Sustainable Landscape Design

Do-It-Yourself Micro-Irrigation System

NM STATE

BE BOLD. Shape the Future.
College of Agricultural, Consumer and Environmental Sciences

Extension Master Gardener

LOS ALAMOS
Department of Public Utilities
Conservation

Professional landscape designer for 35 years
25 years Organic flower & market gardener
Native Pollinator Landscape Design
Native plant specialist
N. CA, W. WA & N. NM Naturalist

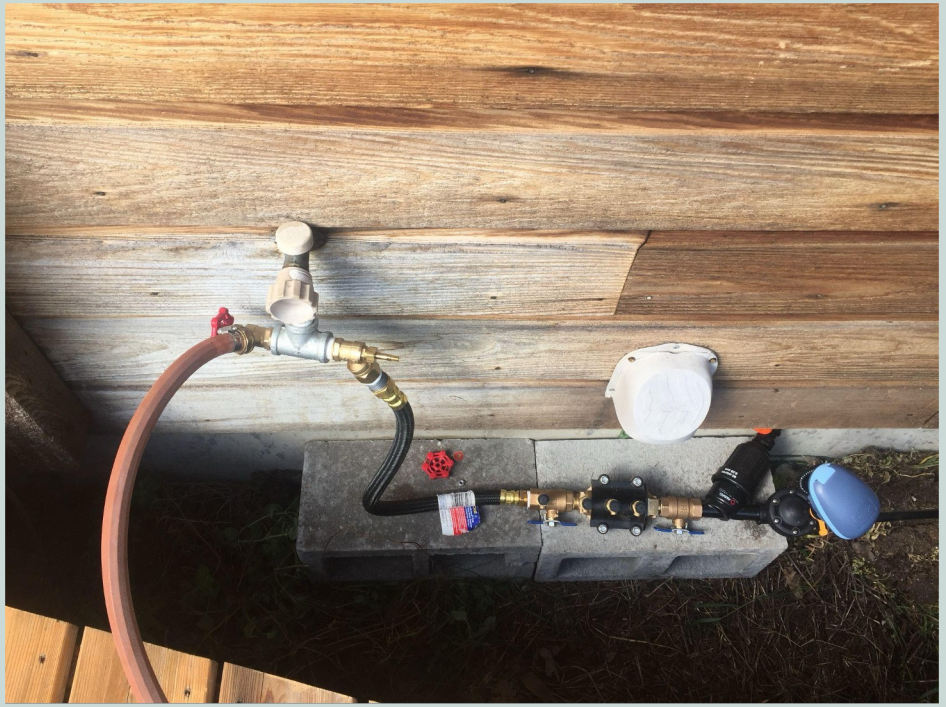
Dana Ecelberger

Session Focus

- Why Irrigate?
- What is Micro-Irrigation?
- Pros & Cons
- Assessing watering needs
- Designing system
- Ordering parts
- Installing system
- Troubleshooting
- Winterizing

We live in a desert, right?

- Yes, we must be mindful & economical with water
- No living plant can survive without water: drought tolerant does not mean it does not need water
- Many native plants can survive with a minimum of water **but** not all of them and ALL plants need an appropriate amount of water
- Know your soil. Know your plant
- Not all irrigation systems are created equal; the right irrigation system can make the difference between a garden that thrives and a garden that dies.



Pros & Cons of micro-irrigation

Pros

- Easy & cost-effective to install
- Perfect for home gardens & vegetable/container gardens
- Water efficient
- Adaptable
- Possible to incorporate into more complex systems
- Easy to find & fix leaks and issues
- Fairly simple system

&

Cons

- Isn't ideal for large expanses of lawn
- Limited # of channels or zones on one hose bib
- Is attached to hose bib so:
  - you might hear it come on and turn off
  - there is a small risk of leaking at the hose bib &/or backflow into house water system
- Isn't super fancy or computerized

One problem with traditional sprinkler systems is that they are complicated & require special training to install and maintain. They tend to waste water as you can see in this video. When they break or spring a leak, it can be very hard to find the problem and even harder to fix.

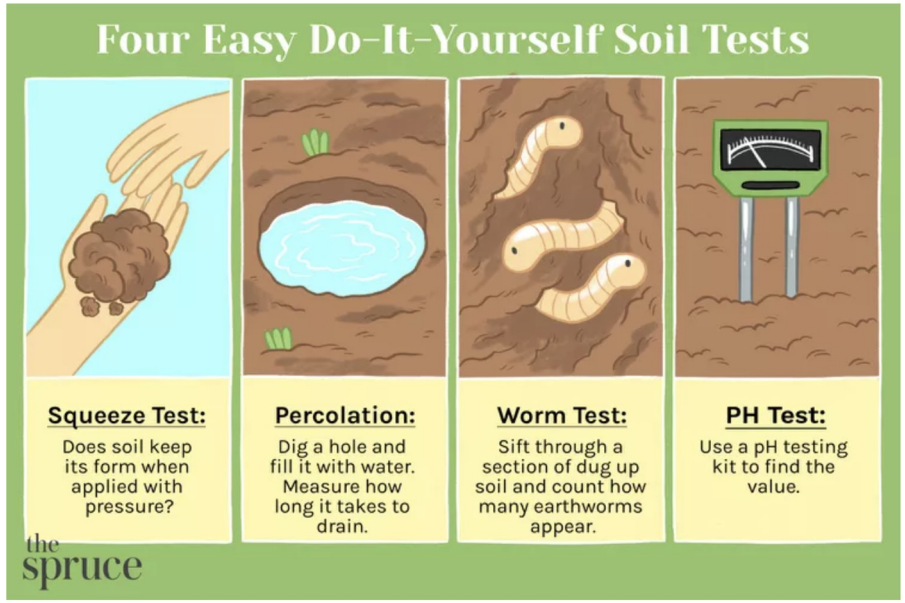
Micro-irrigation requires minimal training to install and maintain. It is very water efficient, dripping .5-1.0 GPH right where you need/want it, without spraying a lot of water into the air. You can spot/hear leaks and fix them easily. This is the irrigation direction favored by sustainable landscaping.

Assessing your watering needs

- Type of soil
- Types of plants (do they want or need water?)
- Slope of property or lots of planters & pots
- Age of plantings (younger plantings & seeds need more water than established plants)
- Exposure to sun & wind (plants dry out faster with both)
- Water pressure (low water pressure takes longer to get through the system)
- GPH output of system (higher output means less time needed)
- Time of year (plants need water ALL YEAR but less in the winter)

Soil Type & Water Pressure

Test your soil type



The Spruce / Kelly Miller

Test your water pressure

- Use a hose end water pressure gauge
- Use the bucket method: https://www.holmanindustries.com.au/flow-rate-bucket-test-calculator/
- The ideal PSI is between 30 & 50

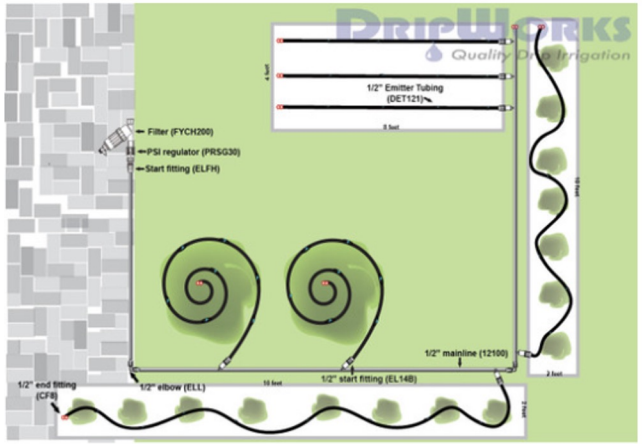
Designing your System

- Where are your hose bibs? Do you have enough?
- Where are impermeable surfaces like driveways?
- Which plants need more or less water? Cluster plants to simplify design.
- One or several zones? Ex. Short spurts daily vs. Longer watering 1-2 times weekly.
- Front &/or Back areas
- All in-line emitter or will you need some sprayers? Ex. wildflower or meadow areas
- Do you have potted plants/containers needing water?
- How will you handle trees & established shrubs?

Let's Discuss Options for this landscape

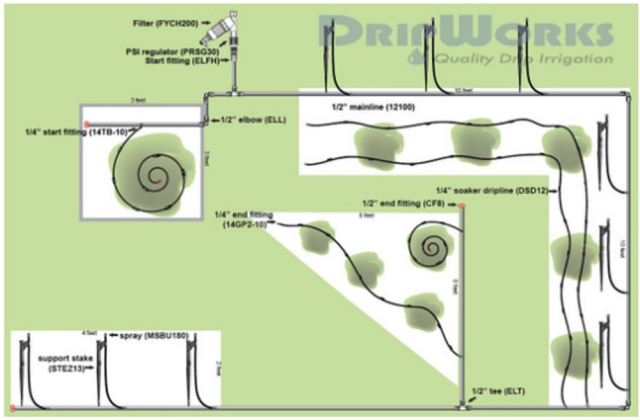
- 2 Hose Bibs: 1 in front & 1 in back: 1-2 zones on each
  - 2 timers, 2 Brass Y splitters, 2 backflow preventers, 2 filters & possibly 2 pressure regulators + 2 ½" female hose starts
- ½" emitter tubing at every 12 inches or trunk line with ¼" watering rings for shrubs and trees
- ¼" tubing every 6 inches for thirsty plants and vegetable boxes.
- ½" compression fittings: Straight couplers, T's, elbows, male hose end cap & possibly a coupler with valve (if I need to regulate flow to a specific area).
- For Meadow: 1-2 360-degree sprinkler on risers punched into ½" mainline.
- Connect beds with ½" plain tubing laid in a trench between beds. Protect the tubing in a ¾" HDPE pipe so it doesn't get broken or spring a leak.
- Cap each ½" line end with a male compression hose end cap to flush line at the end of the season.
- Cap each ¼" line end with flat goof plugs to seal the line.
- For watering rings & vegetable boxes, use ¼" plain line, ¼" emitter line, ¼" T's, transfer barbs, & micro flow valves + tubing clamps
- Earth Staples

These are some of the designs you can find on Dripworks. By adding the one most closely resembling your garden, you will automatically add the parts you need for the design. https://www.dripworks.com/gallery-of-plans



Landscape Plan 6

$0.00



Landscape Plan 5

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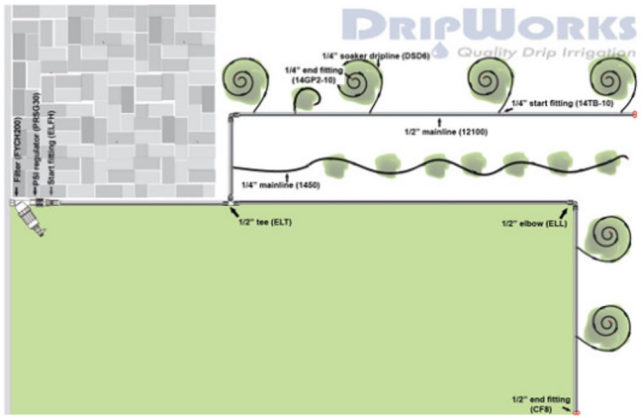

Landscape Plan 4

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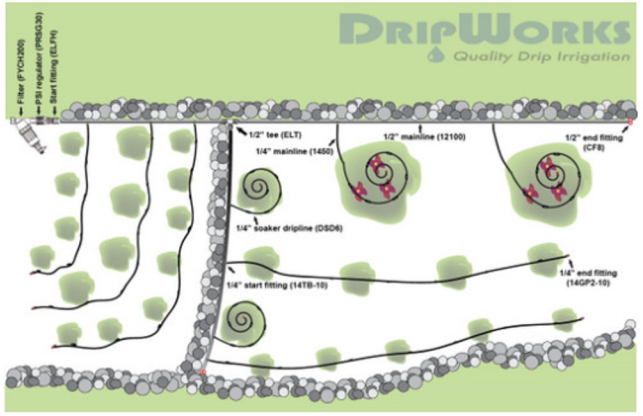
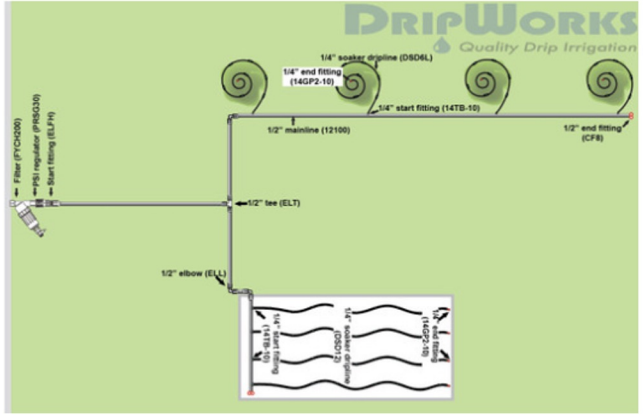
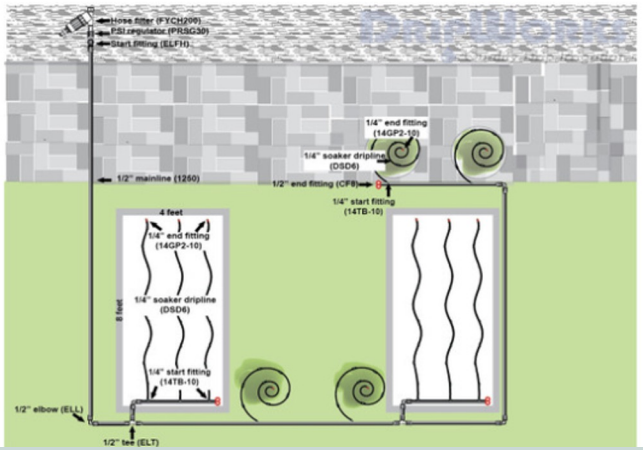






Ordering the Parts

- Plain ½” pipe as the trunk line. This will most likely go either at the back of each bed OR will just be the connecting pipe from hose bib to ½” emitter pipe and between beds. Measure accordingly & order more than you think you need. It’s cheap!
- Emitter ½” pipe. If you are using this as the main source of water in the beds, and you are curving it around big plants, measure the length of bed and multiply by 3. If plants are close together, get the 6” emitters. If far apart, get the 9 or 12” emitters. Order extra!
- Plain & Emitter ¼” line. If you are creating watering rings around trees, running water to pots or raised beds, you will want this. I usually get the 6” emitters & 50’ of plain line.

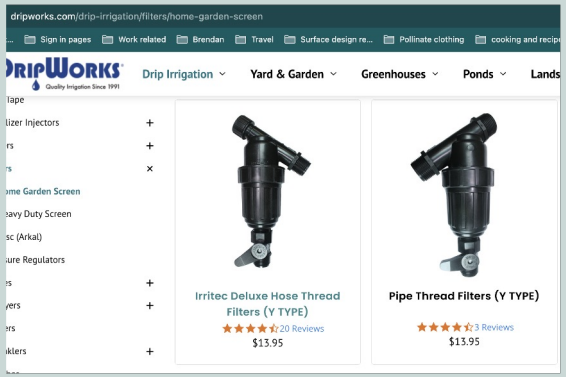
- Brass Y valve for each hose bib
- Backflow preventer
- Timers
- Filter
- Pressure regulator
- Compression fittings: T’s, Elbows, straight, female and male ends.
- ¼” fittings: T’s, elbows, transfer barbs, goof plugs, micro flow valves, sprinkler or shrubbler heads
- Punches
- Earth staples

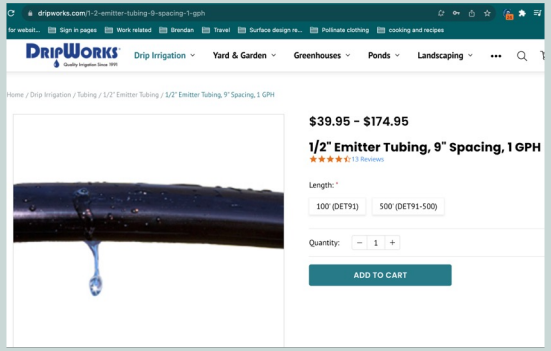
Installing the System

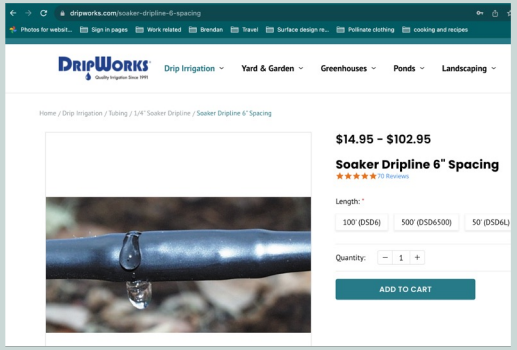
Let the Games Begin!

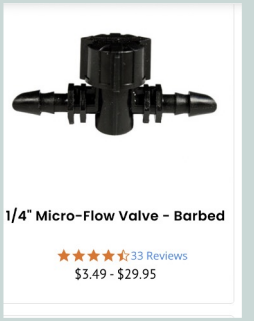
- ❑ Design
- ❑ Tools & Parts
- ❑ A thermos of warm water or hand warmers for warming the pipe
- ❑ Start at the hose bib and work your way around
- ❑ Check your design
- ❑ Think it through
- ❑ Make sure all open ends are closed off
- ❑ Test to be sure everything is getting water and look for leaks
- ❑ Run it for a week and check the soil moisture level. Adjust accordingly. A soil moisture meter can help: https://www.dripdepot.com/item/soil-moisture-meter?gad=1&gclid=Cj0KCQjw1OmoBhDXARIsAAAYGSE4uXMEIMy7FdS1ykeIV0KcI_h-2z9xRvP1XeKzXgcDt6Q_g2aIEsAaAsMOEALw_wcB

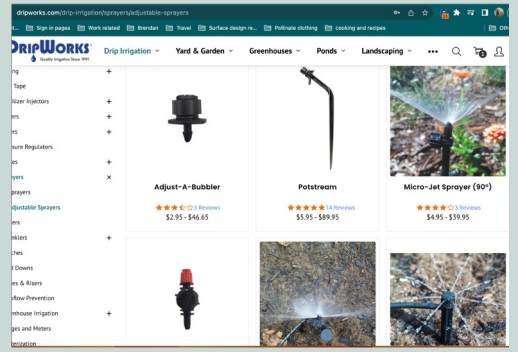
Demonstration

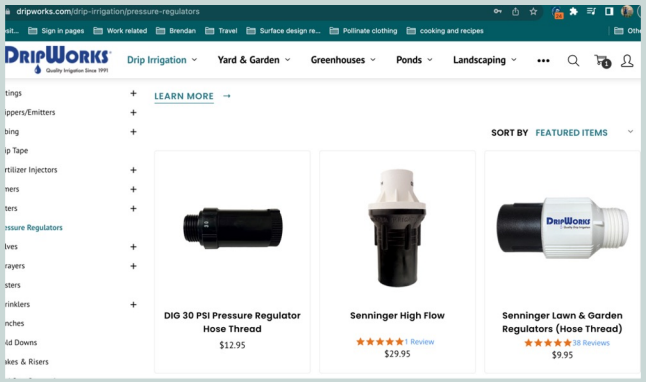


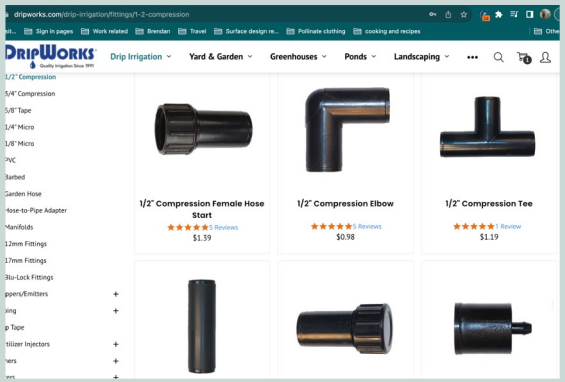


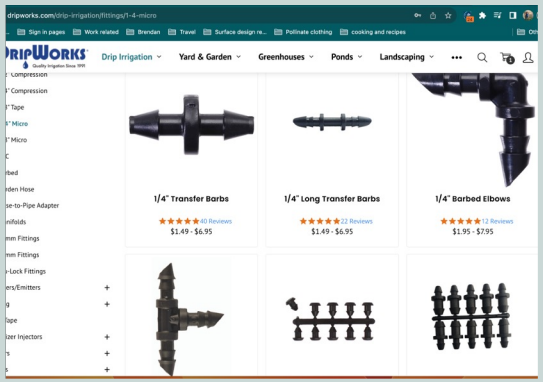


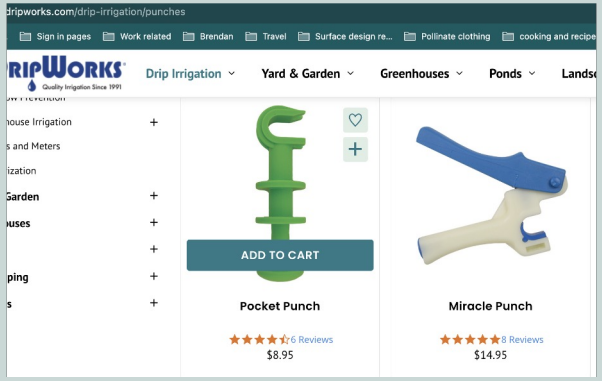












Troubleshooting the System

- Water isn't coming out of lines
  - Is water on at hose bib?
  - Is the filter on in the right direction?
  - Is timer on?
  - Is there a kink in the line?
  - Is the line actually connected to the source line?
- The end of the line isn't getting enough water
  - Make sure you have at least 40 PSI
  - Increase time
  - Maybe you are trying to water too large an area. Try splitting it into 2 or more zones and water at different times.
  - Slope can slow water delivery. May need to have it on a separate zone.
- Help! I've sprung a leak!
  - Find the leak and cut out that section of the pipe. Try not to cut too much or it will be too short. Repair with a straight compression fitting. At the faucet could be the washer. Try replacing that first.

Winterizing the System

- It's Winter. What do I do?
  - Flush lines by removing male end caps and running the timer for a few minutes. Replace caps to seal line.
  - Turn water off at hose bib
  - Disconnect timer from bib and main line. Remove batteries. Store in a dry place.
  - Protect hose bibs with covers.
  - Protect any tender plants with covers or mulch at crown.
- Plants still need water in the winter, especially when we don't get any snow. Dormant plants don't usually need water but plan to hand water shrubs and trees once a week through dry times in the winter.
- In the Spring, put new batteries in the timer, flush system. Reset timers. Test for leaks.

Resource List for planning

(This is my personal list of resources; not endorsed by NMSU or LAPUC)

- Dripworks Videos: https://www.youtube.com/watch?v=c96poQ8FHdE
- Sample Plans: https://www.dripworks.com/gallery-of-plans/landscapes
- Sunlight Calculator: https://getbusygardening.com/how-to-determine-sun-exposure/
- Soil Testing:
  - Chemistry: https://www.almanac.com/content/3-simple-diy-soil-tests
  - Structure: https://growitbuildit.com/mason-jar-soil-test-clay-sand-silt/
- Water Pressure Testing:
  - Bucket & Timer testing method: https://www.dripworks.com/blog/how-to-check-water-pressure-without-a-gauge?gclid=CjwKCAjwyNSoBhA9EiwA5aYlb3HhF_7reSZJR9oJz5TwCVW2O9A6WXuDqfHqoUbiZHxrZH0fwZqnHRoCf7MQAvD_BwE

More information

- NMSU Extension Office: https://extension.nmsu.edu/
- EPA Irrigation Checklist: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.gov/sites/default/files/2020-04/documents/ws-outdoor-landscaping-find-it-flag-it-audit-checklist.pdf
- EPA Micro-Irrigation Guide: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.gov/sites/default/files/2018-05/documents/ws-outdoors-microirrigation-prosguide.pdf
- EPA Saving Water with Micro-Irrigation: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.gov/sites/default/files/2018-05/documents/ws-outdoors-microirrigation-homeownerguide.pdf
- EPA Watering Tips: https://www.epa.gov/watersense/watering-tips#Timing
- Drip Irrigation Tutorials for a slightly different system: https://www.youtube.com/watch?v=also-fV22U8
- Weather & Soil Based Irrigation Controllers:
    - https://www.epa.gov/watersense/weather-based-irrigation-controllers
    - https://www.epa.gov/watersense/soil-moisture-based-irrigation-controllers

Questions?

Name: Dana Ecelberger

Email: danaae3@gmail.com

Direct Links to parts: Page 1

- Dripworks Kits. The easiest option, if you find one that fits your garden: https://www.dripworks.com/drip-irrigation/irrigation-kits
- Dripworks Design Gallery. If you choose one of these, it will add the necessary parts to your shopping cart: https://www.dripworks.com/gallery-of-plans
- Otherwise, here are parts individually:
- ½" Mainline Tubing: https://www.dripworks.com/1-2-polyethylene-mainline-tubing-0-600-id-x-0-700-od
- ½" Emitter Tubing: https://www.dripworks.com/drip-irrigation/tubing/1-2-emitter-tubing
- ¼" Plain & Emitter Tubing (Soaker Dripline): https://www.dripworks.com/drip-irrigation/tubing/1-4-soaker-dripline
- ½" compression fittings: https://www.dripworks.com/drip-irrigation/fittings/1-2-compression
- ¼" fittings: https://www.dripworks.com/drip-irrigation/fittings/1-4-micro
- U shaped hold downs: https://www.dripworks.com/u-shaped-wire-hold-downs & https://www.amazon.com/Pinnacle-Mercantile-Landscape-Staples-Galvanized/dp/B09VYH9QTZ/ref=sr_1_3_sspa?crid=25AIKWAMR0FO3&keywords=earth+staples+6+inch&qid=1696013826&sprefix=earth+staples%2Caps%2C141&sr=8-3-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1
- Nail in Clamps for ½" & 1'4" tubing: https://www.dripworks.com/tubing-clamps
- Sprayer emitters: https://www.dripworks.com/drip-irrigation/sprayers

Direct Links to parts: Page 2

- Timers (this is up to you, but these are my two favorites): High End Galcon. Use the hose thread version): https://www.dripworks.com/galcon-7101d-waterproof-high-flow-lcd-timer & more basic: https://www.amazon.com/Orbit-62061Z-Single-Programmable-1-Valve/dp/B004INGS8S/ref=sr_1_3_sspa?crid=39HDE23AMXXB1&keywords=water+timers+for+garden+and+yard&qid=1696013790&sprefix=water+timers%2Caps%2C131&sr=8-3-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1
- Hose Thread Filter: https://www.dripworks.com/irritec-deluxe-hose-thread-filters-y-type
- Pressure Regulator: https://www.dripworks.com/drip-irrigation/pressure-regulators
- Punch: https://www.dripworks.com/drip-irrigation/punches
- Backflow Preventers: Basic: https://www.dripworks.com/vacuum-breakers & Professional: https://www.dripworks.com/brass-double-check-valves
- Brass Y valve: https://www.amazon.com/Triumpeek-Brass-Garden-Splitter-Connector/dp/B08HCQL6TJ/ref=sr_1_2_sspa?crid=3KDTW4JPRVXPY&keywords=brass+y+valve+hose+splitter&qid=1695937263&sprefix=brass+y+valve%2Caps%2C131&sr=8-2-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1
- Water Pressure Testing Gauge: https://www.dripworks.com/1-4-pressure-gauges-liquid-filled
- Box for organizing small parts: https://www.amazon.com/Flambeau-Tuff-Tainer-Model-4007/dp/B000LF3E8O/ref=sr_1_6?crid=2JBNO3AZWYDP1&keywords=fishing+gear+boxes&qid=1696014879&sprefix=fishing+gear+boxes%2Caps%2C144&sr=8-6

Sustainable Landscape Design

Irrigation Systems

LOS ALAMOS
Parks & Open Space Division

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Why do you want/need an irrigation system?

Identify the need for an irrigation system

- Is an irrigation system the best use for the area?
- Would a Xeriscape Garden be more efficient?

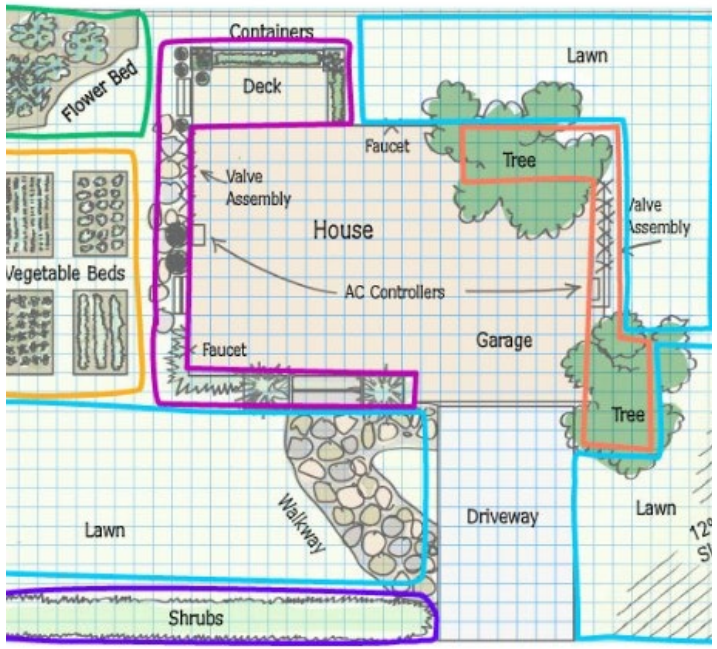
Is a contractor required or is this a homeowner project?

- Home irrigation system (landscaping) does not require a permit from Los Alamos County. Homeowners should contact NM One for utilities lines to be located at 1-800-321-2537.

Key Irrigation Components

- Irrigation Project Plan / Mapping
- Determine your soil type
- Controller
- Backflow Preventer
- Valve / Valve Boxes
- Master Valve
- Zone Valves
- Irrigation Heads
- Maintenance

Planning for an irrigation system!



- **Measure & Draw your property**
- The first step in planning your irrigation system is to measure your property.
- All measurements, including trees, shrubs, driveway, walkways, tool shed, patio, and all other obstacles.
- Make a scale drawing on graph paper so you have a top-down view of your entire property.
- Label different areas of the yard, including the lawn, flower beds, container plants, trees, shrubs, and vegetable garden or rose garden if you have one. Each area will represent a different watering zone, with one sprinkler head per watering zone required.

Determine the Soil Type

There is a simple way to determine what type of soil – sand, loam or clay – you have in your yard. All it takes is a clean, empty jar with a lid, some clean water, a tablespoon of detergent and a sample of the soil you want to test.

1. Fill the jar about 1/3 full with the soil to be tested.
2. Fill the jar with water and detergent then cap it.
3. Shake the jar vigorously and set aside for several hours or overnight.

Evaluate The Results:

Sand: If the water is clear and the soil has settled to the bottom; you have predominantly sand soil.

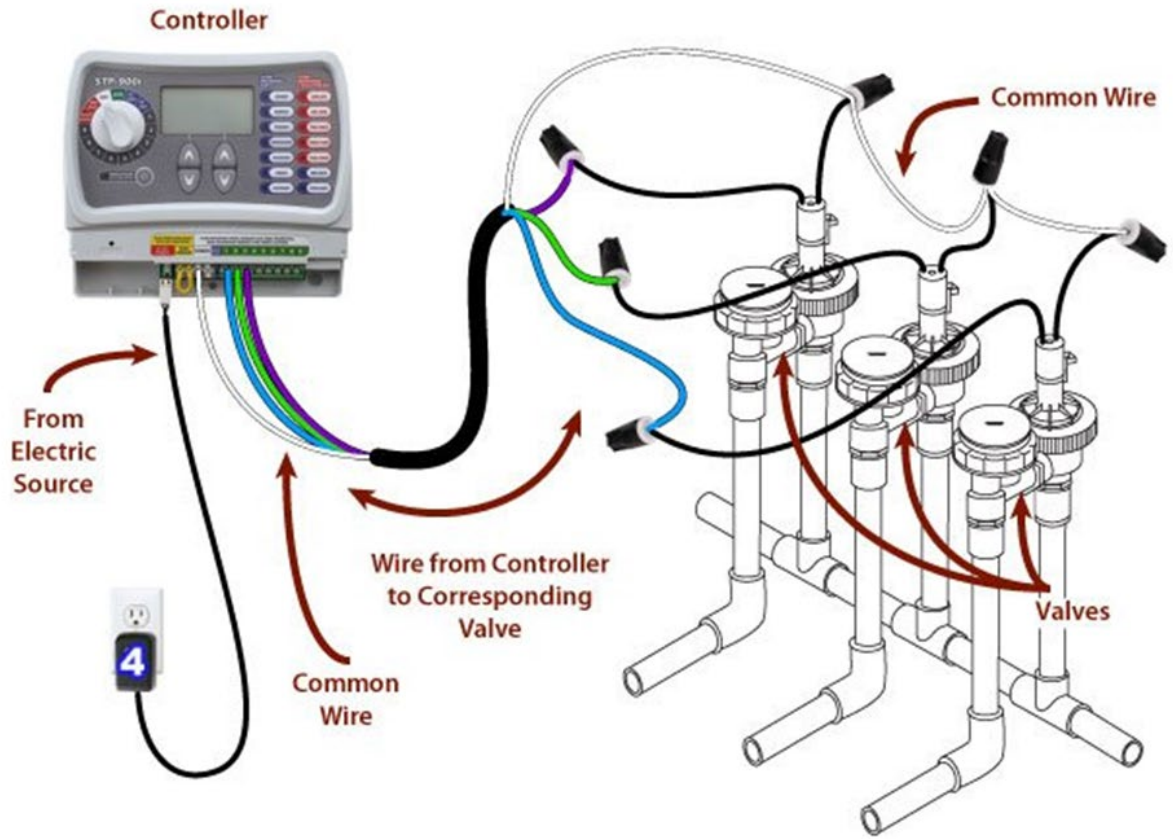
Loam: If the water is still a little murky with bits of matter suspended in it; you have loam soil.

Clay: If the water is still murky and there is a visible ring of sediment around the jar; then your soil is mostly clay.

Irrigation Controller

Need 120 volts to connect into irrigation time and transfer to 24 volts to feed each zone one common that's tied into each zone.

The second wire will supply power for each zone.



Irrigation Coverage

Head-to-head coverage is a term you will often hear when having a conversation about sprinklers.

This coverage means every spot in the irrigated / watered area needs to be covered by at least 2 sprinkler heads, and each head should throw water far enough that it reaches or slightly overlaps the adjacent heads.

Irrigation Backflow Preventer

Backflow Preventer

In most water systems, water flows in only one direction. Sometimes, water can switch directions, creating backflow. There are many reasons why it's essential to avoid this, including contaminated water flowing back into the City water supply. Having a backflow preventer is crucial to your irrigation system. A testable Backflow device is now a mandatory requirement

Irrigation Valves Box

Valves and Valve Box

The sprinkler valve box will be where your wire splices, manifold and valves are located. The valve box can either be installed flush in the grass or under the mulch in a garden. This is an integral part of the system, if you bury it under mulch, it is imperative to know where it's located, we always suggest a good record drawing needs to be created after your system is installed.

Irrigation Master Valves

Master Valve

The master valve is a vital valve during damage or water loss. It's an electric valve that is located at the main water supply. It reduces water loss if there is a leaky valves or a leak in your pressure line. The master valve can help prevent turning off the main water supply if there is a repair needed.

Irrigation Zone Valves

Zone Valves

The zone valves turn on each section of your irrigation system known as zones. Typically, only one zone can run at a time, your controller will turn on each zone valve on for a set period of time until that area has adequate water. The zone valves are fed by the pressure line and hold back the water from the pressure line until the controller activates the valve. When this valve is activated, it allows water into the zone line and the sprinklers or drip will run.

Irrigation Head Types

Fixed Spray Head

These sprinklers are used typically for gardens or small lawn areas. They can spray from 5-18ft and come in different heights. 2",4", 6" and 12". These heads spray a set arc pattern.

Rotor Head

Used for large lawn areas, these sprinklers have a single spray that can reach 30-50ft. These heads rotate to cover their arc pattern.

Irrigation Illustrations

Fixed Irrigation Head

Rotor Irrigation Head

Irrigation Valve Box

Irrigation Illustrations

System Overview

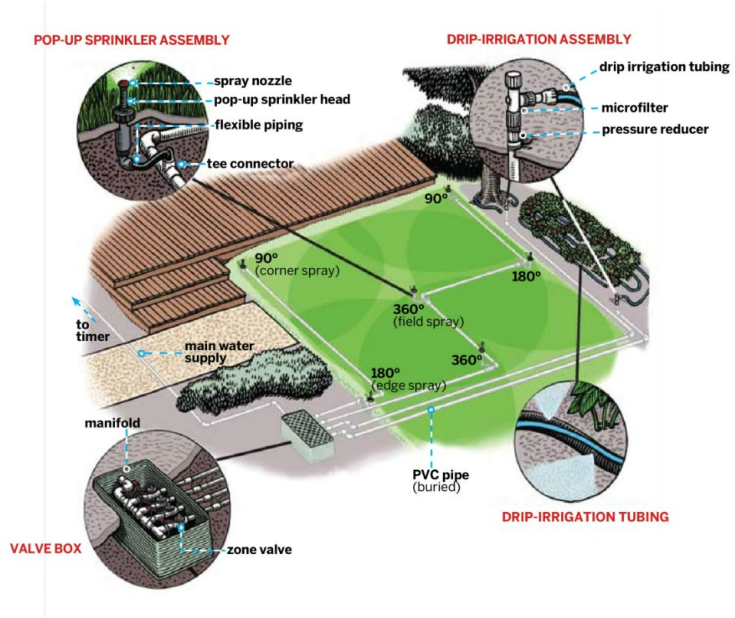


Illustration by Gregory Nemec

Digging the trenches

Photo by Brian Smith

Water Line Connection

Photo by Brian Smith

Maintenance

Irrigation systems require maintenance during the lifespan of the system. Preventative maintenance will help avoid disaster and expensive repairs. By doing this, you are keeping up on little things here and there, which allows it to run it's best. Cleaning your sprinkler heads regularly will help them work properly. Dirt and grass will get stuck in them as they protrude and retract into the ground, cleaning each month. If they get stuck in their upright position, it can be troublesome. They can become damaged by people walking on the lawn, extra dirt and debris getting stuck, or even destroyed by the lawnmower if you don't notice them.

During the winter months, the system will need to winterize. This can be a challenging job, but it's best to do it before freezing temperatures to prevent a pipe or your backflow from freezing and busting, which will be an expensive fix in the spring. Water that is sitting in the pipes should be blown out before freezing temperatures hit. If you're not able to do this on your own, consult a professional.

Resources

NM State University / Ready, Set, GROW! Webinar Series

https://desertblooms.nmsu.edu/grow.html

Los Alamos County Outdoor Watering Tips

https://www.losalamosnm.us/government/departments/utilities/conserve reduce

Water Rule W-8

In effect May 1 through September 30, the following outdoor watering schedule is implemented:

1. Water outdoor landscaping **before 10am or after 5pm**
2. Odd addresses irrigate on **Sunday, Wednesday, Friday**
3. Even addresses irrigate on **Tuesday, Thursday, and Saturday**

TIME	SUN	MON	TUES	WED	THUR	FRI	SAT
Before 10am							
10am-5pm							
After 5pm							

Thank you

Emmanuel Abeyta / (505) 662-1821

emmanuel.abeyta@lacnm.us

Wendy Parker / (505) 663-1771

wendy.parker@lacnm.us

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