

# **Jumbo NurseryStone**

## **SEGMENTAL RETAINING WALL UNITS**

### **PART 1: GENERAL**

#### **1.1 Description**

- A. Work includes furnishing and installing segmental block retaining wall units to the lines and grades designated on the construction drawings and as specified herein or as directed by the Architect/Engineer.

#### **1.2 Applicable sections of related work**

- A. Section 02100 – Site Work
- B. Section 02200 – Earth Work

#### **1.3 Reference Standards**

- A. ASTM C140 - Sampling and Testing Concrete Masonry Units
- B. ASTM D698 - Moisture Density Relationship for Soils, Standard Method
- C. *ASTM 1262 Standard Test Method for Evaluating the Freeze thaw Durability of Manufactured CMU's and Related concrete Units*
- D. ASTM C1372 - Specifications for Segmental Retaining Wall Units
- E. ASTM D 422 Gradation of Soils
- F. NCMA SRWU-1- Determination of Connection Strength between Geosynthetic and Segmental Retaining Wall units.
- G. NCMA SRWU-2- Determination of Shear Strength between Segmental Concrete Units
- H. NCMA SRW Design Manual 3<sup>rd</sup> Edition (2009)

\* Where specifications and reference documents conflict, the Archeitect/Engineer shall make the final determination of applicable documents.

#### **1.4 Reference Standards**

Contractor shall submit a manufacturer's certification prior to start of work providing test results and stating that the Segmental Retaining Wall Units meet the requirements of this specification. Uncertified SRW units shall not be used on this project.

#### **1.5 Delivery, Storage and Handling**

- A. Contractor shall check the materials upon delivery to assure that specified type, grade, color and texture of SRW unit have been received.
- B. Contractor shall prevent excessive mud, wet concrete, epoxies, and like materials which may affix themselves from coming in contact with the materials.
- C. Contractor shall protect the materials from damage. Damaged material shall not be incorporated into the SRW.

## PART 2: Retaining Wall

### 2.1 Materials

#### A. Concrete Units:

1. The Jumbo NurseryStone unit shall be manufactured with an Abraded or split face finish and the color shall be \_\_\_\_\_ insert (natural gray, brown, modeled, or other as indicated)
2. Concrete used to manufacture SRW units shall have a minimum 28 day compressive strength of 3,000 psi in accordance with ASTM C-1372. The concrete shall have adequate freeze/thaw protection for the project environment, with a maximum moisture absorption rate, by weight, of: 7 %.

Minimum Required Net Average Compressive Strength, psi (MPa)		Maximum Water Absorption Requirements lb/ft <sup>3</sup> (kg/m <sup>3</sup> )		
		Weight Classification Oven-Dry Density of Concrete lb/ft <sup>3</sup> (kg/m <sup>3</sup> )		
Average of 3 Units	Individual Unit	Lightweight: Less than 105 (1682)	Medium Weight: 105 (1682) to less than 125 (2002)	Normal Weight: 125 (2002) or more
3000 (20.7)	2500 (17.2)	18 (288)	15 (240)	13 (208)

3. SRW units shall provide a minimum of 94 square inches of wall face area.
4. SRW units shall have angled sides and be capable of inside and outside curves with a minimum of a 36" radius.
5. SRW units shall be interlocking with a concrete rear lip causing a minimum setback of 1" per vertical course.

#### C. Base Material

1. Materials for leveling pad shall consist of crushed stone or lean mix concrete. Concrete leveling pads shall be 2" -4" in thickness. A minimum of 6" of compacted stone foundation is required for engineered walls.

#### D. Unit Fill

1. Fill between and behind units with a well drained ¾" minus sized gravel. Gradation of fill shall be approved by the engineer not to exceed 10% passing the #200
2. A minimum of 12" of drainage fill shall extend behind the wall.

#### E. Common Backfill

1. Where additional fill is required, contractor shall submit sample and specifications to the engineer to determine if acceptable.
2. Material shall be native material unless otherwise specified in the drawings. Unsuitable soils for backfill shall not be used within the reinforced soil mass.
3. Infill material shall be site excavated soils when approved by the on-site soils engineer unless otherwise specified in the drawings. Unsuitable soils for backfill (heavy clays or organic soils) shall not be used in the reinforced soil mass. Fine grained cohesive soils ( $f < 31^\circ$ ) may be used in wall construction, but additional backfilling, compaction and water management efforts are required. Poorly graded sands, expansive clays and/or soils with a plasticity index (PI) > 20 or a liquid limit (LL) >40 should not be used in wall construction.

4. The infill soil used must meet or exceed the designed friction angle and description noted on the design cross sections, and must be free of debris and consist of one of the following inorganic USCS soil types: GP, GW, SW, SP, SM, and SM-SC meeting the following gradation as determined in accordance with ASTM D422.

<u>Sieve Size</u>	<u>Percent Passing</u>
4 inch	100 – 75
No. 4	100 – 20
No. 40	0 - 60
No. 200	0 - 35

## **2.2 Retaining Wall Installation**

### **A. Excavation**

1. Contractor shall excavate to the lines and grades shown on the project grading plans and SRW plan and profile drawing. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Architect/Engineer, at the Contractor's expense.
2. Contractor shall verify locations of existing structures and utilities prior to excavation. Contact the local line-locate service. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation

### **B. Foundation Soil Preparation**

1. Foundation soil shall be excavated as required for footing dimensions shown on the construction drawings, or as directed by the engineer.
2. Foundation soil shall be examined by the engineer to insure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with compacted backfill materials.

### **C. Leveling Pad**

1. Leveling pad soil shall be excavated as required for footing dimensions shown on the construction drawings, or as directed by the engineer.
2. Leveling pad materials shall be installed upon undisturbed insitu soils.
3. Material shall be compacted so as to produce a level, hard surface on which to place the first course of units. Compaction will be with mechanical plate compactors to 95% of standard.
4. Leveling pad shall be prepared to insure complete contact of retaining wall unit with base. Gaps shall not be allowed.
5. Leveling pad materials shall be to the depths and widths shown. Contractor may opt for using reduced depths of sand and gravel in conjunction with a concrete topping. Any topping concrete shall be unreinforced and a maximum of one inch thick

### **D. Unit Installation**

1. First course of SRW units shall be placed directly on the leveling pad. All units should be checked to assure that the units are level in two directions, (parallel and perpendicular to wall face) and that horizontal alignment is correct.

2. Ensure that base course SRW units are in full contact with the leveling pad.
3. SRW units are to be placed side by side for full length of straight wall alignment. Alignment may be done by means of a string line or offset from base line to a molded finished face of the SRW unit. Adjust unit spacing for curved sections according to manufacturer's recommendation.
4. Clean all excess Unit Fill from top of SRW Units and install next course. Ensure each course is completely filled prior to proceeding to next course.
5. Lay up each course so that the concrete lip extends behind the SRW unit below it. The units must then be pulled forward so that the lip is in full contact and that a 1" setback is attained. Repeat for each vertical course of units.

E. Geogrid

1. When geogrid is installed as soil reinforcement, follow the additional requirements of section: Geogrid Wall Reinforcement.

## **GEOGRID WALL REINFORCEMENT**

### **PART 1: GENERAL**

#### **1.1 Scope**

- A. Work includes furnishing and installing geogrid reinforcement, wall fill and backfill to the lines and grades designated on the construction drawings. Also included, is the furnishing and installing of all appurtenant materials required for construction of the geogrid reinforced soil retaining wall, as shown on the construction drawings.

#### **1.2 Applicable sections of related work**

- A. Jumbo NurseryStone Segmental Retaining Wall Units

#### **1.3 Reference Standards**

- A. See applicable standards for reference geogrid manufacture.

#### **1.4 Delivery, Storage and Handling**

- A. Contractor shall check the geogrid upon delivery to assure that the proper material has been received.
- B. Geogrid shall be stored according to manufacturer's specification.
- C. Direction of geogrid shall be in the direction as specified by manufacturer. Direction and geogrid size should be indicated by paint or some marking when multiple pieces are being cut and laid out for installation.

### **PART 2: Material**

#### **2.1 Definitions**

- A. Geosynthetic reinforcement shall consist of geogrid manufactured specifically for soil reinforcement applications and shall be made of high tenacity polyester yarn or high density polyethylene. Polyester geogrid shall be coated with an impregnated PVC or equivalent coating.
- B. Concrete retaining wall units are as detailed on the drawings and are specified under section: Jumbo NurseryStone Segmental Retaining Wall Units.
- C. Wall fill is a free draining granular material used between and behind the concrete units as per engineer's design.

- D. Backfill is the soil which is used as fill for the reinforced soil mass.
- E. Foundation soil is the insitu soil.

## **2.2 Products**

- A. Geogrid shall be the type and length as shown on the drawings.

## **2.3 Acceptable Manufacturer**

- A. A manufacturer's product shall be approved by the engineer prior to bid opening.

## **PART 3: Execution**

### **3.1 Foundation Soil Preparation**

- 1 Foundation soil shall be excavated to the lines and grades as shown on the construction drawings or as directed by the engineer.
- 2 Foundation soil shall be examined by the engineer to insure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with compacted backfill materials.
- 3 Over-excavation shall be filled with compacted infill material.
- 4 Foundation soil shall be proof rolled prior to fill and geogrid placement.

### **3.2 Wall Erection**

- A. Wall erection shall be as specified under section: Jumbo NurseryStone Segmental Retaining Wall Units.

### **3.3 Wall Fill Placement**

- A. Wall fill shall be completed after each 6" or 8" inch lift. Fill shall be compacted to 95 percent of standard.
- B. Backfill shall be placed, spread and compacted in such a manner that minimizes the development of wrinkles in and or movement of the geogrid.
- C. Only hand operated compaction equipment shall be allowed within three feet of the wall face.
- D. Backfill shall be placed from the wall outward, to insure that the geogrid remains taut.
- E. Tracked construction equipment shall not be operated directly on the geogrid. Minimum backfill thickness of 6 inches is required prior to operation of tracked vehicles over the 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 m.p.h. sudden braking and sharp turning shall be avoided.
- G. At the end of each day's operation, the contractor shall slope the last lift of reinforced backfill away from the wall to direct runoff away from wall face. The contractor should avoid allowing other side surface water from adjacent sites to enter the construction zone.

## **PART 4: Measurement and Payment**

- A. Measurement of segmental retaining wall is on a square foot basis as computed on the total area of face and embedment as constructed and verified against the construction drawings.