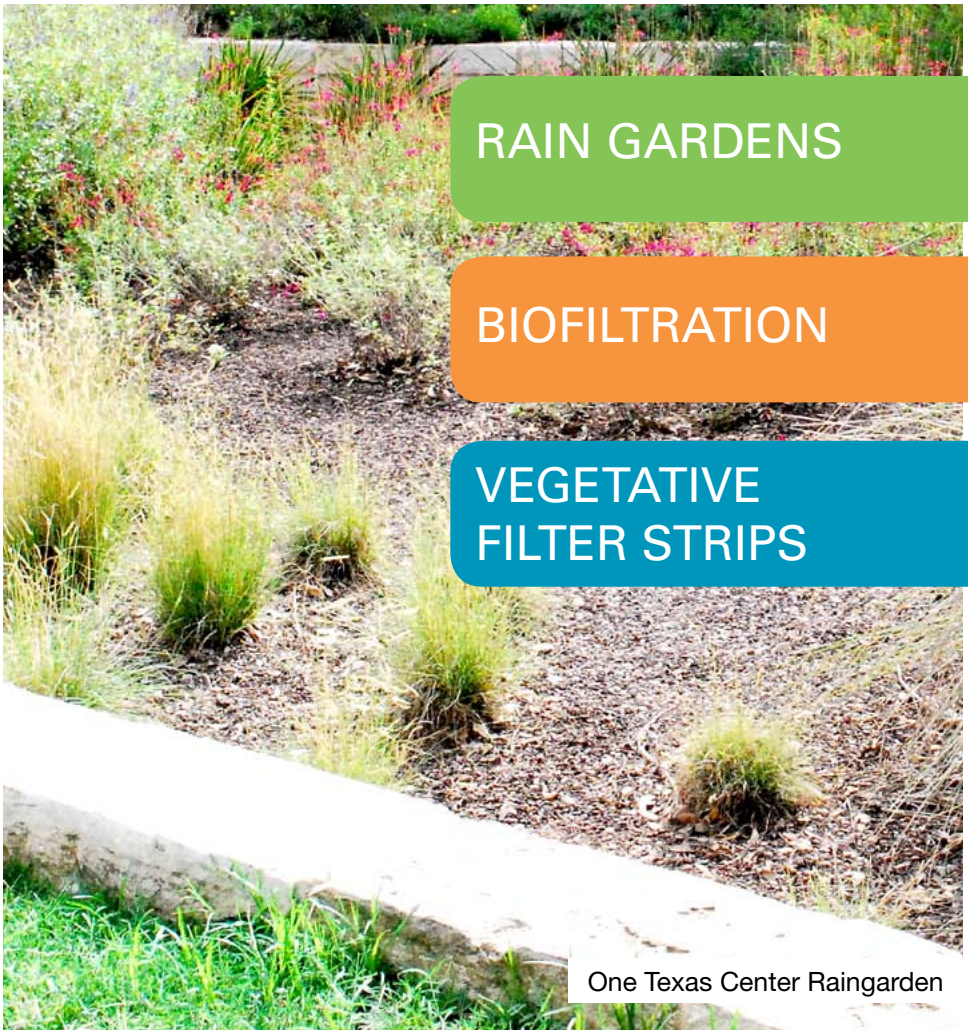
GREEN STORMWATER INFRASTRUCTURE MAINTENANCE MANUAL



One Texas Center Raingarden

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Fig. 1

IDEAL CONDITIONS

- No erosion or scouring of soil in garden
- No sediment or debris at inlet or within garden
- Uniform coverage with desired vegetation; no weeds
- Uniform mulch coverage
- No visible compaction, water drains within 48 hours

RAIN GARDENS

Sediment

ISSUE	SOLUTION
Erosion or scouring present; Mulch or topsoil is worn away by water flow Fig. 2	Redistribute/replace mulch to consistent 3 inch depth; Cover extensive scouring with appropriately sized rock (typically 3 inch river rock) Fig. 3
Sediment deposits or debris at the inlet Fig. 4	Remove sediment, leaves, debris, and trash from the inlet Fig. 5
Sediment deposits greater than 3 inches deep in bottom of basin Fig. 6	If sediment deposits in discrete piles, remove with hand tools. If sediment uniformly covers bottom of basin and has reduced storage depth of garden over design depth, entire basin may need to be dredged to attain design conditions. If vegetation is disturbed, replace with in-kind vegetation. Refer to ECM (Section 1.6.7.C) for information on appropriate vegetation Fig. 7

Scouring

Scouring filled with 3-inch river rock

Clogged inlet

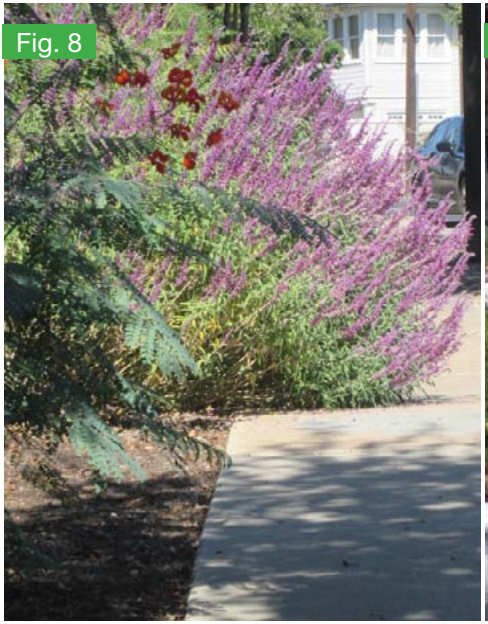
A cleaned inlet with probes

Sediment deposits that need to be removed

Bottom of the basin is clear of sediment buildup

Vegetative Coverage

ISSUE	SOLUTION
Dead vegetation	Remove and replace with viable plants
Vegetation obstructing the street, sidewalk, or curb inlet Fig. 8	Prune overhanging vegetation/ dead branches with hand tools to prevent obstruction Fig. 9
Inflow/outflow structure is blocked	Remove blockage to allow unimpeded inflow/outflow
Bare areas more than 10 sf Fig. 19	Replace dead vegetation and/ or ground cover/mulch to 3 inch uniform coverage Fig. 20
Abundant weeds and invasive plants; Refer to www.texasinvasives.org for a database of invasive plants Fig. 10	Remove weeds by hand tools or other approved IPM measures. Prevent the introduction of weeds by removing weeds before seed dispersal (before seed head forms) and properly maintaining desired vegetation. *See note referring to the use of herbicides* Fig. 11



Vegetation obstructing sidewalk

Sidewalk and curb free from vegetation

Abundant weeds

Appropriate/planned vegetation

Infiltration

ISSUE	SOLUTION
Standing water, >48 hours <72 hours	Monitor drawdown time; soil may be lightly scarified with hand cultivator
Standing water, >96 hours	Remove top layer of sediment and mulch and potentially vegetation. De-compact soil by scarifying with tiller, garden weasel, or other appropriate hand tools. Replace mulch and disturbed vegetation

Holding water after a storm event

Receding water after a storm event

BIO FILTRATION

Fig. 14

IDEAL CONDITIONS

- No visible bare spots
- Appropriate viable vegetation
- Refer to ECM (Section 1.6.7.C) for information on appropriate vegetation
- Little or no weeds or woody vegetation
- Appropriate infiltration rates

Sediment

ISSUE	SOLUTION
Erosion or scouring present; Mulch or topsoil is worn away by water flow	Redistribute/replace mulch to consistent 3 inch depth; Cover extensive scouring with appropriately sized rock (typically 3 inch river rock)
Sediment deposits or debris at the inlet Fig. 15	Remove sediment, leaves, debris, and trash from the inlet Fig. 16
Sediment deposits greater than 3 inches deep in the bottom of basin	If sediment deposits are in discrete piles, remove with hand tools. If sediment uniformly covers bottom of basin and has reduced storage depth of the garden over design depth, entire basin may need to be dredged to attain design conditions. If vegetation is disturbed, replace with in-kind vegetation or mulch. Refer to ECM (Section 1.6.7.C) for information on appropriate vegetation

Curb inlet severely blocked by sediment and vegetation

Inflow into the basin clear of all blockage

Vegetative Coverage

ISSUE	SOLUTION
Vegetation obstructing the street, sidewalk, or curb inlet	Prune overhanging vegetation/ dead branches with hand tools to prevent obstruction
Bare areas more than 10 sf	Replace dead vegetation and/ or ground cover/mulch to 3 inch uniform coverage
Inflow/outflow structure is blocked Fig. 17	Remove blockage to allow unimpeded inflow/outflow Fig. 18
Abundant weeds. Refer to www.texasinvasives.org for a database of invasive plants and weeds Fig. 10	Remove weeds by hand tools or other approved IPM measures. Prevent the introduction of weeds by removing weeds before seed dispersal (before seed head forms) and properly maintaining desired vegetation (See note referring to the use of herbicides)
Dead/diseased trees or dead vegetation Fig. 19	Remove dead trees including root balls, fill void areas with mulch by hand; Treat diseased trees mechanically or by hand depending on IPM guidelines. Cut back and replace with viable vegetation Fig. 20

Curb inlet blocked by vegetation

Proper vegetation

Little or no vegetative cover

Appropriate coverage with no bare spots

Infiltration

ISSUE	SOLUTION
Standing water, >48 hours <72 hours	Monitor drawdown time; soil may be lightly scarified with hand cultivator
Standing water, >96 hours	Remove top layer of sediment and mulch and potentially vegetation. De-compact soil by scarifying with tiller, Garden Weasel, or other appropriate hand tools. Replace mulch and disturbed vegetation

Holding water with no infiltration

Debris line left by receding storm water

VEGETATIVE FILTER STRIP

Fig. 23

IDEAL CONDITIONS

- Dense vegetation cover with no bare spots exceeding 10 sf
- No sediment accumulation greater than 3 inches, especially at level spreader
- No trash or debris
- Level spreaders are intact

VEGETATIVE FILTER STRIP

Sediment - Inspect twice annually

ISSUE	SOLUTION
Level spreader is disrupted and clogged with weeds Fig.24	Remove weeds and sediment buildup from level spreader Fig. 25
Level spreader structure is compromised; rills or gullies are visible from concentrated flow Fig. 26	Repair spreader such that water flows in unconcentrated sheetflow; re-grade rills/gullies to match adjacent flat topography and either re-sod or reseed and cover with soil retention blanket Fig. 27

Level spreader clogged with sediment and debris

Unobstructed level spreader

Vegetative Filter Strip showing rills caused by concentrated flow

Vegetative Filter Strip with no rills or gullies

VEGETATIVE FILTER STRIP

Vegetative Coverage

ISSUE	SOLUTION
Bare spots exceeding 10 sf	Reseed bare spots with appropriate seed mixture or sod Fig. 28
Overgrown vegetation or trash present	If vegetation impedes sidewalks, ROW or level spreader, trim with appropriate hand tools. Pick up trash by hand and dispose of properly
Appearance of woody vegetation	Remove, re-grade disturbed areas, and re-seed or re-sod
Vegetation height	For turfgrass VFS, mowed height should be => 3 inches. For native bunch grass VFS, mowed height should be => 18 inches Fig. 29

Appropriate cover and vegetative height for turf grass applications

Appropriate height for native bunch grasses

MULCH

Mulch is a layer of organic or inorganic material applied to the surface of an area of soil. Its purpose is any or all of the following:

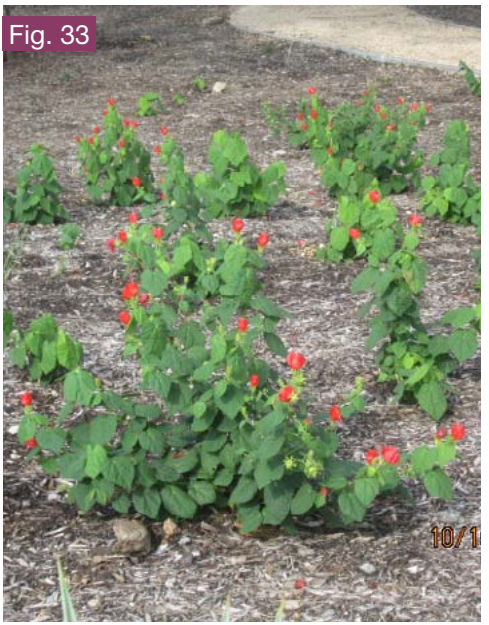
- To conserve moisture
- To improve the fertility and health of the soil
- To reduce weed growth
- To enhance the visual appeal of the area

Examples of mulch are, but not limited to: bark mulch, wood chips, river rock, appropriately sized gravel and properly rounded or milled glass chips.

Appropriately sized gravel mulch

3-inch river rock mulch

Crushed glass mulch



Woody mulch

Additional Tips

Integrated Pest Management

- Weeding by hand tools only.
- Prevent the introduction of weeds by removing weeds before seed dispersal (before seed head forms) and properly maintaining desired vegetation. Refer to www.texasinvasives.org for a database of invasive plants and weeds. Fertilizers are unnecessary and limited use of organic herbicides is allowed.
- Treat all diseased trees and shrubs mechanically or by hand for insect or disease infestation.
- Remove and replace all dead and diseased vegetation considered beyond treatment.

www.austintexas.gov/IPM

Inspections

It is recommended that inspections be performed at least twice annually once the vegetation is established. Inspections will be necessary more frequently during the growing season, March through November. Maintenance is to be performed as needed.

Additional Tips

Tips on Vegetation Maintenance

- Tall Herbaceous and Medium Herbaceous Plants: Trimming activities must not impinge on the growing tips (basal crown) of the bunch grasses. Cutting these grasses below the basal crown will severely stress and possibly kill them. These plants shall be cut no lower than 18” from the ground. The annual physical removal of all woody weeds from the filtration basin is required.

- Short Herbaceous Plants: Sod-forming grasses may be mown or trimmed to an appropriate height. These plants shall not be scalped, cut no lower than 3” from the ground.

- Late winter harvesting should include trimming of bunchgrasses (minimum 18” or higher), and mowing of turf grasses (minimum 3” high). For other types of vegetation, see recommendations in the planting specifications located in the ECM (Section 1.6.7.C).

- Inspect during periods of drought for plant stress. If plants are wilting from heat, apply periodic temporary irrigation to keep plants alive. Consult design landscape architect if unsure about plant stress or irrigation options.

WATERSHED PROTECTION

www.austintexas.gov/watershed

For detailed information:
The Environmental Criteria Manual (ECM) can be found at:

www.austintexas.gov/department/regulations-and-criteria-manuals