

OUR LADY OF THE LAKE SCHOOL:

South Entrance Landscape Proposal



A project of the University of Washington's
Sustainable Community Landscapes Program
at the Center for Urban Horticulture

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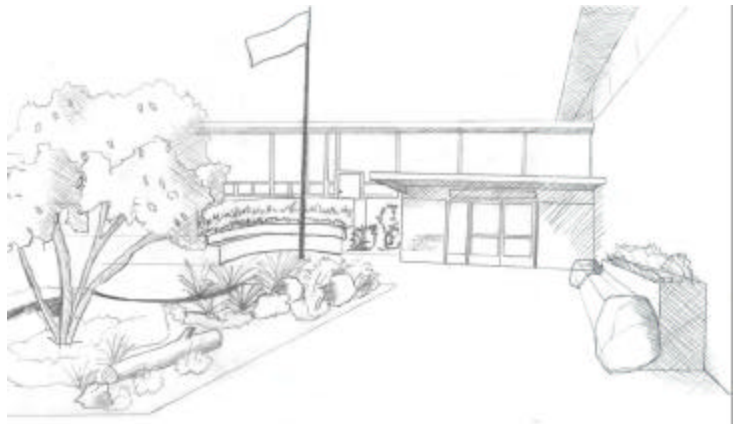
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ABSTRACT

The purpose of this design is to create a garden that meets the desired functional and aesthetic goals of the clients, Our Lady of the Lake School, while also successfully integrating the sustainable design and management principles that are fundamental to the designers' vision statement: to 'create an interactive learning garden for children as well as create a sustainable, beautiful landscape for the enjoyment of the school and church community.' There are numerous design elements incorporated into the design including but not limited to: 1) creating a children's learning garden, 2) creating seating opportunities, 3) creating a sense of entry to the building to enhance the users' daily experience, 4) incorporating ecologically sound and sustainable management practices, and 5) creating habitat for local wildlife.

Our plant selection was driven by our goal to create a sustainable landscape. Due to site orientation, water availability and human use patterns, plants were chosen that would perform well within these constraints. The site is dominated by asphalt, which will absorb summer heat and create heat island effect. To ensure that plants perform well in this location without excessive water or maintenance, drought-tolerant plants were chosen.

This comprehensive document includes a design and construction package: a planting plan, budget analysis, construction details, a plant selection list and additional resources that would allow Our Lady of the Lake Parish School to implement the design.



INTRODUCTION

Through the Sustainable Community Landscapes program, the Our Lady of the Lake School and Parish represented by faculty member Nancy Hanson was partnered with a group of students from the EHUF 480 course “Selection and Management of Landscape Plants” taught by Dr. Linda Chalker-Scott. The purpose of this partnership was to provide the school with a design and installation plan for a new school garden, while providing the University students with an opportunity to work with a real client. The design team members Julie Combs, Naoko Ichii, Brice Maryman, Jennifer Szabo and Rachael Watland created this document as a comprehensive summary of their work during the course of the Fall 2002 quarter. It is intended to be a workable plan for the clients at the Our Lady of the Lake School, as well as being used as part of the project archive of the Center for Urban Horticulture at the University.

VISION STATEMENT

Our goal is to create an interactive learning garden for children as well as create a sustainable, beautiful landscape for the enjoyment of the school and church community.

PROJECT HISTORY

The Our Lady of the Lake School and Parish

The Our Lady of the Lake parish has been worshiping together since 1929. The group purchased the current property for the construction of a church in the 1940s. Shortly after this time, a group of parishioners came together to create a school, and in 1949, the school building was completed and opened to students. Soon a ballooning student population necessitated a larger facility, so the school built an addition in 1955. Likewise, an expanded congregation built a new church in 1965. The property has remained largely unchanged since that time (Our Lady of the Lake Case Statement, 1995)

Currently the school has 204 students in grades Kindergarten-8th grade. The school’s curriculum includes environmental education as well as other hands-on science topics. The teachers would like to enhance their curriculum by using the school grounds. The proposed plans would provide flexible areas that classes could use to learn about topics such as the lifecycle of a plant, wildlife

habitat, and much more.

The Sustainable Community Landscapes (SCL) Program

The Sustainable Community Landscapes (SCL) program is a regional consortium based at the Center for Urban Horticulture at the University of Washington. It serves to integrate regional efforts to create, rehabilitate, and manage landscapes in human-altered or urban areas. They have participants from K-12 and higher education, non-profit organizations, governmental agencies, industry, and the community. Through the application of plant and soil sciences, they hope to increase the percentage of sustainable landscapes in the Puget Sound region. Their educational programs and outreach activities focus on increasing awareness of sustainable management techniques, thereby reducing harmful practices that damage plants and ecosystems (SCL Website, 2002).

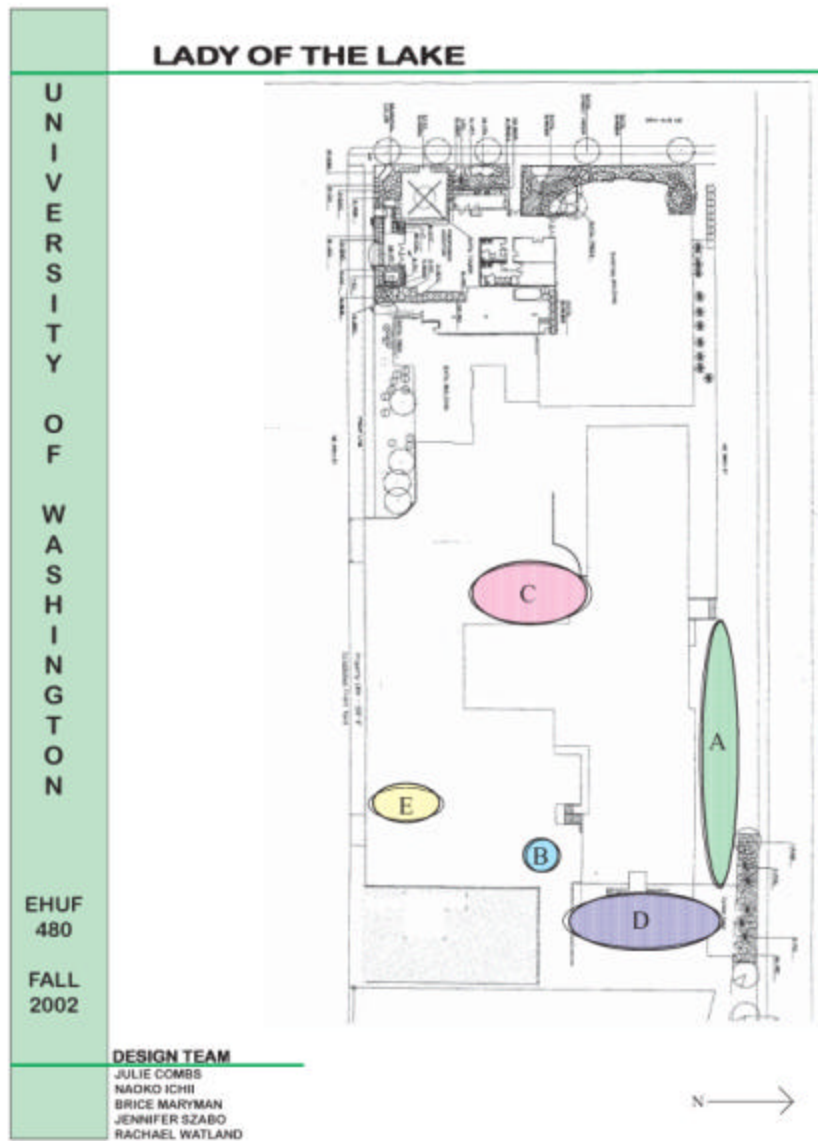
EHUF 480 Course

EHUF 480: Selection and Management of Landscape Plants is a five-credit class offered every fall quarter. In this class, students are taught the basics of sustainable plant management and selection, including theories, myths, and techniques. Early in the quarter, the students are assigned to teams of 5-10 students to work on a site analysis, design scheme, and management plan; clients are encouraged to work closely with students throughout the project. The students work with community members to learn the site's history and analyze the soils, hydrology, plant materials, uses, and other conditions that will influence site plans and plant success. Once the site has been analyzed, students craft a design scheme, explaining what plants they recommend installing, how they would deal with existing problems, etc. The students also create a detailed five-year management plan explaining how to implement and care for the suggested design and plantings. At the end of the quarter, community clients receive a book containing site analysis, design ideas, and the management plan. This plan can then be implemented by the community group, with or without help from students in EHUF 481 or 482 (SCL Website, 2002).

DESIGN PROCESS

Project Selection

During the project selection phase, a list of potential projects was developed based on initial communication with the clients as well as an on-site analysis by the design team. The following sites were considered along with the challenges and opportunities that each posed:



North Entrance

- Everyday administrative entrance
- In need of beautification
- Public amenity
- High visibility from street
- façade change, not interactive
- Soil health concerns

Cedar Tree in Planting Box

- Centrally located
- Highly compacted
- Close to building
- Health of tree is threatened
- Kids seem attached to tree
- Results would be difficult to predict because of feasibility
- Opportunities to free up traffic patterns

South Entrance

- Children's primary entry
- Flag pole is an icon
- Play area for kids
- Lots of pavement
- Kickball wall?
- Opportunities for raised beds/interactive gardens
- Visible from church



East Entrance

- Highly visible for kid's experience
- Small area
- Needs a greater sense of entry
- Opportunities to soften the building
- Would involve removing asphalt
- Concerns about structure of stairs



- May remove kid's biking area

Blue Spruce

- Tearing up asphalt
- Pressing need
- Soil compaction affects tree health
- Tree might require relocation
- Less connection to the building

The design team presented these site options at an open meeting for interested members of the School and Parish. Through this meeting, it was decided that the design team should focus its attention on the South Entrance to the school, which represented the most fulfilling compromise between the program and aesthetic desires for the children, faculty, parishioners and visitors. In addition to site selection, this meeting provided further project definition that was then developed into the design program.

Design Program

Based on the communications between the design team and the school liaison, as well as with members of both the church and school communities, a design program was developed. The following is a list of those key elements:

- Potential for garden space to be used as part of curriculum or create learning opportunities through interpretive signage
- Seating
- Sense of entry to the building to enhance children's/teacher's daily experience as well as announcing the entry to visitors
- Shaded/covered areas
- Garden space that is interactive: providing children with an engaging sensory experience
- Preserve existing patterns of play (kickball area)
- Gathering space around flagpole which references ceremonial uses (St. Francis)
- Incorporation of children's artwork

- Creation of habitat for local wildlife
- Incorporation of ecologically sound/sustainable management practices
- Sign stating involvement of University of Washington

This design program provided the functional parameters on which to build the aesthetics of the final plan.

Design Narrative

Naturalistic elements that support the design concept are balanced against more urban and architectonic aesthetic choices in order to give the garden a sense of integration with the existing context of the school, church and grounds. These two aesthetics of nature and urbanism form the “material language” of the design. It is the tension and balance of these two ideas, repeated throughout the space, which creates a design that is both dynamic and harmonious.

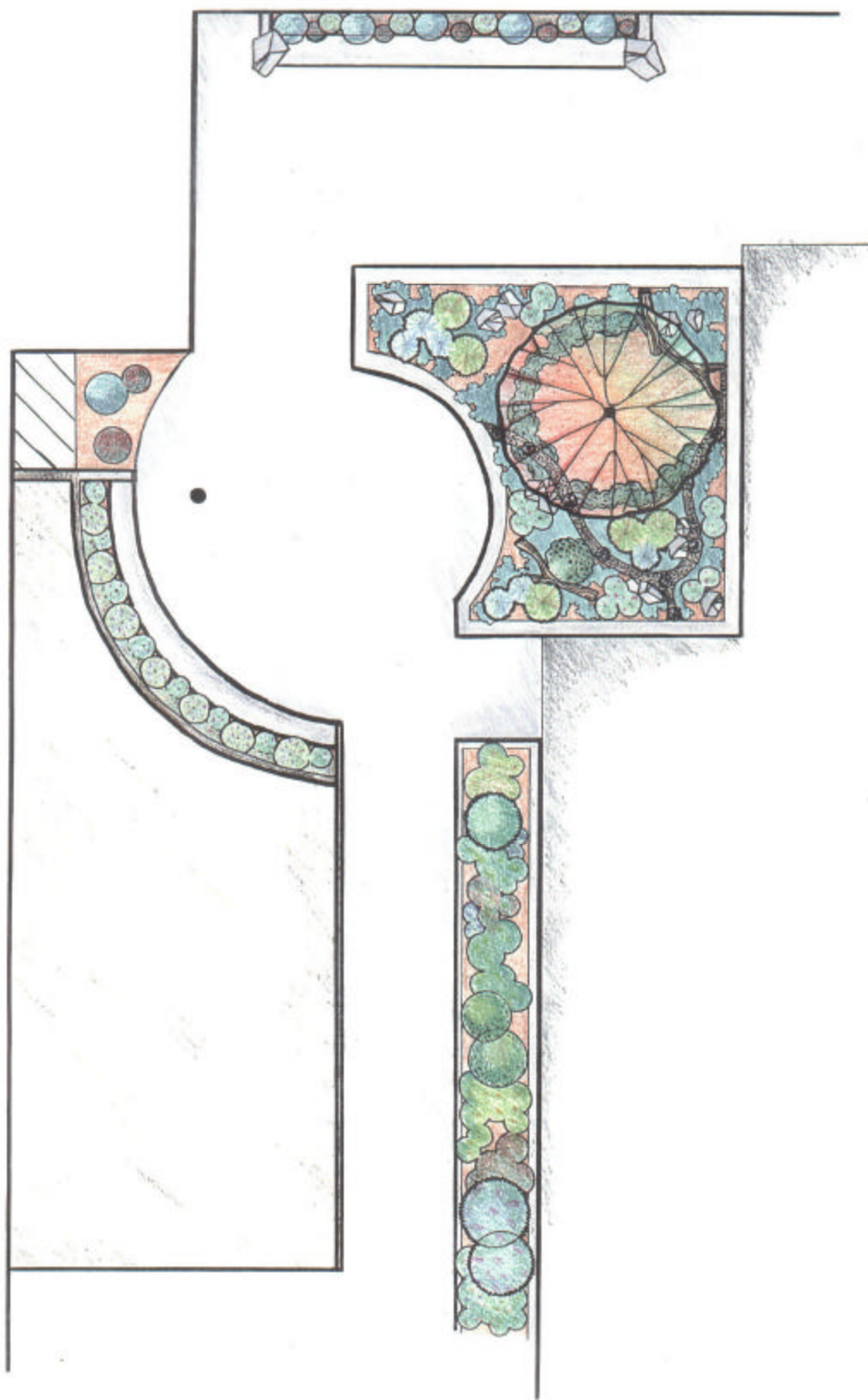


St. Francis in the garden

Raised concrete planters that double as seating walls, provide the framework for the garden, while extending the concrete tones and linear forms of the building and sidewalk into this intermediary plane. Drawing these aesthetics out into the space integrates the garden into the architectural framework of the grounds. Additionally, planters along the building edges soften its form, integrating the building into the garden. This also provides seating for gatherings at the flagpole or outdoor classes.

The plantings are punctuated by bronze and grayish foliage, that once again echoes the colors of the building, creating a more cohesive design. The use of architecturally-structured plants against more free-form ones furthers this overriding design objective.

In order to still provide the feeling of a wildlife habitat within this framework, design elements



Illustrative Planting Plan

such as small boulders, driftwood and trails through planting beds are added. These elements also create new opportunities for imaginative play. This playfulness is reinterpreted through the incorporation of animal tracks in the concrete of the ground plane and stepping stones. Finally, a statue of St. Francis acts as the cornerstone element, honoring both the function of the site as a school and church as well as evoking the concept of wildlife habitat and nature.

All of these elements combine to create the balance and harmony between the two seemingly competitive aesthetics of the natural and the urbane.

OUR LADY OF THE LAKE SITE ANALYSIS

Contextual Analysis

The Our Lady of the Lake property is located along 35th Avenue NE in the Meadowbrook neighborhood of Seattle. Though 35th Avenue is an urban arterial with heavy vehicular usage, the predominant land use that surrounds the school property is detached single family homes. Most of these houses date from the post-WWII building boom. As a result, the neighborhood has an established feel to it, creating a sense of stability and safety.

The Our Lady of the Lake site rests within the boundaries of the Thornton Creek watershed. This water system is an important urban, salmon-bearing creek within Seattle. Community activist's like the Thornton Creek Alliance (TCA) and the Thornton Creek Project (TCP) have taken great strides toward improving its water quality in recent years. Our Lady of the Lake sits like a fortress guarding a ridge of land. The building defines the site's sub-basins. The southern side of the school slopes toward 89th Street NE while the northern side slopes toward 90th Street NE. Since the school building sits closer toward 90th Street, more water runs off of the site toward 89th Street NE.

Light and Seasonal Analysis

General Climate

The general mesoclimate conditions of the Seattle area accommodate a diverse array of plant types. According to Sunset's *New Western Garden Book*, Seattle is classified as zone 5 in the USDA's Plant Hardiness zone system. The Seattle area experiences relatively warm winters due

to ocean influences. Average rainfall for the Seattle area is 36 inches per year. Our wettest months are November through March. Driest months are June through September. Winds come from the northeast in September and October. Winds come from the south/southwest November through August. The average wind speed is 8 mph. The growing season is from early April to early October. The table below summarizes the annual temperature and precipitation for the Seattle area.

*** City of Seattle Website—Weather Almanac

Month	Ave high	Ave low	Ave precip.	Month	Ave high	Ave low	Ave precip.
JANUARY	47	40	5.38	JULY	68	61	0.76
FEBRUARY	50	33	3.99	AUGUST	70	57	1.14
MARCH	44	37	3.54	SEPTEMBER	77	53	1.88
APRIL	74	42	2.33	OCTOBER	56	43	3.23
MAY	57	43	1.70	NOVEMBER	57	46	5.83
JUNE	61	48	1.50	DECEMBER	47	39	5.91

Microclimate (South-facing orientation)

The site receives full exposure to wind, rain, and sunlight. Temperature extremes and water availability will be the most limiting factors for future landscaping. The significant amount of asphalt in the proposed landscape area may act as a reflective surface creating a heat island effect. Evapotranspiration rates may be higher in this location due to sun, wind and heat island exposure which may lead to increased plant stress and decreased plant growth (Chalker-Scott, 2002). To ensure that plants perform well in this location it will be important to apply a top layer of mulch to retain moisture and decrease soil temperatures, alleviating some of the stresses of seasonal drought. It will also be important to make sure water is available for landscaping during and after installation.

Night Lighting

Artificial lighting can affect plant growth by modifying the photoperiod (Chalker-Scott, 2002). There is some night lighting on the school grounds but it is limited to directly around buildings and on the street. The artificial lighting should not significantly affect plant performance in the proposed planting areas.

Hydrology

Percolation Test

Hydrology refers to the movement of water through the soil. Urban soils are typically compacted

resulting in poor drainage (Harris et al, 1999). A percolation test was performed on the north side of the site to determine the rate at which water moves through the soil. The soil type (see Soil Analysis section) and condition (compaction issues) on the north side are comparable to what might be found on the south side.

A hole was dug approximately 10 inches deep (500ml) into the soil in which 500 ml of water was poured. It took the water approximately 50 minutes to drain indicating that the soil has very poor drainage. In the future, if plants are installed in this area the soil should be broken up to encourage better drainage. The results below show a very slow percolation rate indicating that the soil is poorly drained and should be properly aerated before landscape installation begins.

Table 1. Percolation Test Results (10/18/02)

Location: North side of school

Initial Volume:	500 ml
Time to Drain	50 minutes to 1 hour

Soil Analysis

Sampling

Two soil samples were collected at Our Lady of the Lake School on October 18, 2002. Soil at Site 1 was collected in the front yard near the north entrance of the school. Another soil sample collected on at Site 2, under the cedar tree in the planting box.

Field Observation and Soil Texture

SITE 1: There was only turf grass growing but much of the grass was worn away in this area. The soil was highly compacted since foot traffic was heavy going to and from the playgrounds in the back of the school. A soil core revealed a lack of any discernable soil horizon. There was a layer of very hard concrete at a depth of approximately 15 mm, which was very difficult to penetrate through. There was a high volume of gravel and cobbles in the soil sample. The soil was a uniform light brown in color and the texture was of a sandy loam variety.

SITE 2: The soil was much more compacted at this site than Site 1. The soil was so hard that it was only possible to dig down 4 inches. The soil texture was a sandy loam, same as Site 1 except there was a much higher volume of cobble and gravel stones in the sample. The color was

uniform and a slightly lighter brown than at Site 1.

Soil Chemical Characteristics

Soil chemical characteristics were determined by the Soil and Plant Tissue Testing Laboratory at the University of Massachusetts.

Table. Result of soil test

Soil chemical characteristics	Site 1 (Front yard)	Site 2 (Under a cedar tree)
Soil pH	5.9	6.8
Organic matter (%)	2.8	1.5
Nitrate (NO ₃ ⁻ ; ppm)	3	7
Ammonium (NO ₄ ⁺ ; ppm)	3	1
Phosphorous (P; ppm)	3	4
Potassium (K; ppm)	37	157
Calcium (Ca; ppm)	463	858
Magnesium (Mg; ppm)	32	74
Cation exchange capacity (Meq/100g)	5.2	3.7
Extractable aluminum (ppm)	157	39

Soil pH

Soil pH affects nutrient availability to plants and microbial reaction in soil. Soil pH at Site 1 was within the desirable range, whereas the pH of Site 2 was somewhat higher than desirable range for plants. Most plants grow well a soil pH between 5.5 and 7.5. Soil of Pacific Northwest tends to have a slightly acidic pH because of the parental material and climate.

Nitrogen

Plant absorbs nitrogen from soil as nitrate (NO₃⁻) and ammonium (NO₄⁺). Because their levels are susceptible to soil and weather conditions over short periods of time, nitrogen measurements are used to examine extreme levels of nitrogen in the soil. Over-fertilization often results in high nitrogen levels, which can be detrimental to plant health. The levels of nitrogen of both sites were low, indicating there were no problems with over-fertilization.

Soil organic matter

Soil organic matter controls microbial activity in soil and affects some aspects of the soil

structure. Organic matter at both sites was much lower than desired range (4% to 10%). Low organic matter was likely caused by soil compaction and the lack of significant vegetation at both sites. Because the soil at Site 2 was highly compacted, decomposing leaves from the cedar tree were not able to enter the soil and increase the organic content. On the other hand, turf grass roots at Site 1 contributed some organic matter to the soil.

Phosphorous

Phosphorous levels in both sites were relatively low. A deficiency of phosphorous can lead to impaired vegetation growth and weak root systems. However, no phosphorus should be added to these sites because high level of phosphorous leads not only to water pollution but also to nutrient deficiency such as iron and manganese.

Potassium

Plants take up large amounts of potassium during the growing season. Potassium deficiencies cause marginal and interveinal chlorosis and scorching. While the potassium level at Site 2 was high enough, that of Site 1 was low. Potassium deficiency is related to soil pH, soil texture, soil organic matter, and cation exchange capacity.

Cation exchange capacity

Cation exchange capacity (CEC) indicates the soil's ability to hold and supply nutrients to plants. CEC is affected by soil texture, organic matter levels, and soil pH. CEC levels were low at both sites mainly because of low organic matter.

Lead

Soil lead levels are important for playground safety because soil contamination by lead becomes a health risk. Although lead level of the Site 1 was higher than that of the Site 2, both were within acceptable ranges.

SOUTH ENTRANCE SITE ANALYSIS

Water

The site does not receive supplemental water beyond natural precipitation. There is a hose bib along the west side of the gymnasium façade, but this is no longer functioning. There was talk

about having this outlet repaired. We would recommend its' installation in order to facilitate garden maintenance.

The lack of additional water led us to investigate some type of rainwater harvesting/collection system, but when we found out the school roof was made of tar and other petroleum based products, we decided that this would not be the proper place for that type of system, especially since children might end up eating the fruits and berries in the area.

Water issues lead to some specific plant issues as well. Due to the high thermal and solar gain on this side of the building, drought tolerant plants seemed to be the most appropriate types of plants by far. These plants would also benefit the larger urban watershed, since they draw less heavily on those resources. (See <http://www.cityofseattle.net/util/RESCONS/plantNaturally/> or <http://www.ci.seattle.wa.us/util/lawncare/rightplants/resources.htm> for more information).

Use

The site is currently the outdoor multi-purpose area for the school. On weekdays, children run and play on the asphalt and the "little toy." During the weeknights, PTA meetings and community groups fill the parking lot. On the Feast of St. Francis, a blessing of the animals is held around the flagpole. During the weekends, cars pick up and drop-off parishioners near the flag pole and school entrance before parking on the asphalt.

Pedestrian Traffic

Pedestrian traffic flows primarily into the building along the bisecting north-south axis of the building. However the scurry of tiny feet pound the pavement across the entire site, concentrating on the area near and around the little toy.

The Our Lady of the Lake Parish School site presents many challenges. The multiplicity of uses, while allowing for many user groups to use the space, allows none of them to feel like they know which space is truly theirs. School children at church on the weekend may find their favorite patch of weekday play surface being guarded by a Ford Expedition. We believe that there are other ways to more effectively delineate where one group of users' space ends and where another begins. In particular, we hope to provide some type of green space for the children that wrestled some of the hard, paved surfaces away from the automobiles and gave it directly to the younger age groups. This is particularly important since it has been proven that an interaction with nature

at an early age and creating “child-owned spaces” promotes early childhood development (Moore & Long, 1997; Nabhan & Trimble, 1994).

The playground area that is being designed is a multi-functioning space with many constraints. The largest constraint is the need for parking as regulated by city codes. There are also utility areas that require vehicle access, such as the church dumpster. A new design must allow for this dual purpose as well as continued access to these areas. The proposed design will create well-defined areas of vegetation that will not conflict with necessary parking.

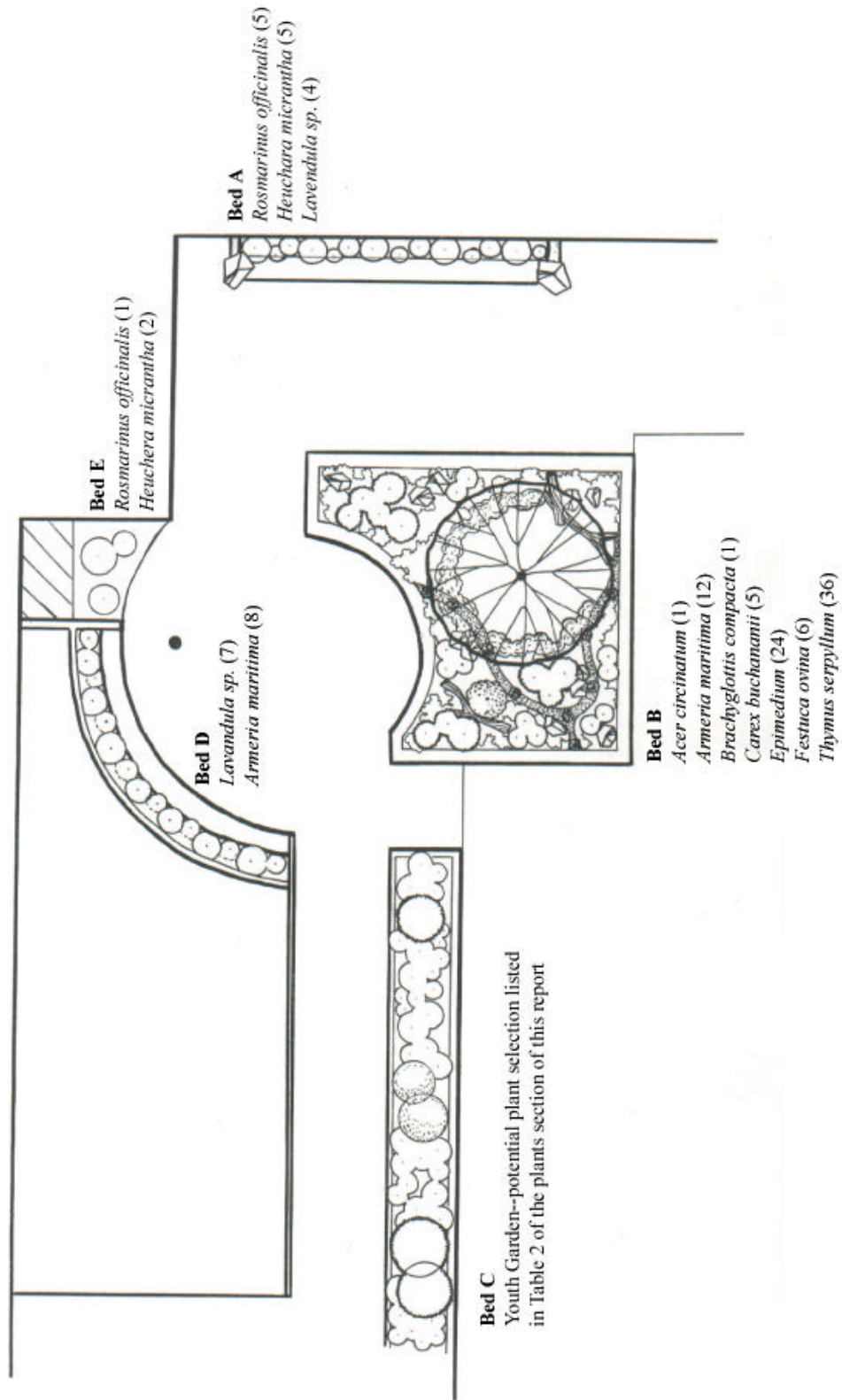
PLANT SELECTION

Sustainable Landscape

One of the key elements of sustainable community landscapes is installing plants that require a low-maintenance regime. Therefore, we chose plants that would respond well to the existing site conditions. Since the site has good exposure, plants were selected that can tolerate high light levels. Most of the plants require low to moderate amounts of water, reducing the need for irrigation even during dry summers. Groundcover—*Thymus serpyllum*—was used to protect the soil by adding organic matter and conserving soil moisture. Two ornamental grasses—*Festuca* and *Carex*--were selected because they are drought-tolerant and low maintenance. Our choice for a larger shrub, *Rosmarinus officinalis* also meets criteria of toughness and low maintenance.

Central Bed and Planter Boxes

Plants in the central bed and planter boxes areas were selected based on site conditions. The south-facing orientation limits the planting palette to species that would perform well in compacted soil, full sun and low to moderate water requirements. A limited selection of native plants would perform well in the central bed; this justified our decision to use mostly non-native ornamental plants in this area. We have selected plants--*Armeria*, *Bracyglottis*, *Epimedium*, *Heuchera*, and *Lavandula*—that will perform well for the site conditions (i.e. low to moderate water requirements, full sun and low maintenance).



Planting Plan

CHILDREN'S EDUCATIONAL GARDEN

Children's Benefit

Engaging sensory experience

Plants that engage children's senses have been chosen to encourage their interaction with nature. Vine maple (*Acer circinatum*) was chosen because of autumn leaf color. The contrast between the evergreen plants and the maple's bright red foliage will impress and delight children, providing them with a visual record of the changing seasons. The understory plants were chosen using a cohesive color palette, while providing variety through an assortment of textural experiences. *Heuchera micrantha* was chosen out of many cultivars and varieties because of its purple foliage. Perennial plants such as *Armeria maritima* and *Epimedium* were chosen because of showy and colorful flower. *Rosmarinus officinalis* is ever-blooming shrub with colorful flowers. *Lavendula heterophylla* and *L. multifida* will provide sweet scent. *Carex buechananii* was chosen not only because of its ornamental value, but also because of its tactile softness.

Safety

Safety concerns were thoroughly considered. We avoided any plant that is poisonous, thorny, or sharp was avoided. Due to concerns for the children's safety—as well as maintenance concerns—we avoided plants that produced fruits, berries or acorns; because of concerns that they would be eaten or used as “ammunition.”

Creating learning opportunities

An educational garden was incorporated; this area will be used as an outdoor laboratory to study various aspects of the natural world. This area is flexible and can be changed periodically as curriculums or interest dictate. A native plant garden designed to attract hummingbirds is one potential theme for the experimental garden. The objective of a hummingbird garden using indigenous plants would be to increase children's familiarity with the native plant of the Pacific Northwest, to learn which hummingbirds use the Puget Sound region during their migratory journeys, and to learn about plant and pollinator interaction.

Enhancing wildlife habitat

Enhancing wildlife habitat will give children sensory experiences and increase biodiversity at the site. Some plants such as *Rosmarinus officinalis* and *Lavendula* spp. attract hummingbirds and

butterflies. As an additional benefit, the proposed design will create positive impacts—by reducing impervious surfaces and minimizing water usage—for the salmon in the Thornton Creek system.

REGULATIONS AND ORDINANCES

One of the main constraints for the design of the selected area was the parking requirements of the site. The site takes advantage of having the dual purpose of being a playground for school children during the weekdays, and serving as a parking lot for the church during weekends and evenings. Both the church and the school share the same requirements for the amounts of necessary parking that are dictated by the City of Seattle Municipal Code, Section 23.54.015, which requires “1 parking space for each 80 square feet of all auditoria and public assembly rooms.” The playground supplements the additional need during the weekends when the church building is in greater use.

Working from the site plan that was used to acquire the original city approval for sufficient parking, we determined that additional parallel parking could be created along the fence on the south end of the playground. These spaces would allow for the displaced parking spaces due to the new design.

In addition to vehicular access, the design of a playground requires the examination of other issues. The playground should meet standards set out by the Americans with Disabilities Act. These regulations involve sensitive design that creates spaces that are accessible to people of all abilities. The design should address elements such as minimal slope requirements, path widths and equal experiences. These standards can be found on the website www.ada.gov.

CONSTRUCTION

Site Preparation

The first step in preparing the site for landscape installation is the removal of unnecessary asphalt and concrete in areas that will become the central planting beds. With a paving saw and jackhammer, this task should take a few volunteers one day to complete.

Hardscape Installation

While this portion of the site proposal requires more skilled labor, a few handy parents or parishioners can likely tackle this project during a long weekend. For the central bed, concrete formwork should be constructed and the seating curbs poured. The more difficult construction will happen on the benches. Again, formwork will need to be constructed, but will include curves, cut-outs for stone placement and other advanced construction techniques. Once the forms are in place, the concrete should be poured and allowed to cure.

These hardscape installations should be built according to the drawings in the appendices.

Please note that we have designed a recessed area to install tiles on the long bench against the current gym wall. We envision these tiles as pieces that the schoolchildren would design and paint, so that the benches could show off all of the amazing activities of the school. In addition, by participating in the construction of this new area, the children would have some connection to it.

Soil and Softscape Installation

The final stage of the construction will involve importing and grading the soil and installing the plant materials. After removing asphalt, use a pickaxe to loosen up the first 6 inches of soil. Breaking up the soil will improve drainage (Chalker-Scott, 2002). After soil has been properly aerated backfill and thoroughly mix in 4-6 inches of unamended soil. If unamended soil is not available, then use a 3 and 1 mix. If 3 and 1 mix is used backfill up to 8 inches because it will subside as it decomposes. All other planters and beds should be filled with the same unamended soil.

For the educational garden, dig asphalt up and scarify the surface except where the bed dies to grade. Where the bed dies to grade loosen up soil approximately 4-5 inches with pickaxe and mix in unamended soil. Fill bed with unamended soil just below the curb of the planter box. If unamended soil is not available, then use a 3 and 1 mix. But again, more soil will be needed because it will decompose and subside.

Nursery Selection

We recommend purchasing plants from City People's Nursery, Swanson's Nursery or Sky Nursery. Unfortunately, native plant selections for the children's educational garden may be limited at these places.

For native plant selection please see King County's web site on native plant sources for the Pacific Northwest (<http://dnr.metrokc.gov/wlr/pi/npnursry.htm>). There is also a generous supply of native seeds online. It may be a great biology project for the kids to germinate the seeds, grow them in milk cartons and plant them in the educational garden.

No matter where the product is purchased, it is important to choose healthy specimens to ensure that plants will perform well. Nurseries will not always have high-quality material, but we suggests taking the time to find acceptable material because high quality plants will perform better and live longer in the landscape. Plants that perform well will reduce maintenance and replacement costs, saving money in the long run. The following are some general guidelines for selecting containerized plants (Chalker-Scott, 2002).

- Make sure plant shows general vigor, i.e. healthy leaves (no damage), no twig die back on stems and overall healthy appearance.
- Plants should be "can-full" meaning that they are firmly in the pot. Plants that wobble or are movable should be avoided because they may have root problems.
- The size of the plant should be proportional to the size of the container. For example, if you choose plants that are very tall in a small container, the relatively small root system may be insufficient to support the crown growth.
- Do not choose plants if roots are growing out of the bottom of the container. This indicates that the plant is root-bound and may have circling or girdling roots that may cause the plant to perform poorly and die shortly after installation.
- Do not choose plants that have been poorly pruned (i.e. heading or topping). This may lead to an undesirable and unstable growth habit later on.

For choosing the vine maple (*Acer circinatum*) keep in mind the above suggestions as well as:

- Choose plants with good trunk taper. Inspect root crown of B&B (balled and burlapped) trees to avoid damaged or rotted trunks. If you are unable to see the root crown, peel back the burlap and check for rot. The B&B should not cover the lower trunk.
- Avoid trees with “knees”¹. This indicates possible circling or girdling roots which will lead to tree death or poor performance.
- Make sure the plant looks uniform in size and shape.
- Make sure the root ball is intact and not dried out.
- Make sure it is the appropriate size for the species.

Plant Installation Specifications

These are general plant installation specifications for containerized woody perennials. Fall is generally the best time to install plants because they usually outperform those planted in winter or late spring. Winter may be too cold for certain species to establish and summer and spring would require more water and aftercare (Harris et al. 1999). It is important to care for material prior to planting so they can perform their best when placed in the ground. Plants on site should be protected from excessive light and heat so they do not desiccate. Keep the roots cool and moist.

Planting Hole Preparation

- 1 With a shovel or spade dig a shallow-wide hole no deeper than root mass but at least twice as wide so backfill can be worked in easily around plant (Harris et al. 1999).
- 2 Remove all debris from planting hole (i.e. gravel, rocks, roots, plastic...).
- 3 The sides should be scarified with a shovel or spade so roots can penetrate beyond the backfill/native soil interface. Do not loosen or disturb soil at the bottom of hole because it could cause the plant to subside (Chalker-Scott 2002).
- 4 Create a mound in the middle of planting hole. The mound should be able to support the size and structure of the root crown.
- 5 Do not add soil amendments into the hole (i.e. compost, mulch, or fertilizers).

Preparing Roots

- 1 Remove all foreign material from plant and root mass (plastic tags, wire, burlap...).
- 2 Potting material must be removed (try to examine roots before you buy them to make

¹ Tree knees refer to roots that have come out of the soil and then submerged back into the soil, exposing a portion of the root near the trunk. The presence of knees often indicates kinked or circling roots, which can

sure they are not root bound otherwise removing potting material will be labor intensive). Removal of soil medium is important because differences in soil texture may inhibit plant establishment.

- 3 Examine roots and prune out any circling, kinking, girdling, damaged, diseased or excessively long roots.

Placing Plant in Hole

- 1 Drape or spread the plant's roots radially and evenly over the mound.
- 2 Orient the healthiest portion toward where it will be most visible (i.e. if next to a building orient weaker side facing the building).
- 3 Root crown should be level with or above grade.
- 4 Only backfill with unamended native soil. Backfilling with mulch or potting soil will decompose overtime and cause subsidence. It will also prevent root expansion because roots will tend to stay within the original growth medium (Chalker-Scott 2002).
- 5 Use fingers to work in soil, using a shovel or spade could compact or damage roots.
- 6 Water to settle plant and eliminate any air pockets in the soil.
- 7 Add more unamended backfill if necessary and water again.

Immediate Aftercare

- 1 A top layer of organic mulch should be applied on the top of the root zone area. Make sure you leave 1-2 inches mulch-free around the trunk. Woodchips are best to use for woody perennials (Chalker-Scott 2002).
- 2 If a plant needs to be staked for support, stake low and loose (the bottom 1/3 of plant). Stakes should be removed after one growing season (Chalker-Scott 2002).
- 3 Build a small berm around the edge of the planting hole to contain water for the plant.
- 4 Prune any dead or diseased branches from vegetative portion of plant. Be careful not to top prune or prune any live portions unless there is damage otherwise plant performance may suffer.
- 5 Water plant thoroughly and maintain watering regime while the new transplant establishes: typically one to two growing seasons (Chalker-Scott 2002).

shorten plant longevity.

(Note: Please see the Sustainable Community Landscapes webpage for visual images of these plant installation techniques [<http://www.cfr.washington.edu/research.mulch/>]).

Maintenance and Aftercare

General maintenance for each garden

Because landscape plants for Our Lady Lake of School were selected for their attributes of low maintenance and adaptability for existing site conditions, they will require only minimal care. The educational garden may require a little more care depending on what theme is chosen such as regular watering.

Watering

Since the landscape plants were selected with minimal or moderate irrigation needs, only occasional watering is needed after the plants are successfully established. See the chart of selected plant lists for watering guideline for each specific plant. Initially, give enough water every 4-7 days during the first growing season to establish a strong root system. Dry summers in Seattle will be crucial for some perennial plants to survive at the educational garden. Regular watering is recommended during this season.

Since water uptake and loss differ among plants and site conditions, it is important to carefully check the soil conditions at each site before watering. The best time to water is in the morning and anytime when plants are dry.

Mulching

Organic mulch should be applied to the sites. Woodchips are a desirable type of mulch because of its affordability, availability, and appearance. Mulch will not only control weeds but will improve soil structure and nutrient content by adding organic matter to the soil. Because the site is surrounded by asphalt, temperature extremes and high evapotranspiration rates will be problematic. Mulch will mitigate these obstacles by improving aeration of the soil and conserving water. It is important to replenish mulch twice a year for maximum effectiveness. Woodchips will not be applied to the youth garden since either perennials or annuals will be planted. Instead of woodchips, other organic mulch would be applied to topsoil.

Weeding

Regular weed removal is recommended for two reasons. First, the landscape should be kept attractive at all times. Second, weeds should be removed for plant health. Weeding is necessary to reduce competition between perennials and weeds for limited nutrient and water resources. As the shrubs and perennials become established, the need for intensive weeding will decrease significantly.

Pruning

Because most selected plants are shrubs or perennials, they require little to no pruning. Pruning influences vigor, flowering of the plant, maintains neat forms and controls the size of the plant. However, it is important to prune plants in correct manner at the right time. Proper pruning for each plant is described in the “General care for individual plants” section below.

Fertilizing

If mulch is properly and regularly applied, conventional fertilizers will not be needed. The mulch will release enough nitrogen and other nutrients necessary for the plants. Compost may be used as a fertilizer in the educational garden. However, all fertilizers should be thoroughly checked for their suitability for use near children.

Replacing plants

Plants should be replaced immediately as needed. Suggestions for replacing each plant is described in the “General care for individual plants” section below.

Plant inspection

Plants should be inspected periodically in terms of plant health. It is necessary to know the growing pattern and morphology of the plant to detect health problems. Weather patterns and cultural practices are other factors affecting plant health. If there are any problems with a plant, it is important to determine whether they are caused by biotic (diseases, pests) or abiotic (cultural condition) reasons. There are many useful web sites available, regarding Integrated Pest Management, such as Hort Sense provided by Washington State University (<http://pep.wsu.edu/hortsense/>).

Keeping records

All maintenance activities that are performed throughout the year, including pest/disease inspection, should be recorded. Keeping records will help to enhance plant health and improve garden conditions, therefore encouraging sustainable landscapes.

General care for individual plants

Acer circinatum: Pruning should be done in summer or early fall to minimize sap bleed. Only perform collar cuts. Avoid flush-cutting, stub-cuts and top pruning. During the first few years, pruning is essential to train the young plant. Proper pruning should result with a central trunk and strong branch structure.

Rosmarinus officinalis: Occasional pruning may be needed to remove older plants. If the plant becomes woody, remove a few of the old branches so that the plant can fill in with new growth.

Armeria maritima: Water moderately during summer.

Epimedium perralchicum: Cut back in late winter before new growth begins.

Heuchera micrantha: Remove dead flowers to have a longer blooming period. May be divided in spring every 3 or 4 years.

Lavandula spp.: Prune back or shear every year after blooming to keep the plant neat.

Potential plants for the educational garden

Aquilegia formosa: Cut back old stems for second crop of flowers. Every 3 or 4 years replacement will be needed.

Aster foliaceus: Can be divided in late fall or early spring.

Camassia quamash: Give enough water to keep soil moisture during growing and blooming period.

Campanula rotundifolia: Maintain adequate drainage around the plant. The plant can be propagated by seeds.

Phlox subulata: Requires moderate watering in the summer. Cut back half of plant material after blooming.

Silene acaulis: Water regularly.

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APPENDIX A

Estimated Budget

CONSTRUCTION BUDGET

of Hours

Rate/hr.

Total

Site Assessment

Site Selection	3	\$35	\$105
Site Analysis (traffic, light, vegetation, etc.)	3	\$35	\$105
Soil Analysis			
Collection of Samples	.5	\$35	\$35
Lab Analysis	N/A	\$123	\$123

Site Assessment Grand Total	\$368
Actual Site Assessment Total	\$0.00

Design and Planning

Design Process	20	\$35	\$700
Drafting	5	\$35	\$175
Production of Plans and Documents	20	\$35	\$700

Design/Planning Grand Total	\$1575
Actual Design/Planning Total	\$0.00

Site Preparation

Remove Asphalt	24	\$20	\$480
Rental of Jackhammer		\$68	\$68
Rental of Concrete Saw		\$91	\$91
Clear Asphalt Debris	16	\$20	\$320

Site Preparation Grand Total	\$959
Actual Site Preparation Total (minus labor)	\$159

Install Hardscaping

Build Seating Curb Formwork	6	\$20	\$120
Pour Seating Curb	2	\$20	\$40
Build Gym Bench Formwork	48	\$20	\$960
Position Boulders	4	\$20	\$80
Pour Gym Bench	8	\$20	\$160
Build Flag Bench Formwork	8	\$20	\$160
Pour Flag Bench	4	\$20	\$80
			\$1600

Materials:

Rental of Concrete Mixer	\$34	\$34	\$34
Plywood for Formwork	4/bd.	\$80	\$80
Concrete	75/yd	\$150	\$150
Accessory Materials	n/a	\$40	\$40
Concrete Coloring	n/a	\$40	\$40
			\$344

Hardscape Installation Grand Total	\$1894
Actual Hardscape Installation Total	\$394

<u>Install Softscaping</u>	# of Hours	Rate/Hr.	Total
Pick axe and mix imported topsoil with gravel sub-base in planting area	2	\$20	\$40
Dump and Grade Imported Topsoil	4	\$20	\$80
Place Boulders and Logs	1.5	\$20	\$30
Install Plant Materials	5	\$20	\$100
Install Mulch	3	\$20	<u>\$60</u>
			\$310

Materials	Unit Cost	Quantity	Total Cost
Boulders	\$80	4	\$320
Soil	\$500	1	\$500
Woodchips	\$100	1	\$100
<i>Acer circinatum</i> (B&B)	\$40	1	\$40
<i>Rosmarinus officinalis</i> (1gal.)	\$9	6	\$54
<i>Armeria maritime</i> (1gal.)	\$15	20	\$300
<i>Brachyglottis compacta</i> (1gal.)	\$10	1	\$10
<i>Epimedium</i> (1gal.)	\$15	24	\$360
<i>Carex buchananii</i> (1gal.)	\$10	5	\$50
<i>Festuca ovina</i> (1gal.)	\$10	6	\$60
<i>Huechera micrantha</i> (1gal.)	\$10	7	\$70
<i>Lavendula</i> sp. (1gal.)	\$9	11	\$99
<i>Thymus serpyllum</i> (4")	\$2	36	<u>\$72</u>
			\$2025

Softscape Installation Grand Total	\$2335
Actual Softscape Installation Total*	\$2025

MAINTENANCE BUDGET

First year after planting

Watering: May-October (and as needed)

.5 hours per week	12	\$20	\$240
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Plant Health Assessment

Site visit once per month for .5 hour	6	\$45	\$270
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Reapplication of Mulch

Labor	1.5	\$20	\$30
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Continuing Growing Season Maintenance

Raking, weeding, trash removal; twice per month for .5 hour	12	\$20	\$240
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			\$780
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Second year after planting

Watering: May-October (and as needed)

.5 hours per week	12	\$20	\$240
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Plant Health Assessment and Maintenance

Site visit once per two months for .5 hour	3	\$45	\$135
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Professional consultation as needed	1	\$45	\$45
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Material for pest control – to be determined upon consultation

Pruning

Labor	1	\$20	\$20
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Reapplication of Mulch

Labor	1.5	\$20	\$30
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Continuing Growing Season Maintenance

Raking, weeding, trash removal; twice per month for .5 hour	12	\$20	\$240
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			\$710
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Third year after planting

Watering: May-October (and as needed)

.5 hours per week	12	\$20	\$240
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Plant Health Assessment and Maintenance

Site visit once during summer for .5 hour	.5	\$45	\$45
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Professional consultation as needed

Material for pest control – to be determined upon consultation

Pruning

Labor	1.5	\$20	\$30
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Continuing Growing Season Maintenance

Raking, weeding, trash removal; twice per month for .5 hour	12	\$20	\$240
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			\$555
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Fourth year after planting

Watering: May-October (and as needed) .5 hours per week	12	\$20	\$240
Plant Health Assessment and Maintenance Site visit once during summer for .5 hour Professional consultation as needed Material for pest control – to be determined upon consultation	.5	\$45	\$45
Pruning Labor	1.5	\$20	\$30
Continuing Growing Season Maintenance Raking, weeding, trash removal; twice per month for .5 hour	12	\$20	\$240
		Total	\$555

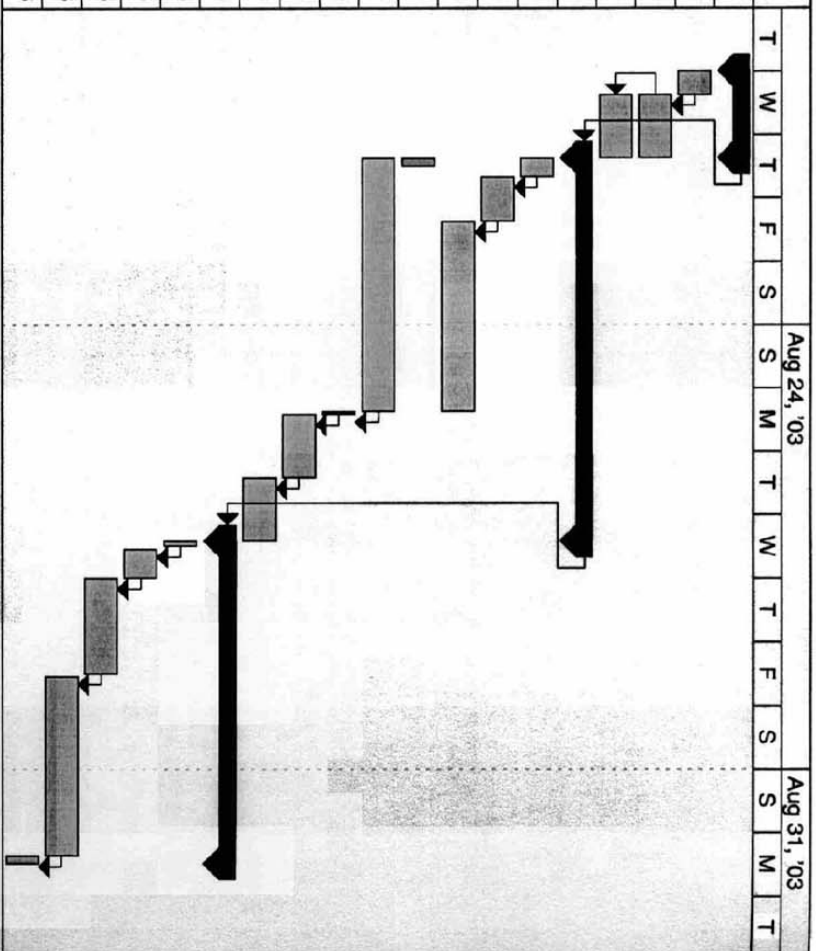
Fifth year after planting

Watering: May-October (and as needed) .5 hours per week	12	\$20	\$240
Plant Health Assessment and Maintenance Site visit once during summer for .5 hour Professional consultation as needed Material for pest control – to be determined upon consultation	.5	\$45	\$45
Pruning Labor	1.5	\$20	\$30
Continuing Growing Season Maintenance Raking, weeding, trash removal; twice per month for .5 hour	12	\$20	\$240
		Total	\$555

APPENDIX B

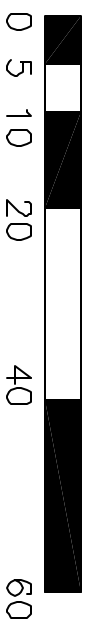
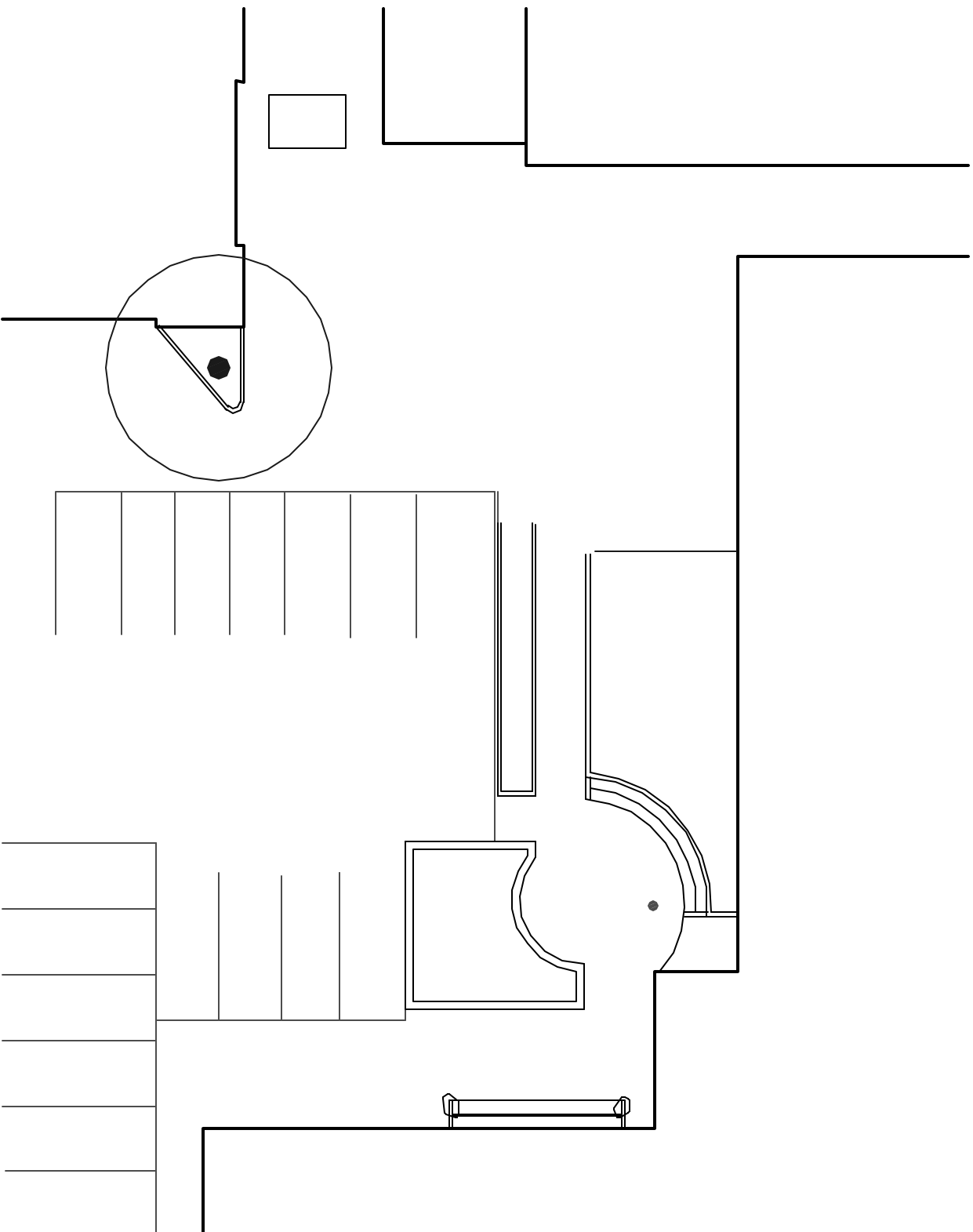
Construction Timeline

ID	Task Name	Duration	Start	Finish	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T
1	Site Preparation	1.13 days	Wed 8/20/03	Thu 8/21/03															
2	Rent Jack/Demolition Hammer	1 hr	Wed 8/20/03	Wed 8/20/03															
3	Break up Asphalt	1 day	Wed 8/20/03	Thu 8/21/03															
4	Clear Asphalt	1 day	Wed 8/20/03	Thu 8/21/03															
5	Install Hardscape	4.13 days	Thu 8/21/03	Wed 8/27/03															
6	Form Concrete Sealing Curbs	6 hrs	Thu 8/21/03	Thu 8/21/03															
7	Pour Concrete Sealing Curbs	2 hrs	Thu 8/21/03	Fri 8/22/03															
8	Sealing Curb Cure	1 day	Fri 8/22/03	Mon 8/25/03															
9	Bring Stones to Site	3 hrs	Thu 8/21/03	Thu 8/21/03															
10	Build Bench Formwork	2 days	Thu 8/21/03	Mon 8/25/03															
11	Position Stones	1 hr	Mon 8/25/03	Mon 8/25/03															
12	Pour Concrete Sealing Benches	1 day	Mon 8/25/03	Tue 8/26/03															
13	Sealing Benches Cure	1 day	Tue 8/26/03	Wed 8/27/03															
14	Install Softscape	3.25 days	Wed 8/27/03	Mon 9/1/03															
15	Mix Soil with Sub-base gravels	2 hrs	Wed 8/27/03	Wed 8/27/03															
16	Import and Grade Soil	4 hrs	Wed 8/27/03	Wed 8/27/03															
17	Place Boulders and Logs	1.5 days	Thu 8/28/03	Fri 8/29/03															
18	Install Plants	5 hrs	Fri 8/29/03	Mon 9/1/03															
19	Install Mulch	3 hrs	Mon 9/1/03	Mon 9/1/03															

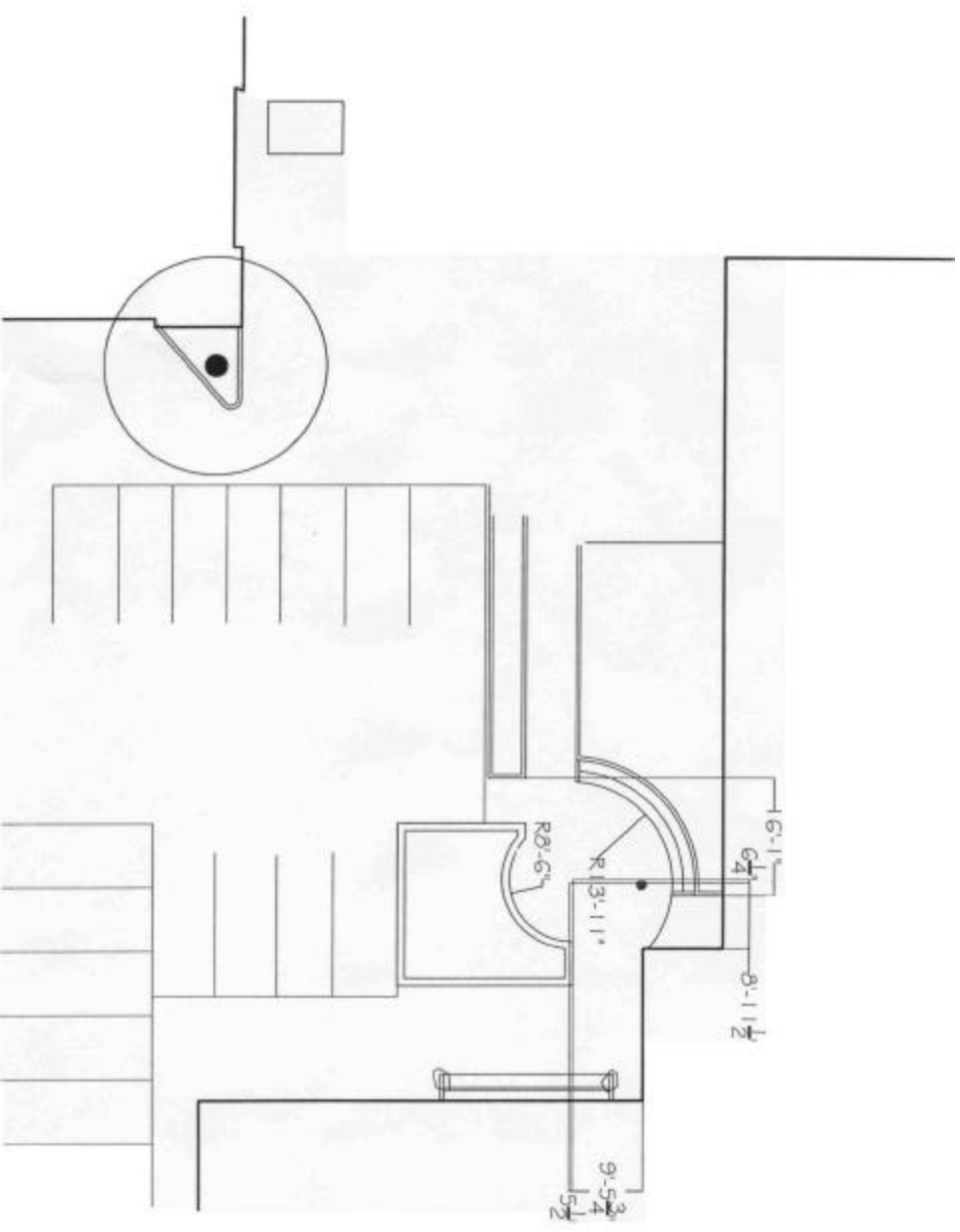


APPENDIX C

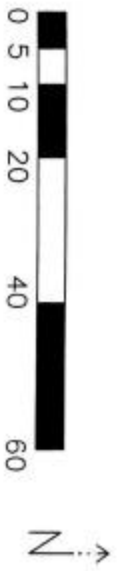
Construction Drawings

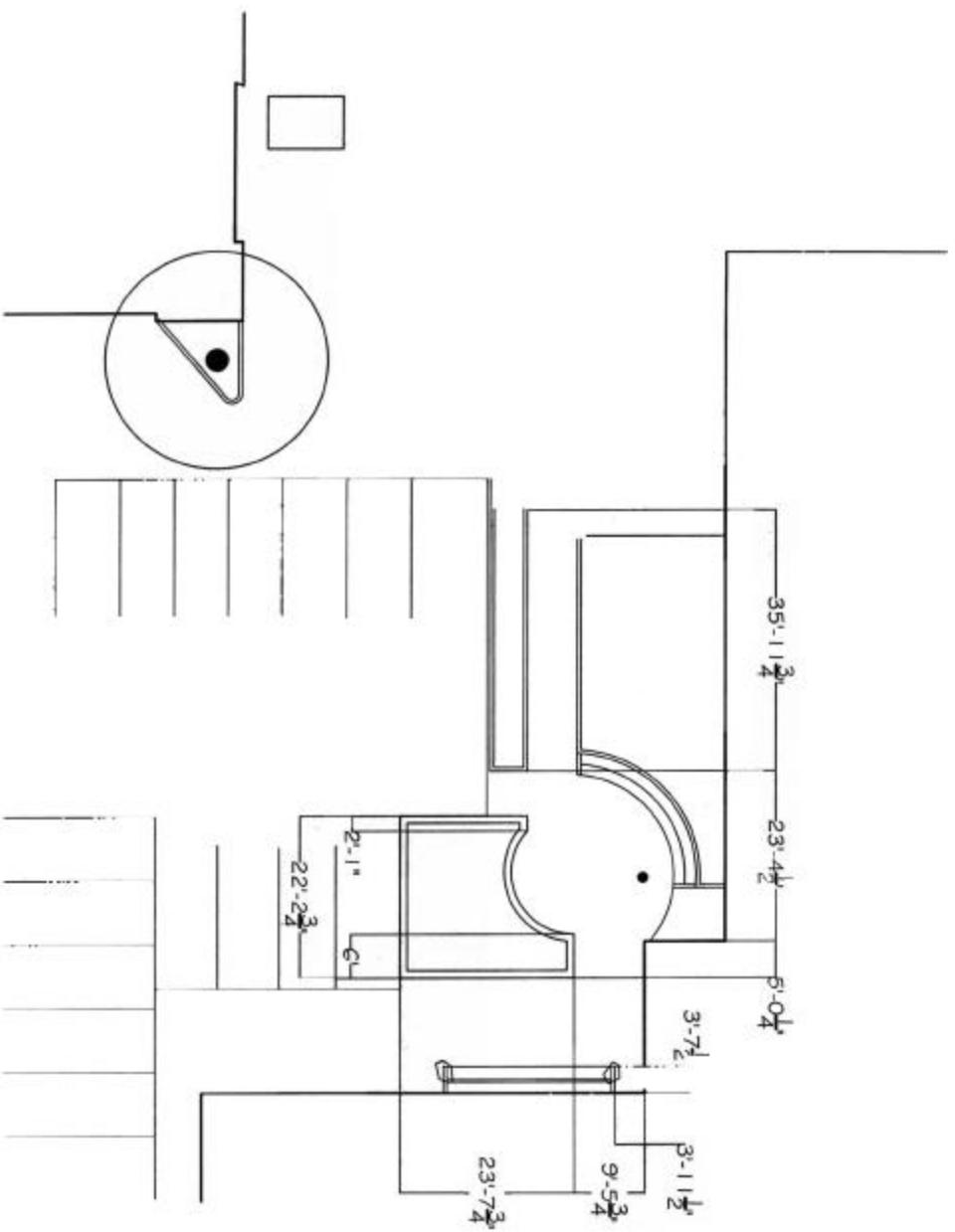


North
↓

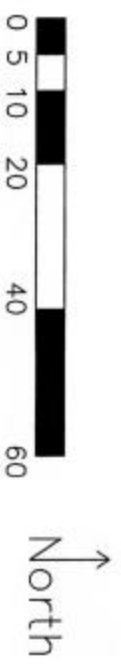


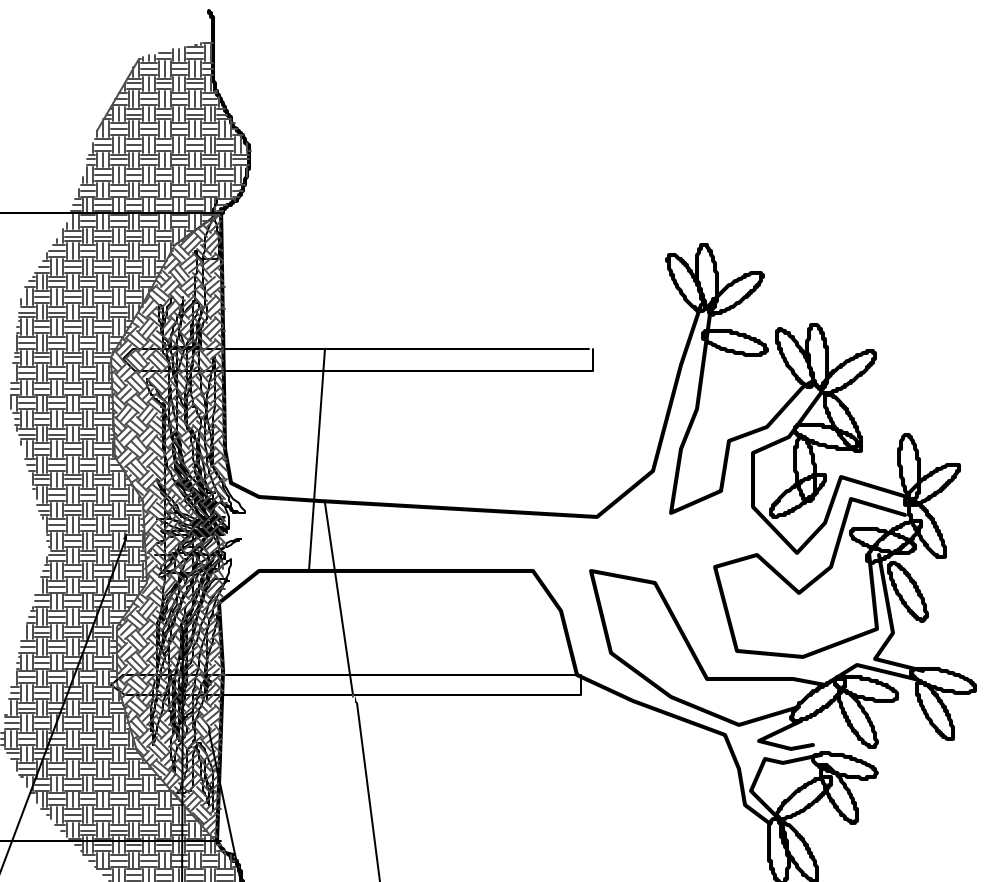
Layout Plan-Radii





Layout Plan





Stakes held low and loose

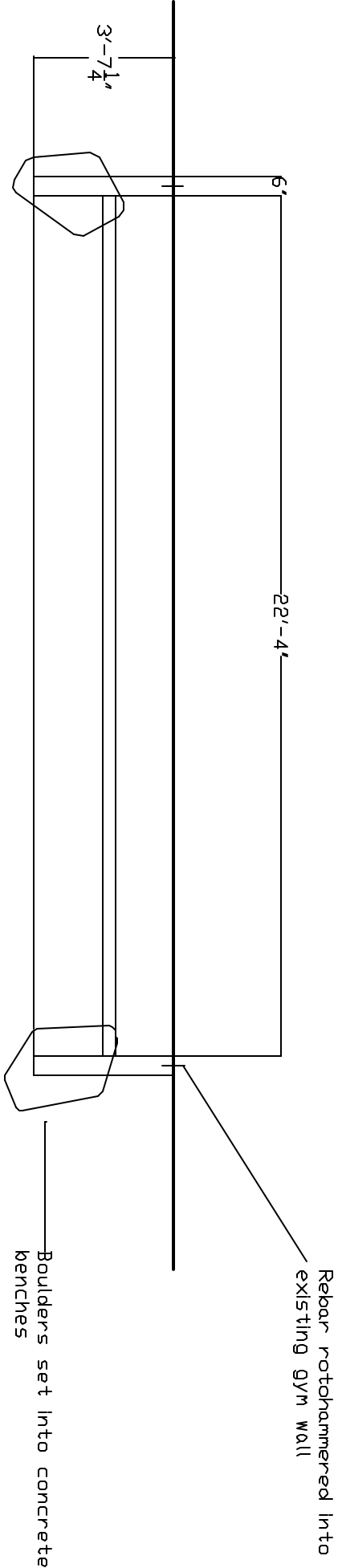
Unamended backfill

Remove potting media and spread roots
radially around planting hole

Mound in middle of planting hole to support
root crown

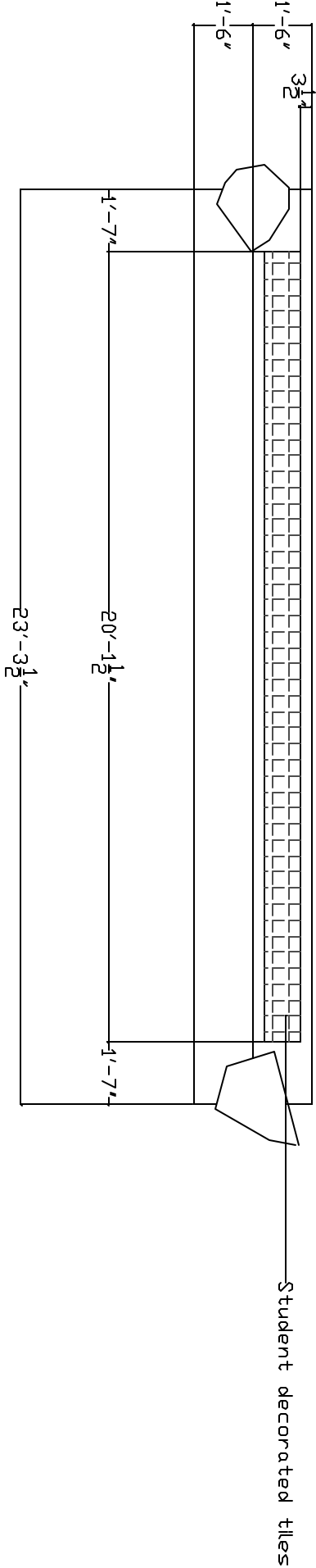
3 times width of root ball

Tree Planting Diagram

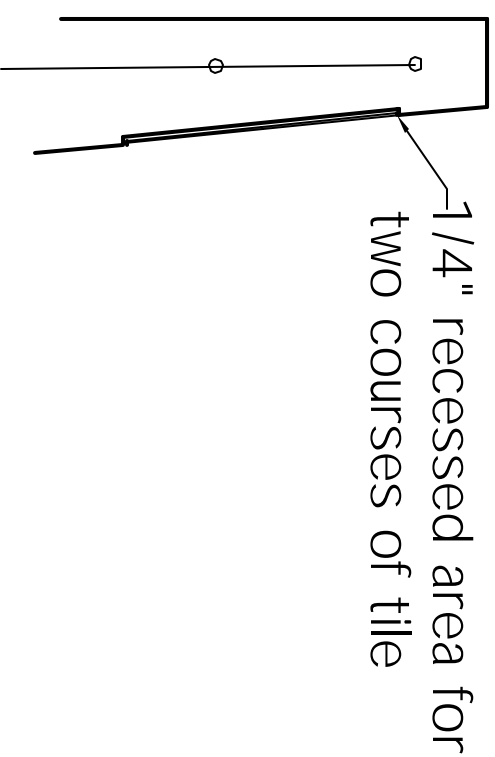
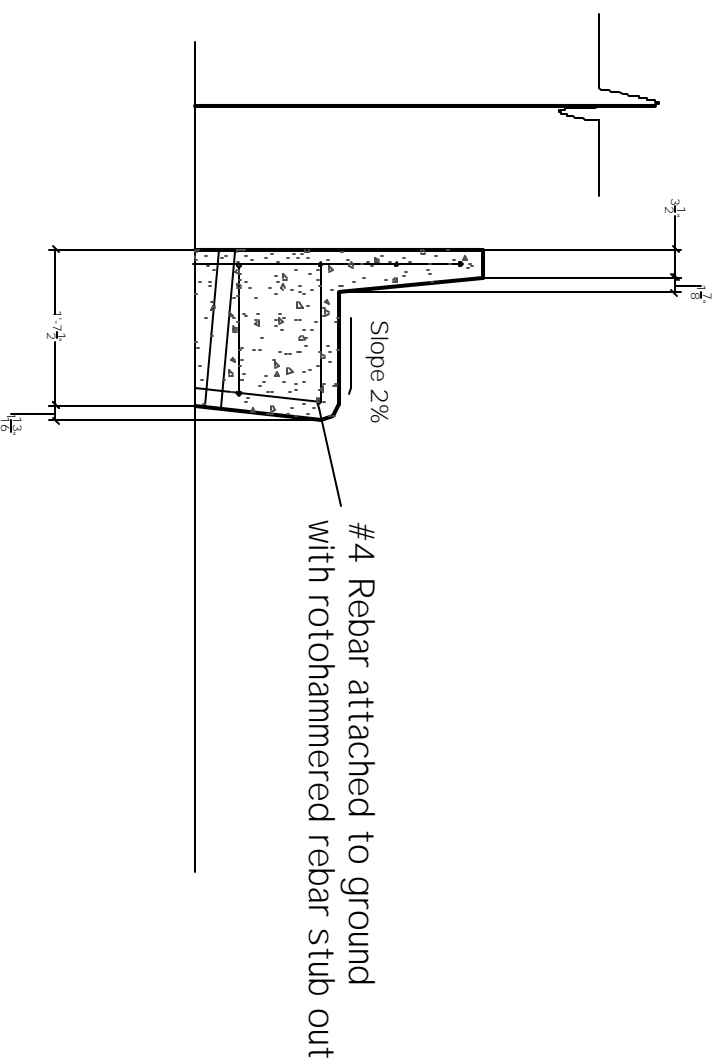
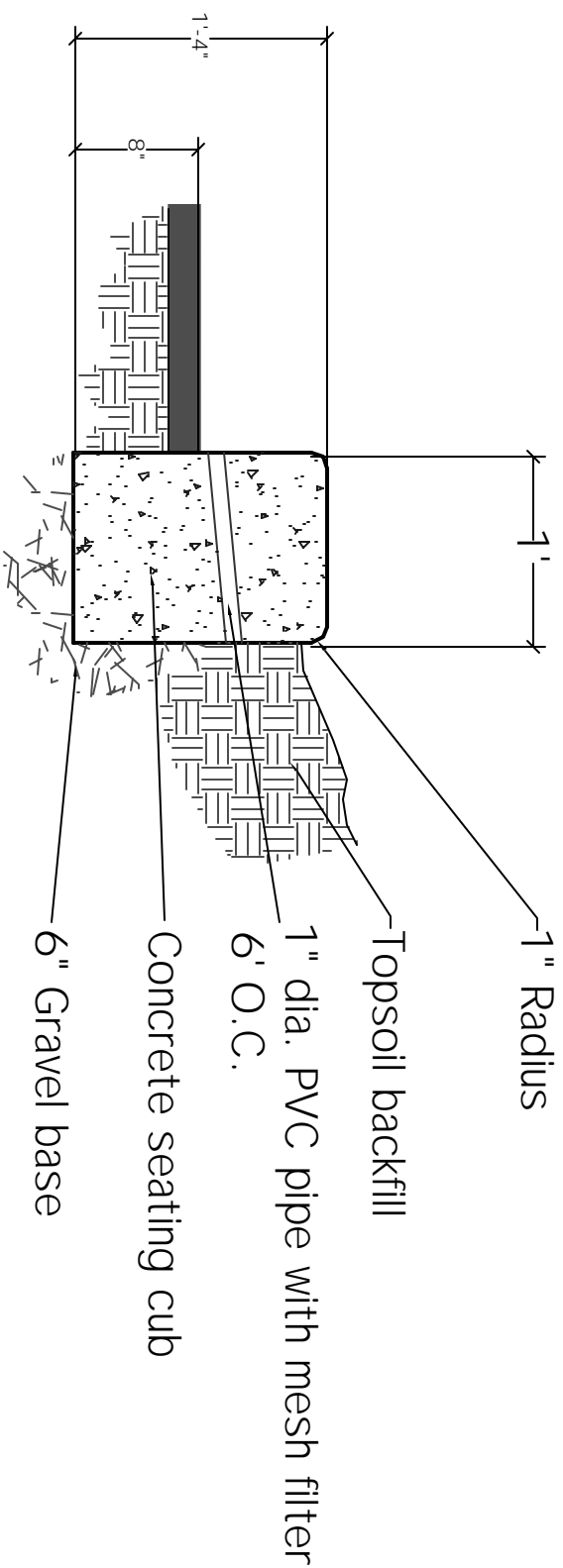


Plan

Elevation



Gym Benches Plan and Elevation



APPENDIX D
Soil Report

SOIL ANALYSIS REPORT FOR NEEDLELEAF EVERGREENS

11/12/02

SOIL AND PLANT TISSUE TESTING LAB
WEST EXPERIMENT STATION
UNIVERSITY OF MASSACHUSETTS
AMHERST, MA 01003

LAB NUMBER: S021107-123
BAG NUMBER: 52370

SOIL WEIGHT: 7.25 g/5cc
CROP:

CENTER FOR URBAN HORT-T. STOUT
BOX 354115 -UNIVERSITY OF WASH
SEATTLE, WA 98195-4115

COMMENTS: VISIT OUR WEBSITE FOR UPD
ATED ORDER FORMS AND SAMPLING INSTR
CTIONS. www.umass.edu/plsoils/soil
test

SAMPLE ID: LL#2

RECOMMENDATIONS FOR NEEDLELEAF EVERGREEN TREES AND SHRUBS:

SOIL PH ADJUSTMENT:

Soil pH is too high. For new plantings you may incorporate sulfur at 2 cups per cubic yard of soil; OR consult insert for plants better adapted to this soil pH.
For established plantings you may carefully topdress soil with sulfur at 2 cups/100 sq ft and maintain an acidic organic mulch, such as pine needles.

FERTILIZER:

The organic matter in this soil is lower than desired for most woody ornamentals. It is important that the soil around this plant be well mulched to conserve moisture and protect the soil surface.

PREPLANT PREPARATION: In the early fall preceeding planting incorporate 1 part finished compost or composted manure into 10 parts soil along with 6 cups bone meal per cubic yard of backfill;
OR in early spring incorporate 1 part finished compost or composted manure into 10 parts soil along with 2 cups dried blood plus 6 cups bone meal per cubic yard of backfill.

ESTABLISHED PLANTINGS: In the early fall topdress with 1/4 to 1/2 inch finished compost along with 4 cups bone meal per 100 square feet and gently scratch into the soil surface; OR in early spring topdress 1.5 cups 10-6-4 fertilizer per 100 square feet. For plantings in a lawn setting use fertilizer recommendations for established turfgrass.

SOIL pH	6.8	NITROGEN: NO3-N =	7 ppm	NH4-N =	1 ppm
BUFFER pH	7.1	ORGANIC MATTER:	1.5 %	(Desirable range 4-10%)	
NUTRIENT LEVELS: PPM					
		Low	Medium	High	Very High
Phosphorus (P)	4	XXXXX			
Potassium (K)	157	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Calcium (Ca)	858	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Magnesium (Mg)	74	XXXXXXXXXXXXXXXXXXXX			

CATION EXCH CAP
3.7 Meq/100g

PERCENT BASE SATURATION
K= 7.6 Mg=11.5 Ca=81.1

MICRONUTRIENT LEVELS
ALL NORMAL

EXTRACTABLE ALUMINUM: 39 ppm (Soil range: 10-250 ppm)

The lead level in this soil is low.

COMPUTER PROGRAM & RECOMMENDATIONS BY DEPT OF PLANT & SOIL SCI UMASS-AMHERST.
For further information contact the Soil Testing Lab at (413) 545-2311.

SOIL ANALYSIS REPORT FOR NEEDLELEAF EVERGREENS

11/12/02

SOIL AND PLANT TISSUE TESTING LAB
WEST EXPERIMENT STATION
UNIVERSITY OF MASSACHUSETTS
AMHERST, MA 01003

LAB NUMBER: S021107-122
BAG NUMBER: 52370

SOIL WEIGHT: 6.65 g/5cc
CROP:

CENTER FOR URBAN HORT-T. STOUT
BOX 354115 -UNIVERSITY OF WASH
SEATTLE, WA 98195-4115

COMMENTS: VISIT OUR WEBSITE FOR UPD
ATED ORDER FORMS AND SAMPLING INSTR
UCTIONS. www.umass.edu/plsoils/soil
test

SAMPLE ID: LL#1

RECOMMENDATIONS FOR NEEDLELEAF EVERGREEN TREES AND SHRUBS:

SOIL PH ADJUSTMENT:

Soil pH is in the desired range. No adjustment required.

FERTILIZER:

The organic matter in this soil is lower than desired for most woody ornamentals. It is important that the soil around this plant be well mulched to conserve moisture and protect the soil surface.

PREPLANT PREPARATION: In the early fall preceeding planting incorporate 1 part finished compost or composted manure into 10 parts soil along with 6 cups bone meal and 3 cups wood ash per cubic yard of backfill; OR in early spring incorporate 1 part finished compost or composted manure into 10 parts soil along with 2 cups 10-6-4 plus 4 cups bone meal per cubic yard of backfill.

ESTABLISHED PLANTINGS: In the early fall topdress with 1/4 to 1/2 inch finished compost along with 4 cups bone meal and 2 cups wood ash per 100 square feet and gently scratch into the soil surface; OR in early spring topdress 3 cups 5-10-5 fertilizer per 100 square feet. For plantings in a lawn setting use fertilizer recommendations for established turfgrass.

SOIL pH	5.9	NITROGEN: NO3-N =	3 ppm	NH4-N =	3 ppm
BUFFER pH	6.6	ORGANIC MATTER:	2.8 %	(Desirable range	4-10%)

NUTRIENT LEVELS: PPM		Low	Medium	High	Very High
Phosphorus (P)	3	XXXXX			
Potassium (K)	37	XXXXXXXXX			
Calcium (Ca)	463	XXXXXXXXXXXXXXX			
Magnesium (Mg)	32	XXXXXXX			

CATION EXCH CAP
5.2 Meq/100g

PERCENT BASE SATURATION
K= 1.4 Mg= 3.8 Ca=33.9

MICRONUTRIENT LEVELS
ALL NORMAL

EXTRACTABLE ALUMINUM: 157 ppm (Soil range: 10-250 ppm)

The lead level in this soil is low.

COMPUTER PROGRAM & RECOMMENDATIONS BY DEPT OF PLANT & SOIL SCI UMASS-AMHERST.
For further information contact the Soil Testing Lab at (413) 545-2311.

APPENDIX E

Additional Resources

Codes and Regulations

www.cityofseattle.net/dclu

Playground Design

www.peacefulplaygrounds.com

www.boundlessplaygrounds.org

Funding

http://www.schoolgrants.org/Links/playground_funding.htm

Native Plant Resources

These all came from the King County Website Native Plant Resources of the Pacific Northwest
<http://dnr.metrokc.gov/wlr/pi/npresrcs.htm>

www.wnps.org Washington Native Plant Society - A non profit organization for native plants.

www.plantnative.com - Includes a great step by step plan for naturescaping.

www.rainyside.com Maritime Pacific Northwest Gardening has a nice native plant section with photos.

www.wildwords.com/Bombus/ - Includes a very useful list of Pacific Northwest Native Plants for Wildlife.

www.wa.gov/dnr/htdocs/fr/nhp/index.html - Washington Natural Heritage Program lists rare and endangered native plants.

gardening.wsu.edu/text/nwnative.htm - Washington State University Native Plants Identifying, Propagating, and Landscaping. Nice photos!

www.tardigrade.org - Pacific Northwest Native Wildlife Gardening. Includes a listserv for gardening for wildlife (with native plants).