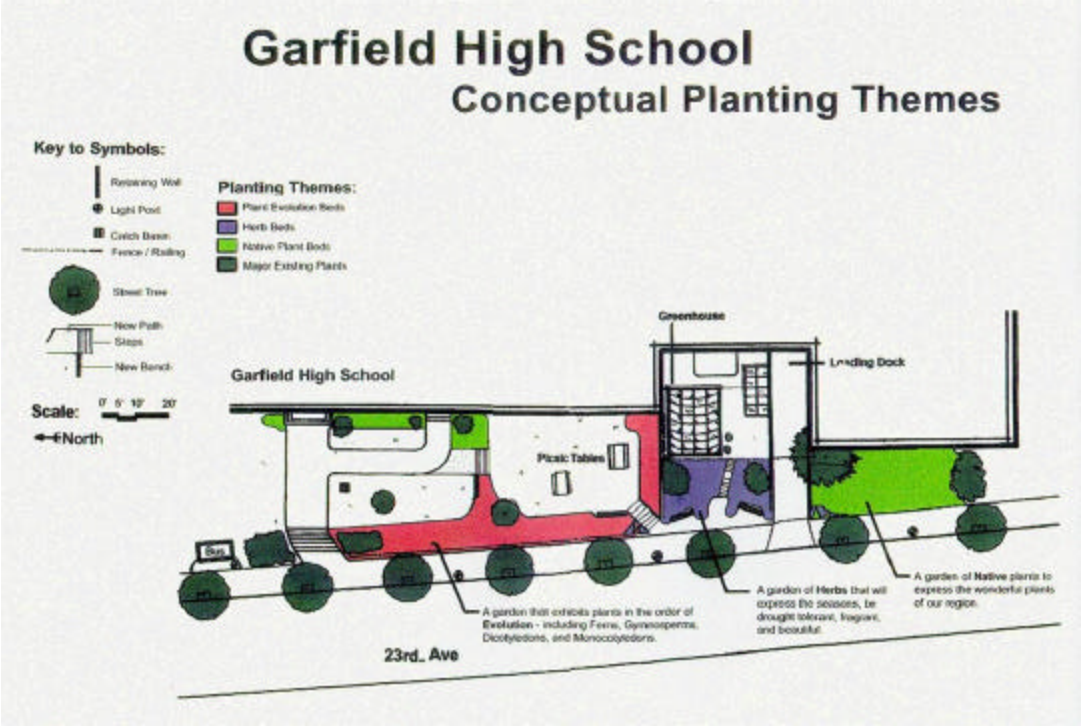
Garfield High School Plant Selection Project

Fall, 2000



Prepared by Students in Landscape Plant Selection

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INTRODUCTION

The Landscape Plant Selection class of Fall Quarter, 1999, led by Dr. Linda Chalker-Scott, was given the task of developing a sustainable landscape design for Garfield Senior High School. The students worked in groups to analyze the existing landscape, its environmental conditions and current uses, as well as the needs and concerns of students, staff, and faculty. The goal of this project was to create a recreational and educational landscape plan, one that is both ecologically sensitive and requires little maintenance. Our design proposal was developed to allow for installation in separate phases over time, as resources and funding become available. The goal of this design was to get students, staff and faculty involved in caring for and learning from their campus landscape.

SITE PLAN ANALYSIS

This project focused on the landscape area on the west side of Garfield High School. The planting area includes the lawn and planting beds located between 23rd Street, the Peace Garden and the Metro bus stop. Currently this area contains a number of large, established plants. Heavy pedestrian traffic occurs on the entire west side of the building, especially the sidewalk. We have divided the area into three adjacent spaces, which are labeled A, B and C (Appendix A).

Area A is a relatively flat grassy area bordered by an ivy covered slope (Fig. 1). This site is bordered on the east by the wall of the school, on the west by 23rd Street, on the north by the bus stop, and on the south by the brick retaining wall. Area A is a relatively flat grassy area bordered by an ivy covered slope (Figs. 1 and 2). Next to the wall are several large laurel shrubs. There are also a few rhododendrons next to the school entrance and several deciduous trees that have been recently planted in the middle of the grassy area. The main concern in this area is the ivy on the slope. English ivy (*Hedera helix*) is a highly invasive species that will outcompete almost any other plant. In addition, it provides habitat for rodents, which are a known problem at Garfield High School. This space has both shady areas and areas which receive afternoon sun.

Figure 1: Area A, looking NE at the upper lawn area

Figure 2: Area A, looking S from the lower lawn towards the upper lawn

Area B is small site with a relatively steep slope; it covers the area between the greenhouse and the road and is confined by the wall and the driveway. It is covered with ivy, dead plants, and debris and has two large lily-of-the-valley bushes on each edge. The dead and trampled plants in this area indicate the site is heavily used. There is a small flight of concrete steps running up the middle of this area, which is not used since the greenhouse is fenced off (Fig. 3). This area receives afternoon sun.

Area C begins at the north end of the Peace Garden and runs to the loading dock (Fig. 4). It also contains an ivy-covered slope. Closer to the building there is a large arborvitae tree and a very large boxwood shrub. Again the main concern with this area is the ivy on the slope. This area receives afternoon sun.

Figure 3 (left): Area B, looking S toward the stairs; Figure 4 (right): Area C, looking S toward the Peace Garden

Clients' Needs and Desires

Any landscape to be installed on Seattle school grounds must receive approval from a review team. Designs developed for the Seattle School District must go through a "self-help" review process. A Self-Help application must be submitted to a team made up of Seattle School District representatives. Maintenance, safety and security are the most significant factors that are addressed during this Self-Help review process.

In a Self-Help landscape design proposal, it is important to have the maintenance duties well defined. The review board will want to know what needs to be done and who will be responsible for the management and aftercare of new plantings. When writing the proposal, it should be noted that district employees have limited time to devote to new landscapes. The school district does not use chemicals on landscapes, so they prefer the designs to have minimal landscape bedding.

When a landscape design calls for the installation of beds, they are required to have edges that can accommodate mowers. These beds must have rounded corners and there must be adequate room between the landscape bed and trees within the parameters of the lawn for mowers to get through.

One of the biggest concerns for the installation of new plant material is safety. It is important to select plant material that will not hinder visibility. Plant material cannot cover any

windows and has to be kept away from doorways and at least one foot from buildings. The district will not allow any plantings that will block out light or provide hiding places.

Existing Plant Material

The project site is presently vegetated with a variety of shrubs and vines, a few trees, and some turf. Maintenance of vegetation at the site appears to have been minimal, indicated by the overgrown nature of the vegetation and the proliferation of invasive vines over much of the area.

Existing tree species noted at the site include one large American arborvitae (*Thuja occidentalis*), several shrubby bigleaf maples (*Acer macrophyllum*), a small American sweetgum (*Liquidambar styraciflua*) and a small zelkova (*Zelkova serrata*). Existing shrubs include several lily-of-the-valley shrubs (*Pieris japonica*), Portugal laurels (*Prunus lusitanica*), cherry laurels (*Prunus laurocerasus*), *Rhododendron* sp., and one each of *Deutzia* sp., *Daphne* sp. and boxwood (*Buxus* sp.). Existing vines include English ivy (*Hedera helix*), Himalayan blackberry (*Rubus discolor*) and small amounts of trailing blackberry (*Rubus ursinus*) and clematis (*Clematis* sp.). Other plants present in small quantities include sword fern (*Polystichum munitum*) and lawn grasses.

The existing plants are overgrown and in poor condition. Fortunately, the plants are hardy and do not have any noticeable pest or disease problems. If problems should arise, it is important to note that the school district has phased out the use of pesticides district wide. Herbicides can be used when requested by an individual school. It is not known whether this includes Integrated Pest Management practices such as the use of horticultural oils.

We propose to retain all of the shrubs at the site, as well as the American arborvitae, the zelkova, and the American sweetgum; all will receive restorative pruning. We also plan to retain most of the existing lawn. Plants to be removed include all of the vines, the bigleaf maples, and the sword ferns (the latter could be transplanted within the site). We will remove additional shrubs at the school's request if they are deemed to be too dense for safety (i.e., they could hide intruders).

Water issues

Seattle has a maritime climate, characterized by wet, mild winters and warm, relatively dry summers. The species we retain and install must be able to thrive within these climatic parameters. While regular watering will be provided for the first year after installation, the area does not have an irrigation system and is not watered by the school district maintenance crew. Teachers and students provide all new plantings with necessary watering during the first season. If supplemental irrigation is required, soaker hoses should be considered.

There are a few site characteristics which should be considered in regard to the availability of natural water on the site. Much of the project site consists of sloped beds which may be subject to erosion from sheet flow during heavy rain events. It is likely there are also areas subject to scouring from water flow off the building and other adjacent impervious surfaces. Many of these adverse effects can be ameliorated by strategic intervention and management practices such as mulch application, use of groundcover, and installation of stone drain fields. Other problems may occur where there is heavy foot traffic and social pathways that have developed over time. The compaction in these areas may cause runoff, erosion, and a decrease in soil porosity. However, soil analysis has determined that, in general, the soils are well drained at the site.

SOIL ANALYSIS

The purpose of our analysis was to determine suitability of the soil medium for installation of new plant material. Soil samples were taken at four separate planting areas within our project site. We analyzed soil pH, bulk density, texture, profile, percent organic matter, water content and percent moisture (Table 1). Nutrient contents were analyzed by a laboratory and also analyzed independently. Our findings show that soil conditions are generally within the range of suitability for most ornamental species.

Table 1. Garfield High School Soil Analysis

Sample	pH	% Organic Matter	Bulk Density	Water Content	% Moisture	%Sand/ Silt/Clay	Texture	Nutrients NPK*
#1	6.11	12%	1.122 g/cm^3	1.16 g	14%	94/5/1	Sand	14/9/142 ppm
#2	6.79	8%	1.230 g/cm^3	1.19 g	17%	80/18/2	Loamy sand	14/9/142 ppm
#3	6.61	18%	1.136 g/cm^3	1.16 g	14%	69/29/2	Sandy loam	14/9/142 ppm
#4	6.16	6%	1.372 g/cm^3	1.15 g	13%	88/8/4	Loamy sand	14/9/142 ppm
Ideal Soil	6.5	4-10%	1.25 g/cm^3	N/A	25%	N/A	N/A	N/A

*Analysis performed from combined soil sample from each sample number for nitrogen (N), phosphorus (P), and potassium (K), in parts per million (ppm)

Recommendations

Irrigation should occur annually from late June through late September on an as-needed basis. Plants of the heath family (Ericaceae), such as *Vaccinium ovatum,* and *Erica carnea*, prefer a more acidic environment than is available. A soil amendment, such as sulfur, may be necessary to provide a more suitable soil pH for these species.

Soil Composition

Soil composition is the arrangement of sand, silt, and clay particles in a soil, and provides useful information about a soil's characteristics. For example, a sandy soil should drain well, but have a low water holding capacity. Clay soils are usually anaerobic and impermeable to both roots and water. Loamy soils, meanwhile, tend to drain fairly well. They are also preferable for plant growth and have a high water holding capacity.

Bulk Density

The bulk density of a soil is the mass of dry soil per unit of bulk volume, including soil air space. Soils with a high percentage of air space to soil space have a lower bulk density, which is generally preferred for optimal plant growth.

Nutrient Analysis

In addition to light, air, and water, growing plants need a supply of nutrients. Three nutrients, called macronutrients, are needed in relatively large amounts. These nutrients are nitrogen (N), phosphorous (P) and potassium (K). Generally, N, P, and K are the basis of commercial fertilizers and of primary interest when performing a soil nutrient analysis.

We sent a sample from each of the four areas to a soil and plant testing laboratory (University of Massachusetts, November 1999). The analysis determined that the Garfield site soils contain adequate, though not ideal, amounts of macro and micronutrients. Each nutrient level was rated on a scale of low to high; the nitrogen level was found to be medium, the phosphorous level was low, and potassium level was high. The soil micronutrient levels, meanwhile, were all within the normal range.

Soil lead levels were also tested. Lead is naturally present in all soils, generally in the range of 15-40 parts lead per million parts soil (ppm). The Garfield site contains 48 ppm, slightly higher than that which would normally occur. The soil lead level does not present a public health hazard but should be monitored.

Cation Exchange Capacity

Cation exchange capacity (CEC) is the number of cations that a soil can adsorb, or hold on to its surface. A high CEC allows for nutrient uptake by plant roots, and is vital for healthy plant life. A CEC between 10-15 Meq/100 g is usually adequate. The test results indicated the CEC was 12.1 Meq/100g.

Soil Profile and Color

A single soil pit was dug at each planting location. Soil pits were excavated to a depth of 16 inches or until a hardpan layer was reached, and soil horizons were recorded. In addition, soil color (Table 4) was determined for each layer using the Munsell Soil Color Book (Munsell, 1988). The soil color can provide useful information on organic matter content and the presence and duration of saturated soil conditions.

Table 4. Soil Profile and Color

Soil pit#	O-Horizon	A-Horizon	B-Horizon	C-Horizon
1	10YR 4/2 "dark grayish brown"	10YR 4/2 "dark grayish brown"	2.5Y 5/4 >12"	Beyond excavation depth
2	None	10YR 3/2 "very dark grayish brown"	2.5Y 5/3 >12"	Beyond excavation depth
3	None	10YR 3/2 "very dark grayish brown"	Hardpan gravel till 8"	Beyond excavation depth
4	None	10 Y 5/2	2.5 Y 5/2 >12"	Beyond excavation depth

PLANT SELECTION

The initial request from Garfield High School was simply for a landscape that required little maintenance and no supplemental water one year after installation. In response, we selected plants that wouldn't require water once established and needed minimal or no pruning or deadheading. Nor will any fertilizer or pesticides be used on the landscape. Another concern was safety, so the majority of plants are groundcovers, perennials, and small shrubs, which don't block views. The few tree and shrub species that were selected have an open form.

The selection of drought tolerant plants was especially critical due to the characteristics of the site. Most of the planting areas have a western exposure, so the plants are in full sun during the warmest part of the day. The slopes in some areas further reduce the amount of water available to plants, as irrigation and rain may run off before penetrating the soil. Finally, the lack of an irrigation system made drought tolerant plants a good choice.

In an attempt to involve the Garfield community in the project, we consulted with biology instructor Jenni Maughan to develop planting themes which can be used to support the biology curriculum. As botany is a main focus of the spring semester biology course, the gardens could serve as an outdoor laboratory for the students. We identified three themes to use in the landscape: native plants, herbs, and plant evolution and diversity. Keeping in mind the

criteria of drought tolerance and low maintenance, we selected plants to fit each of these themes. Spring blooming plants were also emphasized to coincide with the spring botany lessons.

The native plant garden (area C) is dedicated to plants which occur in natural ecosystems of western Washington. The herb garden (area B) will allow students to see, touch, smell, and taste some of the culinary and tea herbs that can be grown in our region. The plant evolution and diversity garden (area A) is designed to lead students through the evolution of plants, from primitive ferns, to conifers and other gymnosperms, to advanced flowering plants. The garden will allow students to examine and compare the diversity of plant forms and life cycles.

Our recommendations are based on the success of species in the Soundscape Lawn and Garden Demonstration at the UW Center for Urban Horticulture, the professional experience of class members, and a literature search.

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APPENDIX A

Site Analysis Maps

Garfield High School Site Map

Existing Conditions

Key to Symbols:

- Retaining Wall
- Light Post
- Catch Basin
- Fence / Railing
- Slope
- Stepping Block
- Street Tree
- Desire Path

Scale: 0' 5' 10' 20'

North

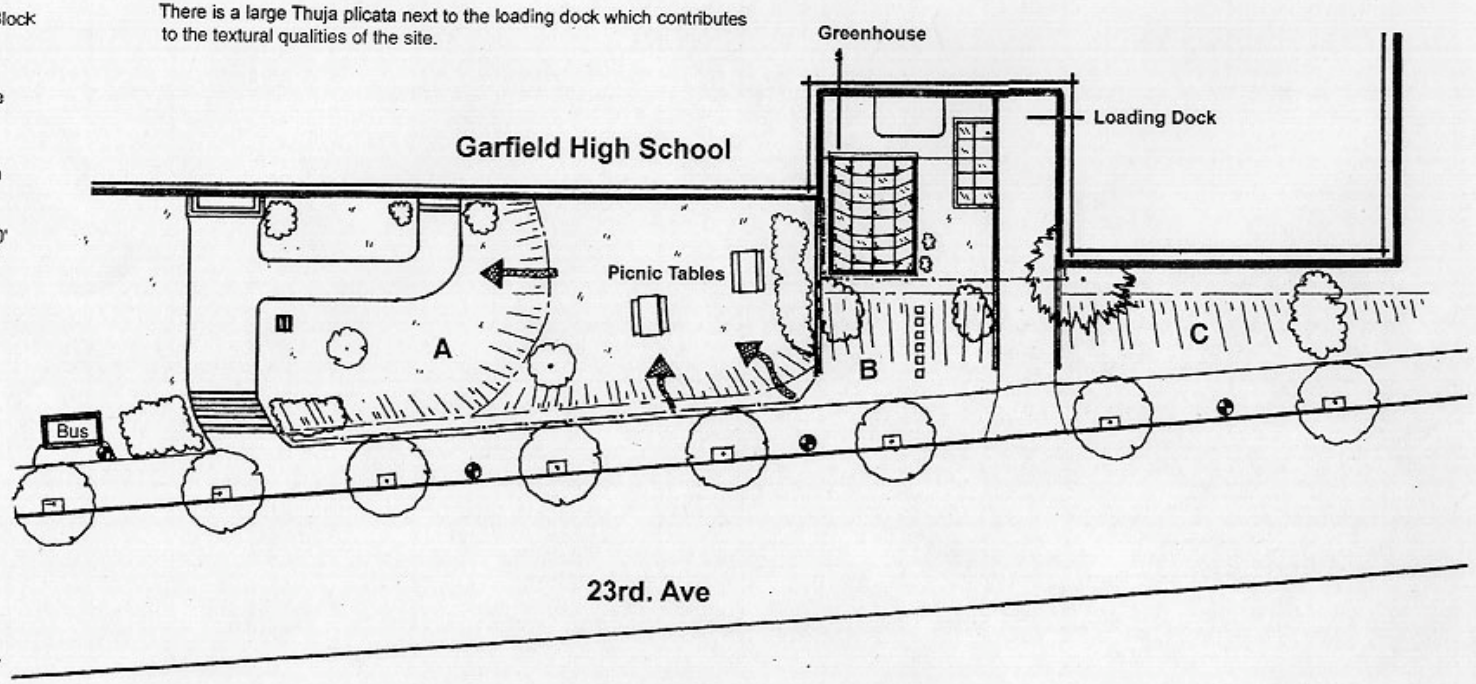
Notes: All slopes North of the greenhouse are covered with Hedera Helix except for a small patch of turf between the upper and lower lawns.

There is heavy auto traffic on 23rd Ave.

The retaining wall between the greenhouse and the lower terraces is a nice element that is now hidden by overgrown shrubs.

Spatial textures and colors are dominated by the brick of the building, and by the turf of the two lawns.

There is a large Thuja plicata next to the loading dock which contributes to the textural qualities of the site.



Garfield High School

Suggested Shrub and Tree Placement