



RAINWATER HARVESTING

Ward Ling- Watershed Coordinator



TEXAS A&M
AGRILIFE
EXTENSION

WHAT ARE YOU DOING WITH YOUR RAIN WATER?

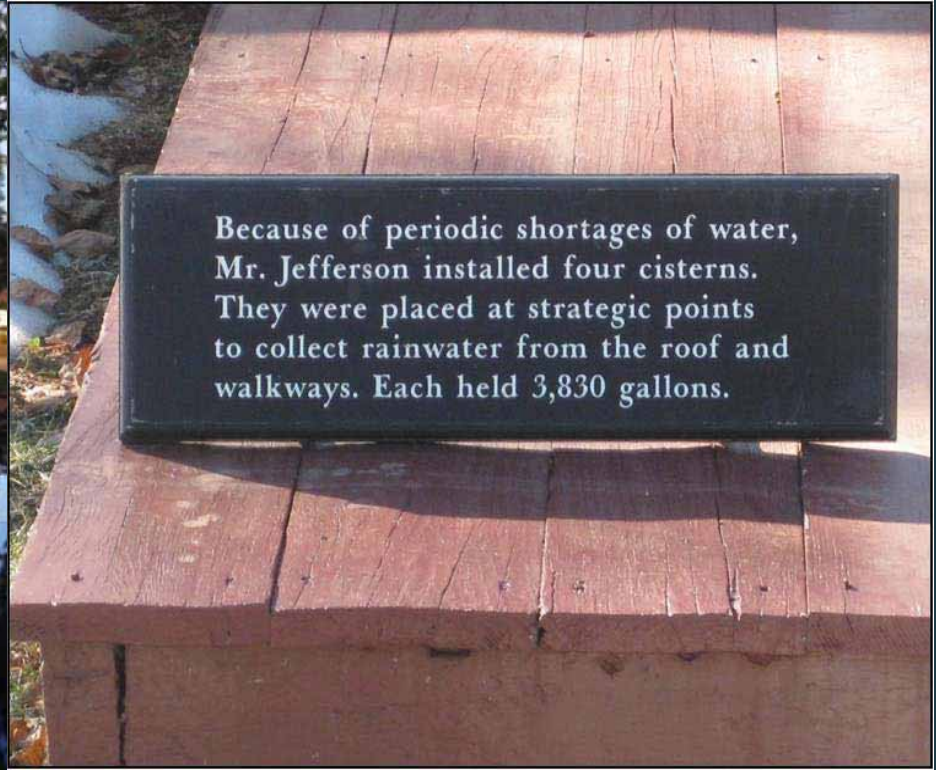


RAINWATER HARVESTING

- *Rainwater harvesting is the capture, diversion, and storage of rainwater for use in landscaping, in-home use, wildlife, livestock, fire protection, stormwater management, and other purposes.*



NOT A NEW IDEA!



Because of periodic shortages of water, Mr. Jefferson installed four cisterns. They were placed at strategic points to collect rainwater from the roof and walkways. Each held 3,830 gallons.

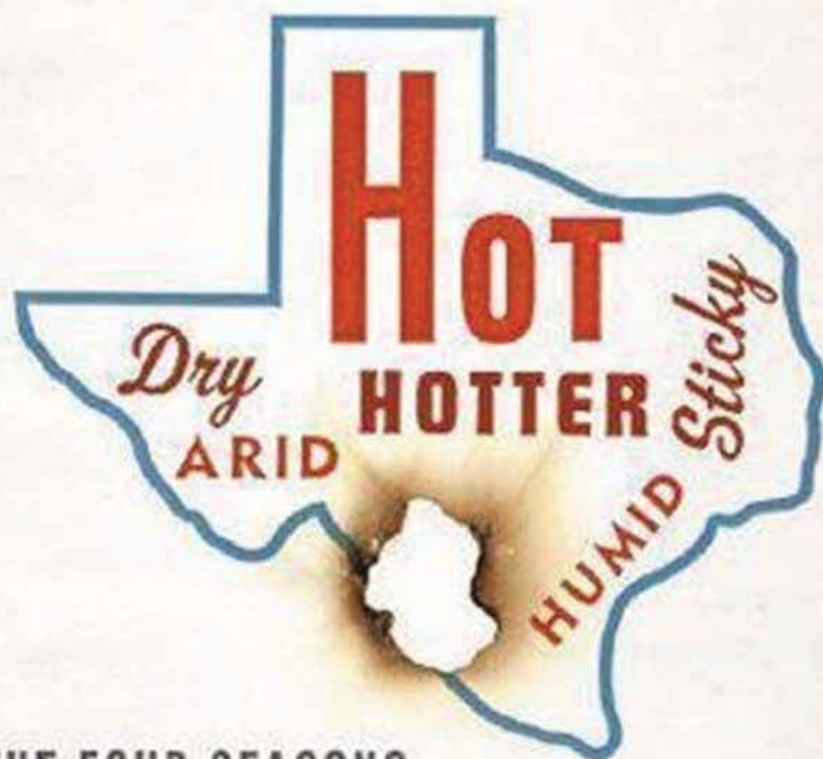
HISTORY

- Archeological evidence suggests that rainwater was being collected for use as early as 4500 BC in parts of India and the Middle East
- In China, rainwater harvesting was being practiced almost 6000 years ago
- In Texas, Mescalero Apaches used natural rainwater catchment systems near El Paso nearly 10,000 years ago to collect rainwater

LEGAL ISSUES IN RWH IN TEXAS

- Texas is one of only a few states in the nation that has devoted a considerable amount of attention to rainwater harvesting and has enacted many laws regulating the practice of collecting rainwater.
- Texas Tax Code 151.355 allows for a state sales tax exemption on rainwater harvesting equipment.
- Texas Property Code 202.007 prevents homeowners associations from banning rainwater harvesting installations.
- Texas House Bill 3391 requires rainwater harvesting system technology to be incorporated into the design of new state buildings and allows financial institutions to consider making loans for developments using rainwater as the sole source of water supply.

A CRASH COURSE IN
TEXAS WEATHER



THE FOUR SEASONS



JANUARY



SUMMER

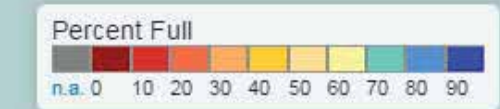
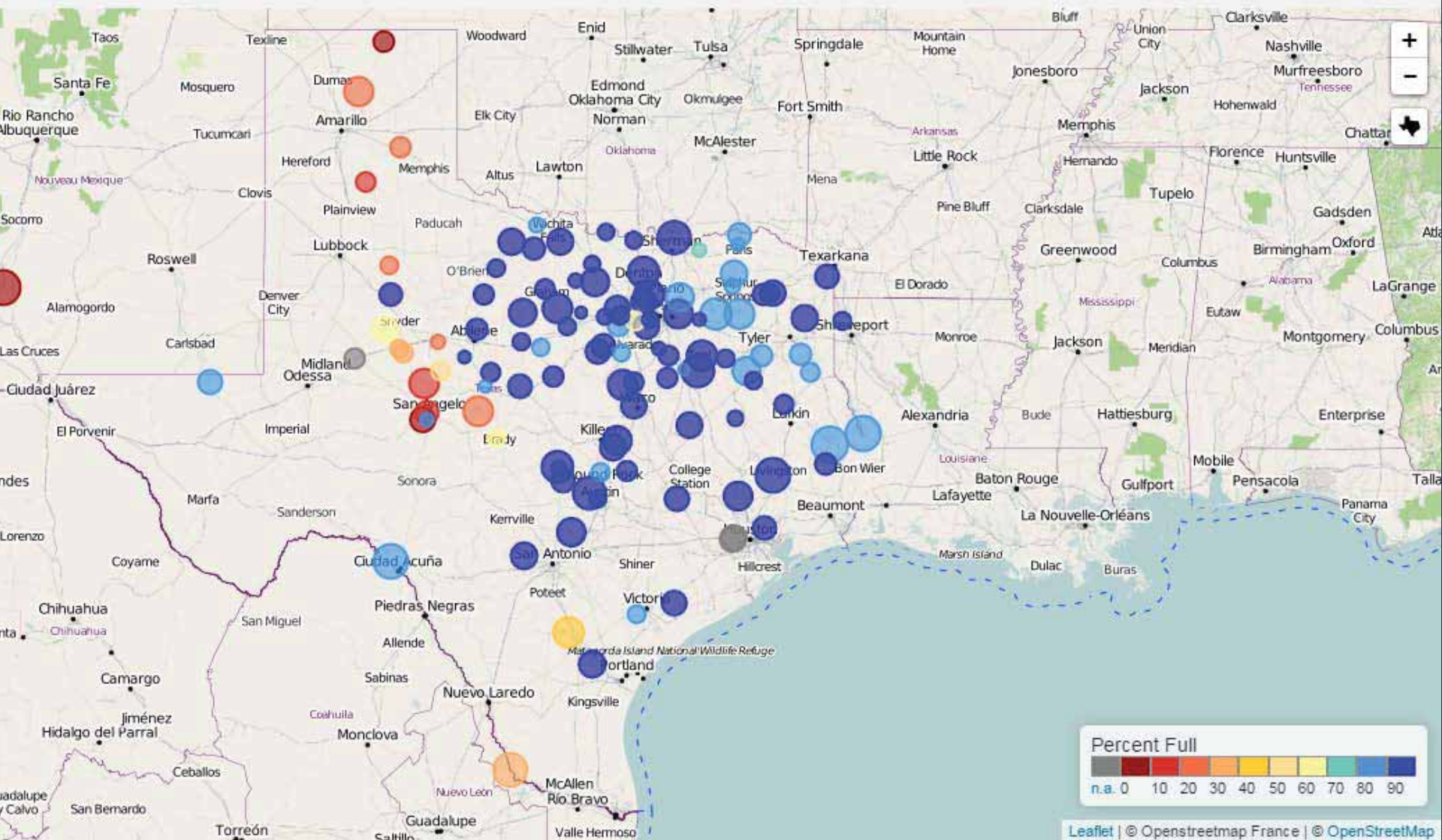


SUMMERER



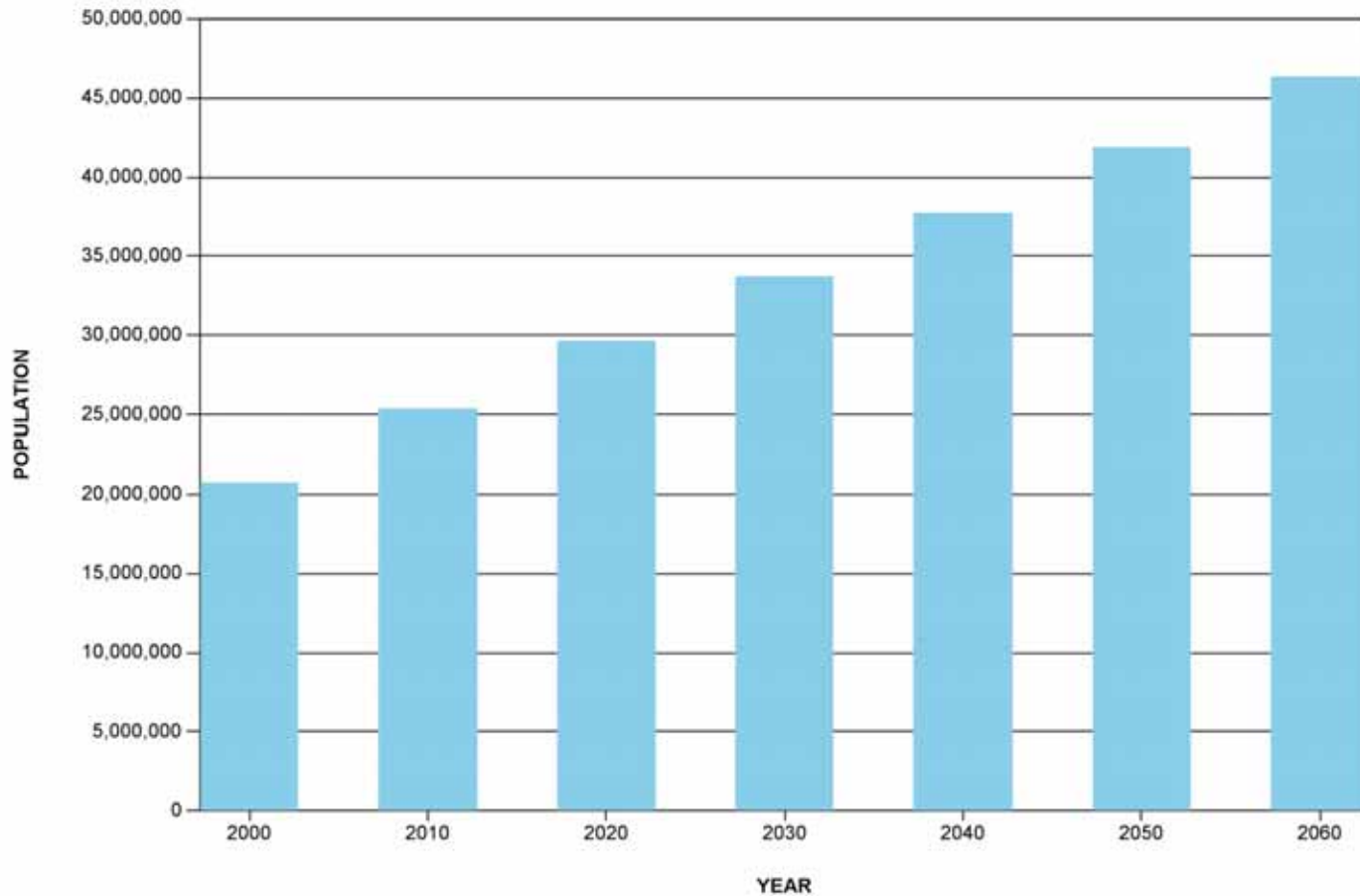
CHRISTMAS

UNLIMITED WATER SUPPLY?

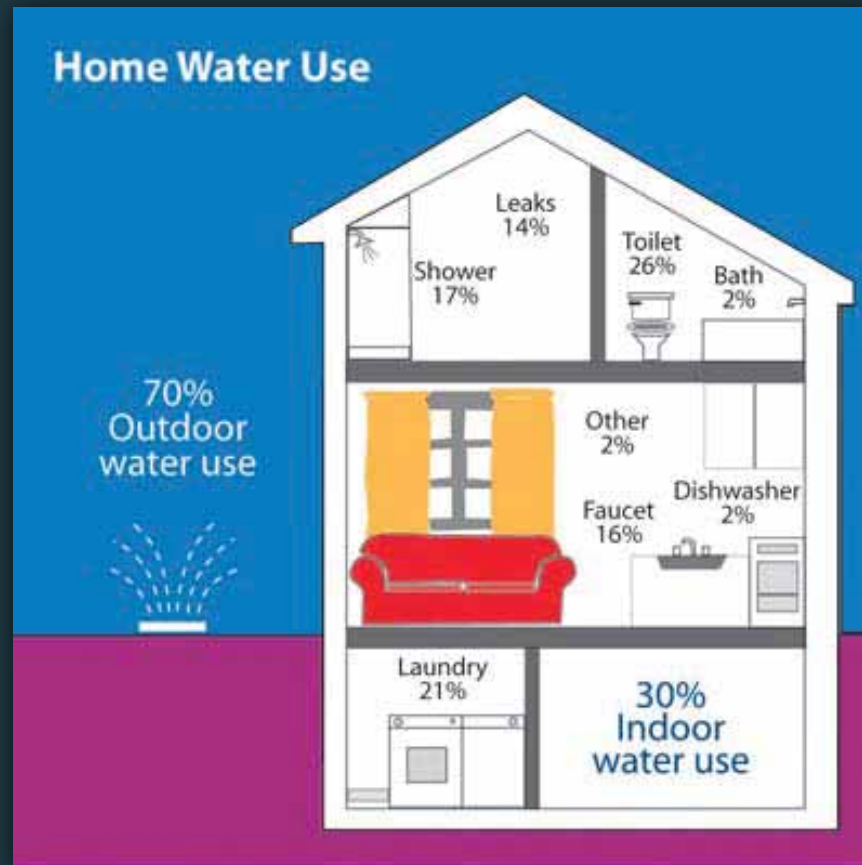


WATER DEMAND

POPULATION PROJECTIONS 2000 - 2060



HOW DO WE USE WATER?



HOW MUCH RAIN CAN I HARVEST?

- During a **one inch rain**, each square foot of a collection surface footprint receives 0.6 gallons of water

Total Gallons H₂O = Square Feet of Footprint X 0.62 Gallons



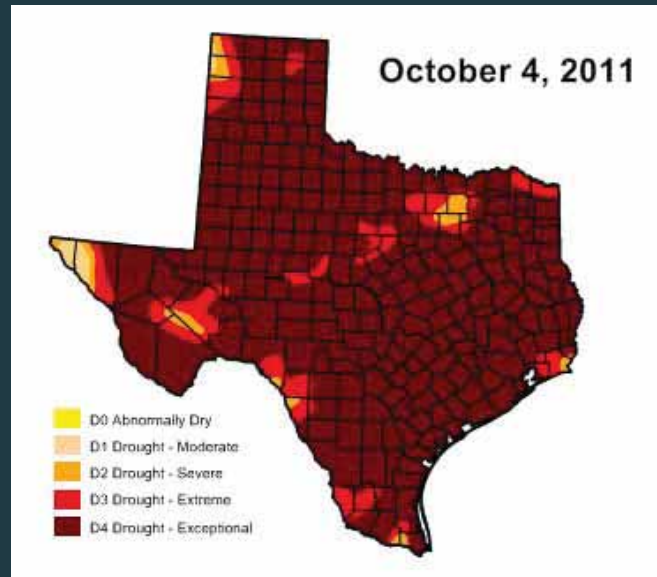
COLLECT RAINWATER IN A DROUGHT?

House

$2000 \text{ sqft} \times .6 \times 8.04 \text{ in} = 9,648 \text{ gallons}$

Barn

$6400 \text{ sqft} \times .6 \times 8.04 = 30,874 \text{ gallons}$



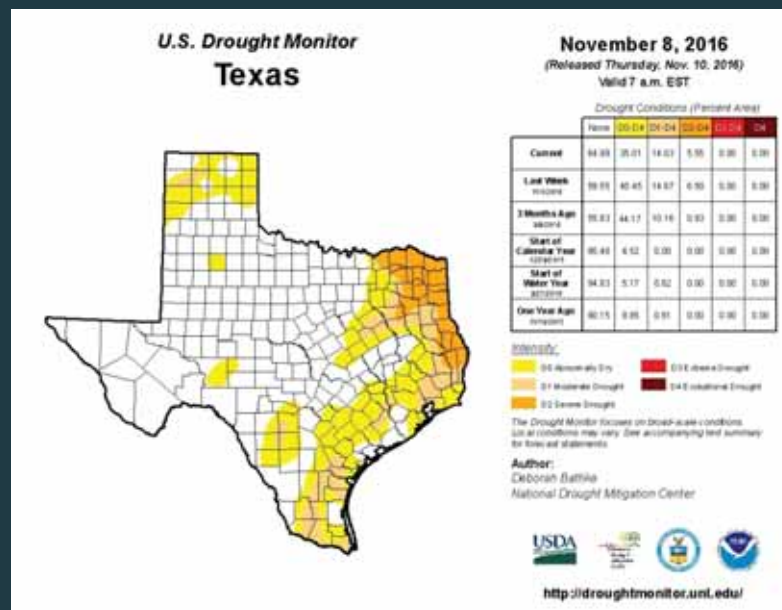
COLLECT IN AN AVERAGE YEAR?

House

2000 sqft X .6 X 34.62 in = 41,544 gallons

Barn

6400 sqft X .6 X 34.62 in = 132,940 gallons



HOW DEEP INTO IT ARE YOU WANTING TO GO?

- *Use—What will the water be used for?*
- *Budget—How much do you have budgeted?*
- *Time—How much time do you have available to install and maintain a system?*

- *Lets start by looking at a rain barrel...*

WHERE AND HOW MUCH?

☆ 55 GALLON PLASTIC RAIN BARREL DRUMS - \$30 (SA



9689



I have around
each. They o



Roll over image to zoom in

55 Gallon Water Storage Barrels 2 Inch Bung Hole BPA Free #2 - \$15 (Leand

image 2 of 2



Rain Wizard

50 Gal. Oak Rain Barrel

★★★★☆ (17) Write a Review Questions

\$80.79 /each

Plus, up to \$25 in Rebates +

AK Rain Wizard Rain Barrel 50 Gallon, Oak

reviews | 69 answered questions

Shipping Details

Estimated delivery in 20 hrs 58 mins and choose Standard Shipping at checkout.

Gift-wrap available



\$88.53



\$82.79

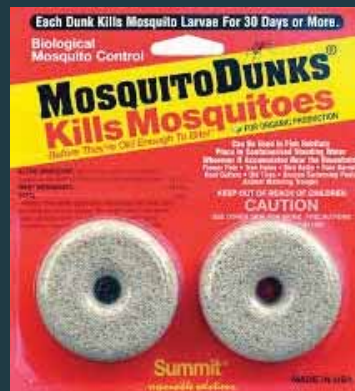


\$75.00

- 50 gallon capacity rain saver
- Classic whiskey barrel look
- Collect water that's great for plants and save money on water bills
- Flat-back design that saves space
- Made with ultra-tough, BPA-free, FDA approved, Polyethylene

SCREEN OUT MOSQUITOES AND TRASH

- *If open top, screen whole top*
 - *Use window screening or other fine mesh to screen water*
- *If with lid*
 - *Cut hole in lid and screw down screen*
- *Add mosquito dunks*
 - *Make sure overflow does not provide open water for mosquitoes*



RAINWATER HARVESTING BENEFITS

- *Saves money on water bills*
- *Reduces demand on municipal water supplies—Texas is growing!*
- *Reduces flooding, erosion, and contamination of creeks and rivers*
- *Supplies nutrients to plants—nitrogen*
- *Provides naturally soft water (sodium free and no hardness)*
- *Low scale buildup on appliances*
- *Makes efficient use of a valuable resource*

WHY WE SHOULD...

- *Since we can not depend on water to come when we want it, we either store or move it to be available when and where needed.*



REDUCE DEMAND

- RWH reduces demand on municipal supply
- Reduces well water demand
- Increases awareness of water used:
 - Leads to higher efficiency



WATER QUALITY

- **RWH is a method of stormwater management**
 - This equals less pollution runoff
- **RWH reduces peak runoff**
- **Allows water to be slowly recharged into aquifer**
 - Whether through irrigation or septic system or rain garden



POTENTIAL RAINFALL COLLECTION VOLUME

A report published by the Texas Water Development Board estimated that a metropolitan area the size of Dallas could capture roughly 2 billion gallons of water annually if just 10% of the roof area was used to harvest rainwater.



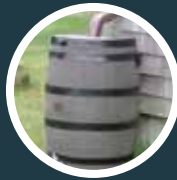
COMPONENTS OF A RWH SYSTEM



Catchment Area



Conveyance System



Storage

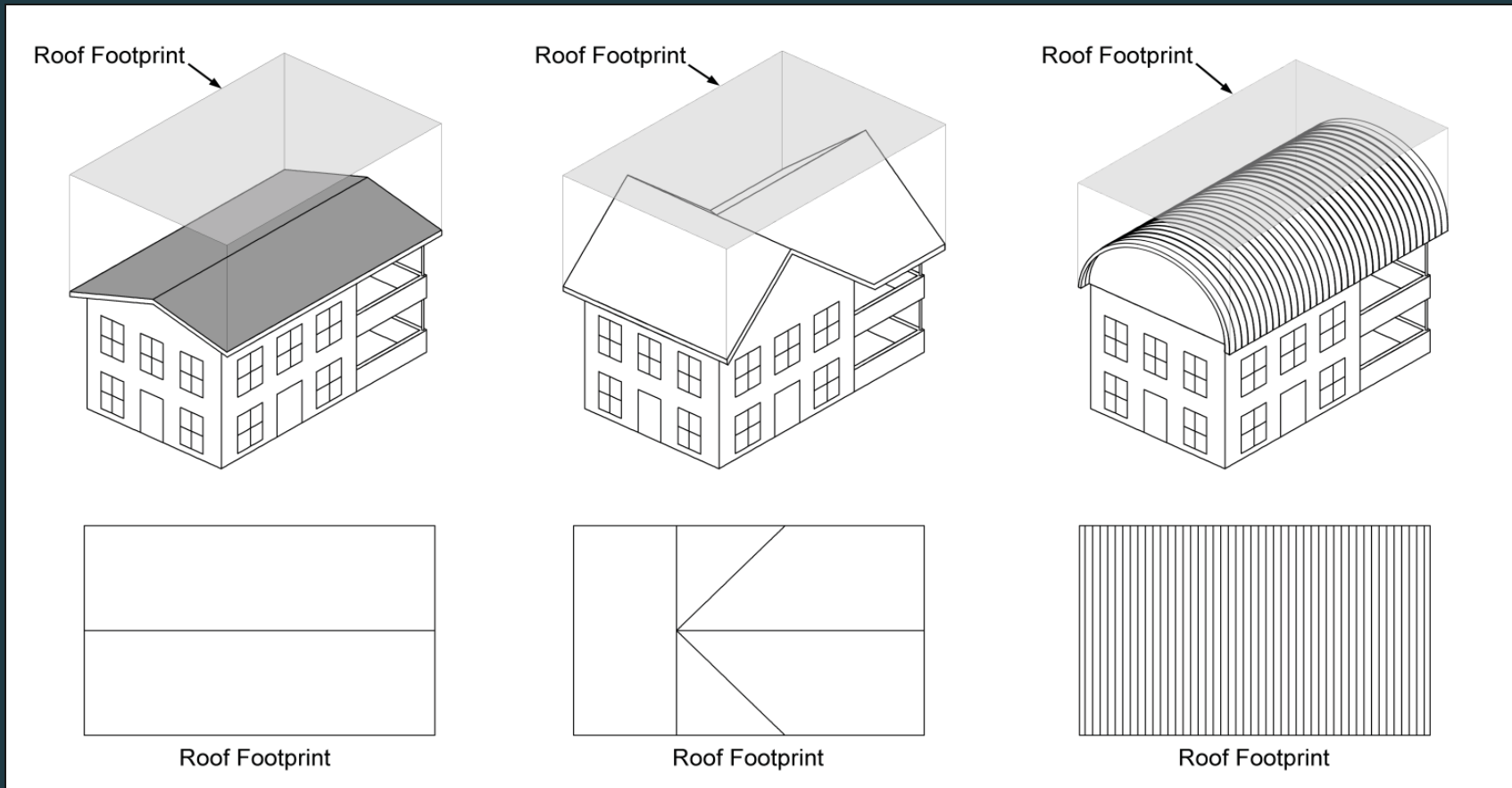


Treatment



Distribution

FOOTPRINT OF THE BUILDING



ROOFS AND COLLECTION SURFACES



WATER TREATMENT PHILOSOPHY

Better to protect the quality of the water from the beginning, rather than spend a lot of money, energy, and possibly chemicals on cleaning it up later.



ROOF MATERIALS



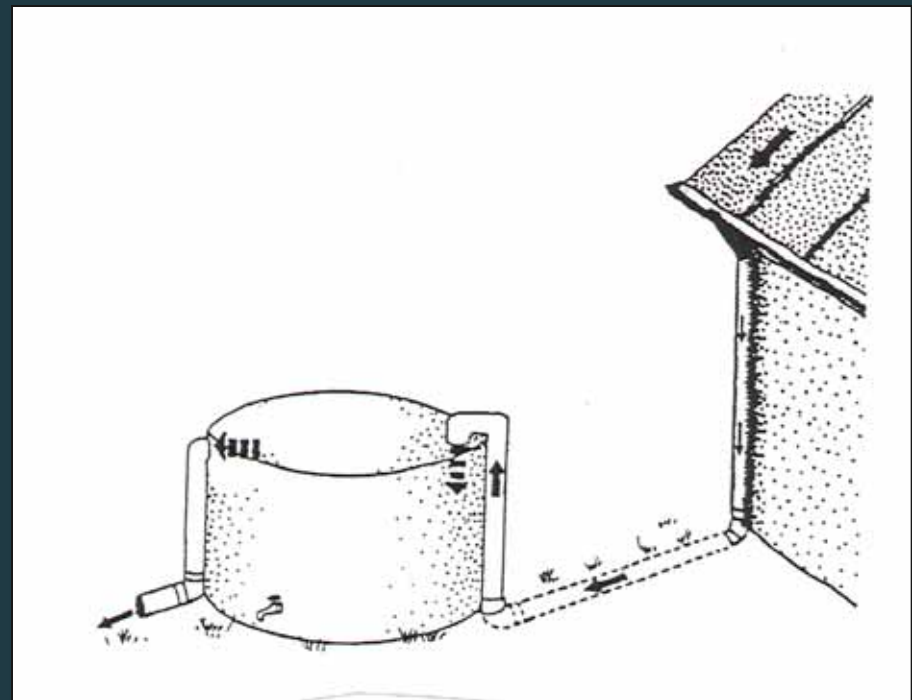
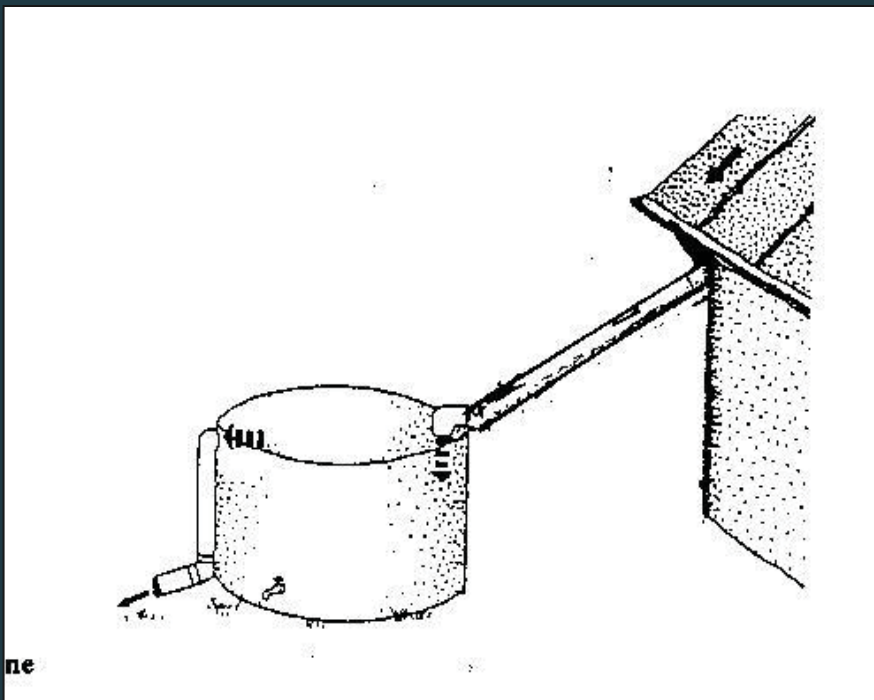
- Roofs made of chemically treated wood, composite asphalt shingles, asbestos, and some paints are not recommended for some uses.
- Depending on type, may have some loss due to surface wetting.
- Particle filters should be used if asphalt shingles are used.



CONVEYANCE SYSTEMS



DRY LINE VS. WET LINE CONVEYANCE

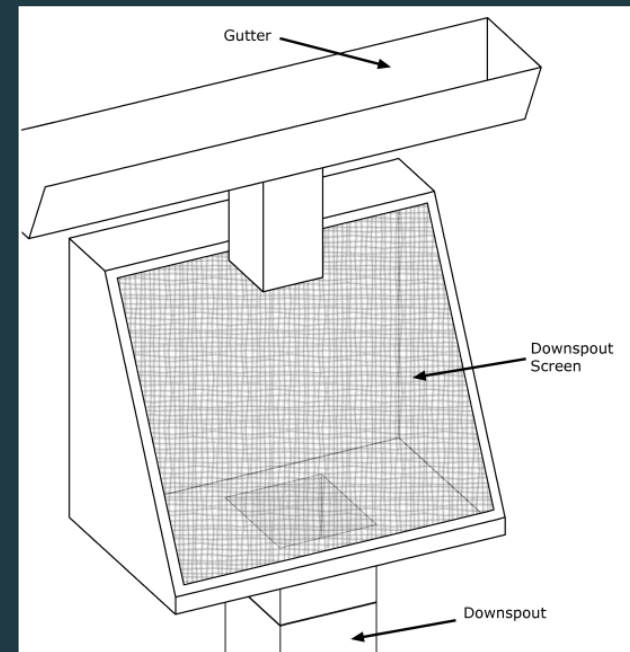
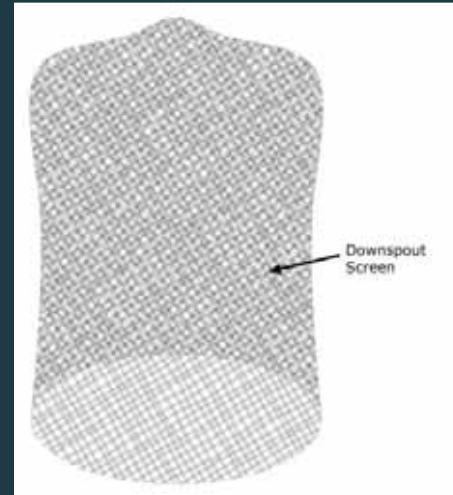
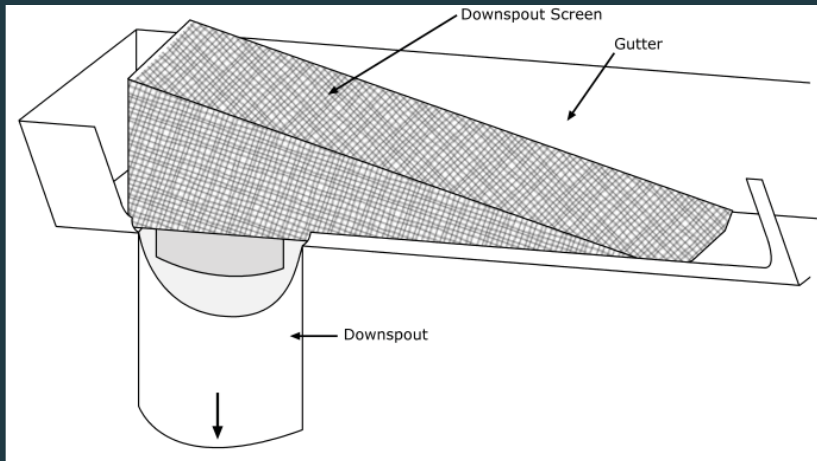


FILTRATION

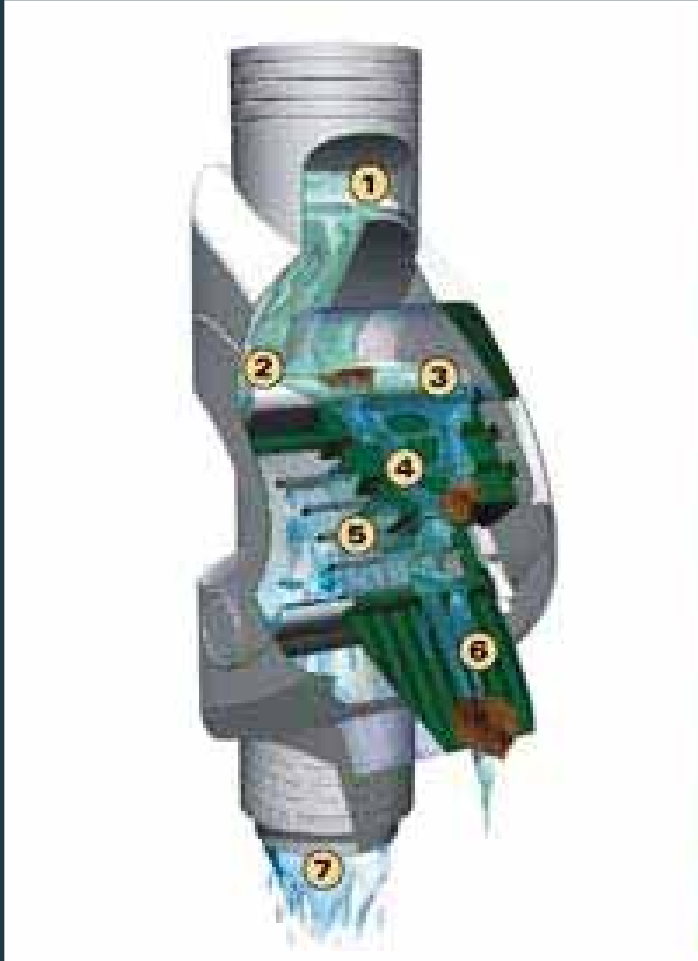
- *Leaf screens*
- *Downspout filters*
- *Strainer baskets*
- *Self cleaning filters*
- *First flush diverters*



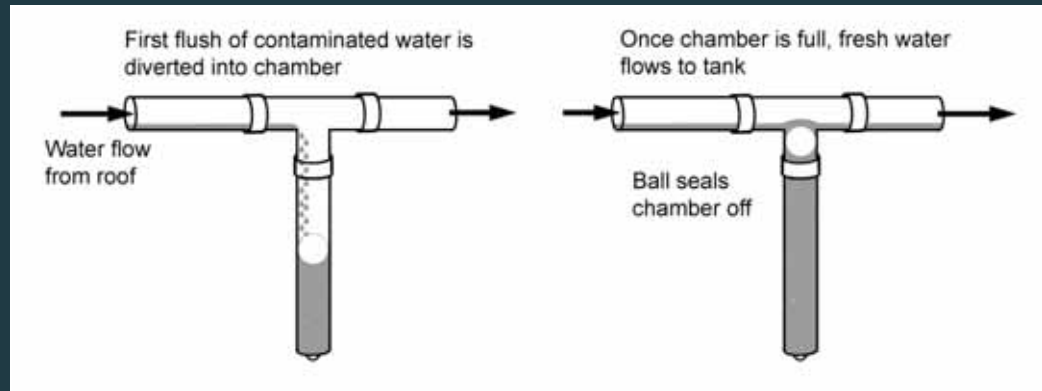
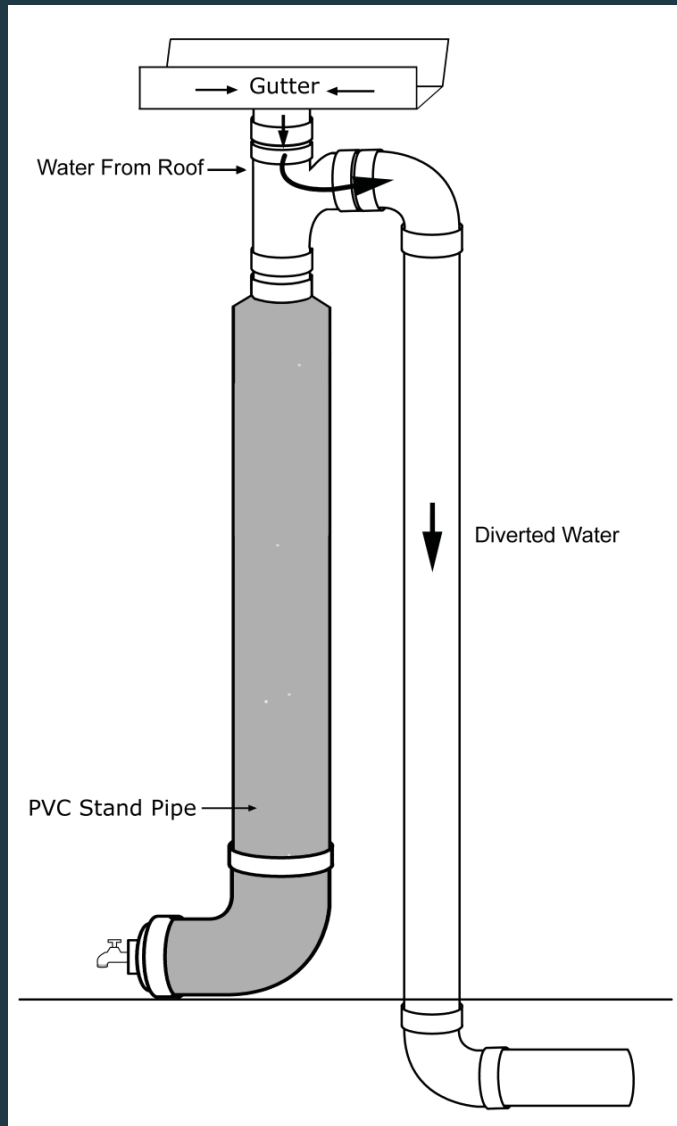
SCREENS AND GUTTER GUARDS



DOWNSPOUT FILTERS

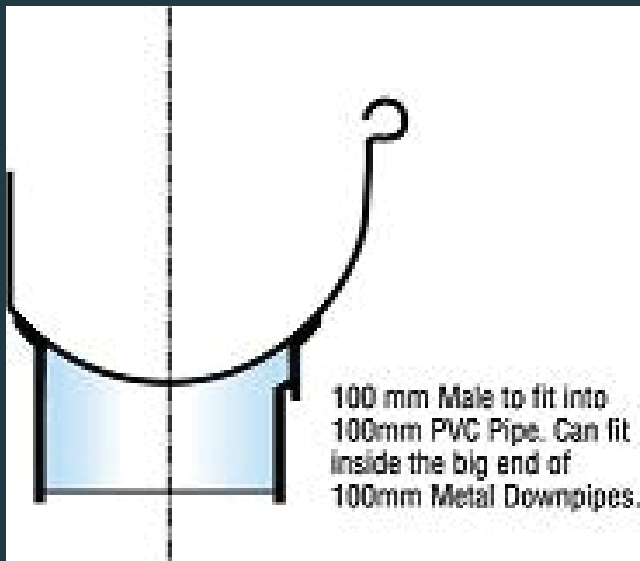


FIRST FLUSH DIVERTERS



WEIGHT – 8.33 LB/GALLON

7.5 GALLONS PER CUBIC FOOT



Sizing Gutters

The gutters should be sized so that they adequately move rainwater runoff from a 100-year storm

As a general rule, gutters should be at least 5 inches wide

Downspouts

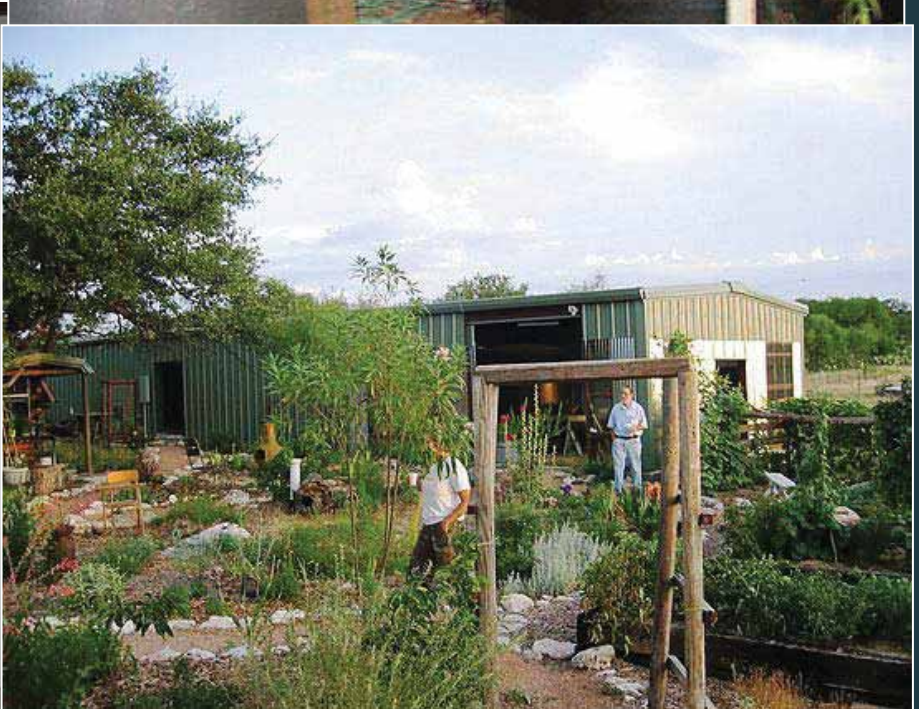
Provide one square inch of downspout area for every 100 square feet of roof area.

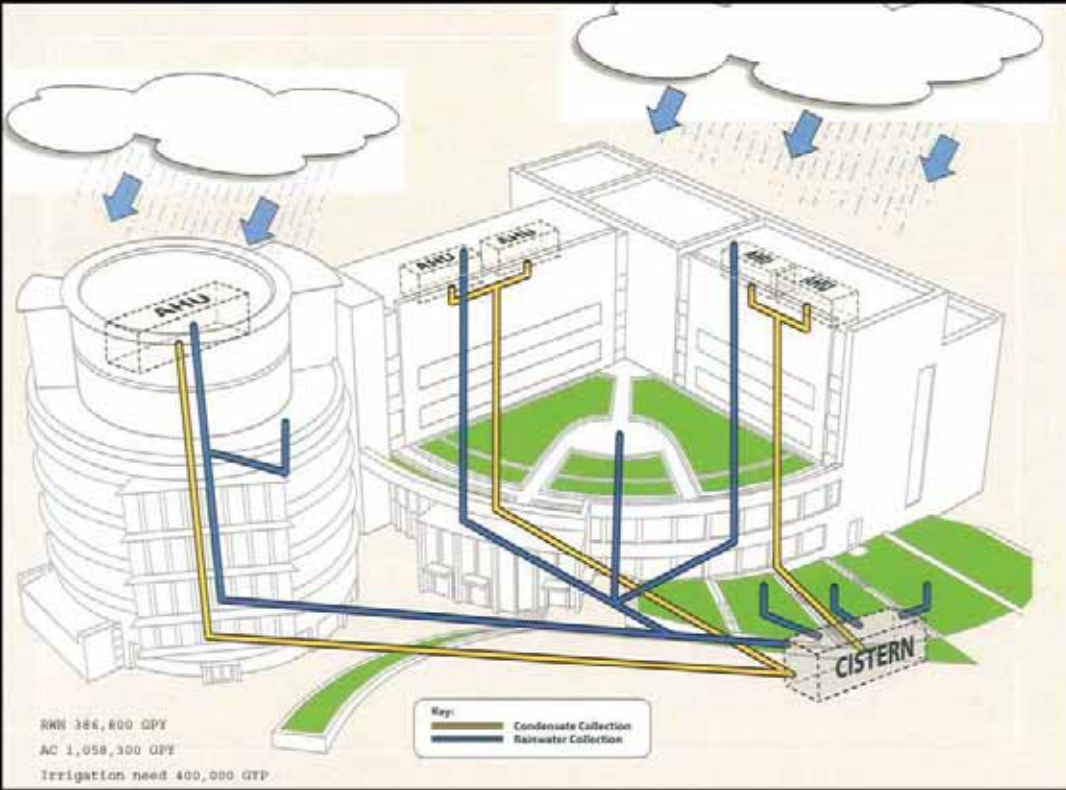
For example, a 2" x 3" downspout (6 square inches) can accommodate runoff from a 600 square foot roof. A 3" x 4" downspout (12 square inches) can accommodate runoff from a 1,200 square foot roof. The same rule can be used for circular PVC piping.



STORAGE OPTIONS



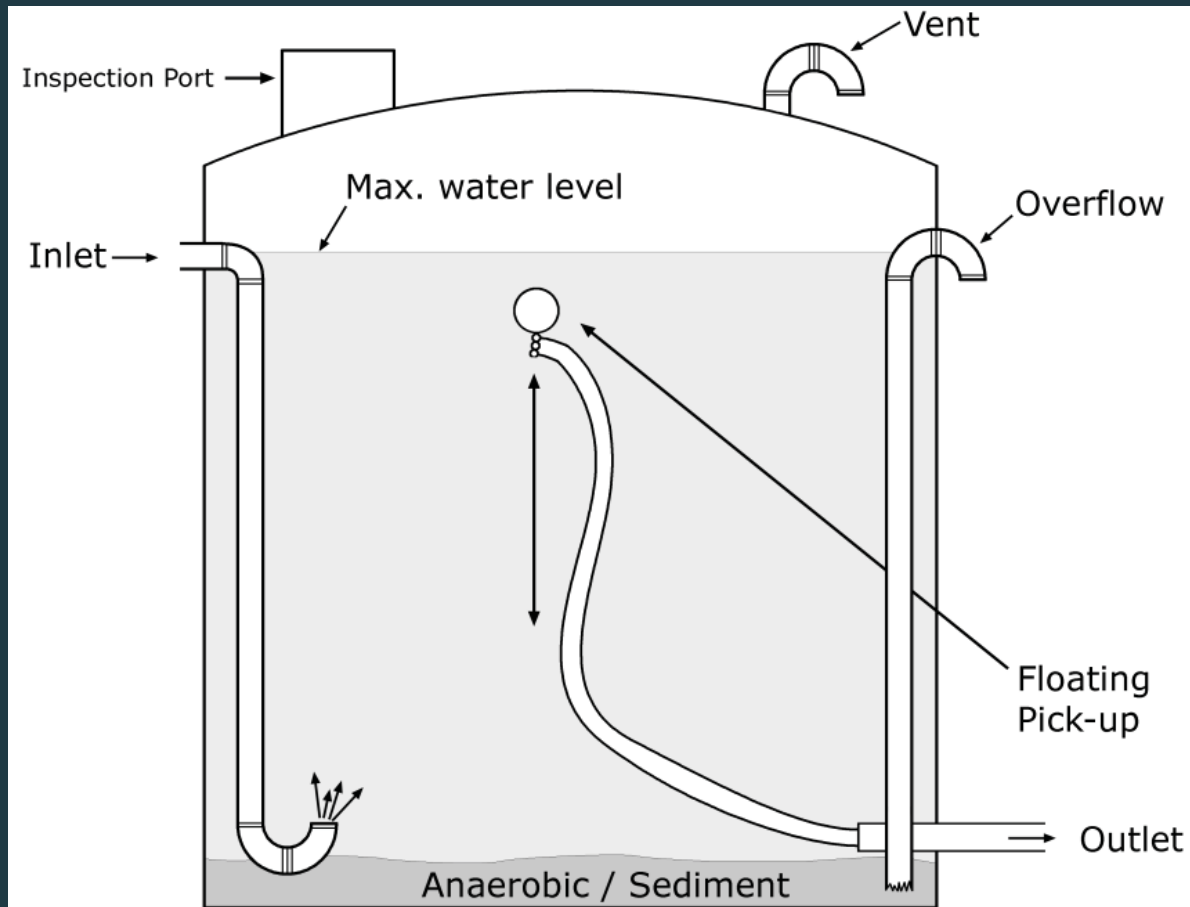




TEXAS A&M
AGRI LIFE
EXTENSION

WATER GOING IN AND OUT

- *Inlet – side or top or bottom*
- *Taking water out*
- *Overflow*
- *Inspection port*
- *Vent*



SAFETY

- *Tank*
 - *good water quality requires no light penetration*
 - *Prevents algae growth*
 - *Screened to keep insects out*
 - *Secured access to keep wildlife/children out*

OVERFLOW PIPE

The overflow allows water to run out of the tank when it is full rather than backing up into the gutter.

Do it right in order to prevent erosion and flooding the yard.



WHAT CAN RWWH LOOK LIKE?



NEW WATERING SOURCE



HUNTERS CABIN





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EXTENSION

Fiberglass Tanks



33,000 GALLON TANK - ADVANCED ALPHARETTA GA





2@1440 TANKS UNDER MASTER BEDROOM DECK



MORE OPTIONS





OTHER TANKS



PILLOW TANKS





TREATMENT SYSTEM

- *Most will require an electrical supply*
- *UV bulbs should be replaced 1/year*
- *UV systems start around \$750*
- *Bulbs cost around \$100*
- *Filters cost around \$100*



DISTRIBUTION

- Gate valve and faucets
- Hoses



PUMP AND PRESSURE TANK

Options: 1) Shallow well pump plus a pressure tank 2) On-Demand Pump or 3) Submersible Pump



WHEN NOT TO COLLECT

- *Bypass system during major pollination seasons*

HOW MUCH DOES IT COST?

Fiberglass VS Metal tanks

- Fiberglass or poly tanks are less expensive than metal
- Cost per gallon stored is less the larger the system
- End use determines level of treatment needed, which determines cost





MORE ON COSTS

- *5,000 gallon tanks can cost about \$1.30 - \$2.25 for every gallon of storage.*
- *7,500 gallons and up can cost between \$0.87 and \$1.75 for every gallon of storage.*
- *Gutters - \$1 to \$3 per linear foot*
- *Pumps – start around \$400*

Example

Tank Town estimate = \$10,000 - \$15,000 for a 10k gallon fiberglass tank, first flush device, pump, filters and uv light.

COST OF 5,000 GALLON SYSTEM AT ILSOLC

- *5,000 gallon metal tank with liner* \$7,000
- *50' of gutter* \$250
- *Piping* \$65
- *Pump* \$450
- *Water line* \$65

Grand total = \$7,830



SYSTEM MAINTENANCE

- Maintenance time and cost
 - Clean first flush system, gutters, etc
 - Repairs to pumps, valves, lines, etc
 - Replace UV bulbs, filters



FOR MORE INFORMATION

Rainwaterharvesting.tamu.edu

Ossf.tamu.edu

Twon.tamu.edu

Tws.tamu.edu

Geronimocreek.org

twdb.texas.gov/innovativewater/rainwater