Family Housing Project, Group B

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Course: ES341 – Environmental Restoration

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Table of Contents

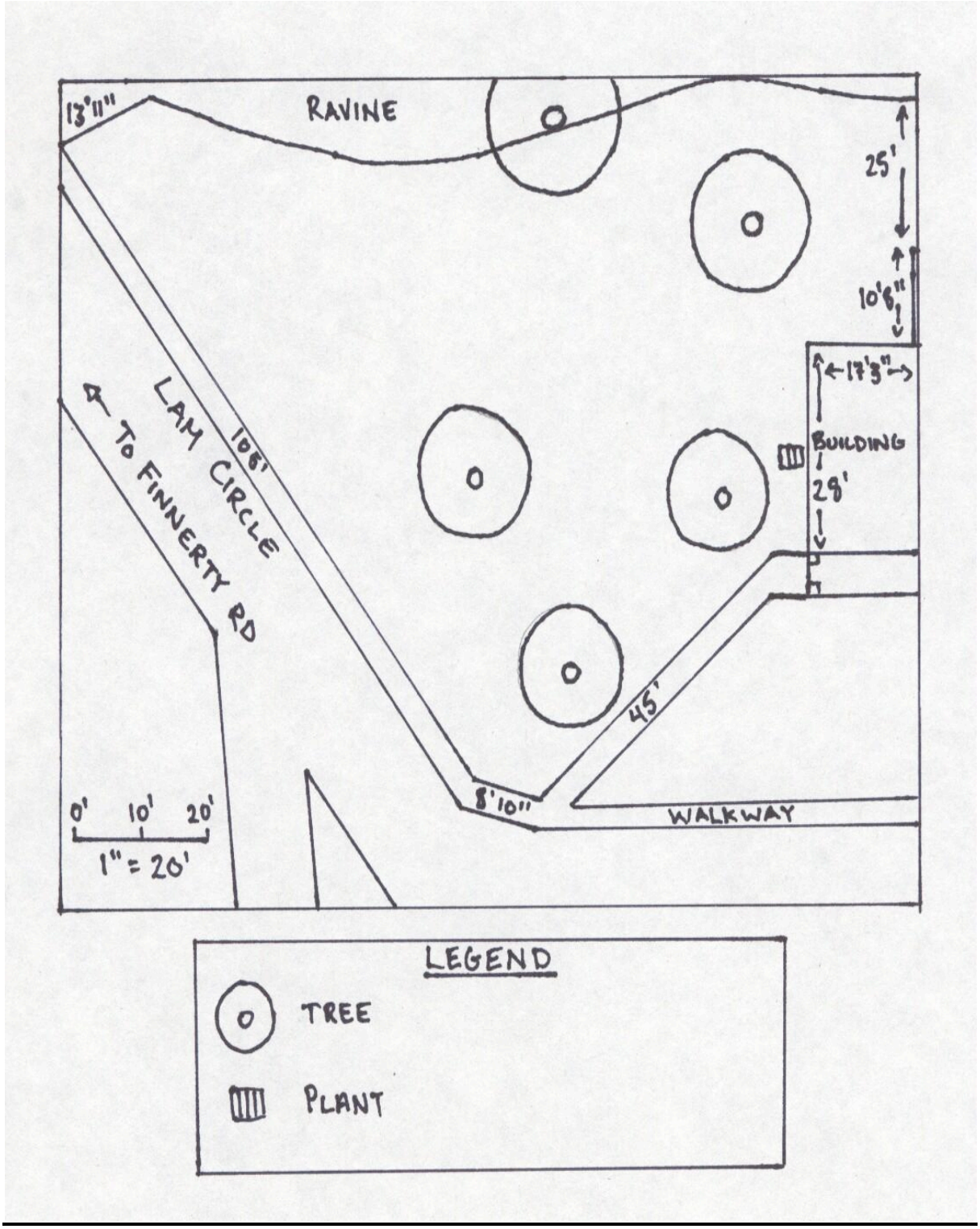
Introduction

"Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (Principles of Restoration, 2008). This can be carried out for many reasons; in the case of the Family Housing Centre's outdoor space, restoration will be carried to restore a degraded site: a lawn with non-native grassses, lacking gardens and seating to inspire families to spend time in the space. Further, as many of the children at the Centre are toddlers, safety is a big concern: there is not a fence between the lawn and the road, nor any barrier between the sloping ravine and the lawn. Thus our goal is to develop a safe, educational, and interactive self-sustaining green/natural space where families can gather to promote feelings of community and connectivity with nature. Once this restoration project is carried out, we hope that the native gardens, the pond, benches and birdhouses will create a vibrant natural space which is inviting to families, butterflies, amphibians, birds, and other local fauna; asthetically and ecologically enhanced and restored to a community space which fosters deeper connections between people and nature. Ultimately, parents who live in Family Housing hope that the space can become an important community meeting space; a space for outdoor get-togethers, celebrations, music groups and other events; as a space to rest and observe the beauty and diversity of local flora and fauna; and as a natural wonderland for children to learn about and develop a connection to nature.

References:

Principles and Guidelines for Ecological Restoration *in Canada's Protected Natural Areas.* National Parks Directorate, Parks Canada Agency: Gatineau, Quebec (2008)

Current Site Map:



Map #1 - Current Site Map

Goals & Objectives:

Our main goal is to develop a safe, educational, and interactive self-sustaining green/natural space where families can gather to promote feelings of community and connectivity with nature.

Objective 1 - The Fence: The objective of the fence is to improve the safety of the site by preventing children and their toys from straying out onto the roadway. A fence would allow parents to be able to relax at the site, knowing their children are not threatened by vehicle traffic on the nearby busy road. We aimed to choose a fence that would balance functionality with aesthetic, thereby meeting the Family Housing representatives' preferences for structure with our desire to keep the site as natural-looking as possible.

Objective 2 - The Benches: The objective of the tables, benches, and other seating is to encourage people to gather and rest in the space. Benches encourage families to sit and enjoy the gardens and the pond, and watch birds flit from tree branch to birdhouse. Tables and stumps provide space for picnics, BBQ's and other outdoor activities such as musical events. We chose plans for benches and tables which can be made easily and cheaply with reclaimed natural materials such as logs and stumps which enhance their asthetic and ecological value.

Objective 3 - The Bird Feeders: The bird feeders are intended to attract a variety of avian species, allowing observation by children and families. These feeders would also provide a food source for local bird populations, thereby increasing abundance in the area. Bird feeders can also be a enjoyable project for the children of the Family Housing Complex, as most feeder options listed can constructed at home.

Objective 4 - The Native Plant Gardens: Native plant gardens will educate children and families, thereby enhancing their connection with nature. Edible species will provide a nutritious source of food for the occupants of the Family Housing Complex as well as a variety of species in the surrounding area.

Objective 5 - The Pond: The intention of the pond is to attract native species that children and families can observe and interact with. By including this element in our stie plans, we hope it will enhance the overall biodiversity of the site as well as increase learning opportunities for occupants of the Family Housing Complex.

Objective 1: The Fence

by Emily McCreesh

Introduction: A red cedar fence was chosen mainly because it is the most natural material that will provide durability while still matching the overall natural look of the site. A cedar fence would be relatively low-cost and low maintenance, as it can be left unpainted and only needs to be stained every four to five years to prevent greying from weather damage. A red cedar fence was the ideal way to match Family Housing preferences with the groups desires for the site.

Fence Option #1

Design: This fence would consist of 4'x4' pressure treated or cedar posts set in concrete with 4'x8' or 6'x8' cedars panels in between posts. The fence would run from the ravine to the road, along the road to the walkway, and along the walkway to the Family Housing building. It would provide a visual barrier to enhance privacy and a physical barrier to keep children at the site off the road.

Materials List/Cost: Table #1 – **total fence length is 175', total cost** from $2762.38

4'x8' cedar panels	$64.99 ea	22 panels needed	$1429.78 + tax
6'x8' cedar panes	$87.99 ea	22 panels needed	$1935.78 + tax
4'x4'x8' pressure treated posts	$10.13 ea	23 posts needed	$232.99 + tax
Bags Post Haste Concrete Mix	$8.69 ea	69 bags needed	$599.61 + tax
Boxes #8 Coated Deck Screws	$50.00 ea	2 boxes needed	$100.00 + tax
Labour for Installation	$25-$35 per hour	16-24 hours needed	$400-$840 + tax

Sources:

Prices for materials are from:

Ace Lumberworld
3943A Quadra Street
Victoria, BC
Ph (250) 479-7151

Price of labour is from:

Butler Fence Co.
2070 Keating Cross Road
Saanichton, BC
Ph (250) 652-2412
Fax (250) 652-4421

Timeline: Butler Fence Co. suggested an estimate of 16-24 hours of labour to complete the fence installation. It will take approximately eight hours to dig holes, pour concrete, and set posts into the ground, and eight hours to put up paneling. This fence could realistically be completed over a regular or long weekend.

Implementation: Family Housing would have the choice of paying a fence company or contractor to come in and install the fence for them, or they could purchase the materials and install the fence themselves in a group effort.

Special Considerations: Materials list does not include taxes, cedar fence post caps, stain, or a gate. These things would require additional materials and labour if desired. There are many, many different styles of cedar fencing therefore, the prices represent the starting price of each item. Staining the fence to preserve its color would increase the overall cost due to additional materials and labour. However, staining is strongly recommended as it adds years to the life of the fence.

Fence Option #2

Design: This fence would consist of 10' cedar split rails stacked 4 high in a zigzag pattern. Holes would need to be drilled in the ends of each rail in order to pass a 10' length of rebar through at each joint. The rebar would then pass through either a small or large concrete block, which would hold the bottom edge of the fence off of the ground. The concrete blocks are optional. The fence would run from the ravine to the road, along the roadway to the walkway, and along the walkway to the Family Housing building.

Materials List/Cost: Table #2 – **total fence length is 175', total cost from $1852.00**

10' Cedar Split Rails	$13.00 ea	100 rails needed	$1300.00 + tax
Large Concrete Blocks	$6.00 ea	25 blocks needed	$150.00 + tax
Small Concrete Blocks	$4.00 ea	25 blocks needed	$100.00 + tax
10' Rebar	$4.00 ea	13 pieces needed	$52.00 + tax
Labour for Installation	$25-$35 per hour	16-24 hours needed	$400-$840 + tax

Sources:

Prices for materials and labour are from:

Butler Fence Co.
2070 Keating Cross Road
Saanichton, BC
Ph (250) 652-2412
Fax (250) 652-4421

Timeline: Drilling the holes in the ends of the cedar split rails and pounding the rebar through each joint is likely to be the most time-consuming portion of the task. Therefore, these jobs will take the better part of an eight hour day to complete. Once the joints are in place, the fence can be stood upright and anchored to the ground (and through the concrete blocks, if desired). This fence could easily be completed over a regular or long weekend.

Implementation: Family Housing would have the choice of paying a fence company or contractor to come in and install the fence for them, or they could purchase the materials and install the fence themselves in a group effort.

Special Considerations: Once again, we have not included stain in the materials quote or timeline. However, it is highly recommended that stain is used. Two five gallon buckets of Thompson's Water Seal or some other comparable product would likely be sufficient to treat the entire finished fence. It should be noted that a cedar split rail fence would be easy for children to climb and toys could still pass through the rails. The Family Housing representatives would also need to decide how deep they would like to set the rebar, as this would influence the strength of the fence. Finally, one should note that a split rail cedar fence is not as structurally strong as a cedar paneled fence, but each option should last approximately the same amount of time. Of the two fence option, the cedar split rail would be less damaging to the ground on site, as no concrete need be poured in order to secure the fence.

References:

Picture #1 – rounded lattice top with white house in background, courtesy of Butler Fence Co. website http://www.butlerfence.com/images/products/LatticeTop2.jpg

Picture #2 – square topped lattice corner fence picture, courtesy of Butler Fence Co. website http://www.butlerfence.com/images/products/LatticeTop.jpg

Picture #3 – greying split rail cedar fence, zigzag pattern, courtesy of Wikipedia website http://en.wikipedia.org/wiki/File:8499720-R1-017-7SplitRail_wb.jpg

Objective 2: Benches & Seating

by Danielle Stevenson

Introduction: Moveable benches and stumps provide seating for children and parents during events in the space. As they are moveable, they can be stored out of the way in the corner (see map) to create more open space for activities. Benches and seating relate to our overall goal by making the space inviting for people to gather, rest, and enjoy this outdoor space- facilitating community gatherings. A diversity of seating options will be offered to accommodate different situations and age groups, i.e. benches with backs which are more comfortable and provide more support; and stumps for children to sit on during music and other events. Several picnic tables will be made to facilitate community events outside such as barbeques and picnics, and to provide tables for activities and crafts. Further, benches and tables will be produced to the extent possible with reclaimed natural materials such as driftwood, stumps and log refuse, to both reduce costs and environmental impact.

Benches

Benches with backs provide seating with support for parents, teachers, grandparents and others to rest in the yard and enjoy the gardens, observe birds and other wildlife, and watch their children play. Benches are fairly easy and cheap to build. Below, I have included building plans for two different styles of bench: one which can be made from stumps and found driftwood, the other which can be built from purchased lumber (preferably eco-forest certified, or pine beetle wood). Alternatively, benches can be purchased from local stores such as the Oak Bay Home Hardware (the Iron Park Bench, $59.99) at 1911 Oak Bay Ave. (250) 598-1620.

Option 1: Bench with Back *plans available at www.buildeazy.com/seat_imp.html

Materials required: All the lumber used in this project is 2x4 stock suitable for exterior use (for example, cedar is rot-resistant, and even inexpensive pine or spruce will usually last for ten years or more). Hopefully parents will have the tools necessary to build this bench; if not, they can be rented from the *Home Depot*'s Tool Rental Service at 3986 Shelbourne St., (250) 853-5356.

Material	Quantity	Cost	Source
2 x 4 lumber suitable for exterior use	60 ft	$60	www.bclumbersales.com and Oak Bay Home Hardware at 1911 Oak Bay Ave., (250) 598-1620
1/2" galvanized carriage bolts, each 4 1/2" long	8	$0.27ea = $2.16	Oak Bay Home Hardware
1/2" galvanized carriage bolts, each 6" long	2	$0.37 ea = $0.74	Oak Bay Home Hardware
3 1/2" galvanized flathead nails	2.5 lbs	Package for >$10	Oak Bay Home Hardware
Saw		$19/4 hrs $27/24 hrs	Home Depot Tool Rental Service (250) 853-5356
Clamp		unknown	Borrow; or rent from Home Depot
Drill		$17/4 hrs $24/24 hrs	Home Depot Tool Rental Service
Total Cost with Tool Rentals:		$110	
Total Cost without Rentals:		Under $70	

Plans: Below are the precise sizes and angle cuts of every piece of lumber required to construct the bench. Always cut the longer pieces first and then cut the shorter lengths from the off cuts.

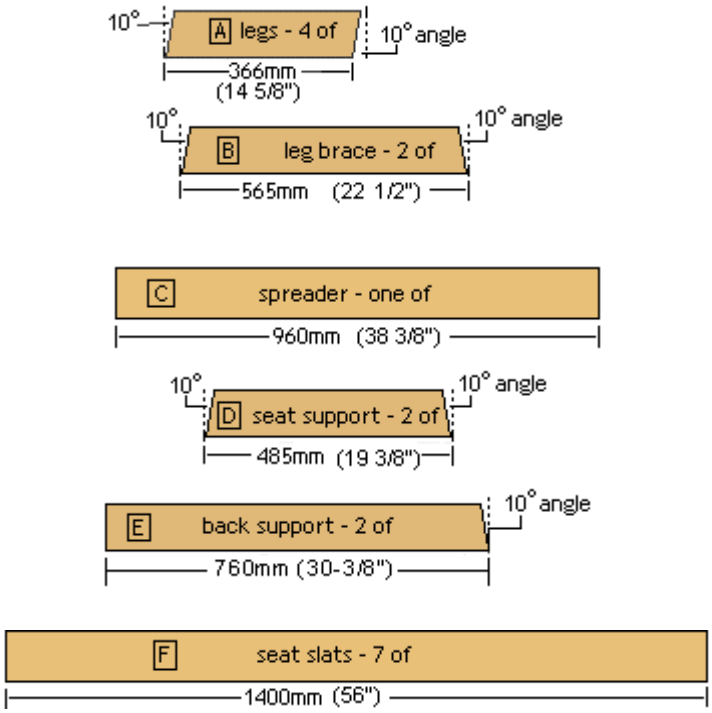
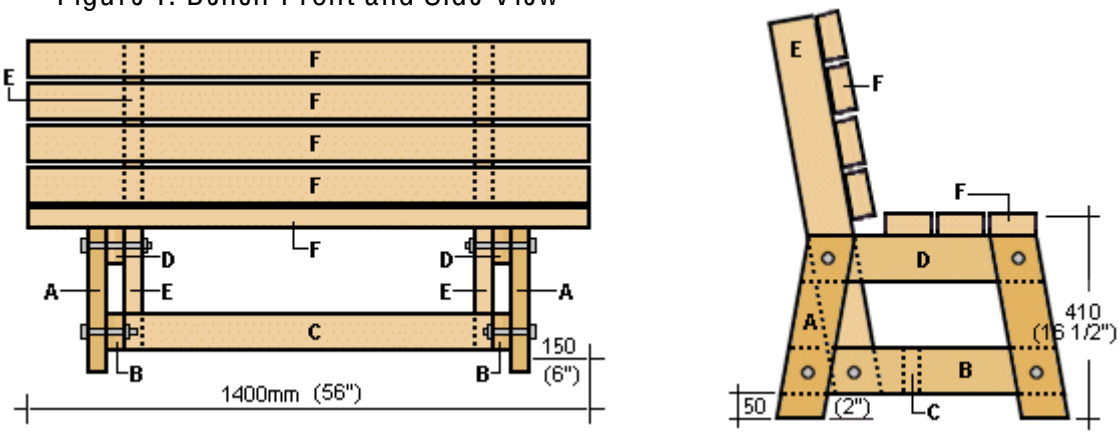


Figure 1. Bench Front and Side View



Assembly Instructions:

Step 1: Cut all pieces of timber to lengths and angles as shown in previous page. All angle cuts are 10 degrees off square.

Step 2: Lay out one of the end frames flat on the ground with the two legs (A) first, followed by the leg brace (B) and the seat support (D) on top of the two legs, and then the back support (E) on top of that. Position as shown in the plan ensuring all ends are flush (refer to fig.1 in the plan).

Step 3: Hold the frame in place with clamps and drill and bolt all adjoining pieces. (4 only 1/2" bolts at 4 1/2" long and 1 only 1/2" bolt at 6" long.) That's the first end frame complete.

Step 4: Make up the second end frame in the same way as described in step 1 and 2 <u>but</u> as a mirror image of the first.

Step 5: Stand up both frames and nail the spreader (C) in place. (See fig.1 in the plan).

Step 6: Commence nailing the seat slats (F) to the seat frames beginning with the first slat flush with the front edges of the legs and overhanging the sides of the legs by 6". (See fig.1 in the plan). Continue nailing the rest of the slats to the seat frames, spreading them out evenly (approx 3/8" gap between slats.) Constantly check that all slats are overhanging the seat frames by the same amount and that the seat frames are square and parallel. Nail with 3 1/2" galvanized flathead nails.

Timeline and Implementation: This bench could be built in one day by parents who had the time and interest to do so.

Option 2: Simple Plank Seat *plans available at: http://www.motherearthnews.com/Do-It-Yourself/2004-04-01/3-Easy-Benches.aspx

Materials:

Material	Quantity	Cost	Source
12-14-inch long cedar stumps	2	free	Davey Tree Expert (250) 477-8733, Suite A, 555 Ardersier Rd.
Driftwood Plank	1	free	Victoria beaches
Or/ Cedar Plank	1	Under $10	Oak Bay Home Hardware at 1911 Oak Bay Ave., (250) 598-1620
4-inch long wood screws	4	Under $2	Oak Bay Home Hardware
Total Cost:		$12	

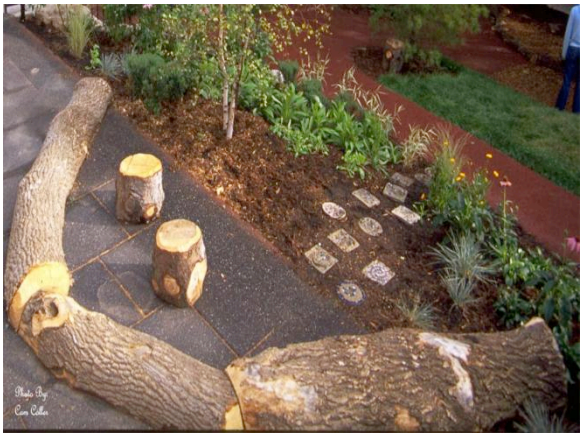
A simple plank for the bench top will work: either a rough-sawn 2-by-12-inch (driftwood or a plank from a neighbour will work) or a piece of milled, construction-grade lumber. Whatever you choose, the bench will look best if you extend the seating plank beyond the uprights by 6 to 8 inches.

Instructions: Fasten the plank to the stumps with the hot-dipped galvanized spikes or 4-inch-long wood screws. Place the stumps on a well-drained spot so they last longer, and peel the bark as it loosens over time. The large, flat seating plank is ideal for visitors to carve their initials in as a reminder of their time at your place. Think of it as a great, big outdoor guest book.

Timeline and Implementation: This bench could be built within less than an hour. Although it doesn't have a back, it nonetheless provides comfortable seating around the gardens and pond, and can be built from recycled materials quickly, cheaply, and easily.

Stumps & Logs

Ten to fifteen small stumps should be gathered to provide seating for children. Stumps are small and easily moveable, thus can be stored in the corner to clear space if desired. One or two logs can be used uncut as long natural benches around the pond. All edges of the logs and stumps should be sanded and rounded until smooth to avoid splintering. *Davey Tree Expert* provides tree and shrub removal throughout Victoria; as a result, they have tree stumps and logs available for free. Contact them at (250) 477-8733 to arrange a pick-up at their site, Suite A, 555 Ardersier Rd. (just off Douglas St.). It is important to use rot-resistant wood, such as cedar so that the stumps will not rot in the rain. Pine and spruce are less rot-resistant but will last for at least ten years.



Materials:

Material	Quantity	Cost	Source
Stumps	10-15	free	Davey Tree Expert (250) 477-8733, Suite A, 555 Ardersier Rd
Logs	1-2	free	Davey Tree Expert
Sandpaper	1	Under $5	Most hardware stores
Truck for log/stump pickup		Gas $	A parent or volunteer
Chainsaw	1	Free if parent has one; otherwise can be rented for $17	Home Depot Tool Rental Service, (250) 853-5356
Total Cost:		$5-25	

Instructions: Cut stumps to desired size, if necessary. Sand all edges of logs and stumps and round until smooth to avoid splintering.

Picnic Tables

A couple simple picnic tables can be created cheaply, quickly and easily from wide tree stumps, like the one pictured alongside. Tables (along with benches and stump seating) provide space for families to picnic outside in the shade of a tree, near the gardens and the pond. These tables are also easily moveable.

Materials:

Material	Quantity	Cost	Source
Larger Stumps	4-6	free	Davey Tree Expert (250) 477-8733, Suite A, 555 Ardersier Rd
Sandpaper	1	Under $5	Most hardware stores
Truck for log/stump pickup		Gas $	A parent or volunteer
4-inch long wood screws (and screw driver or drill)	8	Under $2	Oak Bay Home Hardware
Chainsaw	1	Free if parent has one; otherwise can be rented for $17	Home Depot Tool Rental Service, (250) 853-5356
Total Cost:		$5-25	

Instructions: Cut stumps to desired height as base for table. If the stump is wide enough, it can be used as a table as is, without a table top. The top should be sanded thoroughly. If desired, a table top can be created by cutting a wider stump than the base thinly, sanding it thoroughly, and screwing it into the base with wood screws.

How does this objective relate to our main goal, and to Ecological Restoration?

This is perhaps not a typical ecological restoration project. The site is a grassy patch of land alongside the Family Housing Centre on campus, in between a ravine and a road. This is a space which has been totally transformed by human activity, and which continues to be maintained as simply a patch of non-native grass. Initially our ideas and visions of transforming the space into an ecological playground for native plants, birds, insects, amphibians, butterflies, and children ran wild. However, after our meetings with one of the Head Staff at the Center and several parents who lived within Family Housing, several limitations and challenges became clear. Of course, we had to work with the goals, visions and *needs* of the people for whom the space was intended, the people who use the space. Safety is the primary concern for parents who use the space: thus their main desires are for a fence to prevent children from running across the road nearby, and a natural fence of sorts, a line of thick bushes along the ravine to prevent children from accessing the ravine. Their secondary interest was in creating a more inviting space where families could gather to promote feelings of community and connectivity with nature. Thus, creating seating and tables relates to our main goal. However, initially I had doubts about how building benches

and tables related to ecological restoration. Yet the Society for Ecological Restoration Primer (2004) suggests that:

What makes ecological restoration especially inspiring is that cultural practices and ecological processes can be mutually reinforcing. Accordingly, it is not surprising that interest in ecological restoration is growing rapidly worldwide and that, in most cases, cultural beliefs and practices are drawn upon to help determine and shape of what is to be performed under the rubric of restoration.[1]

Seating creates an inviting and accessible place for children and families to gather near the native-species gardens and the pond. This is important because it hopefully fosters some sense of wonder and interest in children (and parents) about the plants and animals which may extend beyond this space, leading to a sense of stewardship or responsibility for the natural world. Further, seating and tables facilitate communal use of the space, perhaps allowing for the establishment of a social/cultural attachment to that natural space.

[1] Society for Ecological Restoration Primer on Ecological Restoration (Version 2: October, 2004)

Objective 3: Bird Feeders

by David Mahood

Introduction: The third feature of our plan is the introduction of bird feeders to the property. Bird feeders are a simple and direct way to encourage a diverse array of wildlife in the area. By providing a food source for birds, the feeders will help to support bird populations in the area. Birds attracted to the property can provide an eye-opening experience for the residents, giving them intimate interactions with the diversity of avian life. While a more dynamic, self-sustaining way to feed birds is through the planting of appropriate native species, bird feeders are more straightforward and faster to establish. They can provide a great stepping stone on the way towards the establishment of a thriving bird habitat (Campbell, 2003, p.24).

Birding can be a great activity for connecting both with nature and with other members of the community or family. It's a hobby that people of all ages can enjoy together - working together to identify birds, watching their behaviour, and learning the quirks of the individual birds that visit the feeder are all great things to do as a group. By bringing wildlife right into the yard, bird feeders can create a connection with nature, and make adults and children aware of the diversity of life that surrounds us. Families can cooperate to build and decorate the feeders , which is a fun craft for the kids, and provides a sense of ownership for them. Feed and nectar will need to be replenished regularly, and kids can watch the birds right from the window or from the yard.

A major disadvantage of bird feeders, from the perspective of ecological restoration, is that they are not in any way a self-sustaining system. Feeders must be filled and cleaned regularly, and maintained if any damage occurs. However, feeders do achieve many of our other objectives for this project; they are safe, educational and interactive, and they help to foster community and a connection to nature. Additionally, the bird feeders are probably the part of this project that will show the fastest results in terms of attracting wildlife to the property. In this way, the feeders will be a great motivation for those involved in the project, showing them the benefits of the work they're putting in.

Options: There are many options available for bird feeders. Since one of our key goals is to involve children in the process of restoration, I have focused, when possible, on feeders which kids can make with the help of their parents. Premade bird feeders can be bought if residents desire. I have focused on two kinds of feeders, seed feeders and hummingbird feeders. All of the seed feeders are hanging, with the intent of putting them up in one of the trees on the property. I have not addressed suet feeders, but if residents wish to attract suet eaters like woodpeckers, chickadees, and nuthatches, a variety of feeders are available. A simple and highly functional choice is a wire mesh cage that suet can be stored in. Alternatively, suet can be smeared onto a pinecone as in the pinecone feeder described below.

Seed feeders;

1) Pinecone feeder
2) Milk carton feeder
3) "I Can Build It" Deluxe Seed feeder kit
4) Premade seed feeder

Hummingbird feeders;

1) Do-it-yourself feeder, using a bottle
2) Small "Perky-Pet" feeder for planter boxes in front of windows
3) Larger "Perky-Pet" feeder for mounting to window

The pros and cons of each of these options will be discussed below.

Design:

Seed feeders;

1) Pinecone feeder

Very easy to make, the pinecone feeder makes a fun, fast, and easy craft that kids can do all on their own. Other than birdseed, all the items needed for this project are easy to find around the house. However, the Pinecone feeder is not very durable, and is only a temporary feeder; once the birdseed is eaten, it's probably easiest to just make a new feeder. Also, it doesn't give kids the opportunity to decorate or customize their creation.

2) Milk Carton Feeder

A slightly more involved craft, milk carton feeders are still easy to make with materials found around the house. Kids can customize their creation, adding whatever features they like. Also, it's easy to refill with seed. However, milk carton feeders are not nearly as durable as a wood feeder would be.

3) "I Can Build It" Deluxe Seed Feeder Kit

This is a kit that allows kids to make their own wooden seed feeder, without any cutting or drilling required. All required materials are included. This wooden feeder would be much more durable than either of the above feeders, and would allow the same level of creativity as the milk carton feeder. Also, it might be easier to clean than the milk carton, since it would be more resistant to moisture. The disadvantage of this kit is that it costs some money, while the two feeders above only require common household items. It is available from Wild Birds Unlimited (See sources, below)

4) Premade seed feeders

Premade seed feeders provide an easy, durable, and attractive option for bird feeding. However, there's less opportunity for kids to be involved in their implementation; the sense of ownership that kids can take away from building their own feeder is lost. If maintenance or durability of the home-made options become an issue, or if special functions are desired (such as protection from squirrels), then premade seed feeders might be a good option. They can be purchased from many places; one store with good selection nearby to the family housing centre is Wild Birds Unlimited.

<u>Hummingbird feeders</u>

1) Do-it-yourself hummingbird feeder

A pop bottle can be used to create your own hummingbird feeder. It does require the use of a drill and a glue gun, but it's relatively simple to make. This feeder can be decorated or painted in any way you like - decorations should involve the colour red in order to attract hummingbirds. However, it might not be very durable, and it will be more difficult to place it directly outside the window where hummingbirds can be easily viewed.

2) Small "Perky-Pet" Hummingbird Feeder for planter boxes

This premade feeder has a wire attached to it that can insert into a planter box or hanging basket. Since there are planter boxes in front of the family housing windows, this feeder could be easily placed in an ideal location for viewing hummingbirds. However, it does cost some money, and since it is premade there will be less of a sense of ownership and involvement for the kids. Available from "Wild Birds Unlimited".

3) Larger "Perky-Pet" mounting Hummingbird feeder

This premade feeder is a bit larger than the above, and can be mounted to a window, wall, or post. Since it can be suctioned to a window, it would be easy to put this feeder in a spot where kids could watch hummingbirds from inside. It is ten dollars more expensive than the above feeder. Available from "Wild Birds Unlimited".

Cost and Timeline

All the seed feeders will require birdseed, which costs from $7-$14 for a five pound bag. A wide variety of seed can be used, from sunflower to millet to cracked corn. The seed used will help determine what birds will use the feeder. Black oil sunflower seeds are a good choice all-purpose choice for hanging feeders (Campbell, 2003, p.24). Another good general choice is Wild Birds Unlimited's Supreme blend, which is $8.99 for a five pound bag.

Table 1. Seed Feeders

Feeder	Materials	Cost	Time
Pinecone Feeder	- Large pinecone - String, fishing line, or twine - Peanut butter, or vegetable shortening and oatmeal/cornmeal - Pie tin, paper plate, or cookie sheet - Birdseed - Spoon or butter knife	$0-5 for many feeders	20-30 minutes
Milk Carton Feeder	- Milk carton - Bamboo skewer, chopstick, or straight twig - String, twine, or fishing line - Decorative supplies (e.g. nontoxic paint, popsicle sticks, macaroni…)	$0 and up, depending on decoration	20 - 60 minutes or more
Seed Feeder Kit	- Kit - Hammer	$15.99 and up, depending	30 - 60 minutes or

	- Decorative supplies	on decoration	more
Premade feeders	- Feeder purchased from store	$15 and up	10 minutes

Table 2. Hummingbird Feeders

Feeder	Materials	Cost	Time
Do-It-Yourself Bottle feeder	-Pop bottle/Gatorade bottle -Glue gun -Drill -Wide container top (eg. from salad dressing jar)	Free, with proper tools	30 - 60 minutes or more
"Perky-Pet" feeder for planter boxes	- premade	$7.99	10 minutes
"Perky-Pet" mounting feeder	- premade	$17.99	10 minutes

Sources:

Wild Birds Unlimited (For bird seed, premade feeders, and building kit)

Address: 3631 Shelbourne St., Victoria, BC, V8P 4H1

Phone number: (250) 595-3595

Michael's (For any craft supplies needed)

Address: 805 Cloverdale Ave, Unit 100 Victoria BC V8X 2S9

Phone number: (250) 475-6801

Implementation:

Pinecone Feeder

1. Tie a long length of string, fishing line, or twine to the stem end of the pine cone (about three sections down from the top).

2. Thoroughly cover the pinecone with peanut butter using a knife or back of a spoon. If someone has a peanut allergy, a half cup of vegetable shortening can be mixed with a half cup of oatmeal or cornmeal as a peanut butter replacement.
3. Pour birdseed into a pie tin, paper plate, or cookie sheet.
4. Roll the pinecone in the birdseed until it is fully covered.
5. Hang the feeder from a tree branch outside.

Milk Carton Feeder

1. Cut a window from the side of a milk carton, leaving 2" at the bottom.
2. Push a bamboo skewer, chopstick or straight twig through the wall of the milk carton, just below the left side of the opening. Push another skewer just below the right side of the opening. Be sure to push the skewers all the way through to the other side of the carton, to keep them stable.
3. Decorate the carton! Coat it with nontoxic paint, or glue Popsicle stick shingles on the roof.
4. Use a hole punch or skewer to make two holes on opposite sides near the top of the carton.
5. Thread twine through the two holes to makes a hanger.
6. Fill the bottom of the carton with bird seed.
7. Hang the feeder from a tree branch that's easily reachable and viewable.

'I Can Build It" Deluxe Seed Feeder

1. Purchase from "Wild Birds Unlimited".
2. Build according to directions.
3. Decorate!

Do-it-yourself Hummingbird Feeder

(see "Making a Hummingbird feeder" in references)

1. Use a drill to make a large hole in the centre of the smaller bottle cap.
2. Push a napkin through the hole and leave a small part sticking out the bottom. This will act as a temporary spacer.

3. Place the bottle cap directly in the centre of the larger cap (eg. salad dressing jar cap). Adjust the napkin to make sure the smaller cap is just below the level of the larger one, and is as level as possible.
4. Build up four bridges between the two caps using a hot glue gun. Build up the glue slowly, to ensure glue won't cover the bottom of the bottom lid.
5. Take the pop/gatorade bottle and screw it into the smaller cap. If you fill this bottle with nectar, you've got a hummingbird feeder!
6. Decorate the feeder anyway you like. Include the colour red, as it attracts hummingbirds.
7. Mount the feeder using twine, string, or wire.

Hummingbird Nectar

1. Bring 4 parts of water to a boil and add 1 part sugar. Allow to cool.
2. No other additives are necessary - do not add food colouring.

Evaluation of Success: The success of the bird feeders can be measured in a variety of ways. First, the number and diversity of birds that visit the feeders can be measured. Second, the engagement of residents with the feeders can be evaluated by the amount of time spent watching birds, and the success in keeping the feeders clean and stocked with food.

Ideas for the Future: Bird feeding and birding is a hobby that can be built upon over a lifetime. One excellent way for residents to become more involved with the wider birding community would be to join Project Feederwatch. Feederwatchers commit to counting the species and numbers of birds at their feeders for 2 days every week from November to March. This information is then relayed to scientists, who use it to evaluate species distribution.

References:

Campbell, S. (2003). *Naturescape British Columbia. The Provincial Guide*. Retrieved March 13, 2009, from http://www.hctf.ca/naturescape/Provincal_Guide_2003.pdf

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Objective 4: Native Species Gardens (See map for locations)

by Heather Polowyk

Introduction: Currently the family housing site consists of a field of grass with only a few trees to represent the nature that once existed in that spot. This area is a great field for children activities like soccer, or tag, but it lacks in creating a connection between the children and nature. By planting a few gardens around the sides of this area, the children will be given an opportunity to interact with nature while still allowing them to get their exercise in an open field. These gardens will consist of Garry oak meadow flowers, grasses and shrubs that are native to Victoria.

By planting flowers, grasses and shrubs that are part of the Garry oak ecosystem the gardens will help in restoring this beautiful and rare ecosystem. Restoration of this ecosystem is extremely important because it contains high levels of biodiversity, yet there is only 5 percent remaining in natural conditions (Garry Oak Ecosystems Recovery Team Society (GOERT) 2009). The gardens will supply a source of food and create a comfortable habitat for many native species.

The Garry oak ecosystem creates a home to over 151 species of birds, amphibians, reptiles and mammals (GOERT 2009). There are also 800 insects and mite species that depend on these remaining ecosystems (GOERT 2009). The gardens will help provide extra space for these species to fulfill their ecological roll while connecting the small fragments of Garry oak meadows that are currently intact. These meadow gardens will attract many different species, and create a wonderful learning environment for the children.

Native species such as butterflies, humming birds, and deer will be attracted to the flowering plants that have been chosen for these gardens (GOERT 2009). As the animals begin to appear the children will be able to watch and learn about different species. The plants will also create a learning experience as the children can watch them grow, and witness the importance of pollinators. Also, many of plants have a long history of aboriginal uses, either as a food source or medicinal purposes. These uses will be outlined in this document and allow for further education purposes. Another benefit to planting native plants is they are well adapted to the climate which means less maintenance.

After the plants are established (which could take up to a year) the plants need very little watering (GOERT 2009). They never need fertilizers or herbicides which could create a safety hazard for the children (GOERT 2009). Also, each plant chosen for these gardens are perennials, which means years of enjoyment can come from a couple hours of hard work.

Options

1. Gardens in raised beds
    - Raised beds will allow for easy access to the back of the garden
2. Gardens dug into the ground
    - A cheaper option, but adds the difficultly of reaching the back

Design (see figure 1 for a list of all species and planting information (GOERT 2009))

Under tree gardens plant species (See figures 2 and 3)

Harvest Brodiaea

- Corms traditional harvested, steamed and eaten by some coastal peoples
- Works best with Camas and nodding onion

Spring Gold

- Roots traditional eaten raw or boiled
- Attracts butterflies

Common Camas

- Traditionally used as sweetener
- Attracts bees, ungulates and gophers

Nodding onion

- Blubs often cooked and eaten
- Attracts bees, butterflies, humming birds and other birds

Full sun Garden (see figure 4)

Chocolate lily

- Blubs Harvested and eaten raw
- Attracts deer and birds

Red-Flowering currant

- Fruits eaten by some costal peoples but not recommended
- Attracts hummingbirds

Wild Strawberry

- Traditional used in jams or eaten raw
- Attracts deer, rodents and birds

Nodding Onion: See above details
Common Camas: See above details

Shade and Semi-shade Garden (see figures 5 and 6)

Pink fawn lily

- Traditionally bulbs were eaten raw or steamed

Tiger lily

- C
- coastal people often ate bulbs steamed or raw

Sandberg bluegrass

- Good food source for deer

False-lily-of-the-valley

- Berries used for food
- The Quinault used to the roots to heal sore eyes
- The Cowichan used leaves to make tea

Gardners Yampah

- Traditionally roots were boiled and eaten or dried and pounded to make flour

Nodding onion: See above
Spring gold: See above

Natural fence

Mock Orange

- Food source for deer, elk, and seeds are eaten by birds
- Medicinal uses
- May need pruning, especially if planted with Ocean spray
- Good for bank stabilization

Ocean Spray

- Attracts blacktail deer, and is a food source for seed eating birds
- Requires severe pruning after flowering to keep under control
- Good for ersion control
- Flowers stay on all year round (little clean up)

Indian plum

- Attracts birds and mammals
- Fruit will need clean up
- Good soil binding qualities

Raised garden bed: The benefits to building your own raised garden bed is there is less bending when planting, which will save your back. Building your own raised garden can create an activity that the community can be involved in. Plus, this means you can choose the materials. Things like sustainably harvested wood and recycled joints could be used rather than plastics. However, building a raised bed will cost more than an in ground bed, and the wood may rot after several years.

In ground garden: The benefits of an in ground garden is no excess materials are needed. After digging out the garden, the soil will most likely be well suited for the plants chosen. This is because they are native and well adapted to the natural conditions of Victoria. The gardens will require less time during instalment. They will not need to be replaced after a few years due to rioting wood. Also, a major added benefit is they are cost efficient. However, it will be harder to reach the back as plants will be so low.

Costs

Raised gardens (Eartheasy 2009, Home hardware 2009)

Item	Amount needed	Cost	Totals
2 stacked 2x 6" cedar panels (or other weather resistant wood)	4(2 panels each, 8 pieces in total= 12 ft)	$3.99 (est.)	$31.92
2 Stacked 2x 1" cedar pannels	2(2 panels each, 2 pieces in total=1ft)	$1.99(est.)	$7.69
3.5'Galvanized 'spiral' nails	32-40	$15.49 (for 300)	$15.49

Cedar 4x4'	2 (cut into 18" for posts)	$2.39	$4.78
Soils	Fill the raised beds (at least 9 large bags)	$5.99-$12.99	$53.91-$116.91
Total (not including cost of plants)			$113.79-$176.79

In ground garden (cost of plants)(M. Dickerson, personal communication, March 18, 2009).

Plant	Number of plants/bulbs/seeds	Cost (est.)	Total
Common camas	9	$3.69	$33.21
Pink fawn lily	22	$9.99-$12.99 (1g)	$9.99-$12.99
False-lily-of-the-valley	14	$9.99-$12.99 (1g)	$9.99-$12.9
Tiger lily	17	$9.99-$12.99(1g)	$9.99-$12.99
Chocolate lily	7	$3.69	$9.99-$12.99
Harvest Brodiaea	20	$9.99-$12.99 (1g)	$9.99-$12.99
Spring gold	9	$3.69	$33.21
Gardner's Yampah	11	$9.99-$12.99 (1g)	$9.99-$12.99
Wild strawberry	16	$9.99-$12.99 (1g)	$9.99-$12.99
Nodding onion	21	$9.99-$12.99 (1g)	$9.99-$12.99
Red-flower currant	4	$3.69	$14.76
Sandberg blue grass	4	$3.69	$14.76
total	154		$175.86- $188.86

Natural Fence(M. Dickerson, personal communication, March 18, 2009).

Plant	Number of plants (est)	Cost	Total
Ocean spray	2g	$9.99-$12.99	$19.98-$ 25.98
Mock orange	2g	$9.99-$12.99	$19.98-$25.98
Indian Plum	2g	$9.99-$12.99	$19.98-$25.98
Total			$59.94- $77.94

Sources

Flowers, shrubs, grasses

- Cannor Nurseries: 4660 Elk Lake Drive, Victoria BC
    - Phone Number: 250-658-5415
    - www.cannor.com
- GardenWorks-Colwood: 1859 Island Highway, Victoria, BC
    - Phone number: 250-478-2078
    - www.gardenworks.ca
- Nature's Garden Seed Co.
    - Phone number: 250-595-7333
    - www.naturesgardenseed.com
- GardenWorks- Saanich: 4290 Blenkinsop road, Victoria BC
    - Phone number: 250-721-2140
    - www.gardenworks.ca

Garden supplies

- Home Hardware: 1911 Oak Bay Avenue, Victoria BC

- Phone number: 250-598-1620
- www.homehardware.ca

- Eartheasy
  - www.eartheasy.com/grow_raised_beds.htm#c

Timeline

Flowers, shrubs and grasses (1-3 months including in ground garden, natural fence and gardens around trees)

Locating each of the different flowers, shrubs and grasses may be difficult. However, there are many sources that are very helpful in ways to find native plants. Things like bulb trading by neighbours, perhaps finding seeds would be easier, or any of the sources above should be a good start. Collecting should start throughout the summer in order to plant by late fall early spring, as most of these plants require. The actual planting can be done in one or two days, and everyone can take part in making these gardens come to life.

Raised garden (4-5 hours x 3 gardens= 12-15)

Depending on the wood working skills and amount of people available the frame for the raised gardens could take only one day. As stated above this could be a community activity with the children helping to dig up the flower bed area and the adults working on cutting and nailing the word.

Special Considerations

While planning each garden the safety of the children was a main concern. All the plants included in the gardens are non toxic to ensure a healthy and safe environment. This however, did create large implications as many plants do not have much information on them. The lack of information made it more difficult to create gardens high in biodiversity. Also planting shrubs to make a natural fence along the ravine will help ensure there are no accidents. Also, each shrub chosen in the design is useful in erosion control. This will be beneficial in protecting the ravine below. Each species shown in this document can be mixed together or just one species can be used. The children were also considered when planning the width of the gardens.

The gardens are not very wide allowing for easy access to the back. The sun garden shape was a way of allowing the children to see, or reach the back without comprising the width. This was beneficial in making room for more shrubs and larger plants that require more space to grow. Lastly, the gardens were limited to areas around the edges and under trees to keep the space open as an area for meetings, concerts and other community events.

Future Options

For approximately the first year after planting, the gardens will require small amounts of maintenance and watering (GOERT 2009). This does not mean there will be flowers, as many plants can take several years to flower (GOERT 2009). After that the gardens will take care of themselves, as long as invasive species are kept out (GOERT 2009). The gardens would also benefit from occasional organic fertilizers (GOERT 2009).

Once gardens begin to flower the seeds and bulbs can be collected and traded to others. People living in the family housing community can join garden trading clubs, or share plants with neighbours. Trading bulbs will help to create more biodiversity within the gardens and further the children's knowledge of plants and function ecosystems. The bulbs and seeds could also stay within the community and create more gardens and window ledge gardens for years to come.

Sources

Garry Oak Ecosystem Recovery Team (GOERT) website (2009). Retrieved on March 1, 2009, from http://www.goert.ca/

Home Hardware website (2009). Retrieved on March 10, 2009, from www.homehardware.ca

Eartheasy website (2009). Retrieved on March 10, 2009, from http://www.eartheasy.com/grow_raised_beds.htm#c

Figure 1: Details of plants

plant	soil type	moisture regime	shade/sunlight	flowering time	Height
nodding onion	sandy,well drained	dry to moderatly dry	full sun to light shade	june-july	10-50 cm
Common Camas	nitrogen-rich soils	N/A	full sun	early april	20-70 cm
Pink Fawn lily	Sandy, Nitrogen-rich	moist	shade, semi-shade	April	35 cm
Chocolate Lily	nitrogen rich	moist to dry	full sun	april-may	80 cm
False lily-of-the-valley	humus rich	moist	N/A	May	10-25 cm
Ocean Spray	Coarse soils, nitrogen-medium	very dry	full sun to light shade	N/A	4m
Mock Orange	nitrogen-medium	dry	full sun	May- mid June	3m
Red-flowering Currant	well drained	dry	full sun to light shade	april- may	1-3m
Indian Plum	Nitrogen rich	moist to very moist	shade to full sun	early spring	1-5 m
Harvest Brodiara	N/A	dry	full sun to light shade	June-July	30 cm
Tiger Lily	Sany soils, nitrogen- medium	dry	Light shade	june-july	1m
Spring Gold	Coarse soils	N/A	full sun to light shade	N/A	N/A
Wild Strawberry	Sandy	Dry to moist	full sun	June	N/A
Gardiners Yampah	well drained, nitrogen-medium	dry	shade	may-june	40-120 cm

Figure 2: Tree gardens (for two trees)

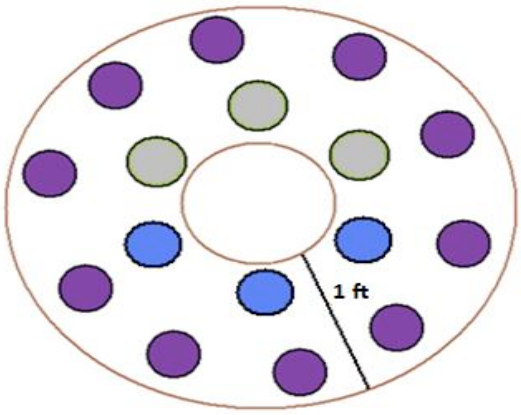


Figure 3: Tree garden (for the tree that receives most sun)

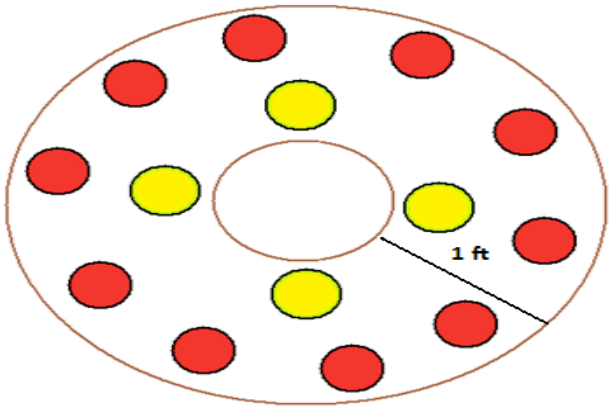


Figure 4: Full sun garden

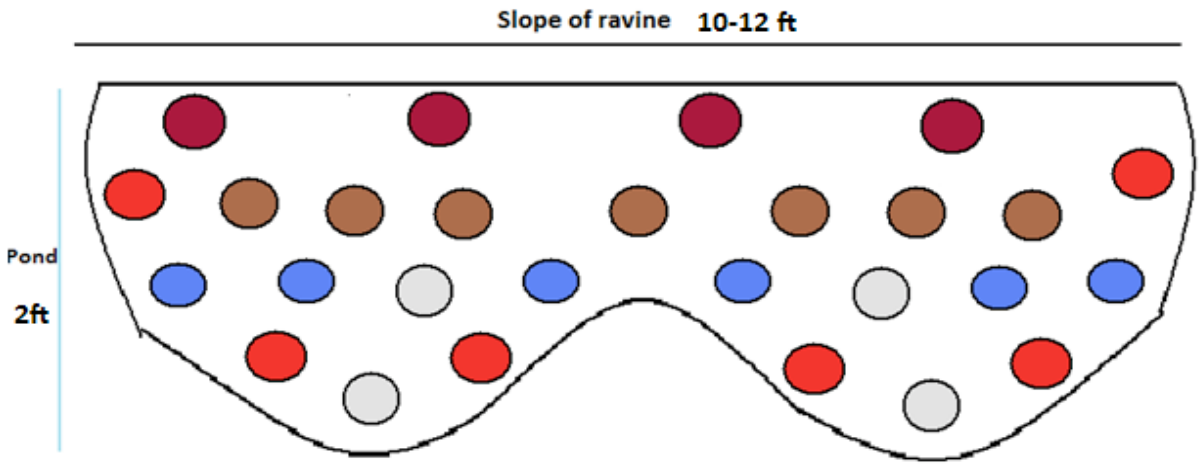


Figure 5: Shade garden

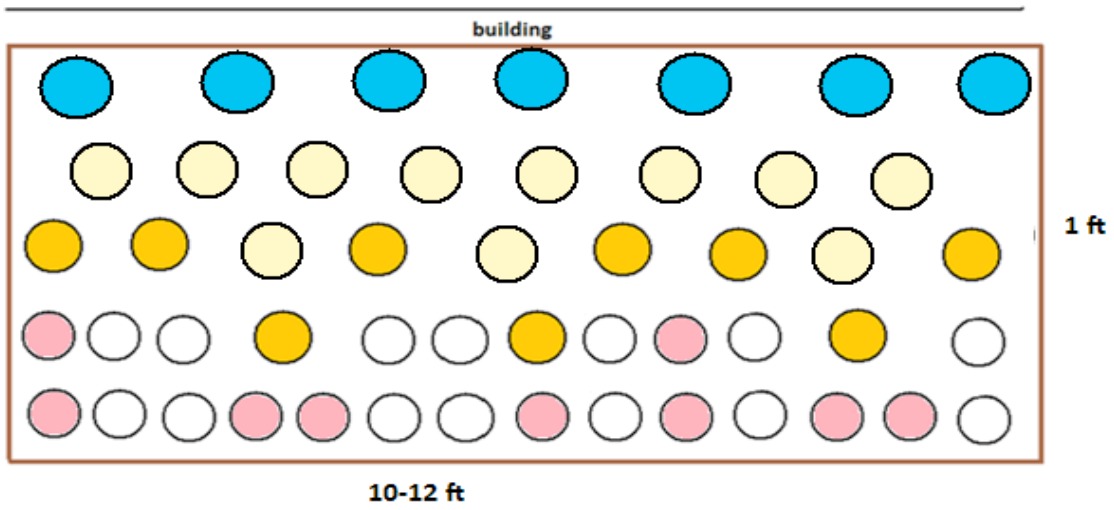
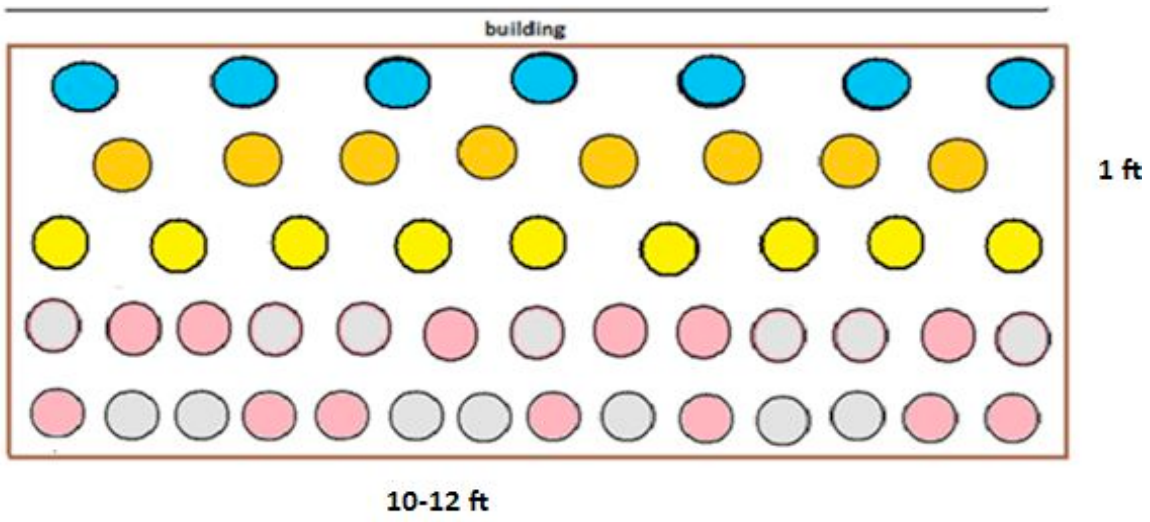


Figure 6: Semi-shade garden



Objective 5: The Pond

by Tim Robinson

Introduction: The fifth feature to be implemented is the pond in the northwest corner of the property. The pond will enhance the natural beauty of the property while providing the residents with the opportunity to enjoy the variety of life the pond and its surrounding features support. In order to achieve both the aesthetic and biological goals of such a project, several specific objectives will need to be met, while numerous concerns will need to be addressed.

From an ecological standpoint, the pond is an important aspect of this proposal because it introduces a habitat very unique to any of the other features proposed. Not only would the unique habitat attract a different variety of biota; ponds are in themselves great supporters of biodiversity (Biggs *et al.*, 2005; Williams *et al.*, 2008). As a result the pond could support both different plants and animals, and a wide variety of these organisms. However, building a pond hardly guarantees that characteristic species will assemble. While plants can be transplanted and then maintained to a certain extent, the desired animals may not choose to use the pond. One particular concern on Vancouver Island in terms of ponds is their invasion by American Bullfrogs (*Rana catesbeiana*) as they can have negative effects on native species (Govindarajulu *et al.*, 2005). Another constraint is the size of the pond. The property is quite small and the pond must be restricted in size in order for other objectives of this restoration to be met. The small size is a concern because of the species-area relationship, whereby the number of species present is correlated with the size of the environment (Krebs, 2001). In simpler terms, the small size of the pond would limit the biodiversity it could contain greatly.

For the inhabitants of Family Housing, the attractiveness of a pond is likely its greatest attribute. Ponds can greatly enhance the aesthetic value of a space, which can help residents to relax and relieve stress. The second cultural objective of the pond is to educate and familiarize the residents with the natural plants and animals found in riparian and/or wetland habitats of the region. Providing a connection between nature and the children and adults who live at family housing could help them to appreciate the amazing services the natural world gives, and in turn encourage them to protect the environment in other ways. There are however drawbacks to such a project. Because there are young children who

would be using the property, the pond must be safe and absolutely cannot be a drowning hazard. It may be difficult for residents to find the time to maintain the pond in order to meet its aesthetic objectives, as some maintenance of artificial ponds is necessary. Finally, standing water could provide a hazard because it provides a mosquito-breeding site. There are two problems with mosquitoes. Firstly, they could be a huge irritant to the residents. Secondly, mosquitoes are vectors of many diseases, including West Nile Virus, which is becoming a concern now on Vancouver Island (Stephen *et al.*, 2006). Additionally ponds are generally costly so with a limited budget it would be difficult to justify the building of one. It is important to minimize potential concerns before going ahead with this project.

The best way to assess whether the ecological objectives are met by this project after its implementation is by determining what species are present. While the introduction of plants in and around the pond will need to be done by the restorationists, animals will need to migrate independently to the pond. Therefore it will be important to determine which species are using the pond in order to decide whether its implementation was successful. Riparian zones in the Victoria area generally support a wide variety of animal taxa, including insects, crustaceans and amphibians. Below is a table of animals that could potentially utilize or live in the pond at family housing.

Table 1.
Listing of animals characteristically inhabiting riparian zones in the Capital Regional District, Vancouver Island, British Columbia. Scientific names for species given in parentheses (from Behler and King, 2004; Capital Regional District)

Classification	
Class Insecta	Mayflies
	Caddis flies
	Stone fly nymphs
	Water beetles
	Whirligigs
	Water striders
	Water boatmen
Subphylum Crustacea	Copepods
	Amphipods
	Crayfish
Class Amphibia	Red-legged frog (*Rana Aurora*)
	Pacific treefrog (*Hyla regilla*)
	Northwestern salamander (*Ambystoma gracile*)
	Rough-skinned newt (*Taricha granulosa*)

If the pond proves to be a successful restoration and it is colonized by some of the species above, these species will also attract their predators, namely birds that eat the insects and amphibians and possibly garter snakes (*Thamnophis* species). Sightings of these animals would also indicate that the restoration was successful.

Options: There are a number of ways in which a pond can be integrated into the overall restoration design, each with its own advantages and disadvantages. For simplicity, these possibilities are categorized into three fairly general options:

1) Designing a custom pond specifically geared to the property and the desires of the family housing residents.
2) Installing a preformed fabricated pond suitable to the space.
3) Digging an "amphibian pool"

The pros and cons of these options will be addressed as each aspect of their implementation is discussed in the sections below.

Design: The design of the pond is a very important aspect of this project because it must fit in with the property and the other new features being proposed. In this sense, the freedom of designing a custom pond makes this option very attractive. That said, it also requires more know-how and would be much more time-consuming than simply buying a prefabricated pond. Preformed ponds are only available in particular shapes and styles and so are limited in their ability to fit the landscape. There are however many different shapes and sizes of these ponds to choose from, so it would be possible to find one that adequately blends into the environment. In both cases, a pump would be required, again with its advantages and disadvantages. The advantage would be that you can have running water, meaning that a small stream, waterfall or fountain could be incorporated into the plan, which would both improve the aesthetic value and attract animals (Campbell & Pincott, 2003). There are two disadvantages to the pump however. From a logistical standpoint, the location would need to be supplied with power somehow, which it currently is not. Secondly, using energy in a time when we are attempting to limit consumption seems counterintuitive to the idea of ecological restoration.

The third option, that is the building of an amphibian pool, is not as large as an undertaking as the other two options. An amphibian pool is essentially a small standing body of water that provides a place for the eggs and tadpoles of amphibians to develop. Its limitations are that it cannot be as large, because the water is not flowing, and the water level needs to be maintained regularly (Campbell & Pincott, 2003). It would also be very difficult to get these pools as nice looking as a larger pond. However it is comparatively easy to build and it does still support life. This option is also fairly open in terms of how it is incorporated into the landscape and more than one of these pools could be dug. They are also only about 20 cm deep so pose almost no risk to young children.

All three options will require the planting of vegetation both in and around the water. Vegetation will provide both forage and cover for animals, and will help maintain the overall health of the pond. There are basically three types of plants that should be used in the pond to enhance the beauty and health of the pond: bog plants, submerged plants and floating plants (Hagen, 2009). Bog plants are plants which are visible above water but have roots underwater, such as cattails. Submerged plants are of particular importance because they are oxygenating and they regulate the growth of algae, meaning they keep the pond clean. Canadian pond weed (*Elodea canadensis*) is a good native oxygenator. The third group is the floating plants, which include pond lilies and buttercups.

It is also essential to surround the pond with plants as they can provide a buffer between the terrestrial and aquatic environments. Generally, sedges and rushes are closest to the edge of the pond, followed by shrubs, deciduous trees and finally coniferous trees as you move away from water (see figure 1). As the area of the pond and its surroundings is small, only sedges, rushes and shrubs can logically be integrated into the design. To add some beauty, some perennials are also suggested. Table 2 summarizes some of the choices for plants keeping in mind that the pond is located in a mostly shady spot. In addition to the plants surrounding the garden, rocks and logs could be used to provide habitat and cover for animals as well as more closely imitate a natural setting.

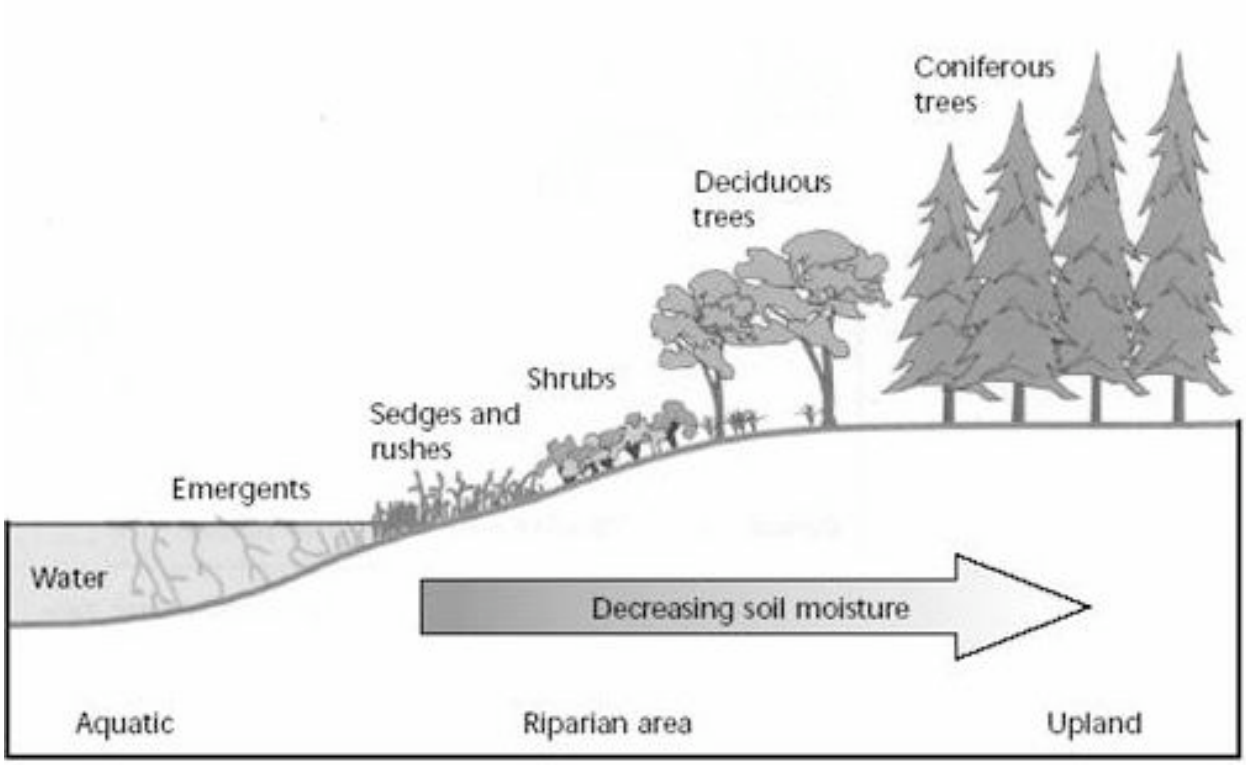


Figure 1. Typical schematic of riparian zone vegetation as soil moisture decreases (from Capital Regional District)

Table 2
Major categories and examples of vegetation to be planted in and around the pond (from Hagen, 2009; Swan Lake Christmas Hill Nature Sanctuary, 2009; Garry Oak Ecosystems Recovery Team, 2007).

Category	Examples
Bog plants	Cattail (*Typha latifolia*)
Submerged (oxygenating) plants	Canadian pond weed (*Elodea canadensis*)
Floating plants	Floating-leaved pondweed (*Potamogeton natans*)
	Yellow pond lily (*Nuphor polysepalum)*
	White water-buttercup (*Ranunculus aquatilis*)
Edge plants	Skunk cabbage (*Lysichiston americanum*)
	Blue-eyed grass (*Syrinchium idahoense*)
	Sawbeak sedge (*Carex stipata*)
Shrubs	Salmonberry (*Rubus spectabilis*)
	Broad-leaved shooting star (*Dodecathon hendersonii*)
	Red-osier dogwood (*Cornus sericea*)
Perennials	Devil's club (*Oplopanax horridum*)
	False lily-of-the-valley (*Maianthemum dilatatum*)
	Trillium (*Trillium ovatum*)

The possibilities for mixing and matching the plants so that they suit the desires of the inhabitants of family housing are endless.

Costs:

Table 3

Costs associated with the construction of a pond.

Option	Product	Cost
1. Custom pond	Pond liner	$100 - $150
	Sand / limestone (approximately 10 bags)	$50
	Pump and filter	$100
	Underlay (carpet under padding)	Free
	Overall (including plants)	$400 - $450
2. Preformed pond	Pond kit with waterfall and pump	$240
	Sand (approximately 10 bags)	$50
	Overall (including plants)	$400 - $450
3. Amphibian pool(s)	Sand (2-3 bags)	$10 - $15
	Small pond liner	$ 70
	Overall (including plants)	$150 - $200

Plants for in and around the pond would also incur costs. However, many plants could be transplanted from nearby natural areas to limit costs. Bundles of about a dozen stems of oxygenating plants, which might be hard to find, can be purchased for about $5. Other plants range in price greatly, so a budget of $100 or so dollars could allow the residents to supplement what they can find with some of the more desired plants. Rocks and logs could also easily be found in Finnerty ravine adjacent or at beaches around town. Digging a pond will also require tools, namely shovels and a big level, which could also raise the cost of this project.

Sources and Contacts: Pond liners, pumps, kits, and preformed ponds can all be acquired at or through various stores including Canadian Tire, Home Depot and Home Hardware. Oak Bay Home Hardware (1911 Oak Bay Ave; 250-598-1620) can order a variety of pond shapes and liners, which are received in about a week. Sand is also available at these stores. Carpet under padding can be obtained from carpet dealers and installers free of charge, as they have end pieces that go into the garbage otherwise. Native plants can be bought at a variety of stores including Garden Works – Saanich (4290 Blekinsop Rd; 250-721-2140), and Cannor Nurseries (4660 Elk Lake Drive; 250-658-5415). To reduce costs, native seed

can also be obtained locally from Nature's Garden Seed Co. (3651 Shelbourne St.; 250-595-2062). A great place to buy native plants is from Swan Lake Christmas Hill Nature Sanctuary but they are only sold for a short time every year in April. As far as plants to go right into the pond, Merlins Water Gardens has a very good selection, though it requires making an order by phone, fax or email (www.merlinswatergardens.com; 1-888-333-2784).

Timeline: Putting in a pond is a time-consuming endeavor, however once the pond itself is dug, the other components can be gradually added until the desires of the residents are met. There are basically three parts of the process that are time-consuming: planning and getting materials, installing and finally planting and putting the finishing touches on the pond. The estimated time for each of these components are presented in table 4 below. The overall time to get the project done might be weeks however as little things may need adding, changing or removing.

Table 4
The approximate time it will take to complete certain tasks associated with the construction of the pond.

Option	Task	Time to complete
1. Custom pond	Planning and getting materials	1 to 2 days
	Installation	2 days
	Planting and finishing touches	2 days
2. Prefabricated pond	Planning and getting materials	½ day
	Installation	1 day
	Planting and finishing touches	2 days
3. Amphibian tool	Planning and getting materials	½ day
	Installation	1 days
	Planting and finishing touches	1 day

Implementation: Ponds are not easy to install, however this can be achieved by anyone willing to put the work into it and get their hands dirty. The step-by- step implementation of each option is described below, as they are not executed in the same way.

Option 1: Custom pond (from Merlins Water Gardens)

- Mark the outline of area you wish to excavate with a garden hose or thick rope. Dig this area out, changing the depth of the pond in different places. One spot should be at least 18 inches deep. With a level, make sure all sides of the pond are even.

- Put a layer of compacted sand or limestone screening at the bottom and sides of the pond.
- Measure out the hole at its widest and longest and then add about a metre (or 3 feet) and then you will know what size of liner to buy. For example, if the pond is 6 feet by 4 feet, you would need a liner at least 7 feet by 9 feet in size.
- Put a layer of carpet underlay on the surface of the dug hole. This prevents the perforation of the liner by roots.
- Now put in the liner and fill with water, adjusting the liner as you go. It is better to make lots of small folds than few large folds in the liner. Allow the liner to settle for a couple of days before finishing the edges of the pond with rocks or soil.
- A layer of soil about 20 cm deep can be added to the bottom of the pond, but aquatic plants can be placed in the pond in pots, which allows them to be moved around.
- Finish off the pond with plants, logs and rocks to enhance its beauty.

Option 2: Prefabricated pond (from Sutherland Lumber Company, 2009)

- Place the preformed pond liner in the area you wish to install it, stand inside it and mark its outline with a shovel.
- Dig a hole slightly larger and deeper than the marked outline.
- Fill the hole with a compacted layer of sand. Place the preformed pond in the hole and level it. Then fill in any gaps with loose soil and sand.
- Fill the pond with water and finish the edges with rocks.
- Once again, aquatic plants can be placed into the pond in pots, and the pond surroundings can be finished off with appropriate vegetation, rocks and logs.

Option 3: Amphibian pools (from Campbell & Pincott, 2003)

- Dig a hole about 4 or 5 feet long by 3 feet wide and 8 inches deep with at least one gently sloping edge.
- Line this pool with a pond liner.
- Add 4 inches of soil to the bottom, and cover this with sand or small pebbles.
- Add water gently.
- Plant with shallow water and bog plants. Again, these can be in pots.
- Plant around the edges.
- Ensure water level remains constant.

Special Considerations: For safety, the pond either cannot be very deep or needs some sort of grate to prevent kids from falling in. Fencing is not a viable option since it would take away from the aesthetics and possibly encourage climbing by the children. Another way to make it safe is to have it raised above ground level. The installation of a pond is obviously an expensive and time-consuming feature, however it does present the possibility of greatly enhancing the natural beauty of the space, being a spot where residents can sit around and talk or relax, and provide residents with glimpses of some interesting animals.

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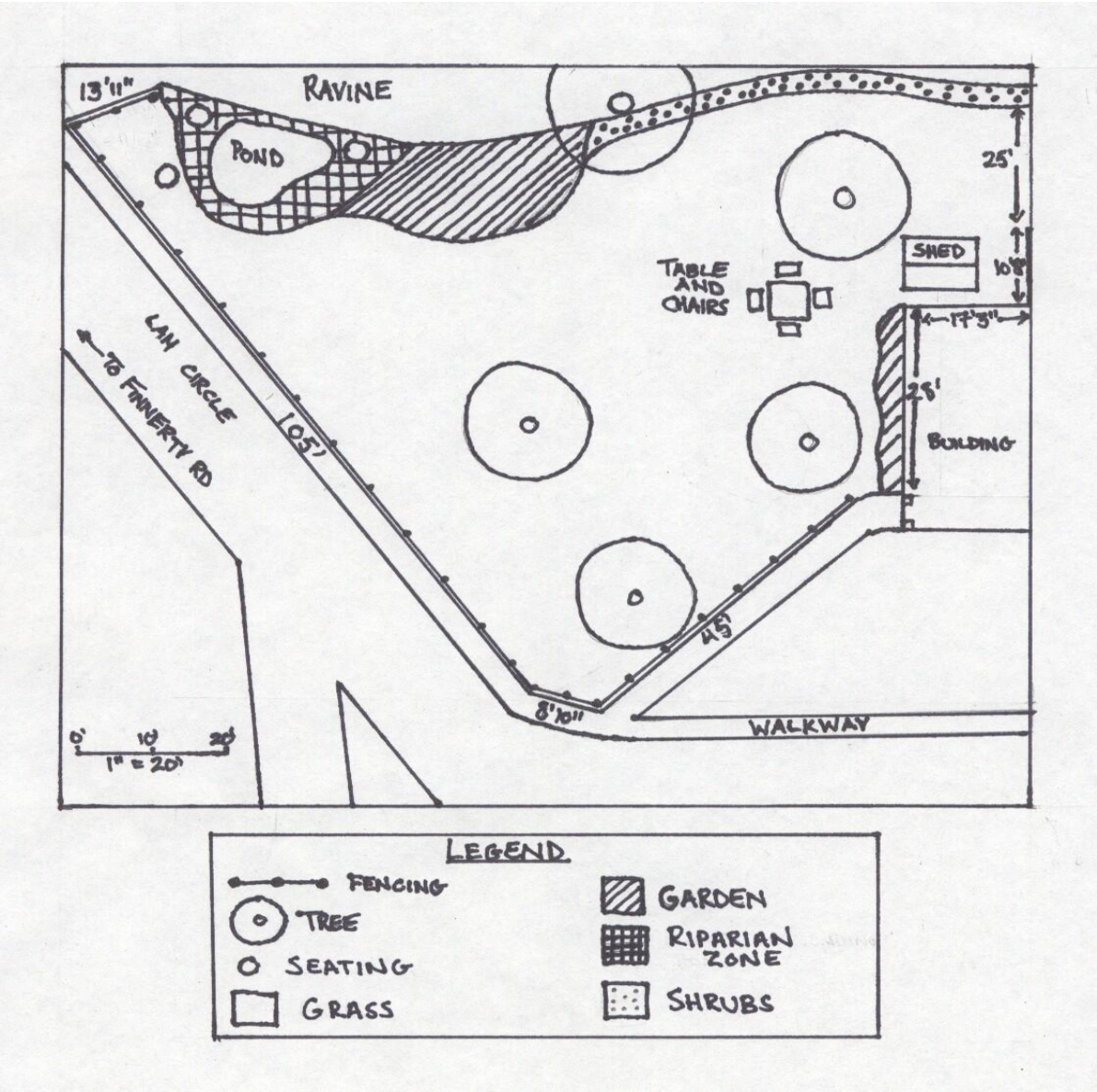
Conclusion:

Future Site Map:



Map #2- Proposed Future Site Map

Overall Budget:

Budget range for the entire project, including all five components

Component	Price Range
Fence	$1852-$2763
Benches	$5-$110
Bird Feeders	$5-$90
Native Garden	$236-$444
Pond	$150-$450
Total Price Range	$2248-$3857

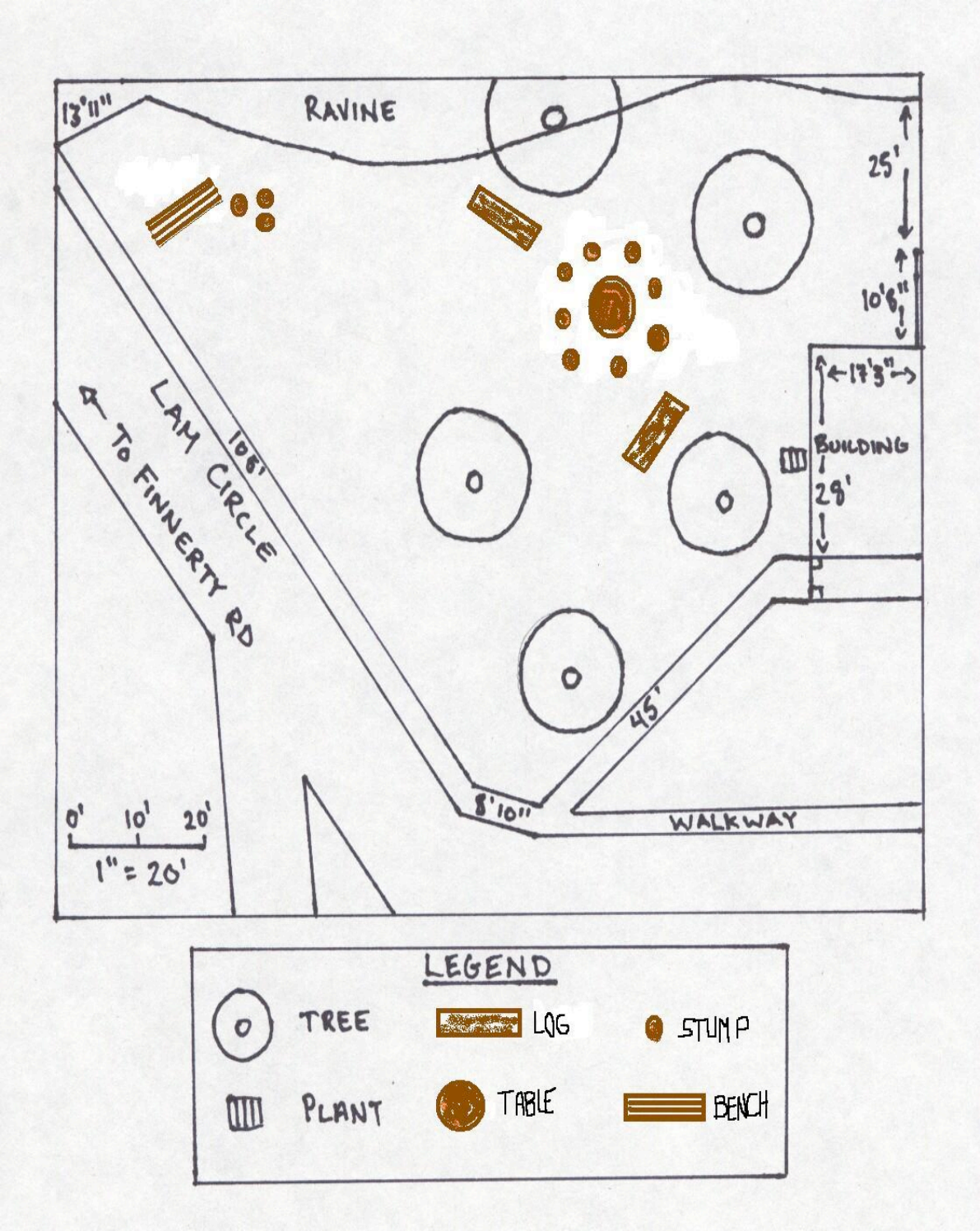
Monitoring & Evaluating Success: Elizabeth Quong (director of the Family Center) and the parents who participated in our meetings mentioned that the main way they would evaluate our project's success would be in terms of how much time they spend at the site. It was suggested they keep track of site usage before and after the restoration, with the expected result that site usage would dramatically increase after the restoration had been implemented. Another evaluation dimension would be to look at how many children's programs utilize or incorporate the site into their activities, or put out a survey in the Family Housing Complex newsletter. Successful fence implementation would reflect increased site usage and increased feelings of safety and security for parents as they would be more relaxed about letting their children play in the area. Successful bench and seating implementation would involve more people gathering at the site to sit, relax, and visit. Successful bird feeder installation could be evaluated in terms of how many avian species are present on site before and after the restoration, and the same could be said for the native plant garden evaluation. The pond could be deemed a success if it attracts a variety of water plant and amphibian species to the area. The benches and fencing would require little monitoring as they are stable structures that are fairly low-maintenance. The bird feeders, native plant gardens, and pond would all require moderate monitoring and maintenance, the responsibility for which would fall to the Family Housing Center occupants. Overall, the success of our restoration project could be evaluated in terms of our overall goal; have we

created a safe, educational, interactive natural space where families can gather to experience feelings of community and connectivity with nature?

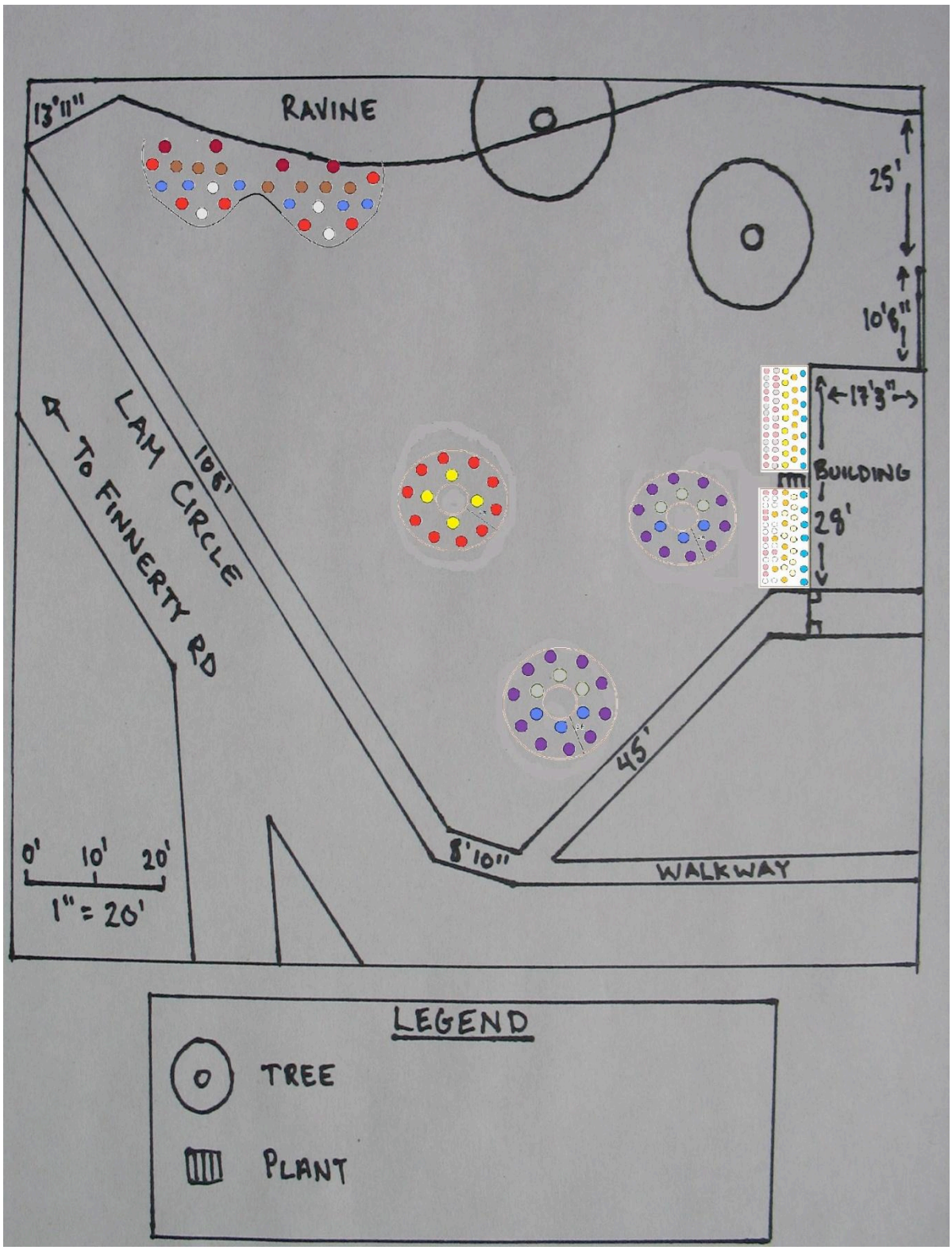
Recommendations & Ideas for Future: A few additional objectives were discussed with Elizabeth Quong (director of the Family Center) and several participating parents. These objectives included; a storage shed (to house gardening tools and excess outdoor furniture), seat cushions (to enhance comfort of the stumps and benches on site), a small greenhouse (which could be used to start seeds and allow children to view plant growth), and a fire pit (around which more gatherings could be arranged and enjoyed). These future objectives would hopefully add to the welcoming atmosphere of the site, while still meeting the overall goal of the restoration project. This is a great example of how restoration goals and objectives must be balanced with cultural constraints and wishes in order to achieve a successful restoration implementation. Our final recommendation for future would be to host a celebration on-site once the first objective has been completed. The purpose of this celebration would be to boost morale for the occupants of the Family Housing Complex, and maintain forward momentum for the restoration project. We have greatly enjoyed working with the Family Housing representatives and wish them the best of luck in their future endeavours!

Appendix:

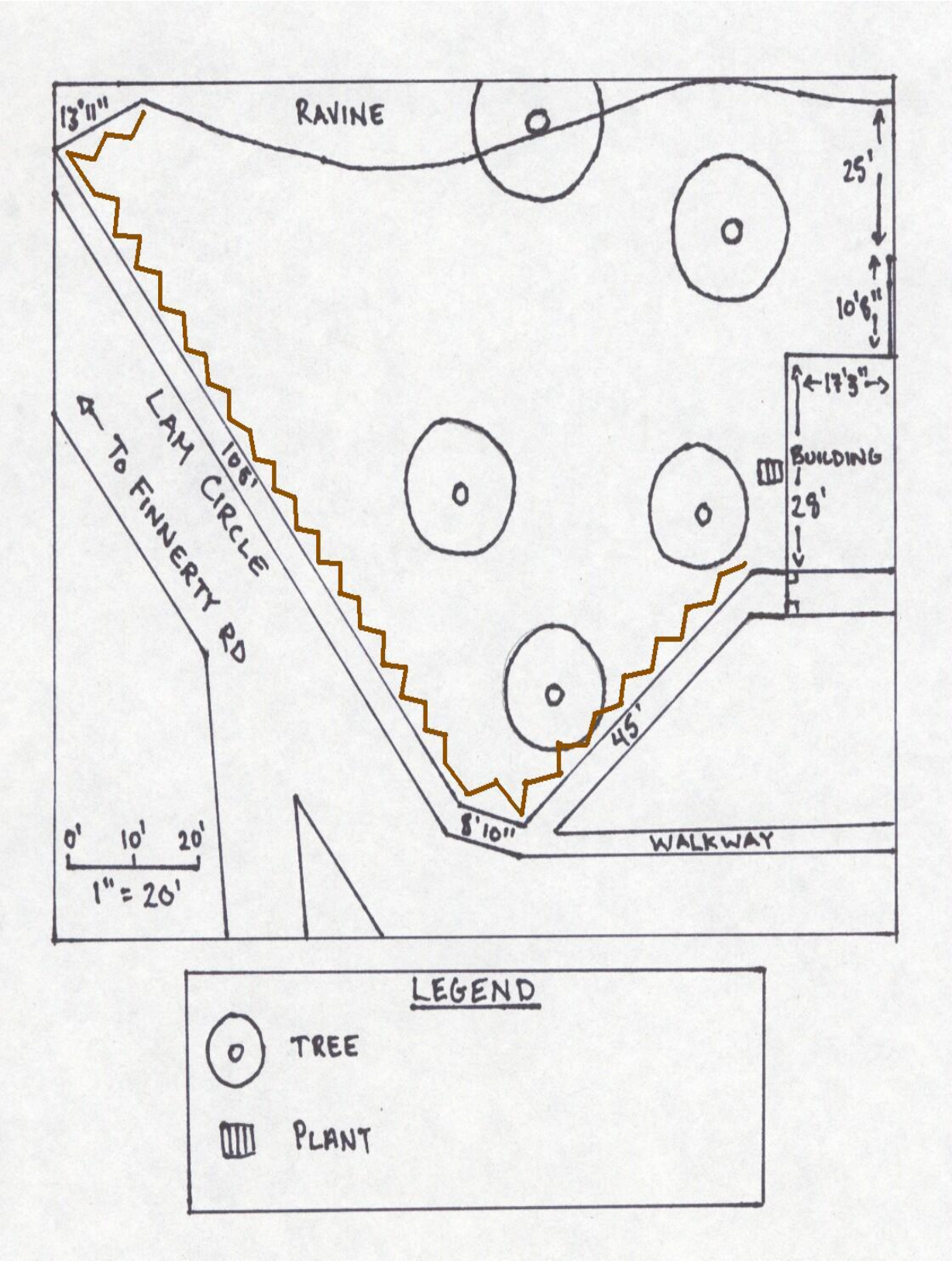
Proposed Site Map with Seating



Proposed Site Map with Gardens and Bushes



Proposed Site Map with Split-Rail Cedar Fencing



Proposed Site Map with Straight Cedar Panel Fencing