Building Natural Drainage Systems

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http://www.seattle.gov/util/About_SPU/Drainage&_Sewer_System/
Natural_Drainage_Systems/

Natural Drainage Systems:
An alternative approach to stormwater management that delivers higher levels of protection for receiving waters with neighborhood street improvements at a lower cost than traditional street and drainage improvements.

Just west of Greenwood Av N
SEA Street
$325,000
- sidewalk one side
- 60 trees, 1,000 shrubs
- curved roadway
- upground detention

Traditional Street
$435,000
- sidewalk two sides
- 20 trees
- straight roadway
- buried detention structure

Implementing NDS

Key Messages
You should have something for everybody:
- traffic
- pedestrians
- environment
- property values
- building community

Some of the City’s Key Messages
Balanced hydrologic cycle, 15% runoff

Unbalanced hydrologic cycle, 55+% runoff

The result

• Decreased forest cover due to development

• 25% of Seattle’s total land surface is street right-of-way

BALANCING DEMANDS:
• Limited Resources (budget)
• Regulatory Requirements:
  • Detention
  • Water Quality Treatment
• Community Priorities:
  • Control Flooding
  • Preserve/Restore Salmon Runs
  • Provide Safe Pedestrian Access
  • Calm Traffic

Options

Minimize pavement...

Decreases runoff generating impervious area and increases areas for stormwater management

Partner with Homeowners ...

Empower them to become part of the solution...
Integrate Horticulture, Landscape Architecture and Engineering: Drainage conveyance shares space with landscaping trees and gardens.

Sidewalks create an inviting pedestrian environment:
- 100+ trees
- 1000+ shrubs
- 2-1/2 times the amount of a typical street

Gentle transitions at the right of way line...blur the private property interface...

...the street becomes a shared “front yard”

Challenges

Build Relationships

- Do what you say you will do.
**Natural Drainage Systems**

**Communications**
An information vacuum creates a dis-information vortex

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**Construction**

- How do we get
  from here...

  to here???

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Warning:
Big Holes Ahead

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Pre-Construction
Visualizing the improvements

**Natural Drainage Systems**

**Dates/Times:**

- Construction work on
  Saturdays, starting this
  weekend, to accommodate
  delays caused by weather.

**Impacts:**

- Excavation will create
dust, mud, noise and
vibration. There are no
expected disruptions of
utility service. Most
work will take place in the
public right-of-way.

- Neighborhood traffic will be restricted compared to normal. There may be traffic
delays and revisions.

- Crews from Gary Merlino Construction Company, under contract to Seattle Public Utilities (SPU), are
implementing the Natural Drainage System on NW 107th St.

- The raingardens have been completed and are awaiting planting.

- Excavation of the ponds and installation of pipes, and sediment catching structures will continue on the east-side
of 2nd Ave. NW this week.

- Placement of amended soil in the ponds and construction of rock walls in and along the ponds on the west-side
of 2nd Ave. NW this week.

- SWALE CONSTRUCTION:

  “green” again!

  It’s been a long time for some of you who have been patiently waiting for their swales and adjacent yards to be
completed!

- RAINGARDEN CONSTRUCTION:

  Completed!

  Continues on 107th and is expected to be completed by mid-August.

- Though the month of August would seem an unusual time to be planting, there are a number of
timely benefits to planting in August.

- **RAINGARDEN CONSTRUCTION**:

  We provide our customers with a reliable water supply and essential sewer, drainage, solid waste and engineering
services that

  In addition to providing more than 1.3 million customers in the Seattle metropolitan area with a reliable water
supply, Seattle Public Utilities provides essential sewer, drainage, solid waste and engineering services that

  Project:

  Watershed in north Seattle. The storm drainage system in the area bounded by 107th and 110th Streets and 4th and
Phinney Avenues will be replaced with a natural drainage system that slows damaging water flows, reduces the level
of sediments and contaminants reaching the creek, and reduces flooding at the intersection of NW 107th and 3rd Ave
in the direction of Mother Nature. Please watch for these Construction Updates for the latest information.

- Please remember, much of the work is sensitive to weather and soil conditions. All dates are subject to change at
the direction of the project manager at the phone number or email address below.

- If you have questions or need more information, please contact
Jim Johnson, Project Manager at (206) 684-5829, or by email at james.r.johnson@seattle.gov

- Construction work on
  Saturdays, starting this
  weekend, to accommodate
  delays caused by weather.

- Heavy equipment and construction trailers will be present during the project. There will be restrictions to on-
street parking, especially during the day.

- Construction hours will continue to be Monday through Friday, 7:00 a.m. to as late as 4:00 p.m.

- Any special barricades that may appear to restrict parking in specific areas.

- During working hours, the contractor will close 107th Street to through traffic between Phinney to Greenwood and
1st Ave. N.W., 2nd Ave. N.W., Palatine Ave. N. and Phinney Ave. N. have all been reopened to traffic and
}

- Pendant construction zone.

- Home.

- Driveways will be restricted during this work

- To avoid being blocked in by the asphalt work. The approaches to alleys will also be paved on Friday, August 6,
Dear Wallis:

We have confirmed your approval of tree and shrub selections, your choice (between grass or groundcover) for your frontage.

Thank you!

Landscape Architect Shane Dewald

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For some people this will be the first time they have done this!
Native Drainage Systems

Component Maintenance Procedures
Upland Landscape Maintenance

Description:
Native plants that were planted as part of natural drainage system according to a landscape plan. Site has high public access.

Purpose:
To provide water quality treatment, shade, detained water and cool water temperatures, to provide food and shelter for wildlife and to aid in erosion control.

Maintenance Frequency
- Urban Trash – Weekly
- Organic Debris – Invasive Removal – Landscape Plantings – Large Tree Maintenance

Community Reaction
The street looks nice and I hear nice comments from all who come to visit. I am noticing more of a sense of community with the children riding their bikes and families walking—C. Kilbourn

The reconfiguration of Phinney Avenue has gone along wonderfully; the new street, sidewalk and swales look beautiful. The workers involved have been friendly and courteous, and there has been little disruption to my life—M. Stevenson

We live at 10738 - 2nd Ave NW and our street is undergoing SEA construction. The street is looking great! The curve definition of the entire street is quite impressive, sidewalks are in as well as the private one to our walkway and they look nice. The swales look enormous right now but with plantings they should be more obscure. And they did drain effectively during our rainstorms a couple weeks ago—Mark & Jan Fisher

Thank you for asking for my input. The street and landscaping continue to look fantastic—Susan Foster

What are some other thoughts on implementing NDS?
- Increased Public Education / Outreach to achieve buy-in, since they maintain.
- Risk of public abandonment of maintenance.
- Intra/Inter-Departmental Acceptance of non-standard infrastructure.
- Projects cost less, but the significant amount spent on “soft” vs. “hard” infrastructure requires a shift in thinking by planners, engineers and managers.

Thank you!
for more information go to
www.seattle.gov
and search keywords raincatchers, natural systems and rainbarrels

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Bringing it Home
Applying NDS strategies to your site
Natural Drainage Systems

Limit impervious area I

Above and Left, Porous Concrete Roadway Placement at High Point

Above, Porous Concrete Sidewalk adjacent standard concrete sidewalk at High Point

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Limit Impervious Area II

Above, Porous Concrete Sidewalk adjacent standard concrete sidewalk at High Point

Right and top right, close up of gravel surface and cell mat which retains gravel in place

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Limit Impervious Area III

California Strips, Broadview Green Grid

Natural Drainage Systems

Managing the Flow with Low Tech:
• Splash blocks

Managing the Flow with Mid Tech:
• Rain Gardens

Disconnection I

Requires advance planning with attention to proper grades and proper management of site soils and/or amendments.

Managing the Flow with Mid Tech:
• Compost Amended Yard

Disconnection II

Managing the flow with Mid Tech:
• Compost Amended Yard

Disconnection II cont’d

• Above: Lawn infiltration facility, High Point
• Right Top: Planted area infiltration facility under construction, Fremont RainCatchers
• Right: Completed Planted area infiltration facility
Managing the flow with High Tech: Residential Rainwater Cisterns

Drip valve empties tank at measured rate in winter. Valves closed in summer and collected water used for yard/garden irrigation.

Follow Applicable Site Strategies

- Reduce pavement
- Create low lying, planted areas with amended soils
- Grade for sheet flow
- Create controlled relief points
- Keep Aesthetics in mind
- Plan from Landscaping backwards

Right: SEA Street at Broadview Green Grid, 1st Ave NW, 2006

Thank you!

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