

Retrofitting: Pros and Woes

by Robert A. Bodi, CID, CLIA, CIC

Water is one of the key ingredients in maintaining quality turf on sports fields. Without a well-designed, installed, and maintained irrigation system, your job is a lot harder. Even a poor sprinkler system beats dragging a hose around the ballfield; be thankful for what you've got, and focus on how to make your system the best it can be.

I have never seen a system that's 100-percent efficient. In the real world, they just don't exist.

On the other hand, I have never seen a system that could not be improved. Before you send a crew member out with a PVC saw and the old trencher, consider the capabilities of your existing system, and think about the qualities you're looking for in a new system.

Water needs

Knowing your turf's water requirements is the most important factor in determining your needs and developing a plan of attack. The irrigation system is blamed for the poor turf at



Director Robert Bodi designed the master irrigation system at Joy Christian Athletic Complex. *Courtesy: Robert Bodi*

many facilities: the system can't talk back and it's an easy out.

An irrigation audit may prove that the system is adequate, but is not being used wisely. About 25-30 percent of the time, the problems can be solved without even getting a shovel out of the truck.

Remember, an irrigation system is only as good as its design and the person using it. You must know the requirements of your turf to be able to manage your systems properly.

Many factors help determine water requirements. Combined with the efficiency rate of your system, factors

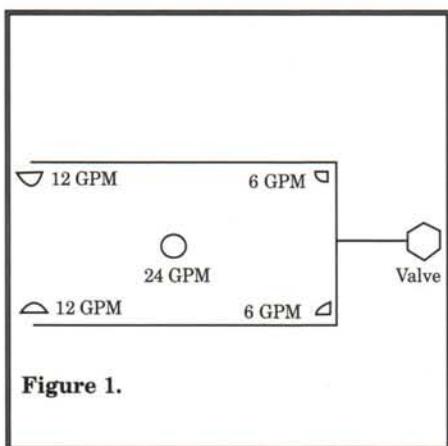


Figure 1.

such as soil profiles, water holding capacity, soil infiltration rate, and the evapotranspiration rate in your area will dictate how, when, and how much to water. If you don't understand these principles, you need to retain the help of an irrigation auditor or irrigation professional.

Soil is a holding tank for the turf's water requirements, and it must be replenished before permanent wilting occurs. Irrigation systems can be a sports turf manager's best friend or worst enemy.

Let's look at some of the reasons to consider retrofitting or scrapping irrigation systems.

Poor efficiency

One of the most common ways to test system efficiency is with the "catch can" method. This entails distributing open-top, straight-sided cans over the field, cranking up the irrigation system for at least 10 minutes, and then measuring the amount of water in the cans. If you place a can where two zones hit it, you'll need to run both zones for the same amount of time to get an accurate reading.

The amount of water delivered to a given area, measured in inches per hour, is the precipitation rate. If the system runs for 20 minutes, multiply the amount of water in the can by three to calculate the rate in inches per hour.

- **Example: 0.15 inches x 3 = 0.45 inches per hour**

Don't be surprised at the vast difference between water levels in different cans. They can vary as much as 30-40 percent. But this simple test will tell you how efficient your system is.

You can also determine the distribution uniformity (DU) of your system using catch can results. Stated as a percentage, DU measures the

uniformity of your system. It tells you how your driest area compares to your average precipitation rate in the area tested. Refer to an irrigation book or consult your irrigation professional to calculate the DU of your system.

If system efficiency results are unsatisfactory, you need to decide if moving heads and/or changing nozzles will bring acceptable coverage, or if the system should be scrapped.

Old systems

Some systems installed 15 to 20 years ago still run great. Others can be made into good systems, and others should be replaced. The age of your system isn't the most important factor; it's all about meeting the requirements of your turf.

Many older systems can be converted by simply changing nozzles, moving certain heads, and adding heads. But in doing this, you must not exceed 5 fps in your piping to maintain proper hydraulics and prevent opening the system to water hammer. This is difficult if you have inherited systems and don't know the size and routing of your pipes.

If you have a high-maintenance system that won't run properly, get rid of it. It will fail when you need it most. You risk losing good turf, and you'll be digging up the field frequently, disrupting its use.

Consider your options

After examining your system, the hard question is: Do we fix it or start over? If the system itself is the problem and money is no object, replace it. If budget constraints force you to live with portions of the existing system, to what depth do you retrofit it?

One of the most common problems with irrigation systems is poor precipitation rates. This can usually be corrected or improved by changing the nozzles in your rotors.

Rotors have a specific flow: the amount of water that comes out of the nozzle, measured in gallons per minute (gpm). The gpm rate is changed directly by the pressure at the nozzle, measured in pounds per square inch (psi). The system's pressure, degree of rotation, and nozzle play important roles in matching precipitation rates.

The manufacturer of the type of heads on your field can supply information you need. Manufacturers list performance details, including a range of pressure ratings at which each nozzle performs efficiently, the

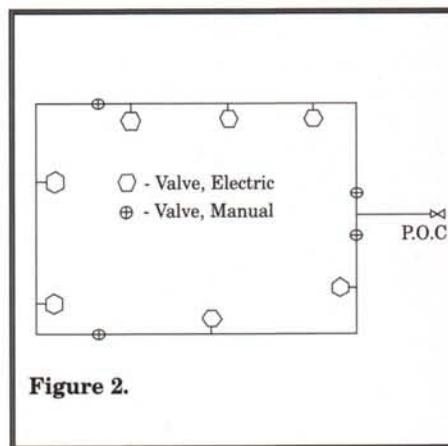


Figure 2.

effective radius for that model at that pressure, and the output of the nozzle at that pressure and radius.

To match precipitation rates, you must first determine the area each head is covering. This is designated by the portion of a full circle that the spray pattern covers (in degrees).

For example, in **Figure 1** five heads cover part of a soccer field. Two of the heads cover an area of 90 degrees, two cover 180 degrees, and one covers 360 degrees. The 90-degree heads supply water at six gpm; the 180-degree heads supply 12 gpm; and the 360-degree heads supply 24 gpm.

As this irrigation system runs, each 90-degree area within that zone of the field receives a uniform amount of water: six gpm. The rotors in this zone have a matched precipitation rate. This is where you need to be with your system; but be careful. To do this properly, you have to know the available pressure, the size (thickness and length) of your underground pipe, the number of outlets on the system, and the spacing of the heads. You also need a general knowledge of hydraulics.

A simple change of heads can increase a system's efficiency. Newer heads give you more advanced technology and more choices, and they need less maintenance. Make sure the new heads' throws (the distance the stream of water travels) are compatible with those of your existing heads.

Sometimes, adding a head or two is the best and simplest way to attain better coverage in a certain area. Again, be careful. You must know the size of your piping and your pressure and flow rates, so you don't overload the system. You also have to match new nozzles to existing ones for uniformity.

To gain more control over your system, consider a new clock. Many new

clocks have features such as cycle and soak, syringe cycle, multiple cycles per day, and multiple programs with several start times. This controller is the heart of your system; don't try to cut costs here to save money. You'll be sorry you did.

System overhauls

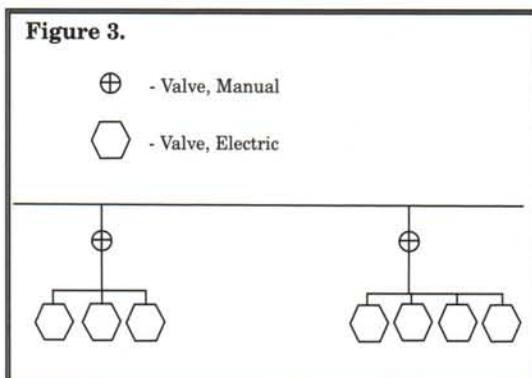
If the budget allows a complete overhaul of your system, consider features that could save you a lot of time and maintenance in the future. Isolation valves are a great way to control a system that's partially down. With properly located isolation valves (see **Figure 2**), you can leave a portion of your system up and running while you fix a problem in another part.

Using isolation valves directly upstream from manifold valves is a very good investment. Here again, if you have a bad valve and have to cut it out, you can leave the other part of your system running as you do so (see **Figure 3**).

Quick connects are another nice addition to a main line. Use them for watering the infields, cleaning the dugouts and bleacher areas, or washing sidewalks.

A rain-sensing shut-off can shut down your system in case of rain. Most have adjustments that allow you to set the amount of rainfall that will shut down the system.

in the past. Whether you need a new system or need help with your old one, hiring a good, certified contractor is well worth the money. And don't be afraid to ask questions. This field is your baby. □



Don't try to do anything in your retrofitting that makes you uncomfortable. There are many qualified people to help you if you get stuck. Most irrigation suppliers have people on staff that can be a great help.

If you decide to hire a contracting firm, check out the work that its done

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