

**SEGMENTAL BLOCK RETAINING WALLS****PART 1 - GENERAL****1.01 SECTION INCLUDES**

Segmental Block Retaining Walls

**1.02 DESCRIPTION OF WORK**

Constructing segmental block retaining walls.

**1.03 SUBMITTALS**

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Upon request, submit certification that products supplied comply with identified specifications.
- B. Detailed design calculations (including soil bearing pressure), construction drawings, and shop drawings for all segmental block retaining walls, prepared by a licensed Professional Engineer in the State of Iowa.
- C. A detailed explanation of the design properties of geogrid reinforcement and quality control tests limits.
- D. Test results on segmental blocks, if required.
- E. Catalog cuts of segmental retaining wall blocks and cap stones indicating the size, type, and color specified for installation.

**1.04 SUBSTITUTIONS**

Comply with Division 1 - General Provisions and Covenants.

**1.05 DELIVERY, STORAGE, AND HANDLING**

Comply with Division 1 - General Provisions and Covenants.

**1.06 SCHEDULING AND CONFLICTS**

Comply with Division 1 - General Provisions and Covenants.

**1.07 SPECIAL REQUIREMENTS**

- A. A licensed Professional Engineer in the State of Iowa must prepare, sign, and seal detailed design calculations, construction drawings, and shop drawings for all segmental block retaining walls.
- B. Ensure design complies with the National Concrete Masonry Association (NCMA) "Design Manual for Segmental Retaining Walls."

**1.08 MEASUREMENT AND PAYMENT****A. Segmental Block Retaining Wall:**

1. **Measurement:** Measurement will be in square feet for the area of the face of retaining wall, measured from the top of the leveling pad to the top of the wall, including coping or cap stones.
2. **Payment:** Payment will be at the unit price per square foot of retaining wall.
3. **Includes:** Unit price includes, but is not limited to, design by a Licensed Professional Engineer in the State of Iowa, excavation, foundation preparation, furnishing and placing wall units, geogrid, leveling pad, subdrain, porous backfill material for subdrain, engineering fabric for subdrain, suitable backfill material, and shoring as necessary.

**B. Excavation and Suitable Backfill Material:** If bid separately, excavation for wall construction and placement of suitable backfill material will be measured and paid according to Section 2010, 1.08.

**C. Granular Backfill Material:**

1. **Measurement:** Measurement will be in tons for material used in connection with segmental block retaining walls.
2. **Payment:** Payment will be at the unit price per ton of granular backfill material.
3. **Includes:** Unit price includes, but is not limited to, furnishing, transporting, placing, and compacting material.

**D. Fence:** Comply with Section 9060, 1.08, A.

**E. Safety Rail:** Comply with Section 9080, 1.08, C.

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**PART 2 - PRODUCTS****2.01 MATERIALS****A. Segmental Block Walls:****1. Dry-cast Concrete Wall Units:**

- a. Comply with ASTM C 1372. Test and provide samples according to ASTM C 140.
- b. Provide certification that the blocks comply with the freeze-thaw durability requirements of ASTM C 1262 and the additional requirements for concrete units of Iowa DOT Materials I.M. 445.04.
- c. Furnish from an approved supplier.
  - 1) Iowa DOT Materials I.M. 445.04, Appendix A lists approved suppliers.
  - 2) Provide written certification that blocks comply with ASTM C 1372 and the additional materials requirements of Iowa DOT Materials I.M. 445.04, Appendix A.
- d. In lieu of furnishing blocks from an approved supplier, provide blocks from an approved system.
  - 1) Iowa DOT Materials I.M. 445.04, Appendix B lists approved systems.
  - 2) Test the required number of blocks from the lot to be installed according to Iowa DOT Materials I.M. 445.04.
  - 3) Submit results of test data to the Engineer.

**2. Wet-cast Concrete Wall Units:** Comply with the materials and compressive strength requirements of Iowa DOT Materials I.M. 445.05.

- a. Furnish from an approved supplier.
  - 1) Iowa DOT Materials I.M. 445.05, Appendix A lists approved suppliers.
  - 2) Provide written certification that blocks comply with Iowa DOT Materials I.M. 445.05.
- b. In lieu of furnishing blocks from an approved supplier, provide blocks from an approved system.
  - 1) Iowa DOT Materials I.M. 445.05, Appendix B lists approved systems.
  - 2) Test the required number of blocks from the lot to be installed according to Iowa DOT Materials I.M. 445.05.
  - 3) Submit results of test data to the Engineer.

**3. Geogrid:** Provide geogrid as specified in the retaining wall design.**B. Leveling Pad:** Provide material recommended by the wall manufacturer or supplier.**1. Granular Material:** Comply with Iowa DOT Section 4132.**2. Concrete:** Comply with Section 6010. Use Class C Concrete.**C. Subdrain:** Comply with Section 4040, 2.02. Minimum 4 inch diameter pipe.**D. Porous Backfill Material (for Subdrain):** Comply with Section 4040, 2.04.**E. Engineering Fabric:** Provide fabric complying with Iowa DOT Article 4196.01 for subsurface drainage.**F. Unit Fill Material:** Comply with Iowa DOT Section 4131.**G. Backfill Material:****1. Granular Backfill Material:** Comply with Iowa DOT Section 4133 within the reinforced earth zone of segmental block retaining walls.**2. Suitable Backfill Material:** Comply with Section 2010.

**2.01 MATERIALS (Continued)**

**H. Fence:** If the contract documents require a fence, comply with Section 9060.

**I. Safety Rail:** If the contract documents require a safety rail, comply with Section 9080.

**PART 3 - EXECUTION****3.01 EXCAVATION AND EMBANKMENT**

- A. Prior to beginning wall construction, compact proposed embankment behind the wall according to the field quality control requirements of Section 2010 with the following exception: compact to a minimum of 90% of maximum Standard Proctor Density.
- B. Excavate to the line and grade specified in the contract documents. Minimize over-excavation. Install sheeting, shoring, or other retention systems as required to ensure the stability of the excavation.

**3.02 INSTALLATION**

**A. Foundation Soil Preparation:** Excavate and compact 12 inches of native soil beneath the leveling pad to 95% of maximum Standard Proctor Density.

**B. Leveling Pad:** Construct a minimum 6 inch thick leveling pad of material as specified in the contract documents.

**C. Unit Installation:** Install materials at the proper elevation and orientation specified in the contract documents. Install the concrete segmental units and geogrid reinforcement according to the approved submittals.

**D. Subdrains:**

1. Install subdrains as specified in the contract documents to maintain gravity flow of water to the outside of the reinforced earth zone. Outlet subdrains into a storm sewer or along a slope at an elevation lower than the lowest point of the pipe within the reinforced earth zone.
2. Place porous backfill material around the subdrain to a minimum cover of 3 inches.
3. Wrap porous backfill material with engineering fabric.

**E. Backfill Material Placement:**

1. Place the backfill material in maximum 8 inch lifts, spread, and compact in such a manner that eliminates the development of wrinkles and/or movement of the geogrid reinforcement.
2. Compact granular backfill material according to the field quality control requirements of Section 2010 with the following exception: ensure the moisture content falls within a range from 3% under optimum moisture to no more than the optimum moisture content.
3. Use only hand-operated compaction equipment within 3 feet of the front of the wall face.
4. Do not operate tracked construction equipment directly on the geogrid reinforcement. A minimum thickness of 6 inches of backfill material is required over the geogrid reinforcement prior to operation of tracked vehicles. Minimize turning of tracked vehicles to prevent tracks from displacing the fill and damaging the geogrid reinforcement.
5. Rubber-tired equipment may pass over the geogrid reinforcement, if done according to the manufacturer's recommendations. Avoid sudden braking and sharp turning.

**3.02 INSTALLATION (Continued)****F. Geogrid Installation:**

1. Do not overlap the geogrid in the design strength direction; use one continuous piece of material. The design strength direction is perpendicular to the wall face. Butt adjacent sections of geogrid in a manner to ensure 100% coverage after placement.
2. Install the geogrid reinforcement under tension. Apply a nominal tension to the reinforcement and maintain it by staples, stakes, or hand tensioning. The tension applied may be released after the geogrid reinforcement has been covered and held in place with soil fill.

**G. Fence:** If the contract documents require a fence, comply with Section 9060.

**H. Safety Rail:** If the contract documents require a safety rail, comply with Section 9080.

END OF SECTION