

SPRING 2016
Data Collection Report
Soil & Water Consulting



The Revere Golf Club



SOIL and WATER CONSULTING

Course Name: Revere Golf Club

Date of Visit: March 24, 2016

	<u>3/19/15</u>	<u>9/29/15</u>	<u>3/24/16</u>
Humidity/Air Temperature	20%/73°	20%/100°	15%/75°
Greens Temperature	62°	72.2°	43.1°
Fairway Temperature	60°	74.5°	46.5°

WATER	Acceptable Range For Water Sample	Hole #18 <u>3/19/15</u>	Hole #2 <u>9/29/15</u>	Hole #14 <u>3/24/16</u>
EC	<2.25 mmhos/cm	2.06	1.96	2.13
Sodium		262.60	246.80	293.60
Calcium	20 - 60 ppm	89.02	89.60	94.61
Magnesium	10 - 25 ppm	29.46	28.18	26.70
Potassium	5 - 20 ppm	22.01	19.09	20.80
Phosphorus	0.1 - 0.4 ppm	0.54	1.80	0.80
Nitrate	5 - 50 ppm	4.37	12.69	8.78
Sulfur	30 - 90 ppm	283.20	289.41	275.76
Bicarbonate	<120 ppm	213.45	160.93	177.10
Boron	<0.67 ppm	0.34	0.33	0.40
Chloride	<177 ppm	324.41	305.86	469.77



Lexington Course



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TEE	Acceptable Range For Alkaline Soils Sample	2 9/29/15	14 3/24/16
Organic Matter (Humus)	2 - 3%	3.65	3.34
Sulfur	12 - 16 ppm	81.00	104.00
Olsen - Phosphorus	13 - 20 ppm	10.00	18.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	2,692.00	5,332.00
Magnesium	>7% base saturation or at least 200 lbs/acre	8.44%/236	10.76%/474
Potassium - TEC of 0 - 35	100 ppm	757.00	364.00
Copper	>0.8 ppm	0.71	1.53
Manganese	>1 ppm	2.00	3.00
Zinc	>1 - 2 ppm	12.98	7.32

FAIRWAY	Acceptable Range For Alkaline Soils Sample	2 9/29/15	14 3/24/16
Organic Matter (Humus)	2 - 3%	1.80	3.79
Sulfur	12 - 16 ppm	5,580.00	604.00
Olsen - Phosphorus	13 - 20 ppm	17.00	38.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	18,716.00	6,854.00
Magnesium	>7% base saturation or at least 200 lbs/acre	3.87%/796	10.95%/642
Potassium - TEC of 0 - 35	100 ppm	718.00	517.00
Copper	>0.8 ppm	2.20	1.70
Manganese	>1 ppm	12.00	5.00
Zinc	>1 - 2 ppm	15.00	5.63

GREENS	Acceptable Range For Alkaline Soils Sample	2 9/29/15	14 3/24/16
Organic Matter (Humus)	2 - 3%	1.81	1.77
Sulfur	12 - 16 ppm	59.00	81.00
Olsen - Phosphorus	13 - 20 ppm	28.00	8.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	2,340.00	3,100.00
Magnesium	>7% base saturation or at least 200 lbs/acre	8.57%/206	8.05%/246
Potassium - TEC of 0 - 35	150 ppm	638.00	726.00
Copper	>0.8 ppm	0.69	0.53
Manganese	4 ppm or more	3.00	2.00
Zinc	>1 - 2 ppm	213.00	10.32



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TEE	Acceptable Range For Saturated Paste Sample	2 9/29/15	1,14 (avg) 3/24/16
Nitrate - Ryegrass	5 - 10 ppm	46.50	<0.5
Nitrate - Bermudagrass	10 -15 ppm		
Phosphorus	2 - 10 ppm	1.65	0.47
Potassium	40 - 100 ppm	35.21	36.87
Calcium	60 - 200 ppm	178.60	133.93
Magnesium	20 - 70 ppm	46.28	35.52
Sodium	0 - 30 ppm	262.90	860.53
Soluble Salts	<1,920 ppm	1,581.00	907.94
Bicarbonate	<60 ppm	151.30	207.44
Chloride	<1,000 ppm	241.00	476.50
SAR	<4%	4.53	6.96

FAIRWAY	Acceptable Range For Saturated Paste Sample	2 9/29/15	1,14 (avg) 3/24/16
Nitrate - Ryegrass	5 - 10 ppm	18.40	<12.0
Nitrate - Bermudagrass	10 -15 ppm		
Phosphorus	2 - 10 ppm	0.44	0.42
Potassium	40 - 100 ppm	68.47	86.46
Calcium	60 - 200 ppm	372.20	563.71
Magnesium	20 - 70 ppm	70.27	124.14
Sodium	0 - 30 ppm	354.10	659.46
Soluble Salts	<1,920 ppm	2,240.00	3,212.50
Bicarbonate	<60 ppm	117.14	224.52
Chloride	<1,000 ppm	228.00	804.50
SAR	<4%	4.41	6.56

GREENS	Acceptable Range For Saturated Paste Sample	2 9/29/15	1,14 (avg) 3/24/16
Nitrate - Bentgrass	1-3 ppm	2.60	<0.5
Phosphorus	2 - 7 ppm	1.66	1.87
Potassium	25-40 ppm	14.43	22.37
Calcium	50- 75 ppm	38.83	102.58
Magnesium	15-30 ppm	10.69	27.61
Sodium	0 - 30 ppm	108.80	198.94
Soluble Salts	<1,000 ppm	506.00	940.00
Bicarbonate	<60 ppm	131.78	123.24
Chloride	<200 ppm	83.00	182.00
SAR	<4%	3.99	4.54



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TEE	Acceptable Range For Tissue Sample	1,14 (avg) 3/24/16
Nitrogen	3.34%-5.10%	3.78
Phosphorus	0.35% - 0.55%	0.57
Potassium	2.0% - 3.42%	2.15
Calcium	0.25%-0.5%	1.00
Magnesium	0.16%-0.32%	0.30
Sulfur	0.27% - 0.56%	0.54
Boron	5-17 ppm	45.35
Iron	97-934 ppm	576.00
Manganese	30-73 ppm	70.15
Copper	6-38 ppm	15.85
Zinc	16-84ppm	72.95
Aluminum	52-92 ppm	332.00
Sodium	229-1107 ppm	5,450.00

FAIRWAY	Acceptable Range For Tissue Sample	1,14 (avg) 3/24/16
Nitrogen	3.34%-5.10%	4.23
Phosphorus	0.35% - 0.55%	0.51
Potassium	2.0% - 3.42%	2.48
Calcium	0.25%-0.5%	0.71
Magnesium	0.16%-0.32%	0.25
Sulfur	0.27% - 0.56%	0.53
Boron	5-17 ppm	34.35
Iron	97-934 ppm	314.00
Manganese	30-73 ppm	40.70
Copper	6-38 ppm	9.65
Zinc	16-84ppm	46.10
Aluminum	52-92 ppm	154.50
Sodium	229-1107 ppm	7,265.00

GREENS	Acceptable Range For Tissue Sample	1,14 (avg) 3/24/16
Nitrogen	3.0%-6.5%	4.29
Phosphorus	0.2%-0.55%	0.56
Potassium	0.86%-2.55%	2.25
Calcium	0.21%-0.50%	0.73
Magnesium	0.09%-0.22%	0.24
Sulfur	0.23%-0.39%	0.54
Boron	5-24 ppm	45.50
Iron	99-500 ppm	311.00
Manganese	30-160 ppm	81.25
Copper	9-40 ppm	21.65
Zinc	5-60 ppm	64.00
Aluminum	63- 408 ppm	153.00
Sodium	506- 2264 ppm	3,765.00



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Concord Course



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TEE	Acceptable Range For Saturated Paste Sample	2,11 (avg) 9/29/15	14 3/24/16
Nitrate - Ryegrass	5 - 10 ppm	36.15	1.00
Nitrate - Bermudagrass	10 -15 ppm		
Phosphorus	2 - 10 ppm	3.36	2.53
Potassium	40 - 100 ppm	35.37	36.10
Calcium	60 - 200 ppm	78.94	113.49
Magnesium	20 - 70 ppm	23.98	31.91
Sodium	0 - 30 ppm	210.15	329.05
Soluble Salts	<1,920 ppm	1,070.50	1,247.00
Bicarbonate	<60 ppm	184.25	192.79
Chloride	<1,000 ppm	150.00	396.00
SAR	<4%	5.40	7.03

FAIRWAY	Acceptable Range For Saturated Paste Sample	2,11 (avg) 9/29/15	14 3/24/16
Nitrate - Ryegrass	5 - 10 ppm	39.10	4.30
Nitrate - Bermudagrass	10 -15 ppm		
Phosphorus	2 - 10 ppm	0.48	0.46
Potassium	40 - 100 ppm	40.94	101.63
Calcium	60 - 200 ppm	337.73	584.59
Magnesium	20 - 70 ppm	69.53	120.76
Sodium	0 - 30 ppm	308.03	730.50
Soluble Salts	<1,920 ppm	2,063.00	3,392.00
Bicarbonate	<60 ppm	142.36	207.43
Chloride	<1,000 ppm	192.67	825.00
SAR	<4%	3.25	7.18

GREENS	Acceptable Range For Saturated Paste Sample	2,11 (avg) 9/29/15	14 3/24/16
Nitrate - Bentgrass	1-3 ppm	1.20	0.60
Phosphorus	2 - 7 ppm	1.64	1.15
Potassium	25-40 ppm	25.69	23.29
Calcium	50- 75 ppm	57.23	109.33
Magnesium	15-30 ppm	15.92	28.09
Sodium	0 - 30 ppm	146.20	186.63
Soluble Salts	<1,000 ppm	752.00	947.00
Bicarbonate	<60 ppm	194.01	131.78
Chloride	<200 ppm	100.00	179.00
SAR	<4%	4.41	4.12



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TEE	Acceptable Range For Tissue Sample	14 3/24/16
Nitrogen	3.34%-5.10%	3.11
Phosphorus	0.35% - 0.55%	0.56
Potassium	2.0% - 3.42%	1.43
Calcium	0.25%-0.5%	1.37
Magnesium	0.16%-0.32%	0.32
Sulfur	0.27% - 0.56%	0.49
Boron	5-17 ppm	44.80
Iron	97-934 ppm	805.00
Manganese	30-73 ppm	76.20
Copper	6-38 ppm	18.20
Zinc	16-84ppm	90.50
Aluminum	52-92 ppm	588.00
Sodium	229-1107 ppm	5,000.00

FAIRWAY	Acceptable Range For Tissue Sample	14 3/24/16
Nitrogen	3.34%-5.10%	3.79
Phosphorus	0.35% - 0.55%	0.55
Potassium	2.0% - 3.42%	1.77
Calcium	0.25%-0.5%	0.98
Magnesium	0.16%-0.32%	0.30
Sulfur	0.27% - 0.56%	0.53
Boron	5-17 ppm	44.30
Iron	97-934 ppm	593.00
Manganese	30-73 ppm	78.30
Copper	6-38 ppm	15.60
Zinc	16-84ppm	77.60
Aluminum	52-92 ppm	338.00
Sodium	229-1107 ppm	5,390.00

GREENS	Acceptable Range For Tissue Sample	14 3/24/16
Nitrogen	3.0%-6.5%	3.88
Phosphorus	0.2%-0.55%	0.47
Potassium	0.86%-2.55%	2.19
Calcium	0.21%-0.50%	0.92
Magnesium	0.09%-0.22%	0.23
Sulfur	0.23%-0.39%	0.66
Boron	5-24 ppm	48.80
Iron	99-500 ppm	398.00
Manganese	30-160 ppm	58.40
Copper	9-40 ppm	17.90
Zinc	5-60 ppm	61.60
Aluminum	63- 408 ppm	250.00
Sodium	506- 2264 ppm	3,440.00



RECOMMENDATIONS



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Thoughts on the course visit

I see progress every time I ride the course to sample. This trip it was the greenside bunkers on Lexington Course. Projects like that are noticeable to the golfer as well as the overall aesthetics of the property. The greens seemed to be further ahead this year versus 2015 and some of that may be attributed to a warm February. The week I was in town was cold at night and windy in the day time. Soil temperatures were approximately 10 degrees cooler than the same time last year if not colder in some spots. So, overall, you seem to have made a switch from "chasing" major infrastructure problems to being able to be more proactive.

With regards to the greens, your main concern should be sodium levels **and** the top 2" of the soil profile. Continuing to run the sulfur burner at full capacity will help, a bi-weekly spray program including synthetic acids (Blast, pHacid, 7-7-7) will help, pulling more cores at aerification events will help and a routine verticutting and topdressing program will help. As we discussed, any previous disease issues or thinning grass is a symptom of the high sodium and thatchy top 2" of the greens. The greens become smoother and faster, yes, but I am recommending these things for their health.



Focus of This Report

This Spring, every client that I visited I took a profile section out of one of their greens. Because I work with all ages of golf courses I have seen anything from a new sod layer to the typical 4-5" pan layer where it was a USGA recommended/constructed green. The picture of your profile (above) is not unusual but it does pose some problems. If you remember from school, the video that showed water moving through a soil profile. Even if there was coarse material layered over finer material, (which is the good rule of thumb when selecting topdressing sands) whenever the water hit a layer, it had to fill the first layer before it drained into the next layer and so on through the soil. It seems like simple physics and gravity, but it does matter to you with regards to moving water in and out of your greens. I see much more dead grass from too much water that from not enough and when you have 2 or more perched water tables in a 12-14" soil profile, that can wreak havoc on the turf. Then add the traffic from machines and people to that, it is reasonable to get disease and worn areas on the greens. So, how can you fix it? Nothing will be quick but you can work on it and improve drainage as time goes on. Cultivate in every layer. Verti-cutting and topdressing works on the thatch, 3-5" core aerification will help the current root zone and most of all below 5"! It is the layer least worked on and the area can show the most dramatic results.

Notes from the visit

- *Primo and Proxy applications already to greens.*
- *Very small crew for 36 holes!*
- *Making great progress on infrastructure issues leading to better turf conditions.*
- *Lexington greens aerification for May.*
- *10-4-16 applied to all greens in February.*
- *Gypsum and potash applied to Concord greens the week prior to sample collection.*
- *Tees had an application of 21-0-0.*
- *New sand in Lexington Greenside bunkers.*

Fertilizer and Product Recommendations

Tees & Fairways (Time applications for Acidification)

Applying a balanced N-P-K fertilizer on the bermudagrass and ryegrass will take care of the current soluble deficiencies. (15-15-15)

Greens (Monthly applications)

Phosphorus- 3 pounds of product per 1,000 square feet. (11-55-00)

Calcium- 10 pounds of product per 1,000 square feet. (Gypsum) Simplify to a bag per green is easy as well.

Potassium- 4 pounds of product per 1,000 square feet (0-0-50)

Manganese- 3 ounces per 1,000 square feet rate of Techmagnum.(Manganese Sulfate)

****pHacid spray and water in every two weeks.***