

Low-Hanging Fruit

Looking for a way to take the aesthetics and playability of your course up a notch but have a limited budget? Begin with grabbing low-hanging fruit by “fixing” mowing contours on putting greens.

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Paint has been used to mark the original putting surface contours. As one can see, intricate mowing contours were lost over time and greens can become smaller and more rounded. Sometimes greens shrink to nearly half their original size.

Just about all of us want to improve our golf courses. Remaining static or, worse yet, going backward while other courses are upgrading their facilities can be detrimental to business in a competitive industry.

Course improvements come in a variety of shapes and sizes. Upgrading agronomic programs to provide better turf and improved playing conditions is a very sound approach. Many golf facilities develop master plans and subsequently implement extensive course renovation projects. However, spending a lot of money on course upgrades does not guarantee success. Further, poorly conceived master plans can have detrimental effects on play-

ability, the maintenance budget, or both. Even the best course improvements will be met with failure if basic agronomic programs are ignored.

The difference in course improvement programs is partially a reflection of the diverse financial health of golf facilities. Some have the resources to implement expensive, ambitious improvement programs and upgrade maintenance programs, whereas others struggle to find ways of keeping the doors open and meeting daily expenses.

What would you say if I told you of a program that could have a significant and very positive effect on playability at most golf courses and can usually

be accomplished without tremendous expense? It probably sounds too good to be true, but the fact is many golf facilities can make major improvements in playability by “fixing” mowing contours. In some cases, fixing mowing contours can also improve turf performance and aesthetics, and the program need not be expensive. A relatively easy way to improve your course without taking it out of play? I call that “low-hanging fruit.”

GOLF COURSES CHANGE

Evolution begins the minute a golf course is constructed, and it has a remarkable effect on turfgrass performance, management, aesthetics, and



Shade and resulting turf problems may have been the original reason for this green's reduction in size. Regardless, expanding greens nearer to strategic features, such as bunkers or steep slopes, can restore great architectural interest and challenge.

playability. Managing these changes is critical to sustaining turf performance and design integrity. Here are a few examples:

- Bunkers are extremely dynamic and their size and shape can change dramatically over time. This is a result of sand being blown and blasted onto grass banks, bunker edging, mechanical raking, and erosion from wind and water. Bunkers usually get larger and become more rounded over time, but the opposite can happen at courses where bunker margins are left more natural, and bunkers may actually shrink.
- Trees benefit greatly from fertilizer and irrigation applications intended for turf. As a result, trees grow much more rapidly on golf courses than they do in the wild. Trees can wreak havoc on turf, and mowing contours are sometimes changed to account for shade, root competition, or growth of trees.
- Fairway contours wander, and their positioning can be influenced tremendously by mowing equipment. In the 1970s, many golf facilities purposely reduced fairway acreage

in response to the gasoline shortage. Fairway acreage was reduced again in the 1980s when lightweight fairway-mowing programs were developed.

- Approaches have often been narrowed in an effort to “toughen up” the course by preventing golfers from running balls onto greens. Mowing equipment, traffic patterns, and turf performance can also have an effect on approach mowing contours.
- Tees and greens usually shrink and become more rounded. This process is influenced tremendously by mowing equipment, particularly when using triplex units.
- Irrigation coverage, drainage issues, and turf problems can also influence mowing contours. Why not shrink a green or fairway if you are having trouble keeping a shaded perimeter healthy? When irrigation systems are replaced after changes in mowing contours have been made, the changes are locked in.

Every component of a golf course changes and evolves based on these and other factors. More often than

not, intricate mowing lines gradually become more rounded, which can adversely affect aesthetics, design intent, playability, and turf performance. The effects usually become more significant over time, so the older the course, the more drastic the changes are likely to be. However, even courses less than 15 to 20 years old have probably experienced mowing contour changes. Given the playability importance of putting greens, this article will focus on their mowing contours.

WHY RESTORE PUTTING GREEN MOWING CONTOURS?

Expanding greens back to their original shape and size can have a remarkably positive effect on aesthetics and playability and can be accomplished for a relatively low price tag. Patience, labor, organization, and golfer education are key requirements of the program. Some golfers will not immediately appreciate the benefits, and memories are often short. Some will undoubtedly claim that “the greens were always this shape.” But, the truth lies in the topography and the soil.

Expanding putting greens provides a number of important benefits, including the following:

- Expanding greens can restore interesting and challenging hole locations intended by the original architect.
- In some cases, expanding a green does not increase the number of hole locations because the expansion area may be too severely sloped. However, it can still create different options for approach and recovery shots from around the green.
- Increasing the size of putting greens creates more area to disperse traffic. Dispersing traffic over a larger area can improve turfgrass quality and performance.
- Expanding putting surfaces often shifts them closer to hazards and strategic features designed to guard the greens. Bunkers are obvious hazards, but steep banks also qualify as strategic features that affect how approach shots are played.
- In addition to bringing a steep drop-off into play, expanding greens close

to the edge of a plateau, particularly where there is no backdrop, can create the “infinity look.” This occurs when the putting surface visually disappears into the distant horizon, and it is a terrific aesthetic effect that can make judging yardage more difficult.

- Greens are designed to be a specific size and shape, and it often makes good architectural sense to restore their original size and shape.

SOME INITIAL ADVICE

There are many different ways to change mowing contours, and the precise methods chosen will vary based on a variety of factors. The most important factors are budget, soil conditions, how quickly the program is to be implemented, the grasses present in the expansion areas, and golfer patience. It is important to select the correct approach for your golfers, and that starts with communication. Golfers must understand the program thoroughly.

Based on experience, the most important advice is to take a slow, organized, and methodical approach. This will make recontouring greens a longer process, but it can help reduce cost and labor. Most important, a slow,



Proposed mowing contours can be marked with irrigation flags, hose, string, or dots of turf paint. Use a system that is easily adjustable, because there will be many adjustments.

organized, methodical approach will make for a much better finished product with less overall golfer disruption.

All golf courses should have putting green turf nurseries that act as an essential insurance policy when imple-

menting green-expansion projects. A good rule of thumb is that a nursery should be double the size of the largest green on the course. Courses embarking on extensive expansion work to greens sometimes build much larger nurseries. Regardless of nursery size, it is critical to have matching turf grown on matching soils available for use during green-expansion projects. For more information on the importance, establishment, and management of putting green nurseries, please see the article [Nursery Green Wanted](#). Similarly, a minimum of one to two walk-behind putting green mowers is essential for green-expansion projects. Green expansion can be accomplished with larger triplex mowers, but walk-behind units typically work much better.

IDENTIFYING NEW MOWING CONTOURS

It is difficult to identify the proper mowing contours, but being precise is important. Simple observation of topography and probing soils can provide much information about the changes that occurred over time. Determine if soils in expansion areas are consistent with soils in the rest of



In addition to losing interesting hole locations, shrunken greens often lose their unique character.

the greens. Areas where the soil is extremely different, perhaps even rocky, may not have originally been part of the putting greens. The margins of modern, sand-based greens will be easier to identify.

You may be able to find original architectural plans, but plans often differ from what was actually built. Old aerial photos documenting the original green shapes and sizes are often more helpful than original plans. Enlisting the aid of a competent golf course architect can also be worthwhile.

Consider the location of irrigation components as expansion areas are identified, but do not be fooled. If the irrigation system was replaced after the mowing contours changed, sprinkler heads, pipes, and wires will likely be located in potential expansion areas. These components will have to be relocated.

Be consistent with respect to placement of green margins relative to topography. If a green margin is

positioned on top of the green pad in one area and close to or over the edge of the green pad in another, aesthetics can be adversely affected and playability will be less consistent.

Mark out initial proposed expansions with irrigation flags, hose, string, or dots of turf paint. The key is to use a system that is easily adjusted, because there will be many adjustments. Once the preliminary contours are decided upon, mow them at a lower, intermediate height. This height reduction should be low enough so expansion areas are easily visible, but not so low as to cause turf injury.

The goal of the initial reductions in mowing height is to provide a visual preview of contour changes. Existing mowing contours subliminally influence one's perception of topography, potentially causing proposed expansions to seem radical initially. Once your eyes become adjusted to the new mowing contours, opportunities for additional expansion and adjustment will become

more apparent. Note: Expansion areas should encompass the green expansion and the new collar areas. When in doubt, expand the greens. It is much easier to bring expansions in than to take them farther out.

Maintain new contours for several months to determine where adjustments are needed, and make changes where necessary. With an intermediate mowing height, adjustments can be made just about any time. However, drastic contour adjustments are best made in the spring and fall, when turfgrass stress levels are lower. To conserve labor and reduce overall disruption, it is important to expand greens one time only. This can only be accomplished with meticulous observation and adjustment of the new contours.

SOIL MODIFICATION AND DRAINAGE

As contours are being adjusted, carefully assess soil conditions in proposed



Do not be fooled by irrigation systems to identify original putting green contours. The irrigation system may have been installed after the green shrank.

expansion areas. Soils in expansion areas and the rest of the greens must be similar if turf in both areas is to react similarly. Consider these points:

- Cultivation and topdressing programs change soils over time. Expansion areas will likely require soil modification in order to support healthy turf.
- How well do proposed expansion areas drain? If deep soil modification has been performed or if drainage systems have been installed in greens, similar work may be necessary in expansion areas before they can be restored.
- How much thatch is present in expansion areas? Excessive thatch will adversely affect turf performance and must be managed before expansion areas can be reclaimed successfully.
- Are expansion areas relatively smooth, or does topography need to be adjusted? Even slight surface imperfections become obvious as cutting heights are lowered. If expansion areas have not been aerated and topdressed regularly, they will not be level enough to handle low cutting heights required for putting surfaces.
- Are the correct grasses present in expansion areas? For expansion areas to blend in and match the rest of the putting surface, the turf composition must be similar.

Repeated aeration, topdressing, and rolling treatments are usually necessary before mowing heights in expansion areas can be lowered significantly. To achieve putting green mowing heights, plan on implementing multiple cultivation treatments annually to expansion areas. Rolling is also an excellent technique to include for smoothing expansion areas. Small

asphalt rollers, such as a one-ton roller, can true up uneven surfaces very quickly and can accelerate the leveling process.

In extreme cases, the surfaces may be so unlevel that sod removal and

requires far more labor and expense. Furthermore, the mix often performs very differently with respect to fertility and drainage when compared with the existing putting green soils. When used adjacent to soil-based greens,

this method frequently provides unsatisfactory results.

ESTABLISHING THE RIGHT GRASSES

When a high percentage of desired grasses is present in expansion areas, conversion can be relatively simple. However, if the desired grasses are not present, other programs and conversion options must be considered.

Expansion areas are sometimes regrassed using a nonselective herbicide or a soil fumigant. However, managing traffic flow around greens can be challenging if expansion areas are regrassed without taking the greens out of play.

If appropriate turf is available and soil

conditions are acceptable, expansion areas can be sodded. However, given the amount of area that expansions sometimes encompass, this can be a big job requiring copious amounts of turf and labor to install it. Furthermore, it is advisable to keep some nursery turf in reserve in case some areas do not perform to expectations and need to be repaired. Some golf facilities choose to sod expansion areas with commercially produced sod; however, while this can work, using commercial sod increases project cost and adds a few complications:

- Commercially produced sod often does not match the existing putting green turf, causing green expansions to “look like green expansions.” Commercially produced sod may eventually blend in, but this can take years. In the meantime, green expansion



Examine soils closely to see if they require modification. Expansion areas often have higher thatch levels that must be reduced before greens can be expanded successfully.

regarding may be necessary before expansion can occur. Some have succeeded in leveling areas by stripping out the top two to three inches of turf and soil and then backfilling with a mixture of aeration cores and topdressing sand. Combined with seeding and rolling treatments, this is an effective means of simultaneously developing matching turf, smoothing unlevel surfaces, and modifying soils. For golf courses with cool-season turfgrasses, this process is best done in the fall, and the affected areas should be roped off and marked as ground under repair. However, managing golfer traffic can be challenging with this option, particularly if used on several greens.

Some golf facilities choose to shell out expansion areas to a depth of eight to 12 inches or more and replace the soil with a prepared rootzone mix. This

sions established with commercial sod will look a little peculiar.

- It can be difficult to find commercially produced sod that is grown on compatible soils. However, if planned far enough in advance, sod can be contract grown to match existing turf species and soil types.
- Even with meticulous care, sod does not always perform well, particularly when used in high-traffic areas like putting green perimeters. Furthermore, sod almost always requires additional cultivation. Using sod to establish putting green expansions may have short-term benefits, but it could come with more long-term headaches. Nonetheless, for those in a hurry who have the money, using commercial sod to expand greens can work.

If you are working on a tight budget and have a little more patience, cultivation and interseeding combined with sequential reductions in mowing heights over a period of several years may be your best option.

LOWERING MOWING HEIGHTS

Turfgrass can be managed in myriad ways, but it often responds poorly to rapid, drastic management changes such as reducing mowing height. Even if the appropriate grasses are present in expansion areas, the turf will need time to adjust to lower mowing heights. Initial height reductions usually come easily, but maintaining turf health as cutting heights are lowered becomes progressively more challenging. Patience is important as mowing

into collar, fairway, and rough where the species of turf is different in each. The desired species may be present in some of these areas but not in others. Thus, there are options to consider:

- Lower the mowing heights in each separate area (i.e., collar, fairway, rough, etc.) and convert them to the desired species independently of one another. Recognize that each area must be maintained with a different mower at a different cutting height and will require different agronomic management strategies.
- Divide greens into like-groups and treat each group similarly.
- Convert all turf in expansion areas to the desired species and lower it to a single height (e.g., collar height), then convert it to putting green height on the same schedule.

The approach you select should be based on availability of labor, extra walk-behind mowers, and your ability to manage a complex program without gaffes. With multiple areas around different greens being maintained at different heights and with different mowers, mistakes are much more likely. Mowing an area with the wrong mower can cause significant turf damage, particularly if it occurs during or before stressful weather. There clearly is value in keeping the program simple.



Some golf facilities find it easier to strip turf and expand with sod or aeration cores, but dealing with golfer traffic can be challenging, depending on the configuration of the green and traffic patterns.

- If sod is used, it is usually wise to maintain sodded expansion areas at a higher mowing height for at least a season. Mowing height will often be dependent upon turfgrass health and levelness of expansion areas. Aeration, topdressing, and rolling will be necessary to smooth sodded expansion areas enough for final reductions in mowing height to be achieved.

heights continue to drop. The turf needs time to adjust.

LOGISTICS

Expansion areas can be treated similarly if they are similar in terms of turf and soil composition. However, a single green expansion often contains different species of turf that have been maintained at different heights. For example, one green might be expanded

THE MECHANICS OF MOWING HEIGHT REDUCTIONS

Timing height reductions is critical. For cool-season turf species, reducing mowing height is best initiated in the spring and fall. It is important to recognize that turf will react differently to height reductions at different times of year.

- Turfgrasses store carbohydrates in the fall, and major height reductions in the late summer or early fall can reduce the ability of turf to store carbohydrates before winter. Although the turf may look healthy, depleted carbohydrate reserves will leave it much more susceptible to stress and disease problems the following summer and beyond. Height reductions can also be damaging during or immediately before stress periods.



If the wrong type of turf is present in expansion areas, sodding is generally the best solution.

- Greater reductions in mowing height can be safely made in the late fall or early spring.
- As a general guideline, a height reduction of 35 to 40 percent can usually be tolerated by higher-cut turf provided proper timing. Reducing the percentage of reduction for lower cutting heights is wise. For example, roughs could be reduced from 2 inches to 1.2 or 1.3 inches, fairways at 0.5 inch could be reduced to 0.3 or 0.325 inch, and collars cut at 0.25 inch could be reduced to 0.170 or 0.180 inch.
- Making cutting height reductions in two smaller increments over a period of a week or so rather than one large reduction in height can help reduce stress on turf.
- A typical approach is to aerate, topdress, and interseed expansion areas every fall and spring for several years. Combined with height reductions, this approach can allow the desired turf species to gradually become established while the

undesirable turf species is eliminated from expansion areas.

- Another option is to purposely scalp the turf to cause injury. When properly timed and combined with cultivation, this can make seeding efforts much more successful.

TARGET HEIGHT NO. 1: COLLAR HEIGHT

Once contours are finalized, the next target is to lower the height of cut to a typical collar height of around 0.25 to 0.30 inch. To achieve this, it will likely be necessary to implement the agronomic steps previously outlined: aeration, topdressing, interseeding, sodding, etc.

Once the turf is at collar height, you can decide whether to continue the conversion with interseeding and mowing height reductions or with sod. If the decision is made to continue with the gradual approach, plan on maintaining the expansion areas at collar height for around one to three seasons. This will provide time for the turf to

adjust to new mowing heights and to perform necessary cultivation and smoothing work. If irrigation components exist in the expansion areas, this is the time to relocate them.

TARGET HEIGHT NO. 2: GREEN HEIGHT

Making the reduction from collar-height turf to putting-surface height is best accomplished in two steps. The first step should be to an intermediate or halfway height, typically 0.160 to 0.180 inch. It may be necessary to maintain the expansion areas at the intermediate green height for an entire season or longer to allow additional surface smoothing and soil modification. It is important to maintain cultivation and rolling programs during this phase. Surface imperfections will become more apparent as cutting heights are lowered. The occurrence of scalping injury should be the guide for gauging height reductions. Note: To avoid golfer confusion, a decision must be made as to whether the intermediate green

height is deemed “part of the putting green” or not. Golfers who lift and replace their golf balls when not on the putting green would incur a penalty.

Surface imperfections that are invisible to the eye and tolerated well by the turf at collar height will begin to appear at the intermediate mowing height. If scalping or thinning occurs during the final height reductions, it is usually best to raise the mowing height slightly until the areas can be smoothed. It can be difficult to re-establish turf on high spots once they experience significant thinning.

ONGOING MAINTENANCE

Green expansions will require specialized maintenance during the expansion process and for two to three years after the desired mowing height is reached. It is critical to closely monitor the health of expansion areas because they can decline rapidly. Following are a few of the remediation steps that are usually needed during the process:

- Reduced mowing — If turf in expansion areas shows signs of stress or thinning, reduce mowing frequency. Reduced mowing of the

cleanup pass around greens is an excellent preemptive step.

- Raise mowing heights — If turf is performing poorly, do not hesitate to raise cutting heights. The goal is for the turf to survive and adjust to each new height. If the turf in expansion areas begins to thin, raising heights a few thousandths of an inch is a small price to pay to avoid losing turf. This can be especially appropriate during periods of weather extremes.
- Supplemental fertility — Turf in expansion areas usually requires extra aeration and rolling; therefore, making a few supplemental applications of fertilizer annually may be necessary to stimulate growth and recovery. Pest control products should be handled similarly.
- Drainage — Even with more aeration, drainage in expansion areas may not be quite as good as the rest of the green. Deep aeration and deep soil modification may be helpful in improving it.
- Keep in mind that turf in the expansion areas will be more susceptible to damage and disease activity following heavy irrigation or rain events. It is wise to reduce stressful

maintenance activities when soils are soft and the turf is more prone to injury.

- Turning boards are helpful in protecting turf health in collars.
- Rolling — Small asphalt rollers can be used to smooth expansion areas quickly, but they can cause injury. It is important to use these tools when turf is relatively healthy. Avoid using heavy rollers when soils are soft and the weather is extreme.
- If putting green nursery turf is available, quickly plug out damaged turf. This can help prevent damage from spreading.

CONCLUSION

There are many different ways to expand putting greens. This article is an attempt to outline successful strategies and options. While it is possible to speed through a putting green expansion project, rushing the process is the most common reason for unsatisfactory results. Trying to do too much too quickly can compromise the finished product, increase cost, and increase overall disruption. Taking the slower, more methodical approach is the best option for most because it can save maintenance dollars and reduce golfer disruption. Regardless of the strategies and techniques you choose, expanding putting greens is a relatively easy way to have an enormously positive effect on the appearance and playability of a golf course. So, if you’re looking for a way to take the aesthetics and playability of your course up a notch but have a limited budget, grab the low-hanging fruit and fix your mowing contours.

ADDITIONAL RESOURCES

[Choosing the Best Approach](#)

[Do You Have Green Creep?](#)

[The Evolution of a Putting Green](#)

[Maintenance on a Shoestring](#)

[Reclaiming Putting Green Edges Using Core Aeration Plugs](#)

[Restoring the Past](#)

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Raise mowing heights when turf thinning appears so that further turf loss is avoided. Raising the height of cut is a small price to pay to avoid more difficult and time-consuming efforts to reestablish turf in areas where turf loss has occurred.