



COURSE CONSULTING SERVICE

Onsite Visit Report

Recreation Centers at Sun City Sun City, Arizona

Visit Date: September 4, 2019

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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 Recreation Centers at Sun City (RCSC) to conduct a Course Consulting Service visit on behalf of the USGA Green Section. The following report summarizes the discussions during the course tour the morning of September 4, 2019. Probably the most critical issue facing the golf courses at RCSC over the next decade will be water availability. With the Arizona Department of Water Resources ready to impose greater restrictions on groundwater use, there will be a much greater emphasis placed on the need for turf reduction in order to meet the new water allotment. Additional items of focus included weed control on all the golf courses, continuing to upgrade infrastructure such as the turf care facility on Lakes East and West, and suggestions and recommendations to improve the surface quality of the putting greens during the summer months following aeration. A brief summary of the topics discussed during this course tour is included below:

- **Water reductions.** The Arizona Department of Water Resources plans to impose further restrictions on water use for golf courses by reducing the annual water allotment from 4.9 acre-feet per acre to 4.6 acre-feet per acre. These restrictions will likely be imposed within the next six months. Although costly, turf reduction will be the best tool for RCSC to reduce water use without sacrificing turf quality down the middle of the golf course.
- **Putting greens.** The putting greens were in excellent health on the day of the course tour; however, there is room for improvement regarding surface quality and ball roll conditions.
- **Weed control.** Like many courses in the Phoenix Metropolitan area, goosegrass and purple nutsedge populations have increased over the past few years. A comprehensive preemergence herbicide program and postemergence for purple nutsedge will be essential to reduce weed populations over the next few years.
- **Bermudagrass transition.** The bermudagrass recovery from overseeding has generally been inferior to previous years at courses in the Phoenix Metropolitan area due to a combination of mild May and June temperatures and a lack of humidity to help the bermudagrass recover in July and August. The RCSC courses have fared better than most, but there were areas of thin bermudagrass cover.
- **Bunkers.** It was excellent to see the bunker renovation work on the South Golf Course was completed this year. There are plans to renovate bunkers on the Lakes West Golf Course next year.
- **Roughs.** In general, the non-overseeded bermudagrass roughs are healthy, and it is clear the golf courses have difficulty keeping up with mowing during July and August when the bermudagrass is growing aggressively. This results in rough that is too high for general play and slows down pace of play.
- **Lakes.** With increased restrictions on water use forthcoming, it will be wise to investigate all methods to reduce water use, including reducing surface lakes. There are six lakes on the Lakes West Golf Course that are not functional and could be considered for removal or reduction.

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Increased State Water Restrictions

Observations

1. Arizona Department of Water Resources Fourth Management Plan

The Arizona Department of Water Resources recently announced that the fourth management plan will soon go into effect and will require golf courses in the five active management areas to reduce water use. The Phoenix AMA will be required to reduce water use from 4.9 acre-feet per acre to 4.6 acre-feet per acre on an annual basis.

2. Arizona Department of Water Resources Fifth Management Plan

Comments from Arizona Department of Water Resources representatives indicate that further water restrictions will be imposed in the fifth management plan, which may go into effect within the next two years. There is potential in this plan for significant water use reductions and a requirement for golf courses to only irrigate a maximum acreage such as 80 or 90 acres of turf, or they may decide to limit the total water allotment per golf course. Although it is not clear what the water restrictions will be at the moment, it is clear that the Department is mandated to reduce groundwater usage and will require the golf industry to play a role in helping to achieve this mandated goal.

Recommendations

1. Turf Reduction

The best long-term method to reduce overall water use for golf courses has proven to be turf reduction. Golf courses such as the South and North courses have well over 100 acres of irrigated turf and therefore, ample opportunity to reduce turf and reduce water use.

- There is already a plan in place for turf reduction on the South Golf Course, and it is recommended to expedite this plan along with modifying the irrigation system and pump station all in one project as soon as funds are available.

2. Water Acreage Reduction

There are six lakes on the Lakes West Golf Course that are non-functional and could potentially be entirely removed, or the surface water acreage reduced.

- The evaporation from lakes is estimated between 6 to 7 acre-feet of water per acre annually. By comparison, overseeded turf requires approximately 5 acre feet. Furthermore, these lakes are unlined and lose additional water to seepage.
- It is recommended to meet with golf course architect Gary Brawley to discuss ideas for reducing the surface acreage on the Lakes West Golf Course.

3. Overseed Reduction

The other strategy golf courses can use to easily reduce annual water consumption is to reduce overseeded acreage. It is estimated that the overseeded turf requires 1 1/2 to 2 acre-feet of water per acre more than non-overseeded turf. Therefore, when the time comes to significantly reduce water use, a simple and cost-effective strategy will be to decrease the overseeded acreage on fairways and limit overseeded acreage around greens.

Putting Greens

Observations

1. Thatch and Organic Matter

We were able to collect soil samples on the South, North, Lakes East and West courses and the new practice putting green on the South course. It is great to report that thatch and organic matter levels are considered in the ideal range for all courses sampled. There is no indication of excess thatch and organic matter, and it was good to see the top 3/4 to 1 inch of the profiles is well diluted with sand.

This profile collected from a green on Lakes East Golf Course has a healthy thatch layer measured at approximately 5/8 inch. This layer is diluted with sand and does not hold excess moisture.



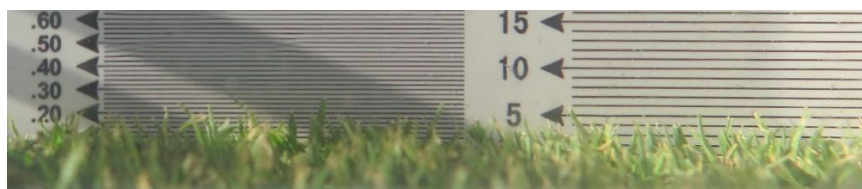
2. Soil Water Infiltration

There is clearly a difference in the ability of greens to move water through the soil profile between the newer greens such as on the North Golf Course and the new South Golf Course putting green when compared to the lakes East and West courses which have not been rebuilt since the early 1970s. However, despite this difference, the rooting depth in all samples was measured at 5 inches or more and, arguably, was most prolific in the older greens where there is a greater amount of moisture and nutrient retention. However, we did observe some anaerobic black layer in the No. 9 Lakes East greens. It is clear the deep tine aeration will be beneficial on these older greens especially, and this will be included in the recommendations section below.

3. Surface Quality

The surface quality of the greens, which is a subjective measure of the texture, smoothness and pace of ball roll, was fair on the day of the course tour.

- It appears much of the problem is related to the absence of qualified equipment managers. Consequently, the quality of cut on the mowers was not ideal, and this was evident in the surface quality of the greens.
- Height of cut readings as measured through the prism gauge ranged as high as 0.200 inch on the South greens to approximately 0.180 inch on the Lakes West greens, 0.140 inch on the Lakes East greens, and 0.130 inch on the North greens.



The prism gauge reading on the South Golf Course was measured at approximately 0.200 inch.



The Lakes West greens were cut slightly lower at approximately 0.180 inch.

- Although it should be expected for the greens to be mowed at a higher height of cut in the two to three weeks following the summer cultivation, once they are recovered, mowing height can be lowered to achieve a field height of cut of approximately 0.100 to 0.120 inch. Achieving this field height of cut will result in better surface texture and ultimately will provide better ball roll conditions.

4. No. 6 South Tree Removal

It was great to see that a large pine tree located immediately east of No. 6 South green has been removed. It was good to hear that the turf on this green has already shown a significant improvement with the greater amount of sunlight exposure.

Recommendations

1. Thatch and Organic Matter Management

Given the excellent conditions with regard to thatch and organic matter, there are only small modifications recommended to the current programs.

- First, it is recommended to use a deep solid tine aeration in conjunction with the summer cultivation every year on each golf course. It is recommended to use a large 3/4-inch diameter solid tine. It is recommended to supplement with a deep tine using a small diameter such as a 3/8- or 1/4-inch diameter tine on the older golf courses such as Lakes East and West four to five times per year if possible.
- Next, it is recommended to quantify the amount of sand applied during each topdressing event and during aeration throughout the year and establish a goal to apply 3,000 to 3,500 pounds of sand per 1,000 square feet annually.
- For routine topdressing events, we discussed using a less coarse sand such as the Pioneer triple-washed material or West Coast or The Source Sand & Gravel material, often referred to as the Premium Grade 1 sand. This sand will work its way into the turf canopy better than the coarse material, will have less impact on mowers, and will provide better ball roll conditions.

2. Improving Surface Conditions

Please consider the following strategies to improve surface conditions on the putting greens.

- First and foremost, it is imperative that the mowers leave the turf care facility each day with the reels and knives sharp enough to cut 20-pound paper across the entire width of the reel. Using a combination of reel and bedknife grinding and frequent backlapping is necessary to maintain sharp reels and bedknives on a daily basis. For more information on mower setup and the importance of sharp reels and bedknives, please review the USGA *Green Section Record* article [Managing Mower Setup to Achieve Quality Putting Surfaces](#).
- Once greens are healed from the summer aeration, progressively lower mowing heights to achieve a field height of cut using the prism gauge in the range of 0.100 to 0.120 inch. This height of will not impart undue stress to the turf and will result in improved ball roll conditions and pace.
- We also discussed the importance of frequent vertical mowing and light intensity grooming to cut aerial stolons and leaf blades growing horizontally along the surface. Ideally, vertical mowing will be conducted at least twice monthly and during the summer months, should be conducted on a weekly schedule. Grooming can be conducted three to six days per week in a non-aggressive fashion.
- Finally, we discussed using growth regulators to slow growth of the greens as well as improve turfgrass density and texture.
 - The growing degree day model developed by Dr. Bill Kreuser from University of Nebraska has revealed that trinexapac-ethyl should be sprayed every 200 growing degree days. In August at RCSC, this means Primo® would need to be applied about every five days at the 4-ounce-per-acre rate.
 - You may consider adding a new growth regulator to the trinexapac-ethyl to extend the time in between applications. With 5 to 8 ounces of Aneuw™ and 2 to 3 ounces of the trinexapac-ethyl, the growing degree day interval increases to approximately 280 growing degree days. In the heat of the summer, when there are approximately 30 to 40 growing degree days per day, this extends the spray interval to 8 to 10 days. It is critical to maintain the spray routine on this frequency to avoid the rebound effect where the turf growth rebounds when coming out of regulation and grows more than it would in absence of a growth regulator.

Weed Control

Observations

1. Increasing Weed Populations

Over the past few years, we have seen increased weed populations, especially crabgrass, goosegrass and purple nutsedge. Weed pressure has generally increased across the entire Phoenix Metropolitan area. At RCSC, the greatest weed populations are in green surrounds and putting green collars as well as adjacent to fairways and roughs.



Goosegrass has contaminated putting green collars and green surround areas.

2. Aggressive Control at Lakes West

It was great to see that the team at Lakes East and West has been aggressive with controlling purple nutsedge on the Lakes West Golf Course and although there are visible scars left from these applications, it is clear the chemical control is working well to reduce the purple nutsedge population.

The purplish-colored areas adjacent to greens on Lakes West have been treated with an herbicide to control purple nutsedge.



Recommendations

1. Crabgrass and Goosegrass Control

Crabgrass and goosegrass control should be based primarily on preemergence applications.

- In putting greens, collars, green surrounds and high-profile areas adjacent to fairways, use an application of a high-label rate of prodiamine in early to mid-February, followed by an application at the high-label rate of granular Ronstar® in early April. The combination of these two applications can be expected to provide greater than 90% level of control if applied appropriately and watered in.
- Postemergence control can supplement the preemergence applications using chemicals such as Revolver® and a combination of Pylex® plus SpeedZone® plus Sencor®.

2. Purple Nutsedge Control

The best time to control purple nutsedge is in the fall as this weed translocates its carbohydrates to the underground tubers.

- Begin immediately spraying Celero® herbicide as you have done on the Lakes West Golf Course and plan on two to three applications before the first frost, likely in November.
- It is also recommended to begin applications in the spring as you see the purple nutsedge emerge with a chemical such as Dismiss® or MSMA.

Bermudagrass Transition

Observations

1. Cool, Dry Year

Cool temperatures this spring encouraged ryegrass growth and delayed bermudagrass recovery from overseeding. Consequently, many courses experienced thin and bare areas once the ryegrass was removed. Furthermore, with the absence of rain and lower humidity levels this summer, these thin or bare areas failed to recover at the pace normally seen in previous years.

2. Bermudagrass Recovery

It is good to report that despite the difficult growing conditions this year, the golf courses at RCSC fared better than most with regard to bermudagrass recovery from overseeding. It was reported that the worst transition occurred on the North Golf Course, and some small scars could be seen in early September.

Recommendations

1. Encouraging Bermudagrass

There are no significant modifications recommended for the bermudagrass transition program. It is recommended to continue the use of intermediate ryegrass as a blend for overseeding and use mechanical means to discourage ryegrass in the late spring/early summer. Such practices include light intensity vertical mowing, slicing, solid tine aeration, utilizing low mowing heights, and perhaps more importantly, ensuring there is adequate soil moisture in all overseeded areas.

Bunkers

Observations

1. South Golf Course Bunker Renovation

It was great to see the bunker renovation was completed on the South Golf Course this year, with the installation of the Better Billy Bunker™ liner and new sand installed. The Better Billy Bunker method and new sand have been widely successful at RCSC over the past few years, and it was reported there are plans to renovate the bunkers on the Lakes West Golf Course next year.



Bunker renovation was completed on the South Golf Course in 2019, complete with a durable liner, drainage and new sand.

2. Bunker Detail

We did observe a lack of a defined bunker edge, encroaching bermudagrass and turf and leaf debris in some bunkers. This detracts from the visual quality of the bunkers, which golfer surveys report are key characteristics of the aesthetics of the golf course and contribute to the overall golfer experience.

Recommendations

1. Lakes West Bunker Renovation

For the upcoming renovation of the Lakes West Golf Course bunkers, you may consider modifying the design of the Better Billy Bunker installation and wrap the gravel into the groove where drainage pipe is located in the floor the bunkers. The white, ABS drainage pipe is placed immediately on top of the Better Billy Bunker liner and the entire void is filled with bunker sand. This design will result in drier sand on the bunker floors as it omits the issue with the perched water table. A figure depicting this design was included in the USGA Course Consulting Service report earlier this year in April 2019.

2. Bunker Detail

It is recommended to use chemicals such as trinexapac-ethyl, Plateau® or Finale® herbicides to reduce bermudagrass growth around bunker perimeters and therefore reduce the intensity of hand mowing and line trimming. Experiment with these products to become comfortable. The frequency will likely need to be every three to four weeks at minimum throughout the summer months to keep up with the aggressive growth.

Roughs

Observations

1. Playability

The biggest concern with the roughs during the summer months is aggressive growth which leads to increased heights in between mowing and leads to frustration for golfers who either cannot find their golf ball, or are unable to advance their golf ball due to the extreme penalty.

With such large acreage, it is unrealistic to keep pace with rough mowing. Consequently, playability and aesthetics suffer.



2. Rough Right of No. 4 North

We observed bare areas and turf thinning in the rough area to the right of the cart path on No. 4 North. Closer observation did not reveal any glaring issues with regard to growing healthy turf in this area. This is an area that receives a great deal of golf balls and will need to be addressed to establish turf in this area.



Aeration plugs harvested from No. 4 fairway on the North Golf Course can be used to establish turf in this bare area right of the fairway landing zone.

Recommendations

1. Keeping Pace with Mowing

During the summer months, the roughs will ideally be mowed 1 1/2 to 2 times per week. However, given the extensive acreage at golf courses such as the South and North courses, it is a huge labor crunch and a fuel drain to mow all this area. Therefore, it is recommended to experiment with Plateau herbicide at 2 to 4 ounces per acre and apply every four weeks from June through September to slow growth of the bermudagrass. While this may result in turf bronzing, it would save on mowing and the reduced height of cut will be a welcomed sight by golfers.

2. Thin or Bare Areas

In the thin, bare turf area right of No. 4 North, it is recommended to first audit the irrigation system in this area to ensure there is good irrigation coverage.

- Once this is addressed, use the Aera-vator in the thin areas and make four to five passes across the surface, which will be an aggressive and disruptive event.
- Use hollow tine core aeration in the adjacent fairway, harvest the cores and incorporate in the bare areas. Roll or wheel-track to work the plugs into the soil.
- Apply ammonium sulfate to expedite turf recovery and utilize the irrigation system as well as small, portable sprinklers to provide adequate water throughout the day.
- Ideally, this practice would be conducted in late May or early June to provide the entire summer for the bermudagrass to fill in.

Miscellaneous Topics

1. Pump Stations

It is recommended to evaluate the need to replace the pump stations on the North and South courses. It is reported that both stations are of similar age and are beginning to show signs of declining efficiency and more intensive maintenance to remain in operation. However, it would be wise to install a new pump station designed for a new irrigation system and significantly less turf on both golf courses. Ideally, these projects would be done at one time to reduce cost.

2. Turf Care Facility Upgrade

It is recommended to move forward as funds are available to replace the turf care facility on the Lakes East and West courses. It was reported that CCBG Architects, Inc. has an excellent relationship with RCSC and will be designing the new facility.

3. Forward Tees

It was great to see the addition of the yellow forward tees on the Lakes West Golf Course. These tees were designed in a square or rectangular fashion and of adequate size, with the anticipation of a significant increase in play from these tees. Congratulations to all parties involved.

This new yellow tee on the Lakes West Golf Course allows players with slower swing speeds the opportunity to reach this green in regulation.



Summary

Thank you for a productive morning of discussions regarding both short-term and long-range agronomic planning at RCSC with board members, course officials and golf course superintendents. In the short term, weed control and improving putting surface conditions should be given high priority. For the long-term health and sustainability of these facilities, the board must place a high priority on reducing overall water use, which begins with turf reduction on the South Golf Course.

Best wishes for the upcoming overseeding season. As always, please do not hesitate to contact my office should you have any further questions or concerns.

Respectfully submitted,



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About the USGA Course Consulting Service

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.

First started in 1953, the USGA Course Consulting Service permits individual facilities to reap the benefits of on-site visits by highly skilled USGA agronomists located in Green Section offices throughout the country.



For questions regarding this report or any other aspect of the USGA Course Consulting Service, please do not hesitate to contact our office.

