11 Miles of Tile at Westmoreland

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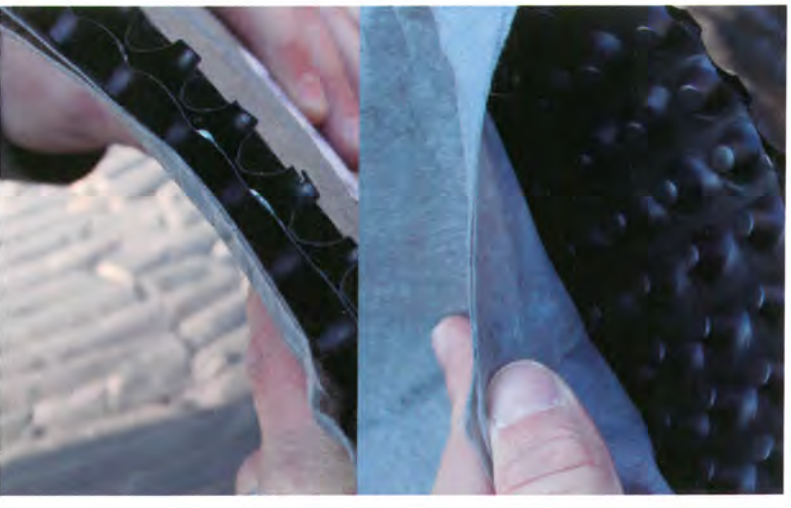
PHOTOS: LUKE CELLA AND TODD FYFFE

Todd Fyffe woke up in the middle of the night to a flashing red sliver of light coming through his bedroom window. When he went to bed the previous evening it had started to rain. The Westmoreland Superintendent's home sits on the south border of the golf course property. When he woke to the strobe, it was still raining.

Six inches of rain had fallen on the partially installed system. It was tested beyond measure with this storm. The flashing light was coming from a power substation relay that controls the main pump on the drainage system. As Todd looked past the strobe, he could see its reflection on a body of water covering the 8th, 9th, and 18th fairways. The new system had failed.....until a relay was reset and the water was pumped off the property as designed.

Westmoreland Country Club is bordered by three different communities: Wilmette to the north, Skokie to the west and Evanston to the east. The country club was founded in 1911 when "a group of men from Evanston Golf Club, located on the canal banks of Evanston, became dissatisfied with the space limitations of their course as the City of Evanston expanded." Hence the name – a group that moved west for more land. The original design of the course was done by William Watson in 1912. This design underwent a significant change in 1920/21 when William Langford and A.W. Tillinghast completed a redesign of the course. Arthur Hills influenced a renovation in the early 1990s but the club still holds true to Watson's original routing.



Over 11 miles of the waffle drain pipe was installed throughout Westmoreland Country Club. The two pieces of plastic are wrapped by a geotextile fabric.

Oddly enough, one of the original reasons the founder's of Westmoreland Country Club chose the 128-acre site was "because it was under laid by a 25-foot bed of gravel, which provides ideal drainage for turf." Somehow, somewhere, something went wrong. The course does not drain at all. Its' soils are a high-organic based muck that hold water and impede root penetration and growth. An inch of rainfall can limit cart traffic for days as the course tries to cast off gravitational water. The physical evaluation from ISTRC show the soil is comprised of 70% sand but the high organic content holds water. Overall there is a 13:1 ratio of water to air with a 70% water holding capacity. All this equals a dreadfully slow infiltration rate of .01 inches per hour.

Drainage has to be the toughest sell to any membership; it is something that no one ever sees. At least with an irrigation system, members will occasionally see a head on, or at the very least, the pump house. If you think about it even further, a drainage system is air, albeit underground. Todd explained to me, the members of the club have been

very supportive of this project, they really understand the importance of being able to take water away. After so many years of repairing and replacing turf due to flooding, the members and Todd are ready for it.

When most of us think of turf injured or killed by floods, we attribute it to some body of water, a creek, river or stream over flowing its bounds and not receding for a long period of time. Westmoreland has no water feature that flows through the property, only an 18" buried storm drain line that was installed in the1960s. Throughout the years, every drain line on the property has been hooked into this concrete pipe. The pipe runs from the east to the west and before it enters into the Village of Skokie's storm / sanitary sewer it is further reduced by a 12" restrictor fitting. When large storms came through, it was not uncommon for portions of the course to be covered in water for two or three days. That 18" mainline could only take so much water and as Todd explained, "the soils here have become muck and clogged, creating temporary ponds in many spots throughout the property when it rains heavily."

Todd Fyffe, Golf Course Superintendent at Westmoreland Country Club told me about a drainage project that the club embarked upon.

One of the regulations through the permitting process by the Municipal Water Reclamation District (MWRD) of Greater Chicago, states that they are only able to accept surface water in their system, not ground water. So any seepage water that flows from the surface through the soil profile (most drainage systems on any golf course) cannot be sent downstream through piping, only on the surface. In addition, because of the golf course's tremendous water holding capacity, the design had to release water slowly into the Village of Skokie's storm / sanitary sewer. Working within these confines, Westmoreland hired Dennis Hurley at Turf Drainage Company of America to design the system, Gewalt-Hamilton (a local engineering firm) to represent the club and manage the project, and Leibold Irrigation to install the system. On paper, the solution was to increase the golf course ponds water holding capacity, pump seepage water to the ponds (make it surface water) and then release it slowly when needed into the MWRD system.

The new design called for an increase in the water holding capacity of the ponds on the course. Prior to the revamp, the ponds on the course had a potential holding capacity from the normal water level to high water level of 1,124,500 gallons of water. Upon completion the pond capacity was increased to 7,600,000 gallons at normal water level by raising two pond banks on property. If heavy rains are expected, by lowering the ponds by 4 feet, the ponds on the course have the capacity to hold over 12,300,000 gallons of water; this is the equivalent of a 4 inch rainfall across the 120 acre property with zero soil absorption or seepage.

When drains vent to the surface grates are held in place by metal cages wrapped in fabric allow air and water exchange from the surrounding soil too.

Water runs through the main drain line from east to west. The main ponds on the golf course are on the eastern and middle section of the property. Water had to be captured and pumped against the natural pitch and flow of the property. The system works by capturing surface water across the course through a series of drains

As with most drainage systems, this drainage system begins using the topography of the course to move water by gravity. In several fairway locations Todd showed me small catch basins where the drains actually come to the surface. Using a geotextile fabric wrapped around a wire structure, these small basins are able to capture water not only from the playing surface, but also from the soil profile as water can seep in through the fabric. Over 150 of these smaller basins have been installed as part of the project. Some of the basins are cylindrical while others are rectangular depending upon the need of the specific site. The other key component that is terminated into these basins, and larger sump pits, is the actual subsurface drainage. The piping system that was installed utilized a waffle drain, a system that has a core of two pieces of plastic wrapped by a geotextile fabric. This type of piping provides a greater collection area for water to enter the flow area than conventional round perforated pipe.

One of the Irrigation Drive Pumps (IDPs) in the early stages of installation in a sump. They sound more complicated than they really are.

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Larger structures installed include sump pits (both concrete and plastic) where large amounts of water are collected and pumped back to the irrigation ponds on the course. One pit has a 7.5 HP motor-driven pump that is actuated by the

How do you cover a four foot wide sump pit in a playable area? Put a four foot wide lid on it 8" under the soil and grow turf on it. Vent it with a 12" grate.

weight of the water within the pit. If electricity fails, there is a back up generator connected to this pump. In a couple of areas where it was too expensive to run electricity for pumps, Irrigation-Driven Pumps (IDP) were installed to push water to holding ponds. These pumps utilize the energy of the irriga-

All the soil was removed from each trench cut on the property and backfilled with sand.

tion system to pump water. The IDP is placed inside of a sump that has a float in the bottom. When the water level in the sump rises, the float opens a standard 1.5" irrigation valve that has been placed in line between the irriga-

A sliding gate drain (widely used in agricultural fields) regulates the pond depth using a damn principle. (l) View from top (r) gate location relative to pond.

tion system and the IDP. By opening the valve, the water of the irrigation system flows through the pump and creates a vacuum or venturi that sucks the water out of the sump pit. Some homes use this same type of system for sump pumps in their basements as a back up for power loss. They run on the water supply piping in the same fashion. Westmoreland has installed 4 of these pumps on the golf course in areas it was not feasible to install conventional electric pumps.

A key feature of the system is the ability to move water between the ponds to make it available for irrigation or to move water from the ponds into the village's sanitary/storm sewer when needed. Westmoreland employs the use of a sliding drain gate to regulate the pond levels and the amount of water flowing into the village's system during non-heavy rain events either before a storm or the next day after a rain storm. This type of valve controls the discharge rate by creating a dam to regulate the water flow out of the holding structure.

The Leibold construction crew compacting sand in one of the trenches.

Todd explained, "it takes about a day to lower the pond four feet through this structure."

All of the pumps on the golf course discharge into HDPE (high density polyethylene) pipe. The advantages of using HDPE are several: It is butt fused to eliminate potential leak problems at joints. It is highly resistant to corrosion and should last for 100 years. It is also lightweight and flexible.

One of the main 10' concrete sumps being installed housing the main 7.5 HP pump that moves most of the water off the property. The switch that actuates the pump is triggered by the weight of the water within the sump.

Beside the ponds, there are only few structures above ground that can be seen on the course. Sump pits, where access is not needed are covered by these large aluminum reducers. The one feature that Todd knows the members will see is an increase in turf quality in the coming years. Todd pointed a couple of areas in a fairway that he reseeded or sodded each year because of inadequate drainage. Todd has already noticed improvement in the turf in these areas due to their ability to dry out.

Last week my son asked me to quiz him for a science test the following day. He had to know the four components of a healthy soil, 5% organic matter, 45% minerals, 25% water and 25% air – remember that? With the new system installed at Westmoreland that air component can now be part of the equation.

When I pulled into the property, Todd was running his irrigation system on full. While most superintendents were blowing out their systems, Todd was purposefully flooding a fairway to see how the water moved – from the surface through the soil profile or subsurface drains to the sump pits and into the pond. Each phase of the project was tested to ensure its performance. This enabled Todd, armed with engineering documentation, to show the membership that their investment works. Furthermore Todd has recorded baseline drainage data through soil testing and will continue to document the systems effectiveness into the future. As the $2 million project is wrapped up, Todd can enjoy his winter and look forward to a growing turf on soils that drain. The membership of Westmoreland can now look forward to better turf conditions and a significant reduction in the number of "no carts" days following rainfall events.

Chris Nelson(L) of Leiblod Irrigation and Todd Fyffe check on of the smaller irrigation driven pumps to make sure it is working as they check the new drainage system late last year.

Thanks to Todd for sharing this project with the membership. As when anyone tells me about a project, my automated response has been to tell them, it sounds like a good article for the membership to me. Todd invited me out to see the project and provided the information for the article. If you have a project or something to share with the membership but don't have the time to get it on paper, let *On Course* know. We can help.

Once the sod is carefully placed back into the same location, even in the same direction, it is hard to tell all that went on below it...until the next rain event.