

Sand and soil analyses: choosing the appropriate sand for the rootzone

Micah Woods

7 October 2026

PACE Turf

www.paceturf.org

Asian Turfgrass Center

www.asianturfgrass.com

Managing Organic Matter in Putting Greens

Effectively managing organic matter will help create the firm and smooth putting greens that golfers have come to expect.

BY ADAM MOELLER AND TODD LOWE

Soft playing conditions, deep ball marks, inconsistent green speed, and bumpy putting surfaces frustrate golfers and golf course superintendents. If golfers and superintendents both want firm and smooth putting greens, why do some facilities struggle to achieve these conditions? Putting greens might be temporarily soft or inconsistent for many reasons, such as recent rainfall, but when there are chronic issues the underlying problem is often excessive organic matter just beneath the putting surface.

Core aeration, verticutting, and topdressing are the primary agronomic practices used to manage organic matter, but they are disliked by most golfers. The choice for superintendents is a difficult one: Upset golfers by failing to produce the desired playing conditions, or upset them by occasionally implementing disruptive programs that are necessary to produce the desired conditions. Since course conditioning



“the underlying problem is often excessive organic matter just beneath the putting surface. Core aeration, verticutting, and topdressing are the primary agronomic practices used to manage organic matter, but they are disliked by most golfers.”

Moeller & Lowe, 2016

“0.5-1.5 cubic feet per 1,000 square feet every 7-14 days effectively dilutes organic matter throughout the growing season”

Moeller & Lowe, 2016

That is 0.15 to 0.45 mm of sand every 7 to 14 days. That's 2,400 to 7,200 kg/ha every 7 to 14 days.

“To keep organic matter content below 3-4 percent in the upper rootzone, these articles recommend core aeration treatments that impact 15-20 percent of the putting surface each year and topdressing programs that incorporate at least 40-50 cubic feet of sand per 1,000 square feet annually.”

Moeller & Lowe, 2016

That's 12 to to 15 mm of sand per year. That's 190 to 240 tons/ha per year.

Another recommendation

“Increasing sand topdressing frequency to every 7 to 14 days and applying at least 20.3 ft³/1000 ft² topdressing sand annually, combined with routine soil cultivation to ensure sand incorporation, are practices that can be utilized to manage SOM.”¹

That's 6 mm sand per year. That's 100 tons/ha per year.

¹Schmid C.J., Gaussoin R.E., and S.A. Gaussoin. 2014. Organic matter concentration of creeping bentgrass putting greens in the continental U.S. and resident management impact. *Applied Turfgrass Science*.

Another recommendation

“Trends observed by USGA agronomists suggest that 25 to 35 cubic feet of sand per 1,000 square feet per year is a good annual target to adequately dilute organic matter.”²

That's 8–11 mm sand per year. That's 120–170 tons/ha per year.

²Whitlark, B. and C. Thompson. 2019. USGA Green Section Record.

Total organic material time series

0 to 2 cm



The horizontal dashed line marks the average value (50th percentile) of all bentgrass samples.

Measuring sand







Play K

Three different ways to measure sand topdressing rates (and how to express them as depth of sand)



Micah Woods

2.09K subscribers



25



Share



Ask



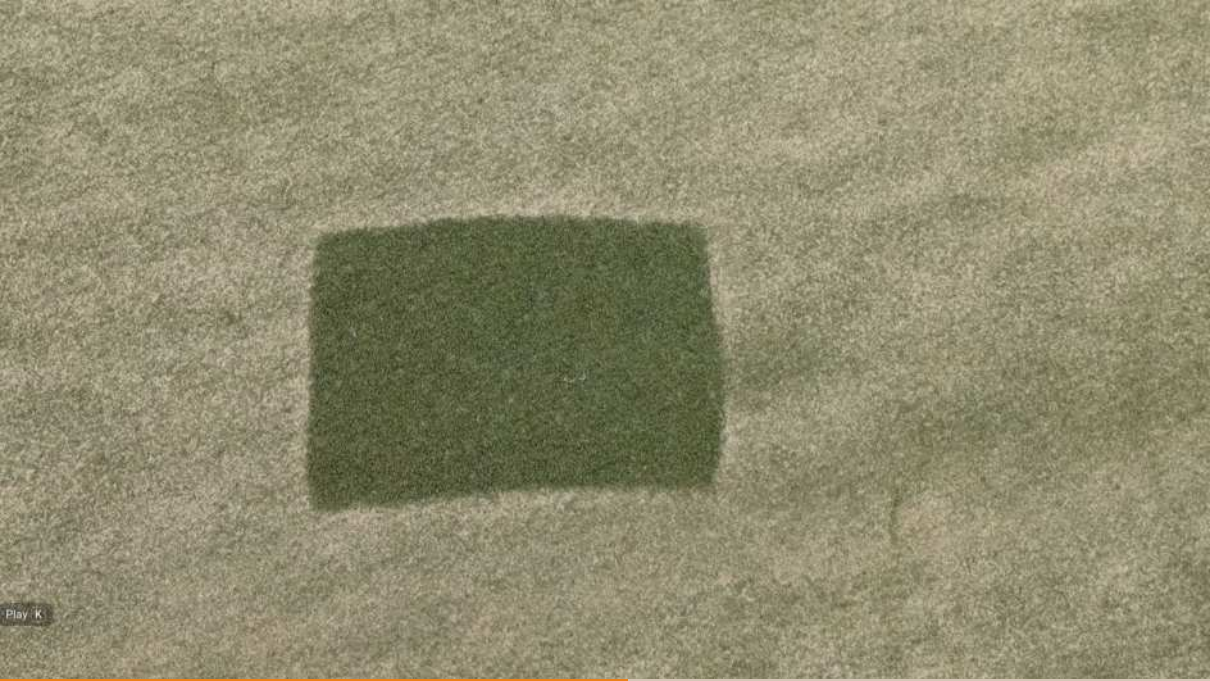
Save















Sand quality

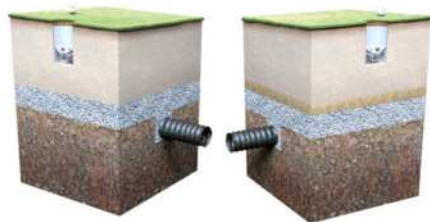


**USGA RECOMMENDATIONS
FOR A METHOD OF**

Putting Green Construction

FOR NEARLY 60 YEARS the USGA recommendations for putting green construction have been the most widely used method of putting green construction throughout the United States and other parts of the world. When built and maintained properly, putting greens built in accordance to the USGA recommendations have provided consistently good results for golf courses over a period of many years. These recommendations are periodically reviewed and updated as a result of scientific research and as new techniques and materials are proven reliable.

This document specifically represents the USGA's recommendations for putting green construction. It does not include a discussion of construction techniques or methods. Additional documents are available from the USGA that describe construction methods, offering tips for success and providing guidance for putting green management.

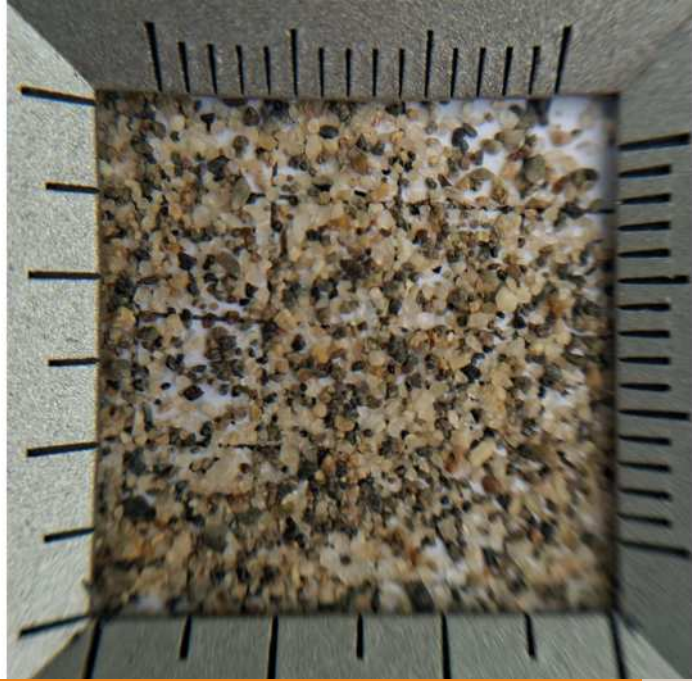


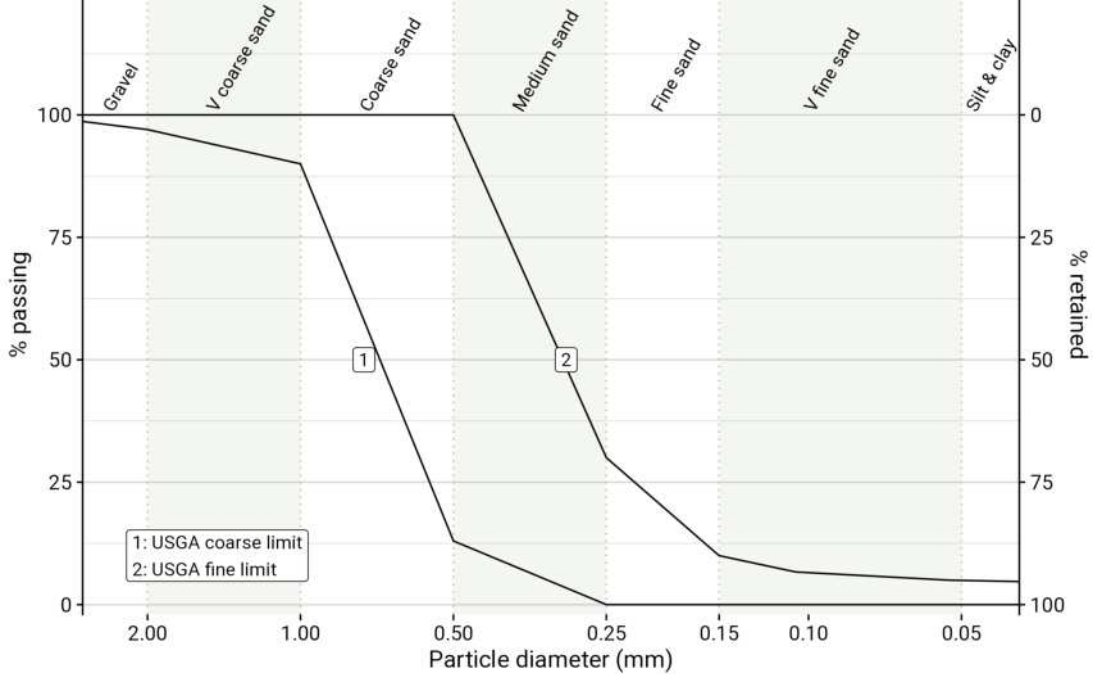
2018 REVISION

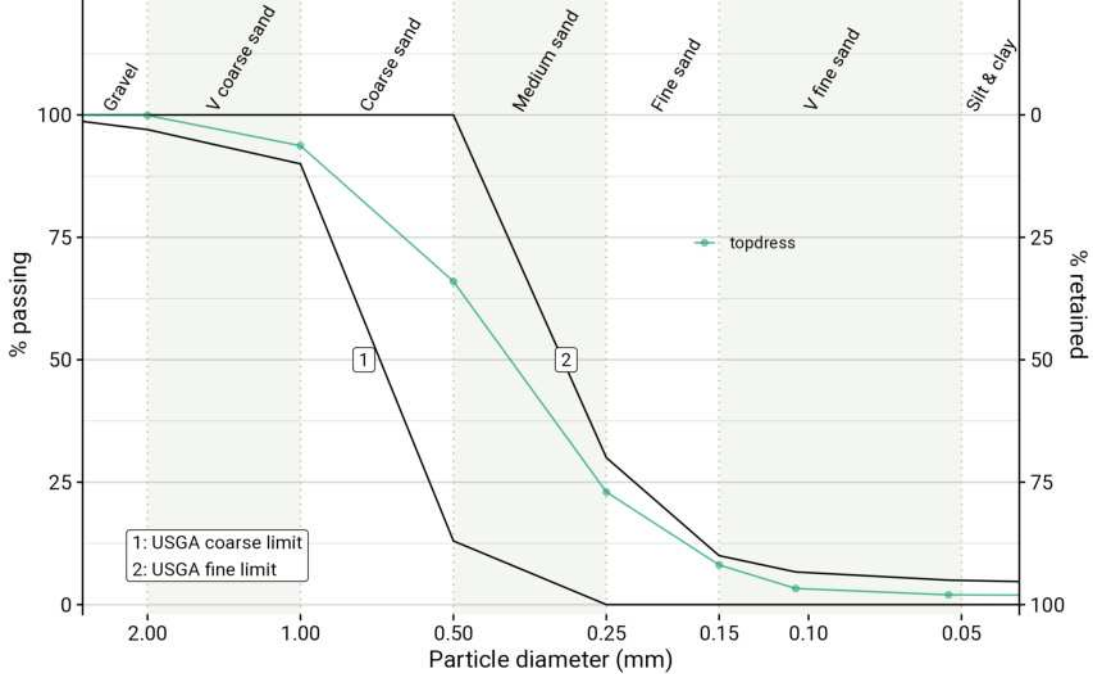
TABLE 3. Recommended Particle Size Distribution for a Putting Green Rootzone Mixture

PARTICLE	DIAMETER	SIEVE	% BY WEIGHT
Coarse gravel	> 4 mm	No. 5	0%
Fine gravel	2.0 – 3.4 mm	No. 10	≤ 3% gravel
Very coarse sand	1 – 2 mm	No. 18	≤ 10% combined in this range
Coarse sand	0.5 – 1.0 mm	No. 35	≥ 60% of the particles in this range
Medium sand	0.25 – 0.5 mm	No. 60	
Fine sand	0.15 – 0.25 mm	No. 100	≤ 20%
Very fine sand	0.05 – 0.15 mm	No. 270	≤ 5%
Silt	0.002 – 0.05 mm		≤ 5%
Clay	< 0.002 mm		≤ 3%
Total fines	Very fine sand + silt + clay		≤ 10% combined
Coefficient of Uniformity (D60/D10)		1.8 - 3.5	Rootzone mixtures with peat
		2.0 - 3.5	Rootzone mixtures with inorganic amendments
		2.0 - 3.5	Pure sand rootzone mixtures

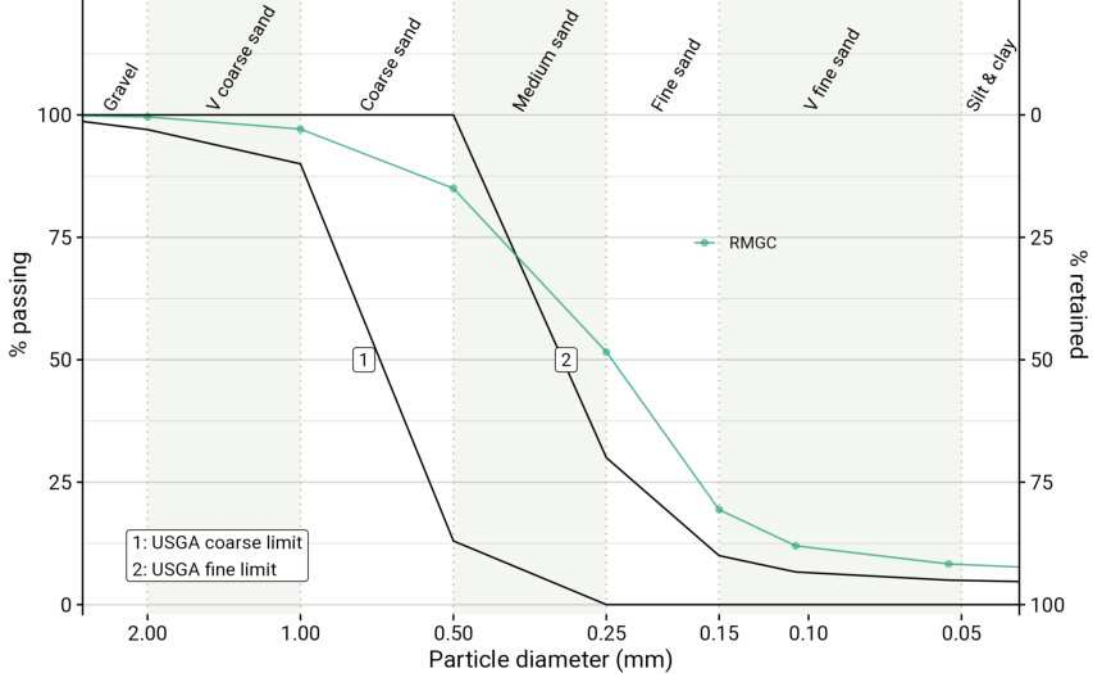




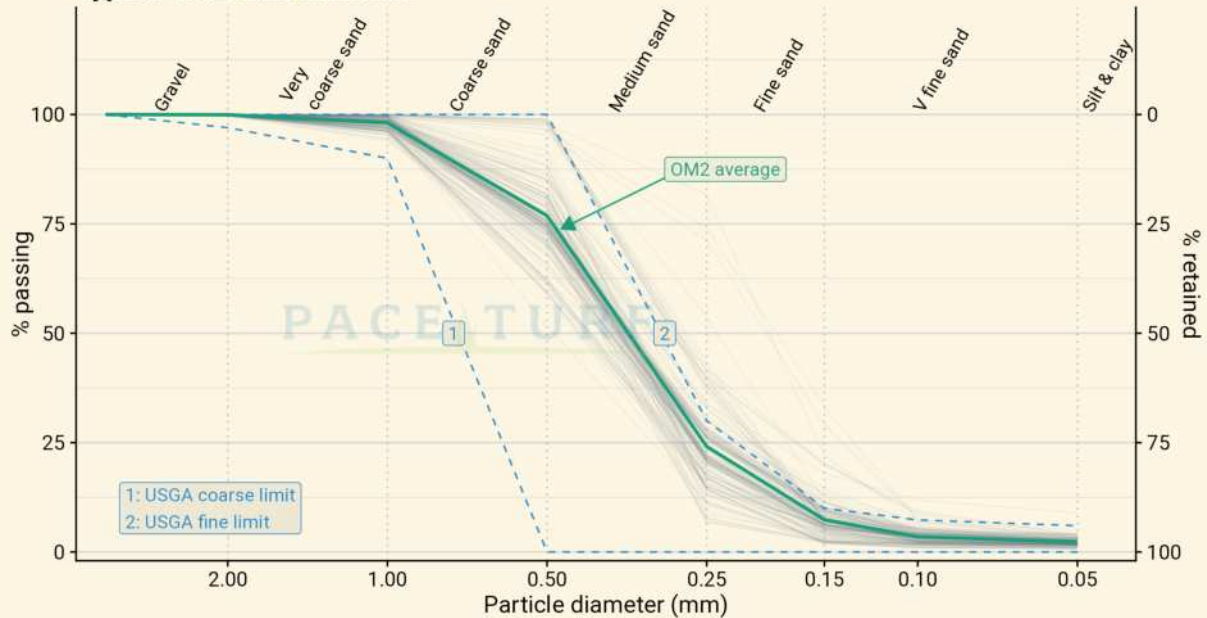






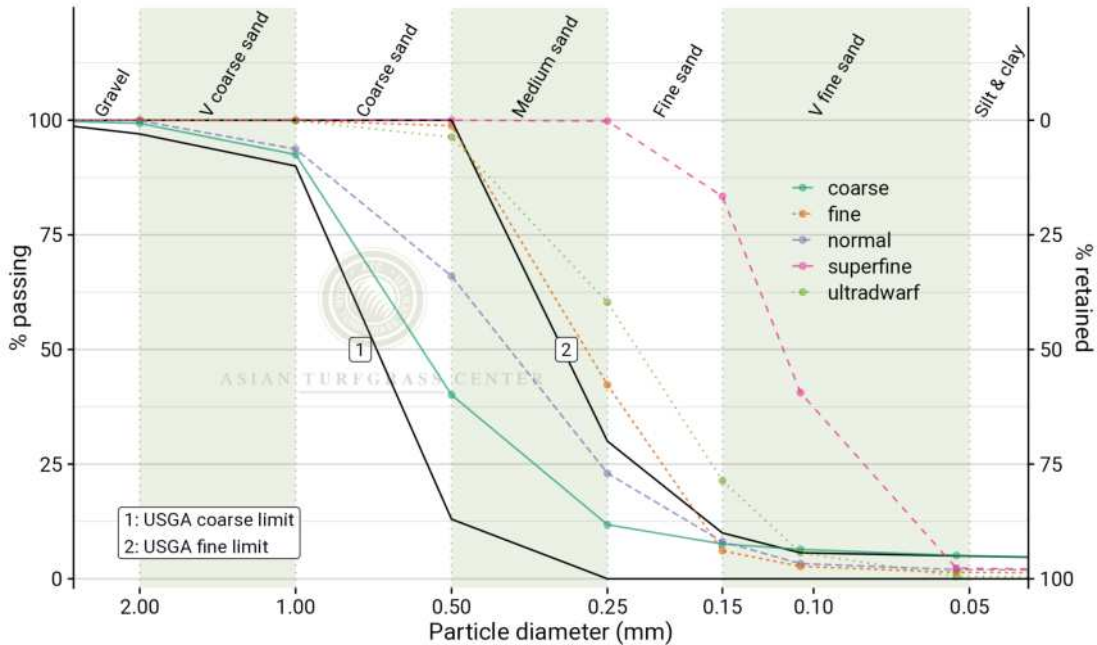


Typical OM2 sand fractions



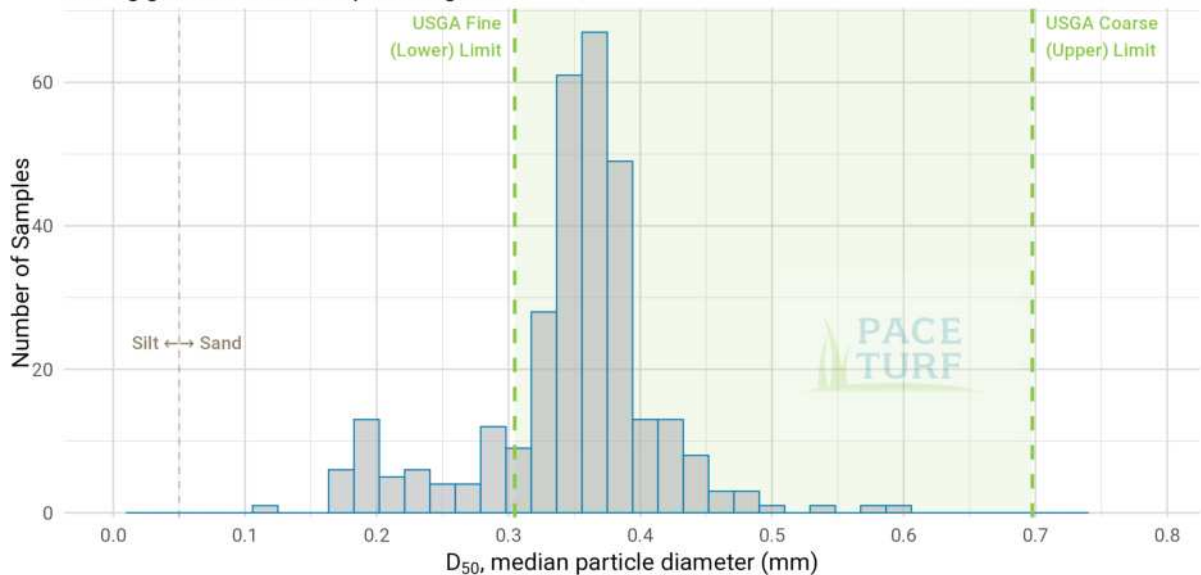
Particle size distributions from 150 OM2 samples after removing organic material by burning

Particle size distribution curves for five distinct rootzone sands



Average particle diameter, D_{50}

Putting green rootzone & topdressing sands



www.paceturf.org

www.asianturfgrass.com

