of panel connection devices within 1 in. (25 mm), except for coil and loop embeds which shall be 3/16 inch (5 mm) . All other dimensions within 3/16 inch (5 mm) .
2. Panel Squareness: Squareness as determined by the difference between the two diagonals shall not exceed ½ in. (13 mm).
3. Panel Surface Finish: Surface defects on smooth formed surfaces measured over a length of 5 feet (1.5 m) shall not exceed ¼ in. (6 mm). Surface defects on the textured-finished surfaces measured over a length of 5 feet shall not exceed 5/16 in. (8 mm).

Units shall be rejected because of failure to meet any of the requirements specified above. In addition, any or all of the following defects shall be sufficient cause for rejection:

1. Defects that indicate imperfect molding.
2. Defects indicating honeycombed or open textured concrete.
3. Cracked or severely chipped panels.
4. Color variation on front face of panel due to excess form oil or other reasons.

All reinforcing steel shall be in accordance with Section 602 of: the Standard Specifications.

626.5.1.2 - Soil Reinforcing and Attachment Devices: All reinforcing and attachment devices shall be carefully inspected to insure they are true to size and free from defects that may impair their strength and durability.

Cutting of reinforcing strips or mesh at vertical obstacles, shall not be permitted. Care must be taken to avoid damage to the galvanized coating during handling, storing, and shipping.

The following requirements shall apply to all soil reinforcing and attachment devices.

A. Reinforcing strips shall be hot rolled from bars to the required shape and dimensions. Their physical and mechanical properties shall conform to ASTM A-36 (AASHTO M-183) or equal. Galvanization shall be required and shall conform to the minimum requirements of ASTM A-123 (AASHTO M-111).

B. Reinforcing mesh shall be shop fabricated of cold drawn steel wire

626.5.1.3

conforming to the requirements of paragraph one of Section 709.4. Galvanization shall be applied after the mesh is fabricated and shall conform to the minimum requirements of ASTM A-123 (AASHTO M-111).

- C. The tie strips shall be shop fabricated of a hot rolled steel conforming to the minimum requirements of ASTM A-570, Grade 50 or equivalent. Galvanization shall be required and shall conform to ASTM A-123 (AASHTO M-111).
- D. Loop embeds shall be fabricated of cold drawn steel wire conforming to ASTM A-510, UNS G-10350 or ASTM A-82. Loop embeds shall be welded in accordance with ASTM A-185. Both shall be galvanized in accordance with ASTM B-633 or ASTM A-123 (AASHTO M-111).
- E. Bolts shall meet the requirements of ASTM A-325. Nuts shall meet the requirements of ASTM A-563 Grade DH or ASTM A-194 2H. Fasteners shall be galvanized in accordance with ASTM A-153.
- F. Connector pins and mat bars shall be fabricated from cold drawn steel conforming to ASTM A-82 and welded to the soil reinforcement mats as shown in the plans. Galvanization shall be required and shall conform to ASTM A-123 (AASHTO M-111).

626.5.1.3. - Joint Materials: Joint materials are to be installed to the dimensions and thicknesses in accordance with the plans or approved shop drawings, unless otherwise indicated:

- A. Provide either preformed EPDM rubber pads conforming to ASTM D-2000 for 4AA, 812 rubbers; neoprene elastomeric pads have a Durometer Hardness of 55 ± 5 ; or polyethylene bearing pads meeting the density requirements of ASTM D-1505 in horizontal joints between panels.
- B. Cover all joints between panels on the backside of the wall with a geotextile fabric that meets the requirements of Section 715.11.4 of the Standard Specifications. The minimum width and lap of the fabric shall be as follows:

Vertical and horizontal joints: 12”(300 mm) ; lap-4”(100 mm) .

626.5.1.4 - Acceptance: The Contractor shall furnish the Engineer a Certificate of Compliance certifying the above materials comply with the applicable contract specifications.

626.5.2 - Concrete Leveling Pad: All concrete used in the leveling pad shall as a Minimum conform to Section 601 of the Standard Specifications for

Class C Concrete.

626.5.3 - Select Granular Backfill

626.5.3.1- Test Requirements: All backfill material used in the structure volume shall conform to the following gradation limits as determined by AASHTO T-27:

Sieve Size	Percent Passing
4 inches (100 mm)	100
No. 40 mesh sieve	0 - 60
No. 200 mesh sieve	0 - 15

The backfill shall conform to the following additional requirements:

- A. The plasticity index (P.I.) as determined by AASHTO T-90 shall not exceed 6, or the material is described as non-plastic.
- B. The material shall exhibit an angle of internal friction of not less than 34 degrees, as determined by the standard Direct Shear Test, utilizing a sample of the material compacted to 95% of AASHTO T-99, Methods C or D (with oversized correction as outlined in Note 7) at optimum moisture content. No testing is required for backfills where 80% of sizes are greater than $\frac{3}{4}$ in. (19 mm).
- C. Soundness: The materials shall be substantially free of shale or other soft, poor durability particles. The material shall have a magnesium sulfate soundness loss of less than 30% after four cycles as determined by AASHTO T-104, or a sodium sulfate loss of less than 15% after five cycles as determined in accordance with AASHTO T-104.
- D. Electrochemical Requirements: The backfill materials shall meet the following criteria:

Requirements	Test Methods
Resistivity greater than 3,000 ohm Centimeters	AASHTO T-288
Ph 5-10	AASHTO T-289
*Chlorides less than 100 parts per million	AASHTO T-291
*Sulfates less than 200 parts per million	AASHTO T-290
Organic Content: 1% maximum	AASHTO T-267

* If resistivity is greater than 5,000 ohm-cm, the chlorides and sulfates requirements may be waived.

626.5.3.2 - Quality Control Testing: Quality control of the select granular material is the responsibility of the contractor as specified in 106.1.

The Contractor shall maintain equipment and qualified personnel to perform all sampling and testing necessary to determine the magnitude of the various properties of the material governed by the Specifications and shall maintain these properties within the limits of the Specifications.

626.5.3.3

The Contractor shall design a Quality Control Plan detailing the methods by which the Quality Control Program will be conducted. The plan prepared in accordance with the guidelines set forth in the appropriate portions of MP 307.00.50 and MP 717.04.21, shall be submitted to the Engineer at the preconstruction conference. The work shall not begin until the plan is reviewed for conformance with the contract documents.

626.5.3.3 - Sampling and Testing: Frequency of sampling and testing shall be in accordance with the Contractor's Quality Control Plan. The minimum frequencies for gradation and plastic limits shall be as stated in MP 717.04.21, Table D, for subgrade.

626.5.3.4 - Acceptance: The Contractor shall furnish certified test results that the select granular backfill meets the contract specifications. The test results for the select granular backfill shall not be used to verify compliance

performed at any time if the material changes. Additional tests for gradations and plastic limits shall be determined during the placement of the material.

Backfill placement shall closely follow erection of each course of panels. Backfill shall be placed in such a manner as to avoid any damage or disturbance of the wall materials or the Contractor at his expense shall correct misalignment or distortion of the wall facing panels due to placement of backfill outside the limits of this specification. At each reinforcement level, the backfill shall be placed to the level of the connection. Backfill placement methods near the facing shall assure that no voids directly beneath the reinforcing elements.

The backfill required to be placed in front of the wall, from the leveling pad to finished ground, shall be placed immediately after the Select Granular Backfill is above the first layer of Soil Reinforcing.

The maximum lift thickness after compaction shall not exceed 6 inches unless approved by the Engineer. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

Compaction within 3 feet (300 mm) of back face of the wall shall be achieved by at least three passes of a lightweight mechanical tamper, roller, or vibratory system.

At the end of each day's operation, the Contractor shall slope the last level of the backfill away from the wall facing to rapidly direct runoff away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

Acceptance for compaction shall be on a LOT-by-LOT basis. A LOT shall be divided into five approximately equal sized sub-lots. A sub-lot shall consist of the quantity of material to backfill a single lift for 100 feet (30 m) of wall and at least one test per lift. One nuclear moisture and density measurement shall be made at a random location within each of the five sub-lots according to MP 207.07.20 for material having less than 40% retained on the $\frac{3}{4}$ in. (75 mm) sieve and MP 700.00.24 for material having 40% or more

retained on the $\frac{3}{4}$ in. (75 mm) sieve. The moisture tolerance shall be from optimum to two percentage points below optimum. The random locations shall be determined in accordance with MP 712.21.26. The target percentage of dry density shall be 95%. For applications where spread footings are used to support a bridge or other structural loads, the target percentage of dry density shall be 100%. If the results of five density tests on a LOT indicates that at least 80% of the material, in accordance with 106.3.1 (West Virginia AP-A), has been compacted to the specified target percentage of dry density, the LOT will be accepted. If less than 80 % has been compacted to the specified target percentage of dry density and/or the moisture content is outside the tolerance range, no additional material shall be placed until the LOT has been reworked to meet the specified requirements. Reworking and retesting shall be at the expense of the Contractor. When the Division performs the testing in the evaluation of reworked LOTs, the testing will be at the expense of the Contractor at the unit cost specified in 109.2.2.

The backfill material must compact to a stable condition. If the material is not stable under the weight of construction equipment, the contractor must correct the problem or replace the material even if test results indicate that the material meets the moisture and density specifications.

626.6 - CONSTRUCTION METHODS:

626.6.1 - Mechanically Stabilized Earth:

626.6.1.1 - Foundation Preparation: The foundation for the structure shall be graded level for a width equal to the length of reinforcement elements plus one (1) foot (300 mm) or as shown in the plans. Prior to wall construction, except where constructed on rock, the foundation shall be compacted with a smooth wheel vibratory roller. Any foundation soils found to be unsuitable shall be removed and replaced with select granular backfill as per Section 614.5.1.4 of these specifications.

626.6.1.2 - Wall Erection: A MSE wall supplier representative shall be present a minimum of three (3) days and as required thereafter during erection of the wall to assist the fabricator, contractor, and Engineer. The cost of the representative shall be considered incidental to the unit price of the MSE Wall System.

Precast concrete panels shall be placed so that their final position is vertical or battered as shown in the plans. Panels shall be handled by means of lifting devices connected to the upper edge of the panel. Panels should be placed in successive horizontal lifts in the sequence shown in the plans as backfill placement proceeds. As backfill material is placed behind the panels, the panels shall be maintained in position by means of temporary wedges or bracing according to the wall supplier's recommendations. The Contractor shall not have more than two levels of temporary wedges in place at any time during wall erection. Concrete facing vertical tolerances and horizontal alignment tolerances shall not exceed $\frac{3}{4}$ in. (19 mm). The overall vertical tolerance of the

626.6.1.3

wall (top to bottom) shall not exceed ½ in. (13 mm) per 10 feet (3 m) of wall height.

Reinforcement elements shall be placed normal to the face of the wall, unless otherwise shown in the plans. Prior to placement of the reinforcing elements, backfill shall be compacted in accordance with these Specifications.

626.6.1.3 - Backfill Placement: Backfill placement shall closely follow erection of each course of panels. Backfill shall be placed in such a manner as to avoid any damage or disturbance of the wall materials or misalignment of the facing panels or reinforcing element. Any wall materials that become damaged during backfill placement shall be removed and replaced at the Contractor's expense. The Contractor at his expense shall correct any misalignment or distortion of the wall facing panels due to placement of backfill outside the limits of this specification. At each reinforcement level, the backfill shall be placed to the level of the connection. Backfill placement methods near the facing shall assure that no voids exist directly beneath the reinforcing elements.

The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift.

The maximum lift thickness after compaction shall not exceed 1 ft. (300 mm). The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

Compaction within 3 ft. (900 mm) of back face of the wall shall be achieved by at least three passes of a lightweight mechanical tamper, roller, or vibratory system.

At the end of each day's operation, the Contractor shall slope the last level of the backfill away from the wall facing to rapidly direct runoff away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

626.6.2 - Cast-in-Place Reinforced Concrete:

626.6.2.1 - General: Except as otherwise shown in the plans or herein, construction methods for cast-in-place retaining walls shall comply with the Standard Specifications.

Construction methods for the following shall be per the indicated section of the Standard Specifications:

<u>Item</u>	<u>Section</u>
Unclassified Borrow Excavation	211
Structure Excavation	212

Wet Excavation	212
Rock Excavation	212
Select Material for Backfilling	212
Concrete	601
Reinforcing Steel	602

626.6.2.2 - Architectural Forms:

626.6.2.2.1 - General: Construct forms to sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, level, and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, chamfers, blocking, screeds, bulkheads, and other as required.

Fabricate forms to prevent cement paste from leaking while placing concrete and for easy removal without hammering or prying against exposed concrete surfaces. Provide crush plates where stripping might damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete. Solidly butt joints and provide backup material at joints to prevent leakage and fins. Assemble forms so that they may be easily removed without damaging exposed concrete surfaces.

Provide temporary form openings where inaccessible formwork interior can be cleaned and inspected before placing concrete. Place temporary form openings as inconspicuously as possible, consistent with project requirements.

When drilling forms used for exposed concrete, drill from the contact face to the outside to suit the ties used and to prevent leakage of concrete mortar. Do not splinter the forms by driving ties through improperly prepared holes.

Unless otherwise shown in the plans:

- *provide sharp, clean corners at intersecting planes with no visible edges or offsets.

- *provide accurately formed chamfered corners using $\frac{3}{4}$ x $\frac{3}{4}$ inch (19 x 19 mm) strips, surfaced to produce uniformly straight lines and tight edge joints.

626.6.2.2.2 - Form Coatings: Coat form contact surfaces with form-release agent before placing reinforcement. Do not allow excess material to accumulate in forms or to come into contact with reinforcement or surfaces that will be bonded to fresh concrete. Apply coating according to manufacturer's instructions.

Coat steel forms with non-staining, rust-preventative release agent, or otherwise protect from rusting. Rust-stained steel formwork is not acceptable.

626.6.2.2.3 - Reusing Forms: Split, frayed, delaminated, or otherwise damaged form-facing materials are not acceptable. Clean and apply a new form-release agent to concrete contact surfaces.

626.7

626.7 - METHOD OF MEASUREMENT:

626.7.1 - General: The unit of measurements shall be the gross area in square meters lying in a plane outside the front face of the structure as determined by the dimensions in the contract documents. . The gross area shall not include barriers, footings, or leveling pads. The gross area shall be the number of square meters established in the proposal, subject to adjustment as provided in Sections 104.2 and 109.2 of the Standard Specifications. No adjustment of pay quantity shall be allowed for changes in wall design to facilitate the Contractor's methods of construction of wall type.

Unless otherwise specified in the contract documents, items such as concrete barriers that are not part of normal retaining wall construction shall be measured separately for payment.

The quantity of earthwork shown in the plans does not include any work within the wall pay limits shown in the plans. Any adjustments to the required amount of embankment or select granular backfill due to the particular wall system proposed by the contractor shall be considered incidental to the project. No separate payment shall be made for increased embankment or increased select granular backfill requirements. The Contractor shall be responsible for any of the cost of changes in waste, borrow, or earthwork quantities from those shown in the plans caused by the requirements of the proposed wall system.

626.7.2 - Mechanically Stabilized Earth: The unit price shall include in place: concrete facing panels, soil reinforcing and attachment devices and associated hardware, coping and trim, or similar items that are normal parts of wall construction. No separate measurement of these items shall be made.

The unit price shall also include in place: all the following items shown within the wall pay limits in the plans: select granular backfill, excavation, embankment, foundation preparation, and leveling pads. No separate measurement of these items shall be made.

626.7.3 - Cast-in-Place Reinforced Concrete: The unit price shall include in place: concrete, reinforcing, joint materials, underdrains, weepholes, or similar items that are normal parts of wall construction. No separate measurement of these items shall be made.

The unit price shall also include in place: all the following items shown within the wall pay limits in the plans: select material for backfilling, excavation, embankment, and foundation preparation. No separate measurement of these items shall be made.

626.8 - BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract price per unit of measurement, respectively, for each pay item listed below and shown in the bid schedule, which prices and payment will be full compensation for the work prescribed in this section.

626.9 - PAY ITEMS:

ITEM	DESCRIPTION	UNIT
626001- *	RETAINING WALL, CAST-IN-PLACE REINFORCED CONCRETE	SQUARE FOOT (METER)
626002- *	MSE RETAINING WALL , "vender name"	SQUARE FOOT (METER)

*Sequence number

627 THROUGH 630-BLANK

SECTION 631 ELECTRICAL WORK

631.1-DESCRIPTION:

This work shall consist of furnishing and installing electric motors, control panels, lighting systems, traffic control systems, conduits, and other electrical equipment and supplies in accordance with this Specification and as shown on the Plans.

631.2-MATERIALS:

The Contractor shall submit, in triplicate, an itemized bill of electrical equipment and materials, showing the rating, make, style, type, and catalog number of each item, which shall be approved by the Engineer before such equipment or materials are purchased or installed. The Contractor shall also submit for the approval of the Engineer, before beginning installation of conduit or electrical equipment, a complete wiring diagram for the work to be done, unless appropriate wiring diagrams are shown on the Plans. All equipment and materials shall meet the requirements of the National Electric Code and all local codes.

631.3-CONSTRUCTION METHODS:

All workmanship for electrical work shall be in accordance with the details shown on the Plans and with the requirements of the current National Electric Code in addition to any local codes as specified under Proposal Requirements.

631.4-METHOD OF MEASUREMENT:

Electrical work will be measured as a complete unit on a lump sum basis or in such units as indicated on the Plans, Proposal, or by Authorization.

631.5-BASIS OF PAYMENT:

Basis of payment will be the contract price bid for the item, which includes all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

631.6-PAY ITEMS: