



drainage

reduce impervious surfaces by narrowing the roadway and creating more space for vegetation and soil to absorb rain water



water quality

utilize a combination of soils, plants, and infrastructure to clean and filter rainwater as it washes off parking spaces and the roadway



landscaping

use natural materials—vegetation and soils — to slow, filter, and infiltrate stormwater runoff... all within the space of the public right-of-way



mobility

calm traffic by narrowing and curving the roadway; ensure safe access for emergency vehicles, bicycles, and pedestrians



community

bring life to the street by constructing sidewalks, gardening with neighbors, and promoting watershed stewardship



education

set an example for future alternative streets projects; monitor changes in water quality and drainage; share ideas with watershed neighbors and other cities



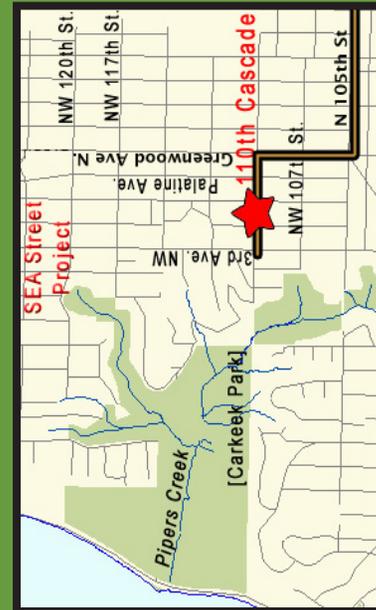
110th-Street Cascade



City of Seattle
www.seattle.gov

Directions:

From I-5 take Exit 173 West (Northgate)
N Northgate Way will turn into N 105th St.
Turn Right onto Greenwood Ave. N.
Turn Left onto N 110th St.
The Cascades begin mid-way between
Greenwood Ave. N and Palatine Ave. N.



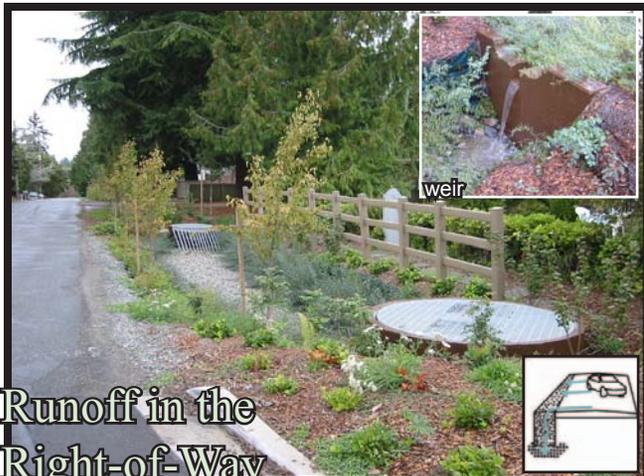
Bus routes nearby are #5, #28, and #355.



The Cascade in Context

The 110th Cascade is a Natural Drainage Systems (NDS) project in Seattle's Pipers Creek watershed. The project spans multiple blocks of 110th Street, between two main traffic arterials: Greenwood Ave. N and 3rd Ave. NW. The right-of-way has been designed to meet transportation requirements, while improving drainage and water quality functions.

The "cascades" within this project are a design and engineering solution for the steep downhill slopes of NW 110th St.



Runoff in the Right-of-Way

The Cascade Project is well-positioned to collect runoff in the right-of-way. Rain falling on 70 acres of the upper watershed travels through this street. In this design, the stair-stepped swales detain stormwater, releasing water slowly through weir walls, and reducing erosion downstream. Some of the detained rainwater infiltrates (is absorbed) into the ground. Sediment is trapped by the large cylindrical sedimentation structures located at each end of the swale cells.



Native Plants

Aesthetics and ecological function were both considered when planning the landscape. Low maintenance native species-- such as evergreen trees, sword ferns, salal and willow-- that are adapted to the local climate were selected for this project. Grasses, sedges and rushes help filter pollutants out of the stormwater. The plants on the north side of the street were planted in "green walls," essentially clay soil bricks wrapped in UV-resistant fabric, used to hold the soil in place.



Water Paths, People Paths

By keeping stormwater moving above ground, instead of in pipes, visitors can observe the connection between stormwater runoff on the streets and the creek system downstream. Just as water and traffic moves through the street, so do pedestrians. The new sidewalk on the south side of the street links neighboring arterial streets and bus lines. Frequent visitors to the project can observe changes to the street and watershed over time.



Thinking Downstream

As rain washes over the built landscape, it may be contaminated by oil and grease, heavy metals, pet waste, chemical fertilizers and pesticides. In the 110th St. Cascade design, water quality is improved when polluted sediments settle out in catchbasins. Plants, soils, and natural river rock in the swale further filter out sediments organically as runoff passes through the system. Bacteria in healthy soils can also help break down carbon based pollutants like motor oil.



Meeting Transportation Needs

Traffic mobility and parking needs on NW 110th St. were not compromised by the addition of wide strips of vegetated swales. A round traffic circle at the intersection of 1st Ave. NW and 110th St. helps to calm traffic. While more space is devoted to drainage and less to pavement, two large vehicles, such as fire trucks or delivery trucks, can easily pass each other.



Lessons Learned Down Every Street

Education about Natural Drainage Systems (NDS) is an ongoing process. As the local residents, students, and other visitors learn about the relationships between the street and Pipers Creek, the staff at SPU continues to study the project's stormwater flow and water quality results. Ultimately, this will help us learn how to make NDS streets function successfully, in terms of mobility, aesthetics, and ecology.