



**Turf & Soil Diagnostics**

**MATERIALS TEST REPORT FOR  
Plaisted Companies, Inc.**



**REPORT TO:** Plaisted Companies, Inc.  
Kerry Glader  
P.O. Box 332  
Elk River, MN 55330

**DATE RECEIVED:** Jun-22-2020  
**REPORT DATE:** Jun-30-2020  
**CONDITION OF SAMPLE:** Normal

**Bunker Sand Evaluation\***

Lab ID#	Sample Name	% Sand 2.0 - 0.05 mm	Soil Separate			% Retained mm (US sieve)						
			% Silt 0.05-0.002mm	% Clay < 0.002mm	No. 5 Gravel 4.0 mm	No. 10 Gravel 2.0 mm	No. 18 V. Coarse 1.0 mm	No. 35 Coarse 0.50 mm	No. 60 Medium 0.25 mm	No. 100 Fine 0.15 mm	No. 140 Fine 0.10 mm	No. 270 V. Fine 0.05 mm
46018-7	Plaisted Pro Bunker	97.5	1.8	< 1.0	0.0	0.0	9.0	29.6	39.8	13.9	3.4	1.8
Bunker Sand Guidelines <sup>1</sup>			≤ 3%		≤ 2%		≤ 15%	78 - 100%				≤ 5%
USGA Recommendations for Greens		≥ 92%	≤ 5% Silt	≤ 3% Clay	0%	≤ 3% Gravel ≤ 10% Combined		≥ 60% Combined		≤ 20%	≤ 5%***	

<sup>1</sup> From Golf Course Management 54:64-70, 1986

<sup>2</sup> From USGA Green Section Record 36:9-12, 1998

Lab ID#	Sample Name	Uniformity Coefficient Cu	D15 mm	D85 mm	Shape Angularity	Shape Sphericity	Infiltration Rate** in/hr	Infiltration Rate** cm/hr	Bulk Density g/cc
46018-7	Plaisted Pro Bunker	3.0	0.20	0.87	Sub-Rounded to Sub-Angular	Medium	21.3	54.0	1.59
Bunker Sand Guidelines <sup>2</sup>		-	-	-	-	-	> 20	> 50	-

USGA Rootzone Coefficient of Uniformity Recommendations: 1.8 to 3.5 for Mixes with Peat; 2.0 to 3.5 for Mixes with Inorganic Amendment or Pure Sand.

Lab ID#	Sample Name	Dry Color	Crusting	Penetrometer Value kg/cm <sup>2</sup>	Angle of Repose Angle (°) Shape of Pile
46018-7	Plaisted Pro Bunker	10YR 5/4 Yellowish Brown	Slight	3.4	

\*ASTM F1632 Method B, Determination of Size Factors SOP, & Bunker Sand SOP

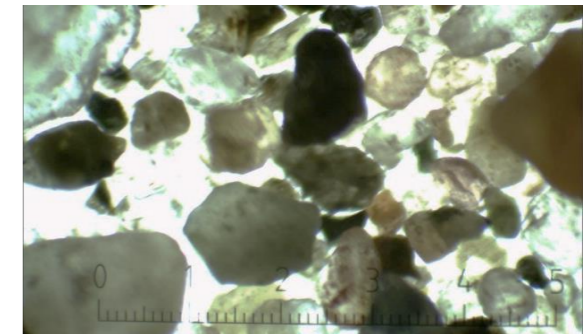
\*\*\*Maximum of 10% combined on Very Fine Sand, Silt, and Clay fractions.

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.

Samples were received without a transmittal letter.

\*\*ASTM F1815 30 cm Tension



Photomicrograph of Lab ID 46018-7 Plaisted Pro Bunker.

Reviewed by \_\_\_\_\_



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Plaisted Companies, Inc.**



**REPORT TO:** Plaisted Companies, Inc.  
Kerry Glader  
P.O. Box 332  
Elk River, MN 55330

**DATE RECEIVED:** Jun-22-2020  
**REPORT DATE:** Jun-26-2020  
**CONDITION OF SAMPLE:** Normal

**Bunker Sand Evaluation\***

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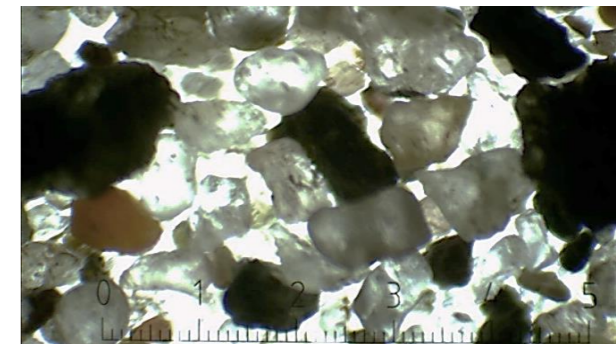
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Photomicrograph of Lab ID 46018-7 Plaisted Pro Bunker.

Reviewed by \_\_\_\_\_



**Turf & Soil Diagnostics**

June 30, 2020

Plaisted Companies, Inc.  
TSD File #46018

The Plaisted Pro Bunker sand sample was tested as received. This sample was evaluated for use in sand bunkers. The results are being compared to published guidelines, which are included with the results for comparison purposes.

To measure the potential of a sand to produce fried egg lies or buried balls, the resistance of the sand to ball penetration is measured using a penetrometer. While there are varying assessments of this test, results between 1.8 and 2.4 kg/cm<sup>2</sup> are generally considered acceptable and values above 2.4 kg/cm<sup>2</sup> considered desirable. The sample has a penetrometer value of 3.4 kg/cm<sup>2</sup>, which is in the desirable range.

There is slight crusting of the sand after wetting and drying, which suggests that bunkers with this sand in place may not require significant raking after rainfall or irrigation events.

The infiltration rate of this sample is 21.3 in/hr, which meets the recommended minimum infiltration rate of 20 in/hr. This suggests that bunkers built with this sand should initially exhibit good internal drainage.

It is desirable for a bunker sand used in green side bunkers to be compatible with the rootzone to reduce the risk of layering on the greens. The sample has a particle size distribution that meets all the bunker sand guidelines. The particle size distribution suggests a minimal risk of layering from sand splashed from green-side bunkers onto nearby greens.

Despite this testing, bunker sand selection is highly subjective. Aside from playability, factors such as color and aesthetics are often weighed in the decision process. We recommend that golf course superintendents, pros, greens committee chairs, and any other interested parties visit a club with the sand in use. Play into and out of it to see how they like it.

Please let us know if you have any questions or are in need of further assistance. Thank you for using Turf & Soil Diagnostics, Inc.

Sincerely,

Duane K. Otto  
Vice President