

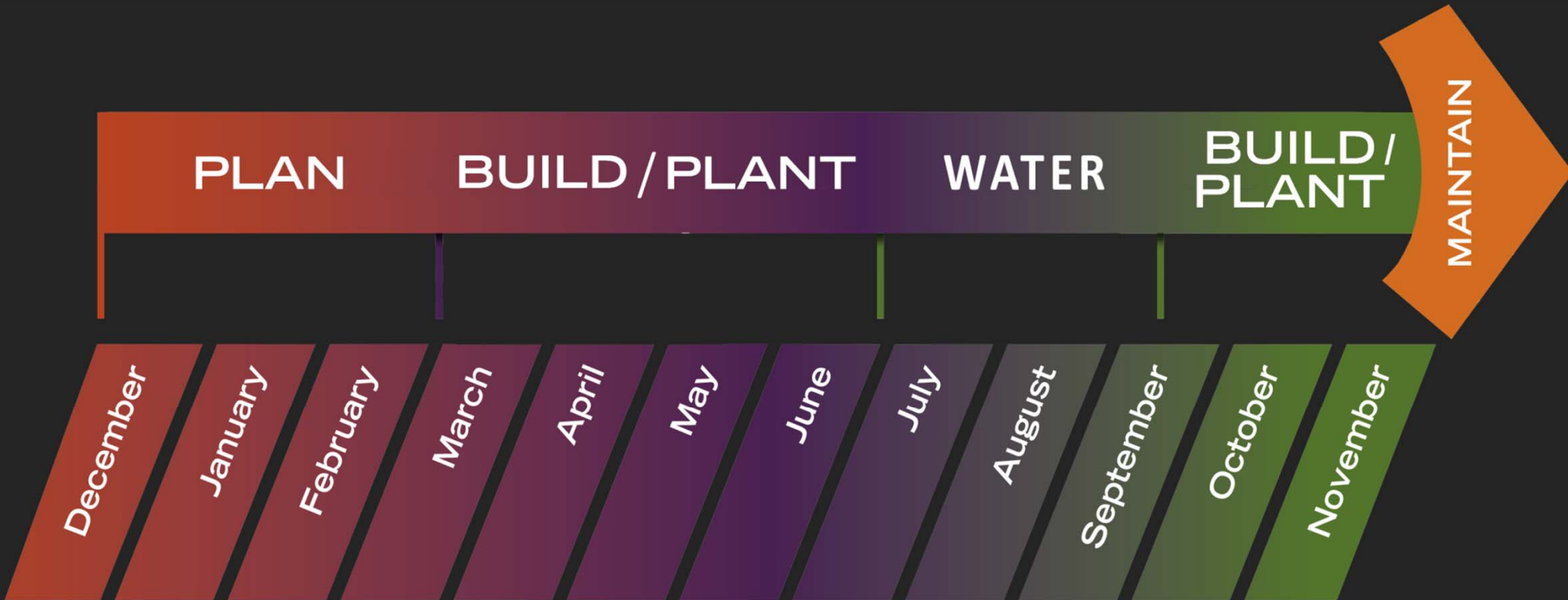
# Rain Gardens: Plant selection



Susan Kenzle, RLA, LI  
Darcy Nuffer, RLA, LI, LEED AP



# Timeline:



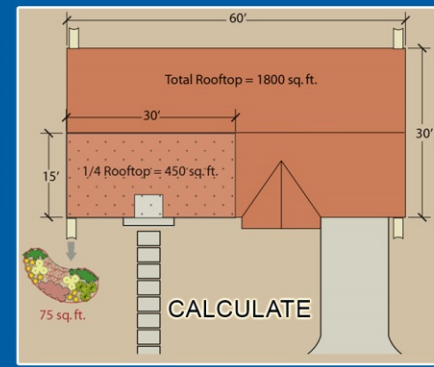
Adapted from *Rain garden Handbook for Western Washington*,  
Washington State Department of Ecology, June 2013.

# Steps



1

## PLANNING & DESIGN



2

## CONSTRUCTION



3

## PLANT SELECTION & INSTALLATION



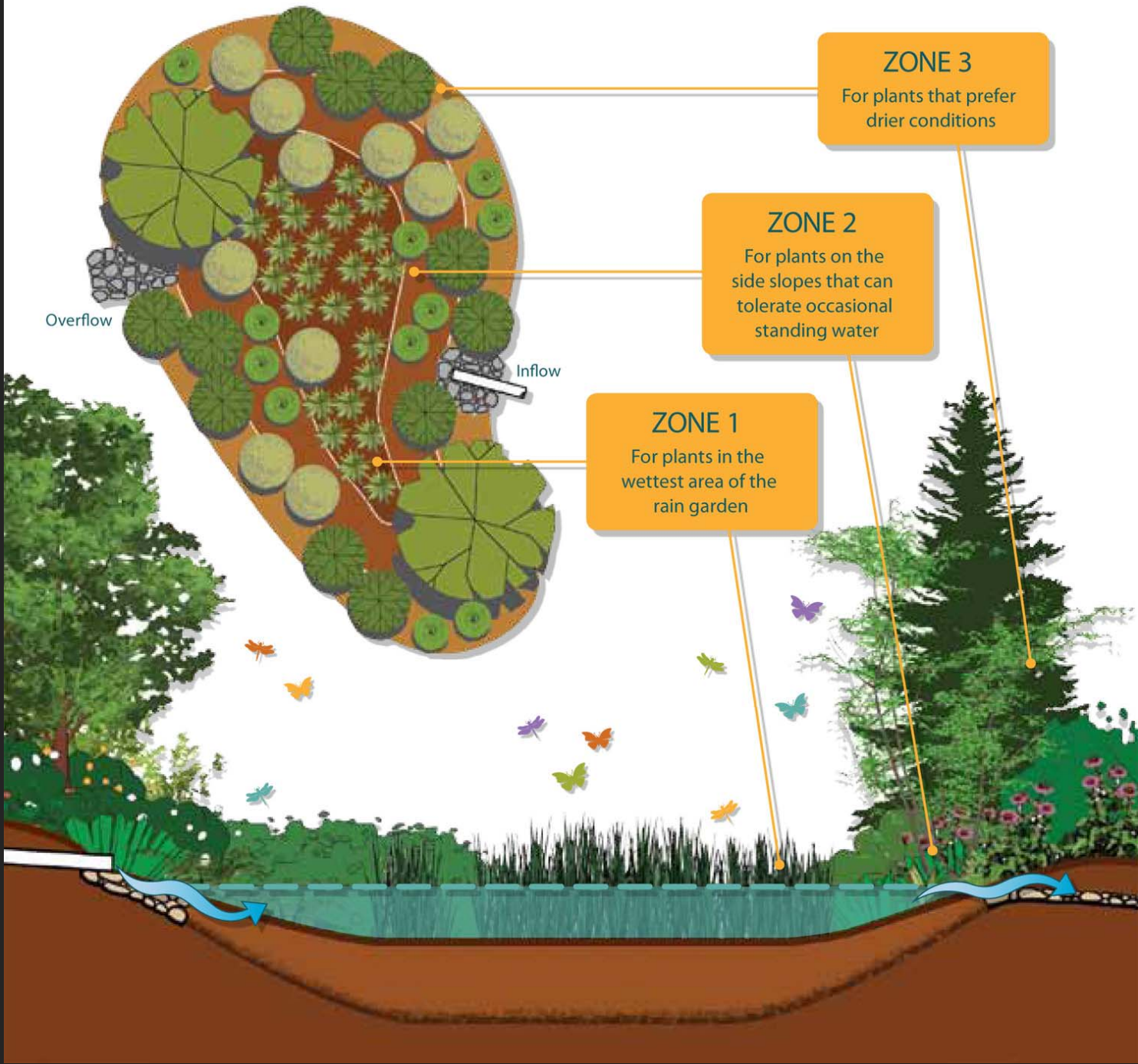
4

## MAINTENANCE





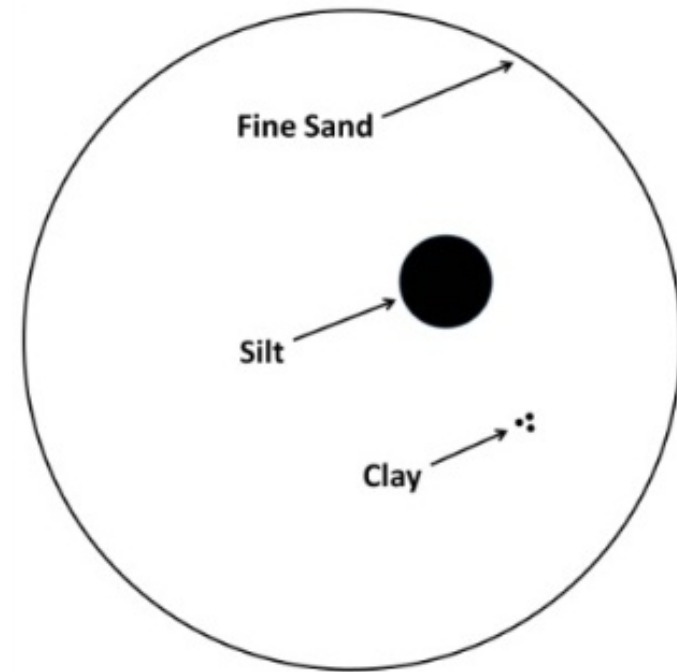
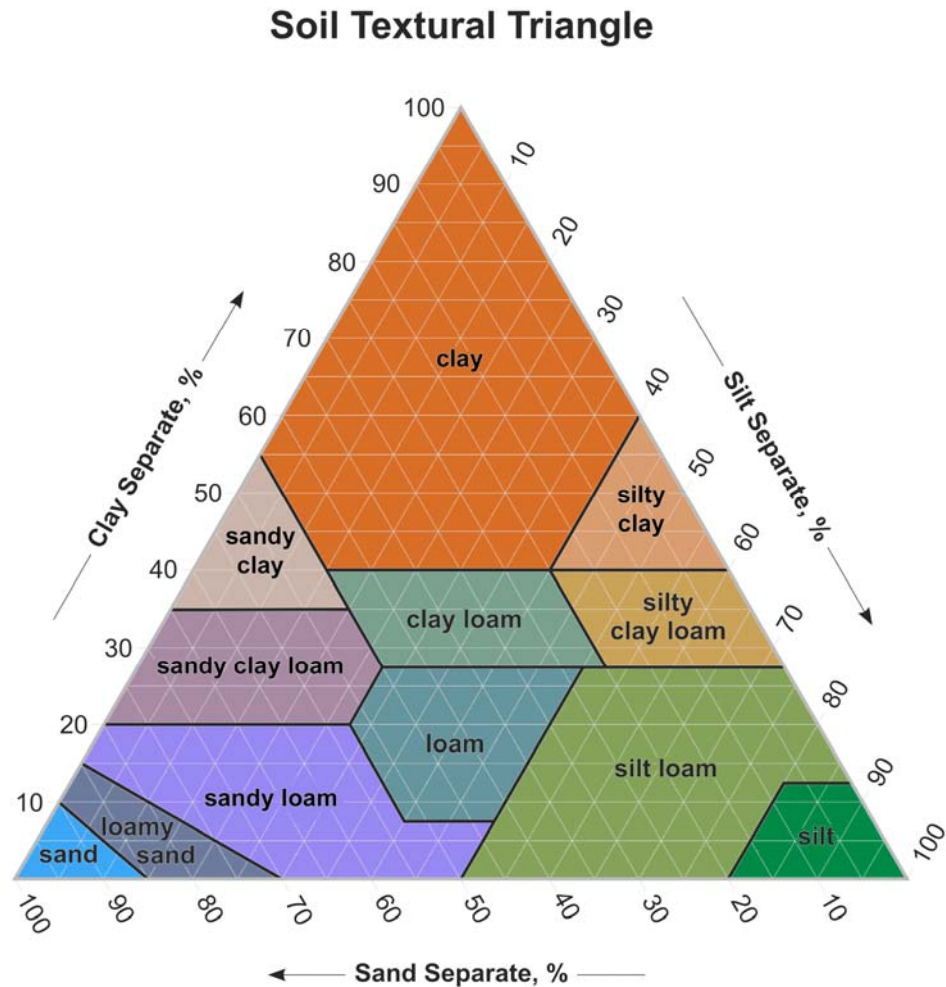
# Planning: Inundation Zones



*Rain garden Handbook for Western Washington, Washington State Department of Ecology, June 2013.*



# Planning: Understanding Soil Texture



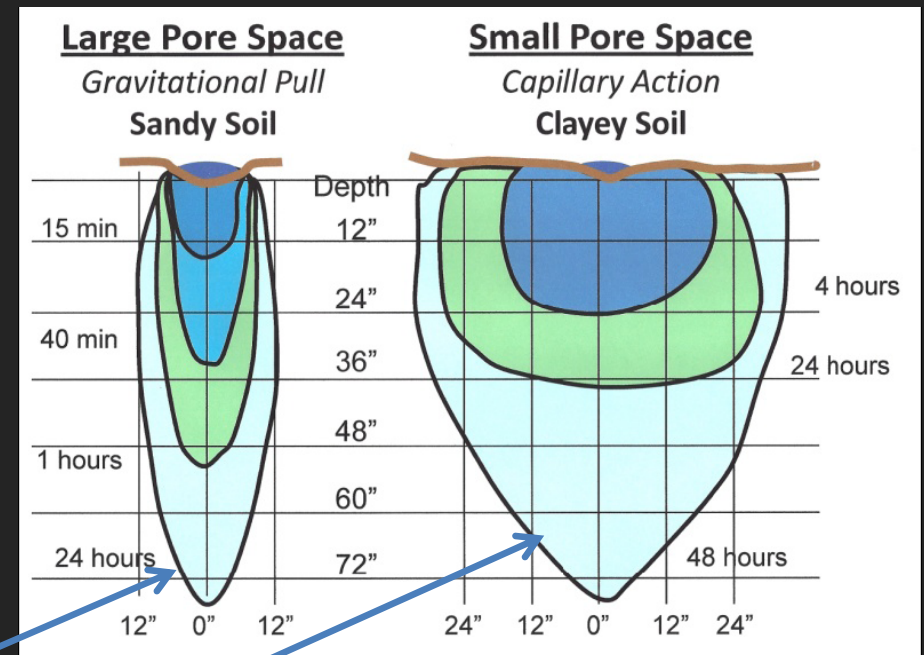
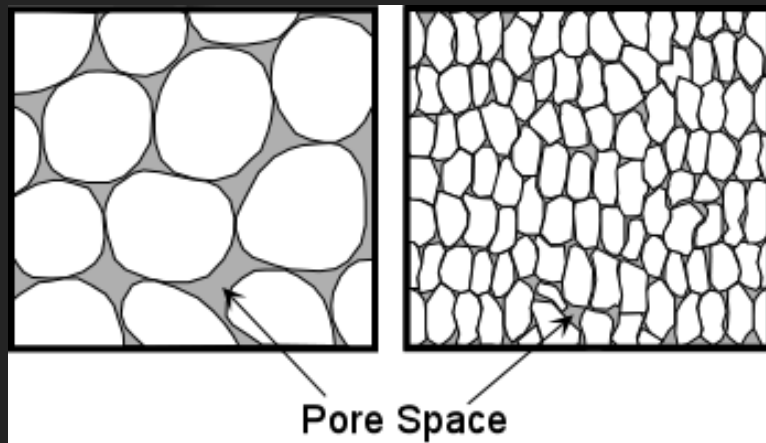
Whiting, D., Card, A., Wilson, C. Moravec, C., Reeder, J..  
*Managing Soil Tillage, Texture, Structure and Pore Space.*  
Colorado Master Gardener Program 2011,  
Colorado State University Extension. CMG GardenNotes #213.



# Soil Texture

## Sand

## Clay



good drainage

poor drainage

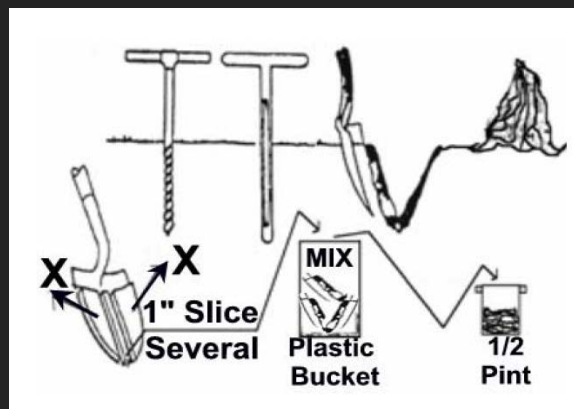
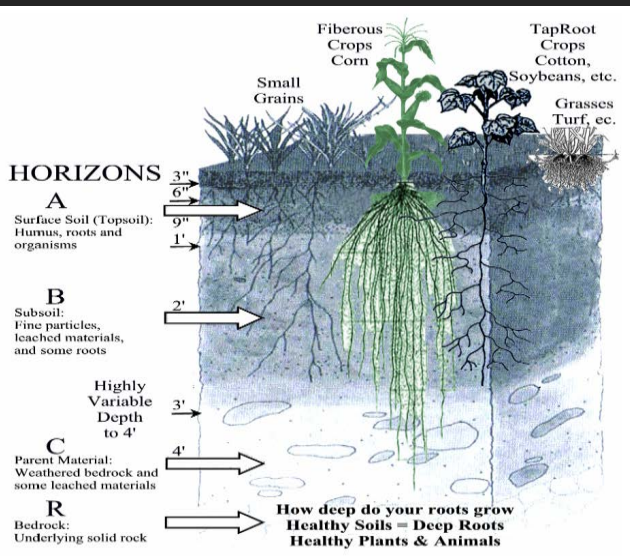
<http://www.tulane.edu/~sanelson/eens1110/groundwater.htm>

Whiting, D., Card, A., Wilson, C. Moravec, C., Reeder, J. Managing Soil Tilth, Texture, Structure and Pore Space. Colorado Master Gardner Program 2011, Colorado State University Extension. CMG GardenNotes #213.

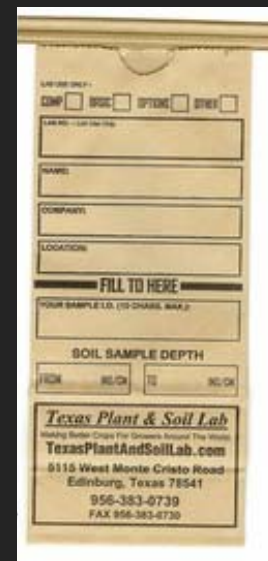


# Planning: Soil Tests

- Used to determine:
  - texture – amount of clay, sand, silt
  - amounts of nutrients available in soil for plant use.
- Tests can include recommendations on amounts of plant nutrients needed for plant health.
- Soil tests are easy and relatively inexpensive.
- Available through:
  - County Extension office, refers you to Texas A&M
  - Texas A&M Soil Testing Lab, [www.soiltesting.tamu.edu](http://www.soiltesting.tamu.edu), \$10 - \$84/sample
  - Private testing labs (e.g., Texas Plant and Soil Lab in Edinburg, TX) [www.texasplantandsoillab.com](http://www.texasplantandsoillab.com)
    - Direct purchase (provide own bag and mailing box)
    - Return mailer kit \$103 includes soil composition, available soil nutrients, extracted available micronutrients, report with recommendations. More specialized tests are available (more expensive)



Soil Sample: it's a simple process



soil sample bag



# Planning: Exposure/Sun/Shade





# Planning: Central Texas Weather/Climate





Jan

Feb

Mar

Apr

May

Jun

# Climate: Rainfall - extremely variable, comes in bursts

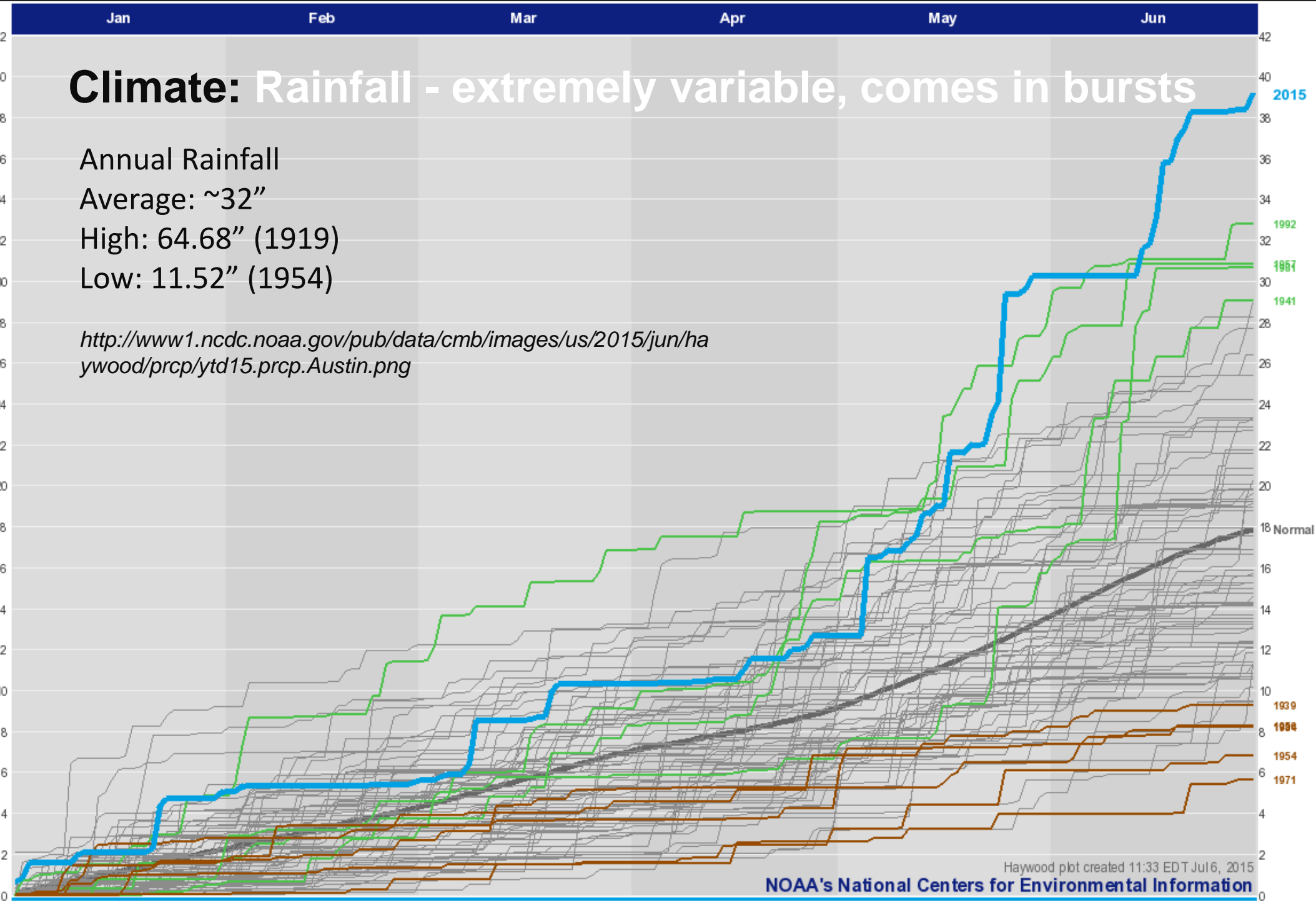
Annual Rainfall

Average: ~32"

High: 64.68" (1919)

Low: 11.52" (1954)

[http://www1.ncdc.noaa.gov/pub/data/cmb/images/us/2015/jun/ha  
ywood/prcp/ytd15.prcp.Austin.png](http://www1.ncdc.noaa.gov/pub/data/cmb/images/us/2015/jun/ha<br/>ywood/prcp/ytd15.prcp.Austin.png)



Haywood plot created 11:33 EDT Jul 6, 2015

NOAA's National Centers for Environmental Information



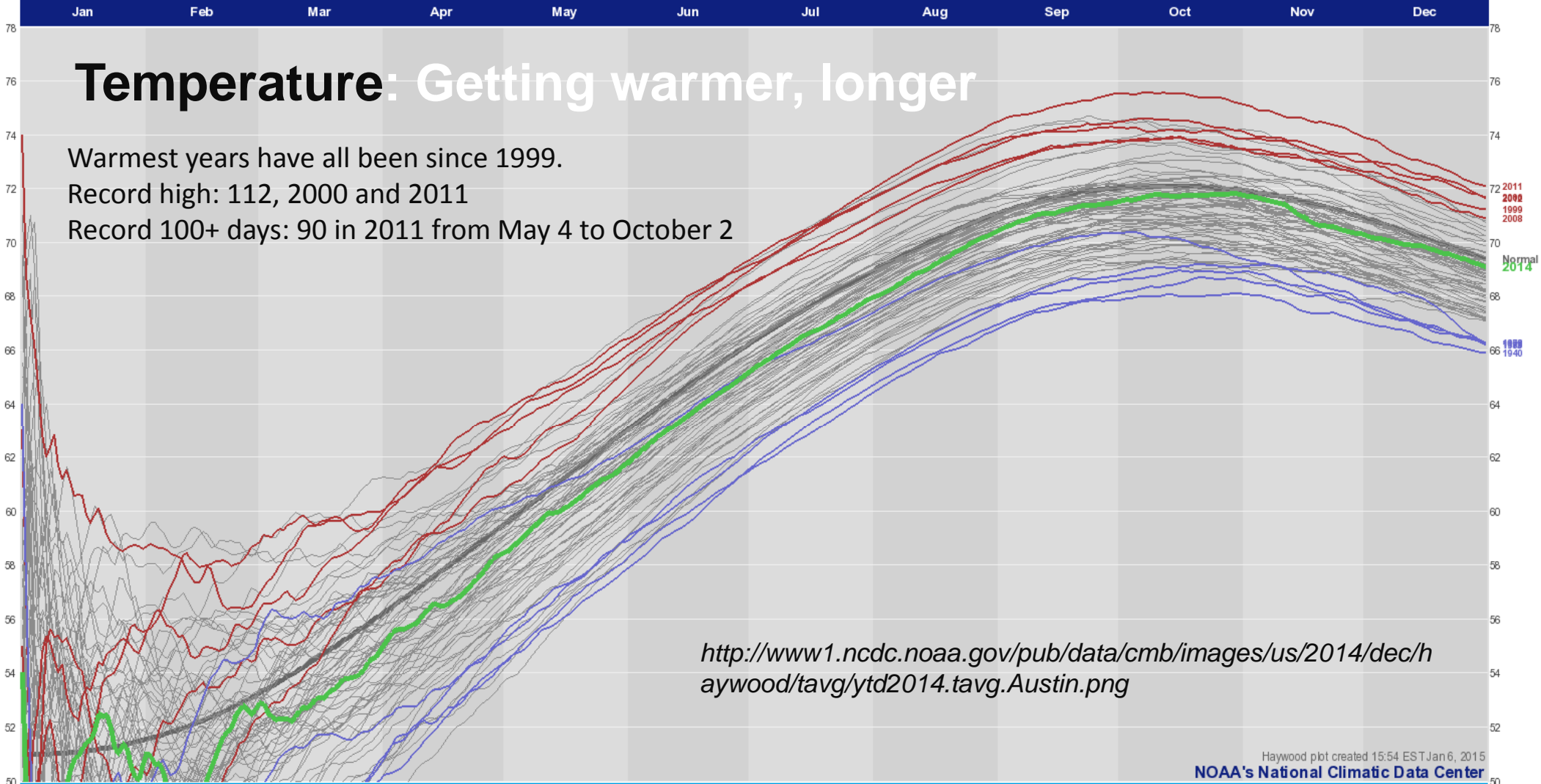
Precipitation (in) to Date for Austin, TX  
Jan 1 through Jun 30. Period of record is 1939 through 2015

5 wettest periods in mint: 2015 1992 1957 1981 1941  
5 driest periods in brown: 1971 1954 1984 1956 1939  
1981-2010 Normal underlaid in dark gray  
2015 period in NOAA Lite Blue

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

# Temperature: Getting warmer, longer

Warmest years have all been since 1999.  
Record high: 112, 2000 and 2011  
Record 100+ days: 90 in 2011 from May 4 to October 2



<http://www1.ncdc.noaa.gov/pub/data/cmb/images/us/2014/dec/haywood/tavg/ytd2014.tavg.Austin.png>

Haywood plot created 15:54 EST Jan 6, 2015

NOAA's National Climatic Data Center

5 warmest periods in crimson: 2011 2006 2012 1999 2008  
5 coolest periods in cornflower: 1979 1968 1983 1976 1940  
1981-2010 Normal underlaid in dark gray  
2014 period in mint

NOAA Average Temperature (F) to Date for Austin, TX  
Jan 1 through Dec 31. Period of record is 1939 through 2014

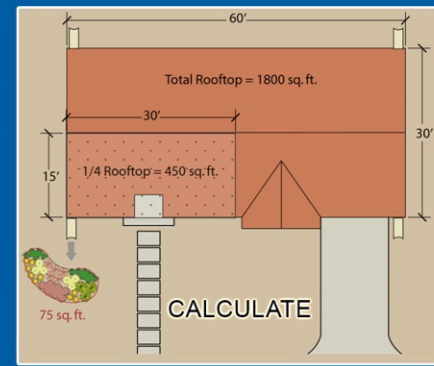
## Plan to fail!



# Steps

1

## PLANNING & DESIGN



2

## CONSTRUCTION



3

## PLANT SELECTION & INSTALLATION



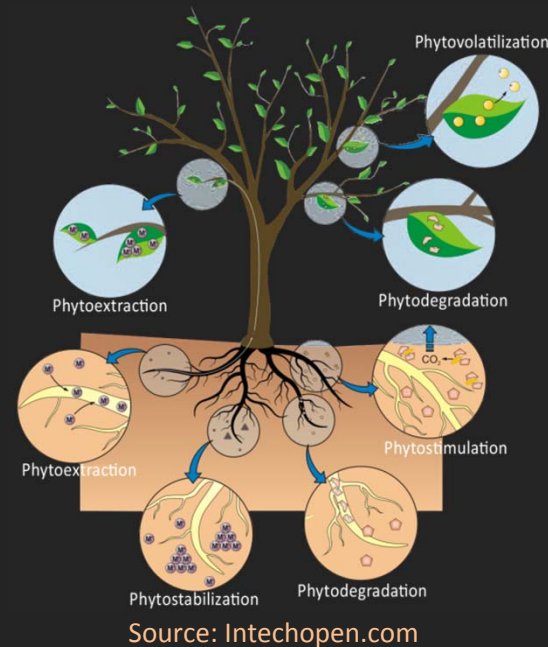
4

## MAINTENANCE

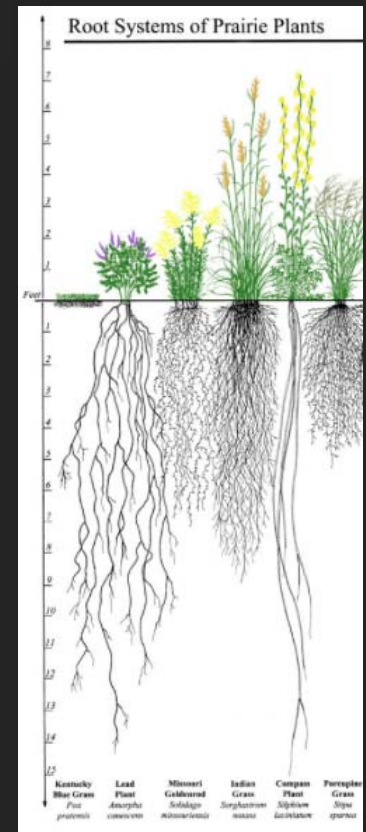


# Plant Selection

- **Plants are an essential component** – they filter and clean stormwater, and stabilize the soil
- Use Native or adapted plants
- Use Drought-tolerant plants – Austin rain gardens are dry 90+% of the time
- Plants with fibrous root systems are very beneficial (e.g., bunch grasses, sedges)
- Plant roots will maintain and increase soil porosity
- Avoid plants that require well-drained soils (e.g., blackfoot daisy, globemallow)
- Diversity of plant types:
  - Type: small trees, shrubs, perennials, bunch grasses, groundcover
  - Leaf Retention: evergreen, semi-evergreen, deciduous



Sedge fibrous root system



Root systems of prairie plants



# Plant Selection: Plant Guide

grow green

Native and Adapted  
*Landscape Plants*

Find your perfect plant with our online search tool!

an earthwise guide for Central Texas

Texas A&M AgriLife Extension Service ★ City of Austin ★ growgreen.org

# Plant Selection: Plant Guide

Native and Adapted

## Landscape Plants

an earthwise guide for  
Central Texas



City of Austin & Texas A&M AgriLife Extension Service

**Common Name**  **Botanical Name**

**Native To**

- Blackland Prairie
- Both Blackland Prairie & Edwards Plateau
- Edwards Plateau
- Hybrid w/ native parentage
- Native to Texas (not part of Edwards Plateau or Blackland Prairie)

**Evergreen/Deciduous**

- Deciduous
- Evergreen
- Semi-Evergreen

**Light**

- Shade
- Sun
- Sun/Part Shade

**Seasonal Feature**

- Bark
- Flower
- Foliage
- Fruit

**Water Needs**

- Very Low
- Low
- Medium
- High










**Attracts Wildlife**

**Plant Type**

- Grasses (Ornamental & Prairie)
- Grasses (Turf)
- Groundcovers
- Perennials
- Roses
- Shrubs
- Trees (Large)
- Trees (Small)/Large Shrubs

**Plant Color**

- Blue
- Gold
- Green
- Grey
- Multi
- Orange
- Pink
- Purple

Acuba	Acuba japonica	Shrubs	Sun/Part Shade	
Agarita	Berberis trifoliata (Mahonia trifoliata)	Shrubs	Sun/Part Shade	
Agave spp	Agave spp.	Yuccas/Agaves/Succulents/Cacti /Sotols	Sun/Part Shade	
Alamo Vine	Merremia dissecta	Vines	Sun/Part Shade	
American Beautyberry	Callicarpa americana	Shrubs	Shade	
Anacacho Orchid Tree	Bauhinia lunarioides	Trees (Small)/Large Shrubs	Sun/Part Shade	
Anacua (Sandpaper Tree)	Ehretia anacua	Trees (Small)/Large Shrubs	Sun/Part Shade	
Apache Plume	Fallogia paradoxa	Shrubs	Sun/Part Shade	
Aralia, Japanese	Fatsia japonica	Shrubs	Shade	



# Plant Selection: Other

The screenshot shows the Wildflower Center website interface. At the top, there is a navigation bar with icons for Shop, Interact, Rental, SITES™, and Contact. Below this is a search bar and a language selector for "En Español". The main content area is titled "NATIVE PLANT DATABASE" and includes a "SHARE" button with social media icons. A central image shows a close-up of a pink and orange flower. To the right of the image, there is introductory text about the database and a link to the USDA Plants Database. A sidebar on the left lists various resources like "About NPIN", "Bibliography", and "Image Gallery".

## BENEFIT

**Use Ornamental:** Showy, Attractive, Color, Pocket prairie, Perennial garden, Wildflower meadow

**Use Wildlife:** This species is palatable to deer and numerous species of birds who eat the seeds. It is also a useful wildlife cover plant. Nectar-Bees, Nectar-Butterflies

**Conspicuous Flowers:** yes

**Attracts:** Birds

**Nectar Source:** yes

**Deer Resistant:** Moderate

## VALUE TO BENEFICIAL INSECTS

Special Value to Native Bees

Special Value to Honey Bees

This information was provided by the Pollinator Program at The Xerces Society for Invertebrate Conservation.

Duration (maturity)

Dry - soil does not exhibit visible signs of moisture

Moist - soil looks and feels damp

Wet - soil is saturated with water

### Bloom Characteristics

Bloom Time:  Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

Bloom Color:  White  Red  Pink  Orange  Yellow  Green  Blue  Purple  Violet  Brown  Black

### Leaf Characteristics

Leaf Arrangement:  Alternate  Opposite  Whorled  Fascicled

Leaf Retention:  Deciduous  Evergreen  Semi-evergreen

### Size Characteristics

Height:  0-1 ft.  1-3 ft.  3-6 ft.  6-12 ft.  12-36 ft.  36-72 ft.  72-100 ft.  More than 100 ft.



# Plants

Pickle Elementary, Austin

CONTAINERS

SEEDS



Photo: L. Sherman, City of Austin

## Local Seed Sources:

- Native American Seed
- LBJ Wildflower Center
- Wildseed Farms

## Container Plants

### Pros:

- Plant anytime if supplemental water available;
- Instant;
- Cost – more expense upfront

### Cons:

- Girdled or circling roots
- Availability limited seasonally, market demand

## Seed

### Pros:

- Element of surprise
- Healthier plants

### Cons:

- Limited planting window
- Need to be protected, watered
- Slow germination, slow growth – can be 2-3 years for full complement of species

## Bareroot/Live Root

### Pros:

- Healthier plants
- Inexpensive

### Cons:

- Limited planting window
- Limited availability
- Must plant immediately



Photo: Native American Seed



# Planting Design: for Clayey Zone 1: tolerate inundation, poor drainage:

- Switchgrass
- Indian grass
- Inland sea oats
- Eastern gamagrass
- Meadow sedge
- Fall obedient plant
- Blue Mistflower
- Frog fruit
- Turk's Cap
- Dwarf palmetto
- Wax myrtle



Photos: [www.wildflower.org](http://www.wildflower.org)

Dwarf palmetto

Indian Grass

Blue Mistflower



**Planting Design:  
Plants for Sandy Zone 1 or Zone 2:  
Upland or tolerate inundation with  
better drainage:**

- Autumn sage
- Big Muhly
- Gulf Muhly
- Maximillian sunflower
- Meadow sedge
- Pigeonberry
- Sideoats Grama
- Yucca sp.
- Turk's Cap



**Pigeonberry**



**Gulf Muhly**



**Big Muhly**



**Sideoats Grama**



**Autumn Sage**

*Photos: [www.wildflower.org](http://www.wildflower.org), [gulfcoastprairielcc.org](http://gulfcoastprairielcc.org)*




# Plant Installation

- Choose, space, and install plants with their mature size in mind.
- Avoid planting in the root zones of existing trees. Most are shallow (8-24") & extensive.
- Right plant, right place. Overly large plants can require more maintenance later.
- If rain garden is near a road, sidewalk, driveway – make sure that mature plants:
  - will not block viewers for drivers, pedestrians, cyclists;
  - will not grow over roads, sidewalks to impede travel.
- Be mindful of overhead and underground utilities. Call before you dig!

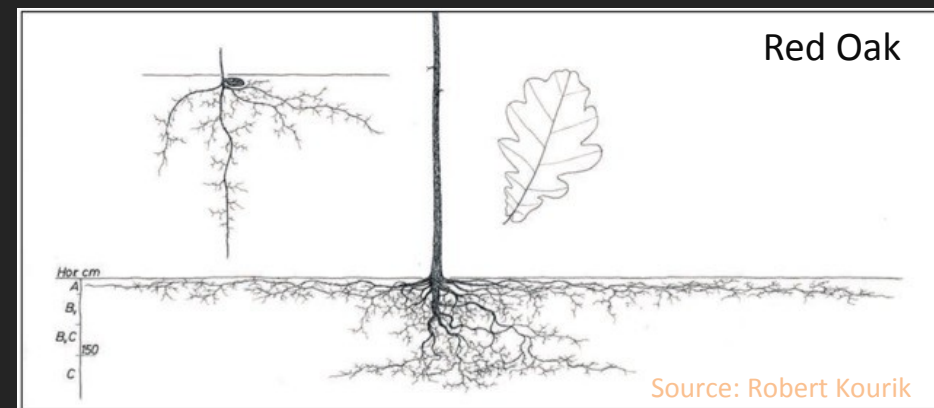


## Tools and Materials Checklist



- PLANTS**  
*(Emergents, Perennials, Grasses, Groundcovers, Shrubs, and Trees)*
- SHOVEL(S)**
- SMALL HAND TOOLS**  
*(Dibbles, Planting Bars, Weeding Knives— for Planting Tubes and Bare-Root Emergents)*
- WHEEL BARROW**
- RAKE**
- MULCH**  
*(Shredded Wood or Chipped Wood)*
- WATER**
- STONES/ROCK**

*Rain garden Handbook for Western Washington, Washington State Department of Ecology, June 2013.*



# Plant Installation: spacing, layout



Photo: [homegrownlandscapes.files](http://homegrownlandscapes.files)

Layout plants per their mature size



Photo: [news.psu.edu](http://news.psu.edu)

Do maintenance later

OR



# Plant Installation: mulch



3" of mulch



Coarse-ground hardwood mulch

Pecan shell mulch

Avoid using finely ground mulch – it floats and washes to the sides.

Avoid rubber mulch.

Avoid dark colored mulch – increases soil heat.



Pea gravel mulch



# Opportunities - Pollinators:

**Pollinators** = bees, butterflies, birds, bats.


Dr. Tallamy, professor of entomology and wildlife ecology,  
Un. of Delaware - **Pollinator Study**

website with plant list <http://www.bringingnaturehome.net/>


**Pollinator Study** - Lepidopteran Use of Native & Alien  
Ornamental Plants <http://udel.edu/~dtallamy/host/>

- categorized native & non-native plants by ability to support insect herbivores → overall biodiversity.
- danger of landscapes dominated by non-native ornamentals that do not support pollinators.
- Goal: develop a list for selecting plants to increase quantity and diversity of host plants.

**NESTING & FORAGE AREAS** are needed.



“...managed honeybee colonies have seen annual losses of 42.1%, and there has been a 90% decline in the monarch butterfly population” (*National Strategy to Promote the Health of Honey Bees and Other Pollinators*, U.S. government report, 2015)



“Pollinators, most often honeybees, are also responsible for one in every three bites of food we take...” (*National Strategy to Promote the Health of Honey Bees and Other Pollinators*, U.S. government report, 2015)

Photo: Tallamy

Photo: S. Kenzie, City of Austin

## Rain Garden Pollinator plant list for Central Texas

### Small Trees:

- Cherry (*Prunus*)
- Anacacho Orchid (*Bauhinia lunarioides*)
- Anacua (*Ehretia anacua*)
- Arroyo Sweetwood (*Myrospermum sousanum*)
- Carolina Buckthorn (*Frangula caroliniana*)

### Woody Shrubs:

- Rose (*Rosa*)
- Turk's Cap (*Malvaviscus arboreus*)

### Herbaceous:

- Goldenrod (*Solidago*)
- Asters (*Aster*)
- Sunflower (*Helianthus*)
- Violets (*Viola*)
- Sedges (*Carex*)
- Black-eyed Susan (*Rudbeckia*)
- Iris (*Iris*)
- Evening Primrose (*Oenothera*)
- Milkweed (*Asclepias*) \*expensive, not readily available
- Verbena (*Verbena*)
- Penstemon (*Penstemon*)
- Phlox (*Phlox*)
- Bee balm (*Monarda*)
- Little Bluestem (*Schizachyrium*)
- Cardinal flower (*Lobelia*)
- Mealy Blue Sage (*Salvia farinacea*)
- THIS LIST IS NOT ALL INCLUSIVE

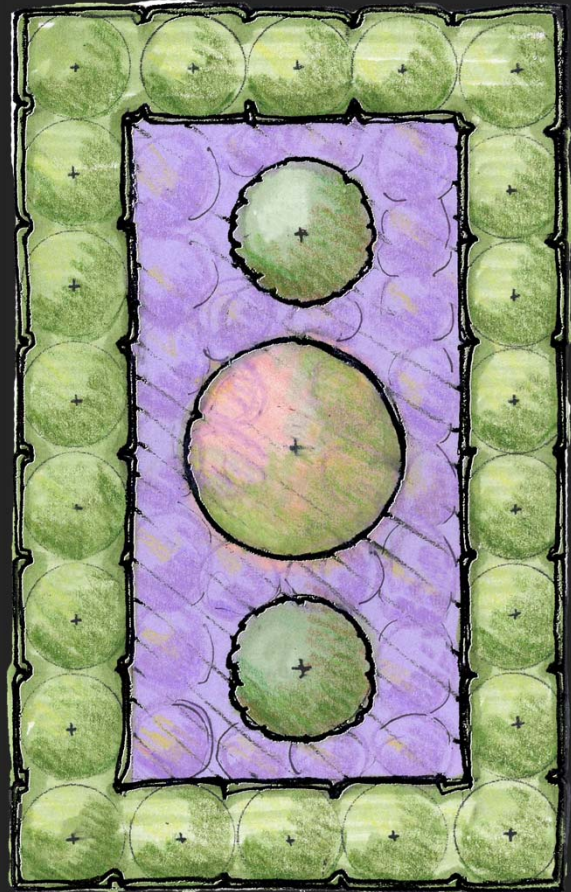
Multiple layers (ground to tree canopy) and Range of seasons





# Opportunities - Aesthetics:

## Formal



Formal rain garden, Piedmont Retreat, Virginia

Photo: Mike Stog \ [mikestog.com](http://mikestog.com)

Source: Low Impact Development Center, Inc.  
[lowimpactdevelopment.org](http://lowimpactdevelopment.org)

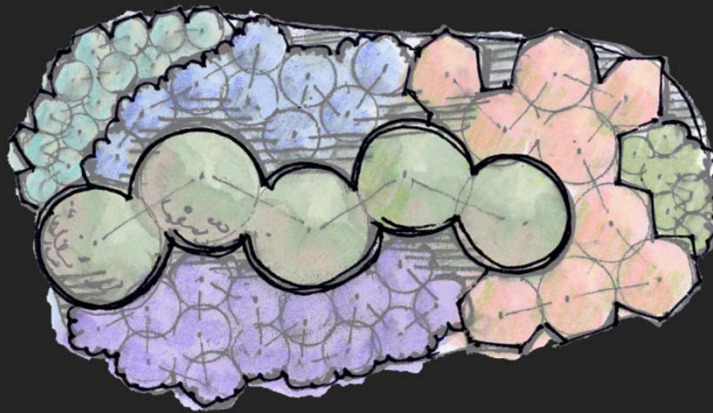


# Opportunities - Aesthetics:

## Informal \ Naturalized



Solvita Townhomes, Harmon Ave.

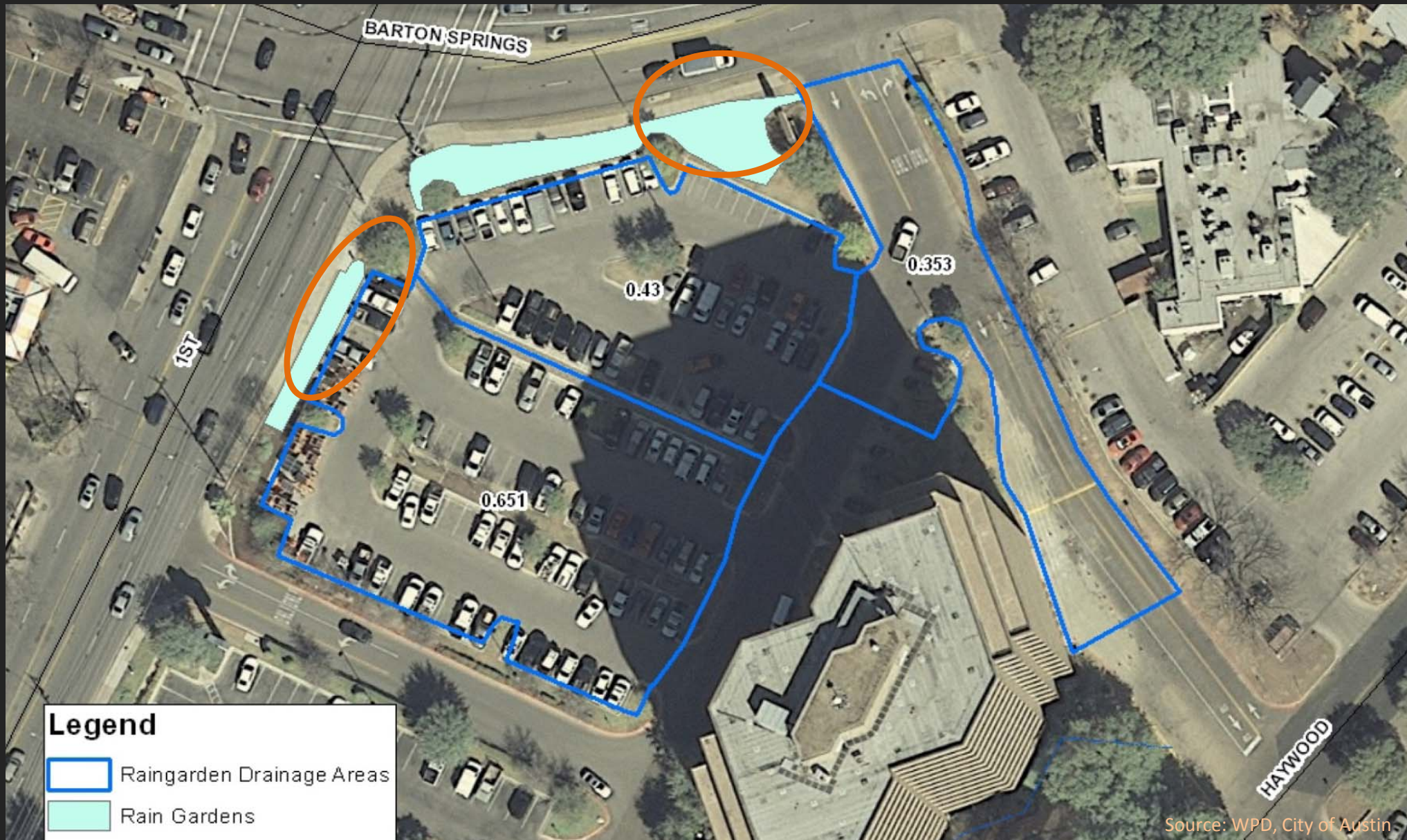


Bellamy Residence



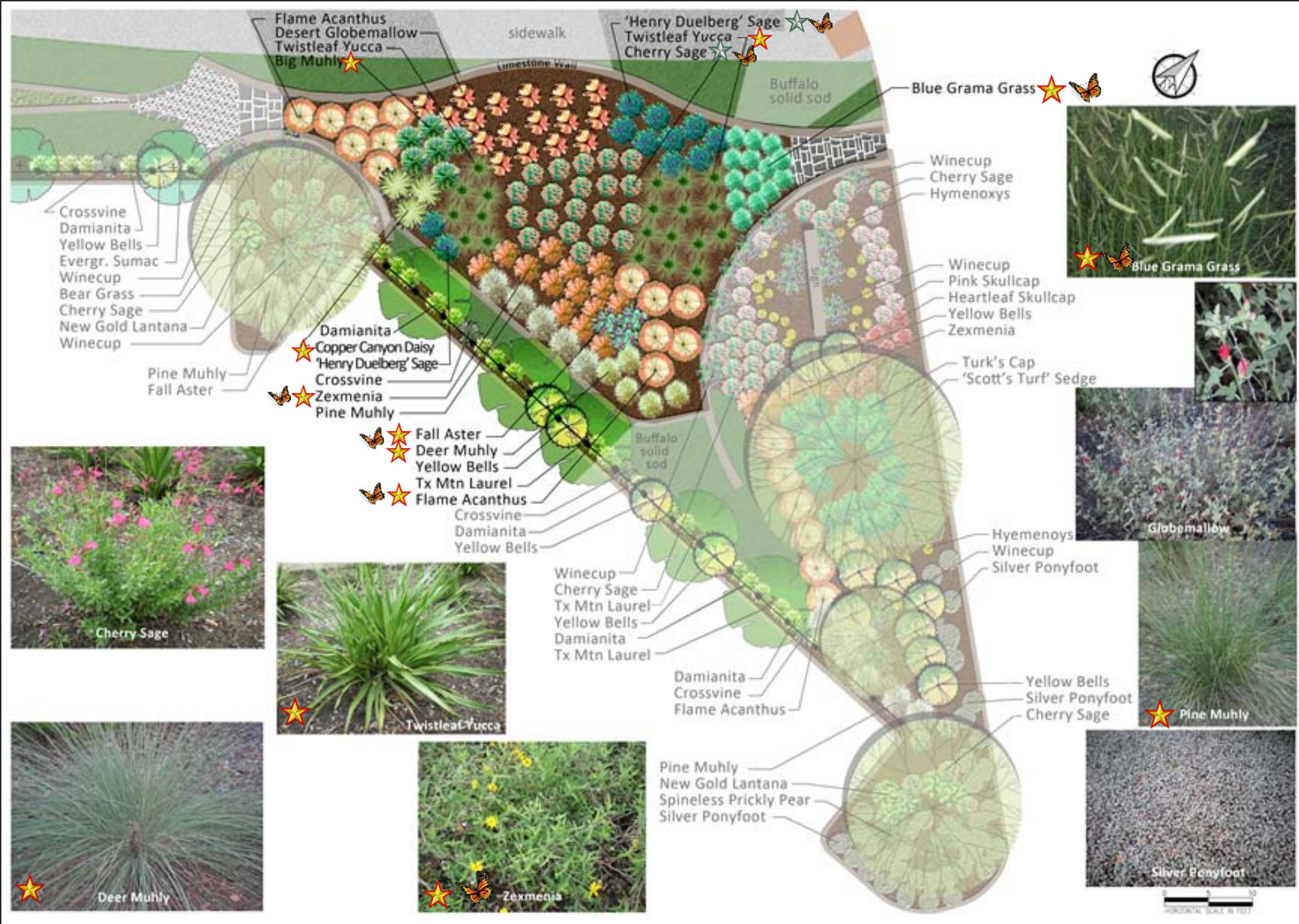
# Case Study: One Texas Center rain gardens

- Constructed & planted in 2012
- irrigated for 1 year
- gets regular maintenance : trash and leaf collection; mulching; weeding





# Case Study: One Texas Center rain gardens



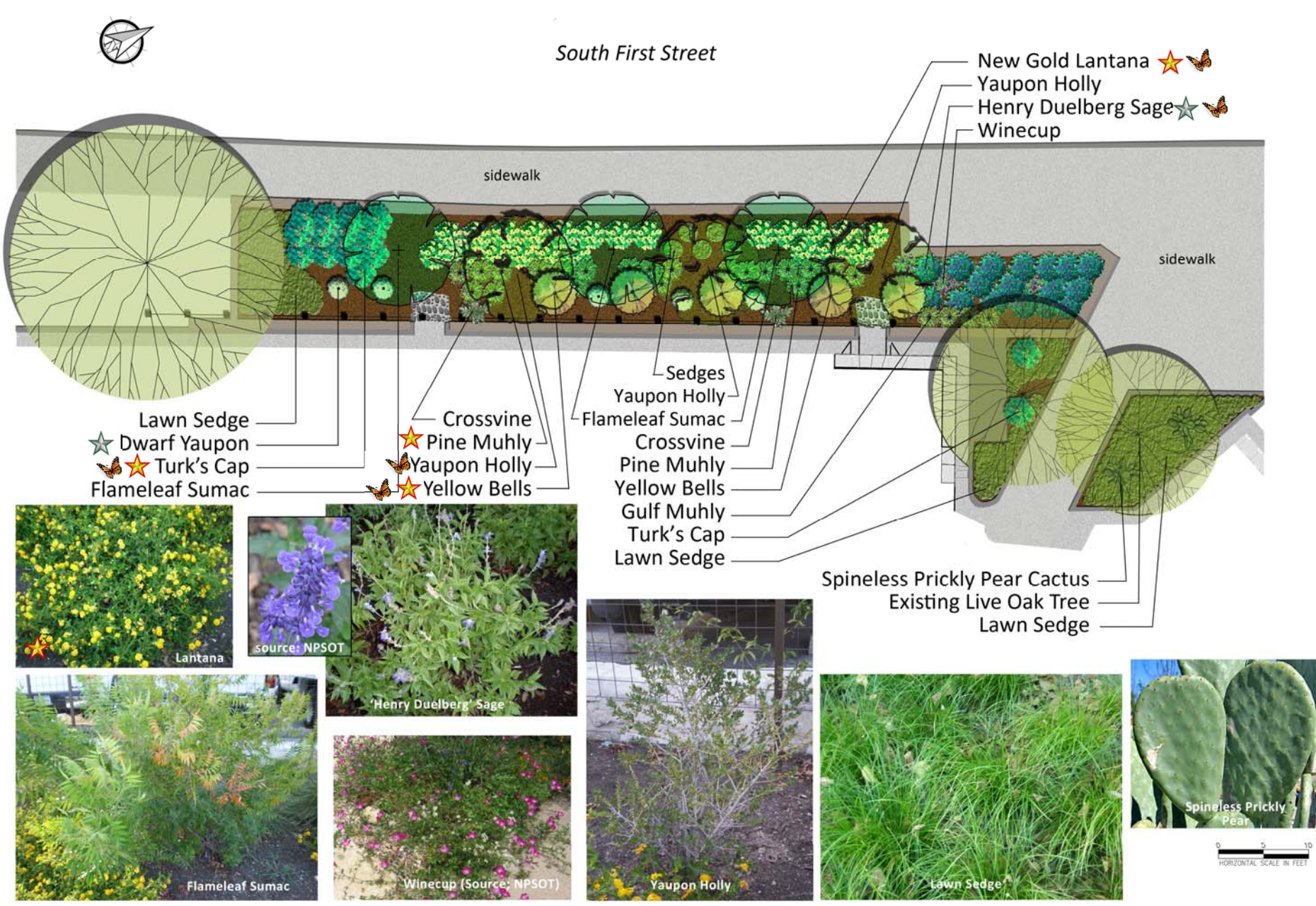
★ Performs well for 2-3 years.  
 ★ Consistently performs well.

🦋 Pollinator plant: butterflies &/or bees

Source: S. Kenzle, City of Austin



# Case Study: One Texas Center rain gardens



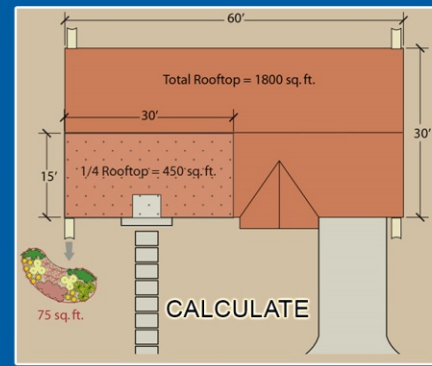
Source: S. Kenzle, City of Austin



# Steps

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## PLANNING & DESIGN



2

## CONSTRUCTION



3

## PLANT SELECTION & INSTALLATION



4

## MAINTENANCE





# Maintenance

Leaves



Suckering plants



Fruit, Nuts (acorns)





# Maintenance

## Plant Replacement



Some plants do not do well. Many are not long-lived or do not seed or spread. Some succumb to drought.