

**Modification/Change Order No. 5**

Bid Number:

PO #: 195193

Fort Bend County Drainage District

EWP – Oyster Creek Channel Bank Stabilization Phase I

Fort Bend County, Texas

July 21, 2021

|   |  |                      |   |   |  |
|---|--|----------------------|---|---|--|
| <b>CHANGE ORDER/MODIFICATION NO. 5</b>  |  | Effective Date:      |   | Page 1 of 2   |  |
| Contract: PO 195193   |  | Dated:<br>12/16/2019 |   | Project: EWP –Oyster Creek Channel Bank Stabilization Phase I |  |
| Issued By (Contracting Local Organization):<br>Fort Bend County   |  |                      | Issued To (Contractor):<br>Shirley and Sons   |   |  |
| TYPE OF MODIFICATION (check appropriate box below)  |  |                      |   |   |  |
| <input checked="" type="checkbox"/> CHANGE ORDER: Issued pursuant to Article 14.4 the changes set forth below are made by this modification.  |  |                      |   |   |  |
| Contract Price  |  | \$3,776,206.72       |   | PERFORMANCE TIME: add 70 Calendar Days                        |  |
| Net Increase in Contract Price:   |  | \$90,000.00          |   |   |  |
| REVISED Contract Price:   |  | \$3,866,206.72       |   |   |  |
| ATTACHMENTS (If none, so state.):   |  |                      |   |   |  |
| This modification is hereby made a part of the contract. Except as provided herein, all terms and conditions of the original contract (as revised) remain unchanged and in full force and effect.   |  |                      |   |   |  |
| <b>CONTRACTOR'S RELEASE OF CLAIMS</b><br>In consideration of the modification agreed to herein as complete equitable adjustment for the Contractors proposal, dated 7-28-2021, the Contractor hereby releases Fort Bend County from any and all liability under this contract for further equitable adjustments attributable to such facts or circumstances concerning the added work for the above added work, including all impacts to the work, overhead and profit. |  |                      |   |   |  |
| Recommended By: (print or type name/title of signer)<br><br>Thomas P. Beach, PE<br>M&E Consultants<br><i>Thomas P. Beach</i>  |  |                      |   |   |  |
| Important Note: Contractor IS required to sign this document and return two (2) copies to the issuing office.   |  |                      |   |   |  |
| CONTRACTOR (print or type name/title of signer)<br><br><i>Ronald Shirley II President</i>   |  |                      | Sponsors/Contracting Local Organization<br>Adam Wright <i>Adam Wright</i><br>Fort Bend County Drainage District |   |  |
| SIGNATURE (person authorized to sign)<br><br><i>[Signature]</i>   |  | DATE<br><br>7-29-21  |   | SIGNATURE (County Judge)<br><br><br>DATE                      |  |

Modification/Change Order No.5  
Fort Bend County Drainage District  
EWP – Oyster Creek Phase I Channel Bank Stabilization  
Fort Bend County, Texas  
July 28, 2021  
Contract No: PO 195193

#### DESCRIPTION OF MODIFICATION/CHANGE ORDER

Pursuant to General Condition, Weather, the contract shall be modified as following.

The Contract performance time shall be extended 70 calendar days due to weather delays and the effects of weather.

Pursuant to General Condition, Article 14.4, the contract shall be modified as following.

The Contractor shall furnish all labor equipment and material to install flex mat as shown on the attached drawing and specifications at Oyster Creek Phase I Site 413 revised. Measurement and Payment compensation shall be Method 3 in Construction Specification 495, lump Sum.

Compensation shall be in accordance with the applicable added items below. Contractor Quality Control shall be accomplished in accordance with Construction Specification 94 for the added work.

Changes to the Bid Schedule:

Add

Item

| No. | Work or Material          | Spec. | Quantity | Units | Unit Price | Amount       |
|-----|---------------------------|-------|----------|-------|------------|--------------|
| 30  | Site 413 Revised Flex Mat | 495   | 1        | LS    | \$xxxx     | \$ 90,000.00 |

Contract price increase – 90,000.00

Contract Performance time: - add 70 calendar days

Performance time revised – November 18, 2021

#### CONTRACTOR'S STATEMENT OF RELEASE

In consideration of the modification agreed to herein as complete equitable adjustment for the Contractors proposal, dated 7-28-2021, the Contractor hereby releases Fort Bend County from any and all liability under this contract for further equitable adjustments attributable to such facts or circumstances concerning the added work for the above added work, including all impacts to the work, overhead and profit.

# Construction Specification 495-Concrete Block Mats

## 1. Scope

This work shall consist of furnishing all materials, equipment, and labor necessary for the installation of concrete block mats.

## 2. Materials

The mats shall be manufactured individual concrete blocks tied together with high strength polypropylene biaxial geogrid. Each block is tapered, beveled and interlocked and includes connections that prevent lateral displacement of the blocks within the mats when they are lifted for placement.

**Blocks** - Furnish blocks manufactured with concrete conforming to the cement requirements of ASTM C150 and to the aggregate requirements of ASTM C33. Meet a minimum compressive strength of 5,000 psi at 28 days. Furnish blocks that have a minimum weight of 3 lb. per block and placed no further than 2 in. apart.

**Polypropylene bi-axial geogrid.** The geogrid will be composed of Polypropylene multifilament yarns coated with an acrylic based coating which is designed to resist degradation in environments with exposure to water and low pH (4 pH) and high pH (>9 pH). When combined with the revetment mat this will yield a high tenacity, low elongating, and continuous filament polypropylene fibers that is securely cast into and embedded within the base of the concrete blocks and obtains connection strength greater than that of the geogrid. Ensure the geogrid meets the requirements of Table 1:

Table 1  
Polypropylene Bi-Axial Geogrid

| Description               | Requirement     |
|---------------------------|-----------------|
| UV Stabilization          | 2% Carbon Black |
| Ultimate Tensile Strength | 2055 lb./lf     |

**Underlayment materials.** The underlayment material shall include 5-pick Leno Weave Fabric, Curlex® II and Recyclax TRM-V. The backing material shall be packaged within the roll of the tied concrete block mats.

### Leno Weave Five-Pick Netting:

This is a woven, white polypropylene netting that provides added strength and support to the underlayments.

| <u>Index Property</u> | <u>Units</u>     | <u>Value</u>    |
|-----------------------|------------------|-----------------|
| GSM                   | g/m <sup>2</sup> | 118 (-3 ~ +3)   |
| Density               | Picks/10 cm      | 62 x 24 (+/- 2) |
| Warp Strength         | N/5 cm           | > 350           |
| Warp Elongation       | %                | 20 - 50         |
| Weft Strength         | N/5 cm           | > 280           |
| Weft Elongation       | %                | 20 - 50         |
| Warp Shrinkage        | %                | < 7             |
| Weft Shrinkage        | %                | < 9             |

### Curlex® II:

Erosion control blanket (ECB) consists of a specific cut of naturally seed free Great Lakes Aspen curled wood excelsior with 80% six-inch fibers or greater fiber length. It is of consistent thickness

with fibers evenly distributed throughout the entire area of the blanket. The top and bottom of each blanket is covered with degradable polypropylene netting.

| <u>Index Property</u>    | <u>Units</u>     | <u>Value</u>   |
|--------------------------|------------------|--|
| Thickness                | ASTM D 6525      | 0.418 in (10.62 mm)                                    |
| Light Penetration        | ASTM D 6567      | 34.6%  |
| Resiliency               | ASTM D 6524      | 64%  |
| Mass per Unit Area       | ASTM D 6475      | 0.57 lb/yd <sup>2</sup> (309 g/m <sup>2</sup> )        |
| MD-Tensile Strength Max. | ASTM D 6818      | 127.0 lb/ft (1.9 kN/m)                                 |
| TD-Tensile Strength Max. | ASTM D 6818      | 50.9 lb/ft (0.7 kN/m)                                  |
| MD-Elongation            | ASTM D 6818      | 28.64%   |
| TD-Elongation            | ASTM D 6818      | 29.84%   |
| Swell                    | ECTC Procedure   | 89%  |
| Water Absorption         | ASTM D 1117/ECTC | 199%   |
| Bench-Scale Rain Splash  | ECTC Method 2    | SLR = 6.84 @ 2 in/hr <sup>2,3</sup>                    |
| Bench-Scale Rain Splash  | ECTC Method 2    | SLR = 7.19 @ 4 in/hr <sup>2,3</sup>                    |
| Bench-Scale Rain Splash  | ECTC Method 2    | SLR = 7.56 @ 6 in/hr <sup>2,3</sup>                    |
| Bench-Scale Shear        | ECTC Method 3    | 2.6 lb/ft <sup>2</sup> @ 0.5 in soil loss <sup>3</sup> |
| Germination Improvement  | ECTC Method 4    | 645%   |

<sup>1</sup> Weight is based on a dry fiber weight basis at time of manufacture. Baseline moisture content of Great Lakes Aspen excelsior is 22%.

<sup>2</sup> SLR is the Soil Loss Ratio, as reported by NTPEP/AASHTO.

<sup>3</sup> Bench-scale index values should not be used for design purposes.

#### **Recyclex® TRM:**

Recyclex TRM – V is a permanent non-degradable Turf Reinforcement Mat (TRM), consists of 100% post-consumer recycled polyester (green or brown bottles) with 80% five-inch fibers or greater fiber length. It is of consistent thickness with fibers evenly distributed throughout the entire area of the TRM. The top and bottom of each TRM is covered with heavy duty polypropylene net. Fibers are tightly crimped and curled to allow fiber interlock, and to retain 95% memory of the original shape after loading by hydraulic events. Fibers have a specific gravity greater than 1.0; therefore, the blanket will not float during hydraulic events. Recyclex TRM – V meets Federal Government Executive Order initiatives for use of products made from, or incorporating, recycled materials. Recyclex TRM – V shall be manufactured in the U.S.A. and the fibers shall be made from 100a% recycled post-consumer goods.

| <u>Index Property</u>    | <u>Units</u>           | <u>Value</u>                                    |
|--------------------------|------------------------|---|
| Thickness                | ASTM D 6525            | 0.294 in (7.47 mm)                              |
| Light Penetration        | ASTM D 6567            | 57%   |
| Resiliency               | ASTM D 6524            | 86%   |
| Mass per Unit Area       | ASTM D 6475            | 0.50 lb/yd <sup>2</sup> (271 g/m <sup>2</sup> ) |
| MD-Tensile Strength Max. | ASTM D 6818            | 295.2 lb/ft (4.32 kN/m)                         |
| TD-Tensile Strength Max. | ASTM D 6818            | 194.4 lb/ft (2.85 kN/m)                         |
| MD-Elongation            | ASTM D 6818            | 32.2%   |
| TD-Elongation            | ASTM D 6818            | 40.8%   |
| Swell                    | ECTC Procedure         | 8%  |
| Water Absorption         | ASTM D 1117/ECTC       | 33.8%   |
| Specific Gravity         | ASTM D 792             | 1.21  |
| UV Stability             | ASTM D 4355 (1,000 hr) | 80% minimum                                     |
| Porosity                 | Calculated             | 97.5%   |

|                         |               |   |
|-------------------------|---------------|---|
| Bench-Scale Rain Splash | ECTC Method 2 | SLR = 586 @ 2 in/hr <sup>1,2</sup>                      |
| Bench-Scale Rain Splash | ECTC Method 2 | SLR = 5.00 @ 4 in/hr <sup>1,2</sup>                     |
| Bench-Scale Rain Splash | ECTC Method 2 | SLR = 6.33 @ 6 in/hr <sup>1,2</sup>                     |
| Bench-Scale Shear       | ECTC Method 3 | 2.41 lb/ft <sup>2</sup> @ 0.5 in soil loss <sup>2</sup> |
| Germination Improvement | ECTC Method 4 | 432%  |

<sup>1</sup> SLR is the Soil Loss Ratio, as reported by NTPEP/AASHTO.

<sup>2</sup> Bench-scale index values should not be used for design purposes.

### 3. Storage and handling

Prior to use, the tied concrete block mats shall be covered or otherwise protected during long periods of storage to protect against degradation of the backing material as recommended by the manufacturer. Receiving, storage, and handling at the job site shall be in accordance with the requirements in ASTM D 4873.

Mats will be rolled for shipment and are packaged with handling straps. These handling straps shall only be used for lifting below 2 ft. to place heavy duty lifting straps under rolls. Upon delivery, rolls may be left exposed for up to 30 days. If exposure will exceed 30 days, cover or tarp the rolls to minimize UV exposure.

All mats to be inspected upon delivery. Assure that all units are sound and free of defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction.

Chipping or missing concrete resulting in a weight loss exceeding 15% of the average weight of a concrete unit is grounds for rejection by the engineer. Replace, repair or patch the damaged areas per the manufacturer's recommendations.

### 4. Performance

Full-Scale laboratory testing performed by an independent 3rd party testing facility with associated engineered calculations certifying the hydraulic capacity of the proposed Concrete Block Mat meets the following requirements:

| Test      | Tested Value | Bed Slope | Soil Classification | Limiting Value        |
|-----------|--------------|-----------|---------------------|-----------------------|
| ASTM 6460 | Shear Stress | 30%       | Sandy Loam (USDA)   | 24 lb/ft <sup>2</sup> |
| ASTM 6460 | Velocity     | 20%       | Loam (USDA)         | 30 ft/sec             |

### 5. Surface preparation

The surface on which the concrete block mat is to be placed shall be graded to the neat lines and grades as shown on the drawings. A seedbed shall be prepared by loosening 2"-3" of the top surface. Fertilizer shall be incorporated in the loose soil as specified in Section 9.

The surface shall be reasonably smooth without holes, depressions, muddy conditions and standing or flowing water. The surface shall be free of loose rocks, stones, sticks, roots, clods, and other protrusions or debris of any kind that would result in an individual block being raised more than 3/4 in. above the adjoining blocks.

Prior to placement of seed the soil surface will be inspected and approved by the Engineer for quality assurance.

### 6. Seeding

The concrete block mat shall be seeded with Common Bermudagrass before the mats are installed. The seed shall meet the requirements of Section 2 of Construction Specification 406.

The grass seed shall be drilled or broadcast onto a firm, clean seedbed. The seed shall not be planted or covered deeper than 1/2 inch below the soil surface. The distance between rows shall not exceed 6

inches. Seed shall be distributed over the entire area at uniform rates. Planting operations shall begin at the base of the slope on works of improvement. The areas will be firmed before seeding and immediately following seeding with a cultipacker or corrugated packer roller weighing 180 to 190 pounds per foot of width. On areas not accessible to the mechanical seeding equipment, seed may be broadcast by hand. The hand seeded areas will be hand raked and then firmed with a hand operated roller. Tracked or heavy equipment shall not be used.

## **7. Placement**

The concrete block mat shall be placed on the approved prepared surface at the locations, lines, grades and details as specified and shown on the drawings. The concrete block mat shall be unrolled along the placement area and loosely laid (not stretched) in such a manner that it will conform to the surface irregularities when material is placed on or against it. The concrete block mats may be folded and overlapped to permit proper placement in the designated area.

Place mats adjacent to one another and install "U" anchors on 5 feet centers each way. "U" anchors consist of folded #3 rebar with 18" legs.

Shingle seams perpendicular to the flow line with the downstream mat recessed a minimum of 2 blocks under the upstream mat. Flip upstream mat back and excavate 2.25" of soil 2 blocks wide from end of upstream mat. Lay the downstream section in the shallow trench and lightly spread topsoil over initial edge. Flip end of upstream mat over the soil covered initial leading edge of downstream mat. Install 18" "U" anchors in 2 feet increments across the overlap. Install anchors directly behind blocks.

Seams parallel to the flow line in ditch or channel applications, center a minimum 3 ft. wide strip of soil retention blanket under the seam. Install 18" "U" anchors across the overlap along the seam at 5 ft. maximum spacing. Parallel seams in the center of the ditch shall be avoided when possible.

The top edge of the concrete mats shall be embedded 18 in. deep in a toe trench. The initial leading edge of concrete mats shall be embedded 24" vertically below the approved subgrade. The anchor trenches shall be backfilled with compacted earth or other approved suitable fill.

## **8. Measurement and payment**

**Method 1** - For items of work for which specific unit prices are established in the contract, the quantity of concrete block mats for each type placed within the specified limits will be determined to the nearest specified unit by measurements made of the covered surfaces only, disregarding that required for anchorage and overlaps. Payment will be made at the contract unit price. Such payment will constitute full compensation for loading and transporting, placing concrete block mats; excavation and disposal; furnishing topsoil and bedding; and equipment, labor, materials, tools, and incidentals.

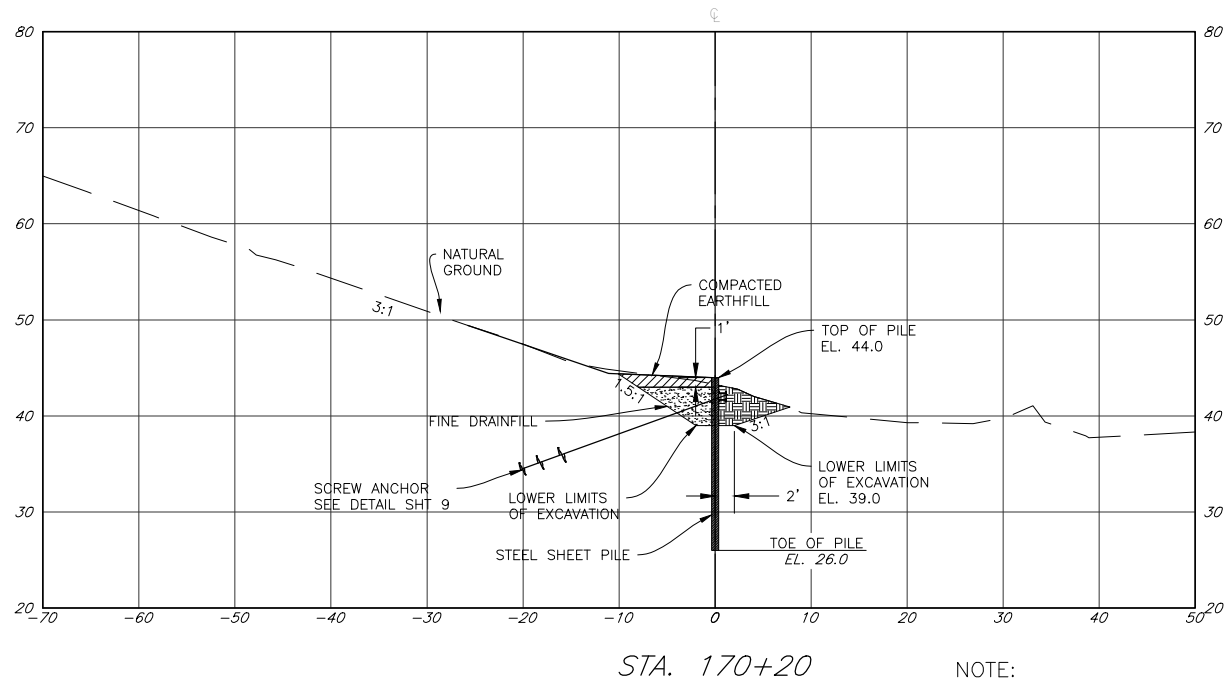
**Method 2** - For items of work for which specific unit prices are established in the contract, the quantity of concrete block mats for each type placed within the specified limits will be determined to the nearest specified unit by computing the area of the actual roll size, or partial roll size installed. The computed area will include the amount required for overlaps, seams, and anchorage as specified. Payment will be made at the contract unit price. Such payment will constitute full compensation for loading and transporting, placing concrete block mats; excavation and disposal; furnishing topsoil and bedding; and equipment, labor, materials, tools, and incidentals.

**Method 3** - For items of work for which specific lump sum prices are established in the contract, the quantity of concrete block mats will not be measured for payment. Payment will be made at the contract lump sum price and will constitute full compensation for loading and transporting, placing concrete block mats; excavation and disposal; furnishing topsoil and bedding; and equipment, labor, materials, tools, and incidentals.

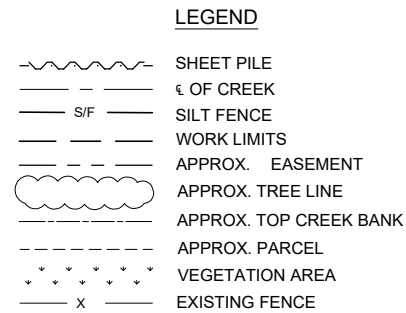
**All Methods** - The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be

included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 9 of this specification.

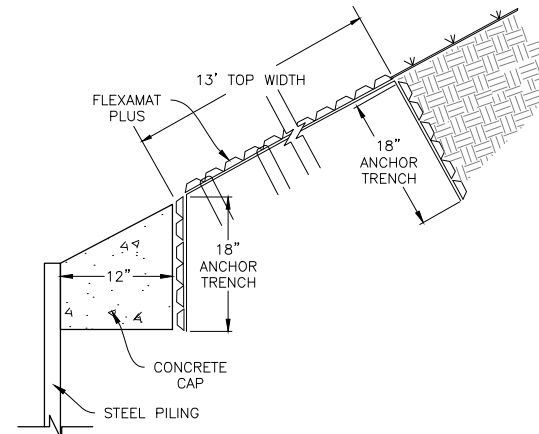
Y:\PUBLIC\Projects - Current\Fort Bend Oyster Creek, Phase 1 And II\DWG\OC Phase 1-Mod2-w Conc Mat.dwg



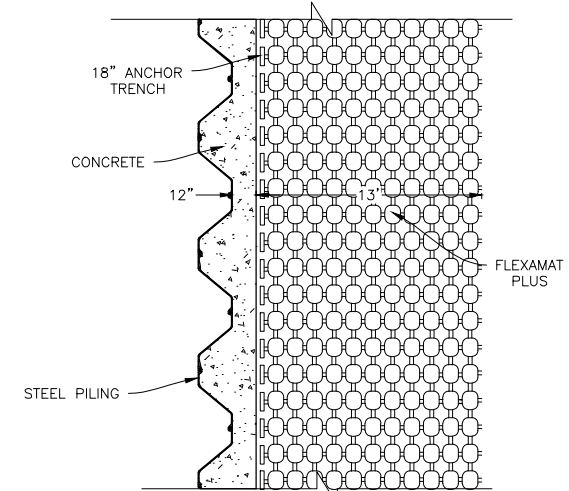
NOTE:  
THE WIDTH OF THE FLAT SLOPE BEHIND THE WALL  
WILL BE ADJUSTED IN THE FIELD TO BE BALANCED WITH  
THE CUT/FILL VOLUME



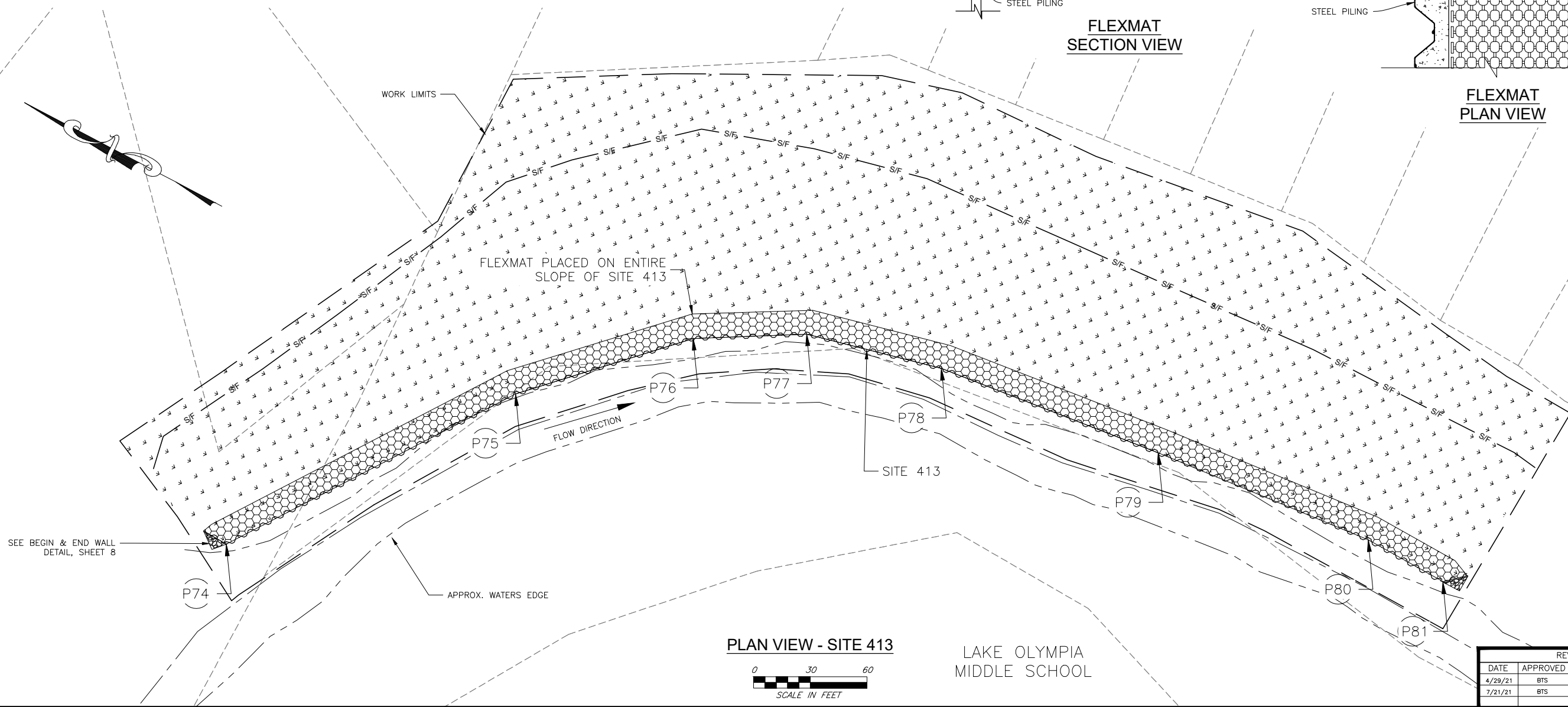
| SHEET PILE LAYOUT |           |           |                  |           |              |              |
|-------------------|-----------|-----------|------------------|-----------|--------------|--------------|
| DESCRIPTION       | STATIONS  | TOP ELEV. | LOWER LIMITS EX. | TOE ELEV. | X-COORDINATE | Y-COORDINATE |
| SITES 422         |           |           |                  |           |              |              |
| P74               | 163+97.90 | 44.00     | 39.00            | 26.00     | 3064773.60   | 13767746.17  |
| P75               | 165+63.02 | 44.00     | 39.00            | 26.00     | 3064914.98   | 13767647.57  |
| P76               | 166+57.61 | 44.00     | 39.00            | 26.00     | 3064984.61   | 13767578.09  |
| P77               | 167+14.35 | 44.00     | 39.00            | 26.00     | 3065014.55   | 13767525.88  |
| P78               | 167+80.45 | 44.00     | 39.00            | 26.00     | 3065031.58   | 13767454.41  |
| P79               | 169+06.55 | 44.00     | 39.00            | 26.00     | 3065045.34   | 13767332.13  |
| P80               | 170+23.60 | 44.00     | 39.00            | 26.00     | 3065056.26   | 13767212.42  |
| P81               | 170+67.63 | 44.00     | 39.00            | 26.00     | 3065054.87   | 13767167.14  |



FLEXMAT  
SECTION VIEW



FLEXMAT  
PLAN VIEW



PLAN VIEW - SITE 413



LAKE OLYMPIA  
MIDDLE SCHOOL

8/10/20

M&E  
CONSULTANTS  
F-4324

DESIGNED BY: BTS  
DRAWN BY: JPK  
CHECKED BY: BTS  
IN CHARGE: JPK  
DATE: 11/19/2019

SITE PLAN - 413 AND SECTION VIEW  
OYSTER CREEK - BANK STABILIZATION  
FORT BEND DRAINAGE DISTRICT  
IN  
FORT BEND COUNTY, TEXAS

United States  
Department of  
Agriculture

Natural Resources  
Conservation Service

|             |            |
|-------------|------------|
| DRAWING NO. | TX-EN-0791 |
| SHEET NO.   | 8          |
| OF          | 11         |

| REVISIONS |          |                                |
|-----------|----------|--------------------------------|
| DATE      | APPROVED | TITLE                          |
| 4/29/21   | BTS      | WALLS REMOVED & RELOCATED      |
| 7/21/21   | BTS      | CONCRETE MAT ADDED TO SITE 413 |