Guide to
Successful Drip Irrigation
For Landscape Professionals

The following information is offered by the Environmental Programs Division of the City of Santa Monica to promote the installation of effective, water-efficient and trouble-free drip irrigation systems in the City.

For more information visit www.smepd.org
or call (310) 458-8972
1. **Overview**

The following information is based on extensive experience in water-efficient landscape irrigation aimed at effective, trouble-free drip systems that function well in urban installations. Keep in mind that installation contractors want to install systems that will not result in call-backs and maintenance contractors want rugged systems that lend themselves to the practices their workers have already learned. Most property owners want the same thing. This information was prepared with those ideas in mind.

2. **Equipment**

Whenever possible, equipment available from local suppliers of professional irrigation equipment has been identified below. However, due to limited experience and training at the retail level, you are probably going to have to order some of this equipment. Allow time in your job schedule to do so. Drip irrigation supplies available at Home Depot and OSH are, for the most part, specifically made for the homeowner market to sell at the lowest possible price. They may function less reliably than professional equipment.

**POINT OF CONNECTION – See Detail 3c**

Backflow Prevention - Unless antisiphon valves are to be used, specify an appropriately-sized reduced-pressure (RP) or pressure vacuum-breaker (PVB) device. Keep in mind that flow rates in drip irrigation are much lower than in spray systems. You may be able to use a smaller backflow device.

**VALVE ASSEMBLIES – See Detail 3a & 3b**

Valve assemblies for low-volume irrigation zones consist of three items: a remote control valve, a pressure regulator and a filter. [If desired, a single master filter and/or master pressure regulator may be used for the entire system, located after the backflow device and/or master valve. In this case, if the system does not include a master valve, heavy-duty filters and pressure regulators that can tolerate constant pressurization must be used.]

**REMOTE CONTROL VALVE**

A key factor for reliable low-volume systems is to choose a valve with a minimum flow rate that is lower than the zone flow rate. For the very low flows encountered in residential applications in Santa Monica, only a few valves will meet the requirement described above.
REMOTE CONTROL VALVE (continued)

Recommended brands / models:
  In-line valves:
    Buckner VBDW Series
    Rain Bird DV, PEB or PESB Series
    Superior 470 DI
    Weathermatic 12000 Series
  Antisyphon valves:
    Rain Bird ASVF
    Superior 850 DI

PRESSURE REGULATOR
As with valves, pressure regulators must have a minimum flow rate that is lower than the zone flow rate. For drip systems you can use a preset or adjustable pressure regulator. For microspray systems use an adjustable pressure regulator.

Recommended brands / models:
  Preset:
    Hendrickson PR5500 Series
    Rain Bird PRF075BFF (Note: This device combines a 30 psi pressure regulator with a 3/4" wye filter. This is a good choice for retrofitting existing antisyphon valves.)
    Senninger LF Series
  Adjustable:
    Bermad PRV Series

FILTER
Use a 150 – 200 mesh, wye or tee filter with a stainless steel screen.

Recommended brands / models:
  Agricultural Products 1Y, 3/4Y or 3/4T;
  Rain Bird QKCHK or RBY Series
  Rain Bird PRF075BFF (Note: This device combines a 30 psi pressure regulator with a 3/4" wye filter. This is a good choice for retrofitting existing antisyphon valves.)
PIPING SYSTEM

PIPE
For lateral lines feeding Riser Units and for Header and Collector manifolds use rigid PVC pipe of the same type used for sprinkler systems. Pipe larger than ¾” is seldom required for residential drip systems. Use Low VOC cement for joining the pipe. Recommended pipe type: Class 315 or Schedule 40. Do not use Class 125 pipe.

RISER UNITS & HEADER / COLLECTOR MANIFOLDS – See Details 1a & 2a
These components are the transition points from below-grade piping to above-grade tubing.

DRIP TUBING & FITTINGS
For simple, trouble-free installations use only name-brand, 16mm (600 Series) or 18mm (700 Series) Polyethylene (PE) tubing for all landscape drip applications.

NOTE: Use of ¼” or 1/8” spaghetti tubing or any drip irrigation device which utilizes this tubing, such as multi-outlet emitters, is not recommended for professional landscape installations. Use ¼” tubing for container plantings only.

Recommended brand / model: Agrifim A620 or A700
Rain Bird XT700
Toro Blue Stripe

Use compression-type fittings that fit over the outside of the tubing. Use fittings matched to the size of your tubing or use Rain Bird Easy Fit fittings. For best results, do not use “twist-lock” type fittings or externally barbed, insert fittings.

WATERING DEVICES

DRIP EMITTERS (Drippers)
Drip emitters are the devices that regulate the water flow from the tubing at a specific rate, usually 0.5 or 1.0 gallons per hour (GPH). There are hundreds of types of drippers but only a few that work reliably, year-after-year in the landscape. The most commonly available, trouble-free drip emitters are based on a principle called turbulent flow.

If your plants are very widely spaced you can use plain PE tubing and insert drippers at each plant. However, for most landscape applications it is easier to use emitter line, (also referred to as dripperline or dripline). Emitter line consists of 16mm or 18mm PE tubing as described above with drip emitters pre-formed into the tubing at a pre-determined spacing. Most types of emitter line utilize turbulent flow emitters. For most landscape drip systems emitter line with 0.5 gallon (2 liter) drippers at 12” spacing works best.
DRIP EMITTERS (continued)
Recommended brand / model:

Individual drip emitters:
- Agrifim Iso-Flo, Aqua-Flo or PC Plus
- Rain Bird Xeri-Bug

Emitter Line:
- Agrifim Dura-Flo
- Rain Bird Landscape Dripline
- Toro DL2000

As indicated in the note above, ¼" emitter line is not recommended for professional landscape use.

CONTROLLER
Choose a controller with three or more programs that permits long (multi-hour) run times. Weather-based irrigation controllers (WBIC) are recommended. Call 310/458-8405 for information about possible rebates on WBICs for qualifying installations in Santa Monica.

ACCESSORIES

MULCH
Use shredded bark mulch. Do not use pebble-shaped mulch.
Recommended brand / model: Kellogg’s Xerimulch or, for large installations, B.D. White Fir Walk-On Bark. Xerimulch is available through landscape supply dealers. B.D. White Company is located in Torrance CA; 310/ 370-5511

WIRE STAKES
Use U-shaped (not shepherd’s crook), galvanized steel wire stakes.
Recommended type: 6 x 1 x 6, 9-gauge, galvanized steel soil staples; available from Aqua-Flo Supply; 310/915-5208.

SPECIAL EQUIPMENT FOR CONVERSION OF SPRAYHEADS TO DRIP – See Detail 4a
Rain Bird makes specialized devices designed specifically for the conversion of both Rain Bird 1800 and Toro 570 sprayheads to drip irrigation.

RETRO 1800
This device looks like a Rain Bird sprayhead, but it is actually an adapter that contains a pressure regulator and filter. When installed in place of an existing sprayhead, it becomes a connection point for drip tubing. When replacing Rain Bird brand sprayheads, only the interior parts need to be replaced. Note: The zone valve, originally designed to work with sprinklers, may have to be converted to a low-flow valve. See VALVE ASSEMBLIES above.

XC-1800 / XC-T-570
These are caps used to close off the unused sprayheads in the converted zone. Use XC-1800 for Rain Bird 1800’s and XC-T-570 for Toro 570’s.
3. Recommended Installation Procedures

PIPING
Install pipe system according to detail drawings using Layout #1 for randomly-placed plants or Layout #2 for linear, on-center plantings.

DRIP TUBING
Do not bury the tubing. Install the emitter line on grade according to detail drawings for the layout you have chosen. Because plant size and exact location within the zone may be changed during installation, the final location of the emitter line in relationship to each plant must be determined by the installer. Place tubing in such a manner as to evenly wet at least 60% of the root ball of each plant. For small plants one emitter may be sufficient. For larger plants, multiple rows of tubing will be required. Use galvanized hairpin type stakes to hold the tubing securely in place.

FLUSHING
Flush all mains, laterals, manifolds and Tattletail / Flush Assemblies before connecting the tubing to the Riser Units or Header Manifolds. After installation of drip tubing, flush all sections again through Tattletail / Flush Assemblies or Collector Manifolds before closing off the tubing.

MULCH
Operate the system for a few weeks uncovered to allow for adjustment. When adjustment is complete, install 2”-3” of mulch.

Questions?
Call Bob Galbreath at the City of Santa Monica Environmental Programs Division at 310 / 458-8405
Emitter-line with built-in, turbulent-flow emitters. Layout as required; see Detail 1b

Fasten tubing in place with galvanized wire staples

Tubing End Closure

FLOW

Emitter-line mounted on surface below mulch

Mulch

Subsurface Lateral

Riser Unit Assembly

Subsurface Lateral

Riser Unit Assembly

ELEV VIEW

PLAN VIEW

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1. Recommended Drip Irrigation Layout #1

Riser Units used with emitter-line for non-linear, random plantings

REV 10/26/05

Not to Scale
Swivel Elbow or Swivel Tee, as required

Finished Grade

Emitter Line

2" - 3" Bark Mulch

Sch 80 Nipple

PVC Lateral

PVC Elbow or Tee, as required

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1A. Recommended configuration for drip irrigation riser units

REV 09/06/05

Not to Scale
Galvanized Wire Hairpin Stakes as required to keep emitters in proper relationship to plants.

Emitter-line with built-in drippers spaced at equal interval. \([1/2 \text{ GPH} @ 12 \text{ inches recommended}].\)

Arrange tubing around plants as required in order to wet at least 60% of the root ball of each plant. Avoid crimping the tubing.

Diameter of wetted area in root zone varies with depth and soil type. Approximately 24 to 30 inch diameter for \(1/2 \text{ GPH}\) dripper at 12 inch depth in loam soil. Wetted area is broader and shallower in clay soil, narrower and deeper in sandy soil.

Close tubing with "Figure 8" closure.

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1b. Recommended Drip Tubing Installation Technique for Randomly-Spaced Shrubs and Small Trees Using Tubing with Built-In Emitters

Rev 09/06/05
Emitters can be offset in adjacent lines. Emitter lines should be built-in turbulent-flow emitters. PVC header and collector manifolds can be used. Fasten tubing in place with galvanized wire staples. Subsurface PVC laterals are used. Emitter lines are mounted on the surface below the mulch. Below-grade header and collector manifolds can be seen in detail 2a. Soil is used to cover the below-grade manifold. Not to scale.
Header Manifold Connection Assembly

Collector Manifold Connection Assembly with Optional Tattletale / Flush Assembly

PVC Threaded Cap
Finished grade
Agrifim CA Series Adapter

1/2" x 1/2" x 1/2" 5/5/5 Tee
1/2" x 1/2" x 1/2" T/T/5 Tee
1/2" Sch 80 Nipple (Length as required)

16mm or 18mm emitter line with built-in drippers spaced at equal intervals. [1/2 GPH @ 12 inches recommended.]

Rainbird 1806 or 1812 w/ PA80 Adapter & 1/2" PVC threaded cap
Hunter Swing Joint

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2a. Header & Collector Manifold for Drip Layout #2
with optional Tattletale / Flush Assembly

REV 08/06/05
NOTICE: All above-grade pipe and fittings must be of metal or Schedule 80, ultraviolet-resistant PVC.
Sufficient clearance must be allowed within box to remove filter screen.

Y-type or T-type Filter (if required)

Remote Control Valve rated for low flow

Finished Grade

Pressure Regulator

Valve Box

Union

Gravel Fill to 4" Depth

FLOW

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3b. Recommended Configuration for Below-Grade Valve Assemblies for Commercial Drip Systems

REV 09/06/05

Not to Scale
NOTE: All above-grade pipe and fittings must be of Type K copper or Sch 40 steel.
1. Existing Rain Bird Sprinkler.

2. Remove cap, nozzle, stem & spring from sprinkler body.

3. Install cap and filter assembly portion of 1800 RETRO device. Note: For brands other than Rain Bird, the entire sprinkler body must be replaced.