

AirField Systems AirDrain Agronomic Drainage Natural Grass Root Zone Guidelines

1.0 DEFINITIONS

- 1.1 Sand: A specific sand with physical properties meeting those required for use in USGA putting green construction.
- 1.2 Peat: A specific peat moss product with physical properties meeting those required for use in USGA putting green construction.
- 1.3 Bridging: The ability of two or more different materials when placed in horizontal layers one on top of the other, to remain in consistent layers without the upper layer infiltrating into the lower layer and losing its integrity.
- 1.4 Subgrade: The subgrade of the field is the compacted and carefully graded soil at a given depth below the final soil surface. Above the subgrade will be a 1 inch high layer of AirDrain overlain by the sand based root zone typically placed in an 11-12 inch thick layer.
- 1.5 Root Zone: The sand or sand/peat mixture used as the growing medium for the turf. The root zone shall meet the USGA particle size recommendations as well as the recommended physical measurements when tested at the proposed placement depth.
- 1.6 Off-Site Mixing: The mixing of the sand and any amendment at the source of the sand in a controlled environment.

2.0 QUALITY ASSURANCE

- 2.1 Root Zone Sand and Mix Testing Agency Qualifications: Samples shall be tested by a laboratory accredited through the American Association for Laboratory Accreditation (A2LA) specializing in Putting Green Root Zone evaluation. The preferred laboratory is:

Thomas Turf Services, Inc.
11183 State Highway 30
College Station, TX 77845
Phone: 979-774-1600

- 2.2 Material Approval: The contractor shall provide the Architect with the source of the sand, peat and/or alternative amendment for the root zone and the results from a approved testing laboratory providing evidence that the proposed root zone meets the USGA recommendations for particle size and physical measurements at the proposed depth of placement.

2.3 Off-Site Testing Procedures – At the Mixing Location: The contractor shall collect and submit samples of the proposed root zone to an accredited laboratory as specified in section 2.1 above. Samples from the initial 500 tons of root zone shall be tested for both particle size, organic matter and physical measurements. Test results from the initial sample shall be approved by the architect prior to further root zone production. Subsequent samples shall be collected and submitted for testing from every 500-750 tons of produced root zone. All samples shall be tested for particle size distribution and organic matter, if present. Alternate samples shall be tested for physical measurements as well.

2.4 Sample Collection from Stock Piles:

2.4.1 Subsamples shall be taken from a given stockpile at 8 or more locations as follows: 2 each from the north, south, east and west sides of the stockpile. All samples should be taken at different heights in the stockpile so as to be unbiased.

2.4.2 At each sample location, first remove the outer 6-12 inches of the stockpile and then insert a clean 1.5-2.0 inch diameter PVC pipe 4 ft in length horizontally into the stockpile. Remove the pipe and empty the material contained in the pipe into a clean 5-gallon bucket.

2.4.3 After all 8 subsamples are in the bucket, the contents should be thoroughly mixed and sufficient material to fill a one-gallon zip-loc plastic bag shall be removed and placed in a bag, which is then sealed and inserted into a second zip-loc bag. The sample should be labeled and packaged for shipment to the testing laboratory.

3.0 EXECUTION

3.1 THE ROOT ZONE MIXTURE

3.1.1 Sand Selection: The sand shall be selected so that both the sand and the final root zone mixture meet the USGA's recommended particle size distribution as set forth in the following table.

3.1.2 The sand shall preferably be predominantly quartz since it is chemically inert and very resistant to further weathering. Sands containing carbonate, mica or other soft and easily weathered materials will only be used if quartz sand cannot be located within a reasonable distance of the project.

Fine Gravel	2.0-4.0 mm	Not more than 3%
Very Coarse Sand	1.0-2.0 mm	Not more than 10%
Total Gravel plus Very Coarse Sand	1.0-4.0 mm	Not more than 10%
Coarse Sand	0.5-1.0 mm	Minimum of 60%
Medium Sand	0.25-0.50 mm	
Fine Sand	0.15-0.25 mm	Not more than 20%
Very Fine Sand	0.05-0.15 mm	Not more than 5%
Silt	0.002-0.05 mm	Not more than 5%
Clay	Less than 0.002 mm	Not more than 3%
Total Fines	Very fine sand + silt + clay	Less than or equal to 10%

- 3.1.3 Organic Material Selection: The most commonly used organic component in a root zone mix is peat moss. A good quality peat should have a minimum organic matter content of 85% or greater as determined by loss of weight upon ignition and a fiber content in the range of 20-50%.
- 3.1.4 Other Organic Products: Organic sources such as rice hulls, finely ground bark, sawdust, compost or other similar products may be used at the discretion of the architect and provided that mixtures can be made with the sand of choice to produce a root zone that meets the USGA criteria at the depth of placement. Special caution should be used to select materials that will be consistent in quality and available long into the future.

- 3.1.5 Physical Properties of the Root Zone Mix: The root zone mix shall have the properties summarized in the following table as tested by an accredited laboratory using USGA protocol and ASTM procedures for the proposed depth of placement.
- 3.1.6 Root Zone Mixing: Root zone components shall be mixed (blended) at the sand plant. Care should be taken to have the sand and peat moist to help avoid segregation of the materials in the stockpile. Care should also be taken to avoid damaging the peat by excessive blending as this will the performance of the final mixture.
- 3.1.7 Root Zone Transportation: The produced root zone mixture shall be transported to the project site in clean trucks. It is critical that all trucks and mixing equipment are kept clean and free from contamination. Root zone material containing clay balls, large gravel or other foreign materials will not be accepted and must be removed by the supplier at their cost.
- 3.1.8 Root Zone Quality Control Testing: A quality control program during blending is required to insure consistency in the root zone mix. See section 2.3 above. In addition to sampling at the blending site, a minimum of 4 samples of root zone from the final field shall be collected and submitted for analysis to be sure that the correct materials were shipped.
- 3.1.9 Root Zone Mix Placement and Compaction: The delivered root zone shall be unloaded at the edge of the field as directed by the project coordinator. It shall be spread on the field using small light-weight tracked equipment. Be sure the mix is moist when spreading. The final grade should be established by using small tractors equipped with turf tires and pulling a laser controlled leveling blade. The final grade must be within a tolerance of ± 0.5 inch

Physical Properties of the Root Zone Mix	
Physical Property	Recommended Range
Total Porosity	35% - 55%
Air-filled Porosity	15% - 30%
Capillary Porosity	15% - 25%
Saturated Hydraulic Conductivity	Minimum of 6 inches/hour (150 mm/hour)