

United States Golf Association
Green Section, Northwest Region
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USGA Green Section Turf Advisory Service Visit



Lake Chelan Municipal Golf Course July 14, 2009

Present: Mr. Larry Bradley, Recreation Board Mr. Charles Sablan, Parks Director
Mr. Don Hensley, Golf Main. Supervisor Mr. Marcus Harness, USGA Intern
Mr. Jim Oscarson, Golf Pro/Manager Golf Course Advisory group
Mr. Jim Reidbolt, City Administrator (short visit)
Mr. Larry Gilhuly, USGA Green Section

This report focuses on several fundamental areas including playing conditions, agronomic programs, budgetary issues and other topics of interest. The intent of the following report is to provide unbiased information for the betterment of your golf course and players while keeping your budget in mind.



It was a pleasure to once again visit the Lake Chelan Municipal Golf Course on July 14, 2009 on behalf of the USGA Green Section. It had been 10 years since the last visit, thus this visit was primarily completed to address existing issues to provide a review of the maintenance operation to address budgetary concerns without compromising turf growth or playing conditions. Specific topics discussed included major topics including staff concerns, equipment and irrigation. In addition, other topics included greens, green surrounds, tees, fairways, roughs and trees topics. Should you have any further questions please do not hesitate contacting our office.

EXECUTIVE SUMMARY

This brief summary provides a non-explanatory list of recommendations that can be found within the main framework of this report in the same order as this summary.

- Staffing issues** - **The lack of an assistant superintendent is hurting the golf course.**
- Equipment** - **Contact Wells Fargo Golf & Turf for a free equipment analysis.**
- Irrigation system** - **Hire a qualified golf course irrigation designer to analyze system.**
- **Contact Mike Huck for assistance with your nozzles.**
- Greens** - **Excess organic material must be addressed more aggressively.**
- **Upgrade topdressing equipment to a spin topdressing unit.**
- **Add a self-contained roller to the operation/roll in target manner.**
- **Growth regulators – another program to assist with green speed.**
- **Reduce drill and fill to every other year program.**
- **Why do “volcanoes” exist near the holes? Players are the reason!**
- **Fairy rings are generally associated with too much organic.**
- Green surrounds** - **Begin treating most of the approaches like the greens.**
- **Organic removal is the key to improving turf growth/play areas.**
- **Lower mowing heights on collars and approaches.**
- **Use wetting agents on persistent dry areas.**
- **Soft sand – use the Fiskars rake/this technique with new sand.**
- **Do not spray herbicides with a hand sprayer!**
- Tees** - **Forward tees are needed for business reasons/more fun.**
- **Change seed percentages/follow this program on practice tee.**
- Fairways** - **Upgrade fairway aeration unit/add vertical mowing reels.**
- **Have operators slow down to reduce marselling.**
- **Premixing tank/proportioner/new sprayer – great cost savings.**
- **Increase “wow” factor with mowing patterns, not mow heights.**
- **Remove all 150-yard trees and all 50, 100 and 150 yard posts.**

- Roughs**
- Mower marselling with a rotary mower has never been seen.
 - Use vertical mowing to flatten wavy areas in roughs.
 - Operators must slow down to minimize this issue.
 - Future drought tolerant grasses may address bare areas.
- Trees**
- Remove trees or limbs causing irrigation rain shadows/No. 5.
 - Remove trees blocking stunning vistas near greens/tee – No. 10.
 - Remove tree in fairway on No. 14.
 - Remove tree near No. 10 tee.
 - Use Roundup around all trees to reduce string trimmer use.



Bad nozzles and trees further impact irrigation coverage causing poor turf coverage!

STAFFING ISSUE

Observations and recommendation. In the 10 years since the last visit to Lake Chelan one major change has occurred that holds the key to overall golf course improvement. Ten years ago Mr. Hensley was the golf course superintendent that spent all of his time taking care of the golf course. While my memory of the golf course is not as if it was viewed last year, there is no question that the golf course was in better overall condition a decade ago, despite the same irrigation system with even less coverage and control, as noted on the day of this visit.

The preceding observation is not meant in any way to imply that Mr. Hensley is totally responsible for the current condition of the golf course as many areas will be discussed where improvement is needed. However, the major difference between this visit and 10 years ago is a decade ago Mr. Hensley was the **golf course superintendent** and not spending half of his time also taking care of the parks without an assistant golf course superintendent to take his place when he is not on the premises. This essentially is the loss of nearly all supervision on the golf course and it showed with many fundamental problems noted including very poor irrigation practices on the front nine with

multiple areas not receiving enough water while the back nine was suffering from too much water on and near the greens. While a new irrigation system is a fundamental requirement, the cost is too high at this time, therefore the No. 1 priority for Lake Chelan at this time is the addition of an experienced assistant golf course superintendent that is ready to work on the golf course daily, understand the current irrigation system and be observant of what is and is not occurring with the greens, green surrounds, tees and fairways. The addition of this staff person should be completed by the end of this year and no later than next spring to help Mr. Hensley in a situation that is virtually impossible to address with ½ person at this time.



Irrigation heads need to be checked daily

EQUIPMENT

Observations and recommendation. The second most important improvement needed for the golf course will cost more than the addition of an assistant golf course superintendent, however the initial step will cost virtually nothing. The overall equipment inventory at Lake Chelan is very old with several gaping holes that need to be filled to address excess organic material on greens, approaches, tees and fairways. In addition, the ability to make the staff more efficient with equipment that will not break down due to old age is absolutely needed, thus it was highly recommended to contact Wells Fargo Golf & Turf for a free equipment analysis.

In the past three years Mr. Todd Gray, VP, Wells Fargo, Golf & Turf Division has given presentations at multiple USGA Green Section conferences with the same message – capital funding for equipment has dried up and most golf courses need to closely look at cash flow models to keep up-to-date with their equipment fleet. While his style of presentation is very strong, his message has proven to be correct for virtually every golf course visited during the past few years. As noted in his article “Fleeting Moments” that has been added to this report as a reprint, the old method of purchasing nearly the entire fleet does not make sense in today’s economic climate for the following reasons:

1. The cost of most equipment is staggeringly high.
2. The longevity of most equipment is staggeringly low.
3. The value of equipment after it has reached its’ useful life is virtually nothing.
4. The cost to keep equipment operational past its’ useful life is very high.
5. Golf courses at all levels and budgets are wasting thousands of dollars by following the old capital replacement model instead of focusing on a cash flow alternative.

Several golf courses in the Pacific Northwest including Michelbook, Charbonneau, Canterwood, The Home Course, Lake Padden Municipal GC, Bell Nob Municipal GC and The Stock Farm along with many others across the country have chosen to use this different way to

replace equipment by contacting Mr. Gray (toddgray@wellsfargo.com) or Mr. David Dunn (daviddunn@wellsfargo.com) to have a **free** analysis completed of the entire fleet. Once completed, you can then decide whether it fits for your operation or not. In these tough economic times the opportunity to have assistance at no cost with possible substantial savings on the other end while keeping your equipment fleet up-to-date was the second highest recommendation given during this visit after the need to add an assistant golf course superintendent.

IRRIGATION SYSTEM

Observations and recommendations. There is no question that the irrigation system at Lake Chelan is in need of complete upgrading as it is now well over 30 years old with woefully undersized main lines and laterals, poor control of water and poor coverage. In short, the system has outlived its' normal lifespan by many years and was fundamentally flawed since the time of original installation. However, improvement was noted on Nos. 12 and 13 where new irrigation was installed to make these two holes the best viewed on the golf course as noted in the right photo. With these two holes as a starting point, the following was recommended for the most expensive capital improvement needed for the golf course:



- **Hire a qualified golf course irrigation designer to analyze the irrigation system.** While hiring an assistant golf course superintendent and addressing your equipment fleet are extremely important, the current irrigation system (excluding Nos. 12 and 13) is not capable of coming close to the new stance by Golf Digest (finally!) on golf course conditioning with “firm and fast” being the goal for golf courses to reduce costs and inputs of water and fertilizer. The current system is not capable of putting water where it is needed, when it is needed and at the proper amount, however the cost of a new system is prohibitive at this time. What is not prohibitive, however is hiring a qualified golf course irrigation designer to come in and complete a thorough analysis of the irrigation system. While the entire irrigation system may not be addressed in the near future at least knowing precisely what is wrong with the irrigation system, and what should be addressed in chronological order can be determined.
- **Contact Mike Huck for assistance with your nozzles.** In addition to getting a review for the irrigation system there also appeared to be issues with the nozzles and proper coverage. In this regard you may wish to contact Mr. Mike Huck for information of specific nozzle improvements that may improve the current irrigation coverage without a major expense. Contact Mr. Huck at mhuck@cox.net for information that can help your situation in regard to the current nozzles.

GREENS

Observations. While the previous three topics represent major areas that can range in very high investment (irrigation system) to free (analysis of the equipment fleet), they are the major issues that need to be addressed for overall golf course improvement. However, the greens are the highest priority on every golf course with all of the three previously mentioned topics in some way impacting the current condition of the greens. Bottom line – the greens at Lake Chelan suffer from too much organic material leading to slightly softer and slower greens that are desired by many that play the golf course. While exceedingly fast speed is simply not needed on the greens, firmer surfaces with smoother ball roll is desired and achievable by adhering to the many recommendations that follow in the next section of this report.

Recommendations. Specific recommendations for the greens included the following:

- **Excess organic material must be addressed more aggressively.** There is no question that the amount of organic material in any green determines many factors for the greens with the most important being smoothness and firmness of the putting surfaces. For this reason, the standard programs of aeration and sand topdressing are generally completed twice annually (spring and fall) using larger tines to remove as much organic material as possible. The problem with this approach is most players do not like the disruption provided by aeration and all municipal golf courses suffer from less revenue during this necessary operation. In response to this issue, equipment manufacturers have made new aeration units (Toro Procore 648, for example) that provide greater versatility in the aeration operation at a faster speed with spacing that is much closer than was possible less than 10 years ago. This has resulted in many golf courses dropping down the size of their aeration tines to ½” at a spacing of 1.25” x 1.25” resulting in much faster recovery and more organic material removed when compared to standard 5/8” tines spaced at 2.5” x 2.5” with the type of aeration units currently at Lake Chelan. While the addition of a newer type of putting green aeration unit can occur in the future, the addition of “quad set” tines with much tighter spacing would be helpful for the greens in the spring and fall. You may also wish to add ¼” tine aeration at least 1-2 times during the growing season to provide further entry for sand without disturbing players in the late spring and early fall.



- **Upgrade topdressing equipment to a spin topdressing unit.** One of the key units needed to address surface smoothness is a more efficient way to apply light amounts of sand during the growing season. The drop-type spreader you currently have is good following spring and fall





aeration, however it only covers 6' per pass, cannot apply wet sand consistently and is too slow for your staff. Major improvements have been made in this area with spin spreaders now providing consistent coverage up to 25' with wet or dry sand. The addition of sand every 2-3 weeks during the growing season at a rate of 1/3 cu. yd./5,000 sq. ft. is one of the most common practices conducted at every golf course to assure smoother surfaces while minimizing the many negative impacts of excess organic material. The most common units viewed include the Dakota 410, Tycrop Propass 180 and Turfco SP1530. Demonstrate all of the units to determine which has the best spreading pattern and can be operated with your current utility vehicles. A bed mounted unit is highly recommended over a pull-type unit. Bottom line – this unit holds the key to addressing firmer greens as light and frequent topdressing is truly needed to improve smoothness and speed of the greens.

- **Add a self-contained roller to the operation/roll in target manner.**

One of the main topics discussed during this visit was the overall speed of the greens during the growing season. A significant amount of research has been conducted during the past decade in regard to putting green rolling, mowing heights and mowing frequency. Please note the chart to the right that shows two methods (double mowing (MF) and rolling (R)) that can provide the same green speed at a mowing height (MH) that is 0.030 higher than the

Ball Roll Distances Achieved with Mowing and Rolling Practices (2004-05): Clarke, Murphy

MH	MF	R	7.5-8.5	8.5-9.5	9.5-10.5	10.5-11.5	11.5-12.5	12.5+
0.110	14	+	1	0	3	18	10	1
0.125	14	+	1	0	9	19	4	0
0.141	14	+	1	1	19	12	0	0
0.110	14	-	1	0	5	17	8	2
0.125	14	-	1	1	12	19	0	0
0.141	14	-	1	5	19	8	0	0
0.110	7	+	2	1	22	8	0	0
0.125	7	+	1	4	24	4	0	0
0.141	7	+	2	9	21	1	0	0
0.110	7	-	1	8	20	4	0	0
0.125	7	-	1	16	15	2	0	0
0.141	7	-	4	22	7	0	0	0

all too common .110 mowing heights seen on many greens. This research was conducted at Rutgers University and offers ample proof that low mowing is not necessary to achieve green speeds in the 9' range which is ideally suited to your greens. In addition, slightly higher

mowing heights will improve the survival of creeping bentgrass over **Poa annua**, thus either of these techniques is superior to lower mowing heights. Finally, a sidewinder type roller such as the one shown in the right photo has proven to be the most popular type of unit used on golf courses due to its' lighter weight, lack of triplex tire marks and extended green speed capability. When combined with regular mowing practices, this offers a way to extend mower life spans while minimizing damage to the putting surfaces.



In addition to keeping the mowing heights slightly higher while following regular programs of light topdressing and vertical mowing, the idea of target rolling was recommended. Please note the enclosed reprint that discusses a program that is now successfully in use at the majority of golf courses in the Pacific Northwest.

- **Growth regulators – another program to assist with green speed.** Another inexpensive program (less than \$500) to assist in slightly increasing growing season green speed is the use of the growth regulators Primo and Proxy. Primo is available in a granular form from Anderson's (Governor) but is not used on greens. Proxy only comes in a liquid form and is very safe and effective in greatly reducing **Poa annua** seedheads during the spring. Golf course superintendents at every type of operation have found both of these growth regulators to be very important tools when addressing smoother and faster green speed requirements, especially later during the day well after morning mowing operations.
- **Reduce drill and fill to every other year program.** The addition of the "drill and fill" aeration program has helped the greens with water movement through the profile, however with the amount of thatch at the surface it was suggested to continue this deep aeration program on an every other year basis while taking the \$5000 for this operation and use it for extra sand for regular topdressing of the greens and approaches.
- **Why do "volcanoes" exist near the holes? Players are the reason!** While natural weather conditions and excess organic material are the main culprits in why the greens were soft on the day of this visit, do not forget that players feet are also a major reason for turf weakness and "volcanoes" as can be noted in the right photo. This photo was taken on a green prior to mowing with player footprints from the first foursome of the day. The footprints were then painted white via computer to show just how much foot traffic occurs around golf holes from one group! Add excess water near the surface and excess organic material and you can expect raised areas on greens in the Pacific Northwest as has been seen at many golf courses viewed over the years when regular sand topdressing is not completed.



- **Fairy rings are generally associated with too much organic.** Minor fairy ring issues were noted on some of the greens (No. 1 is shown in the right photo) with recent research suggested for reducing this issue. Enclosed with this report is an excellent reprint (Breaking the Curse) describing this pathogen in detail. The main portion of this research comes to the following conclusion:





Based on the results of this study, it is obvious that one preventive spring application will not stave off high fairy ring pressure throughout the summer. Our current recommendation for preventive fairy ring control on bentgrass greens in the Carolinas is to make two applications of triadimefon (Bayleton 50 DF or equivalent) at one oz./1000 sq. ft. on a 21- to 28- day interval, beginning in the spring when five-day average soil temperatures reach 55F. Higher rates of triadimefon can result in mild phytotoxicity on bentgrass greens, especially when associated with a freeze event shortly after application. For this reason, and the similar efficacy of high and low rates, we recommend the one oz./1000 sq. ft. rate.

Two articles of note in these recommendations are important. First, it is critical that these preventive applications are watered-in with one-quarter to one-eighth inch of water immediately after application to move the fungicide into the thatch and soil. Too little or too much irrigation will not deliver the fungicide to the target zone and waiting to irrigate may lead to foliar uptake of the fungicide rather than soil delivery. Second, we do not recommend tank mixing of Bayleton with soil surfactants for preventative applications at this time, as our trials have shown no significant benefit from this. Soil surfactants should be applied separately during this time of year to help manage soil moisture and prevent hydrophobia areas from developing.

GREEN SURROUNDS

Observations and recommendations. While the greens hold the highest priority position for the golf course maintenance operation, the green surrounds come in as the second highest priority due to the amount of shots that miss the target and the type of “touch” required for shots hit near the greens. With this as a background, the following was recommended for the green surrounds at Lake Chelan:

- **Begin treating most of the approaches like the greens.** In addition to this report, an enclosed report shows the difference between the greens and approaches in regard to overall firmness using the USGA TruFirm firmness testing device. Bottom line – the firmness of the approaches on those greens that are not severely elevated above the approaches should be as close to the same firmness as the greens to allow players to attempt “bump-and-run” shots. This will be especially important as the greens become firmer with more aeration and sand topdressing. For this reason, the 10-15 yard approach in front of the greens that are not severely sloped should be treated in the same manner as the greens with aeration twice annually using 5/8” tines with core removal and topdressing to fill the holes. Also, regular light topdressing of greens needs to also be completed on the approaches at the same time with an extra “cross-over” pass to provide more sand to these areas that are mowed at a higher height.
- **Organic removal is the key to improving turf growth and play areas.** While aeration and regular sand topdressing are key programs to be started on the approaches that are not too steep, the third program that will greatly improve water efficiency and firmness is regular vertical mowing using the vertical mowing reels on your triplex trim mower. Only two golf courses visited out of nearly 50 have had their approaches the same as the greens in regard to firmness with both vertical mowed twice annually to remove excess organic material near the surface.

- **Lower mowing heights on collars and approaches.** In addition to excess softness on the greens and approaches, the mowing heights that are currently used for the approaches and collars are too high for regular play. While lowering the mowing heights down at this time would cause too much stress on these playing areas, they should be lowered to no more than ½” starting next year with a triplex putting green mower to greatly improve the clip rate and smoothness. This mower would also be used on the tees to improve these important surfaces.

- **Use wetting agents on persistent dry areas.** During the visit Mr. Harness mentioned the use of wetting agents not only on the greens, but also on persistent dry areas that surround the greens. This would be a great benefit for Lake Chelan as another way to minimize the severe coverage issue with the irrigation system as noted in the photo to the right on No. 3 green. While the addition of wetting agents, hand watering, organic removal and aeration may not totally address the weaknesses of the irrigation system, they will at least improve the second highest priority area on the golf course – the green surrounds.



- **Soft sand – use the Fiskars rake and this technique with new sand.** As sand is added to the bunkers, it requires extensive packing due to the initial soft playing conditions new sand provides. One very good tip learned from Bob Fluter at Michelbook CC in Oregon, Sam Sprague at Rainier and confirmed at Canterwood is the use of the Fiskars plastic rake in new sand to minimize this issue. At the same time, when new sand is added to the bunkers it is best to take the sand from the bottoms of the bunkers and move it to the banks or thin areas while adding new sand to the bottoms to minimize fried-egg lies on slopes.



- **Do not spray herbicides with a hand sprayer!** Another observation noted around several greens was the over-application of a herbicide for the control of clover around the greens. Herbicides should always be applied with an exact amount with Confront providing outstanding control of clover when applied at the correct rate. This is another example where an assistant superintendent or someone with direct supervisory responsibilities would have possibly stopped this over-application.





TEES

Observations and recommendations. The tees at Lake Chelan are basically too small on many surfaces and in need of surface leveling due to crowning of the tees from regular use and divot filling. While overall renovation would certainly be helpful, there are far too many other areas that need to be addressed at this time to place the tees in a higher priority. With this in mind, the following was recommended for the tees at Lake Chelan:

- **Forward tees are needed for business reasons and more fun.** While it was not recommended to start on a complete tee renovation program, it does make sense to give serious consideration to adding more forward tees on at least half of the holes on the golf course, with No. 15 leading the way. With lady players generally having 75% the length of the average male, this hole would play a male equivalent distance of a staggering 506 yards as a par 4! At 5,500 yards the forward tees play an equivalent of 7,333 yards for the average male players. As a solid business decision to attract more players, allow seniors to play a more appropriate distance and speed play it would be helpful to add more forward tees.

At the same time it was recommended to change the color sequence to also provide playing options for your players. As an example, Glendale CC completed all 18 forward tees 5 years ago at a total cost of \$32,000 (in-house construction). The former red, white and blue tees were changed to gold, white, blue and black with the new forward tees at approximately 5,100 yards, the new (old red) white tees at 5,750 yards and the remaining back tees staying the same distance, only with different colors. The golf professional, green chairman, golf chairman (men and ladies), club president, general manager and golf course superintendent all reported that the entire membership has embraced this change since all four tees are course rated and slope rated for men and ladies from all 4 sets of markers. Nearly 100% of the ladies (and super seniors) have eagerly moved to the new forward tees (the removal of red (ladies) tees has been a major success) while virtually all of the senior players have moved to the new white markers that previously were the "ladies" tees. Scores have dropped (not handicaps), players are enjoying their golf course as never before and the speed of play has increased. This would be a similar great change for Lake Chelan and a smart business decision as you try to attract more members.

- **Change seed percentages/follow this program on practice tee.** Mr. Hensley mentioned that the seed used for divots is 80% Kentucky bluegrass and 20% perennial ryegrass. Based on results noted all over the eastern side of Washington and Oregon use the same seed but reverse the percentages to 80% perennial ryegrass and 20% Kentucky bluegrass. Also, please note the following program for use on your practice tee and those tees that may suffer from excess wear:
 - **Pre-germinate seed for faster establishment.** On the USGA web page there are two updates from the Southwest Region in January 2009 and the Northwest Region on May 2009 that relate to a faster way to establish seed on practice tees with seed priming. These updates are included with this report and have provided very good results at Monterey Peninsula CC and Eugene as can be noted.

- **Use this aeration technique to further improve grass survival.** Another good idea is detailed in the enclosed reprint that has worked with great success on the practice tee at Lake Padden Municipal GC. The combination of regular shallow aeration, overseeding, topdressing and fertilizer offers a unique way to enhance growth while protecting plant growing points as seed comes up from shallow aeration holes.
- **Slicer/seed on a regular basis.** The use of your slicer seeder set to a deep depth is still another way to protect seed and enhance germination. This technique has been used with great success at Manito CC using perennial ryegrass for over a decade and at Trysting Tree GC in Oregon using perennial ryegrass weekly on used areas.
- **Use Primo and increase fertilizer levels to enhance growth.** Many superintendents report that they believe divots recover faster when Primo is used with some convinced that Primo use on a heavily used practice tee is the answer for faster turf recovery. When combined with increased nitrogen fertilizer levels this combination would be very helpful for controlling excess clippings while directing plant energy into spreading the turf.

- **Supplemental irrigation will assure seedling survival.** While the addition of permanent supplemental irrigation is completed at many courses, a simple and effective idea was viewed at Wenatchee CC with an aboveground hose with smaller misting heads providing mid-day irrigation in front of players without causing disruption. Based on the results noted on their practice tee (right photo), this inexpensive approach is very effective and worthy of consideration.



FAIRWAYS

Observations and recommendations. As with the greens and approaches, the fairways also suffer from excess organic material, as noted in the right photo taken on No. 10 fairway. With close to two inches of nearly pure organic material the fairways will show even more difficulty with the irrigation system as once organic material becomes dry it can take the entire year to get these areas to accept water. With this in mind, the following was recommended for the fairways.



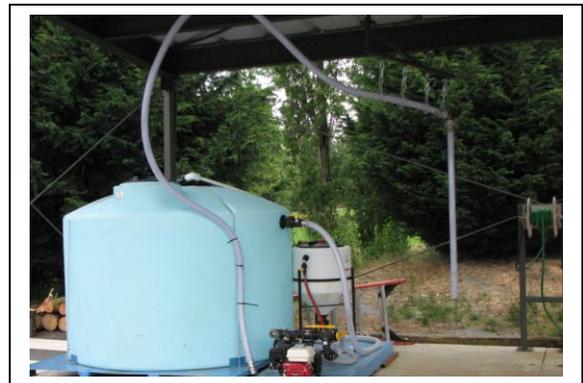
- **Upgrade fairway aeration unit and add vertical mowing reels.** The first thing that must be addressed for the fairways is the retiring of the “antique” aeration unit currently used for the

fairways as this unit is fast, yet does little to penetrate the thatch at the surface and barely brings any soil to mix into the organic material at the surface. As part of your updating of the equipment fleet, a fairway aeration unit that also can be used on the tees is highly recommended.



- **Have operators slow down to reduce mower marselling.** Wavy mowing patterns (marselling) was noted on the fairways and especially the roughs in many areas at Lake Chelan. While vertical mowing will take care of this issue, another key is to instruct the operators slow down when mowing to minimize the “bounce” of the mowing reels.

- **Premixing tank/proportioner/new sprayer – great cost savings.** There are numerous fertilizers available for use; however none are less expensive than granular elemental forms (ammonium sulphate, urea, iron sulphate, potassium sulfate, magnesium sulphate and other non-sulphate forms of nutrients). These can be mixed into a spray tank individually or for the most efficient manner, the addition of the large tank and proportioner shown to the right offers even greater speed when applying liquid materials. As mentioned, the addition of an 1100-1600 gal. holding tank and material proportioner have been viewed with outstanding results. Since elemental fertilizers are the least expensive form of adding plant nutrients, the combination of this tank and proportioner allows for very rapid mixing of elemental fertilizer prior to placement in the sprayer to eliminate major stumbling blocks of time required to apply fluid fertilizers.



Most importantly, the ability to further upgrade the mixing procedure will allow for the use of these lower priced materials (ag grade materials offer even more savings) to be used without the time it normally takes to apply liquids to fairways and larger turf areas when wind is not excessive. For more information concerning the holding tank and proportioner contact Mr. Mike Powers at A&L Supply at 503-910-0068 or email at mpowegolf@direcway.com. The cost savings could easily pay for the spray tank, proportioner and a new 300-gallon sprayer that should be added for this type of operation.

- **Increase “wow” factor with mowing patterns, not mowing heights.** Over the years the subject of “burning” lines has been discussed at virtually every golf course in visited. The negative of this program is the grain that is created, however only those with the lowest handicaps seem to complain or even notice this feature. On the positive side, the vast majority of golfers simply like the color green and truly prefer stripes on their fairways for definition and visual quality. For this reason it is now recommended to “burn” mowing lines on a weekly

basis with 2-3 weekly mowing in the exact same direction on the same dark/light mowing lines. When completed in 2-3 different directions the issue of grain is still addressed, however the distinct visual of the stripes stands out much better when the same lines are completed 2-3 times weekly. Note the photo to the right on bermudagrass in Okinawa (Banyan Tree GC) where the fairways are always mowed in this manner. No added cost, but great visual definition of the fairways!



- **Remove all 150-yard trees and all 50, 100 and 150 yard posts.** The original purpose of any tree placed 150 yards from the green was to **assist** players in their enjoyment of the game. They were never planted to be a **hazard** as has become the case on every golf course where these assistance aids are now being removed. At Lake Chelan you already have a 150-yard post in the middle of the fairway, thus all of the trees are simply not needed and waste labor as well as disrupt irrigation coverage. In addition to the removal of these trees, it was also recommended to remove both the 50 and 100 yard posts as there are also yardage markers in the middle of the fairways showing the same distance. All of the posts simply represent more labor that is being wasted every time they must be moved or maintained.

ROUGHS

Observations and recommendations. The roughs are the lowest priority on any golf course as they are the location that will provide inconsistent lies and more difficulty for shots hit off line. While roughs are generally not a primary focus on TAS visits, the issue with the roughs at Lake Chelan is different with marselling a major issue. On this and other topics the following was recommended:

- **Mower marselling with a rotary mower has never been seen.** When reel mowers are operated too fast and too much organic material is present near the surface, mowers can begin to “bounce” when operated at speeds that are too fast. However, this same concept has never been seen with a rotary mower in the rough and confirmed by every USGA agronomist on our staff as none has ever seen the issue noted in the right photo with a rotary mower.



- **Use vertical mowing to flatten wavy areas in roughs.** While mower marselling has never been seen with a rotary mower, this does not mean that it cannot be reduced or eliminated. Those that have this issue on collars, tees and fairways have used vertical mowing reels to take

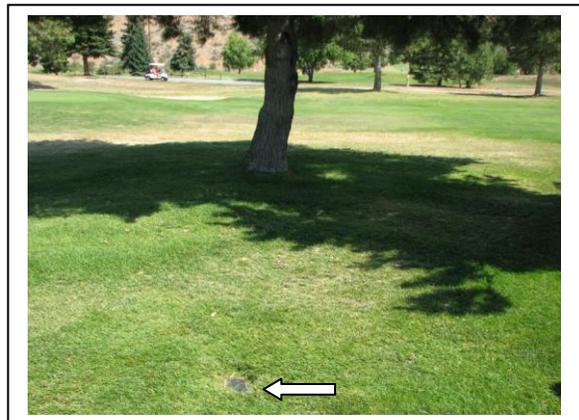
the higher portion of the turf down to the lower cut portion. Since you currently do not have vertical mowing reels for the fairway units, use the smaller triplex units to address the worst areas near play.

- **Operators must slow down to minimize this issue.** As mentioned for the fairways, operators must slow down their mowing speed to minimize marselling due to mower bounce. Also, it was good to view mowers mowing in the opposite direction on the day of this visit to further minimize this issue.
- **Future drought tolerant grasses may address bare areas.** Within 5 years a new very drought tolerant grass (Inland saltgrass) may be available that could answer your non-irrigated rough areas. With the ability to withstand Arizona summers and Colorado winters in may provide the perfect coverage for your currently bare soil areas in the near future.

TREES

Observations and recommendations. As a final topic to discuss that has a major impact on the visual quality of the golf course as well as the irrigation system, the trees at Lake Chelan need to be addressed. Specific recommendations for the trees included the following:

- **Remove trees or limbs causing irrigation rain shadows, such as to the left of No. 5.** A single pine tree to the left of No. 5 is the primary cause for the weak turf to the front of this green based on what was observed during the visit. Note the photo to the right where the irrigation head (note arrow) is directly in line with the trunk of the tree with lower hanging limbs also stopping irrigation distribution. Removal of this tree was recommended as it will also improve cart traffic flow. Bottom line – go through all of the roughs to determine which trees may be causing “rain



shadows” of stressed or dead turf for limb or complete tree removal. The photo at the bottom of the previous page shows two trees with shadows from the irrigation head and lack of water from the fairway heads as an example of the need for lower limb removal.

- **Remove trees blocking stunning vistas near greens and tees, such as No. 10.** Lake Chelan is arguably one of the most beautiful locations in the state with stunning views from your golf course, however these memorable views have been taken away from home building and the growth of trees. While you cannot address the homes, trees that are growing near primary green and tee vista areas should be looked at carefully for possible removal, such as No. 10 tee shown in the right photo.



- **Remove tree in fairway on No. 14.** A large pine to the left side of No. 14 can be removed as it serves the purpose of only penalizing shorter hitting players and will eventually block the entire view of the left side of the fairway. If you would not plant a tree in this location if it was not there in the first place, it is a good candidate for removal.



- **Remove the tree near No. 10 tee.** Another tree that is only in the way of poorer players that hit shots from left to right (the majority of players) is to the left of the forward tee on No. 10. This tree also distracts the natural dogleg nature of this unique hole.



- **Remove and then add trees to the left of No. 15.** Three very weak trees are on the left side of No. 15 that should be removed with at least 3-5 added to offer a buffer between Nos. 15 and 16.. Do not plant trees in a row and use those trees that are indigenous to the area, if possible.

- **Use Roundup around all trees to reduce string trimmer use.** As a final way to save or transfer labor the use of Roundup around all of the trees no more than 18-24” was recommended on a regular basis to eliminate all hand labor and potential damage to trees from string trimmers.



Thank you for the opportunity to discuss your golf course maintenance operation, budgetary issues and playing conditions as part of our USGA Green Section Turf Advisory Service visit. Your use of our service is especially appreciated in these difficult economic times and it is hoped that the preceding recommendations will assist in this regard. In addition to this visit and report, please do not hesitate contacting our office at any time during the year with further questions to take full advantage of our service. Again, your support of the USGA Green Section is appreciated and I look forward to being of service on an annual basis for the betterment of your golf course and players.

Respectfully submitted;

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USGA Green Section

Distribution:

- O:** Mr. Don Hensley, Park/Golf Maintenance Supervisor
- cc:** Mr. Charles Sablan, Parks Director
- cc:** Mr. Jim Oscarson, Golf Professional/Manager
- cc:** Mr. Jim Reidbott, City Administrator

Reprints:

- Dollars and Sense: Making It in a Tough Economy
- Fleeting Moments
- USGA TruFirm results and analysis
- Affirming Firmness
- Green Speed – Trick or Treat?
- Breaking the Curse
- A Method for Pre-germinating Ryegrass Seed for Divots
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