



**Turf & Soil Diagnostics**

July 10, 2017

Paul Hagy  
Texas Sports Sands  
702 Easy Street  
Garland, TX 75042  
TSD File #17070003

Enclosed are the results of the Kosse Golf Sand sample received by our laboratory on 7/3/2017. This sample was tested as received. These results are being compared to the 2004 USGA recommendations for putting green construction.

The particle size results indicate that the sample is clean sand with very little silt and clay present. The sand fraction is very uniform in particle size, with most of the particles in the medium sand size fraction. The gradation of this sample meets the USGA putting green recommendations.

The pH of the sample is neutral.

Performance testing at 30 cm tension indicates that the sample has an infiltration rate that is high, but typical of sand with this gradation. The rate meets USGA recommendations, and suggests that this sample should supply significant internal drainage.

If you have any questions or are in need of further assistance, please contact us. Samples are generally kept on the premises for 45 days after report date. Thank you for using Turf & Soil Diagnostics, Inc.

Sincerely,

Sam Ferro  
President

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## Turf & Soil Diagnostics

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



Date Received Jul-03-2017  
 Date Reported Jul-10-2017  
 Facility Product Development

### Particle Size Evaluation\*

| Lab ID#                         | Sample Name     | % Sand<br>2.0 - 0.05 mm | % Silt<br>0.05-0.002mm | % Clay<br>< 0.002mm | Gravel<br>4.0 (5)             | Gravel<br>2.0 (10) | % Retained mm (US sieve) |                    |                     |                    |                       |
|---------------------------------|-----------------|-------------------------|------------------------|---------------------|-------------------------------|--------------------|--------------------------|--------------------|---------------------|--------------------|-----------------------|
|                                 |                 |                         |                        |                     |                               |                    | V. Coarse<br>1.0 (18)    | Coarse<br>0.5 (35) | Medium<br>0.25 (60) | Fine<br>0.15 (100) | V. Fine<br>0.05 (270) |
| 17070003-1                      | Kosse Golf Sand | 99.4                    | < 1.0                  | < 1.0               | 0.0                           | 0.0                | 0.9                      | 28.2               | 66.5                | 3.4                | 0.3                   |
| USGA Recommendations for Greens |                 | ≥ 92%                   | ≤ 5%                   | ≤ 3%                | ≤ 3% Gravel<br>≤ 10% Combined |                    | ≥ 60% Combined           |                    | ≤ 20%               | ≤ 5%***            |                       |

| Lab ID#    | Sample Name     | Uniformity<br>Coefficient<br>Cu | D15<br>mm | D50<br>mm | D85<br>mm | Shape<br>Angularity    | Shape<br>Sphericity | USDA<br>Textural<br>Classification | Acid<br>Reaction | pH <sup>‡</sup><br>1:1 | % Organic<br>Matter<br>Dry Wt.** |
|------------|-----------------|---------------------------------|-----------|-----------|-----------|------------------------|---------------------|------------------------------------|------------------|------------------------|----------------------------------|
| 17070003-1 | Kosse Golf Sand | 1.7                             | 0.28      | 0.40      | 0.71      | Angular to Sub-Rounded | Medium              | Sand                               | Slight           | 6.8                    |                                  |

\*ASTM F1632 Method A & Determination of Size Factors SOP

‡ASTM D4972 w/ CaCl<sub>2</sub>

\*\*ASTM F1647 Method A

\*\*\*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.

This report may not be reproduced in part, but only in full.

Sample condition upon receipt was normal.

Samples were received without a transmittal letter.

Reviewed by Sam Feno



## Turf & Soil Diagnostics

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



Date Received Jul-3-2017  
 Date Reported Jul-10-2017  
 Facility Product Development

### 30 cm USGA Physical Evaluation\*

| Lab ID#    | Sample Name          | Infiltration Rate*<br>in/hr | Infiltration Rate*<br>cm/hr | Particle Density**<br>g/cc | Bulk Density<br>g/cc | Total % | Porosity Water-filled % | Air-filled % | Degree of Saturation % |
|------------|----------------------|-----------------------------|-----------------------------|----------------------------|----------------------|---------|-------------------------|--------------|------------------------|
| 17070003-1 | Kosse Golf Sand      | 107                         | 271                         | 2.67                       | 1.52                 | 43.1    | 8.0                     | 35.1         | 19                     |
|            |                      |                             |                             |                            |                      |         |                         |              |                        |
|            |                      |                             |                             |                            |                      |         |                         |              |                        |
|            | USGA Recommendations | ≥ 6                         | ≥ 15                        | -                          | -                    | 35 - 55 | 15 - 25                 | 15 - 30      | -                      |

\* Saturated Hydraulic Conductivity (K-SAT)

Air-filled - noncapillary. Water-filled - capillary

| Lab ID#    | Sample Name                     | Sand Parameters                      |                       | Peat Parameters                      |                       | pH <sup>‡</sup><br>1:1 | Elec. Cond.<br>mS / cm<br>1:1 |
|------------|---------------------------------|--------------------------------------|-----------------------|--------------------------------------|-----------------------|------------------------|-------------------------------|
|            |                                 | Bulk Weight<br>LBS / FT <sup>3</sup> | Moisture<br>% Dry Wt. | Bulk Weight<br>LBS / FT <sup>3</sup> | Moisture<br>% Wet Wt. |                        |                               |
| 17070003-1 | Kosse Golf Sand                 |                                      |                       |                                      |                       | 6.8                    |                               |
|            |                                 |                                      |                       |                                      |                       |                        |                               |
|            |                                 |                                      |                       |                                      |                       |                        |                               |
|            | USGA Recommendations for Greens |                                      |                       |                                      |                       |                        |                               |

\*ASTM F1815

\*\*SSSA, Methods of Soil Analysis

‡ ASTM D4972 w/ CaCl<sub>2</sub>

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Reviewed by Sam Fero