

# **MaxFlow**

**CELLULAR CONCRETE FILL  
for GEOTECHNICAL APPLICATIONS**



## **Sample Specification**

### **1. Scope of work**

#### 1.1 Included Scope

1.1.1 The fill contractor shall furnish all labor, materials, equipment and supervision required for the production, delivery and placement of the cellular concrete fill. The production and placement of the fill material shall be accomplished in strict accordance with project plans and specifications.

#### 1.2 Scope Related Work, Not Included

1.2.1 Work items related to the placement of the cellular concrete fill, however, not considered to be within the performance scope of the fill contractor shall include; site excavation, utility construction, retaining wall construction, bulkheads, de-watering, drainage provision and other such related tasks.

### **2. Qualification**

#### 2.1 Fill Contractor

2.1.1 The fill contractor shall submit to the project Engineer, a written statement issued by the fill Manufacturer, certifying the contractor as an approved producer of the cellular concrete fill.

2.1.2 The fill contractor shall routinely engage in the production and placement of cellular concrete. The fill contractor shall provide skilled labor and supervision to perform all related work.

#### 2.2 Equipment

2.2.1 The fill contractor shall provide all batching, mixing and placing equipment required for the production and placement of the cellular concrete fill. The equipment shall be configured in accordance with all fill Manufacturers recommendations.

2.2.2 The cellular concrete batching equipment shall be capable of reproducing subsequent batches of fill at the specified cast density within an accuracy tolerance of +/- 3 lbs/ft<sup>3</sup>.

### 3. Materials

#### 3.1 Cellular Concrete Fill mixture components

- 3.1.1 Portland cement: Type I, IP, II or III, compliant to ASTM C-150. Other cementitious binders, such as blended cements meeting ASTM C 595, may be used when prior approval is obtained from the project Engineer and the fill Manufacturer.
- 3.1.2 Mix Water: shall be free from deleterious amounts of acid, alkali, salts, oils and/or other organic compounds that could adversely effect the setting and/or subsequent strength development of the fill.
- 3.1.3 Foaming Agent: MaxFlow Foaming Agent, produced by MaxFlow Environmental Corporation of Black Mountain, NC. Containers of MaxFlow Foaming Agent shall be clearly identifiable by bearing the Manufacturers product labeling. The foaming agent shall meet the requirements of ASTM C 869 when tested in accordance with ASTM C 796.
- 3.1.4 Standard Mineral Admixtures: fly ash meeting ASTM C 618 and/or sand meeting ASTM C 33 may be used when specified.
- 3.1.5 Non-Standard Mineral Fillers: non-standard mineral fillers such as fly ash not meeting ASTM C 618 may be used when pretested and approved by the project Engineer and the fill Manufacturer.
- 3.1.6 Chemical Admixtures: admixtures shall comply with ASTM C 494 and may be used only when prior approval is issued by the project Engineer and the fill Manufacturer.

#### 3.2 Proportioning

- 3.2.1 The component proportions of the cellular concrete fill for the range class as specified in 4.1.1, shall be supplied to the fill contractor by the Manufacturer. The fill contractor shall thereupon submit the mixture proportions to the project Engineer.

### 4. Fill Properties

- 4.1 The cellular concrete fill shall be produced to meet the following physical properties:
  - 4.1.1 Cast Density: the cellular concrete fill shall have a cast density range of [ select value from table 4.2 ] lbs/ft<sup>3</sup> (+/- 3 lbs/ft<sup>3</sup>). Cast density sampling shall be acquired at the point-of-placement and density determinations shall be made in accordance with the applicable sections of ASTM C 495
  - 4.1.2 Air Dry Density: the cellular concrete fill shall have an air dry cast density range of [ select value from table 4.2 in accordance with selection 4.1.1 ] lbs/ft<sup>3</sup>.

4.1.3 Compressive Strength: the cellular concrete fill shall have a minimum [ *age in days, i.e. 28, 56 etc.* ] day compressive strength of [ *select value from table 4.2 in accordance with selection 4.1.1* ] psi. Testing for compressive strength shall be accomplished in accordance with ASTM C 495.

4.1.4 Bearing Capacity: the cellular concrete fill shall have a minimum ultimate bearing capacity of [ *select value from table 4.2 in accordance with selection 4.1.1* ] tons/ft<sup>2</sup> at [ *age in days, i.e. 28, 56 etc.* ] days. The in-place bearing capacity values of the fill shall be determined by calculation, using the compressive strength values as determined in 4.1.3. Early bearing capacity of the fill may be determined by penetration in accordance with ASTM C 403.

#### 4.2 Tabulated Physical Properties for MaxFlow Cellular Concrete Fill

Range Class	Cast Density (lbs/ft <sup>3</sup> )	Air Dry Density (lbs/ft <sup>3</sup> )	Minimum Compressive Strength (psi)	Bearing Capacity (2000 lbs/ft <sup>2</sup> )
I	18 - 24	14 - 20	20	1.4
II	24 - 30	20 - 26	50	3.6
III	30 - 36	26 - 32	80	5.8
IV	36 - 42	32 - 38	140	10.1
V	42 - 50	38 - 44	200	14.4
VI	50 - 80	44 - 70	350	25.2

Note: As with all concrete mix designs, actual tests should be conducted using the available component materials to verify all theoretical physical properties predictions. The cementitious product used to contemplate the physical properties as shown in the table above is Type I portland cement meeting ASTM C 150. The minimum compressive strength values shown are at 28 days of age and determined in accordance with ASTM C 495.

### 5. Application

#### 5.1 Site Conditions

5.1.1 The fill contractor shall examine the placement site for readiness. The fill contractor shall bring to the attention of the Prime Contractor or the project Engineer, any conditions requiring correction in order to allow the proper and expeditious placement of the cellular concrete fill.

5.1.2 The fill site shall be free from debris, standing water, snow or ice. The cellular concrete fill shall not be placed on frozen ground or atop sub-freezing surfaces.

5.1.3 Do not place at temperatures below 32° F (0° C) or when freezing temperatures are forecast to occur within 12 hours of final placement. Should cold weather placement become necessary, the fill Manufacturer shall be consulted for procedure recommendations.

#### 5.2 Batching and Placement

5.2.1 The batching sequence shall be accomplished in accordance with procedures recommended by the fill Manufacturer. The mixing cycle shall be of sufficient duration as to produce a well blended, homogenous mixture.

5.2.2 The batching process and the method of conveyance, should be synchronized allowing a continuous flow of cellular concrete fill to arrive at the point-of-placement. The method of conveyance shall provide prompt delivery of the cellular concrete fill material.

5.2.3 In areas where thick sections of fill are required, the cellular concrete fill may be placed in lifts. The lifts shall be planned in a manner which would not cause the final placement, that lift fulfilling the maximum plan elevation, to be cast at a thickness of less than 2 inches.

### 5.3 Quality Control

5.3.1 Cast Density: cast density checks shall be taken at the point-of-placement. These checks shall be taken as frequently as is necessary during the initial batches in order to make any required adjustments to the fill mixture. Thereafter, point-of-placement density checks shall be taken at a minimum frequency of one per hour. The density determination information should be logged, also noting date, time and location and should thereafter be maintained by the fill contractor as a project record.

5.3.2 Sampling: a minimum of (4) 3 x 6 cylindrical test specimens, for compressive strength testing, shall be obtained at the point-of-placement for each days placement. Should oven dry density determinations also be required, companion specimens shall be cast. The cylinder molds used shall meet the requirements of ASTM C 470. Sampling and testing shall be conducted in accordance with ASTM C 495 with the following exceptions:

5.3.2.1 Do not rod the cylinders during casting. The specimens shall be made by (1.) half filling the mold with fresh cellular concrete, (2.) dropping the mold on a hard level surface from 1 inch above (4) times, (3.) then filling the mold and repeating step (3.). The freshly cast cylinders shall be placed in an protected area where they will not be disturbed for at least 24 hours.

5.3.2.2 Do not oven dry the specimens cast for compressive strength testing.

5.3.3 Flow Consistency: the flow consistency of freshly sampled cellular concrete fill may be determined in accordance with ASTM D 6103.

### **END OF SECTION**

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