



COURSE CONSULTING SERVICE

Onsite Visit Report

Recreation Centers at Sun City Sun City, Arizona

Visit Date: May 16, 2024

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The USGA Green Section develops and disseminates sustainable management practices that produce better playing conditions for better golf.

Executive Summary

Thank you for your kind hospitality and the invitation to return to the golf courses at the Recreation Centers at Sun City (RCSC) to conduct a Course Consulting Service visit on behalf of the USGA Green Section. It was great to see the completion of the turf care facility at the Lakes East/Lakes West courses and the good conditions of the TifTuf on the front nine of the North Golf Course fairways. It was also good to hear of plans for irrigation replacement and golf course renovation on the Quail Run Golf Course. We had a great group of board and green committee members join us throughout the day, and I thank you for your participation. A brief summary of the topics discussed in this report is included below:

1. General Topics

In the first section of the report, you will find observations and recommendations on the following topics pertaining to all of the RCSC golf courses:

- Weed control in nonoverseeded areas.
- Putting green organic matter management.
- Putting green surface management.
- Bunker sand management.
- Equipment service life.
- Labor.
- Bermudagrass transition.
- Overseeding green surrounds.

2. Course-Specific Topics

In the second section of the report, you will find observations and recommendations pertaining to each of the golf courses we were able to spend time on during our visit.

Table of Contents

General Topics	5
Weed Control in Nonoverseeded Areas	5
<i>Observations</i>	<i>5</i>
<i>Recommendations</i>	<i>5</i>
Putting Green Organic Matter	6
<i>Observations</i>	<i>6</i>
<i>Recommendations</i>	<i>7</i>
Putting Green Surface Management.....	8
<i>Observations</i>	<i>8</i>
<i>Recommendations</i>	<i>9</i>
Bunker Management.....	9
<i>Observations</i>	<i>9</i>
<i>Recommendations</i>	<i>10</i>
Equipment Service Life.....	12
<i>Observations</i>	<i>12</i>
<i>Recommendations</i>	<i>13</i>
Labor 13	
<i>Observations and Recommendations.....</i>	<i>13</i>
Bermudagrass Transition	13
<i>Observations and Recommendations.....</i>	<i>13</i>
Overseeding Green Surrounds	14
<i>Observations</i>	<i>14</i>
<i>Recommendations</i>	<i>15</i>
Course-Specific Topics	15
South Golf Course.....	15
<i>Observations</i>	<i>15</i>
<i>Recommendations</i>	<i>15</i>
Quail Run Golf Course.....	16
<i>Observations</i>	<i>16</i>
<i>Recommendations</i>	<i>16</i>
North Golf Course	17
<i>Observations</i>	<i>17</i>
<i>Recommendations</i>	<i>18</i>
Lakes West Golf Course	18
<i>Observations</i>	<i>18</i>
<i>Recommendations</i>	<i>19</i>
Lakes East Golf Course	19
<i>Observations</i>	<i>19</i>
<i>Recommendations</i>	<i>19</i>

Riverview Golf Course 20
 Observations 20
 Recommendations 20
Willowcreek Golf Course 21
 Observations 21
 Recommendations 21
Closing Comments..... 22
Additional Considerations..... 23
About the USGA Course Consulting Service 23

General Topics

The following topics in this first section of the report are pertinent to all of the RCSC golf courses.

Weed Control in Nonoverseeded Areas

Observations

1. Significant Weed Pressure in Nonoverseeded Roughs

It was great to see that you do not overseed the roughs on any of the golf courses. However, the roughs are susceptible to weed infestation, especially during the winter when the bermudagrass is nearly or fully dormant. During our visit, every golf course had significant weed pressure in the nonoverseeded rough areas.



The weed pressure is high in the nonoverseeded roughs at all RCSC golf courses.

2. Insufficient Fertility

The roughs appeared to be under-fertilized. The insufficient fertility weakens the turf stand and increases the likelihood of weed infestation.

Recommendations

1. Combined Preemergence and Postemergence Herbicide Program

It is essential to combine both preemergence and postemergence herbicides to mitigate weed infestation in the nonoverseeded roughs. There are many preemergence and postemergence options in the marketplace and, while the costs range widely, you can be successful with inexpensive products so long as the program is sound. Consider the following options:

- **Program 1:**
6 ounces/acre Specticle® Flo in mid-October + 40 ounces/acre Kerb® SC.
Follow with glyphosate 12-14 ounces per acre early January.
- **Program 2:**
40 ounces/acre Kerb SC + 5 ounces/acre glyphosate mid-November.
Follow with glyphosate 12-14 ounces per acre early January.
- **Program 3:**
10 ounces/acre Sencor® 75 DF + 5 ounces/acre glyphosate.
Follow with glyphosate 12-14 ounces per acre early January.
- **Program 4:**
32 ounces/acre Princep® 4FL + 6 ounces/acre Specticle Flo + 1 ounce/acre Tribute® Total
+ 5 ounces/acre glyphosate in mid-October only.

Putting Green Organic Matter

Observations

1. Soil Profile

I collected a profile sample from one green on each of the golf courses on the day of the visit. In general, I did not see an excessive amount of surface organic matter, although it appears the highest concentration exists on the South, Riverview and Willowcreek courses. Water could be squeezed from the surface of these three courses. When organic matter concentration is high at the surface of greens, there is chronic surface wetness and the greens become very soft and bumpy in the afternoon with high play volume. Also, it is common to see weaker shear strength in greens with high surface moisture.



2. Shear Strength

The shear strength tester was used at all golf courses. Readings generally exceeded 22 Newton meters (Nm). In fact, on the South greens, I measured one area at about 45 Nm, which is higher than I have ever seen. Values less than 15 Nm indicate a bermudagrass green that is weaker. The weakest values observed were on the Willowcreek greens with values ranging from 13 to 17.5 Nm. I believe the lower shear strength on Willowcreek is due to the elevated surface organic matter and high surface moisture. Water could be squeezed from this layer at 3:30 in the afternoon.

3. Algae

We also observed isolated areas with algae at the surface on the North, Riverview and Willowcreek greens. This is also an indication of elevated surface organic matter holding water.

Recommendations

1. Organic Matter Management Strategies

Managing organic matter has four primary components including (1) sand topdressing for dilution, (2) aeration to remove organic matter, (3) judicious nitrogen inputs, and (4) infrequent irrigation. Please see the following comments on each of these important strategies below:

- **Sand topdressing.** Sand topdressing is probably the most important part of the organic matter management program. Ideally, the greens would receive from 2,500 to 3,000 pounds of sand per 1,000 square feet every year. This amount of sand can be applied through routine sand topdressing events as well as heavier sand applied during aeration and at overseeding. I would recommend that each golf course quantify the amount of sand applied to greens and run a cumulative running total through the year.
- **Aeration.** There is one aeration event per golf course, and it was great to hear that each course will be closed for two weeks to facilitate enough time to aerate and for the greens to largely heal prior to opening. This extended closure also will allow for additional sand to be applied to maximize this once-annual event. With that in mind, ideally, three passes would be made over the greens at each course. The first pass will be with a 3/4-inch-diameter solid tine able to penetrate 8 to 10 inches and on a spacing of 4 by 4 inches. The second and third passes would be conducted with 5/8-inch outside-diameter tines on a tight spacing of 1.5 by 2 inches. USGA research has shown that multiple passes over the greens do not extend the healing time compared to only one pass. It is critical to completely fill all of the holes to the surface with sand. This very likely means making three, four or more sand applications during this event.
- **Nitrogen inputs.** It was good to hear that the annual goal is to apply approximately 4.5 pounds of nitrogen per 1,000 square feet per year or less. There should be very little to no nitrogen applied during the summer months, other than a small amount during aeration (about 1/3 pound of nitrogen per 1,000 square feet). The vast majority of the annual nitrogen should be applied in spring and fall.
- **Irrigation.** Ideally, all the golf courses would irrigate every other day or every third day during the summer months and less frequently in the shoulder and winter months. Allowing the greens to dry at the surface between irrigation events slows organic matter production and increases the microbial decomposition of surface organic matter. The microbes always work more efficiently in an environment with oxygen.

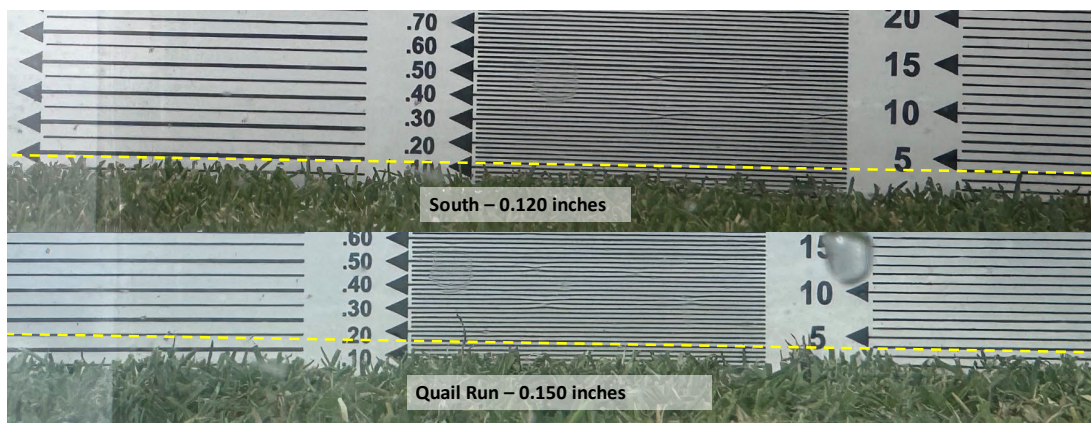
Putting Green Surface Management

Observations

1. Height of Cut

The bench height of cut setting at the golf courses did not vary significantly. By design, the par-3 golf courses are mowed at a higher height of cut to avoid fast green speeds whereas greens on these golf courses are generally more heavily sloped. Although the bench height of cut was similar among the courses, the field height of cut did vary more significantly.

- The lowest field height of cut setting as viewed through the prism gauge was 0.100 inches on the North greens.
- The field heights of cut on the South, Lakes West, Lakes East and Riverview greens were all very similar around 0.120 inches.
- Higher field height of cut was viewed on the Lakes East and the Quail Run greens at approximately 0.150 inches, which is by design. Perhaps the highest height of cut was seen on the Willowcreek greens at 0.180 inches. However, we measured the field height of cut at 3:30 in the afternoon after a full day of play and therefore the comparison to the greens measured in the morning is not a fair comparison.



The prism gauge is used to measure the field height of cut. The measurement revealed the South greens in the morning had a field height of approximately 0.120 inches. Field height of cut on Quail Run was 0.150 inches.

2. Green Speeds

Green speeds were similar where the field height of cut was similar. The fastest greens measured at 10'10" were found on the Lakes West greens. These greens were also the driest and firmest. Green speed on most of the other golf courses was measured between 8 and 9 feet. I believe other than the Lakes West speedy greens, all the other golf courses had green speeds close enough to one another to categorize them as consistent.

3. Quality of Cut

In general, the quality of cut was good on greens. However, we did observe some greens with uncut leaf blades, especially those greens with higher field height of cut. We also observed some bermudagrass stolons laying horizontally along the surface of the greens.

Recommendations

1. Green Speed and Field Height of Cut Correlation

The speed of the greens and the field height of cut are very closely related. For example, just days after this visit, I visited Phoenix Country Club. The field height of cut at Phoenix Country Club was approximately 0.080 inches, and speed was measured at nearly 12 feet. It would behoove you to maintain a similar field height of cut on all the regulation golf courses. I believe an excellent field height of cut for these golf courses would be in the range of 0.110 to 0.125 inches measured in the morning within one to two hours after mowing.

- Some mowers are new and may need to be set at 0.130 to 0.140 inches to yield this field height of cut, while older mowers may need to be set at 0.100 to 0.110 inches to achieve a similar field height of cut.
- With the goal to achieve better consistency, I feel the routine use of the prism gauge at all the courses will help you achieve this goal.

2. Encouraging Upright Growth

All the courses are already employing routine surface management practices such as grooming, brushing and light vertical mowing. My comment here is to reaffirm the importance of these practices throughout the growing season. I would also encourage for all courses to have the ability to measure the height of the grooming blades and the depth of the vertical mowing blades using the appropriate tools such as the groomer gauge and the vertical gauge.

- A good guideline for groomers is to run them about 0.020 to 0.030 inches below the mowing height and run in the counter-rotational direction.
- For vertical mowing, set the blades at a range between 0.030 and 0.080 inches below the bottom of the rollers. Immediately in advance of the aeration event, it is recommended to set the blades more aggressively at 0.125 to 0.150 inches below the bottom of the rollers.

Bunker Management

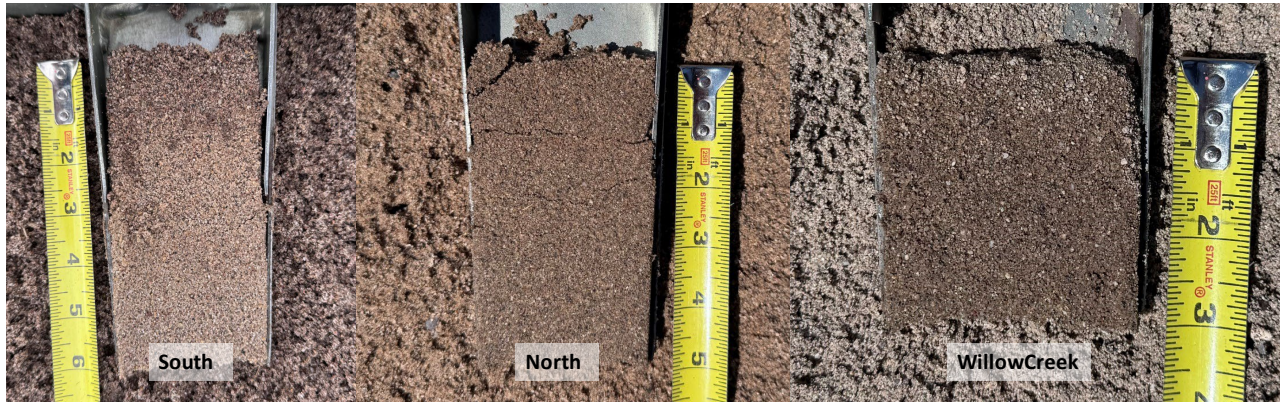
Observations

1. Varying Sand Depths

It is common for any golf course, regardless of the budget, to see varying sand depths in bunkers. Typically, when the sand depth is 4 inches or less, the sand stays wet and is typically too firm. The majority of comments during this visit were that the bunkers play too firm from time to time. We inspected bunker sand depth at nearly every golf course we visited.

- On the greenside bunker on No. 8 South, the sand depth was pretty consistent in the flat area with approximately a 6-inch depth. The firmness in this bunker in the flat area was 0.64 inches, which is right within the ideal range. As a guideline, when firmness in bunkers is 0.50 inches or below, the bunker is probably too firm for routine play. Conversely, when the sand is measured at 0.90 inches or greater, the sand is likely too soft.
- On the greenside bunker on No. 8 North, the bunker sand depth was 5 to 6 inches. The comments on this bunker were much more about the steep faces and difficulty in which to hit bunker recovery shots onto the green.

- On the green side bunker on No. 10 Riverview, the sand depth ranged from 4 to 6 inches and was measured at 8 inches on the bunker face. The firmness ranged from 0.52 in the shallow areas to 0.75 where there was 6 to 7 inches of sand.
- On the greenside bunker on No. 18 Willowcreek, there was an area with only 1 to 2 inches of sand and other areas with 7 inches of sand. This was the firmest bunker we measured and ranged from 0.37 to 0.70 inches.



Sand depth in the bunkers directly relates to the level of firmness. Shallower sand remains wet and is firmer than areas with greater depth.

2. Bunker Difficulty

There were numerous comments during the course tour about the difficulty of the bunkers on several golf courses, but most of the comments were directed to the North Golf Course. The bunkers have fairly steep faces and high lips. It is very difficult for golfers with slower swing speeds to get enough height on the ball to properly recover from the bunker and hit the green.

3. Sand Contamination

We also discussed bunker sand contamination. It is common for bunker sand to become contaminated over time with organic debris and fine sand, silt and clay that either erodes from the perimeter soil around the bunker or is blown in with the monsoon weather in the summer. Observations of many profile samples collected in bunkers did not seem to indicate any excessive amount of fine material accumulation. However, as you will see in the recommendations section below, we cannot rely entirely on observations and need lab analysis data to reveal whether the sand is, in fact, contaminated.

Recommendations

1. Managing Sand Depths

A good guideline is to maintain 7 to 10 inches of sand on the lowest areas and flat areas of the bunkers. The higher sand depths will help maintain drier sand at the surface, which means softer conditions. Greater sand depth also means less chance of exposing the underlying bunker liner.

2. Fluffing the Sand

Many courses have found that aggressively raking and/or fluffing the sand on a routine basis helps with water infiltration and helps to decrease compacted sand. This ultimately results in better playability. Using a deep-tine landscape rake and removing every other tine is often a good tool to aggressively rake the sand. Another option is to use a square-bladed shovel to turn over the sand. However, these types of strategies are very labor intensive and, at this facility, can likely only be done three or four times per year.

3. Adding Sand

It will be necessary for all golf courses to add sand routinely throughout the year. Some bunkers receive higher play volume and will need added sand more routinely.

4. Sand Replacement

A general guideline is to replace bunker sand every seven to ten years or so. However, this is a very expensive process, and sand replacement on this timeline is typically restricted to those golf courses with white sand that is much more difficult to maintain in good condition. At this facility, I have yet to see sand that appears to be contaminated enough to recommend wholesale replacement. However, it is recommended to confirm that observation with sand testing.

- On the golf courses with bunker sand of ten years or more in age, it is recommended to collect the top 2 inches of sand in two bunkers on each course and send for particle size distribution and bunker performance testing, which will include infiltration rate. Please send the test results to me and we can discuss. I would suggest sending to Sam Ferro at [Turf & Soil Diagnostics](#).

5. Addressing Steep Bunker Lips

Unfortunately, there is no easy and inexpensive way to significantly lower the lips of the deep bunkers.

- A significant change would require regrading the bunkers and bunker surrounds to tie in the grade with the greens and surrounding terrain. If this is the goal, then I would recommend reaching out to Landscapes Unlimited who will be on site next year for the Quail Run renovation to inquire about the cost to regrade up to five to ten bunkers. The selection of which bunkers to modify would be left to club leadership.
- Another option is to raise the floors of the deepest bunkers by adding sand. However, the opposite lip of the bunker is typically only 3 to 5 inches high and therefore there is limited amount of sand depth that can be added. You do not want a scenario where the sand depth is higher than the lowest area of the grass lip. I believe you can likely add 3 to 5 inches of sand to the bunker floors, depending on the elevation of the grass lips. While this would not solve the deep bunker problem, it would help and will be the least expensive strategy.



This greenside bunker on No. 8 North is a good example of the steep bunker lips that are a source of frustration and complaints among the membership.

Equipment Service Life

Observations

1. Frequent Repairs

The team at the RCSC have a history of maintaining equipment with frequent repairs to extend the life of the equipment. While the equipment management team should be praised for their efforts, this type of strategy is not ideal for golf course maintenance. Most clubs will lease equipment for three to five years.

- The primary reason for leasing is to reduce capital expenditures and to continually provide the maintenance team with reliable equipment that not only optimizes the efficiency of the golf course maintenance operation, but also allows the equipment management team to focus on maintaining the equipment at optimal levels with sharp reels and bedknives and little time spent on repairs.
- The alternative, which is to purchase equipment and maintain and repair the equipment until it is on its last leg, has negative consequences. Aging equipment is unreliable. When equipment fails, the loss in productivity of the maintenance team is significant. When equipment fails in the morning when the staff must complete tasks ahead of golfers, some tasks are not completed. Furthermore, the equipment management team is faced with repairing equipment rather than focusing their attention on maintaining sharp reels and bedknives which are critical to maintaining a quality playing surface. Finally, the aged equipment is of no value and cannot be sold, thus the team must pay to haul off the equipment as scrap metal.

Recommendations

1. Equipment Replacement Timeline

A good recommendation is to consider replacing equipment when it has reached 3,000 to 3,500 hours of use. In Arizona where equipment is used year-round, this typically means replacing equipment after four to five years. While you may be able to extend the life of transportation equipment beyond this guideline, it is recommended to stick to this guideline for mowing equipment and other utility equipment that leaves the maintenance facility every day or at least multiple times per week.

Labor

Observations and Recommendations

1. Limited Resources

The golf courses under the RCSC umbrella are maintained with limited labor resources. At the Willowbrook/Willowcreek facility, Mr. Manning noted that there are 17-full time equivalent employees for 36 holes. This is only 8.5 full time equivalents per 18 holes, and there is a very large amount of turfgrass acreage and desert landscaping over those 36 holes. In my travels, I see a wide spectrum of budgets for golf course maintenance.

- I visit courses with very low maintenance budgets and Top 100 golf courses with very high maintenance budgets. The range of full-time equivalent employees for an 18-hole golf course typically ranges from as low as five to as high as 35 to 40.
- Municipal golf courses, who are typically near the low end of the budget range, typically employ 8 to 12 full-time equivalents per 18-hole golf course. Clearly, the staffing levels at your facilities are near or at the bottom of this range.

2. Additional Staff

It was good to hear of plans to add one full-time equivalent per 18-hole golf course. For these facilities, it would be great to get to a point where you were able to employ 11 to 12 full-time equivalents per 18-hole regulation golf course and seven to nine full-time equivalents for the shorter executive golf courses.

Bermudagrass Transition

Observations and Recommendations

1. Current Conditions

On the whole, bermudagrass is recovering well in overseeded areas on all golf courses. However, there are localized areas where the overseeded ryegrass has thinned and the bermudagrass has yet to fill in. These areas are more prominent in the green surrounds.

2. Strategies to Favor Bermudagrass

It is critical for every golf course in the Desert Southwest where overseeding is practiced to employ practices to slowly shift the competitive advantage from the ryegrass to the understory bermudagrass. We discussed many of these practices in the USGA report from 2023. In this report, I would like to reemphasize the importance of lowering the mowing height, increasing irrigation and fertility, and utilizing Sapphire® to optimize the success of the transition process. Please see the comments below.

- **Mowing height.** It is critical, especially in the green surrounds, to slowly lower the mowing height to encourage more sunlight exposure to the understory bermudagrass. Mowing height can be maintained over 1 inch from overseeding through the end of February but after that, mowing height needs to be reduced. Ultimately, the green surrounds should be mowed at 5/8 inch by the end of April.
- **Irrigation.** Irrigation must be increased starting in mid-April and continuing until the bermudagrass has fully recovered. This typically means irrigating at 100% to 110% of evapotranspiration during this time frame.
- **Fertility.** Nitrogen must be increased in all overseeded areas beginning in late April and continuing until bermudagrass recovery is achieved. Ideally, the bermudagrass is fully recovered by mid-to-late June.
- **Sapphire.** It is recommended to modify the Sapphire program in the spring of 2025. Begin in the last week of February or early March with a rate of 3 to 4 ounces per acre and spray three times at that rate at 14- to 21-day intervals. Next, increase the rate to 6 to 8 ounces per acre. If there is considerable annual bluegrass in overseed areas, it is recommended in early June to spray Kerb® at 30 ounces per acre to remove any remaining ryegrass and kill annual bluegrass.

Overseeding Green Surrounds

Observations

1. Increased Area

It was great to see the increased area with overseeding perennial ryegrass in green surrounds this past year. The comments from the golfers joining us on the day of the visit offered overwhelming praise of the improvements in aesthetics and playability.

2. Increased Recovery Risk

While the expansion of the overseeded areas in green surrounds was good for aesthetics and playability, it does increase the risk of poor bermudagrass recovery during the early summer months. We saw some of this weak turf in a few localized areas of bare ground in green surrounds in mid-May.

Recommendations

1. Continued Expansion

We discussed continuing to expand the overseed area around greens for the fall of this year. A good guideline is to overseed from the cart path extending to the green and around the green surround in areas where there are significant slopes and extend the overseed line down to the flat area. Another option is to extend to the first set of sprinklers outside of the greens.

2. Increased Transition Practices

With the extended overseed area in green surrounds, it is critical to employ the necessary steps to slowly reduce the competitive advantage of the ryegrass and shift the advantage to the understory bermudagrass without disrupting aesthetics and playability. It is also critical to include the recommendations on the Sapphire program mentioned above in the bermudagrass transition recommendations.

Course-Specific Topics

South Golf Course

Observations

1. Number 9 Green

There was solid, healthy turf with a healthy mixture of bermudagrass in overseeded grass on No. 9 South green. The firmness was measured at 0.478, which is soft and receptive. The greens were watered the night prior to our visit. Green speed was 7'11". Shear strength was measured at 40 to 45 Nm, higher than any green I have ever measured. This extremely high shear strength means no turf tearing upon golf ball impact; however, with the softness of greens, the ball marks will be deep.

2. No. 8 Greenside Bunker

In the greenside bunker on No. 8 South, bunker sand was measured at 6 inches with firmness average of 0.637, which is ideal.

3. Annual Bluegrass

We observed a very high annual bluegrass population in the nonoverseeded roughs.

4. Renovation Plans

It was reported renovation on the South Golf Course will begin in 2026 to replace irrigation and upgrade the fairway turf to TifTuf bermudagrass.

Recommendations

The primary recommendations for the South Golf Course are to increase the intensity of organic matter management in greens, continue to routinely check sand depths in bunkers, and to initiate a more intensive weed control program in the nonoverseeded roughs.

Quail Run Golf Course

Observations

1. Antiquated Irrigation System

By far the biggest problem on the Quail Run Golf Course is the antiquated irrigation system. We observed multiple areas during our visit with leaks, saturated conditions, and even surface water. It was great to hear that irrigation replacement is planned for next year.

2. Renovation Plans

Plans are to replace tees, fairways and green surrounds with TifTuf bermudagrass in 2025. This is an excellent strategy and one that is rapidly gaining popularity in the Desert Southwest. Plans are also to convert the greens to MiniVerde bermudagrass. This will be the first golf course in the RCSC family to grow an ultradwarf bermudagrass. There are also plans for turf reduction, and primarily the focus will be around tees, converting to desert landscape around teeing grounds. The renovation will also include rebuilding the bunkers. Finally, the renovation will include expanding the storage capacity of the irrigation lake, making it deeper.

Recommendations

1. Putting Green Construction

It is recommended to increase the organic matter content in the rootzone to be installed in the putting greens compared to what has been done historically. I will be happy to work with you to select the appropriate amount of organic matter to add to the sand. The ultimate goal is to install a material that will provide an excellent growing medium for the bermudagrass and yet still offer adequate drainage.

2. Nonoverseeded Golf Course

I would strongly recommend the course leadership consider eliminating overseeding on the Quail Run Golf Course other than perhaps heavily played par-3 tees. Eliminating overseeding would reduce costs and provide better playing conditions for more days out of the year compared to an overseeded golf course. Additionally, the golf course could be open in October and November, and conditions will be far better than on an overseeded golf course.

3. Putting Green Firmness

It is recommended to plan to conduct frequent small-diameter venting practices every three to four weeks once the greens are open for play to mitigate putting green firmness. The greens will be firm for the first 16 to 24 months, and we have ample data to support that the venting operations help to improve receptiveness.

4. No Bunker Liner Consideration

If the bunkers are designed to be relatively flat, there will be no need to incur the expense of a bunker liner. Drainage would be cut into the native soil with no gravel over the drain lines. The drain lines and the entire bunker cavity can be filled with bunker sand. It would be recommended to plan on maintaining 9 to 10 inches of sand in the bunkers. If the plan is to install slope on the bunker faces, you may consider installing a liner only on the faces and leaving the floors without a liner. I will be happy to discuss these options in greater detail as you move closer to the project.

North Golf Course

Observations

1. Fairway Conversion to TifTuf

It was great to see the successful conversion to TifTuf bermudagrass on the front nine of the North Golf Course.

- The team deployed an extensive process to try and eradicate as much of the common bermudagrass as possible. Despite those efforts, a percentage of common bermudagrass returned to compete with the TifTuf. It is likely that the TifTuf now comprises 70% to 80% of the fairways and perhaps, over time, that percentage will increase.
- In mid-May, there was excellent turfgrass cover, and the health of the TifTuf is excellent. Furthermore, it's clear that the new bermudagrass offers a superior playing surface compared to the other golf courses. There were some comments about golfers avoiding this golf course in the winter months due to very tight lies. This is partially due to the turf being immature as it only turns one year old this summer. You can expect the density and playing surface to improve this summer and into the fall of this year.

This TifTuf bermudagrass on the front nine on the North Course is in great condition and can be expected to perform better this fall/winter as it has matured.



2. Number 1 Green

We observed some surface algae on No. 1 green. There was an area of thin turf, primarily where people enter and exit the green. Further inspection in this area revealed the bermudagrass is healthy and the thinning was due to the more rapid decline of the overseeded turf. This is likely a result of the concentrated traffic and perhaps this is a drier area within the green. The shear strength in this area within turf was 17 Nm, and the rest of the green values ranged from 20 to 22 Nm.

3. Steep Bunkers

The North Golf Course received the most concerning comments about the deep and steep bunkers, with many players indicating they are unable to hit recovery shots from the bunkers.

Recommendations

1. No Overseed on TifTuf Bermudagrass

It is recommended to not overseed the TifTuf bermudagrass. Conditions can be expected to be better this winter with a more mature turfgrass stand. It will be important to follow the recommendations below to provide the best playing surface possible on the nonoverseeded TifTuf.

- **Herbicides.** Use the full arsenal of preemergence and postemergence herbicides to provide a weed-free surface this winter.
- **Nitrogen.** Plan to apply 2 to 3 pounds of nitrogen per 1,000 square feet from mid-September through the first or second week of November. This nitrogen will increase color retention and growth into the fall and expedite spring green-up.
- **Pigments.** Begin spraying pigments in September or October and apply a few paint applications in the winter as needed. Resume pigment applications in the spring.
- **Mowing heights.** Raise mowing heights in the fall while the bermudagrass is still growing. It is recommended to raise the height to 0.650 to 0.750 inches.

2. Bunkers

We discussed, in the short term, adding 3 to 4 inches of sand to raise the floors of the bunkers that receive the greatest number of complaints. We also discussed meeting with the contractor to explore the appropriate timing and the costs that would be associated with regrading five to ten bunkers with the ultimate goal to lower the elevation of the bunker lips.

Lakes West Golf Course

Observations

1. Putting Greens

Turfgrass density on Lakes West greens was excellent, and the greens had been dried down on the day of our visit. As a result, these greens were the firmest of all. The average firmness was 0.370 inches, which is significantly firmer than all other greens we tested. On the overall firmness scale, these greens would be categorized as moderately firm. As a reminder, a value of 0.300 inches is considered very firm. There is a very significant difference between 0.300 and 0.370.

2. Tees

We were able to evaluate turfgrass health on No. 2 tee which was upgraded to TifTuf bermudagrass and is now about two years old. I'm happy to report that the bermudagrass is performing very well on this tee and has established a healthy rhizome base. All the par-3 tees were upgraded to TifTuf two years ago, and all other tees including the driving range tee were sodded to TifTuf bermudagrass last year. The tees have not been overseeded.

Recommendations

1. Putting Green Irrigation

Continue with your program to water the greens about every other night. It was great to see the surface of these greens allowed to dry down between the irrigation events, and, not surprisingly, there was no indication of algae on the surface.

2. Green Speed/Mowing Height

The green speed was significantly faster on the Lakes West greens. If the goal is to achieve more consistency among the regulation courses, then it would be recommended to raise the mowing height on this golf course by approximately 0.015 inches.

3. Nonoverseeded Tees

In general, golf courses that have upgraded to TifTuf bermudagrass do not overseed the par-4 and par-5 tees. Typically, the par-3 tees are overseeded due to heavy divoting on these tees. However, the comments were positive about the condition of the par-3 tees that have not been overseeded. If this is the case, then I would recommend continuing with not overseeding the tees.

Lakes East Golf Course

Observations

1. Number 9 Green

On green No. 9 Lakes East, the prism gauge revealed the height of cut is approximately 0.150 inches, significantly higher than found on Lakes West. This is by design. Green speed was measured at 7'10", which is in line with expectations for the par-3 golf courses. The surface strength averaged 25 Nm, again indicating very strong surfaces. Putting green firmness was measured at 0.434 inches, what we found on most of the other golf courses. This reading is categorized as a receptive surface.

2. Bunkers

Due to time restraints, we did not evaluate a bunker on the Lakes East Golf Course.

Recommendations

1. Quality of Cut

There is no need to change the height of cut on the Lakes East greens. However, there may be an opportunity to improve the quality of cut and eliminate some of the uncut leaf blades. I would recommend continuing to brush and groom to stand up leaf blades. You may consider from time to time lowering the height of cut by 0.020 inches and double cutting to clean up the surface and quickly raise the mowers back up to a higher height of cut. This may help to provide a smoother ball roll.

Riverview Golf Course

Observations

1. Number 10 Green

We arrived at the Riverview Golf Course at about 1:45 in the afternoon. On No. 10 green, we observed localized areas with surface algae. The field height of cut as measured through the prism gauge was approximately 0.120 inches, and green speed was just over 8 feet. Surface firmness was measured at 0.418 inches. These values are in line with the other regulation golf courses. The bench setting of the mowers on this golf course was reported to be 0.140 inches, while the field height of cut as measured through the prism gauge was 0.120 inches. This is a good example where the field height of cut is significantly lower than the bench setting. Shear strength readings were similarly strong as the other golf courses with an average value of 22 Nm.

2. Number 10 Greenside Bunker

We evaluated the sand depth and firmness in the greenside bunker on No. 10 Riverview. We found sand depth varied from 4 to 6 inches in the floor and up to 8 inches on the bunker face. The firmness in the bunker ranged from a fairly firm value of 0.52 to a more desirable value of 0.75 in areas with greater sand depth.

3. Number 10 Green Surround

The green surround turf on No. 10 is an area we have spent time on during previous visits due to the inconsistent turfgrass coverage. It was good to see the turfgrass coverage has improved; however, there are still a few localized areas with thin turf or bare ground.

Recommendations

1. Site-Specific Watering

There are areas with compacted soil around greens in which it is very difficult to wet the soil with the large overhead sprinklers. As such, we discussed utilizing small portable sprinklers to thoroughly wet the soil profile in areas as needed. Due to the windy conditions, you may consider equipping these small sprinklers with low-precipitation-rate, high-droplet nozzles. You will find that it will take several hours to adequately wet the soil profile.

2. Mitigating Algae

We discussed using Mancozeb and Daconil® Ultrex on greens, making three to four applications over the next two months. We also discussed the importance of sand topdressing and, if labor allows, applying sand weekly to fill in the small voids to cover up the surface algae. The sand will also encourage the bermudagrass to fill in. Finally, we discussed venting the greens with small-diameter solid tines once the machines are available.

3. Bunker Sand Depths

We discussed monitoring sand depth in bunkers. On No. 10, we discussed pulling sand off of the face with the goal to achieve only 2 to 3 inches of sand and increasing the depth on the bunker floor to reach a range from 7 to 9 inches or more.

Willowcreek Golf Course

Observations

1. Putting Greens

We did not arrive to Willowcreek Golf Course until almost 3:00 in the afternoon. With heavy play volume in the morning, it was not surprising to see slightly lower speed this late in the day on these greens. Green speed was measured at 7'9". Firmness was measured at 0.415 inches, consistent with the other golf courses. The field height of cut was measured at approximately 0.180 inches, which is higher than the other golf courses, but we must consider the greens had a full day of growth compared to readings on the other golf courses. It was interesting to see the shear strength was significantly lower on these greens, ranging from 13 to 17 Nm. Upon further inspection, I believe there is a higher concentration of organic matter in the top inch of these greens, and even that 3:30 in the afternoon, water could be squeezed from the top inch. This is a good indication that organic matter is high and with frequent watering, the surface remains chronically wet. I believe this is why we observed lower shear strength values.

2. Number 18 Bunker

We collected sand depth values and firmness readings in the greenside bunker on No. 18. Sand depth ranged from only about 1 inch up to about 7 inches on the floor of the bunker. The firmness aligned with the variable sand depth, with very firm values observed in thin areas at 0.400 inches. Where we found 7 inches of sand, the firmness was very good at about 0.700 inches. We also discussed the potential level of sand contamination. I collected numerous profiles in the No. 18 bunker. I did not see any significant layering, nor did I see any indication that the sand has been contaminated with a significant amount of fine sand, silt and clay. However, we did observe gravel in the bunkers, which we found at other courses as well.

Recommendations

1. Putting Greens

Especially for the Willowcreek greens, I would recommend three or even four passes over the greens with the aeration event. It is critical to open the greens to facilitate as much sand incorporation as possible to dilute the surface organic matter.

2. Lower Mowing Height

I would recommend lowering the mowing height on the Willowcreek greens to achieve a lower field height of cut. As stated earlier in this report, I believe a good field height of cut for these golf courses will be somewhere in the range of 0.110 to 0.125 inches. I believe this will yield more green speed consistency and better ball roll.

Closing Comments

It was great to have the opportunity to spend the day with the golf course staff, leadership and board members at the Recreation Centers at Sun City. The board has made a significant investment in the golf courses to work towards a goal of lowering water use and moving into compliance with the Arizona Department of Water Resources Fifth Management Plan which goes into effect January 1, 2025. I'm optimistic that the conversion to TifTuf bermudagrass and eliminating overseeding will allow you to reduce water use without having to remove a significant amount of turf. I look forward to continuing these discussions and continuing to collect data on the potential for water savings in areas where you have converted to TifTuf bermudagrass. Thank you for your continued support of the USGA Green Section.

Respectfully submitted,



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USGA Green Section

Distribution:

Brian Duthu, Golf Senior Leader

Additional Considerations

USGA Green Section Record

If you would like to receive the USGA's electronic publication, the *Green Section Record*, [click here](#). It is free, informative, and sent directly to you via email every two weeks.

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As a not-for-profit agency that is free from commercial connections, the USGA Course Consulting Service is dedicated to providing impartial, expert guidance on decisions that can affect the playing quality, operational efficiency and sustainability of your course.

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