

SPRING 2017

Data Collection Report
Soil & Water Consulting



— Est. 1947 —

Tucson Country Club



SOIL and WATER CONSULTING

Course Name: Tucson Country Club

Date of Visit: March 20, 2017

	<u>3/12/16</u>	<u>6/25/16</u>	<u>9/6/16</u>	<u>3/20/17</u>
Humidity/Air Temperature	46%/72°	22%/99°	20%/90°	20%/92°
Greens Temperature	51.6°	78°	n/t	78°
Fairway Temperature	52.8°	78°	n/t	79°

	Acceptable Range For Water Sample	Potable Lake <u>3/12/16</u>	Effluent Lake <u>3/12/16</u>	Potable Lake <u>6/25/16</u>	Effluent Lake <u>6/25/16</u>	Effluent Lake <u>9/6/16</u>	Hole #1 <u>3/20/17</u>
EC	<2.25 mmhos/cm	0.39	0.44	0.40	0.13	0.46	0.33
Sodium		30.79	55.70	45.59	91.06	82.85	29.04
Calcium	20 - 60 ppm	34.87	25.08	32.28	47.90	17.75	32.35
Magnesium	10 - 25 ppm	2.80	1.76	2.00	7.27	1.06	2.64
Potassium	5 - 20 ppm	2.28	1.93	2.55	4.56	1.45	3.55
Nitrate	10 - 25 ppm	n/t	1.15	n/t	1.62	1.70	0.98
Phosphorus	5 - 20 ppm	n/t	<0.20	n/t	0.21	<0.20	<0.20
Sulfur	30 - 90 ppm	39.69	35.88	35.16	87.81	23.87	29.10
Bicarbonate	<120 ppm	125.99	143.98	146.66	206.92	195.82	118.79
Boron	<0.67 ppm	0.06	0.11	0.08	0.19	0.15	0.05
Chloride	<177 ppm	22.30	30.98	21.62	61.10	16.00	12.25



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TEE	Acceptable Range For Alkaline Soils Sample	5 3/12/16	6 6/25/16	7 9/6/16	1 3/20/17
Organic Matter (Humus)	2 - 3%	2.92	2.60	2.17	2.56
Sulfur	12 - 16 ppm	18.00	30.00	34.00	17.00
Olsen - Phosphorus	13 - 20 ppm	14.00	13.00	9.00	19.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	5,064.00	4,178.00	3,536.00	3,360.00
Magnesium	>7% base saturation or at least 200 lbs/acre	7.13%/262	7.68%/242	6.79%/184	9.71%/246
Potassium - TEC of 0 - 35	100 ppm	150.00	136.00	180.00	116.00
Copper	>0.8 ppm	0.95	1.20	1.37	1.15
Manganese	>1 ppm	2.00	3.00	2.00	3.00
Zinc	>1 - 2 ppm	4.71	5.30	4.63	6.98

FAIRWAY	Acceptable Range For Alkaline Soils Sample	5 3/12/16	6 6/25/16	7 9/6/16	1 3/20/17
Organic Matter (Humus)	2 - 3%	4.11	3.65	2.35	2.37
Sulfur	12 - 16 ppm	22.00	71.00	47.00	23.00
Olsen - Phosphorus	13 - 20 ppm	28.00	14.00	10.00	34.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	3,462.00	5,012.00	3,364.00	3,054.00
Magnesium	>7% base saturation or at least 200 lbs/acre	9.09%/246	8.62%/342	8.10%/214	10.23%/250
Potassium - TEC of 0 - 35	100 ppm	213.00	371.00	245.00	229.00
Copper	>0.8 ppm	1.72	1.37	1.94	1.50
Manganese	>1 ppm	3.00	5.00	3.00	3.00
Zinc	>1 - 2 ppm	6.15	5.36	4.15	4.47

GREENS	Acceptable Range For Alkaline Soils Sample	5 3/12/16	6 6/25/16	7 9/6/16	1 3/20/17
Organic Matter (Humus)	2 - 3%	0.52	0.77	0.42	0.80
Sulfur	12 - 16 ppm	15.00	12.00	11.00	11.00
Olsen - Phosphorus	13 - 20 ppm	16.00	13.00	9.00	17.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	2,492.00	2,502.00	2,090.00	2,134.00
Magnesium	>7% base saturation or at least 200 lbs/acre	7.25%/148	6.76%/132	7.31%/126	9.40%/166
Potassium - TEC of 0 - 35	150 ppm	384.00	278.00	353.00	284.00
Copper	>0.8 ppm	1.32	1.06	1.50	1.40
Manganese	4 ppm or more	1.00	2.00	2.00	2.00
Zinc	>1 - 2 ppm	3.18	3.20	2.98	4.55



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TEE	Acceptable Range For Saturated Paste Sample	7,16 (avg) 9/6/16	1,10 (avg) 3/20/17
Nitrate - Ryegrass	5 - 10 ppm		<0.5
Nitrate - Bermudagrass	10 -15 ppm	35.00	
Phosphorus	2 - 10 ppm	1.16	1.15
Potassium	40 - 100 ppm	70.39	14.27
Calcium	60 - 200 ppm	58.03	55.38
Magnesium	20 - 70 ppm	7.05	6.47
Sodium	0 - 30 ppm	111.62	59.97
Soluble Salts	<1,920 ppm	634.00	344.50
Bicarbonate	<60 ppm	172.05	230.62
Chloride	<1,000 ppm	83.00	30.50
SAR	<4%	3.70	2.02

FAIRWAY	Acceptable Range For Saturated Paste Sample	7,16 (avg) 9/6/16	1,10 (avg) 3/20/17
Nitrate - Ryegrass	5 - 10 ppm		<0.5
Nitrate - Bermudagrass	10 -15 ppm	75.80	
Phosphorus	2 - 10 ppm	2.25	1.64
Potassium	40 - 100 ppm	51.03	29.45
Calcium	60 - 200 ppm	87.50	59.26
Magnesium	20 - 70 ppm	13.07	8.71
Sodium	0 - 30 ppm	146.04	91.04
Soluble Salts	<1,920 ppm	986.00	456.50
Bicarbonate	<60 ppm	183.03	261.12
Chloride	<1,000 ppm	84.50	39.50
SAR	<4%	3.86	2.94

GREENS	Acceptable Range For Saturated Paste Sample	7,16 (avg) 9/6/16	1,10 (avg) 3/20/17
Nitrate - Bentgrass	1-3 ppm	18.45	<0.5
Phosphorus	2 - 7 ppm	5.84	2.31
Potassium	25-40 ppm	73.13	13.61
Calcium	50- 75 ppm	17.18	17.55
Magnesium	15-30 ppm	2.68	2.73
Sodium	0 - 30 ppm	39.74	34.12
Soluble Salts	<1,000 ppm	452.50	171.50
Bicarbonate	<60 ppm	224.52	102.50
Chloride	<200 ppm	26.00	13.50
SAR	<4%	2.36	2.00



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TEE	Acceptable Range For Tissue Sample	1,10 (avg) 3/20/2017
Nitrogen	3.34%-5.10%	4.81
Phosphorus	0.35% - 0.55%	0.65
Potassium	2.0% - 3.42%	2.68
Calcium	0.25%-0.5%	0.40
Magnesium	0.16%-0.32%	0.16
Sulfur	0.27% - 0.56%	0.42
Boron	5-17 ppm	12.10
Iron	97-934 ppm	287.50
Manganese	30-73 ppm	36.90
Copper	6-38 ppm	11.20
Zinc	16-84ppm	51.50
Aluminum	52-92 ppm	146.75
Sodium	229-1107 ppm	995.00

FAIRWAY	Acceptable Range For Tissue Sample	1,10 (avg) 3/20/2017
Nitrogen	3.34%-5.10%	5.50
Phosphorus	0.35% - 0.55%	0.68
Potassium	2.0% - 3.42%	2.92
Calcium	0.25%-0.5%	0.39
Magnesium	0.16%-0.32%	0.19
Sulfur	0.27% - 0.56%	0.52
Boron	5-17 ppm	21.65
Iron	97-934 ppm	281.50
Manganese	30-73 ppm	63.30
Copper	6-38 ppm	14.15
Zinc	16-84ppm	57.65
Aluminum	52-92 ppm	70.20
Sodium	229-1107 ppm	1,485.00

GREENS	Acceptable Range For Tissue Sample	1,10 (avg) 3/20/2017
Nitrogen	3.0%-6.5%	4.29
Phosphorus	0.2%-0.55%	0.56
Potassium	0.86%-2.55%	2.49
Calcium	0.21%-0.50%	0.40
Magnesium	0.09%-0.22%	0.17
Sulfur	0.23%-0.39%	0.44
Boron	5-24 ppm	9.00
Iron	99-500 ppm	420.00
Manganese	30-160 ppm	88.40
Copper	9-40 ppm	22.20
Zinc	5-60 ppm	50.50
Aluminum	63- 408 ppm	118.00
Sodium	506- 2264 ppm	703.00



RECOMMENDATIONS



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Thoughts on the course visit

The course was in good shape as we drove around. The most noticeable areas of improvement were the out of play and edge of the property areas. This is something that we discussed trying to improve when you were first hired. Tree work and general pruning has made a difference in the beautification of the property.

You had some Winter rains and the days that I was in Tucson there were record highs in the 90's. Your weather to start the year may be a little different than the area is used to but it should help the course get off to a good start in Spring. You were just beginning to lower mowing heights on the rough and tees and fairways. From walking a few of the fairways, I can see that there is plenty of bermudagrass waiting to grow. Because I think your transition to bermudagrass happens earlier than you were used to in Las Vegas, I am recommending multiple applications of 0-0-22 on the bermudagrass. From the beginning when we started sampling in June 2015, we have seen low levels of magnesium in the native soils. We haven't seen significant increases either. If you had time to apply monthly "lower dose" applications I think you will see a very healthy stand of grass.

The greens came through Winter well. Soil temperatures were up the few days I was in town, but I suspect they have settled around 65-70 degrees. I think by April 15th you are in prime growing conditions for the cool season grasses in Tucson.

Notes from the visit

- Greens mowing height- 0.105"
- Deep tined greens on Monday 3/13.
- End of April is first scheduled core aerification on the greens.
- Typical Dominant Plus greens with thinner areas having some Algae.
- Fairway mowing height- 0.425".
- 15-15-15 with iron applied to tees and fairways the week of 3/13/17.
- The course in the out of play areas looks much better over the past two years.
- Crew size is back to "normal" size from when you took over.

Fertilizer and Product Recommendations

Tees & Fairways (AS OFTEN AS YOU CAN- MONTHLY?)

Magnesium/Potassium- 200 pounds of product per acre.(0-0-22; K-Mag)

*** Spray Epsom salts in tank mixes that will allow.**

Greens (Monthly applications)

Calcium- 20 pounds of product per 1,000 square feet. (Gypsum)
ONCE AT CORE AERIFICATION!

Magnesium- 3 pounds of product per 1,000 square feet. (Pro-mag)
ONCE AT CORE AERIFICATION!

Potassium- 2 pounds of product per 1,000 square feet (0-0-50) AND
3-4 pounds of product per 1,000 square feet. (POLY-K 0-0-50) **ONCE AT AERIFICATION!**

***Synthetic acid spray and water in every two weeks. Spray Epsom salts in tank mixes that will allow.**