PUBLIC AGENCY WHITE PAPER

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Five Tips for Safer, More Efficient Roadside Irrigation

Latest irrigation technology makes it possible to maintain attractive vegetation while reducing liability, water use and labor costs

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State and federal transportation agencies tasked with maintaining our country's highways have one primary concern—keeping drivers, pedestrians and roads maintenance employees as safe as possible. In addition to keeping highways clear and in good repair, these agencies must also maintain the surrounding areas by mowing the grass, reducing the amount of weeds and trimming trees. Roadsides that are landscaped with desirable trees, shrubs, flowers and grasses are less likely to become overgrown with wild vegetation that could obscure a driver's vision and cause an accident. Studies have shown that a carefully designed roadside landscape also improves aesthetics, controls erosion, reduces glare and prevents storm water pollution.

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However, establishing landscaped areas along streets and highways requires transportation agencies to achieve a delicate balance between safety, water conservation and budgets. Irrigation systems are often necessary for the ongoing health and beauty of these landscapes, and these roadside systems must be designed and maintained with both safety and water-efficiency in mind. A poorly planned, outdated or inadequately maintained system can lead to overspray on paved areas, creating slick conditions that can result in traffic accidents. Older irrigation systems are also more susceptible to main line breaks, a potentially catastrophic situation that could result in thousands of gallons of water poured onto roadways. Not only are these aging systems unsafe and inefficient, they also put transportation agencies at greater risk for costly litigation.

While public safety is paramount, transportation agencies are also under intense pressure to reduce the amount of water they use for irrigation. Research has shown that many of the irrigation systems currently in use near roadways throughout the United States date back to the 1970s, resulting in higher water consumption and the need for more expensive repairs. In fact, some states with limited access to water, such as California and Arizona, are enforcing new regulations that ask transportation agencies to improve the efficiency of their irrigation systems within a specified amount of time—or stop using them altogether.

Fortunately, there are new, innovative solutions to those safety, budgetary and water efficiency concerns. Today's affordable irrigation technology can create a much safer environment for pedestrians, motorists and highway workers while also using less water, keeping roadsides beautiful on a budget. From sophisticated central control software to water-efficient drip technology and sprays, the following

advances in irrigation now make it possible for vegetation managers to strike a balance between healthy, desirable vegetation and the need to save both money and water. These five tips are designed to help anyone who manages roadside irrigation develop revamped and revitalized systems that save money, time and water while keeping turf and plants looking their best.

Tip #1
Stay in Control with Control Systems

Effectively managing an irrigation system is one of the best ways to address water efficiency. The newest irrigation controllers not only enable users to set the frequency and duration of watering, they can now make scheduling changes based on real-time weather conditions, seasonality, soil type, geographic location and plant type. This weather-based, or "smart," technology is taking irrigation control to an amazing level of precision. While smart controllers are incredibly sophisticated, once they've been installed and programmed, they can make it much easier to efficiently manage an irrigation system on a daily basis.

These controllers can automatically suspend irrigation during significant precipitation events and even subtract rainfall amounts from pre-established watering schedules to determine exactly how much additional water should be applied for optimum plant and turf health.

Today's controllers also offer more manual scheduling options, making it simple to set watering schedules with roadway traffic fluctuations in mind. For example, controllers with a cycle and soak program enable irrigation managers to stretch out the application of water on the site based on soil and terrain conditions. This valuable feature allows water to soak into the soil and decreases dangerous runoff that can contribute to serious safety issues, particularly in areas with steep slopes.

Central controls also offer the additional benefit of constant monitoring, which is especially important for any agency concerned with public safety. Sensors at each location can detect high-flow and low-flow situations, alerting managers to potential problems before they become catastrophic. Considering the fact that a problem like a main line break can have a disastrous result when combined with vehicle traffic, central controls can provide invaluable peace of mind. Some central controls even offer the ability to create customized reports, which is a crucial feature for agencies that must document their water use.

While irrigation controllers are very effective at managing irrigation at a single site, many roadside vegetation managers are tasked with managing irrigation at multiple sites located miles apart from one another. Central control systems can make this job much, much easier. These systems make it possible to program, monitor and operate one or several irrigation systems from one central location—a personal computer. Being able to make individual adjustments to multiple irrigation systems spread

Rain Bird Irrigation Solutions

The following products are just a few of the many Rain Bird irrigation system components that can help public agencies maintain attractive roadsides while saving time, money and water:

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- SiteControl
- IQ
- MDC2

Controllers:
- ESP-LX Modular
- MDC 2-Wire Decoder
- ESP-SMT

Rain Sensor:
- RSD Series Rain Sensor
- WR2 Series Wireless Rain and Rain/Freeze Sensors

Drip Irrigation:
- XF Series Dripline
- XPCN Nozzles

Pressure Regulation:
- DPX Pump Station
- 5000 PRS Rotors
- 1800 PRS Spray Heads

Rotors:
- 5000PRS Series

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over a geographic distance can save significant time and money by eliminating the need for an operator to travel to each site.

Like individual site controllers, central control systems can also have an extremely positive impact on water efficiency. Watering schedules at distant locations can be changed with a few simple keystrokes on an office computer. Weather stations at each site can report back rainfall intensity and evapotranspiration conditions and make automatic adjustments, avoiding irrigation of landscapes that don't need additional moisture. Some central controls also offer extra functionality, such as the ability to turn landscape lights on and off or open and close automated gates.

Tip #2
Keep an Eye on the Sky with Rain Sensors

Because irrigation systems in public areas are so visible, it's even more important for roads departments to do whatever they can to avoid the perception that they are wasting money and water. That's where the latest rain sensor technology can play a crucial role.

Effective and relatively inexpensive, rain sensors can save water and extend an irrigation system's life by automatically measuring precipitation and preventing the system from running its predetermined watering schedule in rainy conditions. Not only does this save a precious natural resource and money spent on needless watering, it also eliminates phone calls or e-mails from drivers and passersby who've observed a public irrigation system in operation during a precipitation event.

Some of the newer rain sensors are completely wireless, making them even easier and faster to install with no need for trenching. More advanced sensors can also be programmed to suspend irrigation if the temperature drops below a pre-determined level, keeping irrigation systems from running in freezing conditions. This is a particularly important feature when irrigating near roadsides, as irrigation water could potentially form icy patches, creating a dangerous driving hazard.

Suitable for commercial applications like roadside irrigation, rain sensors are affordable, durable and easy to install. Due to their relatively small size and low profile, they're also virtually undetectable by drivers or pedestrians, minimizing the chance of vandalism and preserving the aesthetic value of the landscape.

Tip #3

Get Back to Your Roots with Drip Irrigation

The use of overhead irrigation for non-turf areas like planting beds can waste water and promote weed growth. Low volume, or drip, irrigation is often the best way to water these landscaped areas by providing just the right amount of water to plants and shrubs where they need it most—at the roots. Because water is delivered near ground level, it's less susceptible to being blown away by the wind or simply evaporating before plants can absorb it.

Many people think of drip systems as being used most often for smaller, more densely planted areas. The truth is that drip irrigation is extremely versatile, and it can be extremely effective in areas both large and small. Certain types of specialized nozzles offer extremely precise wetting patterns, making them perfect for areas like densely planted roadway medians, parkways or walkways. Point-source drip irrigation, on the other hand, places single emitters along drip tubing at random intervals, making it an efficient way to water large, more sparsely planted areas, like large groupings of shrubs or grasses near highway on-ramps.

In addition to their unparalleled water efficiency, drip systems are also excellent solutions for public areas like roadsides where vandalism can be a problem, as they can be installed primarily below grade with delivery devices masked by plants or hidden under mulch. Drip tubing is one example of a drip system component that can be almost completely hidden from view. Drip tubing can be covered by mulch, with tiny emitters releasing small amounts of water close to the base of each plant. Pop-up micro sprays also deliver effective watering that's only visible to the eye when the sprays are in operation. Water pressure causes these smalls sprays to "pop up" from the ground to their full height, which depending on the model, typically ranges from four to twelve inches. These pop-up sprays then retract back into the ground at the end of their zone's watering cycle. These components of low-volume systems also provide an increased level of safety by reducing run-off and overthrow into thoroughfares or pedestrian right-of-ways.

In the past, drip irrigation had a reputation for being somewhat unreliable and difficult to maintain. Today, the materials used to create drip system components are more durable than ever before, decreasing the likelihood of durability and maintenance issues. Manufacturers are incorporating UV-resistant materials into drip system components like nozzles and sprays, greatly reducing the fading and brittleness that can come from extended sun exposure. Components like drip tubing are now being constructed of thin, flexible polymer layers for superior resistance to chemicals, UV rays and algae growth. While designing and maintaining drip systems does require a little more forethought and planning, after installation, their reliability and almost invisible nature make them a durable, low-maintenance way to keep roadsides beautiful.

Tip #4

Hold Steady with Pressure-Regulating Components

Having optimum water pressure is imperative for any irrigation system to operate at its highest levels of efficiency and safety. If pressure is too low, sprinkler heads or rotors will not be able to deliver enough water to adequately irrigate within their zones, causing unattractive brown turf and unhealthy plants. Conversely, water pressure that's too high will cause sprinklers to emit water as vapor rather than in droplets, an undesirable condition called "misting." When water becomes mist, it's easily blown away by the wind and does not reach the grass or plants for which it's intended. Mist can also drift onto roadways, creating condensation on vehicle windshields and causing hazardous driving conditions. Irrigation technology has advanced to the extent that various system components are now available that can regulate water pressure automatically, making watering more effective and efficient.

Used to boost the operating pressure and gallons per minute output on commercial irrigation sites, today's pump stations can ensure consistent, desirable water pressure to match a system's specific needs. Pump stations are customized for specific sites and applications, taking into account water pressure needs, the size of the area to be watered, the amount of water needed by the system and the water source (fresh water, salt water or reclaimed water, for example.) Because pump stations can be tailored to the needs of the irrigation site, manufacturer's sales representatives are usually available to provide guidance and customized quotes for these products.

On a smaller scale, there are other ways to ensure appropriate water pressure. Sprays, nozzles and rotors are now available with built-in pressure regulation as an option. Some rotors now include in-stem pressure regulators for optimum distribution uniformity and no misting due to high pressure. For smaller turf areas, pop-up, pressure-regulating sprays can significantly improve system performance, even in situations with widely fluctuating or very high water pressure. While certain spray heads improve performance while the system is in operation, some more advanced sprays can also restrict water loss by up to 70% if a nozzle is removed or damaged, perfect for public areas like roadsides that are not under a homeowner's watchful eye.

Tip #5

Customize Your Delivery with Specialized Rotors and Nozzles

Perhaps the most readily recognizable elements of an irrigation system, rotors and nozzles have made major advances in both efficiency and appearance. Now, there are new and improved versions of these system components that can deliver the right amount of water for just about any turf application—low pressure and steep

slopes, high wind areas, non-potable water and areas where vandalism could be a problem. Selecting just the right rotor or nozzle for an application depends upon all those factors, as well as the size of the turf area being watered.

Pop-up rotors—significantly more pleasing to the eye and less susceptible to damage than the old impact rotors on risers—are now available in a wide range of models that can deliver water in distances ranging from 15 to 81 feet. The latest rotors are not only more specialized, they're also designed to provide better water efficiency and head-to-head coverage.

Rain Bird rotors include a unique feature called Rain Curtain Nozzle Technology™. These rotor nozzles are designed with special watering ports that deliver uniform mid-range and long-range water distribution as well as effective close-in watering by reducing the speed at which water is emitted close to the head. This gentle distribution of water eliminates dry spots around the rotors and ensures that the right amount of water is distributed throughout the radius range for less waste and healthier, greener grass.

Meanwhile, some newer spray nozzles now offer a second orifice to minimize brown spots around spray heads and provide more uniform water distribution. These highly efficient nozzles cut watering times, save water and money and reduce waste. Another popular nozzle, the rotary nozzle, features an attractive rotating stream and an efficient, low precipitation rate that makes it perfect for slopes or any area prone to erosion. Both the newer spray nozzles and the new rotary nozzles improve on the efficiency of conventional spray nozzles due to their lower precipitation rates and improved close-in watering.

Today's irrigation technology offers degrees of flexibility, convenience, efficiency and cost-savings that could only have been imagined just a few short years ago. And that's a very good thing, considering the fact that transportation agencies are under more pressure than ever before to use water and budgets as wisely as possible. For those agencies that could benefit from irrigation upgrades, there's never been a better time to improve both the safety and efficiency of any outdated or lackluster irrigation system. Many water providers are now providing rebates for these upgrades, making them more affordable for organizations on tight budgets. In fact, many upgrades can pay for themselves in a relatively short amount of time by reducing the amount of water used for irrigation. And while that's definitely important, reducing liability and keeping drivers and pedestrians safe is reason enough to reevaluate current irrigation systems and find ways to make them better—today

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