Irrigation 101: Hunt for Water Savings

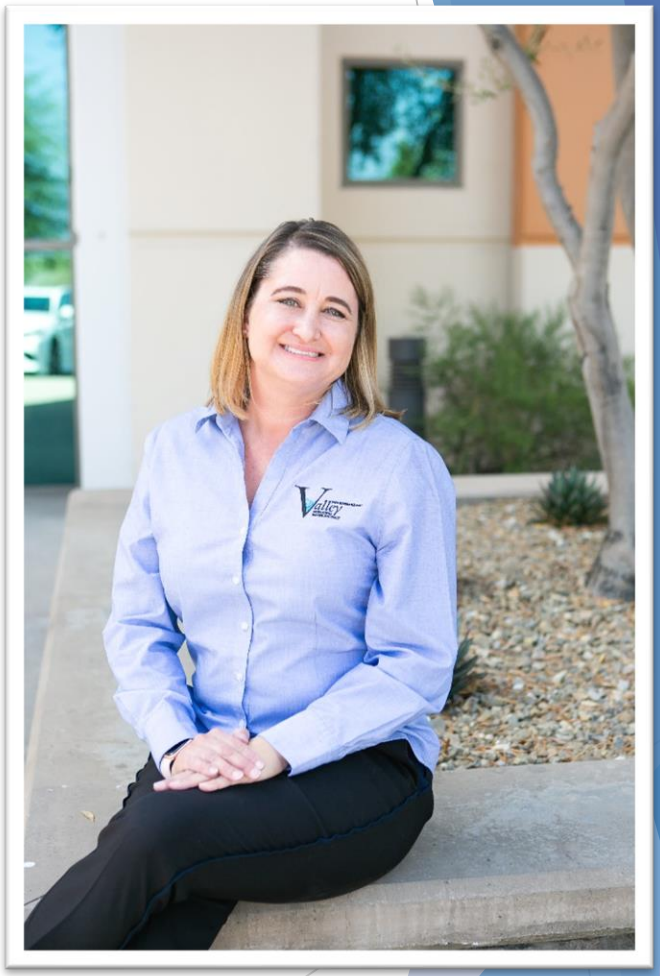
We will begin shortly

Use the "Chat" function if you have questions

Kristeen Farlow

Manager, Water Use Efficiency/External Affairs

San Bernardino Valley Municipal Water District

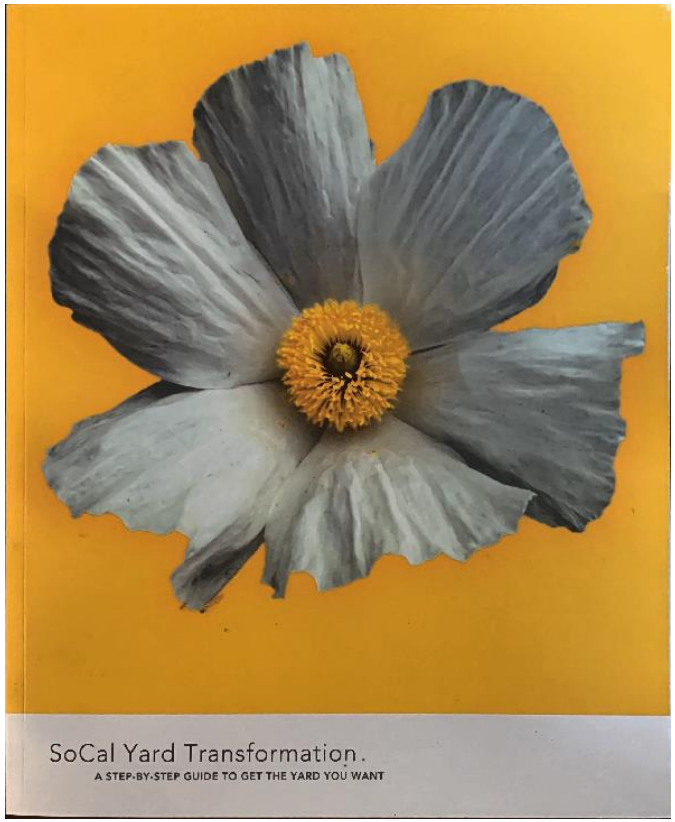


Housekeeping

- This is being recorded
- All attendees are on mute. Use the "chat" function to ask questions.
- 6 sections of the presentation. Your questions will be addressed at the end of each segment.
- You will be receiving a free copy of the So Cal Yard Transformation.

San Bernardino Valley Municipal Water District

SoCal Yard Transformation



Jasmine Orozco Clark
Education Coordinator
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Anita Matlock

Master Gardener since 2003
Irrigation since 1991
Winemaker since 2003
Commercial Owner/Winemaker:
Wildwood Oak Winery, 2016

SoCal Yard Transformation: The Hunt for Water Savings

Anita Matlock

The Cost of Water

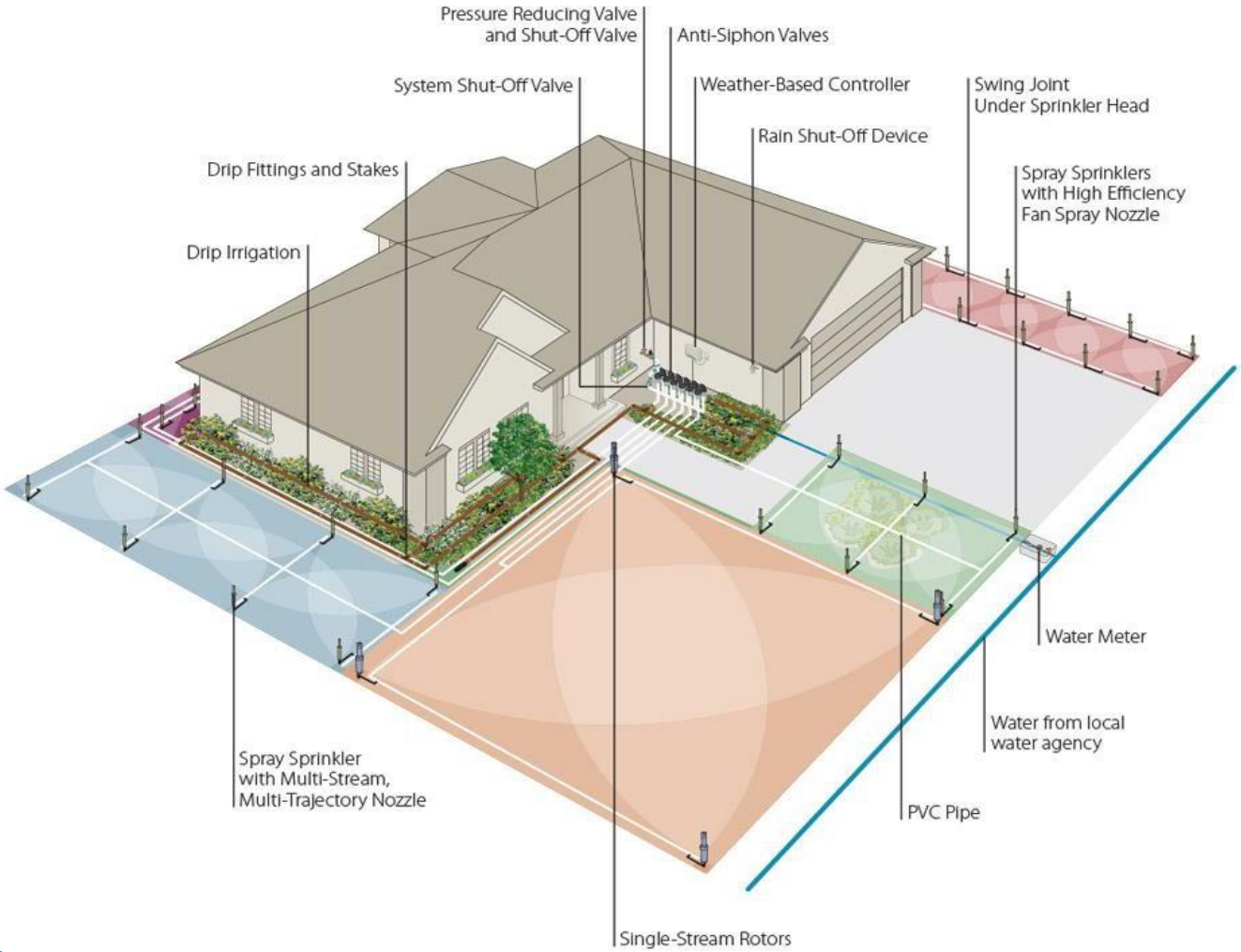
Over-watering creates additional problems that increase costs:

- Leaches nutrients from the root zone requiring the application of fertilizer
- Causes fungus and attracts pests
- Major cause of plant death
- Adds additional time and labor to maintain site
- Runoff damages hardscapes and becomes a liability
- Poor public relations

Leading Causes of Irrigation Water Waste

- Improperly designed, installed, maintained systems
- Inefficient systems using outdated technology
- Incorrect pressure and/or flow for highest efficiency operation
- Water applied at a higher rate than the soil or slope conditions will accept
- Systems operate even though irrigation or rainfall has saturated the soil
- Systems are not adjusted to the current needs of the landscape

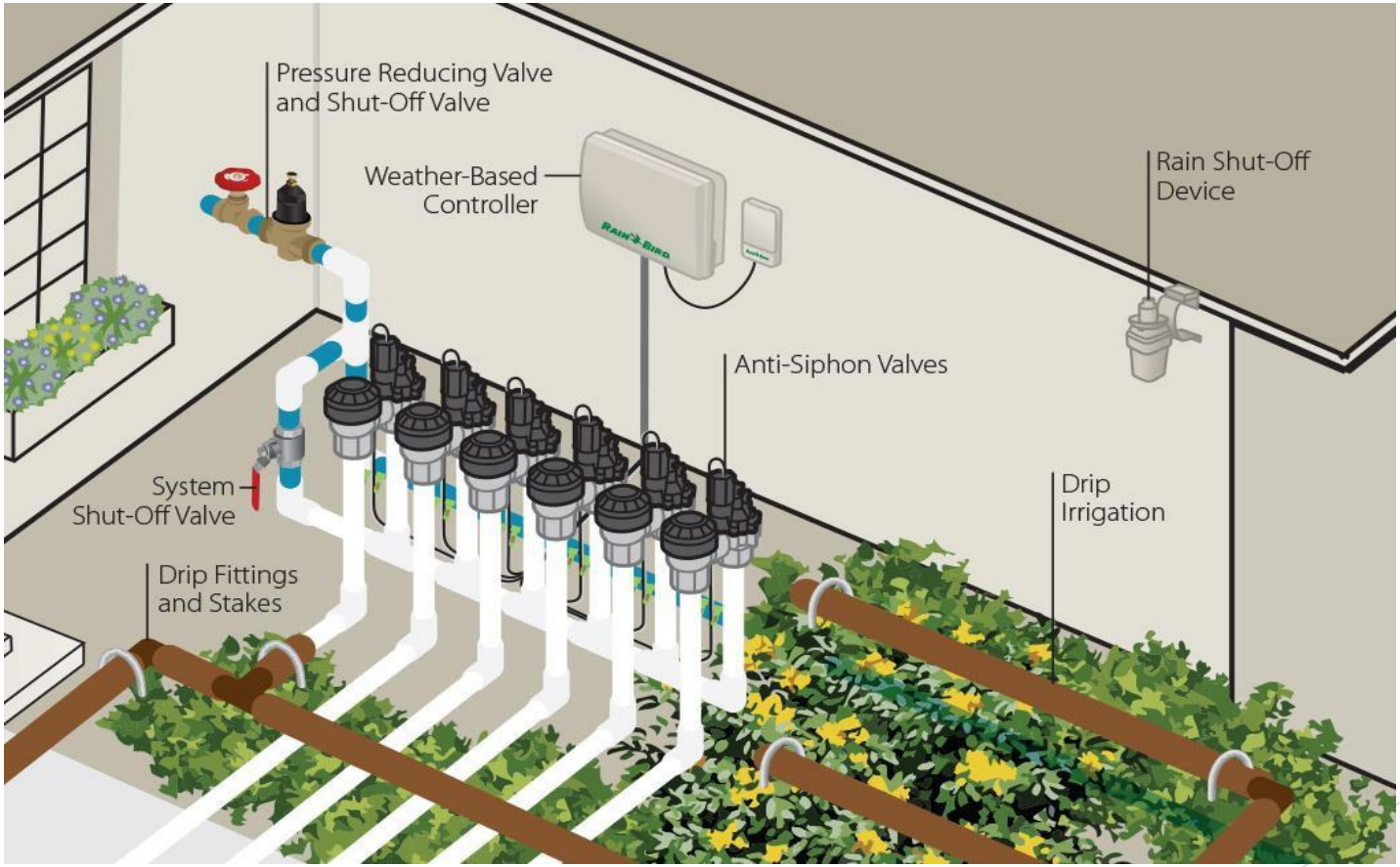
Let's Meet Your Irrigation System


Pressure Reducing Valve and Shut-Off Valve
Anti-Siphon Valves
System Shut-Off Valve
Weather-Based Controller
Swing Joint Under Sprinkler Head
Rain Shut-Off Device
Drip Fittings and Stakes
Spray Sprinklers with High Efficiency Fan Spray Nozzle
Drip Irrigation
Water Meter
Water from local water agency
Spray Sprinkler with Multi-Stream, Multi-Trajectory Nozzle
PVC Pipe
Single-Stream Rotors

6 Key Technologies

1. Weather-Based Irrigation	2. Flow Sensing and Leak Detection	3. Pressure Regulation
4. High-Efficiency Nozzles	5. Sprays to Drip in Planters	6. Maintain, Troubleshoot and Repair

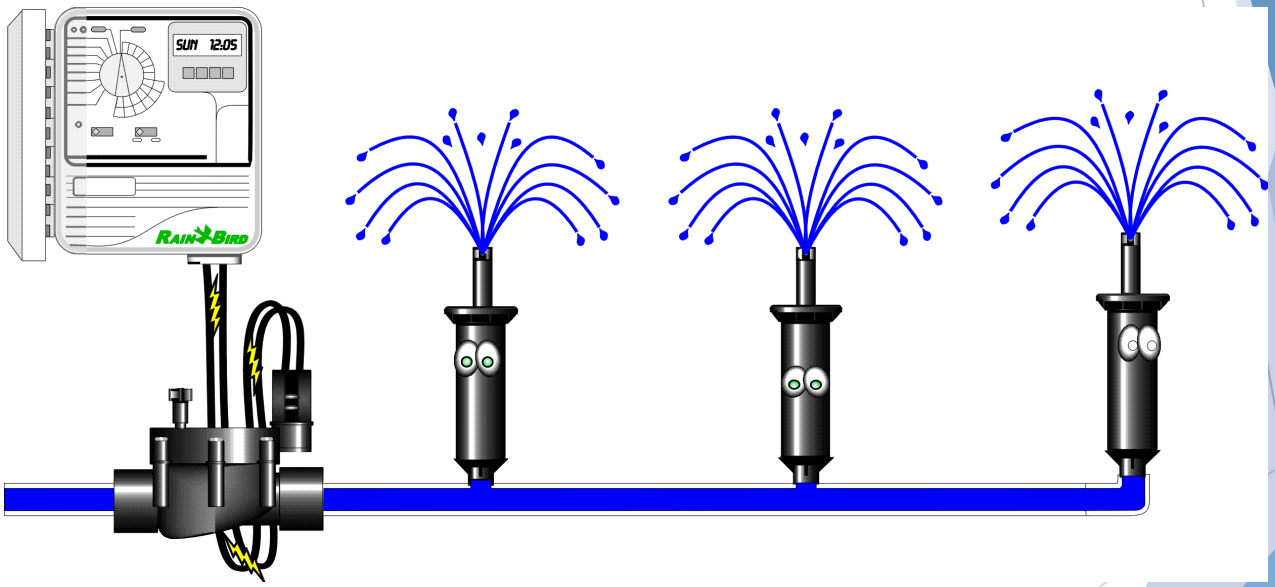
1. Weather-Based Irrigation



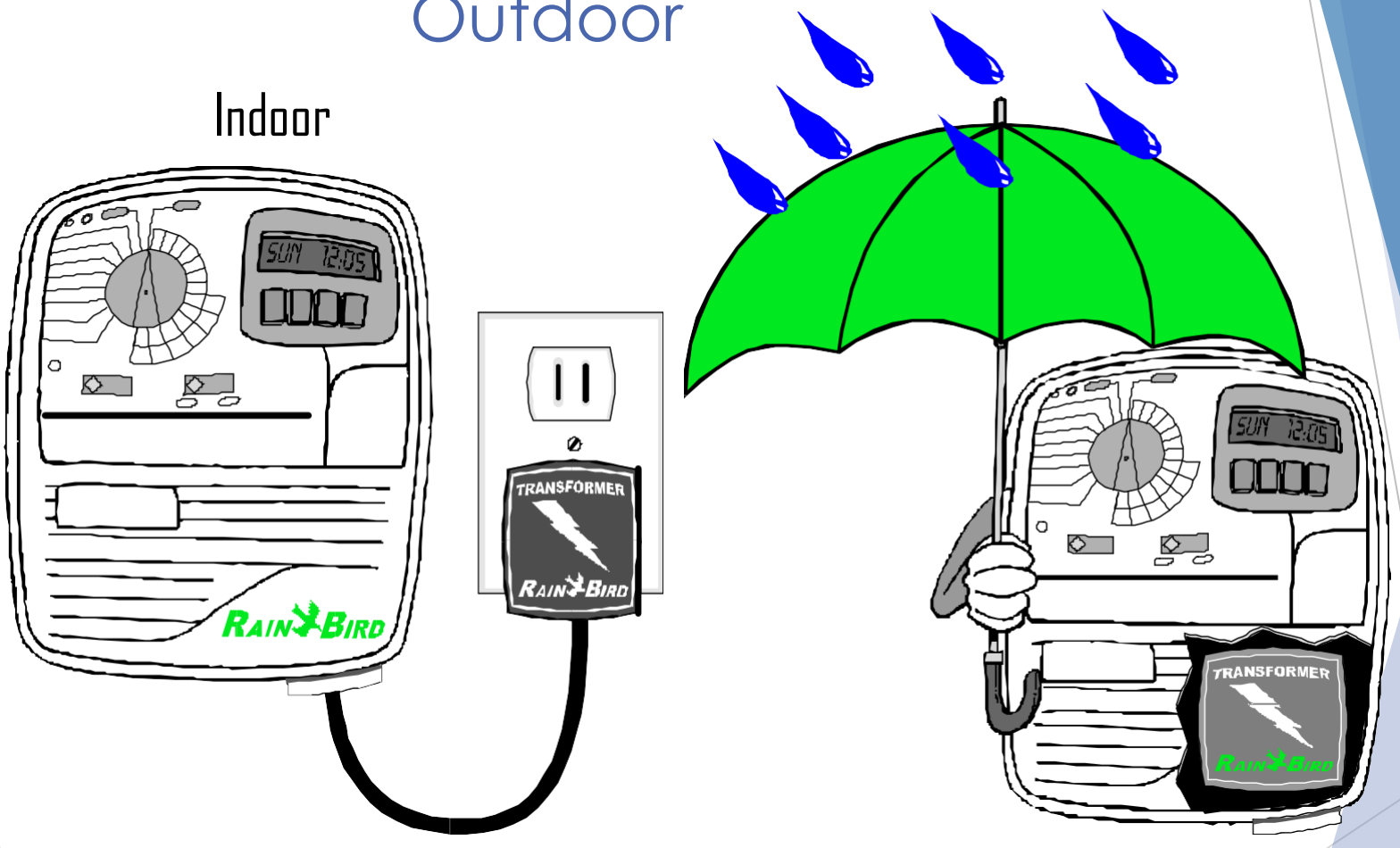
First, let's discuss "controllers"

What's a Controller?

- Also called "Timer" is the BRAINS of your irrigation system
- It tells the system what days to operate, what time to turn on and how long to water



Controller: Indoor vs Outdoor



To program a controller you need to know:

What time is it now?

What time do you want to start watering?

(Start Times)

How long do you want to water?

(Run Time)

What are Run Times?

Run Times -

- The Run Times tell each valve how long (duration) to water.
  - When you program your controller, you will assign a specific amount of time to run for each valve.
  - Calculating the length of run time is called Scheduling and is based on:
    - Sprinkler types
    - Soil type
    - Plant type

If system is not efficient, you are forced to run longer

Could use tuna cans

Scheduling Tips

- Don’t Water the same all year round
- Water in the early morning
- Try cutting back on days; not water times
- Know your soil type; watch for run-off

HOMEWORK!

Process

- Take a pad of paper and a pen
- Use the stopwatch feature on your phone
- Run each valve
- Record the minutes when you see run-off
- Reprogram the controller to match the minutes

Deeper Dive into Water Savings:

- Weather-Based Irrigation Controllers
- Soil Moisture Controllers
- Rain Shut-Off Devices
- Rain Delay/Water Budgeting
- Cycle and Soak

Other Approaches But Less Effective

Rain Shut-Off Devices

- Automatically shuts off the controller when it's raining or sufficient soil moisture is detected

Rain Sensor

Rain Delay and Water Budgeting

- **Rain Delay:**
  - Postpones irrigation when watering isn't needed
- **Water Budgeting / Seasonal Adjust:**
  - Allows the user to easily adjust all run times by % increase or decrease

Cycle + Soak™

- Problem: Apply water faster than soil can accept
- Result: Run off
- Solution: Cycle + Soak™

Cycle + Soak™

- Recommended for slopes and compacted soils
- Another option: multiple start times

Introduction to:
Weather-Based Controllers

Weather-Based Irrigation Controllers

- Controllers that use weather conditions such as rain, wind, temperature, humidity, and ***evaporation*** are called "Weather-Based Irrigation Controllers."
- Evaporation really consists of two factors: Moisture lost through evaporation AND moisture used by the plants through transpiration.
- What term do we call these factors? **Evapotranspiration or ET**

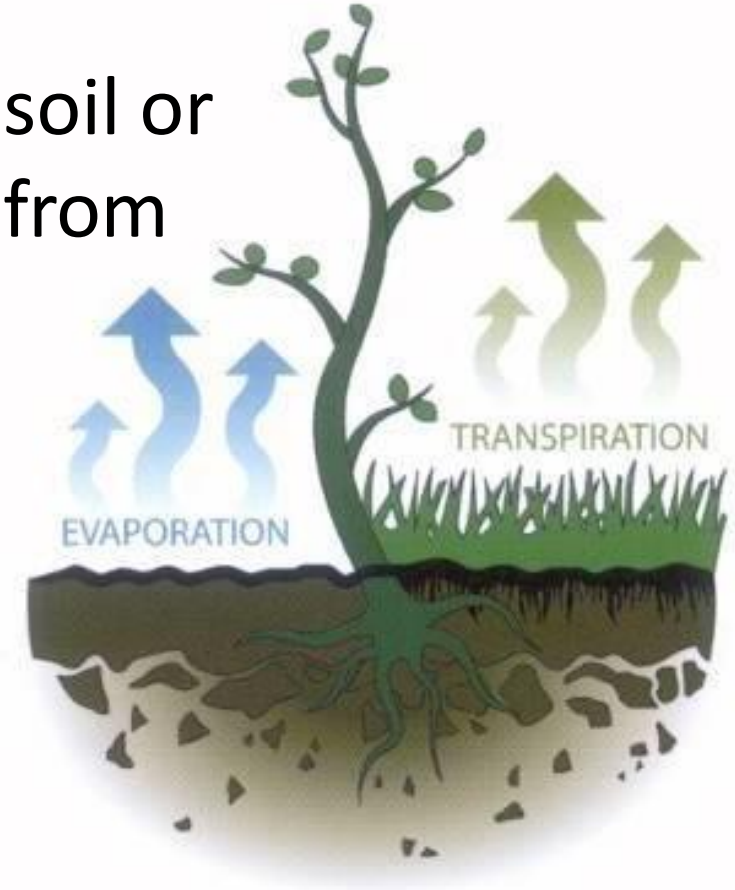
ET-Based Scheduling

What is Evapotranspiration (ET)?

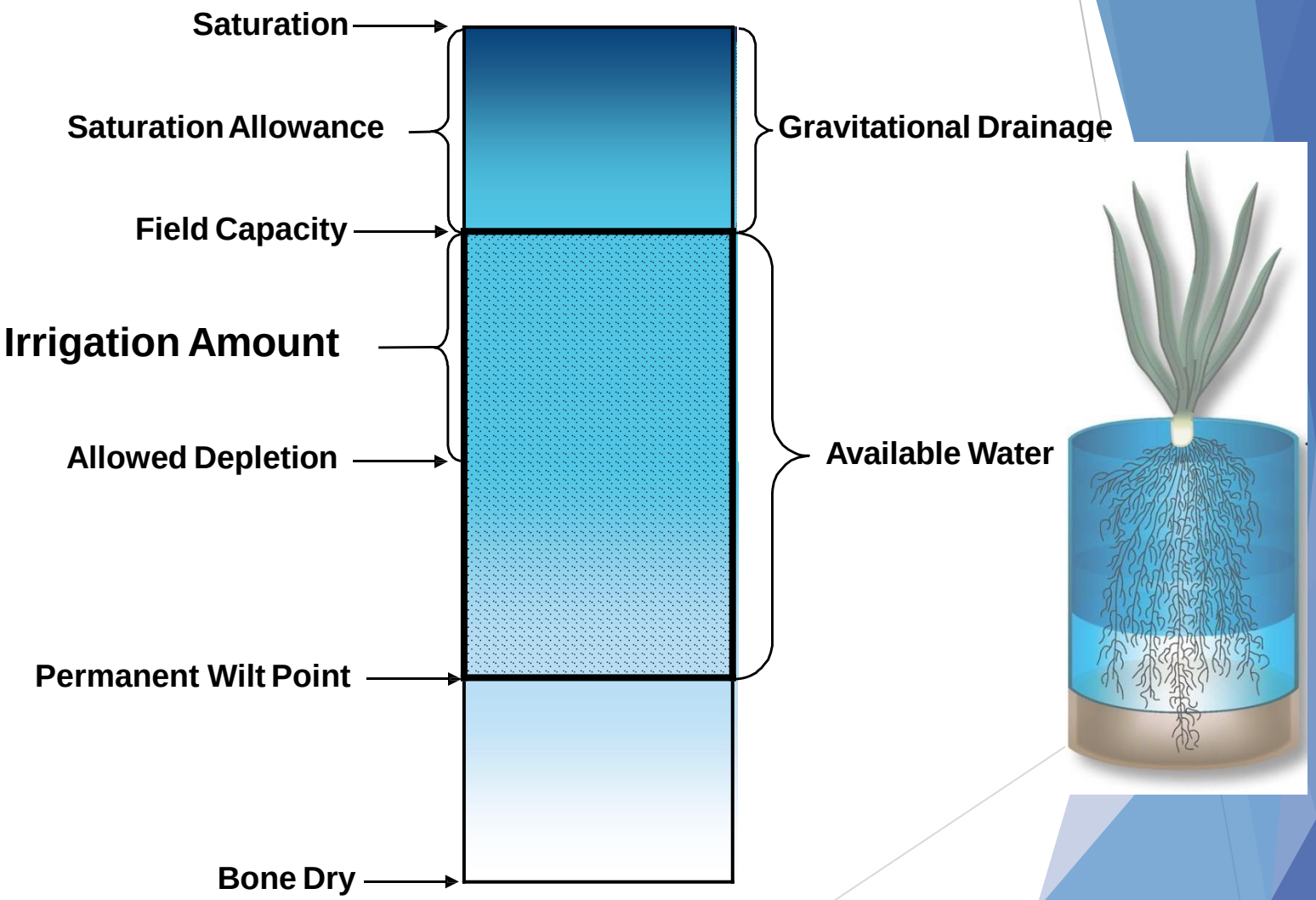
- ET is the inches of water lost to the plant's use through daily evaporation and transpiration
- Effective rainfall (rain that is accepted by the soil) can be subtracted from the ET to calculate the Irrigation ET.
- Irrigation ET is used to calculate the minutes of sprinkler run time required to return the soil moisture level back to desired levels – no more, no less.

Evapotranspiration (ET)

- Evaporation of water from the soil or plants surfaces and transpired from leaves.
- Weather conditions affect ET:
  - Solar radiation
  - Temperature
  - Wind
  - Humidity



Managing the Soil Reservoir



On-Site

Smart Modular Control System

Two Key Components

1. On-Site Weather Sensor
2. Smart Controller

Wi-Fi Controllers

Another Approach – Soil Moisture Monitoring

Soil Moisture Sensor

- **Add-on device for all standard controllers**
- **Suspends irrigation when soil moisture exceeds a set threshold**
- **Simple installation and set-up**
- **Accurate and stable moisture readings – no calibration required**
- **Targeting residential and light commercial applications**
- **Typical water savings of 40% or more**
- **Makes any controller “Smart”**

Summary on Technology 1: Weather-Based Irrigation

-Program the controller carefully

-Consider additional controller features

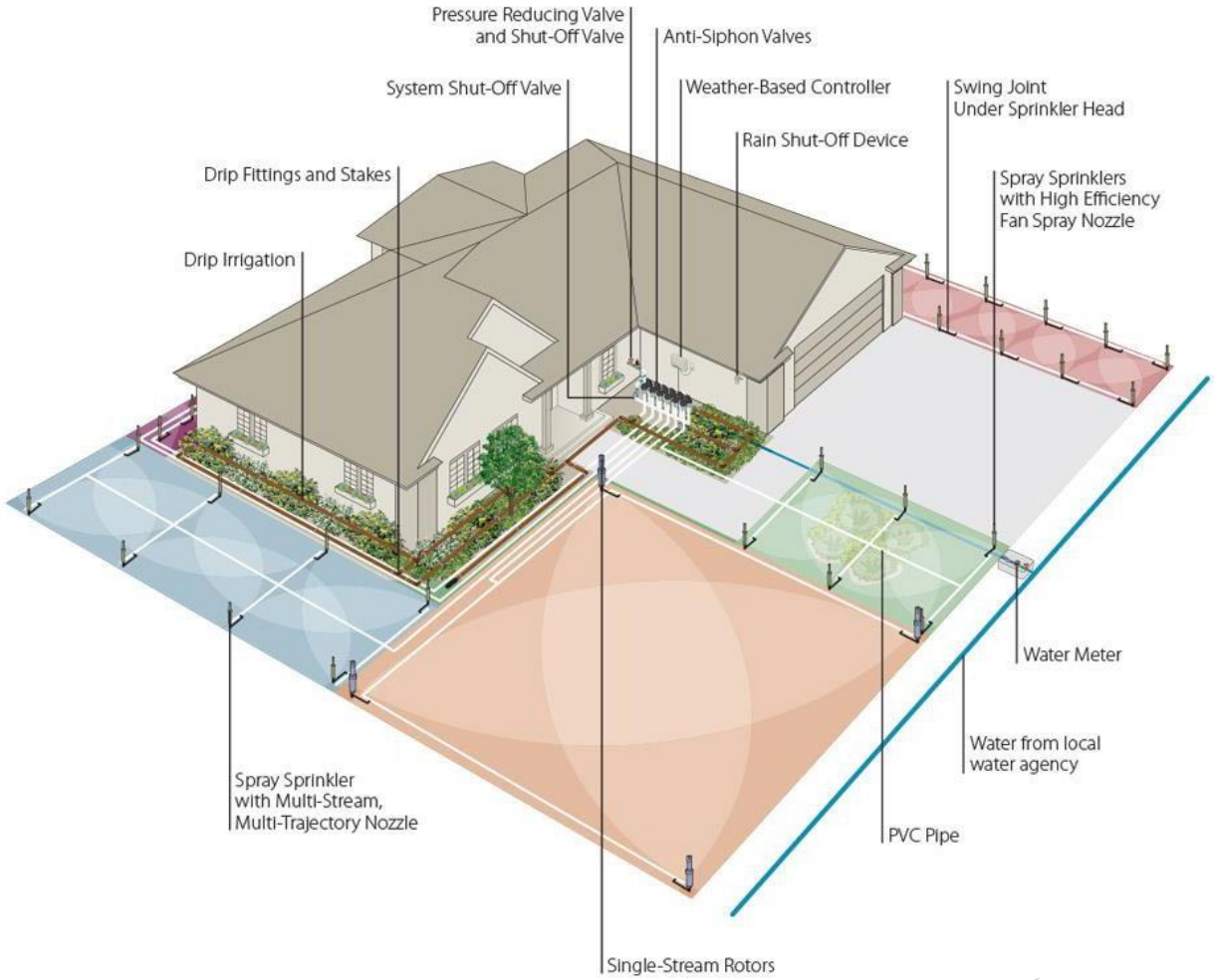
-Upgrade to a weather-based controller

-Check with your water provider to see if they offer rebates on controllers

6 Key Technologies

1. Weather-Based Irrigation	**2. Flow Sensing and Leak Detection**	**3. Pressure Regulation**
4. High-Efficiency Nozzles	**5. Sprays to Drip in Planters**	**6. Maintain, Troubleshoot and Repair**

2. Flow Sensing and Leak Detection



Be the Leak Detector

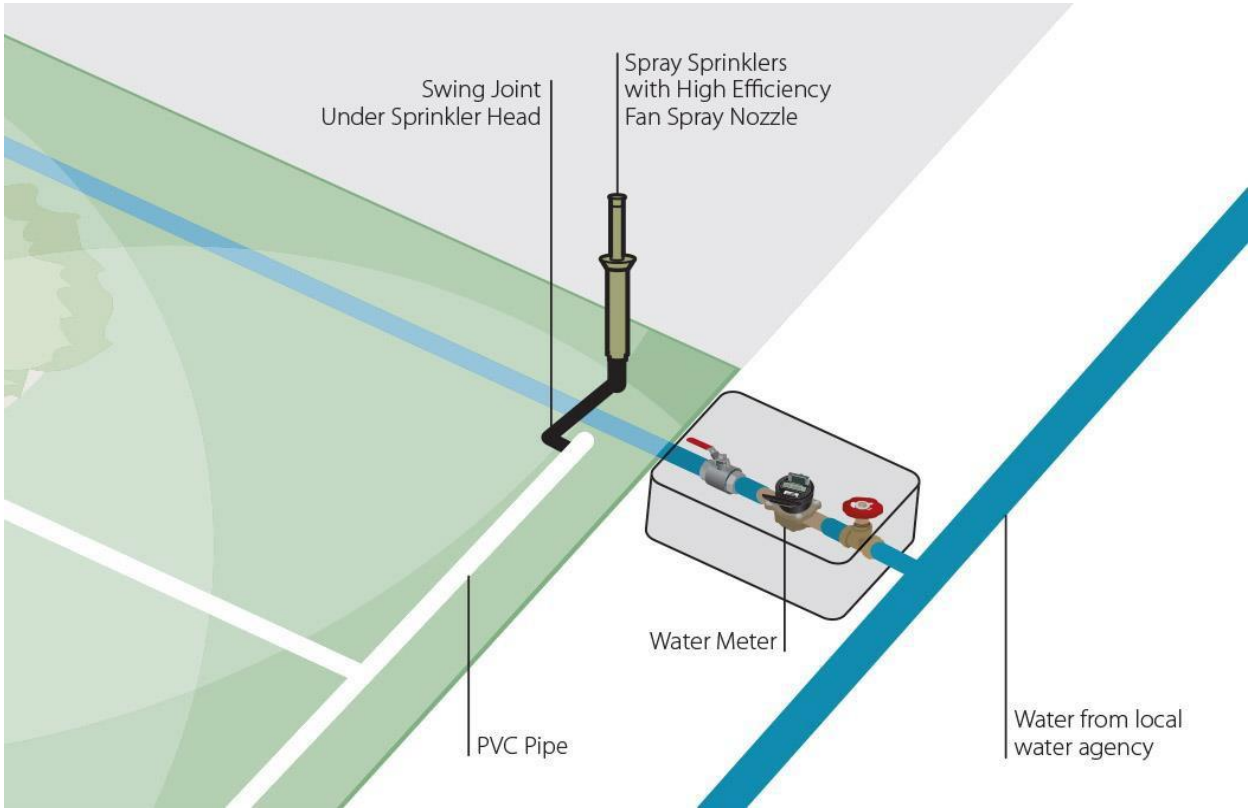
Walk your site and look for leaks

- Water drooling out the lowest head
- Puddling in areas
- Read the Water Meter:
  - Turn off all faucets and water using appliances
  - Read the water meter
  - Meter should not be spinning

Deeper Dive into Water Savings:

- Wi-Fi Water Meters
- Sub-meters
- Check Valves

Smart Meters from Your Water Agency



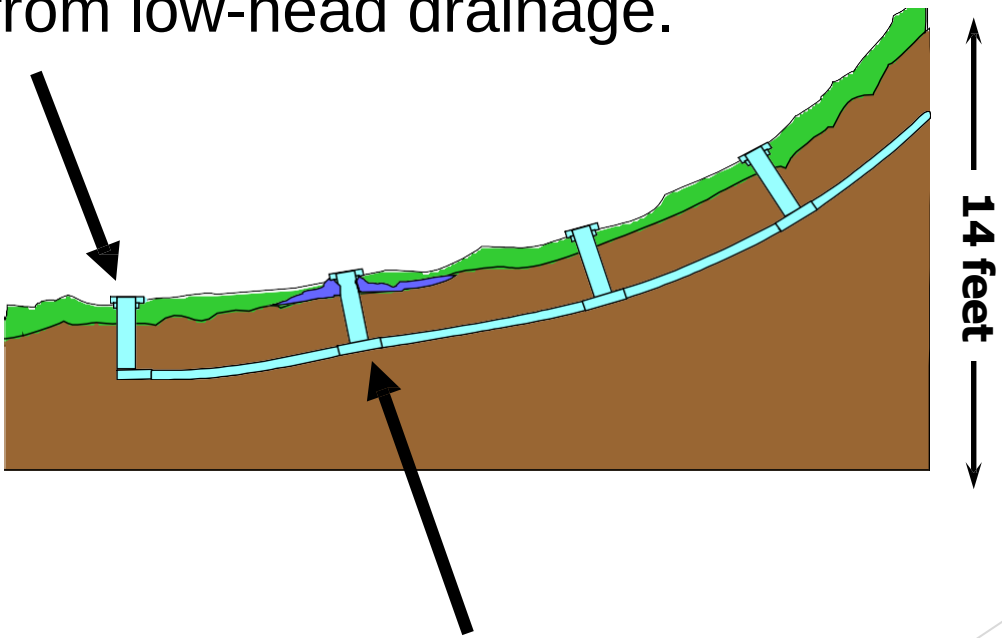
Flow Sensing and Leak Detection

Flow Sensors
Flow Meters

- CII sites use flow sensors to monitor hydraulic conditions in the field
  - Checks in real time for excessive flows caused by broken pipes, vandalized sprinklers or stuck valves.
  - If a problem is detected the system will:
    - Locate the problem
    - Isolate the valve or mainline
    - Send an alarm
- Homeowners – consider a flow meter/submeter for your irrigation
- New Homeowner controllers will alert you!

Leak Prevention from Low Head Drainage

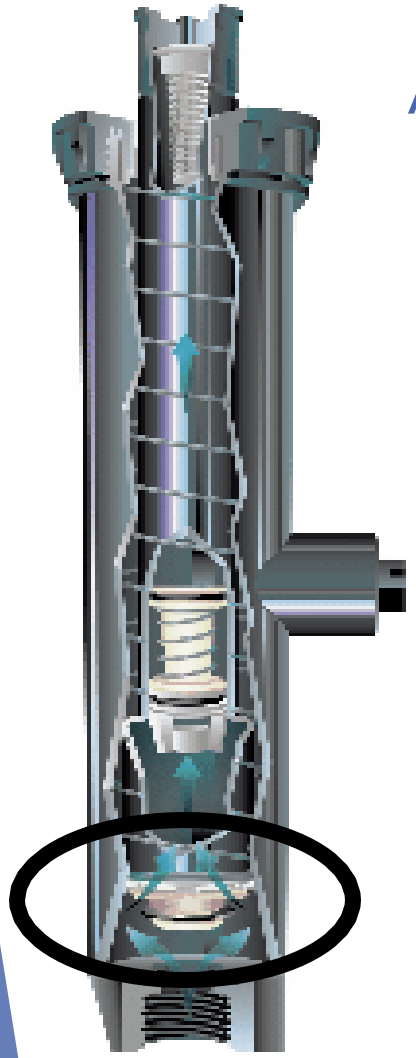
Built-in Seal-a-Matic (SAM) check valve saves water and prevents erosion from low-head drainage.



Low head without SAM wastes water

Check Valves

Available in Spray Sprinkler Bodies



Summary for Technology 2: Leak Detection

- Eliminate leaks
- Upgrade the heads to the check valve feature
- Ask your agency if a smart meter is available

6 Key Technologies

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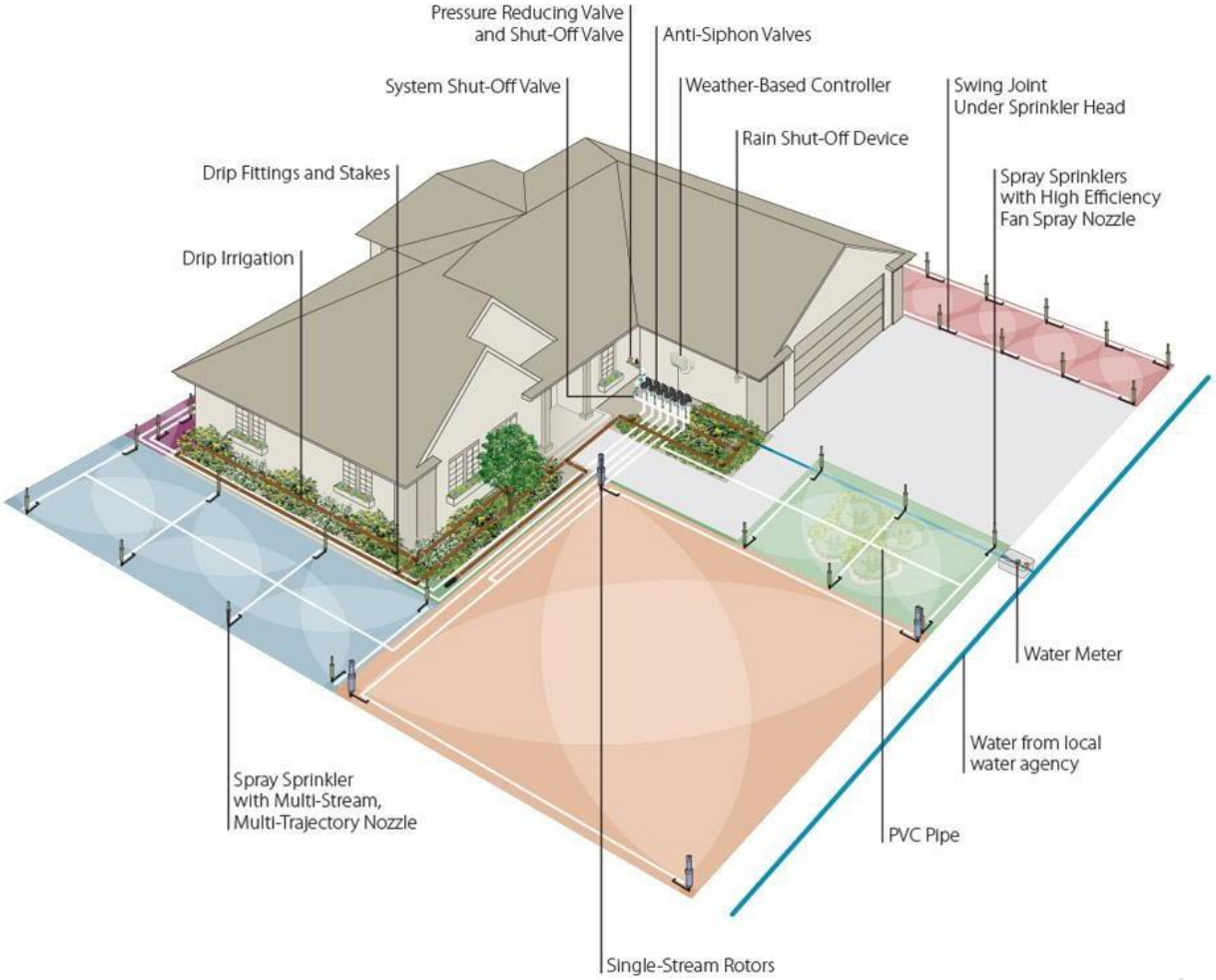
3. Pressure Regulation



Sprinkler Operating Pressure

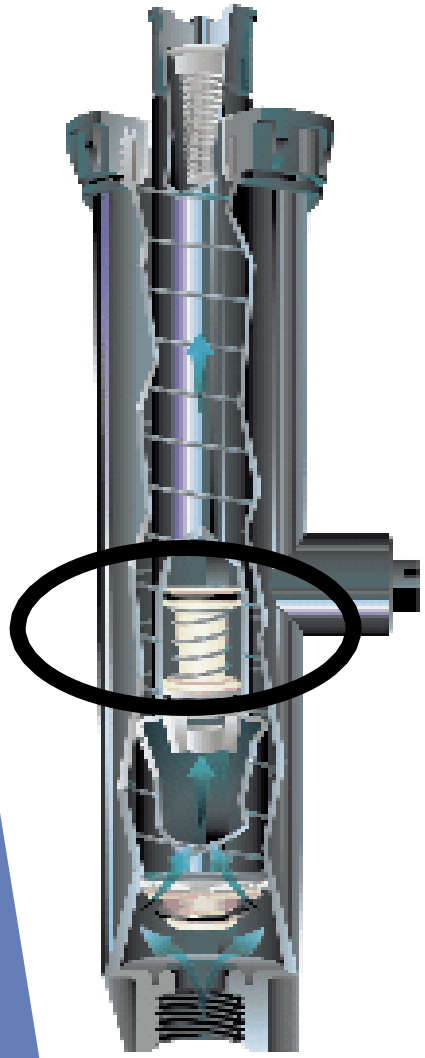
- High pressure wastes water and efficiency
  - results in ineffective misting and fogging
- Solution:
  - Reduce pressure at the sprinkler head

Sprinkler Operating Pressure

- Low pressure wastes water
  - Results in poor, uneven nozzle performance
  - People overwater to compensate

Pressure Regulation

Pressure Regulation in Spray Sprinkler Body



Importance of Regulating High Pressure

- Every 5 psi reduction in pressure to optimal reduces water use by 6-8%
- Study with MWD:
  - 1 gallon saving per minute per head
- October 2020: Can't buy a non-regulated head

Pressure Regulating Stem in 5000 Series Rotors

Competitor @ 75psi

5000 Plus PRS @ 75psi

Summary for Technology 3: Pressure Regulation

- Reduce High Pressure with pressure regulating devices
- In the sprinkler body
- At the house

6 Key Technologies

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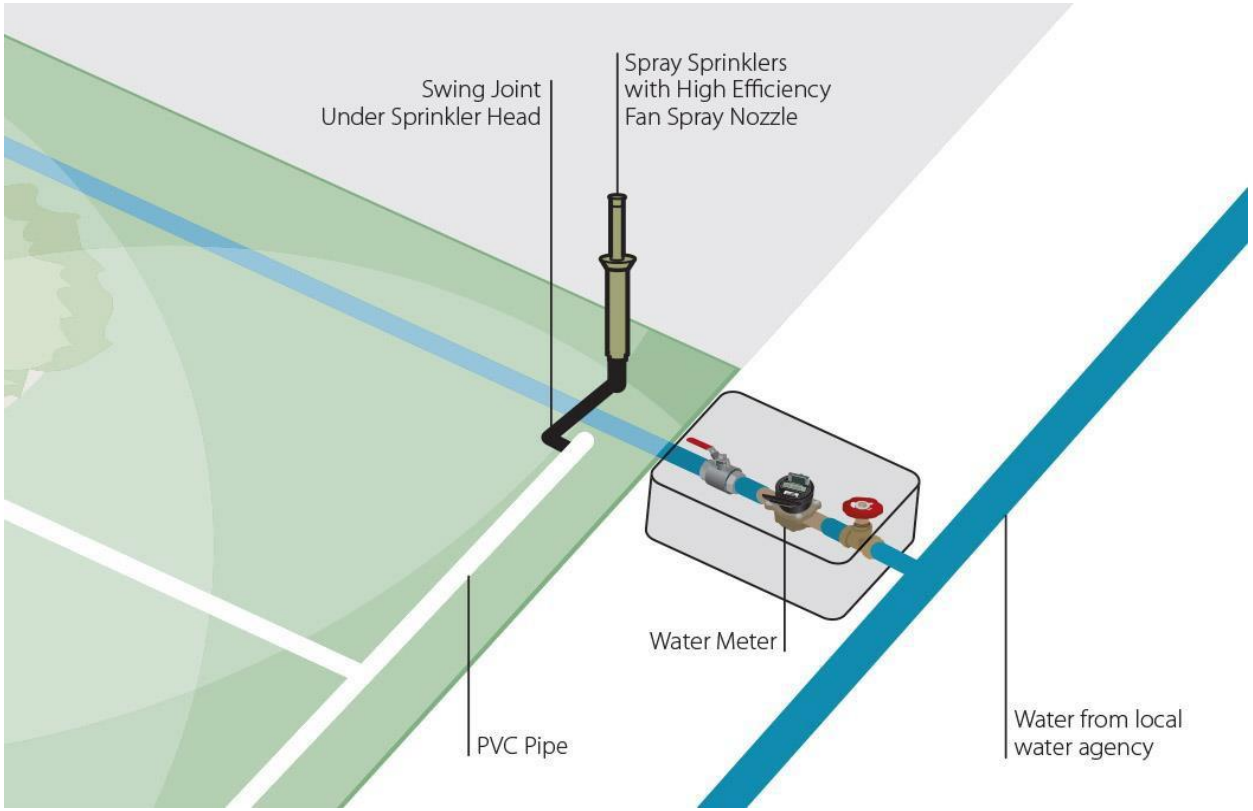
4. High Efficiency Nozzles



High-Efficiency Spray Nozzles

Fan Patterns Nozzles

- Larger droplet; great for wind

Rotating Nozzles:

- Large droplets; slower application rate – great for slopes or clay soils

Nozzle Technology

Three key element High Efficient nozzles:

- **Large droplets minimize effects of wind**
- **Superior close-in watering**
- **Even distribution**
  - **Distribution of Uniformity**
  - **Application Efficiency**

Summary for Technology 4: High Efficiency Nozzles

- Replace older nozzles to high efficiency nozzle
- Ensure head-to-head coverage
- Ask water provider if there are rebates on nozzles

6 Key Technologies

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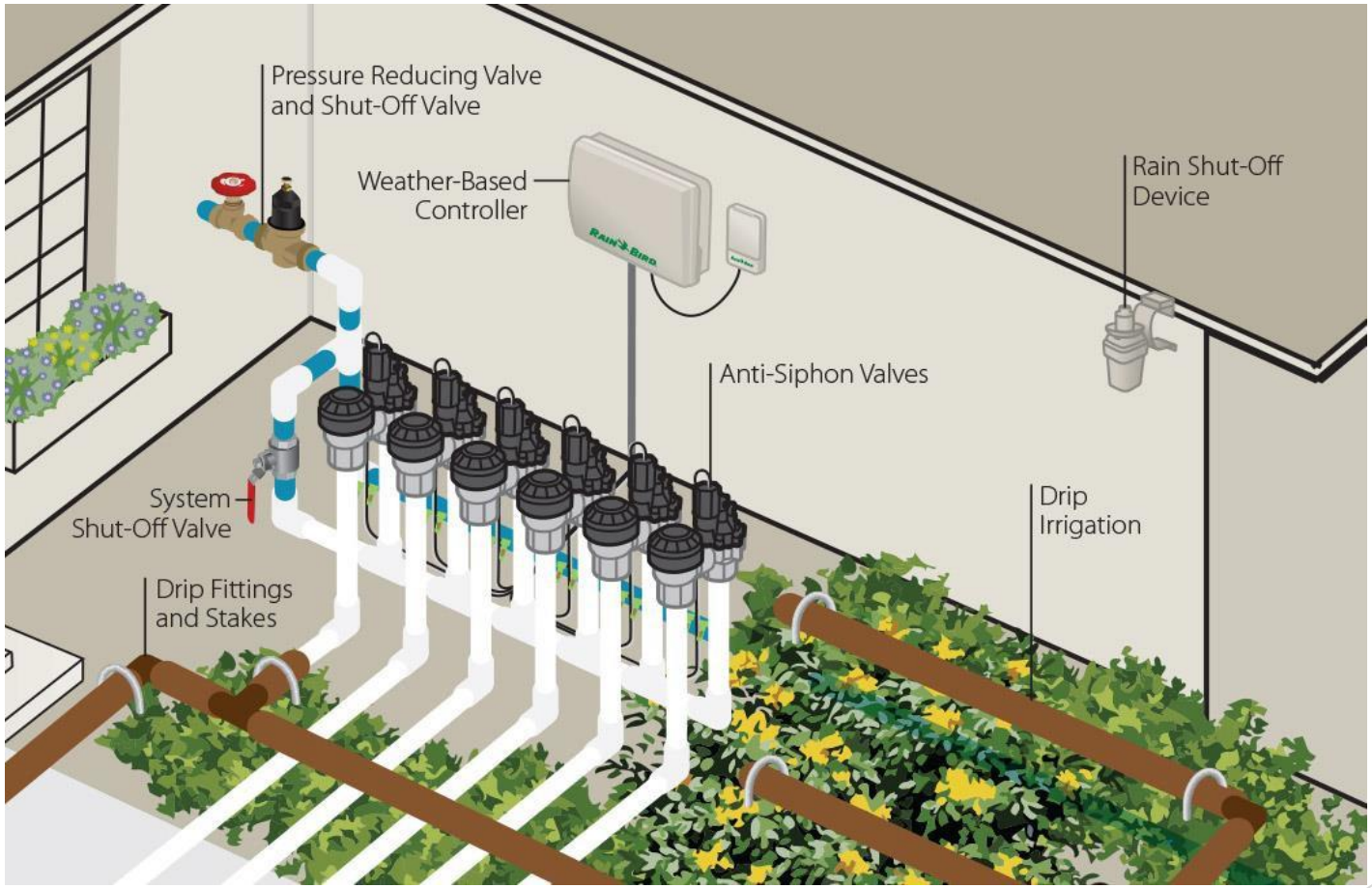
4. High-Efficiency Nozzles	**5. Sprays to Drip in Planters**	**6. Maintain, Troubleshoot and Repair**

5. Sprays to Drip Irrigation



Drip Irrigation

- Also called Micro or Low Volume Irrigation
- Very efficient for non-turf applications
- Apply precise amounts of water slowly and evenly at the root
- Helps reduce weeds and plant disease
- Helps eliminate runoff
- Helps plants thrive with correct installation and maintenance

Why use Drip Irrigation?

Stained Fences

Water Spots on Windows

Water Spots on Vehicles

Blockage from Foliage

Asphalt Damage

Liability to Pedestrians & Vehicles

Benefits of Drip Irrigation

- **Match the water application rate to each plant.**
- **Match the application rate to the soil's infiltration rate.**
- **Apply water directly to the root zone to reduce overspray and evaporation.**
- **Properly designed and installed dripline systems can be over 90% efficient.**

Sprays to Drip

Before Photo

2 minutes Elapsed

After Photo

15 minutes Elapsed

Applications – Sparse Plantings

Sparse Plantings

- Medians
- Narrow planting beds
- High traffic areas
- Slopes

Point Source:

- Watering of specific plants
- Irrigation methods:
  - Emitters/Drippers
  - Bubblers

Applications – Dense Plantings

Dense Plantings

- Narrow planting beds
- Medians
- Slopes

Total Coverage/Broadcast:

- 100% Coverage is required
- Irrigation Method
  - Dripline

Drip Irrigation vs Conventional Irrigation

- Device flow rates are measured in GPH vs. GPM
  - Low flow rate equates to reduced erosion and runoff
  - Low flow rate means more emission devices per valve
- Operating pressure window is typically 15-50 psi
- Water is typically filtered to 120-200 mesh
- Both PVC and/or polyethylene drip tubing may be used

Basic Drip System Components

Control Zone Components

Distribution Components

Emission Devices

Tools

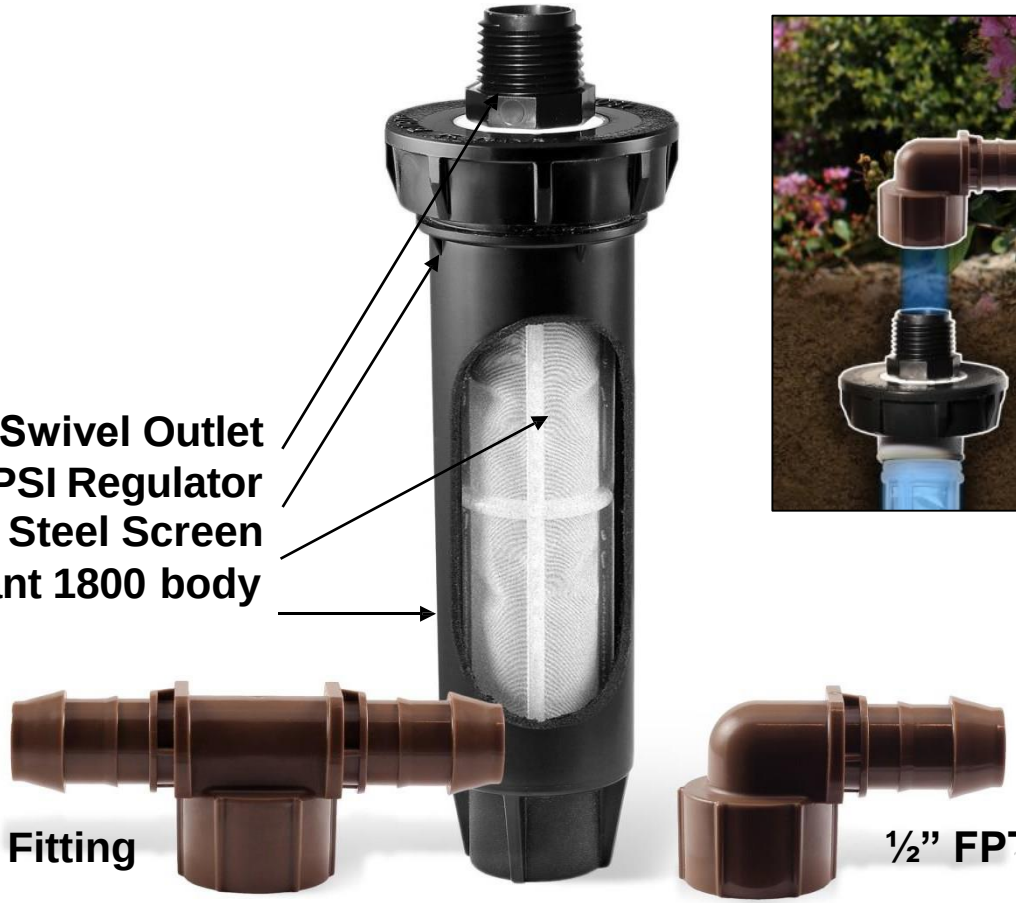
For New Installations

- Low flow valve
- Filter/Regulator

Key Drip Tool: Convert an Existing Zone to Drip

RETRO 1800 KIT | Permits conversion of an existing spray zone to drip irrigation

½” MPT Swivel Outlet
30 PSI Regulator
200 Mesh Stainless Steel Screen
Rugged, UV-resistant 1800 body



½” FPT x Tee Fitting

½” FPT x Elbow Fitting

Maximum flow rate 6.0 gpm (360 gph)

All in One kits

Remove the sprayhead

Drop in the 1800-RETRO

Attach the fitting & tubing

Cap off the remaining sprayheads

Notes

- With 1800 Retrofit kit, pipes and heads stay in the ground.
- Most times, you can keep your existing valve if it can operate at your new drip flow rates.
  - Check with the manufacturer website for your valve. Ideally, your existing valve has a low range of 0.2 GPM (which is 12 GPM) - 2 GPM (120 GPH).
  - Symptom: Valve won't shut down; replace with low flow drip valve (0.2 GPM).

Basic Drip System Components

Control Zone Components

Distribution Components

Emission Devices

Point Source Emission Devices

Rain Bird Options

XB Emitters

XB with Barb inlet
XM-TOOL

XB with 1032 inlet

XBT with ½" inlet

PC Modules

PC module with barb inlet

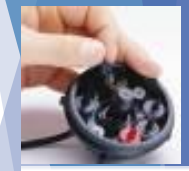
PC Module with 1032 inlet

PC Diffuser Caps

Multi-Outlet

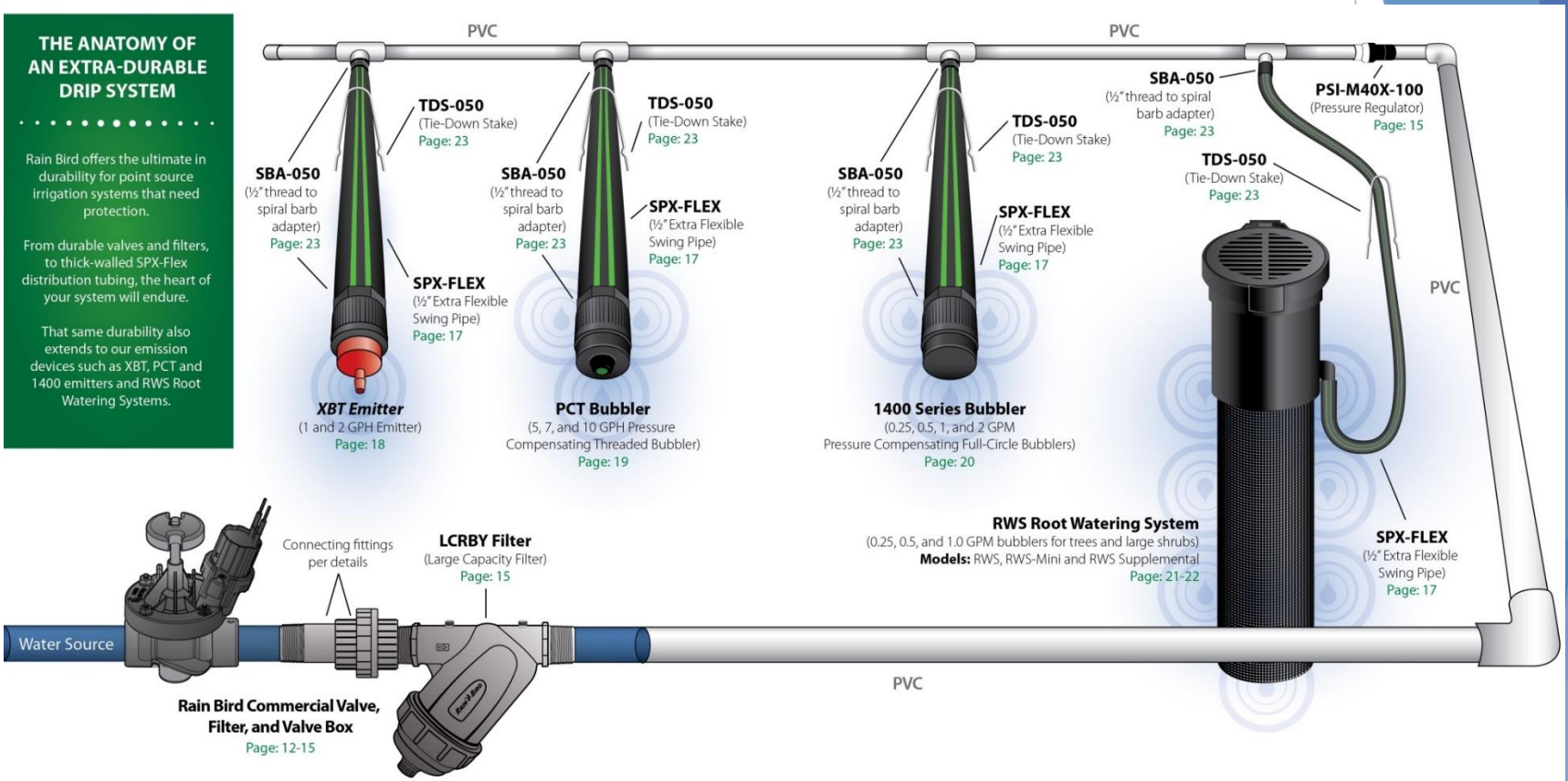
XB- 6 outlet
¼" Barb inlet
½" FPT inlet

XBD-80



EMT-6 XERI

Extra Durable Drip System



¼” Landscape Drip Line

- 6" and 12“ spacing
- 100‘ coil lengths
- 10 to 40 psi operating range
- Flow Rate: 0.8 GPH at 30 psi

Maximum Length of Run (feet)		
Emitter Spacing	**Maximum Length of Run**	**Flow per Ft. @ 15 psi**
6"	19 feet	1 GPH/ft.
12"	33 feet	0.5 GPH/ft

Dripline

Where is it used?

Street Medians

Hotels/ Resorts

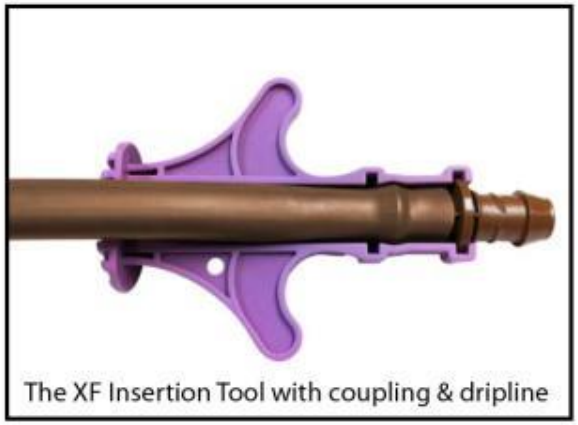
Residential Planter Beds

Raised Vegetable Gardens

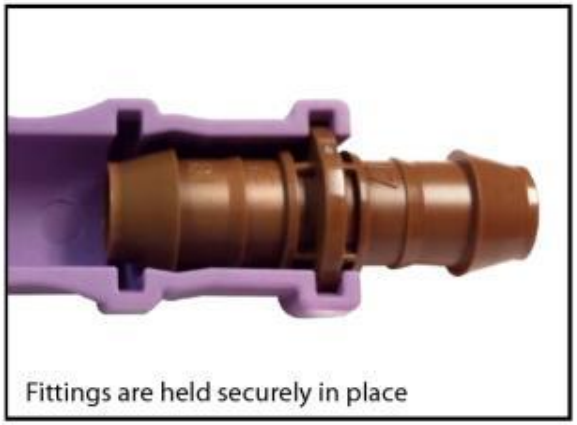
Tools

Insertion Tool

The XF Insertion Tool reduces the effort required to insert the fittings into the tube by 50%.



The XF Insertion Tool with coupling & dripline



Fittings are held securely in place

1 XF Coupling

2 XF Elbow

3 XF Tee

Summary for Technology 5 – Sprays to Drip Irrigation

- Convert spray heads to drip in the planter beds

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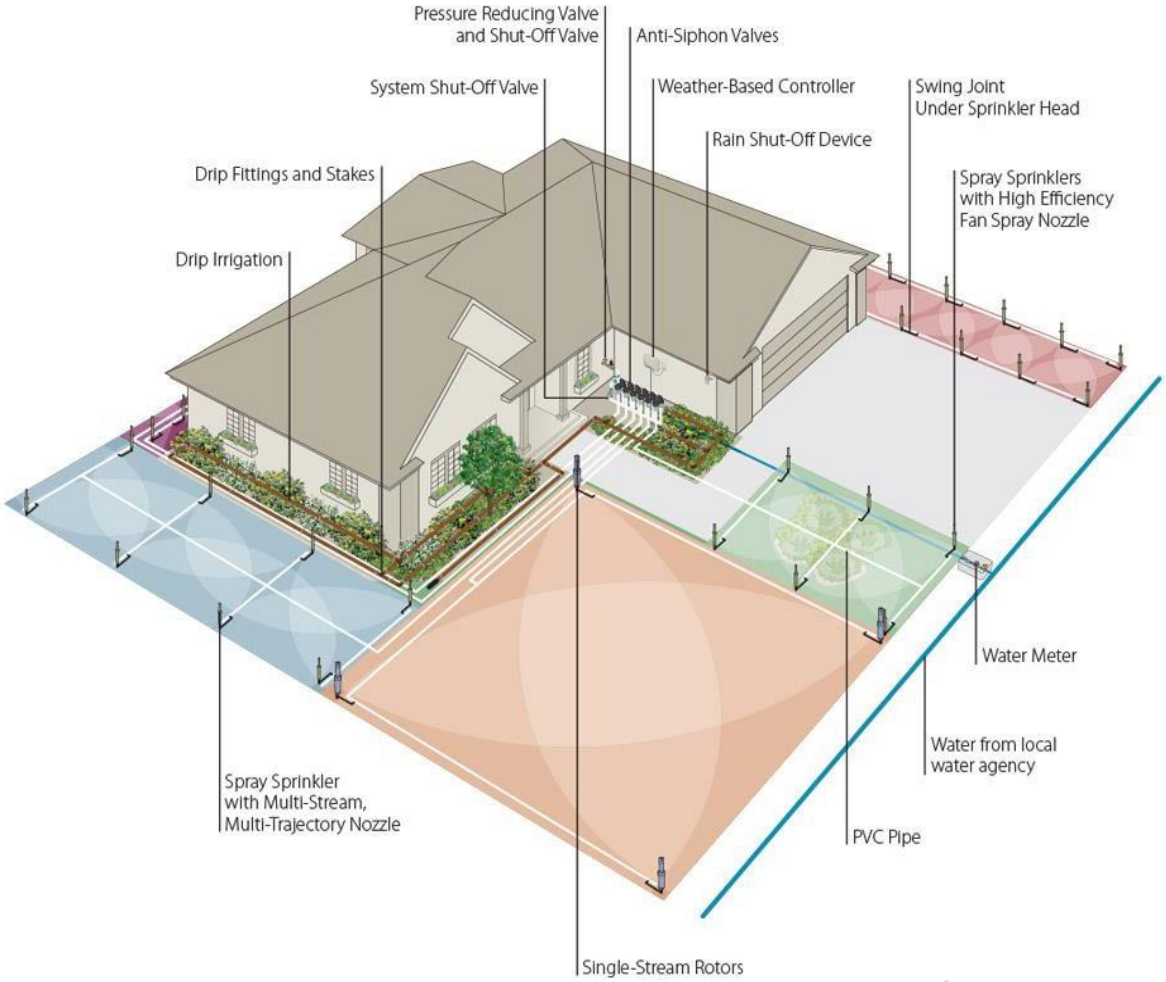
6. Maintain, Troubleshoot, Repair



Summary of Technology 6: Maintain, Troubleshoot, Repair

- Research Troubleshooting guide
- Watch how-to videos
- Contact a contractor that specializes in repairs

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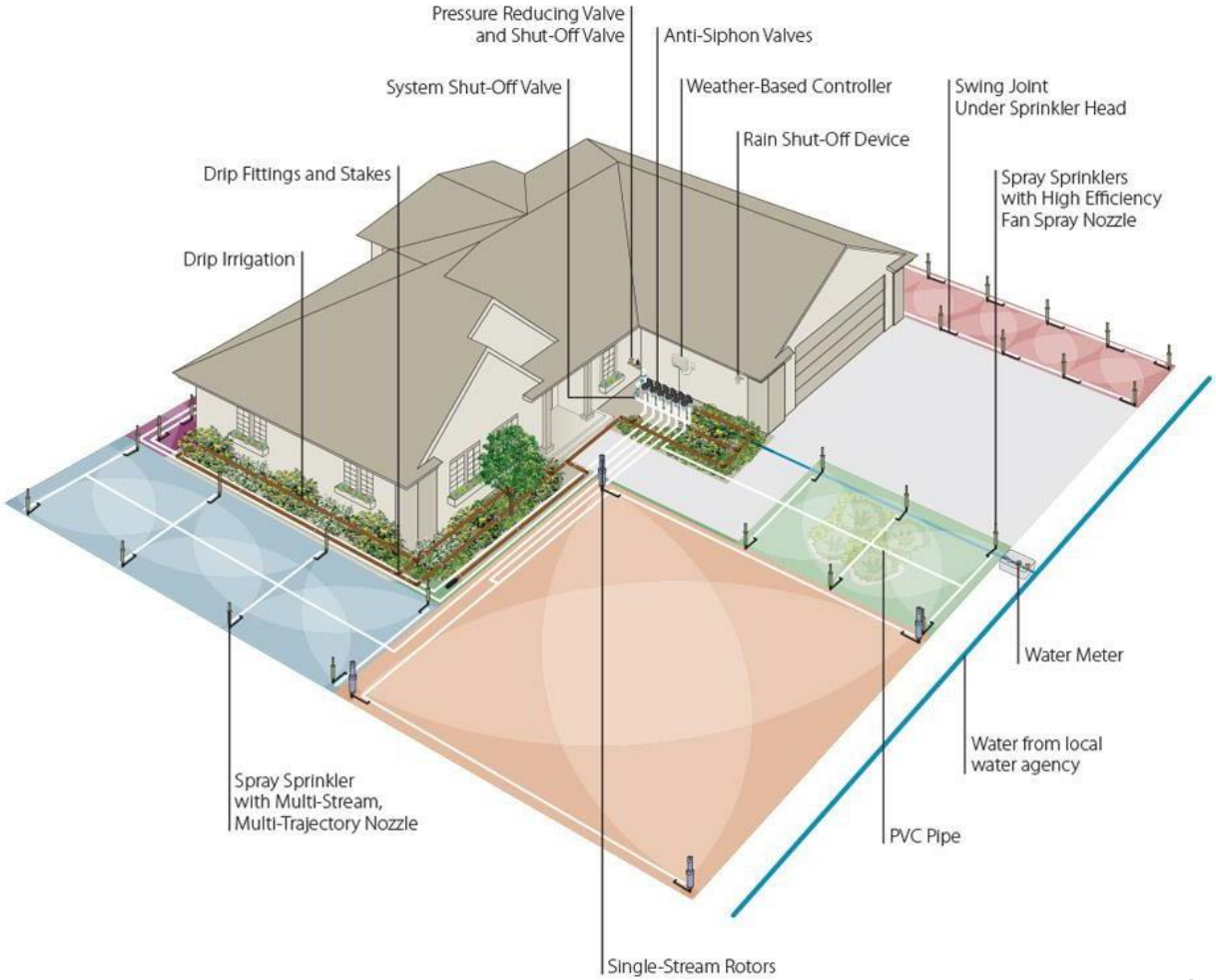
Water-Efficient Irrigation

- Healthier plant material
- Less disease and plant loss
- Shorter irrigation run times
- Less water waste – less run-off
- Lower irrigation water bills
- Sites are easier to maintain
- Use less fertilizer & pesticides
- Makes you a better steward of the environment

SoCalYardTrans.com



Have we inspired you to make some changes?
Questions?

Questions?

Anita Matlock
animatlock@aol.com

Final Comments from:

Kristeen Farlow
kristeenf@sbvmwd.com

Upcoming Event: Butterflies in Your Backyard

May 2nd
10 am – 12 pm

Reminder:

April 22nd is the 50th Anniversary for Earth Day

IERCD has activities to celebrate

Jasmine Orozco Clark
jclark@iercd.org

Thank you for attending!

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