WET GREENS: LET'S TRY THIS FIRST

Before drainage was installed, the green remained wet and soft for several days after a rainfall.

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Plywood sheets were laid down along the trench line to protect the turf and make cleanup easy.

IT IS COMMON KNOWLEDGE that poor internal drainage characteristics in putting green soils can make it difficult or impossible to grow consistently healthy and reliable putting green turf. To combat this problem, many management programs and techniques have been developed over the years. In many cases, soil modification through frequent aerification in combination with topdressing (with straight sand or high-sand mixes) has been successful in converting difficult or marginal soils into more manageable ones. However, more drastic measures may have to be used with particularly difficult soils.

In dealing with poorly drained greens, complete reconstruction is one option that must be considered. Due to the disruption and cost involved, however, it sometimes is worthwhile exploring other alternatives. This is especially true if the problems are confined to a few greens on an older course. Consistency among greens is highly desirable, and it is very difficult to achieve consistency where there exist different grasses and radically different construction materials and maintenance practices. New, high-sand greens have completely different management requirements, and they exhibit very different playing characteristics from older soil-based greens. Having both types of greens on the same course complicates the maintenance program, and it can make achieving consistency difficult or impossible. This is precisely the dilemma that faced officials at Roxiticus Golf Club in Mendham, New Jersey.

All of the original greens at Roxiticus were constructed from heavy clay soils that

A thin layer of gravel was put in the trench, followed by 3-inch perforated drainage tile and more gravel. Topmix was added and tamped in layers to minimize possible settling problems.

Essential tools included a narrow shovel and a tamping device made especially for the project.

exhibited extremely poor internal drainage characteristics. No drain lines of any type were installed when the greens were built, and more than a few are located in poor grass-growing environments. Several of the greens were very prone to developing anaerobic soil conditions and had to be kept closed after periods of wet weather. General thinning, along with moss, algae, disease, and scalping problems, also was frequently experienced. Soil modification techniques, including conventional aerification and topdressing programs, did not provide adequate relief. Deep-tine aerification was tried, but this practice actually caused the greens to hold even more water. After a wetter than normal summer in 1992, it was decided that something had to be done, and we began to collect information on the various options available.

Eventually it was decided that we should try to install a drainage system in one of the existing greens. We had heard of this type of drainage work being done regularly in New Zealand (*Green Section Record*, March/April 1992, "Drainage Improvement — Remedy Without Reconstruction"). Upon further investigation, we also learned that Mr. Al Rathjens, golf course superintendent at Raritan Valley Country Club, Somerville, New Jersey, had installed drainage systems in two existing greens with good results. After a lengthy visit to Raritan Valley, where we discussed the program with Mr. Rathjens and viewed the results firsthand, Ron Renee, chairman of the Green Committee at Roxiticus Country Club, and I became convinced that a putting green drainage installation project was worth a try as an alternative to complete reconstruction. In late October of 1992, we cut a temporary green for the third hole and got to work.

The first step was to design the layout of the drainage system and identify an existing drain line to serve as an outlet. We decided to space the trenches 4' apart and to extend them all the way through and off the green. The rationale behind this was to provide as much drainage as possible to compensate for the poor internal water movement characteristics of the existing soils, and to avoid having to make drainage connections in the green itself. Thus, the drain lines were extended into the first cut of rough on either side of the green. Turf paint was then used to draw the outline of the system on the green.

The next step was to bring in a sod cutter. The sod was cut and moved out of the way by hand. Half-inch plywood was then laid out on each side of the proposed trench. On one side, the 4' × 8' sheets of plywood were laid end to end, but on the side where the trencher would throw the soil, the plywood was laid side by side. This was done to provide additional area for the soil and to allow a small maintenance vehicle to be driven on the plywood alongside the trench to help with soil removal.

Grades were checked frequently, and after the trench was thoroughly cleaned and leveled, a thin layer of ⅜" gravel was spread evenly and tamped to prevent future settling. Three-inch perforated flexible drainpipe was then laid in the trench, and several layers of gravel were added and tamped until the top of the gravel was approximately 12" below the surface of the green. A manifold type of arrangement was used to connect the drain lines from the green to existing drains located nearby.

NOTE: The high ends of the drain lines were extended well out into the first cut of rough and were brought to the surface and enclosed in a valve box. This provides a clean-out mechanism in the event of future problems, and a method to check how well the drain lines are functioning.

After some experimentation, we decided to make our own root zone mix with which to backfill the drainage trenches. The mix consisted of an 80% sand and 20% soil combination. We hoped that it would have adequate water- and nutrient-holding capacity so that the turf over the trenches would not require extra moisture or fertilizer. The mix was then added to the trench. Again, we worked in layers, with each 3" increment being gently tamped by hand. We were very concerned about future settling problems and worked diligently to prevent this by tamping carefully and thoroughly, something that Mr. Rathjens had stressed as being a key to the success of his project at Raritan Valley. We followed this advice closely, and we have not seen any significant amount of settling in the 18 months since the system was installed.

The final step was to reinstall the sod, taking care to replace it just as it was removed. After a final tamping, the green was covered with a geotextile fabric for the winter.

The following spring the cover was removed and the trenches were topdressed as needed. Fortunately, settling was not a big problem, and we attribute that to the amount of tamping performed during the backfilling operation. The summer of 1993 was quite dry, so the system was not thoroughly tested. Nonetheless, the initial results were good enough to convince us to perform the same procedure on another green in the fall of 1993. We are hopeful that this drainage installation project will increase our water management capabilities to such an extent that complete reconstruction will not be necessary on either green. Despite an extremely wet spring in 1994, both greens have performed well to date.

As far as cost was concerned, the greatest expense by far was that for labor. Materials such as sand, gravel, drainage pipe and valve boxes amounted to less than $1,500 per green. However, the project required approximately 544 man-hours to complete. Even though we did not hire additional labor for the project, its completion resulted in other work being neglected.

This type of renovation project is likely to improve conditions in many situations, but there is always a possibility that it will not improve conditions to a sufficient degree. We decided to try this method of drainage improvement knowing full well that we could always employ the more expensive and disruptive option of complete reconstruction at a later date if the results were not acceptable. Fortunately for Roxiticus, the results thus far have been very satisfactory.

Great care was taken to replace the sod as it had been removed.

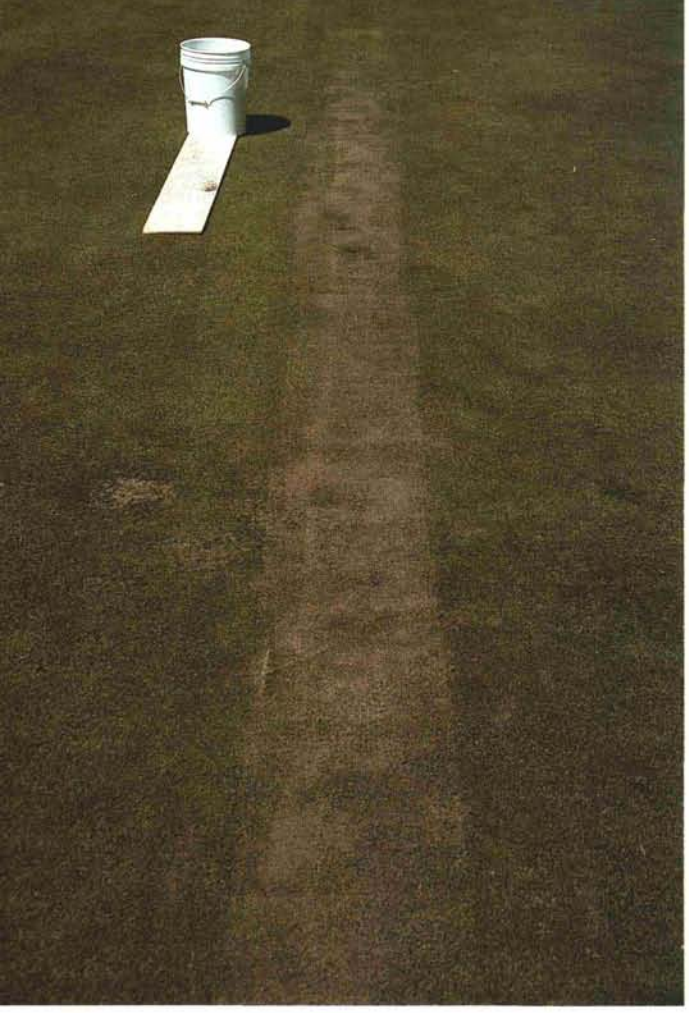
The high ends of the drain lines were brought to the surface, off the green, and eventually were attached to valve boxes for easy access.

Following is a list of the do's and don'ts that helped make our project a success:

• Communicate the problem as well as the solution to the appropriate committees and enlist their support for undertaking this type of project. Be sure not to sell it as a cure-all.

• Take the time to design the system carefully and procure all necessary materials before the project begins.

• Cover the putting surface on either side of the trench with plywood so that no



mechanical injury is inflicted upon the existing turf.

• Check grades often to insure a constant and adequate fall.

• Extend the drain lines beyond the edges of the green by several feet in both directions. Extending the high end of the drain outside of the green and enclosing it in a valve box provides a valuable flush point. Extending the low end beyond the edge of the green is important so that connections are not made in the putting green. If additional drain lines are deemed necessary in the future, they can be installed and connected with less putting surface disturbance.

• Utilize a qualified soil testing lab to perform physical soil testing work before selecting a material with which to backfill the trenches. The material selected should have adequate drainage properties as well as adequate moisture and nutrient rentention so that the trenches do not require supplemental irrigation or fertilization.

• Tamp the gravel and topmix by hand at regular intervals. Settling can cause major problems and for the most part is avoidable.

• Reinstall the sod just as it was removed to minimize visible disturbance.

• If the work is done in the fall, be sure to cover the trenches with a geotextile fabric to prevent desiccation of the sod during the winter.

(Above left) The following spring, trench lines were topdressed several times to account for some slight settling.

(Above right) The sod was cut back and topdressing was added where settling was more severe.

(Right) A final tamping helped smooth the sod over the trenches.