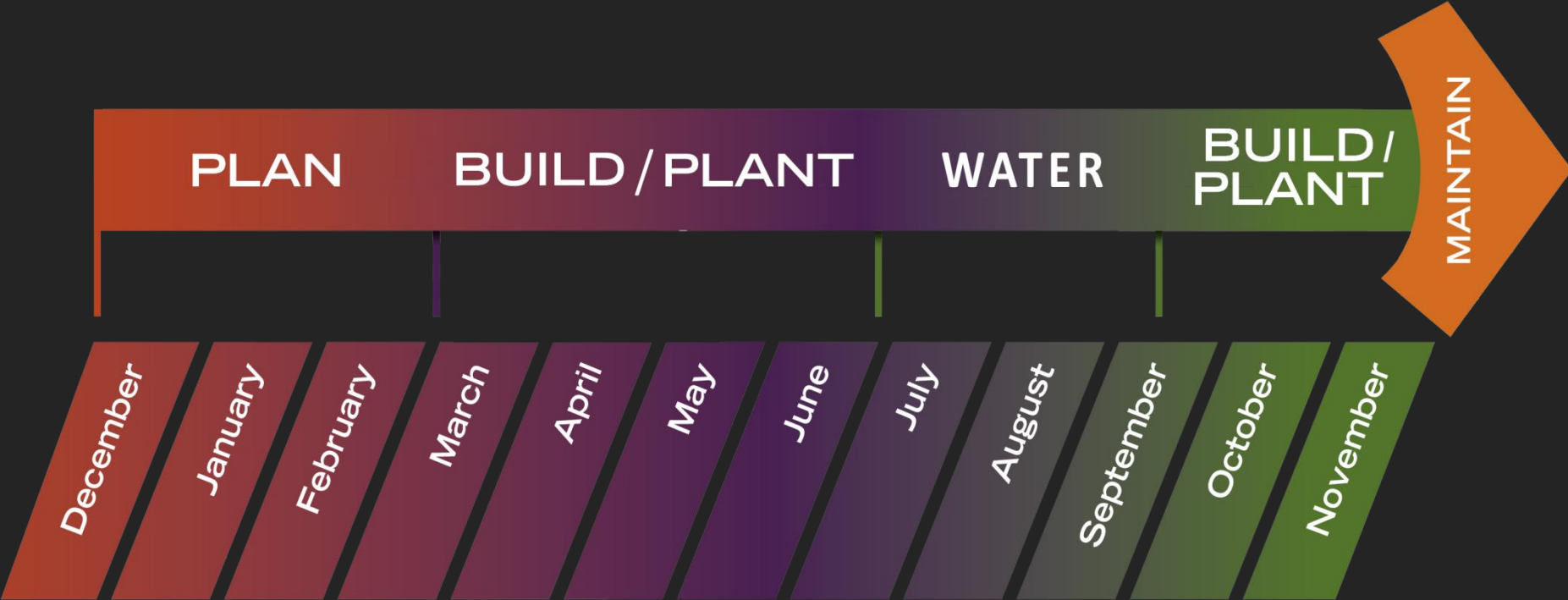


# Rain Gardens: Plant selection



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

# Timeline:



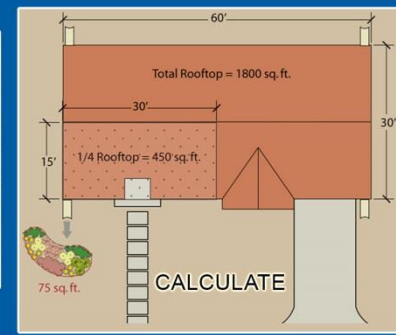
Adapted from *Rain garden Handbook for Western Washington*, Washington State Department of Ecology, June 2013.

# Steps



1

## PLANNING & DESIGN



2

## CONSTRUCTION



3

## PLANT SELECTION & INSTALLATION

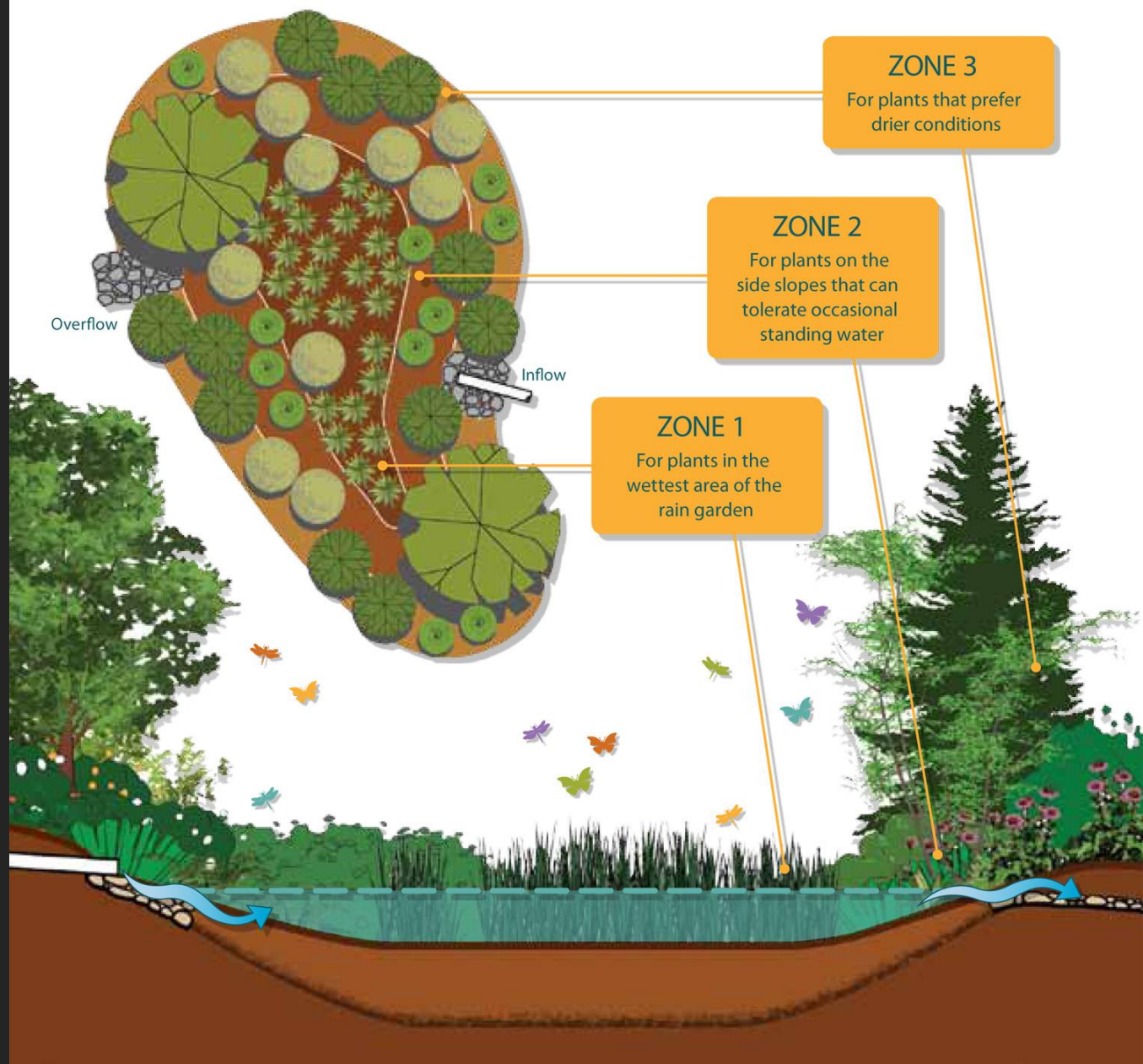


4

## MAINTENANCE

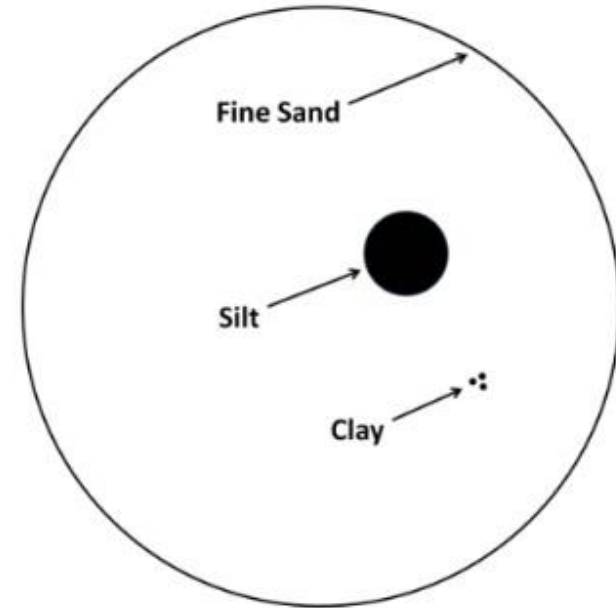
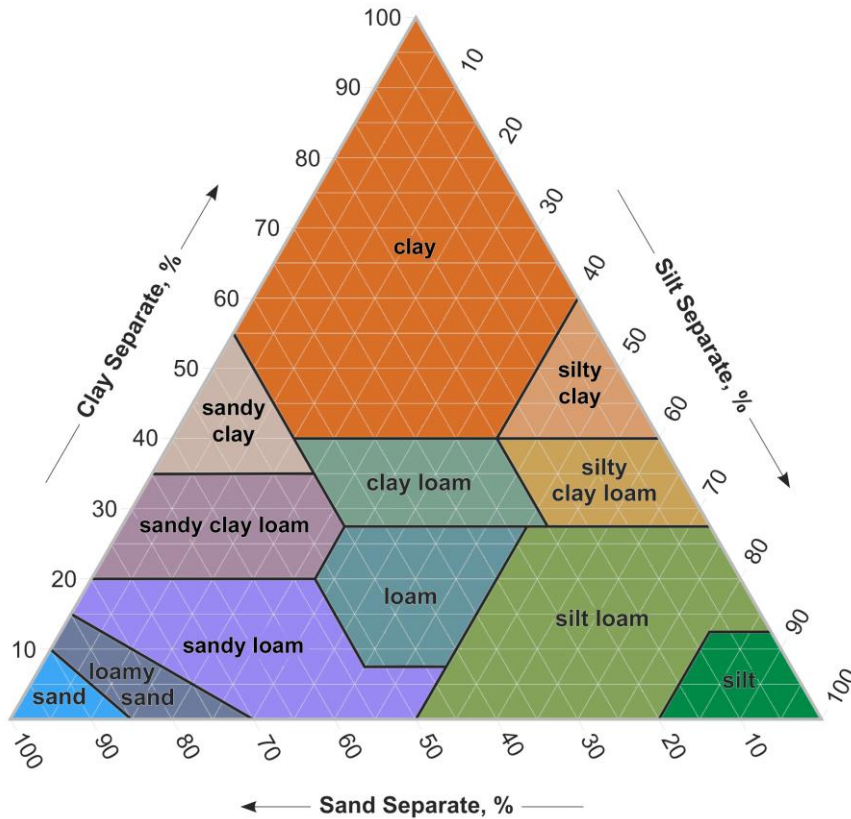


# Planning: Inundation Zones



# Planning: Understanding Soil Texture

Soil Textural Triangle

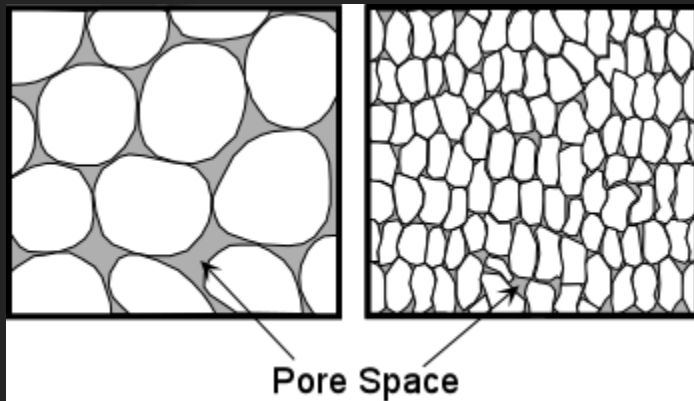


Whiting, D., Card, A., Wilson, C. Moravec, C., Reeder, J..  
Managing Soil Tilth, Texture, Structure and Pore Space.  
Colorado Master Gardener Program 2011,  
Colorado State University Extension. CMG GardenNotes #213.

# Planning: Soil Texture

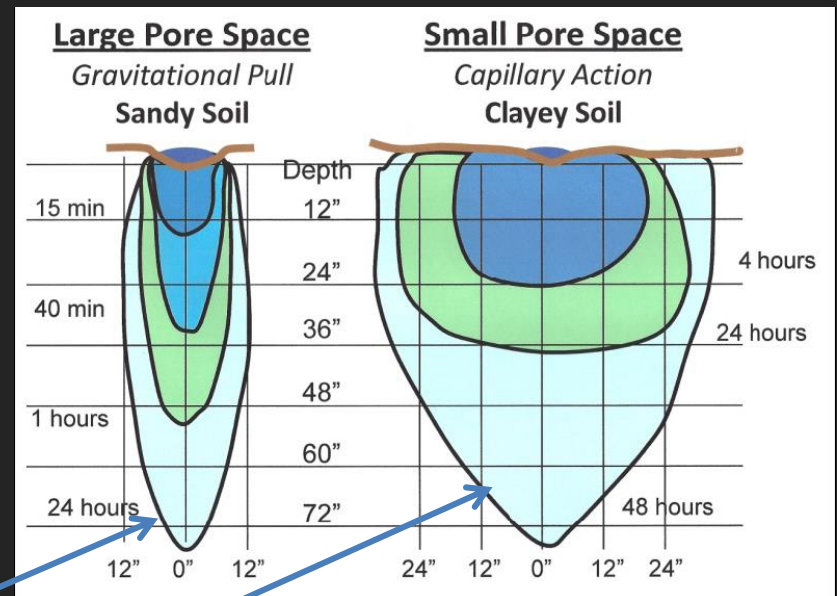
## Sand

## Clay



good drainage

poor drainage

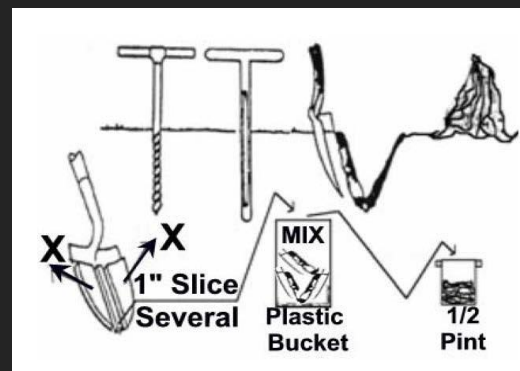
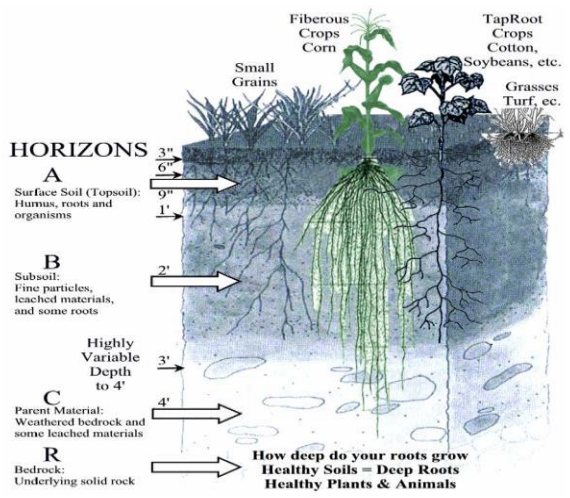


<http://www.tulane.edu/~sanelson/eens1110/groundwater.htm>

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

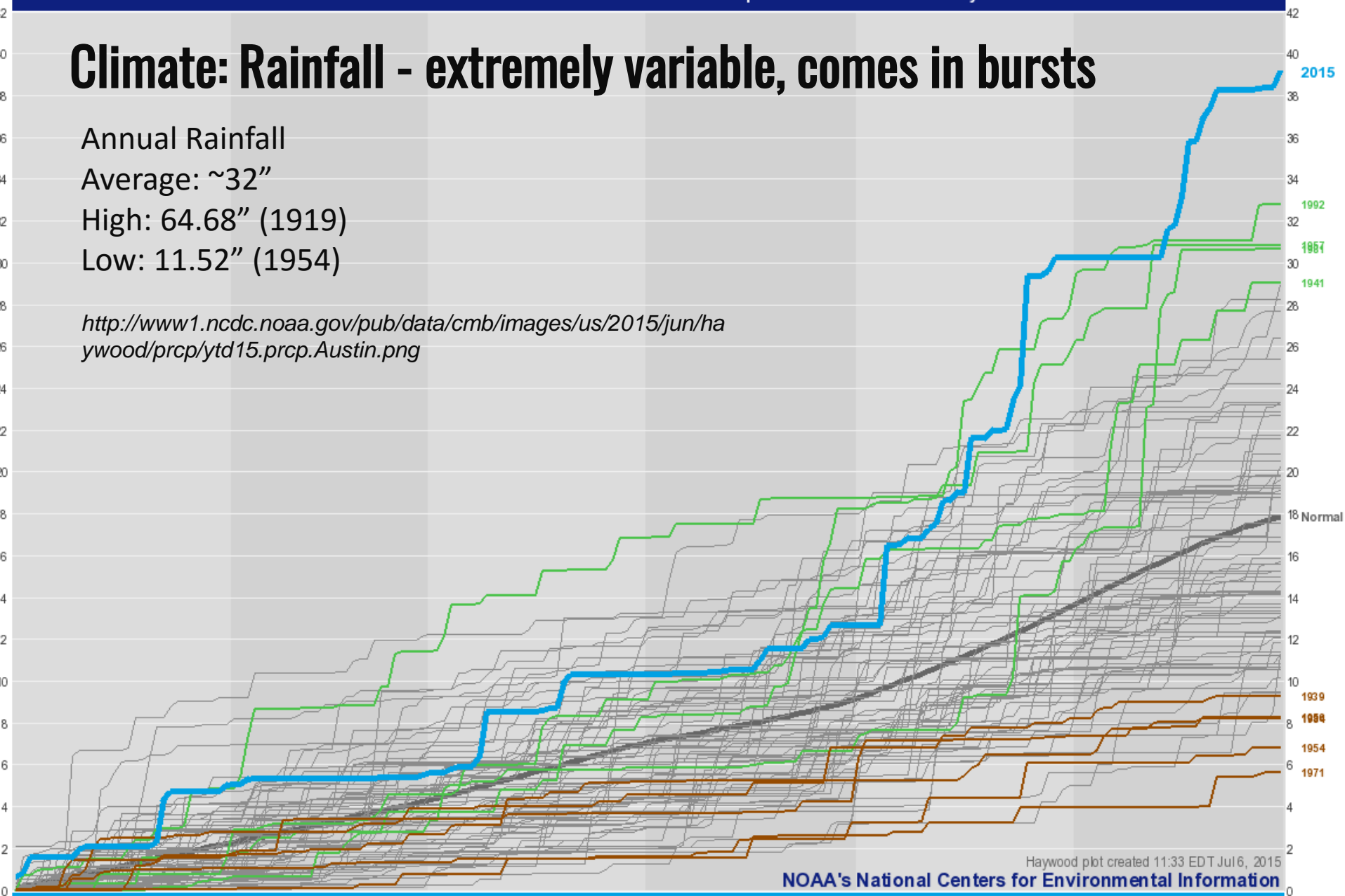
Annual Rainfall

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_ywood/prcp/ytd15.prcp.Austin.png)



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 1964 1956 1939

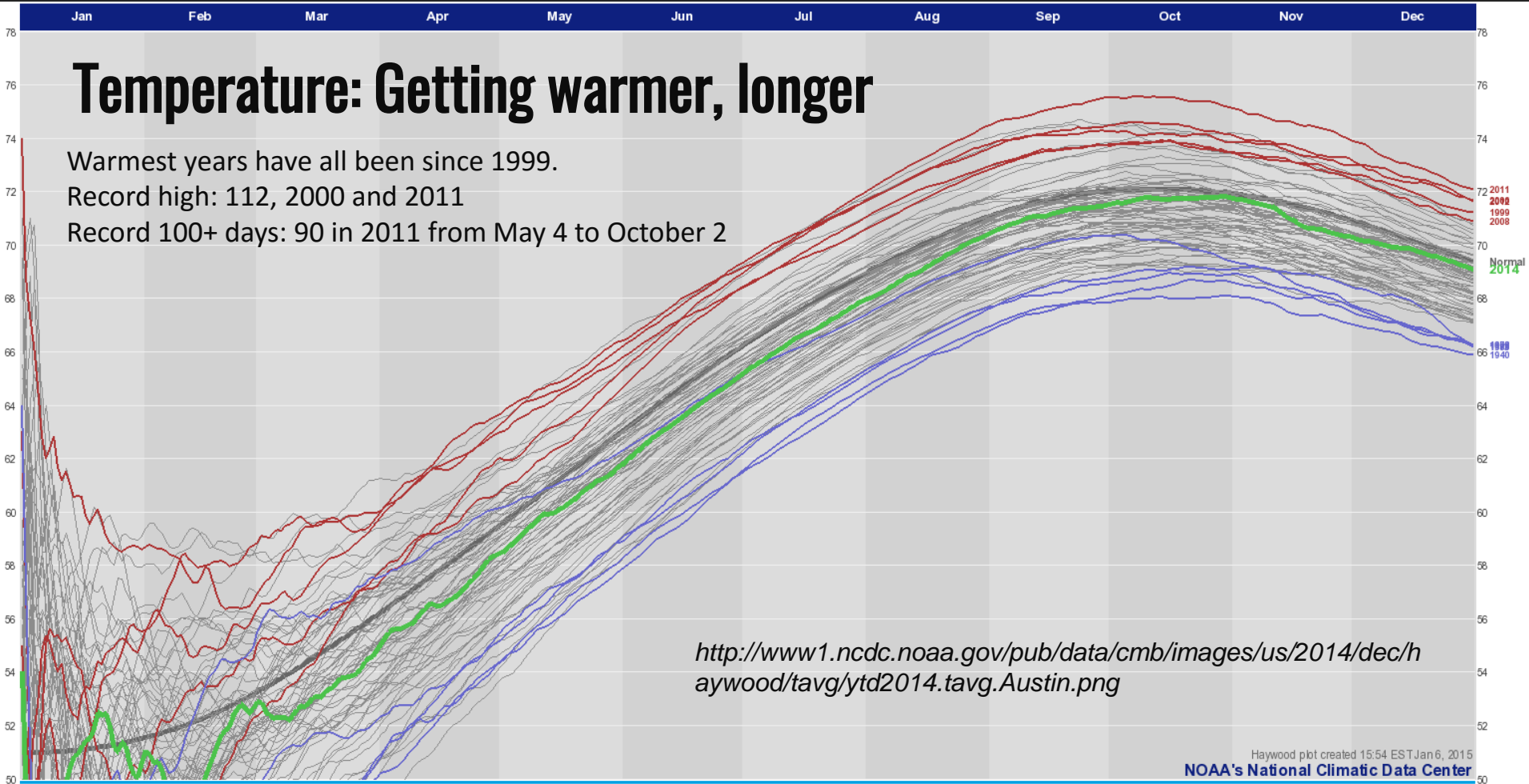
1981-2010 Normal underlaid in dark gray

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

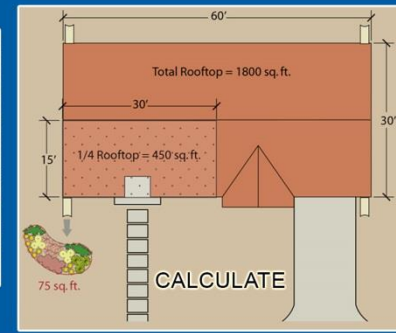
 Average Temperature (F) to Date for Austin, TX  
Jan 1 through Dec 31. Period of record is 1939 through 2014

## Plan to fail!

# Steps

1

## PLANNING & DESIGN



2

## CONSTRUCTION



3

## PLANT SELECTION & INSTALLATION



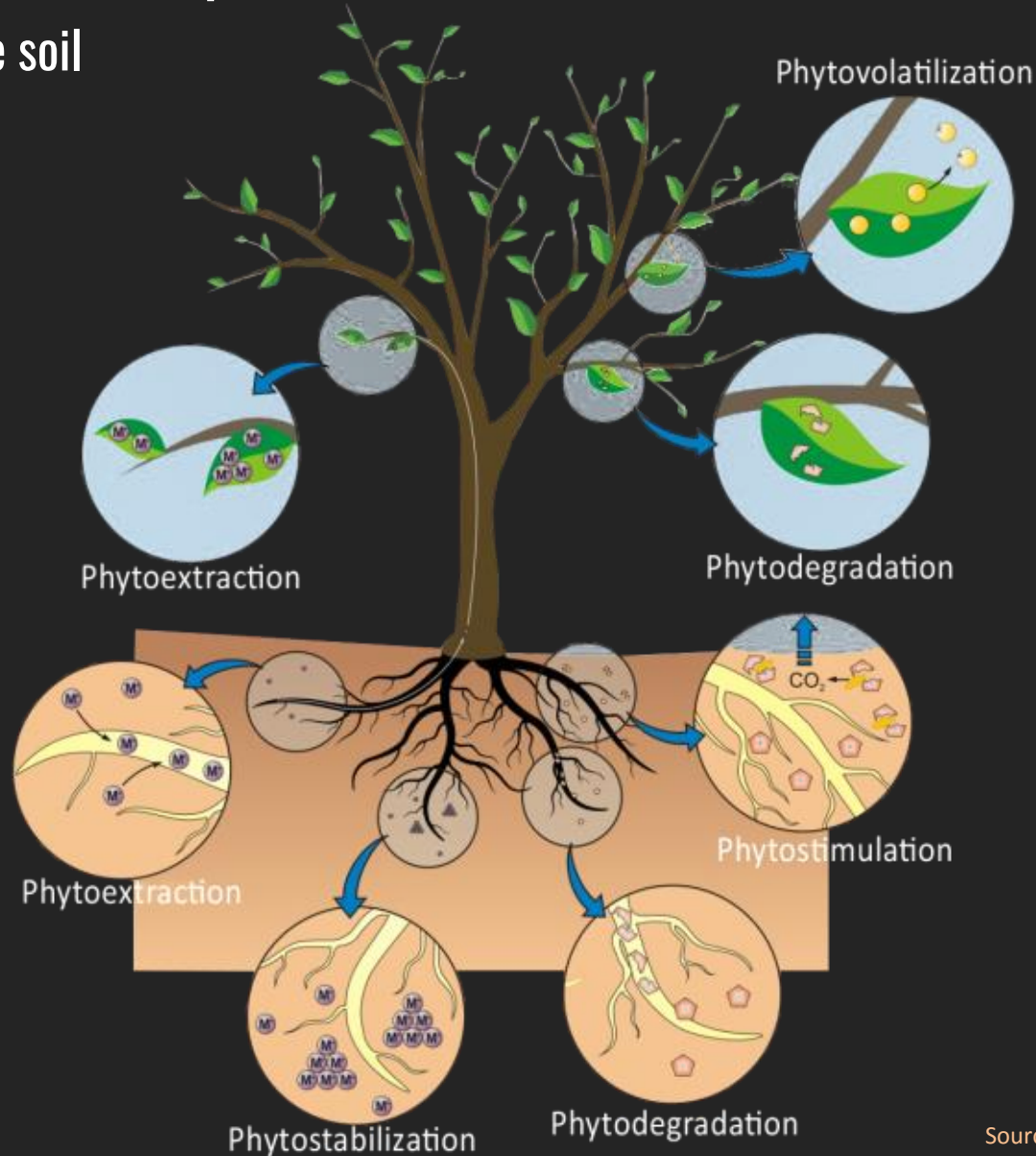
4

## MAINTENANCE



# Plant Selection

- Plants are an *essential* component – they filter and clean stormwater & soil
- They stabilize the soil



# Plant Selection

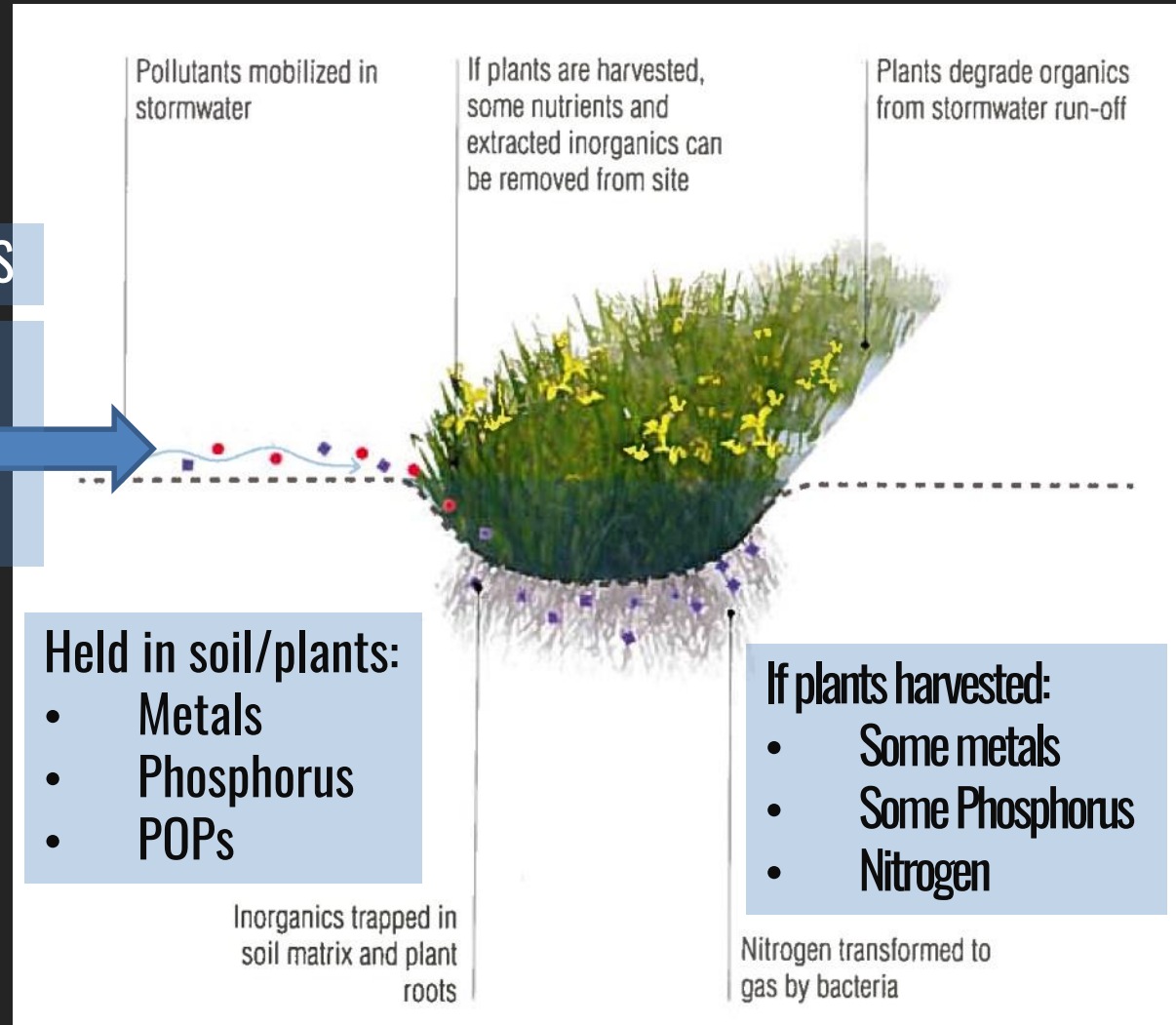
- Plants are an *essential* component – they filter and clean stormwater & soil

## Stormwater Filter

### ROADSIDES, PARKING LOTS

- Nutrients
- Petroleum PAHs
- Metals

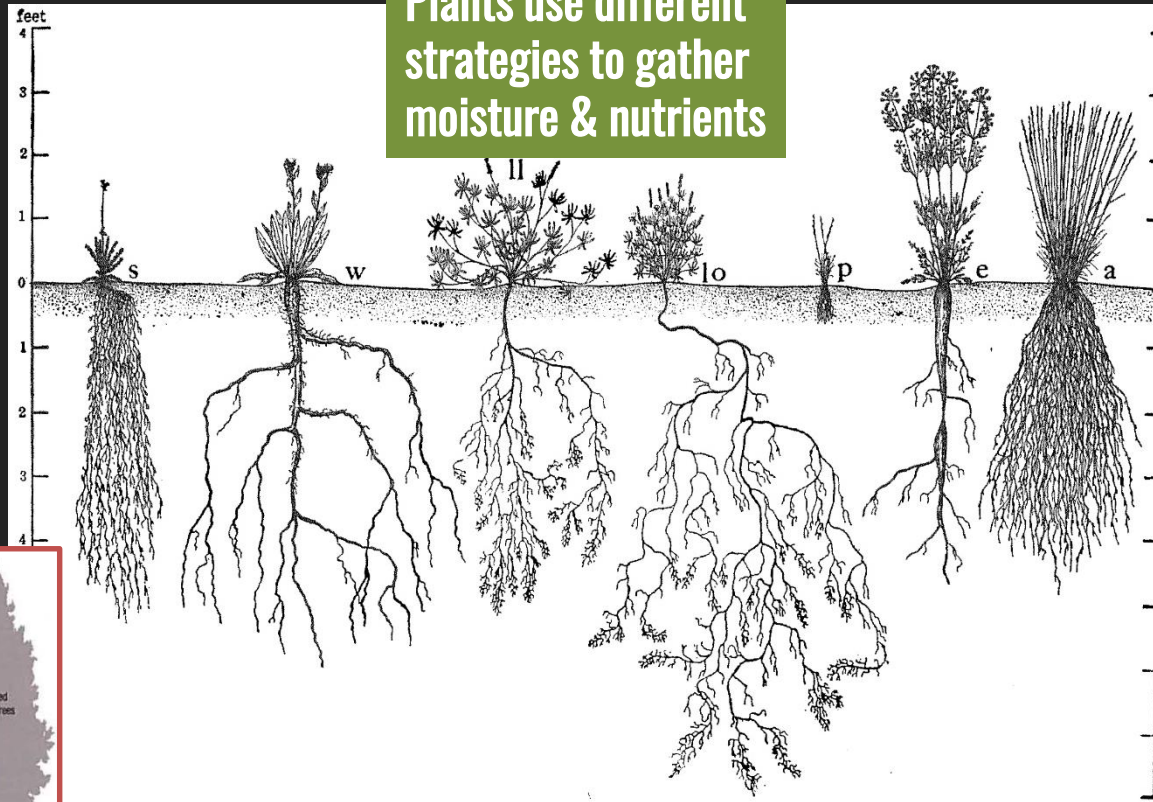
PAHs = Polycyclic aromatic hydrocarbon.  
POPs = Persistent Organic Pollutants.



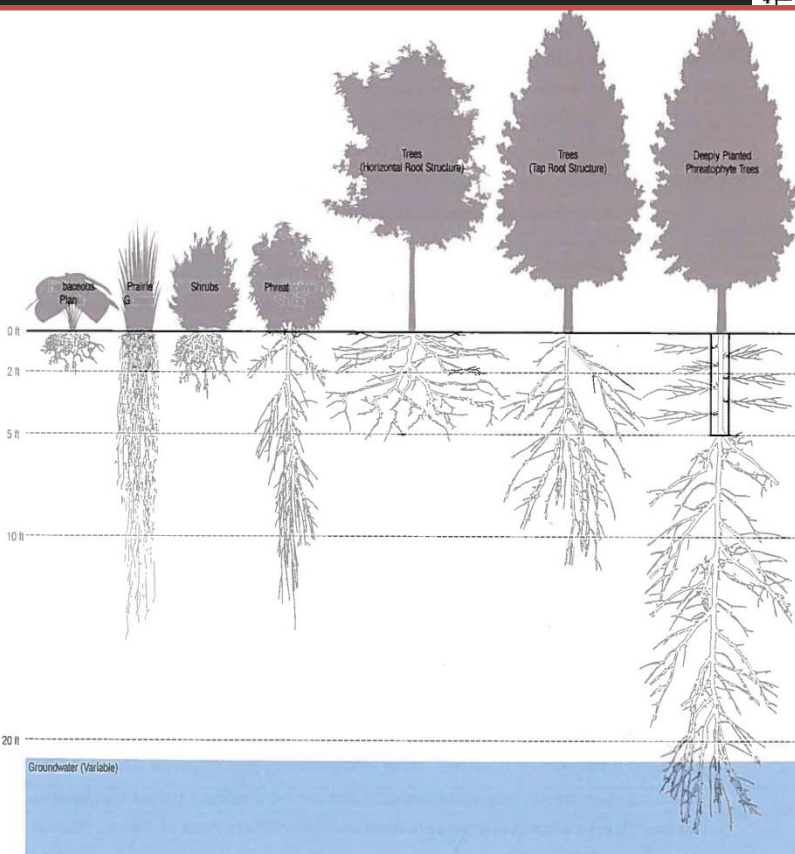
# Plant Selection

- Use Native or adapted plants
- Use Drought-tolerant plants –
- Austin rain gardens are dry 90+% of the time

Plants use different strategies to gather moisture & nutrients



7.—Schematic bisect: s, *Sieversia ciliata*; w, *Wyethia amplexicaulis*; ll, *Lupinus leucophyllus*; lo, *Lupinus ornatus*; p, *Poa sandbergii*; e, *Leptolena multifida*; a, *Agropyrum spicatum*.



70-80% of root structure in top 2' of soil

Source: R. Kourik, *Understanding Roots*

# Plant Selection

- Plants with *fibrous* root systems are very beneficial (e.g., bunch grasses, sedges)
- Plant roots will maintain and increase porosity

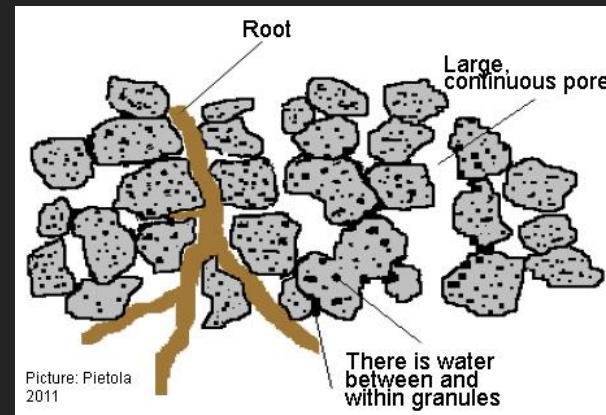
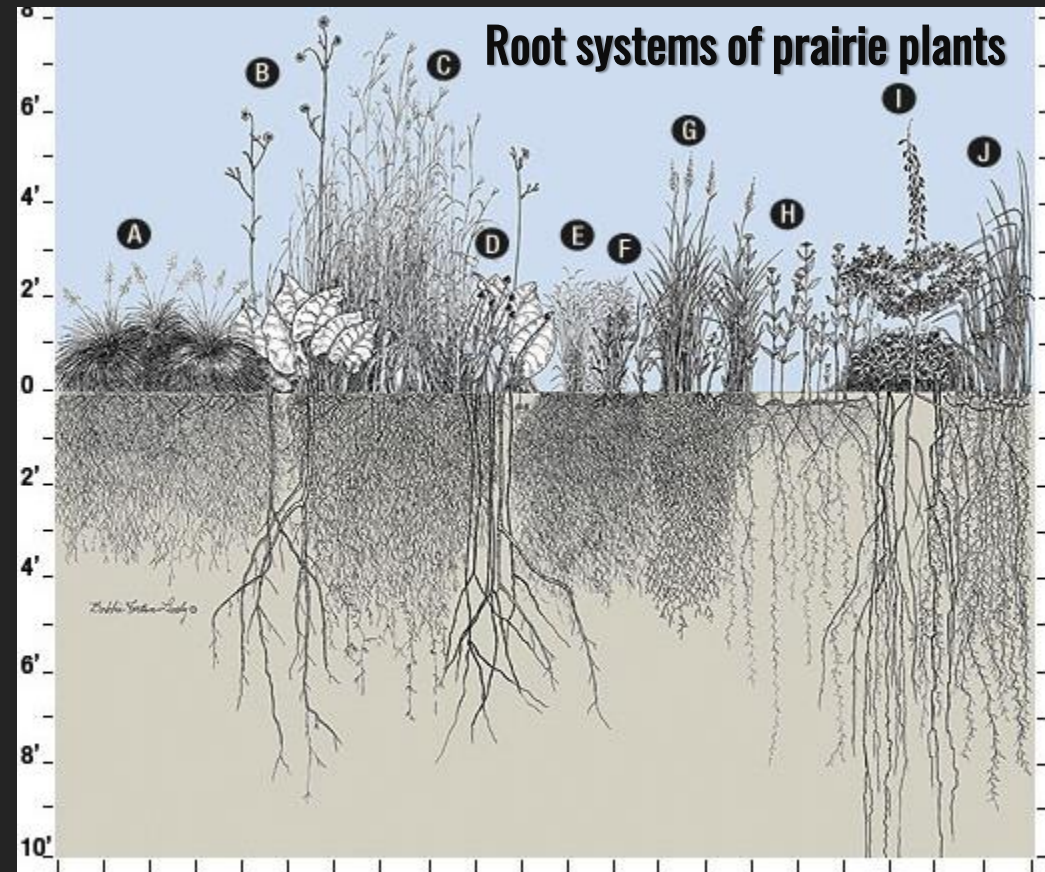


Photo: S. Kenzle, City of Austin

**Sedge with fibrous roots**



Source: Studio Dunn Design

- |                     |                      |                     |                    |                       |
|---------------------|----------------------|---------------------|--------------------|-----------------------|
| A. Prairie Dropseed | C. Big Bluestem      | E. Little Bluestem  | G. Indiangrass     | I. White False Indigo |
| B. Prairie Dock     | D. Purple Coneflower | F. Black-eyed Susan | H. Showy Sunflower | J. Prairie Cordgrass  |



# Plant Selection



Source: [www.theareofspadeslawncare.com](http://www.theareofspadeslawncare.com)

**Turfgrass roots**

vs

**Switchgrass roots**



Source: [www.wikipedia.org](http://www.wikipedia.org)

# Plant Selection

- **Diversity of plant types:**
  - Type: small trees, shrubs, perennials, bunch grasses, groundcover
  - Leaf Retention: evergreen, semi-evergreen, deciduous



Small  
tree

Shrubs &  
perennials

sedges

grasses

Photo: S. Kenzle, City of Austin

# Plant Selection: Plant Guide

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



## Native and Adapted *Landscape Plants*



Find your perfect plant with our online search tool!



an earthwise guide for Central Texas

# Plant Selection: Plant Guide

Native and Adapted

## Landscape Plants

an earthwise guide for  
Central Texas



City of Austin & Texas A&M AgrLife 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**

- Any -










**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

**Search** **Reset**

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

Lady Bird Johnson  
**Wildflower center**  
THE UNIVERSITY OF TEXAS AT AUSTIN

Shop Interact Rental SITES™ Contact

Search  Go


about visit native plants events conservation innovation education support **DONATE** En Español

### Native Plants

- About NPIN
- Bibliography
- Botanical Glossary
- Drought Resources Center
- How To Articles
- Image Gallery
- Mr. Smarty Plants

### NATIVE PLANT DATABASE

SHARE



Welcome to the latest edition of the Native Plants Database where you can explore the wealth of native plants in North America. Use the options below to search for 8,494 native plants by scientific or common name or choose a particular family of plants.

For non-native or introduced species, please visit the [USDA Plants Database](#).

» Recommended Species Lists

## 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 (mespary)

All durations

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.

# Plant Selection: Plants

## Pickle Elementary, Austin

CONTAINERS

SEEDS



Photo: L. Sherman, City of Austin

### Local Seed Sources:

- Native American Seed
- LBJ Wildflower Center
- Wildseed Farms

Photo: Native American Seed

## Container Plants

### Pros:

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

### Cons:

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

## Seeds

### 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/Liveroot

### Pros:

- Healthier plants
- Inexpensive

### Cons:

- Limited planting window
- Limited availability
- Must plant immediately



# 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



**Fall Obedient Plant**



**Inland Sea Oats**



**Dwarf palmetto**



**Indian Grass**



**Blue Mistflower**

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

# 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



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.
- 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.

## Tools and Materials Checklist

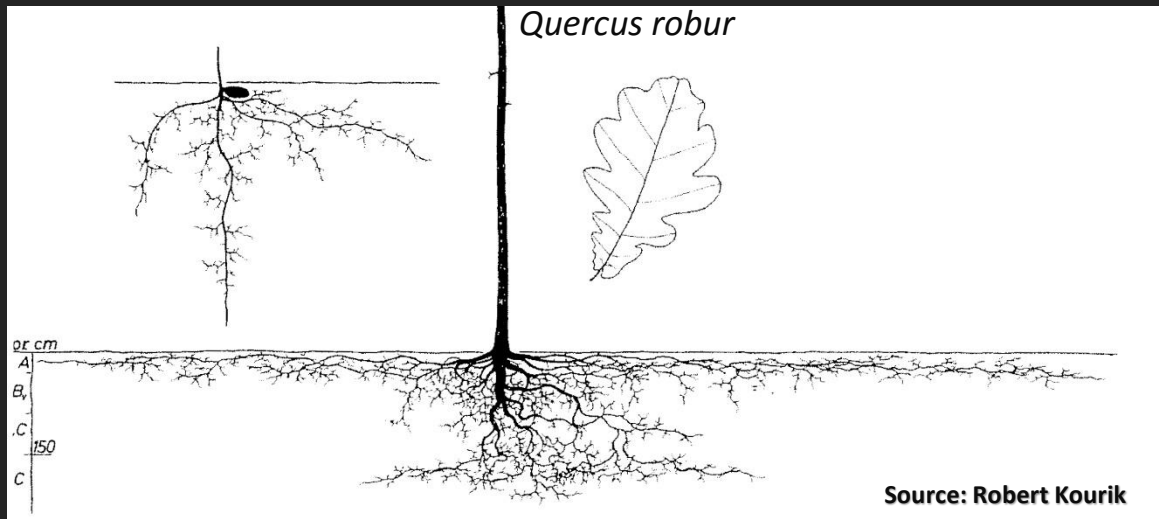


- PLANTS**  
*(Emergents, Perennials, Grasses, Groundcovers, Shrubs, and Trees)*
- SHOVEL(S)**
- SMALL HAND TOOLS**  
*(Dibbles, Planting Bars, Weeding Knives—  
for Planting Tubes and Bare-Root Emergents)*
- WHEEL BARROW**
- RAKE**
- MULCH**  
*(Shredded Wood or Chipped Wood)*
- WATER**
- STONES/ROCK**

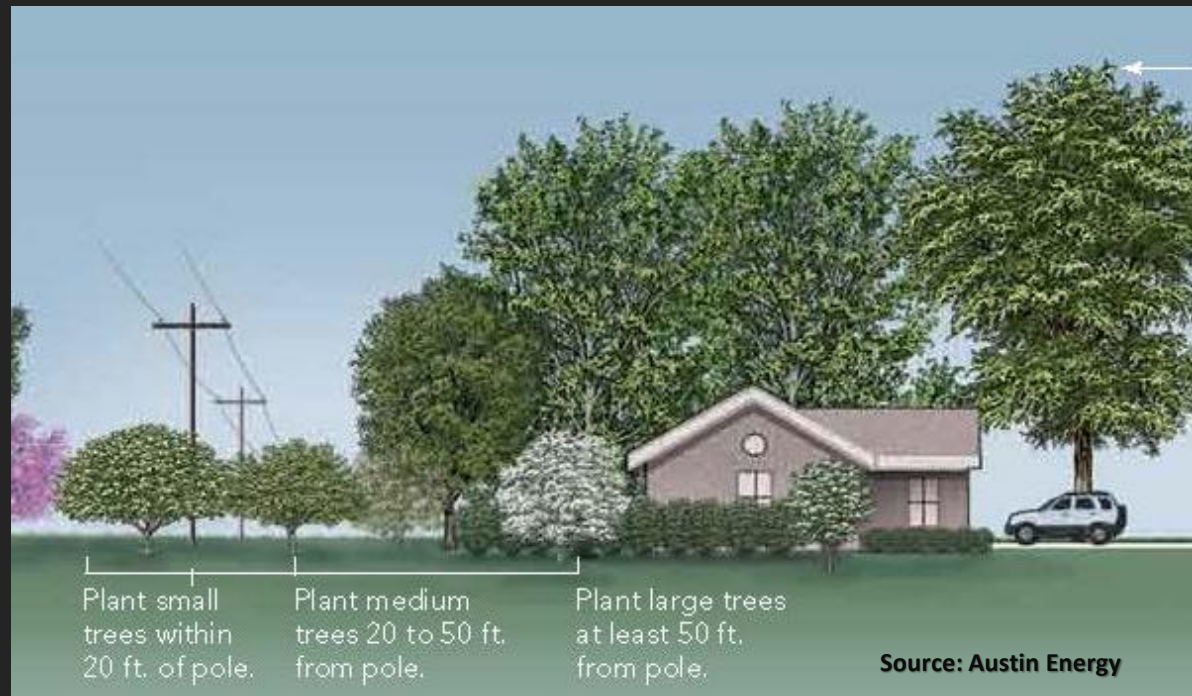
*Rain garden Handbook for Western Washington,*  
Washington State Department of Ecology , June 2013.

# Plant Installation

- Avoid planting in the root zones of existing trees. Most are shallow (8-24") & extensive.



- Be mindful of overhead and underground utilities. Call before you dig!



# Plant Installation: spacing, layout



Photo: homegrownlandscapes.files

Layout plants per their mature size

OR



Photo: news.psu.edu

Do maintenance later

# Plant Installation: mulch



3" of mulch

Photo: austinlandscapesupplies.com

## Coarse-ground hardwood mulch



Photo: www.kellermaterial.com

## 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.



Photo: austinlandscapesupplies.com

## Pea gravel mulch



Photo: longhornlawnsaustin.com

## River rock

# Plant Installation: irrigation

Supplemental water is essential to get plants acclimated to new home – from pampered to roughing it



Photo: [blog.savatree.com](http://blog.savatree.com)

**Nursery Plants – constantly watered, pampered**



Photo: [backtotheroots.com](http://backtotheroots.com)



Photo: [robbinspark.wikispaces.com](http://robbinspark.wikispaces.com)

# Plant Installation: irrigation

Water for plant establishment – at least 1 year

Water after installation through hot months

Follow Austin Water Conservation mandates

**M A N Y  
W A Y S  
T O  
W A T E R**



# Opportunities - Pollinators:

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

“...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*)

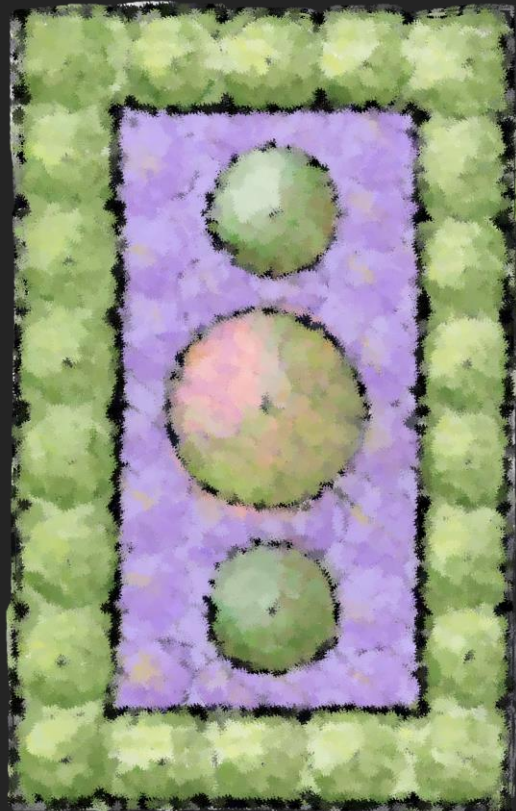
### Herbaceous:

- 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



# 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:

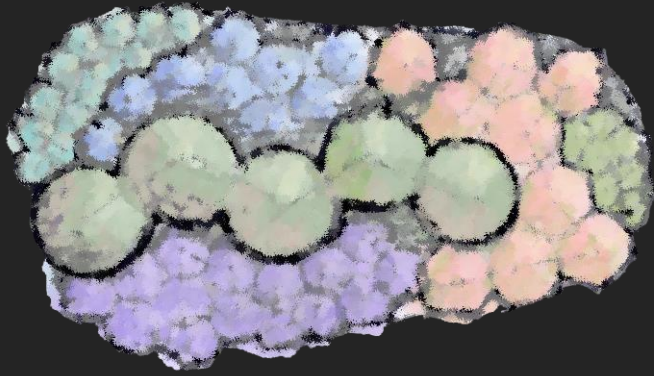
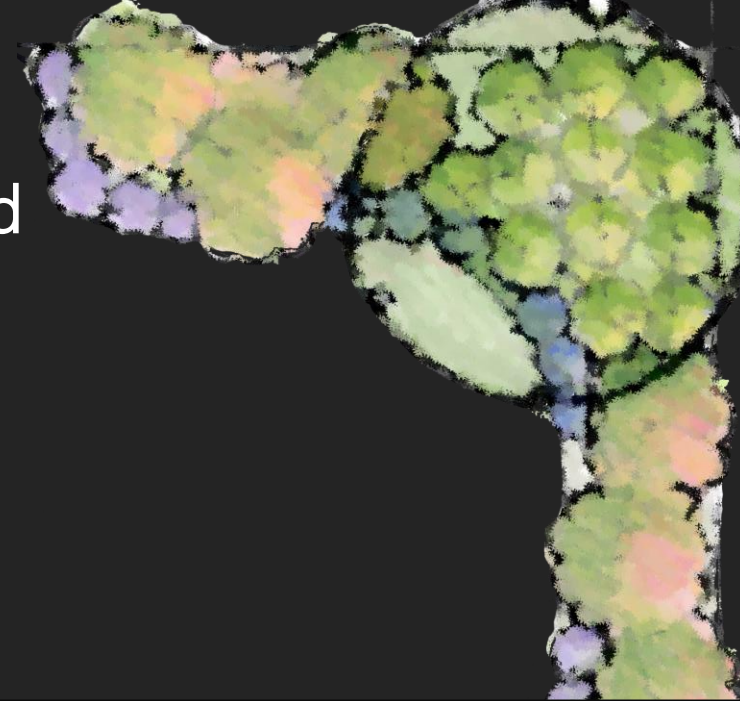
Informal  $\neq$  Naturalized



Solvita Townhomes, Harmon Ave.



Bellamy Residence



# Opportunities - Aesthetics:

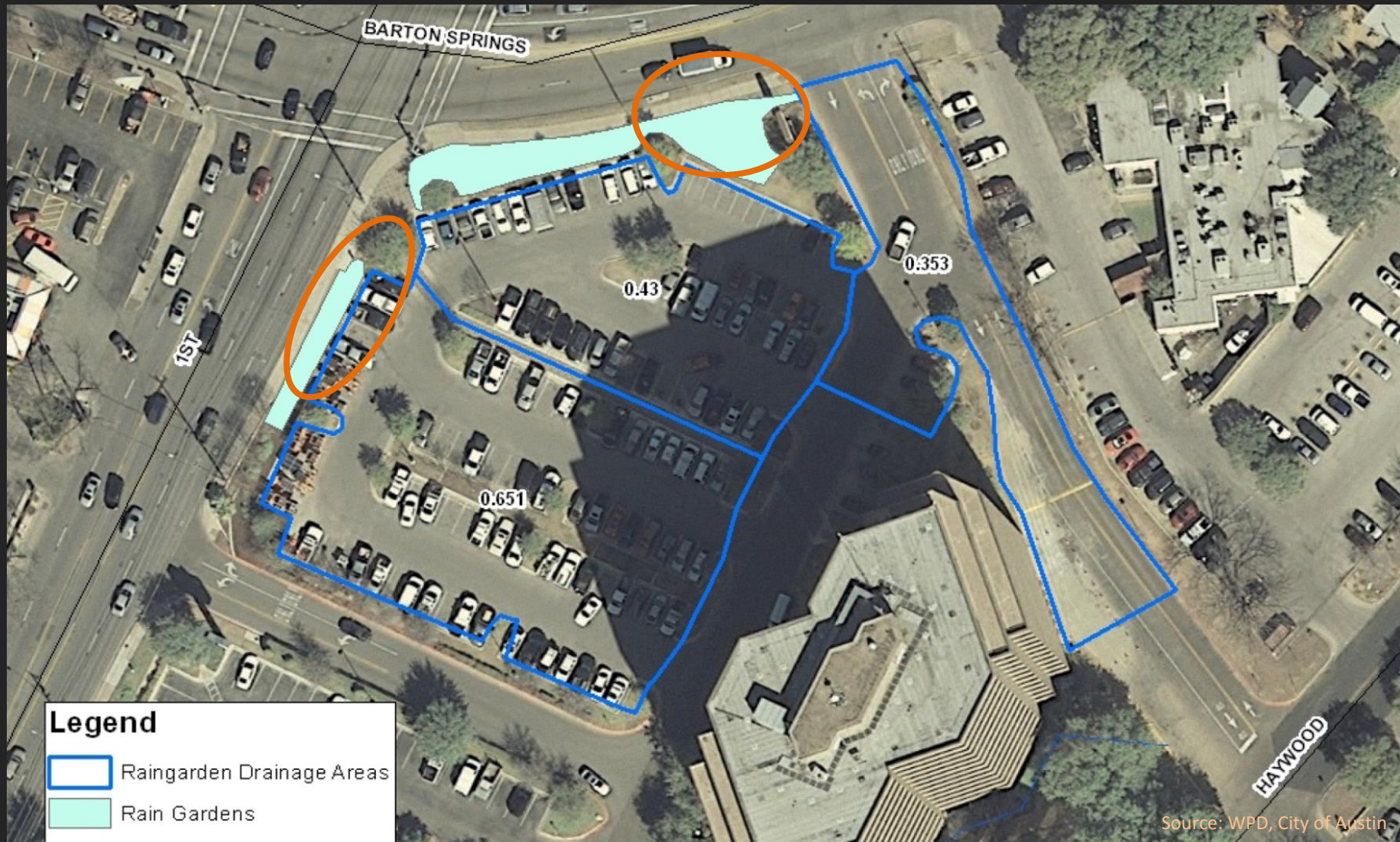
## Fit with Topography



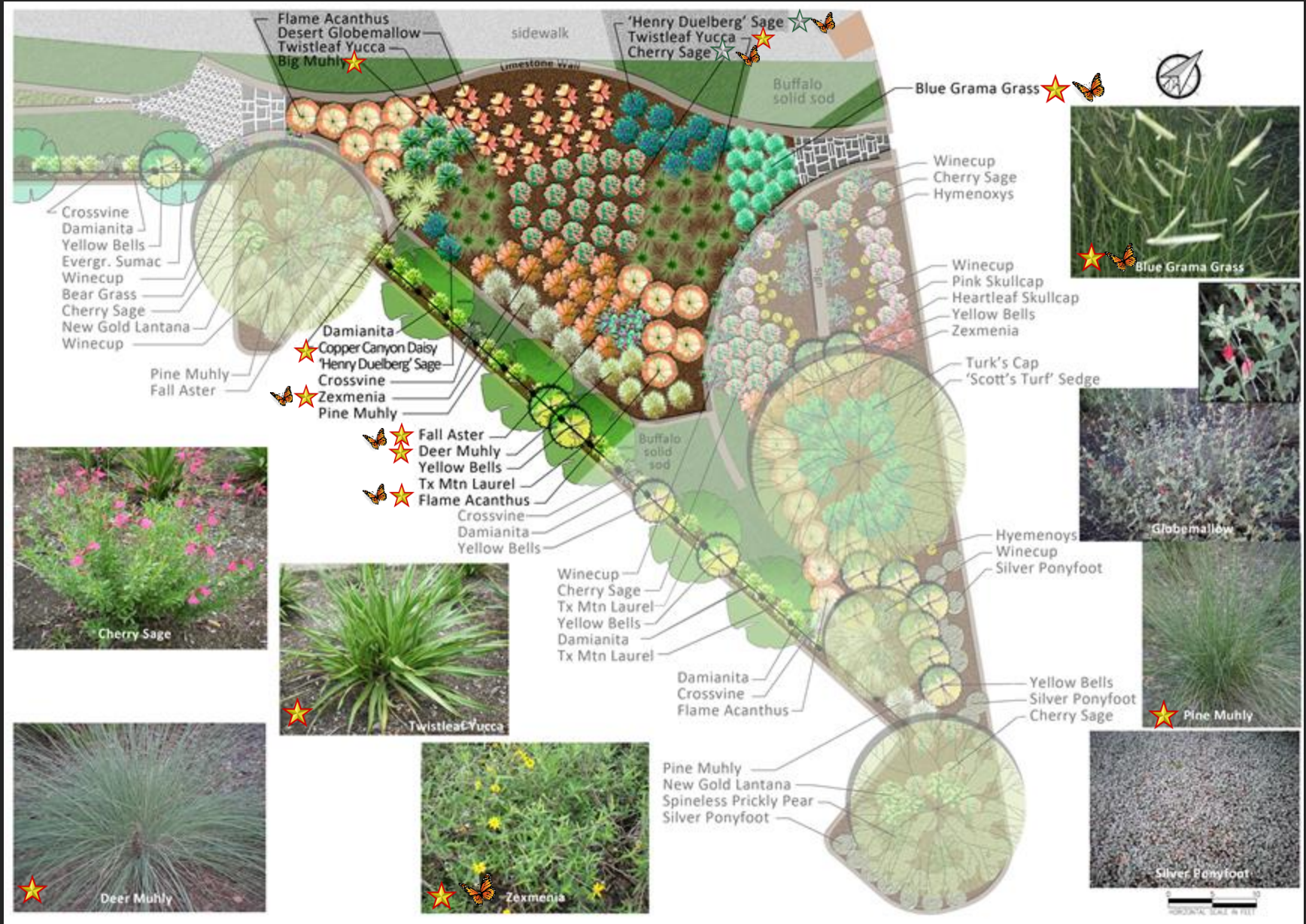
Photo: Susan Kenzle, City of Austin

# 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

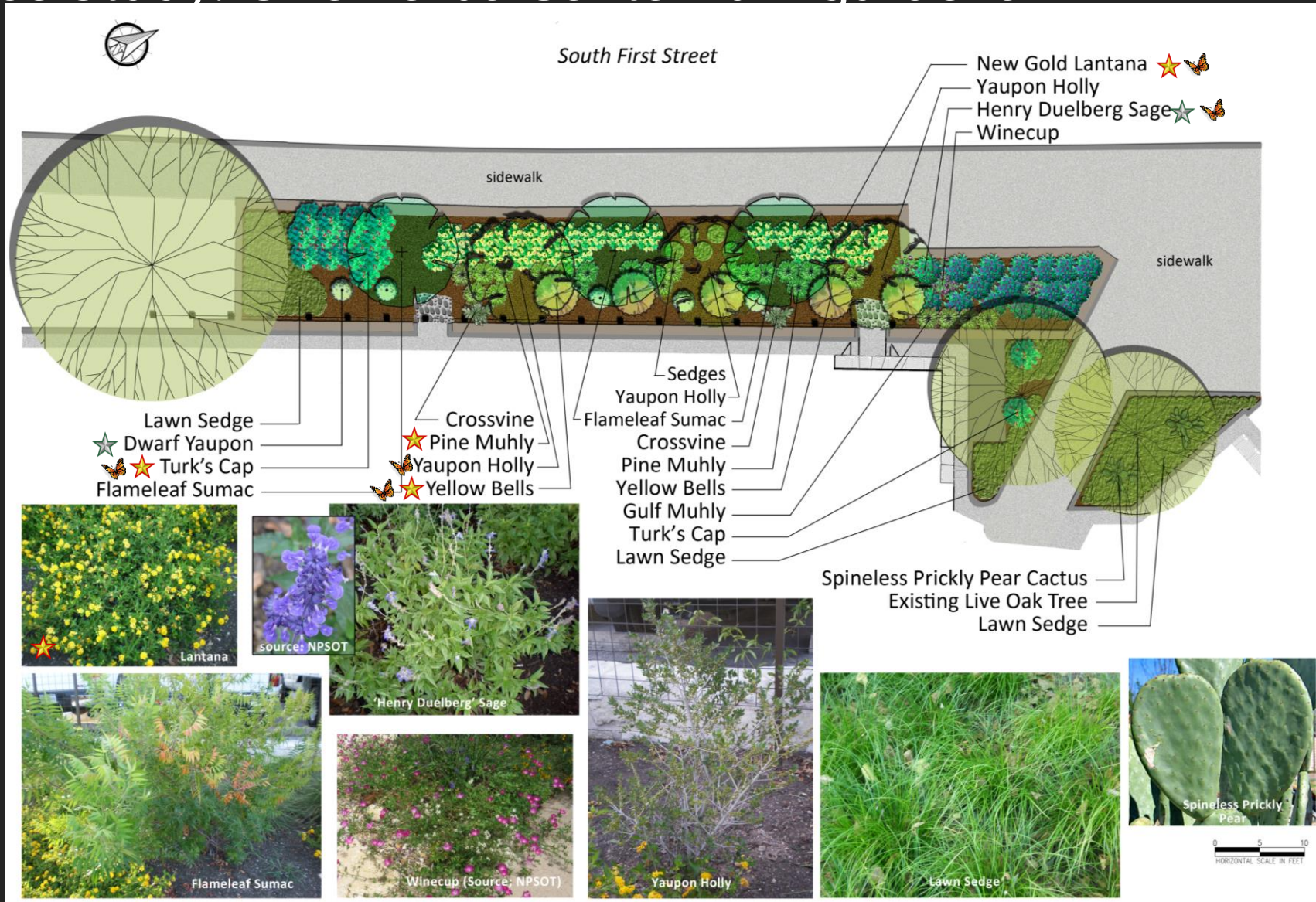


★ Performs well for 2-3 years.  
 ★ Consistently performs well.

🦋 Pollinator plant: butterflies &/or bees

Source: S. Kenzle, City of Austin

# Case Study: One Texas Center rain gardens



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

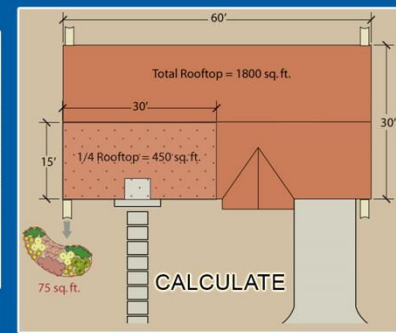
★ Pollinator plant: butterflies &/or bees

Source: S. Kenzle, City of Austin

# Steps

1

## PLANNING & DESIGN



2

## CONSTRUCTION



3

## PLANT SELECTION & INSTALLATION



4

## MAINTENANCE



# Maintenance

Leaves



Suckering plants



Fruit, Nuts (acorns)



# Maintenance

## Plant Replacement



2013



2015

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

Photos: S. Kenzle, City of Austin

## Weeding



## Plants Over Sidewalk





# Thank you for attending

## Questions?

## Discussion

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

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[darcy.nuffer@austintexas.gov](mailto:darcy.nuffer@austintexas.gov)

