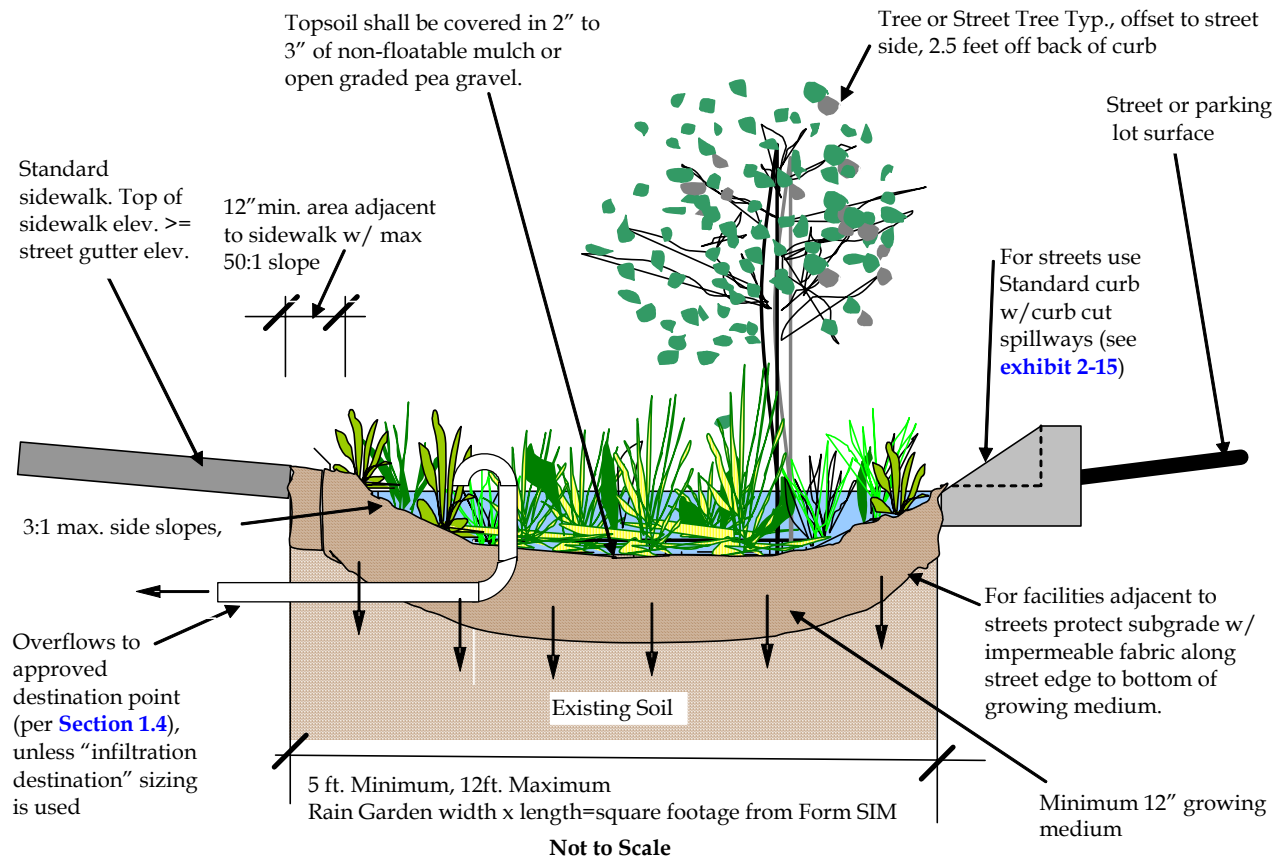


Rain Gardens

Infiltration Rain Garden (Formerly Named Vegetated Infiltration Basins)



<u>Stormwater Management Goals Achieved</u>	<u>Acceptable Sizing Methodologies</u>
---------------------------------------------	----------------------------------------

- | | |
|----------------------------|-------------------------|
| ✓ Pollution Reduction..... | SIM ¹ , PRES |
| ✓ Flow Control..... | SIM |
| ✓ Destination..... | PRES ² |

This facility is **not** classified as an Underground Injection Control structure (UIC).

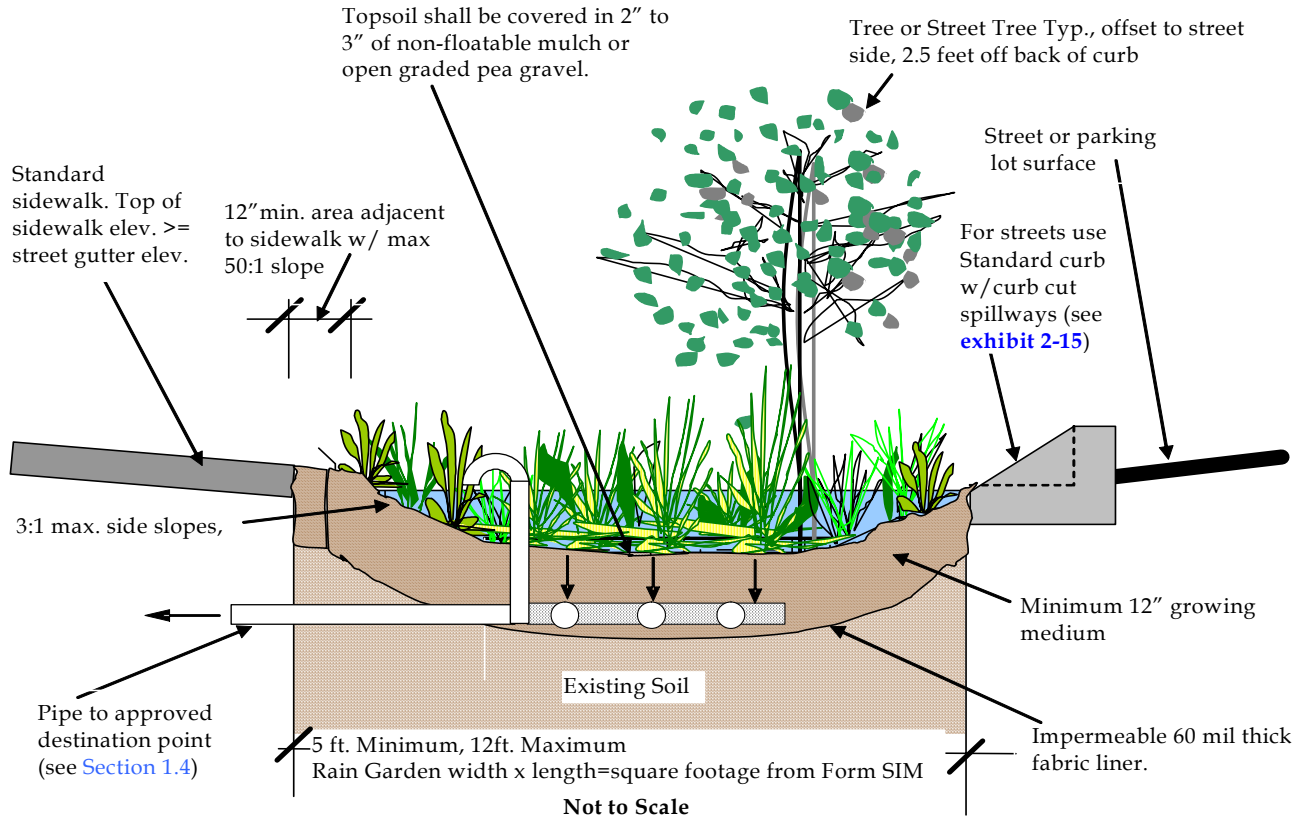
SIM=Simplified Approach, PRES= Presumptive Approach, PERF= Performance Approach

Notes: Rain gardens may be designed to manage runoff from rooftops, and, if submerged into the ground, parking lots and streets in many cases.

- 1) Projects greater than 15,000 square feet of impervious surface area to manage must use the Presumptive Approach to size the Stormwater Planter for pollution reduction.
- 2) Residential applications with NRCS soil types A or B may size infiltration facilities for destination using the SIM sizing factor for Pollution Reduction with Flow Control.

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Filtration Rain Garden



Description: Rain gardens are landscaped reservoirs used to collect, filter, and/or infiltrate stormwater runoff, allowing pollutants to settle and filter out as the water percolates through the planter soil before infiltrating into the ground below or piped to its downstream destination. In addition to providing pollution reduction, flow rates and

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volumes can also be managed with rain gardens. Rain gardens can be used to help fulfill a site's required landscaping area requirement and should be integrated into the overall site design. Numerous design variations of shape, and planting scheme can be used to fit the character of a site. Rain gardens may provide either "infiltration treatment" or "filtration treatment". An overflow to an approved destination per **Section 1.4** will be required, unless the facility is an *Infiltration Rain Garden* sized per **Surface Infiltration Facility** guidelines presented in this chapter.

Infiltration Rain Gardens:

Design Considerations: The infiltration rate of the native soil is a key element in determining size and viability. *Infiltration Rain Gardens* shall not be used on sites with infiltration rates are less than 0.5 in/hr.

Construction Considerations:

Location of *Infiltration Rain Gardens* should be clearly marked before site work begins to avoid soil disturbance during construction. No vehicular traffic, except that specifically used to construct the facility, should be allowed within 10 feet of facility areas. Infiltration rates shall be verified prior to construction for NRCS soil type C.

Soil Suitability: *Infiltration Rain Gardens* are appropriate for soils with a minimum infiltration rate of 0.5 inches per hour (NRCS soil types A, B, & C). There shall be no less than three feet of undisturbed infiltration medium between the bottom of the facility and any impervious layer (i.e. hardpan, solid rock, high groundwater levels, etc.) Topsoil shall be used within the top 18 inches of the facility. Maximum design infiltration rate of the facility is controlled by the infiltration rate of the growing medium and shall not be greater than 2.5 in/hr.

Dimensions and Slopes: Facility storage depth must be at least 3 inches, unless a larger-than-required planter square-footage is used. Minimum *Infiltration Rain Garden* width is 5-feet. The bottom of rain garden shall be constructed without slope.

Setbacks: Required setback for *Infiltration Rain Gardens* is 5 feet from property lines and 10 feet from structures. Easements for non-buildable areas on adjacent properties may be required if facilities are located next to property lines.

Filtration Rain Gardens:

Design Considerations: These facilities are appropriate for all soil types as they collect stormwater that filters through the growing medium and convey it to a piped stormwater system. *Filtration Rain Gardens* may be located within 10-feet of building foundations with an approved impermeable membrane.

Construction Considerations: Special attention needs to be paid to the planter waterproofing if constructed adjacent to building structures. The bottom of *Filtration Rain Gardens* must be lined with an impermeable membrane of 60 mil plastic film.

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Soil Suitability: *Filtration Rain Gardens* are appropriate for all soils types. Topsoil shall be used within the top 18 inches of the facility. Maximum design filtration rate of the facility is controlled by the infiltration rate of the growing medium and shall not be greater than 2.5 in/hr.

Dimensions and Slopes: Facility storage depth must be at least 3 inches, unless a larger-than-required planter square-footage is used. Minimum *Filtration Rain* width is 5-feet. Planters shall be constructed without slope.

Setbacks: A setback for *Filtration Stormwater Planters* is not required.

General Requirements for Infiltration and Filtration Rain Gardens:

Planter Walls: Planter walls shall be made of stone, concrete, brick, wood, or other durable material. Chemically treated wood that can leach out toxic chemicals and contaminate stormwater shall not be used.

Sizing: Individual rain gardens sized with the Simplified Approach shall be designed to receive less than 15,000 square-feet of impervious area runoff. For rain gardens a Simplified Approach sizing factor of 0.09 for *Infiltration Rain Gardens* and 0.05 for *Filtration Rain Gardens* may be used to receive credit for pollution reduction. A high-flow overflow must be provided or the Presumptive Approach must be used in conjunction with a measured infiltration rate to receive credit for stormwater destination. In cases when pollution reduction is the only stormwater management goal, the Presumptive Approach may be used in conjunction with a measured infiltration rate to downsize the Simplified Approach sizing factor. Rain gardens shall be designed to pond water for less than 18 hours after each storm event.

Landscaping: Vegetation provides filtration and root uptake functions, protects from rain and wind erosion, and enhances aesthetic conditions. Plantings shall be designed at the following quantities per 100 square feet of facility area. Facility area is equivalent to the area of the rain garden calculated from Form SIM.

- 2 - Large shrubs/small trees: 3-gallon containers or equivalent.
- 6 - Shrubs/large grass-like plants: 1-gallon containers or equivalent

Ground cover plants: 1 per 18 inches on center, triangular spacing, for the ground cover planting area only. Minimum container: 4-inch pot. At least 50 percent of the groundcover plantings shall be grasses or grass-like plants.

Wildflowers, native grasses, and ground covers used for City-maintained facilities shall be designed not to require mowing. Where mowing cannot be avoided, facilities shall be designed to require mowing no more than once annually.

Topsoil in rain gardens shall be covered in non-floatable mulch or open graded pea gravel.

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Trees: The following evergreen or deciduous trees shall be retained or planted around the perimeter of the rain garden (approximately 30 feet on center):

Evergreen trees:	Minimum height: 6 feet
Deciduous trees:	Minimum caliper: 1 ½ inches at 6 inches above base.

Recommended street trees in or near rain gardens:

With overhead power lines

Acer campestre ‘Evelyn’
 Carpinus caroliniana
 Cercis Canadensis
 Gleditsia triacanthos ‘Impcole’
 Koelreuteria paniculata

Without overhead power lines

Betula jacquemontii
 Celtis occidentalis
 Fraxinus pennsylvanica ‘Johnson’
 Gleditsia triacanthos ‘Skycole’
 Nyssa sylvatica
 Quercus shumardii

Checklist of minimal information to be shown on the permit drawings:

- 1) Facility dimensions and setbacks from property lines and structures
- 2) Profile view of facility, including typical cross-sections with dimensions
- 3) Planter wall material and waterproofing membrane specification
- 4) Growing medium specification
- 5) Drain rock specification
- 6) Filter fabric specification
- 7) All stormwater piping associated with the facility, including pipe materials, sizes, slopes, and invert elevations at every bend or connection
- 8) Stormwater destination
- 9) Landscaping plan

Inspection requirements and schedule: The following table shall be used to determine which stormwater facility components require City inspection, and when the inspection shall be requested. Please note that, while not all facility components may require an inspection call, inspectors will inspect for all required components in the field.

Facility Component	Inspection Requirement
Rain garden grading/ excavation	
Structural components/ liner	
Piping	Call for inspection
Drain rock	
Filter fabric	
Growing medium	
Plantings	Call for inspection

Operations and Maintenance requirements: See Chapter 3.0.

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