

Section 1060

**TABLE 1056-1
GEOTEXTILE REQUIREMENTS**

Property	Requirement (MARV ^A)					Test Method
	Type 1	Type 2	Type 3 ^B	Type 4	Type 5 ^C	
<i>Typical Application</i>	<i>Shoulder Drains</i>	<i>Under Rip Rap</i>	<i>Temporary Silt Fence</i>	<i>Soil Stabilization</i>	<i>Temporary MSE Walls</i>	
Elongation (MD & CD)	≥ 50%	≥ 50%	≤ 25%	< 50%	< 50%	ASTM D4632
Grab Strength (MD & CD)	90 lb	205 lb	100 lb	180 lb	-	ASTM D4632
Tear Strength (MD & CD)	40 lb	80 lb	-	70 lb	-	ASTM D4533
Puncture Strength	220 lb	440 lb	-	370 lb	-	ASTM D6241
Wide Width Tensile Strength @ Ultimate (MD & CD)	-	-	-	-	2,400 lb/ft (unless required otherwise in the contract)	ASTM D4595
Permittivity	0.20 sec ⁻¹	0.20 sec ⁻¹	0.05 sec ⁻¹	0.05 sec ⁻¹	0.20 sec ⁻¹	ASTM D4491
Apparent Opening Size ^D	#60	#60	#30	#40	#30	ASTM D4751
UV Stability (Retained Strength) ^E	50%	50%	70%	50%	50%	ASTM D4355

- 1 **A.** MARV does not apply to elongation
- 2 **B.** Minimum roll width of 36" required
- 3 **C.** Minimum roll width of 13 ft required
- 4 **D.** US Sieve No. per AASHTO M 92
- 5 **E.** After 500 hours of exposure

6 **1056-5 GEOCOMPOSITES**

7 Provide geocomposite drain strips with widths of at least 12" and cores that meet
8 Table 1056-2.

**TABLE 1056-2
CORE REQUIREMENTS**

Property	Requirement (MARV ^A)	Test Method
Thickness	1/4" - 1/2"	ASTM D5199
Compressive Strength	40 psi	ASTM D1621
Flow Rate (with gradient of 1.0)	5 gpm ^B	ASTM D4716

- 9 **A.** MARV does not apply to thickness
- 10 **B.** Per foot of width tested

**SECTION 1060
LANDSCAPE DEVELOPMENT MATERIALS**

13 **1060-1 GENERAL**

14 Supply certifications for all landscape development materials as required below. If no
15 certification is required, supply the Department with a statement certifying that all materials
16 conform to these Specifications and those of the NC Department of Agriculture or both. All
17 landscape development materials shall comply with all applicable Federal and State domestic
18 plant quarantines.

1 1060-2 FERTILIZER

2 The quality of all fertilizer and all operations in connection with the furnishing of this material
3 shall comply with the North Carolina Fertilizer Law and with the rules and regulations,
4 adopted by the North Carolina Board of Agriculture in accordance with said law, in effect at
5 the time of sampling. All fertilizer will be subject to sampling and testing by the Engineer, or
6 by an authorized representative of the North Carolina Department of Agriculture, or both.

7 Dry fertilizer shall be manufactured from cured stock. Care for the fertilizer during handling
8 and storing in such a manner that it will be protected against hardening, caking or loss of plant
9 food values. Pulverize any hardened or caked fertilizer to its original condition before using.

10 1060-3 LIMESTONE

11 The quality of all limestone and all operations in connection with the furnishing of this
12 material shall comply with the North Carolina Lime Law and with the rules and regulations,
13 adopted by the North Carolina Board of Agriculture in accordance with said law, in effect at
14 the time of sampling. All limestone will be subject to sampling and testing by the Engineer,
15 or by an authorized representative of the North Carolina Department of Agriculture, or both.

16 Limestone shall be agricultural grade ground limestone. Either dolomitic or calcitic limestone
17 may be used.

18 All limestone shall contain not less than 90% calcium carbonate equivalents. Dolomitic
19 limestone shall contain not less than 10% of magnesium. Grade dolomitic limestone so at
20 least 90% will pass through a U.S. Standard 20 mesh screen and at least 35% will pass
21 through a U.S. Standard 100 mesh screen. Grade calcitic limestone so at least 90% will pass
22 through a U.S. Standard 20 mesh screen and at least 25% will pass through a U.S. Standard
23 100 mesh screen. Where the current grading requirements of the North Carolina Board of
24 Agriculture are different from the above, the requirements of the Board of Agriculture will
25 apply.

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

29 1060-4 SEED

30 The quality of all seed and all operations in connection with the furnishing of this material
31 shall comply with the North Carolina Seed Law and with the rules and regulations, adopted
32 by the North Carolina Board of Agriculture in accordance with said law, in effect at the time
33 of sampling, and with the quality requirements of the *Standard Specifications*. All seed will
34 be subject to sampling by the Engineer, or by an authorized representative of the North
35 Carolina Department of Agriculture, or both; and will be tested by the North Carolina
36 Department of Agriculture. Supplementary testing for seed germination may be performed by
37 the Engineer.

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

41 Seed shall have been approved by the North Carolina Department of Agriculture before being
42 sown. No seed will be accepted with a date of test more than 8 months before the date of
43 sowing, excluding the month in which the test was completed. Such testing, however, will
44 not relieve the Contractor from responsibility for furnishing and sowing seed that meets these
45 *Standard Specifications* at the time of sowing. The Engineer may retest seed for germination
46 after 5 months of storage; at the beginning of each normal seeding season for the particular
47 kind of seed involved or at any time that the condition of the seed appears to have
48 deteriorated.

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

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

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

12 **1060-5 MULCH FOR EROSION CONTROL**

13 Mulch for erosion control shall consist of grain straw, or other acceptable material, and be
14 approved by the Engineer before being used. All mulch shall be reasonably free from mature
15 seedbearing stalks, roots or bulblets of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild
16 Onion, Crotalaria, Witchweed and an excessive amount of restricted noxious weeds as
17 defined by the North Carolina Board of Agriculture at the time of use of the mulch. Loose
18 and separate straw mulch that is matted or lumpy before being used.

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

20 **1060-6 SPRIGS**

21 Sprigs shall consist of freshly dug live stolons or rhizomes of permanent grasses, at least
22 2" in length, and be first class representatives of the required species or varieties specified in
23 the specifications. The areas from which sprigs are to be obtained shall be free from Johnson
24 Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Crotalaria, Witchweed and an excessive
25 amount of restricted noxious weeds as defined by the North Carolina Board of Agriculture at
26 the time of digging the sprigs. The areas shall have been mowed and raked, burned off, or
27 otherwise prepared in a manner acceptable to the engineer before digging of sprigs begins.

28 **1060-7 SOD**

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

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

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

41 **1060-8 MATTING FOR EROSION CONTROL**

42 **(A) General**

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

(B) Excelsior Matting

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

(C) Straw Matting

Straw matting shall consist of a machine produced mat of 100% grain straw. The straw matting shall have a width of at least 48" and no more than 90" and weighing at least 0.50 lb/sy and no more than 0.75 lb/sy. Evenly distribute the straw over the entire area of the blanket. Cover one side of the blanket with photodegradable netting with a maximum mesh (netting) size of 0.75" x 0.75" sewn together with a degradable thread. The grain straw shall contain no weed seeds. Package each roll separately.

(D) Wire Staples

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

1060-9 WATER

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

1060-10 NURSERY GROWN PLANT MATERIALS**(A) General**

Use all plants as called for by the contract.

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

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

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

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

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

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

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

8 All geophytes; bulbs, corms and tuberous plants; shall be synonymous to the term “plant”
9 within the contract. Examples include, but are not limited to, Narcissi (Daffodil), Tulipa
10 (Tulip), Iris and Canna; the terms “bulb”, “corm”, “tuber”; and specific plant names such
11 as “Daffodil”, “Tulip”, “Canna lily”, etc.

12 **(B) Balled and Burlapped Plants**

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

18 **(C) Container Grown Plants**

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

25 **(D) Bare Root Plants**

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

31 **(E) Plant Substitution**

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

40 **(F) Geophytes**

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

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

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

3 **1060-11 MULCH FOR PLANTING**

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

9 **1060-12 MATERIALS FOR STAKING OR GUYING**

10 **(A) Stakes**

11 Use stakes made of cypress, cedar, oak, locust or other acceptable wood free from defects
12 that would compromise the strength of the stake. Stakes shall be at least
13 2" x 2" (nominal). Use stakes of the size and length as shown in the plans.

14 **(B) Wire**

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

16 **(C) Hose**

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

19 **(D) Other**

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

22 **1060-13 HERBICIDES**

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

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

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

32 **1060-14 COIR FIBER MAT**

33 Coir fiber mat shall consist of 100% coconut fiber (coir) twine woven into high strength
34 matrix. The coir fiber mat shall have a thickness of at least 0.30" and weigh at least 20 oz/sy.
35 The coir fiber mat shall have a tensile strength of at least 1,348 x 626 lb/ft and elongation of
36 no more than 34% x 38%. The coir fiber mat shall have a flexibility of
37 65,030 x 29,590 mg-cm. The coir fiber mat shall have an observed flow velocity of 11 ft/sec.
38 The coir fiber mat shall have a C-Factor of 0.002. The size of the coir fiber mat shall be
39 6.6 ft x 164 ft and the measured open area shall be 50%.

40 **1060-15 SPECIAL STILLING BASIN**

41 The special stilling basin shall be a bag constructed to a minimum size of 10 ft x 15 ft made
42 from a nonwoven fabric. It shall have a sewn-in 8" (maximum) spout for receiving pump
43 discharge. The bag seams shall be sewn with a double needle machine using a high strength
44 thread. The seams shall have a minimum wide width strength of 60 lb/in tested in accordance
45 with ASTM D4884.