Protect Your Irrigation System From Winter's Fury

Northern turf managers must build flexibility into their irrigation systems to avoid serious damage.

By Lawrence Cammarata

Those of us in northern climes who contend with winter soil frost lines down to four feet have a strong appreciation of nature and its power. Pipes, sprinklers, wires, valves, boxes, etc., are continually "heaved" and moved all winter. Install something poorly in the fall and it will have to be redone in the spring.

In most cases, there is little we can do to "beat" our weather conditions. However, there is much that can be done to make a system "give" with the conditions.

Winter protection must begin with design. This is the initial key to providing a system that is reliable year after year, even with repeated winter abuse. For example, any system will usually be installed in the upper 12 to 24 inches of the soil profile. These systems are in the direct line of fire for winter abuse.

Techniques such as "pipe pitching" are intended to direct water flow to an automatic or manual drain for winter water removal. If this pipe were truly pitched during installation, it doesn't necessarily remain that way, due to frost heaving, after the first season. Each fall, less and less water will be released as more of it remains in the piping system. This remaining water then freezes and expands to continually, over time, weaken fittings and pipe through fatigue. Each year system-damage and spring-activation costs increase.

Mainline systems on all projects should be set up in such a way that compressed air can be introduced into the system at key locations and provide for the easy removal of the majority of water from the entire mainline system promptly. An outlet needs to be designed into the water source(s) just downstream of the backflow prevention device so it can be used as the point of connection for the compressor hose. Quick couplers should be included at the end of the mainlines, or at isolation points in looped system design, to allow for water release. Of course, these would be useful for manual watering during the season, but just remember to place them in designated key locations so that high volumes of water can be released from the system easily during winterization. Also, design quick couplers to be placed next to electric valve groupings or in a valve box itself for ease of location during winterization.

Pumping systems can be designed to require very little winterization when well thought out. Study and use of sprinklers, valves, etc. that perform better than others during winterization procedures and during harsh winter months. Poor designs will result in systems that are hard to maintain and winterize.

Installation Precautions

Construction techniques must also strongly support the fundamentals of ease of maintenance. No system should sacrifice those tools needed for a long, durable life for the sake of saving a few dollars during construction.

In these climates of heavy frost, building-in flexibility for heaving is very important. All systems should be installed with some appropriate flexible unit at each sprinkler. Valves should be installed so that valve boxes do not rest on the incoming pipe. Mainlines are to remain completely outside of the electric valve boxes. These comments are based upon providing extra space for wintertime movement.

It is very important for the installer to produce reliable, accurate "as-built" drawings. Keep copies in your file for reference during site changes, winterization, and service.

Accurate as-built drawings provide information that tells the winterization service crew where to begin and where to end. The drawings also warn them of peculiar issues and how to deal with them. As-builts provide a picture to show buried drip lines or isolated quick couplers around the corner that everyone forgot about.

The installing contractor should provide written details about the known needs of the system as part of the as-built

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production process. While these details may not be a problem if the installing contractor remains under contract, they will be important if another firm takes over servicing.

With "as-built" drawings in hand, and a well-designed and installed system, the service contractor begins winterization. This service firm will usually pull up to the curb and extend the air compressor hose to the designated tap provided.

On larger projects with multiple taps and/or looped mainlines, a "game plan" must be thought through and implemented. The overall goal in all cases is to replace the full water volume with equal or greater air volume and push the water out from one point to another. Looped mainlines will need to be isolated to create single independent flow direction. Multiple tap systems will also need to be isolated, one tap from the other, to form independent flow directions.

To begin the winterization process, the service crew must first shut down the water source. If it is a metered system, it may be as simple as shutting a valve. On a pump station designed for non-winter removal, it may be the same (shutting a valve) plus shutting off power. In others, it may require suction line removals, hydraulic valve pumping or microchip removals.

Once the water source is shut down, the compressor can be hooked up to the provided location(s). Find the small drain tap by the water meter. This allows for compressed air to be directed through the meter by the opening the drain tap.

Firms that have been winterizing with compressed air have found air pressures of 70 to 80 psi combined with air volumes of 160 cfm will service most properly laid out systems on large recreational fields.

Larger or some poorly designed sites may require two or more compressor units to provide the air volume needed to purge water from the system. Remember full air volumes are the key to the best system purging. Compressors operating at 70 to 80 psi and providing 160 cfm will winterize most systems in an hour or two. A golf course system, for comparison, usually needs at least two compressor units and requires up to two days to purge water.

Turn the compressor on and let it build up the desired pressure. Once accomplished, go to the end(s) of the mainline and insert a quick-coupler key into the quick coupler provided (or threaded connection — remove cap/open valve). When the key is completely inserted, water will begin to flow. Gradually a combination of water and air, next very moist air and water vapor, and finally just air will be released. Mainline purging is now complete. (Time frame varies with system.)

Designs and construction that provide these provisions (quick couplers and outlets) will be easily and completely purged in shorter time frames, and in a much more thorough manner. Larger volumes of water are released first through the mainline, making circuit-by-circuit procedures less time-consuming.

Next, go to the irrigation controller and activate it, circuit by circuit. Repeat the same process looking for the same results as discussed above. Follow this by locating any manual circuit, drip circuit, fountain system supply taps, lake fill lines, etc. and perform the same process. If additional quick couplers are on site, the same procedure should be followed.

On larger systems with varied topography an additional step is taken. After the initial winterization occurs compressors are shut down. The remaining water is allowed to "pocket." Later, the compressors are reactivated and the remaining water will be purged.

With the system now purged of water for the winter, you can be assured that only a minimal amount of water will reenter the system through sprinklers. Water will not accumulate in volumes large enough to cause damage.

In areas of the country where frost enters the ground but does not reach the piping systems, the use of drain valves may be sufficient as a method of system freeze protection. Our designs usually will work toward system purging with compressed air unless site conditions and topography work very favorably to drain the system. ❑

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