So You Want to Build a Rain Garden?

What have we learned so far?

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Watershed Protection Department
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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

grow green

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. This 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 out 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

Austin Parks and Recreation - 919 West 28½ Street

Create A Rain Garden in Six Steps

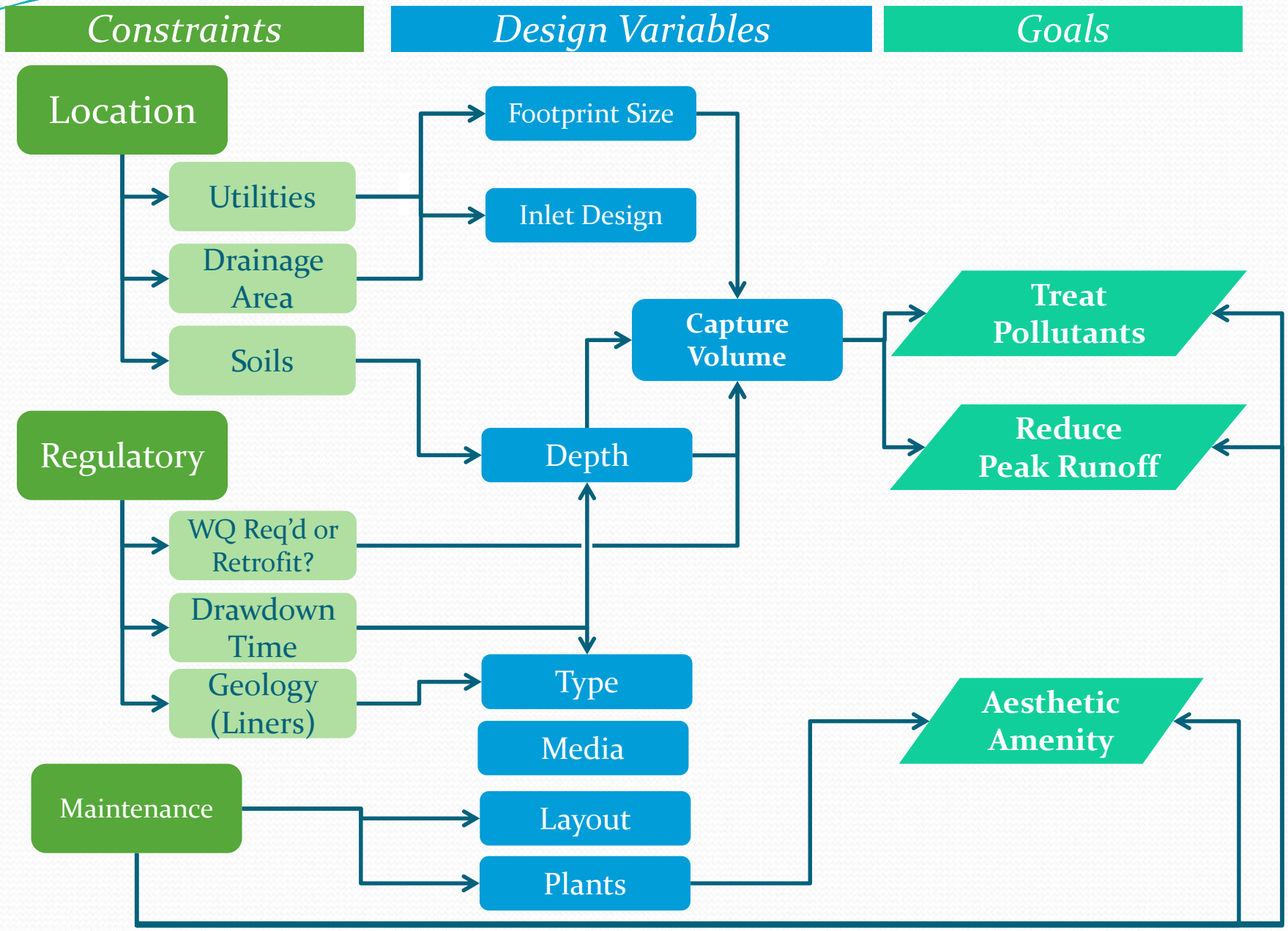
1 Find the Right Location

- 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

Why Build a Rain Garden?

- Protect Watershed
- Conserve Water
- Clean water
- Reduce peak runoff
- Wildlife Friendly
- Aesthetics

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.

<u>Hot spots include, but are not limited to:</u>

- 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 rain garden 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.

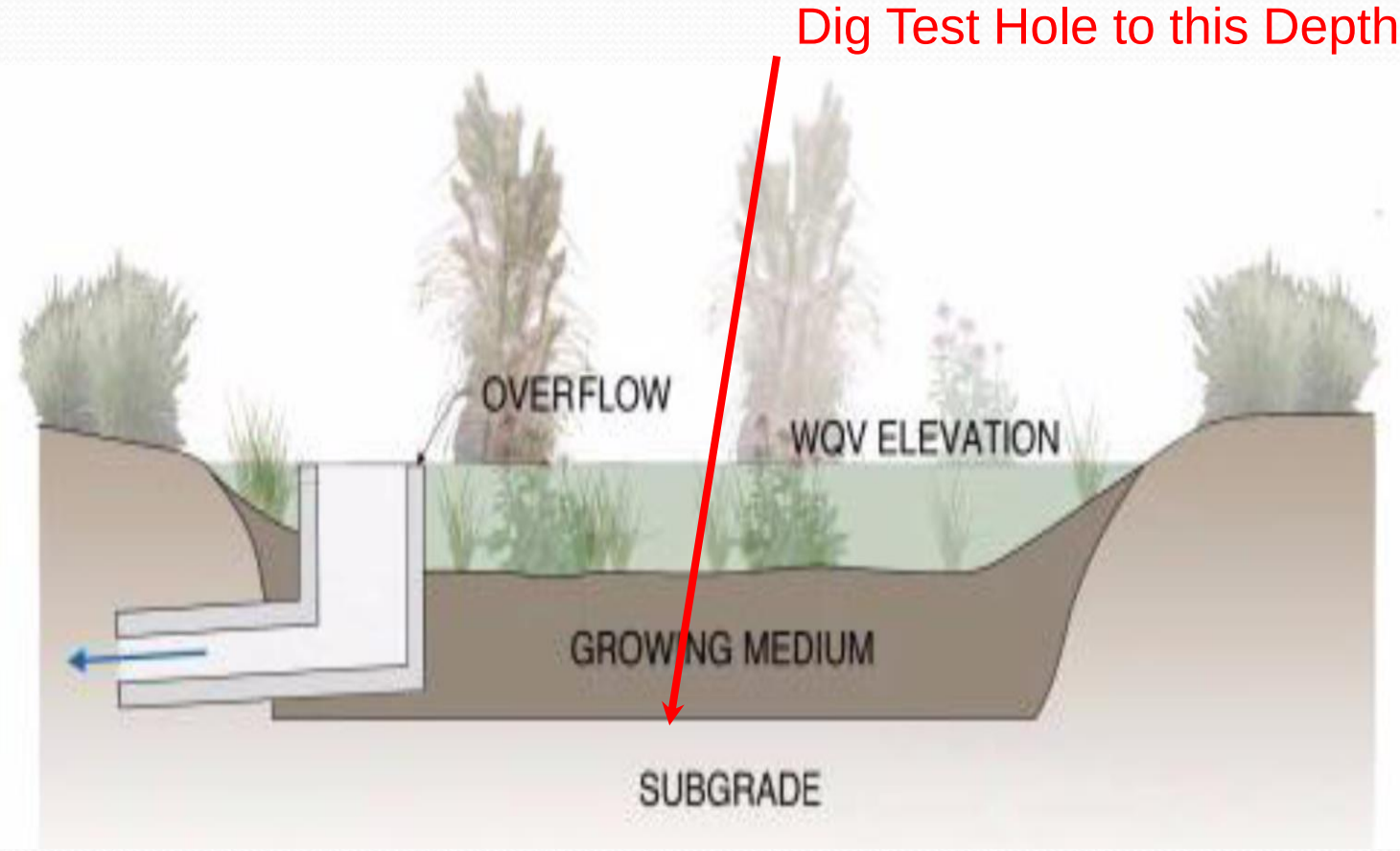
Infiltration Rate of Soil

(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)

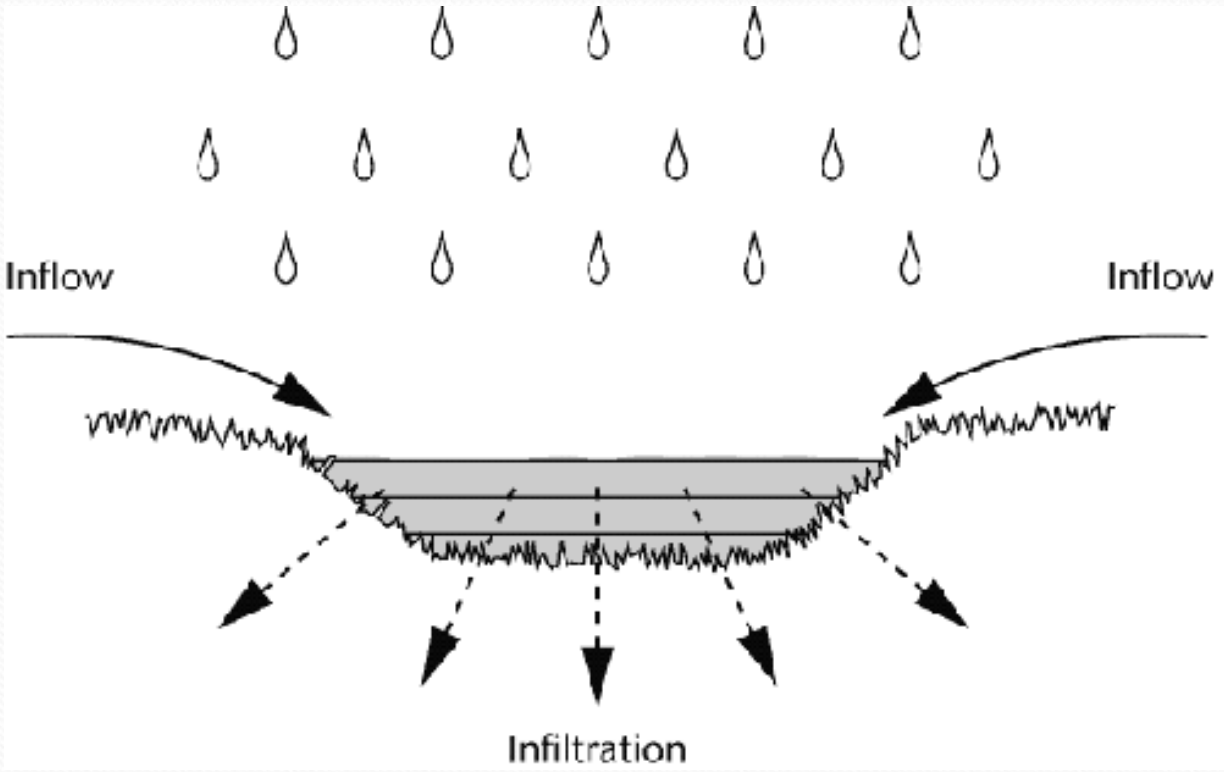
Infiltration Test



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

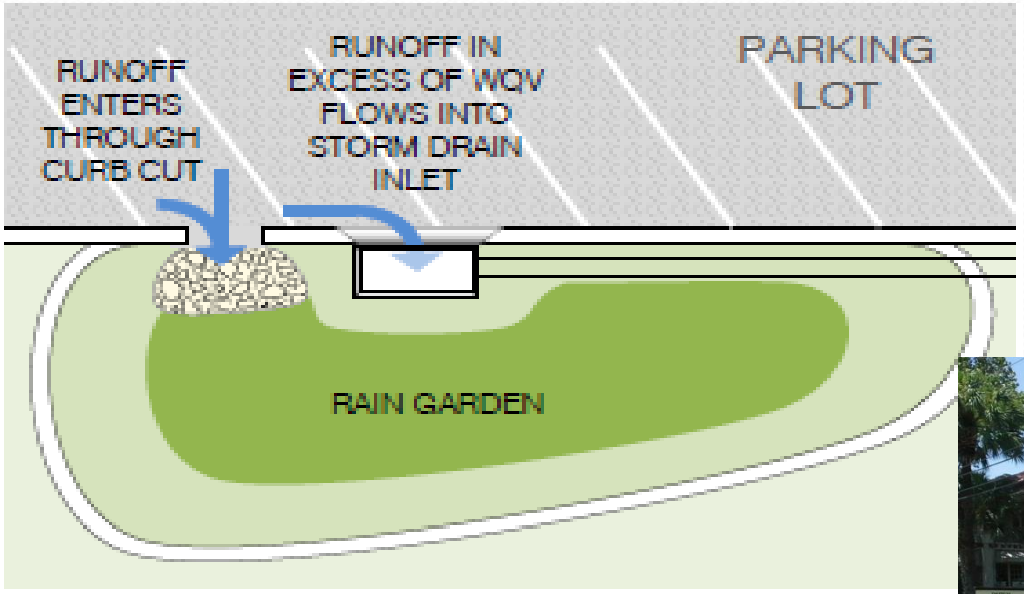
Design inlet for certainty of capture

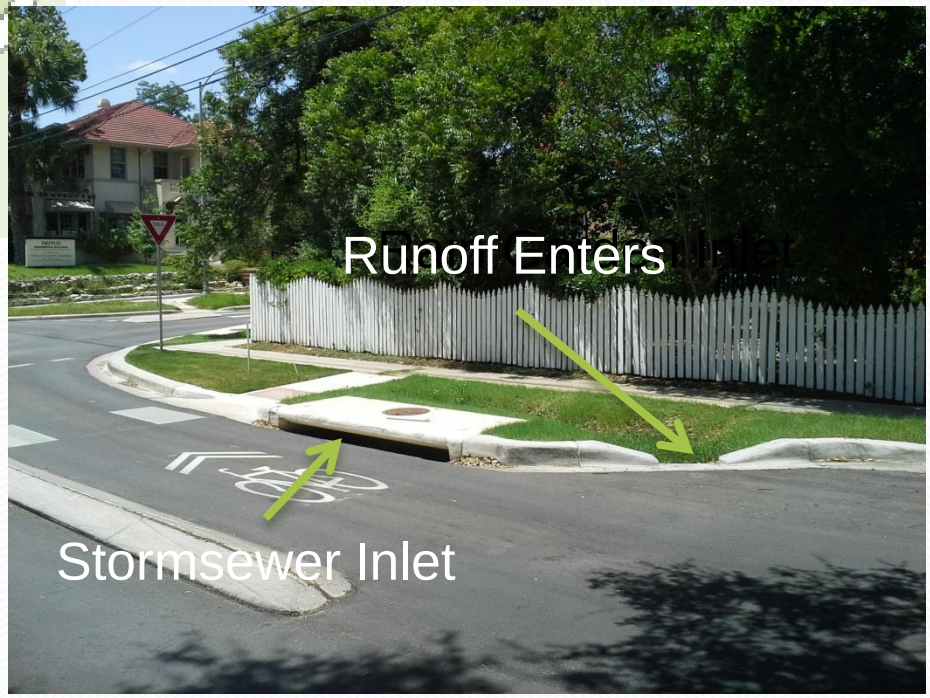
- Grading features or trench drains

FAIL

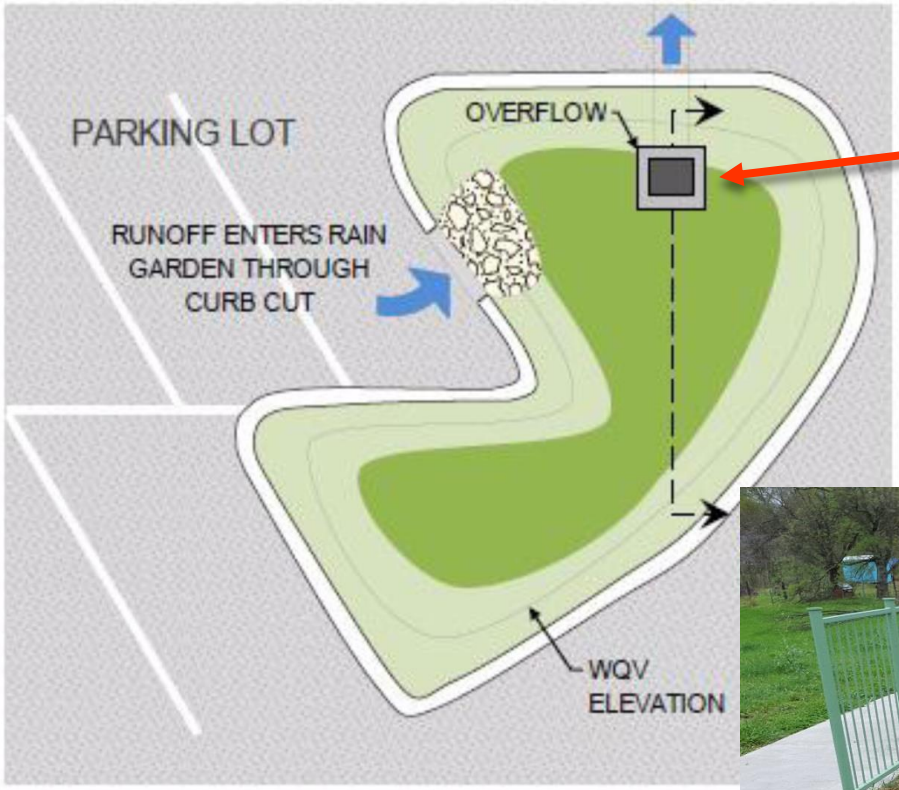
Certainty of Capture

Inlet Design





Inlet Design



Overflow Grate

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 of the media, topsoil and plantings.

Scouring

Inlet Design

Watch the Elevations during Construction

- Top of the area inlet, location of the curb cut, overflow weir sets the ponding depth.

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 ponding volume is reduced or flows are hindered

Blocked Inlet

Blocked Inlet

Splash Pad Design

Watch the length and width.

Length

- less than 6 inches from inside edge of inlet.

Splash Pad Design

Width

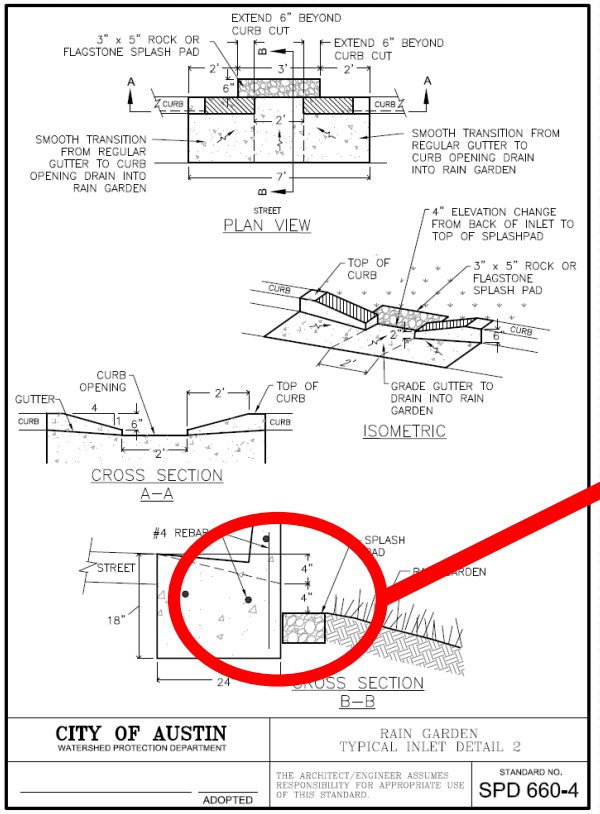
- extend 6 to 12 inches beyond the width of the inlet opening.

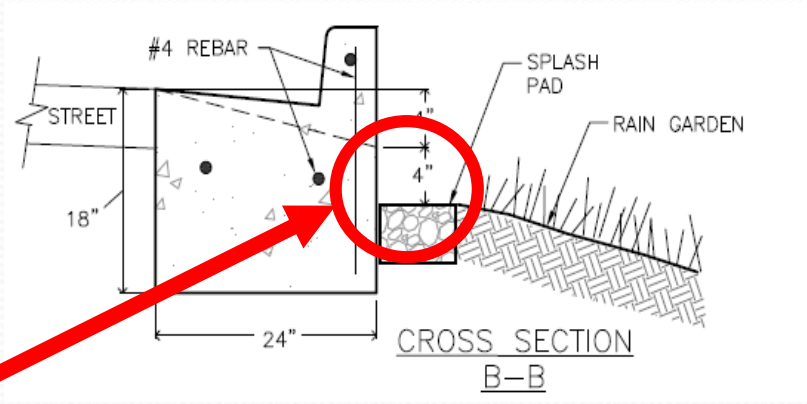
Splash Pad Issues

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.

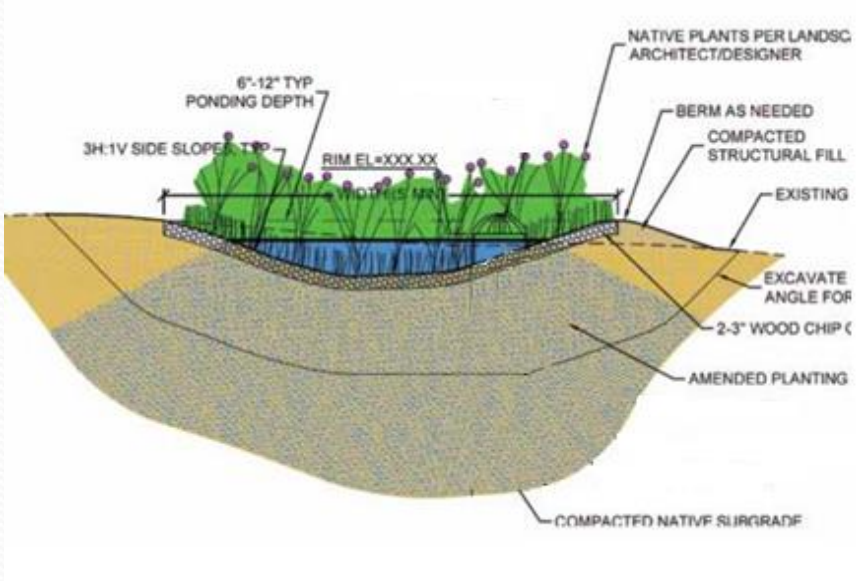




Drop onto Splash Pad

Types of Rain Gardens

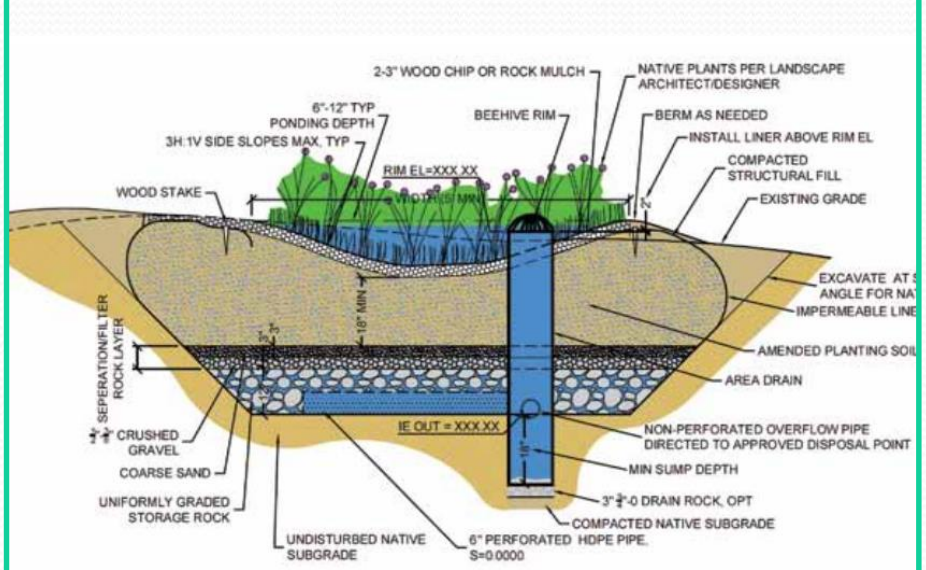
Infiltration



Captured runoff soaks down into ground

vs.

Filtration



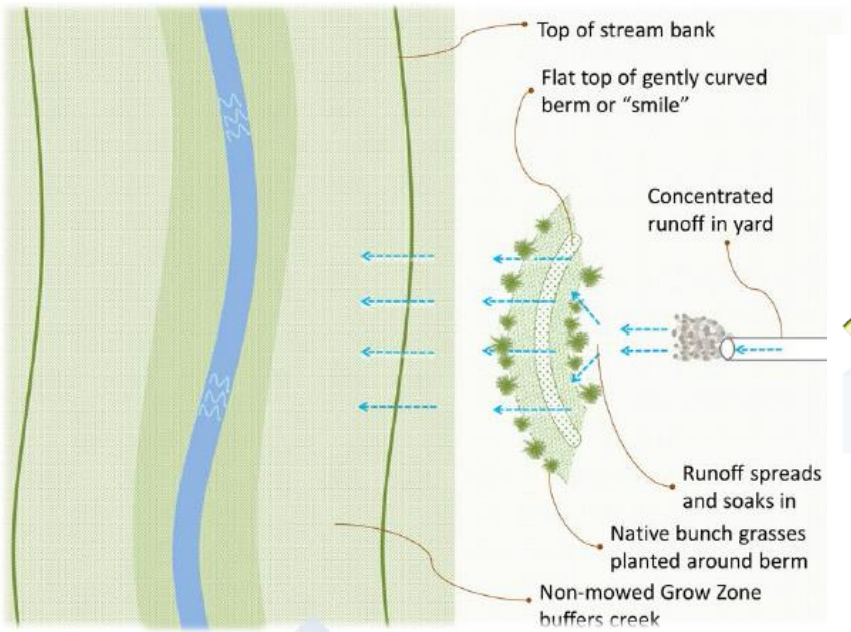
Captured runoff exits through pipe

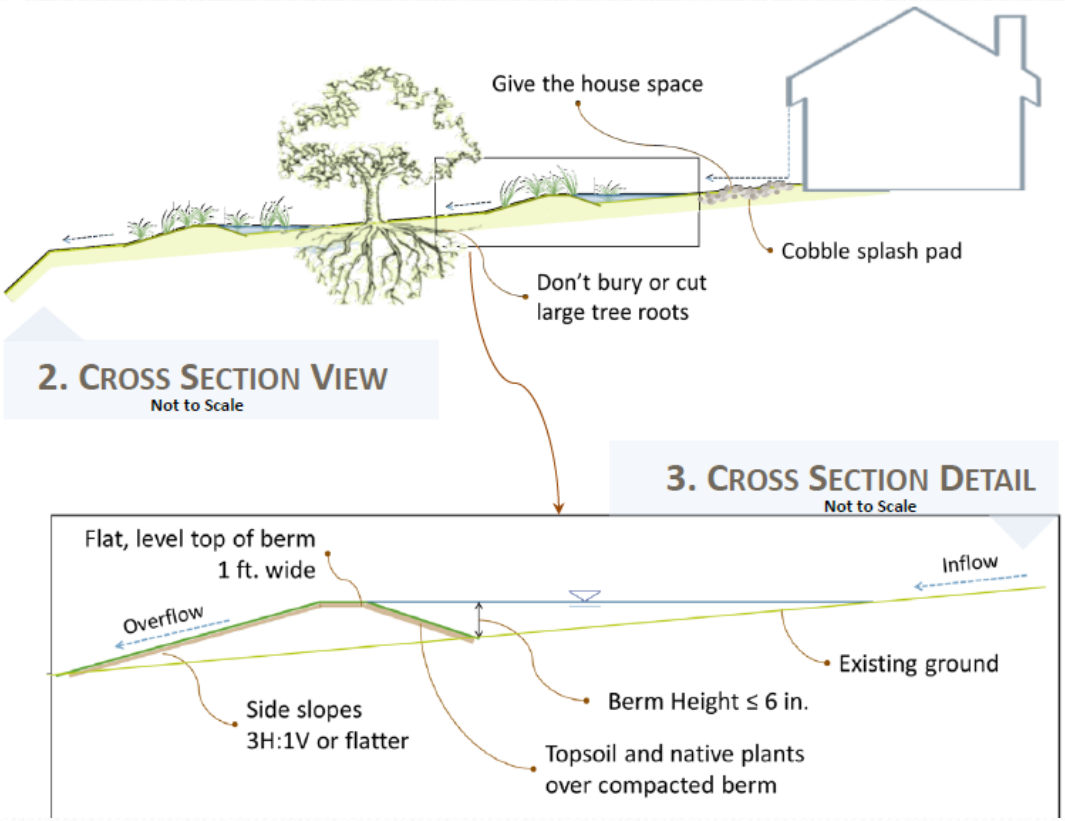
Source: Oregon State University Extension

Rainscape Alternative: Berms

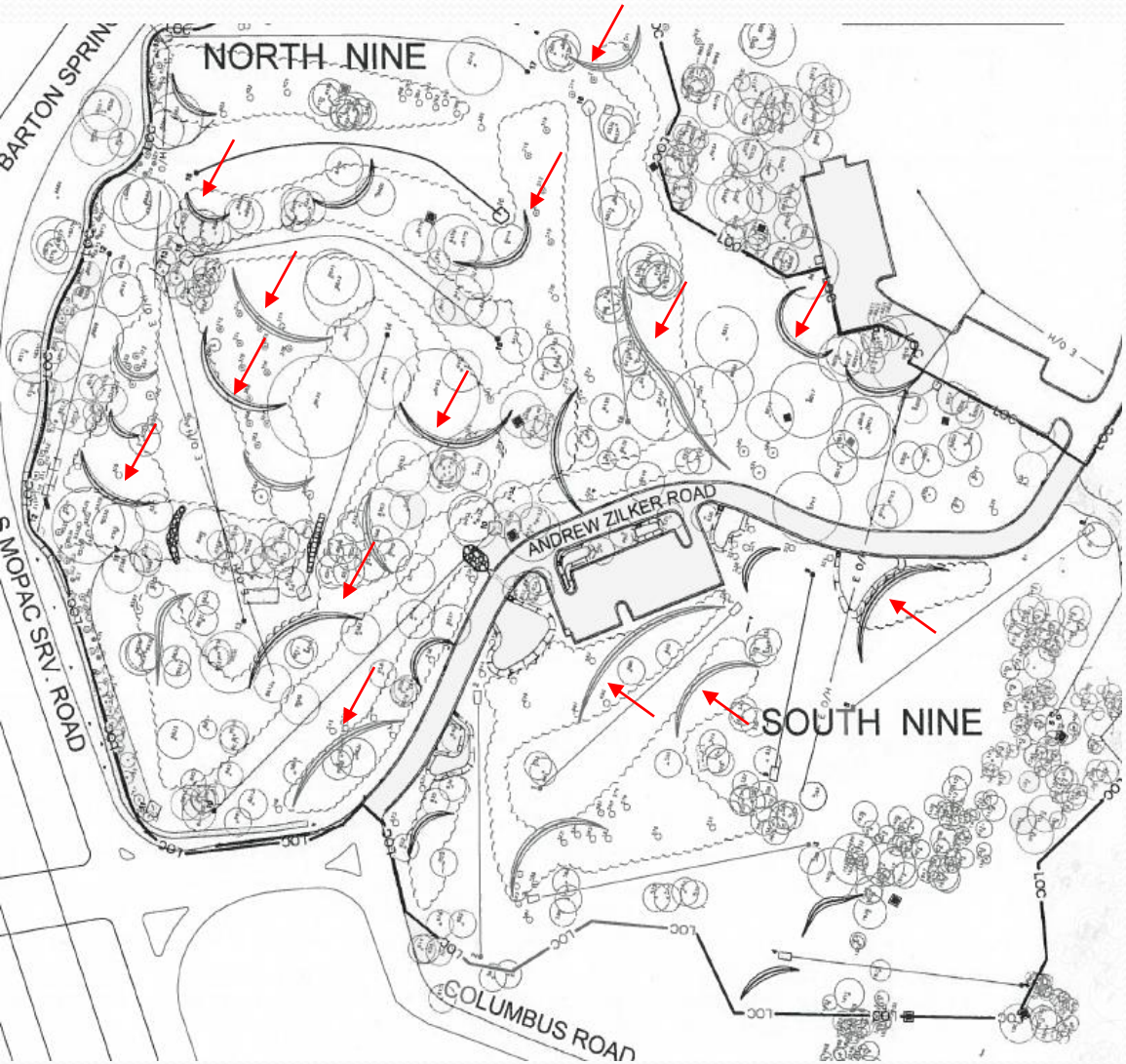
Prevent erosion and improve water quality at the source

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





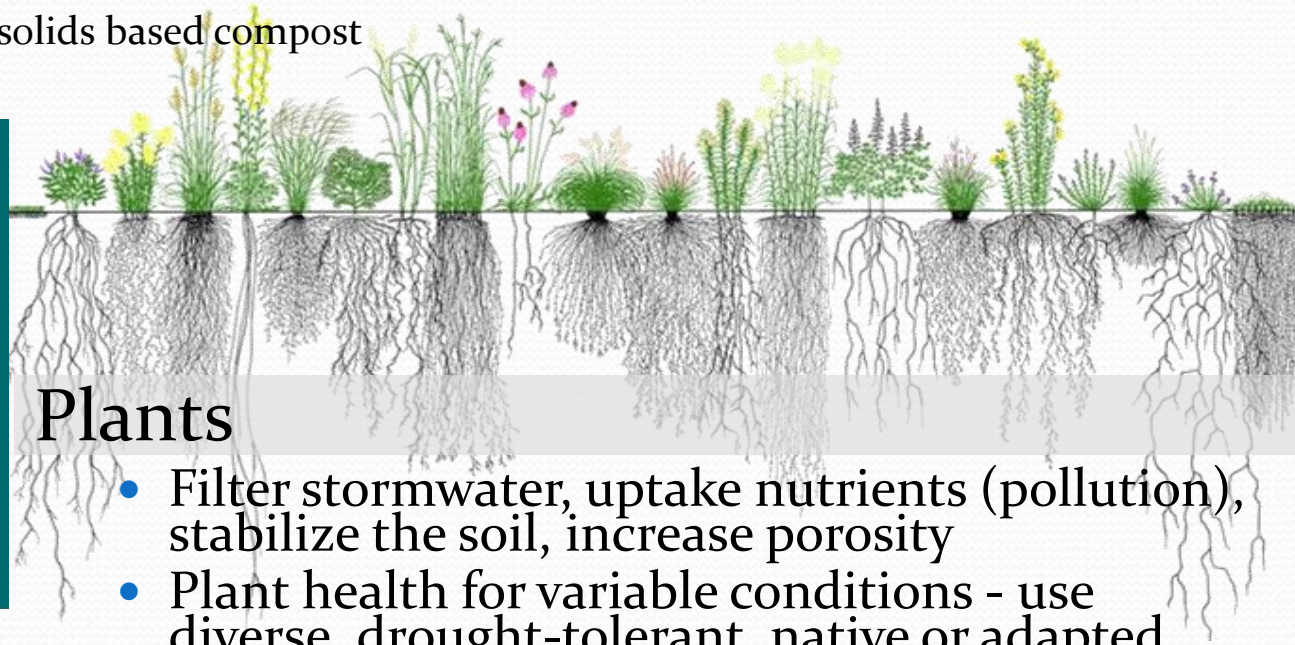
Zilker Disc Golf



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



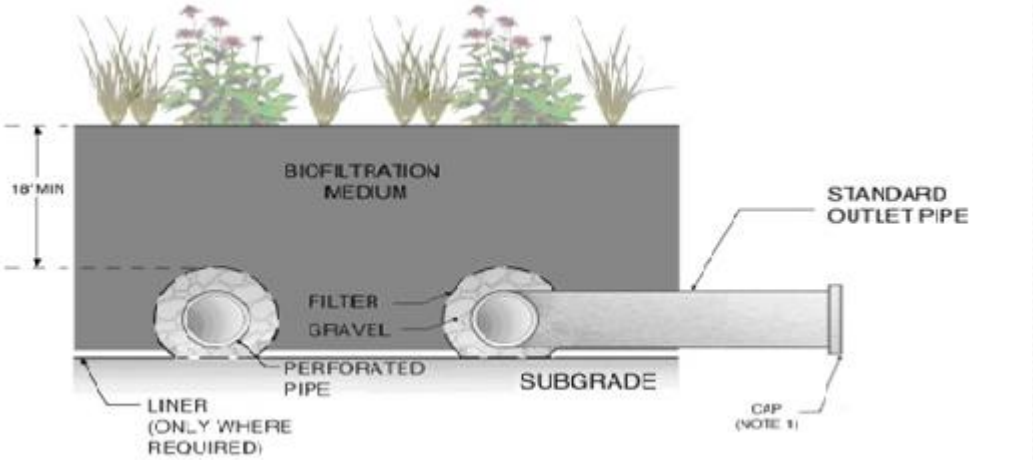
Plants

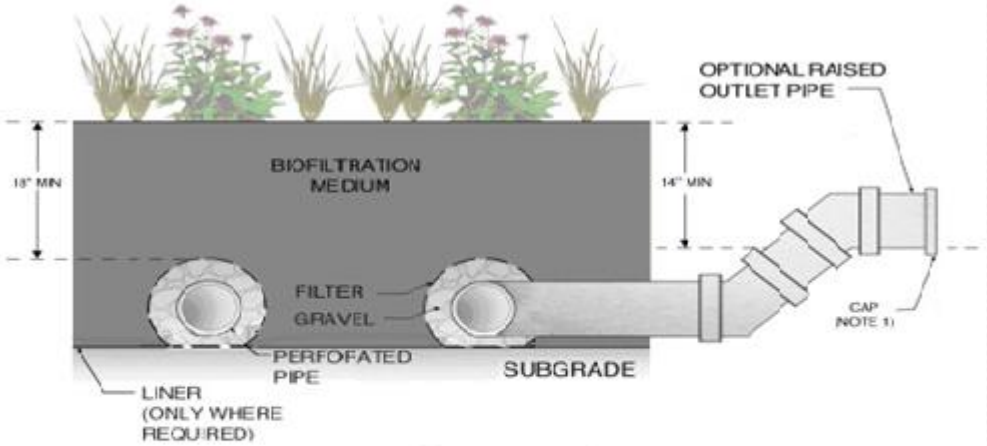
- Filter stormwater, uptake nutrients (pollution), stabilize the soil, increase porosity
- Plant health for variable conditions - use diverse, drought-tolerant, native or adapted plants

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.

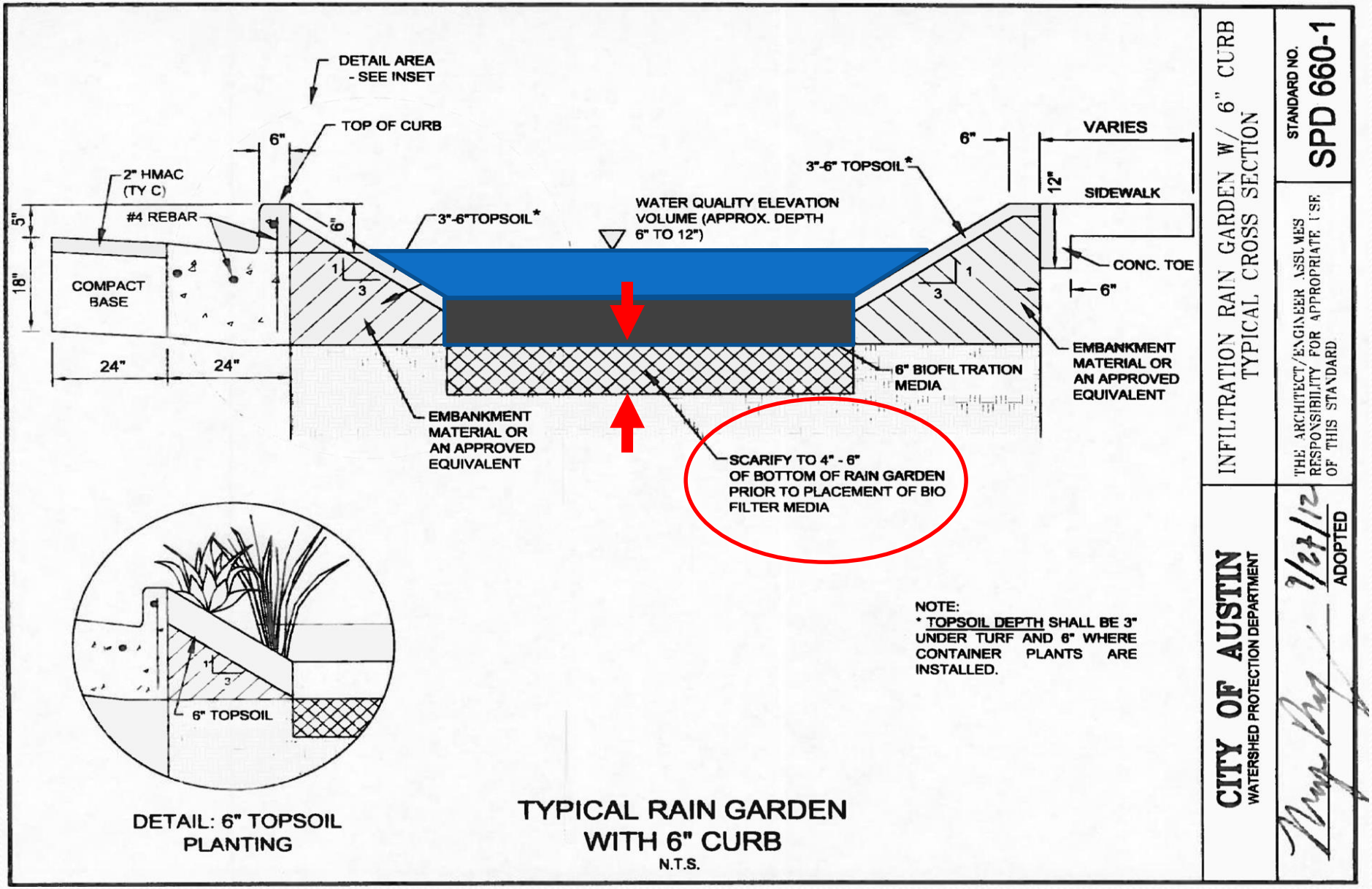
Scarification/Decompaction

Prior to installation of media/topsoil and plantings:

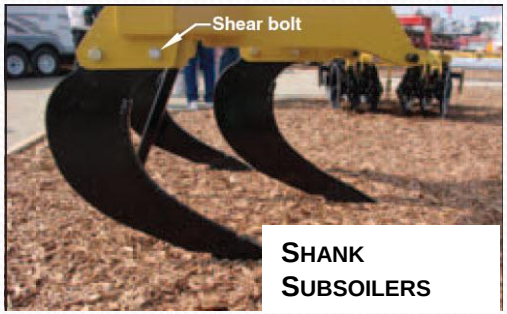
Scarify/decompact top four to six inches at the bottom of rain garden

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

Scarification/Decompaction



Scarification/Decompaction



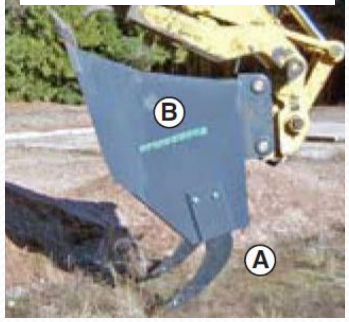
SHANK SUBSOILERS

ROTO-TILLER

BACKHOE

COULTER

SUBSOILING GRAPPLE RAKE



WINGED SUBSOILER

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

Maintenance Manual

Completed 2014

Includes:

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

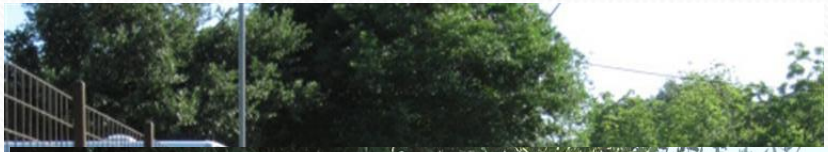
http://www.austintexas.gov/department/stormwater-management

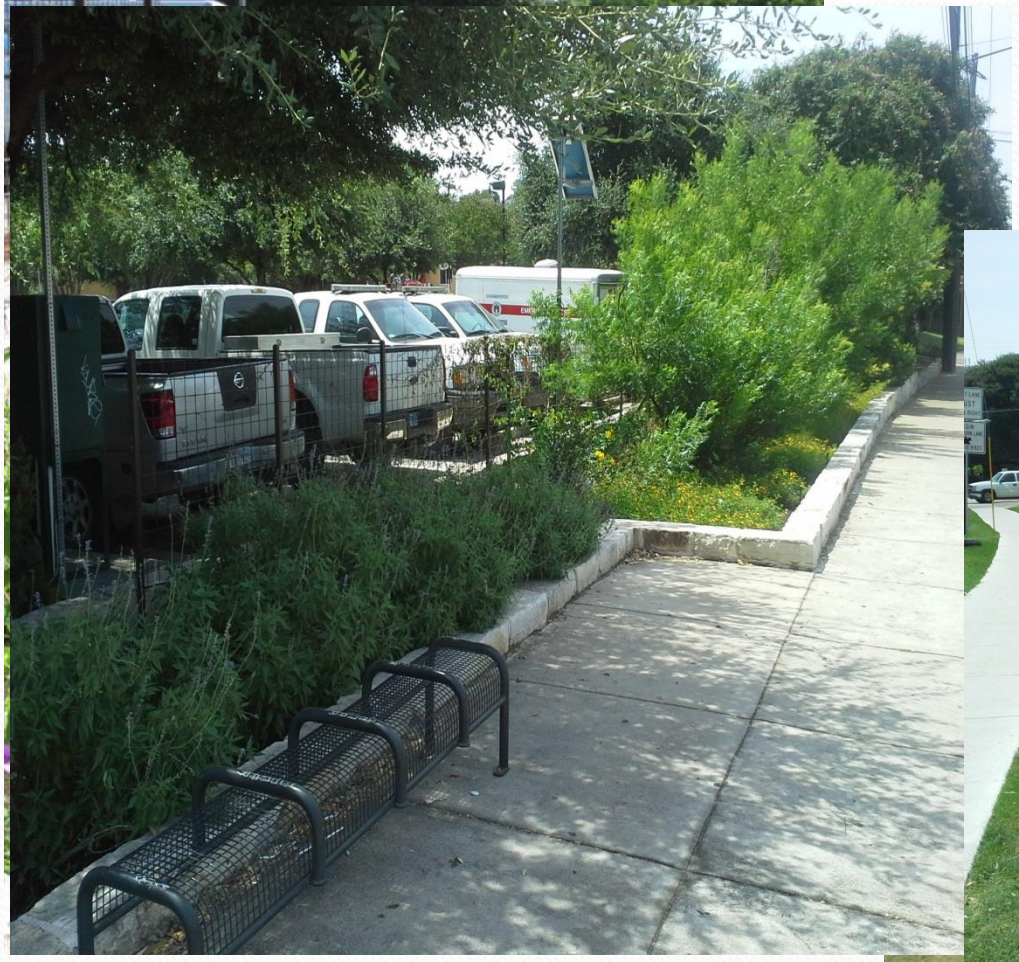
Grover & Reese

Davis Lane & Leo

One Texas Center

Increased plant growth with the infiltration only design



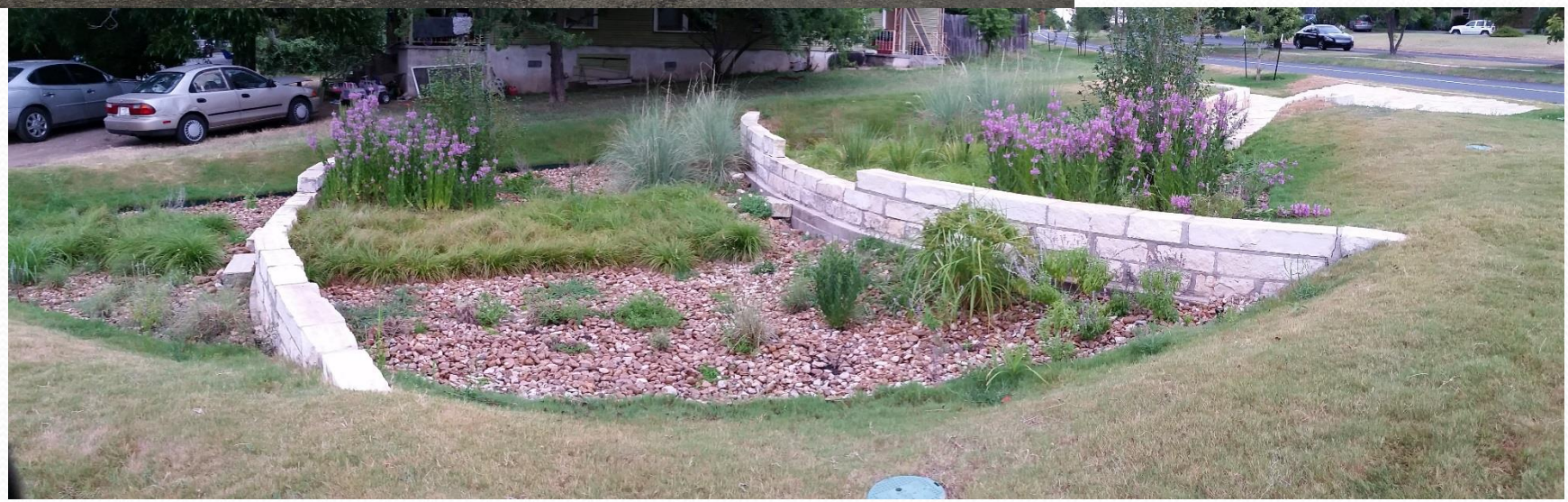


Zilker Disc Golf Course

- 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

JJ Seabrook – Denver at Pershing



JJ Seabrook - Greenwood at Pershing

EM Franklin Rain Garden

Todd Lane

Questions ???

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Thank you for attending