Drip / Low Volume Irrigation Systems should be constructed with three elements considered; Plant, Soil and Water

The One Thing!

The Current Situation

Award Winning Landscapes


610


1
2
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1P

Water Conservation / Sustainability Award Nominee

Conversion of Lawn to Low Water Use Plant Material

Nice Plant Material

What about the Irrigation?

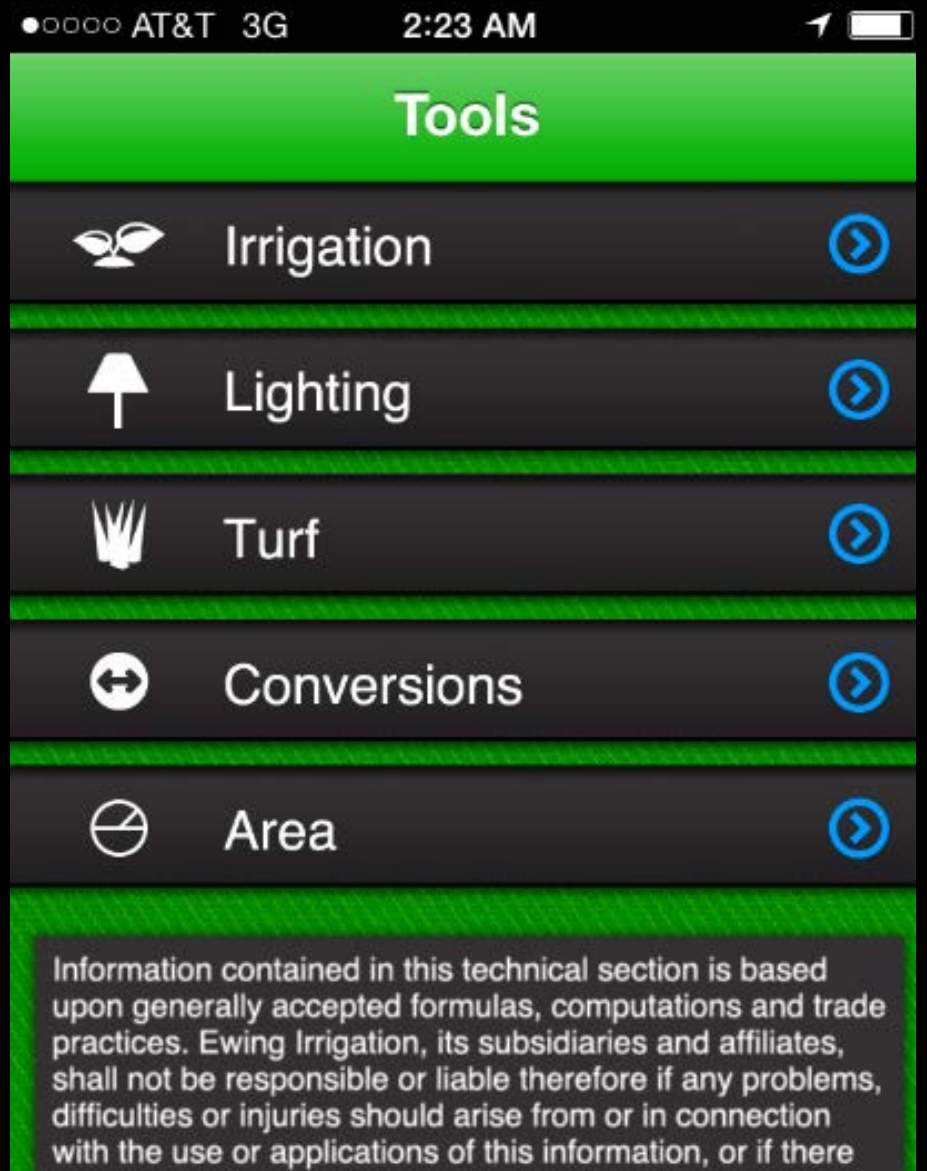
Two pressure compensating bubblers on a 2 foot diameter shrub

Two of these – 0.25 gpm x 2 = 0.50 gpm
or 30 gallons per hour

2 ft diameter shrub
canopy area – Pi x radius^2
3.14 x 1^2 = 3.14 ft^2 canopy area

Low volume irrigation? How fast is this applying water

Let’s calculate with the Ewing APP!



Application rate – 15.25 inches/hr

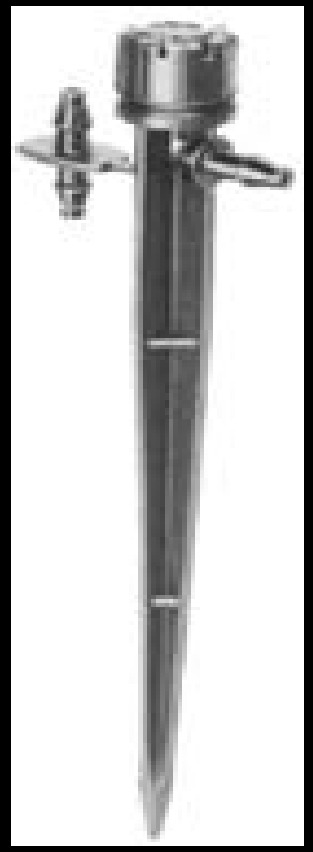
In one minute the system applies 0.25 inches – ¼” of water in 1 minute!

Maximum run time on clay before runoff

12 seconds!

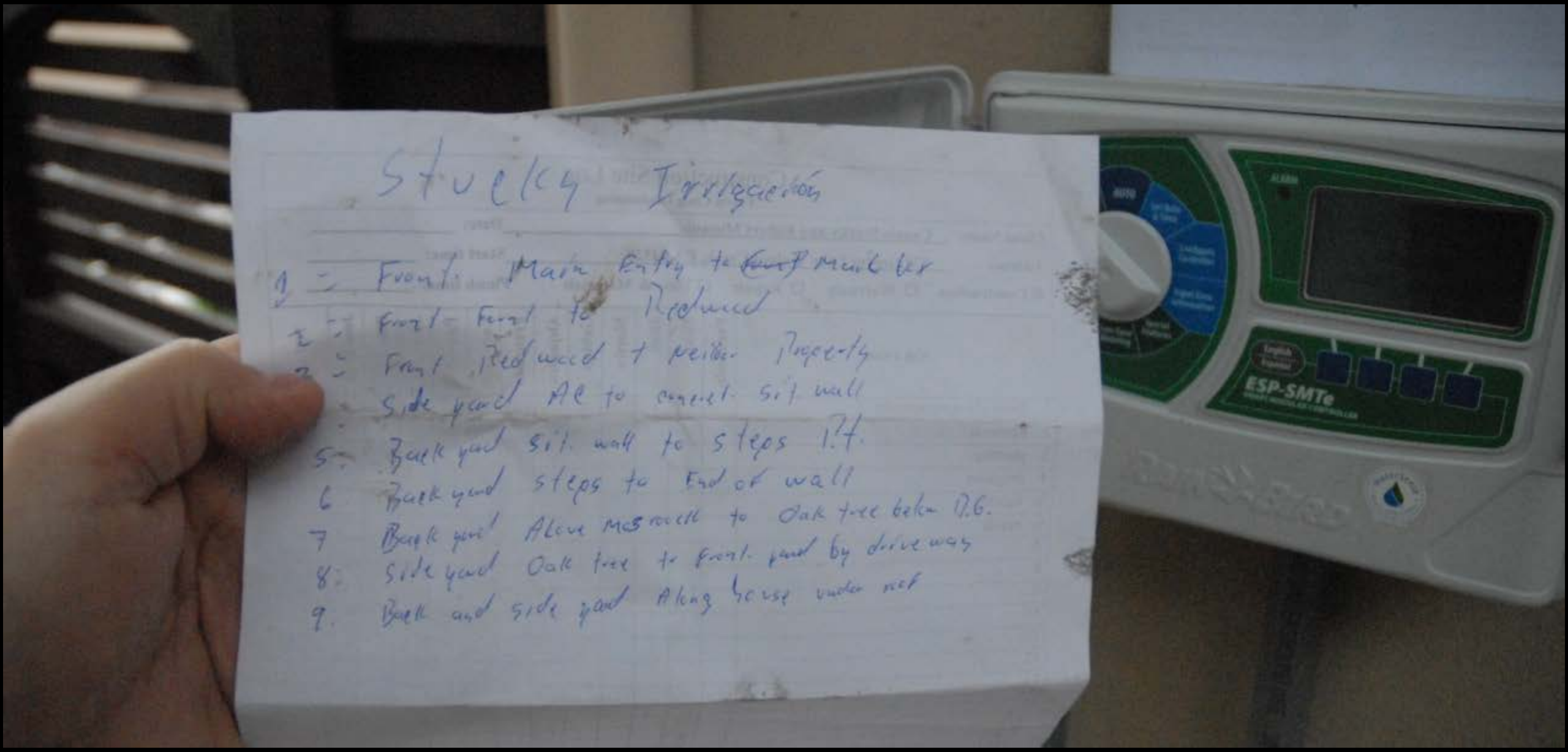
Here’s another from 2016 – Silicon Valley

Five of these – 10 gph x 5 = 50 gph
or 30 gallons per hour



3 ft diameter planter
canopy area – Pi x radius^2
3.14 x 1.5^2 = 7.06 ft^2 canopy area


●●●○○ AT&T 3G
2:39 AM
Irrigation
Irrigation
Drip Irrigation -
Application Rate
Send
Gallons per Hour
50
Area in Square Feet:
7.06
Solution:
11.360 in. per hour
Calculate
Use solution to calculate run time


Stuelcy Irrigation
1 = Front Main Entry to Mailbox
2 = Front - Front to Redwood
3 = Front, Redwood + neibr. Property
4 = Side yard AC to corner Sit wall
5 = Back yard Sit. wall to steps I.T.
6 = Back yard steps to End of wall
7 = Back yard Above Mesquite to Oak tree below I.G.
8 = Side yard Oak tree to front yard by driveway
9. Back and side yard Along house under eaves
ESP-SMTe

So these are Award Nominated Landscapes

What about typical landscapes with low volume irrigation?


SALON
NAILS

What are the consequences of installing these types of low volume irrigation systems?

Why change the way we do drip?

What are our Learning Objectives for Linear Drip Systems

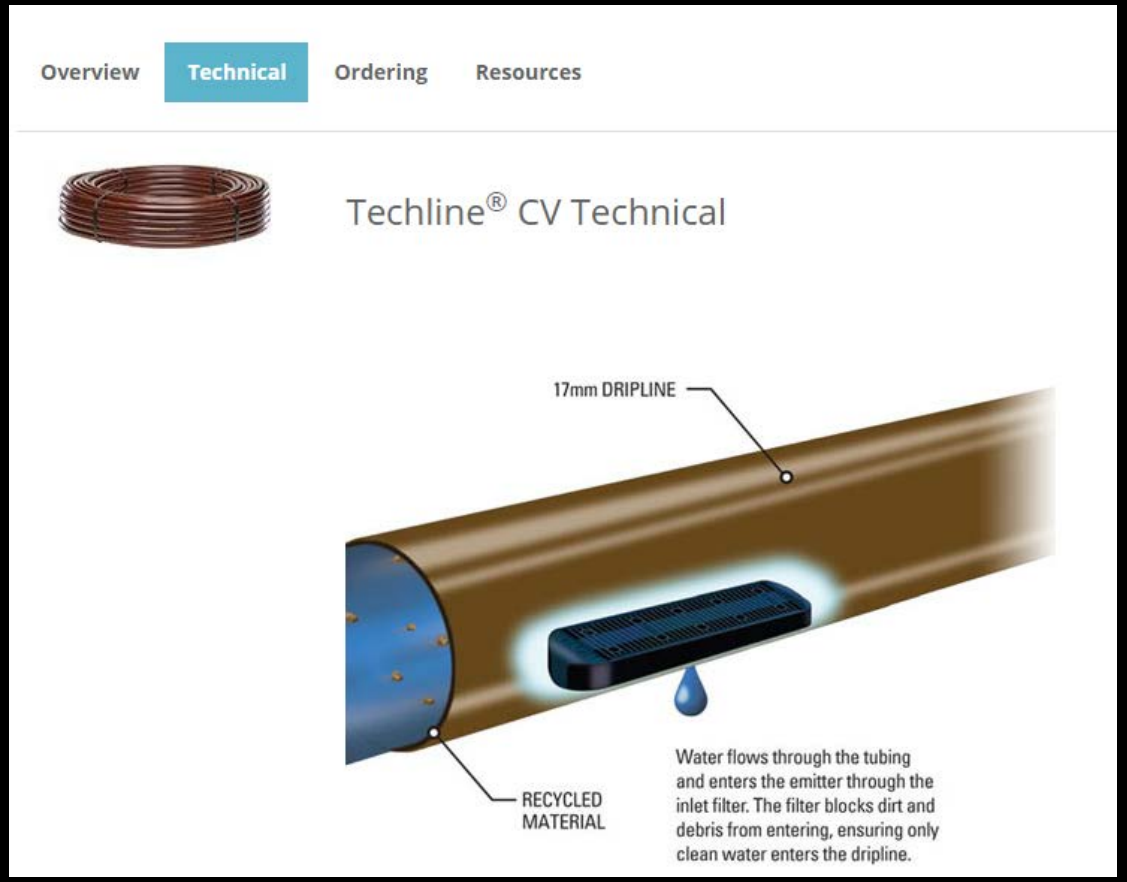
- When designing/installing line source drip, which GPH tubing should be used and how should the tubing be spaced? (Water and Soil)
- What are the pressure requirements for line source drip irrigation and how can it be measure in the field (Water)

What are our Learning Objectives for Linear Drip Systems

- How fast do line source emitters apply water? How is this calculated. How long can drip systems be run on clay soils before runoff?(Soil and Water)
- How much water do plants need? Is there a definitive answer on how many gallons a plant needs in Fresno?(Plants, Soil, and Water)

So, what is linear drip?

- Pressure compensating emitters molded into drip tubing at intervals

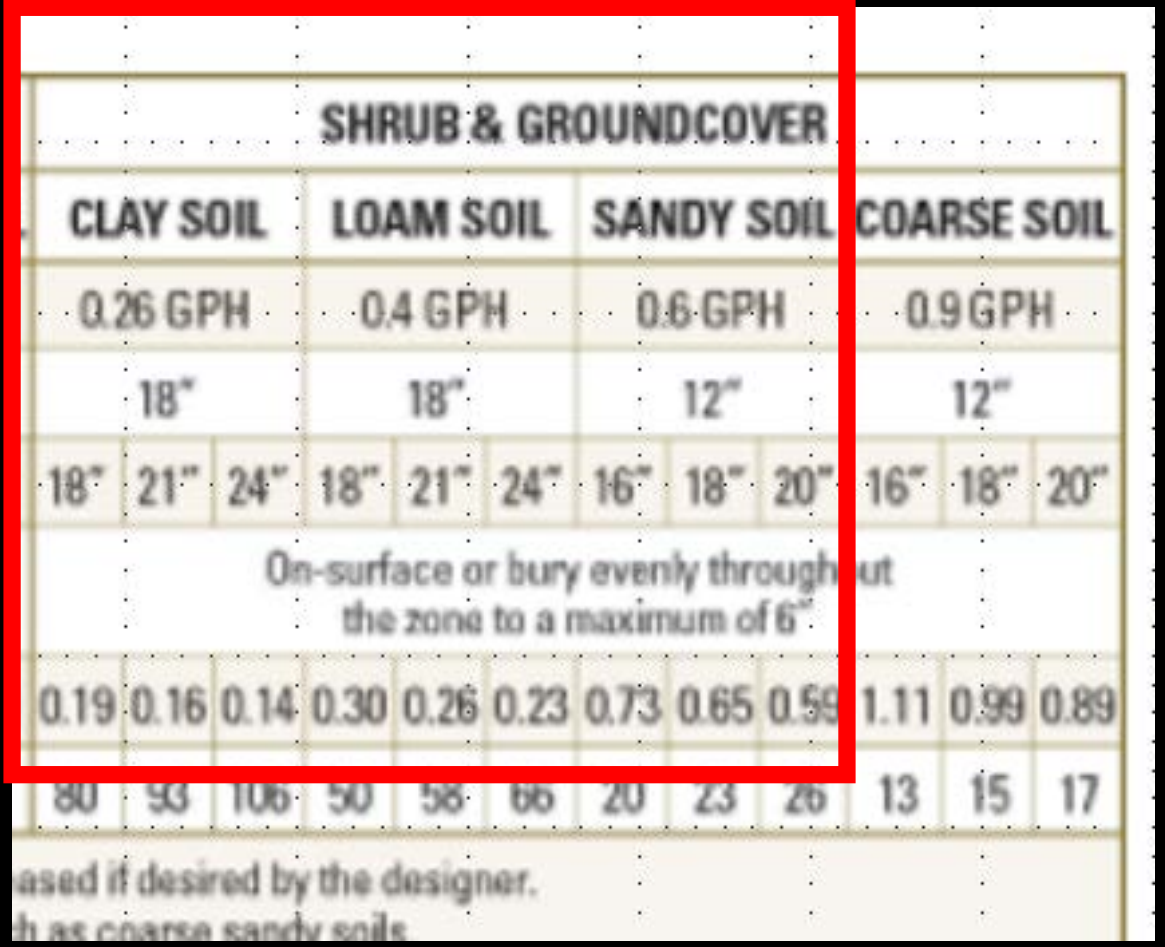


Which emitter GPH should be used – 0.26, 0.4, 0.6, 0.9, or 1 gallon per hour? Soils dictate this

GENERAL GUIDELINES	TURF												SHRUB & GROUNDCOVER											
	CLAY SOIL			LOAM SOIL			SANDY SOIL			COARSE SOIL			CLAY SOIL			LOAM SOIL			SANDY SOIL			COARSE SOIL		
EMITTER FLOW	0.26 GPH			0.4 GPH			0.6 GPH			0.9 GPH			0.26 GPH			0.4 GPH			0.6 GPH			0.9 GPH		
EMITTER SPACING	18"			12"			12"			12"			18"			18"			12"			12"		
LATERAL (ROW) SPACING	18"	20"	22"	12"	14"	18"	12"	14"	18"	12"	14"	16"	18"	21"	24"	18"	21"	24"	16"	18"	20"	16"	18"	20"
BURIAL DEPTH	Bury evenly throughout the zone from 4" to 6"												On-surface or bury evenly throughout the zone to a maximum of 6"											
APPLICATION RATE (INCHES/HOUR)	0.19	0.17	0.15	0.64	0.55	0.43	0.98	0.84	0.65	1.48	1.27	1.1	0.19	0.16	0.14	0.30	0.26	0.23	0.73	0.65	0.59	1.11	0.99	0.89
TIME TO APPLY ¼" OF WATER (MINUTES)	80	89	97	23	27	35	15	18	23	10	12	13	80	93	106	50	58	66	20	23	26	13	15	17
Following these maximum spacing guidelines, emitter flow selection can be increased if desired by the designer. 0.9 GPH flow rate available for areas requiring higher infiltration rates, such as coarse sandy soils.																								

Note: 0.4, 0.6 and 0.9 GPH are nominal flow rates. Actual flow rates used in the calculations are 0.42, 0.61 and 0.92 GPH.

We are matching intake rate of soils (typically clay) to application rate of the emitters



SHRUB & GROUNDCOVER											
CLAY SOIL			LOAM SOIL			SANDY SOIL			COARSE SOIL		
0.26 GPH			0.4 GPH			0.6 GPH			0.9 GPH		
18"			18"			12"			12"		
18"	21"	24"	18"	21"	24"	16"	18"	20"	16"	18"	20"
On-surface or bury evenly throughout the zone to a maximum of 6"											
0.19	0.16	0.14	0.30	0.26	0.23	0.73	0.65	0.59	1.11	0.99	0.89
80	93	106	50	58	66	20	23	26	13	15	17

ased if desired by the designer.
h as coarse sandy soils

So use 0.4 gph or 0.6 gph. DO NOT USE 0.9 or 1 GPH

White stripe tubing 1.0 gph

Blue stripe tubing 0.6 gph

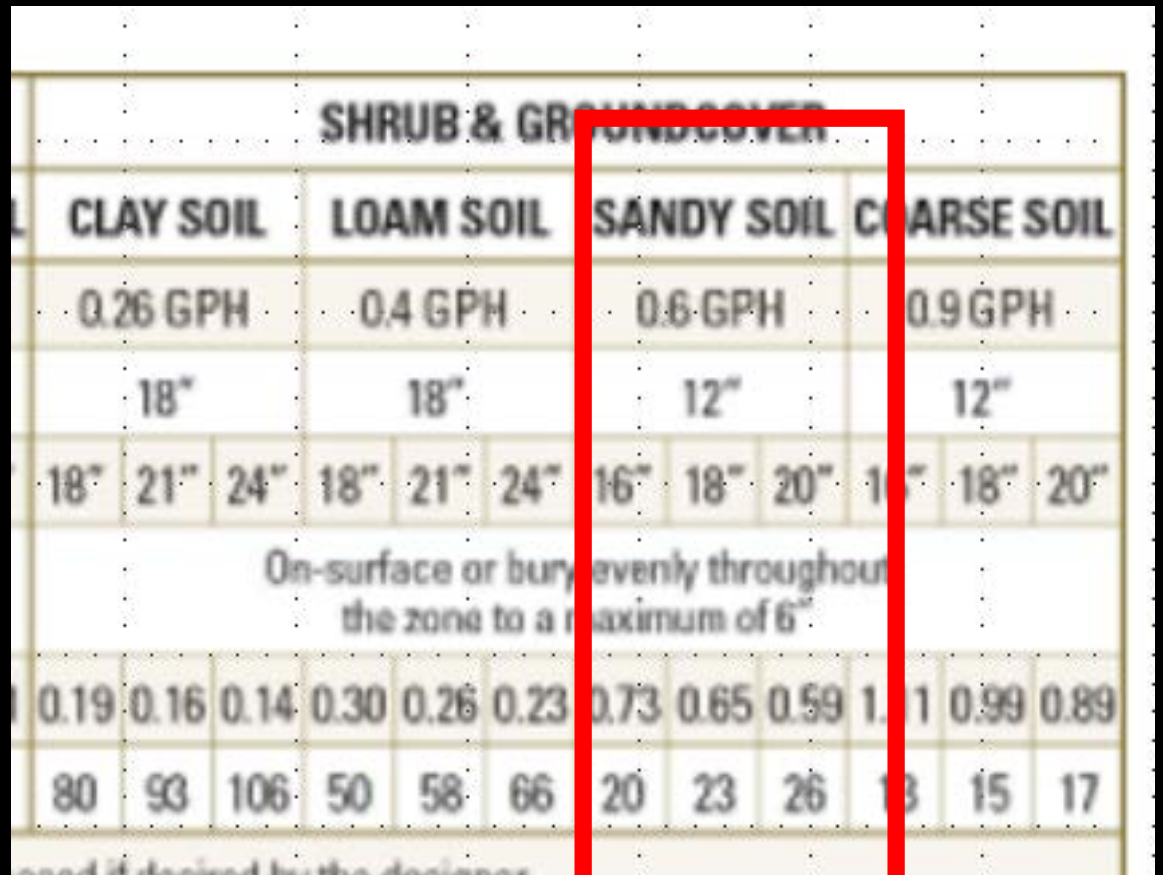
Orange stripe tubing 0.4 gph

Landscape PRODUCTS™
Premier Products for Landscape & Agriculture

How about emitter intervals and spaces between parallel tubes?

Emitter interval and spacing

- 12 inch emitter interval tubing is most common
- The closer the parallel rows, the higher the application rate



SHRUB & GR[illegible]											
[illegible]	CLAY SOIL			LOAM SOIL			SANDY SOIL			C[illegible]ARSE SOIL		
[illegible]	0.26 GPH			0.4 GPH			0.6 GPH			0.9 GPH		
[illegible]	18"			18"			12"			12"		
[illegible]	18"	21"	24"	18"	21"	24"	16"	18"	20"	[illegible]	18"	20"
[illegible]	On-surface or bury evenly throughout the zone to a [illegible]aximum of 6"											
[illegible]	0.19	0.16	0.14	0.30	0.26	0.23	0.73	0.65	0.59	1.[illegible]1	0.99	0.89
[illegible]	80	93	106	50	58	66	20	23	26	[illegible]	15	17

A good compromise is 0.6 gph, 12 inch interval at 18” tube Spacing – 0.65” / hr

Keep the spacing of parallel rows consistent or you'll have irregular coverage!

Handout – page 7

What if you inherit a landscape and the tubing is not marked. How do you calculate the emitter GPH?

Emitter Flow Rates
(Time to fill a 2" sch. 40 cap

Emitter Type	GPH	Fill Time
Point Source	2.00	56 seconds
Pont Source/Line Source	1.00	1 min 52 seconds
Line Source	0.92	2 min 2 seconds
Line Source	0.61	3 min 4 seconds
Point Source	0.50	3 min 45 seconds
Line Source	0.42	4 min 26 seconds

Handout – Appendix – Page 12

Learning Objective Two

What are the pressure requirements for linear drip tubing and how do we measure it? How do we control it?

Measure pressure at the end of the drip lateral or high point of the zone with a gauge adapted to ¼” tubing

Working pressure requirement with check valve emitters is 15 psi!

At lower pressures, emitters will not regulate and may not open

How do we avoid low pressure at emitters (handout page 8)

- Read charts and limit lateral tubing length

MAXIMUM LENGTH OF A SINGLE LATERAL (FEET)

EMITTER SPACING		12"				18"				24"	
EMITTER FLOW (GPH)		0.26	0.4	0.6	0.9	0.26	0.4	0.6	0.9	0.6	0.9
INLET PRESSURE	20 psi	331	242	190	144	468	344	270	204	342	260
	25 psi	413	302	238	180	584	429	338	257	430	326
	35 psi	518	380	299	227	737	540	426	323	542	412
	45 psi	594	436	343	260	845	620	489	371	622	472
	55 psi	655	480	378	287	932	684	539	410	686	522
	60 psi	681	500	393	298	969	713	561	426	716	544

How do we avoid low pressure at emitters

- Increase pressure regulator PSI to 40. Increases maximum tubing length

Landscape Products

1 Inch 40 PSI Drip Pressure Regulator

PR-40 1 IN PRES REG 40 PSI

SKU#: 12000102

MAXIMUM LENGTH OF A SINGLE LATERAL (FEET)

EMITTER SPACING		12"				18"				24"	
EMITTER FLOW (GPH)		0.26	0.4	0.6	0.9	0.26	0.4	0.6	0.9	0.6	0.9
INLET PRESSURE	20 psi	331	242	190	144	468	344	270	204	342	260
	25 psi	413	302	238	80	584	429	338	257	430	326
	35 psi	518	380	299	27	737	540	426	323	542	412
	45 psi	594	436	343	260	845	620	489	371	622	472
	55 psi	655	480	378	287	932	684	539	410	686	522
	60 psi	681	500	393	298	969	713	561	426	716	544

Learning Objective 3

How much water is being applied? Why is this important?

Application rates are important!

- It helps to avoid runoff! Clay soils have a maximum intake of 1/10th of an inch per hour. When this amount has been applied the sprinklers should be turned off and allowed to soak. Cycle sprinklers!

Application rates come from tables (handout p. 7)

Techline® CV - General Guidelines

TABLE 1

	TURF											
	Clay Soil			Loam Soil			Sandy Soil			Sandy Soil		
Emitter Flow	0.26 GPH			0.4 GPH			0.6 GPH			0.9 GPH		
Emitter Interval	18"			12"			12"			12"		
Lateral (Row) Spacings	18"	20"	22"	18"	20"	22"	12"	14"	16"	12"	14"	16"
Burial Depth	Bury evenly throughout the zone 4" to 6"											
Application Rate (in./hr.)	0.19	0.17	0.15	0.30	0.27	0.25	0.98	0.84	0.73	1.48	1.27	1.11
Time to Apply 1/4" of Water (in minutes)	80	89	97	50	55	61	15	18	20	10	12	13

How long can we irrigate on flat clay soils with an IR of 0.10 and linear drip with an application rate of 0.65”/hr

$$\frac{\text{Intake rate}}{\text{Application rate}} \times 60 = \text{run time}$$

$$\frac{0.10”}{0.65”} \times 60 = 9 \text{ minutes}$$

On existing sytems – measure emitter flow with 2 inch cap and measure spacing to determine application rate

Emitter Flow Rates
(Time to fill a 2" sch. 40 cap

Emitter Type	GPH	Fill Time
Point Source	2.00	56 seconds
Pont Source/Line Source	1.00	1 min 52 seconds
Line Source	0.92	2 min 2 seconds
Line Source	0.61	3 min 4 seconds
Point Source	0.50	3 min 45 seconds
Line Source	0.42	4 min 26 seconds

The most important reason to know application rates

- So that we may provide the appropriate amount of water in inches to the plant material!

Learning Objective 4

How much water do ornamental trees and shrubs need? Matching application rate in inches per hour to inches required / day/week/month?

Two factors define plant water requirement

ET (ref. evapotranspiration from CIMIS) – Sta. 80 Fresno

WUCOLS IV – Water Use Classification of Landscape Species

CCUH at UC Davis

Login | Register

CIMIS

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM
CALIFORNIA DEPARTMENT OF WATER RESOURCES

NOTICES

Stations #136, 200, 207, 208, 218 & 230 don't have a functioning rain gage.

The precipitation data shown is missing data rather than zero rainfall.

printer friendly version

CIMIS Overview

The following sections give a brief overview of CIMIS. Sections include the following: Introduction; Data Collection, Transmission, and Processing; Data Retrieval by Users; ETo Maps (Spatial CIMIS); and Trends in CIMIS Data Use. Please click on the arrow to the right of each title below to access the section.

Introduction

The California Irrigation Management Information System (CIMIS) is a program unit in the Water Use and Efficiency Branch, Division of Statewide Integrated Water Management, California Department of Water Resources (DWR) that manages a network of over 145 automated weather stations in California. CIMIS was developed in 1982 by DWR and the University of California, Davis (UC Davis). It was designed to assist irrigators in managing their water resources more efficiently. Efficient use of water resources benefits Californians by saving water, energy, and money.

Data Collection, Transmission, and Processing

Data Retrieval by Users

ETo Maps (Spatial CIMIS)

Trends in CIMIS Data Users

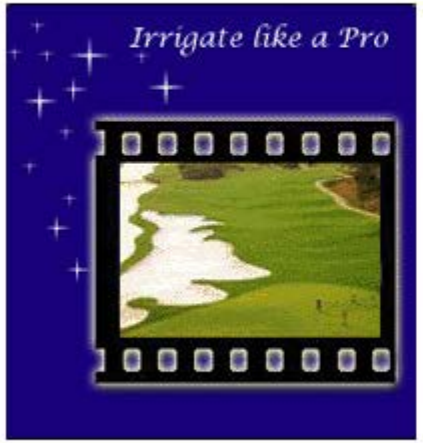
CIMIS

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM
CALIFORNIA DEPARTMENT OF WATER RESOURCES

Notices

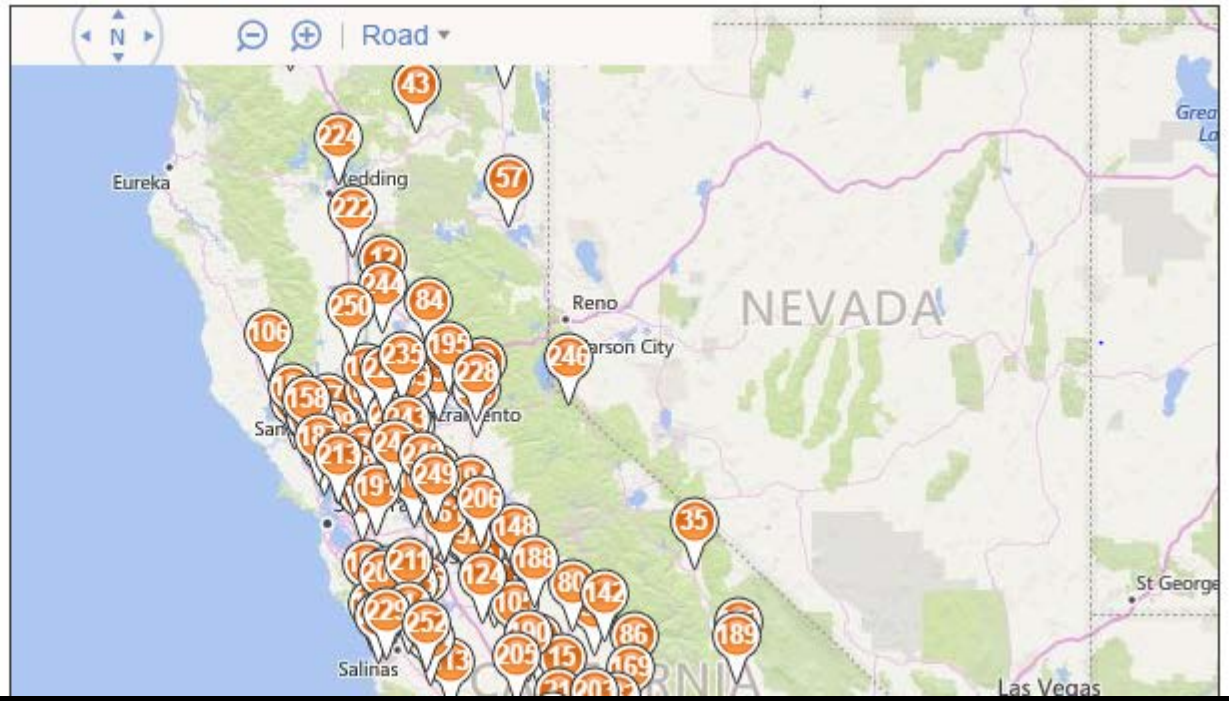
Stations #136, 200, 207, 208, 218 & 230 don't have a functioning rain gage.

The precipitation data shown is missing data rather than zero rainfall.



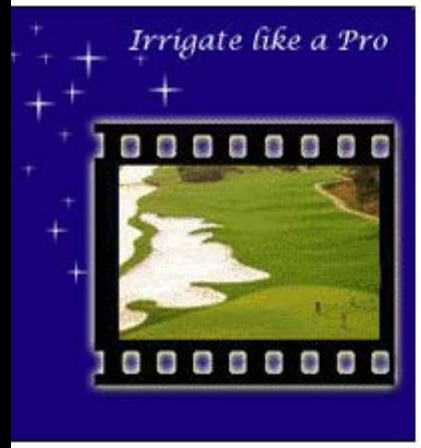
Station List | Station Location Map | Siting | Sensors | Maintenance

This Bing Map shows CIMIS station coordinate points. You can zoom in and out to see the exact station locations. Click the station marker for more detailed information.



Stations #136, 200, 207, 208, 218 & 230 don't have a functioning rain gage.

The precipitation data shown is missing data rather than zero rainfall.



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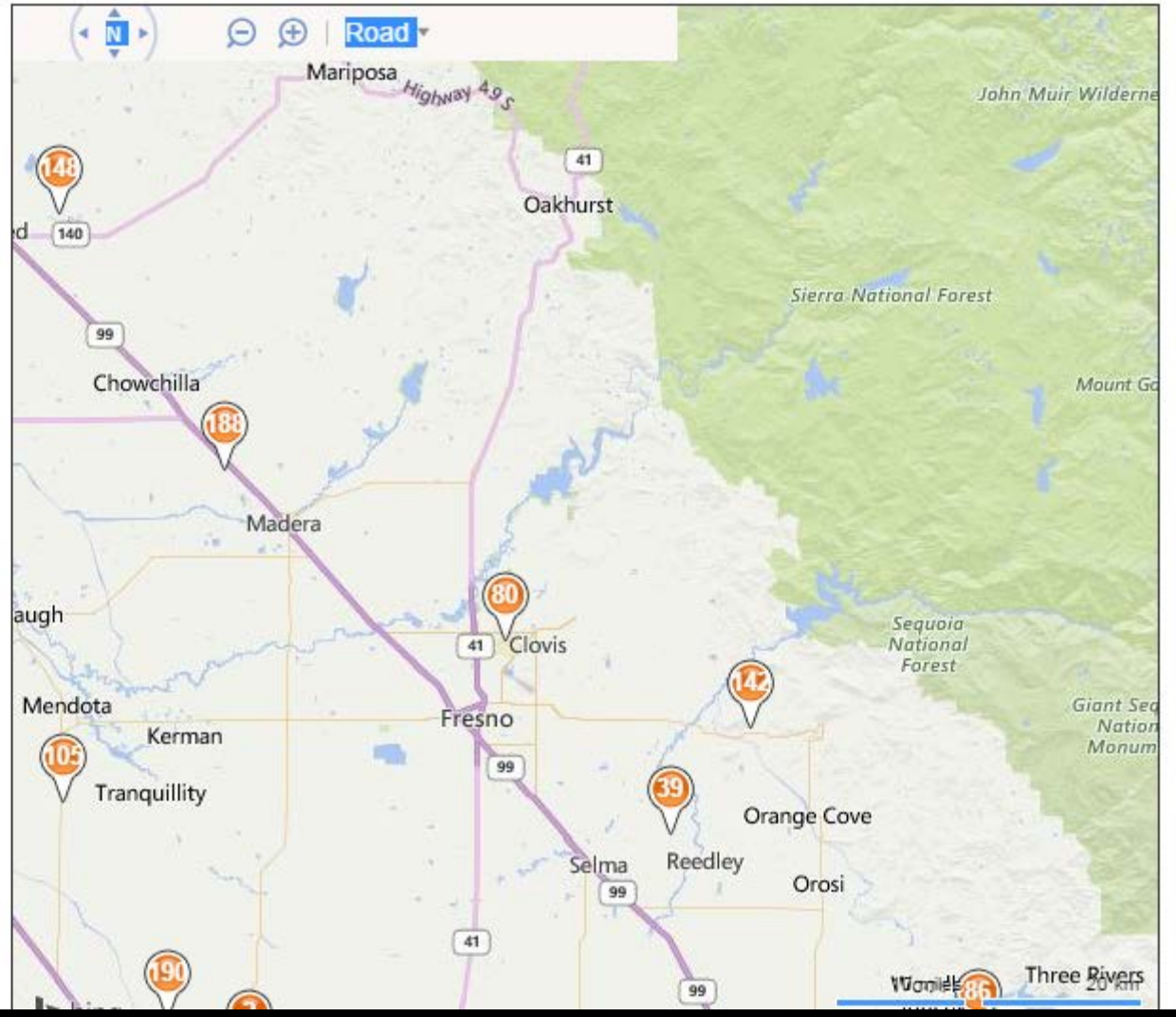

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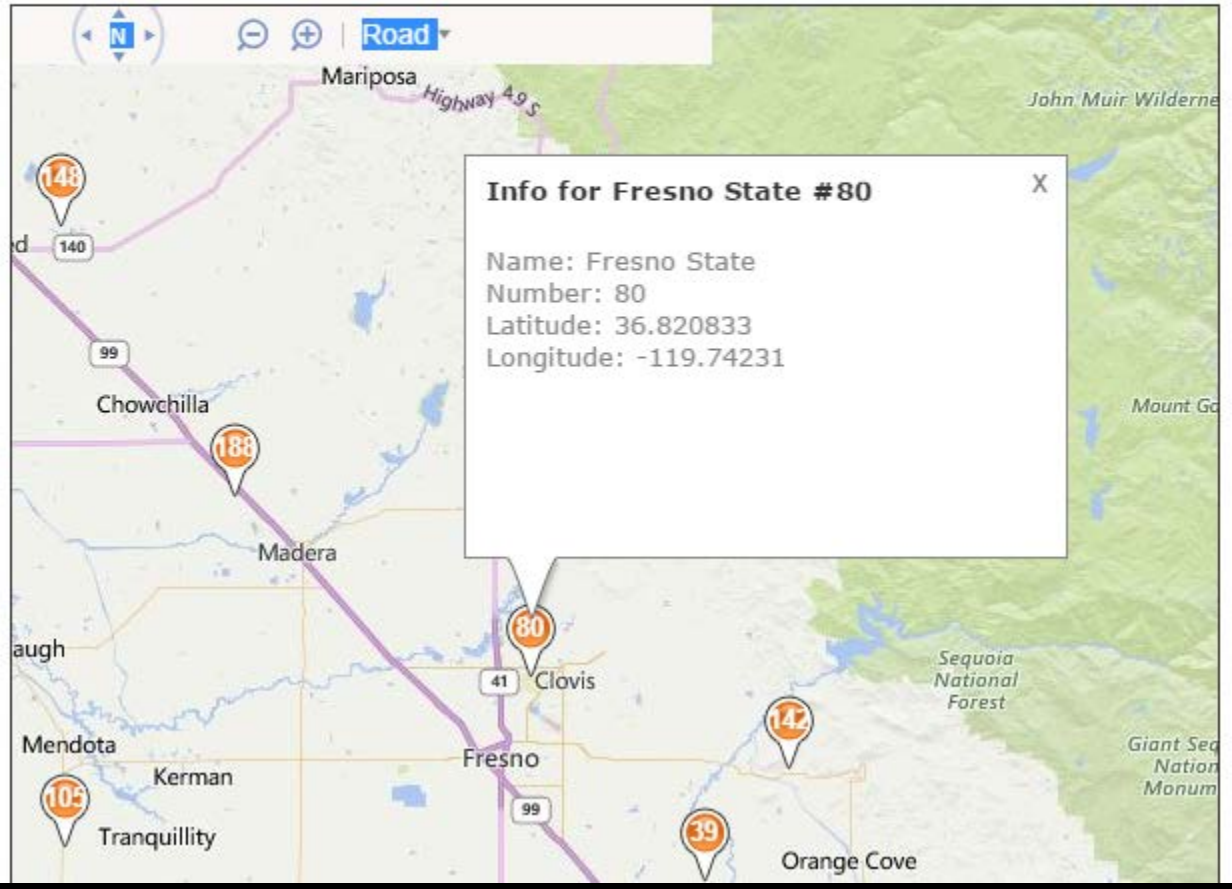
Station List | Station Location Map | Siting | Sensors | Maintenance

This Bing Map shows CIMIS station coordinate points. You can zoom in and out to see the exact station locations. Click the station marker for more detailed information.



HOME | STATIONS | DATA | SPATIAL | RESOURCES

CIMIS Station Reports

CIMIS Station Reports | FTP

1. Select report style and date range

Create a Monthly Avg ETo | PDF Report | in English Units

2. Select one-to-many stations. Click on Column headers to sort

Id	Name	Region	County	Status	Connect	Disconnect
077	Oakville	North Coast Valleys	Napa	Active	3/1/1989	---
078	Pomona	Los Angeles Basin	Los Angeles	Active	3/14/1989	---
080	Fresno State	San Joaquin Valley	Fresno	Active	10/3/1988	---
083	Santa Rosa	North Coast Valleys	Sonoma	Active	1/1/1990	---
084	Browns Valley	Sierra Foothill	Yuba	Active	4/13/1989	---
086	Lindcove	San Joaquin Valley	Tulare	Active	5/31/1989	---

3. Advanced settings (optional)

- [ ] Show Inactive Stations (scroll to bottom of list)
- [ ] Zip Code(s)

California Irrigation Management Information System (CIMIS)

CIMIS Monthly Average ETo Report

Rendered in ENGLISH Units.
Printed on Sunday, June 25, 2017

Average ETo Values by Station

Stn Id	Stn Name	CIMIS Region	Jan (in)	Feb (in)	Mar (in)	Apr (in)	May (in)	Jun (in)	Jul (in)	Aug (in)	Sep (in)	Oct (in)	Nov (in)	Dec (in)	Total (in)
80	Fresno State	SJV	1.15	1.95	3.72	5.40	7.34	8.36	8.75	7.78	5.65	3.64	1.81	1.08	56.63

CIMIS Region Abbreviations		
BIS - Bishop	CCV - Central Coast Valleys	ICV - Imperial/Coachella Valle
LAB - Los Angeles Basin	MBY - Monterey Bay	NCV - North Coast Valleys
NEP - Northeast Plateau	SAV - Sacramento Valley	SBE - San Bernardino
SFB - San Francisco Bay	SJV - San Joaquin Valley	SFH - Sierra Foothill
SCV - South Coast Valleys		

WUCOLS IV
Water Use Classification of Landscape Species

Categories of Water Needs

Category	Abbreviation	Percentage of ET_o
High	H	70–90
Moderate/Medium	M	40–60
Low	L	10–30
Very Low	VL	< 10

Species were evaluated as needing high (H), moderate/medium (M), low (L), and very low (VL) amounts of irrigation water. Expressed as a percentage of reference evapotranspiration (ET_o)[1], these categories were quantitatively defined as follows.

Fig. 2. Five-finger fern was assigned to the "high" water needs category in four regions.

Fig. 3. Cone flower was assigned to the "moderate" water needs category in all

Water needs categories were assigned for each species in each of the six regions. The category High contains species requiring the greatest amount of water during the summer months to maintain acceptable health, appearance, and growth, such as white alder (*Alnus rhombifolia*) and five-finger fern (*Adiantum aleuticum*) (Fig. 2). Species in the category Moderate/Medium need lesser amounts of water, such as ivy geranium (*Pelargonium peltatum*) and cone flower (*Echinacea spp.*) (Fig. 3). Species in the category Low are considered to be water conserving because they perform well with relatively small amounts of irrigation

conditions. These are not the only climate zones that exist in California, but they include much of the state where irrigated landscapes occur. For locations outside of the six regions, it is best to use species evaluations from a region that is most similar climatically to the location of interest.

Number	WUCOLS Region	Sunset climate zones*	CIMIS ET_0 zones**	Representative Cities
1	North-Central Coastal	14, 15, 16, 17	1, 2, 3, 4, 6, 8	Healdsburg, Napa, San Jose, Salinas, San Francisco, San Luis Obispo
2	Central Valley	8, 9, 14	12, 14, 15, 16	Auburn, Bakersfield, Chico, Fresno, Modesto, Sacramento
3	South	22, 23,	1, 2, 4,	Irvine, Los Angeles, Santa

What are the plants in the landscape. Whjat do they look like and how much water do they need?

Water Use Requirements for Common Landscape Plants - WUCOLS IV - Fresno, CA

Aucuba 'Mr Goldstrike'				
Aucuba japonica				
Partial Shade	Irrig Grp			
WUCOLS - Moderate - 40-60%				
6-10 ft	Ht	5-7 ft	Dia.	
Emitter count		6	1 gph	

August Beauty' Gardenia				
Gardenia jasminoldes 'August Beauty'				
Full sun/afternoon shade	Irrig Grp			1
WUCOLS - Moderate - 40-60%				
4-6 ft	Ht	3-4 ft	Dia.	
Emitter count		2	1 gph	

Black Mondo Grass				
Ophiopogon planiscapus 'Nigrescens'				
Partial Shade/Shade	Irrig Grp			1
WUCOLS - Moderate - 40-60%				
6-8 in.	Ht	10-12 in.	Dia.	
Emitter count		l. source	1 gph	

Plant List

Golden Euonymus

Euonymus japonica 'Aureo-marginata'

Irrig Grp 1

WUCOLS - Moderate - 40-60%

5-10 ft Ht 3-6 ft Dia.

Emitter count 4 1 gph

Green leafed Euryops

Euryops pectinatus 'Viridis'

Full Sun Irrig Grp. 1

WUCOLS - Moderate - 40-60%

3-5 ft Ht. 3-5 ft Dia.

Emitter count 3 1 gph

Heavenly Bamboo

Nandina domestica

Full Sun/P.Shade Irrig Grp. 1

WUCOLS - Low - 10-30%

5-6 ft Ht. 6 ft Dia.

Emitter count 4 1 gph

Based on a plants water use category, how much water in gallons would a plant need based on WUCOLS

Stn Name	CIMIS Region											
Fresno State	San Joaquin Valley			Gallons	30 ft	20 ft	10 ft	5ft	4ft	3ft	2ft	1ft
CIMIS Sta. 80			Plant	per ft^2	diam.	diam.	diam	diam	diam	diam	diam	diam
WUOLS- Very Low Use (<10%)			Water	of	tree	tree	ree/shrub	ree/shrub	ree/shrub	shrub	shrub	shrub
		coeff.	Req't.	canopy	***706 ft^2***	***314 ft^2***	***78.5 ft^2***	***19.6 ft^2***	***12.56 ft^2***	***7.06 ft^2***	***3.14 ft^2***	***0.785 ft^2***
					gal./mo.	***gal./mo.***	***gal./mo.***	***gal./mo.***	***gal./mo.***	***gal./mo.***	***gal./mo.***	***gal./mo.***
Mar ETo (in)	3.72	0.1	0.37	0.23	164	73	18	4.5	2.9	1.6	0.7	0.2
Apr ETo (in)	5.4	0.1	0.54	0.34	238	106	26	6.6	4.2	2.4	1.1	0.3
May ETo (in)	7.34	0.1	0.73	0.46	323	144	36	9.0	5.7	3.2	1.4	0.4
Jun ETo (in)	8.36	0.1	0.84	0.52	368	164	41	10.2	6.5	3.7	1.6	0.4
Jul ETo (in)	8.75	0.1	0.88	0.55	385	171	43	10.7	6.8	3.8	1.7	0.4
Aug ETo (in)	7.78	0.1	0.78	0.48	342	152	38	9.5	6.1	3.4	1.5	0.4
Sep ETo (in)	5.65	0.1	0.57	0.35	249	111	28	6.9	4.4	2.5	1.1	0.3

Moderate water use plants – month by month handout) next to last page - bottom

					706	314	78.5	19.6	12.56	7.06
Stn Name	CIMIS Region									
Fresno State	San Joaquin Valley			Gallons	30 ft	20 ft	10 ft	5ft	4ft	3ft
CIMIS Sta. 80			Plant	per ft^2	diam.	diam.	diam	diam	diam	diam
WUOLS - Med. Water Use (40-60%)			Water	of	tree	tree	tree/shrub	tree/shrub	tree/shrub	shrub
		coeff.	Req't.	canopy	***706 ft^2***	***314 ft^2***	***78.5 ft^2***	***19.6 ft^2***	***12.56 ft^2***	***7.06 ft^2***
					gal./mo.	***gal./mo.***	***gal./mo.***	***gal./mo.***	***gal./mo.***	***gal./mo.***
Mar ETo (in)	3.72	0.5	1.86	1.16	818	364	91	23	15	8
Apr ETo (in)	5.4	0.5	2.70	1.68	1,188	528	132	33	21	12
May ETo (in)	7.34	0.5	3.67	2.29	1,614	718	179	45	29	16
Jun ETo (in)	8.36	0.5	4.18	2.60	1,839	818	204	51	33	18
Jul ETo (in)	8.75	0.5	4.38	2.73	1,924	856	214	53	34	19
Aug ETo (in)	7.78	0.5	3.89	2.42	1,711	761	190	48	30	17
Sep ETo (in)	5.65	0.5	2.83	1.76	1,243	553	138	34	22	12

Another Scheduling tool – It assumes an application rate of 0.65” per hour

Drip / Line Source - 0.6 GPH - 12" x 18" spacing

Ornamental Shrubs with a high water use factor K_P 0.80

DU_{LQ}	0.9	
PR Rate	0.64	inches / hr.
RTM	1.06	

Every 4th day watering

Every 3rd day watering

		Sta. 80 ET_O Avg Monthly	Sta. 80 ET_O Avg. daily	Sta. 80 Orn. Shrub Req't daily	Lower Bndry. Run Time min.	Upper Bndry. Run Time min.	Lower Bndry. Run Time min.	Upper Bndry. Run Time min.
31	Mar	3.68	0.1187	0.0950	36	38	27	28
30	Apr	5.36	0.1787	0.1429	54	57	40	43
31	May	7.34	0.2368	0.1894	71	76	53	57
30	Jun	8.32	0.2773	0.2219	83	89	62	66
31	Jul	8.71	0.2810	0.2248	84	90	63	67
31	Aug	7.74	0.2497	0.1997	75	80	56	60
30	Sep	5.62	0.1873	0.1499	56	60	42	45

7530 N. Ingram Ave Fresno, CA 93711-6102 559.438.9530

1599 Menlo Ave Clovis, CA 93611-0509 559.298.4440

EWING Irrigation & Landscape Supply

* lower boundary represents a water time that assumes a high uniformity of application DU_{LQ}

Take Aways

- Objective 1 – linear drip selection 0.4 gph or 0.6 gph 12” eimntter spacing (do not use 0.9 or 1 gph) – keep spacing at 18” between tubes and keep them parallel
- Objective 2 – Measure emitter tubing pressure with a gauge adapted to ¼”. Linear drip with check valves require 15 psi. Limit pressure losses in laterals with charts. Increase pressure with 40 psi regulators

Take Aways

- Objective 3 – Know the application rate of your system. The goal is to avoid runoff through cycling and to provide the appropriate amount of water to the plants in the landscape. Use a 2” cap and tape measure with charts to determine rates
- Objective 4 – Establish run times by matching system application rates to WUCOLS and CIMIS. Use the guides we have provided and start using WUCOLSIV and CIMIS

Login | Register

CIMIS

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM
CALIFORNIA DEPARTMENT OF WATER RESOURCES

NOTICES

Stations #136, 200, 207, 208, 218 & 230 don't have a functioning rain gage.

The precipitation data shown is missing data rather than zero rainfall.

printer friendly version

CIMIS Overview

The following sections give a brief overview of CIMIS. Sections include the following: Introduction; Data Collection, Transmission, and Processing; Data Retrieval by Users; ETo Maps (Spatial CIMIS); and Trends in CIMIS Data Use. Please click on the arrow to the right of each title below to access the section.

Introduction

The California Irrigation Management Information System (CIMIS) is a program unit in the Water Use and Efficiency Branch, Division of Statewide Integrated Water Management, California Department of Water Resources (DWR) that manages a network of over 145 automated weather stations in California. CIMIS was developed in 1982 by DWR and the University of California, Davis (UC Davis). It was designed to assist irrigators in managing their water resources more efficiently. Efficient use of water resources benefits Californians by saving water, energy, and money.

Data Collection, Transmission, and Processing

Data Retrieval by Users

ETo Maps (Spatial CIMIS)

Trends in CIMIS Data Users

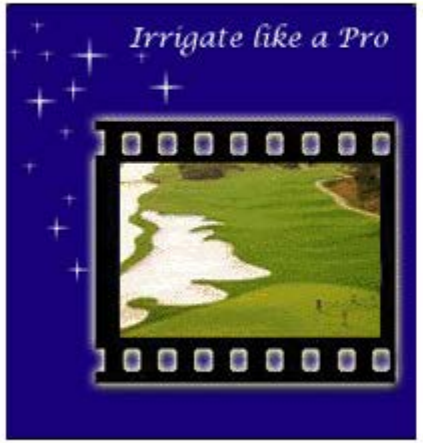
CIMIS

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM
CALIFORNIA DEPARTMENT OF WATER RESOURCES

Notices

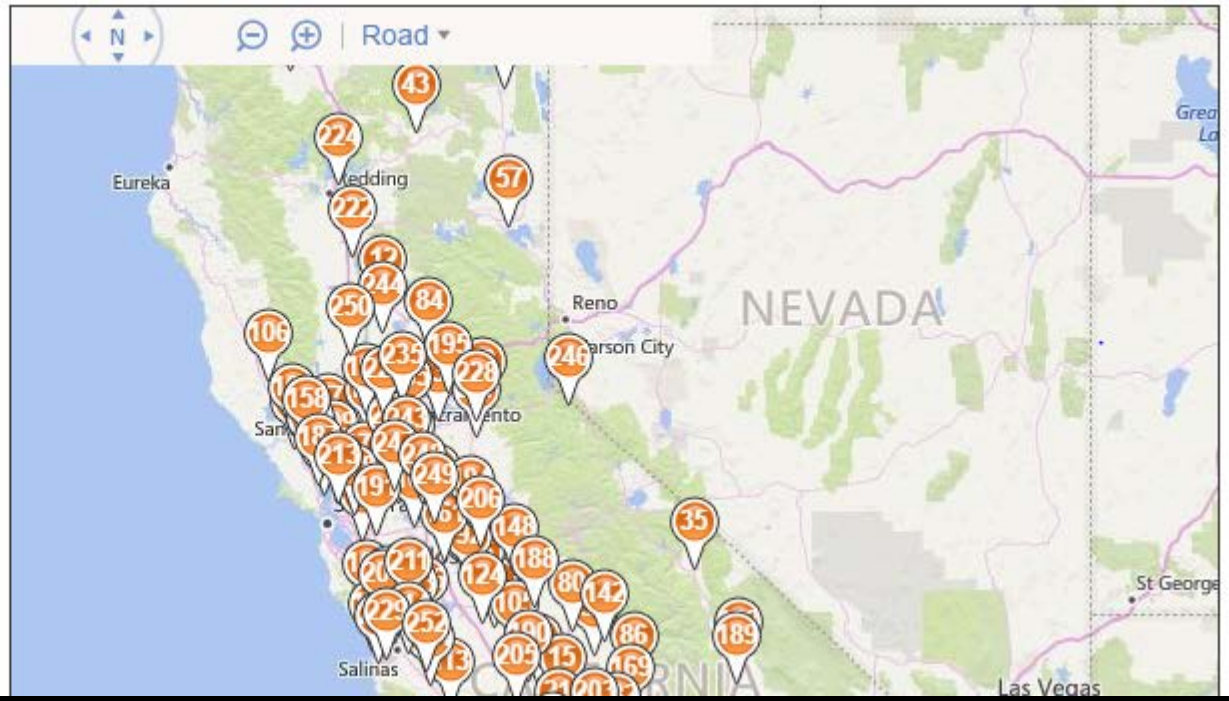
Stations #136, 200, 207, 208, 218 & 230 don't have a functioning rain gage.

The precipitation data shown is missing data rather than zero rainfall.



Station List | Station Location Map | Siting | Sensors | Maintenance

This Bing Map shows CIMIS station coordinate points. You can zoom in and out to see the exact station locations. Click the station marker for more detailed information.



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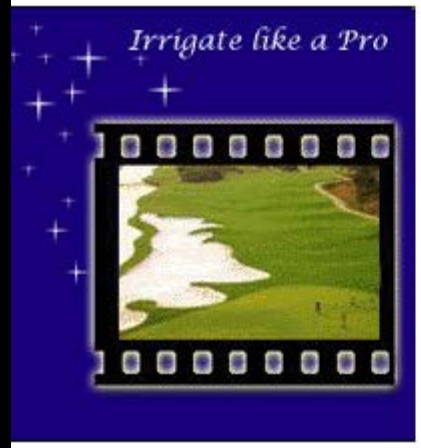

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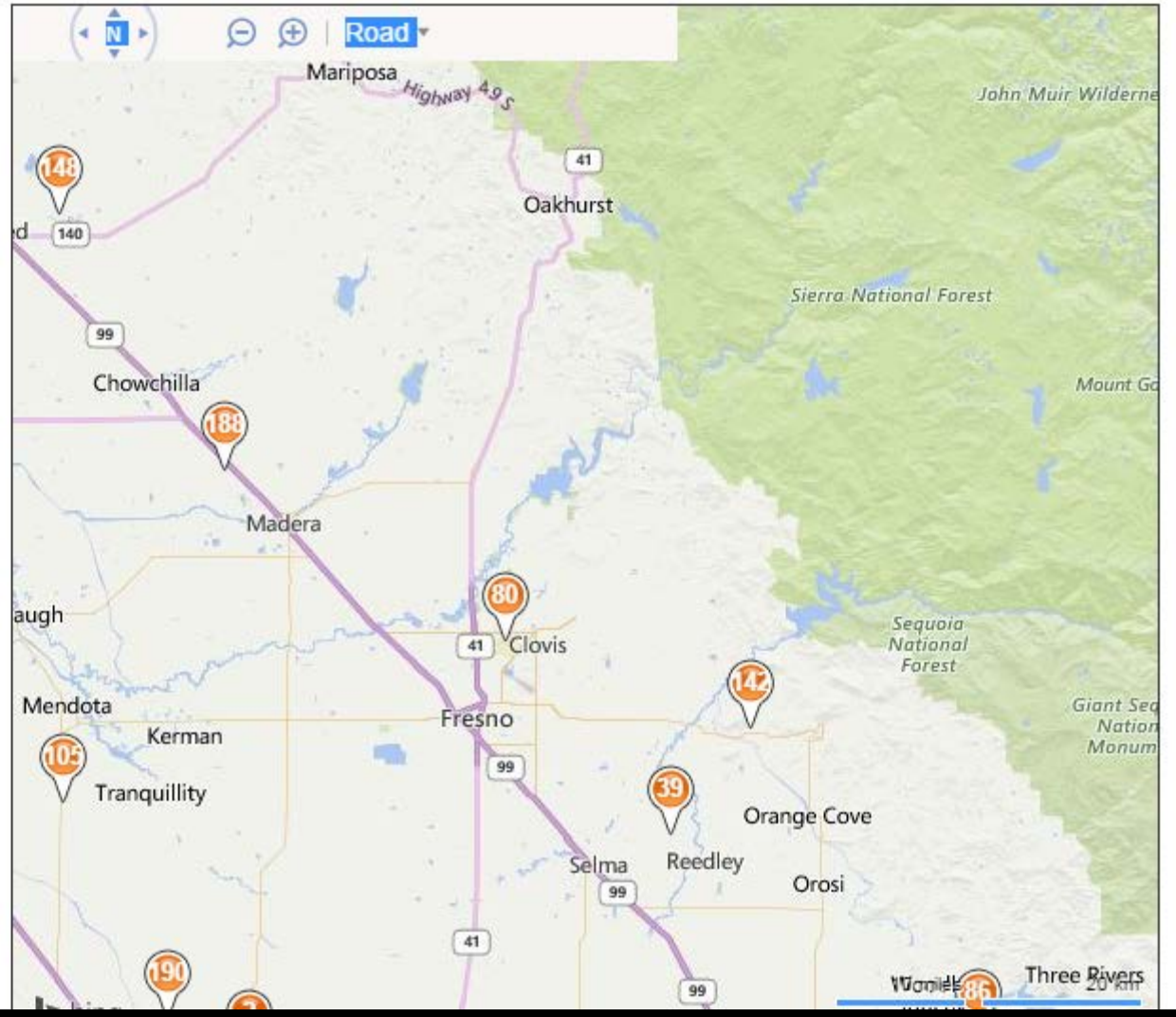

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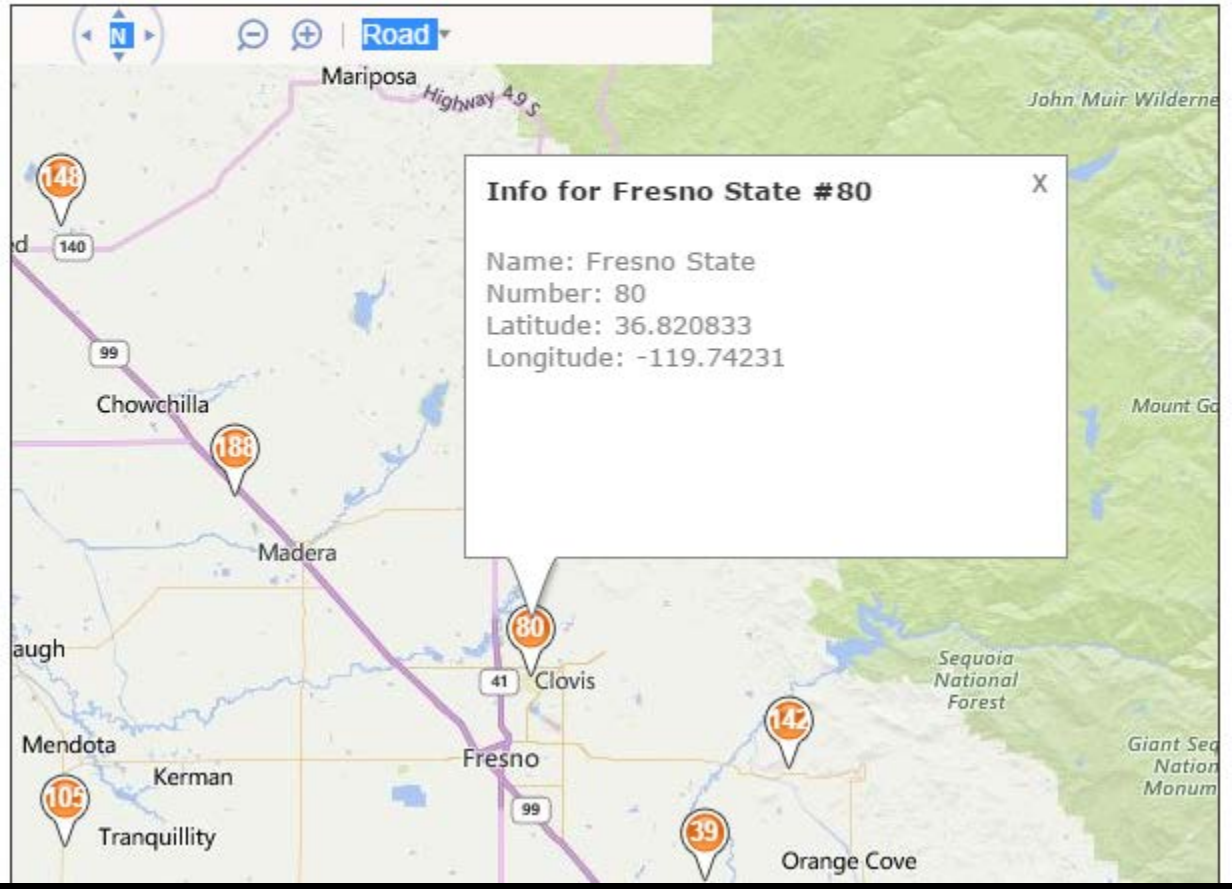
Station List | Station Location Map | Siting | Sensors | Maintenance

This Bing Map shows CIMIS station coordinate points. You can zoom in and out to see the exact station locations. Click the station marker for more detailed information.



HOME | STATIONS | DATA | SPATIAL | RESOURCES

CIMIS Station Reports

CIMIS Station Reports | FTP

1. Select report style and date range

Create a Monthly Avg ETo | PDF Report | in English Units

2. Select one-to-many stations. Click on Column headers to sort

Id	Name	Region	County	Status	Connect	Disconnect
077	Oakville	North Coast Valleys	Napa	Active	3/1/1989	---
078	Pomona	Los Angeles Basin	Los Angeles	Active	3/14/1989	---
080	Fresno State	San Joaquin Valley	Fresno	Active	10/3/1988	---
083	Santa Rosa	North Coast Valleys	Sonoma	Active	1/1/1990	---
084	Browns Valley	Sierra Foothill	Yuba	Active	4/13/1989	---
086	Lindcove	San Joaquin Valley	Tulare	Active	5/31/1989	---

3. Advanced settings (optional)

- [ ] Show Inactive Stations (scroll to bottom of list)
- [ ] Zip Code(s)

California Irrigation Management Information System (CIMIS)

CIMIS Monthly Average ETo Report

Rendered in ENGLISH Units.
Printed on Sunday, June 25, 2017

Average ETo Values by Station

Stn Id	Stn Name	CIMIS Region	Jan (in)	Feb (in)	Mar (in)	Apr (in)	May (in)	Jun (in)	Jul (in)	Aug (in)	Sep (in)	Oct (in)	Nov (in)	Dec (in)	Total (in)
80	Fresno State	SJV	1.15	1.95	3.72	5.40	7.34	8.36	8.75	7.78	5.65	3.64	1.81	1.08	56.63

CIMIS Region Abbreviations		
BIS - Bishop	CCV - Central Coast Valleys	ICV - Imperial/Coachella Valle
LAB - Los Angeles Basin	MBY - Monterey Bay	NCV - North Coast Valleys
NEP - Northeast Plateau	SAV - Sacramento Valley	SBE - San Bernardino
SFB - San Francisco Bay	SJV - San Joaquin Valley	SFH - Sierra Foothill
SCV - South Coast Valleys		

WUCOLS IV
Water Use Classification of Landscape Species

Categories of Water Needs

Category	Abbreviation	Percentage of ET_o
High	H	70–90
Moderate/Medium	M	40–60
Low	L	10–30
Very Low	VL	< 10

Species were evaluated as needing high (H), moderate/medium (M), low (L), and very low (VL) amounts of irrigation water. Expressed as a percentage of reference evapotranspiration (ET_o)[1], these categories were quantitatively defined as follows.

Fig. 2. Five-finger fern was assigned to the "high" water needs category in four regions.

Fig. 3. Cone flower was assigned to the "moderate" water needs category in all

Water needs categories were assigned for each species in each of the six regions. The category High contains species requiring the greatest amount of water during the summer months to maintain acceptable health, appearance, and growth, such as white alder (*Alnus rhombifolia*) and five-finger fern (*Adiantum aleuticum*) (Fig. 2). Species in the category Moderate/Medium need lesser amounts of water, such as ivy geranium (*Pelargonium peltatum*) and cone flower (*Echinacea spp.*) (Fig. 3). Species in the category Low are considered to be water conserving because they perform well with relatively small amounts of irrigation

conditions. These are not the only climate zones that exist in California, but they include much of the state where irrigated landscapes occur. For locations outside of the six regions, it is best to use species evaluations from a region that is most similar climatically to the location of interest.

Number	WUCOLS Region	Sunset climate zones*	CIMIS ET_0 zones**	Representative Cities
1	North-Central Coastal	14, 15, 16, 17	1, 2, 3, 4, 6, 8	Healdsburg, Napa, San Jose, Salinas, San Francisco, San Luis Obispo
2	Central Valley	8, 9, 14	12, 14, 15, 16	Auburn, Bakersfield, Chico, Fresno, Modesto, Sacramento
3	South	22, 23,	1, 2, 4,	Irvine, Los Angeles, Santa

The Landscape Products 17MM EZ-ID Dripline is color coded and ideal for large commercial landscapes (hedges, groundcover) as well as smaller residential gardens. Compatible with brown 17MM standard insert fittings.

All EZ-ID Dripline is made using 100% Dow Chemical 7510 polyethylene (PE) material which has a 25+ year record of product quality. The material is famous for its excellent environmental stress crack resistance (ESCR). The UV stabilized brown color protects the tubing from the harmful effects of the sun and blends well into the landscape. The dripline is color coded with a small stripe for easy identification in the field. The 0.9 GPH has a green stripe, the 0.6 GPH has a blue stripe and the 0.4 GPH has an orange stripe. A purple stripe is also available for reclaimed water applications.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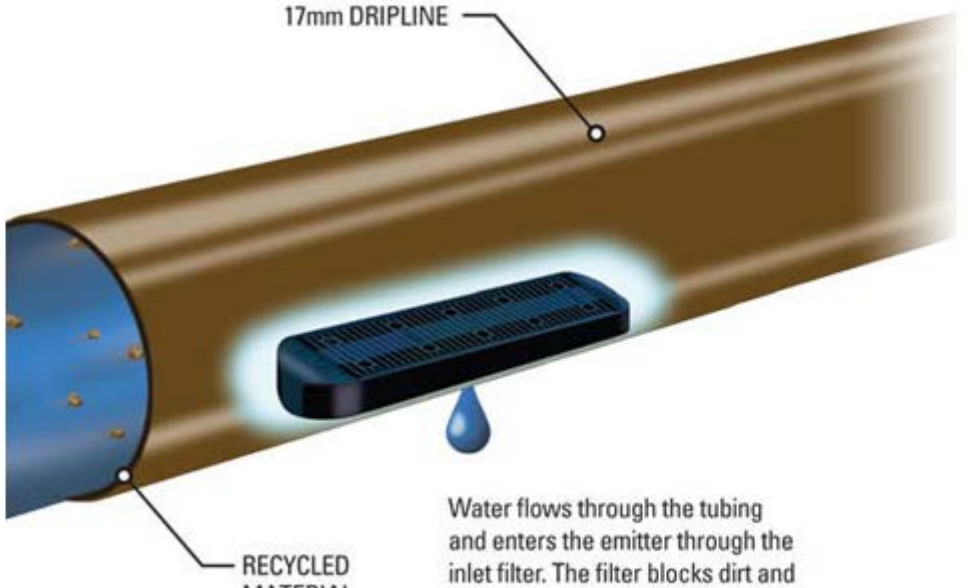
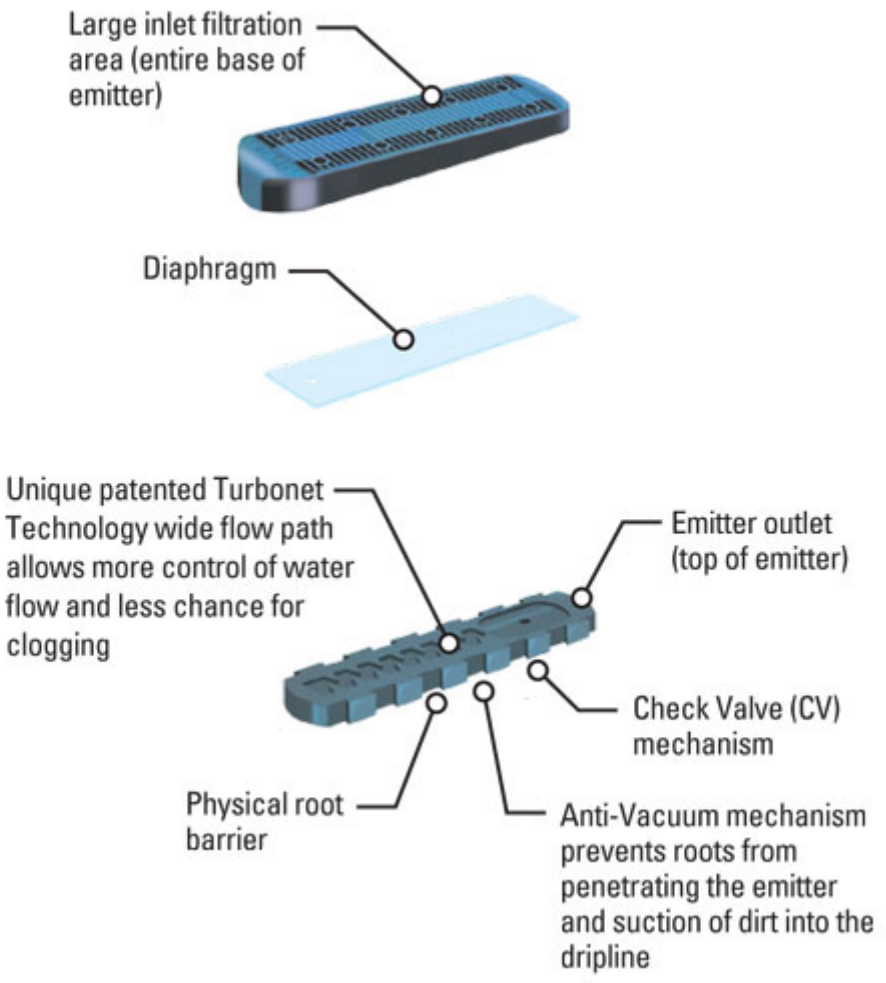
Overview | **Technical** | Ordering | Resources

Techline® CV Technical



Water flows through the tubing and enters the emitter through the inlet filter. The filter blocks dirt and debris from entering, ensuring only clean water enters the dripline.

EXPLODED VIEW OF TECHLINE CV EMITTER



Specifications

- Broadest choice of emitter flow rates: 0.26, 0.4, 0.6 and 0.9 GPH
- Emitter spacings: 12”, 18“ and 24” (24” spacing available for 0.6 and 0.9 GPH only)
- Pressure compensation range:14.5 to 58 psi
- Bending radius: 7”
- Maximum recommended system pressure: 58 psi
- Minimum recommended system pressure: 14 psi
- Tubing diameter: 0.66“ OD; 0.56” ID; 0.050” wall
- Coil length: 100’, 250’, 500’, 1,000’
- Recommended minimum filtration: └120 mesh
- Diaphragm made of silicon
- ISO 9261 Standard Compliance

Limited Warranty For Techline CV

Netafim warrants Techline® CV to be free from environmental stress cracking for a period of seven (7) years from the date of original delivery.

TURF								SHRUB & GROUNDCOVER											
M SOIL		SANDY SOIL			COARSE SOIL			CLAY SOIL			LOAM SOIL			SANDY SOIL			COARSE SOIL		
GPH		0.6 GPH			0.9 GPH			0.26 GPH			0.4 GPH			0.6 GPH			0.9 GPH		
12"		12"			12"			18"			18"			12"			12"		
14"	18"	12"	14"	18"	12"	14"	16"	18"	21"	24"	18"	21"	24"	16"	18"	20"	16"	18"	20"
throughout the zone from 4" to 6"								On-surface or bury evenly throughout the zone to a maximum of 6"											
0.55	0.43	0.98	0.84	0.65	1.48	1.27	1.11	0.19	0.16	0.14	0.30	0.26	0.23	0.73	0.65	0.59	1.11	0.99	0.89
27	35	15	18	23	10	12	13	80	93	106	50	58	66	20	23	26	13	15	17

alines, emitter flow selection can be increased if desired by the designer.
reas requiring higher infiltration rates, such as coarse sandy soils.

rates used in the calculations are 0.42, 0.61 and 0.92 GPH.

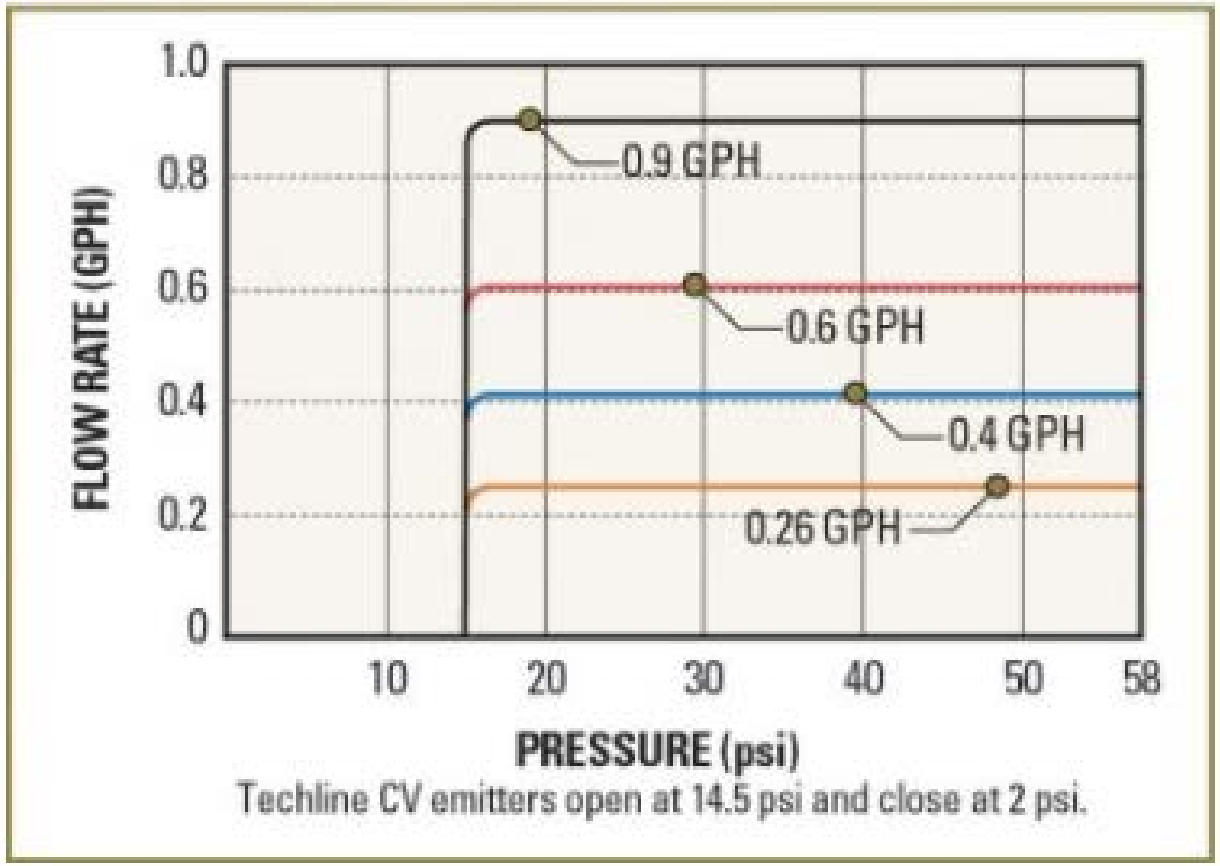
MAXIMUM LENGTH OF A SINGLE LATERAL (FEET)

EMITTER SPACING		12"				18"				24"	
EMITTER FLOW (GPH)		0.26	0.4	0.6	0.9	0.26	0.4	0.6	0.9	0.6	0.9
INLET PRESSURE	20 psi	331	242	190	144	468	344	270	204	342	260
	25 psi	413	302	238	180	584	429	338	257	430	326
	35 psi	518	380	299	227	737	540	426	323	542	412
	45 psi	594	436	343	260	845	620	489	371	622	472
	55 psi	655	480	378	287	932	684	539	410	686	522
	60 psi	681	500	393	298	969	713	561	426	716	544

FLOW PER 100 FEET

EMITTER SPACING	0.26 EMITTER		0.4 EMITTER		0.6 EMITTER		0.9 EMITTER	
	GPH	GPM	GPH	GPM	GPH	GPM	GPH	GPM
12"	26.4	0.44	42.3	0.71	60.8	1.01	92.5	1.54
18"	17.6	0.29	28.2	0.47	40.5	0.68	61.6	1.03
24"	-	-	-	-	30.4	0.51	46.2	0.77

FLOW RATE VS. PRESSURE



Techline CV emitters open at 14.5 psi and close at 2 psi.

Landscape Products

Retro Drip Adapter

L/P RETRO DRIP ADAPTER 1/2IPS

SKU#: 12001300 | MFG#: L/P RETRO 1/2 IPS

- Built in pressure reducer.
- 150-mesh/100 micron filter to prevent clogs.
- Two outlets for maximum flow of 6.5 GPM.
- 1/2 inch female pipe thread inlet.
- 3/4 inch male hose thread outlets.

★★★★★ (1) Write a review

See an error? Tell us.

Overview | **Product Guides** | **Reviews**

Quickly and easily convert sprinklers to drip irrigation with the Landscape Products Retro Drip Adapter. It's ideal for installing dripline or tubing in place of sprinklers to save water and reduce overspray.

The adapter includes a pressure regulator, filter and two outlets. Simply screw it onto a 1/2 inch riser, replacing an existing sprinkler. For dense shrubs and groundcover beds, use Landscape Products barb insert hose swivel to attach EZ-ID-CV dripline. For sparsely planted landscapes, use the compression female hose swivel and 710 PE tubing. Unused sprinklers in the zone can be closed off with sprinkler shut-off caps as needed.

Key Features:

- Built in pressure reducer.
  - Drip zone flow between 0.5 GPM/30 GPH and 1.0 GPM/60 GPH regulates to 40 PSI.
  - Drip zone flow between 1.0 GPM/60 GPH and 6.5 GPM/390 GPH regulates to 30 PSI.
- 150-mesh/100 micron filter to prevent clogs.
- Two outlets for maximum flow of 6.5 GPM.
- 1/2 inch female pipe thread inlet.
- 3/4 inch male hose thread outlets.
- Made with durable polypropylene.
- Maximum inlet pressure of 90 PSI.

Landscape Products

Universal Sprinkler Shut-Off Cap

L/P UNIVERSAL P/U SHUT OFF CAP

SKU#: 12001350

- Cap for unused sprinklers.
- Fits most pop-up bodies.
- Perfect for retro-fitting sprinkler zones to drip areas.

Be the first to review this product


PARKING


SALON
NAILS