

working for clean rivers

# Backyard Habitat Training - Stormwater

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Bureau of Environmental Services  
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ENVIRONMENTAL SERVICES  
CITY OF PORTLAND

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# Why stormwater management?!

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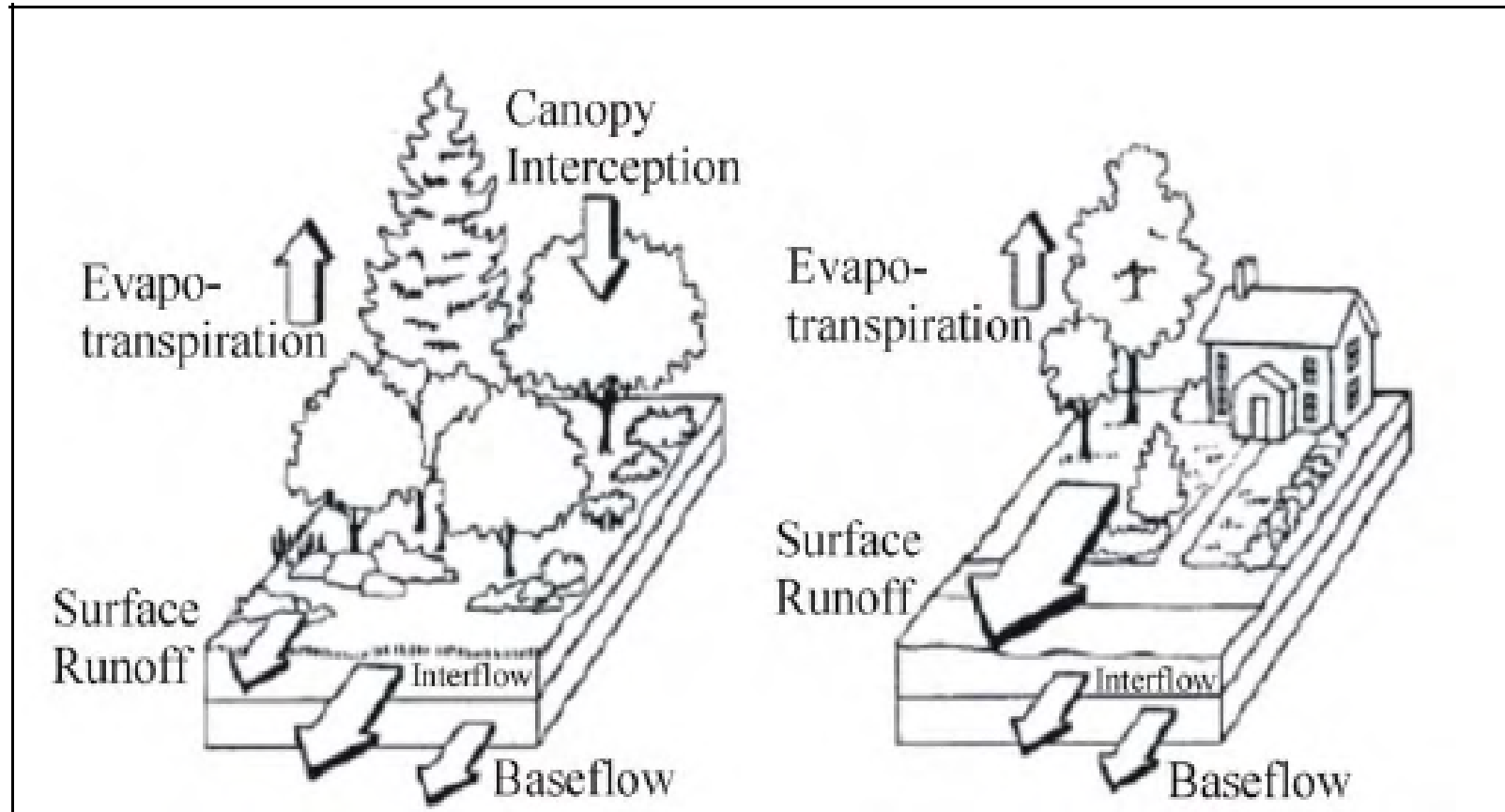
Then



Now

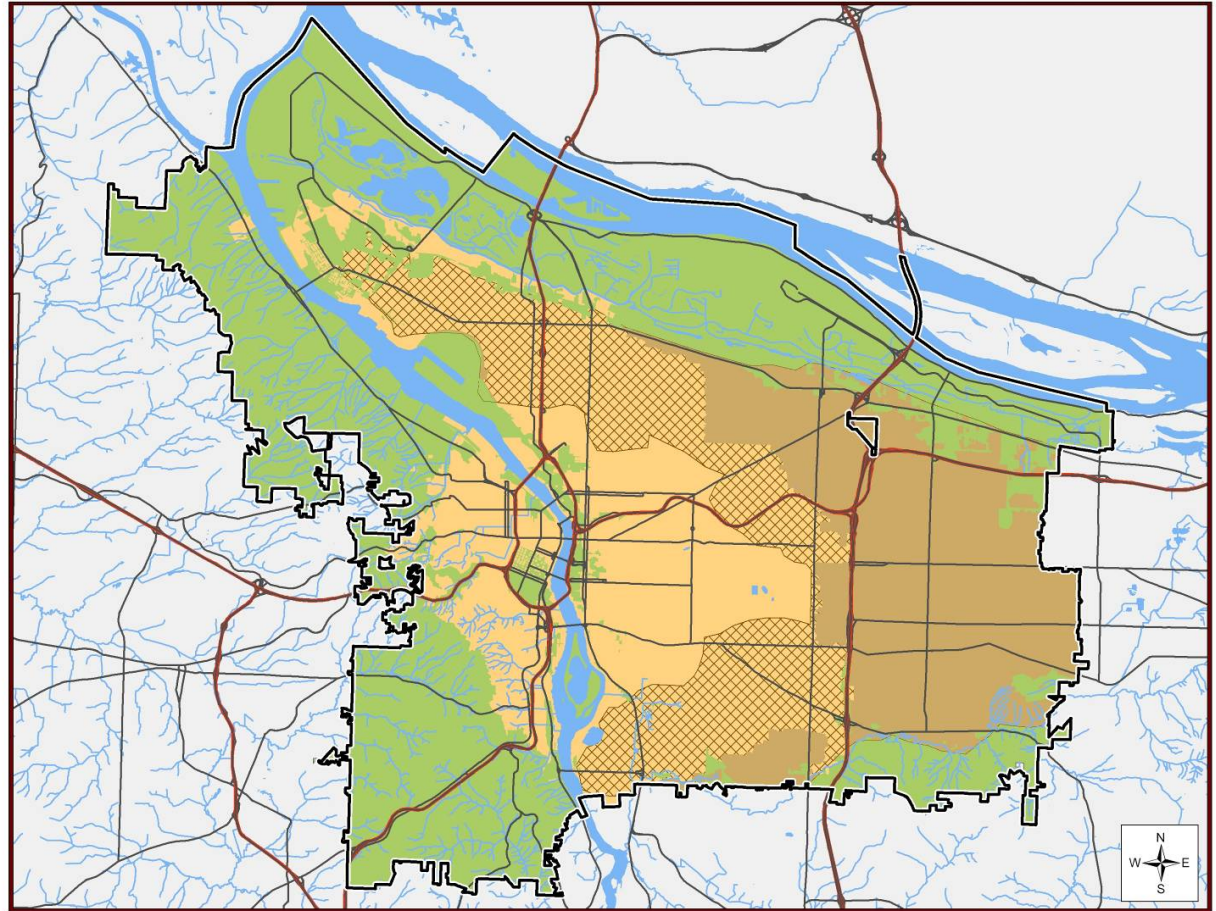


# Development and Stormwater Impacts



# 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

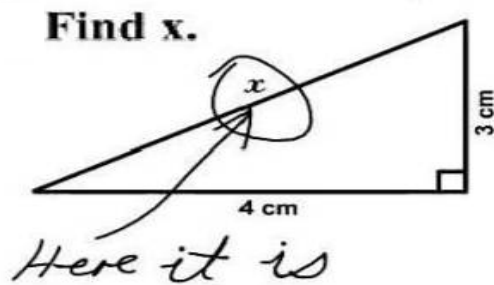
Basic stormwater management components:

- 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

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Menu options:

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



# Large Canopy Trees

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## 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](http://www.friendsoftrees.org)
- Appropriate for all sites!



# Downspout Disconnection

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## Form:

Downspout extends from building and discharges to landscaping

## Function:

Vegetated landscape area filters and infiltrates roof runoff



# Downspout Disconnection

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## 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<sup>2</sup>



# 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

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## 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

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## 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

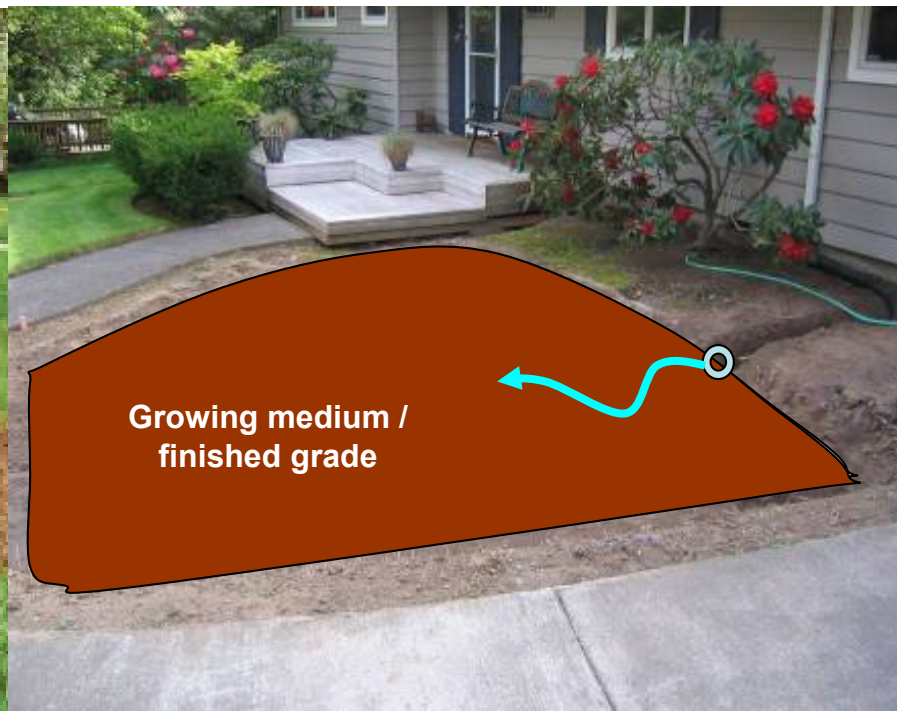


# Rain Gardens

Bermed



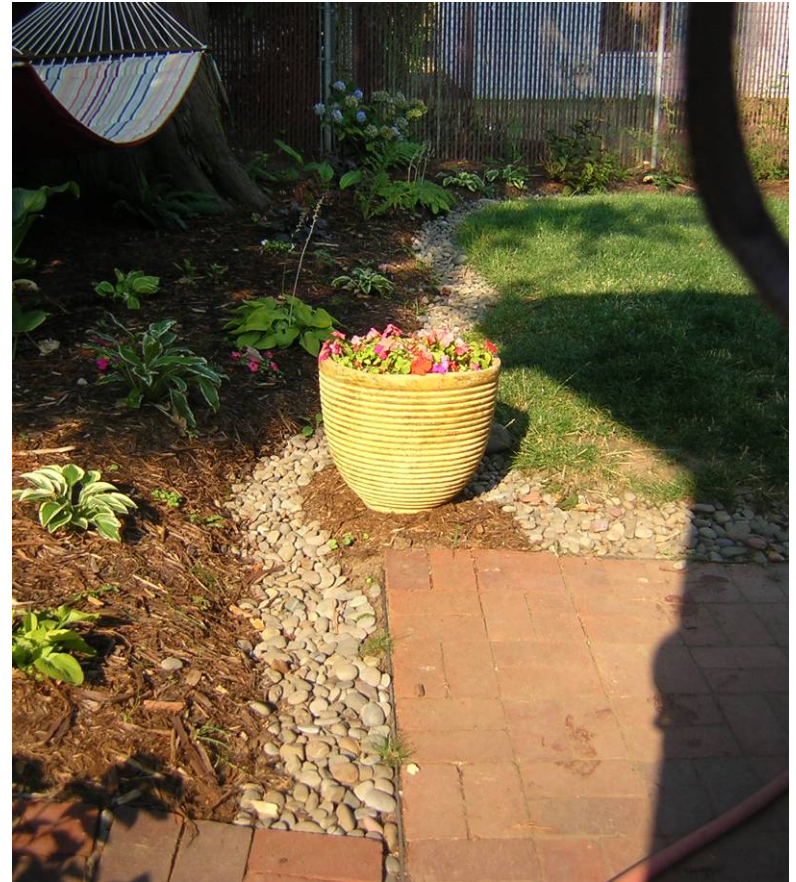
Depressed



# Rain Garden Variations

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## 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](http://www.depave.org)



Astor Elementary courtyard retrofit – 5601 N Yale



# Reducing Stormwater Runoff

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# Reducing Stormwater Runoff

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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

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## Form:

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

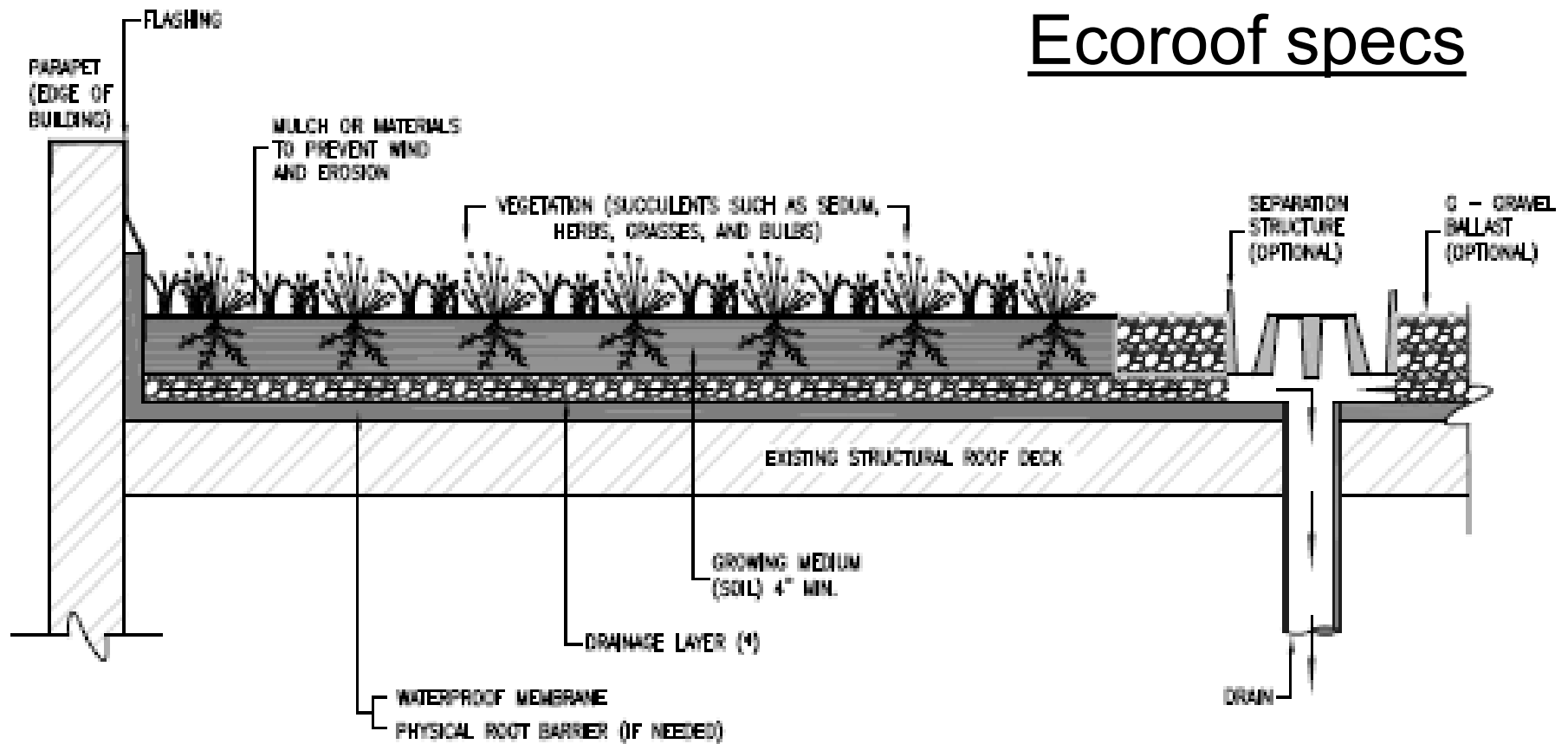
## Function:

Vegetated area designed to detain and evaporate rainfall



# Ecoroofs Resources

## Ecoroof specs



Specs and notes from 2008 Stormwater Management Manual Appendix G



# Ecoroofs

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## 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](http://www.portlandoregon.gov/bes/50818#cid_492807)

# Increase Naturescaping

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Increase natives by  
10%:

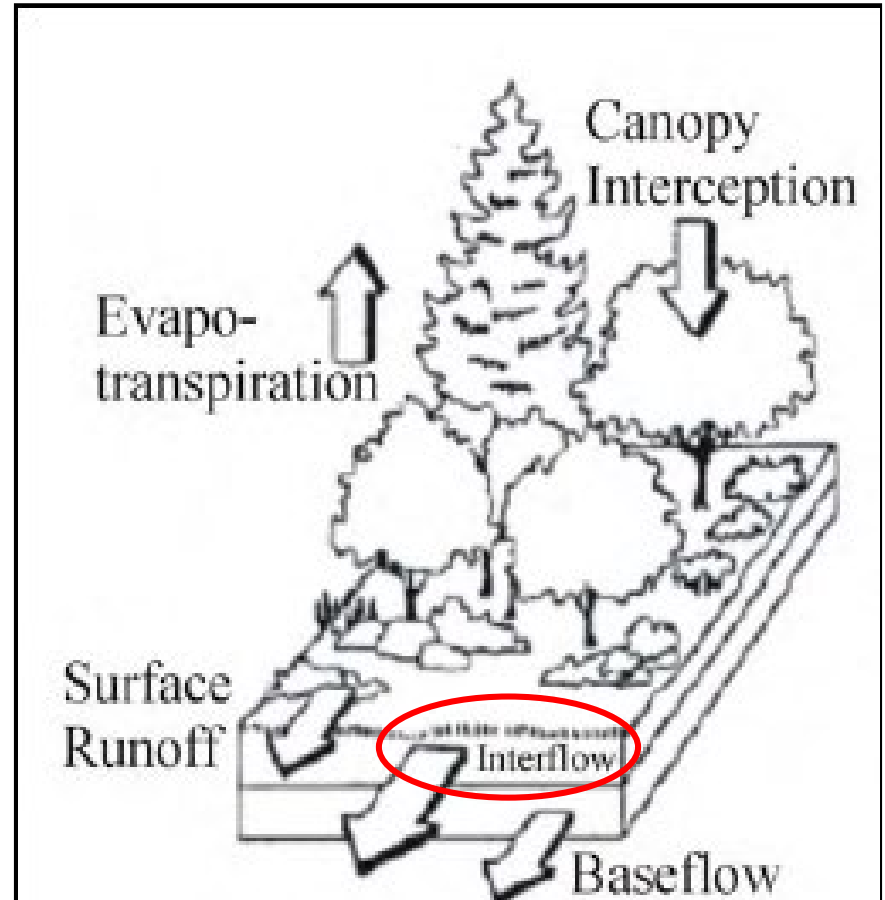
- Added stormwater benefits from increased interception
- Increases native understory layers
- Adapted root structure for erosion control and infiltration
- Reduces irrigation needs
- Appropriate for all sites!



# 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

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## 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

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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

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

**Note: Not a menu item!!!**

## Form:

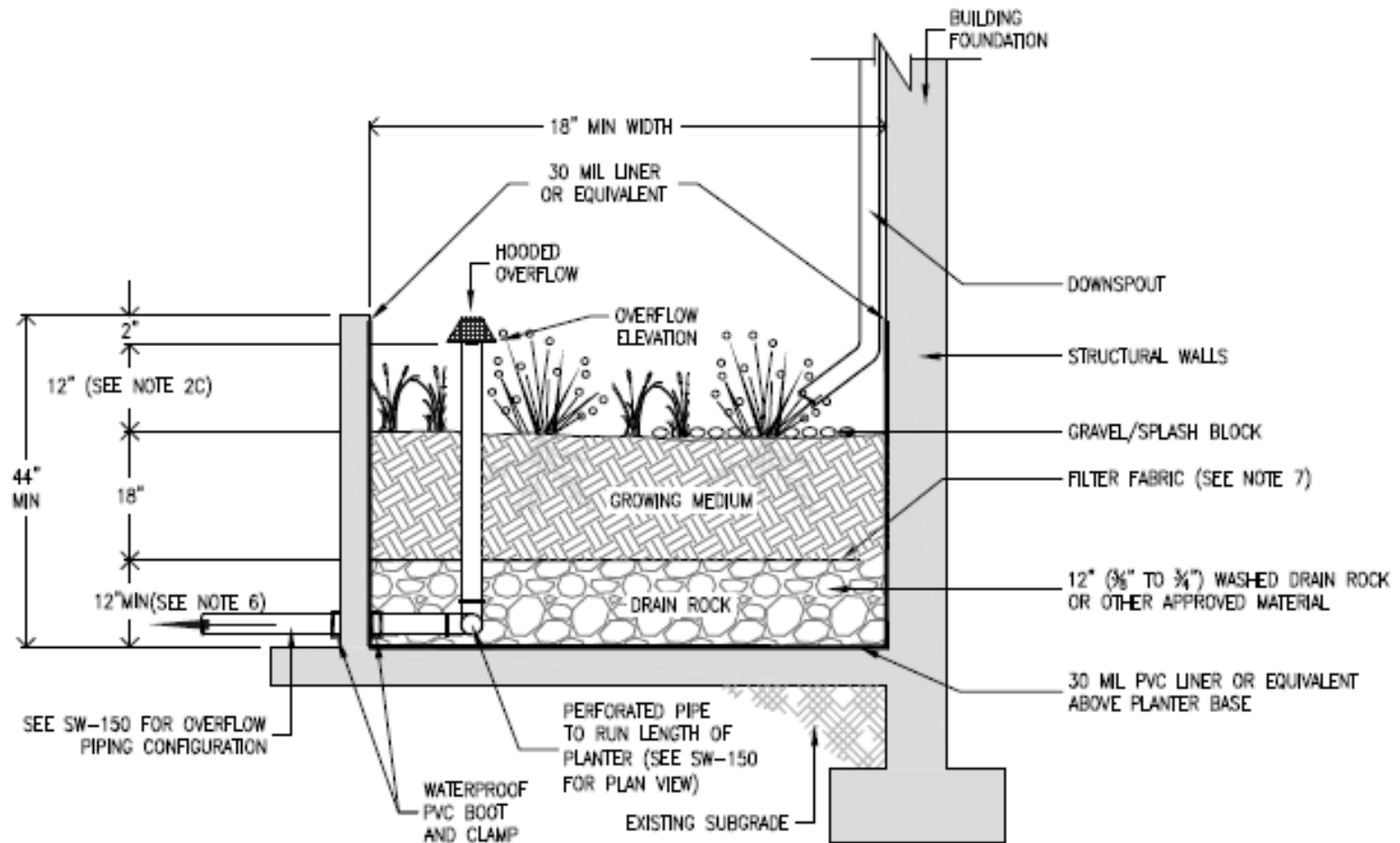
Lined structural landscaped reservoir with a flat bottom and vertical sides

## 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

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# Flow-through Planters gone wrong



Inlet too high



Overflow too high



# 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

