Turf & Soil Diagnostics

February 15, 2017

Paul Hagy
Texas Sports Sands
702 Easy Street
Garland, TX 75042

TSD File #17020044

Enclosed are the laboratory results of the 30-50 sample, which was received by the laboratory on February 9, 2017. This sample was tested according to the USGA protocols. These results are being compared to the 2004 USGA recommendations for putting green construction.

The particle size results indicate that this sample is a narrowly graded sand with over 90% of the particles in the coarse and medium sand fractions. The gradation of this sample meets USGA particle size recommendations.

The infiltration rate of this sand is 72.5 in/hr at the bulk density of 1.52 g/cc. This indicates the sand should be well drained.

If you have any questions or are in need of further assistance, please do not hesitate to contact us. Samples are generally kept on the premises for 45 days after report date. Thank you for using Turf & Soil Diagnostics, Inc.

Sincerely,

Duane Otto

Digitally signed by Duane Otto
DN: cn=Duane Otto, o=Turf and Soil Diagnostics, ou, email=duane@turfdiag.com, c=US
Date: 2017.02.15 16:12:56 -06'00'

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Turf & Soil Diagnostics

ACCREDITED TESTING Cert #0797.01

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**Date Received** Feb-09-2017
**Date Reported** Feb-15-2017
**Facility** Product Development

## Particle Size Evaluation*

| | | | | | | | % Retained mm (US sieve) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lab ID#** | **Sample Name** | **% Sand 2.0 - 0.05 mm** | **% Silt 0.05-0.002mm** | **% Clay < 0.002mm** | **Gravel 4.0 (5)** | **Gravel 2.0 (10)** | **V. Coarse 1.0 (18)** | **Coarse 0.5 (35)** | **Medium 0.25 (60)** | **Fine 0.15 (100)** | **V. Fine 0.05 (270)** |
| 17020044-1 | 30-50 | 99.5 | < 1.0 | < 1.0 | 0.0 | 0.2 | 5.9 | 28.0 | 65.2 | 0.4 | 0.1 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| USGA Recommendations for Greens | | ≥ 92% | ≤ 5% Silt | ≤ 3% Clay | ≤ 3% Gravel<br>≤ 10% Combined | | | ≥ 60% Combined | | ≤ 20% | ≤ 5%*** |

| **Lab ID#** | **Sample Name** | **Uniformity Coefficient Cu** | **D15 mm** | **D50 mm** | **D85 mm** | **Shape Angularity** | **Shape Sphericity** | **USDA Textural Classification** | **Acid Reaction** | **Infiltration Rate** in/hr** | **Bulk Density g/cc** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 17020044-1 | 30-50 | 1.7 | 0.29 | 0.42 | 0.80 | Sub-Angular to Rounded | Medium | Sand | Slight | 72.5 | 1.52 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

*ASTM F1632 Method A & Determination of Size Factors SOP

**ASTM F1815 30 cm Tension

***Maximum of 10% combined on Very Fine Sand, Silt, and Clay fractions.

Samples were tested as received and comments pertain only to the samples shown.

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Sample condition upon receipt was normal.

Samples were received without a transmittal letter.

Reviewed by *Duane K. Otto*



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