



# HOLE NOTES

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## GOLF COURSE IRRIGATION AND DRAINAGE

# Water On, Water Off!

By CLIFF JOHNSON

The formula sounds so easy: Provide grass with optimal moisture and it will thrive.

For golf courses, getting the water on the grass is the simple part, thanks to sophisticated irrigation systems that supplement unpredictable rainfall.

Getting the water off the grass - and out of a waterlogged soil profile - is a more formidable challenge.

One of the most common golf course turf problems is excess water trapped at the surface. When water is unable to permeate topsoil, the result is surface ponding and an unstable surface that inhibits turf growth and invites turf diseases and soil compaction. Poor drainage can cost a golf course in both obvious and hidden ways:

Reduced play days and cart rental income; damage and scarring to fairway turf; turf renovation and restoration; reduced resistance of turf to drought; turf die-back in winter, and less enjoyable playing experience for golfers.

Until recently, the only cure for poor drainage has been major reconstruction of fairways and greens using conventional drainage methods that involve trenching, re-establishment of



**FAST AND QUICK.** The Shelton Super Trencher cuts a trench up to 5" wide and conveys it away to the removal cart.

turf and lengthy disruptions to play.

In the mid-1990s, Hartman Companies of Victoria, Minn., introduced to the United States a proven drainage technology from the United Kingdom called Slit Drainage. The new surface drainage system consists of an intensive grid of parallel slit-trench drains that removes excess surface water before it has a chance to

pond and damage the soil surface. Slit drainage, according to Jeff Hartman, founder and president of Hartman Companies, is capable of draining an area three times faster than conventional drainage (i.e., farm-field style drainage) without an increase in cost.

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## Water On, Water Off—

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Here is how slit drainage works: Main and lateral pipe drains with a porous fill to the surface are installed parallel to the fairway. Then a perpendicular network of gravel-filled 1-inch wide by 10-inch deep slits, on 16-inch spacings, are installed laterally, creating an intensive drainage grid which can remove surface water rapidly.

After construction, new grass growth covers the slits in 10-14 days. The lateral trenches are topped with a sand mix and also recover quickly. Wider trenches are covered with a sand mix, and then covered with sod to provide a natural playing surface.

The specialized machines the company uses to create the lateral slits and fairway drains are manufactured in the U.K. and have been used successfully for many years on golf courses in Europe. Main and lateral trenches are excavated using a Shelton Super Trencher. The Super Trencher cuts a trench up to 5 inches wide and installs 2-inch or 4-inch tile. Excavated soil is conveyed into a wagon and hauled away to avoid leaving a mess.

In a separate operation, the trenches are backfilled with buckshot stone to within 3 inches of the surface, then topped with a sand mix. Then, the whole area is top-dressed with 40 tons per acre of sand, about an eighth of an inch thick, using a ty-crop spreader.



Backfilling trench with buckshot stone.

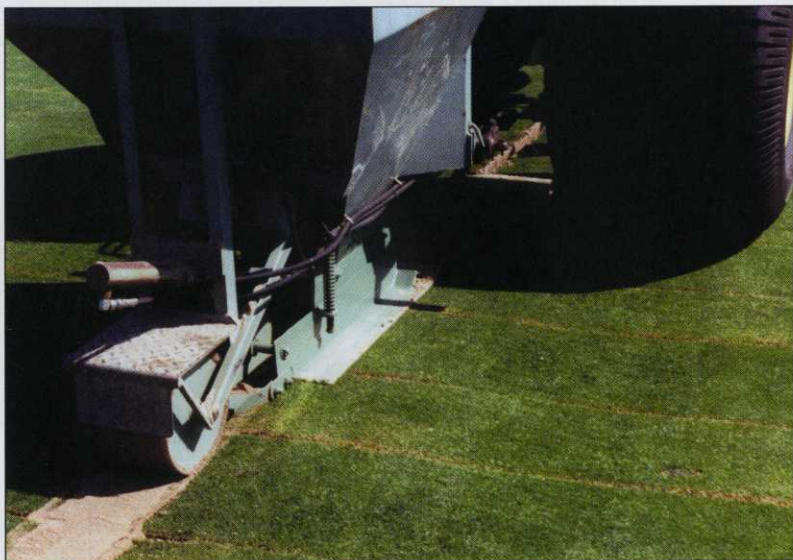
Slit drains are installed using a Shelton twin-leg gravel bander. Two hollow knives, at 16-inch centers, are mounted to the underside of a gravel hopper that is pulled by a tractor. Buckshot gravel is fed into the slits as it proceeds.

"By allowing the adjacent turf to root in the aggregate, without the addition of a finer top soil, maintains a high infiltration rate into the slit drain, which is required to remove excess water," explains Tom West, a Hartman Companies sports-turf contractor. "The excess surface water moves into the columns of coarse aggregate and is carried away by the lateral drain pipes to a collector drain pipe, which leads to an outlet ditch."

The primary idea of slit drainage, according to West, is to remove the excess surface water before it has a chance to pond, thereby softening the ground surface and promoting turf growth. The design for each slit-drainage or gravel-band system, he says, includes consideration of depth, soil texture, spacing and slope. Drain depths will vary depending on the topography of the area, since drains must remain on grade, according to West.

**The art of slit drainage takes place in the planning stage,** West says. "We have to pot-hole where drains cross irrigation lines to check depths and plan drains to go beneath or over the irrigation pipes. In order to protect the existing irrigation system, we need to constantly stop and start the trencher.

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The final stage is backfilling with sand and compacting.

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This is one reason we don't backfill as we trench."

Slit drainage has gained rapid popularity among area golf courses because of the many advantages it offers over conventional drainage alternatives. "The traditional approach to drainage was to re-grade a fairway or green and re-establish the area with new grass," West says. "This traditional approach typically took that portion of the course out of action for a whole year. Now, for the same cost per square foot, we can provide more effective drainage and the area can be used immediately."

Jeff Hartman points out that golf courses typically allocate a certain portion of their annual maintenance budget for drainage. In most situations, when a course has contracted with Hartman to upgrade drainage on a fairway or green, superintendents and general managers are eager to bring other problem areas on the course up to the same standard. "It becomes a revenue-based decision, once they observe how minimally the upgrades disrupt play."

Golf courses often apply the savings they realize from slit drainage to more drainage work or other course improvements, Hartman says.

Hartman Companies' primary clientele are private clubs

that cater to revenue-generating tournaments. The revenue is dependent on keeping the course open and allowing carts. Good drainage allows these clubs to make more money. Members also value good drainage because the course does not have to close down for so long after heavy rains.

The proof and results of Hartman's slit-drainage system can be observed at Brackett's Crossing, Interlachen, Golden Valley, Midland Hills, Wayzata and a number of other Minnesota golf and sports turf clubs.

And the results were on display for the world to see in August 2002 when Hazeltine National Golf Club hosted the PGA tournament. More than three inches of rain drenched the course Friday night and Saturday morning, and only a herculean effort by hundreds of maintenance workers allowed the course to be playable on Saturday. The point, however, is that the course was made playable despite the rain, and earlier drainage projects by Hartman Companies contributed to that favorable outcome.

For complete details on Hartman's slit-drainage and other golf course services, contact: Jeff Hartman, Hartman Companies, 8011 Bavaria Road, Victoria, MN 55386, phone 952-443-2958, fax 952-443-3452, email [jhartman@hartman-companies.com](mailto:jhartman@hartman-companies.com).

*(Editor's Note: Cliff Johnson, a free-lance horticultural and business writer, wrote this article.)*



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