So You Want to Build a Rain Garden…

What have we learned so far?

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Stream Restoration & Stormwater Treatment Section

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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

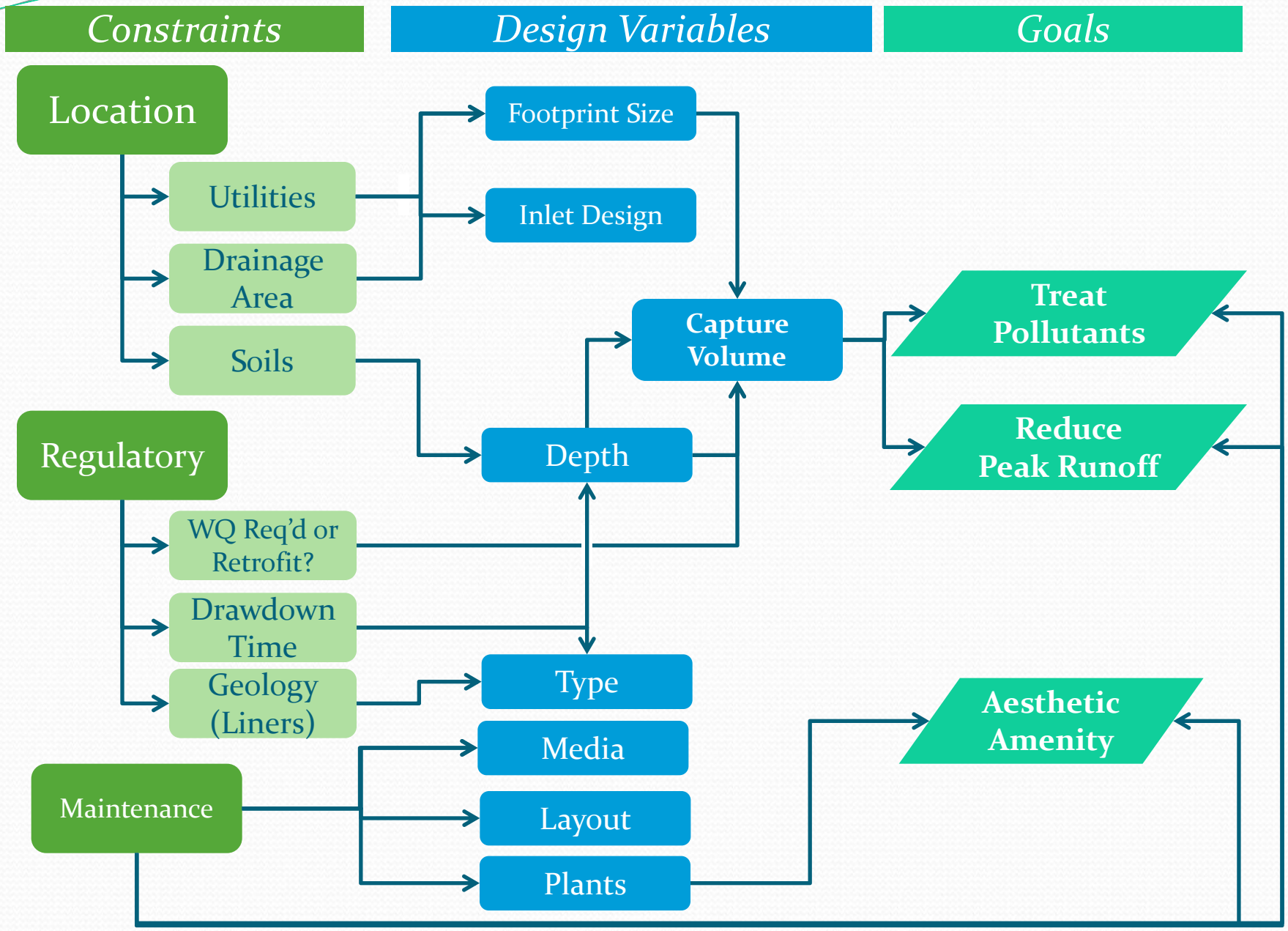
1 Find the Right Location

- 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
- Conserve Energy
- Wildlife Friendly
- Aesthetics

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

Soil Analysis

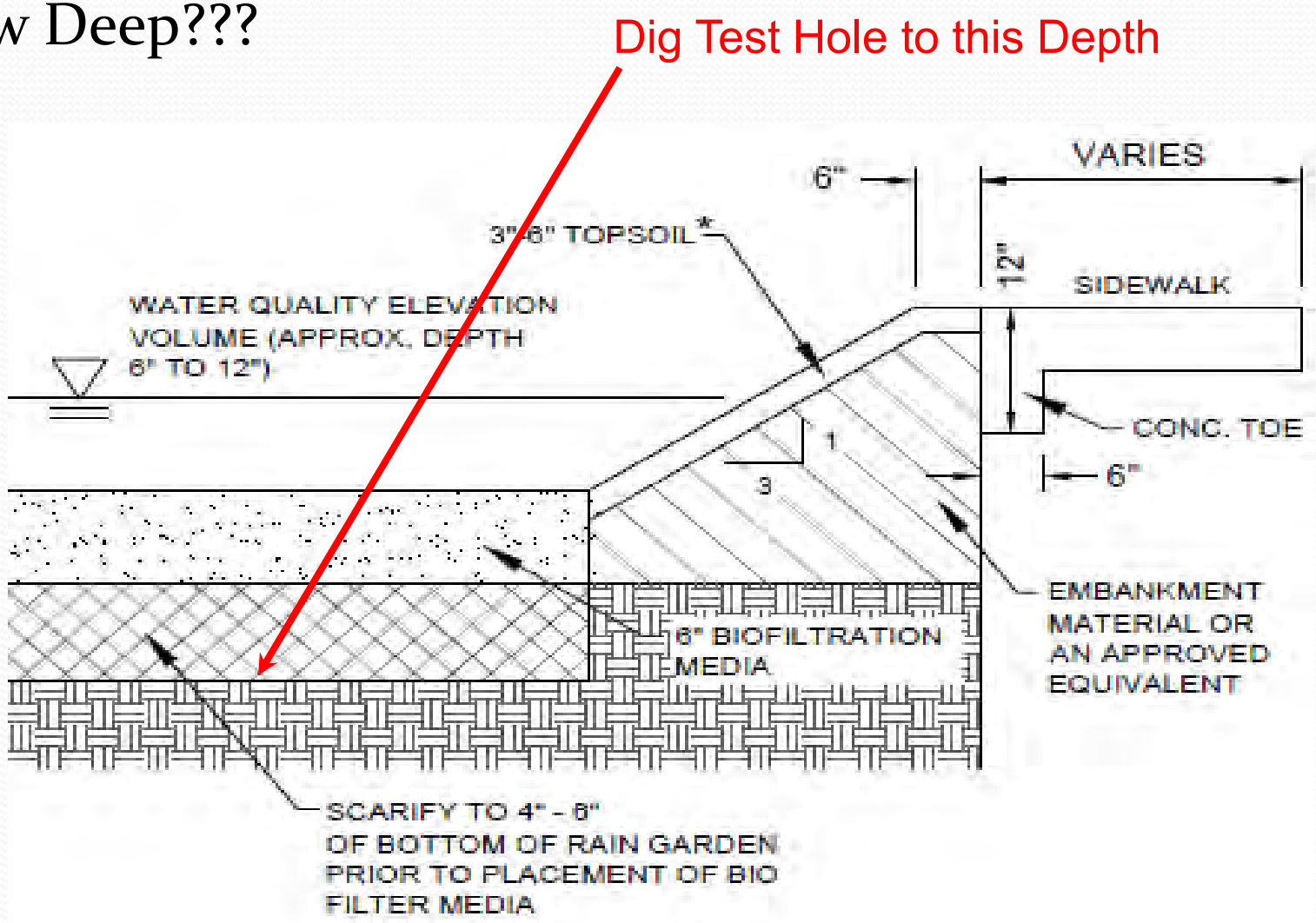
Infiltration rates –

For infiltration rain gardens

- Don’t rely of soil survey maps or desktop evaluation for soil infiltration rates
- Perform an onsite infiltration test (perc test)
- Perform at least one test for every 2000 square feet of rain garden
- Be sure to dig test hole deep enough to measure infiltration at the bottom of the rain garden.
- Apply factor of safety

Soil Analysis

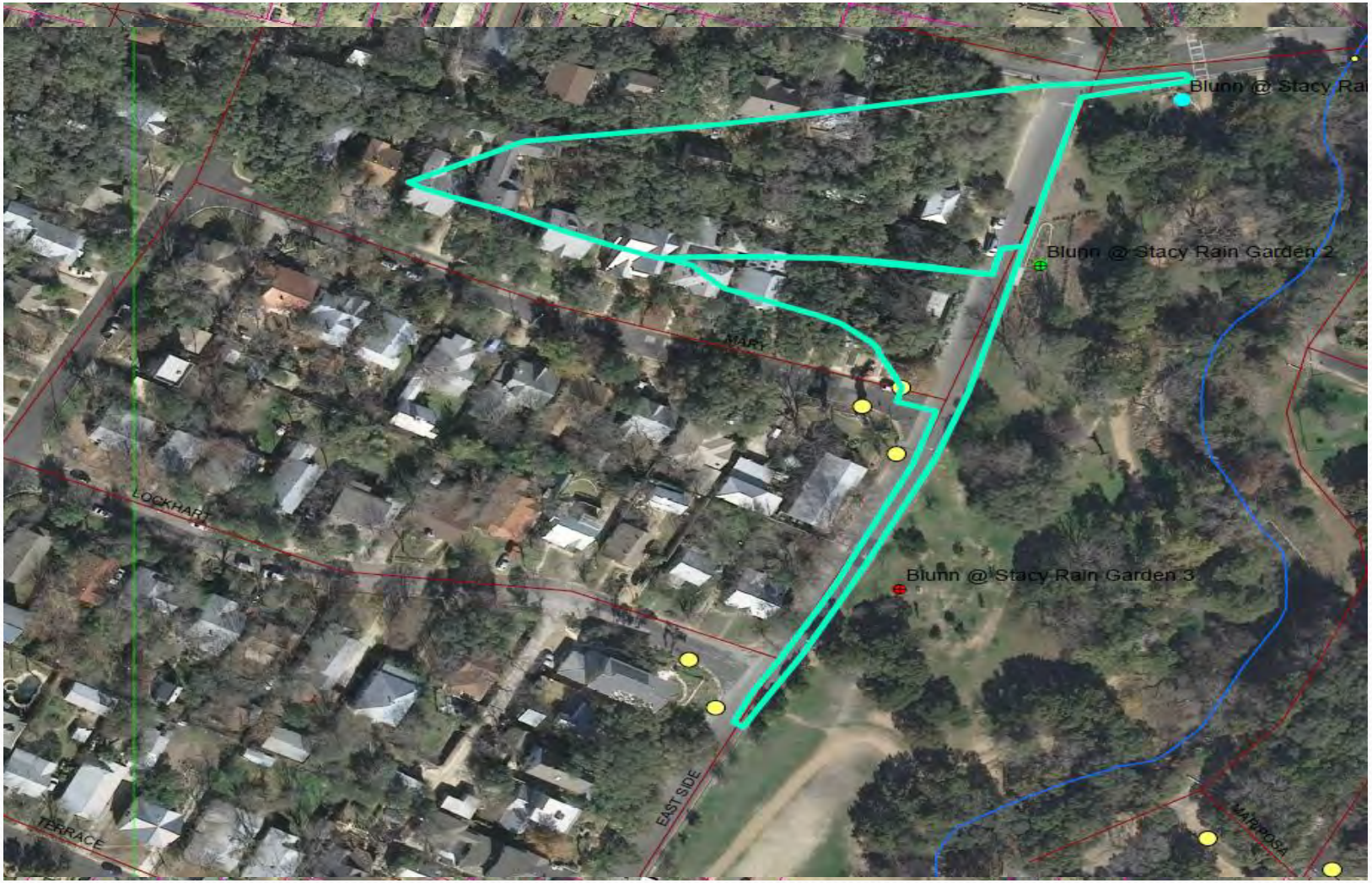
- How Deep???



Drainage Area

- **Desktop analysis**
  - GIS and Google map
- **Field Verify Drainage Areas**
  - Preferably in the rain
- **Design for certainty of capture**
  - Grading features or trench drains

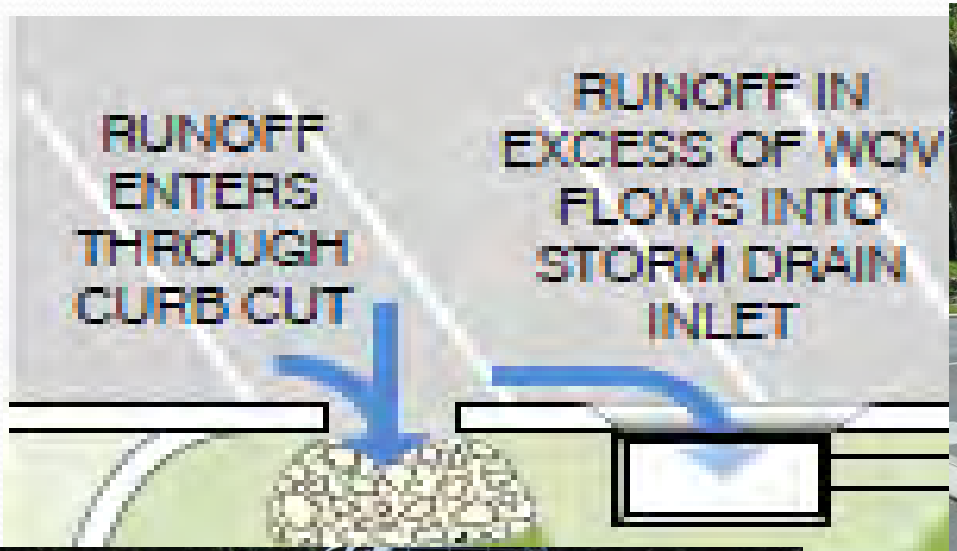
Drainage Area



Certainty of Capture

FAIL

Inlet Design



Items to Consider

- Flow Control
  - Flows into the rain garden should not exc
    storm event)
- Watch the Elevations during Constru
  - 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 spl
  design or construction and WQV is reduce

Splash Pad Sizing

Watch the length and width.

Length

- less than 12 inches from inside edge of inlet.

Splash Pad Width

Width

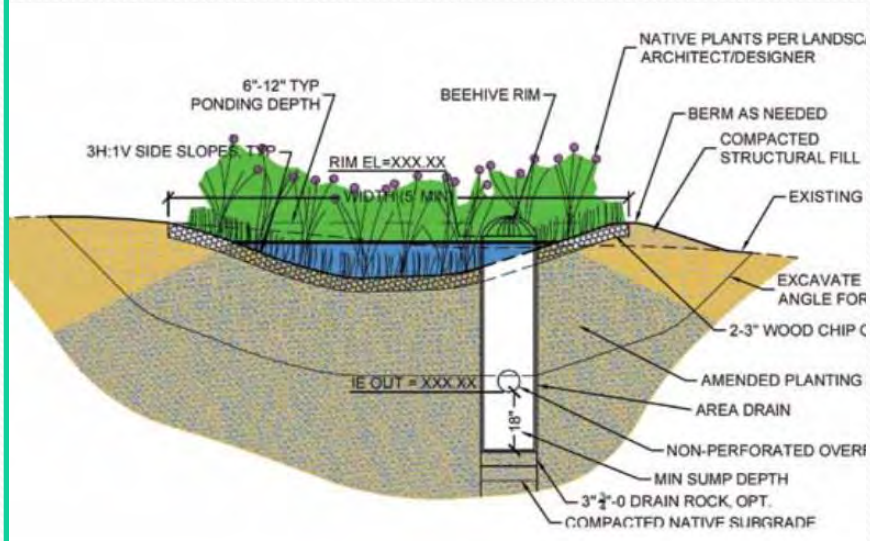
- extend 6 to 12 inches beyond the width of the inlet opening.

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

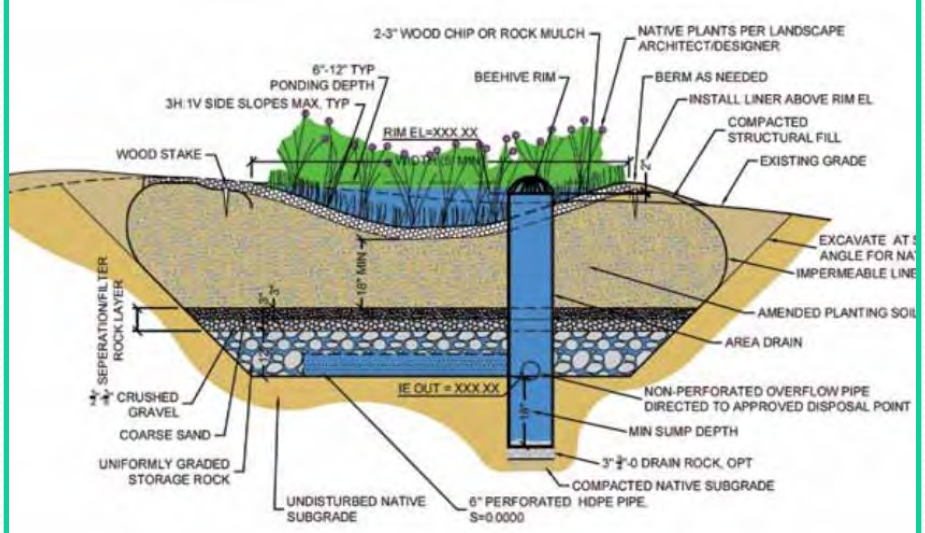
Infiltration



Captured runoff soaks down into ground

vs.

Filtration



Captured runoff exits through pipe

Source: Oregon State University Extension

Media and Underdrains

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
    - No added nutrients
    - No manure & no biosolids based compost

Plants

- Miniature biofilters provide enhanced nutrient removal
- Plant health is important in variable conditions

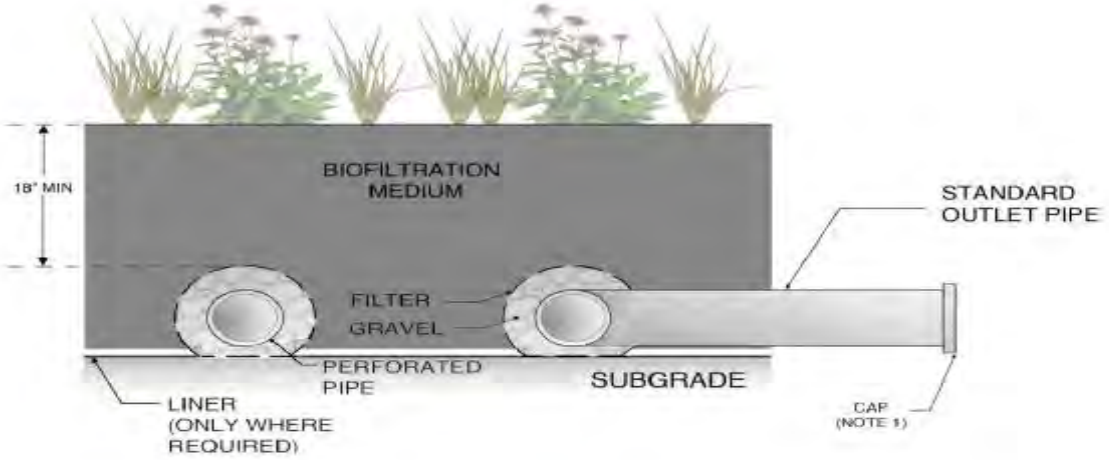
Saturated zone

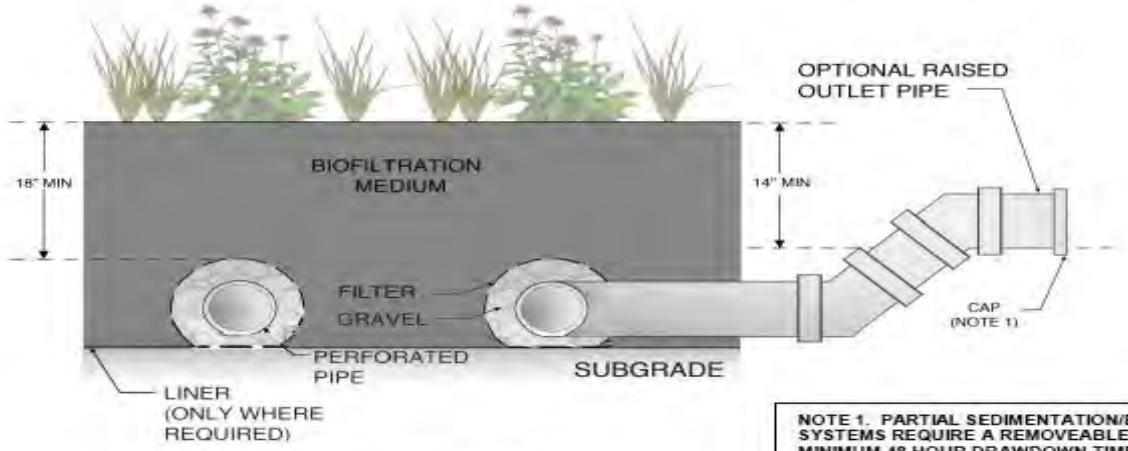
- Promotes pollution removal
- May help with plant viability

Underdrain design

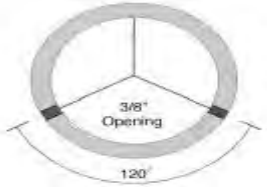
- Allows plant roots to access underlying soil
- Washed river gravel works best

Underdrains





NOTE 1. PARTIAL SEDIMENTATION/BIOFILTRATION SYSTEMS REQUIRE A REMOVEABLE PVC CAP WITH A MINIMUM 48 HOUR DRAWDOWN TIME ORIFICE. FULL SEDIMENTATION/BIOFILTRATION SYSTEMS DO NOT REQUIRE A CAP ON THE UNDERDRAIN OUTLET PIPE.



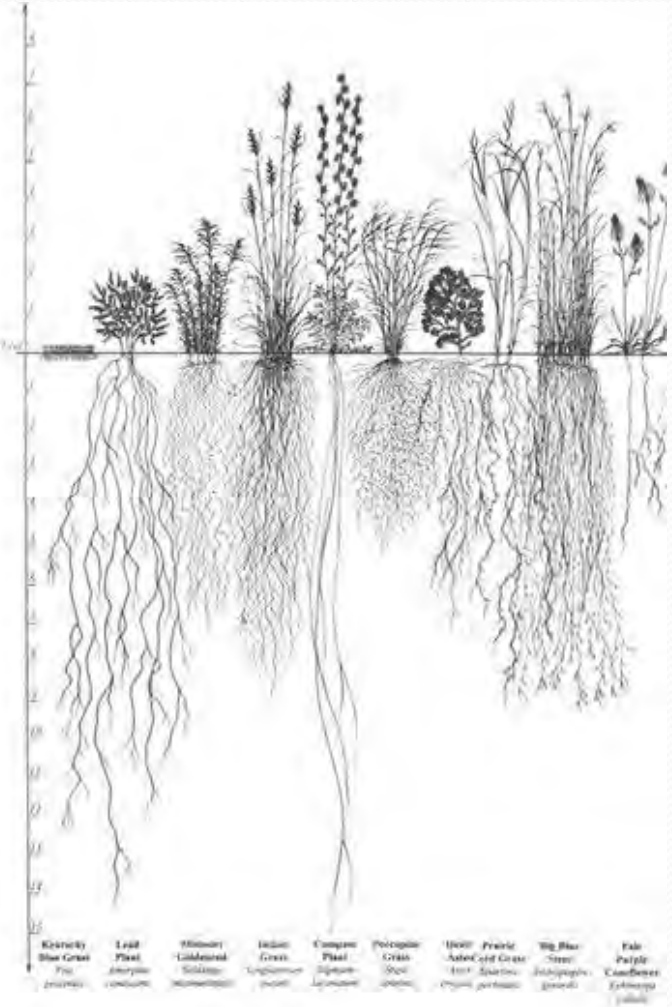
PERFORATED PIPE DETAIL

Rain Garden Landscaping

- **Critical to Project Success**
- **Integrate Engineering & Landscape**
- **Team: Include Landscape Professional**

Rain Gardens: Plants

- **Plants are an essential component** – they filter and clean stormwater, and stabilize the soil
- Use Native or adapted plants
- Use Drought-tolerant plants
- Plants with fibrous root systems are very beneficial
- Plant roots will maintain and increase soil porosity
- Avoid plants that require well-drained soils
- Diversity of plant types



Root Systems of Prairie Plants

Rain Gardens: Plants

PLANT INFORMATION SOURCES

- **Residential and Commercial**
  - Grow Green brochure
  - Landscape Plants guide

Suggested Plants for Central Texas Rain Gardens

Tall Plants

Cherry Laurel
Eastern Gamagrass
Maximilian Sunflower
Possumhaw Holly
Red Buckeye
Switchgrass

Medium Plants

American Beautyberry
Bicolor Iris
Big Bluestem
Big Muhly
Bushy Bluestem
Cherokee Sedge
Chili Pequin
Indian Grass
Little Bluestem
Obedient Plant
Prairie Wildrye
Purple Muhly
Turks Cap

Low Plants

Black-eyed Susan
Blue Mistflower
Cherry Sage
Coreopsis
Deer Muhly
Gulf Coast Muhly
Gulf Coast Penstemon
Horseherb
Inland Sea Oats
Liriope
Meadow Sedge
Missouri Violet
Monkey Grass
Pigeonberry
River Fern
Spiderwort
Tropical Sage
Water Clover
Zexmenia

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

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.

Post-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

Green Stormwater Infrastructure – Maintenance Manual

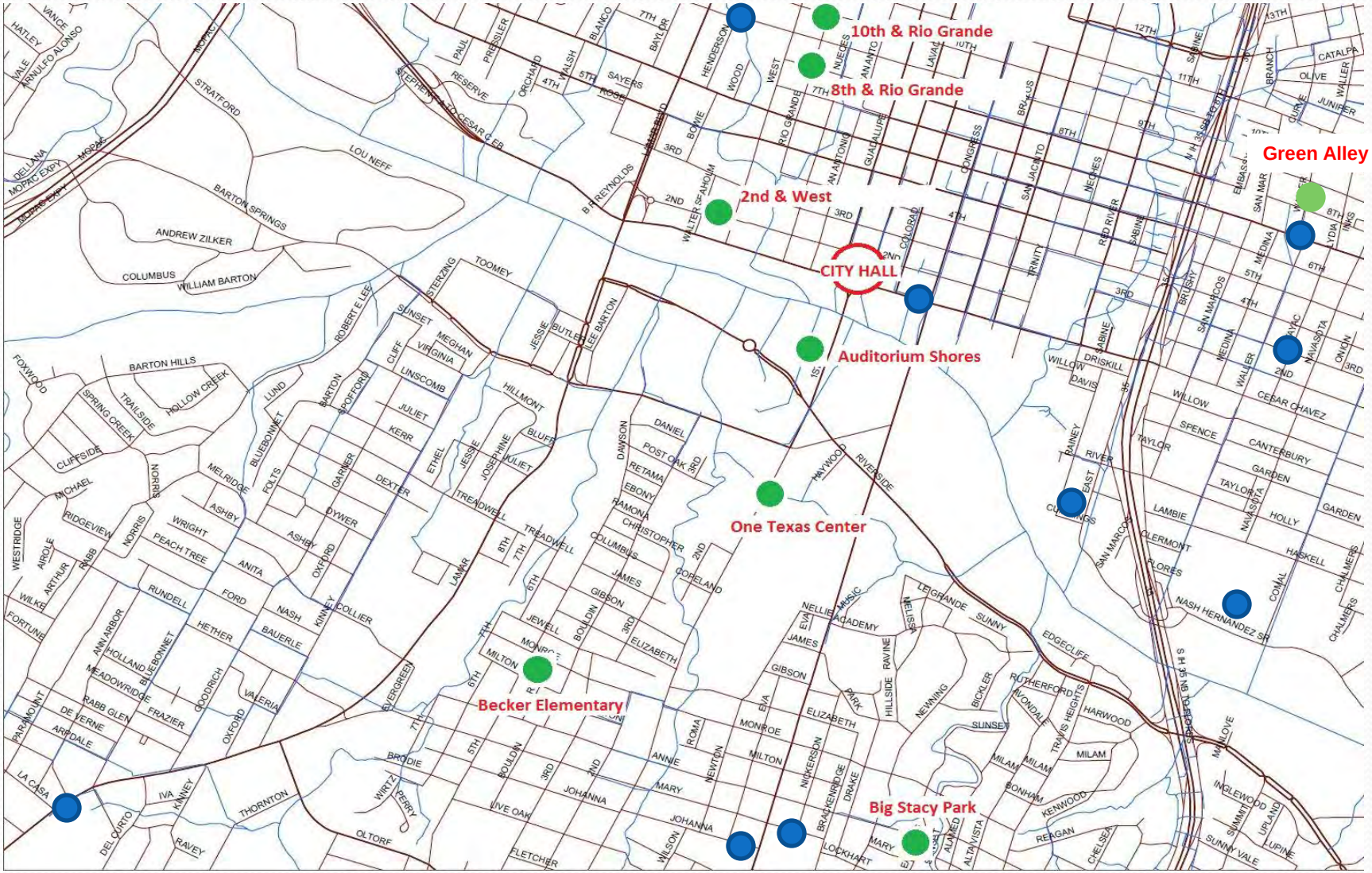
Completed 2014

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

Projects in the area



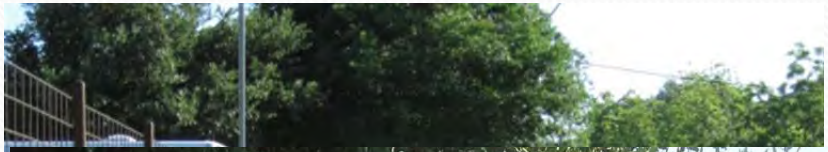
Burnet & Cullen

Grover & Reese

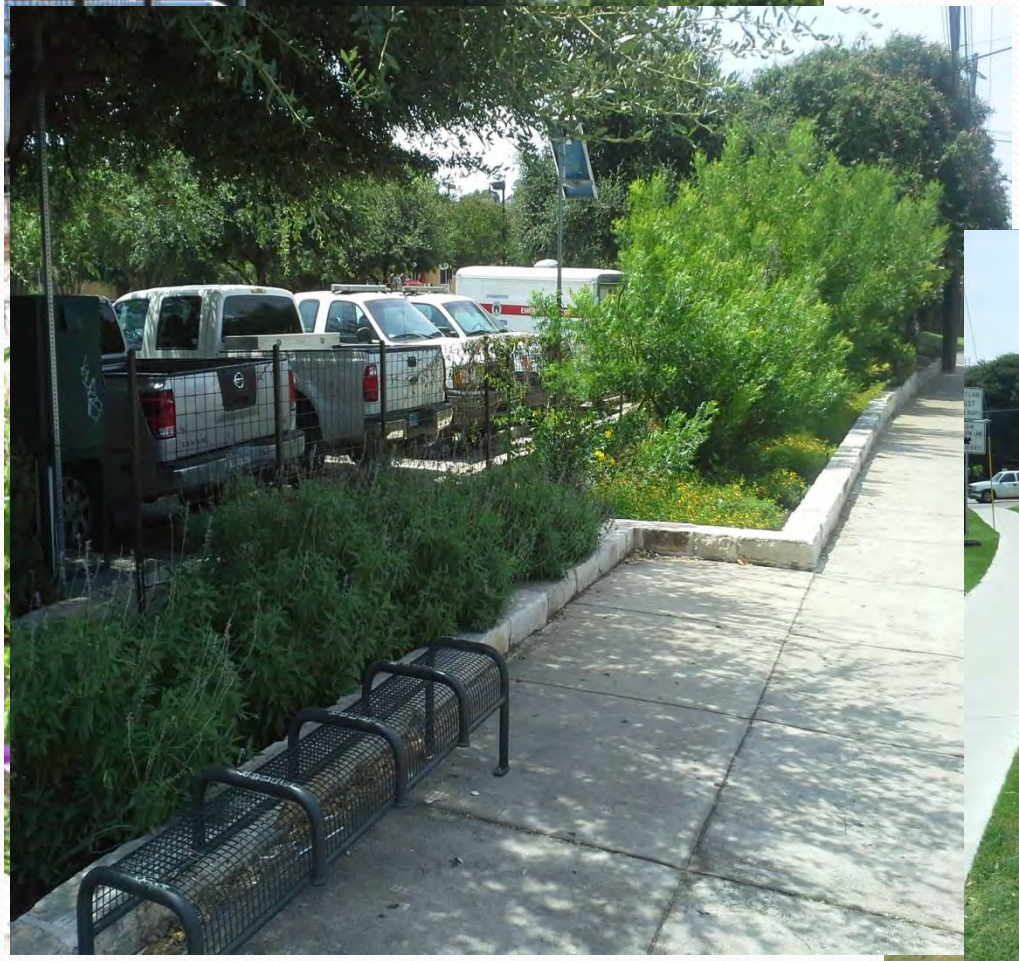
Steck at Rockwood

Davis Lane & Leo

One Texas Center



Increased Plant Growth w/Infiltration Design

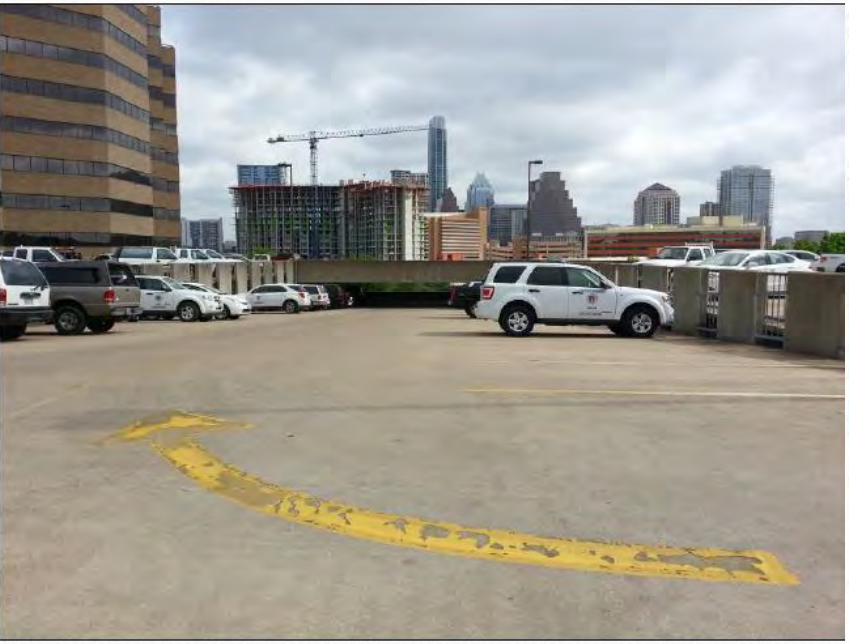


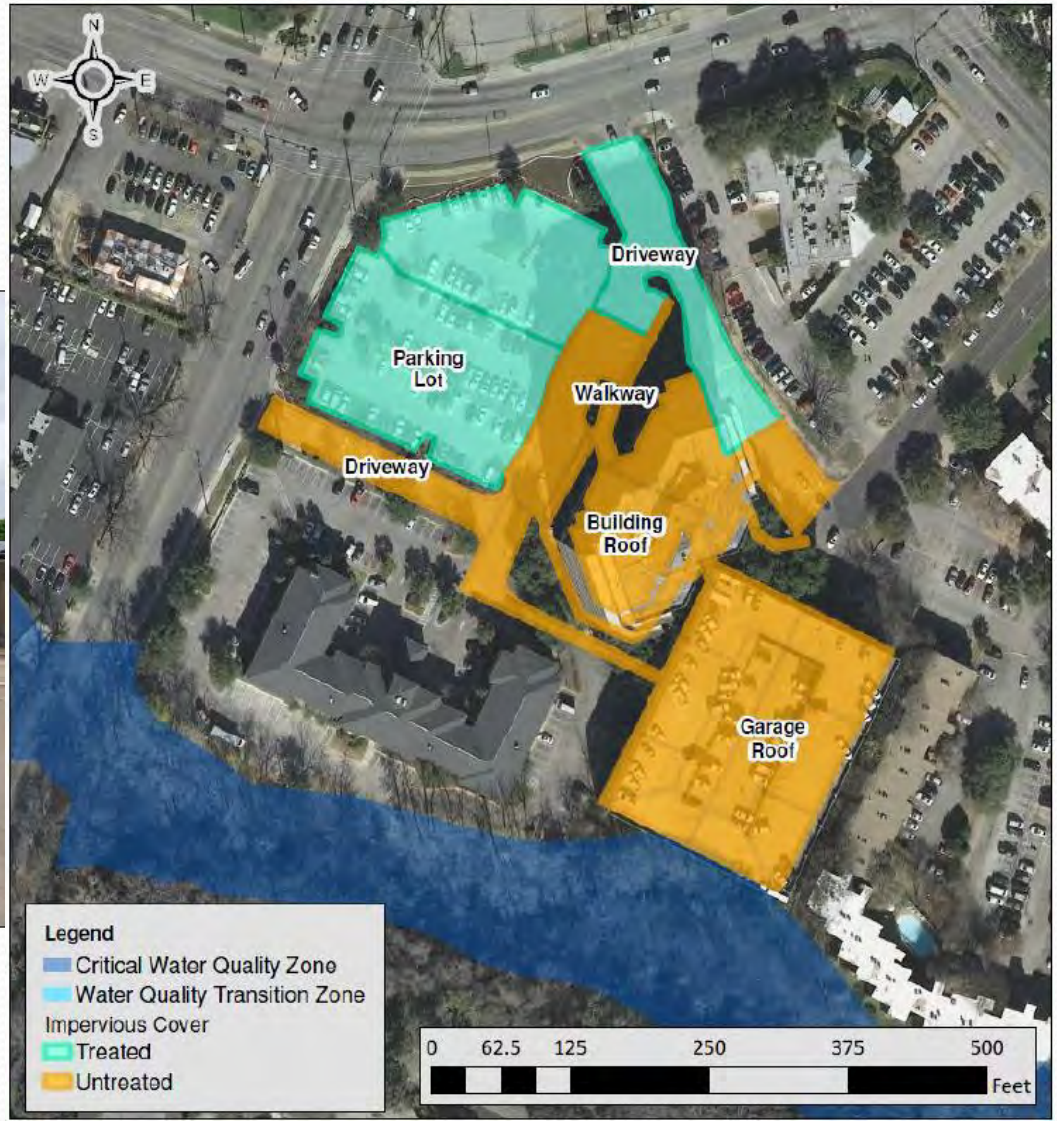
8th & Rio Grande

Green Alley at 8th & Waller

Sneak Peak: OTC Parking Garage

- Phase II of One Texas Center retrofits





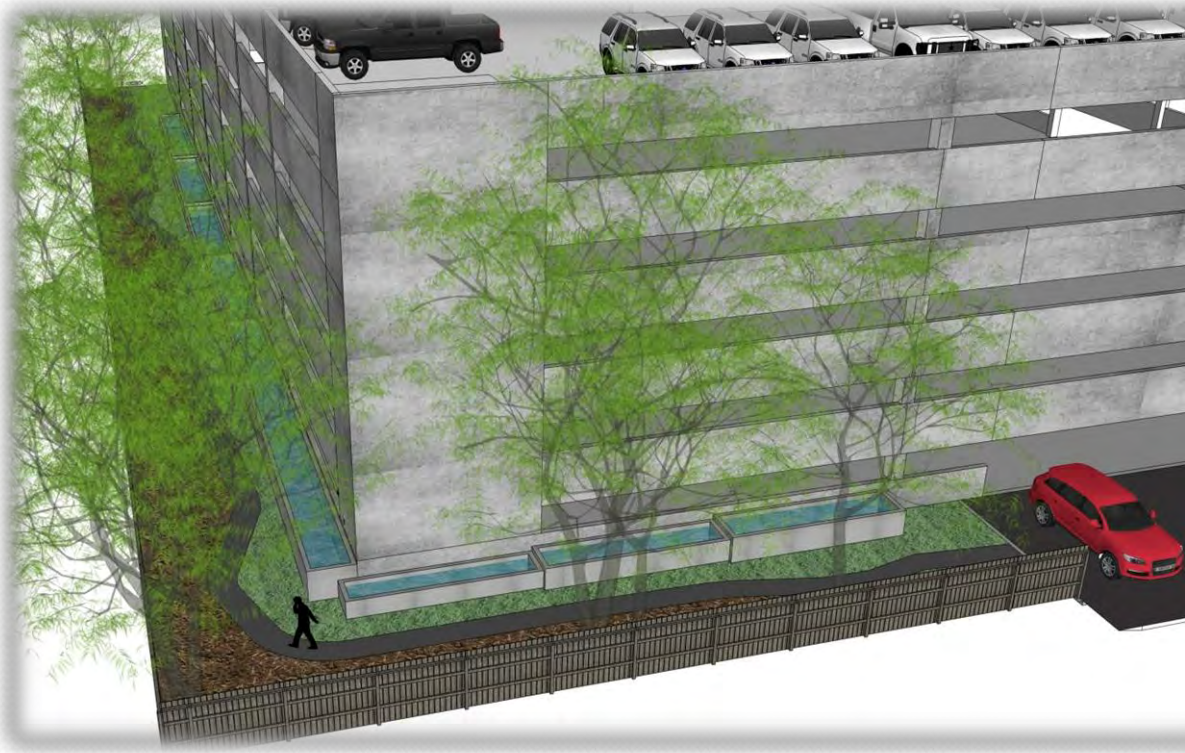
Elevated Rain Gardens (Planter Boxes)

- Rain gardens are gravity-fed systems
- If drainage area is elevated (rooftops, parking garages)…rain garden can be, too!

Image Source: Melbourne Water

Sneak Peak: OTC Parking Garage

- Items to Consider
  - Energy dissipation
  - First Flush
  - Maintenance
  - Structural soundness of surrounding building
  - Saturated Zone
  - Inlets & outlets



Rendering: Susan Kenzle

Questions ???

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