



# **So You Want to Build a Rain Garden?**

**What have we learned so far?**

**Tom Franke**

**City of Austin**

**Watershed Protection Department**

**Stormwater Treatment Section**

January 24, 2019

# On the Agenda

1. What is a rain garden and why build one?
2. Design of Rain Gardens
  1. Siting & Sizing
  2. Location/Drainage Area
  3. Infiltration Rates
  4. Inlets
  5. Types and Alternatives
  6. Media
3. Maintenance of rain gardens
4. Completed Projects



Image: Morton Salt Co.

# What is a Rain Garden?

A rain garden is a vegetated, depressed landscape area designed to capture and infiltrate and/or filter stormwater runoff from impervious surfaces.



# Rain Garden Guidance



earth-wise guide to

## Rain Gardens

Keeping Water on the Land

### what is a rain garden?

A rain garden is a shallow vegetated depression designed to absorb and filter runoff from hard (impervious) surfaces like roofs, sidewalks, and driveways. Rain gardens are usually planted with colorful native plants and grasses. They not only provide an attractive addition to the yard, but also help to conserve water and protect our water quality.

### how does a rain garden help?

As Austin becomes increasingly urbanized, native landscapes are replaced with impervious surfaces that prevent rainwater from soaking into the ground. Stormwater quickly runs off these hard surfaces, picking up pollutants from the land and carrying them to our creeks. The rapidly flowing water also increases the chances of flooding and erosion.

The goal of a rain garden is to keep water on the land. Rain gardens, with their shallow depressions, capture stormwater and provide for natural infiltration into the soil. This provides water for the plants and helps maintain a constant flow of water in our streams through groundwater. They also help filter our pollutants including fertilizers, pesticides, oil, heavy metals and other chemicals that would otherwise reach our creeks through storm drains or drainage ditches. By reducing the quantity of water that runs off your property, rain gardens help lower the risk of flooding and erosion.

[growgreen.org](http://growgreen.org)



Austin Parks and Recreation - 919 West 28th Street

## Create A Rain Garden in Six Steps

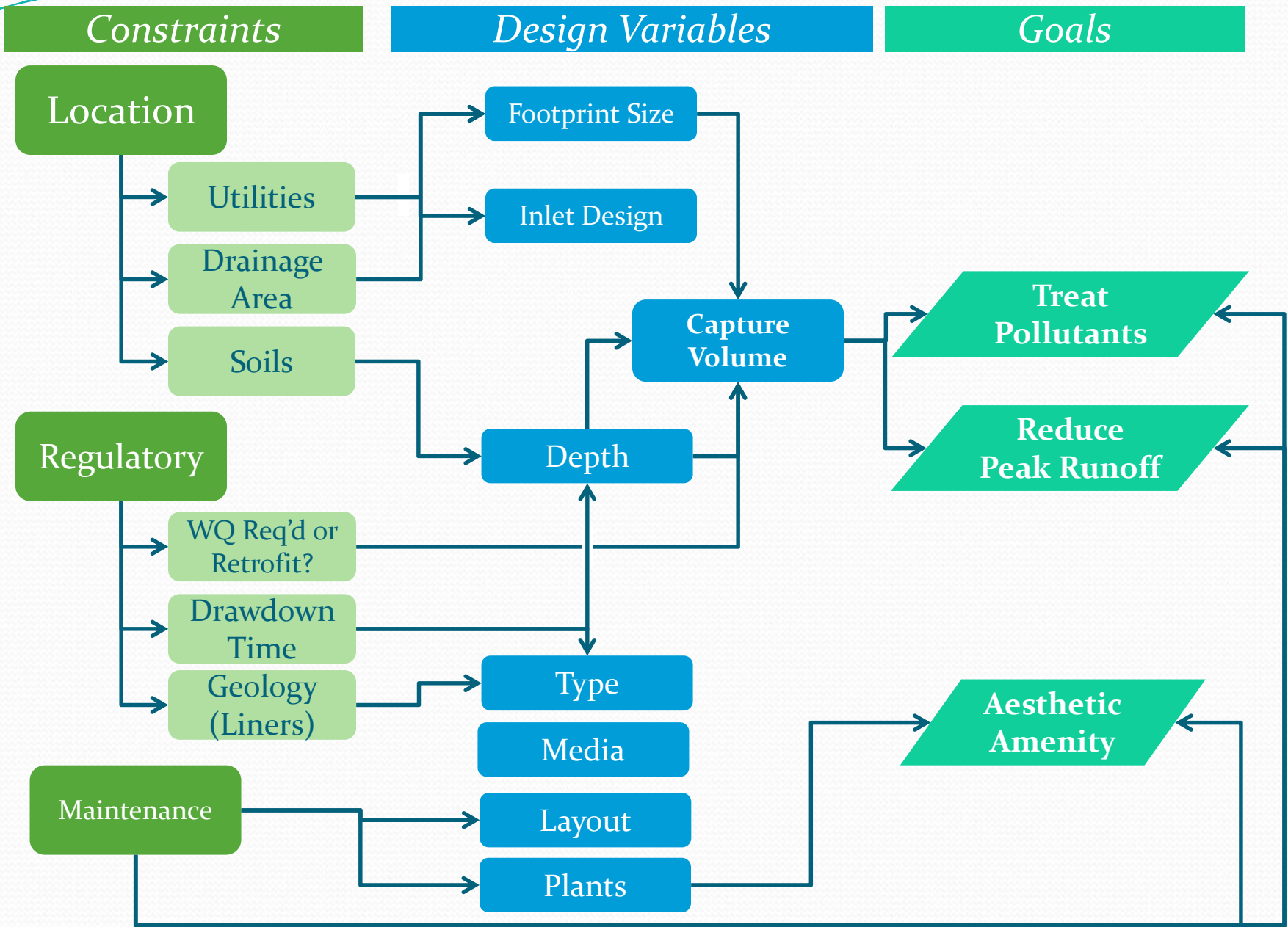
### 1 Find the Right Location

• Observe the flow of water from rooftops, driveways, or other hard surfaces and place the rain garden where this water collects



- Select an area on gently sloping or flat land
- Calculate the slope of your lawn (instructions on next page). The slope should be less than 10%.
- If possible, pick a spot in full to partial sun. Shady locations will still work, but the options for flowering plants are more limited in the shade.
- Make sure that any overflow will not cause unintended runoff to a neighbor's property or other structure.
- If drainage-related problems are occurring (e.g. foundation problems, erosion or flooding), consider placing the rain garden at least 10' away from the structure.
- Avoid areas with utility lines. Be sure to call 1-800-DIG-TESS (344-8377) to identify the location of underground utilities - the service is free.

# Rain Garden Design Considerations



# Siting

## For Water Quality Credit:

### Land Use -

- Commercial, Multi-Family, Civic, and Right of Way developments only.
- Single Family water quality credit allowed under certain circumstances.
  1. Rain garden must be located in a dedicated common area or within a drainage easement that is accessible by standard maintenance equipment from the right of way.
  2. A minimum of four (4) single family lots must be treated by the rain garden.
  3. No rain gardens are to be located in backyards or fenced in yards.
  4. The City of Austin will provide functional maintenance per City Code Section 25-8-231. Homeowners may add additional native landscaping and provide more frequent care.

## Stormwater Hotspots -

Infiltration rain gardens are not allowed in areas where activities generate highly contaminated runoff due to the potential for ground water contamination.

Hot spots include, but are not limited to:

- commercial nurseries,
- auto salvage facilities,
- hazardous materials generators (where containers are exposed to rainfall),
- vehicle fueling and maintenance areas, and
- vehicle and equipment washing,
- dry or steam cleaning facilities,
- food production/distribution loading dock, and
- trash compactor areas

# Location

## **Drainage Area –**

Contributing area not to exceed 2.0 acres.

## **Setbacks –**

Prevent adverse impacts to building foundations, basements, wellheads, and roadways.

## **Slopes –**

Should not be located on slopes exceeding 15 percent.



# Soil Conditions

Consider depth to water table, bedrock, and the soil infiltration rate.

- Infiltration rain gardens are not allowed in locations where the depth from the bottom of the growing medium:
  - to the highest known groundwater table is less than 12 inches.
  - to bedrock is less than 12 inches.
- Infiltration rate of the soil subgrade below the growing medium of the rain garden must be determined using in-situ testing.

# Infiltration Rate of Soil

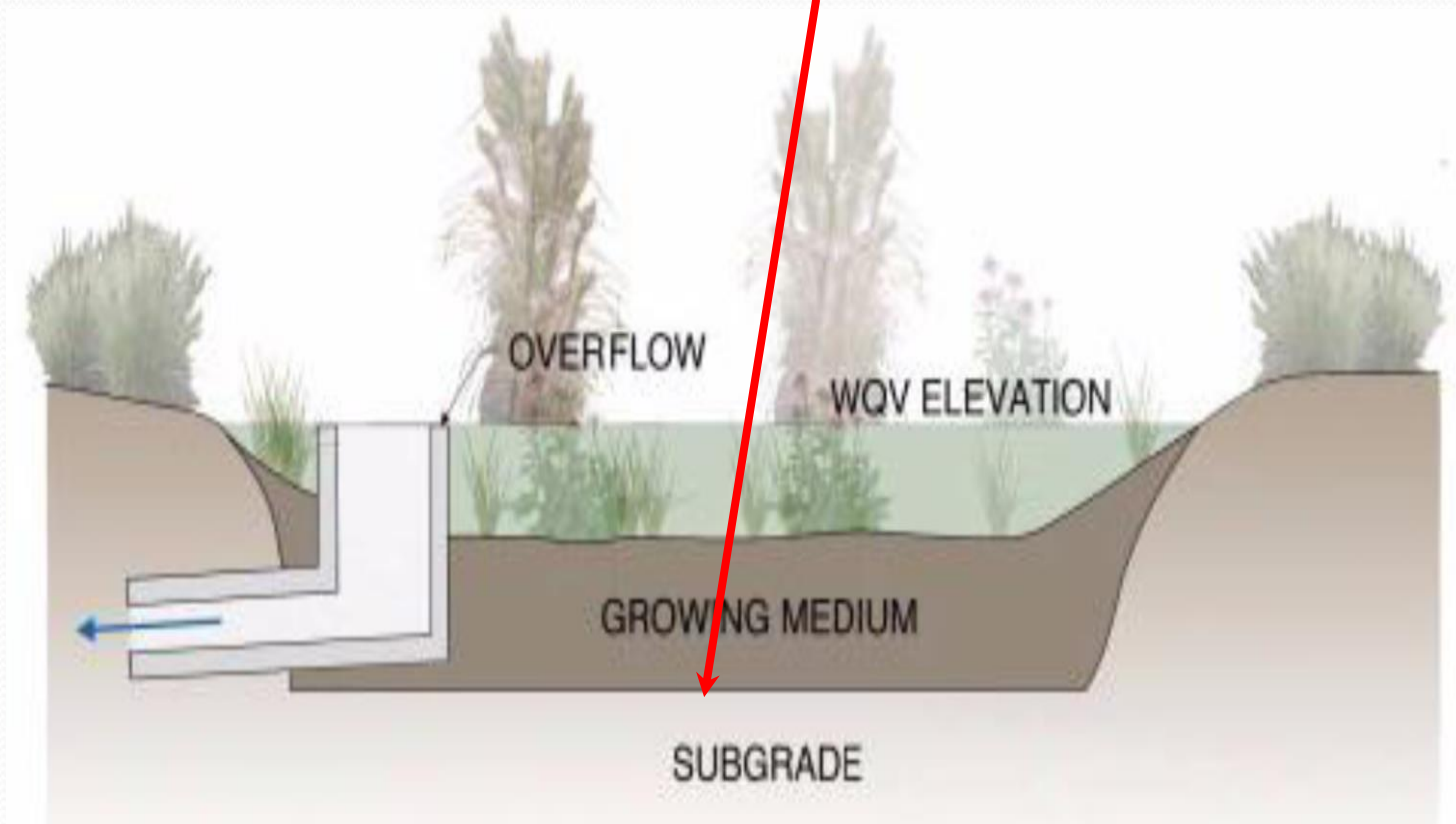
(For infiltration only rain gardens )

- Don't rely of soil survey maps or desktop evaluation for soil infiltration rates
- Perform onsite infiltration test (percolation test)
- At least one test for every 2000 square feet of rain garden
- Dig test hole deep enough to measure infiltration at the bottom of the rain garden.
- Apply factor of safety  
(COA recommends using  $FS = 2$ )



# Infiltration Test

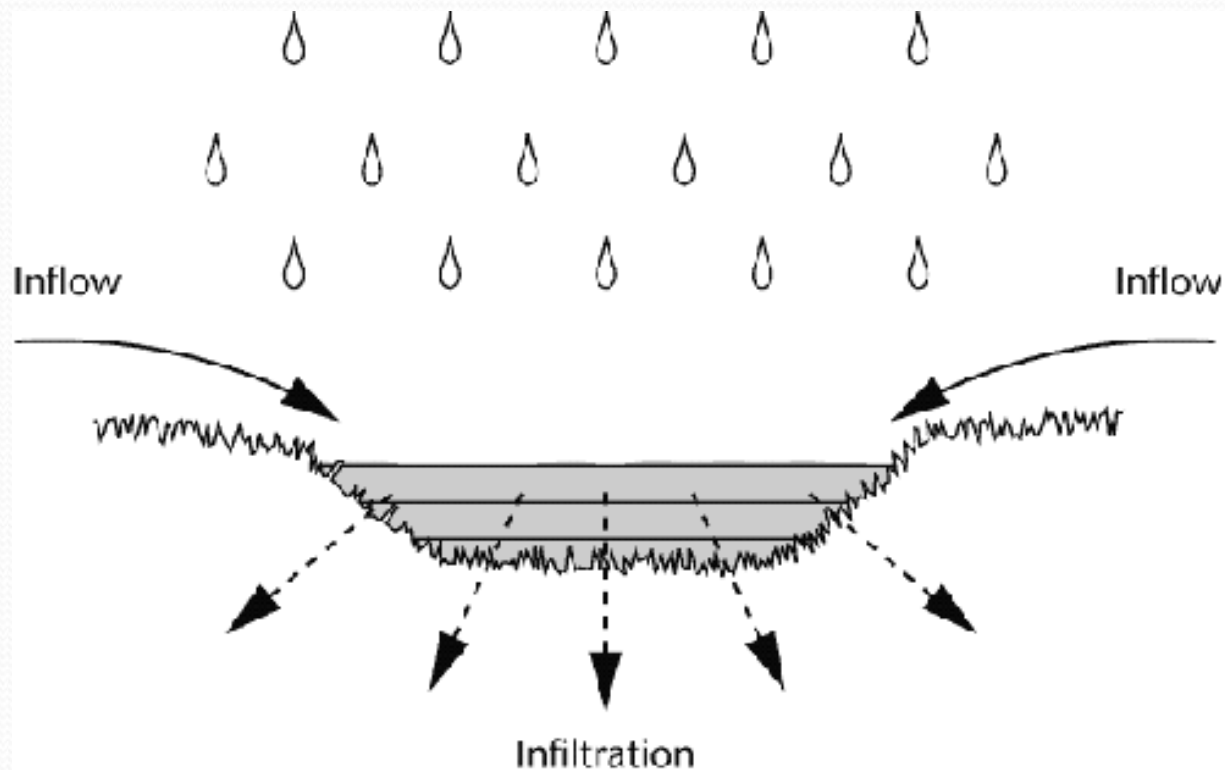
Dig Test Hole to this Depth



# Infiltration vs. Ponding Depth

The underlying native soil must have a design infiltration rate that will draw down the full ponded depth in 48 to 72 hours.

| Infiltration Rate (inches/hour) | Recommended Ponding Depth (inches) |
|---------------------------------|------------------------------------|
| 0.23                            | 12                                 |
| 0.13                            | 6                                  |
| 0.06                            | 3                                  |



# Drawdown Time - How fast should the rain garden empty after it rains?

The City of Austin recommends a drawdown time goal of no more than 2-3 days.

Why 3 days?

- Odors
- Mosquitos (typically take 4 to 5 days to hatch)
- Could affect health of plantings



# Drainage Area

## Desktop analysis

- GIS and Google map

## Field Verify Drainage Areas

- Preferably in the rain



# Drainage Area

**Design inlet for certainty of capture**

- Grading features or trench drains



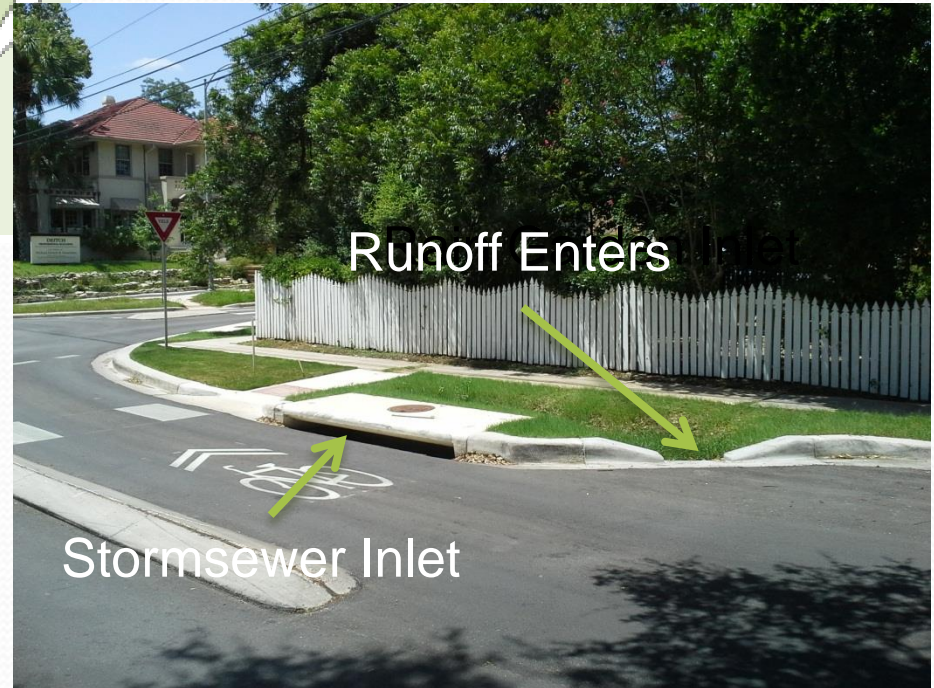
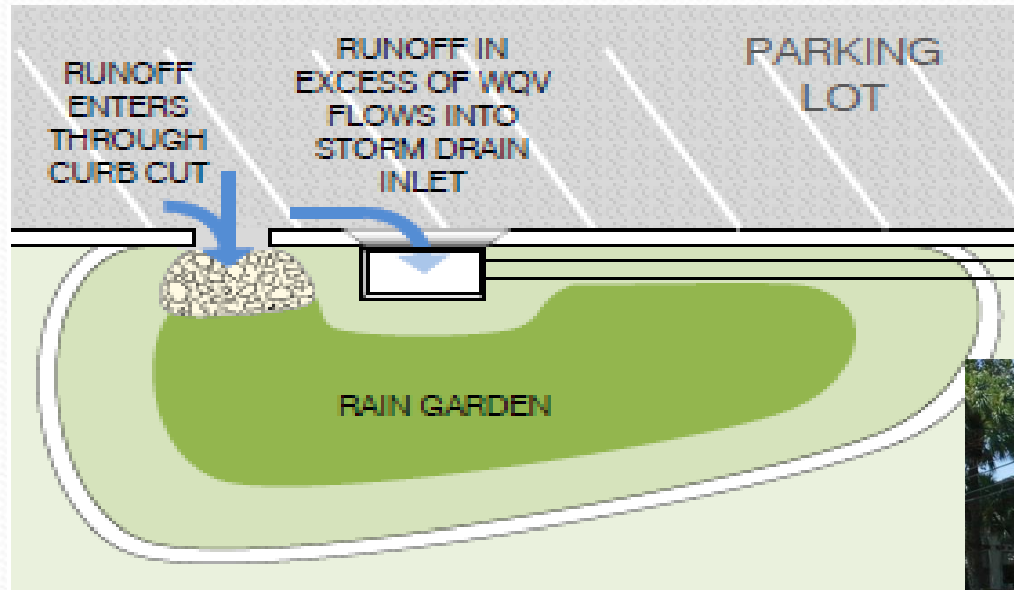
**FAIL**

# Certainty of Capture

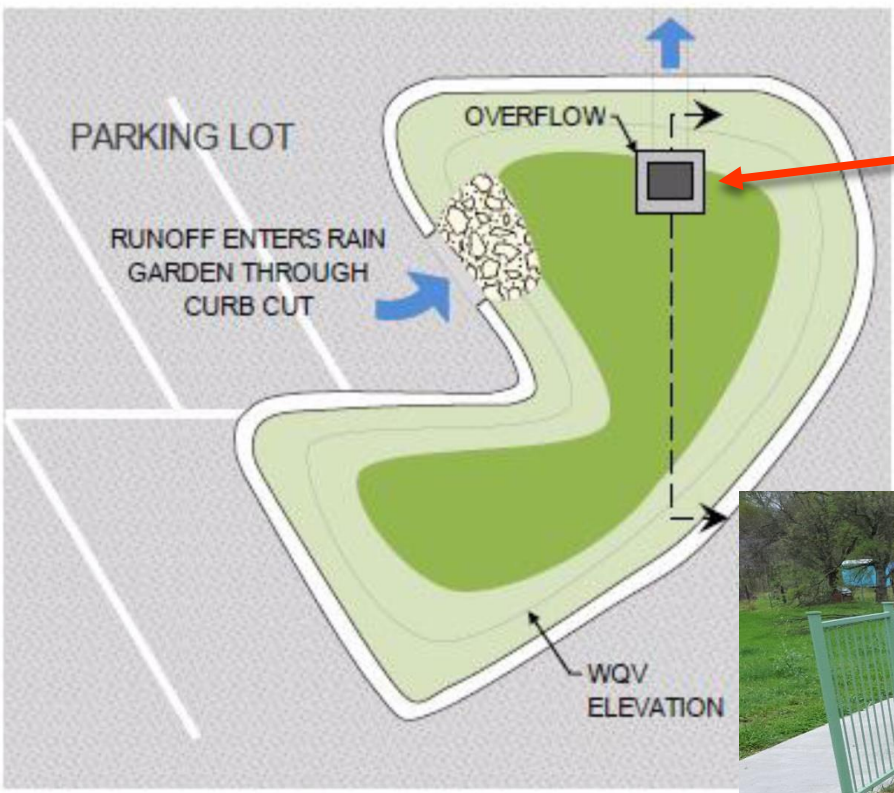




# Inlet Design



# Inlet Design



Overflow Grate



Runoff Enters

# Inlet Design: Items to Consider

## Flow Control

- Flows into the rain garden should not exceed 2 feet per second. Higher velocities can cause scouring and erosion.

# Inlet Design

## Watch the Elevations during Construction

- Top of the area inlet sets the ponding depth.
- Location of curb cut and overflow weir



# Inlet Design

## Don't block flow path into RG

- Often the addition of topsoil, sod, rock splash pad, etc. is not considered during design or construction and WQV is reduced or flows are hindered



# Splash Pad Design

Watch the length and width.



## Length

- less than 6 inches from inside edge of inlet.

# Splash Pad Design

## Width

- extend 6 to 12 inches beyond the width of the inlet opening.



# Splash Pad Issues

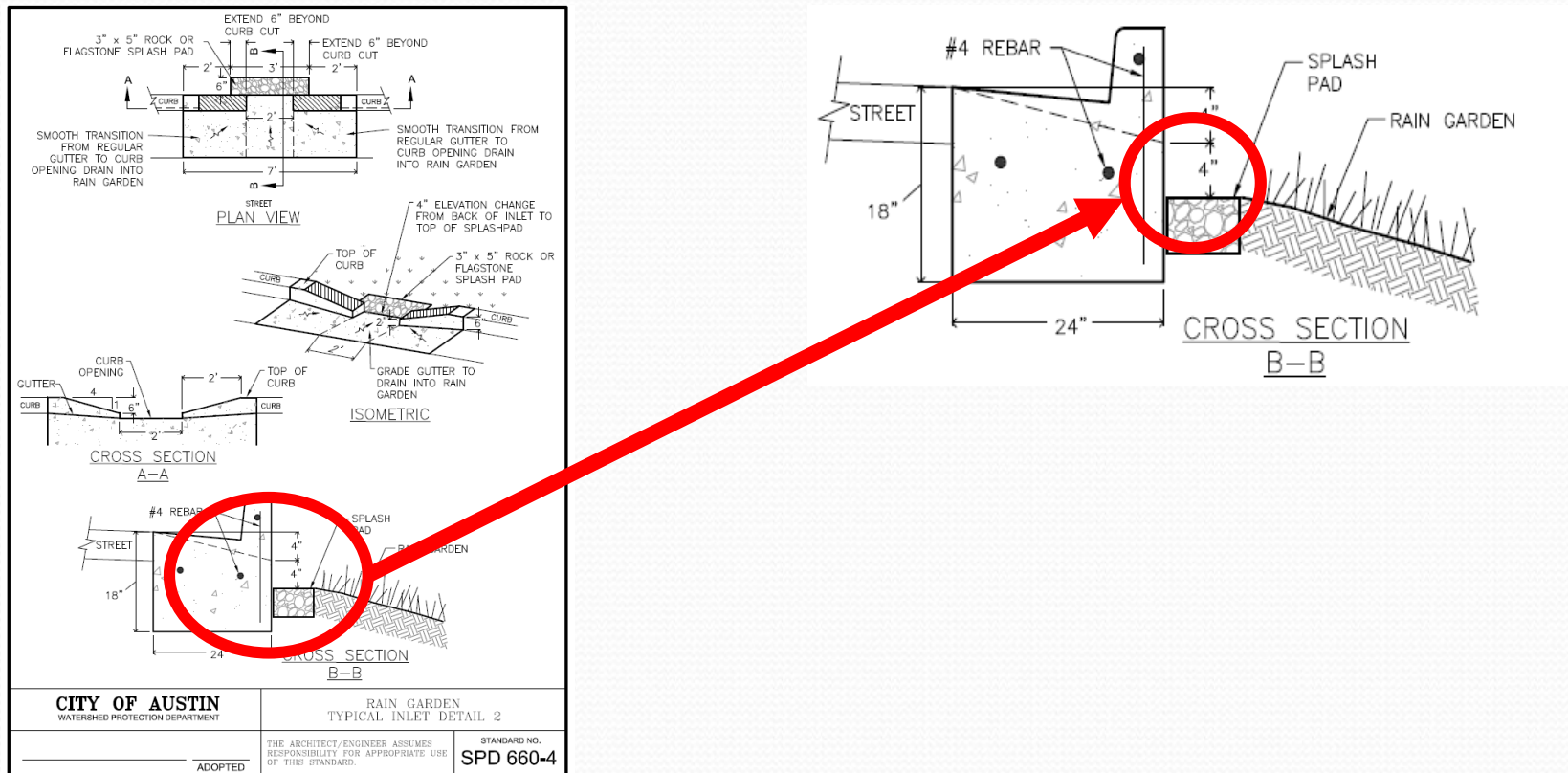
Longer splash pads cause sediment and debris to drop out at the inlet entrance. Over time the inlet becomes blocked and prevents stormwater from entering the rain garden.





# Splash Pad Issues

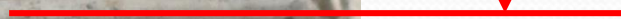
- Drop from edge of inlet opening onto splash pad should be at least 4 inches.



# Drop onto Splash Pad

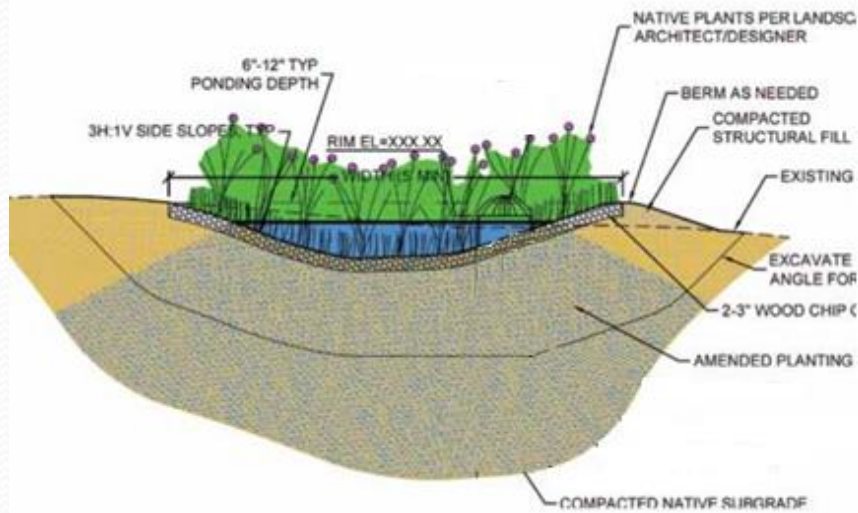


4 inches



# Types of Rain Gardens

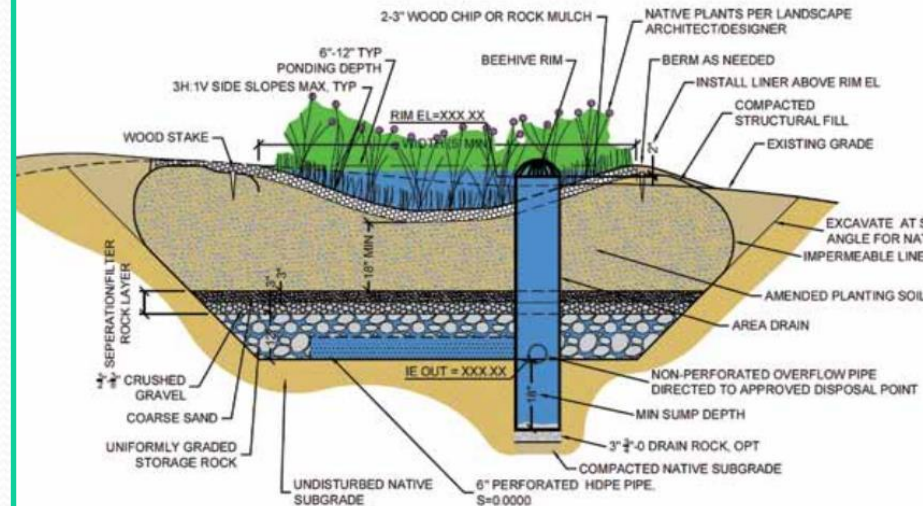
## Infiltration



Captured runoff soaks down  
into ground

vs.

## Filtration

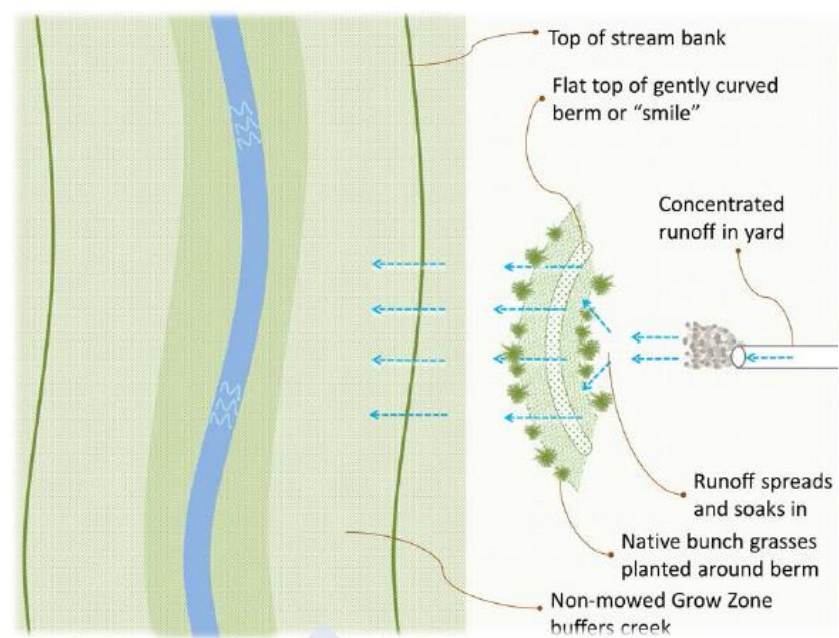


Captured runoff exits  
through pipe

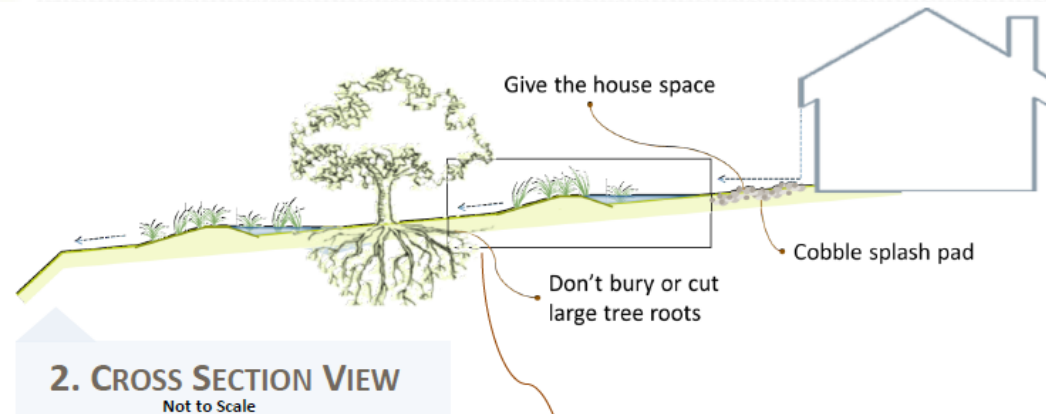
# Rainscape Alternative: Berms

Prevent erosion and improve water quality at the source

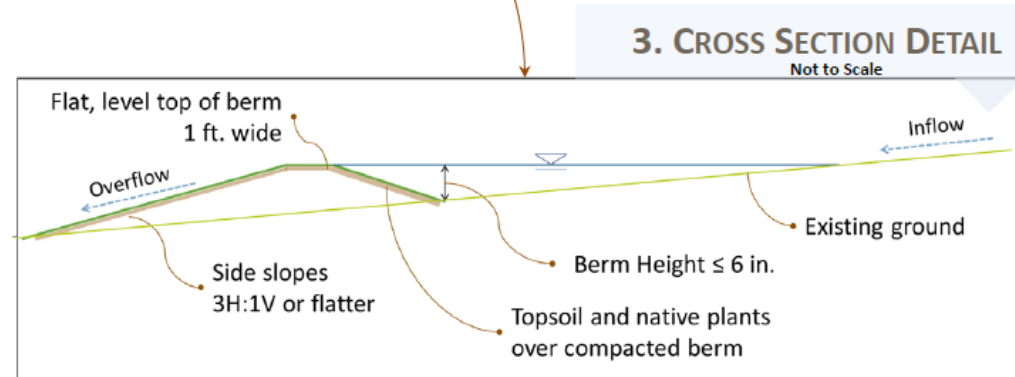
**Slow** it down • **Spread** it out • **Soak** it in



**1. PLAN VIEW**  
Not to Scale

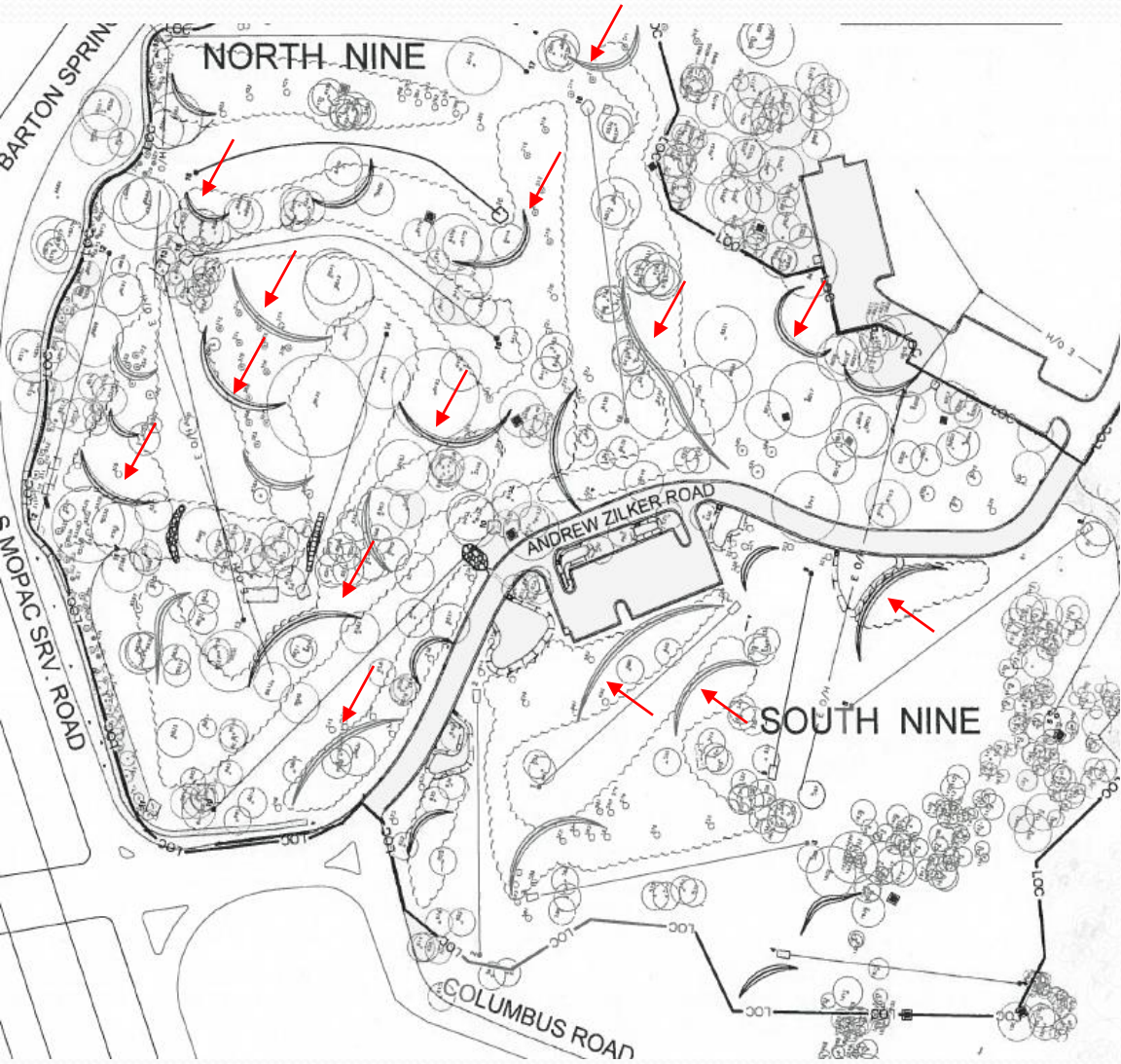


**2. CROSS SECTION VIEW**  
Not to Scale



**3. CROSS SECTION DETAIL**  
Not to Scale

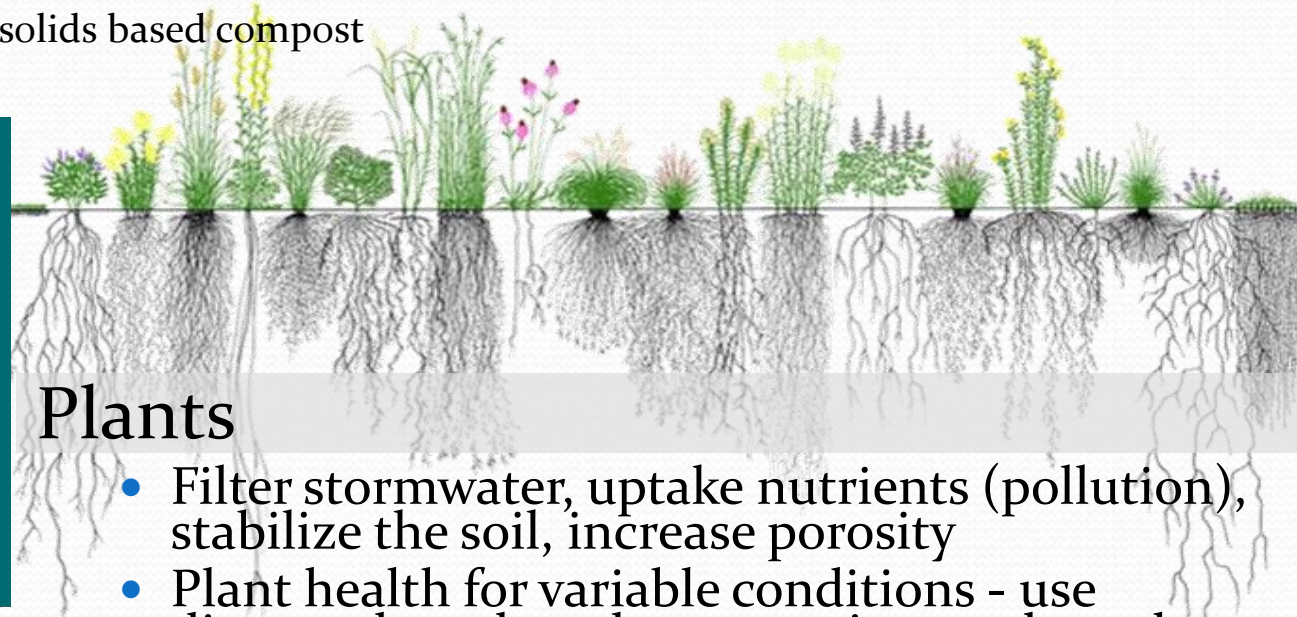
# Zilker Disc Golf



# Media

## Biofiltration medium

- Blend: 70% concrete sand and 30% chocolate loam
- Organic Matter
  - Aged mulch (partially decomposed) may be added (up to 5% by weight)
    - Increase Water Holding Capacity (% silt plus clay should be less than 27% of total volume)
    - No added nutrients
    - No manure & no biosolids based compost



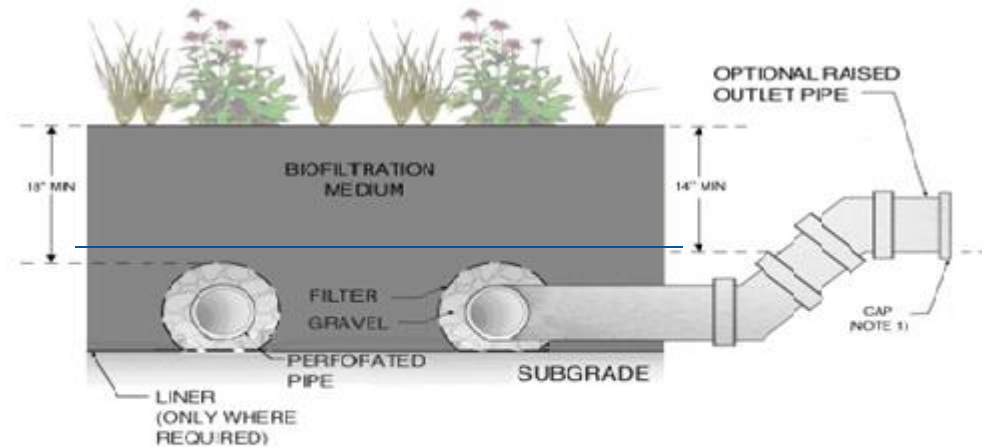
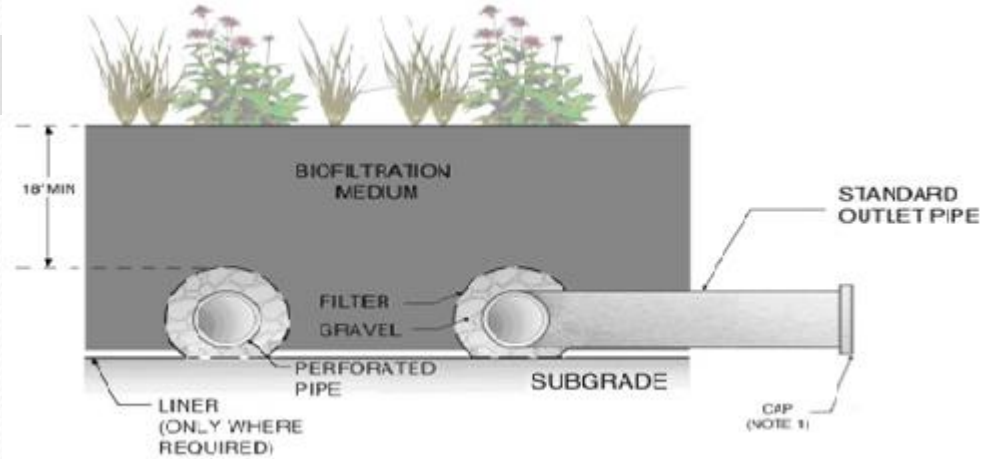
## Plants

- Filter stormwater, uptake nutrients (pollution), stabilize the soil, increase porosity
- Plant health for variable conditions - use diverse, drought-tolerant, native or adapted plants

# Underdrains

## Underdrain design

- Allows plant roots to access underlying soil
- Washed river gravel works best



## Saturated zone

- Promotes pollution removal
- May help with plant viability

# Infiltration Only Rain Gardens

## During Construction:

Foot and equipment traffic on the bottom of the rain garden area will compact the soils and will affect the infiltration rate.





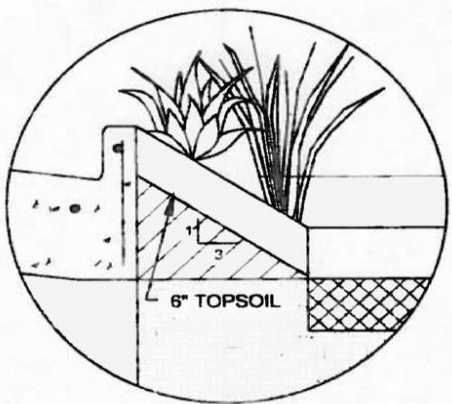
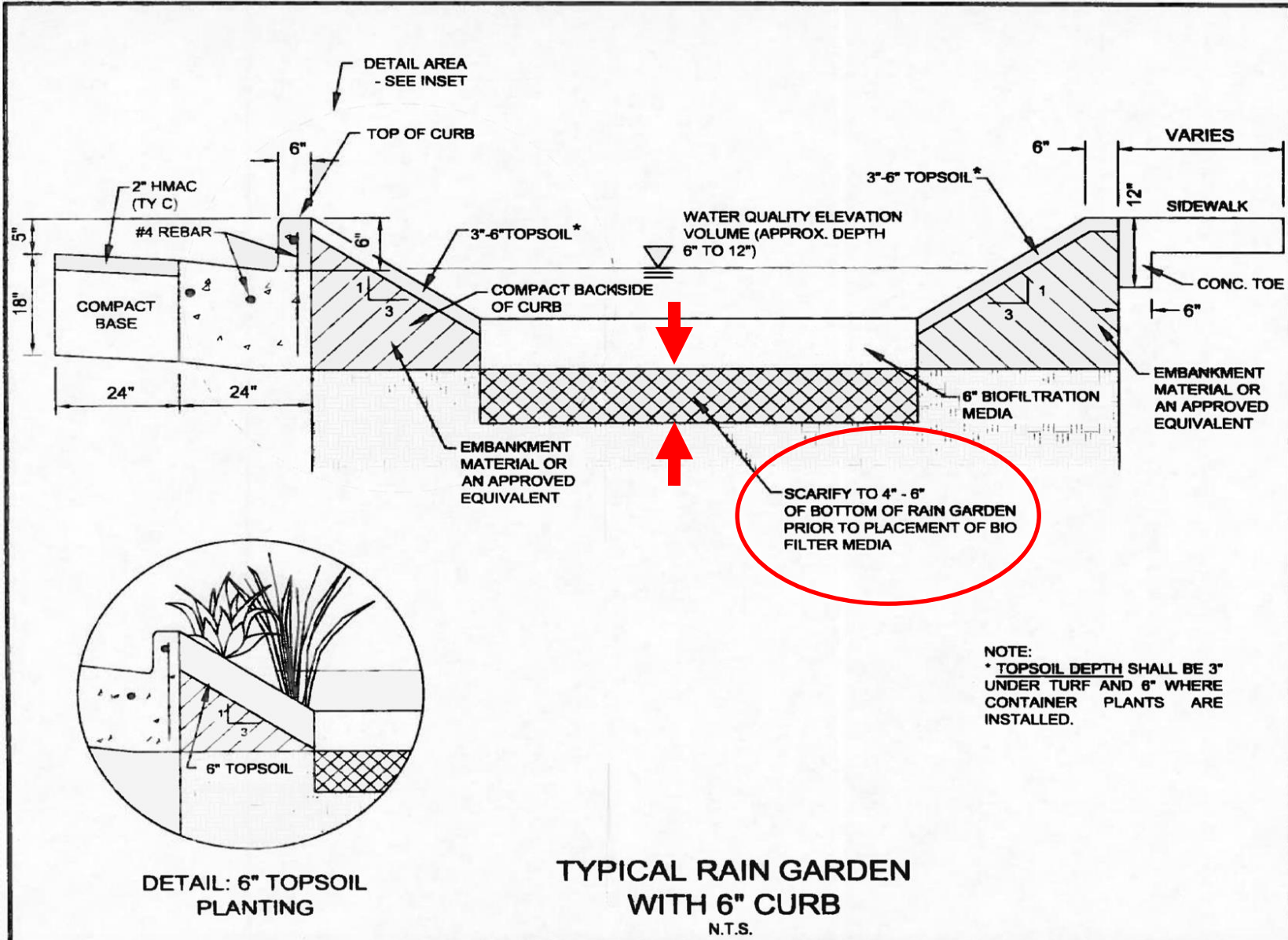
# Scarification/Decompaction

**Prior to installation of media/topsoil and plantings:**

Scarify/decompact top four to six inches at the bottom of rain garden

- restores in-situ infiltration rate.
- promotes root penetration.
- minimizes nuisance ponding issues.

# Scarification/Decompaction



DETAIL: 6" TOPSOIL PLANTING

TYPICAL RAIN GARDEN WITH 6" CURB  
N.T.S.

INFILTRATION RAIN GARDEN W/ 6" CURB  
TYPICAL CROSS SECTION

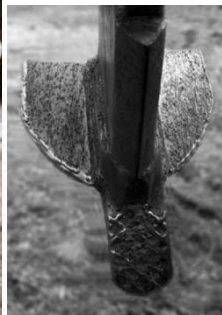
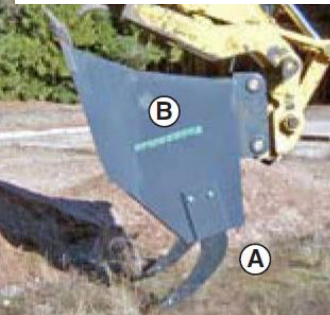
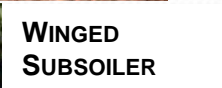
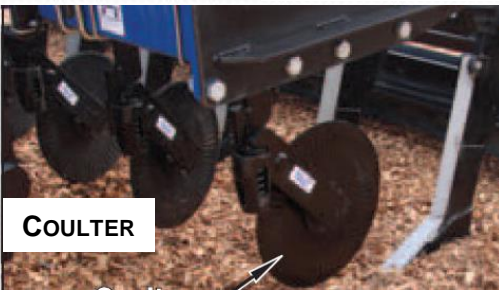
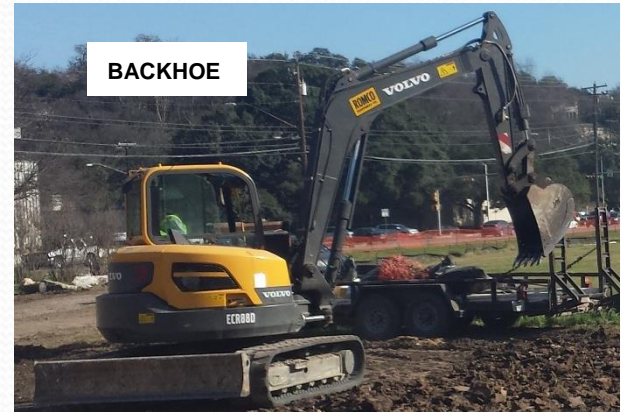
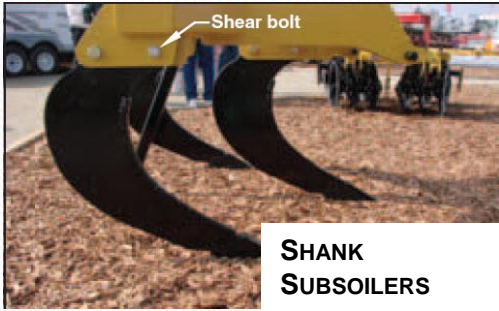
STANDARD NO.  
**SPD 660-1**

THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD

CITY OF AUSTIN  
WATERSHED PROTECTION DEPARTMENT

*[Signature]*  
ADOPTED  
1/27/12

# Scarification/Decompaction



Sources: USFS, USDA, City of Austin, State of Minnesota

# Maintenance

“Another flaw in the human character is that everybody wants to build and nobody wants to do maintenance.”

— Kurt Vonnegut, *Hocus Pocus*



Source: [sbgardendesign.wordpress.com](http://sbgardendesign.wordpress.com)

# Maintenance Manual



Completed 2014

Includes:

- Recommended maintenance schedule
- Checklist of items to inspect/maintain for a variety of stormwater control measures

Direct link =

[www.austintexas.gov/sites/default/files/files/Watershed/stormwater/GSI\\_Maintenance\\_Manual\\_web.pdf](http://www.austintexas.gov/sites/default/files/files/Watershed/stormwater/GSI_Maintenance_Manual_web.pdf)

# Grover & Reese



# Laird Drive



# One Texas Center

Increased plant growth with the infiltration only design





# Zilker Disc Golf Course

- Installed soil berms, rock check dams, log terraces, and shallow depressions to slow & soak in stormwater runoff
- Revegetated and aerated the soil
- Established roughs as “grow zones”



# Zilker Disc Golf Course



Tee #14 Rock Check Dam



Tee #1 "Smile" shaped berm



# JJ Seabrook – Denver at Pershing



# JJ Seabrook - Greenwood at Pershing



# EM Franklin Rain Garden



# Skyview Depaving/Rain Garden



# Questions ???

Tom Franke  
512-974-1882

[Tom.franke@austintexas.gov](mailto:Tom.franke@austintexas.gov)

Thank you for attending