



Aeration and Soil Modification Strategies Medinah Country Club

Turfgrass Talk Show 2014 GIS

Course Overview

- Medinah Country Club
- Just Outside Chicago, Illinois
 - 54 Holes
 - 600 acres
 - 1924, 1925, 1928

Mission

• 2008

 Mission – Determine the Need and Rebuild the Golf Course Infrastructure to Provide the Highest Quality, Consistent, Playing Conditions Across All 3 Golf Courses.

– And Prepare for the 2012 Ryder Cup











• What's My Aeration and Soil Modification Strategy?



Infrastructure Overhaul

- Project List Since 2008
 - Rebuilt the Practice Facility and Added Short Game Area
 - Rees Jones
 - Rebuilt the Course 3 Greens to a USGA Spec
 - Rees Jones
 - Rebuilt the Course 3 Bunker Infrastructure
 - Regrassed the Course 3 Fwys (+/-)
 - Rebuilt the Course 3, 15th Hole
 - Rees Jones

Infrastructure Overhaul

- Project List Since 2008
 - Renovated the Golf Course Maintenance Facility
 - Renovated Course 1
 - Full Scale/6.4 Million Project
 - In Progress
 - Tom Doak (Renaissance Golf)
 - Course 2 Improvements
 - Tees, Bunkers, Green Expansions
 - Partial
 - Total Investment to Date = 11.5 Million

Never Stop Learning!

- Throughout my career
 - Every Site Has Been Different
 - Every Site Requires a Different Approach
 - Sonoran vs. Mojave Deserts
 - Eastern Connecticut
 - Every Course at Medinah
- Every Season Is Different
 - Each requires strategy evaluation and adjustment
 - Goals can change
 - Variables are never constant

Medinah Challenges

- At Medinah -
 - Heavy Soils, Don't Drain. and are Easily Compacted
 - Average 18k Rounds in 6 Months
 - 75% with golf carts
 - Shade Impacts Significant
 - Rolling Topography Lends to Lots of LOW Areas
 - Playing Surface Expectations are High

Change the Environment

- At Medinah
 - Sand is King!
 - Modify, Modify, Modify (when not rebuilding!)
 - Drainage, Drainage, Drainage
 - Old Age Saying applies to not only structural drainage/tile, but also to soil medium capabilities
 - Promote Oxygen Content, Compaction Resistance, Surface Firmness, and BENTGRASS!

Core Aeration Applies in Various Scenarios

- On Our USGA Greens We Still Core Aerify!
 - Tine Size and Depth Changes with Each Application
 - 2x per Year
 - Drag Out the Cores to Free the Mix and Return to Profile
 - Topdress with Construction Mix
 - 1/2" Holes and Above

Constant Evaluation

- Monitor Progress and Determine Strategy
 - Regular Soil Structure Analysis (ISTRIC, Brookside, Logan, Turf Diagnostic and Design)
 - Daily Probing and Physical Evaluation
 - Consistent Monitoring of Drainage
 - Sub Surface Moisture Units
 - Drainage Daylight Evaluation/Flushing Irrigation
 - Sub Surface Vaccums/Blowers

Green #3 - Course 2



Table 1. '+' improvement, '=' no change, '-' regressed Native Soil Green #3 Comp. Nov. April May 2013 Pash-up Green Index* 2008 1" tier (0-4 in.) 2011 (1+ Bar Sample) \$,50 9.81 [significant improvement since 2011 - does mirror the trends in the air pores & water pores, but it is important to note with air pores & water pores at nearly a 2:1 water to air ratio and organic percentages in excess of 3 to 4 ++ 1.38 1.38 percent, by inch, there is no way 9.81 Infiltration Rate [In/hr] At least 2 inches per hour is sustainable without the aid of an open scrification hole given the overall balance of physical properties we would estimate the current sustainable infiltration rate would be around 5 to 7 inches per hour] Air Porosity 17.71% [positive improvement - good At least 12% + 11.22% 10.09% Mos-Copillery] for a soil green] Water Porosity Less than 30% + 30.38% [at our upper target range] 32.20% 39.33% [Capillary] 1.42 fless compacted than 2011] Bulk Density [g/cc] -1.35 to 1.45 + 1.48 1.38 21.73% 28.41% Water Holding Less than 25% -21.36% [remains high] 3.57% 4,98% Organic Content: 0 - 1" 1.5% to 3.0% -4.06% [high] Organic Content: 1 - 2" 3.30% [very high] 2.93% 2.26% 1.0% to 2.0% -Organic Content: 2 - 3" 3.10% [high] 5.50% 0.5% to 2.0% -3.14% 0.5% to 2.0% 6.67% [very high] 6.43% 6.04% Organic Content: 3 - 4" = Root Mass at least 16 in. = 5/8 in. 5/8 in. 5/8 in 3 in at least 3.5 in. 3 % in. Sparse Feeder Roots + <3 in.

Sparse

-med density



















Fairway Program

- Fairways and All Native Soil Mediums
 - Aggressive, 2x per year Core Cultivation
 - Cores Harvested
 - 25 tons/a of Sand applied per application
 - 50 Tons Per Year Minimum
 - Depending on the Season, Aggressive
 Grooming/Verticutting in advance

Drill and Fill

- Drill and Fill Modification
 - Averaging 13 acres per year
 - 13 Tons of Sand/a
 - 3000sqft/hour
 - Spring and Fall
 - Targeting
 - Course 2 Greens (Only Push Up's Left)
 - Fwy Landing Areas, Traffic Areas, Low Areas (surface draining), Approaches



































Green #3 2 nd tier (4-8 in.)	Native Soil Push-up Greens 2 nd & 3 rd tiers (4-8 & 8-12 in.)	Comp. Index* +,=,•	May 2013	Nov. 2011
Infiltration Rate [In/hr]	At least 1	=	0.00 [no change since 2011 – reflects an extremely dense, heavy soil – note the strong correlation to its lack of air pores]	0.01
Air Porosity [Non-Capillary]	At least 8%	=	5.43% [dangerously low – almost guarantees the root zone will be oxygen deprived]	5.12%
Water Porosity [Capillary]	Less than 35%	+	37.57% [high]	39.72%
Bulk Density [g/cc]	1.40 to 1.50	-	1.54 [high, particularly for the amount of organic matter – typically a root zone with a high percentage of organic matter will yield a low bulk density – the current OM content would typically support a bulk density at or below 1.35 g/cc – the higher than expected bulk density is a strong indicator the root zone would benefit from less compaction]	1.39
Water Holding	Less than 30%	-	24.35% [the extreme contrast in water porosity (water holding potential) and the water holding (actual water retained) is a strong indicator compaction is not only impacting permeability, but also the root zone's ability to absorb water]	28.57%
Organic Content: 4 – 5"	0.1% to 3.0%	+	6.06% [very high]	6.82%
Organic Content: 5 – 6"	0.1% to 3.0%	+	5.01% [very high]	6.29%
Organic Content: 6 – 7"	0.1% to 3.0%	+	4.73% [high]	6.04%
Organic Content: 7 – 8"	0.1% to 3.0%	+	4.90% [high]	5.16%
Root Mass	at least ½ in.	=	N/A	N/A
Feeder Roots	at least 3.5 in. -med. density	=	None	None

Oh the Poa!

Heavy, Poorly, Draining, Compacted Soils Heavy Shade Impact Cool Wet Spring and Fall Season Flood Prone (4sq mile drainage basin)

EXTREMELY HIGH POA ANNUA PRESSURE

So, if you pull a core, aren't you cultivating the Poa seed bed? Aren't you creating a void for Poa to capitalize?

Yes, but....







Modification Proving It's Benefits

A well draining soil, with adequate oxygen pore space, will support bentgrass competition over Poa annua.

Core cultivation performed at the right time, in conjunction with soil modification applications, targeted fertility, and proper irrigation, traffic, and cultural management will make bentgrass the more competitive species.



Thank You!