Business Case For Irrigation Technology

Subsurface Irrigation

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Goal of Drip Irrigation

Drip irrigation meets the water and nutrient needs of landscape plant material by **precisely** delivering water and chemicals directly to the active root zone of the plant in a timely fashion.

Advantages of Drip Irrigation

Highly Efficient

- Sprays 35% to 60% Distribution Uniformity (DU)
- Rotors 45% to 70% Distribution Uniformity (DU)
- Rainfall 92% to 95% Distribution Uniformity (DU)
- Drip 92% to 98% Distribution Uniformity (DU)

Lower pressure requirement

No overspray

No water window

Soil Water Movement

Water applied to soil moves by:

- **Infiltration:**
  - Due to gravitational forces
  - Capillary
- **Redistribution:**
  - due to soil tension
  - Slow movement; flow toward dryer soil

Inline Drip

Typical Inline Options:

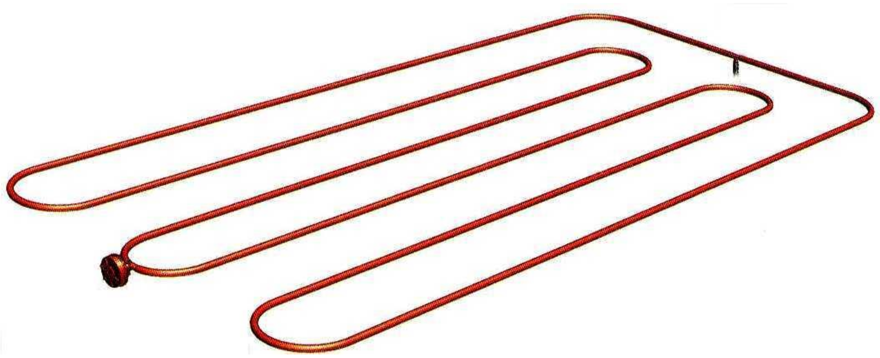
- ➢Pressure compensating
- ➢Check valves
- ➢Flow rates – per soil type
- ➢Spacing's – 12”, 18”, 24”
- ➢Different Coils sizes

Applications

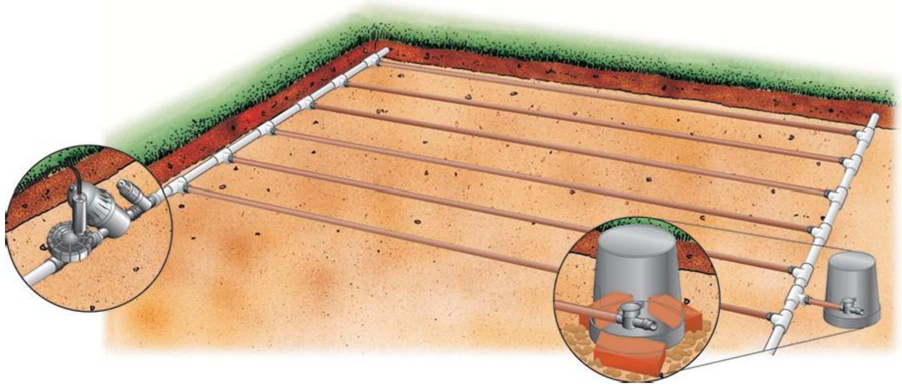
Efficiently Irrigates Odd Shaped Areas

Typical Layouts

"LITE" – on surface



Grid Layout - subsurface



Basic Design Review

- You should already know how to use drip in planting beds.
- The major difference between designing an irrigation system using sprays and rotors and drip is determining the type of soil <u>before</u> you do the drip design.
- The soil tells us what emitter flow and spacing to use, how far apart the rows should be.
- The type of plant material determines the length of irrigation cycles.

Design Guidelines

1. What Plant material are you irrigating
2. What is your soil type
3. These two questions decides for us the emitter flowrate, emitter spacing and row spacing of the tubing

GENERAL GUIDELINES	TURF												SHRUB & GROUNDCOVER											
	CLAY SOIL			LOAM SOIL			SANDY SOIL			COARSE SOIL			CLAY SOIL			LOAM SOIL			SANDY SOIL			COARSE SOIL		
EMITTER FLOW	0.33 GPH			0.53 GPH			0.77 GPH			1.16 GPH			0.33 GPH			0.53 GPH			0.77 GPH			1.16 GPH		
EMITTER SPACING	18″			12″			12″			12″			18″			18″			12″			12″		
LATERAL (ROW) SPACING	18″	20″	22″	12″	18″	20″	12″	14″	16″	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)	0.24	0.21	0.19	0.85	0.56	0.51	1.23	1.05	0.92	1.86	1.60	1.40	0.24	0.20	0.18	0.38	0.32	0.28	0.92	0.82	0.74	1.40	1.24	1.12
TIME TO APPLY ¼″ OF WATER (MINUTES)	64	71	78	18	27	30	12	14	16	8	9	11	64	74	85	40	46	53	16	18	20	11	12	13

Following these maximum spacing guidelines, emitter flow selection can be increased if desired by the designer.
1.16 GPH flow rate available for areas requiring higher infiltration rates, such as coarse sandy soils.

Step 2 Length of our lateral lines

What pressure are we working with?

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	240	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

Step 3 – Flowrate of the zone

Length of Tubing / 100 x (times) GPM per 100

253/100 = 2.53 x .77 = 1.94 GPM

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	35.3	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

Shrub Beds

Divide into Zones

Same as for Conventional Systems

- Plant Requirements
- Environmental Issues
- Elevation
- Precipitation Rate

And Maximum Length of a Single Lateral

- Looping or Center Feeding will double the maximum run length of a lateral
- Use the chart

Select Filter, Valve, and Pressure Regulator

Select a filter base upon the flow

- ¾" to 13 GPM
- 1" to 22 GPM
- 1½ to 35 GPM
- 2 to 132 GPM

Select a valve

- Note the minimum & Maximum flow range

Select a pressure regulator base upon the flow

- ¾" to 0.5 - 5 GPM (low flow model)
- ¾" to 3.5 - 20 GPM (high flow model)
- 1½ to 7.0 - 40 GPM
- Other models up to 500 GPM are available

Other Considerations

- Below grade installations
  - Inline drip can effectively irrigate turf
  - Installation is 4” to 6” below grade
  - Staples are not necessary but recommended
- Above Grade Installations
  - Staples are required every three to five feet
- Winterization is the same as for conventional systems
- Maintenance
  - Open the drain valve and thoroughly flush the system at spring start up
  - Clean the filter annually or more frequent

Sub Surface Turf

Benefits:

- Can run system 24hrs a day.
- Low evaporation / high uniformity
- No heads to trip over / break / liability.
- Alternate water source issues (health codes).
- Low maintenance / less vandalism.
- Reduces need for aeration.
- Lower flow requirements.

SSDI vs Sprayheads

SSDI

Sprayheads

SSDI vs Sprayheads

SSDI

Sprayheads

SSDI – Commerce City installed summer 2003 picture 8-13

The District
Salt Lake

Woodlands Medians Historical Water Usage Castle Rock, Colorado 2000 2010

							Woodlands Medians Historical Water Usage Castle Rock, Colorado
Bill Master Account #	Loc. #	Address	Account #	Average gallons per year (2000-2007)	Total Gallons (2010)	Diff.	
2536-01	68060	4 Irr Scott Blvd	1386	103,125	0	103,125	
2540-01 IA	68140	InActive	1390	4,375	0	4,375	
2530-01	67160	1 Irr Woodlands Blvd	1381	45,375	4,000	41,375	
2531-01	67180	2 Irr Woodlands Blvd	1382	404,375	257,000	147,375	
2532-01	67200	3 Irr Woodlands Blvd	1383	326,000	129,000	197,000	
2538-01	68100	2 Irr Scott Blvd	1388	62,625	169,000	-106,375	** 108Kgal used in June. Would attribute that useage to a leak or improper programming.*
2539-01	68120	1 Irr Scott Blvd	1389	960,125	91,000	869,125	
2537-01	68080	3 Irr Scott Blvd	1387	91,375	205,000	-113,625	*Not sure why consumption was up on this account. Will investigate further.*
2533-01 IA	67220	InActive	1384	29,000	0	29,000	
			Total	2,026,375	855,000	42.19%	*2010 useage is 42.19% of the average useage for 2000-2007*
							This equals a savings of 57.81%
						1,171,375	*Gallons saved as compared to the historical average consumption*
						1,171	1,000's of gallons saved
						$17,453.49	**Total Dollars Saved in one year of conversion!**

Maintenance

Center for Irrigation Technology reported:

1. Subsurface drip irrigation required less maintenance than a conventional system
2. Subsurface drip irrigation received less complaints regarding water run-off
3. Subsurface drip irrigation required less water than a conventional irrigation system

Irrigation systems with in-line emitters require less maintenance than a conventional system

Winterization is the same as conventional systems, turn down the pressure

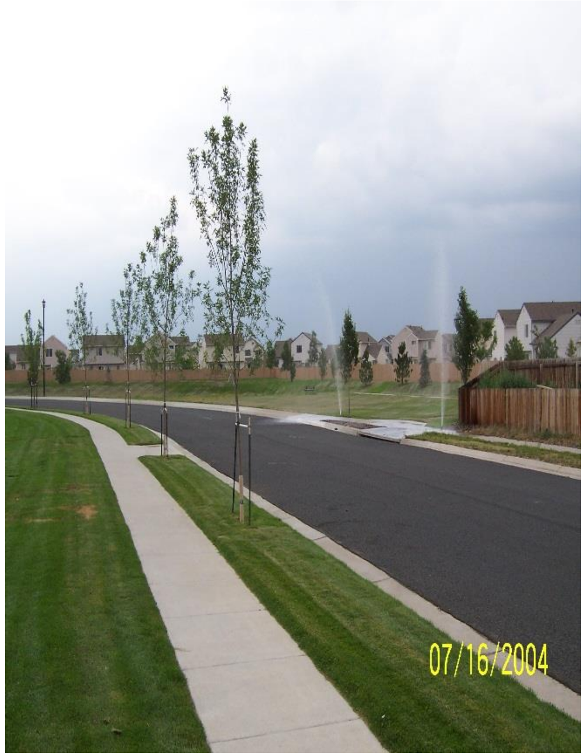
Filters usually require annual cleanings

MAINTENANCE

Pressure

Filtration - Flushing

Flow Testing



Troubleshooting

Less maintenance doesn't mean no maintenance

Contact Information

Thank You!

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