water smart LANDSCAPE

A Better Way to Beautiful

WaterSmart Landscape

MAKEOVER SERIES

Class 3: Intelligent Irrigation and Implementation

Housekeeping, Part 1

Housekeeping:

Breaks: Mid class, after lab

Restrooms

Please silence your cell phones

If you can't attend, contact us to make arrangements!

WaterSmart Series Contacts:

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DeLorenzo International Landscape Architecture + Planning

Email: **landscapemakeover@sdcwa.org**

Housekeeping, Part 2

- WaterSmart Landscape Makeover Series Survey:

  To continue to improve these classes, we need your input.
  Take a few minutes to **complete the survey**. Please turn it in at the end of Class 4.

- Publicity: use of class materials and photographs
  - We need to hear back from you! **Take a series of photos** from one spot and as many others as you like. **Send them to us, please!**
  - During the application process you agreed to allow us to use items related to this program.
  - NO names or addresses will be made public.
  - In the event you need to opt out of this agreement, please notify Sharon in writing.

Housekeeping, Part 3

- Prep for Class 4
  - Sign up for your appointment today!
  - Prep for your Coaching Session
  - Arrive 15 minutes early
  - Bring the following:
    - L-1, L-2, L-3 and L-4 base Plans
    - Photos (yard & irrigation)
    - Highlighted Design Questionnaire
    - Bubble Diagrams
    - Hardscape Plan
    - Plant List
    - Evaluation Sheet from Notebook

Before you leave Class 4:

- Have your Low Impact Development, Planting & Irrigation Plans photographed BEFORE YOU LEAVE!

Housekeeping, Part 4

- Want to Learn More?

  Landscape Design programs at local Community Colleges:

  - Cuyamaca Community College
  - MiraCosta Community College
  - Southwestern Community College

WaterSmart Landscape
MAKEOVER SERIES

Series Topics:

Class 1

Let's Get Started:
Watersheds, Base Plan,
Scale, Soil & Site Analysis, Stormwater

Class 2

Shaping Spaces:
Landscape Design Fundamentals, Plant
Selection, Functional Design, Bubble Plans

Class 3

Make it Happen:
Turf Removal, Irrigation,
Efficiency, Maintenance

Class 4

Design Coach: LID, Planting and Irrigation Plans

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Make it Happen!

Class 3

Irrigation and Implementation of Your WaterSmart Landscape

Homework Review

4. Design continued: Irrigation

- Anatomy of an Irrigation System
- Water Efficient System Performance
- Retrofit Options
- Management and Scheduling
- Demonstration

5. Implementation

- Turf Removal
- Sheet Mulching
- Installation

6. Care for Your WaterSmart Landscape

- Maintenance
- Troubleshooting

Preparation for Class 4

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CLASS 3

Class 3 Objectives

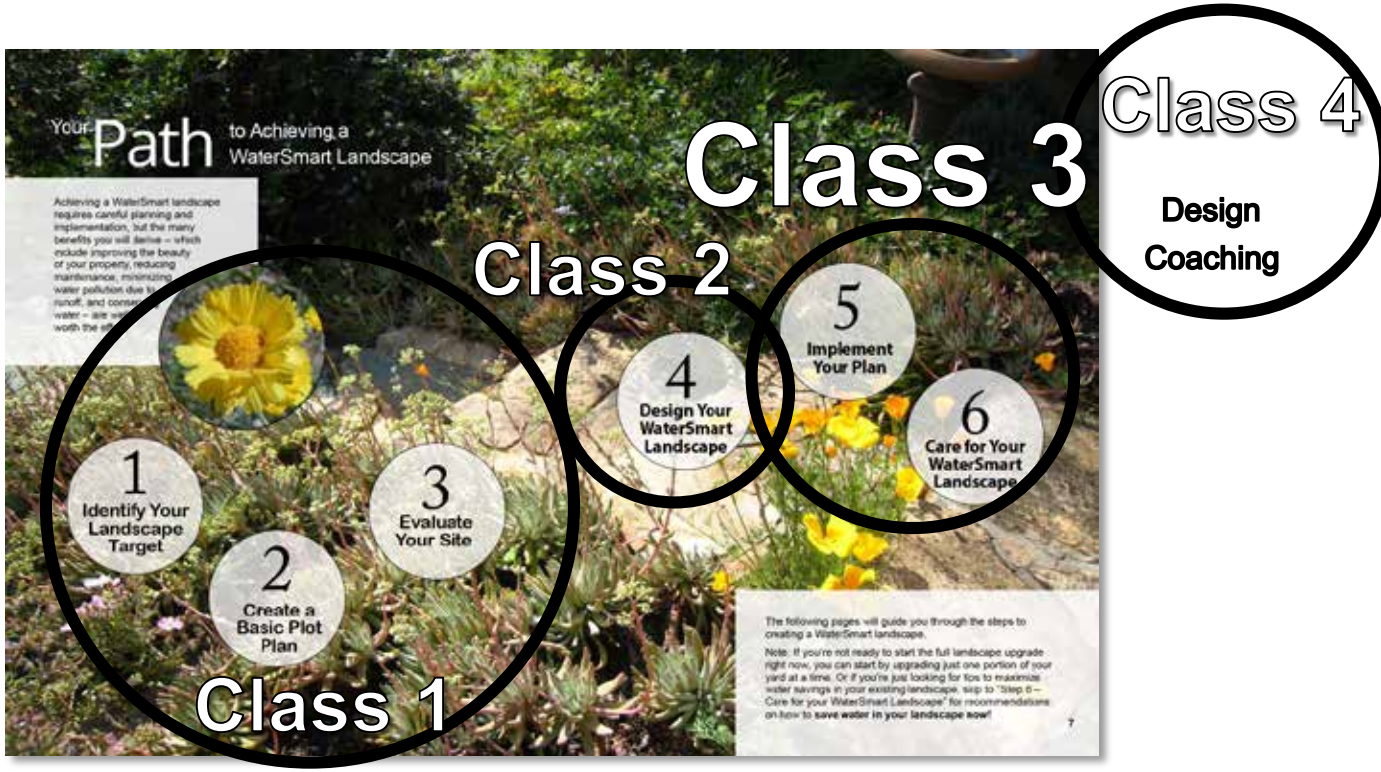
Homework Review

Step 4. **Design continued:**
Irrigation
- Anatomy of an Irrigation System
- Water Efficient System Performance
- Retrofit Options
- Management and Scheduling
- Demonstration

Step 5. **Implementation**
- Turf Removal
- Sheet Mulching
- Installation

Step 6. **Care for Your WaterSmart Landscape**
- Maintenance
- Troubleshooting

Preparation for Class 4



WaterSmart Landscape
MAKEOVER SERIES

CLASS 3

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A Better Way to Beautiful

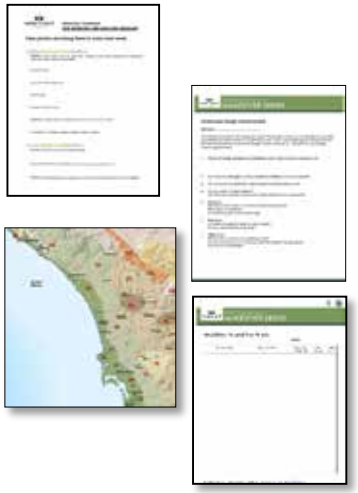
Make it Happen!

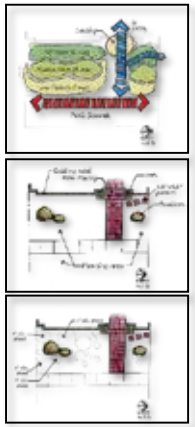
Homework Review:

Homework

Homework sheets are located in the Notebook at the end of Class 2 Section

1. Do: Landscape Design Questionnaire
2. Identify: Sunset Western Garden Zone
3. Do: Plant List
4. Do: Bubble Diagram
5. Do: Hardscape Plan
6. Recommended: Start your planting plan
7. Photograph: Your irrigation system
8. Read: A Homeowner's Guide to a WaterSmart Landscape Pages 18 - end
   Sustainable Landscape Guidelines Pages 46 - end
   Scan the Resource info at end of Class 3 material in Notebook
9. Watch: E-Learning Videos Episodes 9 through 17
   http://landscapemakeover.watersmart.org





Step 4:
Design: Irrigation

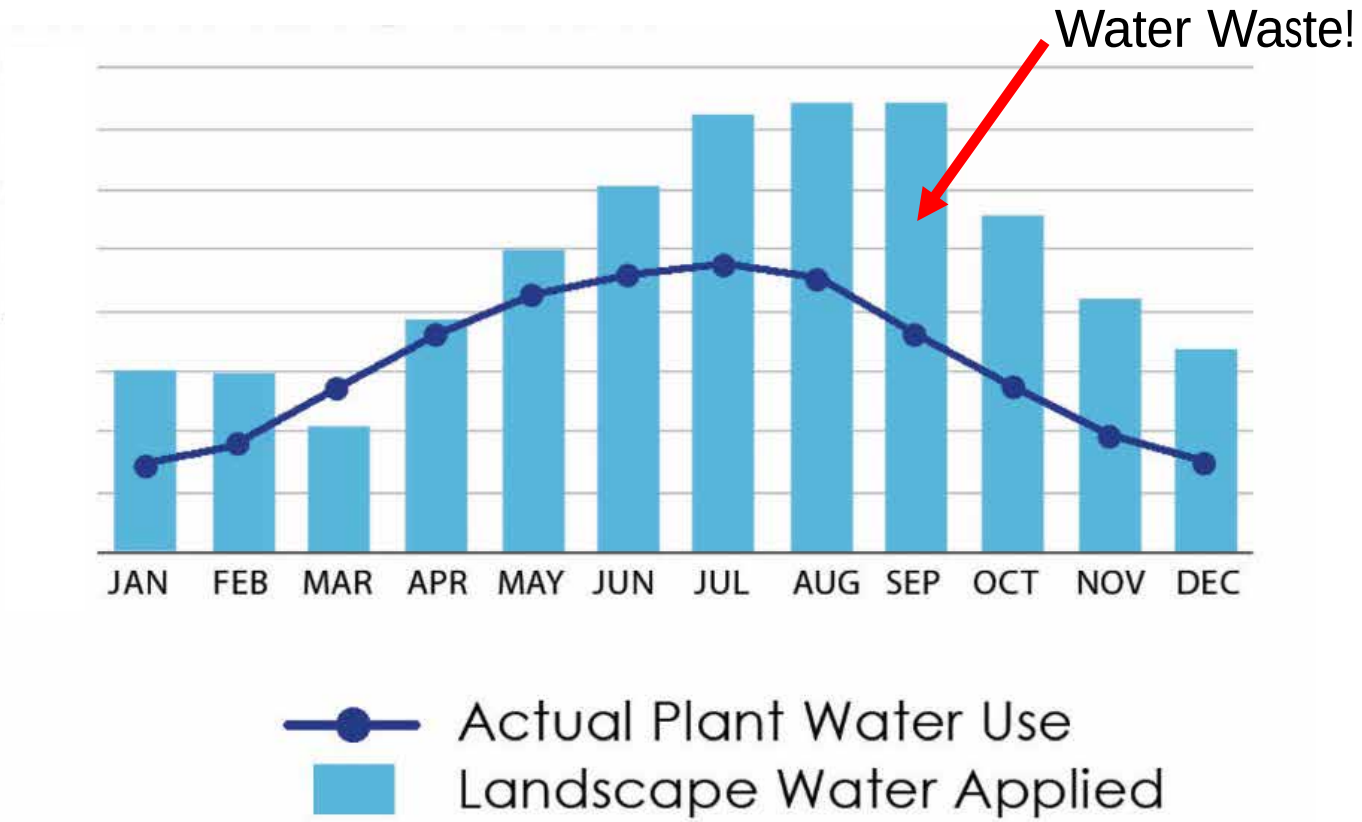
What is Efficient Irrigation?

- Efficient Water Delivery – System Performance
  - Correct Pressure
  - Good Distribution Uniformity

- Intelligent Water Management and Scheduling

Step 4:
Design: Irrigation

Water Needs vs. Water Use

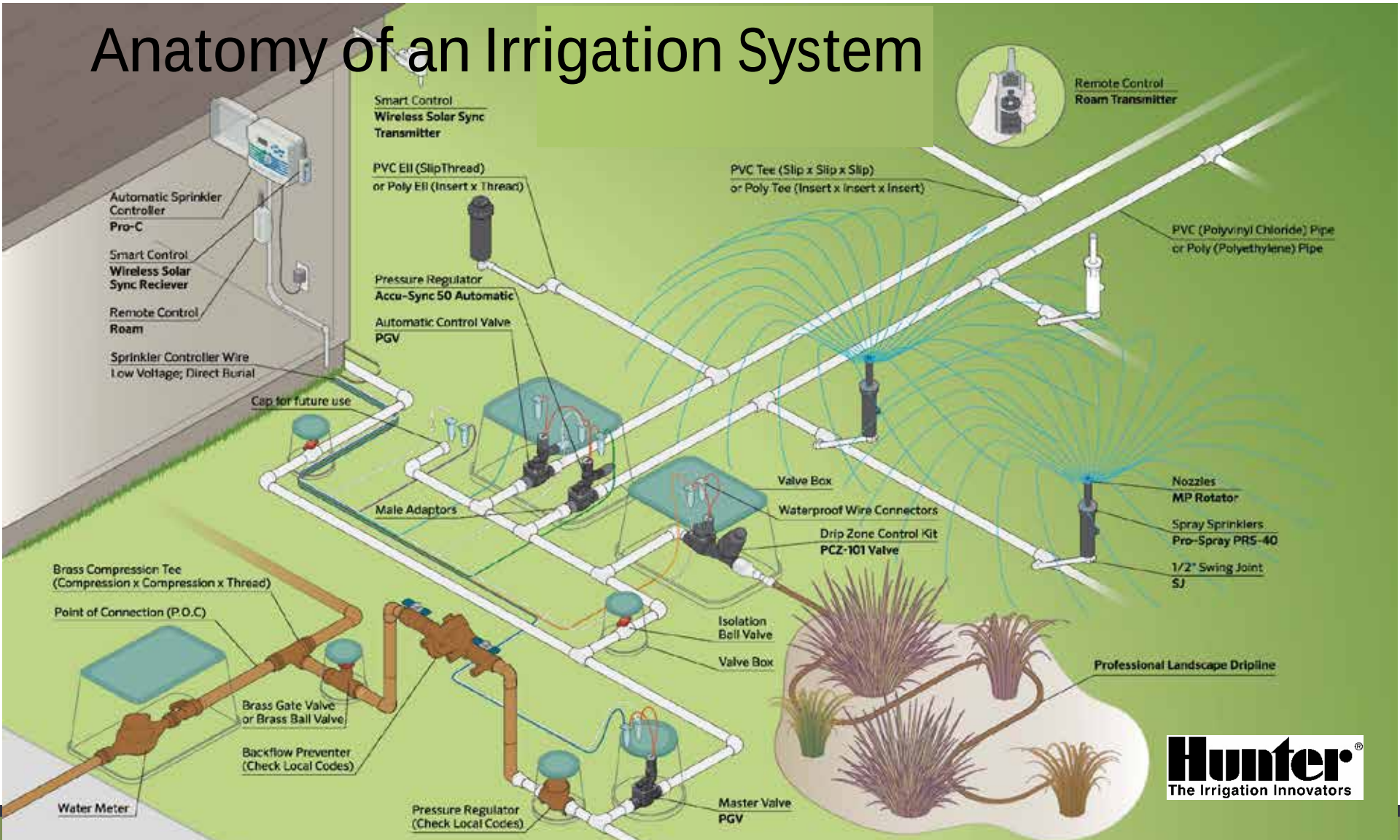


Step 4:
Design: Irrigation

Preventing Water Waste

- What is waste?
  - Runoff
  - Watering past root zone
  - Watering more than plants require
- How to prevent waste:
  - Improve uniformity
  - Improve infiltration
    - reduce compaction
    - mulch
    - increase soil organic matter content
  - Split cycles, cycle and soak

Step 4:
Design: Irrigation



Step 4:
Design: Irrigation

Backflow Prevention

Check your base plan, your backflow device should be identified!

A Reduced Pressure Zone Device (RPZ) protects against:

- Back Siphon
- Back Pressure

An anti-siphon valve (ASV) protects against:

- Back Siphon

Step 4:
Design: Irrigation

Control Valves

Step 4:
Design: Irrigation

Overhead System Types

Spray heads

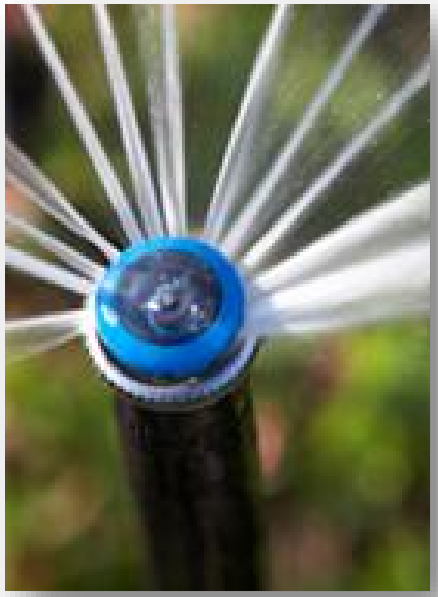
Rotors

Low precipitation rotors or spray (water efficient)

Step 4:
Design: Irrigation

Advantages of Efficient Overhead Spray

- Simple to retrofit existing spray hardware
- Can match precipitation rate of drip
- Simpler to troubleshoot than drip
- May provide better coverage for groundcover



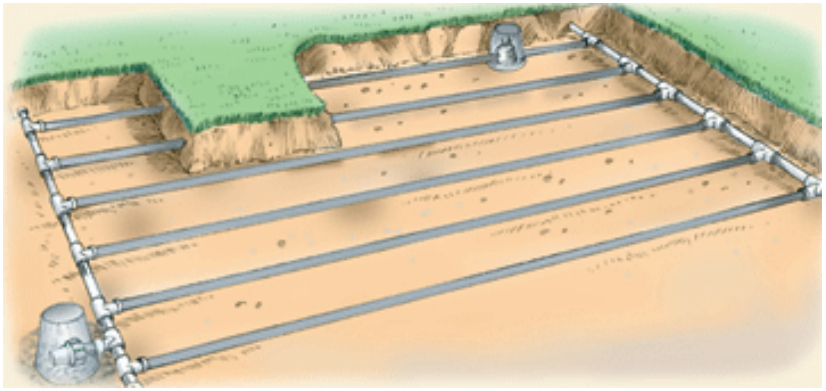
Step 4:
Design: Irrigation

Don't Mix Overhead Spray Types

Step 4:
Design: Irrigation

Surface or Subsurface Drip Irrigation Types

In-line drip irrigation



Sub-surface in-line drip

Point Source Drip

Bubblers

Step 4:
Design: Irrigation

Filters

At the valve

At the head

Step 4:
Design: Irrigation

Advantages of Drip Systems

- Drip is the most efficient irrigation delivery type
- Reduces weed growth by targeted water application
- Prevents runoff and erosion
- Low precipitation rate
- No trenching means less digging

Step 4:
Design: Irrigation

Drip Retrofit Systems

- Replace existing pop-ups with retrofit such as Rainbird R-1800
- Subsurface tubing with in-line emitters is preferred, NOT micro spray or point source emitters on 1/4”spaghetti lines
- Cover with mulch

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Step 4:
Design: Irrigation

Drip Retrofit Systems

Rainbird R-1800

Step 4:
Design: Irrigation

Advantages of In-Line Drip Emitters

- Provides consistent flow throughout line
- Less prone to clogging and damage than micro spray
- Easy to install
- Distributes water to entire root zone when installed correctly
- Low precipitation rate

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Step 4:
Design: Irrigation

In-line Drip

Step 4:
Design: Irrigation

Hardware Considerations

- Plant material choice
- Soil texture, slope
- Existing hardware
- Available pressure
- Available flow
- Budget
- Maintenance requirements

Step 4:
Design: Irrigation

Pressure

Static pressure at the point of connection (POC)- this may not always be a reliable location to measure irrigation pressure

Dynamic pressure at the irrigation heads

Step 4:
Design: Irrigation

Pressure Test

- This was recorded during your field visit and shown on your plan
- Range should be between 25 psi and 40 psi

Step 4:
Design: Irrigation

Pressure Regulation

At the point of connection (POC)

At the head

Step 4:
Design: Irrigation

Sprays: Adequate Pressure

Step 4:
Design: Irrigation

Sprays: High Pressure

Misting

Step 4:
Design: Irrigation

Rotors: Adequate Pressure

Rotor stream should disperse evenly from beginning to end

Step 4:
Design: Irrigation

Rotors: Low Pressure

Rotor emits one noticeable stream

Step 4:
Design: Irrigation

Rotors: Low Pressure

Donuts formed by poor coverage

Step 4:
Design: Irrigation

Head Damage

- Especially adjacent to driveways
- High Pressure can also cause damage.

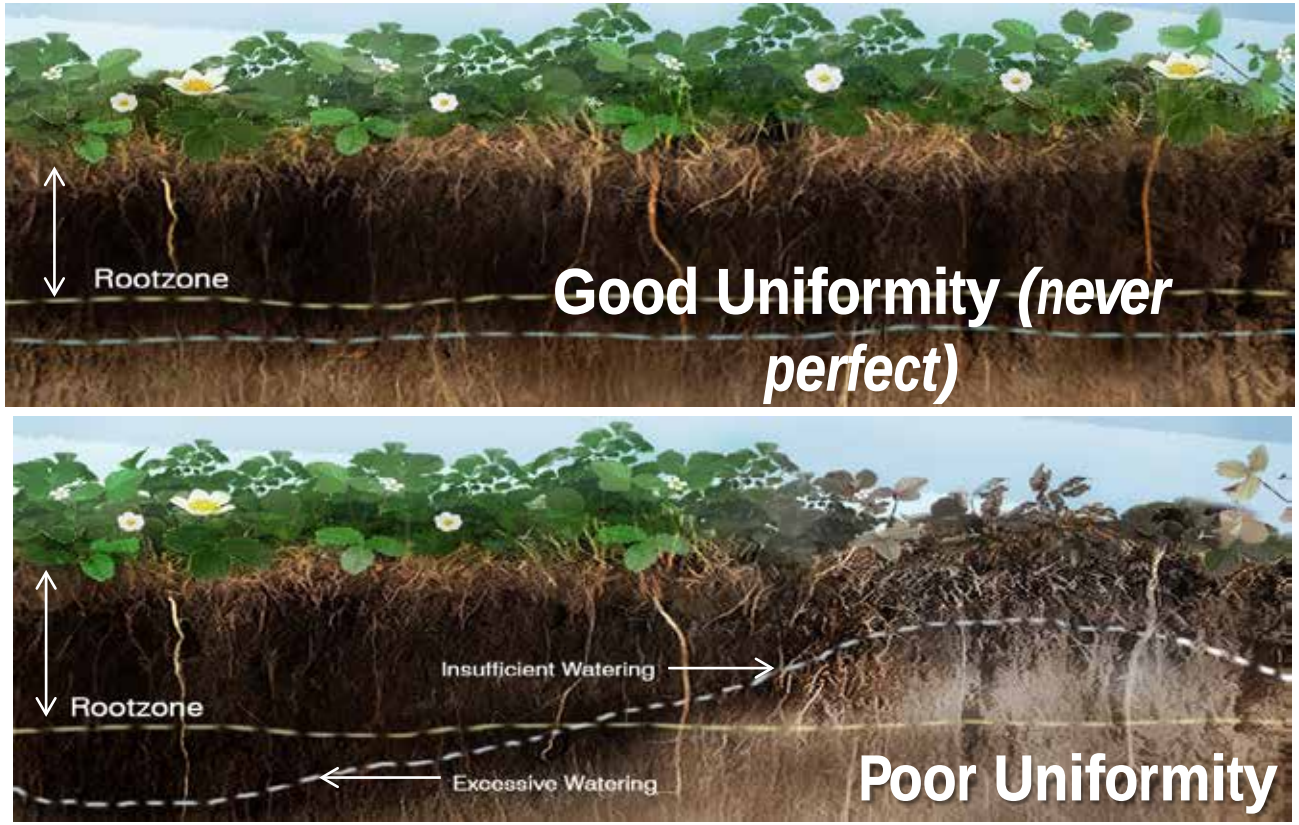
Step 4:
Design: Irrigation

Distribution Uniformity

- How evenly irrigation water is applied
- Wet area vs. dry area in the same zone

Step 4:
Design: Irrigation

Distribution Uniformity (DU)



Step 4:
Design: Irrigation

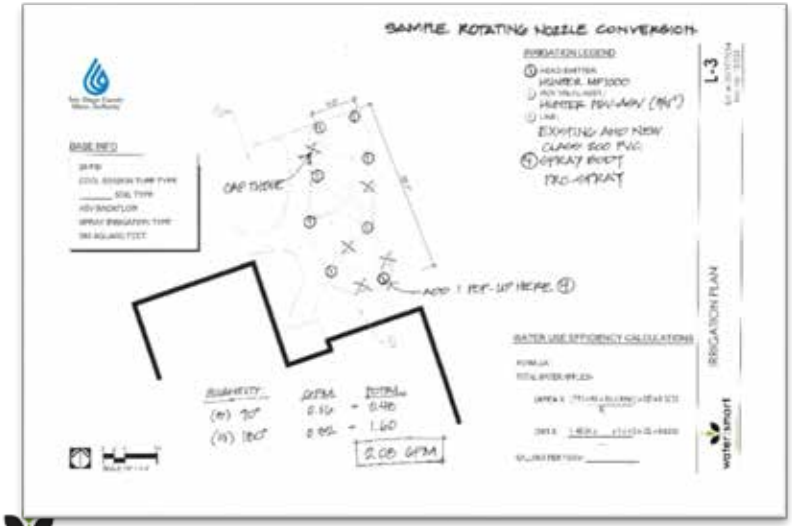
Factors Effecting DU

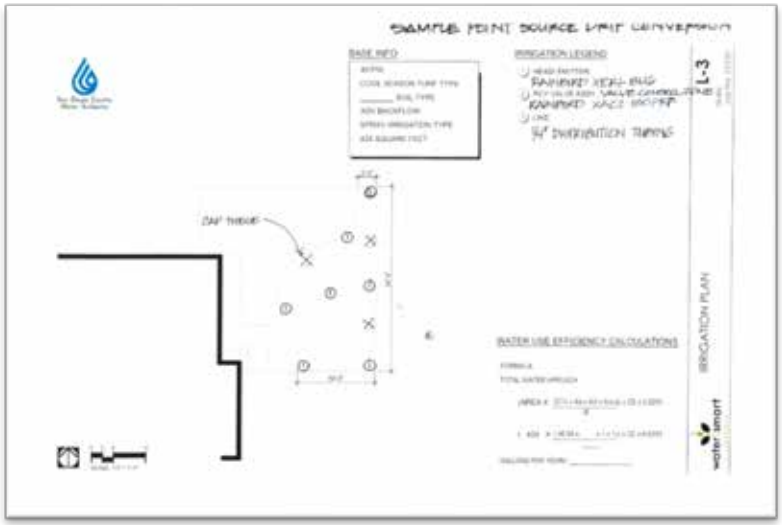
- Sprinkler Spacing
- Mixed Nozzles and Equipment
- Plant Interference
- Incorrect Water Pressure
- Tilted Sprinkler Heads
- Head Arc Adjustment
- Radius Adjustment
- Low Head Drainage

Step 4:
Design: Irrigation

Irrigation Plan

- Create an irrigation plan based on your completed planting plan and hydrozones.
- Select a category of irrigation (rotor, drip,etc…)
- Work with the Design Coach to prepare a materials list and fill in spaces on your legend (quantity and components).





Step 4:
Design: Irrigation

Overhead or Drip?

Choose Overhead for:

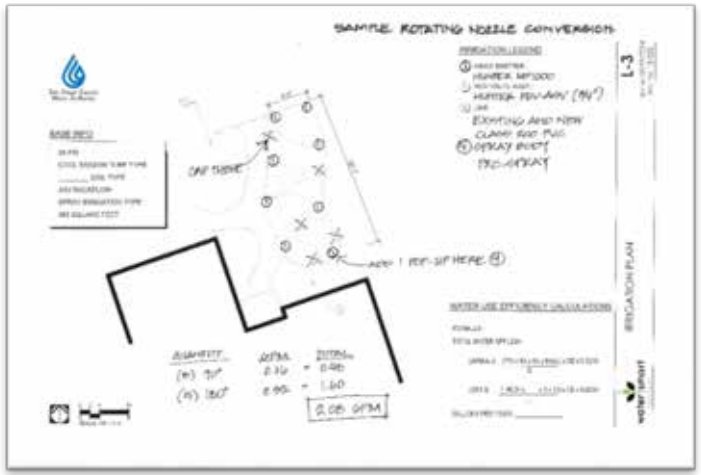
- Large areas of turf replacement ground cover (i.e. dymondia, Beach Strawberry, etc.)
- The existing overhead system has good existing coverage

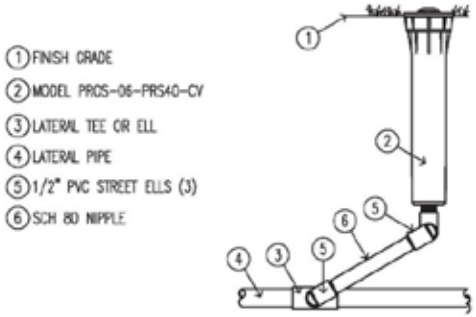
Choose Drip for:

- Small, oddly shaped planting areas
- Mixing of plants with differing water requirements in the same valve area

Step 4:
Design: Irrigation

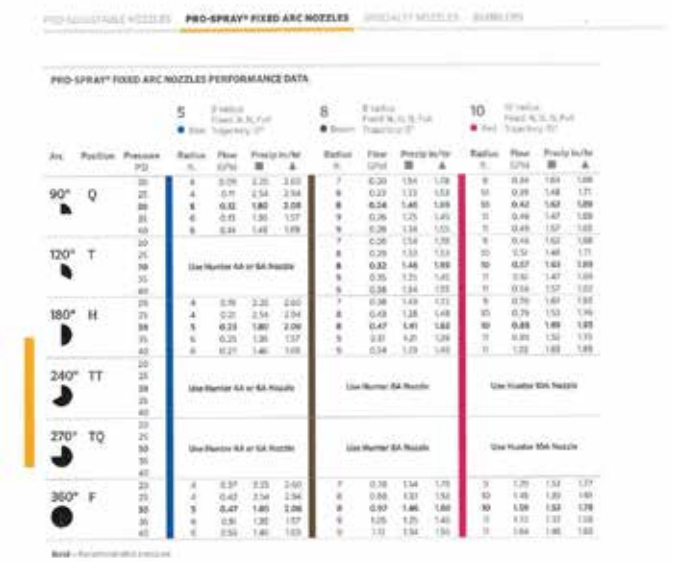
Specifying Spray Rotor Conversion





Step 4:
Design: Irrigation

Specifying Spray Rotor Conversion

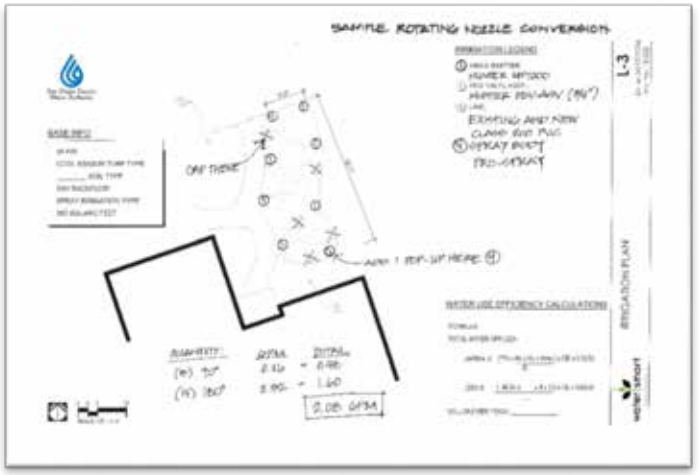


PRO-SPRAY® FIXED ARC NOZZLES

PRO-SPRAY® FIXED ARC NOZZLES PERFORMANCE DATA

Arc	Position	Pressure PSI	5 Radius ft.	5 Flow GPM	5 Precip In/Hr ■	5 Precip In/Hr ▲	8 Radius ft.	8 Flow GPM	8 Precip In/Hr ■	8 Precip In/Hr ▲	10 Radius ft.	10 Flow GPM	10 Precip In/Hr ■	10 Precip In/Hr ▲
90°	Q	30	4	0.09	2.25	3.03	7	0.20	1.54	1.78	9	0.34	1.84	1.88
		25	4	0.11	2.54	2.94	9	0.23	1.33	1.53	10	0.39	1.48	1.71
		30	**5**	**0.12**	**1.80**	**2.08**	**8**	**0.24**	**1.45**	**1.69**	**10**	**0.42**	**1.62**	**1.88**
		35	6	0.13	1.80	1.57	9	0.26	1.25	1.45	11	0.44	1.47	1.69
		60	6	0.14	1.48	1.69	9	0.28	1.34	1.55	11	0.49	1.57	1.82
120°	T	20					7	0.26	1.54	1.78	9	0.46	1.62	1.88
		25					8	0.29	1.33	1.53	10	0.51	1.48	1.71
		30		Use Hunter AA or GA Nozzle			**8**	**0.32**	**1.46**	**1.69**	**10**	**0.57**	**1.63**	**1.88**
		35					9	0.35	1.25	1.45	11	0.61	1.47	1.69
		60					9	0.38	1.34	1.55	11	0.66	1.57	1.82
180°	H	20	4	0.15	2.25	2.60	7	0.38	1.43	1.71	9	0.79	1.69	1.93
		25	4	0.21	2.54	2.94	8	0.43	1.28	1.48	10	0.79	1.53	1.76
		30	**5**	**0.23**	**1.80**	**2.09**	**8**	**0.47**	**1.41**	**1.63**	**10**	**0.88**	**1.69**	**1.95**
		35	6	0.25	1.35	1.57	9	0.51	1.25	1.29	11	0.95	1.52	1.55
		60	6	0.27	1.46	1.69	9	0.54	1.29	1.49	11	1.02	1.63	1.89
240°	TT	20												
		25												
		30		Use Hunter AA or GA Nozzle				Use Hunter GA Nozzle				Use Hunter 10A Nozzle		
		35												
		60												
270°	TQ	20												
		25												
		30		Use Hunter AA or GA Nozzle				Use Hunter GA Nozzle				Use Hunter 10A Nozzle		
		35												
		60												
360°	F	20	4	0.37	2.25	2.60	7	0.38	1.54	1.78	9	1.29	1.54	1.77
		25	4	0.42	2.54	2.94	8	0.86	1.33	1.53	10	1.45	1.89	1.69
		30	**5**	**0.47**	**1.80**	**2.06**	**8**	**0.97**	**1.46**	**1.68**	**10**	**1.59**	**1.52**	**1.76**
		35	6	0.51	1.35	1.57	9	1.05	1.25	1.45	11	1.72	1.37	1.58
		60	6	0.55	1.46	1.69	9	1.13	1.34	1.56	11	1.84	1.46	1.68

Bold = Recommended pressure



Step 4:
Design: Irrigation

Specifying Spray Rotor Conversion

MP ROTATOR*

MP ROTATOR PERFORMANCE DATA

Arc	Pressure (PSI)	MP1000 Radius (ft)	MP1000 Flow (GPM)	MP1000 Flow (GPH)	MP1000 Precip in/hr ■	MP1000 Precip in/hr ▲	MP2000 Radius (ft)	MP2000 Flow (GPM)	MP2000 Flow (GPH)	MP2000 Precip in/hr ■	MP2000 Precip in/hr ▲	MP3000 Radius (ft)	MP3000 Flow (GPM)	MP3000 Flow (GPH)	MP3000 Precip in/hr ■	MP3000 Precip in/hr ▲
90°	25	--	--	--	--	--	17	0.31	18.8	0.47	0.68	25	0.60	41.4	0.43	0.43
	30	13	0.36	9.89	0.43	0.53	18	0.33	19.8	0.35	0.45	27	0.74	44.4	0.39	0.46
	35	13	0.38	10.8	0.40	0.46	19	0.37	22.2	0.39	0.44	28	0.80	48.0	0.39	0.45
	40	**14**	**0.39**	**11.4**	**0.39**	**0.45**	**20**	**0.40**	**24.0**	**0.39**	**0.44**	**30**	**0.88**	**52.8**	**0.37**	**0.43**
	45	14	0.40	12.0	0.38	0.45	21	0.42	25.2	0.37	0.42	30	0.91	54.6	0.35	0.41
	50	14	0.41	12.6	0.38	0.43	21	0.44	26.4	0.35	0.40	30	0.96	57.6	0.34	0.39
	55	15	0.42	13.2	0.37	0.43	21	0.47	28.2	0.37	0.43	30	1.03	61.8	0.35	0.40
180°	25	--	--	--	--	--	16	0.58	34.8	0.44	0.50	25	1.44	86.4	0.44	0.51
	30	12	0.52	15.0	0.43	0.50	17	0.63	37.8	0.41	0.48	27	1.58	94.8	0.42	0.48
	35	13	0.55	17.0	0.40	0.46	18	0.68	41.4	0.41	0.47	28	1.72	103.2	0.42	0.48
	40	**14**	**0.57**	**22.2**	**0.39**	**0.45**	**19**	**0.74**	**44.4**	**0.39**	**0.45**	**30**	**1.82**	**109.2**	**0.39**	**0.45**
	45	14	0.60	24.0	0.39	0.45	20	0.79	49.8	0.38	0.43	30	1.93	115.8	0.41	0.48
	50	14	0.61	24.6	0.38	0.44	21	0.83	49.8	0.38	0.44	30	2.04	122.4	0.44	0.50
	55	15	0.63	25.8	0.37	0.43	21	0.85	51.0	0.37	0.43	30	2.13	127.8	0.46	0.53
210°	25	--	--	--	--	--	16	0.68	40.8	0.44	0.50	25	1.68	100.8	0.44	0.51
	30	12	0.57	22.2	0.43	0.50	17	0.74	44.4	0.42	0.48	27	1.84	110.4	0.42	0.48
	35	13	0.61	24.6	0.40	0.46	18	0.80	48.0	0.41	0.47	28	1.99	119.4	0.42	0.48
	40	**14**	**0.63**	**25.8**	**0.39**	**0.45**	**19**	**0.86**	**51.6**	**0.39**	**0.45**	**30**	**2.12**	**127.2**	**0.39**	**0.45**
	45	14	0.66	27.6	0.39	0.45	20	0.91	55.2	0.38	0.43	30	2.25	135.0	0.41	0.48
	50	14	0.68	28.8	0.38	0.43	21	0.97	58.2	0.36	0.41	30	2.37	142.2	0.42	0.50
	55	15	0.70	30.0	0.37	0.43	21	1.01	60.6	0.37	0.43	30	2.46	147.6	0.44	0.52
270°	25	--	--	--	--	--	16	0.87	52.2	0.44	0.50	25	2.19	131.4	0.43	0.52
	30	12	0.68	29.0	0.43	0.50	17	0.93	57.0	0.42	0.48	27	2.37	142.2	0.42	0.48
	35	13	0.74	32.0	0.40	0.46	18	1.03	61.8	0.41	0.47	28	2.53	150.0	0.42	0.48
	40	**14**	**0.77**	**34.0**	**0.39**	**0.45**	**19**	**1.11**	**66.0**	**0.39**	**0.45**	**30**	**2.73**	**163.8**	**0.39**	**0.45**
	45	14	0.80	35.0	0.39	0.45	20	1.17	70.2	0.38	0.43	30	2.89	173.4	0.41	0.48
	50	14	0.83	36.0	0.38	0.43	21	1.23	73.8	0.36	0.41	30	3.06	183.6	0.44	0.50
	55	15	0.88	40.0	0.37	0.43	21	1.30	78.0	0.37	0.43	30	3.20	192.2	0.46	0.53
360°	25	--	--	--	--	--	16	1.16	69.5	0.44	0.50	25	2.88	172.8	0.44	0.51
	30	12	0.85	38.0	0.43	0.50	17	1.27	76.2	0.42	0.48	27	3.15	189.0	0.42	0.48
	35	13	0.91	42.6	0.42	0.47	18	1.37	82.2	0.41	0.47	28	3.40	204.0	0.42	0.48
	40	**14**	**0.95**	**45.0**	**0.39**	**0.46**	**19**	**1.47**	**88.2**	**0.39**	**0.45**	**30**	**3.64**	**218.4**	**0.39**	**0.45**
	45	14	0.99	48.0	0.39	0.45	20	1.55	93.0	0.38	0.43	30	3.86	231.6	0.41	0.48
	50	14	1.04	50.4	0.38	0.44	21	1.64	98.4	0.36	0.41	30	4.07	244.2	0.44	0.50
	55	15	1.07	52.2	0.37	0.43	21	1.72	103	0.37	0.43	30	4.27	256.2	0.46	0.53

Bold = Recommended Pressure

This can easily be achieved by using the MP Rotator with the Hunter PRS40 Spray Body (pressure regulated at 40 PSI)

Works best with PRS40

For PRS40 information see page 40

MP ROTATOR

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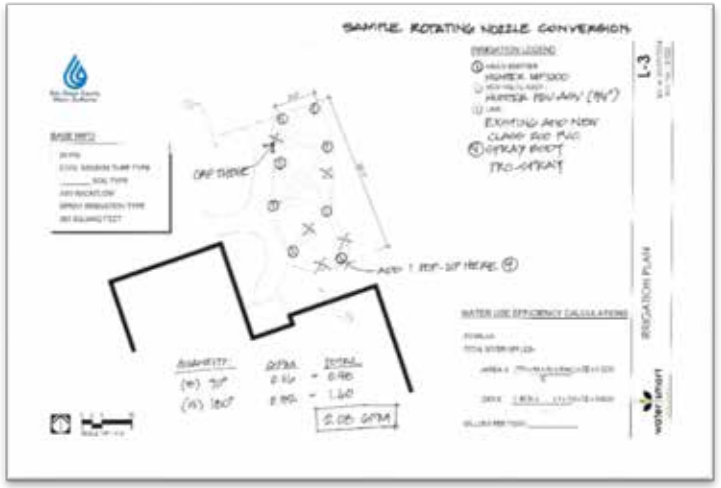
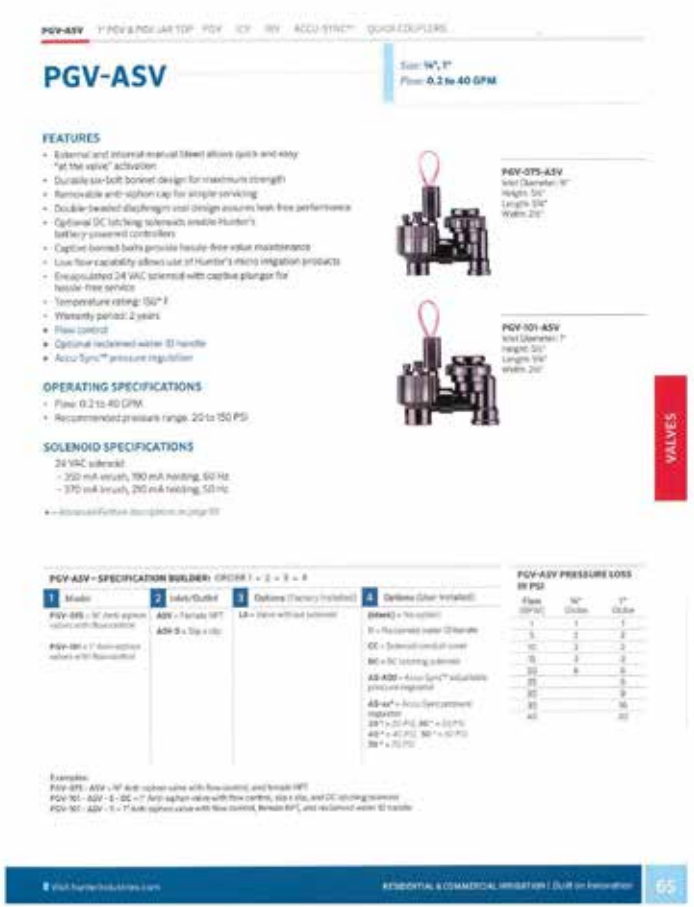


Step 4:
Design: Irrigation

Specifying Spray Rotor Conversion



PGV-ASV

Size: ¾", 1"
Flow: 0.2 to 40 GPM

FEATURES

- External and internal manual bleed allows quick and easy "at the valve" activation
- Durable six-bolt bonnet design for maximum strength
- Removable anti-siphon cap for simple servicing
- Double-beaded diaphragm seal design assures leak-free performance
- Optional DC latching solenoids enable Hunter's battery-powered controllers
- Captive bonnet bolts provide hassle-free valve maintenance
- Low flow capability allows use of Hunter's micro irrigation products
- Encapsulated 24 VAC solenoid with captive plunger for hassle-free service
- Temperature rating: 150° F
- Warranty period: 2 years
- Flow control
- Optional reclaimed water ID handle
- Accu-Sync™ pressure regulator

PGV-075-ASV

PGV-101-ASV

OPERATING SPECIFICATIONS

- Flow: 0.2 to 40 GPM
- Recommended pressure range: 20 to 150 PSI

SOLENOID SPECIFICATIONS

24 VAC solenoid
- 350 mA inrush, 190 mA holding, 60 Hz
- 370 mA inrush, 260 mA holding, 50 Hz

VALVES

PGV-ASV – SPECIFICATION BUILDER: ORDER 1 + 2 + 3 + 4

1 Model
PGV-075 = ¾" Anti-siphon valve with flow control
PGV-101 = 1" Anti-siphon valve with flow control

2 Inlet/Outlet
ASV = Female NPT
ASV-S = Slip x slip

3 Options (Factory Installed)
LR = Valve without solenoid

4 Options (User Installed)
(blank) = No option
R = Reclaimed water ID handle
CC = Solenoid conduit cover
NC = NC latching solenoid
AS-ADJ = Accu-Sync™ adjustable pressure regulator
AS-xx* = Accu-Sync pressure regulator
*20 = 20 PSI, NC = NC
40 = 40 PSI, 50 = 50 PSI
75 = 75 PSI

Examples:
PGV-075 - ASV = ¾" Anti-siphon valve with flow control, and female NPT
PGV-101 - ASV - S - DC = 1" Anti-siphon valve with flow control, slip x slip, and DC latching solenoid
PGV-101 - ASV - S - 1" Anti-siphon valve with flow control, female NPT, and reclaimed water ID handle

PGV-ASV PRESSURE LOSS
in PSI

Flow (GPM)	¾" Globe	1" Globe
1	1	1
5	3	2
10	3	3
15	5	3
20	8	5
25		6
30		9
35		12
40		16

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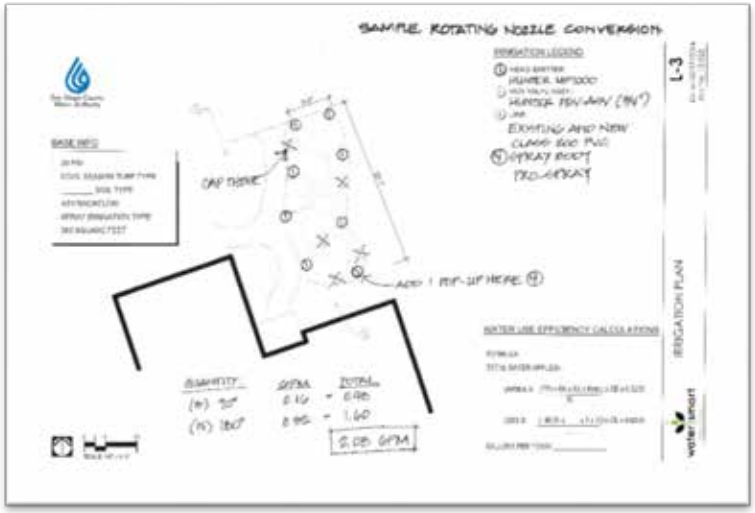
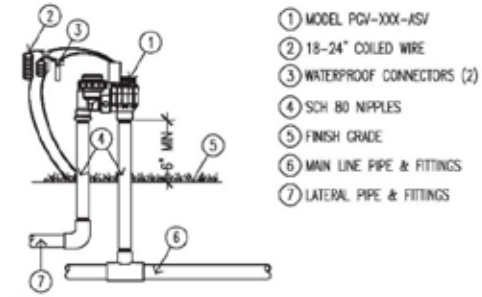
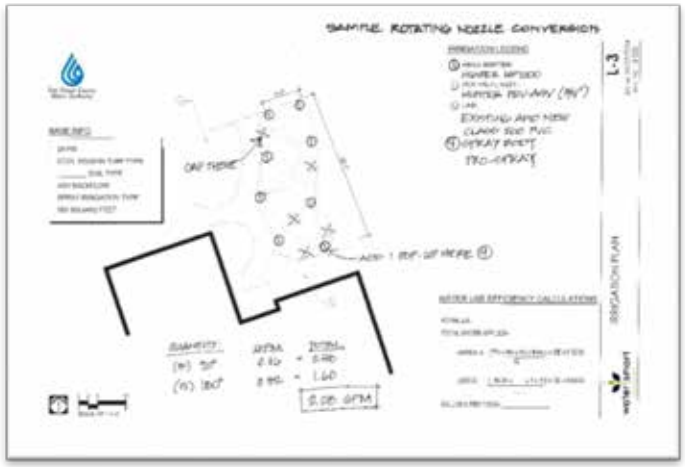


Step 4:
Design: Irrigation

Specifying Spray Rotor Conversion





Step 4:
Design: Irrigation

Specifying Spray Rotor Conversion

0700 PVC/IRRIGATION PIPE

PVC PRESSURE RATED PIPE

Class 200 - SDR 21

Class 315 - SDR 13.5

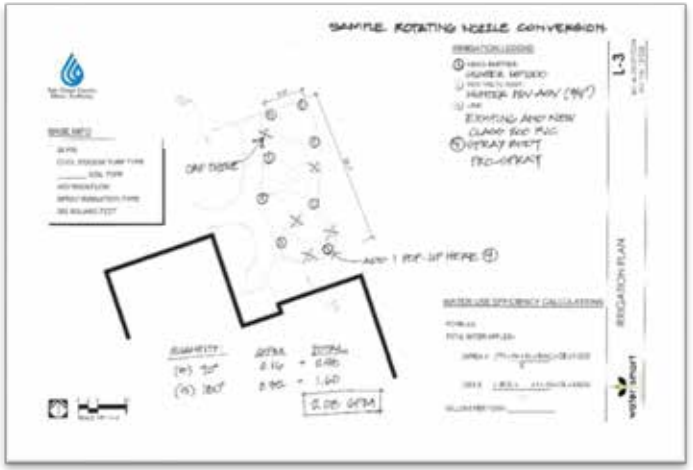
Schedule 40 Pipe

Schedule 80 Pipe

100 Foot Head

Class 100 SDR 41

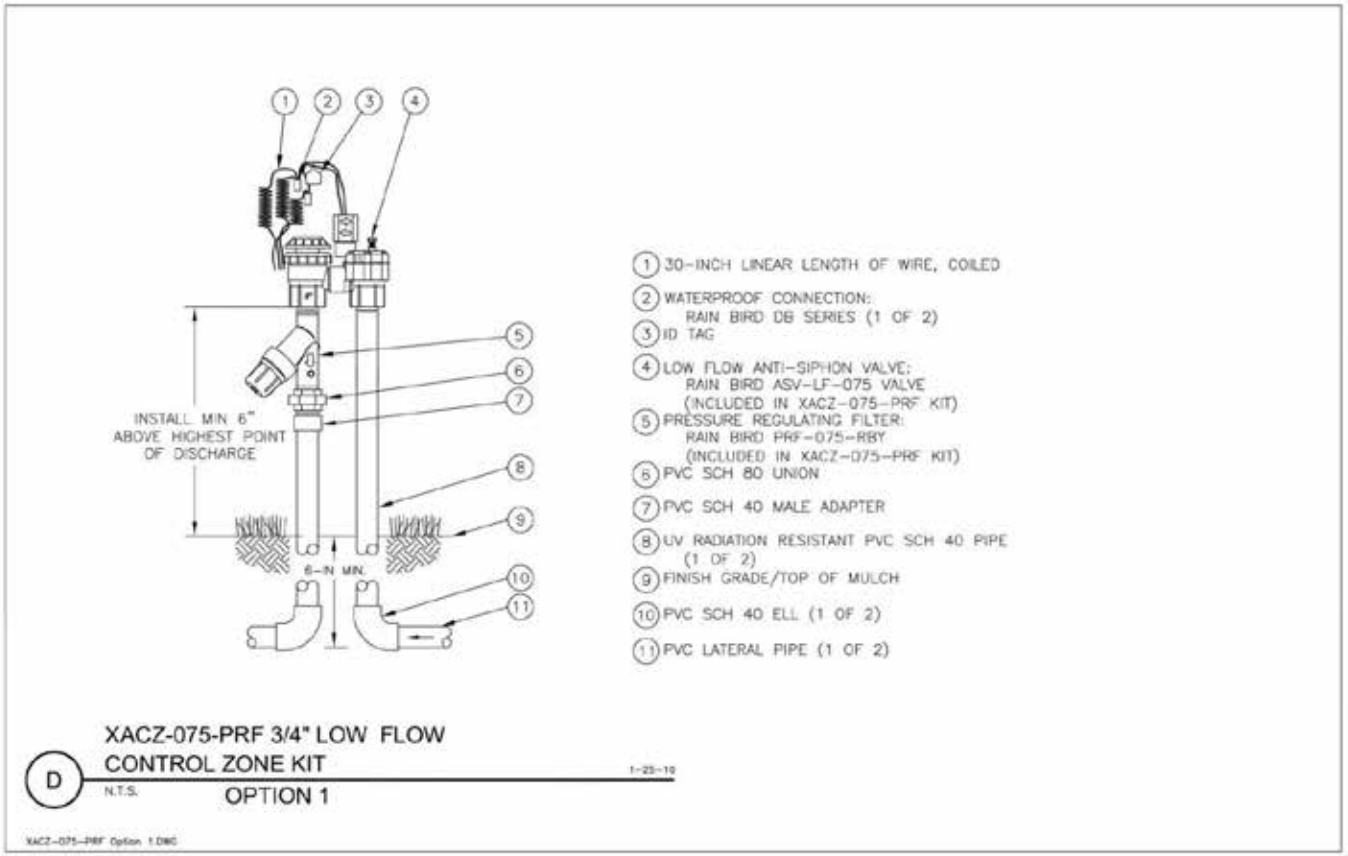
34 EWING Irrigation & Golf & Industrial



Use Sch. 40 pipe (only) for all mainlines (up to 1.5”)

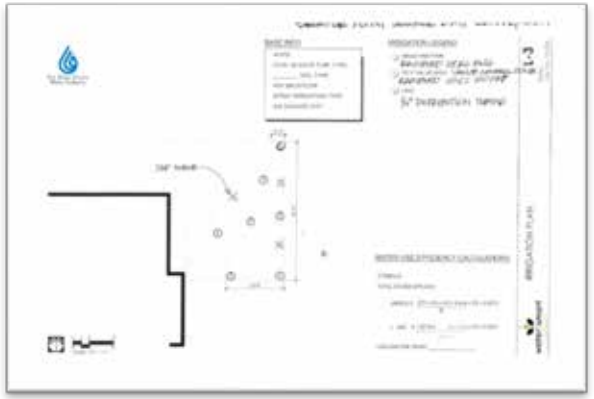
Step 4:
Design: Irrigation

Specifying Drip Conversion



Step 4:
Design: Irrigation

Specifying Drip Conversion



Step 4:
Design: Irrigation

Specifying Drip Conversion

RAIN BIRD

Control Zone Kit Selection Chart

Flow Range	0.2 GPM to 5.0 GPM		3.0 GPM to 15.0 GPM
Filter Type	Pressure Regulating Manual Flush		Pressure Regulating Manual Flush
Model #	XCZ-075-PRF	XCZ-LF-100-PRF	XCZ-100-PRB
	XACZ-075-PRB (Anti-Siphon)		XACZ-100-PRB (Anti-Siphon)
Valve	Low Flow or Anti-Siphon	Low Flow	DV or Anti-Siphon
Inlet x Outlet Size	3/4" FPT x 3/4" MPT	1" FPT x 3/4" MPT	1" FPT x 1" MPT
Inlet Pressure	20 to 120 PSI		20 to 120 PSI
Regulating Pressure	30 PSI		40 PSI
Filter	200 Mesh Stainless Steel		200 Mesh Stainless Steel
Replacement Filter	RBY200SMX		RBY200SMX

Low Flow Valves

The only valve on the market that can handle low flows (below 3 gpm) without surging

Shorter Kits

With only two components (valve plus pressure regulating filter) you can fit more Control Zone Kits in a valve box, saving time and money

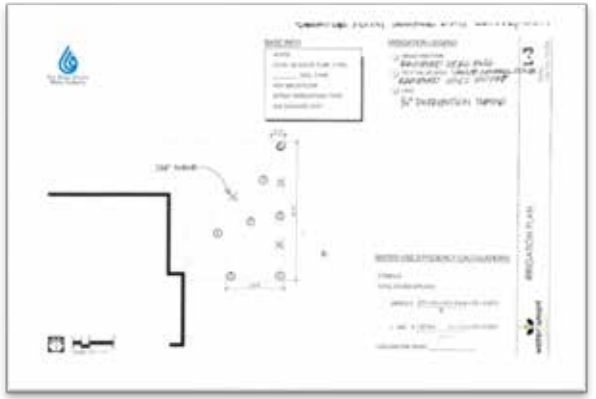
Anti-Siphon Valves

Field proven low flow anti-siphon valve that has an atmospheric vacuum breaker for backflow prevention and an IAPMO rating

PB Filter Kits

All of these kits provide on/off control, filtration, and pressure regulation with fewer connections, so there is less chance of leakage at the connections, both at installation and over the life of the system

D30002



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San Diego County Water Authority

Step 4:
Design: Irrigation

Specifying Drip Conversion

Spray-to-Drip Retrofit Kit

Simple kit that easily converts a conventional spray zone to a low-volume irrigation zone

Features

- 1800 Series Spray Body that contains a filter, pressure regulator, and ½" male threaded outlet
- Permits convenient conversion to drip tubing when used with Easy Fit Fitting and female adapter
  - Can be installed above or below grade
- Internal assembly can be removed and easily dropped into any 1804, 1806 or 1812 Spray Head Body to easily retrofit existing system to Xerigation products
- Provides 30 psi (2.1 bar) pressure regulation and 200-mesh (75-micron) screen
- If retrofit flow is less than 3 gpm, replace electronic valve with a Rain Bird Low Flow Valve

Operating Range

- Flow: 0.50 to 4.00 gpm (1.9 to 15.1 l/m)
- Inlet pressure: 15 to 70 psi (1.0 to 4.8 bar)
- Regulated pressure: 30 psi (2.1 bar)
- Filtration: 200 mesh (75 micron)

Model

- RETRO-1800

Dimensions

- ½" female-threaded inlet
- ½" male-threaded swivel outlet
- Height: 7" (17.8 cm)
- Width: 2" (5.1 cm)

½" Male Elbow Fitting (Included)
½" MPT swivel outlet
30 psi pressure regulator
200-mesh filter
Rugged, UV-resistant 1800 body

MDCF Coupler or MDCF TEE (sold separately) Pg. 161
Dripline
MDCF 50FPT (sold separately) Pg. 161
½" Elbow Fitting
RETRO-1800
Converts 1800 Spray Bodies to Dripline

Landscape Drip

Water Saving

Designed specifically for areas with water restrictions, our Spray-to-Drip Retrofit Kit allows use of existing 1800 Series Spray Bodies as drip irrigation connection points.

The Intelligent Use of Water.™

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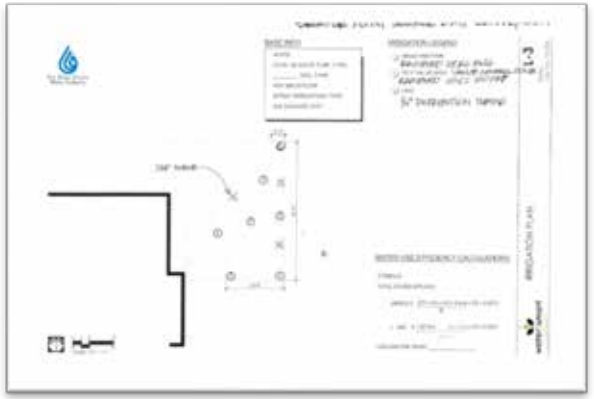
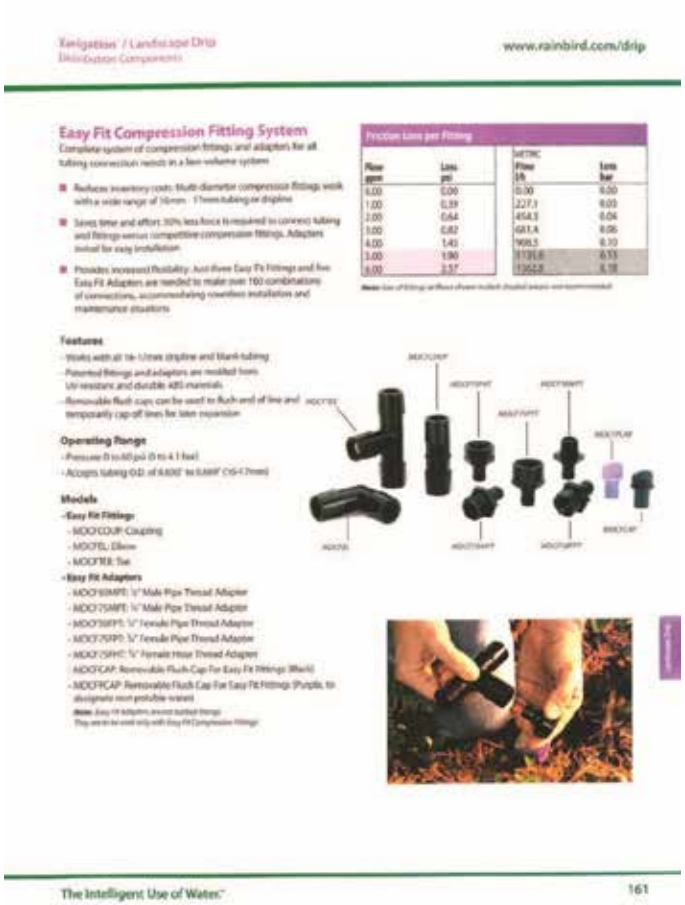


Step 4:
Design: Irrigation

Specifying Drip Conversion



Rainbird / Landscape Drip
Distribution Components

www.rainbird.com/drip

Easy Fit Compression Fitting System

Complete system of compression fittings and adapters for all tubing connection needs in a low-volume system.

- Reduces inventory costs: Multi-diameter compression fittings work with a wide range of 16mm - 17mm tubing or dripline
- Saves time and effort: 30% less force is required to connect tubing and fittings versus competitive compression fittings. Adapters swivel for easy installation
- Provides increased flexibility: Just three Easy Fit Fittings and five Easy Fit Adapters are needed to make over 100 combinations of connections, accommodating countless installation and maintenance situations

Friction Loss per Fitting

Flow gpm	Loss psi	Flow l/h	Loss bar
0.50	0.00	0.00	0.00
1.00	0.39	227.1	0.03
2.00	0.64	454.3	0.04
3.00	0.82	681.4	0.06
4.00	1.43	908.5	0.10
5.00	1.90	1135.6	0.13
6.00	2.57	1362.8	0.18

Features

- Works with all 16-17mm dripline and blank tubing
- Patented fittings and adapters are molded from UV-resistant and durable ABS materials
- Removable flush caps can be used to flush end of line and temporarily cap off lines for later expansion

Operating Range

- Pressure: 0 to 60 psi (0 to 4.1 bar)
- Accepts tubing O.D. of 0.600" to 0.660" (16-17mm)

Models

- Easy Fit Fittings
  - MDCFCOUP: Coupling
  - MDCFEL: Elbow
  - MDCFTEE: Tee
- Easy Fit Adapters
  - MDCFSMPT: ½" Male Pipe Thread Adapter
  - MDCF75MPT: ¾" Male Pipe Thread Adapter
  - MDCFSFPT: ½" Female Pipe Thread Adapter
  - MDCF75FPT: ¾" Female Pipe Thread Adapter
  - MDCF75HT: ¾" Female Hose Thread Adapter
  - MDCFCAP: Removable Flush Cap For Easy Fit Fittings (Black)
  - MDCFPCAP: Removable Flush Cap For Easy Fit Fittings (Purple, to designate non-potable water)

Note: Easy Fit adapters are not barbed fittings. They are to be used only with Easy Fit Compression Fittings.

The Intelligent Use of Water.™

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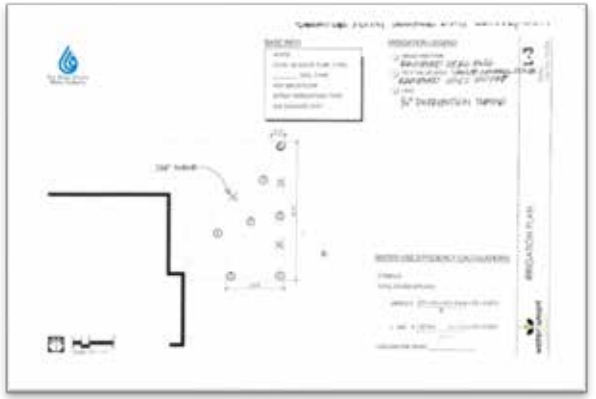
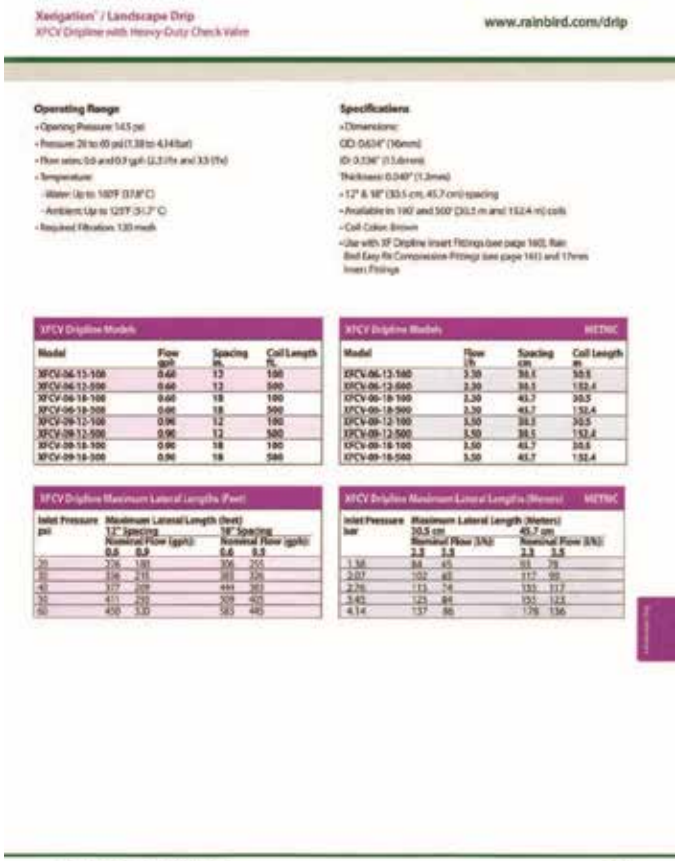


Step 4:
Design: Irrigation

Specifying Drip Conversion


Xerigation® / Landscape Drip
XFCV Dripline with Heavy-Duty Check Valve

www.rainbird.com/drip

Operating Range
- Opening Pressure: 14.5 psi
- Pressure: 20 to 60 psi (1.38 to 4.14 bar)
- Flow rates: 0.6 and 0.9 gph (2.3 l/h and 3.5 l/h)
- Temperature:
  - Water: Up to 180°F (37.8°C)
  - Ambient: Up to 125°F (51.7°C)
- Required Filtration: 130 mesh

Specifications
- Dimensions:
  OD: 0.634" (16mm)
  ID: 0.536" (13.6mm)
  Thickness: 0.040" (1.3mm)
- 12" & 18" (30.5 cm, 45.7 cm) spacing
- Available in 100' and 500' (30.5 m and 152.4 m) coils
- Coil Color: Brown
- Use with XF Dripline Insert Fittings (see page 160), Rain Bird Easy Fit Compression Fittings (see page 161) and 17mm Insert Fittings

XFCV Dripline Models

Model	Flow gph	Spacing in.	Coil Length ft.
XFCV-06-12-100	0.60	12	100
XFCV-06-12-500	0.60	12	500
XFCV-06-18-100	0.60	18	100
XFCV-06-18-500	0.60	18	500
XFCV-09-12-100	0.90	12	100
XFCV-09-12-500	0.90	12	500
XFCV-09-18-100	0.90	18	100
XFCV-09-18-500	0.90	18	500

XFCV Dripline Models METRIC

Model	Flow l/h	Spacing cm	Coil Length m
XFCV-06-12-100	2.30	30.5	30.5
XFCV-06-12-500	2.30	30.5	152.4
XFCV-06-18-100	2.30	45.7	30.5
XFCV-06-18-500	2.30	45.7	152.4
XFCV-09-12-100	3.50	30.5	30.5
XFCV-09-12-500	3.50	30.5	152.4
XFCV-09-18-100	3.50	45.7	30.5
XFCV-09-18-500	3.50	45.7	152.4

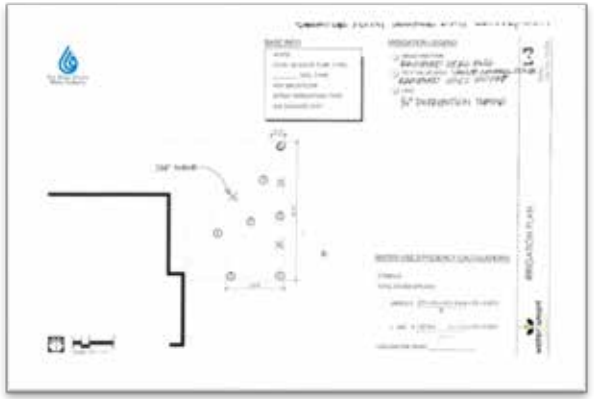
XFCV Dripline Maximum Lateral Lengths (Feet)

Inlet Pressure psi	Maximum Lateral Length (feet) 12" Spacing Nominal Flow (gph): 0.6	0.9	18" Spacing Nominal Flow (gph): 0.6	0.9
20	206	180	306	255
30	356	215	383	326
40	377	209	444	383
50	411	255	509	405
60	450	330	583	445

XFCV Dripline Maximum Lateral Lengths (Meters) METRIC

Inlet Pressure bar	Maximum Lateral Length (Meters) 30.5 cm Nominal Flow (l/h): 2.3	3.5	45.7 cm Nominal Flow (l/h): 2.3	3.5
1.38	84	45	93	79
2.07	102	65	117	99
2.76	113	74	135	117
3.45	125	84	155	123
4.14	137	86	178	136

The Intelligent Use of Water.™ 157



Step 4:
Design: Irrigation

Water Management

Know Root Zone Depth =

Know How Much Water To Apply

Deep, less frequent watering is best for plant health

Step 4:
Design: Irrigation

Water Management

- You Can't Manage What You Can't Measure
  - Locate your water meter
  - Know your water history
  - Consider adding a flow sensor

Step 4:
Design: Irrigation

Water Efficient Control Equipment

- Use your water meter to track weekly/monthly water use.

Rain and ETo Sensors

Smart Controllers

Moisture Sensors

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San Diego County Water Authority

Step 4:
Design: Irrigation

Irrigation Controllers

- Multiple types and manufact Aavailable
- Multiple start times
- Look at calendar length
- Look for ability to program individual stations
- Web based capability
- Sensor data capability

Hunter®
The Irrigation Innovators

RAIN BIRD

TORO®

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San Diego County Water Authority

Step 4:
Design: Irrigation

Weather Based Controllers

- Type
  - Historical
  - Weather station
- Web-Based Control
- Sensor Data Input – solar sync
- Flow meters

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Hunter® The Irrigation Innovators

San Diego County Water Authority

Step 4:
Design: Irrigation

What is a Controller Program?

- A set of instructions stored in the controller
- Different irrigation schedules
  - Irrigation days – how often?
  - Start times – at what time?
  - Water times – how long?

Step 4:
Design: Irrigation

How much water does your landscape need?

…. It depends.

Irrigation Scheduling Factors

- Soil Texture
  - Infiltration rate – how fast soil takes water in
  - Water holding capacity
    - how long it stays there
    - “plant gas tank”
- Precipitation Rate
  - How fast water is applied
    - “light rain vs. heavy rain”
- Plant Demand

Step 4:
Design: Irrigation

Irrigation Scheduling: Internet

BeWaterWise.com

WATERING SCHEDULE
(Zip Code 92024)

SHRUBS: Low Water Use | Clay Loam | Rotors, 0.5 Inches/Hour

SUGGESTED SCHEDULE - GUIDELINE ONLY (FULL SUN AREAS)										PROGRAM S24CL		
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Minutes per start time	15	15	15	15	15	15	15	15	15	15	15	15
Start times per week*	2	2	3	4	4	4	5	5	4	3	2	1
Total minutes per week (Plant Requirement)	30	30	45	60	60	60	75	75	60	45	30	15

*Start times per week may not equal days per week. Multiple start times per day may be needed to avoid runoff. ***Consider shutting controller off during periods of extended rain, or attach a rain sensor to controller when possible.***

NOTE:
The irrigation schedule provided is a guideline only, as calculated by the Metropolitan Water District Watering Calculator for your zip code, equipment class and soil type (see www.bewaterwise.com for more information). The soil type is approximate and was determined by a quick field test. For a more accurate soil analysis, Owner should have a soils analysis performed by a professional soils laboratory. Soil types can vary within a property. It is the Owner's responsibility to observe irrigation applications to ensure that the soil can absorb the water applied during a single application without runoff. If runoff occurs, shorten the minutes per start time and increase the number of start times. Changes to your plant material and/or irrigation equipment can necessitate a different watering schedule. A new watering schedule can be obtained at www.bewaterwise.com.

The water requirements for your property may also vary depending on exposure (sun/partial sun/shade) or fire protection measures required during the fire season. Inefficient irrigation layout (lack of head-to-head coverage) may result in brown spots or poor plant performance. Plant maturity and previous watering schedules may also impact plant performance under a new water schedule.

The property owner should monitor the landscape on a weekly basis to make sure that a new watering schedule is sufficient to prevent wilting and/or brown spots – especially during season changes- and should adjust the watering schedule accordingly. Unseasonable weather (excessive rain or excessive heat) will require adjustments to the schedule. The property owner should also monitor irrigation system and landscape for leaks, runoff and other problems.

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San Diego County Water Authority

Step 4:
Design: Irrigation

But Remember …

- The best technology is only as smart as the person operating it.
- Nothing replaces human knowledge and attention!

Step 4:
Design: Irrigation

Medusa outdoor demonstration

Break

Step 5:

Implementation: Turf Removal & Sheet Mulching

1. Prepare the site
2. Edging, mounding & contouring
3. Ensure irrigation of trees and plants
4. Plant large plants
5. Apply weed barrier
6. Layer compost and mulch

Step 5:

Implementation: Turf Removal & Sheet Mulching

1. Prepare the site

- Call 811 first!

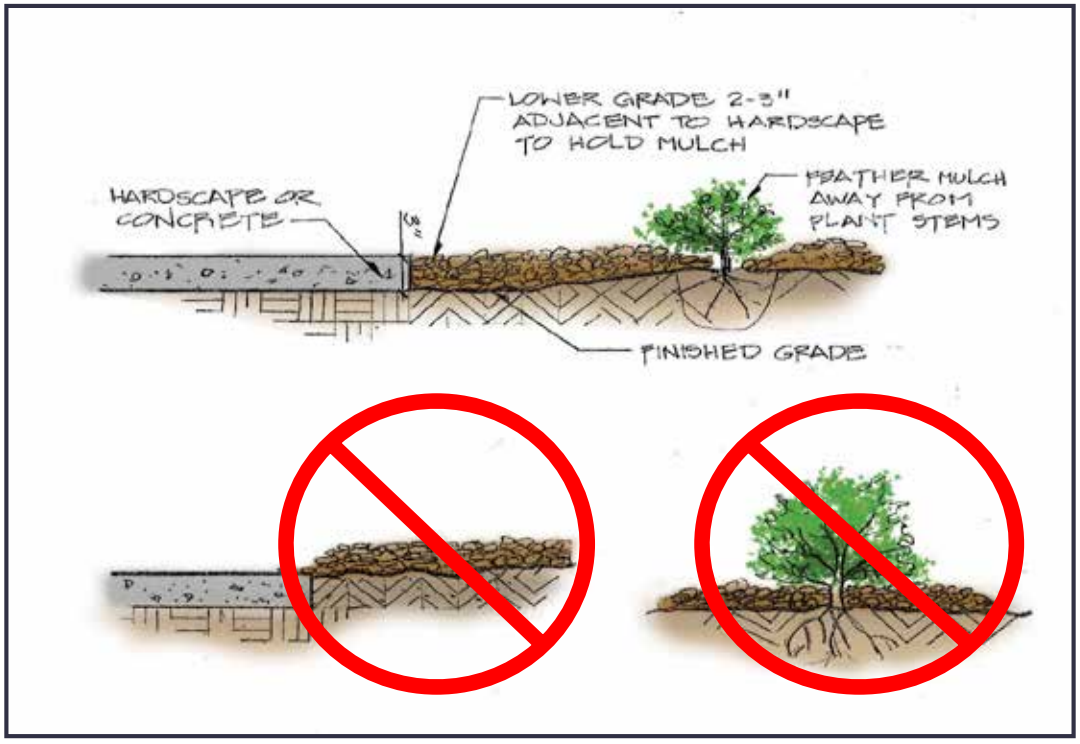
- Hardscape prep:
  - Layout areas which will become paths and patios.
  - These areas will NOT require mulching and will need to be excavated.
  - Lay irrigation lines beneath areas before completing hardscape.
- Remove woody or invasive plants (warm season turf)
- Flag sprinkler heads
- Soak the area with water

Step 5:

Implementation: Turf Removal & Sheet Mulching

2. Edging, Mounding & Contouring

- Make room for the mulch: Cut lawn 12 inches away from concrete to 3” below concrete level.



Step 5:

Implementation: Turf Removal & Sheet Mulching

2. Edging, Mounding & Contouring

- Create mounds with removed sod by facing turf side down or discard removed sod
- Contour as needed

Manual
"Grubbing"

Gas Powered
Sod Cutter

Step 5:
Implementation: Turf Removal

3. Ensure Irrigation of Trees and Large plants

- Add bubblers or drip irrigation if needed

Bubbler Head
Drip Irrigation

In-line drip irrigation can be expanded as tree grows

Step 5:

Implementation: Turf Removal & Sheet Mulching

3. Ensure Irrigation of Trees and Large plants

- Add bubblers or drip irrigation if needed

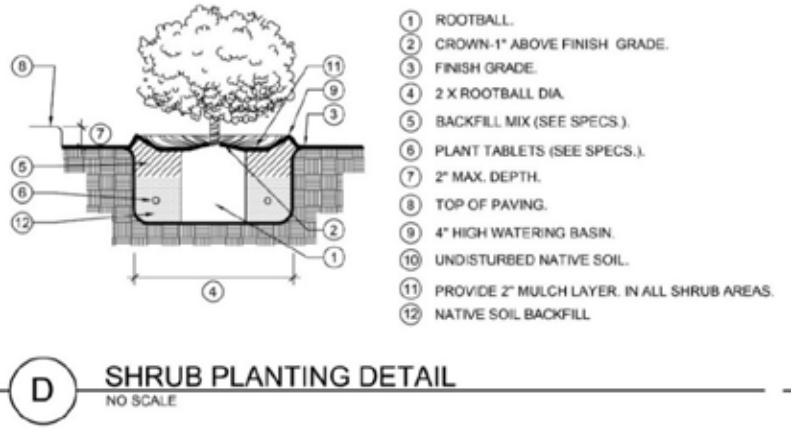
In-line drip irrigation

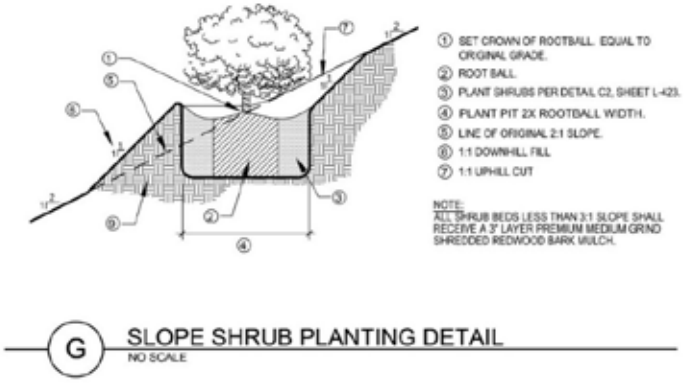
Step 5:

Implementation: Turf Removal & Sheet Mulching

4. Plant Large Plants

- 5 gallon and larger
- Hole
  - As deep as pot, 2 x wide as pot
  - Rough sides
  - Fill with water before planting
- Plant crown above soil level
  - Loosen roots
- Amend Back Fill Soil
  - Add 30% compost to soil removed from hole (3 scoops compost : 7 scoops soil)
  - Natives: If soil is disturbed, add 15% compost to soil removed from hole.
  - Use mixture to backfill planting hole.





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Step 5:

Implementation: Turf Removal & Sheet Mulching

5. Layers

- Cardboard:
  - Costco, Best Buy
  - http://www.papermart.com/regular-b-flute-corrugated-paper-rolls/id=4609#4609
- Rule of thumb for coverage:
  1 Cu. Yd. covers 100 SF @ 3" depth

Step 5:

Implementation: Turf Removal & Sheet Mulching

Weed barrier around large plants

- NOT weed cloth (optional under rock or DG)
- Newspaper / painter's paper
- Cardboard (warm season turf)
- Overlap by 6-8 inches
- Cover all ground except where there are plants

Paper & Cardboard
Weed Barrier

Do NOT use weed cloth

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Step 5:

Implementation: Turf Removal & Sheet Mulching

Watering

- Water between layers
- Be sure to continue watering existing trees while mulching

Step 5:

Implementation: Turf Removal & Sheet Mulching

Sheet Mulching

Notify your neighbors first!

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Step 5:

Implementation: Turf Removal & Sheet Mulching

Sheet Mulching

Cover compost, newspaper and cardboard layers with 3” of SOIL BUILDING mulch, not wood chips

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Step 5:
Implementation: Hardscape

Hardscape and Sheet Mulching

Remove turf, don't Sheet Mulch underneath

Hardscape requires soil compaction beneath

Step 5:

Implementation: Turf Removal & Sheet Mulching

7. Planting Fast Method

- Steps:
  - Install hardscape
  - Contour landscape for stormwater detention
  - Place rocks
  - Plant large plants
  - Sheet mulch between and around plants
  - Or Sheet mulch entire area, then pull back mulch, cut hole in cardboard, plant and replace mulch

- Rooting Groundcovers:
  - Remove turf completely, work in compost, and then plant groundcover with mulch around it
  - Plants require contact with soil, not just mulch

Step 5:

Implementation: Turf Removal & Sheet Mulching

7. Planting Traditional Method

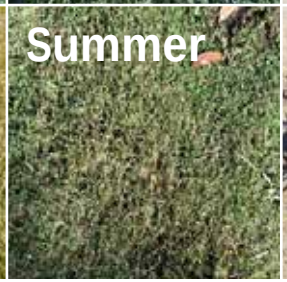
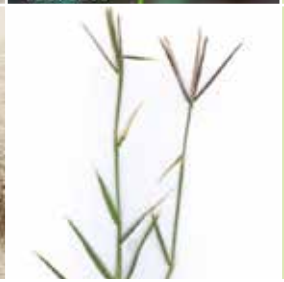
- Steps:
  - Install hardscape
  - Wait until Sheet Mulching has completed breakdown of sod and cardboard before planting, taking 6+ months
  - Contour landscape for stormwater retention
  - Place rocks
  - Plant

- Rooting Groundcovers:
  - Let sheet mulching complete the process or remove turf completely, work in compost, and then plant groundcover
  - Plants require contact with soil, not just mulch

Step 5:

Implementation: Turf Removal & Sheet Mulching

Know your Turf Type to Remove Effectively

Turf Type	Dormant Season	Active Season	Growth form	Seeds	Common Types	Kill Method
Cool Season	Winter	Summer	Small tuffs		Dwarf Tall Fescue (common locally), Perennial Ryegrass, Annual Ryegrass, Blue Grass	Sheet Mulch
Warm Season	Winter	 Summer	Creeping Stolons		Bermuda grass, Zoysia grass, St. Augustine Grass, Kikuyu grass	Solarization or Chemical Followed by Sheet Mulching

Step 5:

Implementation: Turf Removal & Sheet Mulching

Sheet Mulching Layer	Cool Season Turf	Warm Season turf Control break through grass
Weed Barrier:		
Newspaper	6 layers	6 - 12 layers
Cardboard (not shiny)	Optional	2 - 3 layers
Compost:		
¼" minus	1.3 inches	1.3" inches
Mulch:		
Soil Building Mulch *	3 inches	3-5 inches

- Soil Building Mulch has a variety of size particles and a balance of Nitrogen (leaves) and Carbon (wood). It is NOT wood chips. Bulk sources include Miramar Greenery, Agri Service, San Pasqual Valley Soils, and other soil suppliers.
- Rule of thumb: 1 CY covers 100 SF of area 3" thick

Step 5:

Implementation: Turf Removal & Sheet Mulching

Warm Season Turf Issues:

- Very resilient
- May break through: watch for regrowth and remove
- Optional but helpful:
  - Remove warm season turf before sheet mulching
  - Kill / weaken warm season turf before sheet mulching

Step 5:

Implementation: Turf Removal & Sheet Mulching

Turf Removal Approaches and Considerations

	HIGH ↑ Environmental Friendliness Scale ↓ LOW				
	Preferred Method	**Warm Season Turf Pretreatments; Use Before Sheet Mulching**			
		Acceptable Methods			**Not Encouraged**
Simplified **Cool Season Turf:** Sheet Mulching Only **Warm Season Turf:** Kill or Remove Before Sheet Mulching	**Sheet Mulching** **Cool Season:** Use newspapers or one layer cardboard **Warm Season:** Use three layers cardboard	**Non-Toxic Grass Killers**	**Solarization**	**Complete Sod Removal**	**Toxic Grass Killers**
Environmental Issues					
Soil Health	**Excellent:** Builds soil health due to composting in place	**Mixed:** May kill soil microbes if present, compost needed to reestablish healthy soil	**Mixed:** Will kill soil microbes if present, compost needed to reestablish healthy soil	**Neutral**	**Mixed:** May kill soil microbes if present, compost needed to reestablish healthy soil
Safe for Pets and Kids	**Yes**	**Yes**	**Yes**	**Yes**	**Concerns**
Pollution	**Excellent:** Composts grass in place, adding to health of soil	**Excellent**	**Good:** Composts grass in place, adding to health of soil	**Concerns:** Gas powered equipment used	**Concerns:** listed as carcinogen by WHO and indicated in runoff pollution
Landfill	**Excellent:** No landfill impact	**Excellent:** No landfill impact	**Good:** No landfill impact other than plastic disposal	**Poor:** Sod goes into landfill	**Excellent:** No landfill impact

Step 5:

Environmental Friendliness Scale

Turf Removal Approaches and Considerations (Continued)					
	Sheet Mulching	**Non-Toxic Grass Killer**	**Solarization**	**Complete Sod Removal**	**Toxic Grass Killer**
Time Table					
Season for treatment	**Any**	**Cool Season Turf:** Any **Warm Season Turf:** Must be applied during growing season	**Warm Season only**	**Any**	**Cool Season Turf:** Any **Warm Season Turf:** Must be applied during growing season
Time before planting	**Fast:** Plant large plants before sheet mulching in areas between plants	**Medium:** Must be applied, wait, water & reapply several times	**Slow:** Must be done during warm months in sun; takes 4-8 weeks	**Fast:** Sod cut and Remove turf, then plant before sheet mulching areas between plants	**Medium:** Must be applied, wait, water & reapply several times
Time for soil improvement	**Slow:** Sheet Mulching improves soil in 4+ mons.	**Slow:** Sheet Mulching improves soil in 4+ mons.	**Slow:** Sheet Mulching improves soil in 4+ mons.	**Slow:** Mulch will improve soil in 4+ mons.	**Slow:** Sheet Mulching improves soil in 4+ mons.
Components					
	Layers of Newspaper, Cardboard, Compost & Mulch	Ammoniated Salts of Fatty Acids Potassium Salts of Fatty Acids d-Limonene	Clear Plastic followed by Sheet Mulching	Dig out top 3 to 6 inches of sod; dispose of in landfill	Glyphosate Diquat Dibromide
Cost DIY					
	$$ Mulch, compost & free cardboard	**$$$** Poison & Sheet Mulching	**$$$** Plastic & Sheet Mulching	**$$$$$** Sod Cutter Rental, Dump Fee & Sheet Mulching	**$$$** Poison & Sheet Mulching
Labor DIY					
	Easy	**Easy**	**Easy**	**Extensive**	**Easy:** Observe safety precautions
Potential for Break-Through Regrowth of Turf					
Cool Season Turf	**Low**	**Low, but not needed**	**Low, but not needed**	**Low, but not needed**	**Low, but not needed**
Warm Season Turf	**Medium (alone):** Used alone, use 3 layers of cardboard and remove / treat breakthrough grass; For complete kill, pre-treat.	**Low / Medium:** Must be done when grass is actively growing during warm season, not winter. Use multiple applications for best control.	**Low:** Must be done during warm season	**Low /Medium:** Can be done anytime	**Low:** Must be done when grass is actively growing during warm season, not winter. Use multiple applications for best control.

Step 5:

Implementation: Turf Removal & Sheet Mulching

Warm Season Turf Treatment Methods

- Herbicides
  - **Cannot be killed with Chemicals when dormant**
  - Spray herbicides when actively growing
  - Repeat application!
- Non-toxic herbicide products

Step 5:

Implementation: Turf Removal & Sheet Mulching

Warm Season Turf Treatment Methods

Solarization

- Use clear plastic, not black
- Must be done in warm season
- Takes 8-12 weeks
- Doesn't work in shade
- Caution! This action also tends to kill the beneficial microbiological life in soil. You may also need to amend with mature compost after utilizing this technique.

- See: http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74145.html

Step 5:

Implementation: Turf Removal & Sheet Mulching

Warm Season Turf Treatment Methods:

- Complete Sod Removal
- Sod goes to landfill, cannot be recycled

Step 5:
Implementation: Sequence

Do it yourself or Professional Contractor

What is right for you?

- Tradeoff: Cost vs. Labor & Time
- Option: Be the General Contractor yourself

Installation or Repair:

- California Landscape Contractors Association (CLCA) http://www.clcasandiego.org
- Certified Irrigation Professional www.Irrigation.org
- Contractors State License Board (CSLB) http://www.cslb.ca.gov/Consumers/
- YouTube Instructional Videos

Step 5:
Implementation: Resources

Irrigation Information:

- Manufacturer Product Catalogs
- Your homeowner's guide
- BeWaterwise.com
- Local irrigation vendor workshops
- YouTube

Step 6:
Maintenance: Irrigation

Irrigation Maintenance

- Adjust run time for season:
  - 1. Winter
  - 2. Fall & Spring
  - 3. Summer
- Check for leaks and fix leaks promptly
- Flush drip systems and check filters to reduce clogging
- Adjust sprayheads to prevent overspray on hardscape

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Step 6:
Maintenance: Irrigation

Irrigation Troubleshooting: Overhead

- Broken or leaning sprinkler heads
- Overspray
- Misting instead of spraying
- Uneven coverage
- Spray patterns blocked by plant material
- Broken or clogged nozzles and drip emitters

Problem	Estimate of event volume affected	Volume of total event (gal)	Events/ week	Events/ Year	Waste/year (gal)
Misting (high pressure)	10%	4,500	3.5	91	40,950
Misaligned heads	5%	4,500	3.5	91	20,475
Overspray	15%	4,500	3.5	91	61,425
Mismatched heads	4%	4,500	3.5	91	16,380
Information from the Alliance for Water Efficiency					

Step 6:
Maintenance: Irrigation

Irrigation Troubleshooting: Subsurface

- Look for excessively wet areas
- Unusual mounding in turf areas
- Water flowing or seeping from turf/sidewalk edges

Problem	Flow Rate (gpm)	Run time/event (minutes)	Irrigation events/ week	Events/ Year	Waste/year (gal)
Lateral line leaks	5	20	3.5	91	9,100
Seal leak	4	20	3.5	91	7,280
Break in drip line	3	20	3.5	91	5,460
Missing or broken head	6	20	3.5	91	10,920
Information from the Alliance for Water Efficiency					

Step 6:
Maintenance: Irrigation

Irrigation Troubleshooting: Subsurface

- Drip systems, remove surface debris to clearly see piping and emitters
- Look for unwanted bubbling or spraying
- Missing or broken drip emitters
- Separations at pipe fittings for drip lines

Step 6:
Maintenance: Irrigation

Irrigation Troubleshooting: Subsurface

Yearly Maintenance

- Turn the system off
- Remove nozzles from sprinklers at end of each line; remove end caps from drip lines
- Run system a few minutes until clean, solid stream of water flows from sprinkler heads and ends of drip lines
- Turn system off
- Check nozzles, rinse drip line filter screens
- Reassemble system
- Run system and check for proper operation

Step 6:
Maintenance: Irrigation

Tools for Maintenance

- Small Flathead Screw driver
- Rotary Nozzle Sprinkler Adjustment tool
- Small Channel Locks

Step 6:
Maintenance: Plants

Plant Maintenance

- Amend soil with compost and mulch regularly
- Remove weeds
- Monitor plant health
- Minimize the use of non- organic chemicals
  - Start with a hard spray of water
  - Use insecticidal soap or other non-toxic pest killer

Enjoy!

- Please keep in touch, write and send pictures of your progress!
- Please reply to our completion surveys to track your success

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Homework for Design Coaching

Preparation for CLASS 4

Class 4 Preparation (NEXT Class)

Prepare

- Research and think to develop your
  - Plant Palette
  - Planting Plan
- Complete and highlight important aspects on Design Questionnaire
- Complete your Irrigation Assessment

Class

- Arrive 15 minutes prior to your appointment
- Meet with your Design Coach

Afterward

- Lab: Finish your Planting Plan
- Scan your Plans: LID, Planting and Irrigation

Arrive 20 minutes prior to your appointment

Homework for Design Coaching

Preparation for CLASS 4

Class 4 Preparation (NEXT Class)

Bring all needed materials:

- Base Plans:
  - L-1 with notes for reference
  - L-2 with Drainage notes
  - L-3 with your existing Planting Plan work
  - L-4 with your existing Irrigation notes
- Photos
- Highlighted Design Questionnaire
- Bubble Diagrams
- Hardscape Plan
- Plant List
- Evaluation Sheet from Notebook

QUESTIONS?