Seattle Tilth Revitalization Plan

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Abstract

This analysis was developed by students in EHUF 480, Selection and Management of Landscape Plants, as a collaboration between Seattle Tilth Demonstration Gardens and the Sustainable Community Landscapes consortium at the Center for Urban Horticulture, University of Washington.

Major analysis components include revised design, plant selection suggestions, soil issues, and symphylan issues.

Design Goals:

- Reconfigure the path system to make the garden more unified and the demonstrations more visually and physically available and accessible
- Redesign and relocate the compost demonstration area to accommodate larger groups, seating, shade, and a better layout for demonstrations
- Create space for an outdoor kitchen and dining area in an effort to invite more people into the gardens, create more seating within the garden, and provide an overflow and alternative education/demonstration space next to the compost area
- Provide multipurpose demonstration areas, including: wattle garden, shade and sun flower demonstration areas, drought tolerant and low maintenance beds, edible landscapes, habitat gardens, native plants, medicinal gardens, vines, lawn alternatives, annual and perennial vegetable gardens, pollination gardens, container gardens, pruning, rain barrels/water collection methods, fruit trees, seasonal extension, mulch, compost, worm bins, and flexilbe spaces for future demonstrations,
- Create space near the greenhouse for storage and staging purposes, facilitating plant sales, production and research
- Maintain a visual and noise buffer between the demonstration gardens and the neighboring private properties
- Shade the office in an effort to create a cooler, more pleasant atmosphere for the employees of Seattle Tilth

Plant Selection

The planting plan was designed and compiled to help Seattle Tilth teach the community how they can implement these gardens in their own back yard. The existing garden has many species that are desirable and work well in the demonstration garden. The planting plan and associated lists and diagrams provided in this analysis suggest what plants need to be removed, and what plants can be transplanted. To accommodate the needs of garden staff, the planting plan is organized by bed.

Soil Issues:

Seattle Tilth soil has been tested irregularly over the past several years. Results have shown no significant problems, but staff have recently noticed general problems growing various plants. New tests indicate an overabundance of nutrients in the soil, possibly leading to plant difficulties. Recommendations are to stop fertilizing and change to mulches with lower nitrogen content.

Symphylan Issues:

Seattle Tilth plants, especially vegetables, have demonstrated reduced growth and vigor possibly indicative of symphylan infestation. Recommendations include implementation of a monitoring program, use of cover crops and sheet mulches to protect vegetables, and use of sturdy vegetable transplants instead of seedlings or direct sowing.

Table of Contents

An assessment of current and historical conditions at Seattle Tilth Demonstration Gardens.

Context and Maps of Seattle Tilth

Seattle Tilth Demonstration Gardens are located at 50th and Sunnyside Ave. N. Seattle, King County. A series of context maps in the appendix are provided to assist in understanding the qualities of Seattle Tilth's location. The garden is sited on the northern edge of the Seattle neighborhood of Wallingford. The homes are densely packed with a thick allee of trees lining the edges of the street, and the site itself site has a gentle slope sweeping downward from east to west at a shallow angle.

Green Lake is nearby, but Seattle Tilth is one of the few large open space plots left in the Wallingford District. The garden is adjacent to the Good Shepherd P-Patch, as well as a school and small park.

Although the graphical GIS analysis makes the site feel tightly enclosed between buildings and houses, the site from within feels much different. Adjacent and surrounding foliage in combination with the fences give a feeling of escaping from the urban neighborhood. The open space created becomes an extremely valuable and historic demonstration garden, shared not only by the citizens of Wallingford, but also by the citizens of the greater Seattle Metropolitan area.

History of the Seattle Tilth Site

For most of the 20th century, Tilth was part of the Home of the Good Shepherd, a large institution run by a Catholic order for the rehabilitation of "unfortunate girls." Most of the grounds were planted in orchards and vegetable gardens, and until 1973 there was also a huge laundry on the premises (Harris 2002), so it is possible that chemical and detergent residues were sources of pollution for this site. The actual gardens were previously an asphalt-covered tennis court (Niemi 2002c). However, the Home closed in 1975 and the larger site has been used since then as a community center.

Seattle Tilth began in 1978 by removing the asphalt and creating the Demonstration Gardens. Through the varied gardens they have planted, they have endeavored to make organic methods of

gardening people's first choice, instead of an "alternative." They try to demonstrate the myriad ways that urban and suburban residents can have a more positive impact on their environment via composting, recycling, organic gardening, and urban ecology (Seattle 2002).

Current Plant Assessment:

Seattle Tilth is a well-established demonstration garden. The vegetation at the site is large, established plants that have been pruned, adequately watered and maintained. Most of the garden has wonderful color, texture and scent. Being a demonstration garden they offer many educational aspects to the garden. They have many different types of gardens but it would be good to see more continuity in the garden. With the great plant species in the garden there are some problems as well.

Problem Plants and Locations:

For locations of plants, please refer to the black area on the Plan of Existing Plants in Section III.

Buddleja davidii, Butterfly bush has been known to be invasive in some parts of the world. At Seattle Tilth the plant is too large and looks scraggly in the garden. This plant attracts butterflies and looks good for only a season and then starts to look really bad. The staff would like to remove it and replace it with something that would fit better. This Chinese shrub is spreading in urban and heavily disturbed sites in Western Europe and riparian habitats in New Zealand. It forms open to dense stands in sites where no competitors are present and, where suitable seed sources are available, facilitates succession. Within a year or two of disturbance *B. davidii* colonizes urban or quarry sites wherever a viable seed source exists. Control can be carried out by hand weeding young plants or by using a glycophosphate herbicide. However, due to the high seed output and vigorous growth any disturbance caused by removal of individuals inevitably results in the emergence of a new cohort. If total removal from a site is wished without resulting to chemical control of newly germinated seedlings, then it is best to ensure a rapid ground cover of another species, which will prevent *B. davidii* from re-establishing

Rosmarinus officinalis, Rosemary is a large shrub that has taken over a few of the beds. Rosemary is a much-needed plant in a demonstration garden, but may be overused. Rosemary has many uses including cooking and should be used in the landscape, but does need some

pruning to keep it looking good. A few of the plants should be removed to make room for other species. Rosemary succeeds best in a light, rather dry soil, and in a sheltered situation, such as the base of a low wall with a south aspect. On a chalk soil it grows smaller, but is more fragrant. Plant requires regular watering initially but becomes fairly drought tolerant. Yellowing is a symptom of under watering. Woodiness is a symptom of excessive feeding and watering. Pinch tips of young plants to insure compact form and prune older plants.

The **weed garden** can become a problem when the weeds start to spread. There have been problems with the weeds escaping and maintenance is an issue. A weed garden is a great idea so that people can physically see the weeds and identify them but a different method may be more useful, such as a photo weed garden providing pictures and information about the weeds.

Lemon Balm is a great plant but prone to spreading to new locations. It should be avoiding for maintenance reasons, even though it is a useful herb.

Tall grasses by french drain block the view of the vegetable garden and are not a pleasant entrance.

Raspberries need to be moved to a new location. They are in the middle of a great space and take away from the space.

Espaliered Apple Trees are a fun idea but seem to not thrive where they are. The root crowns are all out of the ground and the plants are leaning. The trees do not produce well and take up space that could be better used.

Desirable Plants:

There are many plants in the garden that have aesthetic, ornamental, and sentimental value that we would like to keep in the plan. Since much of the garden is going to be redesigned and cleared there are some we would like to see stay and integrate into the plan. These plants are in the gray area on the Plan of Existing Plants in Section III.

Elderberry is a focal point of the garden and is in good health. The shrubbery under the tree needs to be removed and then the area replanted with some low growing plant material to not take away from the elderberry and its value in the garden.

The **plum tree** is very important to the garden staff. This tree is in good health and will fit right into the new design for an edible garden.

Apple orchard, minus the two problem trees indicated in black on the Plan of Existing Plants in Section III, will stay and provide food for human and wildlife enjoyment.

The **ground cover** area is essential and the proposed plan adds to the existing area.

The **vine maples** at the entrance to Tilth will be a great accent for the native bed. They give excellent fall color and year round enjoyment.

Many of the **rosemary shrubs** can be transplanted and put in other areas of the garden. A few overgrown plants will need to be removed.

The **serviceberry** at the Northeast corner of Tilth will stay and become integrated into the home demonstration area.

There are many more desirable plants in the garden that will need to be moved. For a diagram of which plants need to be moved and where they need to be moved to, please refer to the letters on the Plan of Existing Plants in Section III.

Soil History

The soil analysis records provided by Seattle Tilth go back intermittently for several years with some dating to 1995. Some tests have had consistent results throughout the analyses while others have varied widely.

Phosphorus, organic matter, calcium, zinc, iron, and copper have always tested at high to very high levels. Sodium and sulfur have been consistently low to very low. Soil pH has generally been slightly

acidic, and cation exchange capacity has tested average. Manganese and boron levels have been adequate.

Magnesium levels have shown decreasing amounts, starting from high to very high levels in 1995 and ending with low to very low levels in 2001.

Nitrogen and potassium levels have shown inconsistent patterns during the years tested.

Recent Practices and Problems

Information provided by the staff indicates that they have used many different methods of soil enhancement (Niemi 2002b). On areas not currently used for growing plants, they have used wood chips as mulch (Dane 220). In planted beds, they have mulched with straw, leaves, and corn gluten. Layers of compost have been added, plus they have tried several varieties of fertilizer. Cover cropping has been utilized between growing seasons.

Staff have reported difficulties with growing several types of crops, especially from seed. Poor production of fruit and vegetable crops, infestations of various pests, whole crop failures, and stunted plants are of concern (Niemi 2002b).

Present Test Results and Interpretations

In November of 2002, the soil in eight different areas was sampled by the UW/SCL group and tested by the Department of Plant and Soil Science at the University of Massachusetts at Amherst (Soil 2002). Specific areas of Seattle Tilth sampled were:

- the compost demonstration area
- the south apple orchard
- paths between the plots
- the area around the greenhouse
- the actual plots
- the area along the east wall
- the tomato trellis area
- the east row of apples

The results (see Appendix) reported for most of the macronutrients are unique. Levels for many of the elements are off the scale. Phosphorus, calcium, magnesium, and organic matter levels are high to very high throughout and the potassium level is medium-high to very high. Nitrate and ammonium levels are generally low except in the compost demonstration area and the south orchard which also have the lowest pH. Probable causes of this deficiency are end-of-the-growing-season plant uptake and leaching/runoff of excess nutrients nutrient (Chalker-Scott 2002a). All micronutrient levels are within normal limits, and lead, cadmium, nickel, chromium, and aluminum readings are satisfactorily low.

Buffer pH readings are good, and pH ranges from 5.9 to 6.8. Cation exchange capacity ranges from more than adequate to quite high. This is likely due to the excessive amounts of organic matter. Generally organic matter accounts for 4-8% of soil, but the Tilth soils range from 10.3 to 25.9 with an average of 16.2.

Even though current nitrogen levels are generally testing low, it is reasonable to assume that they are usually high, reflecting the high levels in non-productive areas and coordinating with the other high measurements of macronutrients. Also, even though they test low, they are still higher than any other samples taken from soils throughout the city at this time (Chalker-Scott 2002b).

The percent base saturations in the gardens vary from 74.2 to 89.9. The calcium to magnesium ratio is a little high. The ideal Ca/Mg ratio is 6 to 1 (Taberna 2002), but Tilth's ratios start there and peak at approximately 13 to 1.

A soil texture test was also done and shows 33% sand, 52% silt, and 14% clay, making Tilth soil a silt loam (Harpstead 1997). This is comparable to commercially available soil.

Symphylans

Garden symphylans, S*cutigerella immaculata*, are small arthropods in the class Symphyla. They feed on germinating vegetable seeds, roots and plant parts in contact with the soil, stunting crops by eating fine root hairs and preventing water and nutrient absorption. Results of heavy symphylan feeding include stunting, low yields, delay in fruit and vegetable maturity, and greater susceptibility to disease.

Seattle Tilth garden has a long history with symphylans, starting in 1993. They were initially diagnosed by then Garden Coordinator Carl Elliot by water flotation. While there have been no direct measurements of symphylans recently, the gardens have been plagued by a number of problems believed due to symphylan feeding. Laura Niemi summarized the current situation with crop failure in an e-mail directed to the student group. Her observations were "that root crops started from seed have had a 99% failure rate. Starts planted that were on the small side to start off, have really struggled and generally died (or have been removed due to their pathetic performance.) In fact, very few crops seem to really thrive in the garden. Cover crops seem to do the best sown from seed. Most other seed-sown crops are failures. The crops we have planted as transplants that have really thrived are cucumbers and squash. Both of these plant have large seeds, which might make a difference. Also, the squash that are doing so well were planted in a bed that had been sheet mulched (layering of organic materials and soil and planting on top of the layers rather than tilling or disturbing the soil). The cukes were planted with root crops which were a total loss, so maybe the symphs filled up on radishes before they got to the cukes? Anyhow, recent damage includes a dying bed of brassicas (where the same bed planted at Bradner is thriving) and a recent puny bed of peas (also planted at Bradner with success.)" (Niemi 2002a) It is clear that a problem exists, and symphylans are a likely suspect, either alone or in tandem with soil issues.

Hydrology Analysis

Overall, the Seattle Tilth Demonstration Gardens do not have any major problems with water. The entire site, not including the service area, is approximately 22% impervious, and with the addition of a green roof on portions of the greenhouse and tool shed, it will only be 20% impervious. The primary impervious surface is the central brick and rock path, which directs water either to the french drain or to the sides of the path. All of the water from this surface and from the kiosk area is being collected and drained onsite rather than flowing into the sewer system.

Water is also currently being collected from the greenhouse and tool shed roofs. The addition of a green roof on the tool shed will reduce the amount of water coming off of that roof, though a rain barrel collection system is still relevant for drainage. The windows of the greenhouse now drain into a gutter that empties into a planter that seems to have sunken into the ground a bit and is not very affective at catching water. A low gutter that empties next to a path and doorway, this is a prime location for an updated stormwater planter demonstration.

Three additional downspouts drain onto the Demonstration Garden property from the school and offices on the eastern side. The northernmost gutter empties into a rain barrel with a hose nozzle that is used for spot irrigation. The middle downspout empties directly into the bed that is running along the bottom of the building. There do not appear to be any water damage, erosion, or drainage problems from this downspout, though it does present an opportunity to demonstrate more water collection systems. The southernmost downspout, which is actually on the service area side of the building, is the only drain that enters the sewer system. Again, this downspout is in a prime location for another rainwater collection or stormwater planter demonstration.

Four areas have faucets and hose connections for aboveground watering, two of which have valve boxes controlling the soaker and drip hoses. One that is not shown is attached to the grape arbor on its west side.

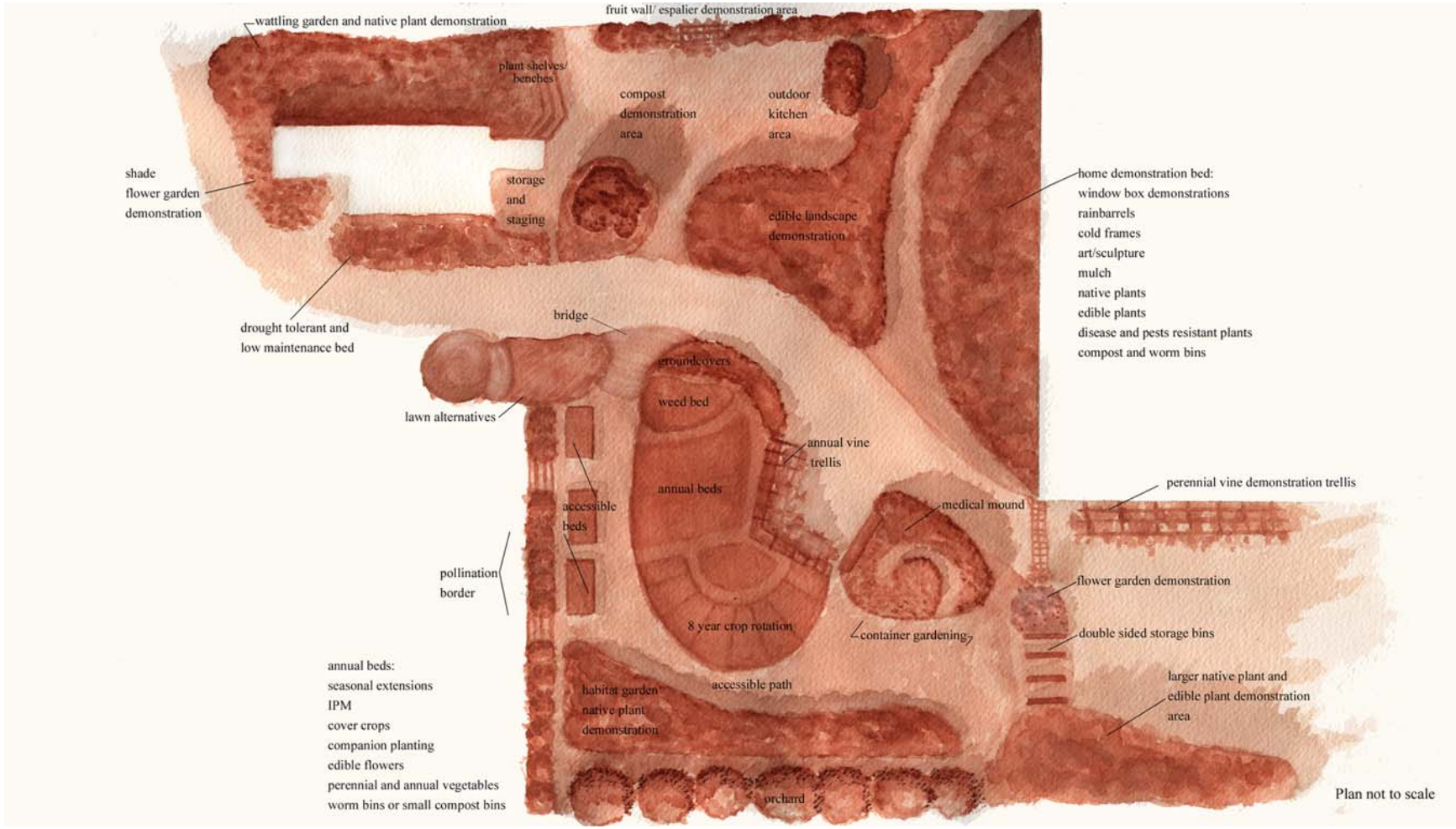
The rest of the property is watered via underground soaker hoses and drip hoses on a timer that is located inside the greenhouse. This method of watering keeps additional water on-site and

available to plants rather than an aboveground irrigation alternative which would not be as effective and end up costing a lot more due to water loss from evaporation.

Overall, Seattle Tilth exhibits great care and responsibility for the water falling on its site as well as making sure that the water added to the site is used efficiently and effectively. There are several opportunities for more demonstrations, though no real hydrologic problems exist on this site.

Shade Analysis

Existing shade is diagrammed above in gray, with the primary shade sections being north of the urban orchard, the greenhouse, and the loading area on the east. The areas immediately south of the main path are sunny all year long and ideal for both vegetable gardening and seasonal extension demonstrations.


wattling garden and native plant demonstration
fruit wall/ espalier demonstration area
plant shelves/ benches
compost demonstration area
outdoor kitchen area
shade flower garden demonstration
storage and staging
edible landscape demonstration
home demonstration bed:
window box demonstrations
rainbarrels
cold frames
art/sculpture
mulch
native plants
edible plants
disease and pests resistant plants
compost and worm bins
drought tolerant and low maintenance bed
bridge
groundcovers
weed bed
lawn alternatives
annual vine trellis
annual beds
perennial vine demonstration trellis
accessible beds
medical mound
pollination border
flower garden demonstration
8 year crop rotation
container gardening
double sided storage bins
annual beds:
seasonal extensions
IPM
cover crops
companion planting
edible flowers
perennial and annual vegetables
worm bins or small compost bins
habitat garden native plant demonstration
accessible path
larger native plant and edible plant demonstration area
orchard
Plan not to scale

Proposed Site Plan Description

The existing entries to the demonstrations gardens remain the same, though the paths within the garden are redesigned to make the gardens an easier place both to work in and to visit. The goal is to make Seattle Tilth better equipped to accommodate its three pillars: volunteers, education, and research.

Paths and entries

The grape arbor now leads directly into the compost demonstration area and outdoor kitchen and is not a major threshold into the general demonstration gardens. The straight path next to the school now curves through the space, making it a more interesting path to traverse while not losing a relatively quick access to and from the school from the main garden entry near the office. An accessible path runs through the south side of the site, helping to consolidate circulation into a single wide path. A bridge over the rock river announces the existence of more demonstration gardens, and makes them easier to get to. Currently the rock river acts as a barrier to the southern half of the garden; a small, simple bridge could become a better threshold. The design of the bridge could be a contest in an effort to encourage community participation and to get exciting, unique ideas. The parameters of such a contest are included in the phasing description of Section III.

Several accessible path options exist, the limiting factor being budget. The minimum cleared path width should be 36 inches, and a turning space requires a clear 360 degree area of a 60 inch diameter. (Tilley 2001) What follows is list of acceptable accessible path materials, the main criteria being that they should be firm and level (Stoneham 1994):

-flat stone laid in a bed of sand, requires a firm, compacted foundation
-brick laid in a bed of sand, requires a firm, compacted foundation
-compacted crushed stone (similar to existing path between the apple trees and school)
-grass, with a compacted firm foundation and good maintenance
-wood (if slip resistant)
-recycled rubber tiles (if slip resistant), requires a firm, compacted foundation
-prefabricated pavers laid in a bed of compacted sand, requires a firm, compacted foundation

-crushed brick, requires a firm, compacted foundation
-asphalt, precast concrete, in situ concrete

The north side of the central path

The compost demonstration area is closer to the greenhouse so that it can accommodate more people in a more flexible space with movable seating in the shade of the elderberry.

An outdoor kitchen and dining room are proposed for the area currently used for the compost demonstrations. This area is already equipped with a spigot and could also accommodate a cob oven, a large chopping block, and a more intimate space for a big dining table and benches. Adjacent to the new compost area, the outdoor kitchen area also functions as overflow space for larger groups of people. An edible garden demonstration surrounds the outdoor dining room, and could provide some shade for the table and sitting area.

Storage and Staging: Outside of the greenhouse, there is a small space set aside for storage and staging purposes, as well as a proposed shelving system that can also function as more seating for the compost demonstration area. The parameters for a shelving system are in the phasing description of Section III.

Wattle garden: Surrounding the greenhouse on the north side is a "wattle garden," where plants such as willows (*Salix sp.*), filberts (*Corylus sp.*), and twig dogwoods (*Cornus stolinifera*) are grown and harvested every year to give wattling demonstrations in an effort to promote renewable resources. This area can also double as a native plant demonstration area for shade tolerant species.

Shade flower garden: Along the central path on the west side of the greenhouse, a shade tolerant "entry garden" welcomes visitors to the Tilth demonstration gardens, and displays a shade tolerant flower garden.

A drought tolerant and low maintenance demonstration bed is on the south side of the greenhouse in full sun along the main path.

Edible landscape: An expansive edible garden demonstration bed is a centerpiece for the garden. Visually accessible from all sides, this island bed holds great potential for demonstrating to home

owners how an edible landscape can also be a border, a focal point, a path, or simply a beautifully designed garden. Primarily perennial vegetables, berries, herbs, or small fruit trees, this bed would provide year-round structure to the garden, as well as year-round interest and beauty.

Home demonstration: Along the wall of the school, a large area is set aside for a "home demonstration" area. Since this wall has windows and two downspouts, it is a good place to show different ideas for treating the garden space that may border a house. Incorporating window box demonstrations, rain barrels, cold frames, a small compost area, disease and pest resistant plants, art/sculpture, mulch, native plants, worm bins, or edible plants, for example, this demonstration area can put ideas into context here as a border display next to a house. It can also function as a display space for the Pacific Northwest Flower and Garden Show demonstration booth, or a testing space for ideas for the show.

The south side of the central path

Annual vine demonstration trellis: Removing the central kiosk makes the existing sitting area off of the main path more usable and flexible as it clears the space. A trellis over the longer of the two benches functions as an annual vine demonstration area so that the sitting space has shade in the summer and sun in the winter. The design of this trellis should be a design contest so that it could have more of a sculptural quality rather than simply functional, similar to the iron birch sculpture at the main entry. The parameters of such a contest are included in the phasing descriptions of Section III.

Medicinal garden: A "medicinal mound" is on the other side of the shorter bench. Formed from soil removed from the proposed annual demonstration beds area, a spiraling path ends at a vantage point on the top of the mound. Planted as a medicinal garden demonstration area, the mound and its circling path offer a bit of surprise to the more curious or adventurous.

Lawn alternatives demonstration: The area next to the french drain and the entry to the annual demonstration area is set aside for a lawn alternatives demonstration area. The intention is not only to display different ideas for lawns, but also to keep this bed low in an effort to visually invite more people into the southern half of the gardens. This area can also use benches or chairs to create more seating, and to help illustrate its use as an alternative to a lawn. A seed mixture such as "eco-turf" could be applied to this bed. It is a mixture of low-growing broad-leaved plants and flowering perennials that require less maintenance, fertilizer, and water than traditional

lawns. It creates a 3-6 inch meadow-like lawn full of strawberry clover, creeping yarrow, creeping thyme, and English daisies. Other alternatives for this sunny area would be sections of clover, creeping or woolly thyme, wildflowers and meadow grasses, or chamomile.

The annual demonstration beds are consolidated along the central path through the south side of the gardens. The existing ground cover and the weed bed demonstrations remain as they are. The rest of this area is space for demonstrations of integrated pest management, cover crops, perennial and annual vegetables, seasonal extensions, companion planting, edible flowers, worm bins or small compost bins, and an eight-year crop rotation demonstration. The path system throughout these beds is flexible, wood chips for example, and could be moved around depending on the demonstrations. Part of this area is currently raised, this soil will be moved to form the medicinal mound.

Three raised accessible beds not only demonstrate accessible gardening but also function as more space for annual demonstrations. The beds could be made of anything: concrete, wood, recycled plastic, etc. No matter the material, they should have drainage holes at their base, and they could be retrofitted with irrigation. These beds could also become a design contest, encouraging community participation, and resulting in a non-standard, more interesting answer to accessibility requirements. On the plan, they are drawn as rectangular boxes, though their shape could be more amorphous depending on the material used to construct them. Several parameters must be kept in mind, however (Stoneham 1994):

- maximum arm reach from a wheelchair is 20 inches, if the beds are to be accessible from both sides, the maximum width is 36-40 inches
- ideal height is 30 inches, with 34 inches being the maximum height.
- toe cut outs at the base of the beds makes it easier for a wheelchair to get closer to the beds without having to lean forward. These toe holes should run the length of the bed, be 10 inches high, and set back 6-8 inches
- ideally, accessible beds should have a knee clearance as well so that a wheelchair can get right next to the bed. This clearance should be at a minimum of 27 inches from the ground and set back at least 6 inches
- an overhang, or lipped extension, can also allow a wheelchair gardener to get right into the bed.
- The below illustrations demonstrate some of the possibilities for accessible raised beds:

A "pollination garden" borders the demonstration gardens on the western edge. An entire row of lavender, for example, helps to attract pollinators to the garden, as well as providing an evergreen, solid threshold to and from the P-Patch.

The southern border of the property has a large habitat and native plant demonstration garden as well as a row of fruit trees along the fence. The main priority here is to create a buffer between the neighbors' properties and that of the demonstration gardens. With more and more interest in habitat and native plant gardening, it seems appropriate to dedicate a relatively large area to demonstrate different ideas. This area could also accommodate other demonstrations such as mulches.

Container gardening: Between the medicinal mound and the habitat garden, the edges of the wider path here is set aside for container gardening demonstrations, as well as City of Seattle demonstrations.

Double-sided storage bins: The western edge of the garden is characterized by three bulk storage bins accessible from both sides. Again, the neighbor's property is buffered, here with a demonstration of some of the larger native plants or larger edible shade plants.

Perennial vine demonstration: The office has a trellis that supports a perennial vine demonstration, functioning also to shade the office and to create a more beautiful entry.

Plant List

Bed descriptions refer to the above Planting Plan
Numbers refer to entry in Table of Plant Characteristics which follows.

wattle, native, edible, shade garden:

1. vine maple
9. hazelnut
10. red osier dogwood
11. nine bark
19. hosta
22. willows
30. thyme
33. filberts

drought tolerant/ low maintenance:

7. broad-leaved stonecrop
8. Oregon stonecrop
18. aster
26. lavender

B. any desirable herb specimens
C. any desirable drought tolerant specimens

edible landscape demonstration garden:

2. evergreen huckleberry
6. red huckleberry
12. salmonberry
13. bunchberry
14. wild strawberry
26. evergreen blueberry

A. raspberries
G. perennial vegetables

floral entry on northeast entrance:

10. red osier dogwood
17. columbine
18. aster
23. bleeding heart
24. fuchsias

home demonstration garden:

4. Indian plum
5. red flowering currant
29. rosemary

B. any desirable herb specimens
E. any desirable specimens
F. tall grasses
perennials
annuals
ground covers

ground cover:

7. broad-leaved stonecrop
8. Oregon stonecrop
13. bunchberry
14. wild strawberry
34. nasturtium
36. strawberries
35. chives

annual beds:

14. wild strawberry
27. evergreen blueberry
28. German chamomile

habitat garden:

1. serviceberry
17. columbine
18. aster
20. coneflower
21. delphinium
23. bleeding heart
24. fuchsias
34. nasturtium

medicinal mound garden:

20. coneflower
25. foxglove
26. lavender
28. German chamomile
29. rosemary
30. thyme

native, edible, shade garden:

1. vine maple
13. bunchberry
14. wild strawberry
17. columbine
20. delphinium

Japanese anemone, snowbells, hellebore, epimedium, crested iris

pollination garden:

26. lavender
29. rosemary
44. sage

porch vines, container garden:

15. trumpet vine
31. kiwi vine
32. grey beach pea vine

D. perennial vines
   bulbs
   sedums
   herbs
   annuals

annual vine demonstrations:

37. cucumber
38. squash
39. purple hyacinth bean vine
40. scarlet runner beans
41. sweet peas
42. pole beans
43. black eyed Susan vine

lawn alternatives:

A seed mixture such as "eco-turf": a mixture of low-growing broad-leaved plants and flowering perennials including strawberry clover, creeping yarrow, creeping thyme, and English daisies. Other alternatives would be clover, creeping or woolly thyme, wildflowers and meadow grasses, or chamomile.

Table of Plant Characteristics

Number	Common name	Latin Name	Habit/form	Native	Edible	Shade/sun	Drought/wet	Use/value	$Cost/Size
1	vine maple	*Acer circinatum*	Deciduous Tree	Yes		shade		ornamental, butterflies	$ 40/ 5 gal
2	evergreen huckleberry	*Vaccinium ovatum*	Shrub	Yes	Yes		drought	berries, butterflies, hummingbirds	$ 10.95/1gal
3	serviceberry	*Amelanchier alnifolia*	Shrub	Yes		shade	drought	berries, butterflies, hummingbirds	$33/5gal
4	Indian plum	*Oemlaria cerasiformis*	Shrub	Yes			drought		$14.95/1gal
5	red flowering currant	*Ribes sanguineum*	Shrub	Yes		shade tolerant	drought	attract hummingbird	$45/5gal
6	red huckleberry	*Vaccinium parvifolium*	Shrub	Yes	Yes	shade	drought	berries, butterflies, hummingbirds	$45/5gal
7	broad-leaved stonecrop	*Sedum spathulifolium*	Ground cover	Yes			drought		$2.89/4”pot
8	Oregon stonecrop	*Sedum oregonense*	Ground cover	Yes			drought		$2.89/4”pot
9	hazelnut	*Corylus cornuta var. californica*	Shrub	Yes		shade	drought or wet	nuts	
10	red osier dogwood	*Cornus stolonifera*	Shrub	Yes					$24.95/2gal
11	nine bark	*Physocarpus capitatus*	Shrub	Yes		shade	drought or wet	nut/seed	$45/5gal
12	salmonberry	*Rubus spectabilis*	Shrub	Yes	Yes		wet	berries, butterflies, hummingbirds	$14.95/1gal
13	bunchberry	*Cornus unalaschkensis*	Ground/ low shrub	Yes		shade	wet	berries, butterflies	$2.89/4”pot
14	wild strawberry	*Fragaria spp.*	Ground/ low shrub	Yes	Yes	shade	drought	berries, butterflies, hummingbirds	$2.89/4”pot
15	trumpet vine	*Campsis radicans*	Vine/ flower				drought	butterflies, hummingbird	$45/ 5gal
16	clematis	*Clematis spp.*	Vine/ flower	Yes		shade	drought	butterflies, hummingbirds	$10.95/1gal
17	columbine	*Aquilegia formosa*	Perennial	Yes		shade		hummingbird	$2.89/4”pot
18	aster	*Aster spp.*	Perennial	Yes			drought	butterflies	$2.89/4”pot

Number	Common name	Latin Name	Habit/form	Native	Edible	Shade/sun	Drought/wet	Use/value	$Cost/Size
19	hosta	*Hosta spp.*	Perennial			shade	wet	hummingbirds	$2.89/4”pot
20	coneflower	*Echinacea purpurea*	Perennial/ herb					butterflies, hummingbirds	$2.89/4”pot
21	delphinium	*Delphinium spp.*	Perennial	Yes				butterflies, hummingbirds	$2.89/4”pot
22	willow	*Salix spp.*	Shrub				wet		$35/5gal
23	bleeding heart	*Dicentra formosa*	Flower	Yes		shade		butterflies, hummingbird	$8.99/1gal
24	fuchsias		Perennial						$8.99/1gal
25	foxgloves	*Digitalis spp.*	Flower				drought	hummingbird; medicinal	$8.99/1gal
26	lavender	*Lavendula*	Herb				drought	butterflies, hummingbird	$8.99/1gal
27	evergreen blueberry	*Vaccinium ovatum*	Fruit shrub		Yes				$9.95/1gal
28	German chamomile	*Chamomilla recutita*	Herb		Yes			medicinal	$2.89/4”pot
29	rosemary	*Rosmarinus officinalis*	Herb		Yes		drought	butterflies, hummingbirds, medicinal	$8.99/1gal
30	thyme	*Thymus spp.*	Herb		Yes	shade		butterflies	$2.89/4”pot
31	kiwi vine		Vine						$10.95/1gal
32	grey beach peavine	*Lathyrus littoralis*	Vine						
33	filberts	*Corylus spp.*	Shrub						
34	nasturtium		Annual						$1.69/4”pot
35	chives	*Allium schoenoprasum*	Perennial						$2.89/4”pot
36.	strawberries	*Fragaria spp*	Perennial						$2.89/4”pot
37	cucumber	*Cucumis sativus*	Annual						$1.89/6pack
38	squash	*Cucurbita spp.*	Annual						$1.89/6pack
39	purple hyacinth bean vine	*Dolichos lablabeds*	Annual Vine						$1.69/4”pot
40	scarlet runner beans	*Phaseolus coccineus*	Annual						$2/seed bag
41	sweet peas	*Lathyrus odoratus*	Annual						$1.69/4”pot

Number	Common name	Latin Name	Habit/form	Native	Edible	Shade/sun	Drought/wet	Use/value	$Cost/Size
42	pole beans	*Phaseolus spp.*	Annual						$1.89/6pack
43	black-eyed susan vine	*Thunbergia alata*	Annual Vine						$1.69/ 4”pot
44	sage	*Salvia officinalis*	Perennial						$2.89/4”pot

Soil and Mulching Recommendations

Although Tilth plants show no symptoms specific to particular nutrient toxicities, the overabundance of nutrients might be harming the plants indirectly and through their associations with soil microbes.

With elevated nitrogen, soil and compost can become too hot. This can destroy desirable microbes, leaving the more detrimental, thermophilic organisms with fewer enemies to prevent their harm. Additionally, if nitrogen is too readily available, it can overwhelm the assimilative capacities of beneficial microbes and be lost to the atmosphere as ammonia and/or as nitrate in leachate/runoff (Richard 2002).

It is recommended that any use of fertilizer be discontinued immediately. Also, it would be advisable to shift to mulches, especially in planting beds, that have an lower nitrogen content such as dried leaves and/or hard or soft wood chips. Alternatively, rice hulls, newsprint, and shredded telephone books might also be good choices. The lower nitrogen contents in these substances would increase the carbon/nitrogen ratio, thereby improving the environment for beneficial microbes (Chalker-Scott 2002b).

Symphylan Suggestions

Symphylans can be eradicated with extensive soil fumigation, and some gardens have found success with extensive and frequent tillage of the soil. However, based on the considerations at Seattle Tilth, the following actions will be most helpful in reducing symphylan damage.

- As the presence of symphylans has not been recently determined, a regular system of monitoring should be established. Monitoring can be accomplished by placing a shovel of soil in a bucket of water, and counting the symphylans which float to the surface. Another easy method is the 'potato test' developed by Dr James Fisher and graduate student Jon Umble:
    a. Prepare a level spot under plants by removing the very top surface of the soil so that moist soil and soil macropores are exposed. Avoid smearing the surface so that symphylans can access the bait.
    b. Place half a potato with sliced side down on the prepared spot. Cover the potato to keep moist and dark.

c. After 2-5 days during morning hours, carefully pick up the bait and count the number of symphylans on both the surface of the bait and the soil.

d. To reuse the same potato as bait, slice 1/8th inch off the surface to remove eaten areas and to expose fresh potato, and place it on another prepared spot. (Yang, 2002)

It is best to monitor several times over the growing season, from early spring to fall. A record of the numbers of symphylans found at different times of year is vital to understanding the pattern of symphylan activity at Seattle Tilth, and refining locally appropriate solutions.

- To minimize the loss of seedlings, plant out using large and vigorous transplants, rather than direct sowing.
- Plant early in the spring, and late in summer, to avoid high feeding times by symphylans.
- As there has been some indication that undisturbed organic matter and crop residues decrease symphylan presence, possibly due to the development of predator populations, I would recommend the avoidance of heavy cultivation of the soil, and planting into layered mulches or mowed cover crops. A variation on this technique can be used to 'rotate' crops in a single location over the growing season. Planting in wide rows allows interplanting of younger starts when the first plantings are nearing maturity, and may reduce symphylan predation on new plants.

Irrigation

Seattle Tilth will be able to easily reroute existing drip irrigations systems to accommodate the new plan. As discussed in the Hydrology Analysis of Section I, there are no serious problems with existing irrigation on site.

Informational Signage Boards

The new plan for Seattle Tilth breaks the garden up into many small garden rooms. Each individual room has its own special character and purpose. Through a series of specifically designed sign boards, the public will be better able to use the garden as a tool or learning experience. The goal is that this demonstration garden will stimulate ideas for the home gardener to take into their own gardening experience.

The above image is a sample of a sign board that Seattle Tilth could use as their informational signage. The sign board serves three purposes simultaneously. The right hand side of the board gives the shape and location of each individual garden space. The example shown is a diagram of

the Medicinal Mound, which locates its general position within the entire garden and serves as a plant species identifier. Most significantly, the information signs will also give gardening tips specific to those seen in each display garden, such as watering techniques, mulching, composting, etc. Each information sign will hold to the same general layout. Materials are left to the discretion of the budget.

Signage is to the success of the educational component of Seattle Tilth. To the right is a diagram giving suggested locations for each plaque. The objective is to have at least one plaque within each garden space, although some of the larger spaces may require more.

Connection of French Drain

A brick french drain currently exists on site with a history spanning the life of Seattle Tilth. Unfortunately, this drain currently has little functional use, due to the fact that water rarely reaches it. Presently, the water from the office downspout is connected to a pipe and enters the sewer system. During heavy rains, some water from the central path reaches the drain, though typically the surface water is absorbed into the ground, because the majority of the site is composed of pervious, well-drained soil. One option to direct more water to the french drain is to pipe the water from the office downspout underground to the drain. This future connection underground could be a burdensome task given the existing central path construction, which is relatively permanent. For this reason the most appropriate time to begin this project would be if the pathway were to be changed. In the meantime, connecting this downspout to a rain barrel would help to relieve stormwater flows to the sewer system. Refer to the Installation Description Section III for more information on rain barrels.

Guidelines for Transplanting and Installing Trees, Shrubs, and Perennials

General

- Bare root plants and B&B plants should only be dug and planted after they have gone dormant in the nursery. Fall is the optimal time for planting container stock if weather conditions permit.
- Nothing should be planted during the following conditions: soil conditions are waterlogged or frozen, air temperature is less than 32 degrees F. or over 90 degrees F, wind velocities exceed 30 mph.
- Lift, transport and plant B&B or container trees by rootball or container only, not by trunk or branches.
- Keep roots cool and moist throughout planting and storage. Plants should be heeled in trenches or covered with decomposed sawdust, wet newspaper, or other acceptable material as necessary to keep roots moist.
- Complete all planting operations begun each day. Do not leave trees next to pits, or partly planted overnight.

Plant Preparation

- If the plants are in containers or B&B rather than bareroot, remove all container material and set aside for top dressing. Remove any foreign materials such as twine, burlap, tags, and wire baskets from B&B or container plants.
- Remove any long, circling, kinking, or unhealthy roots. Roots matted to the bottom of rootball should be cut and removed.

Planting Hole Preparation

- Dig planting hole 3 times as wide as rootball, and only as deep as the rootball. Do not disturb the bottom of the planting hole.
- Remove any weeds, rocks, or debris from the planting hole.

- Where pits are dug with backhoes or other large equipment that may cause compaction or glazing in the surrounding soil, scarify the sides of the pit and break up edges to provide a rough transition between undisturbed soil and backfill.
- Make a mound in the middle of the planting hole with excavated native soil to support the crown, lightly tamp down the soil to create a stable base. The top of the rootball should be slightly raised above or level with surrounding grade and should never be below.

Planting

- Place plant on top of the mound and arrange to form an even radial distribution around the trunk. Roots should not circle, kink, or girdle each other. If planting on a slope or on a windy site, orient the plant so that the best roots are facing towards the wind and/or on the uphill side of the plant.
- Backfill the pit with excavated, native soil.
- Form a watering saucer above finish grade. Water the plant well to settle, if holes appear, fill with native soil.

Installation Aftercare

- Prune only damaged, dead, or diseased branches from the crown. Remove all metal or plastic tags, labels and strings restraining branches from trees or plants immediately after planting.
- Remove weeds around the planting hole to limit competition.
- Topdress the entire bed with a generous skirt around the plant with any container material removed prior to planting or 2 inches of compost and 2-6 inches of woodchips on the surface immediately after planting.
- Remove any mulch that collects around the base of tree trunks or plants.
- Water the tree or plant in by filling saucer with water immediately after completion of planting, entire mulch skirt should be well saturated.
- Stake or anchor any large material. Stake ties should be loose and low, not higher than 1/3 of the tree height. All staking material should be removed entirely 1 year after planting.

Phasing Plan

The installation plan has been divided into phases for ease of implementation. Each phase focuses on a different area of the garden, allowing phases to be completed without overly disturbing function of the other sections of the garden. Phases I, II and III are presented in the recommended order of installation. Phases X and Z can occur at any time in the installation process, and after the main installation is completed, respectively. This section includes a phasing plan diagram, an installation checklist, and descriptions of steps in the phasing plan.

Installation Checklist:

Phase I
- ☐ build trellis by office (using parts from bins if possible)
- ☐ transplant vines from building to pots under trellis by office
- ☐ rebuild storage bins for 2-way access
- ☐ removal and chipping of woody material

☐ Phase I complete

Phase II
- ☐ planting plan, clear raspberry and laurel areas
- ☐ move compost demos to just cleared raspberry area
- ☐ remove current gravel path by building, install new path
- ☐ surface new path and prepare newly created beds
- ☐ create and plant edible and home demonstration gardens
- ☐ rain barrel installation in home demonstration beds

☐ Phase II complete

Phase III
- ☐ stage medical plants/perennials from annual area
- ☐ regrade soil in rotation area to medical mound
- ☐ install annual beds
- ☐ install habitat and native demonstration and mulches bed
- ☐ install medical mound plants
- ☐ plant flower bed by storage bins

☐ Phase III complete

Phase X (at any time during construction)
- ☐ lawn alternative area

- pollination garden
- bridge design contest and construction
- design contest for trellis over meeting area

Phase Z (after main construction)
- ADA path fundraising and installation
- ADA bed funding and installation
- design contest and construction for seat wall/plant storage shelves by greenhouse
- wattle garden installation
- outdoor kitchen accessories
- side bed of big natives and edibles
- trellis and annual vine over meeting area installation
- container plantings
- finish any planting left undone.

    - Phases X and Z complete

Phasing Descriptions

Brief descriptions of different steps in the phasing plan, organized by phase.

Phase I

1. Trellis construction

   See Trellis and Storage Bin Retrofit diagram in Appendix. Trellis should be placed by Tilth office entrance.

2. Transplant vines

   Move perennial vines from south side of building into pots for use with trellis by Tilth office entrance.

3. Rebuild storage bins:

   To facilitate movement of mulches and soil into the garden, the storage bins need to be redesigned to allow access from both the garden and the paved delivery area. The current bins will need to be disassembled and the materials they contain being either discarded, used to build other improvements, or stored in a different location until the bins are rebuilt. The cinderblocks forming the current bins can be reused to form the new bins. After leveling and compacting the soil, bins should be reconstructed with walls approximately seven feet apart wide to accommodate the back of a pickup for easy dumping of materials. Use of reinforcement rods to stabilize the walls is strongly recommended. Three bins should be constructed, leaving a small garden space between the bins and the garden entrance.

4. Remove and chip woody plants

   See black areas of above Plan of Existing Plants for diagrammed locations of plants to be removed. Plants to be removed include: two apple trees, the row of espalier apples, part of the fruit hedge, the apple by main entrance, the bay laurel, the grape mahonia, and the butterfly bush.

Phase II

1. Remove/transplant plants in North part of Tilth

   General movement of plants from current locations to new locations, focusing on the drought tolerant bed. This includes temporarily transplanting desirable plants into crop bed area, clearing the bed in front of the greenhouse for the new drought tolerant bed. Then move all desirable drought tolerant plants from existing drought bed to new drought bed. Clear remaining vegetation from the current drought tolerant area, saving any desirable

plants by transplant to crop beds, or to other clear area. Also clear the area under the Elderberry. Move raspberries and artichokes temporarily to crop bed area, until ready to plant into edible garden.

2. Relocate compost demos
3. Remove current gravel path

   The current path will be removed to make room for the home demonstration garden. Gravel and compacted gravel-soil underneath path should be removed and discarded/recycled. Soil may need to be tilled or otherwise loosened in preparation for use as a planting bed. The new path should be marked out as shown in the map of the site plan, and surfaced. There are several surfacing options; selection of surface, such as chips, gravel, straw, etc, has been left to the discretion of Seattle Tilth. If gravel is selected, the discarded gravel from the original path may be reusable.

4. Surface new path, prepare newly created beds

   Install preferred surface on the new path, and prepare new beds for eventual planting. Preparation for new beds includes loosening compacted soil if applicable, grading soil if necessary, and applying a layer of mulch or compost to preserve soil health until ready to plant.

5. Planting of new beds

   Plant edible demonstration garden, home demonstration garden, and new perennial bed into prepared beds. See part 4 of Phase II above for description of bed preparation. Refer to the above section, Guidelines for Transplanting and Installing Trees, Shrubs, and Perennials for transplanting guidelines.

6. Install rain barrels in home demonstration beds

   The rain barrels address several issues for the home demonstration beds, including the exposed downspout and homeowner education on water use. Demonstrating sustainable practices is a vital function of this garden, since solutions shown here are most likely to be carried into the everyday home garden, and rain barrels are a simple and cost effective measure to reduce irrigation water use by home gardens. “Residential irrigation can account for 40% of domestic water consumption in a given municipality. These barrels not only lower your water bills, they help decrease demand during the sweltering summer months. Only 1/4 inch of rainfall runoff from the average roof will completely fill your barrel.” (Green Culture 2002) Collecting rainwater on site also eases pressure on municipal storm water systems, and benefits the environment by allowing a slower release of water into the soil.

There are many varieties of rain barrels available, each with specific installation specification requirements. As Seattle Tilth currently has a few rain barrel systems which may need to be upgraded in the interests of sustainable technology, selection of products to use has been left to the discretion of the staff. A list of rain barrel sources is included in the Additional Resources section of this report. The Green Culture website in the Works Cited section also has some useful rain barrel products.

Phase III

1. Move plants in South part of Tilth

   Move medicinal plants and perennials from annual bed, transplanting to temporary areas, and move Acanthus and tall grasses by the french drain to home demonstration garden. Trim rosemary and transplant to home demonstration garden, or to temporary location for transplanting into habitat garden.
2. Prepare medicinal mound and annual beds

   Level the annual beds and crop rotation area, using the extra soil to form a mound in the medicinal garden. Mulch beds in preparation for planting. Install plants in medicinal garden, referring to recommendations in the Plant List.
3. Install habitat and native gardens and mulches bed

   Refer to part 4 of phase II for bed preparation, and to the Guidelines for Transplanting and Installing Trees, Shrubs, and Perennials for transplanting guidelines.
4. Plant crop rotation beds and edible flower garden when appropriate.

Phase X

1. Install lawn alternative area, using plants recommended in Plant List.
2. Install pollination garden, using plants recommended in Plant List.
3. Begin bridge design contest.

   Bridge measurements for design contest parameters

The bridge should be at least 30 inches long and 35 inches wide. Extending it past the large rock set in the ground would make it 50 inches long, though this rock could also be removed. The rock covering the drain currently is relatively flush with the grade on either side, with a slight slope down on the north side. This rock is set in concrete, as are the other rocks lining the main drainage path. The north side of the bridge is brick and rock set in concrete, while the south side is currently woodchips, but will be changing to a firmer

surface material to accommodate differently-abled visitors. The farthest drop from the bridge would be only 9 inches, so handrails would not be necessary, though a small lip might be helpful.

At conclusion of contest, install bridge.

4. Begin annual vine trellis design contest

Bench measurements for annual vine trellis contest

In plan, this bench is roughly a right angle, with one leg being 167 inches long, and the other 160 inches. The front of the bench is mosaic, and the top has two strips of recycled gray plastic "lumber" forming the seat. The back of the existing bench is where attachments to a trellis structure would be made. Currently, the back is below grade, but it appears to be various widths and forms of concrete. Depending on what is discovered when the existing grade is removed, the trellis contest might have to also call for a refinishing of the back side of the bench, or the trellis could be retrofitted into the existing concrete. Ideally, the bench could be sat upon from either side once the grade is removed. Therefore, the only structure that should be actually touching the bench are structural supports for a more elaborate trellis above the bench, a primary goal being to provide shade. These structural supports will also function as the poles for various annual climbing vines to creep up. Examples of some vines might be pole beans, sweat peas, purple hyacinth bean, cucumber, or squashes. Some of these vines need more support than others, so the poles might vary accordingly, accommodating "branches" along the way to support heavier or more fragile vines. It should be kept in mind that the base of the poles should be kept clear for planting, so any foundations for them should be at least 8" below the surface of the ground. It could be the case, however, that soil or planter boxes for the vines are incorporated into the trellis itself. In that case, the foundations for the poles can be flush with grade, or even raised. This trellis is in a central location in the demonstration gardens, and will only be covered later in the summer, so it has great potential to take on a sculptural form, creating another signature piece for the gardens. Recycled, sustainable, or found materials are encouraged, in keeping with the other artwork within the gardens, and ideally it would be able to stand a long time.

At conclusion of contest, install trellis and plant annual vines.

Phase Z

1. ADA path fundraising and installation

Raise community funds to surface the ADA path as described in the Proposed Site Plan Description of Section II.

2. ADA bed fundraising and installation.

   Raise community funds to build ADA accessible planting beds, as described in the Proposed Site Plan Description of Section II. Install and plant beds.

3. Begin design contest for seat wall and storage shelves near greenhouse

   Design parameters for seat wall and storage shelves next to the greenhouse

   The existing seat wall shown in the plan, below right, has mosaic on the top and front sides. It stands 15 inches taller than the bottom grade, and meets a sloping grade at the top. As shown below left, the proposed seat wall will be an extension of the existing one, keeping the same measurements (15" tall, 15" wide) and possibly the same materials. The drawing shows only one additional bench, though it is possible to create two.

4. Install wattle garden

   Clear *Rosa rugosa* from the area behind the greenhouse and plant recommended plants for the wattle garden.

5. Kitchen accessories

   Design and install desired kitchen accessories. A design contest may be used to encourage community involvement in this project. Exact specifications are left to the discretion of the Tilth staff.

6. Finish side beds of big natives and edibles as outlined in Plant List.
7. Container plantings

   Install and plant as desired. Suggestions can be found in the Plant List.

8. Finish planting any beds not completed

This is a minimal budget, intended to reduce costs by using and reusing material from the site. The following summarizes some of the considerations for an overall budget, but does not provide a complete budget analysis.

equipment rental:

chipper: $182.60/day
chainsaw: $40/day
5 ton tandem roller(required for installation of ADA beds): $117.20/day

labor:

None of this work requires specialized labor, rather the bulk of the labor can be performed by volunteers and staff.

materials:

Wood chips are often available for little to no cost from commercial or public arborists. Alternatively, a cubic yard of chips can be bought for approximately $30 from local businesses (Sawdust 2002).

Extra cinder blocks for storage bins can be bought for less than one dollar.

Benches and containers: prices range for these from $25- $900.

Plants: see Table of Plant Characteristics in Section II.

ADA Path options: prices depend on the material chosen for the path
Below are some of those options with associated costs:

EQUIPMENT	MATERIAL	LABOR	TOTALS
equipment required: 5 ton Tandem Roller			$117.20 per day
standard brick with sand base	$2.37 per square foot	$5.05 per square foot	$7.42 per square foot
masonry/concrete pavers on sand base	$1.98 per square foot	$4.77 per square foot	$6.75 per square foot
stone pavers	$4.20 per square foot	$3.73 per square foot	$7.93 per square foot
soil binder (ADA approved, polypavement.com)			$1.35 per square foot
recycled rubber tires (safety deck tiles, matfacturyinc.com)			$6.45 per square foot
wood carpet (ADA approved, zeager.com)			

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