

Southern Area



INTRODUCTION TO IRRIGATION

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BASED ON PRESENTATION BY Mel Hengan, Master Gardener

BuzzFeed

presents

When It Rains In LA

TRUE AND FALSE QUESTIONS

- 1. The first forms of irrigation were rain and flooding.
- 2. PVC pipe is available in two forms for irrigation Schedule 40 and Class 200 always use the larger number as it is the strongest type.
- 3. Drip or low volume irrigation is the only form of irrigation that should be used in the desert as it saves the most water and grows the best plants.
- 4. When Irrigating landscapes the length of time you water is all that you really need to take into consideration.
- 5. All irrigation pipe and tubing should be buried at least one foot deep or deeper this helps protect it from damage.
- 6. Drip irrigation was developed in the desert southwest

A person wearing a traditional conical hat and a light-colored, long-sleeved shirt is walking through a field. They are carrying two large, round, brown pots on a wooden yoke across their shoulders. They are pouring water from the pots onto the ground, creating a misty spray. The background is a lush green field with trees.

**IF WE HAD TO IRRIGATE
THIS WAY WE WOULD
USE LESS WATER**

PHOTO FROM BBB SEED HEIRLOOM VEGETABLE AND WILDFLOWER SEEDS AMATES DA NATUREZA



NEVADA RAIN GAUGE

RAIN WAS THE FIRST IRRIGATION



IN THE BEGINNING THERE WAS RAIN AND NATURAL FLOODING

- THE NILE RIVER IS ONE OF THE BEST EXAMPLES OF AGRICULTURE AND RIVER FLOODING



**NEXT THERE WAS
CANNEL/ DITCHED
FLOOD
IRRIGATION**



CANNEL/FLOOD IRRIGATION IN TEXAS

ACEQUIA OR IRRIGATION DITCH,
PART OF THE ORIGINAL ACEQUIA
BUILT TO SUPPLY FARMS AND THE
MISSION SAN ANTONIO DEL VALERO.



FLOOD IRRIGATION FOR AGRICULTURE



FLOOD IRRIGATION IN A CITRUS GROVE



FLOOD IRRIGATION WITH NEWLY PLANTED PALMS



IRRIGATOR A TEMPORARY IRRIGATION SYSTEM



IRRIGATOR A TEMPORARY IRRIGATION SYSTEM



PALM IRRIGATION A TEMPORARY IRRIGATION SYSTEM



PALM IRRIGATION A TEMPORARY IRRIGATION SYSTEM



PIVOT IRRIGATION FOR AGRICULTURE



PIVOT IRRIGATION FOR AGRICULTURE



WHERE THE HELL AM I
IT'S HOTTER THAN LAS VEGAS



IRRIGATION AND SOIL

- **AS LITTLE AS 2% ORGANIC MATTER IN THE SOIL CAN REDUCE IRRIGATION NEEDS BY 75% OVER POOR SOILS WITH LESS THAN 1% ORGANIC MATTER**
- **SHADING WITH MULCH AND PLANT LEAVES CAN REDUCE IT BY 60%**

(RAINWATER HARVESTING FOR DRYLANDS AND BEYOND VOLUME 23 PAGE 20)

CUTTING COST\$

IT IS NOT WISE TO TRY AND
SAVE A FEW DOLLARS ON
IRRIGATION SYSTEM DESIGN,
INSTALLATION OR
MAINTENANCE. YOU MAY END
UP WITH

AN IRRITATION SYSTEM!

IRRIGATION OBJECTIVE

- **THE PURPOSE OF AN IRRIGATION SYSTEM IS TO SUPPLEMENT NATURAL PRECIPITATION BY DELIVERING THE RIGHT AMOUNT OF WATER, AT THE RIGHT TIME, WITH LITTLE WASTE, SO PLANTS MAINTAIN GOOD HEALTH AND APPEARANCE.**



**DESIGN AND MAINTAIN TO
SAVE WATER**



**DESIGN
AND
MAINTAIN
TO SAVE
WATER**



DESIGN AND MAINTAIN TO SAVE WATER





DESIGNING YOUR IRRIGATION SYSTEM

- **THE MOST WATER-EFFICIENT LANDSCAPES FOLLOW THREE BASIC RULES**
 - 1. GROUP PLANTS BY WATER REQUIREMENTS AMOUNT + FREQUENCY**
 - 2. MATCH IRRIGATION TO PLANT NEEDS AND SOIL TYPE**
 - 3. HARVEST AND CHANNEL RAINWATER AND EXCESS IRRIGATION WATER**

PVC PIPES

**SCHEDULE
40**

**CLASS
200**



1 INCH

3/4 INCH

1/2 INCH

FRICTION LOSS

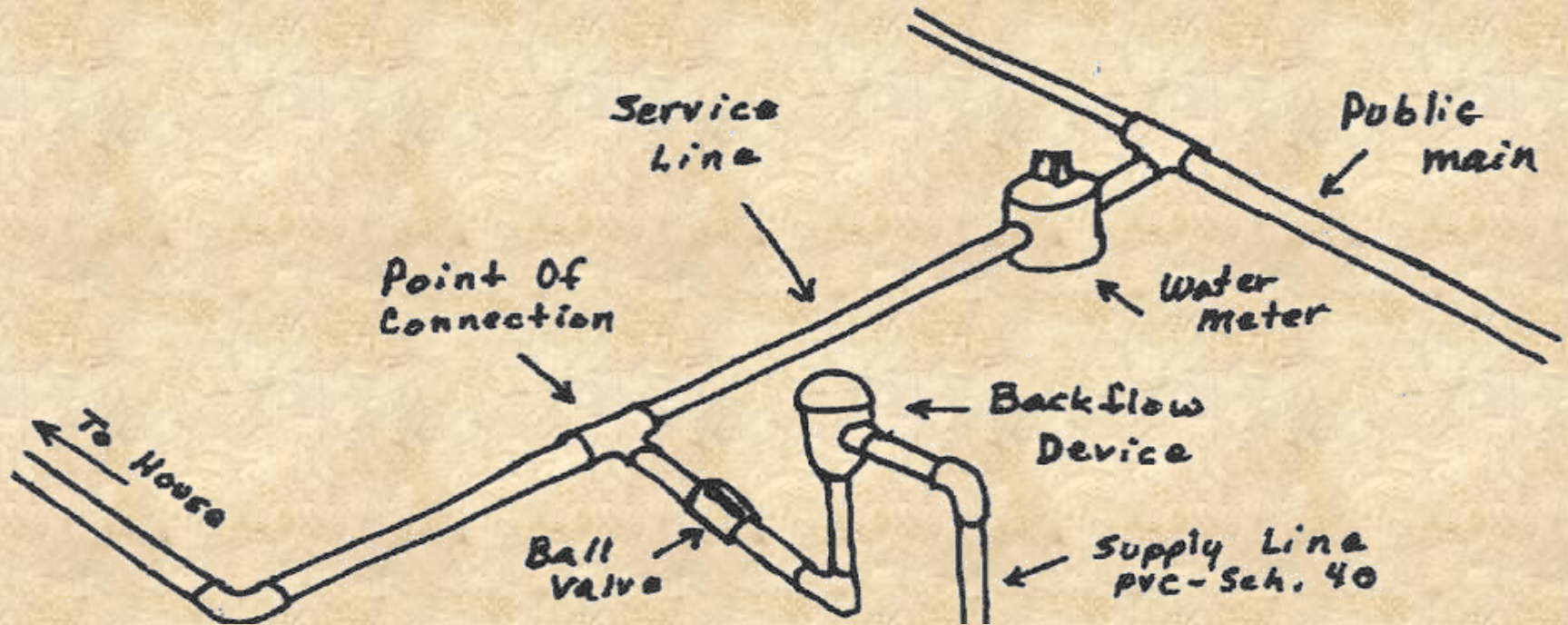
- **PRESSURE LOSS WHEN WATER FLOWS THROUGH:**
 - **SERVICE LINE**
 - **WATER METER**
 - **BACKFLOW PREVENTION DEVICE**
 - **DELIVERY LINE**
 - **CONTROL VALVES**
 - **FITTINGS**
 - **OTHER DEVICES IN THE SYSTEM**

HYDRAULICS

VELOCITY - THE SPEED OF WATER MOVING THROUGH A PIPE, MEASURED IN FEET PER SECOND (FPS)

- HIGH VELOCITY CAN DAMAGE EQUIPMENT AND COMPONENTS**

POINT OF CONNECTION



FRICITION LOSS

- ON A RESIDENTIAL OR SMALL COMMERCIAL WATER SYSTEM, THERE IS TYPICALLY 20 TO 25 PSI LOSS DUE TO FRICTION FROM THE WATER MAIN TO THE LAST SPRINKLER OR EMITTER.

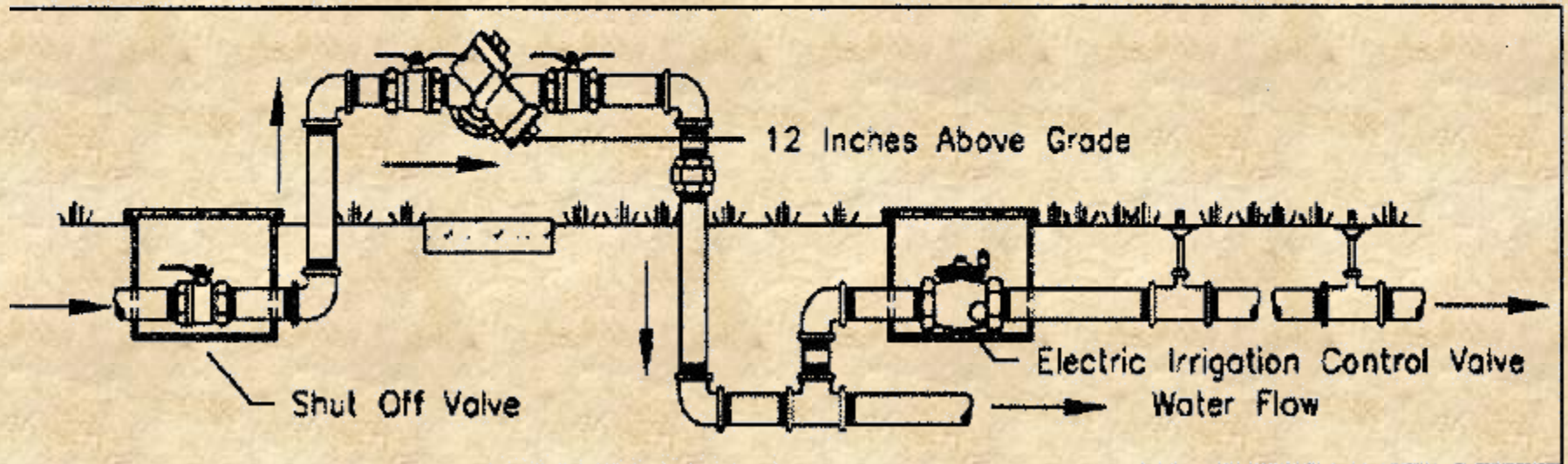


BACKFLOW PREVENTION

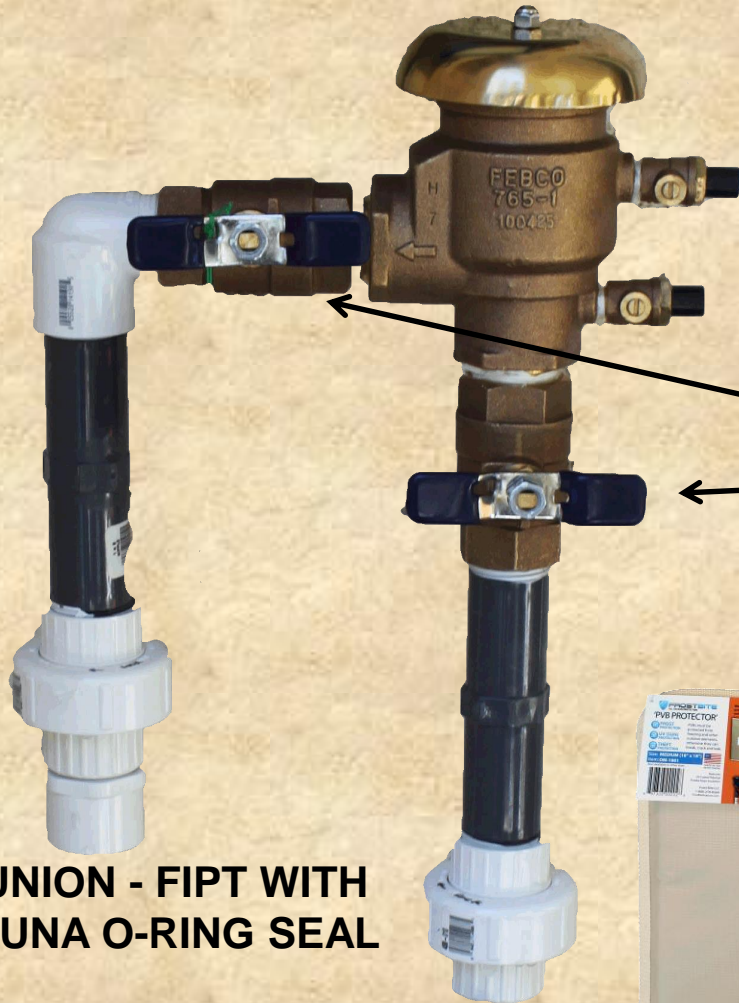
- **BACKFLOW IS WHEN WATER FLOWS BACKWARD FROM AN IRRIGATION SYSTEM INTO A POTABLE WATER SYSTEM**
 - **BACK SIPHONING IS CAUSED BY NEGATIVE PRESSURE, SUCH AS A LINE BREAK OR HEAVY USAGE.**
 - **BACK PRESSURE IS A REVERSAL OF FLOW CAUSED FROM DOWNSTREAM PRESSURE BY PUMPS OR ELEVATION.**

RP DEVICE INSTALLATION

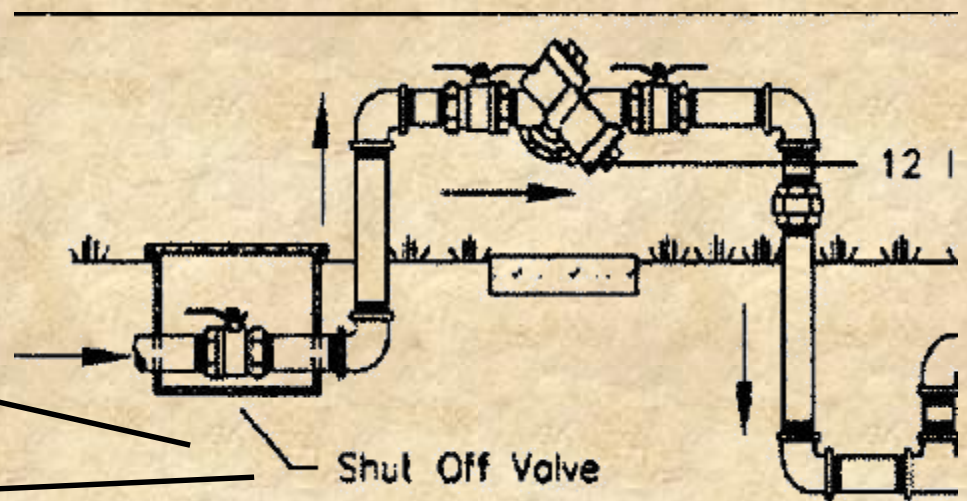
REDUCED PRESSURE PRINCIPLE ASSEMBLY



BACK FLOW PVB OR PRESSURE VACUUM BREAKER



UNION - FIPT WITH BUNA O-RING SEAL



PRESSURE REGULATOR

CHOOSE A PRESSURE
REGULATOR MODEL BASED
UPON IRRIGATION SYSTEM
TYPE AND DESIGN.

NEXT SELECT A PRESSURE
REGULATOR THAT WILL
SUPPLY THE NEEDED FLOW
RATE AT THE DESIGNATED
OPERATING PRESSURE.

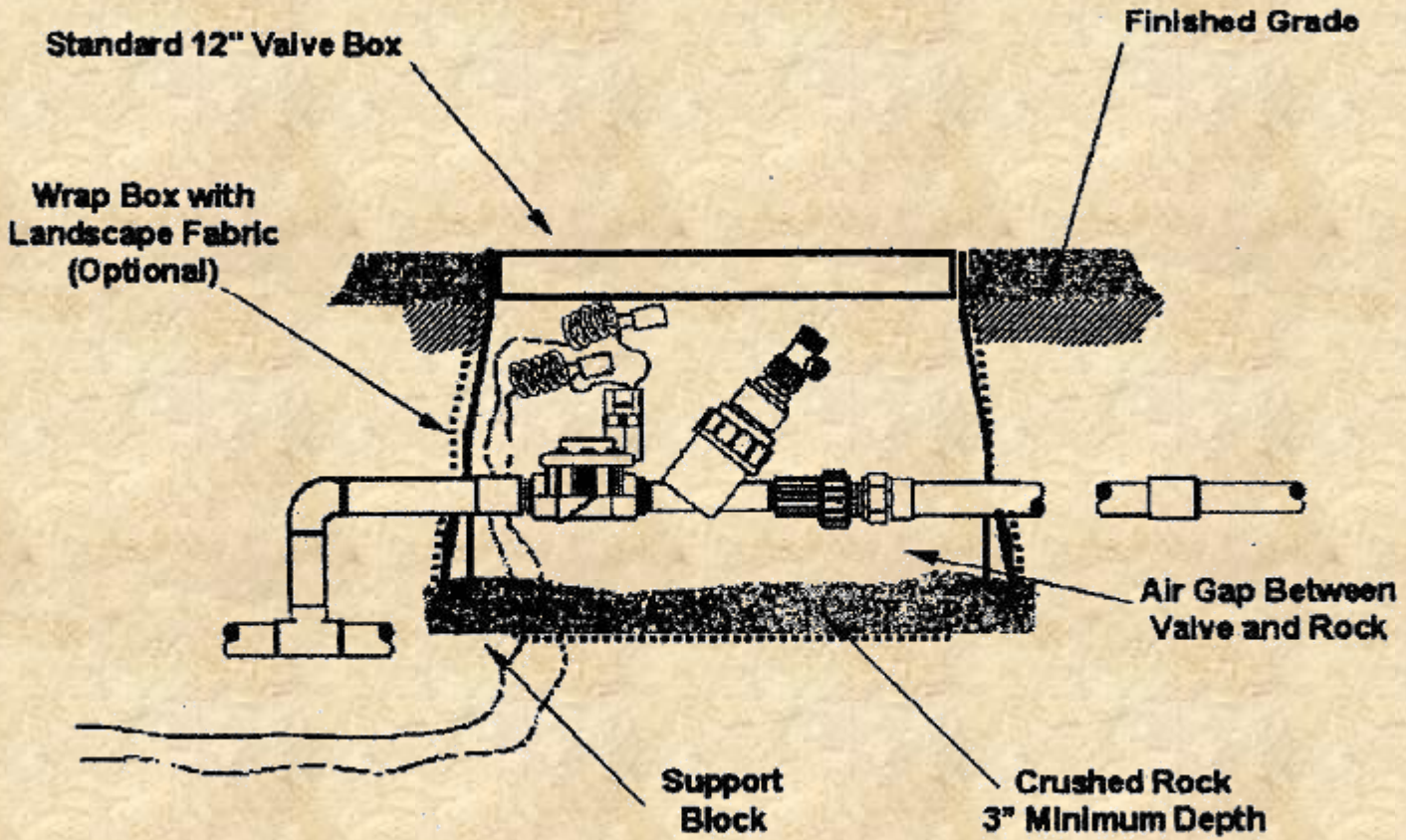
E.G. 2 - 20 GPM.



VALVE SELECTION

- **CHOOSE A VALVE THAT WILL OPERATE AT THE PRESSURE AVAILABLE AND THE FLOW NEEDED FOR THE ZONE**
- **CHOOSE A VALVE THAT WILL BE EASY TO WORK ON, SHOULD THE NEED ARISE**
- **CHOOSE ONE FOR WHICH SPARE PARTS CAN BE LOCATED QUICKLY, SUCH AS ESTABLISHED NAME BRANDS**

VALVE BOX INSTALLATION



Valve Box



Drip Electric Control Valve

VALVE MANIFOLD

- LOCATE IN AREA WHERE ZONES CAN BE SEEN
- IF POSSIBLE, DO NOT LOCATE IN LAWN
- CAN BE PURCHASED READY-MADE
- OR DESIGN YOUR OWN



VALVE MANIFOLD

- **OR DESIGN YOUR OWN**

**UNION - FIPT WITH
BUNA O-RING SEAL**



VALVE MANIFOLD



VALVE MANIFOLD





FINISHED



REPAIRS ARE EASIER



LOCATE VALES IN A CORRECT LOCATION



LOCATE VALES IN A CORRECT LOCATION



WRONG!



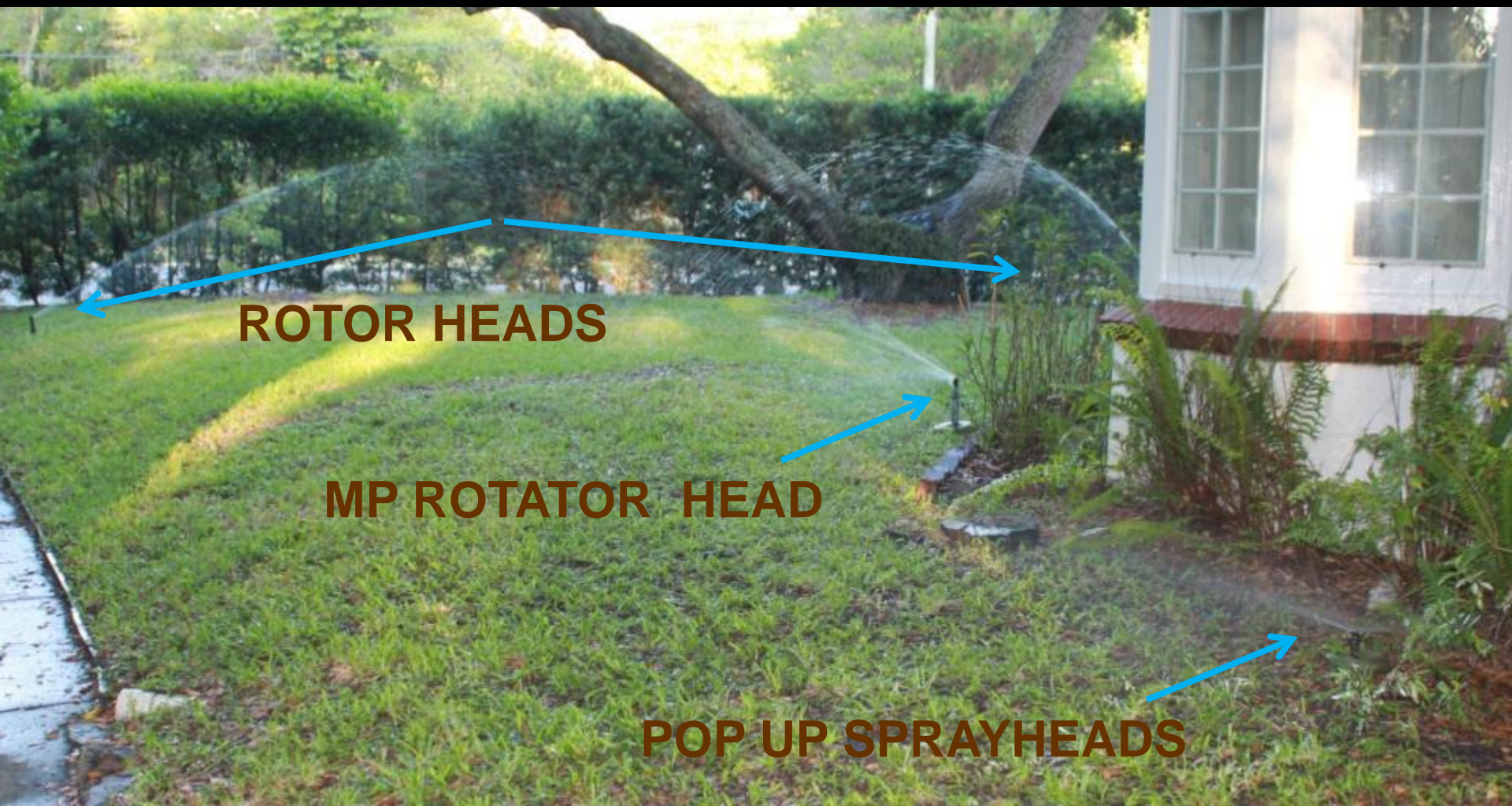
DESIGNING A LAWN IRRIGATION SYSTEM

- **1. MATCHED PRECIPITATION RATE**
 - **PRECIPITATION RATE (PR) IS THE RATE AT WHICH SPRINKLER NOZZLES APPLY WATER TO A SPECIFIC AREA OF COVERAGE, OVER A GIVEN PERIOD OF TIME, MEASURED IN INCHES PER HOUR. (MUCH AS RAINFALL IS MEASURED)**
 - **FOUND BY CALIBRATING THE SPRINKLER SYSTEM**



**ALL SIDES OF THE TURF AREA
MUST HAVE COVERAGE TO
ACHIEVE HEAD-TO-HEAD SPACING**

DON'T MIX SPRINKLER HEADS



ROTOR HEADS

MP ROTATOR HEAD

POP UP SPRAYHEADS





**SPRINKLERS
SHOULD BE
LOCATED IN AN
AREA THAT THE
SPRAY IS NOT
BLOCKED**

**HEADS SHOULD BE AT LEAST 6 INCHES
FROM THE PAVEMENT**

LOCATION OF SPRINKLER HEADS

- **POP UPS:**
 - 3-4 INCHES FROM HARDSCAPES
 - 18 INCHES FROM WALLS
- **ROTORS:**
 - 4-6 INCHES FROM HARDSCAPES
 - 24 INCHES FROM WALLS

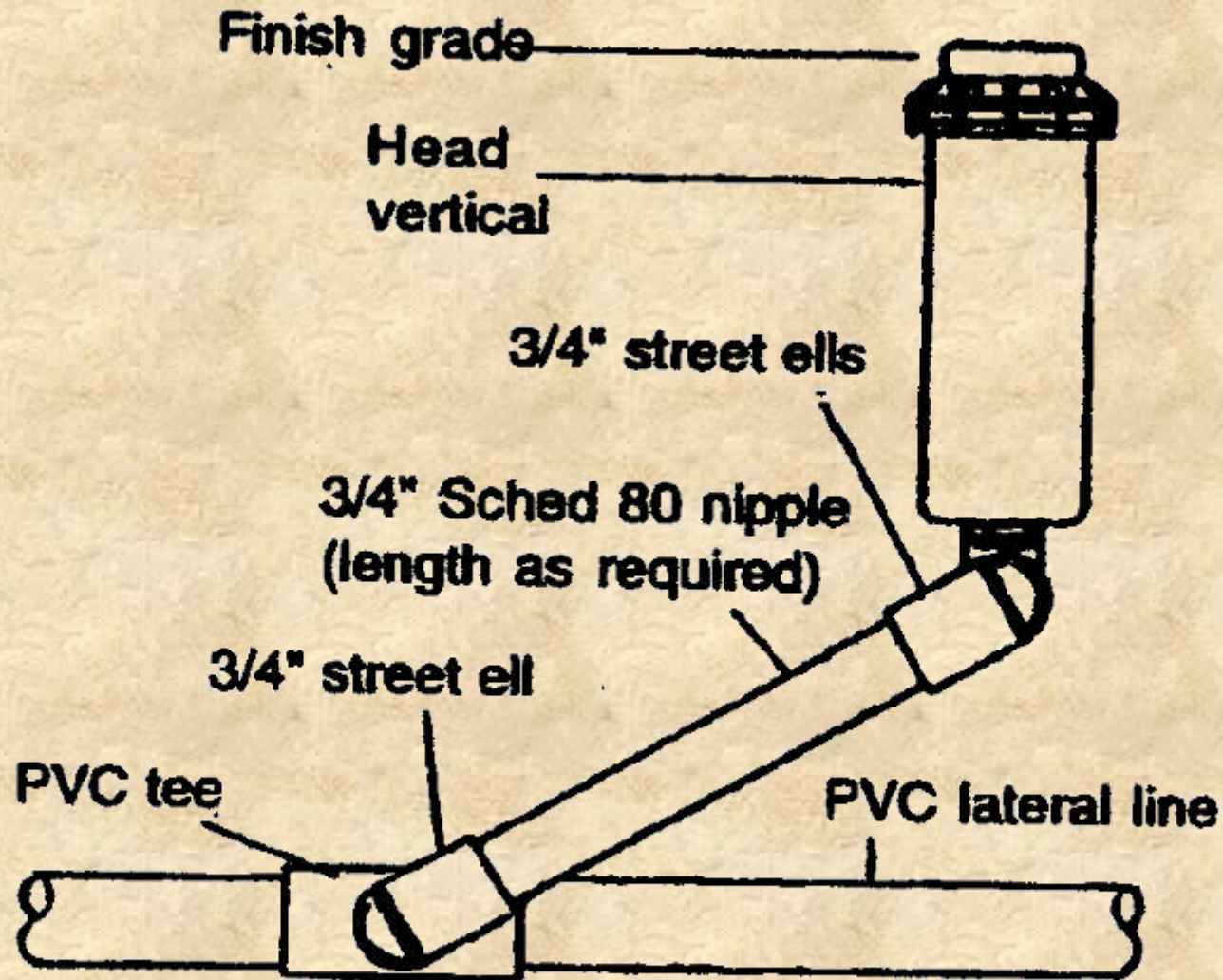
IRRIGATION PIPES NEED TO BE 12 TO 18 INCHES DEEP



SWING JOINT



SWING JOINT



Installed swing joint showing all parts.



FLEX JOINT



OTHER EQUIPMENT NEEDED

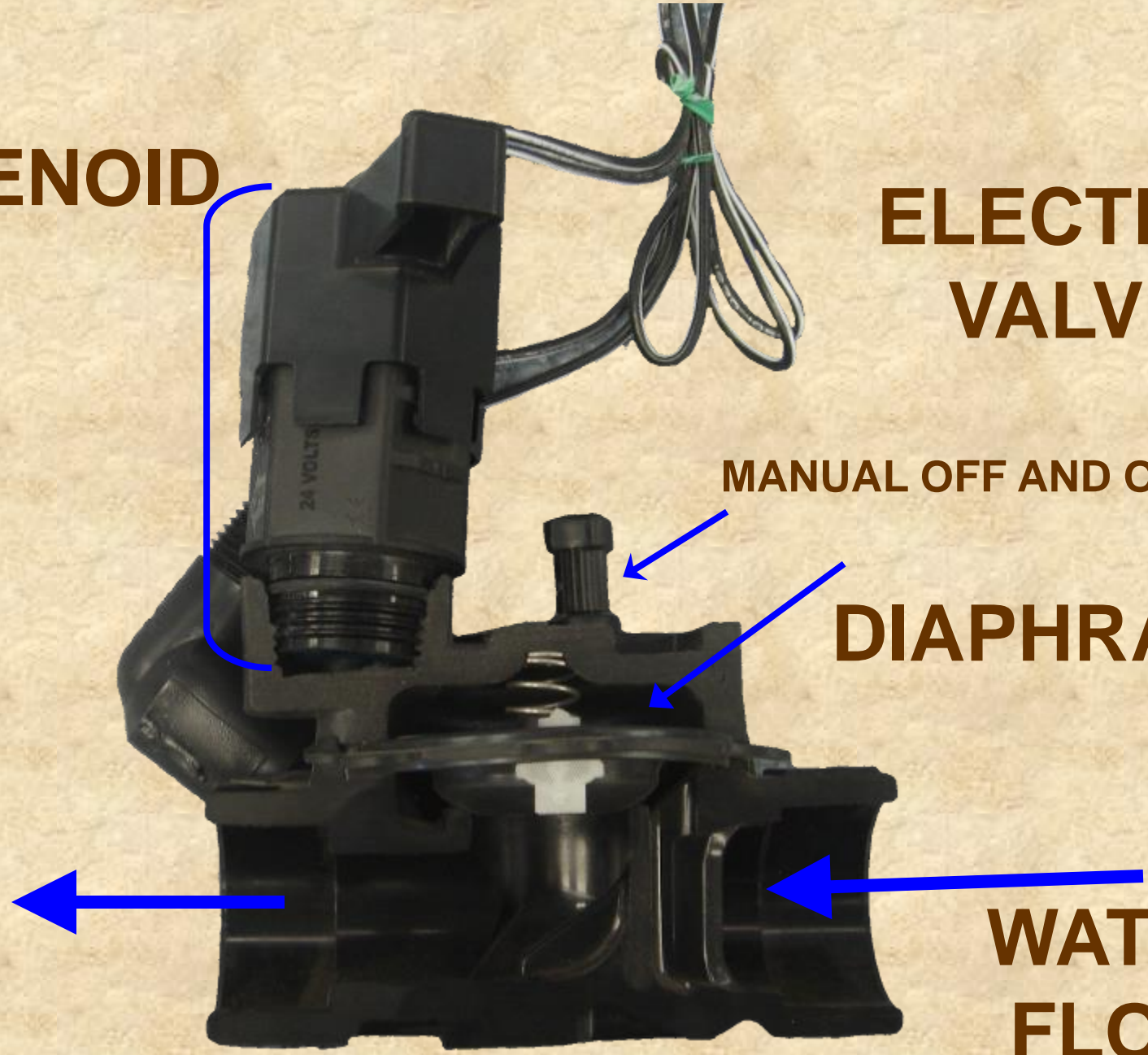
SOLENOID

ELECTRIC VALVE

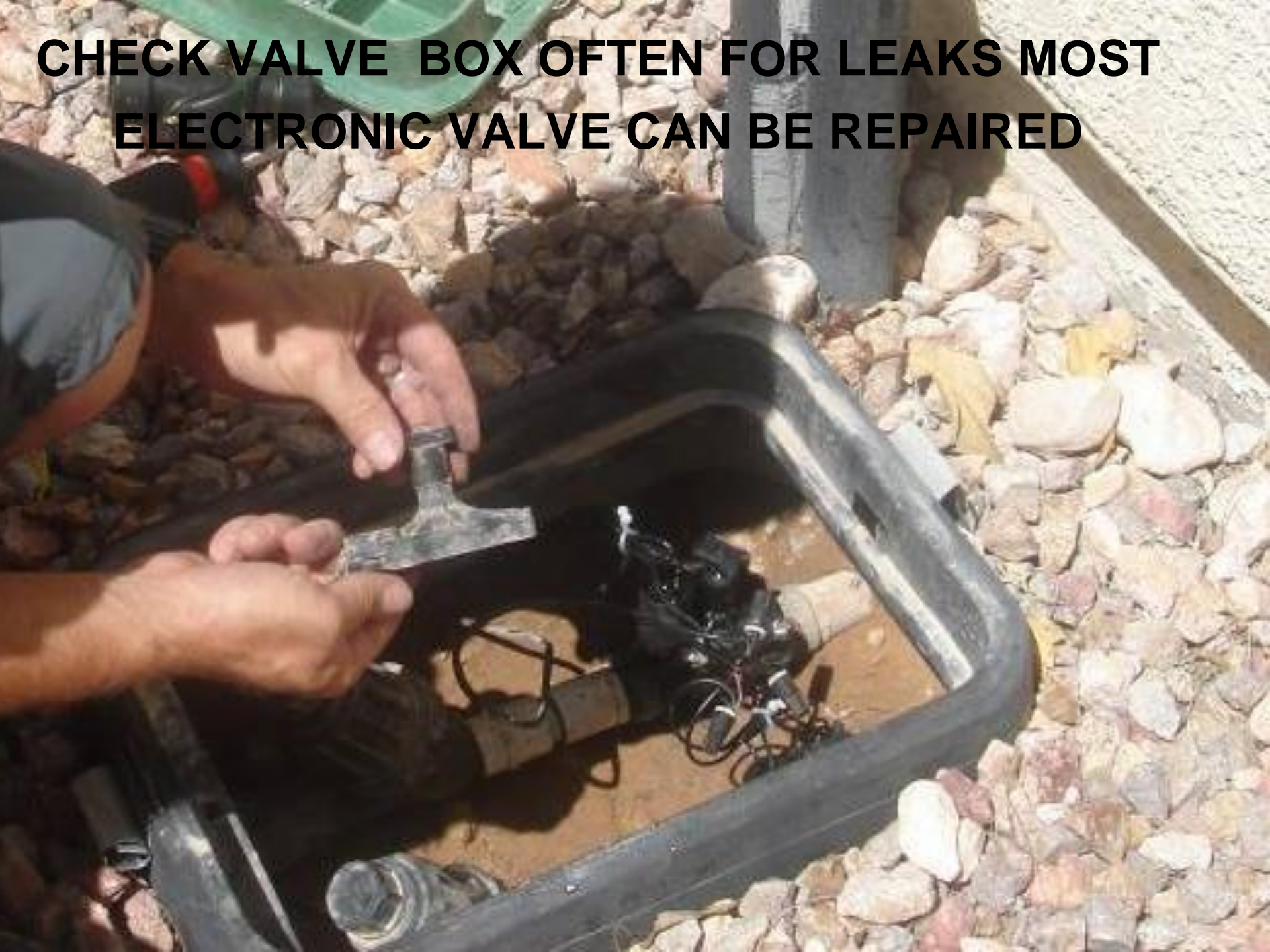
MANUAL OFF AND ON

DIAPHRAGM

WATER FLOW



**CHECK VALVE BOX OFTEN FOR LEAKS MOST
ELECTRONIC VALVE CAN BE REPAIRED**



CHECK VALVE BOX OFTEN FOR LEAKS



WATER

WET

THIS LEAK WAS NOT VISIBLE UNTIL THE WATER WAS TURNED OFF TO THE YARD



**LEAKING
WATER
METER BOX**



CHECK VALVE BOX OFTEN FOR PEST

BEEES



SOLARIZE THEM

BEEES



OTHER EQUIPMENT NEEDED



PVC GLUE AND PRIMER

PVC PRIMER GOES ON FIRST



THEN THE PVC GLUE



**DO THE SAME PRIMER FIRST
AND THEN GLUE FOR THE
INSIDE**



THEN INSERT AND TWIST INTO PLACE QUICKLY

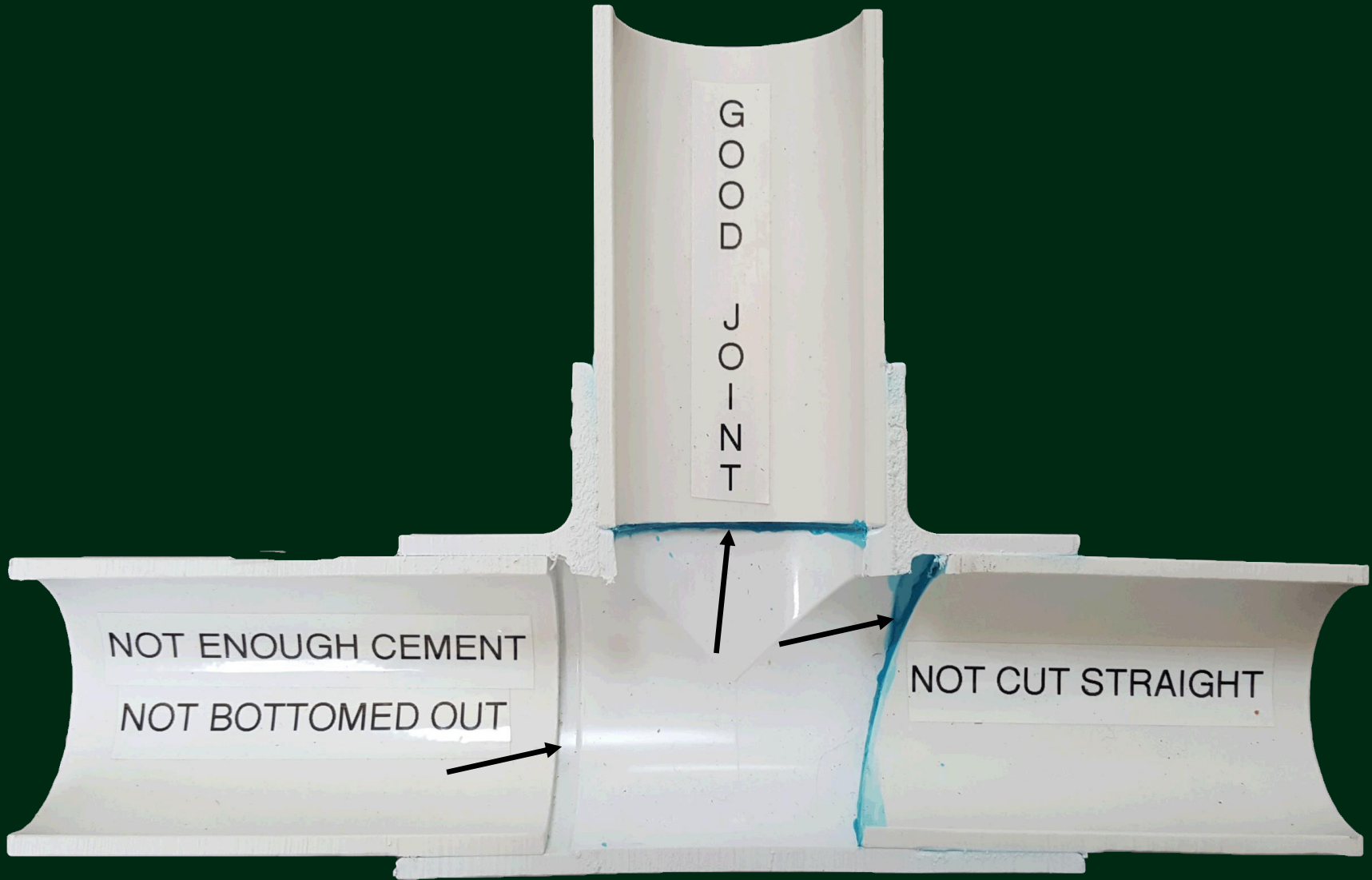




OUTSIDE

INSIDE

GLUING PVC PIPE



OTHER EQUIPMENT NEEDED

INLINE FILTERS



OTHER EQUIPMENT NEEDED



SOAKER TUBING AND BLACK POLY TUBING



BLACK POLY TUBING

1 INCH, $\frac{3}{4}$ AND $\frac{1}{2}$ INCH



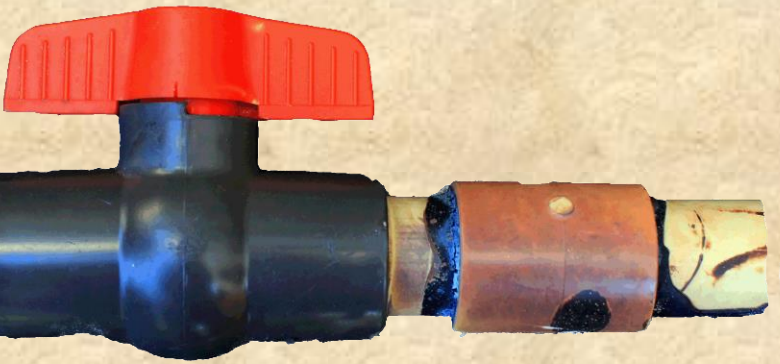
OTHER EQUIPMENT NEEDED



**GATE
AND
BALL
VALVES**

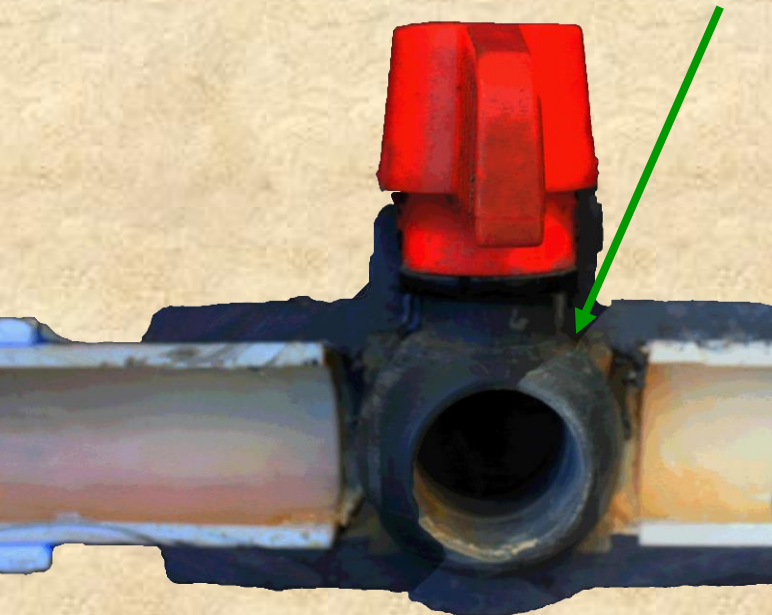


OTHER EQUIPMENT NEEDED

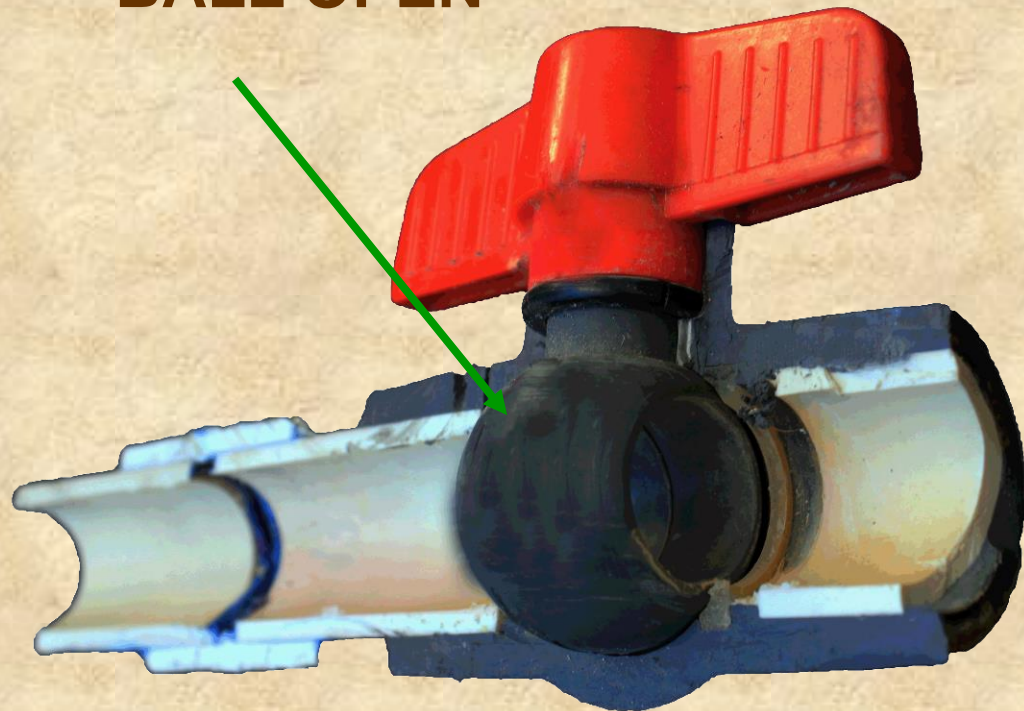


BALL VALVE

BALL CLOSED



BALL OPEN



LABEL VALUE BOXES





WHEN YOU SEE THIS COLOR

PIPES AND
OTHER
EQUIPMENT
THIS COLOR
ARE USING
RECLAIMED
WATER DO NOT
DRINK



WHEN YOU SEE THIS COLOR



CALIBRATING A SPRINKLER SYSTEM



1. PLACE 5 OR MORE COLLECTING CONTAINERS (RAIN GAUGES HERE) RANDOMLY IN AN IRRIGATION ZONE.
2. RUN IRRIGATION SYSTEM FOR SEVERAL MINUTES (10 OR 15) IS GOOD.

CALIBRATING A SPRINKLER SYSTEM



3. POUR ALL COLLECTOR CONTAINERS' WATER INTO ONE COLLECTING CONTAINER.
4. TOTAL AMOUNT OF WATER IN INCHES.
5. DIVIDE BY THE NUMBER OF COLLECTOR CONTAINERS USED.
6. THIS WILL GIVE YOU THE AMOUNT OF WATER APPLIED IN THE AMOUNT OF TIME RUN.

SCREWDRIVER TEST FOR LAWN

- **TALL FESCUE**
 - 8 INCHES
- **BERMUDAGRASS**
 - 6 INCHES



**THE LENGTH
BELOW
GROUND =
WATERING
DEPTH**

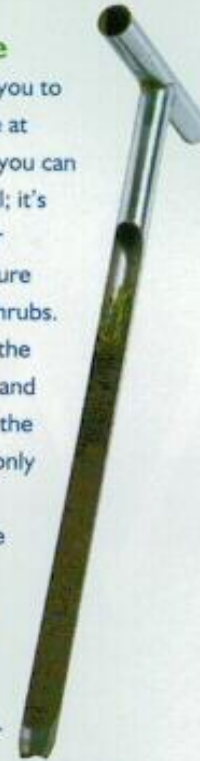
**(REMEMBER THAT SOUTHERN NEVADA
SOILS ARE HARD AND ROCKY. SAMPLE
MANY AREAS TO MAKE SURE THE
RESISTANCE IS FROM DRY SOIL AND NOT
ROCKS, THIS DOES NOT WORK IN HIGH
ORGANIC OR SANDY SOILS)**

TYPES OF SOIL PROBES



Using a soil sampling tube

This device allows you to check soil moisture at deeper levels than you can reach with a trowel; it's especially useful for checking soil moisture around trees and shrubs. Push the tube into the ground, pull it out, and examine the soil in the tube. If it is dry or only slightly moist, it's time to water. If the top layer is damp and the rest is dry, you need to water longer to ensure deeper penetration.



SOIL PROBES



CALIBRATING A DRIP SYSTEM



USE A CONTAINER
TIME HOW LONG IT TAKES TO FILL



UNCE IRRIGATION DEMONSTRATION

The diagram illustrates an irrigation system layout. At the top left, a circular area is labeled "YOU ARE HERE". The system includes a main line, a lateral line, and several emitter types: Micro Sprays, 1/2" DRIP EMITTERS, IN LINE EMITTER TUBING, 1/4" DRIP EMITTERS, BUBBLERS, MP ROTATORS, ROTOR/GEAR DRIVES, and POP UP SPRAYS. The system is shown in a cross-section view, with a brown soil layer and a green grassy area. The emitters are shown in various colors (blue, black, white) and are connected to a network of pipes.

MICRO SPRAYS
These sprays are usually used in irrigation systems for planting beds to moisten areas where overhead sprays are more desirable. These devices pop up from nozzles, have a 1/2 inch diameter and come with various types of spray angles from 90° to 360°. With a pressure of 1 to 3 bar.

1/2" DRIP EMITTERS
Emitters are usually used in the driest subsections to encourage subsurface aeration. Emitters are used to irrigate areas where overhead sprays are not desired. They are usually used in 1/2 inch diameter tubing and are usually used in 1/2 inch diameter tubing. They are usually used in 1/2 inch diameter tubing.

IN LINE EMITTER TUBING
Tubing used in various subsections such as soil water retention for soil water and plant beds. This type of emitter usually comes with a 1/2 inch diameter tubing and is usually used in 1/2 inch diameter tubing. They are usually used in 1/2 inch diameter tubing.

1/4" DRIP EMITTERS
Emitters are usually used in the driest subsections to encourage subsurface aeration. They are usually used in 1/4 inch diameter tubing and are usually used in 1/4 inch diameter tubing. They are usually used in 1/4 inch diameter tubing.

BUBBLERS
A widely used water delivery system to irrigate plants, trees and shrubs. They usually have a high rate of delivery of 1 to 2 GPM. They are usually used in the driest subsections to soil with high rates of drainage.

MP ROTATORS
A type of overhead emitter usually used to irrigate small soil areas where precise placement of 1 to 11 bar and various angles are desired.

ROTOR/GEAR DRIVES
Overhead devices usually used to irrigate large lawns and plant areas with various spray patterns ranging from 27 to 90 feet and up to 100'.

POP UP SPRAYS
Overhead devices usually used to irrigate small lawns and plant areas with spray patterns up to 10 feet and various angles from 1° to 360°.

PROPER IRRIGATION EQUALS WATER CONSERVATION

 University of Nevada
Cooperative Extension

**IRRIGATION MORE THAN JUST A DROP
IN THE BUCKET**




**YOU KNOW YOU HAVE BEEN
WATERING TOO MUCH WHEN**





**LET'S
TAKE A
BREAK**

廁所
TOILET →

A desert landscape featuring a river flowing through a rocky, arid environment. The foreground is dominated by a large, spiky cholla cactus. The background shows a mix of green and brown shrubs and trees under a clear blue sky. The text is overlaid in the center of the image.

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REFERENCES

**HUNTER INTERNATIONAL, GUY COLLINS
FROM HARVESTING RAINWATER FOR
LANDSCAPE USE UNIVERSITY OF ARIZONA
THE HOT GARDEN: SCOTT CALHOUN**

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