ITEM 554.05----17 - MECHANICALLY STABILIZED SEGMENTAL BLOCK RETAINING WALL SYSTEM (EXTENSIBLE REINFORCEMENT)

DESCRIPTION

Construct a Mechanically Stabilized Segmental Block Retaining Wall System (Extensible Reinforcement), (MSSBRWS) where indicated on the plans.

A MSSBRWS is a mechanically stabilized earth wall system consisting of an un-reinforced concrete or compacted granular leveling pad, facing and cap units, backfill, underdrains, geotextiles, and an extensible reinforcement used to improve the mechanical properties of the backfill.

Only MSSBRWS designer-suppliers (designer-supplier) with facing and cap units appearing on the Department's Approved List of Products for Precast Concrete Retaining Wall Block will be acceptable for use under this item. The Approved List of Products is available from the Office of the Director, Materials Bureau.

Upon award of the contract, notify the Deputy Chief Engineer, Technical Services (DCETS) of the name and address of the chosen designer-supplier. Once designated, the chosen designer-supplier shall not be changed without written permission from the DCETS. Obtain all necessary materials (except backfill, unit fill, leveling pad material, underdrains, geotextiles, and cast-in-place concrete) from the chosen designer-supplier.

Obtain from the designer-supplier and submit to the DCETS for approval, the MSSBRWS design and installation procedure. Designer-suppliers must submit and have their design reviewed and approved for use. All MSSBRWS designs must conform to the requirements of Section 5.8 of the Association of State Highway and Transportation Officials Standard Specifications (AASHTO). All MSSBRWS designs must be stamped by a Professional Engineer licensed to practice in New York State. The DCETS requires 20 working days to approve the submission after receipt of all pertinent information. Begin work only after receiving DCETS approval.

Submit shop drawings and proposed methods for construction to the Engineer for written approval at least 30 working days before starting work.

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

Provide the Engineer with two copies of the designated designer-supplier Installation Manual two weeks before beginning construction.

Other definitions that apply within this specification are:

A.	Leveling Pad	An un-reinforced concrete or compacted granular fill footing or pad which serves as a flat surface for placing the initial course of facing units.
B.	Facing Unit	A segmental precast concrete block unit that incorporates an alignment and connection device and also forms part of the MSSBRWS face area. A corner unit is a facing unit having two faces.

C.	Alignment and Connection Device	Any device that is either built into or specially manufactured for the facing units, such as shear keys, leading/trailing lips, or pins. The device is used to provide alignment and maintain positive location for a facing unit and also provide a means for connecting the extensible reinforcement.
D.	Extensible Reinforcement	High density polyethylene, polypropylene or high tenacity polyester geogrid mats of specified lengths which connect to the facing unit and are formed by a regular network of integrally connected polymer tensile elements with apertures of sufficiently large size to allow for mechanical interlock with the backfill.
E.	Unit Fill	Well-graded aggregate fill placed within and/or contiguous to the back of the facing unit.
F.	Cap Unit	A segmental precast concrete unit placed on and attached to the top of the finished MSSBRWS.
G.	Backfill	Material placed and compacted in conjunction with extensible reinforcement and facing units.
H.	Underdrain	A system for removing water from behind the MSSBRWS.
I.	Geotextile	A permeable textile material used to separate dissimilar granular materials.

MATERIALS

Not all materials listed are necessarily required for each MSSBRWS. Ensure that the proper materials are supplied for the chosen system design.

A. Leveling Pad

1. For MSSBRWS greater than or equal to 4.6 meters in total height, as measured from the top of the leveling pad to the top of the cap unit, supply a leveling pad conforming to the following:

    a. Un-reinforced Concrete:
    Supply concrete conforming to Section 501 (Class A Concrete).

2. For MSSBRWS less than 4.6 meters in total height, as measured from the top of the leveling pad to the top of the cap unit, supply a leveling pad conforming to one of the following:

    a. Un-reinforced Concrete:
    Supply concrete conforming to Section 501 (Class A Concrete).

b. Granular Fill
Supply select granular fill conforming to §203-2.02C (Select Granular Fill and Select Structure Fill).

c. Crushed Stone
Supply crushed stone conforming to Section 623 (Screened Gravel, Crushed Gravel, Crushed Stone, Crushed Slag), Item 623.12, Crushed Stone (In-Place Measure). Use an approximate 50-50 mix of Size Designations 1 and 2.

B. Facing and Cap Units
Supply units fabricated and conforming to §704-07 (Segmental Retaining Wall Blocks). Notify the Director, Materials Bureau, of the name and address of the units' fabricator no later than 14 days after contract award.

C. Alignment and Connection Devices
Supply devices conforming to the designer-supplier's Installation Manual.

D. Extensible Reinforcement
Supply reinforcement which has been tested and certified to meet the minimum requirements for the long term design tensile strength, T_d, of the latest version of AASHTO.

E. Unit Fill
Supply unit fill conforming to material and gradation requirements for Type CA-2 Coarse Aggregate under §501-2.02, B.2. (Coarse Aggregate).

F. Cast-in-place Concrete
Supply concrete conforming to Section 501 (Class A Concrete).

G. Backfill
Supply backfill material conforming to §203-1.08 (Suitable Material). Backfill material must come from a single source, unless prior written approval for use of multiple sources is obtained from the Director, Geotechnical Engineering Bureau.

Stockpile backfill material conforming to the current Geotechnical Control Procedure (GCP) titled "Procedure for the Control of Granular Materials."

1. Material Test, Control and Acceptance Procedures
The State will perform procedures conforming to the appropriate Departmental publications in effect on the date of advertisement of 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.

2. Material Properties

a. Gradation
Stockpiled backfill material must meet the gradation requirements listed in Table 17554-2:

TABLE 17554-2
GRADATION

Sieve Size Designation	Percent Passing by Weight
63 mm	100
6.3 mm	30-100
425 µm	0-60
75 µm	0-15

b. Plasticity Index.
The Plasticity Index must not exceed 5.

c. Durability.
The Magnesium Sulfate Soundness loss must not exceed 30 percent.

H. Separation Geotextile

Supply geotextile material for Separation, Strength Class 2, appearing on the Department's Approved List of Products for Geosynthetics for Highway Construction, B. Geotextiles (for use on NYSDOT projects with a Sept. 7, 2000 or later letting date).

I. Drainage Geotextile

Supply underdrain and geotextile material for drainage as shown on the plans or conforming to the designer-suppliers Installation Manual:

1. Underdrain Pipe
Supply optional underdrain pipe conforming to Section 605 (Underdrains).

2. Geotextile Drainage
Supply geotextile material for drainage, Strength Class 2, Drainage Class B, appearing on the Department's Approved List of Products for Geosythetics for Highway Construction, B. Geotextiles (for use on NYSDOT projects with a Sept. 7, 2000 or later letting date).

J. Identification Markers

Supply identification markers conforming to the designer-supplier's Installation Manual.

K. Basis of Acceptance

Accept cast-in-place concrete in accordance with the requirements of Section 501 (Portland Cement Concrete), Class A.

Accept granular and backfill materials by the appropriate Departmental publications.

Accept facing and cap units in accordance with the requirements of §704-07 (Segmental Retaining Wall Blocks).

Accept other materials by manufacturer's certification. The State reserves the right to sample, test, and reject certified material in accordance with Departmental written instructions.

CONSTRUCTION DETAILS

A. Excavation, Disposal and MSSBRWS Area Preparation

Excavate, dispose and prepare the area on which the MSSBRWS will rest conforming to Section 203 (Excavation and Embankment), except as modified here:

1. Grade and level, for a width equaling or exceeding the reinforcement length, the area on which the MSSBRWS will rest. Thoroughly compact this area to the Engineer's satisfaction. Remove all soils found unsuitable, or incapable of being satisfactorily compacted because of moisture content, in a manner directed by the Engineer, in conjunction with recommendations of the Regional Geotechnical Engineer.

2. Remove rock to the limits shown on the plans.

3. Excavate the area for the leveling pad in accordance with the requirements of Section 206, (Trench, Culvert and Structure Excavation).

B. Facing and Cap Unit Storage and Inspection

Handle and store facing and cap units with extreme care to prevent damage. The State will inspect facing and cap units on their arrival at the work site and prior to their installation to determine any damage that may have occurred during shipment. Facing and cap units will be considered damaged if they contain any cracks or spalls and/or honey combed areas with any dimensions greater than 25mm. The State will reject any damaged facing and cap units. Replace rejected units with facing and cap units acceptable to the Engineer.

C. Facing Unit Erection

1. Provide an un-reinforced concrete or compacted granular fill leveling pad as shown on the plans.
   a. Place concrete in conformance with §555-3, (Construction Details).
   b. Place and compact granular fill in conformance with §203-3.12 (Compaction).

2. Install by placing, positioning, and aligning facing units in conformance with the designer-supplier's Installation Manual and within the tolerances in Table 17554-3.

3. Correct all misalignments of installed facing units that exceed the tolerances allowed in Table 17554-3 in a manner satisfying the Engineer.

TABLE 17554-3
TOLERANCES

Vertical control	±7 mm over a distance of 3 m
Horizontal location control	±13 mm over a distance of 3 m
Rotation from established plan wall batter	±13 mm over 3 m in height

4. Control all operations and procedures to prevent misalignment of the facing units. Precautionary measures include (but are not limited to) keeping vehicular equipment at least 1 meter behind the back of the facing units. Compaction equipment used within 1 meter of the back of the facing units must conform to §203-3.12B.6. (Compaction Equipment for Confined Areas).

D. Unit Fill

1. Place unit fill to the limits indicated on the plans. Before installing the next course of facing units, compact the unit fill in a manner satisfying the Engineer and brush the tops of the facing units clean to ensure an even placement area.

2. Protect unit fill from contamination during construction.

E. Extensible Reinforcement

1. Before placing extensible reinforcement, backfill placed and compacted within a 1 meter horizontal distance of the back of facing units must be no more than 25 mm above the required extensible reinforcement elevation. Backfill placed and compacted beyond the 1 meter horizontal distance may be roughly graded to the extensible reinforcement elevation.

2. Place extensible reinforcement normal to facing units unless otherwise indicated on the plans. Replace all broken, damaged or distorted extensible reinforcement at no additional cost to the State.

3. Install extensible reinforcement within facing units conforming to the designer-supplier's Installation Manual. Pull taut and secure the extensible reinforcement before placing the backfill in a manner satisfying the Engineer.

F. Backfill

1. Place backfill materials (other than rock) at a moisture content less than or equal to the Optimum Moisture Content. Remove backfill materials placed at a moisture content exceeding the Optimum Moisture Content and either rework or replace, as determined by the Engineer. Determine Optimum Moisture Content in conformance with Soil Test Methods for compaction that incorporate moisture content determination. Use Soil Test Methods (excluding STM-6) in effect on the date of advertisement of bids. Cost to rework or replace backfill materials shall be borne by the Contractor.
2. Place granular backfill material in uniform layers so that the compacted thickness of each layer does not exceed 250 mm or one block height, whichever is less. Compact each layer to a minimum of 95 percent of Standard Proctor Maximum Density and in conformance with §203-3.12 (Compaction).

3. Place rock backfill in uniform layers so that the compacted thickness of each layer does not exceed 250 mm or one block height, whichever is less. Compact each layer in conformance with §203-3.12 (Compaction). The Engineer will determine by visual inspection that proper compaction has been attained.

METHOD OF MEASUREMENT

MSSBRWS measurement is computed as the number of square meters of wall face area between the payment lines shown on the plans.

BASIS OF PAYMENT

A. Mechanically Stabilized Segmental Block Retaining Wall System
Payment in square meters of wall face area includes cost of all labor, equipment and materials necessary to complete the work, including leveling pad, facing and cap units, backfill, underdrains and geotextiles.

B. Excavation and Disposal
Excavation and disposal will be paid for under Item 203.02, Unclassified Excavation and Disposal or Item 206.01, Structure Excavation.

C. Water
The unit price bid for the MSSBRWS includes the cost of adding water for backfill compaction, unless separate items for Furnishing Water Equipment and Applying Water have been included in the Contract.