



TODD LOWE
CONSULTING

Rootzone Performance Metrics

Prepared For:

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Naples, FL

Visited On:

December 16, 2025





What is RPM?

Samples were taken from putting greens on Stonebridge Country Club Holes 9 & 18 on December 16, 2025 and subjected to Rootzone Performance Metrics (RPM) testing.

These tests provide an in-depth evaluation of several important soil properties, within the putting surface and upper rootzone, including:

1. Visual evaluation of rootzone layering & root density
2. Organic matter (%) determined by loss on ignition
3. Sand particle size distribution through sieve gradation
4. Infiltration & percolation (Ksat) of intact cores

Unlike traditional soil tests, RPM soil testing measures all surface organic material within the upper thatch layer, underlying mat (stain) layers and original mix. Understanding these properties and how they change over time can help you finetune your soil cultivation and fertility programs, as well as help develop your long-range goals.

For more information on these procedures see:

1. [A Standard Method for Measuring Putting Green Surface Organic Matter](#)
2. [Documenting Changes in USGA Specification Rootzone Properties in Ultradwarf Bermudagrass Greens](#)



Rootzone Layering

Sand Particle Sizes

Organic Matter Content

Infiltration Rate



Scorecard

The "Scorecard" is a subjective analysis of your rootzone performance at this time, as compared to other bermudagrass greens throughout the region.

- Roots were nearly 2.5 inches deep and appeared fibrous and healthy
- Thatch layer and stain layer OM% values are listed below, along with average values from other golf course greens in our region
 - Thatch layer (0-2 cm)
 - Stonebridge CC greens - 7.7%
 - Avg Fall FL golf courses - 8.5%
 - Stain layer (2-4 cm)
 - Stonebridge CC greens - 2.7%
 - Avg Fall FL golf courses - 4.7%
 - Stain layer (4-6 cm)
 - Stonebridge CC greens - 0.7%
 - Avg Fall FL golf courses - 2.7%
- Uniform sand particle size distribution occurs in each layer and conforms to USGA construction recommendations
- Good infiltration rate (3.6 inches/hour) was observed in the upper rootzone at this time - Hole 9: 1.7 inches/hour, Hole 18: 5.4 inches/hour



Root Length & Density



Organic Matter



Sand Particle Sizes



Infiltration Rate

1

ROOTZONE LAYERING



Rootzone Layer Depths

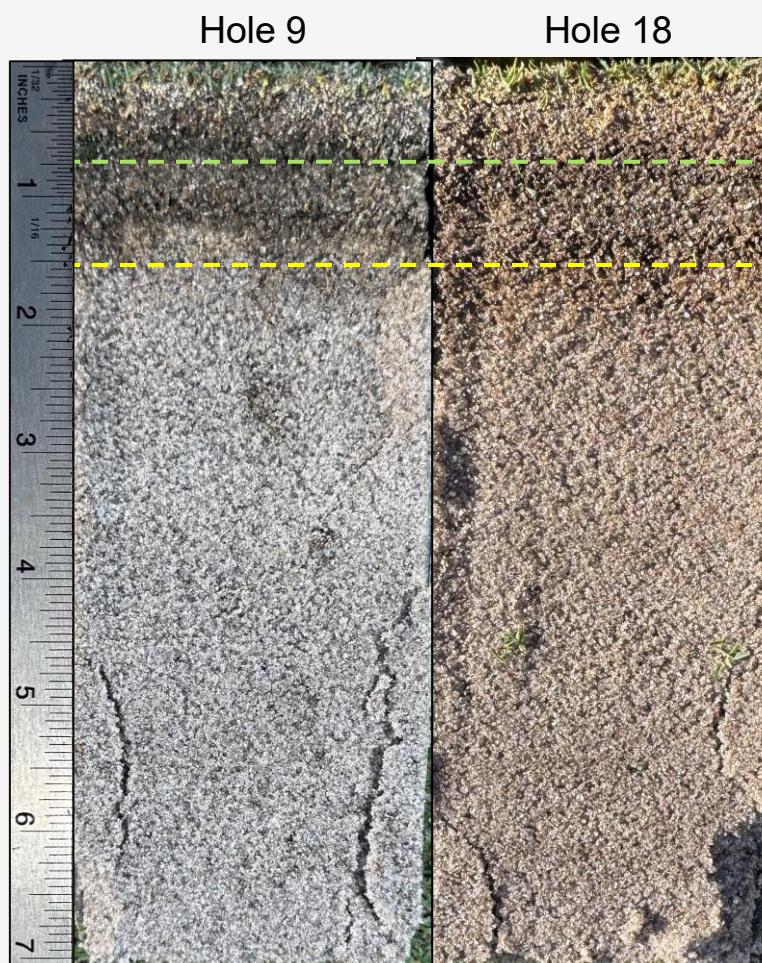
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Hole 9



Hole 18



Thatch Layer - Thatch layer extends to nearly 0.75-inch below the surface and comprised of living and dead bermudagrass stems & roots, intermixed with sand

Stain Layer - Stain layer comprised of dead/dying stems, living roots and humus, intermixed with sand has begun to form on these new greens and extends to a depth of nearly 1.5 inches below the surface

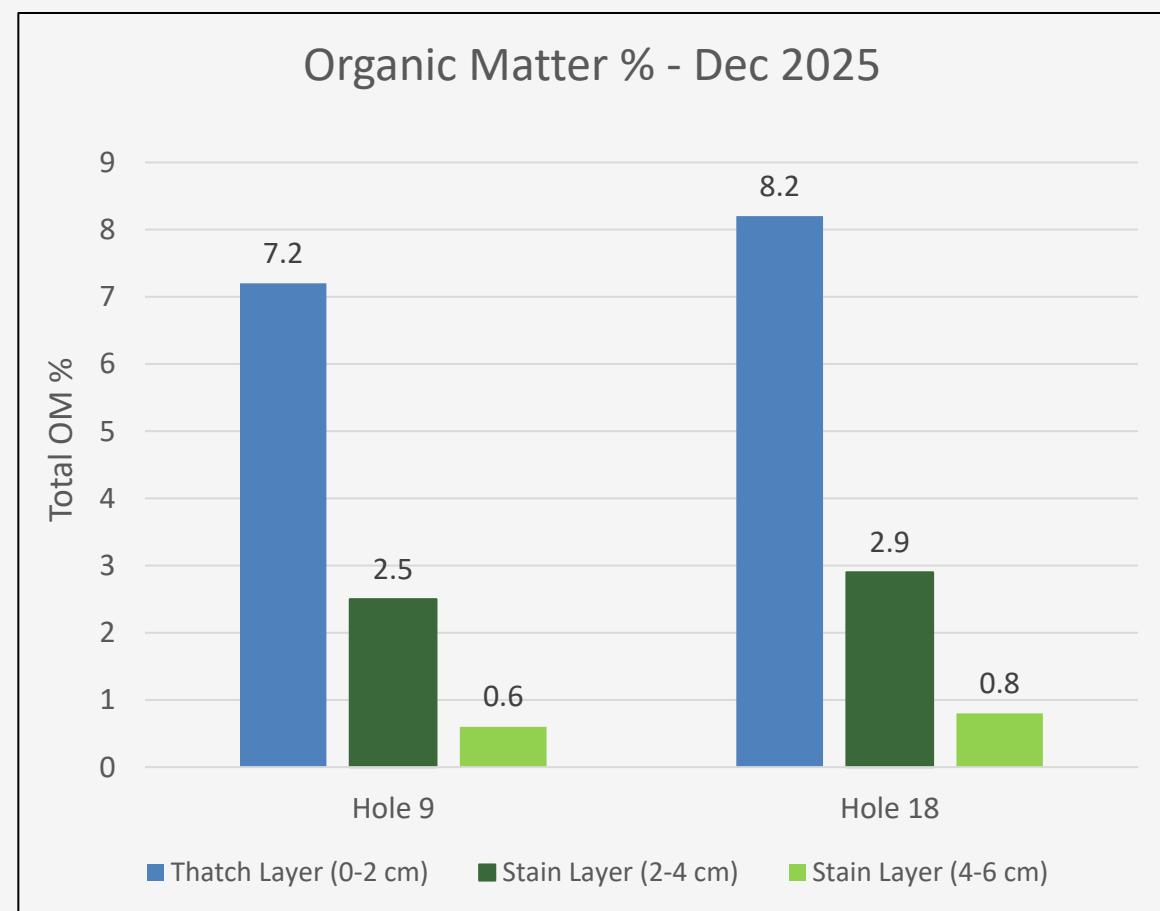
Original Mix - Original mix from recent renovation comprised of sand and peat

2 TOTAL ORGANIC MATTER



Organic Matter % - Dec 2025

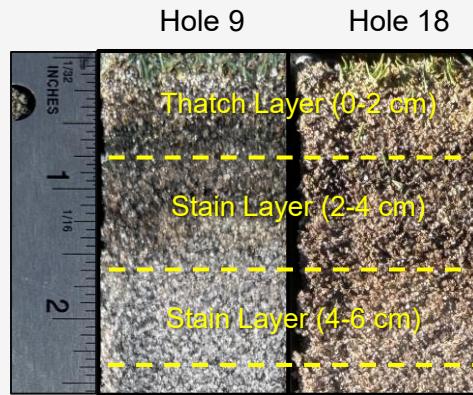
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 - Stain layer (2-4 cm)
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 - Stain layer (4-6 cm)
 - **Stonebridge CC greens - 0.7%**
 - Avg Fall FL golf courses - 2.7%
- Thatch layer OM% was slightly less than average for our region, indicating that effective summertime cultivations take place
- Lower stain layer OM percentages are due to their young age and the lower "stain" layer actually represents original mix properties
- For more information on average values and how to interpret this information see Page 9



3 PARTICLE SIZE DISTRIBUTION



Sand Sizes



- Uniform sand particle size distribution occurs in each layer and conforms to USGA construction recommendations
- Less very coarse sand occurs in upper rootzone than original mix, which is normal, as mowers remove larger sand particles after topdressing

Sand particle size distribution of Stonebridge Country Club 9 & 18 rootzone layers								
Rootzone Layer	Hole	Sand (%)						
		Fine Gravel	Very Coarse	Coarse	Medium	Fine	Very Fine	Silt & Clay
Thatch (0-2 cm)	9	0.0	1.7	34.0	28.2	15.4	4.6	0.7
	18	0.0	1.6	37.7	34.2	19.6	6.0	0.9
Stain (2-4 cm)	9	0.0	3.4	41.4	31.4	17.6	5.7	0.5
	18	0.0	3.2	41.6	31.3	17.7	5.9	0.5
Stain (4-6 cm)	9	0.2	5.3	41.2	32.6	17.3	3.1	0.2
	18	0.2	5.4	42.7	30.2	17.1	4.0	0.4
USGA Construction Recommendations		≤ 10		≥ 60		≤ 20	≤ 10	

4 SOIL PERMEABILITY



Infiltration Rate (Ksat)

- **Good infiltration rate (3.6 inches/hour) was observed** in the upper rootzone at this time
 - Hole 9 - 1.7 inches/hour
 - Hole 18 - 5.4 inches/hour
- Infiltration rates remained similar after samples were cored in the lab (data not shown), showing that thatch layer reduced infiltration less than stain layer



Thatch impact on Ksat is determined by coring samples in the lab.

Saturated hydraulic conductivity (Ksat) from intact cores on Stonebridge Country Club 9 & 18 greens

Hole & Sample	Infiltration Rate (inches/hour)
Fall 2025	
Hole 9 - A	1.9
Hole 9 - B	2.1
Hole 9 - C	0.3
Hole 9 - D	2.5
Avg Ksat - Hole 9	1.7
Hole 18 - A	7.4
Hole 18 - B	6.8
Hole 18 - C	1.3
Hole 18 - D	6.2
Avg Ksat - Hole 18	5.4
Avg Ksat	3.6

Observations & Recommendations

- Stonebridge greens are still quite young and developing an appropriate organic “pad” of thatch and organic matter, but effective summertime cultivation programs are in place as evident in sound metrics
- Monthly venting in winter helps reduce soil compaction from golfer traffic and improve root health
 - Small-diameter hollow tine aerification (Ninja or JRM Imperial tines) can also be performed, if dethatching is needed
- Summertime cultivation programs and appropriate nitrogen fertilization is needed for effective organic matter management and it appears that both are taking place at Stonebridge at this time



Discussion

Soil physical properties affect both putting green playability and turf health. Each golf course is unique regarding the desired level of playability and there are no adapted industry standards at this time. The Scorecard on Page 3 is a subjective guideline and based more on turf health from observations on other golf courses in our region. Your programs may create values outside of these averages to provide desired playability but may also negatively affect soil physical properties.

- **Organic Matter** - Average OM% represents a variety of otherwise healthy putting greens in Florida, ranging from 4.5-13.2% in the thatch layer. Outlier greens were not included in this average and these consisted of new greens with v. low OM% or from greens with excessive OM% from prolonged inadequate cultivation. For more information on this subject, see [Are You Managing Putting Green Organic Matter or Is It Managing You?](#)
- **Sand Sizes** - USGA particle size recommendations are meant as guidelines for initial construction. There are no standards for mature putting greens and the values listed from your putting greens do not necessarily mean there will be long-term concerns. It is common for finer sand particles to accumulate in the upper rootzone over time, as mowers remove coarser sand particles that remain above the turf canopy after topdressing.
- **Infiltration Rate** - The USGA recommends a Ksat of >6 inches/hour as a guideline for new greens. Upper rootzones of mature greens may have diminished infiltration rates from increased OM% and finer particle sizes over time. Our soil lab has recorded infiltration rates from 0.1 to >6 inches/hour on functioning putting greens in Florida.

Drainage occurs via surface flow across a putting green and also internally through the soil, so putting greens with good surface drainage can perform well with slower infiltration rates. Flatter surfaces may be more impaired than sloped areas on greens with lower infiltration rates. Also, periods with lower evapotranspiration (ET) rates such as December and January, in Florida, may be more prone to turf stress and diseases on greens with lower infiltration rates (<0.5"/hour). Cultural practices such as venting and applying fungicides more frequently may be necessary during those periods.



Additional Resources

Table from ["Core Aeration by the Numbers"](#) -
USGA Green Section Record July/Aug 2001

Surface Area Impacted By Tine/Blade Size and Spacing					
Tine Diameter (inches)	Spacing (inches)	Holes/ft ²	Area Impacted by One Tine (in ²)	Total Area Impacted (%)	Aerifications Needed for 20%
1/4	1 X 1	144	0.049	4.9	4.1
1/4	1 X 2	72	0.049	2.5	8.1
1/4	2 X 2	36	0.049	1.2	16.3
3/8	1 X 1	144	0.110	11.0	1.8
3/8	1 X 2	72	0.110	5.5	3.6
3/8	2 X 2	36	0.110	2.8	7.2
1/2	1 X 1	144	0.196	19.6	1.0
1/2	1 X 2	72	0.196	9.8	2.0
1/2	2 X 2	36	0.196	4.9	4.1
5/8	1 X 1	144	0.307	30.7	0.7
5/8	1 X 2	72	0.307	15.3	1.3
5/8	2 X 2	36	0.307	7.8	2.6
Verticut 9/64 Blades	1 X 1	NA	NA	14.1	1.4
Verticut 5/64 Blades	1 X 1	NA	NA	7.8	2.6

