working for clean rivers

Backyard Habitat Training - Stormwater

SK Amaro, Stormwater Retrofits Program
Bureau of Environmental Services
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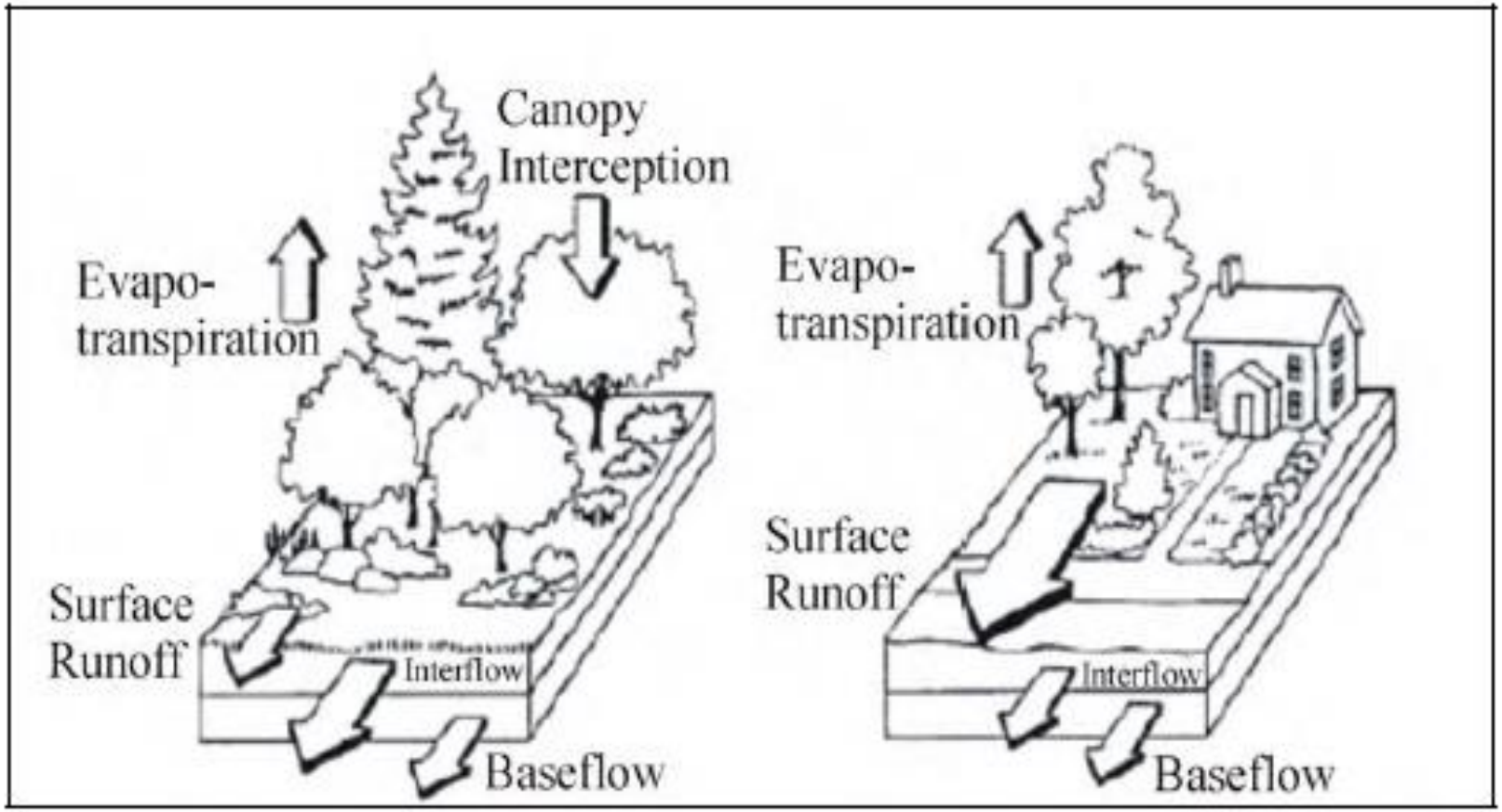
Why stormwater management?!

Then

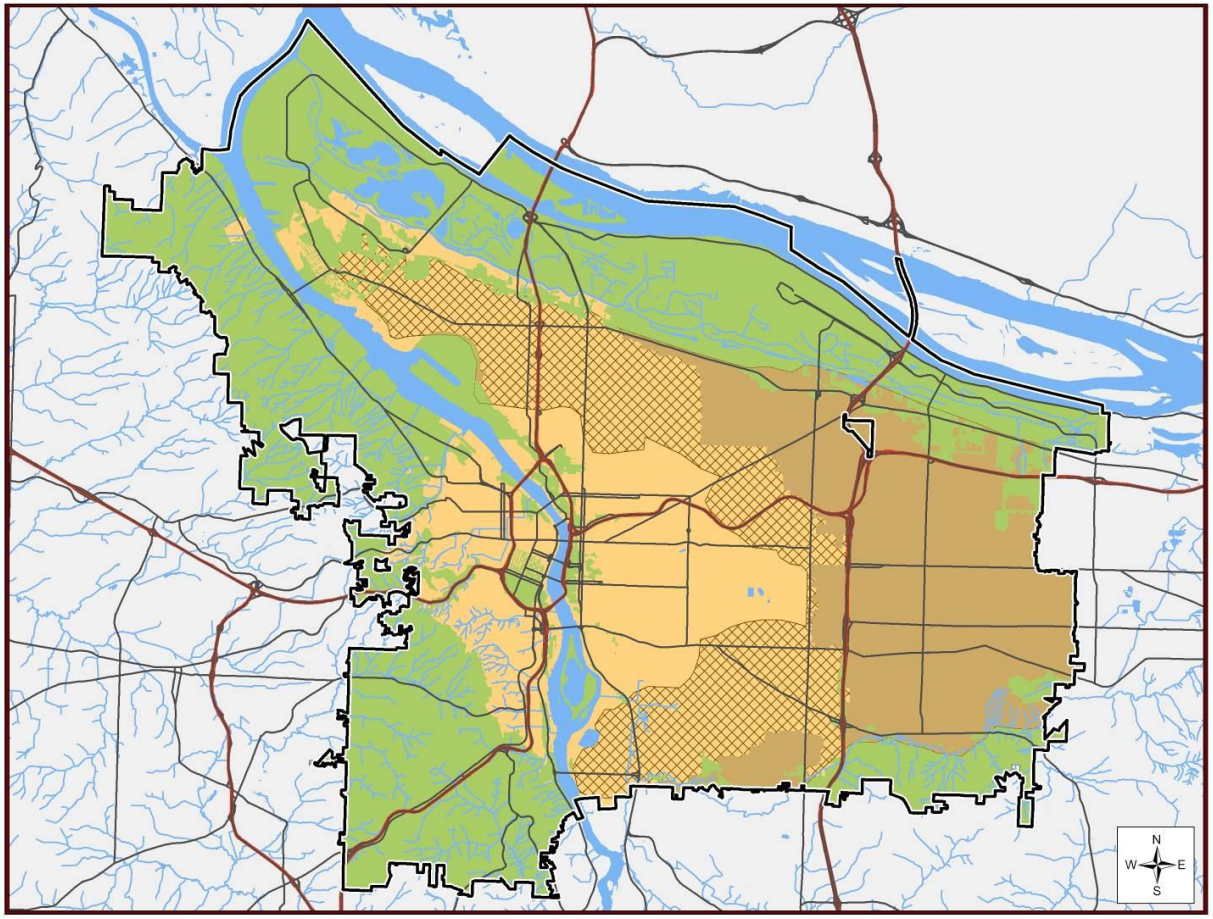
Now

Development and Stormwater Impacts



Portland Stormwater Drainage Systems

- Natural Waterways
- Combined Sewer
- Sumps/dry wells
- Combined sewer with sumps



Stormwater Runoff Impacts

Stormwater runoff causes…

- Physical impacts like erosion, pipe exposure, and habitat destruction
- Pollution movement into streams and groundwater
- Costs of millions of dollars to build and maintain pipes, ditches, sumps, and other stormwater systems and provide treatment

Stormwater Retrofits as part of the solution

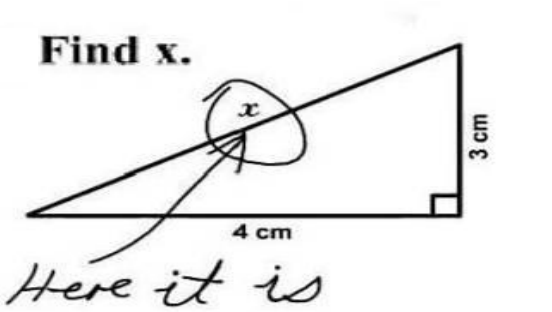
Stormwater retrofits mimic the natural hydrologic cycle in a manner that is safe and effective for the site and neighboring properties

Basic stormwater management components:

- Collect and convey
- Slow or detain
- Evaporate, transpire & infiltrate
- Safe overflow & escape route

Benefits of Stormwater Retrofits

- Simplest solution



- Community engagement

- Watershed benefits

- Reduced costs

BHCP Stormwater Menu Options

Menu options:

- Large canopy trees
- Downspout disconnect
- Rain gardens
- Impervious area reduction
- Ecoroofs
- Naturescaping
- Restoring soils
- Water conservation
- Eco-friendly maintenance

Large Canopy Trees

Plant trees:

- Trees help intercept rain and reduce stormwater reaching the ground
- Adds essential habitat
- BES Treebate program http://www.portlandoregon.gov/bes/51399
- Friends of Trees is a great community resource (503) 248-TREE (8733) www.friendsoftrees.org
- Appropriate for all sites!

Downspout Disconnection

Form:
Downspout extends from building and discharges to landscaping

Function:
Vegetated landscape area filters and infiltrates roof runoff

Downspout Disconnection

Sizing/Design:

- Drainage area should be at least 10% of the roof area
- Make sure landscape gently slopes away from buildings and there is sufficient space for infiltration
- Can be used alone or with other stormwater facilities
- Erosion control advised at discharge point of downspout
- Cap remaining standpipe!

Downspout Disconnection

Setbacks:

- Discharge 6 feet from basements
- Discharge 2 feet from slab/crawl foundations
- Discharge 5 feet from property lines

Permits:

- Permits required for buildings >5,000 ft^2

Downspout Disconnection

Downspout Disconnections Gone Wrong

Additional Considerations

Location considerations take away message:

- No infiltration on or uphill of steep slopes
- West hills typically has poor infiltration and weak soils (some exceptions)
- Other slopes in Portland prone to slope creep, raveling, erosion problems
- If in doubt, call an engineering geologist or geotechnical engineer

Just because you can, doesn't mean you should!

Rain Gardens

Form:
Shallow vegetated landscape depressions with a flat bottom and gently sloping sides

Function:
Vegetated landscape depressions designed to collect, detain, filter, and infiltrate roof runoff

Rain Gardens

Design:

- Great for areas where slope is not ideal for simple splashblock disconnection
- Plant with native water/drought tolerant species
- Best in areas with adequate soil infiltration (2”/hour)

Rain Gardens

Setbacks:

- Discharge 6 feet from basements, 2 feet from slab/crawl foundations
- Discharge 5 feet from property lines

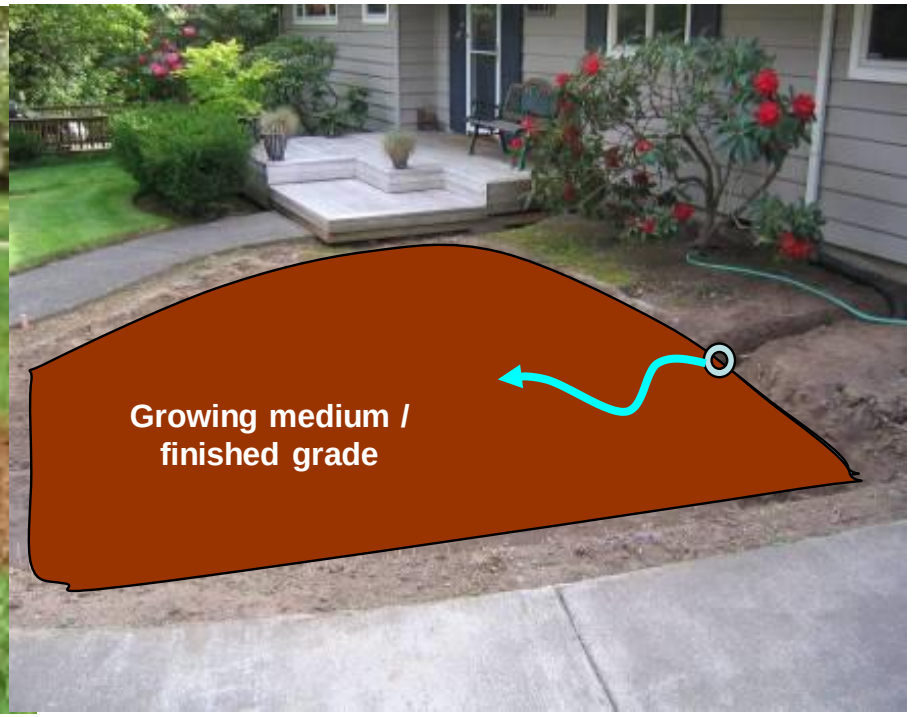
Permits:

- Permits not required for small scale (residential) projects

Rain Gardens

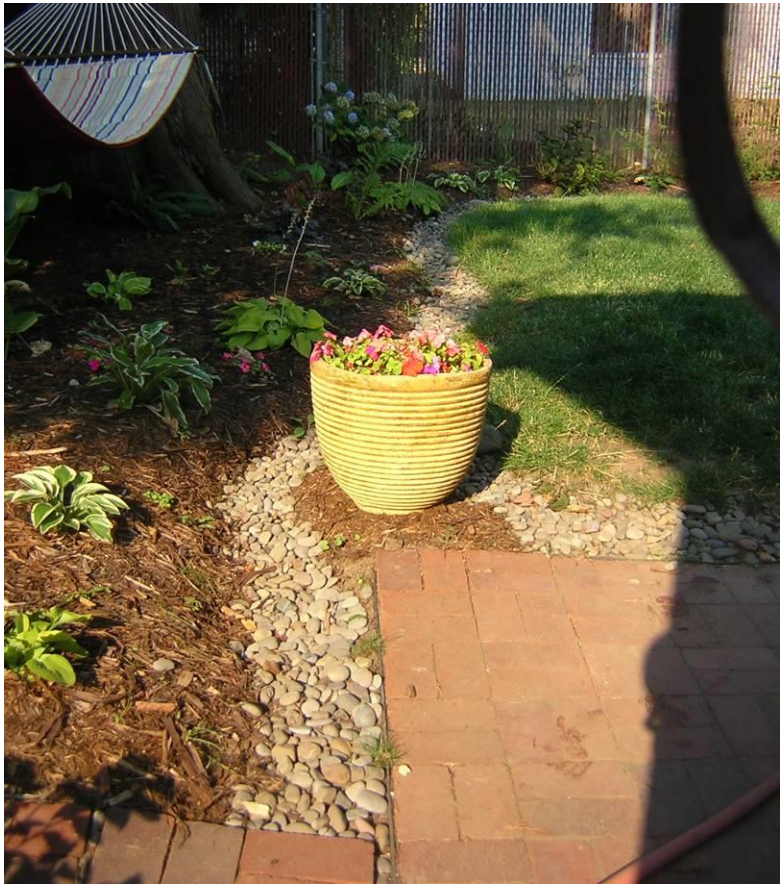
Bermed

Depressed



Rain Garden Variations

Dry creek bed swale



Rain Garden Gone Wrong

Reducing Stormwater Runoff

Remove Impervious Area:

- 500 sf minimum reduction
- Reduces stormwater runoff
- Provides pervious areas for stormwater management
- Adds additional areas for naturescaping
- Appropriate for all sites!
- www.depave.org

Astor Elementary courtyard retrofit – 5601 N Yale

Reducing Stormwater Runoff

Reducing Stormwater Runoff

Remove Grass/sod areas:

- 500 sf minimum reduction
- Grass has poor/shallow root structure
- Acts as impervious area, pollutant transport (chemicals)
- Removal adds additional areas for naturescaping
- Appropriate for all sites!

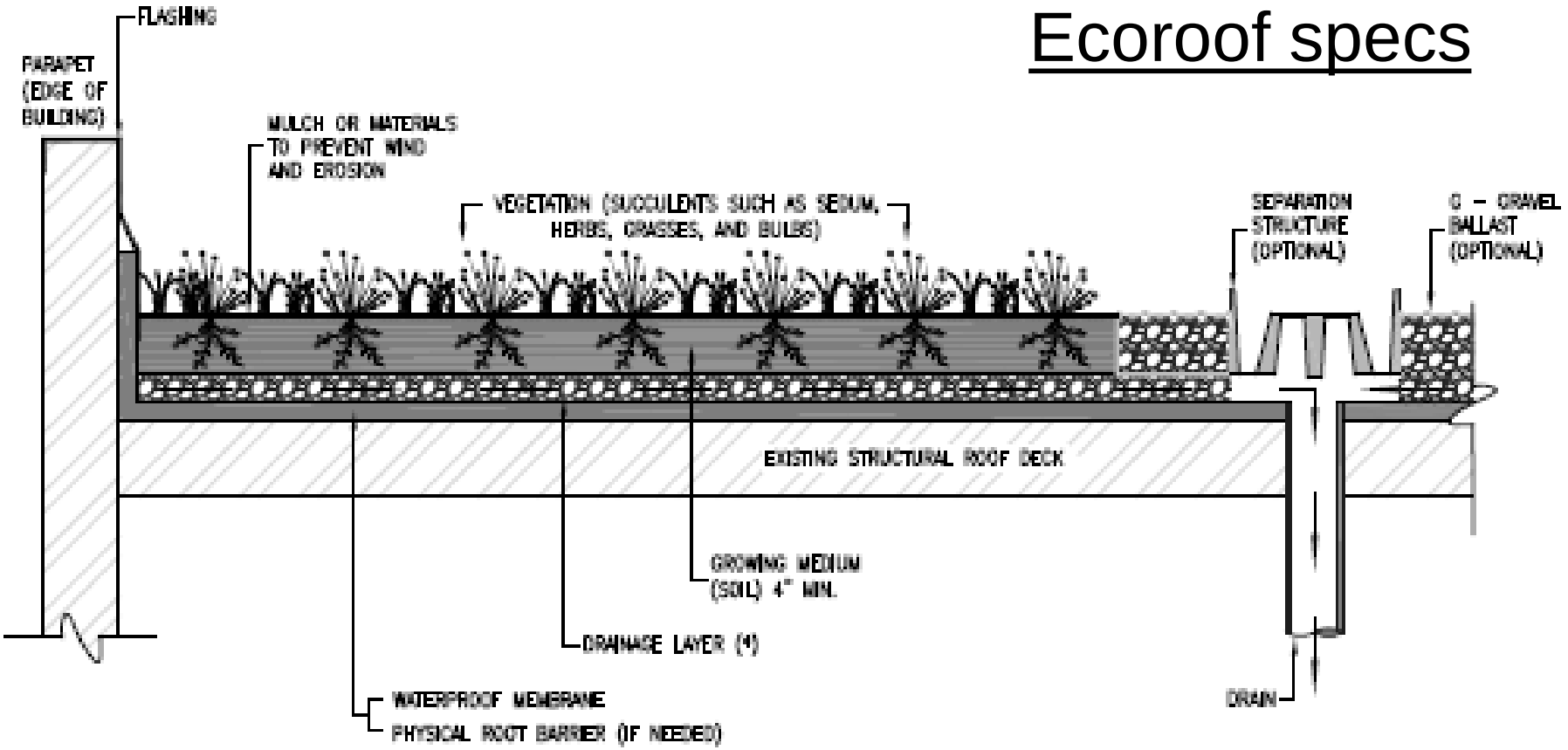
Ecoroofs

Form:
Selected plant species growing in a shallow medium on top of a waterproofed roofing material

Function:
Vegetated area designed to detain and evaporate rainfall

Ecoroofs Resources

Ecoroof specs



Specs and notes from 2008 Stormwater Management Manual Appendix G

Ecoroofs

Benefits:

- Stormwater runoff reduction
- Pollinator micro habitat
- Increased roof life

Resources:

- Ecoroof handbook
- Do-It-Yourself Ecoroof (best for small-scale projects)

http://www.portlandoregon.gov/bes/50818#cid_492807

Increase Naturescaping

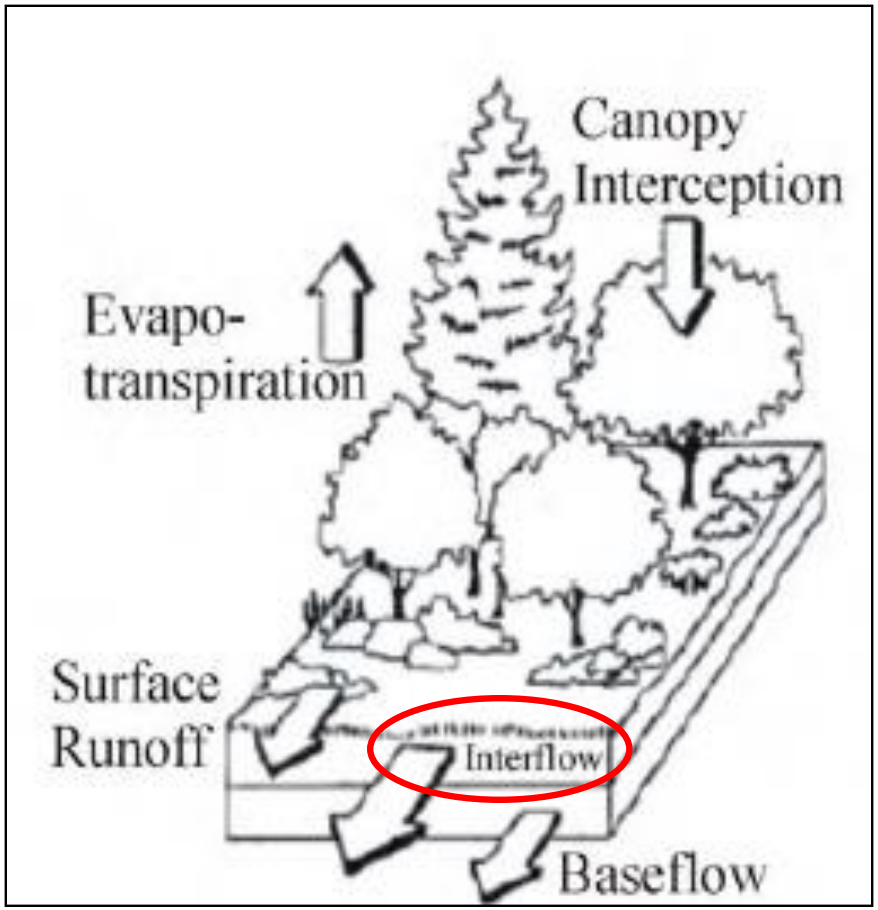
Increase natives by 10%:

- Added stormwater benefits from increased interception
- Increases native understory layers
- Adapted root structure for erosion control and infiltration
- Reduces irrigation needs
- Appropriate for all sites!

Restore Soils

Restoring soils:

- Leave debris for nutrients and increased soil health
- Amend with compost and other organics
- Restores "duff" layer typical of natural areas
- Increased interflow capacity of site (slows runoff)
- Appropriate for all sites!



Water Conservation

Water conservation:

- Eliminate lawn irrigation (let it brown!)
- Water at ideal times (morning/evening)
- Spot water only as needed
- Appropriate for all sites!

Rain barrels/cisterns*

(*Not a stand-alone menu item!)

- Not disposal systems! Great for stormwater detention and conveyance
  - On average, one rain barrel will fill up with < 0.2 inches of rain
- Where's the overflow going?

Eco-friendly Maintenance Practices

Maintenance practices:

- Hand pull weeds
- Eliminate gas powered tools
- Good exercise
- See BHCP resources for landscape professionals
- Utilize certified ecobiz landscape contactors (http://ecobiz.org/)
- Appropriate for all sites!

Love to the hula hoe!

Flow-through Planters

(Contained rain garden common to newer west-side/sloped properties)

Note: Not a menu item!!!

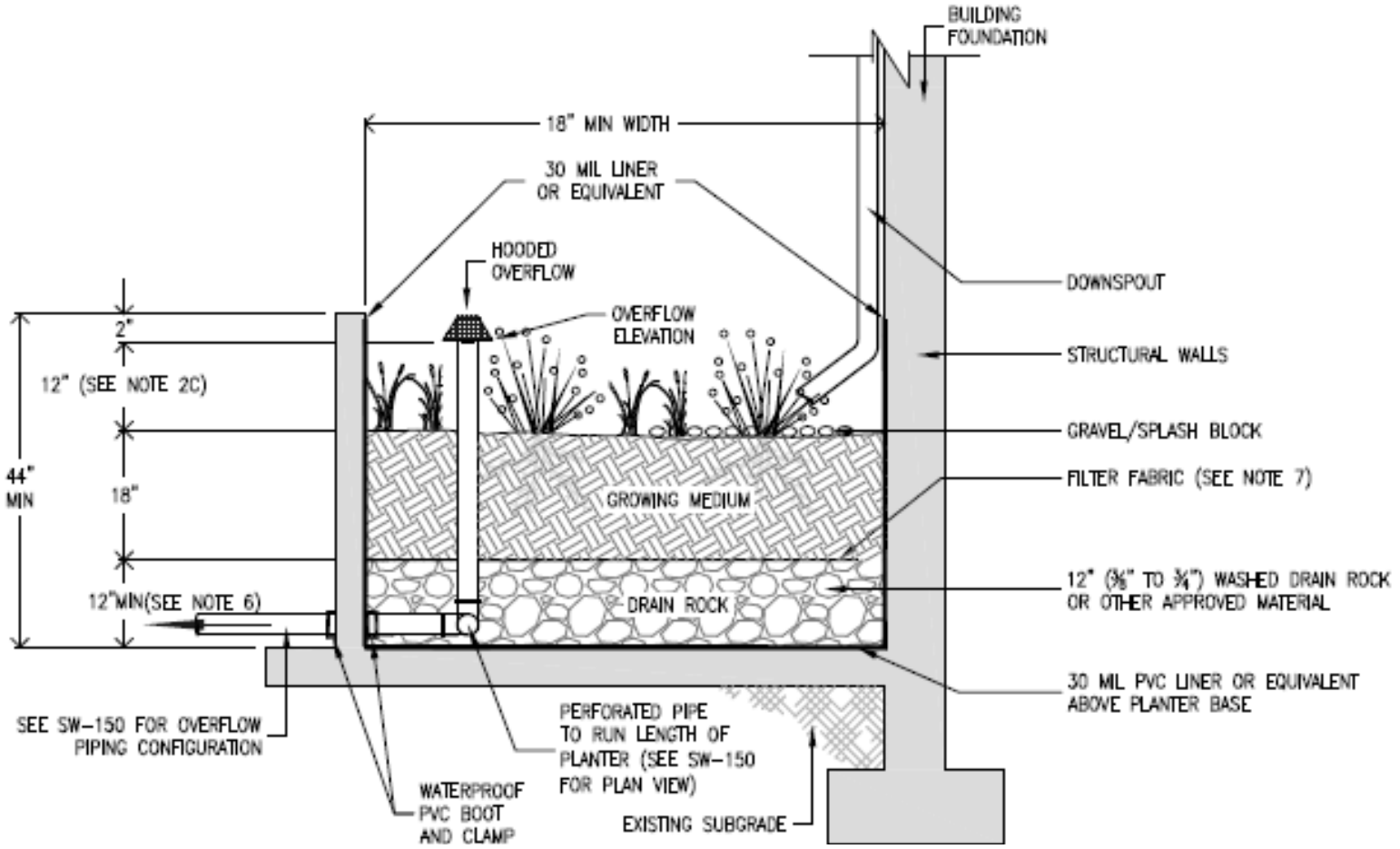
Form:

Lined structural landscaped reservoir with a flat bottom and vertical sides

Function:

Vegetated structure designed to collect, detain, and filter roof or parking lot runoff where infiltration is not appropriate

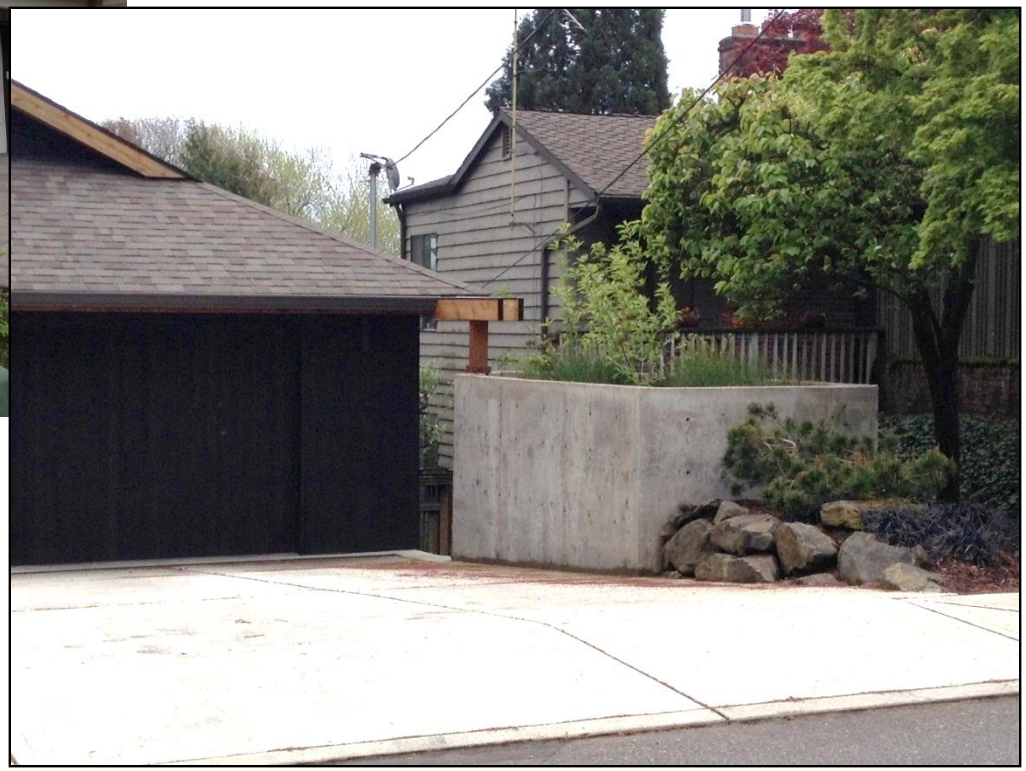
Flow-through Planters



Permits:

- Permits required due to structural, plumbing elements

Flow-through Planters



Flow-through Planters gone wrong

Questions?

Rain garden wildlife

Retrofit Success Downspout Disconnection

Downspout Disconnection Program

- Program started in 1995
- Resulted in over 58,000 downspouts offline
- Over 1.2 billion gallons of runoff removed from the combined sewer annually
- Reduced the diameter of the 6 mile east side big pipe by 5 feet
- Program ended in June of 2011
- Cost effective grass roots program

Retrofits Solve Local Sewer Capacity Issues

Residential rain gardens (Tabor to the River)

Retrofits Solve Local Sewer Capacity Issues

Commercial Projects (Tabor to the River)

Retrofits Solve Local Sewer Capacity Issues

Partner will Portland Public Schools

Mt. Tabor Middle School

Retrofits Solve Local Sewer Capacity Issues

Green Streets