IRRIGATION & Design Equipment

by Nate Hines

Potable water resources available for landscape irrigation are increasingly competing with other water needs. For landscape architects, it is essential that our profession develop systems to irrigate and support vibrant, healthy landscapes, and in doing so, engineer our design processes efficiently and specify equipment that will conserve the most water possible. Depending on the region of the country and the type of site, the irrigation water requirement for a given project may comprise 25 percent to 75 percent of the site's total water budget. The infrastructure demands are immense in treating, storing, transferring, and distributing water for irrigation, but with careful engineering and the right products, the potential savings are huge.

Given the increased awareness around sustainability issues in recent years, a plethora of irrigation products have emerged that claim to save water. Specifiers face several challenges in identifying the right piece of equipment for the job and integrating it into a larger water-handling system. It's important to figure out how specific pieces of equipment help meet the conservation goals of the owners and the design team. Among the competing priorities in planning and designing a system are its environmental impact, capital infrastructure costs, and operational and maintenance impact. Each of these priorities is intimately connected to the others. For example, environmentally responsible use (or, ideally, reuse) of water helps to cut a project's energy requirements, as do solutions that reduce maintenance. It is essential that those who design irrigation systems outline their costs and benefits thoroughly and keep each of these factors in mind. My firm has found some great products in the equipment categories described below that balance sustainable conservation, cost, and ease of maintenance.*

In-Line Fertigation Healthy soil makes for healthy plant material. Fertilizer injection systems, which are connected to the irrigation system, downstream of the cross connection control device, condition the soil each time the irrigation system runs. What we find especially exciting are reliable, inexpensive aspirating systems, which are becoming increasingly common. Unlike a traditional injection system, which utilizes above-ground storage tanks and requires a power connection, these compact aspirating-type systems require no power, provide incredible accuracy in dosing fertilizers, and will fit below grade in a valve box. You should work with manufacturers who have aligned themselves with providing organic and natural soil conditioners, fertilizers, and herbicides. There are some excellent manufacturers out there who will provide free seasonal treatment recommendations if given a soil and water sample. We are seeing up to a 30 percent reduction in water, up to 90 percent reduction in fertilizer requirement, and a virtual elimination of fertilizer runoff. Additionally, if the unit is sized properly, maintenance personnel are able to fill and check the fertigation device in 15 to 20 minutes every six weeks, instead of spending hours or days fertilizing manually each season.

We love these products because they are inexpensive, provide significant water savings potential, encourage the use of organic soil conditioners and fertilizers, eliminate chemical runoff, are easy to refill, and require little maintenance.

Weather-Based Sensors and Control The growth in communications technology affects the green industry in numerous ways – not least by introducing a number of inexpensive, site-specific weather-based sensors that provide real-time weather data to a project irrigation controller. This information is used by the controller to update watering schedules to closely match actual site conditions and plant water requirements. For years, site weather stations and capable, yet expensive, central control systems have led the charge in electronic, sensor-based water management. Today, for the appropriate project size type, you may specify a controller with a small on-site weather station for $1,000. Testing shows that these systems can perform within several percentage points of the traditional $20,000 weather station – that is huge value for a very reasonable investment. In our opinion, every site could benefit from utilizing this type of user-friendly, water-conserving technology.

Other equipment you may wish to consider for future projects may include moisture sensors, rain or freeze sensors, and a host of reasonably priced communication options that allow project owners or maintenance contractors to monitor system operation from any Internet-ready computer terminal in the world. Paired with a master valve and flow sensor, this capability provides a powerful system-management tool to detect high or unscheduled flows and shut the system down in the event of a pipe break. A communication-enhanced control system will alert the appropriate personnel via email or text message.

Water Storage When planning regional or site development, water capture and reuse is a key component to reducing potable water use, recycling available on-site water resources, and contributing to stormwater management strategies. Traditionally, water-storage equipment has represented 70 percent of the total infrastructure cost associated with reusing harvested stormwater, greywater, condensate or blowdown from building cooling systems, reclaimed (treated effluent) water, or raw (ditch) water. This assumes that on-site lake storage, which is significantly cheaper if space is available, is not an option. There is

an increasing awareness of storage technologies from around the world, many of which can reduce the costs of storage by up to 50 to 60 percent. Providing sub-grade storage of a variety of water types and allowing great flexibility of placement (beneath parking lot areas or sports fields and the like), these systems can often be integrated into a site or regional stormwater management strategy to provide additional cost offsets for what has been traditionally seen as just another piece of an overly expensive irrigation system.

Although the price can be high, and routine maintenance is required, we have found smart water storage strategies are essential for greatly reducing or eliminating potable water use for irrigation and other incidental water requirements on project sites.

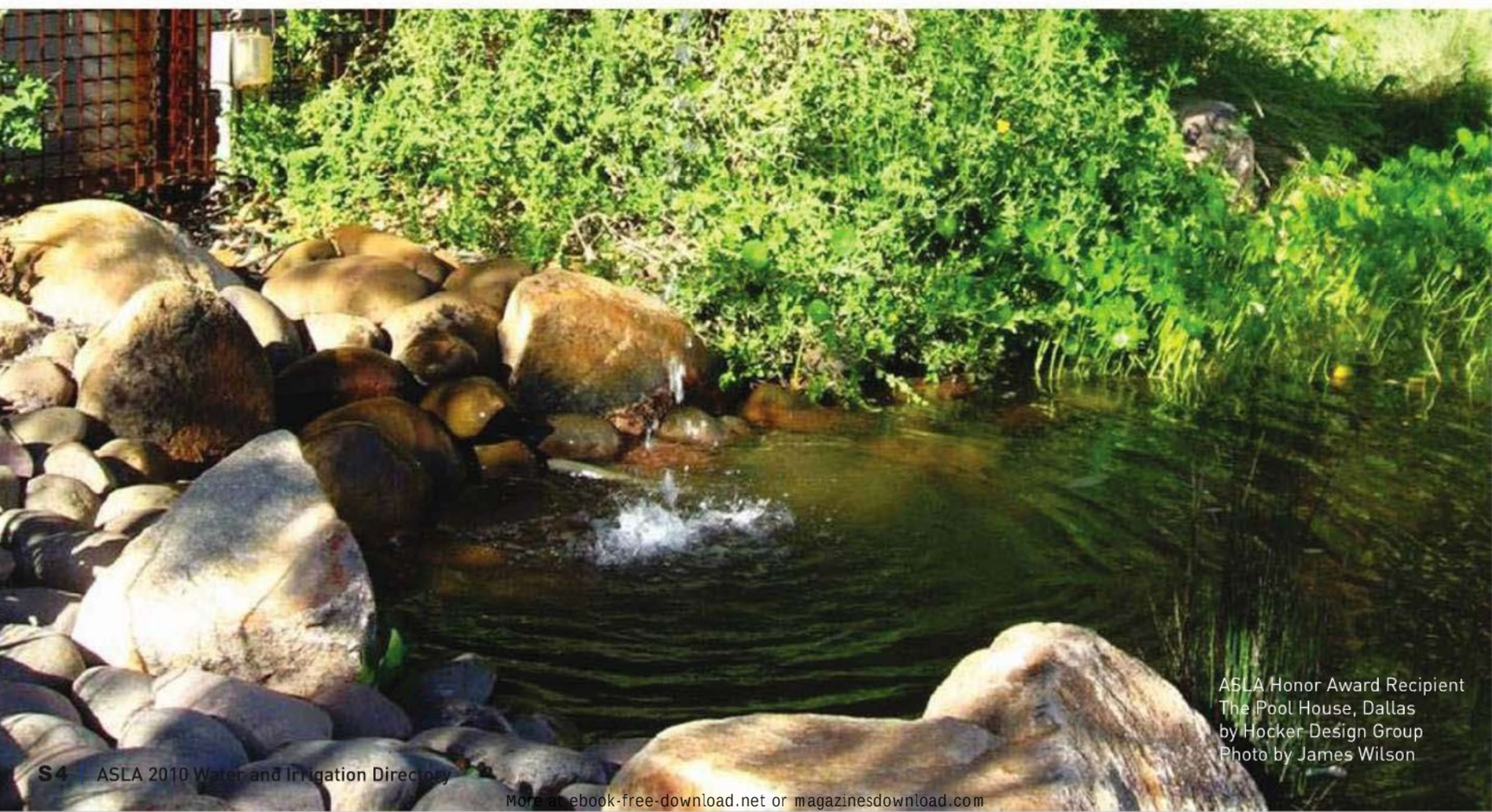
VFD Pump Control Irrigation pumping systems, which are often essential on projects that rely on a non-potable water source, may include a rather complex control system to manage the variable operational requirements inherent in an irrigation system's operation. Variable Frequency Drive (VFD) pump controls provide a system for controlling the speed of the pump motor. This is important because an irrigation system may function at several different, and frequently changing, flow rates. By changing the speed of the pump motor, a VFD will provide constant system pressure at a variety of flow rates. The primary savings comes in the electricity required to operate the pump; however, because the pump output is matched more closely to demand, the pump, filter equipment, and irrigation system are not subjected to the full force of an operating pump. This directly contributes to a reduction of wear-and-tear on the pump station and all downstream appurtenances. Reduced maintenance most certainly cuts maintenance staff travel time, CO_2 emissions (saved through less travel to the project site), and industrial pollutants (given that fewer replacement parts are needed).

WE HAVE FOUND SMART WATER STORAGE STRATEGIES ARE ESSENTIAL FOR GREATLY REDUCING OR ELIMINATING POTABLE WATER USE.

The cost of great VFDs has dropped dramatically in the past five years, making the VFD-controlled pump station more attainable for a site that would have opted for the traditional single-speed pump system.

*Please note that we have assumed each product considered has been manufactured, tested, and proven in the field prior to specification.

Nate Hines is principal of Hines Irrigation Consultants Inc., of Fort Collins, Colorado, and Phoenix, Arizona. Hines is highly recognized for his work integrating sustainable solutions into the design process of large scale and unique projects, both in the U.S. and abroad. www.hinesinc.com



ASLA Honor Award Recipient
The Pool House, Dallas
by Hocker Design Group
Photo by James Wilson