

Background

Philadelphia CC was originally built in 1927. Green #3 is characterized as a push-up green that have been gradually modified through years of topdressing and aeration. The green was re-grassed with A-1 bentgrass 2001. Green #3 was tested by ISTRC in May 2004. The primary objective for the current testing is to monitor any changes in the green's physical properties and/or particle distribution to not only help assess the aging of the root zone but also provide a basis for evaluating the impact of the past & current practices.

"The improvements in Green #3's root zone physical properties since 2004 is an excellent confirmation the program is working; however with the moderate to high percentage of organic matter within the upper 4 inches of the root zone it will be important that you continue to maximize the surface area displacement."

Aeration Process

1. Around Memorial Day: DryJect 3x3 spacing with straight sand.
2. October: Deep aerification with Vertidrain 7/16" hollow tines followed by DryJect 3x3 spacing with straight sand.

Test Result and Discussion

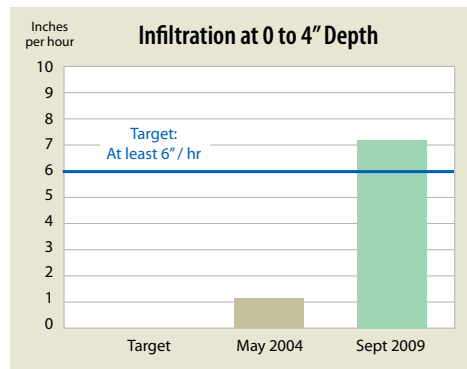
"Green#3 has reported excellent improvements in its 1st tier (0-4 in.) infiltration rate, air porosity, and water retention since 2004. A key variable in the improvements is the lower percentage of organic matter at 1-4 inches."

"Green #3's current infiltration rate at 7.04 in/hr, which has improved dramatically since 2004, is very good for a 1st tier (0-4 in.) of an older sand-based or push-up green. The air pores & water pores have also improved considerably from over a 3:1 water to air ratio to well better than a 2:1 water to air ratio. The long term goal for the green is to stabilize the root zone around 1:1 air to water ratio."

Text in quotation marks ("") are direct quotes from ISTRC report to Philadelphia CC dated September 11, 2009

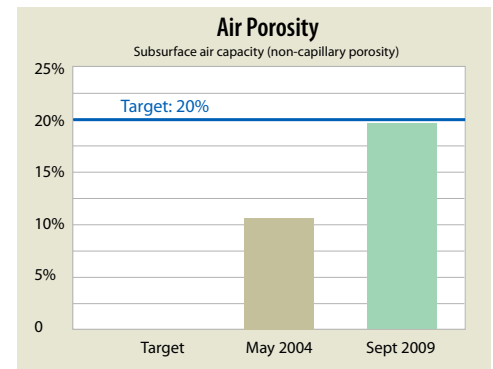
CONSISTENT TREATMENTS LEAD TO SIGNIFICANT ROOT ZONE IMPROVEMENTS

- After a 5-year program, the treated green shows greatly improved infiltration, air porosity and water retention
- A key variable in the improvements is the lower percentage of organic matter in the top 4"



Infiltration Rate

"Green #3's current infiltration rate at 7.04 in/hr, which has improved dramatically since 2004, is very good for a 1st tier (0-4 in.) of an older sand-based or push-up green."

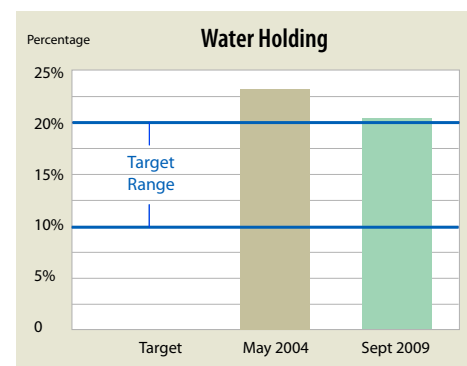


Air Porosity

"The air pores & water pores have also improved considerably from over a 3:1 water to air ratio to well better than a 2:1 water to air ratio."

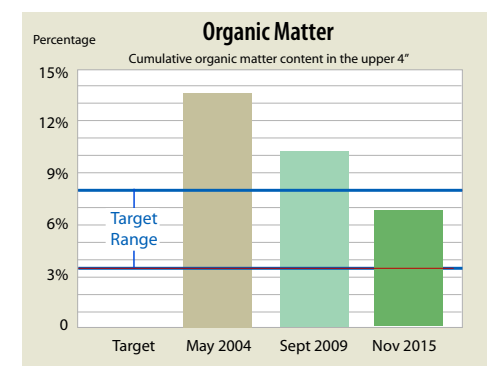
2015 UPDATE

Organic matter continues to improve!



Water Holding (Retention)

Remains at the high end of our target range, but excellent improvement since 2004, due to reduction of cumulative organic matter content in the top 4" of the root zone.



Based on the sum of the upper 4" at 1" increments, as per ISTRC standards.

Organic Matter Content

"Remains high but excellent improvement. The cumulative OM content (sum of the upper 4") has dropped from 13.73% in 2004 to 10.20% in 2009."



TARGET FOR WELL-DRAINED GREENS (1ST TIER)

ISTRC COMMENT

		PHILADELPHIA CC GREEN #3 MAY 2004	PHILADELPHIA CC GREEN #3 AUGUST 2009	PHILADELPHIA CC GREEN #3 NOVEMBER 2015	
Infiltration Rate (in/hr)	At least 6	1.15	7.04		Excellent improvement; mirrors the changes in the air and water pores since 2004
Subsurface Air Capacity (Non-Capillary Porosity)	20%	10.91%	19.35%		Good
Water Porosity (Capillary)	15% - 20%	33.37%	29.16%		Positive improvement, but remains higher than our recommended target range
Bulk Density (g/cc)	1.35 - 1.45	1.42	1.41		No change
Water Holding	10% - 20%	23.51%	20.61%		At our upper range; continues to highlight the need for a pro-active cultural program to further dilute the % of organic matter within the upper 3 to 4 inches.
Organic Content					
0 - 1"	1.5% - 2.5%	3.39%	3.68%		High
1 - 2"	1.0% - 2.0%	3.05%	2.73%		High
2 - 3"	0.5% - 2.0%	3.41%	1.78%		Excellent improvement
3 - 4"	<u>0.5% - 1.5%</u> 3.5% - 8.0%	<u>3.88%</u> 13.73%	<u>2.01%</u> 10.20%		Excellent improvement Remains high, but excellent improvement
Ave, all depths		3.4%	2.55%	1.65%	
Root Mass	At least 1/2 inch	1/5 inch	5/8 inch		Good improvement
Feeder Roots	At least 3.5 in., medium density	3" sparse	Less than 3"		Less than 3"