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PRESENTING PARTNERS



PARTICIPATING PARTNERS





# Subsurface Drip Irrigation for Golf Course Water Conservation

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Joel Krause, Golf Course Superintendent, Eagle Crest Golf and  
Resort, Canton, Michigan



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## Subsurface Drip Irrigation for Turfgrass Areas





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Bunker surrounds and steep slopes →

Fit any shape



S.F. Golf Club - July 1998.  
A single drip line around the bunker edge.







Homeowners Professionals Golf Agriculture Online Store

You Are Here: Home > Landscape Irrigation > Products > Drip Tubing & Distribution Components > XFS Sub-Surface Dripline

Product Information

Spray Bodies

Spray Nozzles

Rotors

Impacts

Valves

Controllers

Pump Start Relays

Central Controls

Drip Control Zone

Drip Distribution

Drip Emission

## XFS Subsurface Dripline

### With Copper Shield™ Technology

Rain Bird® XFS Dripline with Copper Shield™ for sub-surface drip irrigation is the latest innovation in the Rain Bird Xerigation® Family. Rain Bird's patent-pending Copper Shield Technology protects the emitter from root intrusion, creating a long-lasting, low maintenance sub-surface drip irrigation system for use under turf grass or shrub and groundcover areas.



2010 Irrigation Show  
Award Winner  
Best New Product  
for Turf/Landscape



## LANDSCAPE

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**Driplines**

[Techline® HCVXR](#)

[Techline® HCVXR-RW and RWP](#)

[Techline® CV](#)

[Techline® RW and RWP](#)

[Techline® DL](#)

[Techline® EZ](#)

[17mm Dripline Fittings](#)

[TechLock Fittings](#)

[12mm Dripline Fittings](#)

[Techfilter Systems](#)

[Líneas de Goteo](#)

[Dripline Components](#)

[Filters](#)

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[Water Meters](#)

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[▶ DRIP SOLUTIONS](#)

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## Techline® HCVXR

**Overview**

[Technical](#)

[Ordering](#)

[Resources](#)



### Techline® HCVXR (17mm Dripline)

A revolutionary new dripline which provides superior root intrusion resistance. It's also the longest lasting solution that continues to function even after years of use because Cupron®copper oxide is infused in the material used to make the emitter. In addition to the copper oxide, Techline HCVXR has a unique patented emitter design with physical root barrier for even more root intrusion protection.





Count on it.



ENGLISH (UNITED STATES) (CHANGE)

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#### Irrigation

Spray Heads

Spray Head Nozzles

Rotors

Landscape Drip Components

» Drip Bubbler

» DL2000® Series PC Dripline

» Drip In® PC Brown Dripline

» Blue Stripe® Distribution Hose

» NGE® PC Emitters

» Turbo-SC Plus® PC Emitters

» E-2® Classic (Flag) Emitters

» Multi-outlet Manifold

» Filters

» Pressure Regulators

» Drip Zone Valve Kits

» Loc-Eze® Fittings and Accessories

Controllers

Sensors

Central Control Systems

Valves

## DL2000® Series PC Dripline



0

- » No filters to change or chemically treated disks to handle
- » Irrigation takes place at or below grade so there is minimal water loss due to mist, evaporation, run-off or wind
- » Ideal for shrub areas, median strips, public recreation areas and parking islands
- » Seven-year warranty against root intrusion



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Hunter®

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HOMEOWNERS

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## ECO-MAT®

Subsurface Irrigation: Under Turf, Gardens, Small Shrubs



UNMATCHED UNIFORMITY AND WATER SAVINGS

? SUPPORT

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OVERVIEW

MODELS

SPECS

DOCUMENTS

PHOTOS

ECO-MAT SUBSURFACE IRRIGATION: HOW TO INSTALL ECO-MAT

### PRODUCTS

ALL PRODUCTS

ROTORS

+

ST SYSTEM

+

MP ROTATOR

+

NOZZLES

+

SPRAY BODIES

+

CONTROLLERS

+

SENSORS

+

REMOTES

+

SOFTWARE

+

VALVES

+

MICRO IRRIGATION

+

ACCESSORIES

+

TOOLS



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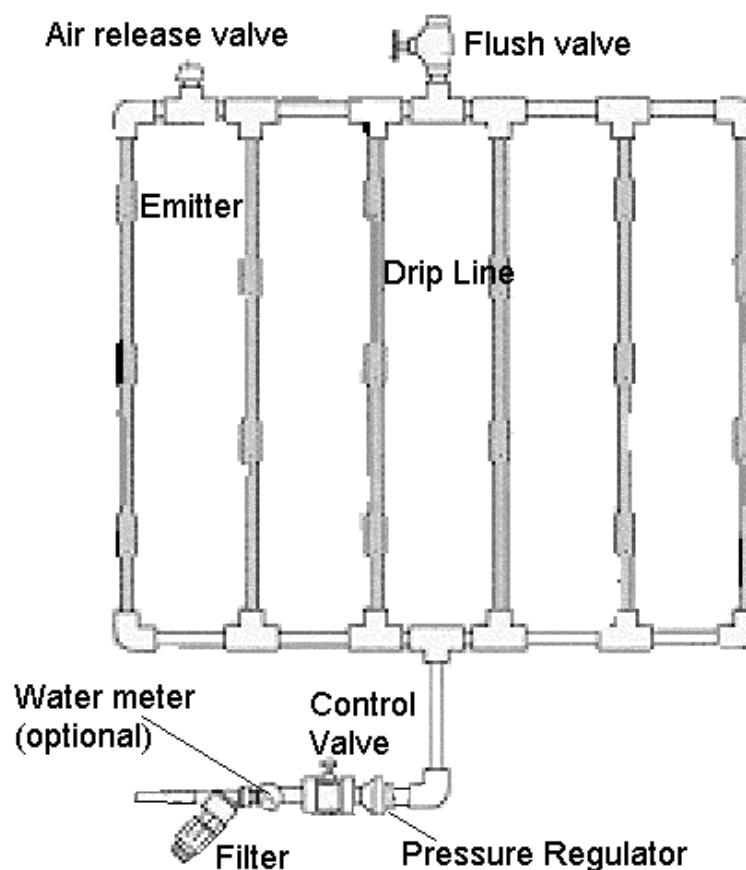


## SUBSURFACE DRIP IRRIGATION (SDI)

### Typical design:

- 4" (10 cm) depth
- 1' (30 cm) spacing

Toro, 2000











**FLOW PER 100 FEET**



EMITTER SPACING	0.33 EMITTER		0.53 EMITTER		0.77 EMITTER		1.16 EMITTER	
	GPH	GPM	GPH	GPM	GPH	GPM	GPH	GPM
12"	33.0	0.55	53.0	0.88	77.0	1.28	116.0	1.93
18"	22.0	0.37	33.3	0.59	51.3	0.86	77.3	1.29
24"	16.5	0.28	26.5	0.44	38.5	0.64	58.0	0.97

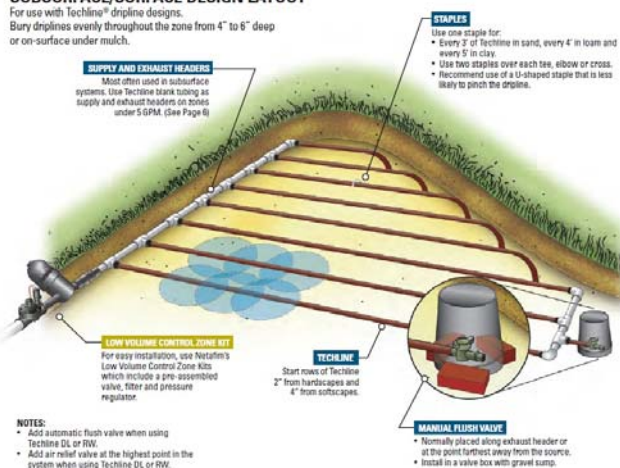
**MAXIMUM LENGTH OF A SINGLE LATERAL (FEET)**

EMITTER SPACING		12"				18"				24"	
EMITTER FLOW (GPH)		0.33	0.53	0.77	1.16	0.33	0.53	0.77	1.16	0.77	1.16
INLET PRESSURE	25 psi	237	173	136	103	335	246	192	146	244	184
	30 psi	327	249	187	142	464	341	266	203	338	258
	35 psi	385	282	221	168	546	401	314	239	400	304
	40 psi	429	315	247	187	611	449	351	267	446	340
	45 psi	467	342	268	203	663	488	381	290	486	370
	50 psi	499	366	287	218	710	521	408	311	520	396
	55 psi	528	387	303	230	752	552	432	329	550	418
	60 psi	554	406	318	241	788	579	453	345	578	440

**TYPICAL DESIGN LAYOUTS**

**SUBSURFACE/SURFACE DESIGN LAYOUT**

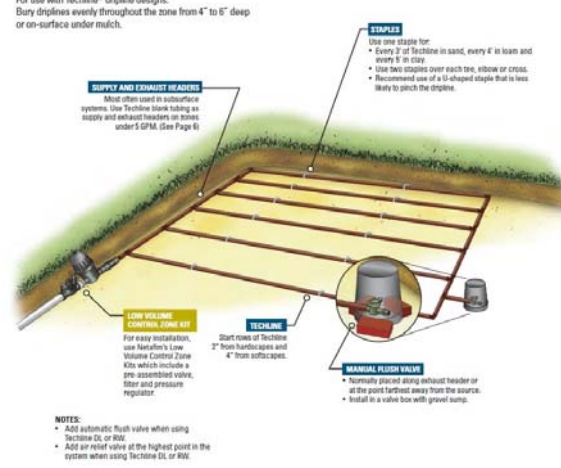
For use with Techline™ dripline designs.  
Bury driplines evenly throughout the zone from 4" to 6" deep or on-surface under mulch.



**TYPICAL DESIGN LAYOUTS**

**SUBSURFACE/SURFACE DESIGN LAYOUT**

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## System Installation





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## System Installation



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# System Installation



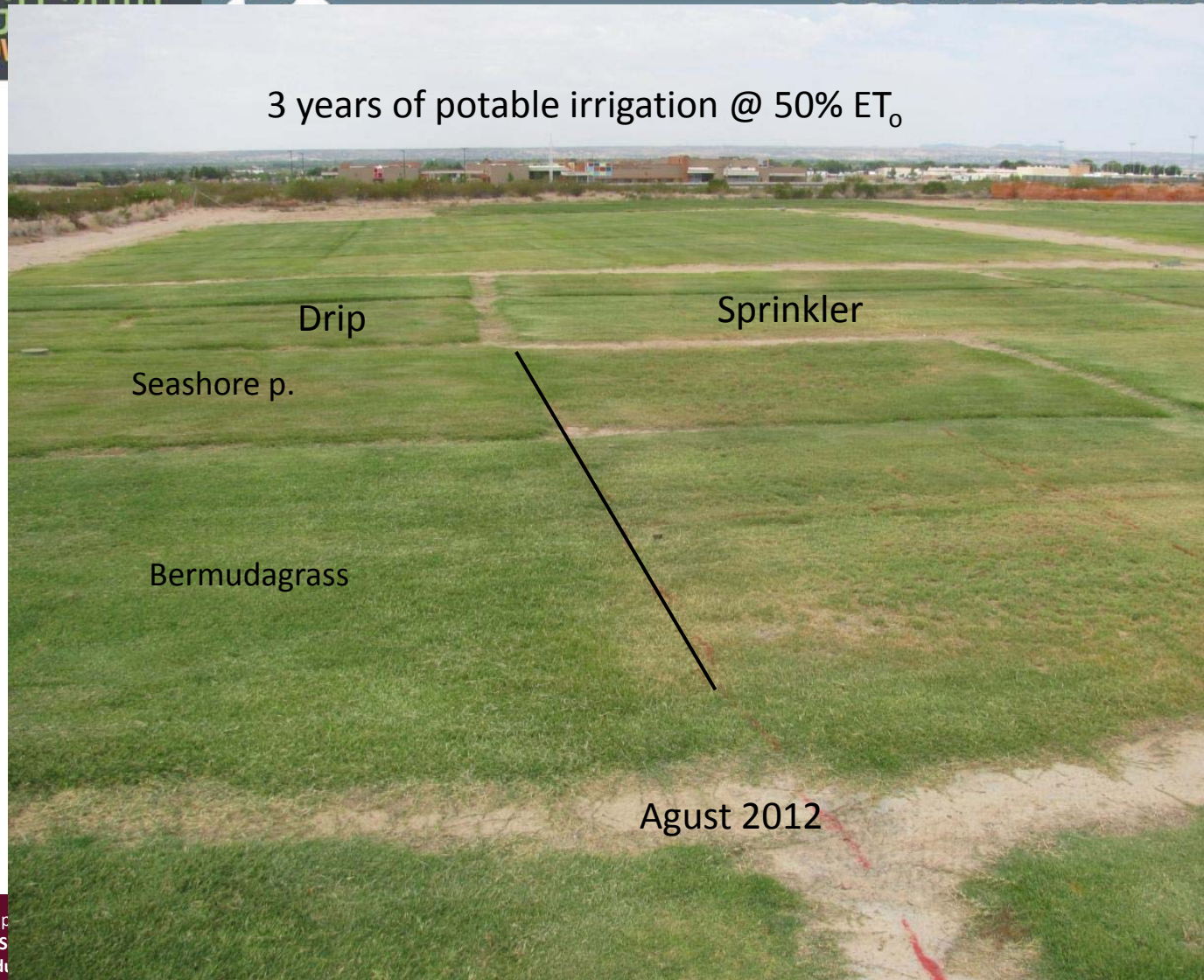




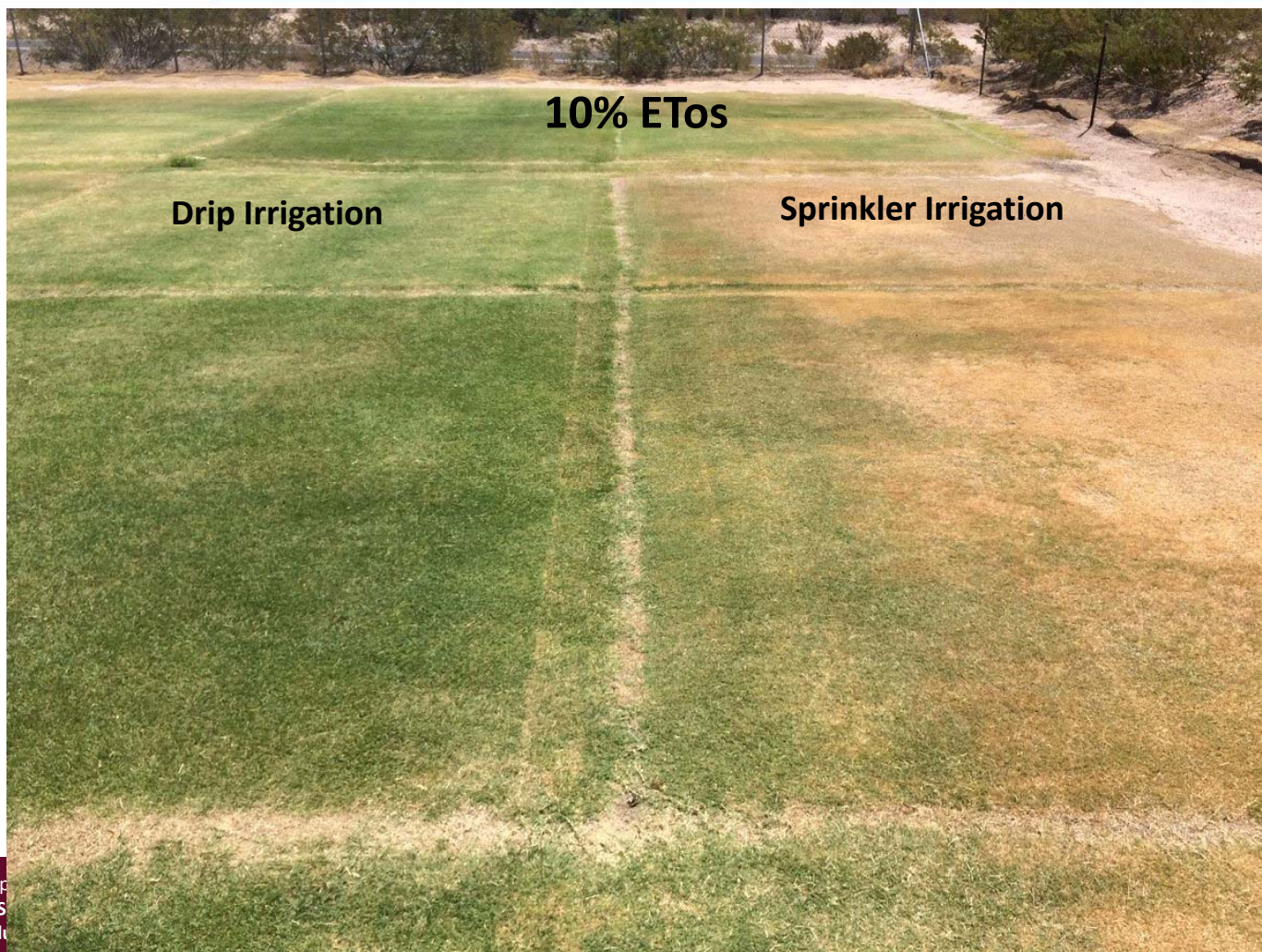
# System Installation



3 years of potable irrigation @ 50% ET<sub>o</sub>











Irrigation effect on  
brown patch  
(*Rhizoctonia* sp.)  
occurrence





# Problems

- Production
- Installation
- Filtration
- Root intrusion
- Maintenance





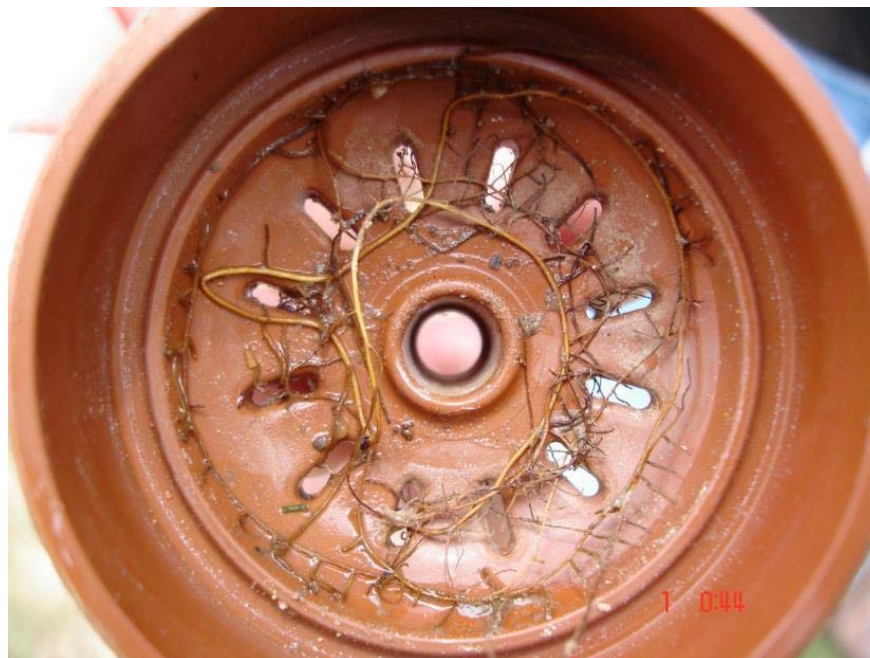


## Striping





## Roots







# Installation







# Clogging







## Las Campanas, NM

- Santa Fe, NM 7,000 ft elevation
- 14" average precipitation
- 36 holes
- Budget constraints
- Irrigation water conservation
- 2015 decision to install SDI
- Supported by USGA, Hunter, Netafim, Rainbird, Toro





## Problem: Overspray







## Materials and Methods

- 14 tee boxes (back tees): 240 – 760 ft<sup>2</sup>
- USGA type construction/rootzone
- Creeping bentgrass + annual bluegrass
- Mowing height
- Hunter ECO-MAT (0.6 gl hr<sup>-1</sup>)
- Netafim XCVXR (0.53 gl hr<sup>-1</sup>)
- Rainbird XFS (0.42 gl hr<sup>-1</sup>)
- Toro DL 2000 (0.5 gl hr<sup>-1</sup>)
- 2 controls (DU 0.69 and 0.79)
- 5 inches deep
- Trenching vs. sod removal

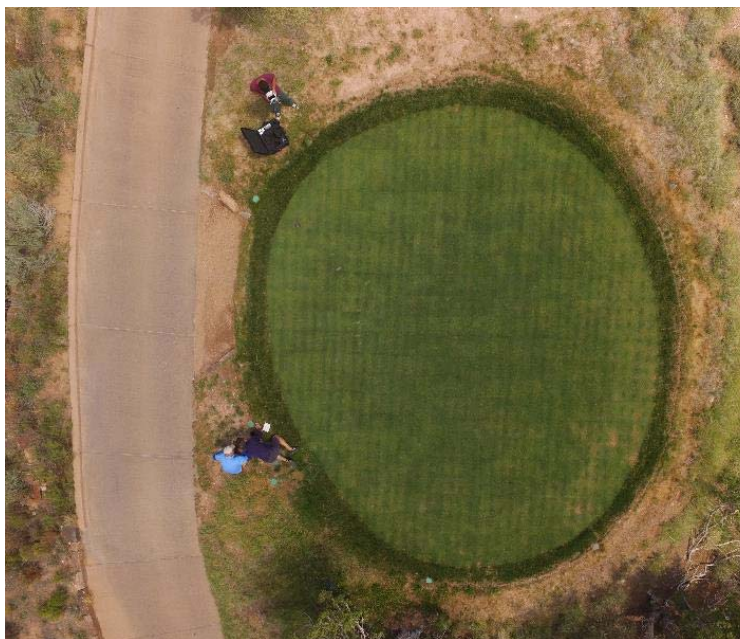
# Installation April 28<sup>th</sup> 2016







Sod removal



Trenching into existing turf



Installation April 26 – Photo taken August 5<sup>th</sup>





## Problem: Drip lines installed too deep



August 5<sup>th</sup> 2016



October 5<sup>th</sup> 2016





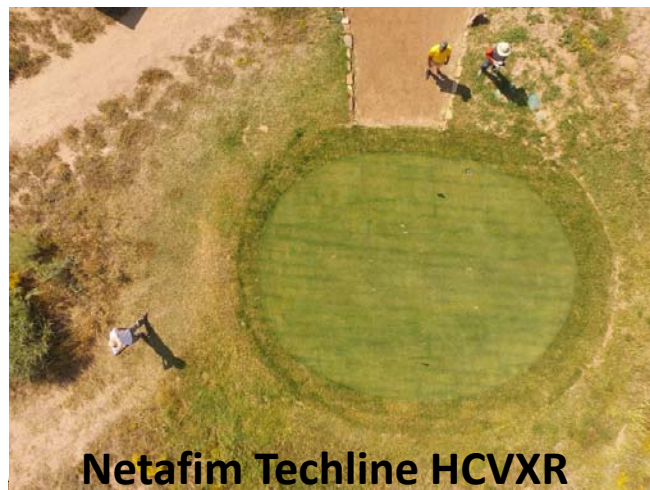
## Las Campanas, Tee #6







Due to publicity and great success, Hunter and Netafim SDI were added to the test in 2017



**Netafim Techline HCVXR**



**Hunter Eco-Mat**

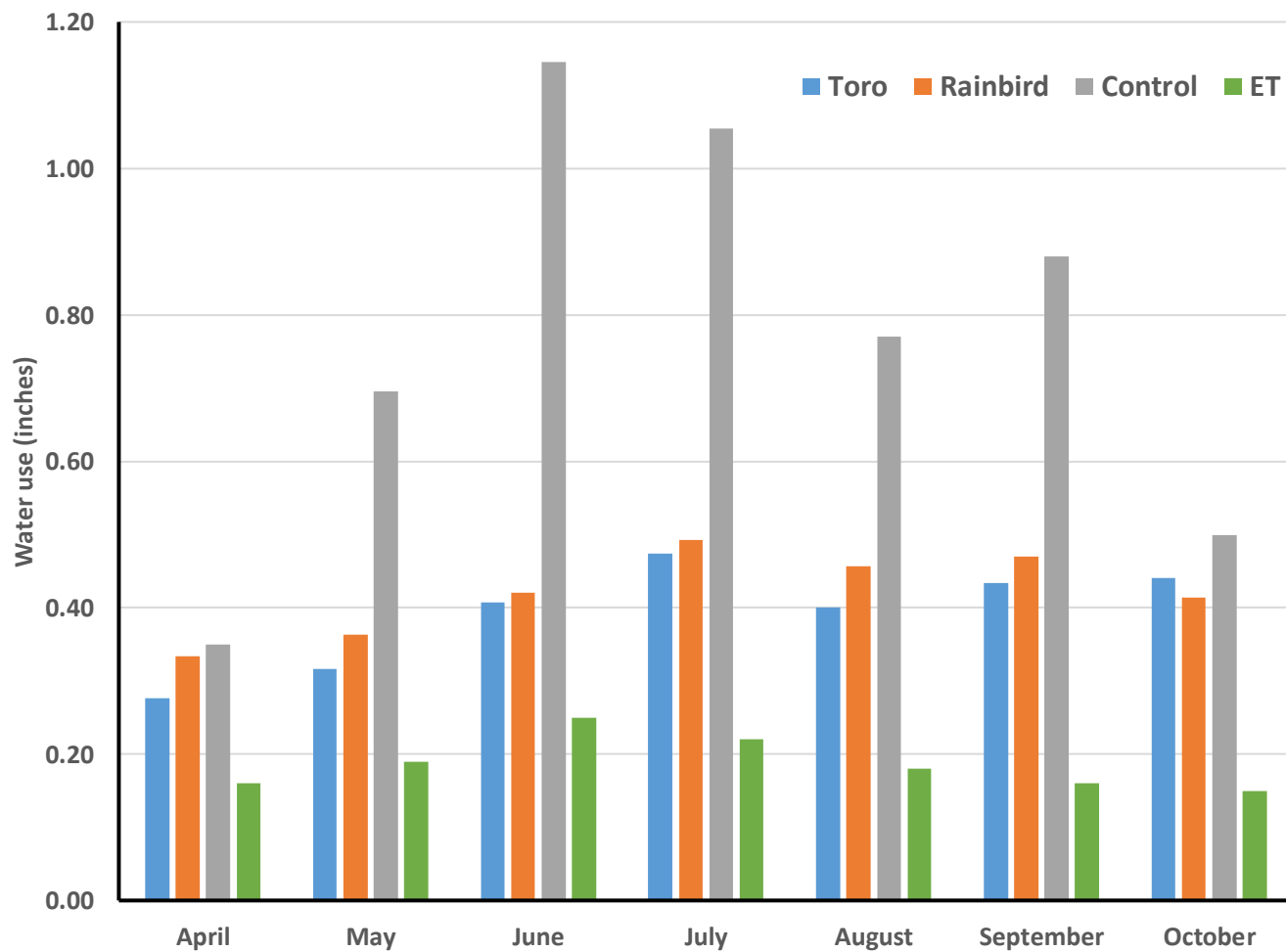






## Keeping up with the maintenance









# Summary





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## Acknowledgements







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