# Retrofitting irrigation for football fields

Ask just about any irrigation consultant about retrofitting irrigation for an athletic field, and their response will be the same—if you're a dedicated professional, you're already retrofitting monthly, if not weekly.

"Every time you move a head, repair a swing joint, or replace a sprinkler nozzle, you're retrofitting your system," explains Jeff Bruce, president of Jeffrey L. Bruce & Company LLC in Kansas City, MO. Bruce, a board member of the American Society of Irrigation Consultants (ASIC), qualifies his statement with two caveats: "You preserve system integrity using parts specified in the original design; and you keep records of all activities, from replacing valves, to splicing wires, to syringing hot spots, to dealing with drainage issues, and make periodic system adjustments according to those data."

## In-house retrofit

There are two primary areas of consideration when embarking on the proverbial retrofit journey: repair history, and system operational auditing. Both of these areas represent opportunities for the turf manager to make a significant difference in system performance without expending significant capital.

Tracking repair history is relatively straightforward and serves several purposes. By documenting "failures" in your irrigation system, very clear patterns emerge over time. Consider developing a spreadsheet that will track location, specific irrigation component(s), time of year, soil and turf conditions, damage to the system or turf area, and time and expense associated with repairs.

Compiling repair history information helps to identify and exploit trends on your football field, and quantify expenses associated with problem areas. What better way to justify an upgrade or retrofit expenditure than to offer a cost/savings analysis based on documented history?

Most irrigation consultants will suggest or perform an audit of your site and your system. "Even if you plan on bringing in an expert, to be effective you have to be as familiar with your system as possible; plus irrigation consultants are much more effective when you already have baseline data in hand," Bruce explains. "Nobody knows your site and system better than you."

An as-built plan is a great place to start. If you don't have one, get one. If you do have one, ensure that it's current and accurate. Then get out to the field and start taking measurements. Remember, you're assessing and refining coverage uniformity and everything that contributes to it.

Measure and chart zone-by-zone the distance between heads. At each head, measure and record pressure at the nozzle. Adjust any tilt and grade issues, then check each sprinkler nozzle for wear and damage. Ensure nozzle sizes are according to original design specification for matched precipitation rates. Throughout this process, make all changes that will quickly yield results.

Next, run a catch-can test for each zone to determine your low-quarter distribution uniformity. This will determine your minimum runtime per zone that ensures the area getting the poorest coverage still gets the minimum required irrigation for good turf health.

"Every field has its own wear patterns," says Bruce. "So while you're assessing irrigation, be sure to include information about compaction problems; sun and wind exposures; equipment traffic and so forth. Many of these issues can be resolved through a retrofitted irrigation system."

You should become intimately familiar with your control system. To complete Phase I, make a comprehensive list of functions and features you would like in a new control system, including capacity for future demands.

You've brought your existing system as close as you can to operating specifications. If you're still having operational or performance issues, consider taking it to the next level.

## Bringing in a pro

If your in-house retrofit didn't yield adequate results, your coverage or performance problems may be more systemic. Serious hydraulic issues or poor turf performance may flag a system that just can't perform under changing field conditions. This would be a good time to bring in some outside expertise.

"Generally, by the time an irrigation consultant is brought in, we find that the systems are maxed out. They're undersized and the piping is stretched," admits Bruce. "Over time, demands typically change and the system rarely has the buffer to accommodate that."

Bruce says he focuses a retrofit on three areas: the heads and peripheral distribution system; the electrical system; and the piping system; and how they all tie-in with the soil type, water quality and turf cultivar. "We attempt to isolate improvements to the system first," he explains. "We start with heads, nozzling and coverage because that's typically where systems go awry. Sprinkler heads have the shortest life cycle in the system and can provide the greatest return for the least cost. Good quality matched-precipitation turf heads really impact coverage and turf quality."

Then he suggests reviewing the control system: the number of stations in use and available; how reliable it has been; how many control-wire splices have been made; whether or not there have been problems with ground faulting. If your control system is in relatively good health, some of your hydraulic issues might be resolved or postponed through scheduling strategies.

Finally, it's time to work your way into the heart of the system, the pump station and piping, which ultimately have to perform to specification for the rest of the system to deliver. "As we start looking at water service pressure, there are significant opportunities to improve irrigation system efficiencies," says Bruce. "Things change. There may be areas of new development around the site that have

dropped system pressures, like a new subdivision or mall."

Adding a jockey pump can contribute to system pressure, but oftentimes the system is so out of kilter that an entirely new pump station is in order. "Typically, older stations use a staging of constant-drive pumps," he says. "Generally, we specify VFDs, or variable drive pump controls, so the station performs continuously at its peak on the pump curve. But if the budget or project doesn't allow for that, we do what we can through scheduling to keep the constant drives operating in the sweet spot of the pump curve."

### Planning a total overhaul

Some projects just can't be pieced back together, and a ground-up design is in order. Under such conditions, with an appropriate budget, the existing football field is removed, including the growing medium, and replaced with a new medium, drainage, new irrigation, new soil and new sod. Because an irrigation consultant can specify irrigation and oversee the overall construction process, the end product is assured to perform as designed.

"A legitimate independent irrigation consultant will take as many factors into consideration as we can identify when doing a complete ground-up retrofit," says Bruce. "Including the timing, to optimize seasonal turf recovery, safety and liability issues specific to sports turf, permitting and compliance, water sources and potential alternate water sources, and the like."

Bruce says the current trend for football fields, particularly in the Southeastern Conference, is to eliminate irrigation equipment from the playing surface altogether, specifying big-gun turf cannons that punch into the ground and rain 200 gallons of water per minute 300 feet through the air from the sidelines. "They're also good for crowd control," he adds. "But, it's expensive. We have to use big pipe and high-pressure pumps."

For more traditional field retrofits, the general strategy for head placement is to keep them away from high-use areas. Bruce avoids placing heads in any hashmark areas. "We generally spec a four-across or five-across system, but some managers like the ability to water down the center of the field," he continues, "It's about what's best for the manager, the site and the front office."

Appearances and liability are very important in sports turf, and the need for greater attention to your irrigation system runs hand in hand with that. Getting an outside professional involved guides you in implementing, phasing and budgeting a retrofit project while advocating your position as turf manager.

Whether you're replacing a head or rebuilding an entire irrigation system, retrofitting irrigation is more of a philosophy than it is a task. Keeping your irrigation system running at original design performance levels is a professional ethic, not just part of the job. ST

*The American Society of Irrigation Consultants (ASIC) provided this article. For more information about ASIC or its members, call 508/763-8140 or visit www.asic.org.*