

# Shoreline's Aurora Corridor Improvement

## From eyesore...to...so much more



Aurora at 160th before construction

Wide asphalt roadway and shoulders transitioned directly into parking for businesses along both sides of Aurora Avenue in Shoreline, Washington. Buildings, roadways, and parking covered approximately 97 percent of the area with hardened surfaces. Untreated stormwater runoff flowed directly to Echo Lake, then to Lake Ballinger, and eventually to Lake Washington.



Aurora at 160th after construction

Low Impact Development (LID) features, such as raingardens, retain and treat stormwater near the source. New LID features along Aurora Avenue help prevent pollutants from entering nearby creeks and lakes. In addition to improving water quality, LID features provide many other social benefits.

## Background

A three-mile stretch of Aurora Avenue (Highway 99) between North 145th Street and North 205th Street in Shoreline, Washington, had problems. Approximately 40,000 to 45,000 vehicles and a large number of pedestrians use this corridor every day. Before the city began making improvements here, much of the area lacked sidewalks and the wide roadway transitioned directly into parking for businesses along both sides of the street. Between 1992 and 1996, vehicles struck 42 pedestrians and 38 percent of those accidents were fatal or disabling, compared to the statewide average of 12 to 15 percent. The Washington State Department of Transportation said this corridor was one of the most dangerous stretches of road in the state.

## Problem

Traffic accidents were not the only result of the corridor's design. Prior to the improvement project, buildings, roadways, and parking lots covered approximately 97 percent of the area in hardened surfaces blocking most of the absorption of rainwater into the ground. During storms, or heavy rain events, stormwater runoff from these surfaces flowed directly into nearby waters with little to no water quality treatment. The inadequate stormwater system also contributed to downstream flooding, erosion, and pollution problems in Echo Lake, Lake Ballinger, and McAleer Creek down to Lake Washington.



## Project goals

The city's initial goal was to address pedestrian and traffic safety concerns. They also wanted to help improve the local economy, the environment, and replace the inadequate stormwater system at the same time. They realized this project provided them with an opportunity to incorporate Low Impact Development (LID) structures into the design to help them meet all of their goals. LID employs techniques using vegetation and soil to mimic how nature manages rainwater and keeps it from running over hard surfaces and collecting pollution along the way. LID structures, such as raingardens, help manage stormwater near its source.

## Milestones and outcomes

The city installed a series of LID structures that will help:

- Reduce stormwater volume and velocity, reducing erosion downstream.
- Reduce pollutants (oil, dissolved metals, phosphorus, and fecal coliform) from discharging into nearby waters.
- Save money. LID structures are less expensive to install and maintain than traditional stormwater systems.
- Improve community aesthetics. The plants and trees used in LID structures (raingardens) are attractive.
- Improve air quality and reduces heat island effect. Vegetation provides shade and cleans the air.



The city installed six raingarden swales and 36 raingarden planters (an increase from their original design) to help reduce stormwater flows.

Rapid stormwater flow can cause soil erosion and damage downstream habitat. Swales and planters reduce the velocity (speed) of stormwater, which helps prevent erosion caused by fast moving water. These structures also help reduce the volume (amount) of stormwater by providing time for water to soak into the ground. Placing structures between roads and sidewalks also improves aesthetics.

In addition to the raingardens and swales you can see along the corridor, Shoreline installed more stormwater treatment and management structures below ground. These structures are not visible at the street level, but help significantly improve water quality.





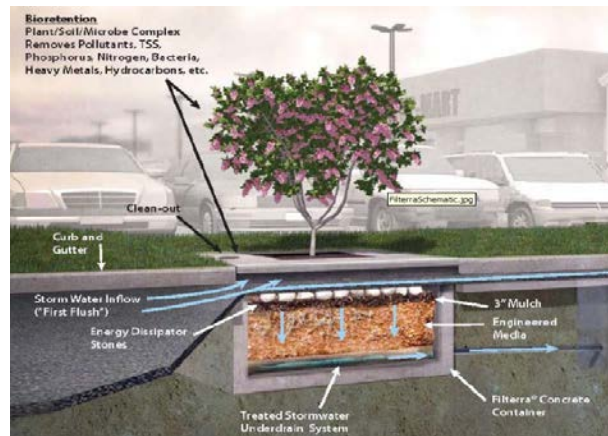
*Pervious paver walkways and “green walls”*



*Under the walkways, modular root boxes hold lightly compacted soils in place, which supports the sidewalks and provides space for healthy root and tree growth.*



*The city installed 17 Filterra\* stormwater treatment units, also known as bioretention boxes.*



*These units will remove total suspended solids, at least 50 percent of the total phosphorus, and 80 percent or more of dissolved metal concentrations from stormwater.*



*Raingarden demonstration plaza adjacent to a parking lot.*



*Stormwater flows into large pipes installed under the parking lot where it is stored and then slowly released. This helps reduce downstream flooding and erosion in Echo Lake, Lake Ballinger and McAleer Creek.*

## Project results

It is too early to verify a reduction in stormwater volumes and pollutants, but the city has seen a 60 percent reduction in accidents along the section of roadway completed in 2007. Busses are running more efficiently in their dedicated lanes. New businesses are moving in to the area and older buildings are being remodeled, indicating economic improvement. Community aesthetics have greatly improved with trees and other vegetation planted in medians and at the corridor margins.



*Information signs located at the Raingarden Plaza.*

The city of Shoreline has secured funding for the final phase of corridor improvements and plans to begin construction in winter 2013. Construction between North 192<sup>nd</sup> Street to North 205<sup>th</sup> Street will include several more LID structures. The city expects installation of these structures, combined with work already completed, will improve stormwater quality, and reduce downstream erosion and flooding in Echo Lake, Lake Ballinger, McAleer Creek, and Boeing Creek.

## Partners

Federal Highways Administration  
WA Department of Transportation  
Highways and Local Programs  
WA Department of Ecology  
Transit Mobility  
WA Public Works Board  
WA State Transportation Improvement Board  
Puget Sound Regional Council

King County Department of Transportation  
Metro Transit  
Seattle Public Utilities  
Seattle City Light  
Ronald Wastewater  
Puget Sound Energy  
Comcast  
Frontier

## Funding assistance

WA Department of Transportation (\$4,042,949)  
King County Metro (\$341,077)  
WA Transportation Improvement Board  
(\$5,500,000)  
Seattle City Light (\$1,274,965)  
Seattle Public Utilities (\$217,918)  
Department of Ecology (\$624,243)

## Construction assistance

HDR (Engineer of Record)  
KBA (Construction Management Team)  
Johansen Excavating (Prime Contractor)  
Frontier  
Comcast  
and numerous other subcontractors.

## For more information

John F. Vicente, P.E., P.M.P.  
Capital Projects Manager  
City of Shoreline  
17500 Midvale Avenue N  
Shoreline, WA 98133-4905  
206-801-2474  
[jvicente@shorelinewa.gov](mailto:jvicente@shorelinewa.gov)

Kirk McKinley  
Program Manager  
City of Shoreline  
17500 Midvale Avenue N  
Shoreline, WA 98133-4905  
206-801-2481  
[kmckinley@shorelinewa.gov](mailto:kmckinley@shorelinewa.gov)

Melisa Snoeberger  
Ecology Grant Project Manager  
Department of Ecology NWRO  
3190 160<sup>th</sup> Avenue SE,  
Bellevue, WA 98008  
425-649-7047  
[melisa.snoeberger@ecy.wa.gov](mailto:melisa.snoeberger@ecy.wa.gov)

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