SEA Street

Seattle Public Utilities Seattle, U.S.A. Prepared by Gilbert Wong and Orion Stewart





The unique design of SEA Street naturally manages stormwater while calming traffic and providing a sense of place.

Photo by Gilbert Wong.

Seattle's Street Edge Alternative (SEA) street is a narrow meandering block in northwest Seattle. Its sides are lined with white pavers instead of curbs, it has a narrow pathway on one side rather than traditional sidewalks, and its edges feature lush rolling swales instead of pavement or gravel. It is part of the City of Seattle's Natural Drainage Systems (NDS) -- an alternative to the traditional stormwater systems made up of pipes and ditches. Traditional systems carry runoff with traces of contaminants directly into creeks, lakes, and the Puget Sound and, during heavy rains, the speed and volume of the water can erode stream channels. These designs result in reduced water quality, disrupted marine food chains, and compromised wildlife habitat.

The SEA Street project mitigates these traditional design problems. It uses less paving along with numerous plants, trees, soils, swales, and small wetland ponds to absorb water, slow the flow of water, and filter contaminants. The concept is to mimic the natural drainage system that existed prior to development. "We're trying to make an urbanized environment think like it's still forested," said Bob Spencer, City of Seattle Creek Steward. (Estuary Newsletter 2007)

The SEA street pilot project is located in the Pipers Creek watershed. It covers the 660-foot-long block between 117th and 120th streets on 2nd Ave NW. This precedent study focuses on this pilot block, although the NDS has since been expanded to other areas in North Seattle, as well as the High Point redevelopment project in West Seattle.



SEA Street is located in northwest Seattle on 2nd Ave NW between NW 120th St. and NW 117th St. Runoff collected along the block is part of the Pipers Creek watershed.

Image courtesy of the Seattle P-I.

"Our objective is to now engineer our streets in a new way. We are mimicking nature's functions." - Denise Andrews, SPU Strategic Advisor

Right: With its lush vegetation and winding paths, SEA Street feels more like a park than a city street.

Photo by Orion Stewart.

Below: Design of the SEA Street project required collaboration with multiple agencies and residents.

Image courtesy of SPU.





Implementation

In 1998, the city approved funding for the Urban Creeks Legacy program, which restored large areas of the city's creeks and salmon runs. But stormwater planners at Seattle Public Utilities (SPU) realized that creek restoration alone would not protect creeks or salmon. So SPU proposed that certain streets be retrofitted with natural drainage systems instead. The proposal was informed by low-impact development (LID) concepts, which at that time had only been implemented in small areas of new suburban development. Seattle was the first major U.S. city to bring this approach to existing city streets.

In 1999, a team of SPU planners, civil engineers, landscape architects, and fire and police department representatives began work on a low-impact water management project. The city approved initial capital funding to launch the effort and SEA Street was chosen as a NDS pilot project and completed in the spring of 2001.

The cost of the SEA Street project was \$850,000, which included an extensive design and communications budget due to the close work that was done with residents to ensure a result that would meet the needs of the community. SPU expected that new NDS projects will cost less than regular street improvements and have found them to generally cost 15 to 25 percent less than traditional street redevelopment. Other NDS projects target parts of the city that drain to creek watersheds but do not currently have formal drainage or street improvements, many of these areas are located in north Seattle. New projects are funded entirely by a drainage fee paid by property owners based on the percentage of impervious surface coverage on their lot.

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Design

Water Quality

The bioswales along SEA Street are designed to carry and cleanse runoff naturally. Grasses, sedges and rushes physically filter pollutants out of stormwater. Modified soils that emulate the "duff" of a forest floor speed absorption. Bacteria in the soil helps break down carbon-based pollutants like motor oil. The narrow design of SEA street also uses less paving . The street width was reduced from 25 to 14 feet and a sidewalk was only installed on one side of the street, reducing impervious surfaces by 18 percent. The system is designed to handle a storm of a size expected to happen every two years. Anything bigger will cause water to back up from the last swale on the block and run into the open ditches around the neighborhood.

Vegetation

More than 100 deciduous and evergreen trees and 1,100 shrubs were planted on a 2.3-acre area along SEA Street. Most plants are native Pacific Northwest species that require little maintenance. It was designed using the concept of "right plant, right place." Trees with smaller root systems are located near the street and plants that thrive in wetlands have been placed in the lower areas of the swales and ponds. Nearly 100% of these plants have survived over the 4 year life of the project.

Traffic and Parking

The narrow, curved design of SEA Street helps slow traffic by making the street more difficult to navigate and by adding visual interest. Large trucks and emergency vehicles can still safely access the entire street. White strips on the edge of the street (called "flat curbs") provide an additional two feet of driving room on either side of the 14 feet roadway. This provides enough room for two fire trucks to pass each other. If further room is necessary, the roadside grass-planted strips are reinforced with a lattice of material that can handle occasional traffic. Project planners conducted parking surveys and SEA street was designed meet residents' parking needs through occasional angled parking clustered along the street.

Aesthetics and Livability

SEA Street is designed to be beautiful as well as functional. The separate, narrow vehicle lane separated from the sidewalk by plantings creates a park-like setting. Seattle Public Utilities has found that if neighbors like the way the street looks, they are more likely to help care for it. Neighbors have agreed to care for the plants within the right-of-way through weeding, mulching and mowing when necessary. This encourages neighbors to get to know each other while they care for the plants. Clusters of mailboxes is designed to create additional neighbor interactions. The "garden-street" appeal and visual continuity of the block is designed to make SEA Street a common destination for nearby residents. It is also designed to educate visitors and residences of their place in the larger Pipers Creek watershed. Many community members have become involved in efforts to improve water quality and stream health in the area.



Water flows above ground and is mostly absorbed on site.



Plants are functional and attractive.



A few angled parking spaces meet residents' needs.



SEA Street attracts visitors for its aesthetic and educational qualities.

Photos by Gilbert Wong and Orion Stewart.

"We all stuck together and I made a lot of new friends. All for water quality." - Joe O'Leary, SEA Street resident and civil engineer

	Successes
	The SEA Street project has been successful in terms of stormwater manage- ment, finance, and residence satisfaction. A University of Washington Study found that the design prevents the discharge of all dry season water flow and 98 percent of wet season runoff. In wet months, SEA Street reduces runoff by a factor of 4.7 relative to a conventional street. (Horner et al. 2005). Projects like SEA Street can also help cities comply with local, state, and national environ- mental regulations.
The SEA Street project transformed an ordinary street into an example of stormwater management best practices.	SEA street cost approximately \$850,000. This however, is comparable to the costs of a traditional street design (Taus 2002). Savings were realized in stormwater management costs were reduced by 29 percent and paving costs were reduced by 49 percent. Additionally, traditional stormwater management infrastructure requires periodic city maintenance while the landscaping on SEA Street will be managed by neighbors. The bioswales on SEA Street are also expected to naturally improve performance with time, as opposed to traditional systems.
Images courtesy of the Seattle P-I.	The unique aesthetics and environmental attributes of SEA Street are expected to boost property values in the neighborhood. The project garnered almost unanimous support from residents, some of whom reported previous flood- ing problems in the basements of their homes. The street is reported to attract walkers and bicyclists from the neighborhood as well as international visitors interested in low-impact development and natural drainage systems. Merely walking down the street is a relaxing and pleasant experience. A great contrast from the surrounding traditional streets.
	In 2004, SPU won one of five \$100,000 awards from the highly esteemed Innovations in American Government program for its NDS project. (Edwards 2005). The award money is used to help communicate the agencies accomplishment and encourage innovation in government programs elsewhere.
AFTER	
	The SEA Street pilot project is in a quiet part of the residential Broadview neighborhood in northwest Seattle. The scale and traffic environment/volume are much different than the area between King Street Station and the Col- man Dock in downtown Seattle. All the north/south streets in the study site: Alaskan Way, Western Ave., 1st Ave all the way to the study area boundary along 4th Ave., carry tremendous volume of vehicular traffic. It is not pragmatic to narrow roads and create bioswales. However, the east/west streets in the Pioneer Square area to the waterfront could be a good place to implement the bioswales approach along the sidewalks. Another possible area would be along the waterfront, when and if the Alaskan Way Viaduct is demolished and turned into a tunnel system. Other possible areas for SEA Streets may be along Oc- cidental Ave. south near Qwest Field and perhaps along the BNSF train tracks.



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Cistern at vine Street designed by Buster Simpson.

Photo courtesy of Seattle Office of Arts and Cultural Affairs.

Infrastructure

The Sea Street project cost about \$850,000 and has been a very successful project for ecological, aesthetic, and financial reasons. However, there were no sidewalks in that neighborhood to begin with. The implementation of upgrading the "open ditch and pipes" to a bioswales system was a lot more manageable and easier to implement when compared to the already completely paved area between King Street Station and Colman Dock. Existing sidewalks in this area accommodate and provide safer pathways for the often heavy pedestrian traffic. Ample Sidewalks are needed for this area.

Downtown stormwater management

Even in downtown Seattle, the city has made an effort to call attention to stormwater -- using art instead of ecological systems. On Vine Street, a giant cistern with a beckoning hand takes water from a downspout and carries it into a series of planters along the sidewalk. On that same street, a series of terraced water gardens step down a steep slope, slowing runoff before it enters a small jade pool and is carried into the existing stormwater system). While the projects obviously can't mitigate runoff from the entire downtown area, they do have an important public educational effect. Seattle's one-percent art tax helped fund these projects (Estuary Newsletter 2007).

This kind of public art approach is more appropriate throughout the study site. It could be used to capture some of the runoff from rooftops and also bring awareness to the general public regarding environmental issues.

"Not only is it beautiful, but it works." - Bruce Wulkan, Puget Sound Water Quality Action Team



Plan view of the SEA Street project. Numbers reference part of SPU's SEA Street tour.

Image courtesy of SPU.

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