CLCAV

How to Inspect and Evaluate the Performance of Your Current Irrigation System

Gardenworks Inc.

QUALITY LANDSCAPE DESIGN, CONSTRUCTION & MAINTENANCE

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UTILITIES DEPARTMENT CITY OF HEALDSBURG CALIFORNIA SINCE 1867

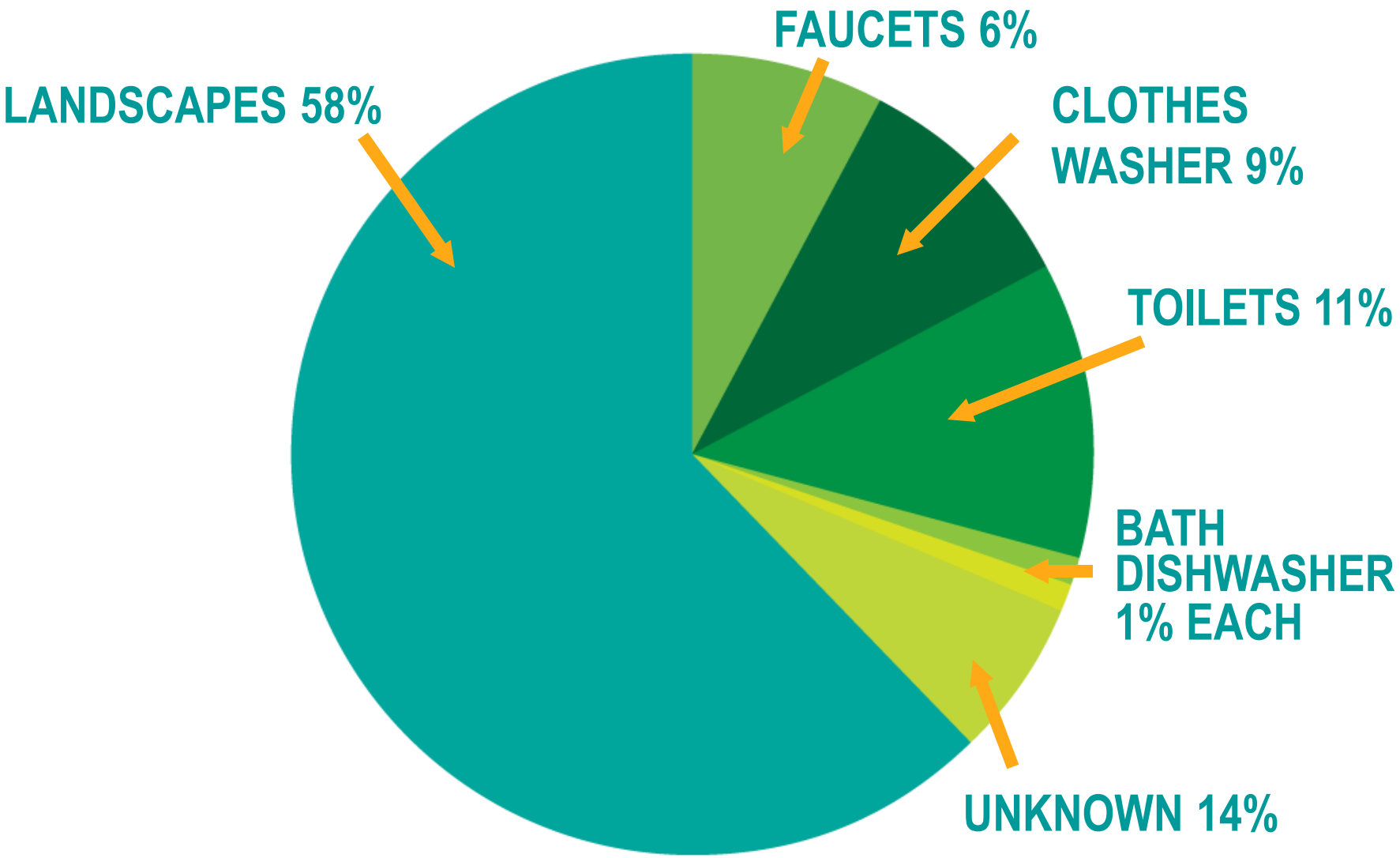
SMART LIVING

Importance of Water Conservation

- ***Limited Resource***
- ***Climate Change***
- ***Drought – Natural and Regulatory***
- ***Demands***
- ***Saves Energy and Other Resources***
- ***Good for Plants***

Preparing for a Drier Future

- ***State Goal - reduction (per capita)of 20% by 2020***
- ***Water WILL Cost More***
- ***Focus on Sustainability***
- ***Use New Irrigation Technology***



Urban Water Use

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Water Saving Potential

- Average Homeowner Overwaters Between 130 and 300% of What Their Landscape Actually Needs
- Efficiency Includes Design, Maintenance and Management
- Learning Curve is Steep to Achieve full Potential

Optimize Landscape Water Use

- Check for Leaks and Repair
- Incorporate New Technology
- Learn to Read Water Meter
- Program Timer for Efficiency and Run Multiple Cycles
- Mulch
- Minimize Evaporation
- Check Soil Moisture
- Avoid Runoff on Sidewalks

What to do NOW!

- Review your irrigation system
- Learn or know the individual parts
- Learn to Read Your Water Meter
- Bring Irrigation System up to optimum performance
- Program Controller Efficiently

What is an Irrigation Controller?

- **Automated Method of Applying Water**
- **Simply Turns Irrigation Valves (RCV's) on and off**
- **Features add convenience**

Why Use an Irrigation Controller?

- Convenience
- Efficiency
- Reliability

Features of Modern Controllers

- **Program** – ***the ability to individualize areas based upon water needs***
- **Run Time** – ***how long each zone/station/valve will watering***
- **Start Time** – ***when will the program(s) begin watering. Can be multiple times/day***
- **Days On/Off** – ***what day will the controller activate***
- **Budgeting** – ***simplified process to adjust for seasonal changes***

Types of Modern Controllers

- **Stand Alone – provides standard features to automatically operate watering schedule – use non-volatile memory**

- **Weather Based – provides standard features plus ability to use or input weather data and calculations to create schedule**

- **Central Controller – advanced management: allows operation/access to all programming and monitoring of controller from a remote site, laptop computer, Mobile device**

Basic Programming: Conventional Controller

- Sets Up Watering Intervals
- Sets Up Times to Water
- Sets Duration of Watering
- Sets Cycles of Watering
- Sets Control to Prevent Watering in Wet Conditions
- Sets Watering Budget

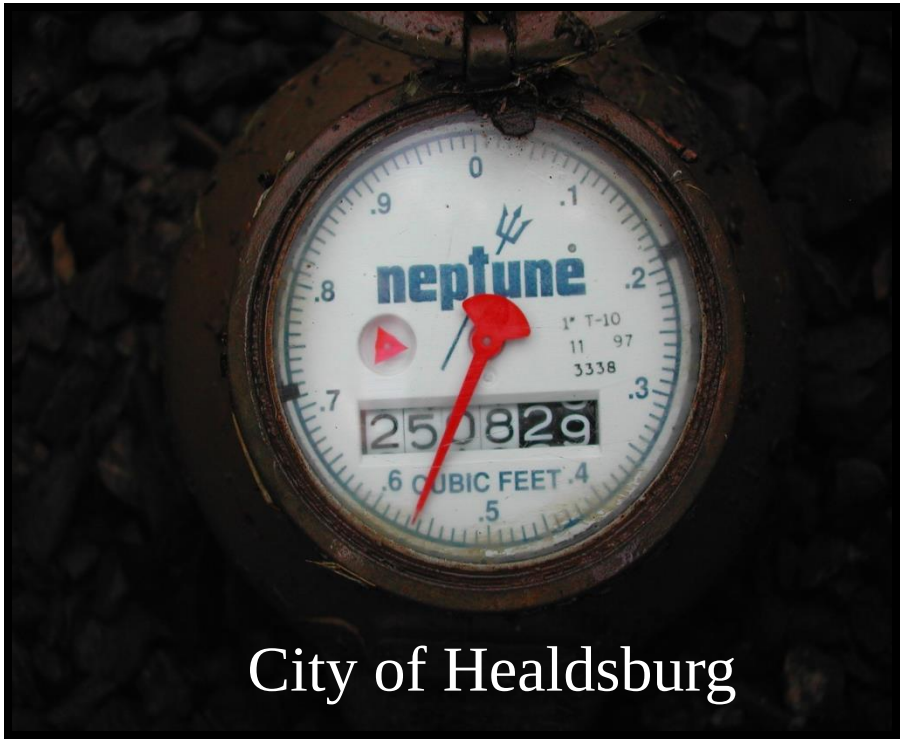
What is Needed for Efficient Scheduling?

- Water Meter
- Water Budget
- Controller
- Knowledge of Site Characteristics
- Make Adjustments
- Learn Cycle/Soak Method

Water Meters

- **Mixed Use or Dedicated**
- ***Read in Cubic feet (typically)or Gallons (100 cu.ft. = 1HCF = 748 gal)***
- ***Low Flow Detection Indicator***
- ***City of Healdsburg or Internet Can Teach How to Read***

Water Meters



City of Healdsburg

Irrigation Schedule

- **Determine Application Rate** - how much water each sprinkler type puts out (measured in inches per a measurement of time)
- **Determine Gallons per Minute/Hour** - manufacturer specs or water meter reading
- **Determine how many gallons per week needed** - multiply run times by number of days water will occur
- **Produce Irrigation Schedule** - write it down and post it at controller

Scheduling Guide 1

CLCA California Landscape Contractors Association

Minimum and Maximum Station Runtimes

		Spray		*Gear Rotor		*Impact Sprinkler		Stream Rotor		Rotating Nozzles	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Soil Type	**Slope**	1.8 in/hr		.7 in/hr		.65 in/hr		.6 in/hr		.45 in/hr	
Sand	Mild	16	5	33	8	37	6	37	8	50	10
Sand	Moderate	10	5	21	8	22	6	24	8	31	10
Sand	Steep	7	5	12	8	8	6	10	8	13	10
Sandy Loam	Mild	13	5	23	8	25	6	26	8	36	10
Sandy Loam	Moderate	8	5	15	8	17	6	18	8	24	10
Sandy Loam	Steep	5	4	8	8	8	6	9	8	13	10
Loam	Mild	10	5	18	8	21	6	23	8	30	10
Loam	Moderate	7	5	12	8	12	6	14	8	19	10
Loam	Steep	4	4	8	8	7	6	8	8	11	10
Clay Loam	Mild	8	5	15	8	17	6	18	8	24	10
Clay Loam	Moderate	5	4	8	8	10	6	11	8	16	10
Clay Loam	Steep	3	3	8	8	6	6	8	8	10	10
Clay	Mild	5	4	10	8	12	6	13	8	18	10
Clay	Moderate	3	3	8	8	8	6	10	8	13	10
Clay	Steep	3	3	8	8	6	6	8	8	10	10

CAUTION: These station runtimes are approximate and are intended to be used as a guide to allow you to develop the optimum runtimes for your particular property.

*NOTE: Minimum runtimes for rotary sprinklers: The engineered rotational speed is 1 to 1 1/2 minutes per rotation of the sprinkler. Four passes or rotations are needed to apply meaningful amounts of water per cycle for full circle sprinklers. If valved separately, half circle sprinklers runtimes can be reduced 50%. 90 degree sprinklers can be reduced 75%.

Rotating Nozzles:
MP Rotator nozzles are .45 in/hr.
Rain Bird R13-18 are .70 in/hr.
Rain Bird R17-24 nozzles are .75 in/hr. at most pressures.

Flat to Mild Slope = 0 to 5 degrees **Moderate slope = 5 to 20 degrees** **Steep Slope = More than 20 degrees**

Calculated minimum precipitation per cycle as follows

Spray heads - (1.8in/hr) - @ 5minutes = .15in/cycle. @ 3 min. = .09in/cycle. **Gear Rotors** - (.7 in/hr) @ 8 min. = .0 in/cycle. **Impact Rotors** - (.65 in/hr) @ 6 min. = .065 in/cycle. **Stream Rotors** - (.60 in/hr) - @ 8 min. = .08 in/cycle. **Rotating Nozzles** - (.45 in/hr) - @ 10 min. = .075 in/cycle.

Scheduling Guide II

Irrigation Scheduling Worksheet

Enter Precipitation Rate: 1.8

Enter Station Run Time: 6

Turf

?Sports Turf?

Month	Reference ET	Season adj.	Crop k	Site k	System k	Required H2O		Minutes per week	Number of cycles/week
January	1.35	1	0.8	1	0.625	1.73		13	2
February	1.87	1	0.8	1	0.625	2.39		18	3
March	3.45	1	0.8	1	0.625	4.42		34	6
April	5.03	1	0.8	1	0.625	6.44		50	8
May	5.93	1	0.8	1	0.625	7.59		58	10
June	6.71	1	0.8	1	0.625	8.59		66	11
July	7.11	1	0.8	1	0.625	9.10		70	12
August	6.29	1	0.8	1	0.625	8.05		62	10
September	4.84	1	0.8	1	0.625	6.20		48	8
October	3.61	1	0.8	1	0.625	4.62		36	6
November	1.8	1	0.8	1	0.625	2.30		18	3
December	1.36	1	0.8	1	0.625	1.74		13	2
Totals	**49.35**					**63.17**			

Enter Precipitation Rate: 0.9

Enter Station Run Time: 6

Shrubs & Ground Cover

Month	Reference ET	Season adj.	Crop k	Site k	System k	Required H2O		Minutes per week	Number of cycles/week
January	1.35	1	0.6	1	0.625	1.30		20	3
February	1.87	1	0.6	1	0.625	1.80		28	5
March	3.45	1	0.6	1	0.625	3.31		51	8
April	5.03	1	0.6	1	0.625	4.83		74	12
May	5.93	1	0.6	1	0.625	5.69		88	15
June	6.71	1	0.6	1	0.625	6.44		99	17
July	7.11	1	0.6	1	0.625	6.83		105	18
August	6.29	1	0.6	1	0.625	6.04		93	15
September	4.84	1	0.6	1	0.625	4.65		72	12
October	3.61	1	0.6	1	0.625	3.47		53	9
November	1.8	1	0.6	1	0.625	1.73		27	4
December	1.36	1	0.6	1	0.625	1.31		20	3
Totals	**49.35**		**0.6**			**47.38**			

Sample: Controller Programming Chart

CONTROLLER PROGRAMMING CHART

CLCAV California Landscape Contractors Association

JOB NAME: ABC Mfg. **PREPARED BY:** JM

CONTROLLER: RME-12 **DESIGNATION:** A **VALVES:** WeatherMatic **MOW DAY:** Th

PROGRAM 1				PROGRAM 2				PROGRAM 3				PROGRAM 4			
STA.#	RUN TIME	AREA WATERED	SPKLR.	STA.#	RUN TIME	AREA WATERED	SPKLR.	STA. #	RUN TIME	AREA WATERED	SPKLR.	STA.#	RUN TIME	AREA WATERED	SPKLR.
1	6	Turf	spray	4	5	Shrubs & GC	spray	10	20	Raised planters	drip				
2	6	Turf	spray	6	6	Shrubs & GC	spray								
3	6	Turf	spray	8	12	Shrubs & GC	rotor								
5	6	Turf	spray	9	12	Shrubs & GC	rotor								
7	6	Turf	spray												
11	6	Turf	spray												
Hrs	0.60				0.58				0.33						
DATE	DAYS ON	START TIMES	CY/WK	DATE	DAYS ON	START TIMES	CY/WK	DATE	DAYS ON	START TIMES	CY/WK	DATE	DAYS ON	START TIMES	CY/WK
1-Mar	2-3-4-5	1am/2am/3am	12	1-Mar	3-4-5	9p/10p/11p	9	1-Mar	2-3-4-5-6	6am	5				

CY / WK = Cycles per week. Multiply number of "Days On" by number of "Start Times".

Adjustments to Schedule

- Poor Sprinkler Coverage (D.U.)
- Poor Sprinkler Performance
- Run Off Occurs
- Microclimates
- Soil Type Variations
- Exposure
- Mowing Day

Methods To Increase Efficiency

- Rain Shut Off
- Soil Moisture Sensors
- Flow Sensor
- Hunter SolarSync System
- Soil Probe
- Pressure Gauge for Sprinkler Heads
- Remote Control Activator

Hunter Industries – SolarSync

Spray Irrigation - Usually Used For Lawns, Annual Color, Groundcover

- High Flow (Sprays, Impacts,)
- Low Flow (Rotors, Rotator Nozzles, Precision Sprays, Mini-Sprays
- Must Have Matched Precipitation Rates
- Know Optimum Operating Pressure and Flow
- Know Distance of Throw
- Know Type of Arc - Adjustable or Fixed

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Spray Irrigation:

Output Measured by Precipitation Rate and Distribution Uniformity

- **Precipitation Rate - How Fast Water is Released Over a Period of Time - Inches Per Hour**
- **Distribution Uniformity - How Evenly The Water Is Applied - as a Percentage of Equivalent Rain Fall**

Why is Distribution Uniformity (DU) Important?

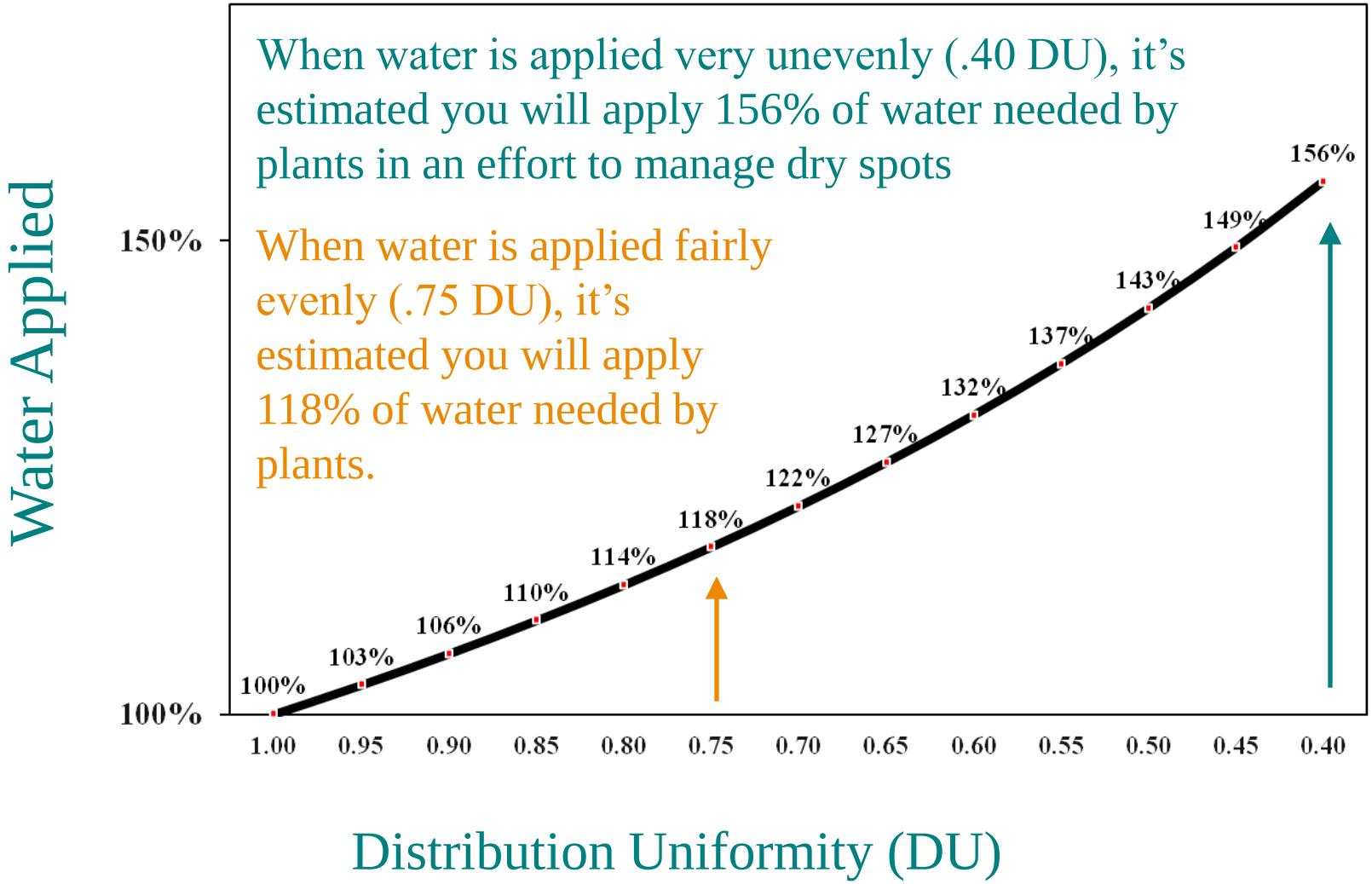
- **Pinpoints Weaknesses in Sprinkler Coverage**
- **By Definition - Creates the Need to Overwater**
- **Industry Standard is roughly 65%**
- **A Good DU is Anything above 70%**
- **An Actual Test is the Best Method to Determine**

Why Does a Low DU Result in Overwatering?

What is A Well Designed Spray System?

- Operates at the Optimum Pressure Needed for Type of Sprinkler by Using the Correct Number of Valves or Zones
- Utilizes Sprinklers with Matched Precipitation Rates
- Provides for Better Than Head to Head Coverage
- All sprinklers are Pressure Compensating and have Check Valves to Prevent Weeping in Low Areas
- Allows for Multiple Cycling to prevent Run Off
- Allows for Adjustments and Water Budgeting

Efficient Irrigation Basics
Poor DU leads to overwatering



Leading causes of poor DU

Obstacles

Sprinkler Set too Deep

Leaning Sprinkler

Rain Shadow

Nozzle Issue

Obsolete Products

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Drip Irrigation

Benefits

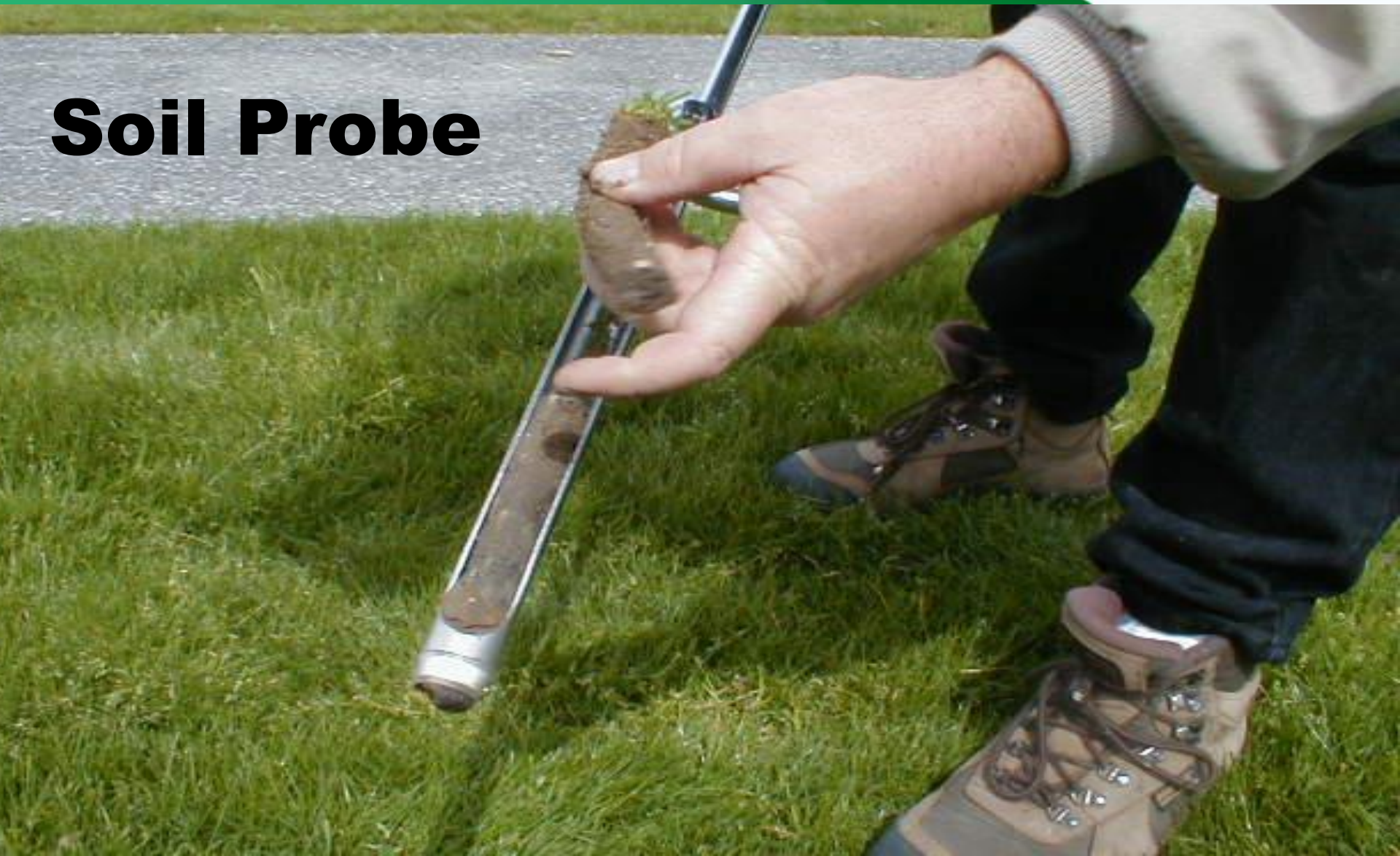
- ***High Distribution Uniformity***
- **Good Water Savings Potential**
- **Low Flow/Low Volume**
- **Typically Surface Run**
- **Easily Repaired**
- **Pin Point Delivery**
- **Reduced Weed Population**
- **Longer Run Times**

System Inspection

Tools:

- Note Pad or Inspection Sheet
- Small Screw Driver or Adjustment Tool Specific to Sprinkler Type
- Tape Measure
- Marking Flags
- Sod Knife/Pruning Shears
- Drying Towel
- Soil Probe

Soil Probe



System Inspection

Controller:

- Note – make, model and serial number (download manual for reference)
- Change battery 1x/year
- Should be turned off Nov – April (other than testing)
- Review and adjust program for time of year
- Create scheduling matrix for year

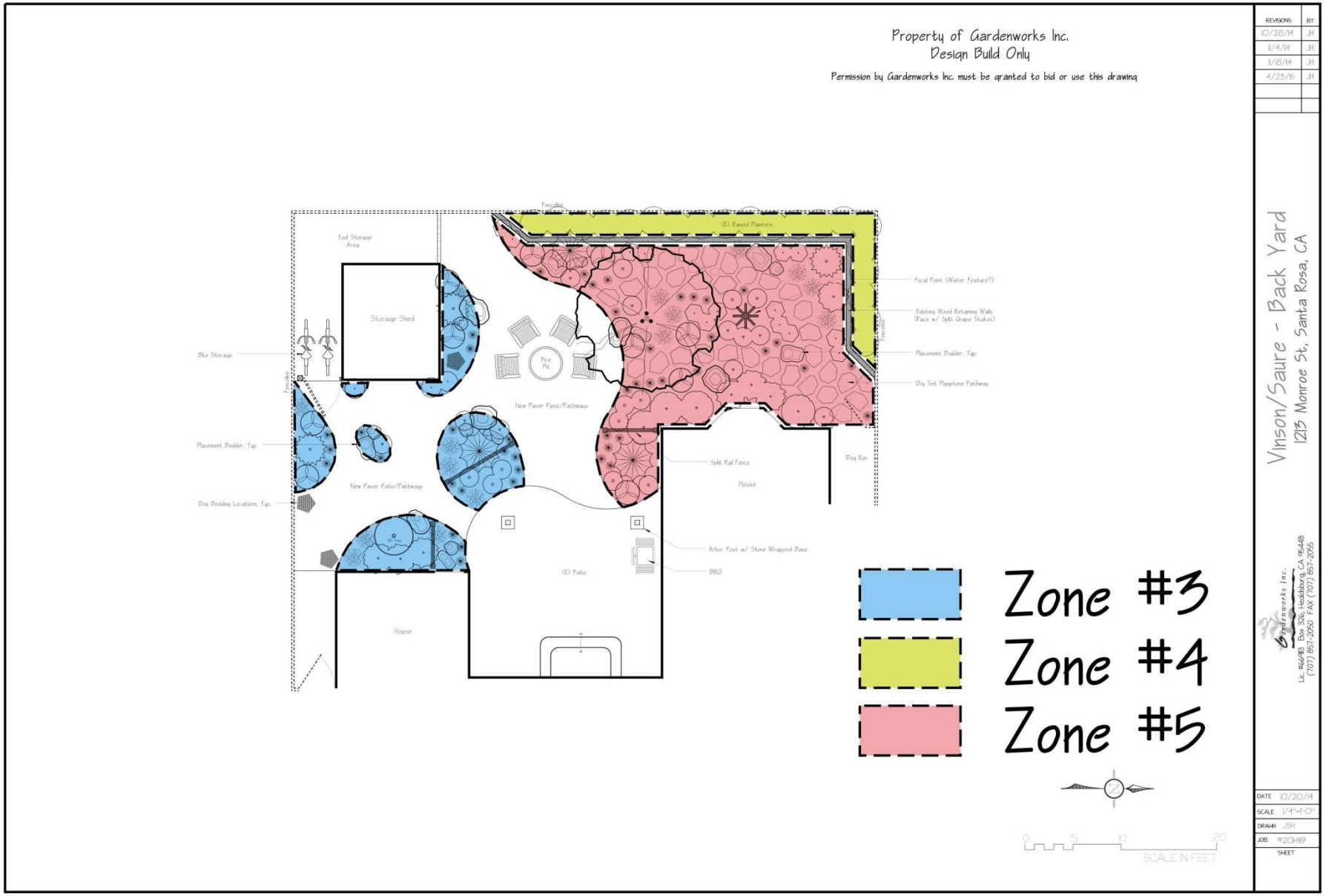
CONTROLLER PROGRAMMING CHART

JOB NAME:		WETZEL			CONTROLLER: Hunter Pro C - 9 station		DESIGNATION:			VALVES:		MOW DAY: Tuesday		PREPARED BY: PE	
														DATE: 08/11/06	
		PROGRAM A - turf				PROGRAM B - drip				PROGRAM C - Drip				PROGRAM D	
STA.#	RUN TIME	AREA WATERED	SPKLR	STA.#	RUN TIME	AREA WATERED	SPKLR	STA. #	RUN TIME	AREA WATERED	SPKLR	STA.#	RUN TIME	AREA WATERED	SPKLR
1	5	Front Lawn - South	spray	6	30	Front/South Fence Line	drip	8	15	Raised Planter Boxes	drip				
2	5	Front Lawn - North	spray	7	30	Back yard	drip								
3	5	Back Lawn - Middle	spray												
4	5	Back Lawn - Upper	spray												
6	5	Back Lawn - Lower	Spray												
TOTALS	0.41666667				1				0.25				0		
DATE	DAYS ON	START TIMES	CY/WK	DATE	DAYS ON	START TIMES	CY/WK	DATE	DAYS ON	START TIMES	CY/WK	DATE	DAYS ON	START TIMES	CY/WK
Jan				Jan				Jan				Jan			
Feb				Feb				Feb				Feb			
Mar	Su,W,F	1am,2am	6	Mar	Su	3:30am	1	Mar				Mar		WB = 40%	
Apr		WB = 60%	15	Apr		WB = 60%	4	Apr				Apr		WB = 60%	
May		WB = 75%	15	May		WB = 75%	4	May	every day	7:am/4:30pm	14	May		WB = 75%	
June	mow day?	WB = 90%	15	June		WB = 90%	4	June	every day	7am, 4:30pm	14	June		WB = 90%	
July	Su,M,W,Th,Sa	1am,2am,3am	15	July	Su,T,Th,Sa	3:30am, 5:00am	4	July	Su,Tu,Th,Sa	7:am, 4:30pm (WB	8	July		WB = 100%	
Aug		WB = 55%	5	Aug		WB = 55%	4	Aug		WB = 90%	8	Aug		WB = 55%	
Sept		WB = 65%	5	Sept		WB = 65%	4	Sept		WB = 65%	8	Sept		WB = 65%	
Oct	Su,W,F	1am,2am	6	Oct	Su,Th	3:30am	2	Oct	Su,Tu,Th	7am	3	Oct		WB = 45%	
Nov	Su,W,F	1am	3	Nov	Su	3:30am	1	Nov				Nov		WB = 25%	
Dec				Dec				Dec				Dec			

CY / WK = Cycles per week. Multiply number of "Days On" by number of "Start Times".

*** Recommended watering schedule only - should be adjusted for actual site conditions ***

Irrigation Zone Map



Pre-season inspection/maintenance System check-up

Activate the valve - Check for Leaks and Breaks and Leaky valves.- Look, listen, and feel

Walk Station - Adjust Spray Patterns and Flag All Troubled Areas

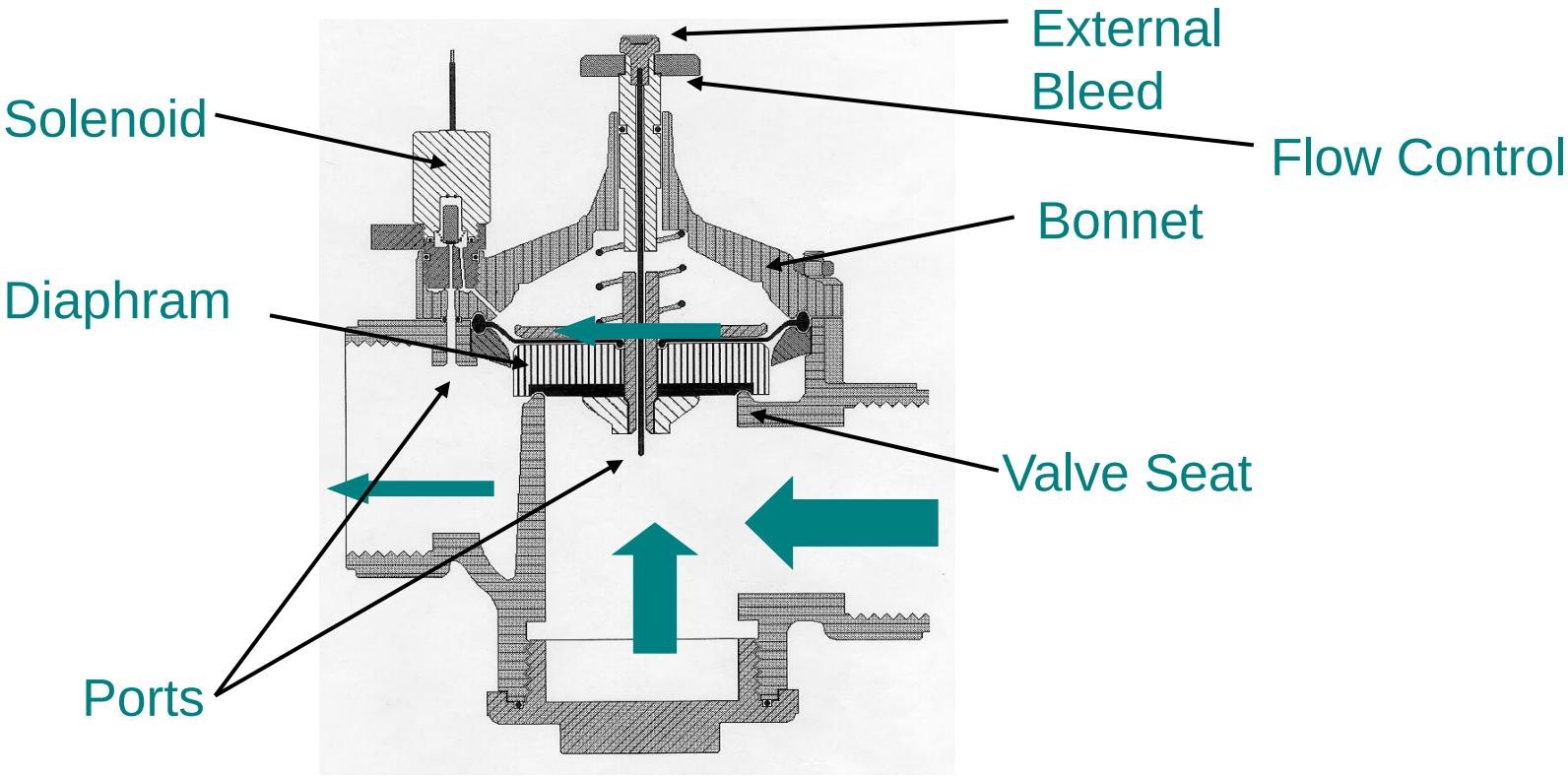
Repeat With All Valves

Fix All Flagged Areas

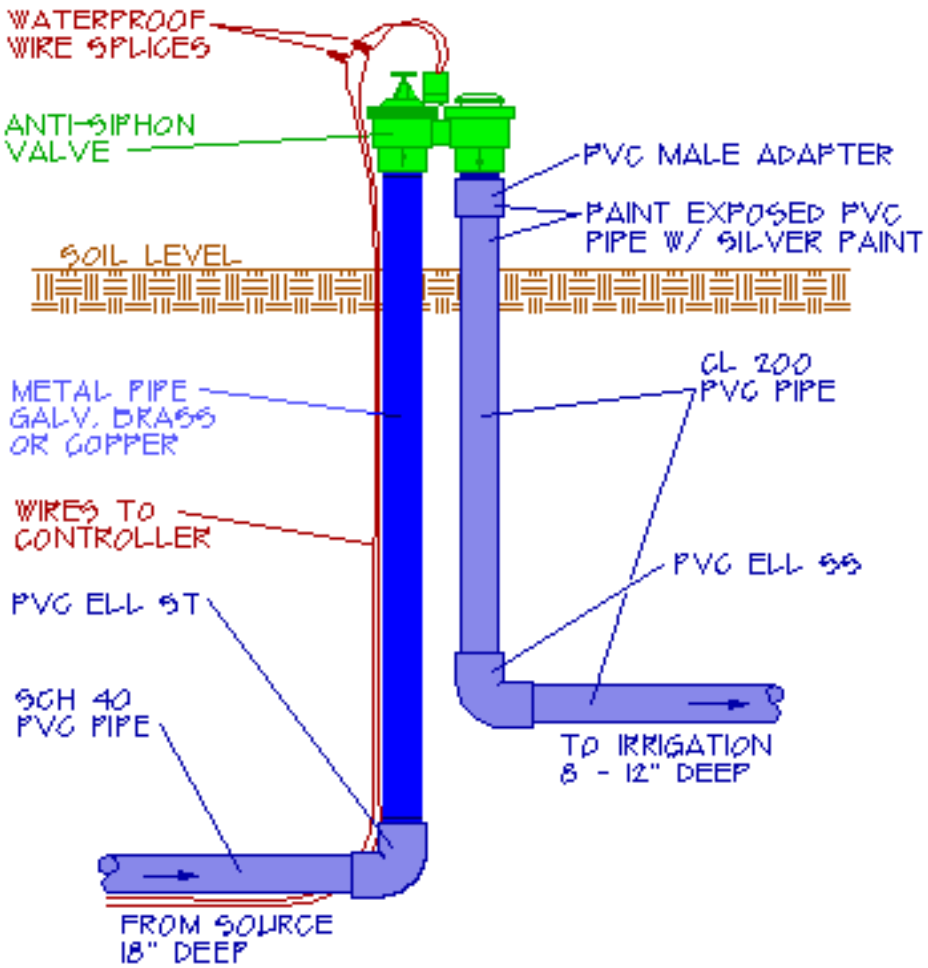
Irrigation Valves

- Locate and Clear Any Debris Blocking Servicing of the Valves
- Visual Check – Solenoid, Wire Connections, etc
- Check for Leaks (Algae Present)
- Cycle On and Off Using Bleed Screw
- Cycle On and Off From Controller
- Tune Valve if Needed (Increase or Decrease Flow Control) – Should Shut Off in Approx. 10 Seconds or Less
- Be Sure Waterproof Wire Nuts are Used for Wire Connections

Valve Anatomy



Above Ground - Anti-siphon Valve



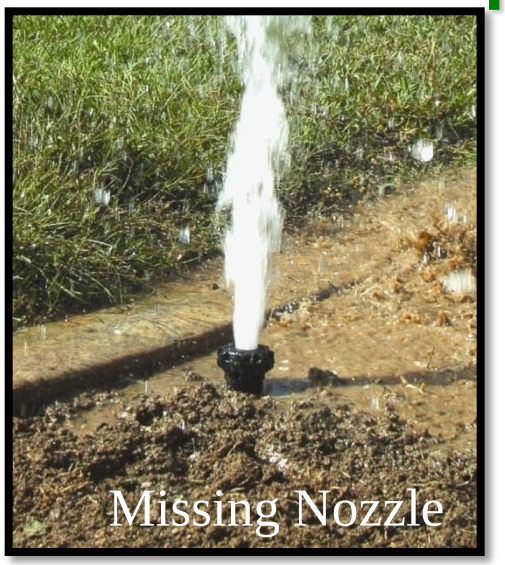
Drawing and text courtesy of:

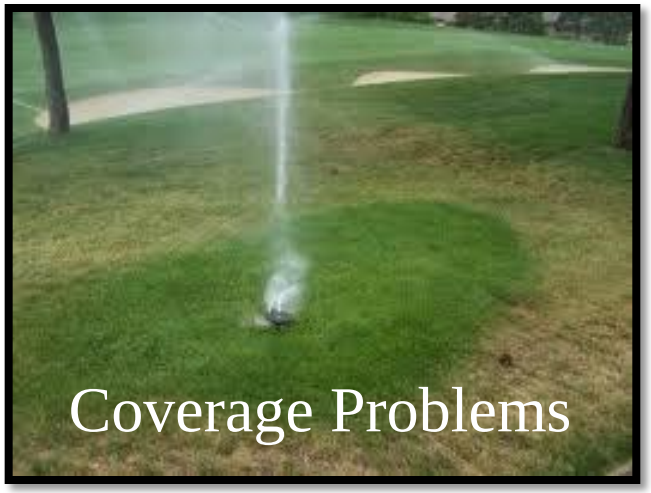
www.IrrigationTutorial.com

Lawn/Shrub Sprinklers

- Locate and Clear Any Debris Blocking Sprinkler From Popping Up or Operating
- Visual Check – Should be Perpendicular to Grade and Able to Clear Grass Blades at Their Highest Growth Between Mowings
- Must Have Head to Head Coverage
- Should Only be Hitting the Intended Target Area
- Should be No Misting (High Pressure)
- All Sprinklers on Same Valve Should be at Their Full Extension When Running (Low Pressure)
- DO NOT ALLOW ANY RUN OFF

Spray head problems





Drip Irrigation

- **Inspect and Clean Filters**
- **Should Have a Pressure Reducer – Usually 20psi**
- **<u>Walk</u> Line and <u>Check</u> All Emitters for Proper Operation**
- **All Emitters Should be Pressure Compensating and Have the Same Output on Each Valve (gph)**
- **Should be no Missing Emitters or Emitters with no Plants (*replace or add goof plugs*)**
- **Add Emitters as Plants Grow**
- **Bury Exposed Drip Pipe Under Mulch**

Do and Don’ts

- Do Apply Water Only When Needed
- Do Adjust Controller Program a Minimum of 1x/Month
- Do Turn Off Controller During a Measurable Rain Event and for 48 Hours After
- Do Use a Screw Driver to Poke Into the Ground to Check Moisture – Water When Top 2-4 Inches are Dry
- Do Repair Leaks Immediately
- Do Keep a List of Irrigation Station/Zones With the Controller
- Do Learn to Read Your Water Meter

Do and Don’ts Cont’d

- Do Use a Cycle and Soak Approach
- Do Learn How to Water Budget (Workshop on June 10th)
- Do Learn How to Operate Your Irrigation Controller
- Do Learn How Long You Can Run a Station/Zone Before Runoff Occurs and Use that Info to Create a Cycle/Soak Schedule
- Do Create a Station/Zone Map

Do and Don’ts

- Don’t Mix Different Sprinklers on the Same Valve (Spray vs. Rotor, Toro vs. RainBird)
- Don’t Mix Drip Emitters or Micro-Irrigation Devices With Spray or Rotor Sprinklers
- Don’t Plant Plants With Different Water Needs on the Same Irrigation Valve (Workshop on June 3rd)
- Don’t Ignore Your Irrigation System
- Don’t Install Sprinklers That are not Pressure Regulated and Don’t Have a Check Valve
- Don’t Install More Sprinkler Heads Than the Operating Pressure and Flow Allows

When to Water Lawns

- Water When the Lawn Has a Gray Cast to the Green and or When You Can See Your Footprints After Just Walking Across it
- Water When the Top 2-4 “ of the Soil is Dry
- Water Just to the Point of Runoff and Then Use a Cycle/Soak Method. On for 4 Minutes Then off for 30-60 Minutes Then On Again for 4 Minutes and so on Until the Desired Amount or Time of Water is Applied

Quick Tips

- Read Water Meter Monthly (minimum)
- Check for Leaks and Make Adjustments
- Check Soil Moisture
- Water Budgeting
- Avoid Run Off
- Install Rain Shut Off
- Learn What Eto Means (workshop June 10th)
- Subscribe to Watersmart (city of Santa Rosa – srcity.org/watersmart)