

SECTION 02242

**CONCRETE MODULAR RETAINING WALL
(SPECIFICATION WRITER: THIS SECTION MAY NOT BE REQUIRED)**

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PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work includes furnishing and installing modular block retaining wall units, geogrid reinforcement, wall fill and backfill to the lines and grades designated on the construction drawings and as specified herein.
- B. Work includes preparing foundation soil, furnishing and installing leveling pad, unit fill and backfill to the lines and grades designated on the construction drawings.
- C. Furnishing and installing all appurtenant materials required for construction of the geogrid reinforced soil retaining wall as shown on the construction drawings.

1.02 RELATED SECTIONS

SECTION 02200 – EARTHWORK (Includes Riprap) **check cross-references**
SECTION 02720 – STORM SEWER SYSTEMS **check cross-references**

1.03 REFERENCE STANDARDS

The following most current publications form part of the specification to the extent indicated by references thereto and shall be followed for all construction testing:

ASTM C90 – 85 Hollow Load Bearing Masonry Units
ASTM C140 – 75 Sampling and Testing Concrete Masonry Units
ASTM C145 – 85 Solid Load Bearing Concrete Masonry Units

1.04 DELIVERY, STORAGE AND HANDLING

- A. Contractor shall check the materials upon delivery to assure that proper material has been received.
- B. Geogrids shall be stored above -20 Degrees F.
- C. Contractor shall prevent excessive mud, wet cement, epoxy, and like materials which may affix themselves, from coming in contact with the materials.
- D. Contractor shall protect the material from damage. Damaged material shall not be incorporated into the retaining wall structure.
- E. Rolled geogrid material may be laid flat or stood on end for storage.

1.05 SUBMITTALS

- A. Samples of all products used in the work of this section. Available colors and texture shall be provided to the Owner for selection.
- B. Latest edition of manufacturer's specifications for proposed materials, method of installation and list of material proposed for use.
- C. The design of the wall stamped by a registered professional engineer. The wall shall be designed for (**SPECIFICATION WRITER TO INDICATE HIGHWAY SURCHARGE, 3:1 FILL, SLOPE,**

ETC.) Lateral earth pressures used for design shall be in accordance with the geotechnical recommendations for the project.

1.06 QUALITY ASSURANCE

- A. Soil testing and inspection services for quality control testing during earthwork operation will be supplied by the independent test laboratory retained by the Contractor and approved by the Owner.

PART 2 - PRODUCTS

2.01 CONCRETE UNITS

- A. Masonry units shall be Retaining Wall Units designed to create a modular blockwall.
- B. Concrete retaining wall units shall have a minimum net 28 day compressive strength of 3,000 psi. The concrete shall have a maximum moisture absorption of 6 to 8 lbs/ft.³.
- C. Exterior dimensions may vary in accordance with ASTM C90-85. Full-size units shall have a minimum of 1 square foot face area each. Partial units shall have a minimum 1/2 square foot face area each.
- D. Units shall have angled sides capable of concave and convex alignment curves with a minimum radius of 10 feet. NOTE: Where applicable, for straight walls use non-angled straight side cap units.

2.02 GEOGRID

- A. Geogrid to be used as soil reinforcement shall be TENSAR UX1500 or approved equal.

2.03 VACANT

2.04 BASE LEVELING PAD MATERIALS

- A. Material shall consist of compacted structural fill, 3/4 crushed stone, and underdrains as shown on the construction drawings. The compacted leveling pad shall be a minimum 12 inches thick for each layer (structural fill and crushed stone).

2.05 UNIT FILL

- A. Fill for units and within the geogrid behind the units shall be structural fill.

2.06 BACKFILL

- A. Material shall be compacted structural fill as approved by the Engineer.
- B. Where additional fill is required Contractor shall submit sample and specifications to the Engineer to determine if acceptable.
- C. Backfill zone shall extend to encapsulate all Geogrids.

2.07 FILTER FABRIC

Filter fabric shall be installed as shown on the plans and shall meet the requirements of Section 02200 of these Specifications.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Over excavation shall not be paid for and replacement with compacted fill and/or wall system components will be required at contractor expense. Contractor shall be careful not to disturb embankment materials beyond lines shown.

3.02 FOUNDATION SOIL PREPARATION

- A. Foundation soil shall be excavated as required for footing dimensions shown on the construction drawings or as directed by the Engineer.
- B. Foundation soil shall be examined by the Engineer to assure that the actual foundation soil strength meets or exceeds assumed design strength. Soils not meeting required strength shall be removed and replaced with acceptable material.
- C. Over-excavated areas shall be filled with approved compacted granular fill backfill material.
- D. Foundation shall be proof rolled prior to fill and geogrid placement.

3.03 BASE LEVELING PAD

- A. Leveling pad materials shall be placed as shown on the construction drawings, upon undisturbed in-situ soil.
- B. Material shall be compacted so as to provide a level hard surface on which to place the first course of units. Compaction shall be to 95% of standard proctor.
- C. Leveling pad shall be prepared to insure complete contact of retaining wall unit with base.
- D. Leveling pad materials shall be to the depths and widths shown.

3.04 UNIT INSTALLATION

- A. First course of concrete wall units shall be placed on the base leveling pad. The units shall be checked for level and alignment. The first course is the most important to insure accurate and acceptable results.
- B. Insure that units are in full contact with base.
- C. Units are placed side by side for full length of wall alignment. Alignment may be done by means of a string line or offset from base line.
- D. Install connecting devices and fill all voids at units with unit fill material. Tamp fill.
- E. Sweep all excess material from top of units and install next course. Insure each course is completely unit filled, backfilled and compacted prior to proceeding to next course.
- F. Lay up each course insuring that connectors protrude into adjoining courses above a minimum of one inch. Pull each unit forward, away from the embankment, against connectors in the previous course and backfill as the course is completed. Repeat procedure to the extent of wall height.
- G. The top two courses of wall units below the cap shall also have an adhesive or epoxy to provide a permanent bond of the upper blocks.
- H. As appropriate where the wall changes elevation, units can be stepped with grade or turned into the embankment with a convex return end. Provide appropriate buried units on compacted leveling pad in area of convex return end.

3.05 CAP INSTALLATION

- A. Place Modular Block Cap units over projecting connectors from units below. Pull forward to set back position. Back fill and compact to finished grade.
- B. As required, provide permanent mechanical connection to wall units with construction adhesive or epoxy. Apply adhesive or epoxy bottom surface of cap units and install on units below.

3.06 GEOGRID INSTALLATION

- A. The geogrid soil reinforcement shall be laid horizontally on compacted backfill. Connect to the concrete wall units by hooding geogrid over connector units. Pull taut, and anchor before backfill is placed on the geogrid.
- B. Slack in the geogrid at the wall unit connections shall be removed.
- C. Geogrid shall be laid at the proper elevation and orientation as shown on the construction drawings or as directed by the Engineer.
- D. Correct orientation (roll direction) of the geogrid shall be verified by the contractor.
- E. To pretension geogrid, pull pinned geogrid taut to eliminate loose folds. Stake or secure back edge of geogrid prior to and during backfill and compaction.
- F. Follow manufacturer's guideline relative to overlap requirement of uniaxial and biaxial geogrids.

3.07 FILL PLACEMENT

- A. Backfill material shall be placed in 8 inch lifts and compacted to 95% of Standard Proctor.
- B. Backfill shall be placed, spread, and compacted in such a manner that minimizes the development of slack or loss of pretension of the geogrid.
- C. Only hand-operated compaction equipment shall be allowed within 3 feet of the back surface of the Modular Block units.
- D. Backfill shall be placed from the wall rearward into the embankment to insure that the geogrid remains taut.
- E. Tracked construction equipment shall not be operated directly on the geogrid. A minimum backfill thickness of 6 inches is required prior to operation of tracked vehicles over geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- F. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.
- G. Fill placed one foot behind the geogrid units shall be wrapped in filter fabric as shown on the plans. A 6" overlap of the filter fabric shall be provided at the top of each layer of stone backfill.
- H. The fill placement shall be coordinated with the installation of handrails, fences, or guiderails.

---END OF SECTION 02242---