TEXAS A&M AGRILIFE EXTENSION

Rain Gardens

Rainwater Harvesting

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"When the well runs dry we will know the worth of water."

— Benjamin Franklin

Water is life

- Two methods to sustain water supply:
  - Increase Supply
  - Reduce Demand

Nature's First Rain Catchers

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1/3 of Root Die Annually

Roof-Reliant Landscaping™

Rainwater Harvesting with Cistern Systems in New Mexico

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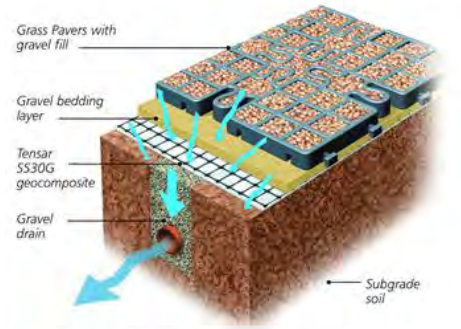
New Mexico Office of the State Engineer

1-800-WATER-NM • www.ose.state.nm.us

Office of the State Engineer
nm
Interstate Stream Commission

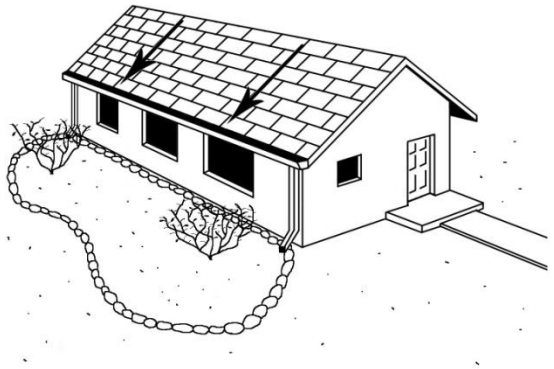
Low Impact Development (LID)

- Low impact development (LID) is increasingly being adopted as an alternative to traditional water management systems.
- LID includes practices such as bioretention, green roofs, rainwater harvesting, and permeable pavements.



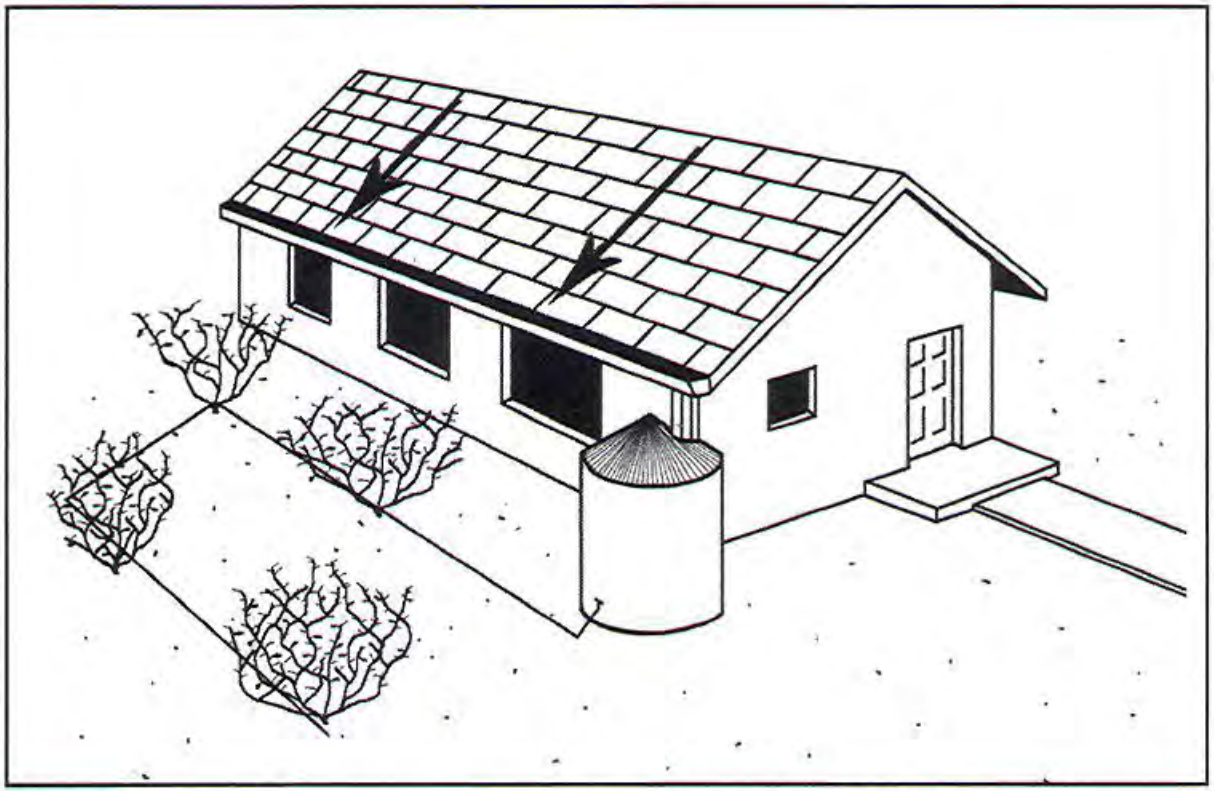
How Rainwater Harvesting Works

- Types of Systems
  - Simple and complex systems
    - Simple: distributes rainwater immediately



    - Complex: stores some or all of rainwater for later use

Complex /Active Rainwater Harvesting



Complex water harvesting system with roof catchment, gutter, downspout, storage and drip distribution system.

How to Collect Rainwater

- .6 gallons per square foot roof per 1” rainfall
- 2,000 sq. foot roof X 1" rain (0.6) = 1,200 gal. water
- 1,200 gal. X 30" rainfall per year= 36,000 gal/yr

How Big Does The Roof Need To Be?

5’ diameter
Pi times radius squared
3.14 x 2.5 x 2.5 = 19.6 square feet
19.6 x .6 = 11.8 gallons per 1” rain
4” = Full Tank

32 inches = Filled 8 times/yr

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Filled 16 Times!

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24 Times

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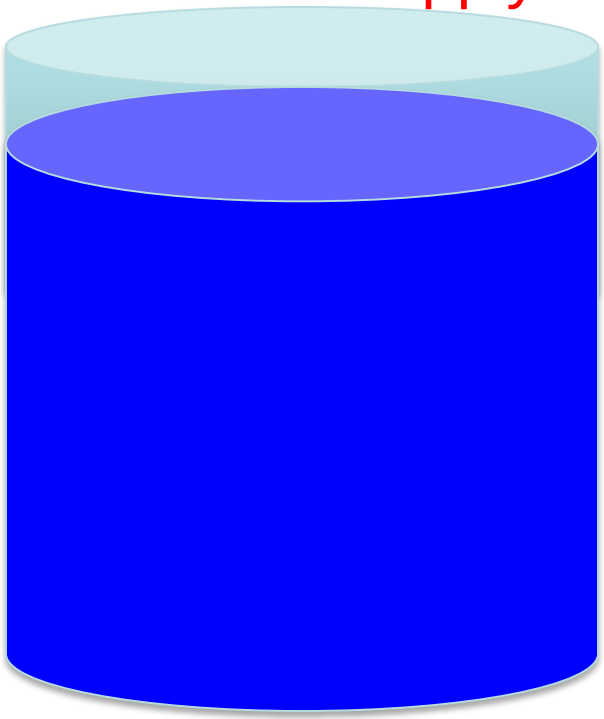
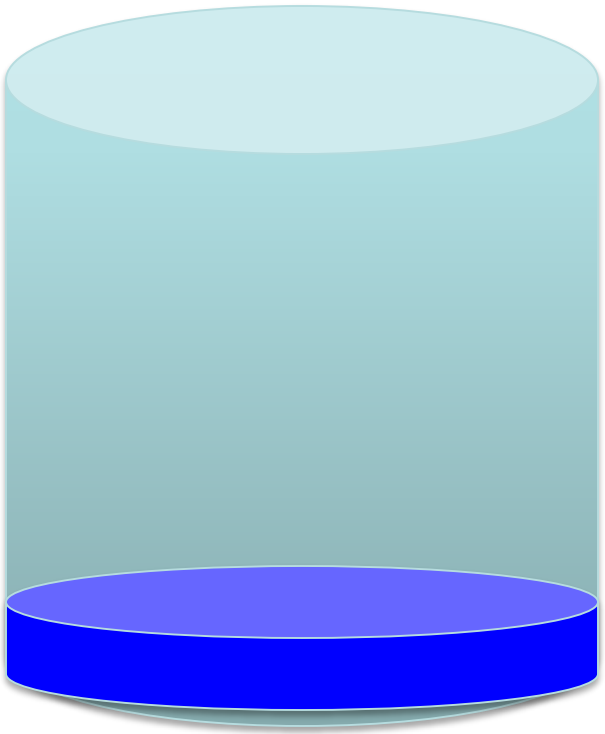
Three approaches to rainwater/stormwater management

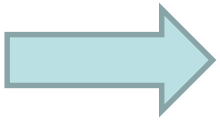
Cistern managed for water supply



Cistern managed for stormwater control



AND



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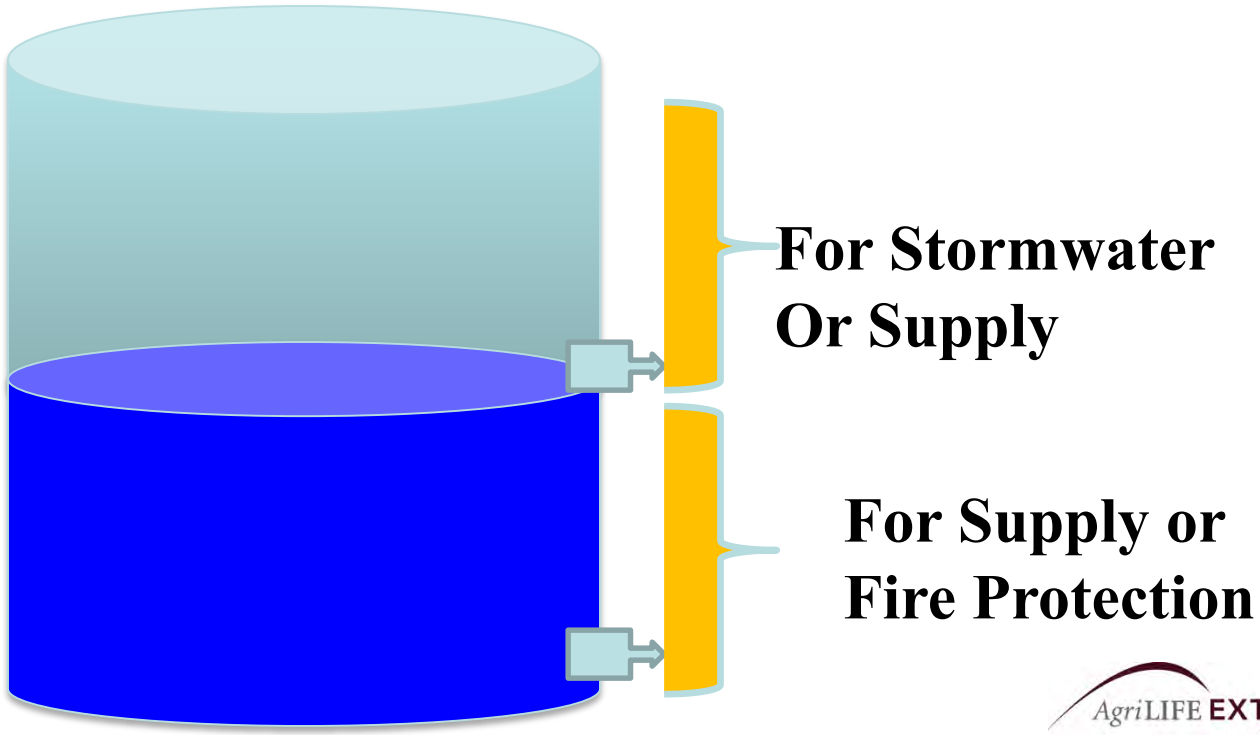
Cistern managed for BOTH water supply
and managed for stormwater control or fire protection



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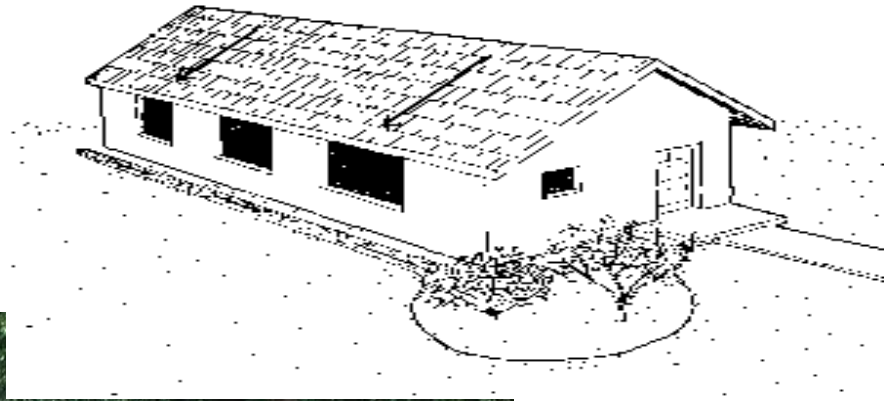
Simple - distributes rainwater immediately



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What is a Rain Garden (Bioretention)?

A rain garden is a beautiful landscape feature consisting of a planted shallow depression that collects rainwater runoff from roofs, parking lots and other impervious surfaces.

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Rain Garden in Parking Lot

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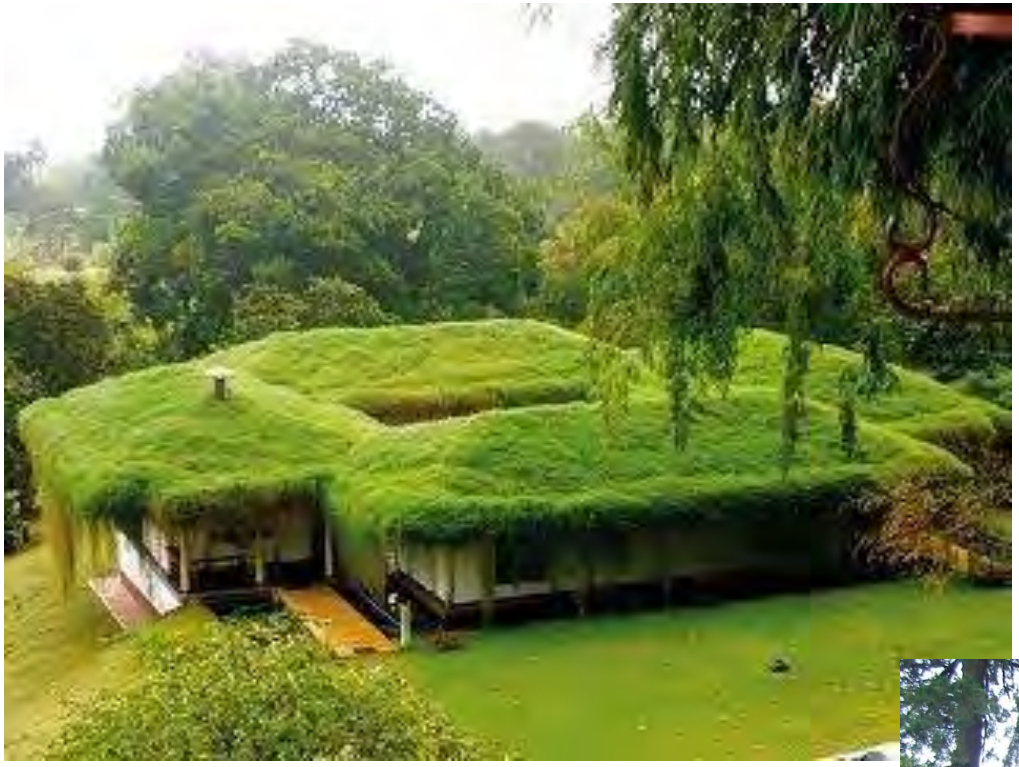


JUNCTION
MIDDLE SCHOOL
WELCOME BACK!
SEPT. 7 HOLIDAY
14 PROGRESS REPORTS
GO EAGLES

Rain Gardens

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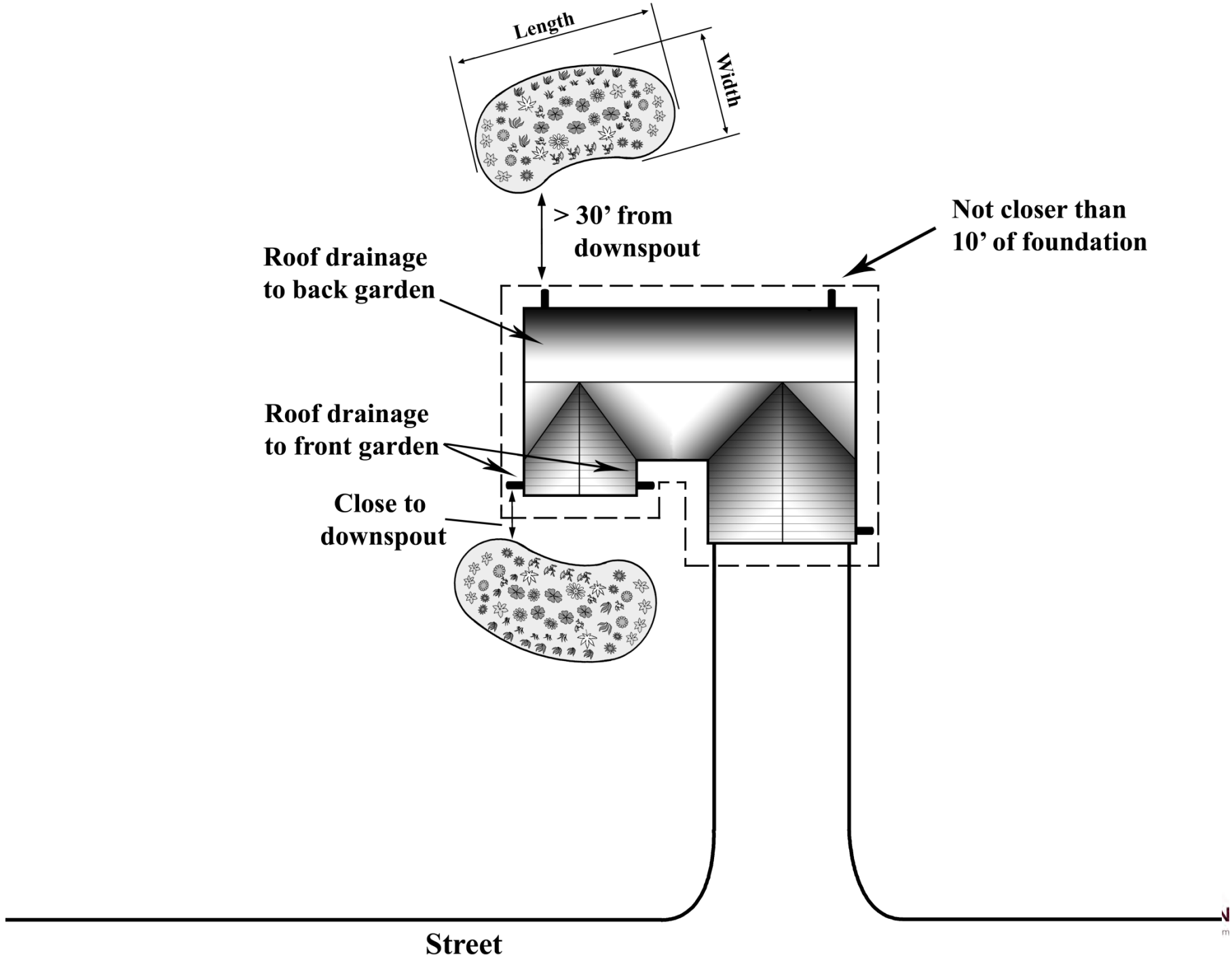
How do I determine where the system should be located?

- Proximity to foundations
- Location relative to downspouts
- Ground cover
- Slope
- Views from the house and road
- Existing landscape

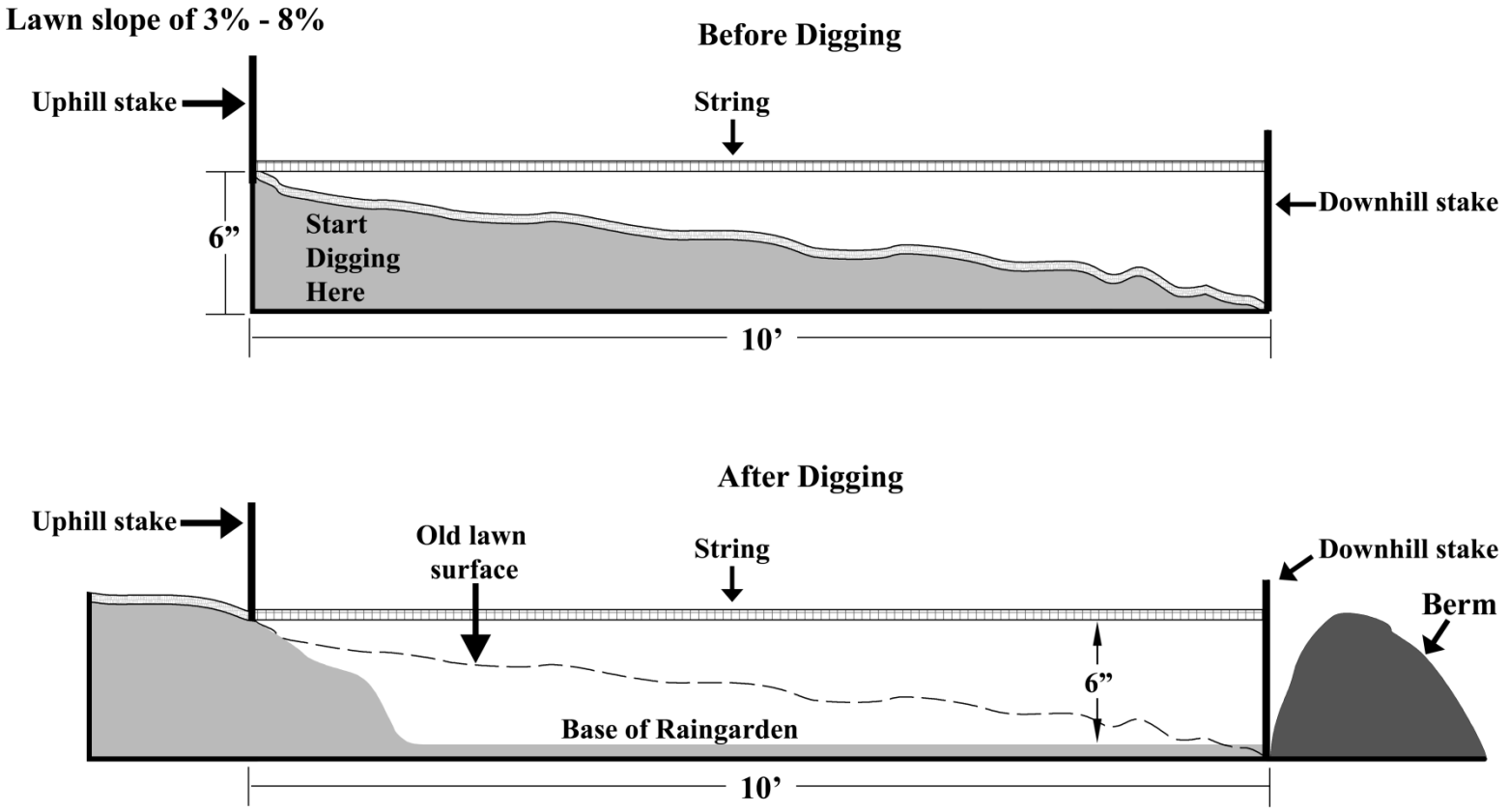
How do I determine where the system should be located?

- Proximity to foundations
  - > 10 feet from a structure or foundation

- Location relative to downspouts
  - Garden will catch water from roof as well as all grass uphill


Length
Width
> 30' from
downspout
Not closer than
10' of foundation
Roof drainage
to back garden
Roof drainage
to front garden
Close to
downspout
Street

How do I determine where the system should be located?



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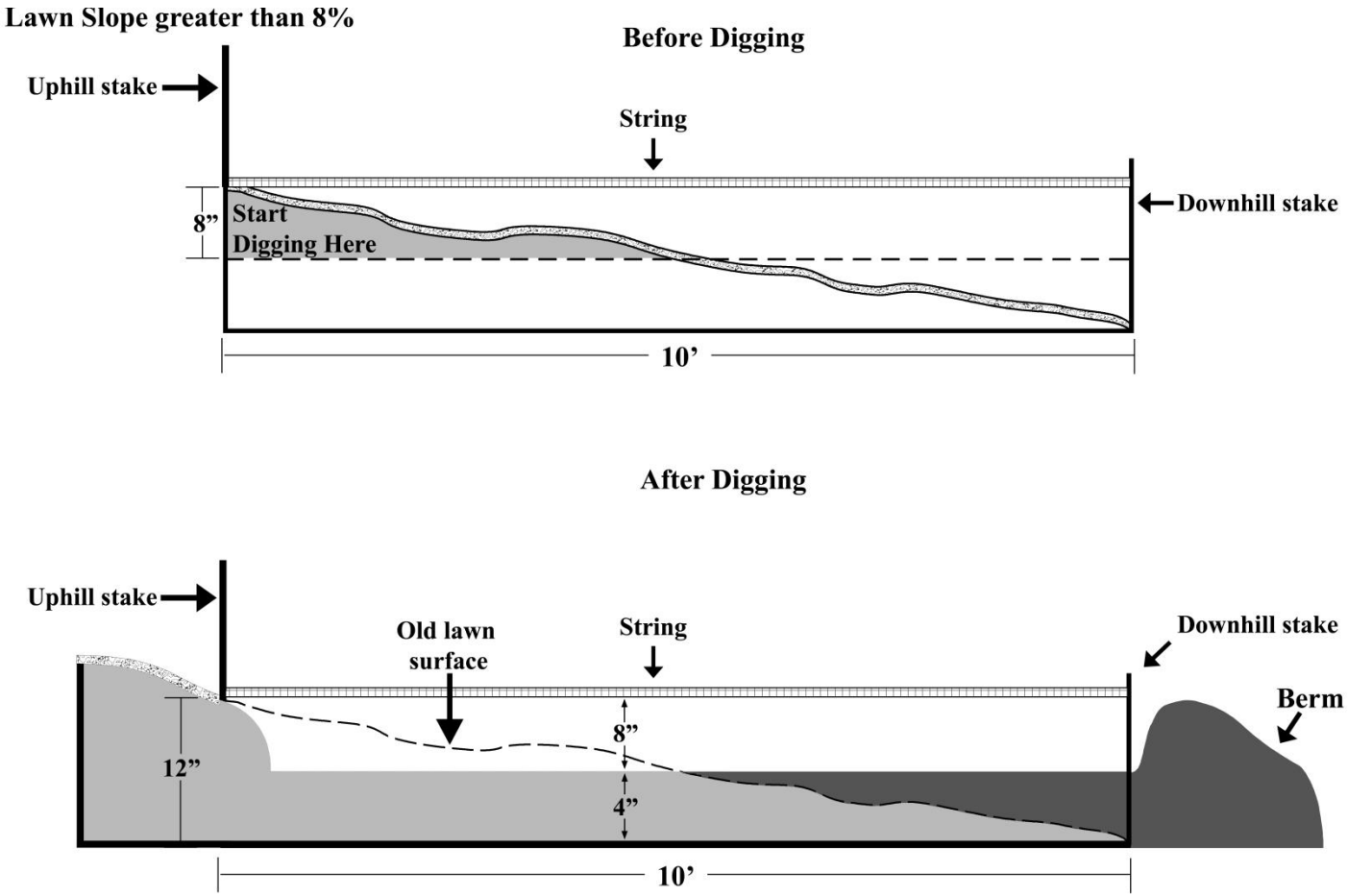

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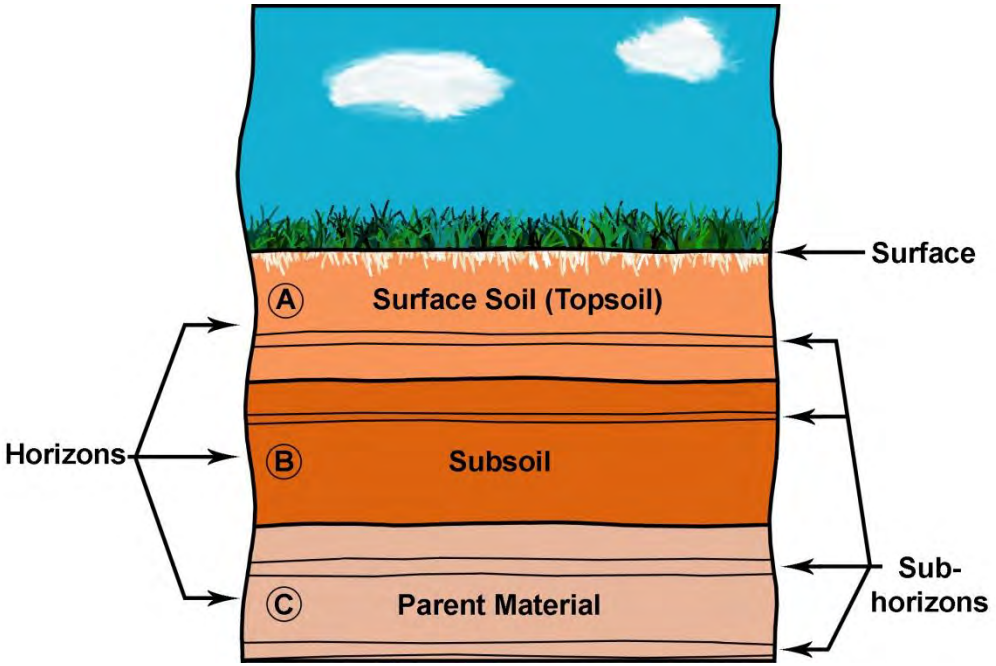
How do I determine the size of my raingarden?

- Slope
- Soil texture class
- Distance from downspout
- Catchment area

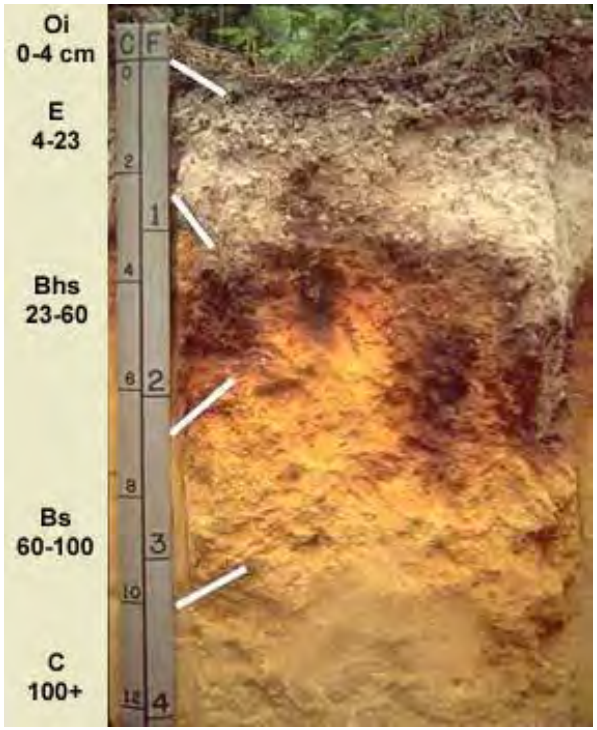
How do I determine the size of my raingarden?

- Water movement and Soil characteristics
  - Soil characteristics influence water movement
    - Soil profile (horizons)
      - Impermeable layers
      - Seasonal groundwater indicators

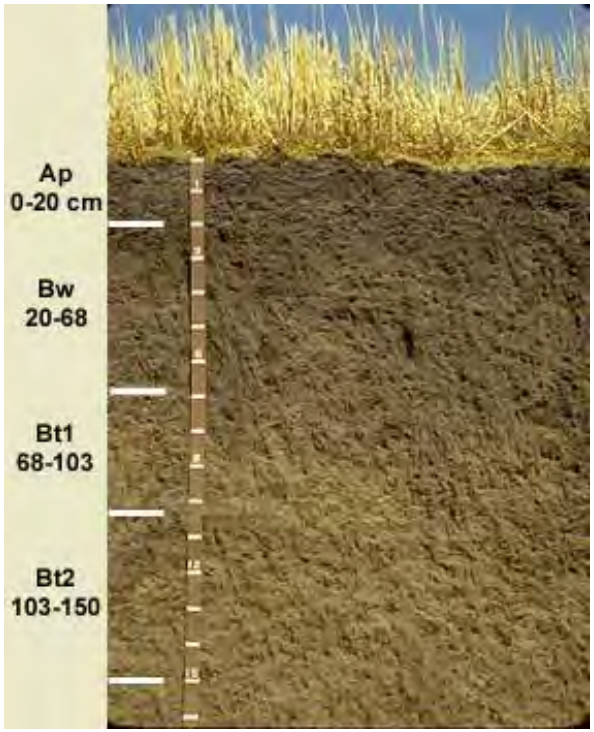


Soil Types

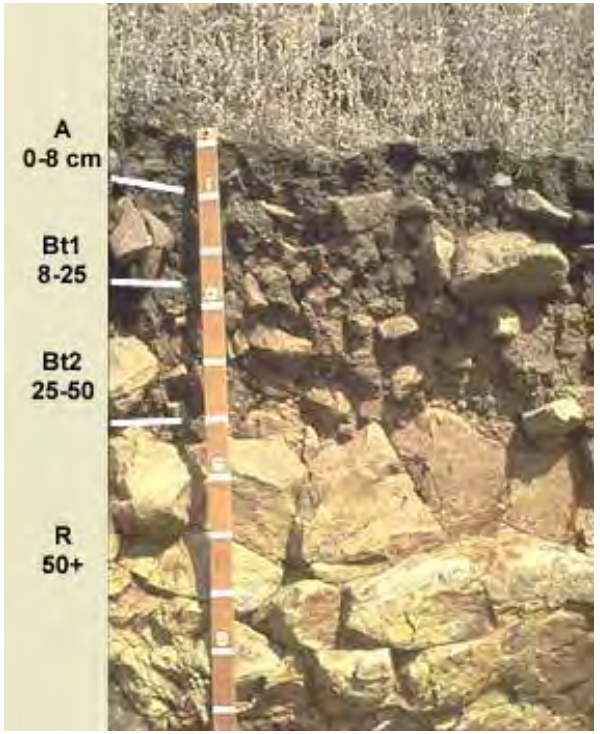
Sand, Clay, Shallow / Rocky



Sand

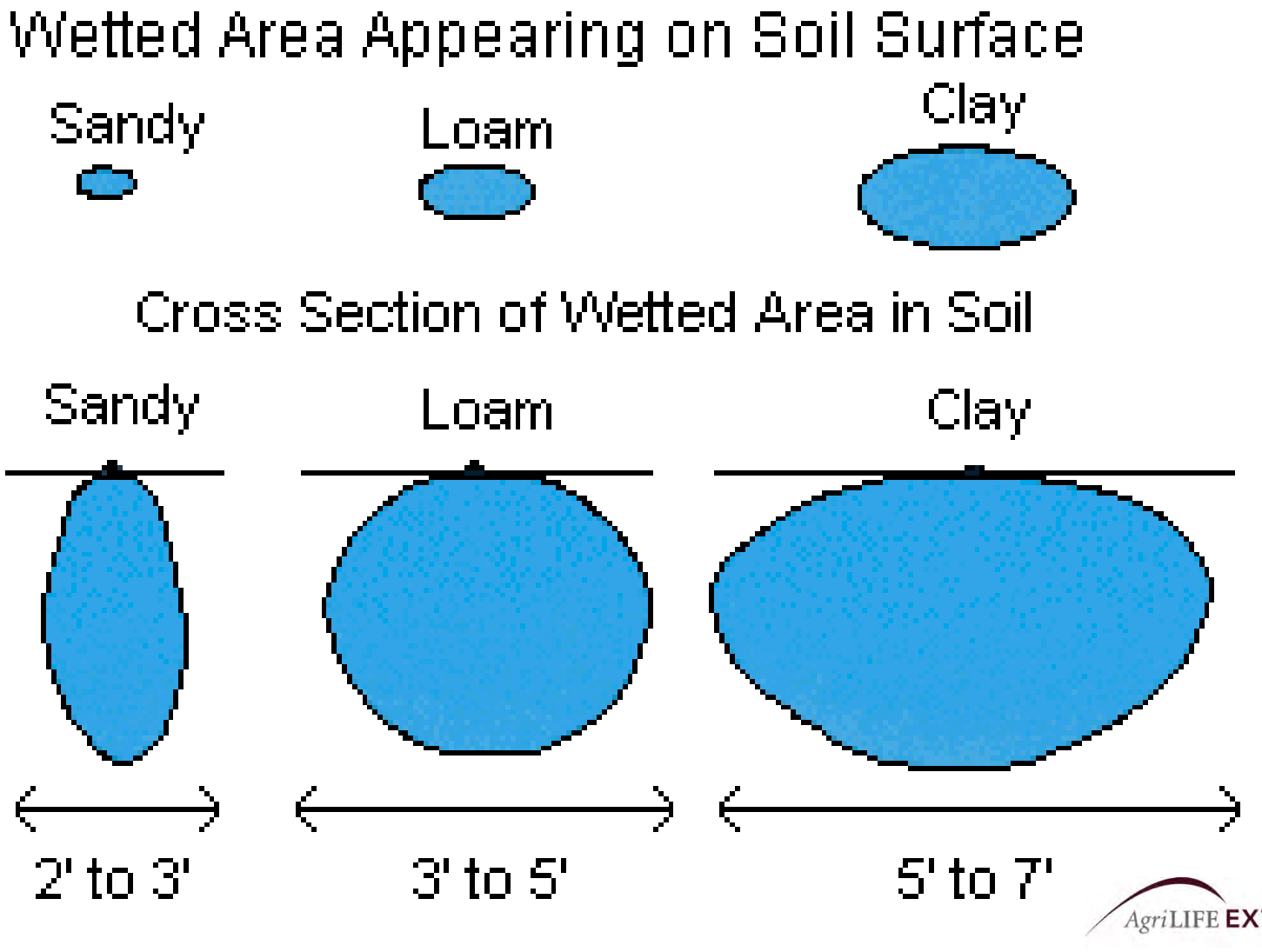


Clay



Shallow / Rocky

Wetting Patterns



How do I determine the size of my raingarden?

- Catchment area
  - Determine catchment area
    - Footprint of roof and any area of lawn between the downspout and the raingarden.

How do I determine the size of my rain garden?

- Sizing factor
  - Sizing factor for rain gardens less than 30 feet from a downspout.

	3-5 in. deep	6-7 in. deep	8 in. deep
Sandy soil	0.19	0.15	0.08
Silty Soil	0.34	0.25	0.16
Clayey soil	0.43	0.32	0.20

Construction and Maintenance

- Key to the success and long term operation of the system
- Soil Compaction
  - Compacted soil lowers the infiltration rate
  - Aeration or loosening of the soil may be needed
- Berm
  - Utilize as much of the soil from the garden
  - Compact soil on the berm
  - Gentle slopes

Next Determine the Roof Size

Library Roof Length: 30 feet - Width: 20 feet: 30 x 40 = 1,200 square feet
Soil type: silt
Distance from Library: 30 feet
Factor to use: .34
Dam height: 5”
Minimal size: 1,200 x .34 = 408 sq. feet
(Does not include drainage area from the ground going into the garden)

Place Flags Around Proposed Area

- Determine shape and square footage of proposed rain garden – 12 x 40 = 480 sq.’

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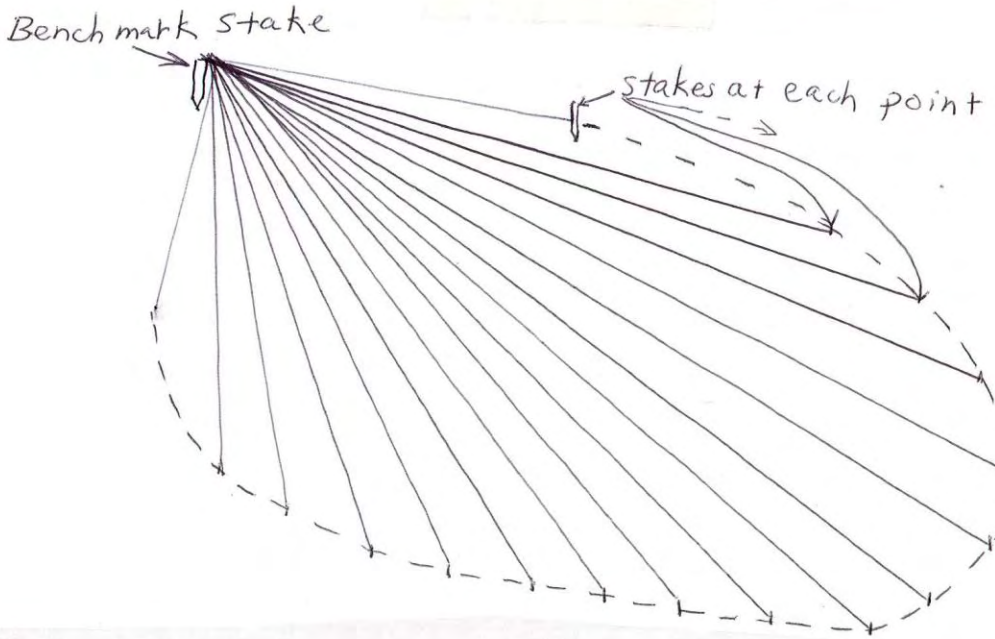
Drive First Stake at the Highest Point of the Garden

Drive Next Stake Down to same Level

The stake at the lowest point is used as a benchmark and the level of the garden is based on that stake.



Then We Used a String Level and Used One Stake as our Benchmark And Leveled Everything To It Using a String Level

All the Soil Was Built up to the Top of the String on the edge at the Stakes – And Down 5” Inside the Garden Area

Areas Too Deep Were Filled In And Places Too Shallow Had To Be Dug Down

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Finally All the Garden Area is 5” Deep and Level Throughout the 480 Square Foot Area

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The Area Between the Downspout and the Garden Needs Protection From Erosion – Rocks Protect the Soil

Adding Plants – These Are Native Tall Bunch Grasses – Notice How Spread Out The Water Is

Big Bluestem
Little Bluestem
Yellow Indiangrass
Switchgrass

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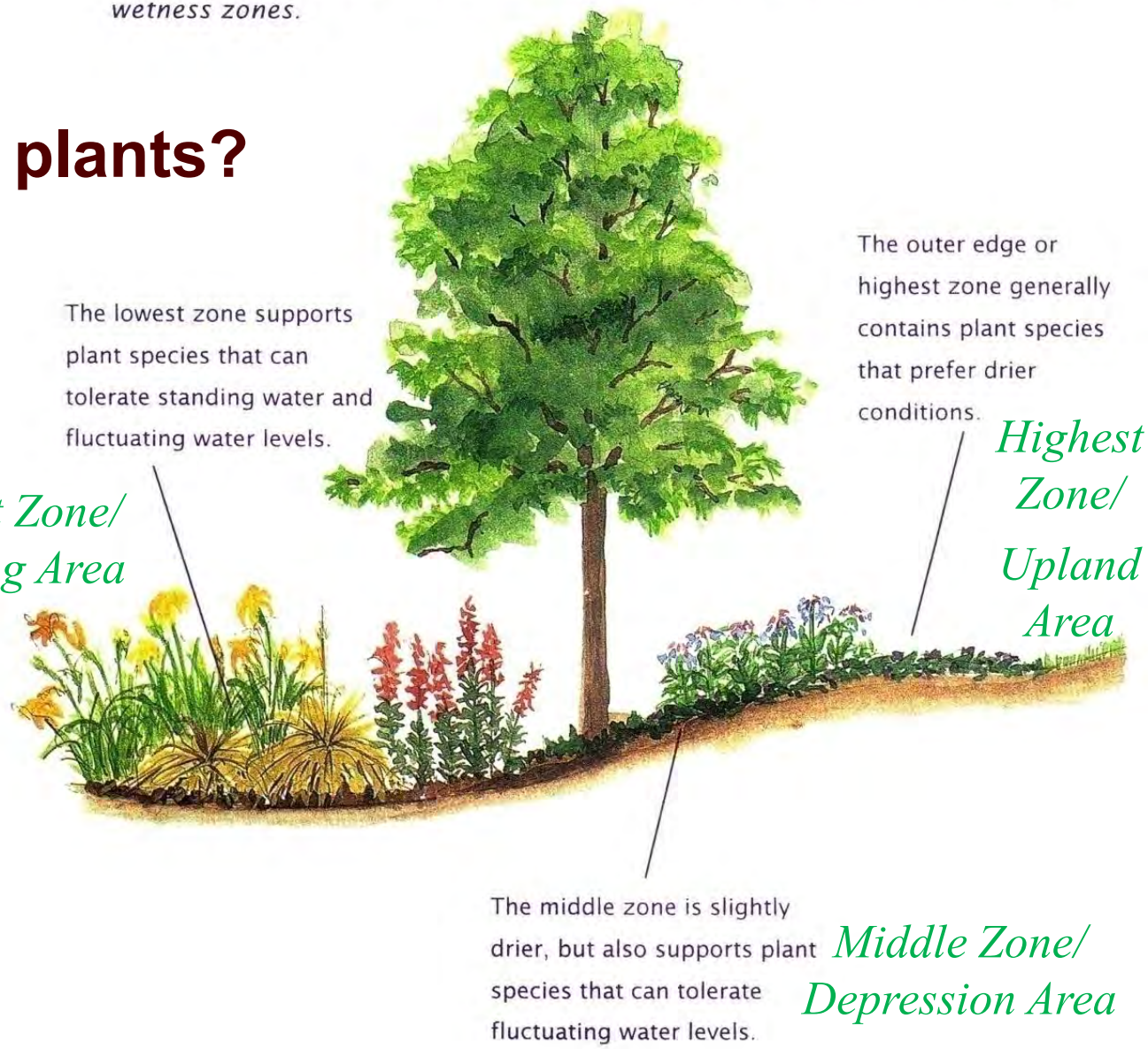
What plants?

Your Rain Garden is composed of woody plants (trees and shrubs) and herbaceous species (flowers, grasses, and ground covers) planted in three wetness zones.



Lowest Zone/ Ponding Area

Highest Zone/ Upland Area

Middle Zone/ Depression Area

http://plants.usda.gov

Appropriate Plant Selection

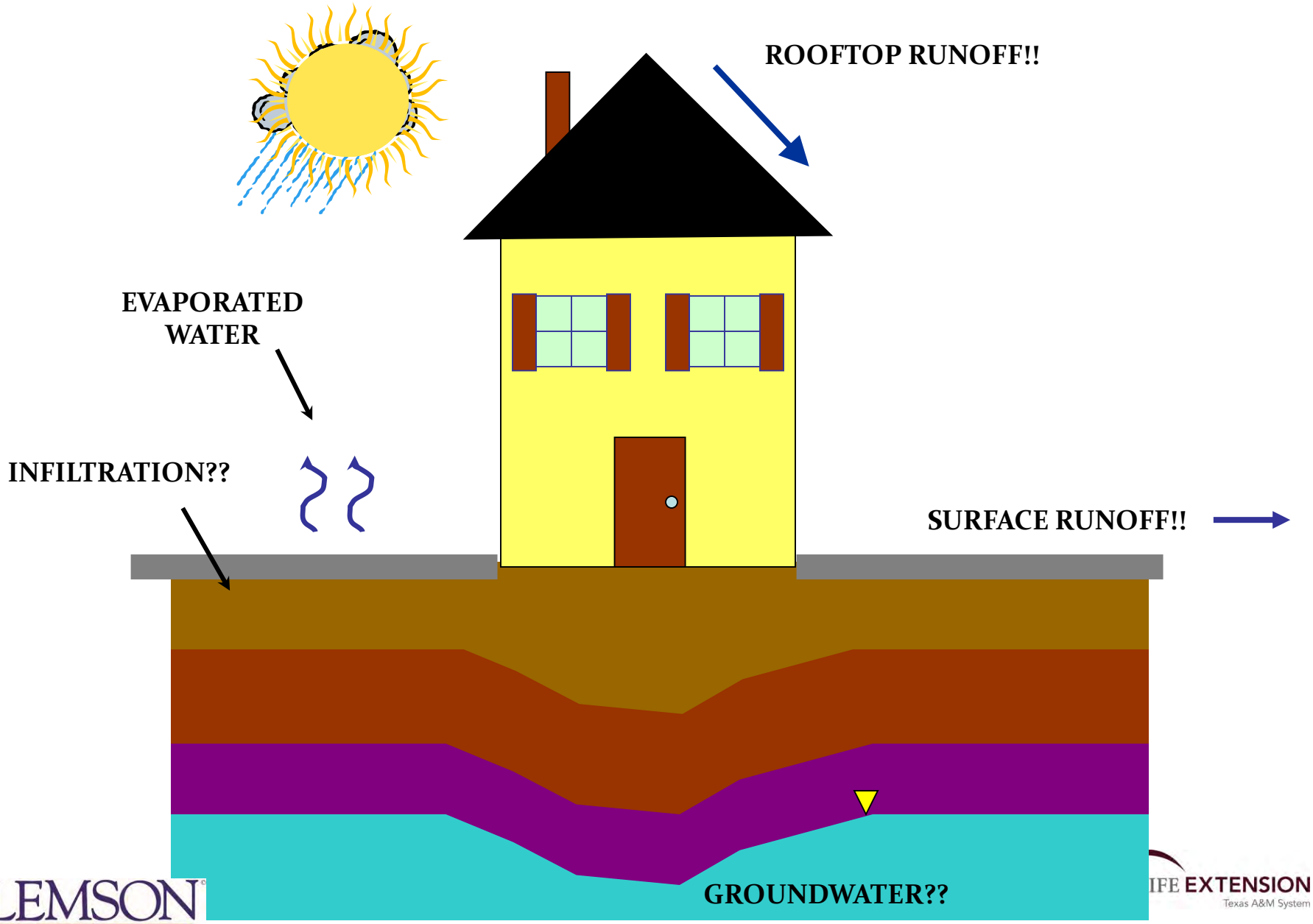
Increase Soil Infiltration

Trinidad Museum

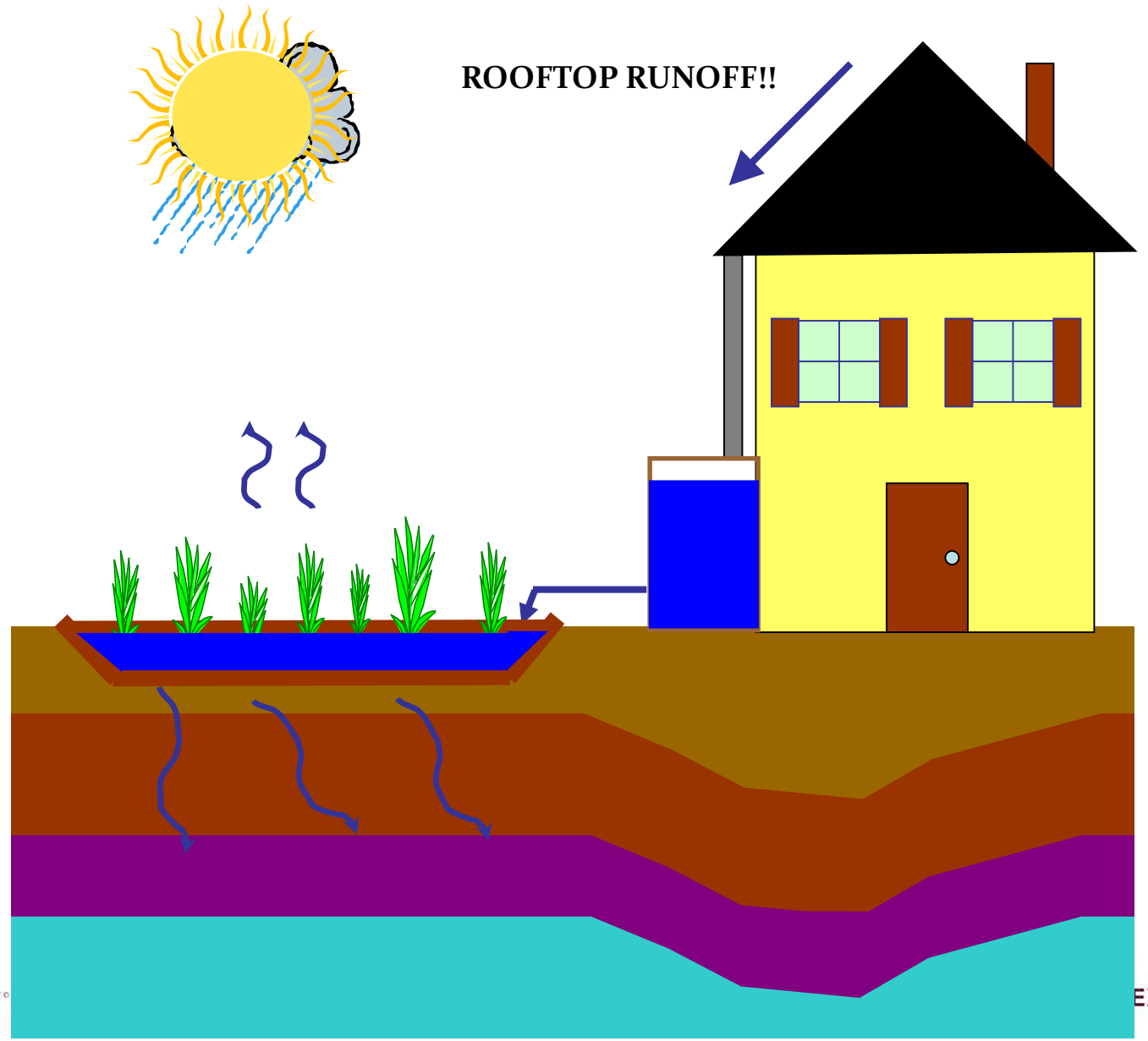
HB 645 – 2003 Texas Legislature

- Prevents homeowner associations from implementing new covenants banning outdoor water-conserving measures
  - Composting
  - Water efficient landscapes
  - Drip irrigation
  - Rainwater harvesting installations
- H.A's can require screening or shielding to obscure view of tanks

Urban Water Budget – Pavement and Rooftop Scenario



Urban Water Budget – Rainwater Harvesting Scenario



"The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value." Teddy Roosevelt

Resources

- **ARCSA website** www.arcsa.org - FREE public domain rainwater harvesting manuals: TX, VA, GA, FL, HI, Ontario. "Resources & Documents" many free publications and hyperlinks to rainwater information around the world
- **Texas A&M University http://rainwaterharvesting.tamu.edu**
- **Texas Rainwater Catchment Association –**
- **www.texrca.org**

Thank You - Billy Kniffen

Rainwater Harvesting

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