

Ochsner employs two-wire irrigation system in Dayton

Dan Ochsner, head groundskeeper for the Dayton (OH) Dragons of the Midwest League, was experiencing "phantom" electrical problems last spring at Fifth Third Field. He called in J.C. Wheaton, manager for Centerville Landscape and Irrigation, Inc., to help him troubleshoot the problem. "The field had a 'gremlin' problem," said Wheaton. "Zones

would work one minute, but not function the next day. Then last spring they lost the ability to activate about half of the zones from the controller."

While doing patchwork, Wheaton and his crew discovered that the old system was a "rat's nest" of re-spliced wires and riddled with in-ground connections that weren't even close to the valve boxes. "Dan and I decided to finally fix it once and for all. That's when we started talking about two-wire.



Head groundskeeper Dan Ochsner (left) and JC Wheaton, manager, Centerville Landscape and Irrigation, Inc. at the Dayton Dragon's home field.

"After doing the math, we found that retrofitting the ballfield with two-wire would prove to be much more cost-effective than pouring money into the existing faulty electrical," he said.

Two-wire irrigation control systems use just a single pair of wires that extend from the controller to each valve sequentially in the irrigation network. The two-wire path can be branched in any direction that works best for the site.

"In a conventional, multi-wire installation, we'd dig trenches to accommodate wiring from the controller to each station, then extend the common and run a hot wire back to the controller," said Wheaton, "with costs adding up for labor, wire and materials."

"However, we found that systems with over 300 feet of mainline cost less when installed with two-wire and they are easily expandable."

The ability to add valves at any time and anywhere along the two-wire path is one of the system's best-known features—no retrenching.

"Installing two-wire also doesn't require any special equipment or tools, so we could use the same valves that we were familiar with and the same solenoids and waterproof connectors that were already on our trucks. Even the line is typical irrigation wire," said Wheaton.

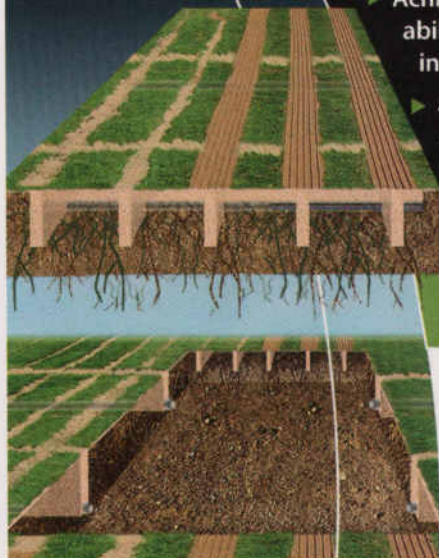
Back at the ballfield, Wheaton and Ochsner decided to go with an Underhill 2Wire system. They brought in a new Hunter ICC Controller, but kept the Hunter I-25 and I-40 rotors, along with the 2" HBV (Hunter brass



Underhill decoders are attached to every valve and irrigation programming is relayed to each valve over the two-wire system.

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IRRIGATION & DRAINAGE



Hunter ICC is set up for operation with two-wire decoder module, which directs all 13 stations.

valves). They also ran new wire and connected the valves to the two-wire system with Underhill's 2Wire Decoder Receivers. A Hunter rain sensor was added for improved efficiency.

Renovation started April 1, 2008 and was completed in 4 work days, with a little juggling around the Dragons spring schedule.

Since the entire system was going two-wire, when the new ICC was installed, the crew just snapped the Underhill ICC Decoder Module into the first module slot. To verify the ICC module was correctly inserted, the installer pressed and held the Push button until a green LED programming light flashed to indicate the Decoder Module had been correctly mounted. All 13 stations were then enabled.

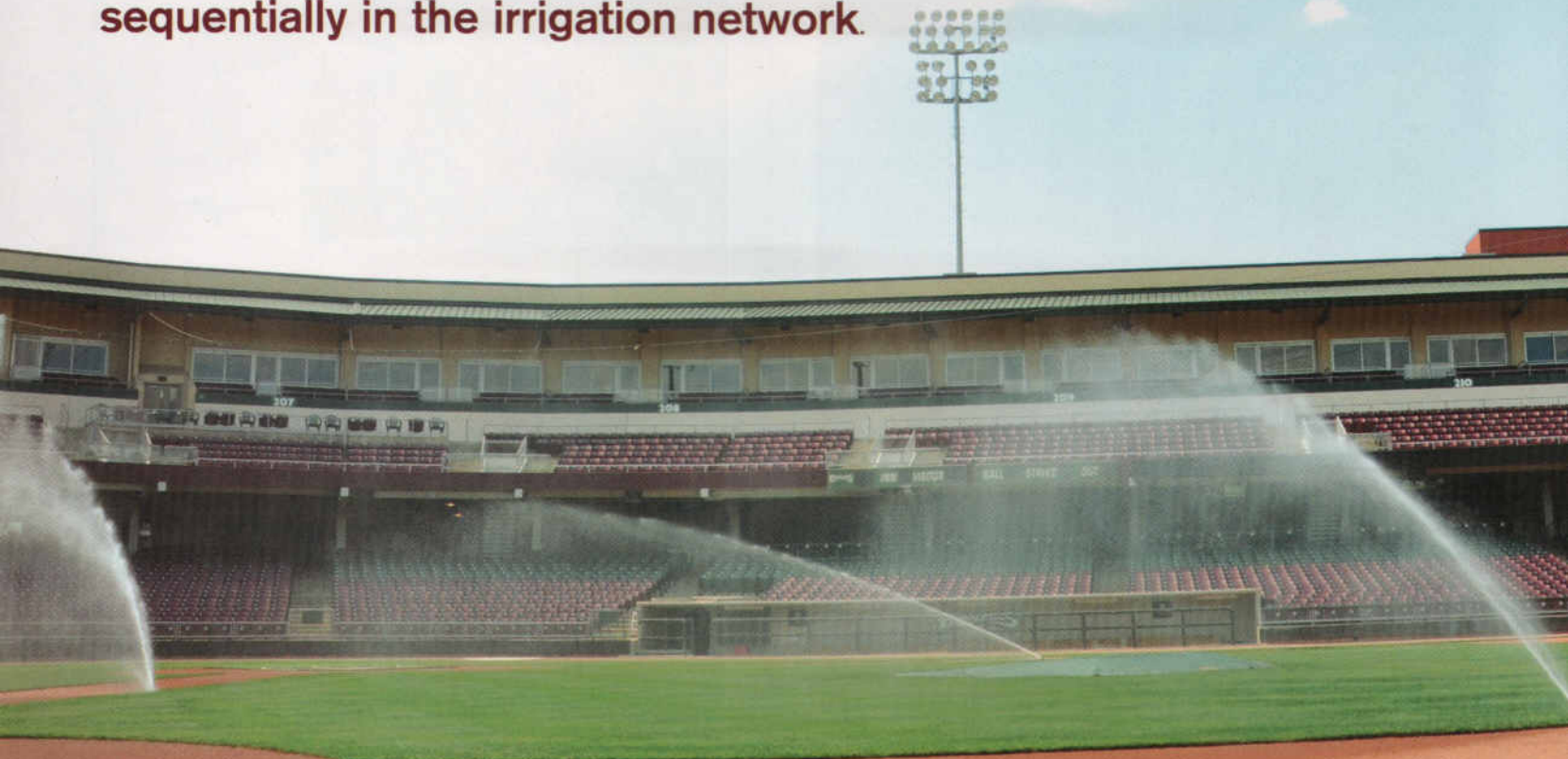
Each valve decoder/receiver was set with a unique station address before the decoders were installed. That way, when the controller turned on a decoder station, it sent power down the main two-wire cable along with a digital signal (the address) that was specific to each valve decoder. As the decoder/receiver heard its address, it applied voltage to the solenoid, completing communication from the controller to each station.

All Fifth Third Field valve decoder/receivers were programmed with Underhill's portable Programmer/Tester. There is also a built-in decoder programmer on the ICC Decoder Module, which allows the installer to program a valve decoder station number by inserting red and black decoder wires into the ICC Decoder Module.

Connecting Valves and Decoders

The Centerville crew routed the main two-wire cable between each control valve location and the ICC. At the valves, they cut the main cable

Two-wire irrigation control systems use just a single pair of wires that extend from the controller to each valve sequentially in the irrigation network.



Hunter I-25 and I-40 rotors at work with new control system.

and stripped back the outer insulation 4 inches on each cut end. They then stripped each conductor one-half inch and the four wires on the decoder one-half inch. After they spliced the decoder's red and black wire into the main cable, they connected the decoder's red wire to the main cable's L1 conductor and the black to the L2, then attached each of the decoder's yellow wires to each solenoid wire valve. All wire splice connections were done using waterproof connectors.

Back at the ICC Controller, they routed the main two-wire cable through the conduit and attached the conduit to the controller at the large portal at the right side bottom of the cabinet. They then stripped one-half

inch of insulation from ends of the main two-wire cables and secured each conductor into the bottom two terminals of the ICC Decoder Module. They finished by connecting the conductor with the decoder's red wires to L1 and the conductor with the decoder's black wires to L2.

Ochsner reports they've had great luck with the system, which runs the irrigation every evening with water from an on-site well. He has five zones of 180-degree heads on the perimeter, running for 10 to 18 minutes, and eight zones of 360-degree rotors on the field, typically irrigating for 20 to 30 minutes.

Ready for all kinds of Midwest weather, the field is turfed with Kentucky bluegrass, overseeded with perennial ryegrass and has an efficient sand-based rootzone drainage system. Drain lines are set 18 inches below grade, running parallel at 25-foot intervals.

"My only two-wire recommendation is that the irrigation installer prepare a detailed system plan that identifies each valve and decoder and the overall number of zones. This will save hours of time during troubleshooting, such as locating bad solenoids or identifying non-working zones," said Wheaton. ■

This article supplied by Hardwick Creative Services, Encinitas, CA

Where to use two-wire

Two-wire is used on sites where the costs of installation and maintenance are a consideration, typically systems with more than 300 feet of mainline. Two-wire is also recommended for use on sites that might be installed in phases or unexpectedly expanded, such as a community sports facility or college sports complex.

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Irrigation and drainage go hand and hand

As demand for water increases so does its cost. But of greater consequence to those who manage sports fields is the real possibility that irrigation water use in the foreseeable future is going to be seriously curtailed.

In managing sports turf it seems to be that we either have too much water around in

which case we need to undertake drainage, or too little, in which case we need to irrigate. The two are interdependent on one another and can no longer be treated as separate entities.

It's unwise to compromise in the design of irrigation and drainage schemes to save a little money initially. You should be looking upon both as major capital investments, which can

Shelton System 25 installing secondary drainage in soccer stadium.



earn a good return over a number of years. Time and time again one sees serious shortcomings in practice as a result of compromises made at the installation stage.

Consider the situation of excess soil water on your fields. Modern drainage systems can move up to one inch of rain in one hour. Main drains are usually sited off the main playing area and the lateral drains are spaced at 5, 7 or 10 yard intervals depending on the design criteria. The high-speed wheel trenching machines cut with precision, conveying the excavated soil into trailers running alongside leaving a clean surface finish.

Superimposed over these piped drains there needs to be a secondary drainage system to speed the passage of water to the pipes. Two alternatives have been used in Europe: the Shelton Gravel Band Drainage and Shelton System 25. Both install gravel bands 1 inch wide and down to a maximum depth of 13 inches, and 16 inches respectively, spaced at 16-32 inches apart.

Gravel band drainage is a trenchless system. The operation has to be carried out when soil is moist and this prevents summer work unless irrigation is available. Disruption is minimal and the area can be brought back into play immediately. Because of the close spacing of the bands soil shrinkage is less of a problem and significant settlement in the bands rarely occurs.

The Shelton System 25 is designed to dig trenches with minimum disturbance to the playing surface. To this end it has a conveyor carrying the excavated soil to a trailer running alongside. Simultaneously, a vibrating hopper on the rear of the machine places a permeable fill in the trench in a one-pass operation.

Often in the past the drainage water was allowed to go to waste, which can be a case of money down the drain when one realizes that 1 inch of rain falling upon an acre is in excess of 22,000 gallons. Today the scheme designer should be planning for its storage in order that it can be used for irrigation in drier times. Run-off from paved areas and buildings can be considerable, and where possible, should be conserved also. However rain water from car parking areas may be polluted and need treatment before being used for irrigation purposes.

Increasingly reclaimed water is being used for irrigation. It is essential to get such water analysed on a number of occasions and over a

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IRRIGATION & DRAINAGE



Above: Gravel Band Drainer installing 1-inch wide bands in Gateshead Stadium, England.



Three-ton Gravel Band Drainer installing gravel to surface. Aggregate can also be set down in the trench.

period of time before making a decision as to whether it is safe to use.

Reclaimed water from sewage treatment plants serving mainly residential areas may be treated at the plant to remove high levels of phosphates. However, from our experience, lapses can occur and irrigated sportsturf can soon be receiving more phosphates than is good for the plants.

One needs to take great care in using reclaimed water from industrial areas for one hitch at the treatment beds can do untold damage on the sports field.

Reed beds for foul-water treatment are increasing in popularity for some domestic and semi-domestic situations. Reports suggest these work extremely well but it would be wise to get analytical reports before proceeding.

For too long installers of land drainage and installers of irrigation have worked apart. As a result one sometimes blames the other when pipes and control cables are seriously damaged. The lack of joint planning leads to a chaotic network of underground services. Substantial sums of money could be saved initially and in the ongoing situation, with forethought and cooperation.

The use of a high speed wheel trencher for installing irrigation pipes up to four inch diameter minimally impacts established playing surfaces. It also can be easier to ensure that the design depth is achieved and the location of the pipes can be permanently marked by adding sand in the backfilling operation.

Whether to install irrigation pipes below the drainage pipes or vice-versa is a matter of personal preference for the pros and cons of each appear to balance out one another.

In other ways, too, drainage and irrigation of sports fields go hand in hand. The Shelton gravel-banding technique described above was developed as a drainage technique but it is also capable of dramatically saving irrigation water. In hot weather when irrigation is applied daily the top 3-4 inches of the soil absorbs this moisture and much is evaporated. The grass roots are mainly in this zone. If water is withheld the plant is quickly put under strain. With a gravel band drainage system in place the irrigation water passes through the gravel bands to lower depths often 10-12 inches.

Considerably less water is lost to evaporation. The pattern of applying irrigation water in these circumstances needs to be changed. Best results are obtained by two or three short periods of irrigation as opposed to one long one. If the land drains begin running then too much water has been applied. Gravel banding looks set to be equally important to the irrigator as it is to the drainer.

Turf managers everywhere are looking for cost savings. Architects, too, need to consider the on-going management and maintenance of new facilities once they are built. Closely integrating the drainage and irrigation aspects leads to greater efficiency and effectiveness. ■

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