UNIVERSITY OF NEVADA •Reno

COOPERATIVE EXTENSION

Bringing the University to You

Southern Area

INTRODUCTION TO IRRIGATION

M L ROBINSON

SPECIALIST/PROFESSOR

UNIVERSITY OF NEVADA COOP EXTENSION

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

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


NEVADA RAIN GAUGE

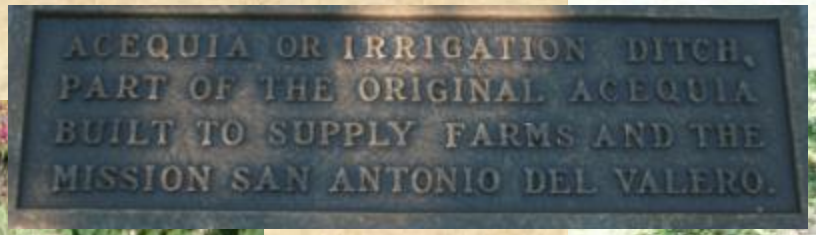
RAIN WAS THE FIRST IRRIGATION

IN THE BEGINNING THERE WAS RAIN AND NATURAL FLOODING

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

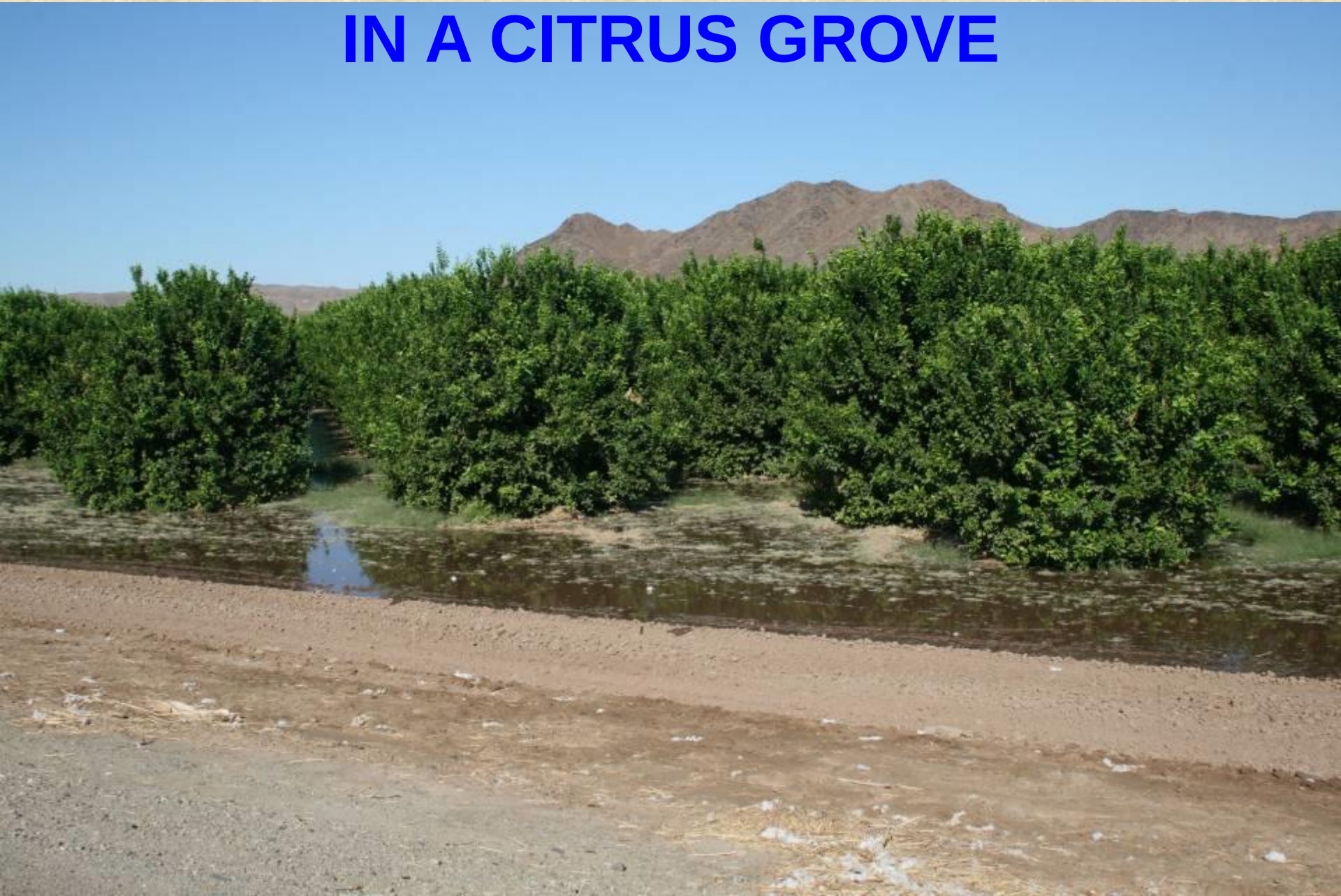
NEXT THERE WAS CANNEL/ DITCHED FLOOD IRRIGATION

CANNEL/FLOOD IRRIGATION IN TEXAS



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

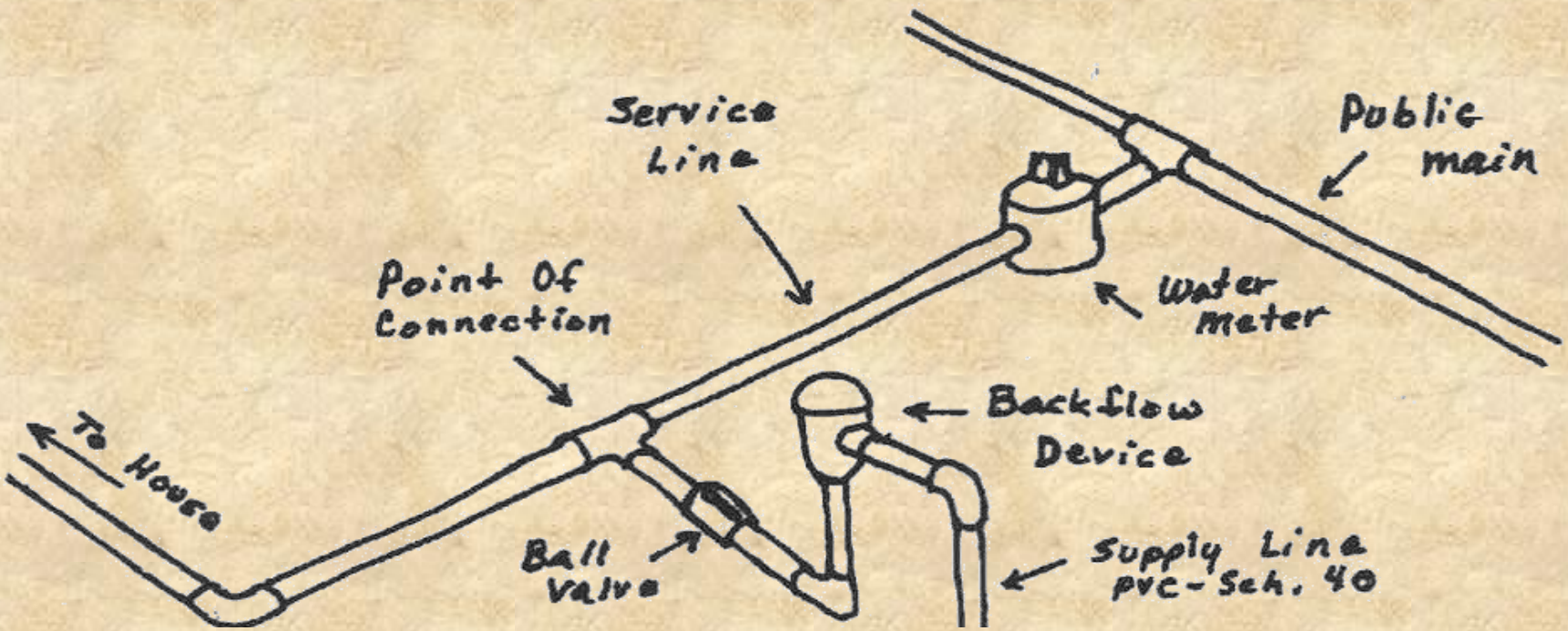
- PRESSURE LOSS WHEN WATER FLOWS THROUGH:
  - SERVICE LINE
  - WATER METER
  - BACKFLOW PREVENTION DEVICE
  - DELIVERY LINE
  - CONTROL VALVES
  - FITTINGS
  - OTHER DEVICES IN THE SYSTEM

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



FRICTION LOSS

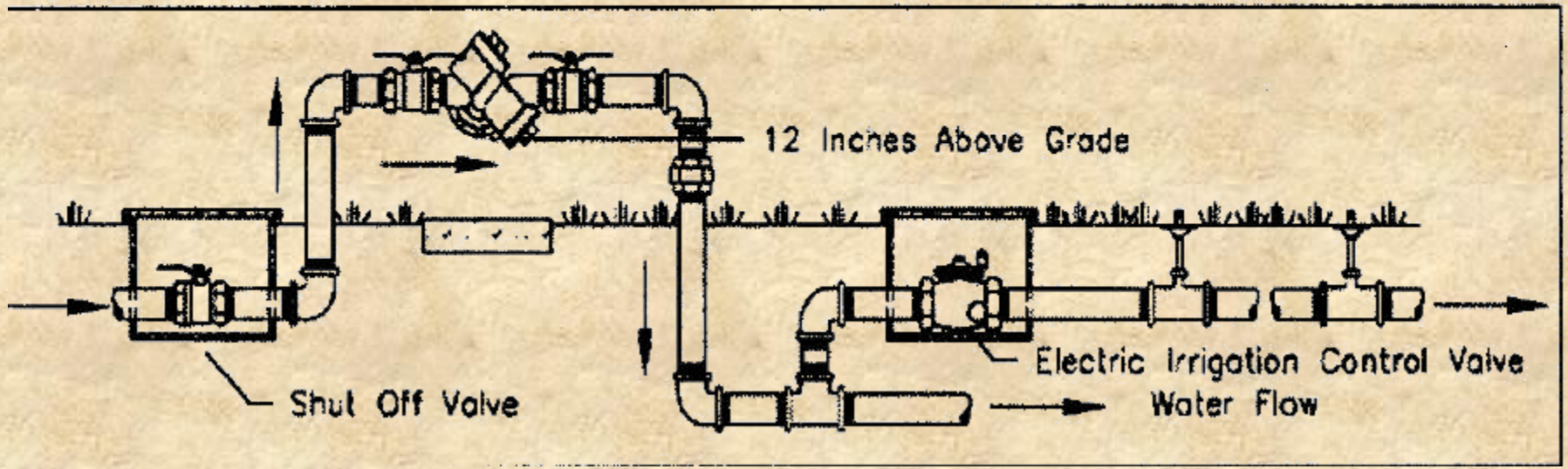
- ON A RESIDENTIAL OR SMALL COMMERCIAL WATER SYSTEM, THERE IS TYPICALLY 20 TO 25 PSI LOSS DUE TO FRICTION FROM THE WATER MAIN TO THE LAST SPRINKLER OR EMITTER.

BACKFLOW PREVENTION

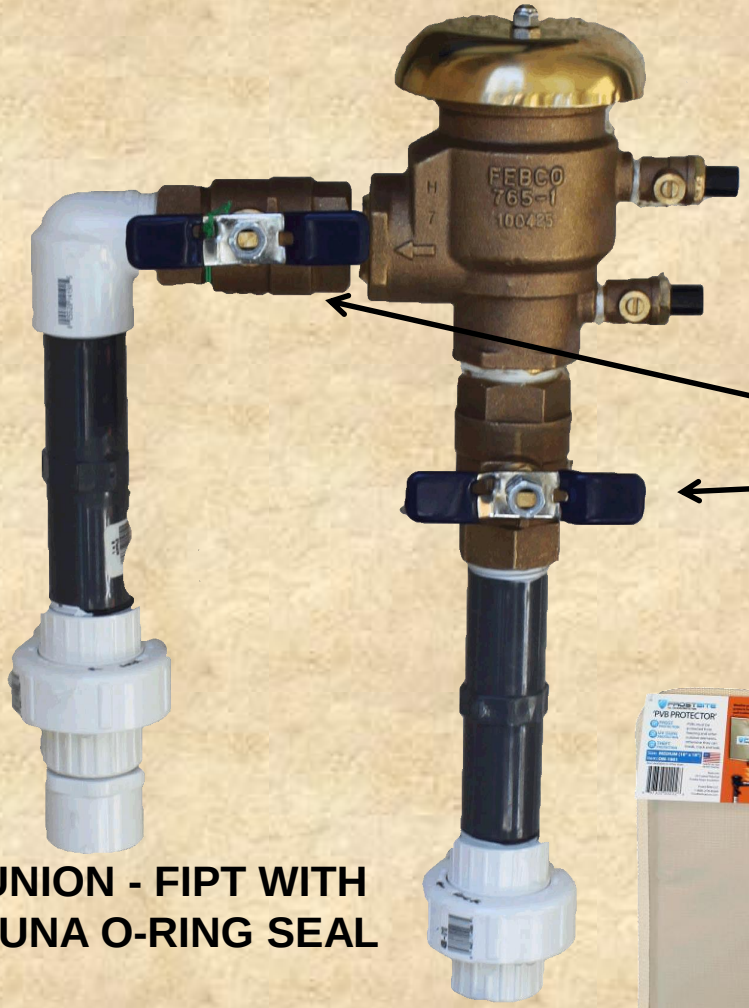
- BACKFLOW IS WHEN WATER FLOWS BACKWARD FROM AN IRRIGATION SYSTEM INTO A POTABLE WATER SYSTEM
  - BACK SIPHONING IS CAUSED BY NEGATIVE PRESSURE, SUCH AS A LINE BREAK OR HEAVY USAGE.
  - BACK PRESSURE IS A REVERSAL OF FLOW CAUSED FROM DOWNSTREAM PRESSURE BY PUMPS OR ELEVATION.

RP DEVICE INSTALLATION

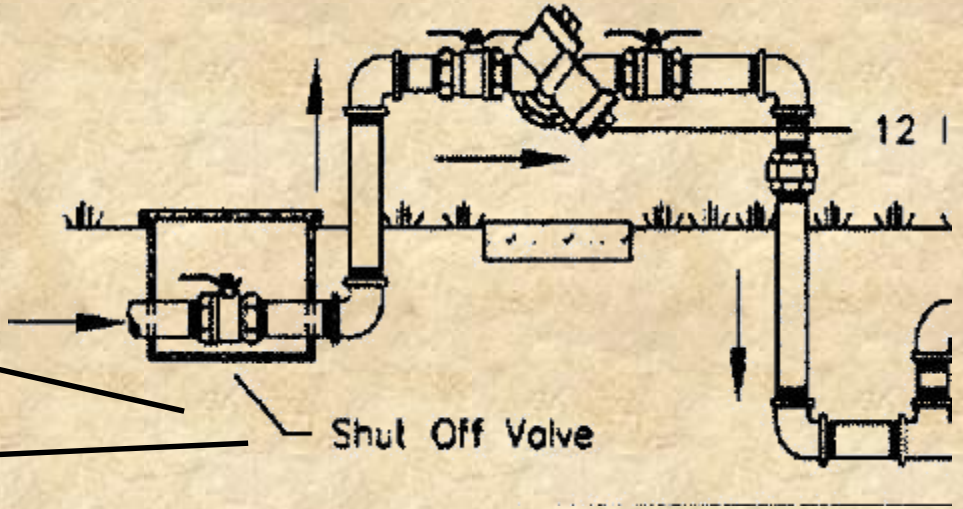
REDUCED PRESSURE PRINCIPLE ASSEMBLY



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.

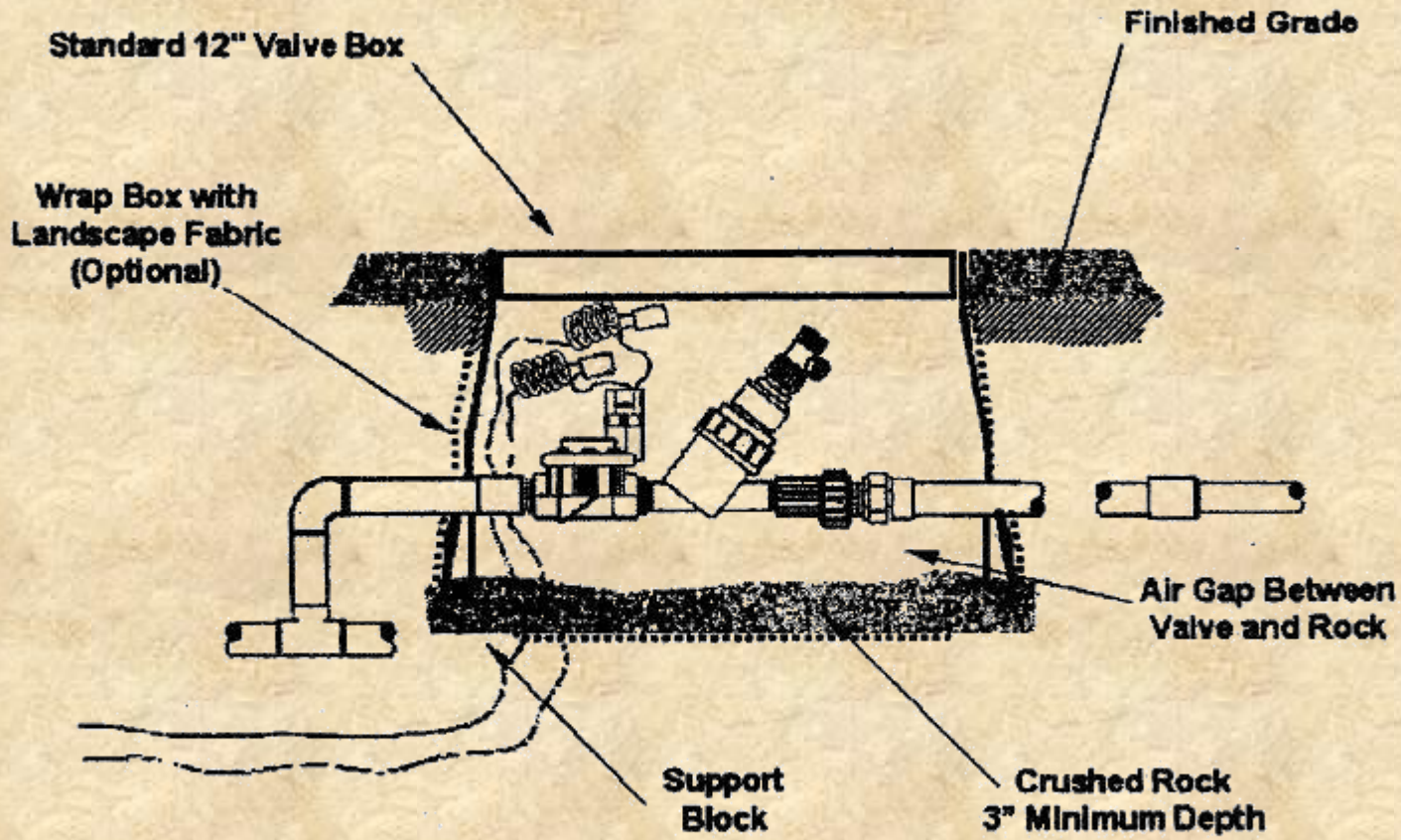
NEXT SELECT A PRESSURE REGULATOR THAT WILL SUPPLY THE NEEDED FLOW RATE AT THE DESIGNATED OPERATING PRESSURE.

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

VALVE MANIFOLD

VALVE MANIFOLD


orbit

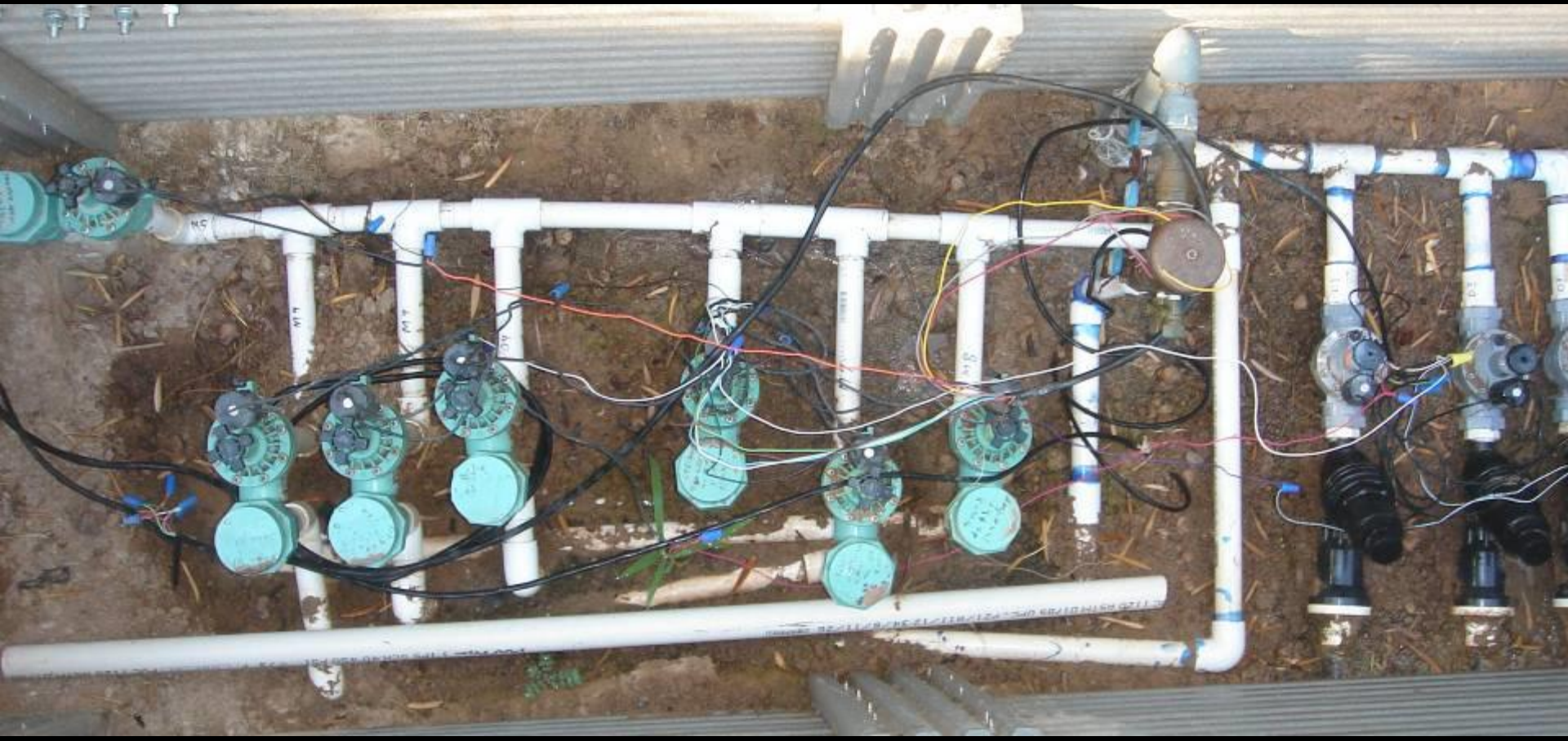

FINISHED

REPAIRS ARE EASIER

LOCATE VALES IN A CORRECT LOCATION

LOCATE VALES IN A CORRECT LOCATION

WRONG!

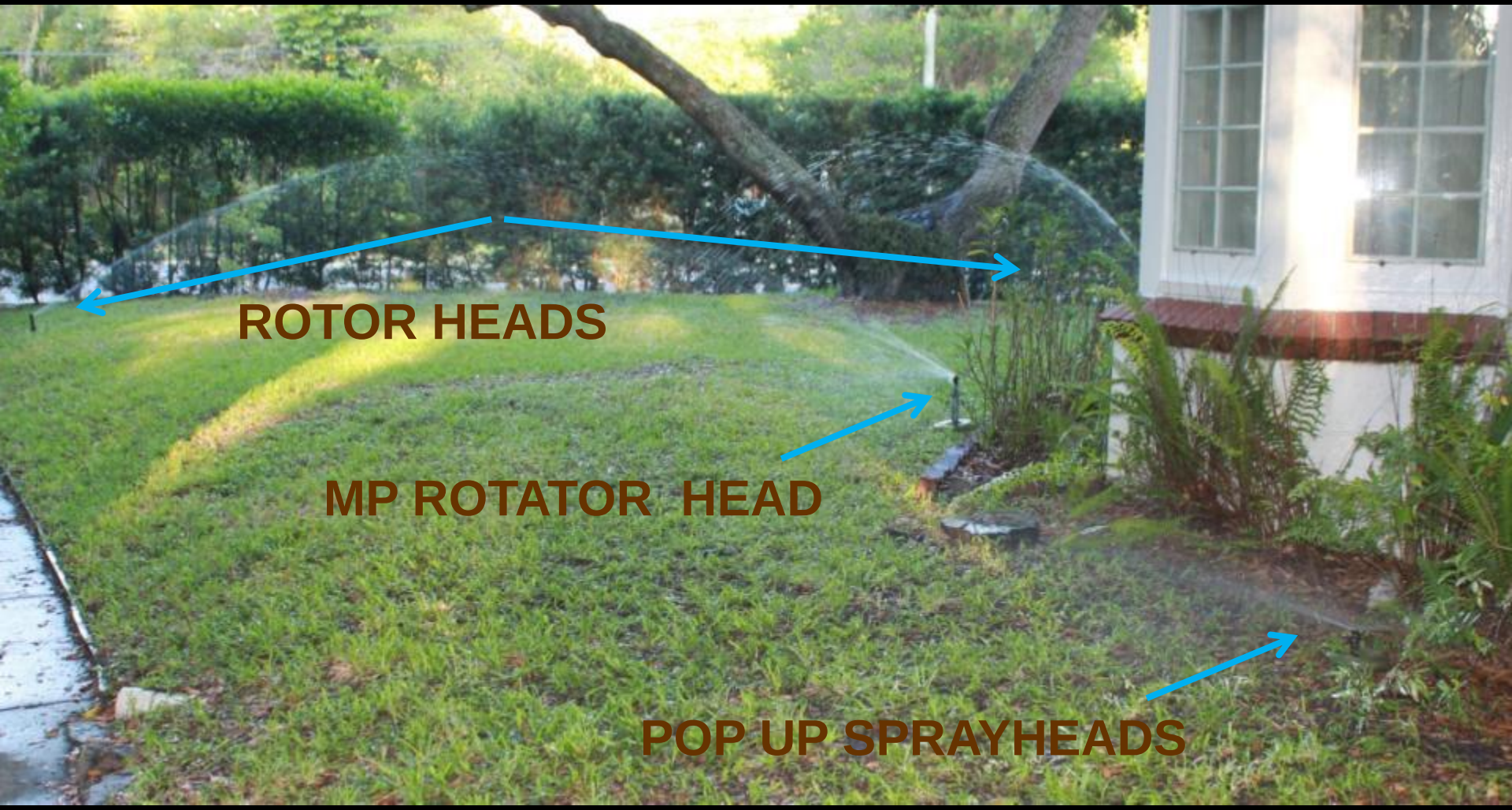


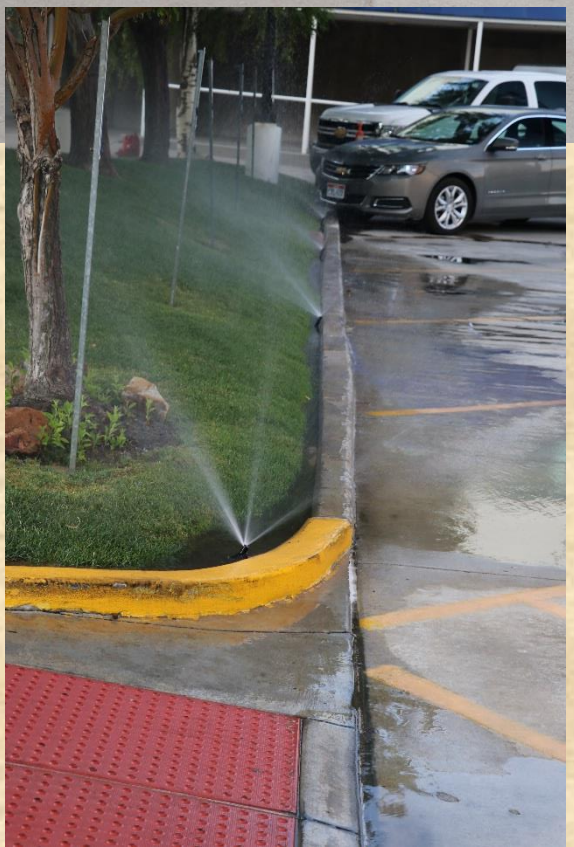
DESIGNING A LAWN IRRIGATION SYSTEM

- 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






LOT
FULL

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

HEADS SHOULD BE AT LEAST 6 INCHES FROM THE PAVEMENT

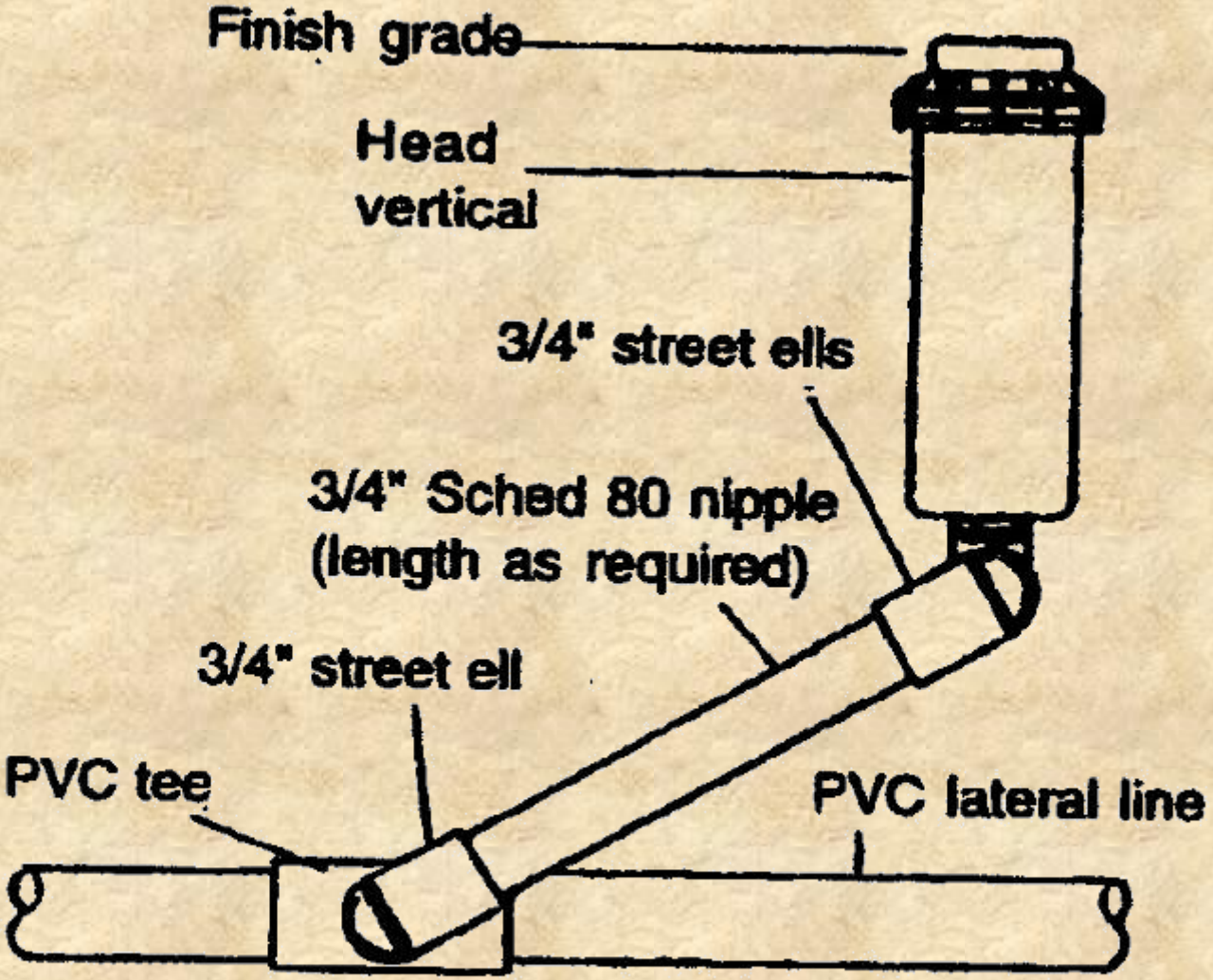
LOCATION OF SPRINKLER HEADS

- **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

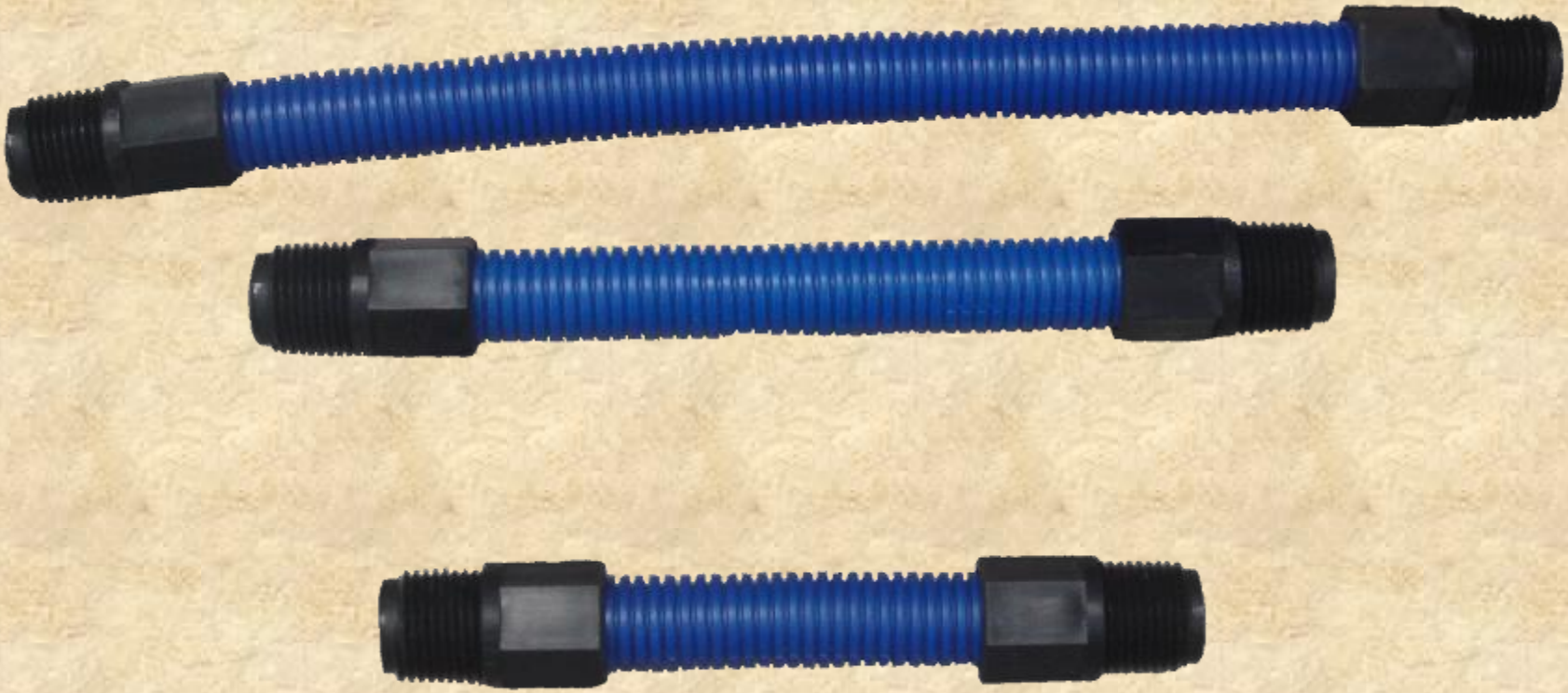
SWING JOINT

SWING JOINT

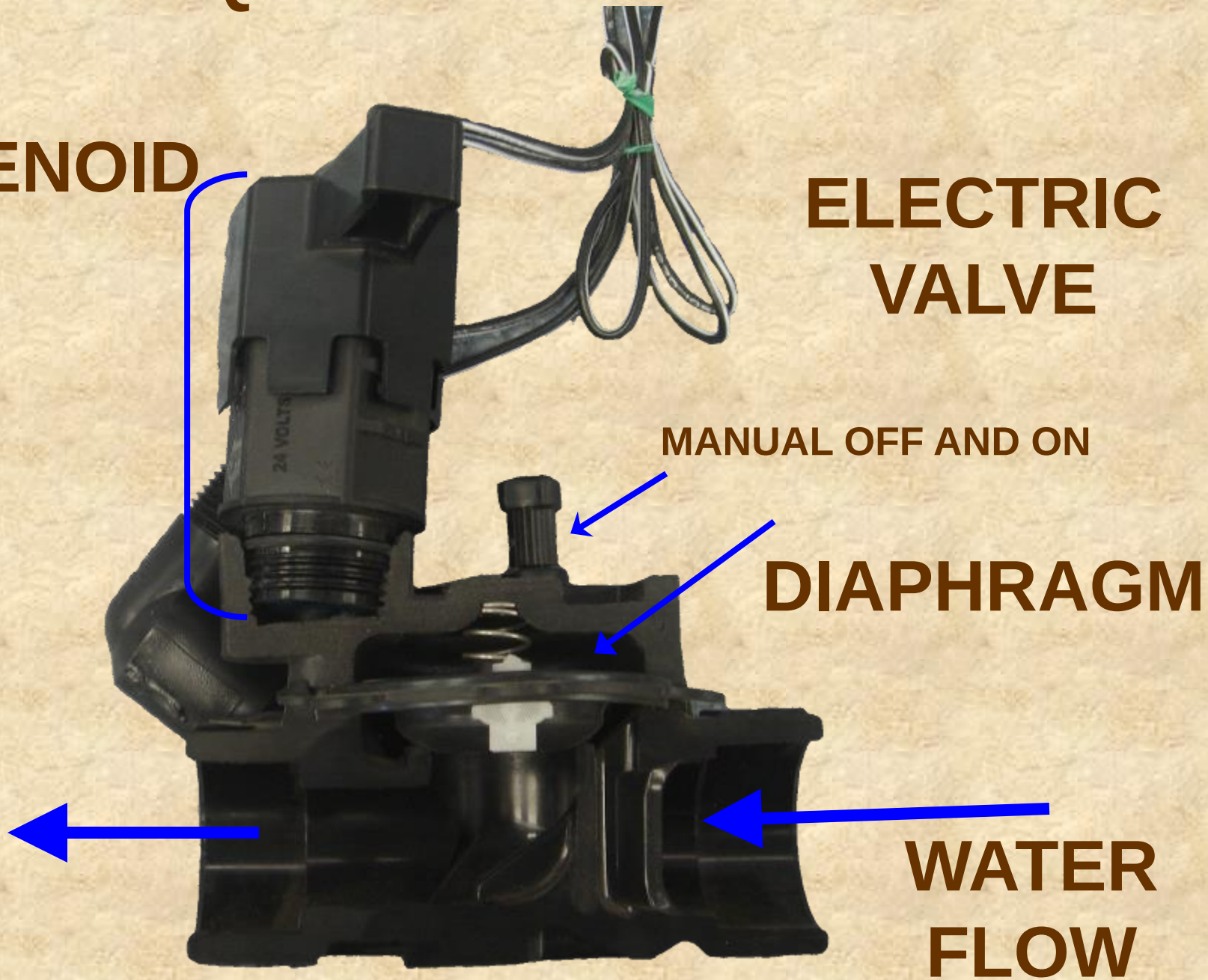


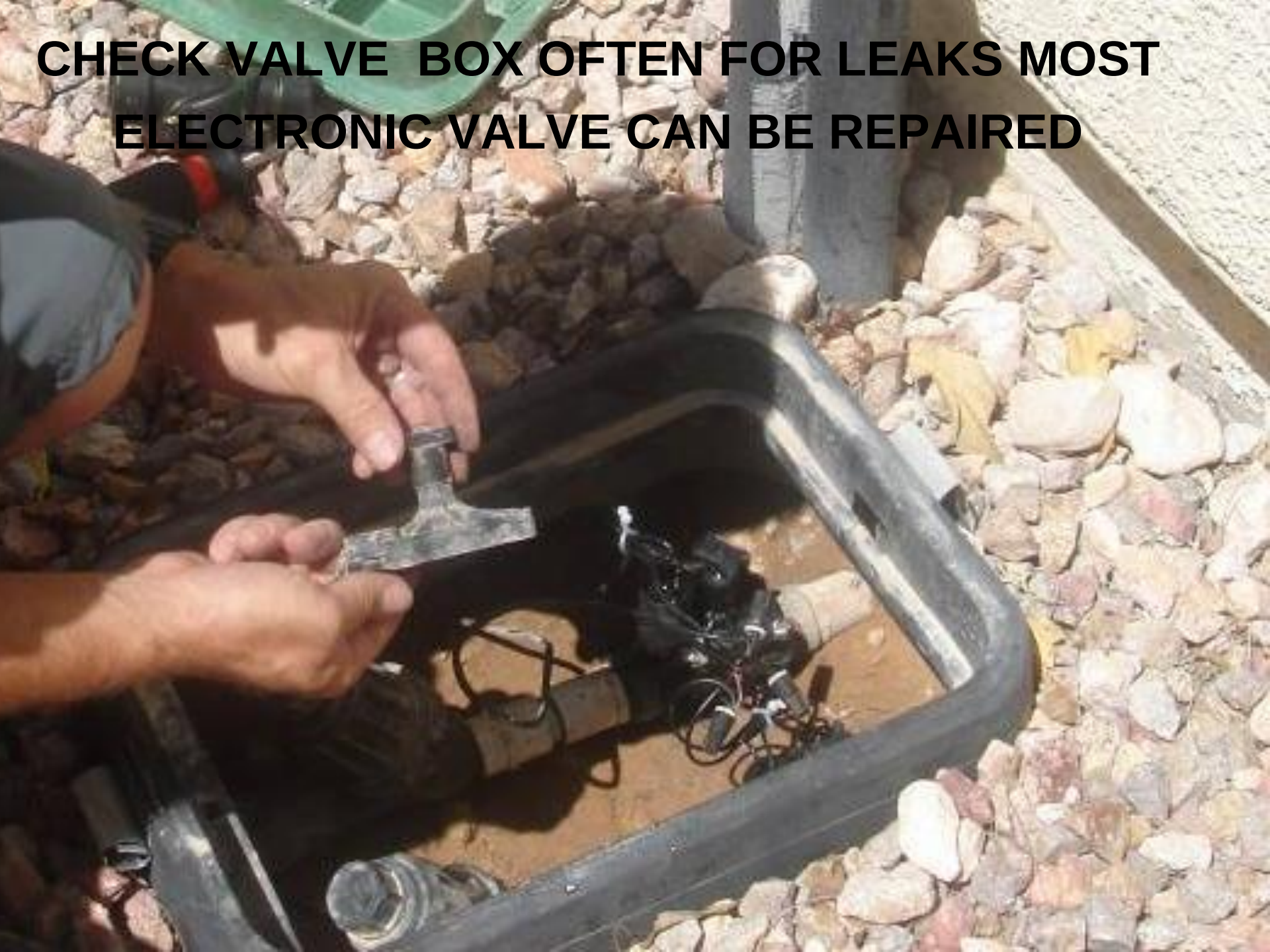
Installed swing joint showing all parts.

FLEX JOINT



OTHER EQUIPMENT NEEDED




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

CHECK VALVE BOX OFTEN FOR LEAKS

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


CHECK VALVE BOX OFTEN FOR PEST
BEES


SOLARIZE THEM
BEES

OTHER EQUIPMENT NEEDED

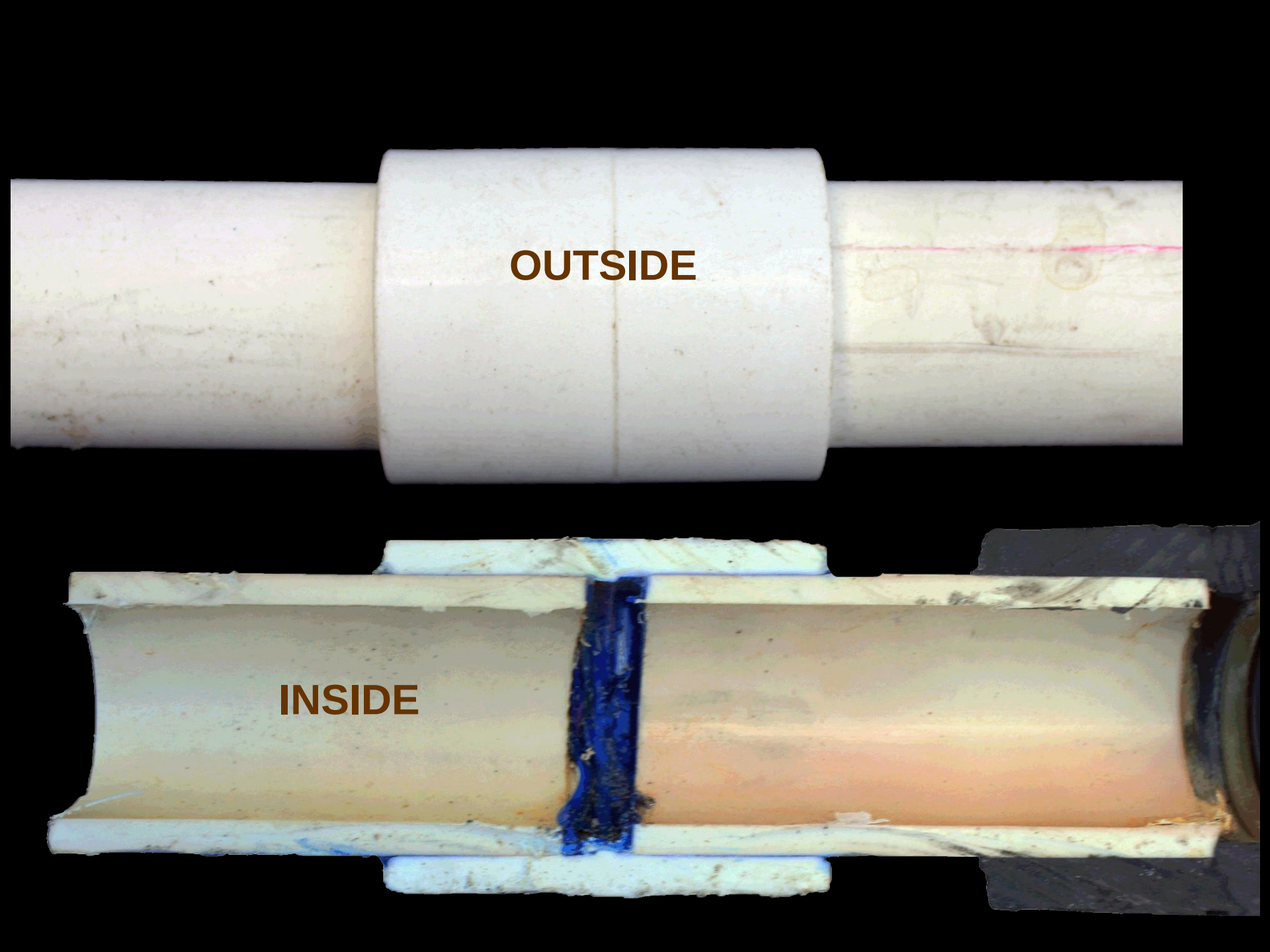
PVC GLUE AND PRIMER

PVC PRIMER GOES ON FIRST

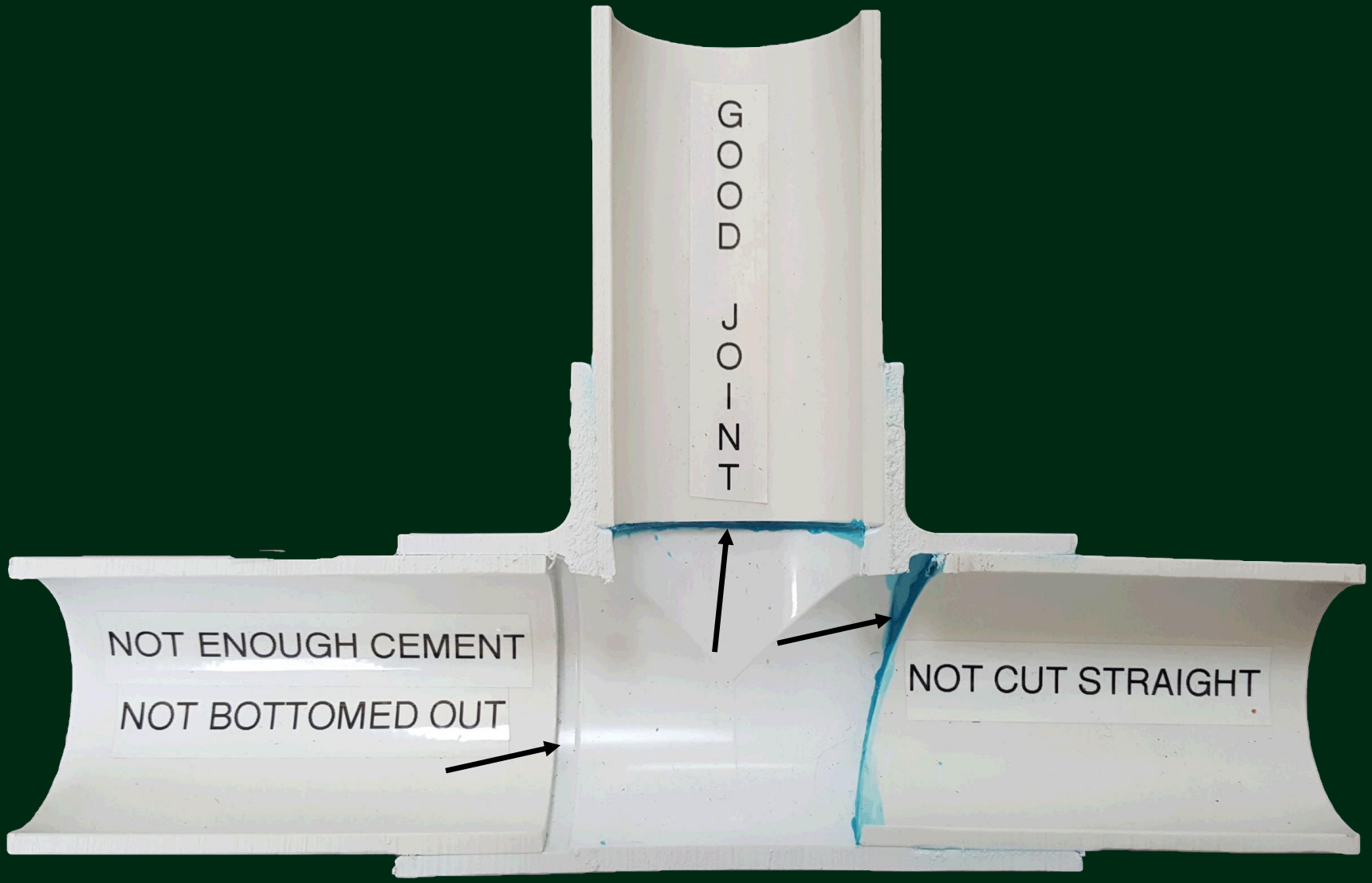
THEN THE PVC GLUE

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, ¾ AND ½ INCH

OTHER EQUIPMENT NEEDED

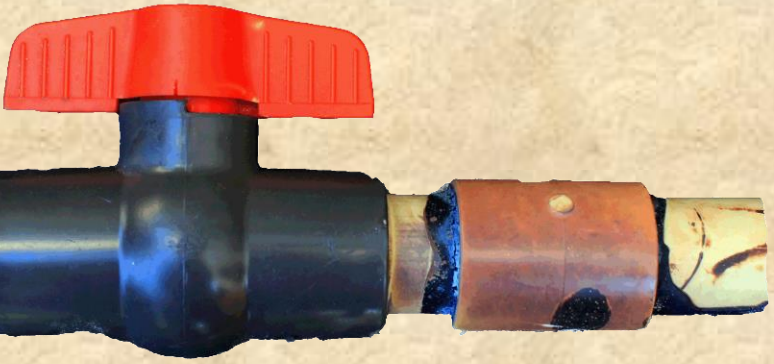
GATE

AND

BALL

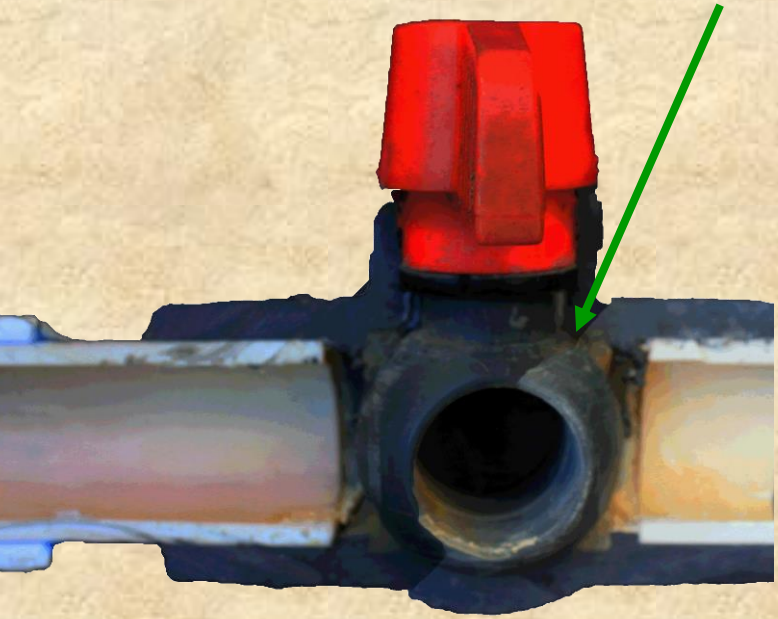
VALVES

OTHER EQUIPMENT NEEDED

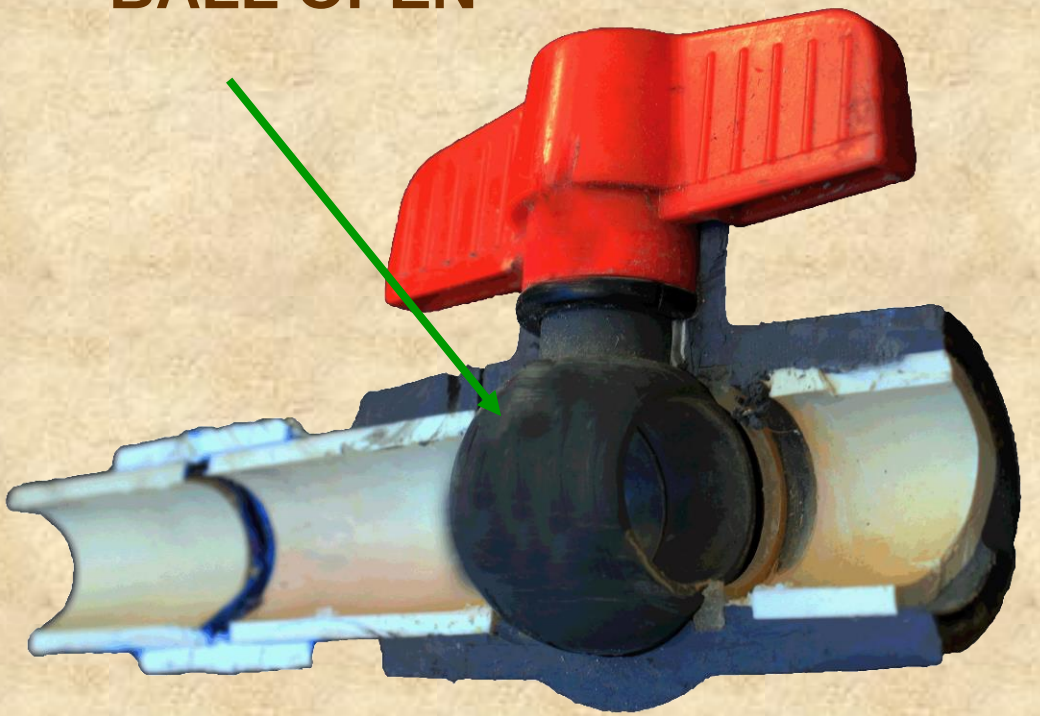


BALL VALVE

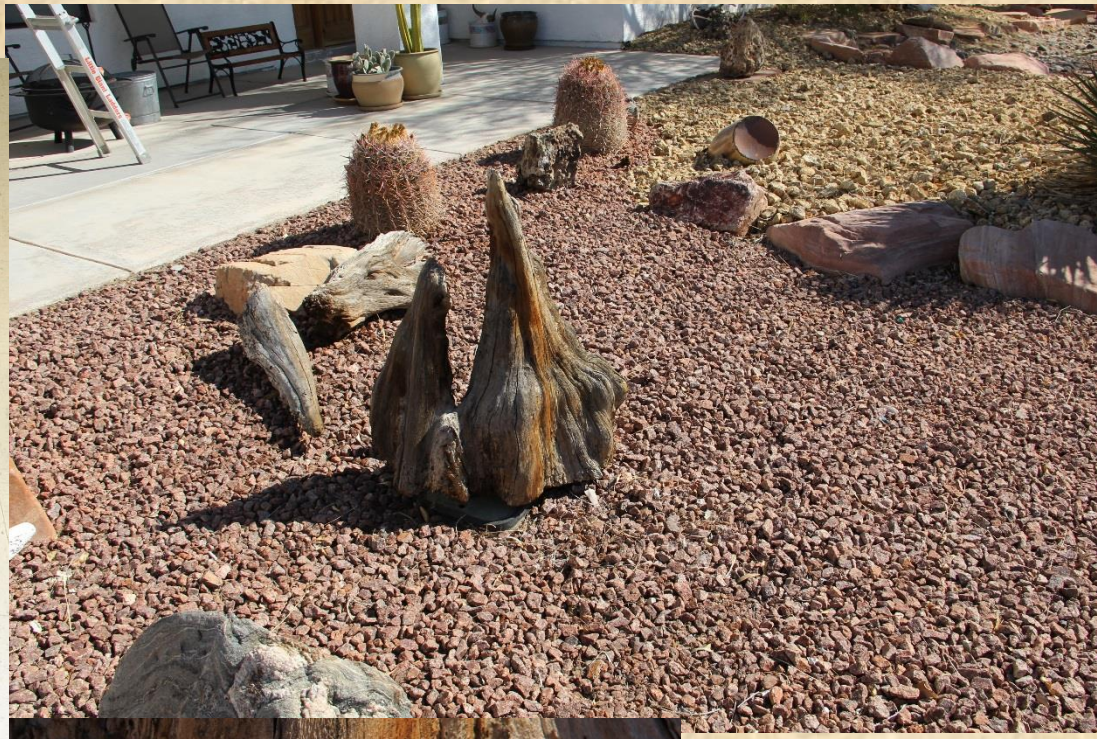
BALL CLOSED



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 LAWNS

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

(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

IRRIGATION MORE THAN JUST A DROP IN THE BUCKET

YOU KNOW YOU HAVE BEEN WATERING TOO MUCH WHEN


LET'S
TAKE A
BREAK
厠所
TOILET

ALL MATERIAL IN THIS HANDOUT CAN ONLY BE USED FOR THIS CLASS AND CANNOT BE COPIED WITHOUT PERMISSION FROM THE PRESENTER, MLR

REFERENCES

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

DISCLAIMER

All materials used are what is believed to be of public domain or are used with permission from the respective author. Every effort is made to identify the original author and attribute appropriately. When this is not possible, "Author Unknown" is noted or no author is shown.
If something is misquoted or attributed to the wrong author, or if an author or interested party of any of the written work wishes for it to be attributed appropriately or removed, please notify UNCE and it will be taken care of promptly.
All graphics are created by the author unless otherwise attributed. The graphics are not available for use elsewhere due to licensing agreements without permission.

THE USE OF A PRODUCT NAME IS NOT A DIRECT OR INDIRECT ENDORSEMENT OF THOSE PRODUCTS OR THAT PRODUCTS NOT MENTIONED ARE INFERIOR TO THOSE MENTIONED. THE USE OF A PRODUCT NAME IS SIMPLY FOR CONVENIENCE.)

MLR