Garfield High School
Landscape Renovation Proposal
Autumn 2001

Prepared by:

EHUF 480: Selection and Management of Landscape Plants
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VISION STATEMENT

The new planting plan for the northwest end of the Garfield High School entrance is designed to be a continuation of the existing planting beds recently installed near the southwest entrance. Repetition of species and color themes unify the area. Conceptually, this area is designed to simultaneously enhance the visual character of the school and provide educational opportunities.

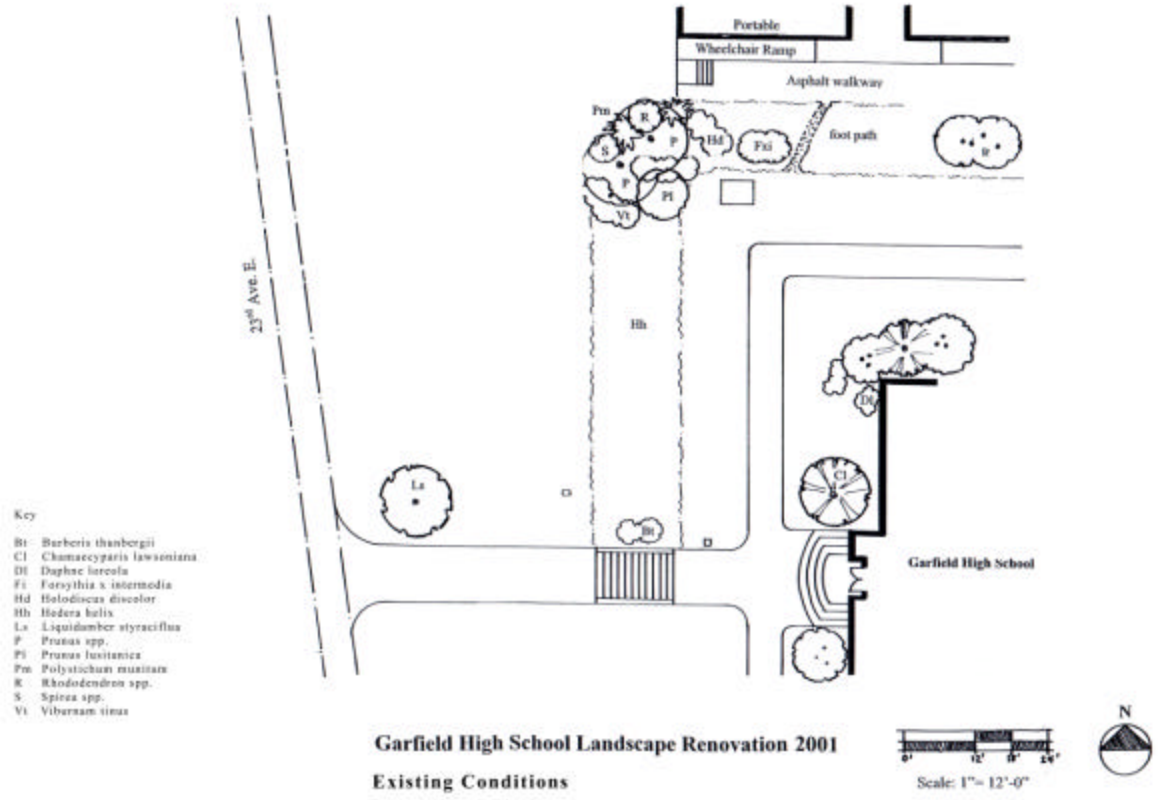

Figure 1. Existing Site Conditions

LIGHT AND SEASONAL ANALYSIS

Overview. A shade study (Figure 2) conducted in late fall, revealed that portions of the site were partially to fully shaded during the day. The western bed was in full sun conditions from eleven o'clock on. Shade cast from the building and the prunus trees caused the northern bed to remain mostly shaded. Summer will bring about more light for both beds, with the western bed receiving sun earlier in the day and for a longer duration.

Night Lighting. There are two security lights attached to the building. One is over the entrance while the other is on the northwest corner approximately fifteen feet from the

ground. Additionally there are streetlights along 23rd Avenue. These lights pose little impact on the site and are not of great concern.

TRAFFIC ANALYSIS

Overview. The site is adjacent to a busy four-lane road, 23rd Avenue, with two bus stops nearby. There is no curbside or temporary parking available on the street. The grounds of Garfield High School have two distinct foot-traffic patterns, determined by school hours.

Outside of School Hours. Before and after school students walk to or from the southwest or the northwest. A bus shelter is located to the southwest of the site and the area is heavily used. The large number of students utilizing the southwest area has little impact on the site as they briefly pass through the area on the sidewalk. A smaller number of students cut across the lower lawn as they walk to the northwest. The turf seems to be adequately tolerating the foot traffic and there are no distinct paths worn into the grass.

During School Hours. During school hours most of the students are moving from the building, along the sidewalk, then using the footpath to access the portables. This traffic has compacted and eroded the slope, creating a hazardous and unsightly condition.

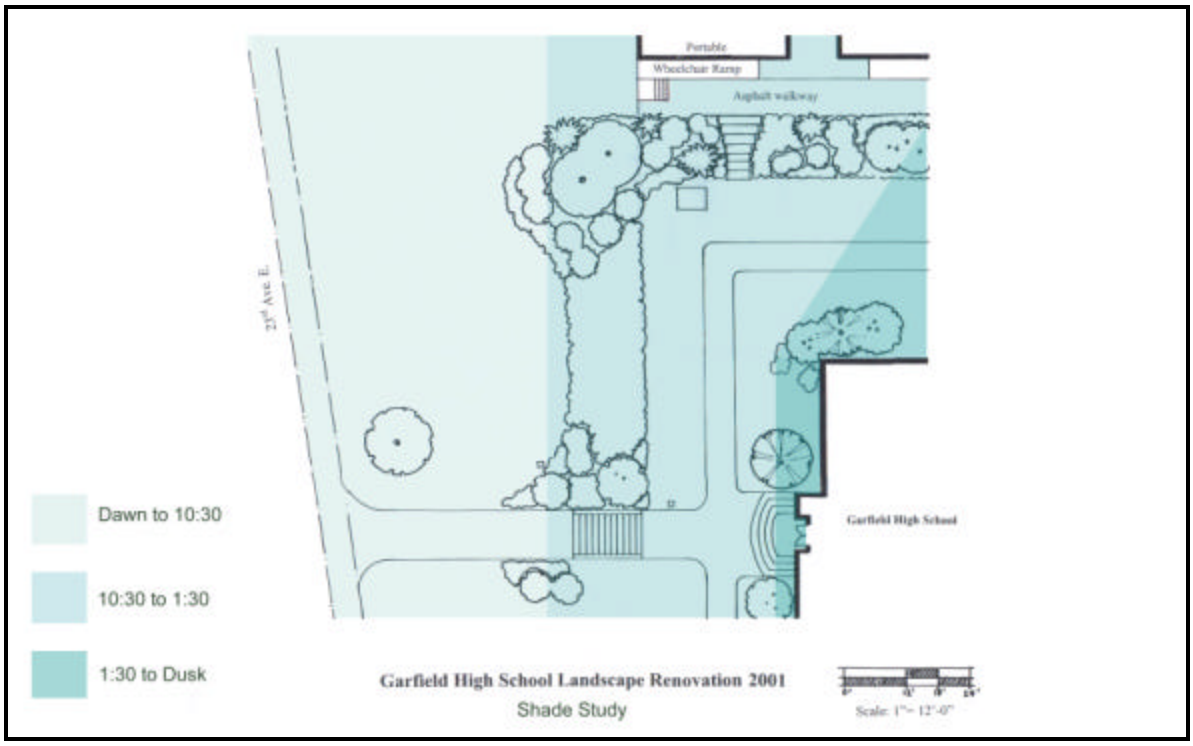

Figure 2. Shade Analysis.

HYDROLOGY

Overview. The cycling of water within an ecosystem is called hydrology. In the context of landscape installation, hydrology refers to the movement of water through the soil. A common consequence of the compaction of soils evident in many urban sites is saturated soil conditions. Although the soils around Garfield have sustained heavy use over time, the specific area proposed for this design is largely composed of a wide, sloping bed covered by vegetation. As a result, the soils here appear to have surprisingly well-developed structure, important in water flow.

Local precipitation. The Seattle climate regime largely dictates what plants can be successfully established and readily maintained, particularly with regard to rainfall. Winter precipitation is frequent, usually in the form of light rainfall of moderately short duration. However, summers are typically arid, with very little rainfall, subjecting plants to water stress for several months.

Grading and flow. Topography of the design site is fairly straightforward. The main building is on a raised, level plateau covered in turf. A concrete walkway circumnavigates the building. North and west of the building, the site slopes steeply (20-25º), dropping about six feet before leveling off going north but to the west gently sloping down toward 23rd Avenue. Rain falling on the site percolates through the turf or ivy then flows as groundwater downhill, west to the street.

Percolation. Hydrology was further evaluated by measuring gross percolation in three locations (Figure 3). One test was conducted at the base of the slope at the design area's northernmost end (A). A second test (B) was performed mid-slope, amid the ivy under the canopy of a large *Prunus* (cherry) tree, representing understory conditions. Finally, a third percolation test was conducted near the stairs at the south end of the bed (C).

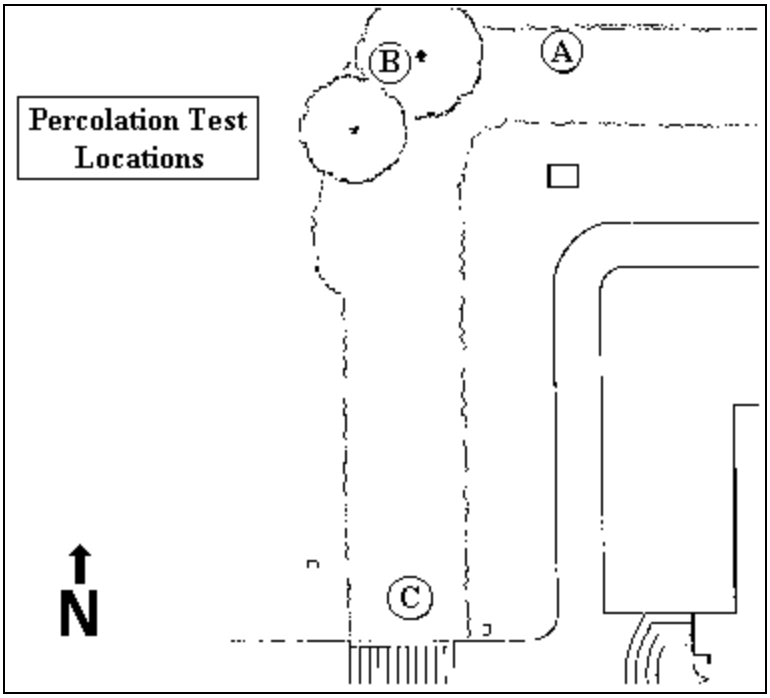

Figure 3: Percolation test locations

At each location, a small plug of soil was removed and a 4" diameter PVC tube was inserted approximately 3cm deep. Each cylinder was filled with water to 4cm in depth and allowed to drain. Water percolated out of the tubes at the approximate rates in Table 1.

Table 1. Percolation Rates.

Test Location	Location A	Location B	Location C
Initial Depth:	4 cm	4 cm	4 cm
Time to Drain:	24 mins.	14 mins.	19 mins.
Percolation Rate	10 cm/hr.	17 cm/hr.	13 cm/hr.

These coarse results indicate excellent drainage with regard to avoidance of saturated or anaerobic conditions. However, they also suggest that this sloped site may dry out fairly rapidly, particularly during arid western Washington summers.

SOIL ANALYSIS

Overview. The physical and chemical properties of soil largely determine the health of the vegetation growing in it. Although some characteristics can be modified, existing soil conditions will generally persist absent large-scale soil removal or amendments. Plants should therefore be selected based on their adaptation to site-specific soil conditions. Soil conditions at Garfield High School were determined by examining the soil layers, evaluating soil texture, measuring soil solution pH and bulk density, and by chemical soil analysis at the UW College of Forest Resources Soils Laboratory.

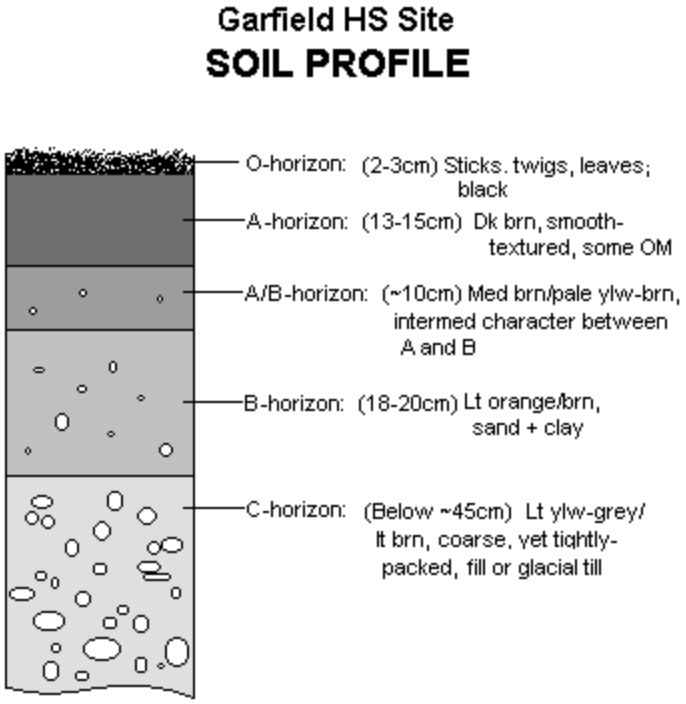

Figure 4: GHS Soil profile.

Soil Profile. A soil pit was dug on the north-facing slope to a depth of approximately 60 cm (Figure 4). The location was chosen based on two criteria: it is typical of conditions in the site with respect to vegetation (under dense ivy cover) and could be accessed without causing additional compaction to the planting bed.

The soil profile for the Garfield site included a surface layer of leaves, twigs and partially decomposed organic debris followed by relatively fertile topsoil with moderate organic matter content. Below the topsoil was an intermediate zone transitioning to subsoil with accumulated clay and little organic content. The final horizon was primarily fill or glacial till, packed tightly and without significant alteration from the parent minerals from which it was derived.

Sampling. Soil samples were collected for analysis of texture, bulk density, acidity/alkalinity (pH), organic matter content, nutrient content, and for metal contaminants (Tables 2-4). Three general sampling zones were identified: a north-facing slope covered with ivy and small shrubs, an understory zone beneath several large cherry trees and laurel shrubs, and a west-facing slope covered only by ivy. For each zone, five samples were taken from the topsoil layer. These five samples were then evenly mixed using a plastic spade. From this mix, two smaller subsamples were drawn for analysis, representing the general content and characteristics of the zone.

Table 2. Summary of Soil Properties

Site Location	Bulk Density (g/cm^3)	% Organic Matter	Soil Reaction (pH)	Texture
North-facing Slope	1.13	9.9	5.99	Clay loam
Understory	--	9.1	5.86	Clay loam
West-facing Slope	1.13	6.5	6.16	Sandy clay loam

Table 3. Soil texture

Site	% Sand	% Silt	% Clay	Texture
North-facing Slope	20-40	25-45	30-40	Clay loam
Understory	20-40	25-45	30-40	Clay loam
West-facing Slope	50-70	5-25	20-30	Sandy clay loam

Table 4. Nutrient Content.

Site Location	% OM	C:N Ratio	% N	P (ppm)	K (ppm)	Al (ppm)	As (ppm)	Ca (ppm)	Fe (ppm)	Pb	Zn
North-facing Slope	9.9	17.2	0.33	1151	501	15093	--	3859	11937	206	104
Understory	9.1	16.6	0.31	1198	739	16883	Trace	4249	13435	201	102
West-facing Slope	6.5	14.3	0.26	861	824	16390	--	4532	15022	161	102
WA Dept. of Ecol: Natural Bkgrnd						32600	7		58700	24	
WSU Extension Optimal for plants				10-20**	120-200*			600-4000			>1
UMass Soils Lab: Safe upper limit										300	

* 800 ppm considered excessive
** 40 ppm considered excessive

EXISTING PLANT MATERIALS

Overview. The majority of the site is covered with turf or English Ivy (*Hedera helix).* The existing tree species include a Port Orford-cedar (*Chamaecyparis lawsoniana),* two mature cherry trees (*Prunus* spp.), and a young sweet gum (*Liquidambar styraciflua).* Shrubs growing under and around the mature cherry trees include one rhododendron, sword fern

(*Polystichum munitum), Viburnum tinus*, Portuguese laurel (*Prunus lusitanica), Spiraea* spp., and *Forsythia* x *intermedia.* Two barberries (*Berberis thumbergii)* are located next to the stairs. There is one *Daphne laureola* and another *Spiraea* spp. next to the building. Besides ivy, weeds present on site include clematis, horsetail, blackberry and dandelion; these are lesser concerns.

Figure 5: Northwest corner of the site

Figure 6: Damaged *Liquidambar stryaciflua*

REGULATIONS AND ORDINANCES

School Ordinances. Many concerns have been raised over the years about projects at Garfield High School. This year's concerns are no different from the previous ones. The landscape should allow for the students' safety and visibility. The landscape should look clean and not contribute to the rodent problem present on campus. In addition, the landscaping should not require heavy maintenance, even though the school has a budget to do some maintenance. Other concerns include conservation of water and composting yard waste, and connectedness to classroom work. In addition, relevant portions of the City of Seattle Landscaping Ordinance (SMC 23.44.017) and other city codes must be followed. If these issues and concerns are met in the landscape proposal, then the review team, which is composed of Seattle School District representatives, may grant permission to proceed with the landscaping.

DESIGN OBJECTIVES

Overview. Our design encompasses the northwest corner of Garfield. There is a large planting bed overgrown by ivy, along a slope that continues around to the north side of the

building. In designing a new planting scheme for this area, we have taken several factors into consideration. These include:

- Visibility: Safety is a major concern, since this is a school.
- Aesthetic aspects: Neighbors, students, parents, and staff want the school to visually reflect their quality of standards of education.
- Education: Develop a potential learning garden for students.

Concept. We chose a design that incorporates native and ornamental plants with ethno-botanical uses. Additionally, these plants were selected with interesting fall, winter, and spring color in mind, since these are the seasons that the school is the most active. The area will provide both visual and educational benefits for the students.

Design Narrative. As students, teachers, and others approach the steps to the northwestern entrance they will pass by *Acer circinatum* and *Hamamelis mollis*. These plants act as a framing device by highlighting both the steps and the entrance above it. As time passes, these trees should be limbed up, which will allow pedestrians to walk underneath the canopy.

Unfortunately, *H. helix* is growing abundantly at Garfield High School. At the time of the site analysis, the ivy was flowering and setting fruit. We recommend removing all *H. helix* from this site to create an environmentally sound landscape and to reduce rodent problems.

As an alternative to *H. helix*, the western planting bed will consist mostly of *Viburnum davidii* and other low growing plants that allow for a clear line of site to 23rd Avenue. In addition to the line-of-site considerations, a large amount of grass will remain.

Our design also addresses other foot traffic issues on the site by recognizing a social path (Fig. 7) and installing steps to resolve the situation. The step framework will use 6" x 6" landscape timbers set into the slope, with compacted 5/8" crushed rock to create a tread surface. This portion of the design, if adopted, should be bid out to local construction contractors for installation.

Figure 7. Existing Footpath.

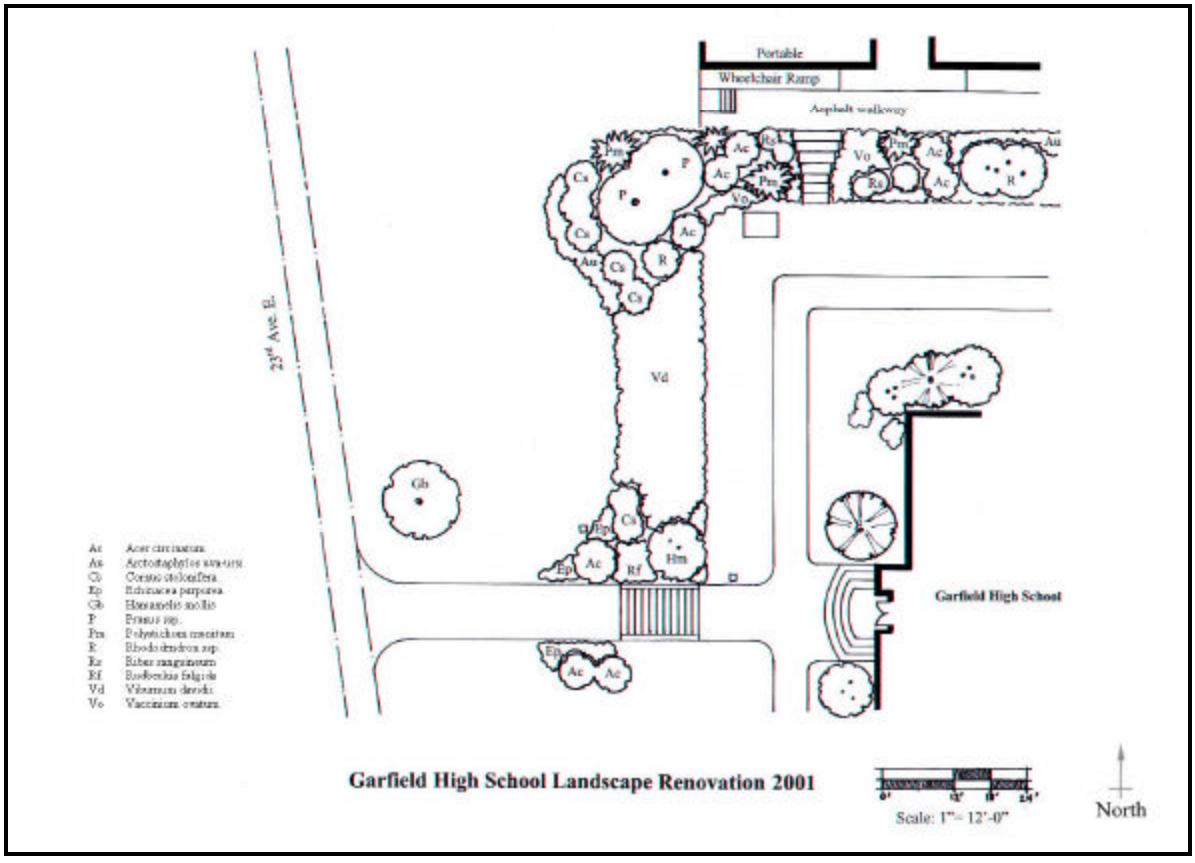

Figure 8. Proposed Design Plan.

Plant Selection. When selecting plants from a nursery, it is important to choose healthy plants. Following are some guidelines for choosing the healthiest individuals.

Stems/Leaves/Overall Appearance.

- The plant should have a normal growth rate.
- Make sure there is no twig dieback or other dead tissue, which can also indicate root problems.
- The size of the plant should be proportional to the size of the pot.
- Gently rock larger plants back and forth to see they are able to hold themselves up without a stake.
- Leaves should look healthy and green. They should be the normal size for species and be free from spotting or dead tissue.

Root System. Even when the aboveground portion of a plant appears healthy, there may be problems with the roots. Some problems may not appear until far down the road, long past the expiration of the nursery's warranty.

- Look at the surface of the soil. There should be no "knees," or thick roots that come above the soil and go back under. The soil surface should also be mostly free from smaller feeder roots.
- Pull a little of the soil away from the trunk of the plant. You should see an even distribution of thick roots around the trunk.
- Gently remove the plant from the pot. You should see roots where the soil and pot meet. However, you do not want to see large roots circling the pot or a mass of roots at the edge of the soil, because this indicates that the plant is root-bound.
- In general, it is important to remember that plants are living organisms, and not all plants will be of the same quality within a nursery. If you suspect any problems with a plant, especially root problems, do not purchase the plant.

Site Preparation. The primary task in preparing for the landscape installation is the removal of undesirable existing plant material. Targeted removals include the climbing vine English ivy (*Hedera helix*), several *Forsythia* shrubs, a few saplings of the genus *Prunus* (cherry), and an overgrown *Viburnum tinus* plant. The planting bed is rather large, as are some of the shrubs and saplings. Thus, removal could be accomplished by use of a backhoe. Alternatively, most of the woody plants can be removed with a handsaw or chainsaw, first cutting back tall branches, then cutting the stem(s) near the base. In order to reduce the presence of fungal decay organisms it may be advisable to grind up stumps and large, woody roots. Immediately upon the removal of the plants, a 4-6" layer of coarse woodchips should be placed atop all bare soil. Some plants will be preserved and will need to be protected from injury during site preparation and installation.

Nursery Analysis. Finding a nursery that provides healthy material is essential to the survival of your landscape. Keep notes of which nurseries the plants came from in case of failure due to poor nursery stock. Also ask about the nurseries' refund policies, because most nurseries offer refunds over one growing season, usually 3-6 months, if the plant fails, but not if the plant was planted or cared for incorrectly.

Installation of the Steps. This portion of the design, if adopted, should be bid out to local construction contractors for installation. We envision steps constructed of railroad timbers backfilled by crushed gravel. Alternatively, poured concrete steps could be constructed.

A path leading from the existing sidewalk to the step should be installed at the same time to prevent further degradation of the area. Existing 3'x 3'concrete pavers, which have been overgrown by grass, are located at the bottom of the western bed. This material could be removed and reinstalled above. Another option may be to pour a concrete pathway.

Plant Installation Procedures. Installation should begin as soon as the soil is fairly dry and not too saturated. Once the plants are installed, the root zone should be covered with a mixture of compost and wood chips.

MAINTENANCE AND AFTERCARE

Overview. The proposed landscape for Garfield High School will require minimal maintenance. In addition, most of the selected plants have similar watering and care requirements.

Watering. Seattle gets an average of 39 inches of rain each year, but only 13 inches fall during the growing season. It is especially important to water plants on a regular basis during the first year or two after planting, while root systems are establishing.

During the first two years, water the plants once a week, for an hour, from May to October. Make sure the new trees receive five to ten gallons of water per week, for every inch in caliper. Water in the morning and avoid getting the trunks of trees and shrubs wet. If the plants have wilting leaves or reduced growth rates, they may not be receiving enough water.

Mulch. All of the plants should be mulched. Suitable mulches include woodchips, pine needles, and shredded leaves. The mulch should be three to four inches thick and spread at least three feet around the larger plants. Organic mulch should be replenished at least every two years to maintain benefits.

Weeding. Weeds compete with desirable plants for water and nutrients and should be removed as soon as possible to prevent them from producing seed. Monitor the site for weeds at least twice per year.

Fertilizing. Plants should only be fertilized if they show signs of nutrient stress, and only the limiting nutrient(s) should be applied.

Pruning guidelines for trees and large shrubs. Pruning plants can increase their vigor, retain their natural form, and reduce any hazards, but only if done correctly! All pruning should be done by professionals or those trained in proper practices.

Monitoring plants and record keeping. Monitoring plants on a yearly basis and keeping records of plant health and maintenance work has two benefits. First, the needs of the site can be assessed, which can prescribe how the site is managed. Second, hazards can be identified and mitigated. Keeping accurate records of the site conditions and work performed at the site can reduce liability if the site were to become unsafe in the future.

Assess the overall appearance of the site, including the presence of weeds and thickness of the mulch. Document plant health, being sure to assess the plants for growth, vigor, pests, diseases, broken or damaged parts, and watering and pruning needs. Also record all applications of pesticides and herbicides, and whether the treatments succeeded or failed. Lastly, make recommendations for any work that needs to be performed.

ESTIMATED BUDGET

Overview. The proposed budget covers all aspects of this project, from site analysis to installation and aftercare. Materials and labor are based on the current market value. Other materials or miscellaneous expenses may be incurred depending upon need and plant availability.

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The UW students who wrote this report