

Section 1060

TABLE 1056-5 GEOCELL REQUIREMENTS		
Property	Minimum Requirement	Test Method
Cell Depth	4"	N/A
Sheet Thickness	50 mil -5%, +10%	ASTM D5199
Density	58.4 lb/cf	ASTM D1505
Carbon Black Content	1.5%	ASTM D1603 or D4218
ESCR ^A	5000 hr	ASTM D1693
Coefficient of Direct Sliding (with material that meets AASHTO M 145 for soil classification A-2)	0.85	ASTM D5321
Short-Term Seam (Peel) Strength (for 4" seam)	320 lb	USACE ^C Technical Report GL-86-19, Appendix A
Long-Term Seam (Hang) Strength ^B (for 4" seam)	160 lb	

- 1 **A.** Environmental Stress Crack Resistance.
- 2 **B.** Minimum test period of 168 hours with a temperature change from 74°F to 130°F in
- 3 1-hour cycles.
- 4 **C.** US Army Corps of Engineers

5 Provide geocell accessories (e.g., stakes, pins, clips, staples, rings, tendons, anchors,

6 deadmen, etc.) recommended by the Geocell Manufacturer.

7
8
9

**SECTION 1060
LANDSCAPE DEVELOPMENT MATERIALS**

1060-1 GENERAL

11 Supply certifications for all landscape development materials as required below. If no

12 certification is required, supply the Department with a statement certifying that all materials

13 conform to these Specifications and those of the NC Department of Agriculture and

14 Consumer Services (NCDA&CS) or both. All landscape development materials shall comply

15 with all applicable Federal and State domestic plant quarantines.

1060-2 FERTILIZER

17 The quality of all fertilizer and all operations in connection with the furnishing of this material

18 shall comply with the North Carolina Fertilizer Law and with the rules and regulations,

19 adopted by the North Carolina Board of Agriculture in accordance with said law, in effect at

20 the time of sampling. All fertilizer will be subject to sampling and testing by the Engineer, or

21 by an authorized representative of the North Carolina Department of Agriculture and

22 Consumer Services, or both.

23 Dry fertilizer shall be manufactured from cured stock. Care for the fertilizer during handling

24 and storing in such a manner that it will be protected against hardening, caking or loss of plant

25 food values. Pulverize any hardened or caked fertilizer to its original condition before using.

1060-3 LIMESTONE

27 The quality of all limestone and all operations in connection with the furnishing of this

28 material shall comply with the North Carolina Agricultural Liming Materials and Landplaster

29 Act, and with the rules and regulations, adopted by the North Carolina Board of Agriculture

30 and Consumer Services in accordance with said law, in effect at the time of sampling. All

1 limestone will be subject to sampling and testing by the Engineer, or by an authorized
2 representative of the North Carolina Department of Agriculture, or both.

3 Limestone shall be agricultural grade ground limestone. Either dolomitic or calcitic limestone
4 may be used.

5 All limestone shall contain not less than 90% calcium carbonate equivalents. Dolomitic
6 limestone shall contain not less than 10% of magnesium. Grade dolomitic limestone so at
7 least 90% will pass through a U.S. Standard 20 mesh screen and at least 35% will pass
8 through a U.S. Standard 100 mesh screen. Grade calcitic limestone so at least 90% will pass
9 through a U.S. Standard 20 mesh screen and at least 25% will pass through a U.S. Standard
10 100 mesh screen. Where the current grading requirements of the North Carolina Board of
11 Agriculture are different from the above, the requirements of the Board of Agriculture will
12 apply.

13 During handling and storing, care for the limestone in such manner that it will be protected
14 against hardening or caking. Pulverize any hardened or caked limestone to its original
15 condition before using.

16 **1060-4 SEED**

17 The quality of all seed and all operations in connection with the furnishing of this material
18 shall comply with the North Carolina Seed Law and with the rules and regulations, adopted
19 by the North Carolina Board of Agriculture and Consumer Services in accordance with said
20 law, in effect at the time of sampling, and with the quality requirements of the *Standard*
21 *Specifications*. All seed will be subject to sampling by the Engineer, or by an authorized
22 representative of the North Carolina Department of Agriculture and Consumer Services, or
23 both; and will be tested by the North Carolina Department of Agriculture. Supplementary
24 testing for seed germination may be performed by the Engineer.

25 The quality of all seed will be based on the percentage of pure live seed, which will be
26 computed by multiplying the percentage of purity by the percentage of germination and
27 dividing the result by 100.

28 Seed shall have been approved by the North Carolina Department of Agriculture and
29 Consumer Services before being sown. No seed will be accepted with a date of test more than
30 eight months before the date of sowing, excluding the month in which the test was completed.
31 Such testing, however, will not relieve the Contractor from responsibility for furnishing and
32 sowing seed that meets these *Standard Specifications* at the time of sowing. The Engineer
33 may retest seed for germination after 5 months of storage; at the beginning of each normal
34 seeding season for the particular kind of seed involved or at any time that the condition of the
35 seed appears to have deteriorated.

36 When a low percentage of germination causes the quality of the seed to fall below the
37 minimum pure live seed specified, the Contractor may elect, subject to the approval of the
38 Engineer, to increase the rate of application sufficiently to obtain the minimum pure live seed
39 content specified, provided that such an increase in the rate of application does not cause the
40 quantity of noxious weed seed per acre or square yard, as the case may be, to exceed the
41 quantity that would be allowable at the regular rate of application.

42 Furnish and deliver each of the species or varieties of seed in separate bags. If seed is to be
43 mixed before sowing, perform such mixing in a commercial seed mixing machine, or by
44 an equally thorough means, after sampling and testing have been completed.

45 During handling and storing, care for the seed in such a manner that it will be protected from
46 damage by heat, moisture, rodents or other causes.

47 **1060-5 MULCH FOR EROSION CONTROL**

48 Mulch for erosion control shall consist of grain straw, or other acceptable material, and be
49 approved by the Engineer before being used. All mulch shall be reasonably free from mature

Section 1060

1 seedbearing stalks, roots or bulblets of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild
2 Onion, Crotalaria, Witchweed and an excessive amount of restricted noxious weeds as
3 defined by the North Carolina Board of Agriculture at the time of use of the mulch. Loose
4 and separate straw mulch that is matted or lumpy before being used.

5 Material for holding mulch in place shall be asphalt or other approved binding material.

6 **1060-6 SPRIGS**

7 Sprigs shall consist of freshly dug live stolons or rhizomes of perennial grasses, at least 2
8 inches in length, and be first class representatives of the required species or varieties specified
9 in the specifications. The areas from which sprigs are to be obtained shall be free from
10 Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Crotalaria, Witchweed and an
11 excessive amount of restricted noxious weeds as defined by the North Carolina Board of
12 Agriculture at the time of digging the sprigs. The areas shall have been mowed and raked,
13 burned off, or otherwise prepared in a manner acceptable to the engineer before digging of
14 sprigs begins.

15 **1060-7 SOD**

16 Sod shall consist of a live, dense, well-rooted growth of permanent grasses, free from Johnson
17 Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Crotalaria, Witchweed and an excessive
18 amount of restricted noxious weeds as defined by the North Carolina Board of Agriculture
19 and Consumer Services at the time of cutting the sod. Mow the area from which sod is to be
20 obtained to a height of not more than 2 inches. Rake free of grass clippings and debris and
21 otherwise prepared in a manner satisfactory to the Engineer before cutting of sod begins.

22 Cut the sod into rectangular sections of sizes convenient for handling without breaking or loss
23 of soil. Cut it with a sod cutter or other acceptable means to a depth that will retain in the sod
24 practically all of the dense root system of the grass.

25 During wet weather, allow the sod to dry sufficiently before lifting to prevent tearing during
26 handling and placing. During extremely dry weather, water it before lifting if such watering
27 is necessary to insure its vitality and to prevent loss of soil during handling.

28 **1060-8 MATTING FOR EROSION CONTROL**

29 **(A) General**

30 Matting for erosion control shall be excelsior matting or straw matting. Furnish
31 a Type 3 material certification in accordance with Article 106-3 certifying that the
32 matting meets this article. Other acceptable material manufactured especially for erosion
33 control may be used when approved by the Engineer in writing before being used.
34 Matting for erosion control shall not be dyed, bleached or otherwise treated in a manner
35 that will result in toxicity to vegetation.

36 **(B) Excelsior Matting**

37 Excelsior matting shall consist of a machine produced mat of curled wood excelsior at
38 least 47 inches in width and weigh 0.975 lb/sy with a tolerance of $\pm 10\%$. At least 80%
39 of the individual excelsior fibers shall be 6 inches or more in length. Evenly distribute
40 the excelsior fibers over the entire area of the blanket. Cover one side of the excelsior
41 matting with an extruded plastic mesh. The mesh size for the plastic mesh shall be no
42 more than 1 inch x 1 inch.

43 **(C) Straw Matting**

44 Straw matting shall consist of a machine produced mat of 100% grain straw. The straw
45 matting shall have a width of at least 48 inches and no more than 90 inches and weighing
46 at least 0.50 lb/sy and no more than 0.75 lb/sy. Evenly distribute the straw over the entire
47 area of the blanket. Cover one side of the blanket with photodegradable netting with

1 a maximum mesh (netting) size of 0.75 inch x 0.75 inch sewn together with a degradable
2 thread. The grain straw shall contain no weed seeds. Package each roll separately.

3 **(D) Wire Staples**

4 Staples shall be machine made of No. 11 gauge new steel wire formed into a U-shape.
5 The size when formed shall be not less than 6 inches in length with a throat of not less
6 than 1 inch in width.

7 **1060-9 WATER**

8 Water used in the planting or care of vegetation shall meet Class C fresh waters as defined
9 in 15 NCAC 2B.0200.

10 **1060-10 NURSERY GROWN PLANT MATERIALS**

11 **(A) General**

12 Use all plants as called for by the contract.

13 Container grown plants may be used instead of balled and burlapped plants or bare rooted
14 plants provided written approval for such use has been obtained from Engineer.

15 Grading of plants, size of root balls and type and minimum dimensions of containers
16 shall conform to the *American Standard for Nursery Stock*. Do not cut back plants from
17 larger sizes to meet the sizes called for in the contract.

18 Botanical names referred to in the contract are taken from *Hortus Third, the Bailey*
19 *Hortorium* (MacMillan Publishing Co., Inc.). All plants delivered shall be true to name.
20 Each plant, or group of the same species, variety and size of plant, shall be legibly tagged
21 with the name and size of the plant.

22 All plants shall be first-class representatives of their species or varieties. The root system
23 shall be vigorous and well developed. The branch systems shall be of normal
24 development and free from disfiguring knots, sun scald injuries, abrasions of the bark,
25 dead or dry wood, broken terminal growth or other objectionable disfigurements. Trees
26 shall have reasonably straight stems and be well branched and symmetrical in accordance
27 with their natural habits of growth.

28 All plants shall be free from plant diseases and insect pests. All shipments of plants shall
29 comply with all nursery inspection and plant quarantine regulations of the states of origin
30 and destination, as well as with Federal regulations governing interstate movement of
31 nursery stock. Any nursery stock used on highway landscape projects shall be
32 accompanied by a valid copy of a certificate of inspection, which has been granted by the
33 North Carolina Department of Agriculture and Consumer Services, Entomology
34 Division. Fire ant treatment certification, where applicable, is required.

35 When nursery stock from other states is used on projects in North Carolina, this stock
36 shall be accompanied by a tag or certificate stating that the nursery stock has been
37 inspected and certified by an authorized official of the state of origin as apparently free
38 from injurious plant pests.

39 All plant materials are subject to inspection at any time by the Engineer. Any such
40 inspection before or during planting operations, however, will not be construed as final
41 acceptance of the plants involved.

42 All geophytes; bulbs, corms and tuberous plants; shall be synonymous to the term "plant"
43 within the contract. Examples include, but are not limited to, Narcissi (Daffodil), Tulipa
44 (Tulip), Iris and Canna; the terms "bulb", "corm", "tuber"; and specific plant names such
45 as "Daffodil", "Tulip", "Canna lily", etc.

Section 1060

1 (B) Balled and Burlapped Plants

2 Dig plants to be balled and burlapped so as to retain a firm ball of soil and the plant's
3 fibrous root system. The soil in the ball shall be the original and undisturbed soil in
4 which the plant has been grown. Dig, wrap, transport and handle the plant so the soil in
5 the ball shall not become frozen, loosened, cause stripping of the small feeding roots nor
6 movements of the soil away from contact with such roots.

7 (C) Container Grown Plants

8 Container grown plants shall be healthy, vigorous, well-rooted and established in the
9 container in which they are delivered. These plants shall be in the container long enough
10 for the fibrous roots to have developed so the root mass will retain its shape and hold
11 together when removed from the container. The container shall be sufficiently rigid to
12 firmly hold the soil protecting the root mass during transporting, handling and planting.
13 The soil shall not be allowed to become frozen.

14 (D) Bare Root Plants

15 Bare root plants shall have a heavy fibrous root system that has been developed by proper
16 cultural treatment. Dig, package, transport and handle bare root plants in a manner that
17 will prevent injury to or drying out of the trunks, branches or roots, or freezing of the
18 roots. Bare root plants damaged through improper handling, freezing, drying out, etc.
19 will result in rejection of material.

20 (E) Plant Substitution

21 No change in the *Standard Specifications* (species, variety, size, caliper, furnish) will be
22 made without written approval of the Engineer. Present all requests for substitutions in
23 writing and include a listing of the sources contacted in an attempt to secure specified
24 plant material. Requests for substitutions shall include the botanical name, common
25 name, cultivar, where applicable, size, caliper and furnish description of the proposed
26 substitute. No increase in compensation will be made to the Contractor as a result of the
27 use of approved substitute plants. The Department reserves the right to locate specified
28 plant material for the project when it has knowledge that specified material is available.

29 (F) Geophytes

30 Geophytes; bulbs, corms and tuberous plants; shall be healthy and free of disease caused
31 by fungi, nematodes, bacteria and wilt. Plants that are lightweight and lacking adequate
32 mass will result in rejection. Plants shall be firm and absent of discolored patches with
33 soft or spongy areas or signs of rot, slime or mold. Plants with new root growth will
34 result in rejection.

35 Dig, package, transport and handle these plants as to prevent injury, drying out, excessive
36 wetness or freezing. Damaged plants through improper handling, freezing, drying out or
37 excessive moisture will result in rejection.

38 All geophytes, bulbs, corms and tuberous plants shall be inspected for size and condition
39 and rejected plants shall be removed from the supply before planting.

40 1060-11 MULCH FOR PLANTING

41 Use mulch for planting as specified in the specifications, shown in the plans, or approved by
42 the Engineer. Mulch for planting shall not contain substances injurious to plants or which
43 will inhibit normal development and growth of plants. Mulch for a project shall come from
44 a single source, as approved by the Engineer, unless an additional source is submitted and
45 approved before use.

1060-12 MATERIALS FOR STAKING OR GUYING**(A) Stakes**

Use stakes made of cypress, cedar, oak, locust or other acceptable wood free from defects that would compromise the strength of the stake. Stakes shall be at least 2 inches x 2 inches (nominal). Use stakes of the size and length as shown in the plans.

(B) Wire

Wire shall be new soft No. 14 gauge steel wire or as shown in the plans.

(C) Hose

Hose to be used with wire shall have a minimum inside diameter of 1/2 inch. All hose shall be garden type hose composed of rubber and fabric, or as shown in the plans.

(D) Other

Other staking and guying materials may be used if a sample is submitted and approved by the Engineer before use.

1060-13 HERBICIDES

The herbicide to be used for a particular application shall be as specified or approved by the Engineer prior to their application.

Herbicides shall be properly labeled and registered with the United States Department of Agriculture and the North Carolina Department of Agriculture and Consumer Services. A container shall contain only the herbicide that meets the analysis guaranteed on the label. Keep all herbicides in such original labeled containers until used.

Herbicide application shall only be conducted by individuals who possess a pesticide license from the NC Department of Agriculture and Consumer Services or individuals under their direction and who has read, understands, and follows the herbicide labeling before applying the product.

1060-14 COIR FIBER MAT

Coir fiber mat shall consist of 100% coconut fiber (coir) twine woven into high strength matrix. The coir fiber mat shall have a thickness of at least 0.30 inch and weigh at least 20 ounces per square yard. The coir fiber mat shall have a tensile strength of at least 1,348 x 626 lbs/ft and elongation of no more than 34% x 38%. The coir fiber mat shall have a flexibility of 65,030 x 29,590 mg-cm. The coir fiber mat shall have an observed flow velocity of 11 feet per second. The coir fiber mat shall have a C-Factor of 0.002. The size of the coir fiber mat shall be 6.6 feet x 164 feet and the measured open area shall be 50%.

1060-15 SPECIAL STILLING BASIN

The special stilling basin shall be a bag constructed to a minimum size of 10 feet x 15 feet made from a nonwoven fabric. It shall have a sewn-in 8 inches (maximum) spout for receiving pump discharge. The bag seams shall be sewn with a double needle machine using a high strength thread. The seams shall have a minimum wide width strength of 60 lbs. per inch tested in accordance with ASTM D4884.

SECTION 1070 REINFORCING STEEL

1070-1 GENERAL

All reinforcing steel and welded wire reinforcement shall come from a NTPEP certified facility for Reinforcing Steel and Welded Wire Reinforcement (REBAR/WWR). Standard drawing details for reinforcement products are found in the *Roadway Standard Drawings*.