

# In-ground irrigation systems

Design, use and maintenance



**St. Johns River**  
Water Management District

St. Johns River Water Management District  
4049 Reid Street • P.O. Box 1429  
Palatka, FL 32178-1429  
386-329-4540 • 800-725-5922

[www.sjrwmd.com](http://www.sjrwmd.com)

© 2023 St. Johns River Water Management District

## In-ground irrigation systems

One of the most important ways to help meet our water supply needs for today and in the future is through conservation, that is, the efficient and effective use of water.

More than 50 percent of residential water use occurs outdoors, mostly for landscape irrigation. Automatic in-ground irrigation systems have become a common method for watering our lawns. Unfortunately, many of these irrigation systems are inefficient. Sometimes as much as half of the water delivered through the systems doesn't benefit the intended landscaping.

We can have a tremendous impact on the amount of water we use outdoors by using well-designed irrigation systems and performing regular maintenance to keep them functioning properly.

Several things should be considered when installing an in-ground irrigation system.

Florida law requires that all automatic irrigation systems installed after May 1991 have a functioning rain sensor shut-off switch. This switch overrides the automatic irrigation system's cycle when a preset amount of rain has fallen.

Backflow prevention devices are also necessary to prevent water from flowing back into the water main, which can contaminate drinking water.

With Florida's irrigation laws continually being updated, you should consult with or hire a trained professional to design and install an irrigation system. Two of the professional organizations that encourage and provide training are:

- The Irrigation Association  
[www.irrigation.org](http://www.irrigation.org)
- The Florida Irrigation Society  
[fisstate.org](http://fisstate.org)



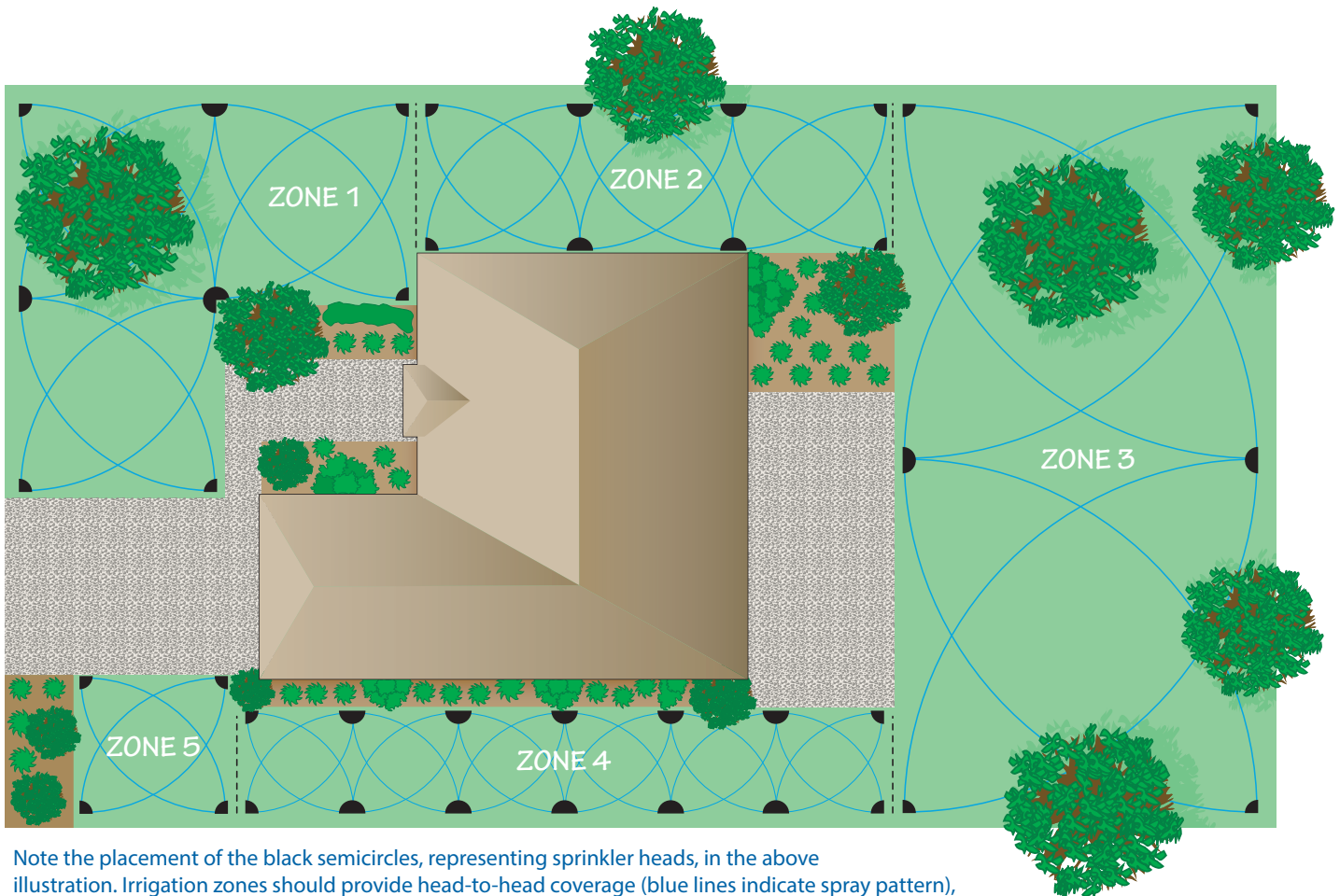
## Irrigation system design

A landscape and an irrigation system should be designed so that they work well together. This means putting your plants in “irrigation zones,” allowing for a system design that will deliver the appropriate amount of water to individual planting beds or turf areas. You should:

- Keep non-turf plants confined to planting beds.
- Group together plants that have similar moisture needs.

**Irrigation zones** — For efficient irrigation, zones are critical. Each irrigation zone should be comprised of the same kind of emitters throughout, be it rotors, spray heads or micro-irrigation.

The rate at which different heads deliver water varies, so for even coverage, head types should not be mixed. Also, heads from different manufacturers vary in coverage, so all heads should be the same brand to ensure even coverage.



Note the placement of the black semicircles, representing sprinkler heads, in the above illustration. Irrigation zones should provide head-to-head coverage (blue lines indicate spray pattern), meaning the spray from one head should reach no further than the next closest head.



The term head-to-head coverage is used to describe proper placement of sprinkler heads to ensure even water coverage. Essentially, the water from one head should reach the closest neighboring heads.

If one type of head in a zone delivers one inch of water in one hour and another type only delivers one-quarter inch, then you may be overwatering one area or underwatering the other. For example, use rotors or pop-up spray heads for turf areas, but don't use both in the same zone.

- Use rotors to water large turf areas.
- Use spray heads to water medium- to small-sized turf areas.
- Use micro-irrigation to water planting beds. Because it is a low-volume irrigation technique, micro-irrigation uses less water than rotors and spray heads. Micro-irrigation systems include trickle or drip, micro-sprays (also known as micro-jets) and bubblers.
- Use drip and trickle irrigation on shrubbery and in planting beds.
- Use micro-sprays and micro-jets for shrubbery or ground covers.
- Use bubblers to establish trees or large shrubs.
- Pressure-regulated sprinkler heads will ensure more even coverage.



Spray head



Gear driven rotor



Micro-jet



Micro-spray



**Head placement** — Spray head placement is just as important as the type of head used in the various zones of your irrigation system.

Spray heads should have sufficiently large bodies so that they are above the normal turf level when spraying water. For example, six-inch spray heads are required to adequately clear properly mowed St. Augustine turf.

Heads should be adjusted to prevent water from spraying onto roads and driveways and to prevent water from spraying onto houses or other obstructions.



Sprinkler heads that are not adjusted can waste water by spraying onto paved areas.



Without proper maintenance, spray heads can become too low to the ground to be effective, such as this example. Use six-inch pop-up riser extensions and periodically raise spray heads above grass beds.



**Pressures and piping** — Adequate pressure must be factored through the entire system, from the water source to the last head on the line. Increases in pressure can occur by improper design, such as by using pipe that is too small. Too much pressure in pipes can cause leaks by wearing down pipes and fittings.

Generally, pressure differences within any irrigation zone should be no more than 20 percent. For example, if pressure at the source is 60 pounds per square inch, or 60 psi, pressure throughout the system should not fall below 48 psi.

Low pressure is apparent when heads emit large droplets, which can cause erosion and runoff. Too much pressure can result in heads misting, allowing water to drift away.

For correct pressures, pipe size is fundamental. Pipes that are too small will account for large differences in pressure, resulting in uneven water application.



## System maintenance

Regular maintenance is required for irrigation systems to operate properly and efficiently. Routinely inspect and adjust your irrigation system and use the following steps:

- Turn the system on occasionally during daylight hours to observe the heads during irrigation, and to check for broken or misdirected spray heads.
- Periodically raise rotors and spray heads above grass beds, because foot and mower traffic tend to push them into the soil.
- Buy and install riser extensions as ground covers grow or grass thickens at the base. These keep spray heads above grass beds.
- Replace or clean micro-spray heads if they are clogged.
- Adjust heads so they cover the target area and don't waste water on tree trunks or sidewalks.
- Clean micro-irrigation filters as needed. Filtration is necessary to prevent spray emitters from getting clogged.
- Use only replacement parts produced by the same manufacturer, as different brands often don't function correctly together.





## Scheduling irrigation

Scheduling your irrigation system to water efficiently is just as important as designing an efficient system and maintaining it.

You don't need to stick to a rigid irrigation schedule. Water only when plants or grass need it, such as when plant leaves begin to wilt a little and when grass blades fold in half or turn a bluish-gray color. Let rainfall be the first and foremost source of moisture for your landscape.

**Controls and switches** — Most irrigation system timers, also known as controllers, allow a great level of control over watering schedules. Familiarize yourself with your timer's functions using its instruction manual or online videos. Often, controllers also have directions on the inside of the cover panel.



**Setting your irrigation controller** — The following shows the programming controls on the illustration to the left, which represents a typical controller:

**LCD display** — During normal operations, this displays the time of day; during programming, it shows the results of program settings; during watering, it shows the zone that is running and the minutes remaining in its run time.

1. Arrow on/off buttons — These set times and days to water, and make program changes.
2. A/B program button — This selects watering program A or B.
3. Manual start/advance button — This starts the irrigation program manually or manually advances watering from one zone to the next.
4. Programming dial — This turns the controller on and off, and is used for schedule programming.
5. Schedule slide switch — This selects one of the fixed-interval watering schedules for a custom watering schedule.

**Programming criteria** — Timers generally have three criteria that need to be set: watering days, start times for each zone and watering duration. Irrigation control settings must reflect mandatory watering restrictions enacted by the St. Johns River Water Management District. Abiding by these restrictions will promote a healthy, drought- and stress-tolerant lawn.

**Watering restrictions** — These restrictions apply to residences and non-residential facilities anywhere within the District's 18-county region that irrigate with water from ground or surface water bodies, a private well or pump, or a public or private water utility.

- Residential irrigation: During daylight saving time (second Sunday in March until the first Sunday in

November), watering is permitted no more than two days per week. Those with addresses that end in an odd number or no number may water only on Wednesday and Saturday, and those with addresses that end in an even number may water only on Thursday and Sunday. During Eastern Standard Time (first Sunday in November until the second Sunday in March), the District allows watering only one day per week, on Saturday at addresses that end in an odd number or no number and on Sunday at addresses that end in an even number.

- Non-residential irrigation: During daylight saving time, watering is allowed only on Tuesday and Friday. During Eastern Standard Time, watering is allowed only on Tuesday.
- All lawn and landscape irrigation must occur before 10 a.m. or after 4 p.m. Irrigation is limited to three-quarters of an inch of water per application, for no more than one hour per day per zone.

There are a few exceptions to these restrictions.

**Watering duration** — The number of minutes that each zone runs depends on the type of head used in each zone.

Generally:

- Rotor zones set between 45 and 60 minutes apply about three-quarters to an inch of water.
- Zones with spray heads set at 20 to 35 minutes generally apply the same amount.
- For newly installed planting beds, set micro-irrigation zones for 60 minutes twice a week for 30 days. Then cut back to once a week until plants are established, which will take no more than another month or two, depending on weather conditions. Then water only as needed.

**Other considerations** — The following factors should also be considered when scheduling irrigation systems:

- During extended periods of rainy weather, irrigation systems should be turned off.
- Irrigation controllers have default programs that take over if a set program is lost due to a power outage. On the controller pictured, for example, if the schedule switch (lower right) is in the “Custom” mode, it will default to watering every day. Reset program after a power outage.

### The “catch can test”

Determine how long your irrigation system needs to run by calibrating each zone with what is called a “catch can test.” To do this test, place cans (about the size of a tuna can) or other containers around your yard and measure the water collected in half an hour.

Measure the depth of water in each can. Average the measurements and use this number to determine how long you need to water to apply three-quarters of an inch of water.

