



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

## **What have we learned so far?**

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**City of Austin**

**Watershed Protection Department**

**Stream Restoration & Stormwater Treatment Section**

January 2016

# On the Agenda

1. What is a rain garden and why build one?
2. Design of Rain Gardens
  1. Siting & Sizing
  2. Inlets
  3. Types and Alternatives
  4. Media
3. Maintenance of rain gardens
4. *Optional outdoor tour: existing and future rain gardens*



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

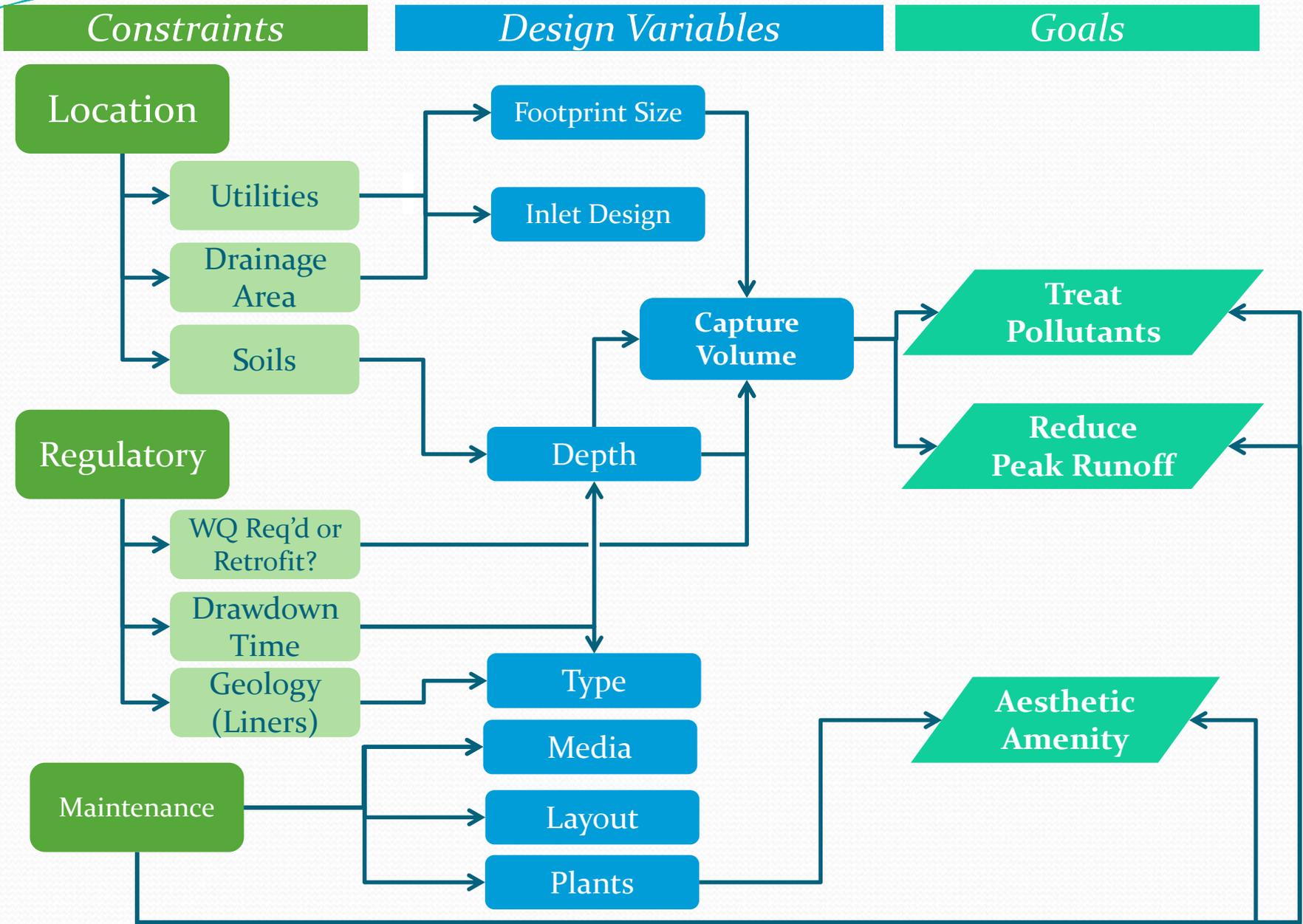
### 1 Find the Right Location

• 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-ID-G-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 -**

1. Commercial, Multi-Family, Civic, and Right of Way developments only.
2. Single Family water quality credit allowed under certain circumstances.

### **Stormwater Hotspots -**

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

# 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

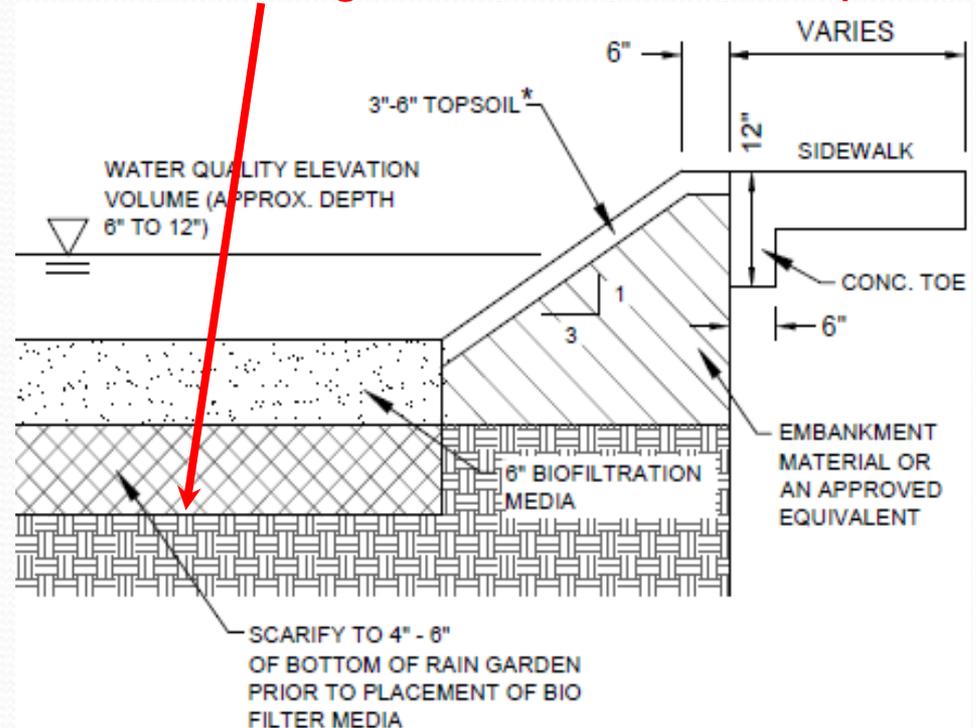
# Infiltration Rate of Soil

(For infiltration rain gardens)

- Don't rely of soil survey maps or desktop evaluation for soil infiltration rates
- Perform onsite infiltration test (perc 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



Dig Test Hole to this Depth



# Drainage Area

## Desktop analysis

- GIS and Google map

## Field Verify Drainage Areas

- Preferably in the rain



# Drainage Area

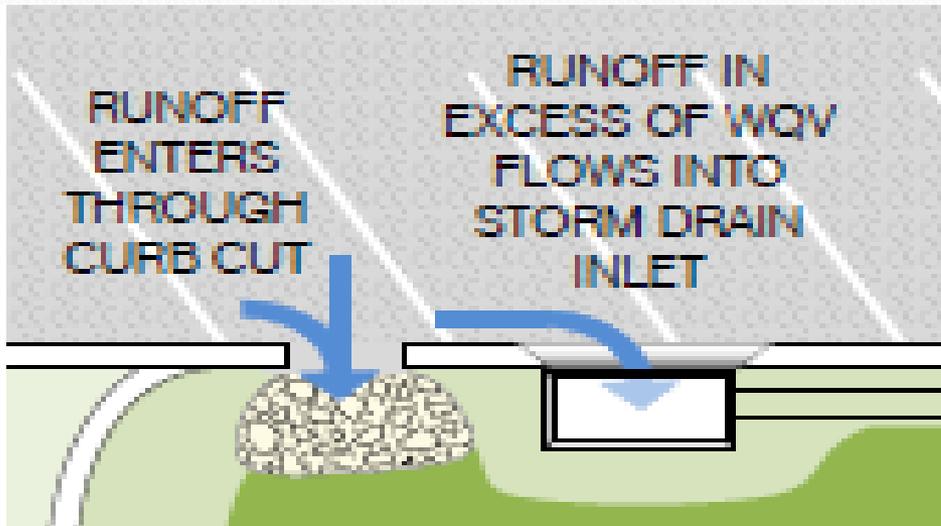
**Design inlet for certainty of capture**

- Grading features or trench drains



**FAIL**

# Inlet Design



# Inlet Design: Items to Consider

## Flow Control

- Flows into the rain garden should not exceed (25 yr storm event)

## Watch the Elevations during Construction

- Top of the area inlet
- Location of curb cut and overflow weir

## Don't block flow path into RG

- Often the addition of topsoil, sod, rock spill during design or construction and WQV i



# 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.



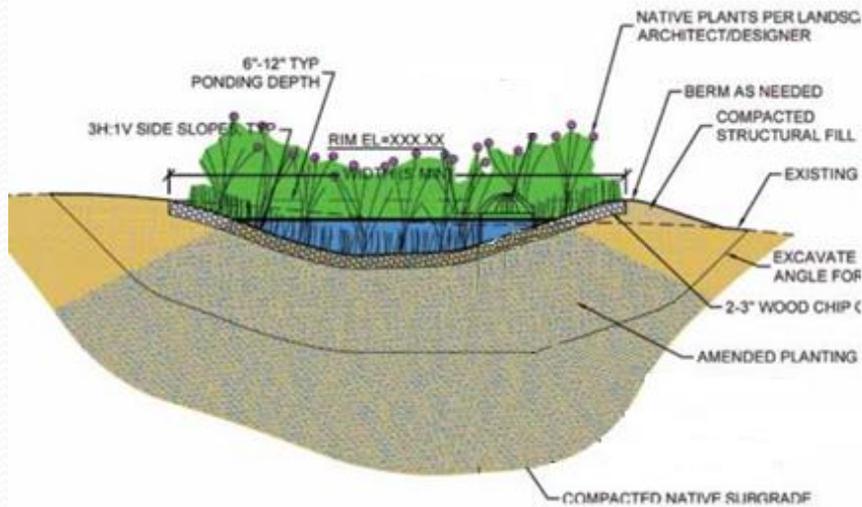
# Splash Pad Issues

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.



# Types of Rain Gardens

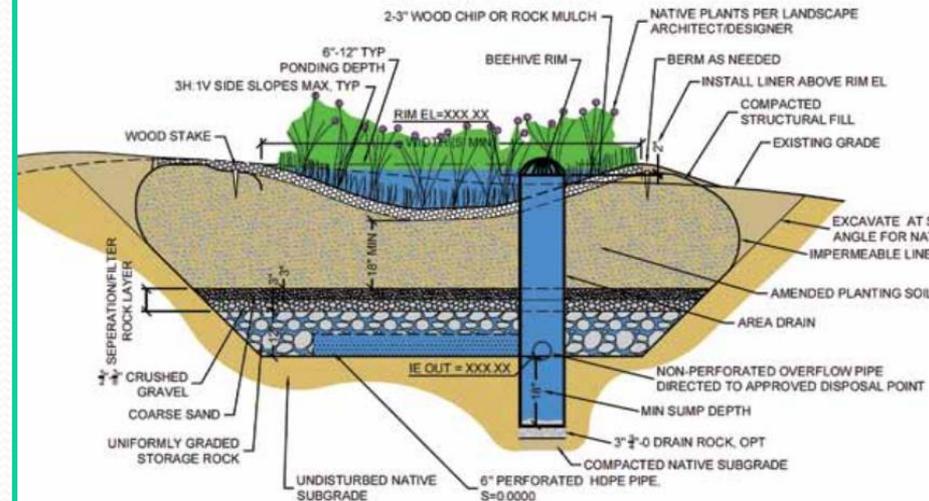
## Infiltration



Captured runoff soaks down  
into ground

vs.

## Filtration

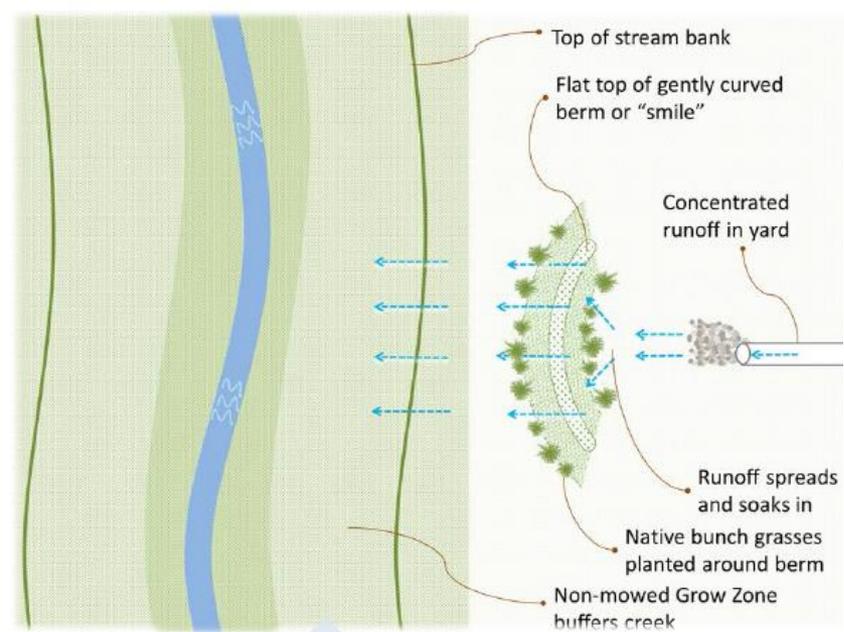


Captured runoff exits  
through pipe

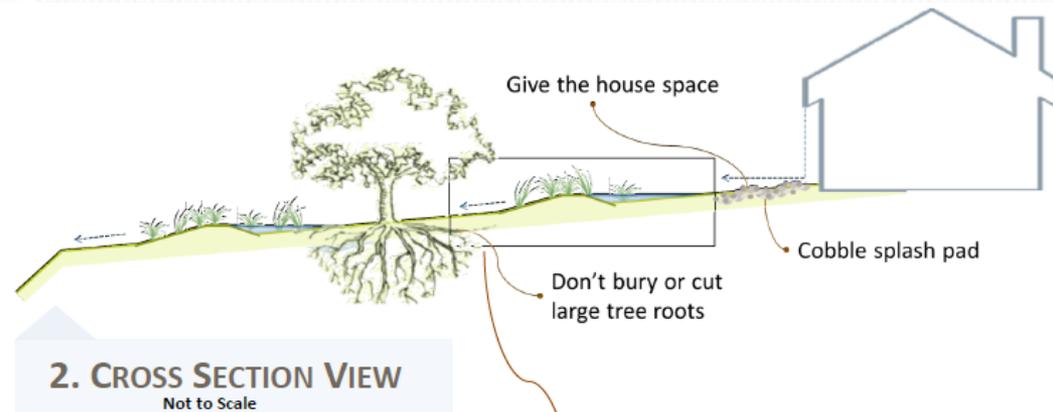
# Rainscape Alternative: Berms

Prevent erosion and improve water quality at the source

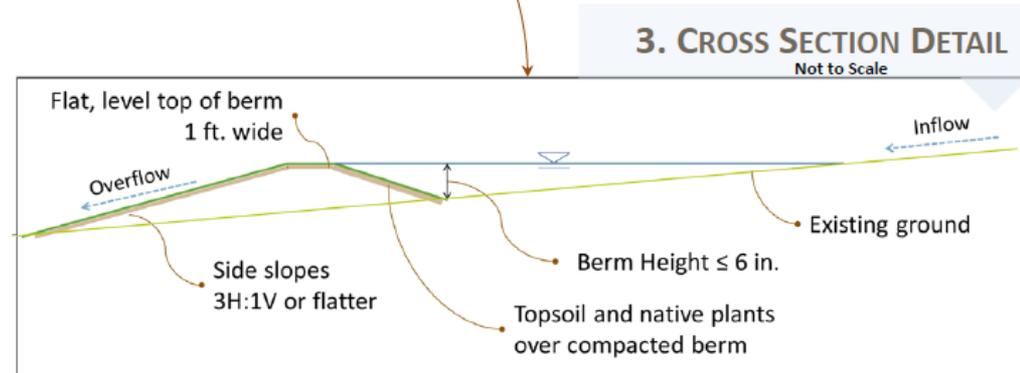
**Slow** it down • **Spread** it out • **Soak** it in



**1. PLAN VIEW**  
Not to Scale



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

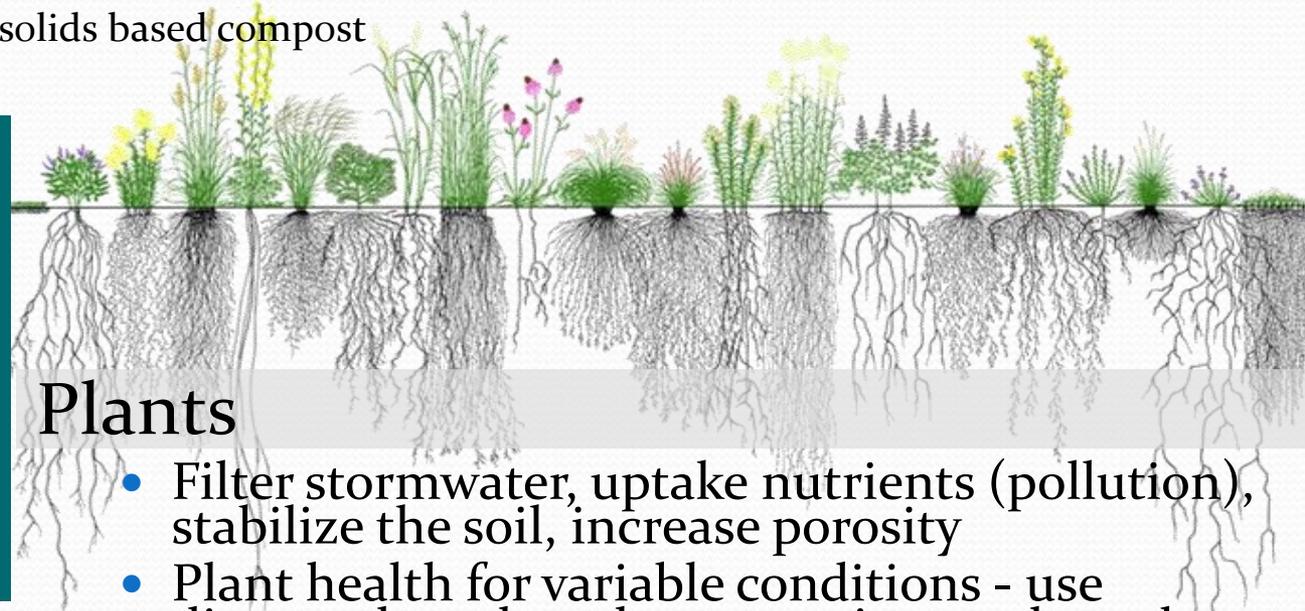


**3. CROSS SECTION DETAIL**  
Not to Scale

# 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



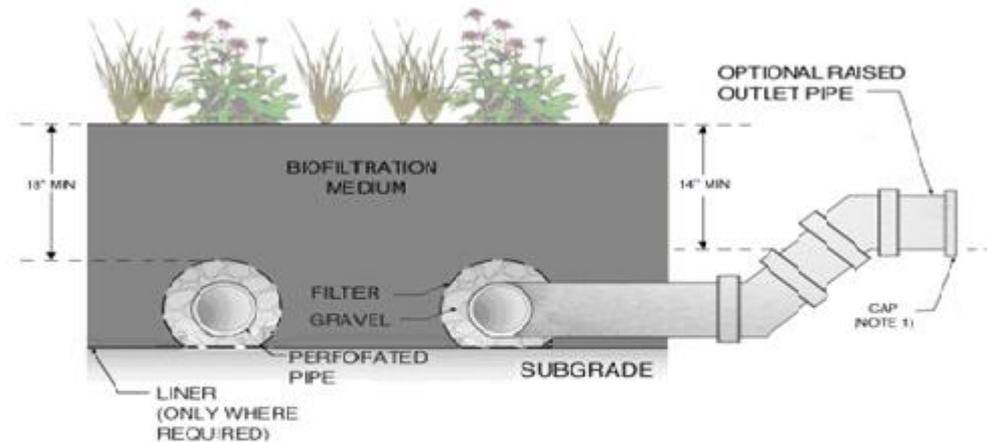
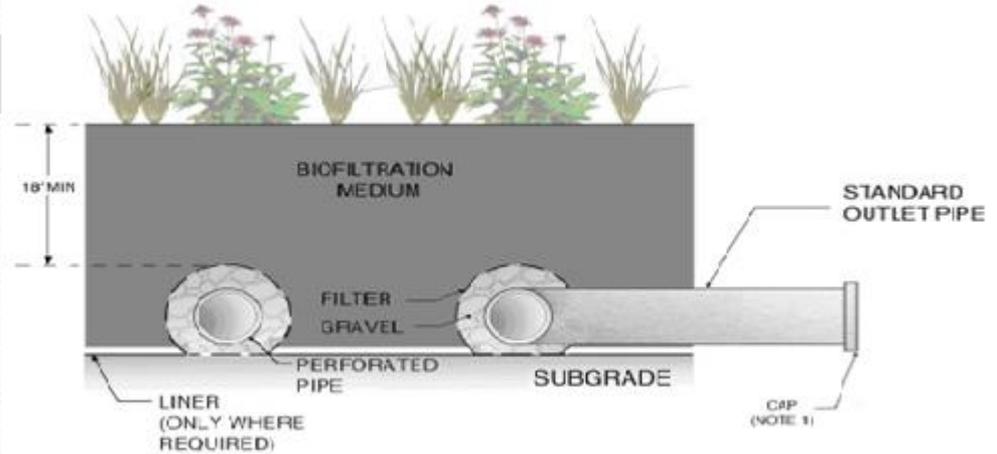
## Plants

- 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

# 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)

# Consider Maintenance During Design

- Select native vegetation whenever possible.
- Plan vegetation throughout the entire garden.
- Plants should predominate over mulch or gravel soil stabilization.
- Proper plant spacing is important.
- Crushed granite & other materials with fines should not be used as they can clog the system, preventing proper drainage.
- If pedestrian traffic is expected, provide stepping stones to direct walking.
- Plant spiny vegetation along garden edge to discourage pedestrian use.
- Design the garden depression to be as shallow as possible to facilitate mowing and reduce erosion.



# Pre-Construction Maintenance

## Plants



- ✓ Prune excessive growth or prune for plant health
- ✓ Do not prune native plants in geometric or unnatural shapes



- ✓ Mow sod-forming grasses no shorter than 4"

# Post-Construction Maintenance

## Plants, Mulch, Soil



- ✓ Replace dead or diseased vegetation.  
95% living veg. is required.

- ✓ Maintain mulch depth & coverage.
- ✓ No bare areas over 10 s.f.
- ✓ Repair erosion, animal burrows.
- ✓ Maintain drawdown time less than 96 hours



- ✓ Remove or control weeds with minimal herbicide, pesticide use.
- ✓ IPM



# Post-Construction Maintenance

## Trash, Dead Animals, Standing Water



- ✓ Remove dead animals, pet waste, and trash regularly



- ✓ Water standing for over 96 hrs may signal clogging & become a mosquito breeding area

# 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



# Davis Lane & Leo



# One Texas Center

Increased Plant Growth  
w/Infiltration 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



# Questions ???

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# Zilker Botanical Garden – Rain Garden Tour



NATURE  
CENTER

Potential  
Rain  
Garden

Rain  
Garden

You are  
here

MOPAC  
MOPAC

STRATFORD

STRATFORD

BARTON SPRINGS

STEP

AG EXPY

BARTON SPRINGS RD

MOPAC

STRATFORD