So You Want to Build a Rain Garden…

What have we learned so far?

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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. Inlets
   3. Types and Alternatives
   4. Media
3. Maintenance of rain gardens
4. Optional outdoor tour: existing and future rain gardens
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

Why Build a Rain Garden?

- Protect Watershed
- Conserve Water
- Clean water
- Reduce peak runoff
- Conserve Energy
- Wildlife Friendly
- Aesthetics
Rain Garden Design Considerations

**Constraints**
- Location
  - Utilities
  - Drainage Area
  - Soils
- Regulatory
  - WQ Req’d or Retrofit?
  - Drawdown Time
  - Geology (Liners)
- Maintenance

**Design Variables**
- Footprint Size
- Inlet Design
- Capture Volume
- Depth
- Type
- Media
- Layout
- Plants

**Goals**
- Treat Pollutants
- Reduce Peak Runoff
- Aesthetic Amenity

**Additional Considerations**
- Drawdown Time
- Soils Type
- WQ Req’d or Retrofit?
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 on 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

Runoff enters through curb cut.

Runoff in excess of WQV flows into storm drain inlet.
Flow Control
- Flows into the rain garden should not exceed 2 feet per second (for a 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 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.
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** vs. **Filtration**

- **Infiltration**: Captured runoff soaks down into ground
- **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**
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
Underdrain design

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

Saturated zone

- Promotes pollution removal
- May help with plant viability
“Another flaw in the human character is that everybody wants to build and nobody wants to do maintenance.”
— Kurt Vonnegut, *Hocus Pocus*
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

- Bunch grasses no shorter than 18”

- 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

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

- Remove dead animals, pet waste, and trash regularly
Maintenance Manual

Completed 2014

Includes:

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

Direct link =
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

Before

After

Tee #1 “Smile” shaped berm

Before

After
Questions ???

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Zilker Botanical Garden – Rain Garden Tour

Potential Rain Garden

Rain Garden

You are here