SPORTS TURF MANAGER

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Drainage Techniques

20 page issue

CHUCK WOLSBORN, GOLF COURSE SUPERINTENDENT, GRESHAM GOLF LINKS

"Common sense is the most important characteristic of a good golf course superintendent and if you're not sure you have that, then put in more drainage (a.k.a. the 'Hawtree Law')," stated British golf architect Fred W. Hawtree. "Drainage, drainage and more drainage is the key to better turf in Britain."

Though these statements obviously understate our jobs, they point out how important a dry playing surface is to playing the game of golf and growing healthy turf. Old Tom Morris, Donald Ross and Dr. Alister McKinzey all emphasized the importance of locating golf courses on well drained sites. I remember reading of Old Tom designing a golf course in the morning and playing the course's first tournament that afternoon – what marvelous pieces of land he must have had to work with. More often than not our golf courses are located on marginal pieces of property with soils and/or soil structure that would be considered unacceptable by our predecessors. Even though we might not have the naturally well drained sites of our forbears, the tools we have to 'de-water' a site would have made them envious.

As my crew is working on a rather large drainage project, I look back over the years at a number of mistakes and learning experiences I have had in the installation of drainage. If a mistake could be made in putting a piece of drainpipe in the ground, then a member of my crew or myself has probably made it. From using the wrong grade, wrong pipe, wrong rock or wrong fabric (any fabric is the wrong fabric) we probably tried to make it work. I have also read most of the turfgrass books with regard to drainage and understand the principles but few authors really get into the mechanics of installing drainage in established turf. What follows are some of the lessons my crew and I have learned over the years while installing subsurface drainage.

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French Drains

I never use the term 'French Drain' to describe any subsurface drains. My understanding of French Drains is using large flat stones to create underground voids for water to move through. I have heard the term used to describe any hole filled with rock to sophisticated subsurface systems as used in putting greens and sand-based athletic fields. It has been my experience when people refer to 'French Drains' they do not know what they are talking about but like to sound like they do.

Locates

The area to be drained needs to be laid out and marked in white paint (and/or flags) with concern being given to locating all existing public and private pipes and wires. A single call to the Oregon Utility Notification Center will notify electric, gas, communications, water and sewer. Check if such a centre exists for your area. Ignoring this step exposes your crew and yourself to unnecessary risks. Generally all locates are completed in three working days. *... con't on page 4*

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Drainage Techniques: Continued from Cover

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Finding the Proper Grade

It did not take me long to learn running pipe at the proper grade was probably the most important part of the job. The use of a theodolite (transit) or builder's level can insure that your drainage will work when the job is complete. Placing the theodolite at the beginning of the line while trenching the ditch and checking grades can save a lot of handwork later.

The theodolite can be dialed to the exact grade you wish your pipe to run. I like to run main drain lines at a minimum 2% grade and laterals at a minimum of 1/2 of 1%. The main lines should be placed along the line of maximum slope terminating at the discharge area. Laterals can be laid at a maximum fall by using a herringbone pattern. Of course the site will probably dictate the use of herringbone, grid or random patterns. Running at flatter grades makes the use of the theodolite even more important. Spacing between laterals can be as little as 15-20 feet on sites with fine textured soils. Remember you will need to work between the trenches.

Trench Basics

I like the ditch to be twice the width of the inside diameter of the pipe being used. In the case of 4-inch pipe, we trench an 8-inch ditch. This will allow the pipe to be completely encircled with rock. The depth of the trench should be based on the fall and that the pipe should have a minimum of 12-18 inches of cover. Generally 24 inches is the range we dig but deeper generally is better.

Efficient Clean-up

A labour saving technique that I credit to my crew is handling of the spoils. After the location of the line is marked, plywood is laid next to the ditch on the side that the trencher will deposit the major part of the spoils. This accomplishes two things: first, it protects the underlying turf and second, an operator on a loader can pick up a high percentage of the material thus reducing handwork.

Often the remaining material in the bottom of the ditch will turn to mud before it can be removed. If and when this happens, it is practically impossible to remove with a conventional shovel. For these cases we use a tool we designed in house called 'Can on a Stick.' This tool is composed of a 3 lb. coffee can generally attached to a discarded golf cart handle at about a 45 degree angle. This does an excellent job of getting the slop out of the ditch. We have no patent pending on this thingamajig!

Rock Bed Installation

Now that the ditch is clean, there is one final step prior to laying of the pipe. We use the theodolite to help as we lay a minimum one-inch rock bed in the bottom of the ditch to our final grade. This will be the second and final check of the grade.

Catch Basins

We like to locate catch basins in all low areas and/or at least every 100 ft. as cleanouts and inspection portals. Catch basins work great as clean outs in that they are generally easier to locate than a 4-inch piece of pipe, easy to see down, and easy to stick a hose down if flushing is in order.

My pipe of choice is ADS N-12. Although this pipe looks quite similar to the conventional corrugated slotted drainpipe we have used in the past, I think it is a substantially superior product. N-12 is a corrugated double wall pipe with a smooth inner wall. This pipe has significantly greater strength than conventional corrugated drainpipe and is less likely to be crushed through a shallow run. With the smooth inner wall, it is less likely to silt up as with corrugated pipe. In fact, I have seen engineers' drawings showing this pipe laid at as little as 1/3 of 1%. If silting does become a problem, the smooth inner wall is much easier to run a hose down during the flushing process. Since it is semi-rigid, it lays in the open ditch better and is easier to work with during the rocking stage. On the down side, N-12 costs twice as much as comparable single wall corrugated pipe. Depending on the depth of the trench and other variables, my drains cost me between $4 and $8 a lineal foot. Compare conventional slotted 4" corrugated drain pipe at 35¢ a foot to comparable N-12 at 70¢, I think the pipe cost is nominal when compared to the benefits of this product, namely the superior strength and flow characteristics.

Backfilling

The rock we use as backfill is 1/4 to 3/8 inch round pea gravel. The shape is as important as the size in that if a rock that is too angular is used there will be insufficient voids between the individual stones to move water. We backfill to the surface of the trench with pea gravel and avoid using sand or fine soils on top which might contaminate the gravel or create a perched water table.

Rocking the Trench

For years, rocking the trench was a time consuming and labour intensive job. It often involved load after load of drain rock shoveled into the ditch by hand. This would often times result in a rock missing the ditch and require additional handwork. We have simplified this job with the use of a tractor-mounted back fill piece of equipment adapted from an old fertilizer spreader. The device is simple and can be assembled by merely removing a tractor mounted rotary spreaders' metering head, rotor and PTO. What remains is simply a rather large one-yard funnel mounted on the back of the tractor. To the bottom of hopper, attach a three-foot section of hose made from an automotive inner tube with a large hose clamp. With the hose (inner tube), one can control the flow of the back fill material into the trench while an operator drives the tractor over the trench. During filling and transport, the hose (inner tube) is wrapped around the frame and secured to prevent rock from leaking out.

I hope some of these techniques can be incorporated into your drainage projects. I would like to thank my predecessors, golf course architects, civil engineers and golf course superintendents who shared many of their ideas with me. ♦

—Turfgrass Management in the Pacific Northwest, *Volume 4, Issue 2, Spring 2001*