



Excavation, Soil Work, Grading, and Planting Rain Gardens



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Seattle Public Utilities

Installing Rain Gardens & Cisterns

Trainings for contractors, 11/3/2011

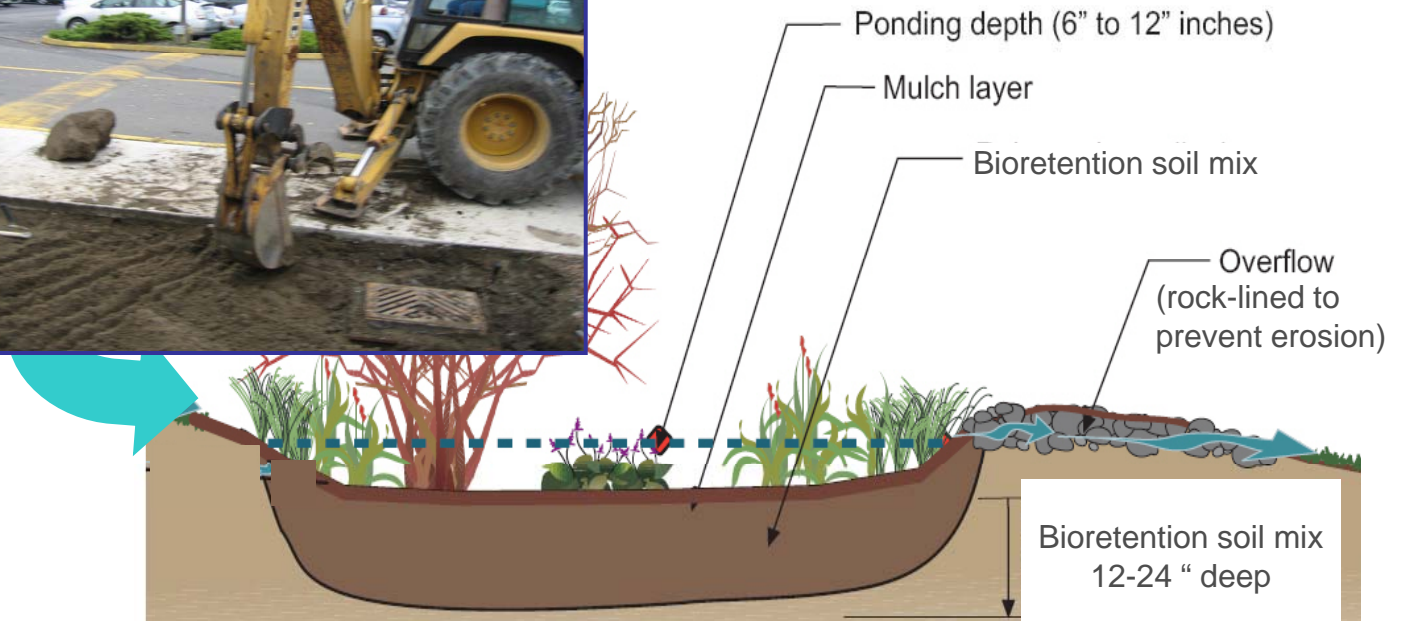
www.seattle.gov/util/rainwise



Over-excavate, to depth of amended soil

Excavate to:

- ponding depth (usually 6 in.)
- + plus 4 in. minimum freeboard
- + plus 12 inches min. for amended soil
- = 22 inches minimum excavation depth





Use a transit and/or level – *Your eye won't tell you what's level!*

- Bottom must be flat & level, so water spreads over whole area
- Inlet higher than overflow
- Overflow at lowest point on edge
- Compact berm around edges, minimum 4" inches higher than overflow





Place rain garden soil (min. 12 inch soil depth)

Import bioretention soil

- Haul off excavated native soil
- Backfill with “bioretention soil” mix (35% compost / 65% coarse sand per SPU specification – currently only available from Cedar Grove)
- Place in 6-inch lifts, wetting each lift to settle if possible.





Compost and bioretention soil quality

- Bioretention soil spec: 35-40% compost, 60-65% coarse sand
 - See compost quality below
 - Coarse sand, few fines: less than 5% passing #200 sieve
 - Bioretention soil spec at www.seattle.gov/util/GreenInfrastructure
 - Available from Cedar Grove Compost, likely other suppliers soon

- Compost: 1/2 or 3/4 inch screened
 - from WA permitted composting facility see list in *Building Soil* manual at www.BuildingSoil.org
 - Additional quality assurance if producer is certified by US Composting Council “STA” (Seal of Testing Assurance) program
 - Your nose can tell: should smell like forest floor, not stinky ammonia, neither sticky wet nor dusty dry





Grading the rain garden soil

- Level the bottom (use 2x4 with level)
- Form side slopes at 2.5H:1V slope (2.5 inches horizontal run per 1 inch vertical rise)
- Settle RG soil by saturating with water
 - Or boot pack, but don't machine compact!
 - Use water to find final level grade
- Use native soil to compact into a berm on down-slope edge (if needed to fit site slope)
- Haul away leftover native soil

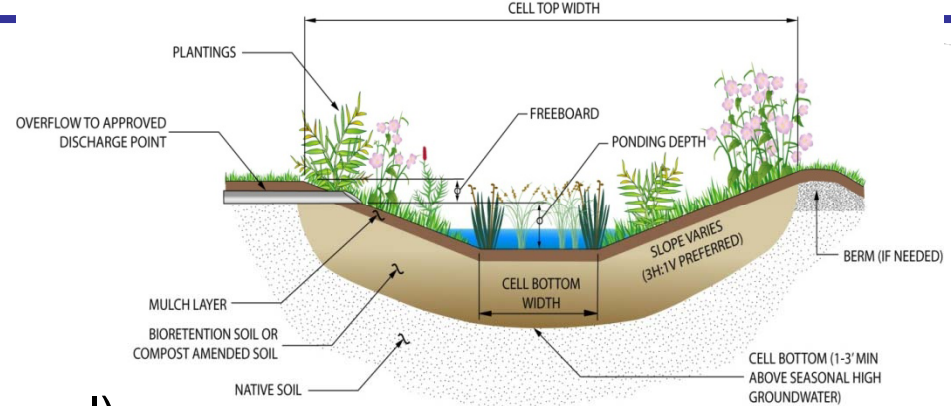


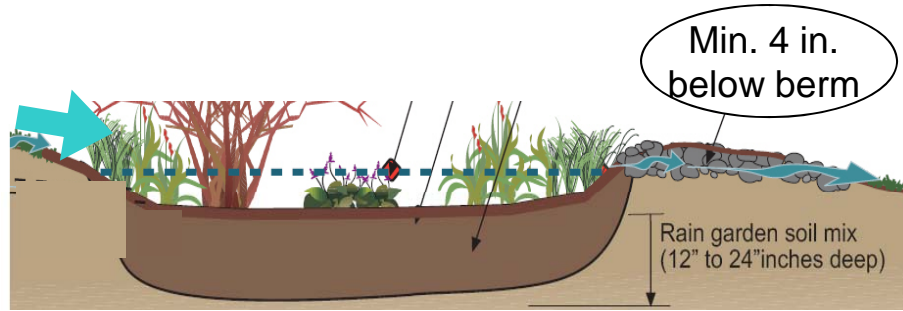
photo from "Rain Gardens"
article by Emily Bishton at
www.IPMopedia.org



Construct the inflow and overflow

Inflow higher than overflow, options:

- vegetated swale
- ditch filled with rock
- 3 in. underground pipe

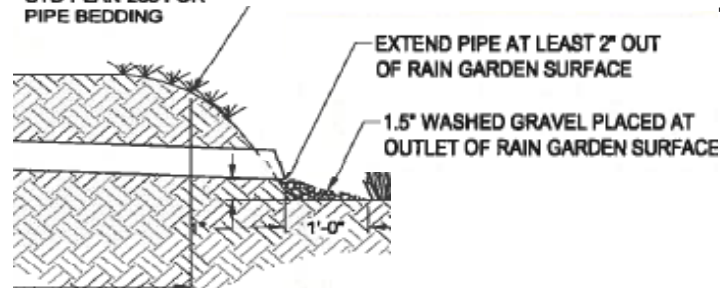


Overflow:

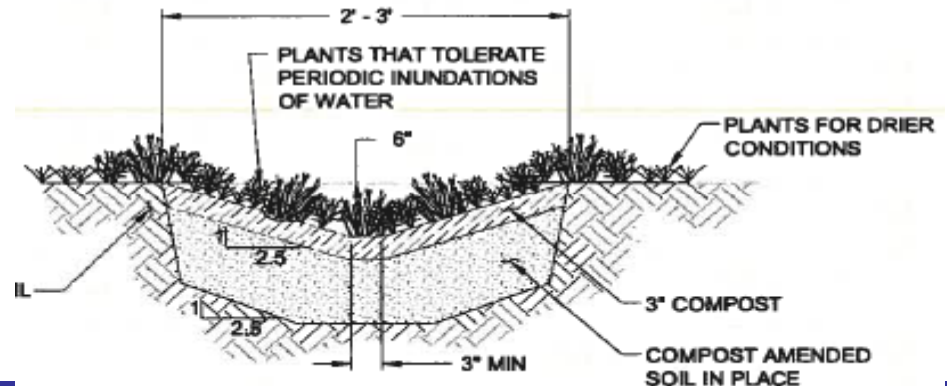
- min. 4 in. below top of berm
- determines ponding height
- rock-lined edge
- rock spreader to disperse water into landscape, min. 10 ft. from buildings, 3 ft. from sidewalks or alleys.

Piped Inflow – higher than overflow level

-3" DIA SCHEDULE 40 PVC PIPE. SEE STD PLAN 285 FOR PIPE BEDDING



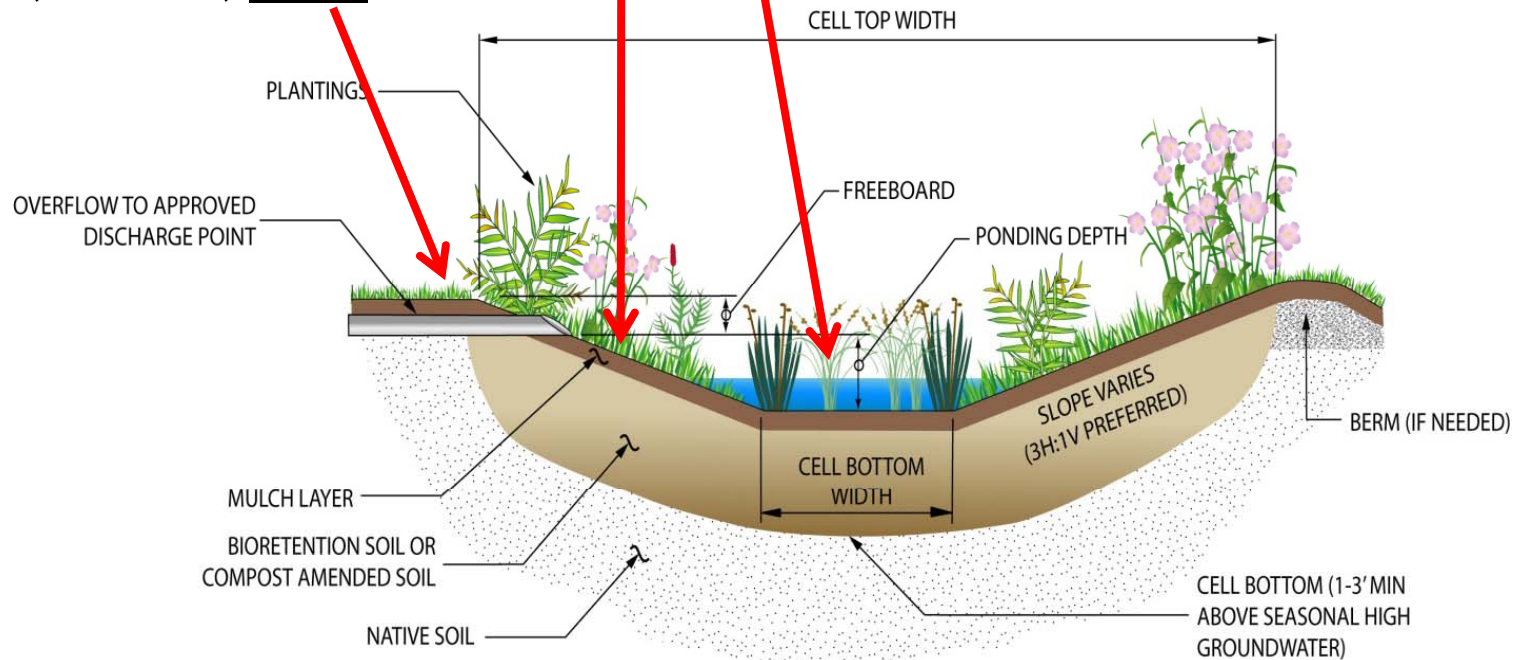
Vegetated Swale Inflow





Plant Selection for Rain Gardens - Two Planting Zones:

- Zone 1 (Bottom): wet-loving plants
- Zone 2
 - Sides: wet & dry tolerant plants
 - Top (Zone 3 in RG Handbook): dry-tolerant plants – grass, shrubs, trees





Plant Selection Criteria for Rain Gardens

- Right Plant Right Place
- Low maintenance – Plants reach a mature height with minimal pruning (fit plant size to site – plants grow bigger in compost!)
- Wildlife Habitat Potential – Berries, nuts and flowers
- Mix of evergreen and deciduous plants
- Flowers
- NW Natives
- Availability (Easy to find and/or replace)
- Tough and hardy in our climate and growing conditions



Examples



Zone 1

- *Carex obnupta* – slough sedge
- *Cornus stolonifera* ‘Isanti’ – dwarf red-twig dogwood
- *Juncus patens* – grooved rush

Zone 2

- *Arctostaphylos uva-ursi* – kinnikinnik



Erica sp. – various heaths



Polystichum munitum
– sword fern



Rain Garden Plant Lists



- City of Seattle Green Factor Plant List “Bioretention Zone”
- Rain Garden Handbook (3 Zones)
- SPU Streetside Rain Garden Plant List (2 Zones)

All linked from:

- www.seattle.gov/util/rainwise
- www.rainwise.seattle.gov



Plant Spacing, & Best Planting Times

Space plants according to their mature size. Plants in rain gardens grow fast!

- 3 ft. O.C. is typical for perennials and small shrubs
- 12 in. O.C. for ground covers
- Plant ground covers 1 ft. away from sidewalk edge
- Plant shrubs 2 ft. away from sidewalk & driveway edges

Best Planting times

- Early fall (Sept.- Oct.) needs least irrigation
- Spring once soil warms – provide summer irrigation
- Avoid planting July & Aug. or water daily
- All plantings will need water through first summer season, and hot-dry-weather watering for first 2-3 years



Finish with a Mulch Layer

- Place 2"- 4" arborist wood chips on upper zone and slopes
- If the rain garden regularly fills, use compost as the mulch in the bottom zone, because it doesn't float



Can mulch
and then
plant,

or plant and
then mulch,

but don't mix
mulch into
planting hole





Learn more about rain garden details and design examples

- Rain Garden summary factsheet
- *Rain Garden Handbook*
- Design specs, photo examples, and locations for field visits to City projects on www.seattle.gov/util/greeninfrastructure
- Locations to see rain gardens on private property and more resources on RainWise Tools, www.rainwise.seattle.gov



All linked from www.seattle.gov/util/rainwise



Final Construction Inspection

(for projects seeking SPU reimbursement)

SPU Inspector will:

- Verify proper downspout disconnection from sewer line, and connection to rain garden
- Verify min. 1% slope in pipe or swale from downspout to RG
- Verify min. 12 inch bioretention soil depth in RG
- Verify proper overflow (low point in berm, rock lined, rock or gravel level spreader to disperse flow into landscape min. 10 ft. from buildings and min. 3 ft. from sidewalk)
- Verify RG size & depth per pre-construction plan
- Verify plant selection is appropriate for rain garden: bottom plants (wet-tolerant) and sides/top (drought tolerant)



More rain garden plant examples



The following slides show plants used in recent City of Seattle installed streetside rain gardens. They are hardy, have wildlife benefits and seasonal color, and are appropriately sized for urban rain gardens.

See the RainWise website for links to more plant lists.

These images and descriptions were provided by Jennifer Carlson, Haven Illustrated LLC



Zone 1 Rain Garden Plants

Zone 1 is the bottom, suited to wet-loving adapted plants



- *Cornus stolonifera* 'Isanti' – Dwarf red-twig dogwood
- Natural mounded shape – no pruning required
- White flowers in spring
- White berries in summer
- Red fall color
- Brilliant red stems in winter
- Habitat value for pollinators and birds



Zone 1 Rain Garden Plants



- Camassia Leichtlinii – Camas lily
- Large blue flowers in the spring
- Deciduous
- NW Native
- Habitat value for pollinators



Zone 1 Rain Garden Plants



- Carex Obnupta – Slough sledge
- Evergreen
- Grass-like texture
- Brown flower stalks
- Habitat value for birds



Zone 1 Rain Garden Plants



- Iris douglasiana – Douglas iris
- Blue flowers in spring
- Grass-like leaves
- Evergreen
- NW native



Zone 1 Rain Garden Plants



- Juncus patens – Grooved rush
- Blue-green stems
- Brown flowers
- Evergreen
- Habitat value for pollinators



Zone 1 Rain Garden Plants



- Scirpus acutus – Hardstem bulrush
- Evergreen
- Brown flowers
- Habitat value for pollinators and birds



Zone 2 Rain Garden Plants



- Zone 2 is the upper slope and top of the rain garden
- Plants prefer a well-drained soil
- Traditional landscape plants can be used in this zone



Zone 2 Rain Garden Plants



- *Arctostaphylos uva-ursi* – Kinnikinnik
- Evergreen ground cover
- Flowers in spring and summer
- Red berries in summer and fall
- Habitat value for pollinators and birds



Zone 2 Rain Garden Plants



- Calluna – Heather
- Evergreen
- Low perennial
- Some varieties have foliage that will change color in fall
- Varieties can be chosen that provide flowers every season
- Habitat value for pollinators



Zone 2 Rain Garden Plants



- Erica – Heath
- Evergreen
- Low perennial
- Summer or winter blooming varieties available
- Habitat value for pollinators



Zone 2 Rain Garden Plants



- Escallonia “Compacta” – Escallonia
- Evergreen shrub
- Glossy dark green foliage
- Pink or red flowers in summer
- Habitat value for pollinators



Zone 2 Rain Garden Plants



- Geranium – Cranesbill geranium
- Low perennial
- Red, blue, pink or white flowers all summer
- Fall color
- Semi-evergreen



Zone 2 Rain Garden Plants



- Mahonia nervosa – Low oregon grape
- Low perennial
- Dark evergreen leaves
- Yellow flowers in spring
- Blue berries in summer
- Red foliage in fall
- Habitat value for pollinators and birds
- NW native



Zone 2 Rain Garden Plants



- *Polystichum munitum* – Sword fern
- Evergreen foliage
- Can tolerate full sun – dense shade
- NW native



Zone 2 Rain Garden Plants



- Spirea x bumalda “Magic carpet” – Dwarf spirea
- Small deciduous shrub
- Colorful spring foliage
- Pink flowers spring-summer
- Fall color
- Habitat value for pollinators



Zone 2 Rain Garden Plants



- *Symphoricarpos albus* – Snow berry
- Small deciduous shrub
- Flowers in spring
- White berries in late fall and winter
- Habitat value pollinators and birds
- NW native