Leschi Park Gateway Landscape Plan

A class project for EHUF 480, Autumn 2002

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Abstract

Leschi Park Gateway creates an entryway along Lake Washington Boulevard into an impressive, historically rich area. A cable car once ran from downtown Seattle to the bank of Lake Washington in Leschi Park. There still remains an old cable car bridge over Lake Washington Boulevard. The main goal for this site is enhancing a gateway, with native vegetation, which leads into the forested area farther along Lake Washington Boulevard. This involves removing all invasive species, while preserving the native vegetation. A layer of mulch will be added when the amount of biomass is at a low enough level to help control the invasive species.

Some limitations and constraints are at hand, but have been addressed. These include respecting the views of the surrounding neighbors, along with restoring the enclosed tree canopy as intended in the 1903 Olmsted Brothers' plan for the area. Preserving the stability of the steep slopes surrounding Lake Washington Boulevard is also very important. Plant selection took into account the following aspects: soil analyses, steepness of slope, hydrological needs, light and temperature availability, visibility parameters of mature growth, and aesthetic value. Fascines will be used with appropriate native vegetation to keep slopes stable. Over-planting of selected species will be used in order to assure success.

The correct installation process will be used, along with the proper aftercare and maintenance. This includes using soaker hoses connected to the water taps of agreeable neighbors. Pruning of newly planted material will not be done due to the repercussions to the establishing root system.

This plan meets all the goals of the community and the landowners, the city Department of Parks and Recreation and the Department of Transportation.

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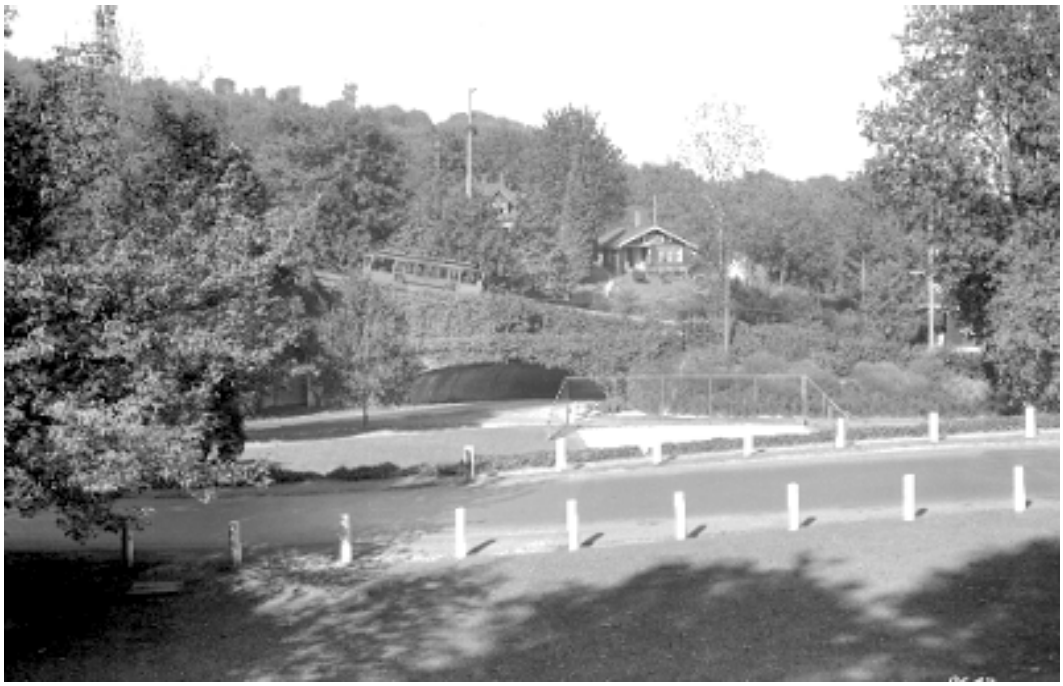
Introduction

The landscape plant selection and management class (EHUF 480) of Fall quarter, 2002, at the University of Washington, led by Dr. Linda Chalker-Scott, developed a landscape renovation proposal for Leschi Park Gateway. Leschi Park Gateway is composed of two areas. Area 1 consists of the southwest corner of Erie Avenue and Lake Washington Blvd and a section next to Lake Washington Blvd, extending to the old cable car bridge on East Yesler Way. Area 2 lies on the northwest corner of East Huron St. and Lake Washington Blvd. The land to either side of Lake Washington Blvd. is owned by the Seattle Department of Parks and Recreation to 25 ft. from the center of the Boulevard. The rest of the site is owned by the Seattle Department of Transportation. This proposal contains recommendations for the design, installation and maintenance of a landscape renovation at Leschi Park Gateway that will be carried out by the community group, the Leschi Greenspace Committee.

Site History

A man named Frederick J. Grant, who was a local historian and the president of the Leschi cable car company, named Leschi Park. He named it after the Chief Leschi of the Nisqually nation. Chief Leschi was a well-known man in the area for his controversial presence during the 1850's. The Indians had blazed a trail from the shore of Lake Washington in the Leschi area, to the city of Seattle including most of the shore of Elliot Bay. With the invasion of white settlers and the death of Chief Leschi, the trail soon became a really rough wagon road from Leschi to Seattle. As settlement numbers increased, the rough wagon road soon became a prime cable car route. Built in 1880, with ideas from Henry Yesler, the cable car became a reality.



In 1903, the Olmsted Brothers were hired by the city of Seattle to design a park and boulevard system in the settlement area of Leschi. With the steep rolling hills of Leschi Park, the boulevard was routed around this area in order to prevent landslides. Bicycle paths were very common in the Leschi area. With Leschi Park being such an attraction, many bicyclists took a day ride to Leschi from Seattle. In 1905, a marina was built on the shore of Lake Washington, which today is still prevailing as local shops and restaurants and a gathering spot for local boaters and visitors.

Jacob Umlauff was appointed the "master gardener" of the Leschi area by the city of Seattle. He specialized in planting large sequoia trees on the hillsides of Leschi Park. He retired in 1941.

The problem in the 1940's became traffic because of growing popularity. Automobiles were becoming more dominant with ferry access and the completion of the I-90 floating bridge. The Leschi Improvement Council was formed in 1959 to help resolve these issues; history says they accomplished their goals fairly well.

Project Goals and Objectives

1. Restore park property along boulevard to a more native habitat.
2. Create a gateway and transition from Area 2, to Area 1, using native plants to the woods beyond the old Yesler Cable car bridge.
3. Enhance boulevard for general enjoyment.
4. Provide an attractive entry area for neighborhood into Leschi Park.
5. Provide habitat for native plants and animals.

The first objective involves removing all invasive non-native plants and replacing them with native plants that will help stabilize steep slopes. Restoration is to be done on park property along with the neighborhood properties that abut property to prevent re-invasion by invasive plants. Safety is a concern, so the plants located at the intersection will be low growing.

The second objective is to create a transition from ornamental plants at the intersection of Erie Avenue and Lake Washington Blvd., transitioning into native landscape and continuing through the cable car bridge on East Yesler Way.

The third objective involves creating a sitting area on Area 1, between Lake Washington Blvd. and East Huron Street.

The fourth objective is to enhance the aesthetic beauty of the boulevard entrance into Leschi Park by replacing removed madronas with healthy madronas and addition of other native plants to the area.

The fifth objective will be reached by using native plants that provide habitat for native animals.

Site Constraints and Limitations

1. Slope stabilization
2. Seattle DPR requires a tree over-story on Lake Washington Blvd.
3. Tall trees block views of the neighbors
4. No source of water for plant irrigation formally exists

The first constraint is the steep slope on Area 2 that shows signs of instability. The slope is covered with invasive plants and a few topped trees. The length of time and intensity of invasive and unwanted plant removal is greatly affected. The slope steepness also affected the plant palette that can be used at Area 2.

The second constraint is the long-term goals of the Seattle Department of Parks and Recreation, which include that trees be re-planted to create a dense canopy cover over Lake Washington Blvd.

The third constraint is that neighboring properties' views of Lake Washington would be blocked by tall tree canopies. This greatly affected the plant palette that can be used.

The fourth constraint is water availability. The site will naturally collect little water. There is no formal source of water for plant irrigation. Neighbors are the only realistic possible sources of water for the site. The lack of water availability also affects the plant palette that can be used.

Site Analysis: Current Conditions and Vegetation

Site Analysis of Physical Conditions: Methods

Slope

Using an Ohio Forge 25 Foot power tape, slope was determined with a person standing with the tape measure at a height of 4 feet 2 inches and then at that height the tape measure was pulled out until it reached the soil at that height. This was performed on Area 1 at the intersection of East Yesler Way and Lake Washington Blvd., in the middle of the site and finally near the intersection of East Huron and Lake Washington Blvd. on the Lake Washington side. On Area 2, slope was determined on one hill on East Huron and then one the hill at the intersection of East Huron and Lake Washington Blvd. Once completed, the numbers were used in the mathematical formula to determine slope, which is rise over run. The number represents the percent slope on the hillside. The average slope was taken for Area 1 and Area 2 for the steepest areas on the hillside.

Hazard Tree Assessment

Hazard trees were determined by looking at the overall health of the tree, percent of canopy dieback, percent of large dead limbs, percent of missing bark from trunk, which way the tree was leaning and evidence of decay.

The tree was determined to be hazardous if it represented a potential threat to pedestrians, cars, houses and or power lines. If the tree is in decline and is leaning towards the road, removal is recommended.

Further assessment and removal actions are being done by the Senior Arborist for the Seattle Department of Parks and Recreation, Mark Mead.

Light And Temperature Availability

Light and temperature availability were determined by visiting the site at different times of the day. Measurements were performed on Area 1 at the intersection of East Yesler Way and Lake Washington Blvd., in the middle of the site, finally near the intersection of East Huron and Lake Washington Blvd. on the Lake Washington side and finally on the top of the hill at the same intersection. There were two light assessments, one in the morning and one in the afternoon. There was only one temperature measurement in the morning. On Area 2 there was only one measurement for light and temperature at the intersection of East Huron and Lake Washington Blvd.

Soil Analysis

Three core samples were taken. The first was taken from the top of the slope on the south side of East Huron and Lake Washington Blvd. beneath a big-leaf maple. The

second was taken from the bottom of the slope along Lake Washington Blvd. just north of E. Yesler Way. The third sample came from the base of the slope on the north side of East Huron and Lake Washington Blvd. All three samples appeared very similar with no apparent horizons. Core sample depths were approximately 4 inches. We also dug two holes approximately 10 inches deep on either side of East Huron and poured in half a gallon of water to time the drainage. Both holes drained in approximately four minutes, indicating good drainage.

Samples were then sent to University of Massachusetts soil lab for analysis of nutrients, pH, heavy metal concentrations, cation exchange capacity (CEC) and organic matter.

Site Analysis of Physical Conditions: Results

Slope

The slopes grade measurements on Area 1 were: 82%, 70% and 69% with an average of grade of 74%. On Area 2 the slope grade measurements on Area 2 were: 79% and 84% with an average grade of 82%.

Hazard Tree Assessment

Our assessment was not needed, since the Senior Arborist for the Seattle Department of Parks and Recreation has already determined trees that will be removed. There are 3 to 4 Madronas south of Huron and one north of Huron that are in the process of being removed by the city. The big-leaf maple just south of Huron has been diagnosed with disease and will be monitored by the city. The topped maples north of Huron will be removed once replacement trees are established.

Light and Temperature Availability

Table 1 shows that light and temperature are variable throughout Area 1 and 2. The majority of both areas experience filtered sunlight, while temperature fluctuations between areas is different at different times of the day, with the shady portion of Area 1 being cooler than other locations of both sights.

Table 1: Light and temperature availability assessment for three locations on Area 1 and location on Area 2.

Location	Light in morning	Light in afternoon	Temperature (F)
Area 1			
E Yesler & Lk WA	Sun	Filtered sun	60°F
Lk WA	Shade	Filtered sun	50°F
E. Huron & Lk WA	Sun	Sun	53°F
Area 2			
E Huron & Lk WA	Filtered sun	Filtered sun	52°F

Soil Analysis

The soil analysis results indicated that nutrient levels, pH, heavy metal, cation exchange capacity (CEC) and organic matter were adequate for most plants. Listed in Table 2 are the results for each sample, which includes soil pH, macronutrients and micronutrients. The only nutrient that was in excess was Potassium (K), which was extremely high on both areas. The pH is slightly acidic, which will support broadleaf evergreens as well as deciduous plants.

Table 2: Soil analysis results from the University of Massachusetts soil lab for two locations on Area 1 and one location on Area 2. Data includes only nutrient and soil pH results.

Site #	Soil pH	NO_3-N (ppm)	NH4 - N (ppm)	P (ppm)	K (ppm)	Ca (ppm)	Mg (ppm)	Micronutrients
1 - Huron – South	6	14	14	12	262	1465	267	Normal
1 – Lk WA	6.2	17	9	9	181	1632	290	Normal
2 - Huron – North	6.1	5	21	22	256	2027	551	Normal

Table 3 shows other results from the soil analysis and recommendations. The heavy metal concentrations were low on both areas. The soil range for aluminum is 10 – 250 ppm, with our samples on the lower end. The desirable range for organic matter is 4 – 10%. The results from both samples on Area 1 were ideal. The results from Area 2 indicated that the organic matter is high, but with the addition of more plants and increased mulch it should begin to decrease to a lower level. CEC results indicated that there are sufficient nutrients available in the soil for uptake by plants. CEC that is between 10 to 15 is normal and sufficient for plants. Overall the results indicate that **fertilizer is not necessary** on any of the areas, with potassium (K) in excess.

Table 3: Soil analysis results from the University of Massachusetts soil lab for two locations on Area 1 and one location on Area 2. Data includes heavy metal, cation exchange capacity (CEC), organic matter and recommendations.

Site #	**Lead**	**Aluminum**	**CEC**	**OM**	**Recommendations**
1 - Huron - South	Low	22 ppm - low	13.7 Meq/100g	6.1%	Maintain mulch, DO NOT add Potassium - very high, no other fertilizer necessary
1 - Lk WA	Low	18 ppm - low	13.0 Meq/100g	7.3%	Maintain mulch, no fertilizer necessary
2 - Huron - North	Low	16 ppm - low	20.2 Meq/100g	9.1%	DO NOT add Potassium, no other fertilizer necessary

Hydrology

Area 1 consists mostly of slopes of 74%. This site has the highest percentage of trees and is well vegetated, with mostly invasive and/or non-native shrubs and vines. There is no visual evidence of instability of the earth on this site. Most of the neighborhood runoff is directed down E. Huron Street onto Lake Washington Blvd., causing a severe flooding issue for the owner of 118 Lake Washington Blvd. who has had to redirect the runoff from Huron to prevent it from entering his garage.

Area 2 consists entirely of slopes of 82%. The southwestern side of this site is well vegetated, again mostly with invasive or non-native plants. The southern portion of the site has many challenges in the area of vegetation. The southwestern end is densely populated with blackberry, while the rest has trees of which two have been severely

topped. It is at this portion of the site that there is evidence of erosion, in the form of fanned silt deposits caused by runoff and the subsequent slumping of the soil.

Over all, both areas are fast draining and will need to have erosion control measures taken into account for the invasive removal and installation of new plantings in order to reach the goal of long term slope stability.

Existing Plant Material

Existing plants on site include a mixed collection of native and non-native trees, shrubs, vines and ground cover and are listed as follows:

Existing Non Natives for Removal	**Existing Natives**
Budleja davidii – butterfly bush	*Acer macrophylum* – big-leaf maple
Clematis – vigorous woody var.	*Alnus rubra* – red alder
English holly	*Arbutus menziesii* - madrona
Grasses – Assorted species	*Astragalus* – milk vetch
Hedera helix – English ivy	*Corylus cornuta* – beaked hazelnut
Lathyrus latifolius - Sweet pea	*Holodiscus discolor* – ocean spray
Morning glory	*Polygonum lapathiforum* – willow weed
Prunus laurocerasus – English laurel	*Polygonum lapithorflorium* – willow weed
Rubus discolor – Himalayan blackberry	*Polystichum munitum* – sword fern
Solamun dulcamara – 'nightshade'	*Pteridium aquilium* – bracken fern
Sweet pea	*Rumex crispus* – curly dock
Vinca minor – trailing vinca	*Symphoricarpos albus* - snowberry
Clover	

It is recommended that the non-natives be removed, as they will compete with any new native plantings. In response to the recommendations of the Senior Arborist for the Seattle Department of Parks and Recreation, there are four dead and/or hazard madronas, *which* will be removed during the month of December 2002. There are also three big-leaf maples that are being evaluated for future removal. Two are recently topped and are expected to decline over the next few years, and one is suffering from included bark that has led to decay at the connection point of the two leaders and will need to be removed sometime in the next couple of years.

When preparing the site for planting it will be important to protect the existing native trees and shrubs in order to ensure their survival. Native perennials such as *Astragalus* (milk vetch), *Polygonum lapathiforum* (willow weed), *Polygonum lapithorflorium* (willow weed) and *Rumex crispus* (curly dock) will be removed in order to increase the success rate of the new plantings.

Plant Sources and Selection

The plants we chose for the site are all native plants that will do well under the existing environmental conditions with special consideration for erosion control and drought tolerance. There are several sources for native plants. For a list, see the King County list <http://dnr.metrokc.gov/wlr/PI/Npnursry.htm>.

Based on a price list obtained December 2002 for wholesale materials from a native plant grower, the average price for 1-gallon container stock is $3.50 each. Retail prices are higher, averaging $10 for 1-gallon containers and $15-20 for larger trees as bare-root stock. For deciduous shrubs and trees, you will get better prices and usually larger plants if you purchase them bare-root when they're dormant between January and March. The King Conservation District has inexpensive bare-root plants and an annual sale; they can be reached at (206) 764-3410 x103.

To obtain the fascines that we recommend, contact Storm Lake Growers, Inc. in Snohomish, WA at (360) 794-4842. they offer fascines of *Cornus sericea* and *Spirea douglasii* from November to March.

The following is a list of suggested native plants that meet the site conditions and preferences of the surrounding neighborhood:

Evergreen Trees

- *Arbutus menziesii* – madrona – evergreen with white flowers in spring followed by clusters of red berries in fall that are popular with birds. Reddish brown trunk. Bark peels in irregular flakes. Prefers well drained, sandy soils, to 30m (100') tall.

Evergreen Shrubs

- *Arctostaphylos uva-ursi* – kinnikinnick – dry forest and clearings, low to alpine elevations. Trailing to 20 cm (8") tall.
- *Gaultheria shallon* – salal – coniferous forests, rocky bluffs, understory shrub with edible black fruit growing in clusters, creeping to erect 0.2-5m (1-16') tall.
- *Juniperous communis* – common juniper – dry, open woods, outcrops, gravelly ridges, prostrate, trailing, 1m (3') tall, forms mats or clumps to 3 m (10') in diameter.
- *Mahonia nervosa* – dull Oregon grape – dry to fairly moist, open to closed forests, low to middle elevations. Erect, rhizomatous to 60 cm (2') tall.
- *Mahonia repens* – creeping mahonia – both Mahonia spp. have yellow spring flowers with very tart blue berries. Glossy green serrated leaves are reddish purple over winter. 1-3' shrub.
- *Rhododendron macrophyllum* – pacific rhododendron – large evergreen shrub with large pale purple flowers erect to spreading, to 20' tall.

- *Vaccinium ovatum* – black huckleberry – understory, dry to moist, coniferous forest/open areas. Edible black, blueberry like fruit in fall. Erect, bushy to 4 m (13') tall.

Deciduous Trees

- *Acer glabrum* – Douglas maple – dry ridges to moist but well-drained seepage sites, low to middle elevations, shrub or small tree to 10m (32') tall.
- *Ceanothus sanguineus* – red-stem ceanothus – dry, fairly open sites: road margins, dry forest openings & edges, low to middle elevations. Erect to 3m (10') tall.
- *Corylus cornuta var. californica* – beaked hazelnut – moist but well-drained sites, low to mid. Elev. Small to medium, thick shelled nuts of good flavor. Late flowering, early ripening, blight immune. Shrub to small tree 1-4 m (13') tall.

Deciduous Shrubs

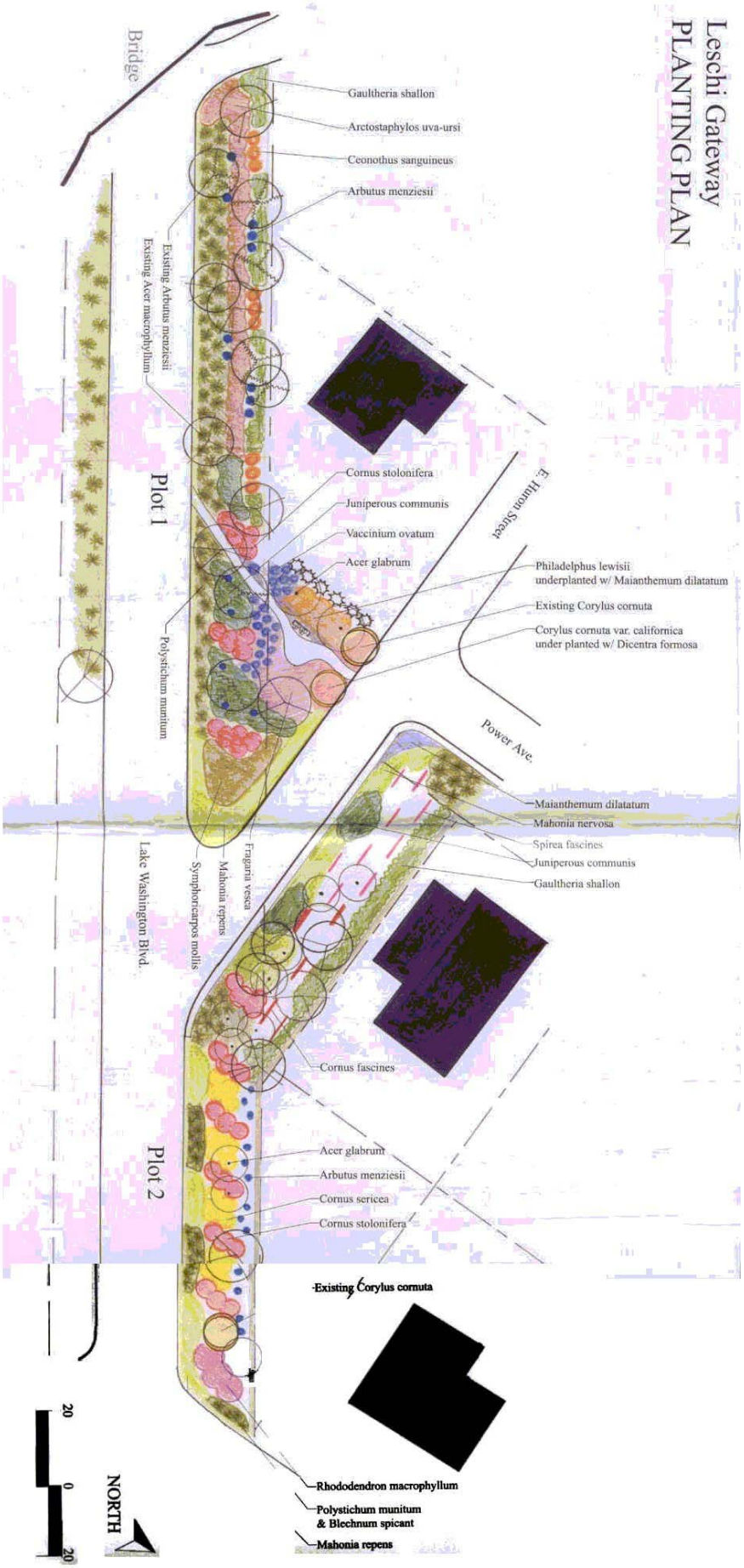
- *Cornus stolonifera* – Red-twig dogwood – moist soil, bog-forest edges and disturbed sites to mid elev. Multi stemmed shrub, great red fall color & red twigs over winter. Excellent for wildlife & erosion control, to 6 m (20') tall.
- *Cornus sericea* – Yellow-twig dogwood – freely spreading shrub with many stems to 6 m (20') tall.
- *Philadelphus lewisii* – mock orange – open forest to forest edge, open bushy areas on dry slopes, rocky soils, low to middle elevations. Large, fragrant white flowers cover these medium sized, multi-stemmed shrubs in late June. Shredding bark and yellow fall color are also attractive features to 3 m (10') tall.
- *Spirea douglasii* – western spirea - has a strong root system for erosion control. Shrubby, 3-6' with many stems, each one tipped with purple-pink flowers.
- *Symphoricarpos mollis* – creeping snowberry – useful for erosion control because of its rhizomes, white berries, persisting over winter until eaten off by wildlife, 1 ½ ' spreading groundcover with very fine twigs

Ferns

- *Polystichum munitum* – sword fern – moist forests, lowland, montane, evergreen fern to 5'.
- *Blechnum spicant* – deer fern - found in moist to wet forests and generally on heavily shaded sites, to 16" tall.

Perennials

- *Dicentra formosa* – wild bleeding heart
- *Fragaria vesca* – woodland strawberry – open forest and clearings, trailing to 6" tall.
- *Maianthemum dilatatum* – false lily of the valley


Leschi Gateway
PLANTING PLAN
Bridge
Gaultheria shallon
Arctostaphylos uva-ursi
Ceonothus sanguineus
Arbutus menziesii
Existing Arbutus menziesii
Existing Acer macrophyllum
Plot 1
Cornus stolonifera
Juniperous communis
Vaccinium ovatum
Acer glabrum
E Huron Street
Philadelphus lewisii
underplanted w/ Maianthemum dilatatum
Existing Corylus cornuta
Corylus cornuta var. californica
under planted w/ Dicentra formosa
Polystichum munitum
Power Ave.
Maianthemum dilatatum
Mahonia nervosa
Spirea fascines
Juniperous communis
Gaultheria shallon
Lake Washington Blvd.
Fragaria vesca
Mahonia repens
Symphoricarpos mollis
Cornus fascines
Acer glabrum
Arbutus menziesii
Cornus sericea
Cornus stolonifera
Plot 2
Existing Corylus cornuta
Rhododendron macrophyllum
Polystichum munitum
& Blechnum spicant
Mahonia repens
20
0
20
NORTH

Planting Design

The design represented Figure 1 is informed by many considerations. First, the Seattle Department of Parks and Recreation, which owns the land 25 ft. to either side from the center of Lake Washington Blvd., has a long-term goal for the boulevard of preserving the scenic boulevard system as originally envisioned in the Olmsted Brothers' 1903 plan for Seattle. The Olmsted plan for Lake Washington Blvd. specifies a sinuously curving drive through alternating open and enclosed canopy. The section of the boulevard in our site was intended to be enclosed canopy, but this quality has been lost as trees, particularly madronas (*Arbutus menziesii*), have declined and not been replaced. Our design remedies that by planting a new generation of madronas. To deal with the high failure rate of madronas, the design calls for over-planting by installing 3 madronas for every existent failing madrona on the site.

Views are a concern in the community, so much so that in one case it has led to the illegal topping of existing big-leaf maples (*Acer macrophyllum*) on the site. It is not our wish to reward this behavior; however, this is only one indicator that views are an issue. In two meetings between the students and the community group, views and tree height repeatedly came up as an issue. The landscape plan must meet community needs as well as the city's goals. Therefore, we propose replacing the topped big-leaf maples with smaller Douglas maples (*Acer glabrum*) and slow-growing Western red cedar to maintain a view corridor for residents.

Erosion is a constraint of any design to be done on the site, with slopes of 74% and 82% in places, and erosion already occurring on the north side of East Huron St. To address this problem, we recommend a technique called 'fascines' to be used on the area of steepest slope. Fascines are an erosion-control planting method that involves packing bundles of woody plant cuttings and laying them in trenches along slope contours, secured by live stakes. (This is also called contour wattling.) The species we recommend for fascines are red-twig dogwood (*Cornus stolonifera*) and Western spirea (*Spirea douglasii*). We chose these plants for their rapid establishment and especially in the case of spirea, its aggressive rooting to control erosion and compete with the Himalayan blackberry that dominates the slope currently. In addition to controlling erosion once the plants establish, the fascines provide a terracing effect that helps keep mulch in place on the slope.

Another design consideration is the gradient along the site from the more cultivated area at the north end of Lake Washington Blvd. to the more forest-like area at the south end of

the site past the trestle bridge. We chose to represent this gradient visually and incorporate a transition with a mixed planting of red-twig and yellow-twig dogwood in a broad strip from one end of the site to the other, the mixture being dominated by red-twig at one end and yellow-twig at the other. Instead of random plantings, we chose artfully arranged grouped plantings. We also placed Pacific rhododendron at the more cultivated (north) end of the site, providing a connection with the Boulevard right-of-way that is being maintained as part of resident's yards. The more forest-like (south) end of the site is planted with sword fern near the road, to provide a sense of forest understory and also to have symmetry with the sword fern planted on the opposite side of the Boulevard by residents.

Looking NE on Lk Washington Blvd.

Symmetry was a consideration not only for the sword fern, but also for the beaked hazelnut (*Corylus cornuta*) on the south side of Huron St. There is an existing beaked hazelnut that seems to be doing well, so we propose a gravel path into that portion of the site with the existing hazelnut mirrored on the other side of the path. Similarly, both sides of East Huron St. will be planted with Oregon grape (*Mahonia* spp.) as ground cover for a symmetrical effect. However, due to traffic visibility problems as reported by the community members, the south side will contain trailing Oregon grape (*Mahonia repens*). The north side presents less of a visibility problem, so it will be planted with low Oregon grape (*Mahonia nervosa*), which is still a low-growing plant but not quite as low as the trailing Oregon grape. The corner on the north side of East Huron St. and Lake Washington Blvd. will be planted with sword fern, visually connecting it to the sword fern farther south on the Boulevard, and also providing a low-growing planting that will not obscure sight of cars and bicyclists. Sword fern's allelopathic quality will help prevent that corner from being overrun by anything taller.

To meet the goals of enhancing the Boulevard for general enjoyment and also providing habitat for native animals, the design emphasizes native plants with edible berries. These plants can be enjoyed by birds and people. In response to a community request and to provide a pleasant viewing area for the native plants and wildlife, a swinging bench will be placed on the flat portion of the lot to the south of


View from bench

Huron St. This property is owned by the Seattle Department of Transportation. The bench can be secured by a concrete pad or by concrete posts (one under each leg of the bench) sunken into the ground. The bench will look out onto the Boulevard, and to ensure privacy for the house behind it, will be back-planted with mock orange (*Philadelphus lewisii*) and false lily-of-the-valley (*Maianthemum dilatatum*)

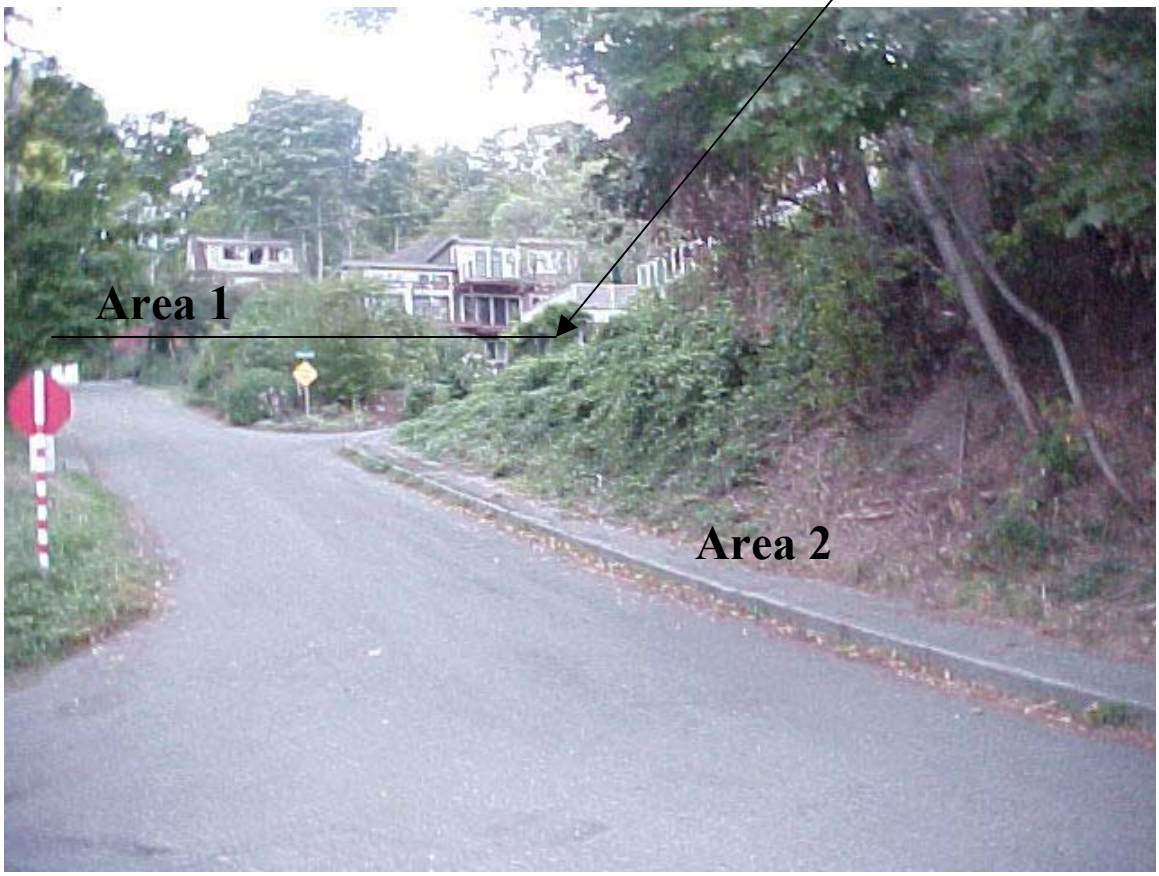
The visual effect of the design can be seen in the other figures in this section, which show the site as it exists now and as it will appear after this plan is implemented and plants have established and grown to mature sizes.

Figure

Existing area

View of Site 1 from E. Huron St.


Looking North On
Lk. Wash. Blvd.
E.Huron St.
Section line


Area 1
Area 2

Current view down E. Huron Street to Lake Washington Blvd.

Proposed view down E. Huron Street.

Site Preparation and Installation

General Notes

This section deals with three key issues to the site, site preparation, soil stabilization and plant installation. None of these issues can be addressed or preformed on their own. Each issue is dependent upon each other for their success.

Site preparation will allow for healthy plant installation, but will also destabilize the hillside. While invasive plants are being removed from the hillside, steps must be taken to ensure slope stability. Many of those issues can be addressed through planting the hillside right away.

To ensure a successful restoration project, each issue must be done in conjunction with each other.

Removal of Invasive Plants

The main issue with this site is removing invasive plants; English ivy (*Hedera helix*), *Clematis*-vigorous woody varieties, and Himalayan blackberry (*Rubus discolor*), while still maintaining slope stability. Another issue is the removal of large diseased and dead trees from the site, many of which are located on the steep hillsides. Tree removal equipment would completely destroy planting beds therefore it is strongly recommended that tree removal occurs well before plant installation.

A benefit of having the tree removal done first will be the reuse of the tree in several different manners within the site. The larger pieces of the tree can be used to help build wood reinforced terraces to retain the mulch, hillside and new plants. A second use would be chipping the remaining material into a mulch to be used around the new plants, which will help suppress the invasive and weed growth.

Soil and Hillside Stabilization

To help with hillside stability, site preparation will occur in 8-ft wide strips moving from the top of the hill working down to the street level. The reason is because the invasives are a valuable resource in stabilization of the slope.

A combination of terracing on the hillside with wood and fascines (or contour wattling) will create a stable slope for years to come. The terraces will be constructed with wood from the downed trees and staked with 2”x4”x4’ dead wood stakes driven into the ground until they hit a firm layer or are driven flush with the tops of the wood terrace.

Fascines are another tool, which will be used to help retain and promote growth on the steep slopes. The Fascines can be constructed (for this information, see Slope Stabilization and Erosion Control Using Vegetation <http://www.ecy.wa.gow/programs/sea/pubs/93-30/contwattle.html>); or they can be purchased.

What are Fascines? They are live wood material; best results are using willow, red osier dogwood, snowberry or spirea, bound together with untreated twine.

What do Fascines do? They convey water in lateral movements, slowly letting the water to percolate down into the soil, instead of having the water move in a rapid manner over the surface eroding away the hillside as the water moves down the steep slope.

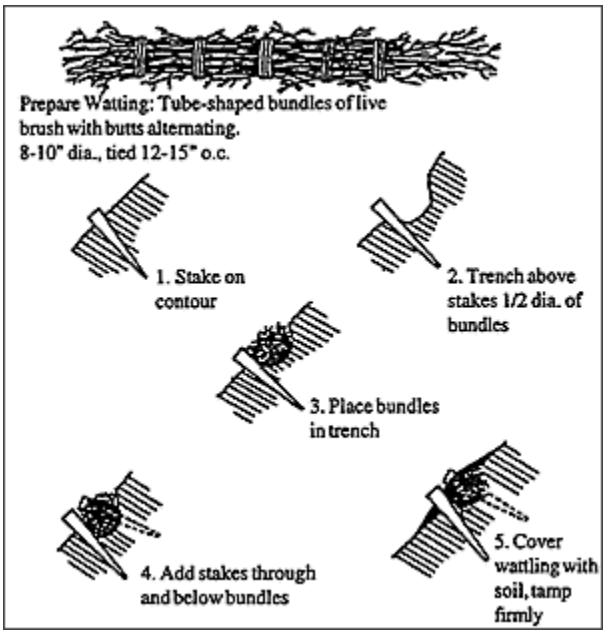


Figure 2. Picture courtesy of U. Nebraska Cooperative Extension

How are they installed? (See Figure 2) Starting form the toe of the hillside and working up to the top, trenches are dug approximately 2" wider then the fascines and are at least 2/3 the depth of the fascine. The length of the trench is determined by the area to be covered by the fascines. Once the fascines are in the trench, the soil that was removed to create the trench should backfill over the fascine covering about 80% of the fascine. Walk lightly over the soil to compact it to a point were the first rain would not wash away the soil while at the same time not crushing the fascines. There are two types of stakes used to hold the fascine to permanently hold the hillside in place, a live stake and a dead stake. The live stake will be placed on the down hillside and be about 2-ft in length. The dead stake will be driven through the fascine from the top again being 2-ft in length. Both will hold the fascine in place, and the live stake will start growing to permanently hold the hillside in place.

What do I need to consider when using Fascines? Fascines can only be installed during the dormant period, approximately January to March. The process of constructing the fascine and the trenches that they will be placed in can be very time consuming. That is why we recommend purchasing fascines instead of constructing them. Even with pre-made fascines, the time to dig and place them is at minimum a 4-person crew. Watering is an issue if planting during the summer months; they will need extra water to become established. Once they are in the ground, the fascines will need little or no maintenance, except for monitoring to make sure they are not being flooded by water or drying out.

Installation Procedure

Step 1. Use a combination of mowers, hand-held weed-whackers, pruners and hand pulling to cut all the invasive plants as close to the ground as possible.

Step 2. In the current 8ft work section, remove as many of the roots from the area while trying not to dig up or disturb the surrounding soil.

Step 3. Using downed logs from tree pruning create terraces, laying large lengths of wood parallel to the street. Taking 4-ft lengths of dead wood staking at 45-degree angle, drive them into the ground until it hits a firm surface or are flush with the top of the wood terrace. If there are any remaining stakes, cut them flush for safety.

Step 4. See section on fascines for installation. Plant fascines per plan.
On the flat portion of Area 1, install the gravel path, concrete pad and bench. The concrete should be poured by a professional, to ensure a high-quality installation. The bench should be secured by the recommended attachment process per the instructions packaged with the bench; or if no instructions are provided, 3 in. masonry bolts. Community members can install the gravel path, using approx. 5 yd. of 5/8– crushed gravel, delivered to the site. The gravel should be a depth of 3-4 in., 2-3 ft. wide, and lie above the grade of the soil.

Step 5. Install all planting material into current work section where invasives were just removed, preventing slope instability. Proper planting practice will and must be followed to protect the planting process. Proper steps included inspection of all plant material, checking for broken, diseased branches, inspecting roots and overall health and reject the plant if it does not meet any of these requirements.

Step 6. When digging planting hole, dig hole twice as wide as root ball and only deep enough so that the root crown is flush with soil line, and backfill with native soil, removing all debris from hole.
Staking should be done only if necessary to keep trees upright. Stakes should be attached to tree no more than 1/3 of the way up the trunk, and should be loose enough to allow at least 1 in. of movement.

Step 7. Using soaker hoses, ring each plant just outside of the drip line. For lengths longer then 4-ft splice in a tight line hose, this will help increase the pressure in the hose also it will keep the water around the plants root zone, preventing soil saturation and potential slide problems.

Step 8. Cover the entire planting area with a 6-8” layer of mulch to help retain moisture for the plants and suppress the growth of invasives and weeds around the new

planting. Create small watering bowls around each plant to help retain water during rainy periods.

Step 9. When the next phase of planting begins, repeat steps 1-8 as needed and checking previously planted sections. When checking, perform basic maintenance as needed, such as mulching and weeding.

As part of installation, one or two permanent signs should be installed on the site in a visible place from Lake Washington Blvd., explaining that the landscape renovation is a project of the Sustainable Community Landscapes group at the Center for Urban Horticulture, University of Washington, Box 354115, Seattle, WA 98195-4115.

Disposal of invasives can be accomplished by taking the material to a disposal facility, or less expensively by placing it on a tarp somewhere on the site and leaving it until it turns into compost. Then compost can be added to the site as a top-dressing.

Plant Schedule

Quantity	*Botanical Name*	*Common Name*	*Size*	*Spacing*
	Evergreen trees			
30	*Arbutus menziesii*	madrona	Bare root or 1 gal.	5' OC
	Evergreen shrubs			
500	*Arctostaphylos uva-ursi*	kinnikinnick	1 gal.	18" OC
540	*Gaultheria shallon*	salal	Bare root or 1 gal.	18" OC
30	*Juniperous communis*	common juniper	1 gal.	10' OC
400	*Mahonia nervosa*	dull Oregon grape	Bare root or 1 gal.	18" OC
640	*Mahonia repens*	creeping mahonia	Bare root or 1 gal.	18" OC
3	*Rhododendron macrophyllum*	pacific rhododendron	5 gal.	10' OC
25	*Vaccinium ovatum*	evergreen huckleberry	Bare root or 1 gal.	8' OC
	Deciduous trees			
12	*Acer glabrum*	Douglas maple	4" cal. B&B	20' OC
9	*Ceanothus sanguineus*	red-stem ceanothus	Bare root or 1 gal.	8' OC
1	Corylus cornuta var. californica	beaked hazelnut	Multi-stemmed	
	Deciduous shrubs			
32	*Cornus stolonifera*	Red-twig dogwood	Bare root or 1 gal.	8' OC
5	*Cornus stolonifera*	Red-twig dogwood	15' fascines	
16	*Cornus sericea*	Yellow-twig dogwood	Bare root or 1 gal.	8' OC
42	*Philadelphus lewisii*	mock orange	Bare root or 1 gal.	5' OC
10	*Spirea douglasii*	Western spirea	15' fascines	
35	*Symphoricarpos mollis*	creeping snowberry	Bare root or 1 gal.	3' OC
	Perennials			
920	*Polystichum munitum*	sword fern	1 gal.	3' OC
40	*Blechnum spicant*	deer fern	1 gal.	1' OC
	Perennials			
50	*Dicentra formosa*	wild bleeding heart	4" pot	1' OC
150	*Fragaria vesca*	woodland strawberry	4" pot	1' OC
150	*Maianthemum dilatatum*	false lily of the valley	4" pot	1' OC

Aftercare and Maintenance of Plantings

Weeding

Regular weeding will be necessary to prevent the invasive Clematis, ivy and blackberry from dominating the site. Following installation, we recommend manual removal of weeds every two weeks throughout the growing season (March – October). The method of removal is cutting all stems down to the ground with either pruners or a weed-whacker, to be *immediately* followed by an application of wood-chip mulch in a thick layer (at least 6-8 in. deep).

Replanting

Every installation has some plant mortality. Approximately 6 months after installation, replace any plants on steep slope areas that have died. Approximately 1 year after installation, replace any plants on other areas that have died.

Irrigation

Irrigation is crucial to the establishment of new plants, especially after a spring planting. The approach recommended by Washington State University's Cooperative Extension is to use deep, less frequent watering to encourage roots to grow deeper. WSU also advises irrigating new installations for at least the first two years. There should be an initial irrigation to wet the root zone immediately after installation, and thereafter irrigation should occur every 4 to 7 days through the growing season, using the guideline that "1 inch of water applied to a sandy soil will penetrate 12 inches. It will move anywhere from 6-10 inches into a good loam soil, and in a clay soil it will percolate down only 4-5 inches."

Water will be supplied by rainfall and by soaker hoses, located under the mulch as specified in installation. The soaker hoses will be attached to outdoor faucets of participating neighbors' houses, and will have gauges attached so that (a) the correct amount of water will be dispensed, and (b) the neighbors can be compensated for their water expenditure. The planting area is 8,770 square feet. The soil type is sandy loam, so we estimate that 2 inches of water will be needed per irrigation event to penetrate the root zone. Irrigation events should be every 4-7 days from April through September and on an as-needed basis through the rest of the year.

The following tables show how much water will be needed from the soaker hoses per month **for a fully planted site**, assuming a schedule of every 7 days:

Month	Total water needed (inches)	Water available from precipitation (inches)[1]	Water needed from irrigation (inches)	Water needed from irrigation (cubic feet)
March	8.5	3.75	4.75	3470
April	8.5	2.51	5.99	4377
May	8.5	1.69	6.81	4976
June	8.5	1.44	7.06	5159
July	8.5	.78	7.72	5641
August	8.5	1.09	7.41	5415
September	8.5	1.78	6.72	4910
October	8.5	3.47	5.03	3675

The 2003 residential rates for drinking water from Seattle Public Utilities are as follows. Cost is per 100 cubic feet, or ccf.

Off-Peak Usage (Sept. 16 - May 15th)	
Any amount of ccf	$2.35
Peak Usage (May 16th - Sept. 15th)	
Up to 5 ccf per month	$2.75
Next 13 ccf per month	$3.20
Over 18 ccf per month	$8.55

The estimated cost per month of water is:

Month	Water needed from irrigation (cubic feet)	Cost
March	3470	$81.54
April	4377	$102.85
May	4976	$172.63
June	5159	$342.54
July	5641	$383.75
August	5415	$364.43
September	4910	$227.51
October	3675	$86.36

If the site were planted all at once, the total cost for one growing season of irrigation would be approximately $1,761. However, plant installation will occur in phases. Irrigation will be provided for at least two growing seasons, plus watering over the winter if necessary and some tapering-off irrigation in the third growing season. So if planting is begun in spring (Timeline A), the first growing season's cost will be $587, as about 1/3 the site is planted. The second growing season will be $1761, as the first 1/3 continues to receive water and the remaining 2/3 have been planted. The third growing season will be

[1] Precipitation data from Western Regional Climate Center (http://www.wrcc.sage.dri.edu) based on data collected at Seattle-Tacoma Airport from 1931 to 2001.

$1355, as the first 1/3 no longer receives much water and the other 2/3 continues to receive irrigation.

Mulching

Although the site will have already been mulched as part of site preparation, mulch must be reapplied every few years as it decomposes.

Stake Removal

Stakes must be removed one year after the plant is installed.

Timeline for On-Site Work

Two different timelines are proposed, depending on when the project is approved by the city agencies involved. Timeline A is less expensive but involves more maintenance (because plants must be watered over the summer); Timeline B requires more money (because plant materials cannot be bare-root) but less maintenance.

An important scheduling factor to keep in mind is that work on the steep slopes alongside Lake Washington Blvd. will require closing one lane of the road. To do this, a permit must be obtained from the city, and this will take 2 weeks or so.

The gravel path, concrete pad and bench should be installed at or before the time of the first planting.

Year 1

(Begin here for Timeline A)
January – Clear invasives in entire area to be planted with fascines, and in a 6-to-8-ft. wide strip on each of the two other slopes. Clear all invasives on flat area of Plot 1. Cut back invasives in remaining areas but do not remove the root systems. This is to help control the invasives, but they are still needed to help stabilize the hillside. Use deadfall wood, held in place with 2-3 ft. stakes, to create mini-terraces where necessary to ensure mulch stays in place. Apply 6-8 in. of wood-chip mulch to cleared areas. Install fascines in cleared areas, where specified by planting design.

February – Plant cleared areas.

March to November – Weed in planted areas every 2 weeks. Water every 4-7 days, depending on plant condition. (Exact amount of water needed depends on amount of rainfall and mulch depth.)

(Begin here for Timeline B)
September – Clear invasives in another 6-ft. wide strip on each slope. Install deadfall wood, mulch and fascines in cleared areas.

October – Planting of cleared strips. Replant in previously planted areas where plants have died.

November to March – Weed planted areas once a month, and water as needed. Repeat for years 2 and 3, tapering off frequency of watering in year 3.

Years 2 and 3

Repeat Year 1, clearing and planting slopes in strips until entire site is planted, and tapering off frequency of watering as plants reach their third growing season. During installations, replant previously planted portions where plants have died.

Budget

The following is an estimated budget for the project, to be used for planning purposes. Cost of irrigation and plant material will vary according to site conditions, season, and type of material. Because we were unable to obtain prices for bare-root plants, the Plant Material item is for containerized stock, which is the most expensive. The budget can be reduced by using bare-root and/or salvaged plants, thicker mulch (requiring less water), getting supplemental irrigation from the city's watering truck, and disposing of invasives on site. Operating costs assume Timeline A is followed.

Initial Costs

Plant Material for Installation	$13,274
Bench	$132 (from Home Depot, as of 11/2002)
Concrete to Secure Bench	$300
Mulch	$0 (can be obtained free from arborists)
Disposal of Invasives	$0-? (contact City of Seattle for current rates)
Gravel	$175 (for 5 yd. of 5/8– crushed gravel from Cadman, as of 12/2002)
Total	$13881

Operating Costs, Year 1

Plant Material for Replacement	$1769 (for 1/3 the site, assuming 40% mortality)
Irrigation	$587
Total	$2356

Operating Costs, Year 2

Plant Material for Replacement	$3539 (for 2/3 the site, assuming 40% mortality)
Irrigation	$1761
Total	$5300

Operating Costs, Year 3

Irrigation	$1355
Total	$1355

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