Deer Lake Conservancy DIRECT DRAINAGE PROJECTS Grant LPT 62619

Phil and Jeanne Foussard: **Underground Rock Infiltration with Diversions**
Birchwood Terrace

Before: July 2018

After: August 2019

Linda Givens: **Rock Infiltration**
[redacted]

Before: September 2018

After: July 2019

Excavated pit to sand for drainage

Dave and Renee Graves: **Diversion System to Existing Rain Garden**

[redacted]

Before: Project will capture runoff from new garage (not shown) and parking area

After: August 2019

Cal and Connie Dinham: **Rock Infiltration Trench and Pit**

[redacted]

Before: August 2018

During Construction

After: October 2019

Sally and Restor Johnson: **Rock Infiltration (3 systems installed)**
[redacted]

Before: May 2019 (Construction Site)

After: September 2019

Chapman Mayo: **Underground Infiltration from Downspouts**
[redacted]

Before: August 2019

After: October 2019

Excavated pit

Robert Senkler, **Native Planting** (Volleyball Court)
[redacted]

Before: June 2019

After: September 2019

Foussard – **Rock Infiltration** adjacent to Mayo
Birchwood Terrace

Before: July 2019

After: October 2019

Runoff from road travels down this driveway to the lake

PENDING PROJECTS: DESIGN and BIDS COMPLETE FOR INSTALL SPRING 2020

Ryan Rubischko and Stephanie Eckerman: **Rock Infiltration, Rain Garden**
[redacted]

Renae Fry: **Rain Gardens**
Shady Grove Shores

John Bieble (with Steve Palmer): **Rain Gardens**
Dry Creek Road

PENDING PROJECTS: SITE VISITS/PRELIMINARY DESIGNS – (priorities highlighted)

Greg and Lisa Appelhauf: rock infiltration
[redacted]

Tom and Kellie Mathias: rain gardens (per landscaper Joseph Ebert – wait until spring 2020)
[redacted]

John and Mellissa Walter: rock infiltration – w/ Abrahamson – cost limit $10K ($20,000 est.)
[redacted]

Greg and Tammy Hustad: rock infiltration, infiltration basin
[redacted]

John and Debbie Patterson: diversion or infiltration
Birchwood Terrace

Joanna Victor estate: rain gardens - preliminary design complete, tree fell
[redacted]

Mollie Keyes: rock infiltration, rain garden - site measurements complete
Deer Lake Park

Rich Johannson: rock infiltration, rock diversion - dry creek bed - landscaper preparing design
Deer Lake Park

Ross Larsen: shoreland buffer – waiting on landscaper (probably doesn't want to have deed restriction)
[redacted]

Tom Bader: rain gardens - sent concept drawings 8/21/19
[redacted]

Sandra Gerhartz-Wolf: – pending Goulet purchase
[redacted]

Denise Sinclear Todd and Robert Todd: diversions
Peer Avenue

SITE VISIT REQUESTS (2020)

Don and Roxy Barry
[redacted]

Erik and Kyra Iwen
[redacted]

PENDING NEIGHBORHOOD PROJECTS – Emmons and Olivier Design

Deer Lake Park infiltration

Johnson Preserve, pretreatment for pond east of Andersen Lane

Deer Lake Conservancy DIRECT DRAINAGE PROJECTS Grant LPT 62619

Robert Senkler, **Native Planting** (Volleyball Court)
Hungerford Point Road
Landscaper: Dragonfly Gardens

Before: June 2019

After: September 2019

After: June 2020

Ryan Rubischko and Stephanie Eckerman and Tim Flynn
Rock Infiltration and Dry Creek Bed
[redacted]
Shade Tree Landscaping

Before May 2019

After: September 2020

Renae Fry: **Rain Gardens and Dry Creek Bed Diversions**
Shady Grove Shores
Willow River Landscaping

Before July 2019

After May 2020

John Bieble (with Steve Palmer): **Rain Gardens**
Dry Creek Road
Palmer's Landscaping

Before September 2018

After July 2020

Greg and Lisa Appelhauf: **Underground Rock Infiltration**
Birchwood Terrace
Shade Tree Landscaping

Before August 2019

During/After November 2020

Joanna Victor Estate: **Rain Gardens**
182nd Street
Shade Tree Landscaping

Before September 2018

Before June 2019

After October 2020

After October 2020

Steve and Catherine Rieke: **Rain Garden**
Hungerford Point Road
J&M Landscaping

Before June 2020

After September 2020

Tim and Susan Laske: **Rain Garden**
Hungerford Point Road
J&M Landscaping

Before June 2020

After September 2020

Jacob and Angela Rider: **Rain Gardens, Pretreatment, Rock Infiltration**
Hungerford Point Road
Landscaper: Balsam Lake Pro-Lawn

Before July 2020

Before July 2020

After October 2020

After October 2020

Observation well for rock infiltration

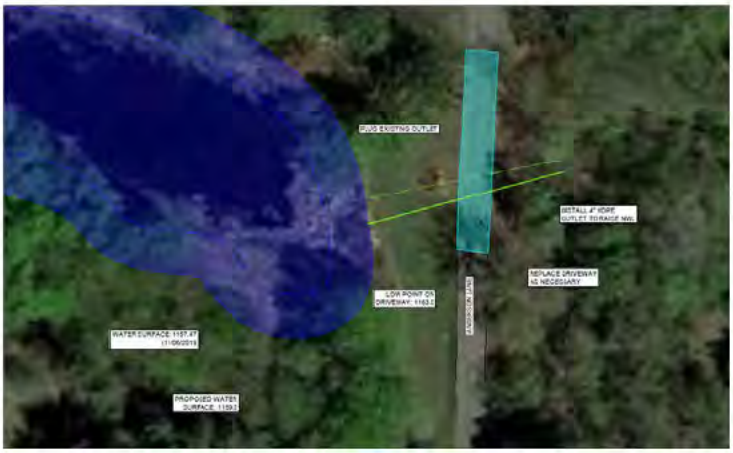
Scott and Susan Housh: **Rock Infiltration and Trench Diversion to existing Rock Infiltration**
Hungerford Point Road
Palmer's Landscaping

Before September 2020

Before September 2020

After November 2020

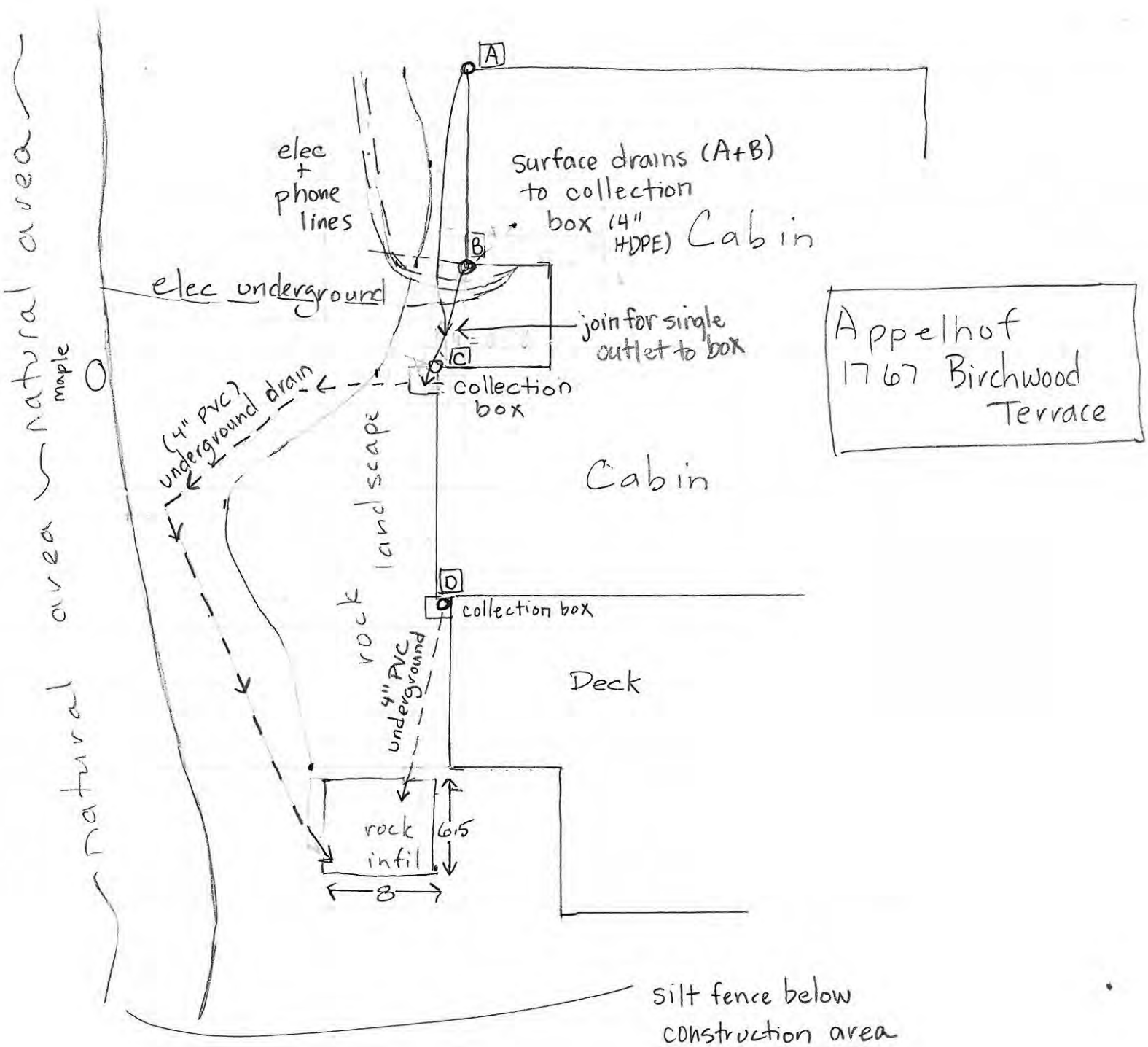
NEIGHBORHOOD PROJECT – Emmons and Olivier Design
Johnson Preserve, **Culvert modification and increased pond capacity**
Cross Country Excavating

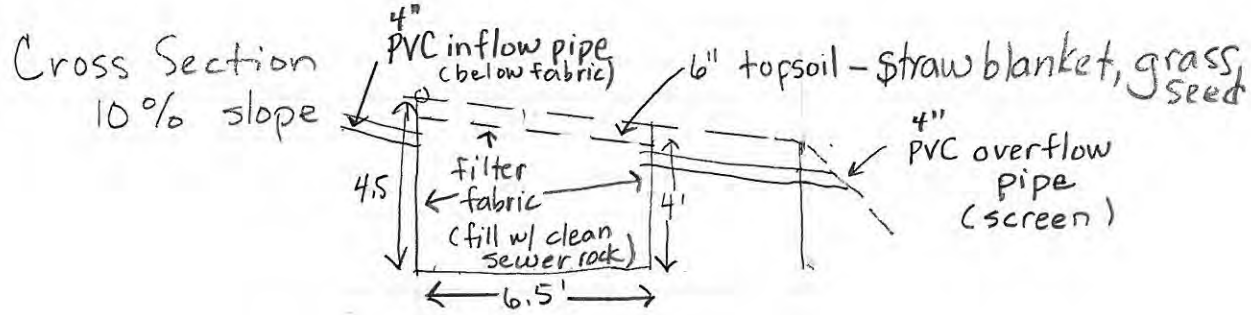


Before: 2, 4" culverts (partially blocked to be replaced by 1, 6" culvert, with pond elevation increased by 1.53 feet

After: October 2020 – to be dormant seeded in November

140th Avenue Culverts – Johnson Preserve
Outflow Stabilization, October 2020





C Clemens
5/17/20

Runoff Reduction Plan
Deer Lake

Lisa and Greg Appelhof
[redacted]

Rock Infiltration

Design Calculations[1]:
Roof Area (989.5 ft^2)

Runoff volume with 1 inch rain: 82.5 ft^3

Rock volume needed: 206 ft^3

The soil profile from the soil map indicates that a depth of 4.0 feet would be appropriate for the rock infiltration pit to reach sand and gravel for better infiltration. The pit will be located below the cabin adjacent to the deck as indicated on the site diagram. Since there is a slope in this area (about 10%), and the bottom of the pit should be flat, the uphill side will need to be excavated to about 4.5 feet deep. A 4 foot deep pit (lowest depth) would need a surface area of 51.5 ft^2, so the pit will be 8 ft. X 6.5. Different top dimensions can be used as long as the pit reaches sand and gravel and the total pit volume is at least 206 ft^3.

Underground drains (4" PVC pipe) carry roof runoff to the rock infiltration pit. The two downspouts furthest uphill are connected with a surface pipe to a collection box.

<u>Quantities Rock Infiltration #1</u>
¾" – 2" clean sewer rock: 8.2 yards
Topsoil: 1 yard
Filter fabric: 250+ ft^2 (approx.)
(6' width X 42' to allow for overlap)
4" corrugated HDPE pipe: 30 feet
Y Connector (HDPE)
Downspout connectors (2)
4" PVC pipe: 48 feet
PVC pipe connectors (2)
4" outlet PVC pipe: 15 feet
Downspout collection box C (16")
Downspout collection box D (11")
Outlet pipe screen
Shady grass seed
Straw blanket, Silt fence

[1] Program standards allow for installation of an infiltration system to capture a 1-2" rain event, depending upon space available and desired budget.

05/17/20

Call Diggers Hotline – 811 to have utilities located prior to construction.

A permit will likely be required from the Polk County zoning office for the rock infiltration.

Silt fence must be in place below excavation area before project begins.

Instructions:

1. Dig a pit of the specified size (6.5' X 8', 4 to 4.5 deep on the uphill side) as shown on site diagram. The bottom of the pit should be flat. Extra rock volume is need because of the slope.

2. Install a 16" square collection box below downspout C that will serve as a sump to screen and collect debris from the downspout. The collection box will also provide a separation to prevent freezing up the downspout. (See illustrations on following page).

3. Connect the two top two downspouts (A and B) with flexible 4" HDPE piping, Join to a single "Y" outlet to the collection box C.

4. Install an 11" square collection box below downspout D.

5. Connect the collection boxes C and D to the pit with 4" PVC pipe. The pipes will enter near the top of the rock on the uphill side of the pit, so the top of the pipe will begin about 8 inches below the surface (underneath the filter fabric). Use solid PVC underground and not the corrugated HDPE pipe shown in the illustration.

6. Construct an outlet for the rock chamber with a 4" PVC pipe installed on the downhill side of the rock chamber. The PVC pipe will outlet at the surface of the slope (preferably in a well-vegetated area). A screen is installed on the end of the outflow pipe to prevent animals from entering it.

7. Line the sides only of the pit with filter fabric allowing for pipe to enter and exit the rock chamber of the pit. NOTE THE BOTTOM OF THE PIT IS NOT LINED TO PREVENT CLOGGING OF THE FILTER FABRIC.

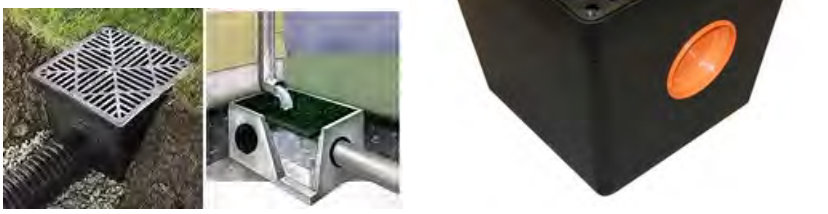
8. Fill the pit with clean, ¾ to 2 inch washed rock, stopping approximately 6 inches from the top.

9. Add a horizontal layer of filter fabric on top of the rock.

10. Cover the filter fabric with topsoil to the surface.

11. Plant grass seed and cover with erosion control fabric.

Installed collection box (16” square box for downspout C and an 11” square box for downspout D)



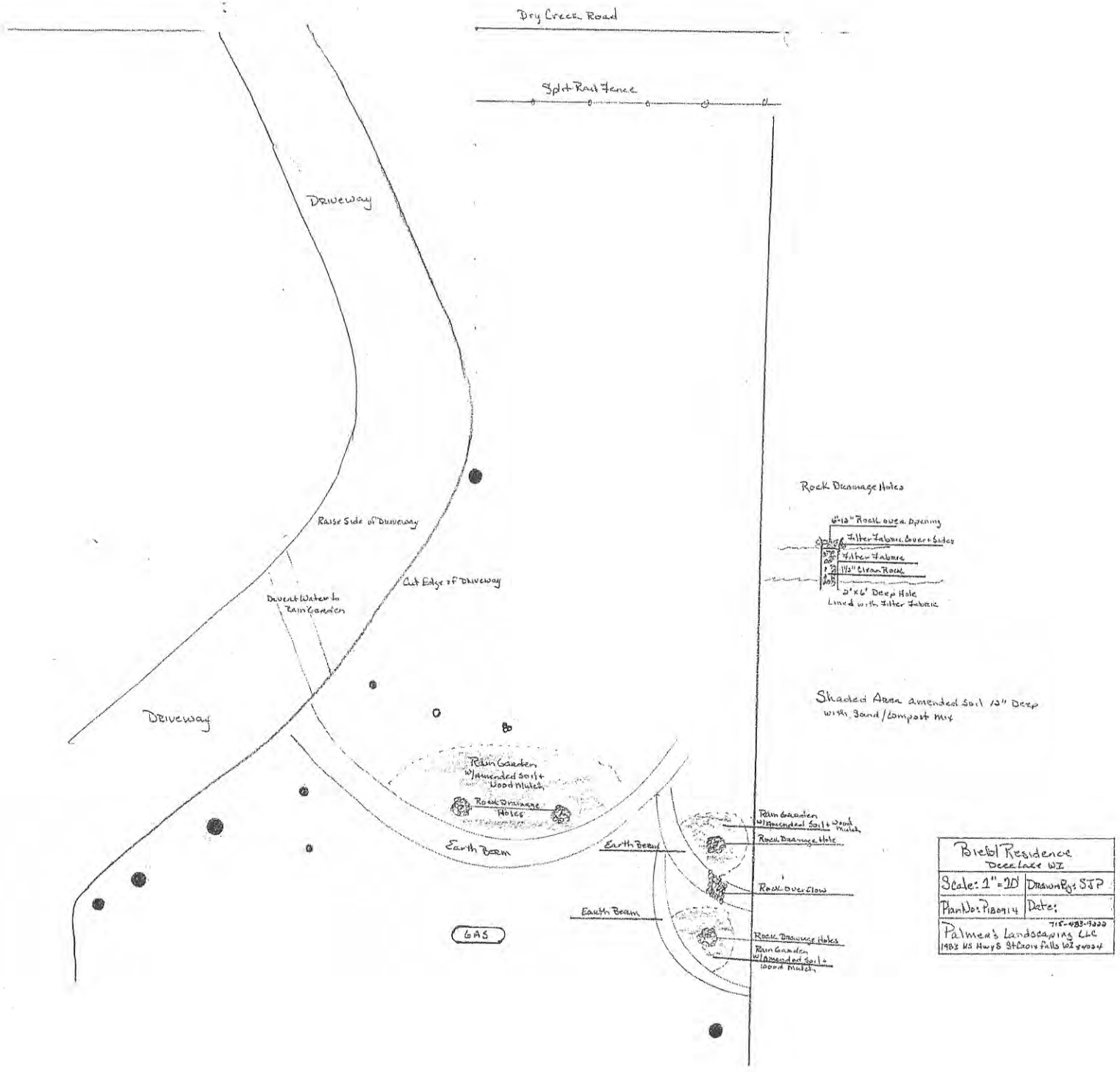
05/17/20

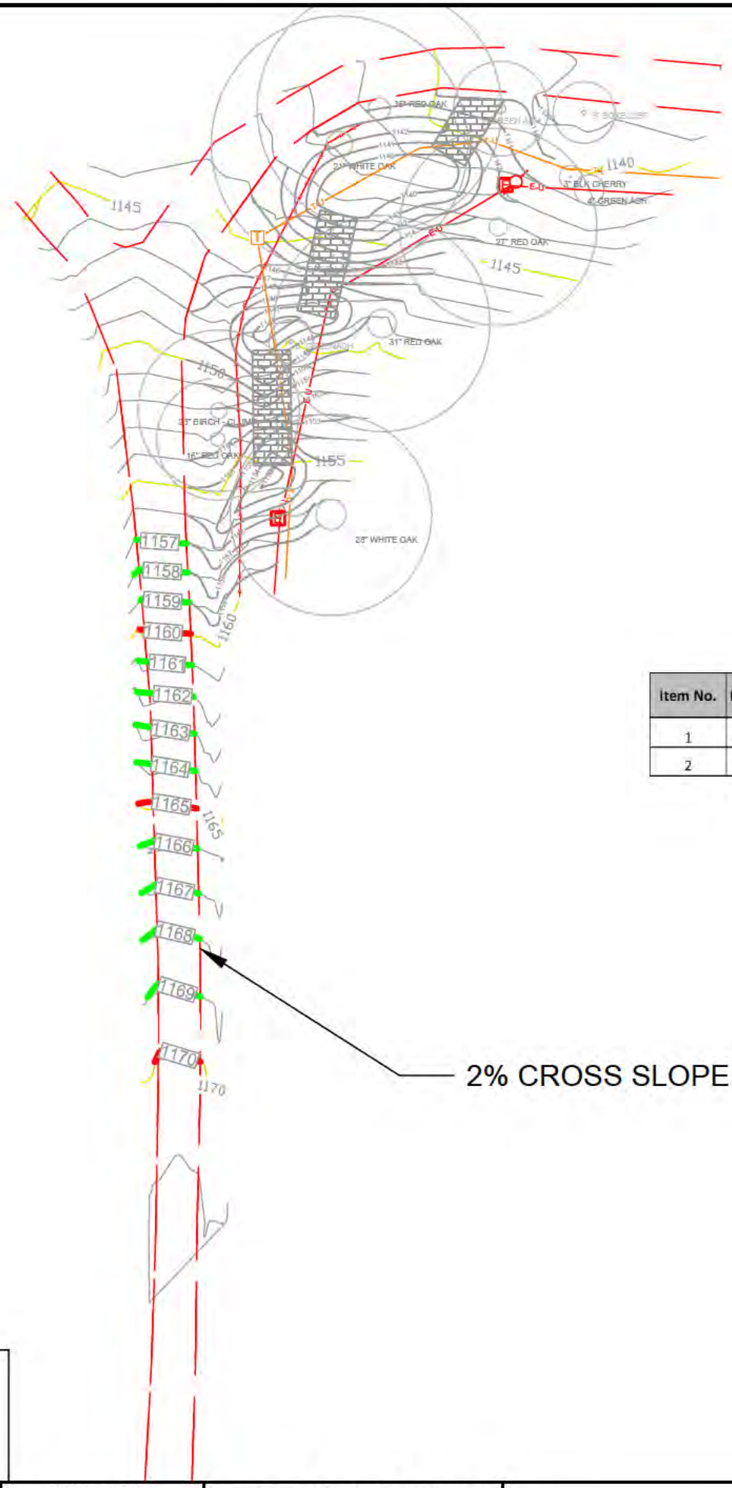
Biebl Residence
Dry Creek Rd

MATERIAL LIST

Rain Garden Budget figure 2019

SIZE	DESCRIPTION	QUANTITY				
	Main Rain Garden					
	Excavating - Ammending Soil - Rock Drainage holes				4550	00
	Changing Driveway Flow				985	00
	Plants + Planting				1800	00
					7335	00
	2 Side Rain Gardens					
	Excavating - Ammending Soil - Rock Drainage holes				3685	00
	Plants + Planting				1500	00
					5185	00
	Total Both Areas				12500	00


Dry Creek Road
Split Rail Fence
Driveway
Raise Side of Driveway
Cut Edge of Driveway
Divert Water to Rain Garden
Driveway
Rain Garden w/Amended Soil + Wood Mulch
Rock Drainage Holes
Earth Berm
GAS
Rock Drainage Holes
6-12" Rock over Opening
Filter Fabric Cover Sides
Filter Fabric
1½" Stone Rock
2'x6' Deep Hole Lined with Filter Fabric
Shaded Area amended Soil 12" Deep with Sand/Compost Mix
Rain Garden w/Amended Soil + Wood Mulch
Rock Drainage Hole
Rock Overflow
Earth Berm
Rock Drainage Holes
Rain Garden w/Amended Soil + Wood Mulch
Biebl Residence
Deer Lake WI
Scale: 1" = 10'
Drawn By: STP
Plan No: PB0914
Date:
715-483-9222
Palmer's Landscaping LLC
1983 WS Hwy 8 St Croix Falls WI 54024



Item No.	Item	Unit	Estimated
1	Asphalt Removal	SF	1,700.00
2	Fill	CY	10.00

*** LENGTH OF GRADING AREA IS 140 LF

2% CROSS SLOPE TO THE EAST

N

SCALE IN FEET

0 20 40 80

NO	DATE	BY	REVISION
6			
5			
4			
3			
2			
1			

NOT FOR CONSTRUCTION

SUBMISSION DATE: XX/XX/XXXX

DESIGN BY	DRAWN BY	CHECKED BY
DEM	DEM	XXX

EOR PROJECT NO. 00996-0014

Emmons & Olivier Resources, Inc.
1919 University Ave W
St. Paul, MN 55104
Tele: 651.770.8448
www.eorinc.com

DEER LAKE CONSERVANCY

DEER LAKE CIRCLE ROAD RECONSTRUCTION
ST. CROIX FALLS, POLK COUNTY, WISCONSIN

STATE PROJECT NO. —

CITY PROJECT NO. —

GRADING PLAN

SHEET 01 OF 01 SHEETS

Plot Date: 07/09/2020
Drawing Name: C:\Users\DMoisan\Desktop\Deer Lake Circle Recon\00996_0014_X-BASE.dwg
Xrefs:

Runoff Reduction Plan

Cal and Connie Dinham
[redacted]

The following practices are recommended to reduce runoff from your pole building.

- Road underground infiltration
- Roof water infiltration areas

Instructions for the underground infiltration above the driveways along Deer Lake Park Road will be provided following further evaluation. The roof water infiltration trench information is included in this plan so it is ready for installation. These trenches will intercept runoff water that would otherwise flow toward the road and driveways and ultimately to the lake.

Roof water infiltration
A rock infiltration trench is recommended to capture roof runoff from the pole building. The trench will be placed one foot from the west side of the building. The first foot from the building will be graded to slope away from the building to the trench. The trench will extend along the entire length of the building, plus an additional 6 feet and be 2 feet wide and 2 feet deep.

The trench will run to a rock infiltration pit which will extend an additional 8 feet and be 4 feet wide and 4 feet deep. A prefabricated trench will be installed on the back (uphill) side of the trench to provide pretreatment. Accumulated sediment will need to be removed from this trench periodically to prolong the life of the infiltration pit.

Impervious area draining to the infiltration trench:
Pole building roof = 1064 ft^2
Water generated with a 1 inch rain: 89 ft^3
Water generated with a 2 inch rain: 178 ft^3
Rock Infiltration Area Recommended: 222 ft^3 – 444 ft^3 **– 376 ft^3 specified**

Quantities for Roof Water Infiltration
1.5 inch clean sewer rock: 395 ft3 (includes surface rock along building): **14.6 yards**
Filter fabric (4 oz.): 864 ft^2 (approx.): (6 ft. X (112 + 32)
Prefabricated trench: 6 feet total length, 5-6" wide and deep, removable heavy-duty plastic or stainless steel grate

Diggers Hotline must be notified and utility lines marked before any excavation begins. You or your landscaper can request marking of underground utilities at diggershotline.com or by dialing 811. **Silt fence must be in place below excavation area (across entire driveway) before project begins.**

Instructions:

1. Dig trenches and pit as specified on site drawings. The dimensions for the roof trench will be 62 feet by 2 feet wide and 2 feet deep. The dimensions for infiltration pit will be 8 feet by 4 feet wide and 4 feet deep. The bottom of each infiltration area must be flat. Additional rock may be required to accommodate existing slope.

2. Slope from the edge of the building to the infiltration trench.

3. Line the sides of each infiltration area with filter fabric.

4. Fill the pit with clean, sewer rock, stopping approximately 6 inches from the top.

5. Add a horizontal layer of filter fabric on top of the rock.

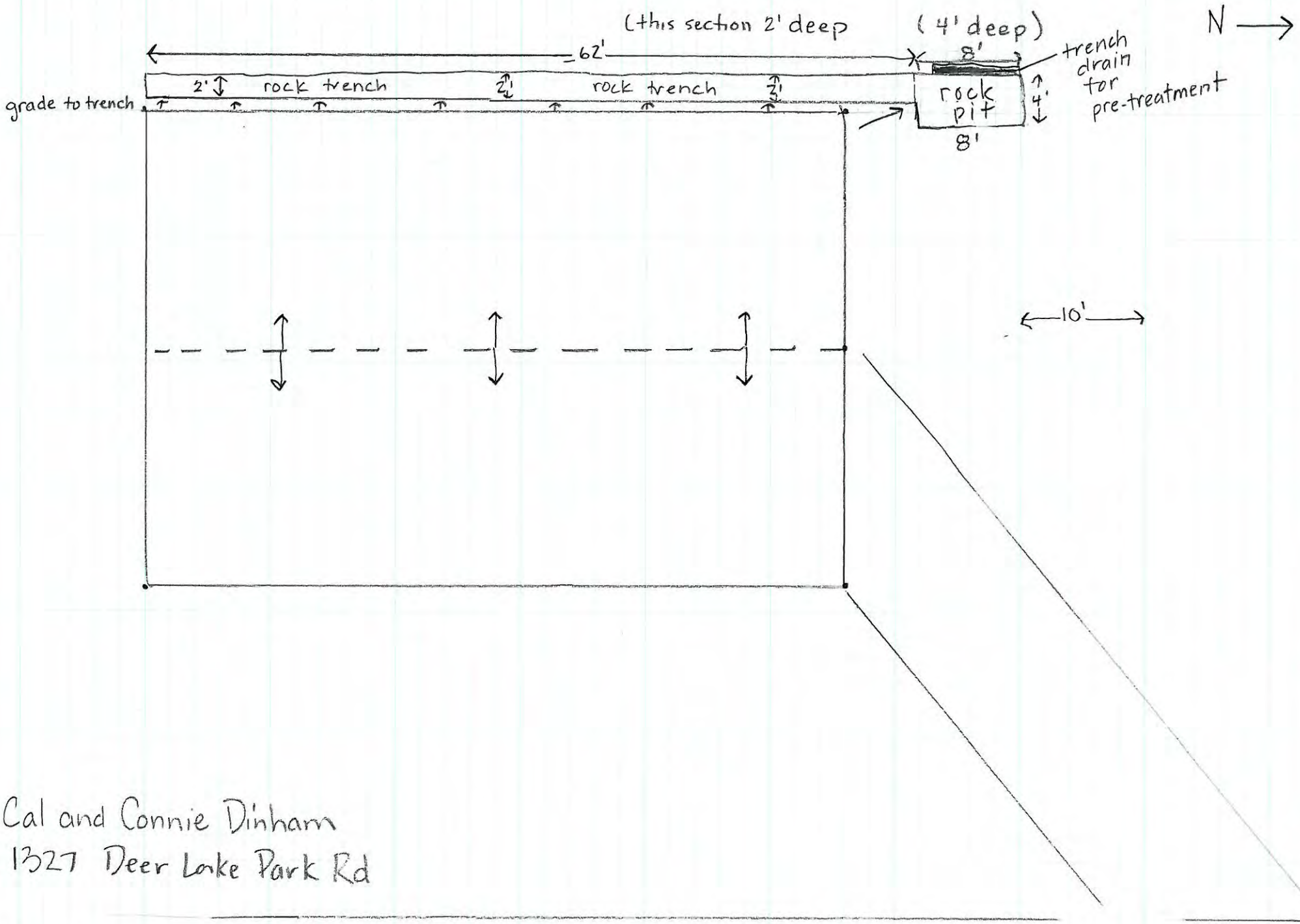
6. Cover the filter fabric with rock to the surface.

7. Install a 6 foot trench drain on the uphill side of the infiltration area.

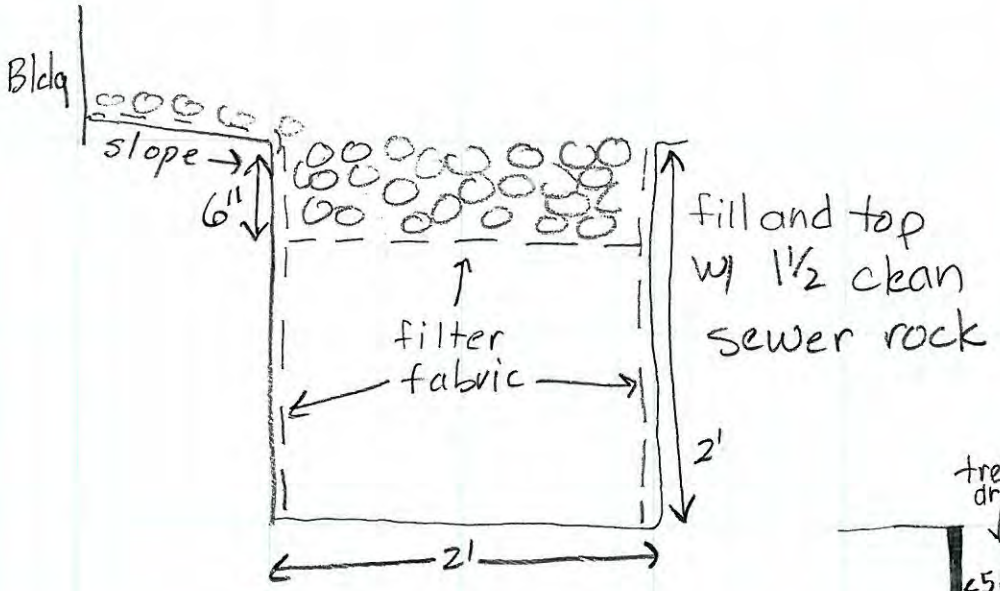
The top horizontal layer provides the ability to revive the system by removing and cleaning the top 6 inches of rock. Infiltration will be prolonged by periodically cleaning out accumulated debris and leaves. A leaf blower works well to clean rock. The trench drain will also keep sediment out of the infiltration pit as long as it is cleaned out regularly.

The soil survey indicates that soil present is Rosholt loam with sand and gravel soils that begin at a depth of about 28 inches. To ensure this layer is reached (without a site specific soil test), the bottom of the pit must be placed at a depth of no less than 3 feet to maximize infiltration. A hole that reaches sand and gravel must be confirmed during installation. An alternative is to order a soil test to determine the depth prior to final excavation. These tests generally run about $150-$200 when a single test pit is dug.

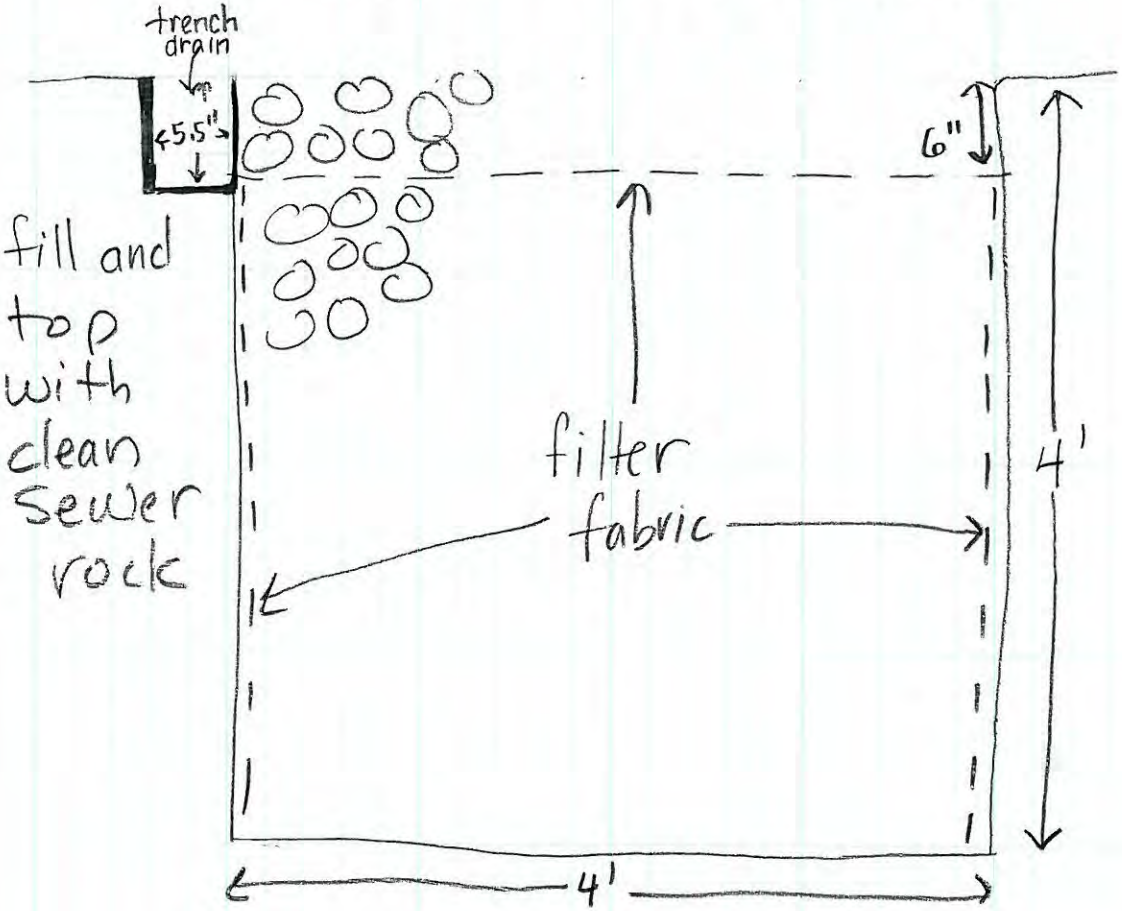
Example trench for pretreatment


(this section 2' deep
(4' deep)
N
62'
8'
trench drain for pre-treatment
2'
rock trench
2'
rock trench
2'
grade to trench
rock pit
4'
8'
10'
Cal and Connie Dinham
1327 Deer Lake Park Rd
07/26/19
Deer Lake Park Rd.

Rock Trench Cross Section



Rock Pit Cross Section



Cal and Connie Dinham
1327 Deer Lake Park Rd

07/26/19

Runoff Reduction Plan
Deer Lake

Phil and Jeanne Foussard
Birchwood Terrace

Rock Infiltration

Design Calculations[1]:
Road Area (1440 ft^2)

Runoff volume with 1 inch rain: 120 ft^3

Rock volume needed: 300 ft^3

The soil profile from the soil map indicates that a depth of 4.0 feet would be appropriate for the rock pit to reach sand and gravel for better infiltration. The pit will be 4 feet wide and 21 feet long along the side of the road. The road edge will be sloped to the pit.

Quantities Rock Infiltration #1
¾" – 2" clean sewer rock: 12 yards
Filter fabric (6 feet wide): 75 feet
Shady grass seed
Straw blanket, Silt fence

Call Diggers Hotline – 811 to have utilities located prior to construction.

Instructions:

1. Dig a pit of the specified size as shown on site diagram. The bottom of the pit should be flat.

2. Line the sides only of the pit with filter fabric. NOTE THE BOTTOM OF THE PIT IS NOT LINED TO PREVENT CLOGGING OF THE FILTER FABRIC.

3. Fill the pit with clean, ¾ to 2 inch washed rock, stopping approximately 6 inches from the top.

4. Add a horizontal layer of filter fabric on top of the rock.

5. Plant grass seed and cover with erosion control fabric.

[1] Program standards allow for installation of an infiltration system to capture a 1-2" rain event, depending upon space available and desired budget.

Linda Givens
[redacted]

Road Infiltration Pit

The site diagram indicates the proposed location for the infiltration pit.

The designed pit (4' X 12' X 4' deep) will have a capacity of 288 cubic feet (10.67 yards).

The proposed infiltration pit may not be able to contain *all* the runoff from a major storm, but it will reduce the amount and improve the quality of runoff water making its way across your lake property and to the lake. The pit will capture water from the back lot and (as long as the road is graded correctly) from the road itself.

Top view and cross section diagrams are included.

A. Constructing a rock infiltration pit

1. Dig a pit of the specified size. The bottom of the pit will be level.

2. Line the pit sides and slope to the road with filter fabric. Do not line the bottom of the pit

3. Fill the pit with clean 1.5 inch washed rock. Larger rock could be used for the first 3.5 feet of depth if desired. The rock must be of relatively uniform size to allow for maximum pore spaces.

4. Add a horizontal layer of filter fabric on top of the rock.

5. Cover the filter fabric with clean 1.5 inch rock to the surface. Larger rock should not be used here to allow for parking if needed.

B. Maintaining a rock infiltration pit

Regularly remove pine needles, fallen leaves, and any other debris that collects on the surface of the infiltration area. A leaf blower works well for this purpose. When sedimentation begins to slow infiltration, do the following:

1. Remove the top layer of rock and sift with mesh to remove sediment.*

2. Rinse rock.*

3. Remove remaining sediments from the surface of the filter fabric.*

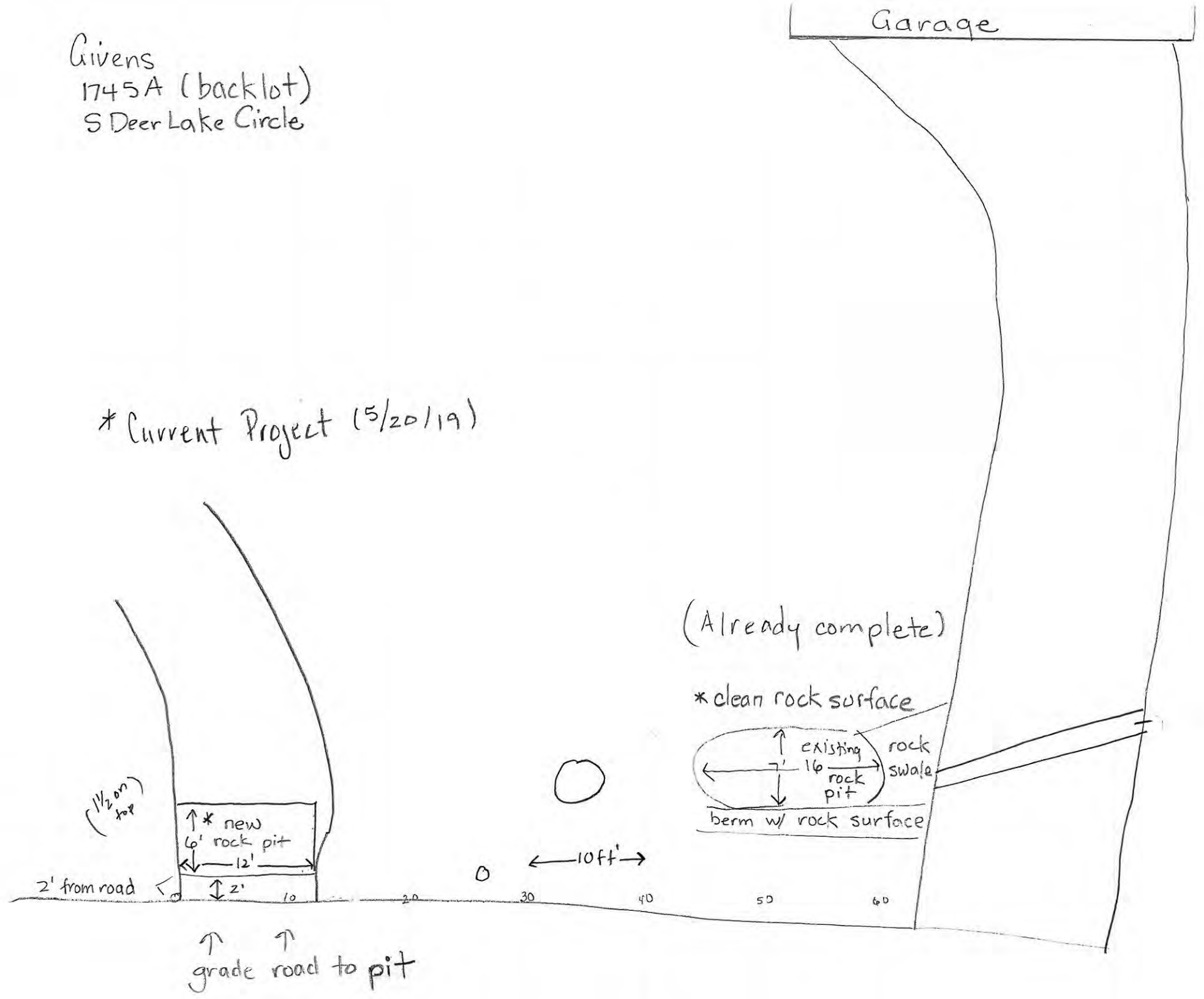
4. Rinse and return filter fabric, or replace with new filter fabric.*

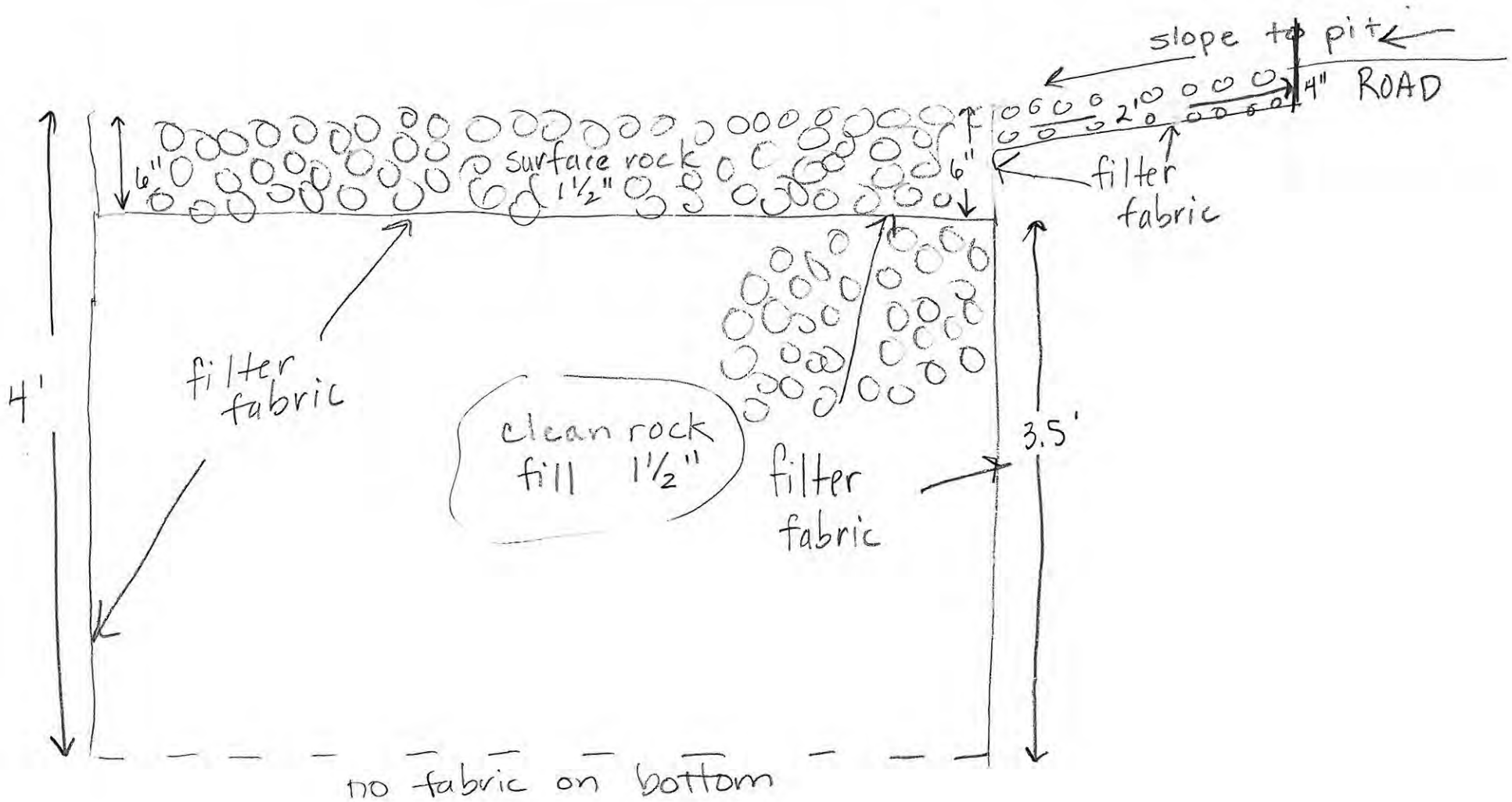
5. Refill with cleaned rock.

*Discard sediment and dirty water in a contained area on your property, such as a garden or flowerbed. This will prevent excess sediment from making its way into the lake.

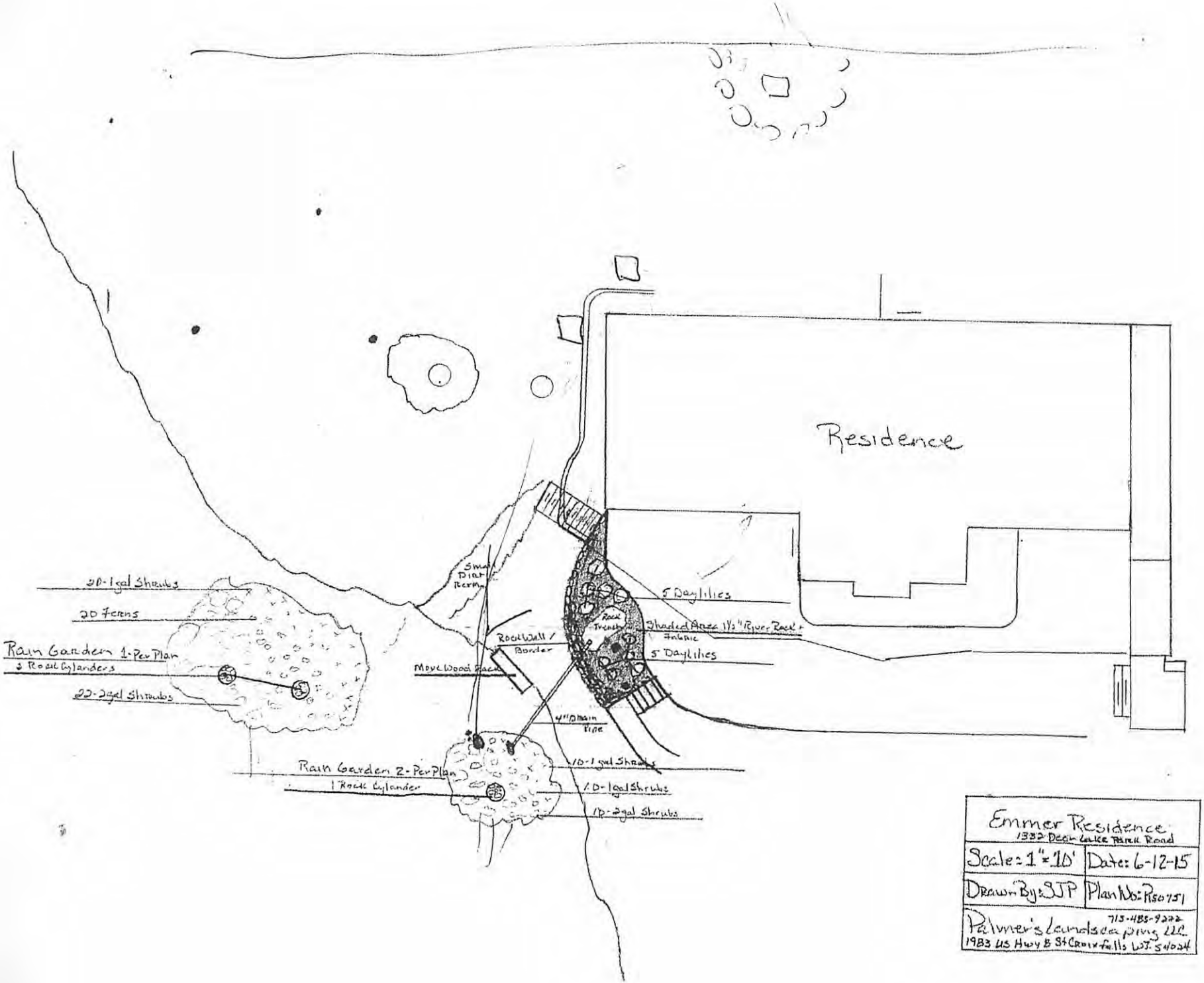
Quantities
Pit Rock (1.5"): 10.67 cubic yards
Surface Rock (1.5"): 8 cubic feet / 0.29 yards
Filter Fabric (15 feet wide X 22 feet) :330 ft^2

Givens
1745A (backlot)
S Deer Lake Circle



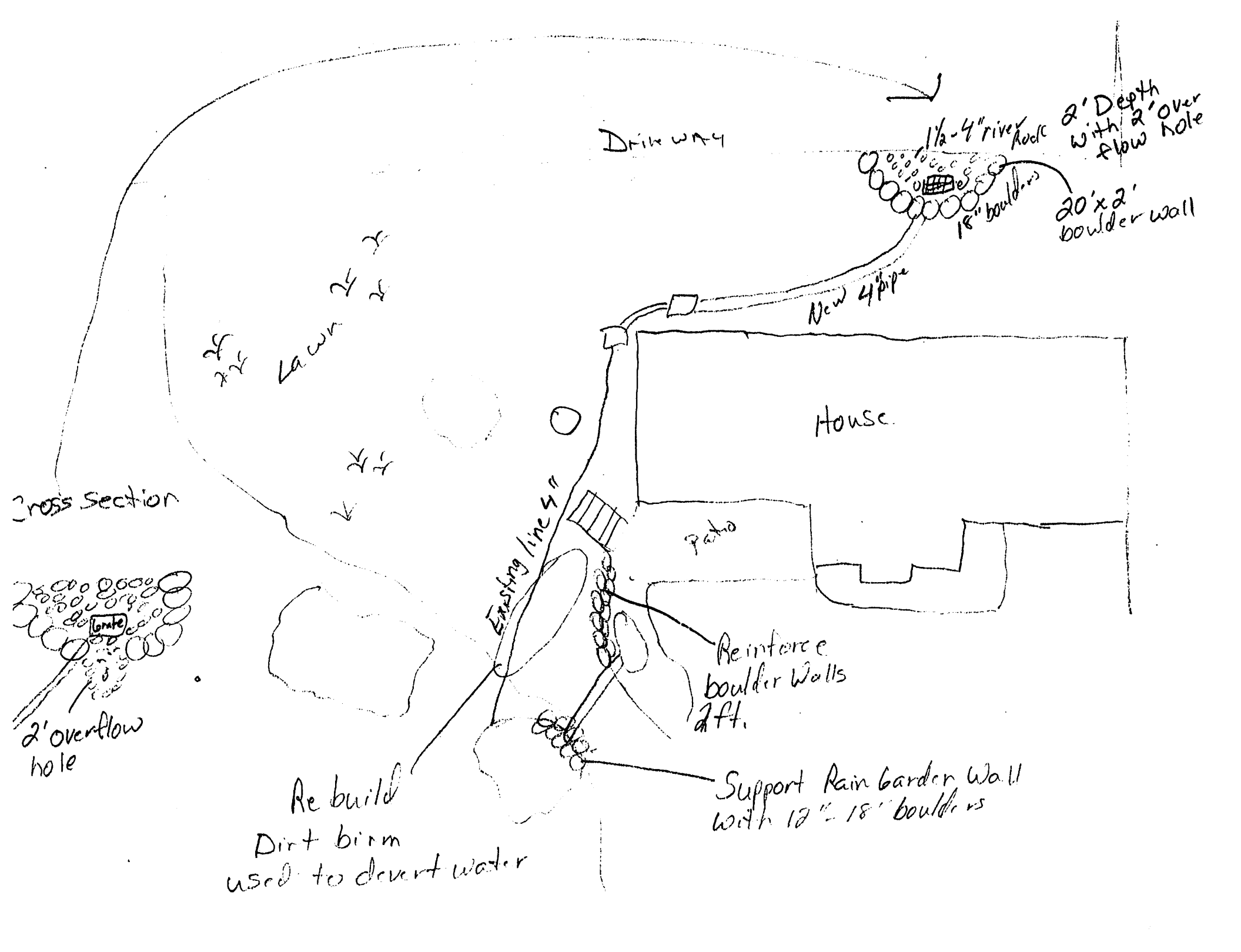


Linda Givens
Road Rock Infiltration
1745A S Deer Lake Circle
5/20/19

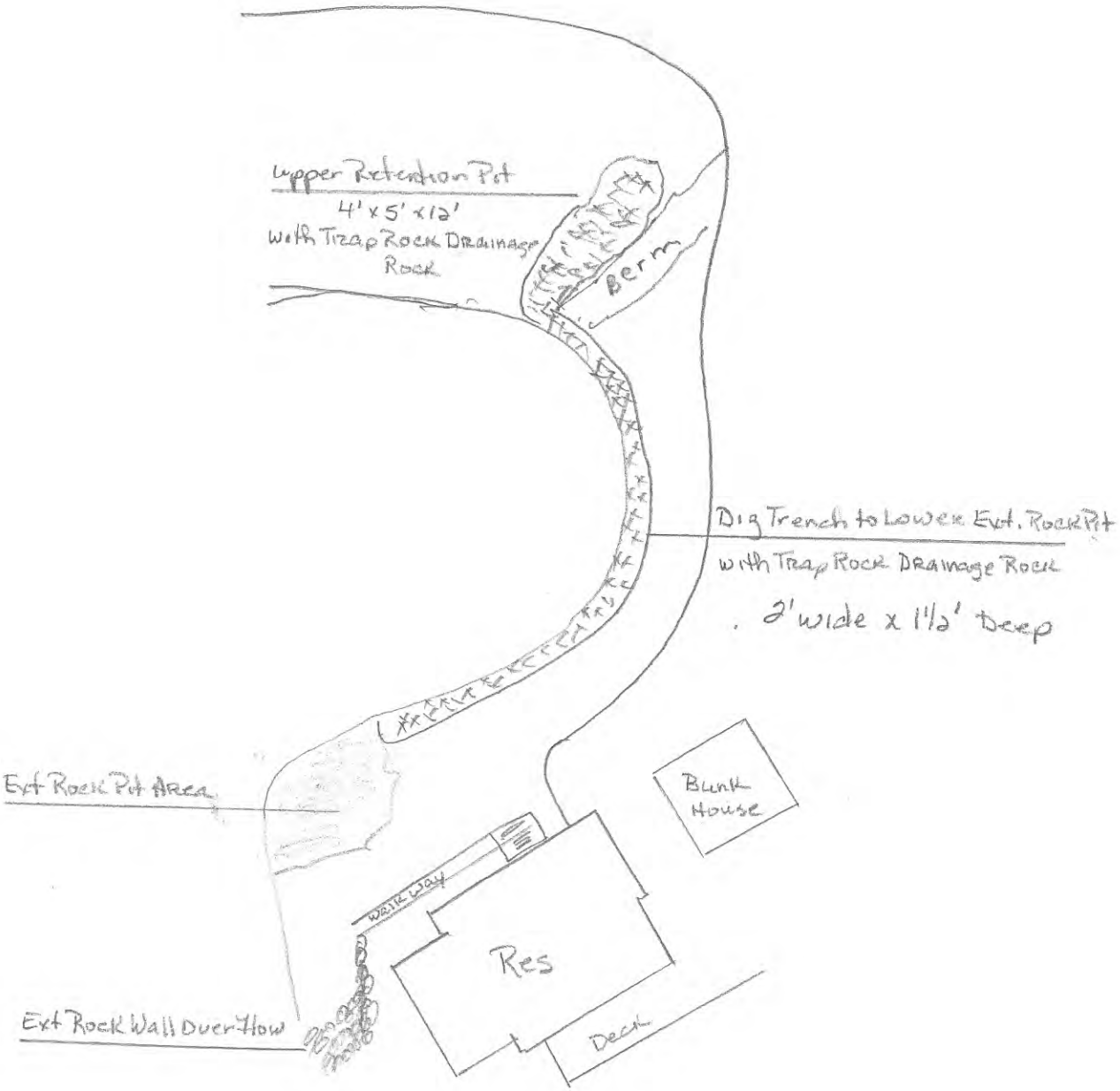


Emmer Residence 1332 Deer Lake Ranch Road	
Scale: 1" = 10'	Date: 6-12-15
Drawn By: SJP	Plan No: Piso751

Palmer's Landscaping LLC
715-485-9222
1983 US Hwy 8 St Croix Falls WI 54024


Driveway
1½-4" river rock
2' Depth with 2' over flow hole
18" boulders
20'x2' boulder wall
New 4" pipe
Lawn
House
Patio
Existing line 4"
Cross section
Grate
2' overflow hole
Reinforce boulder Walls 2ft.
Support Rain Garden Wall with 12"-18" boulders
Rebuild Dirt birm used to devert water

Housh Residence
Deer Lake



Palmer's Landscaping LLC
1983 US Hwy 8
St Croix Falls WI 54024

Palmer's

Name Housh Residence Phone

Address Deer Lake | City | State | Zip

DIRECTIONS AND INSTRUCTIONS

Dig Out Retention Pit + Trench
Haul Away Fill
Install Trap Rock Drainage Rock
Regrade + Compact Driveway

4500 00

Sales Tax if Applicable .

247 50

4747 50

Total Price For This Job As Stated Above Or Per Plan # $

General Terms

Minimum of 33% down with all new orders under $6,000.00. On any order of $6,000.00 or more, 1/3 down is requires upon signing of contract with another 1/3 due at the midway point of the job, and the final 1/3 of balance due upon completion of work. An annual percentage rate of 18% (1-1/2% per month) will be charged on any account past due over 30 days.

Total Order				
Tax				
Total				
Down Payment				
Balance Due				

I have read and understand conditions of sale on back side of page.

X | X

Client's Signature | Date: | Salesman's Signature

Runoff Reduction Plan

Sally and Restor Johnson
[redacted]
Deer Lake

This Runoff Reduction Plan includes instructions for installing the proposed practice to increase water infiltration on your property. The following practice is included in this plan:

- Parking and driveway infiltration trench
- Roof water infiltration areas

The soil survey indicates that soil present is Rosholt loam with sand and gravel soils that begin at a depth of about 28 inches. To ensure this layer is reached (without a site specific soil test), the bottom of the pit must be placed at a depth of no less than 4 feet to maximize infiltration. Sand may be used to backfill the pit to create the appropriate depth for installation of the blocks or rocks. A hole that reaches sand and gravel must be confirmed during installation. An alternative is to order a soil test to determine the depth prior to final excavation. These tests generally run about $150- $200 when a single test pit is dug.

Diggers Hotline must be notified and utility lines marked before any excavation begins. You or your landscaper can request marking of underground utilities at diggershotline.com or by dialing 811. **Silt fence must be in place below excavation area before project begins.**

See sheet A-6 with roof gutter downspouts and drainage areas indicated. Downspouts A – E are indicated on the drawing along with the rock volume needed to capture a 1" rain event.

Parking and Driveway Infiltration Trenches w/Berms (+ downspout D and E)
Two rock infiltration trenches will catch runoff flowing from parking areas and driveway and downspouts D and E. They will be installed 15 feet south of the house on each side as shown on sheet A-6. **The east trench must be located at least 25 feet from the well on the east side of the dwelling. Each infiltration trench will provide 644 cubic feet of rock infiltration capacity. They will be backed by an earthen berm to hold and direct runoff to the infiltration area.**

Sizing for these infiltration areas was calculated based on the impervious surface draining to them. These trenches will intercept runoff water that would otherwise flow toward the house and ultimately to the lake.

Impervious area draining to infiltration trenches: 4740 ft^3
parking and garage = 4200 ft^2
driveway = 540 ft^2
Water generated with a 1 inch rain: 395 ft^3
Rock Infiltration Area Needed: 987.5 ft^3

Infiltration Trench Sizing

	Downspout Rock Volume Needed (ft^3)	Parking and Drive Rock Volume Needed (ft^3)	Total Rock Volume Needed (ft^3)	**Surface Area Needed 4.5 foot depth**
East Rock Infiltration	112 (D)	494	606	**135**
West Rock Infiltration	137 (E)	494	631	**140**
Design Size			616 ft3	

Quantities for Infiltration w/Berms
¾" – 2" clean sewer rock: 1232 ft^3 + surface rock (2X28 ft^3): 1288 ft3 or **48 yards**[1]
Filter fabric: 1150 ft^2 (approx.): (6 ft. X 94) X 2
Landscape edging (6"): 30 ft X 2 = **60 ft.**
Topsoil: 49 ft3 X 2 = 98 ft3 or **3.6 yards**
Grass seed (shady mix)
Straw blanket: 6 X 40 X 2 = **480 ft^2**

Instructions:

1. Dig 2 trenches of the specified size. The dimensions are indicated in the site plan. Surface area of the rock areas will be 154 ft^2 each. The bottom of the pit must be flat. Additional rock may be required to accommodate existing slope.

2. Create a 6 inch high berm on the downhill side of each infiltration trench, extending wings to the side to catch overland flow. **Berms must be flat across the top** and slope gradually from front to back to allow mowing.

3. Plant berms with shady grass mix include annual rye for quick germination and cover with straw blanket. Berms may be planted with other vegetation at owners' discretion and expense.

4. Slope the driveway and yard to the infiltration trenches.

5. Line the sides of the pit with filter fabric.

6. Fill the pit with clean, ¾ to 2 inch washed rock, stopping approximately 6 inches from the top.

7. Add a horizontal layer of filter fabric on top of the rock.

[1] Additional material may be required to accommodate slopes.

8. Separate the area where rock will be exposed (first 2 feet from the berm) from the area to be covered with soil and planted to grass with 6" landscape edging.

9. Cover the filter fabric with rock to the surface in the first 2 feet from the berm.

10. Add topsoil over filter fabric and plant shady lawn mix over remaining area.

The top horizontal layer of rock provides the ability to revive the system by removing and cleaning the top 6 inches of rock. Infiltration will be prolonged by periodically cleaning out accumulated debris and leaves. A leaf blower works well to clean rock.

Roof water infiltration

An underground infiltration system can also capture runoff from the roof area. Rain gutters and underground piping will deliver water to the infiltration system. The only visible evidence that this system is in place will be a 6 inch overflow pipe for cases of heavy rain. Two options are available for infiltration:

1) A hollow plastic cell system such as Quick 4 or Aquablox ™
2) A rock infiltration system

Because there is more void space with the plastic cell system, about 40% of the volume needed for rock is required. This system would also avoid hauling heavy materials across the lot.

Infiltration Chamber Sizing

Chambers used in charts below assume a 54 gallon capacity in each segment which is 14" high, 3 feet wide and 4 feet long. (QUICK4 PLUS HIGH CAPACITY CHAMBER SPECIFICATIONS)

Sizing for Infiltration Chambers – Surface Area Needed (10 X 20) 12"rock base

Downspout	Chamber Volume Needed (ft^3)	Chamber Volume Needed (gallons)	Rock Volume Needed (ft^3)
A	65	486	
B	45	337	
C	32	239	
TOTAL		**1062**	
Design Volume		**648 (12 chambers)**	
Remaining needed		414 (gallons) 55 (ft^3)	138 (10' X 20' X 1')

Sizing for Infiltration Chambers (Option 2) – Surface Area Needed (10 X 15) 18" rock base

Downspout	Chamber Volume Needed (ft^3)	Chamber Volume Needed (gallons)	Rock Volume Needed (ft^3)
A	65	486	
B	45	337	
C	32	239	
TOTAL		**1062**	
Design Volume		**486 (9 chambers)**	
Remaining needed		576 (gallons) 77 (ft^3)	192 (10 X 15 X 1.5)

Surface area square feet needed with a 4 feet or 5 feet deep rock pit is also shown. A B and C will be combined into a single infiltration pit.

Sizing for Rock Infiltration Pits – Surface Area Needed 4 ft. deep pit = (9 X 10)

Downspout	Rock Volume Needed (ft^3)	Surface Area with 4 feet depth (ft^2)	Surface Area with 5 feet depth (ft^2)
A	165	41	33
B	114	28.5	23
C	80	20	16
D	137	34	27
E	112	56	22

<u>Rock Infiltration Instructions:</u>

1. Dig a pit of the specified size. A 4 feet deep pit filled with rock would need to be 9 feet X 10 feet

2. Connect the rain gutter downspout pipe to the pit. The pipe will enter near the top of the rock on the uphill side of the pit, so the top of the pipe will begin about 8 inches below the surface.

3. Construct an outlet for the rock chamber with a 4" PVC pipe installed on the downhill side of the rock chamber. The PVC pipe will outlet at the surface of the slope in a well-vegetated area. A screen is installed on the end of the outflow pipe to prevent animals from entering it.

4. Line the sides of the pit with filter fabric allowing for pipe to enter and exit the rock chamber of the pit.

5. Fill the pit with clean, ¾ to 2 inch washed rock, stopping approximately 6 inches from the top.

6. Add a horizontal layer of filter fabric on top of the rock.

7. Cover the filter fabric with topsoil to the surface.

8. Plant grass seed and cover with erosion control fabric.

Quantities Rock Infiltration (A, B, C)

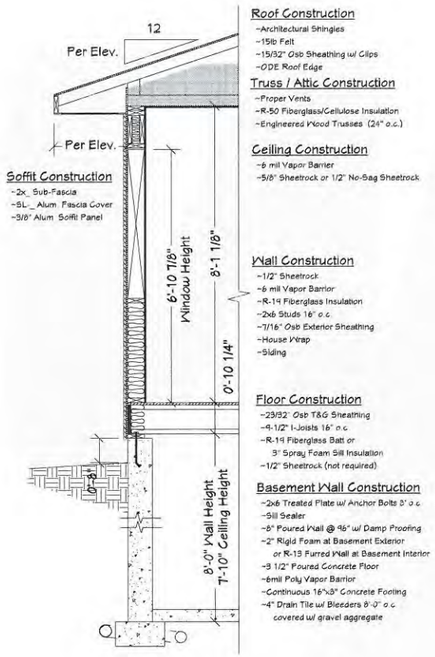
Downspout	¾" – 2" clean sewer rock	Infiltration chambers (Quick 4)	Topsoil	Filter fabric	*4*" outlet pipe	Outlet pipe screens
Rock Infiltration	13.3 yards		1.75 yards			
Infiltration Chamber	7 yards	9				

Plastic Cell System

General Instructions:
To install this underground infiltration chamber, a hole is dug large enough to fit the required number of cells. The outer layer of cells is then wrapped in filter fabric (min. 8 ounce), to keep out sediment, and lowered into the hole. The downspouts are then redirected into the chamber and the overflow outlet pipe installed. A screen is installed on the end of the outflow pipe to prevent animals from entering it. If the hole is larger than the cells, rock is used to backfill around the cells. The cells are covered with soil, seeded to lawn grass and covered with erosion control blanket or straw.

Also see manufacturer's installation instructions. Note that many of these systems are constructed to hold water for re-use. This system is lined with filter fabric to allow for infiltration.

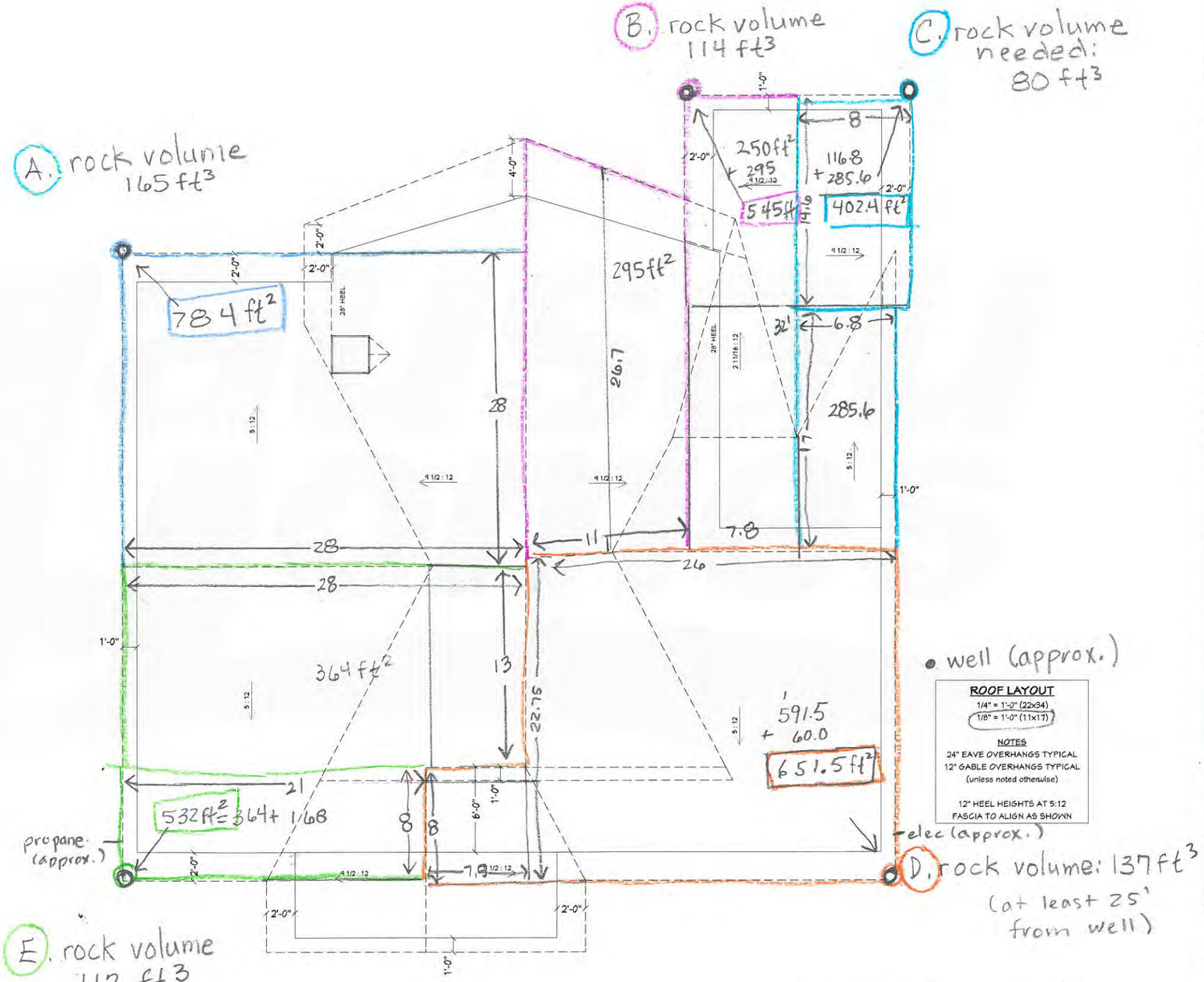
Any changes to this project would need to be approved by Harmony Environmental on behalf of the Deer Lake Conservancy.



TYPICAL WALL SECTION

1/2" = 1'-0" (22x34)

1/4" = 1'-0" (11x17)



ROOF LAYOUT

1/4" = 1'-0" (22x34)

1/8" = 1'-0" (11x17)

NOTES

24" EAVE OVERHANGS TYPICAL

12" GABLE OVERHANGS TYPICAL

(unless noted otherwise)

12" HEEL HEIGHTS AT 5:12

FASCIA TO ALIGN AS SHOWN

JOHNSON

ST CROIX FALLS, WI

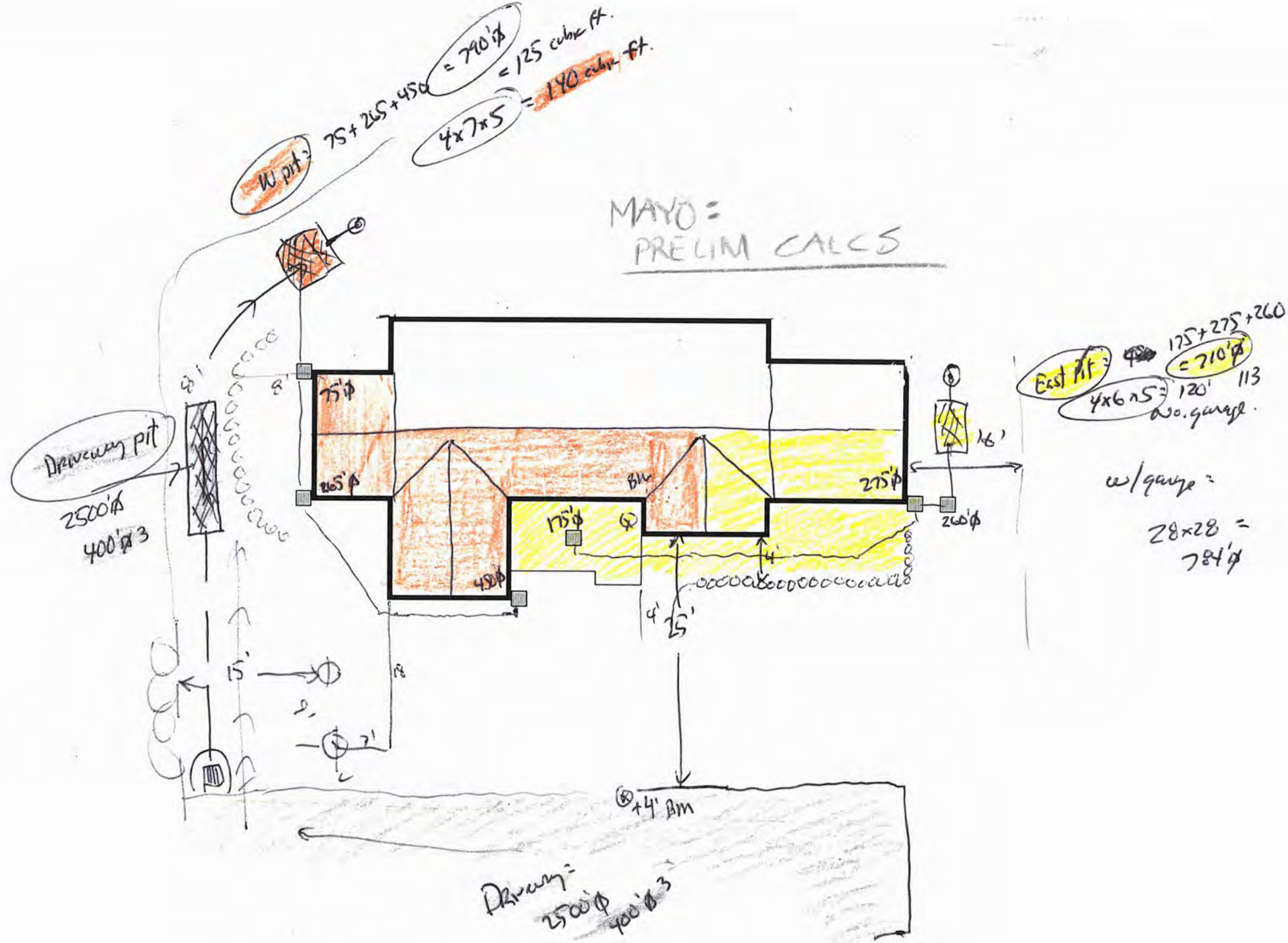
WO622R BRULE

FINAL SET

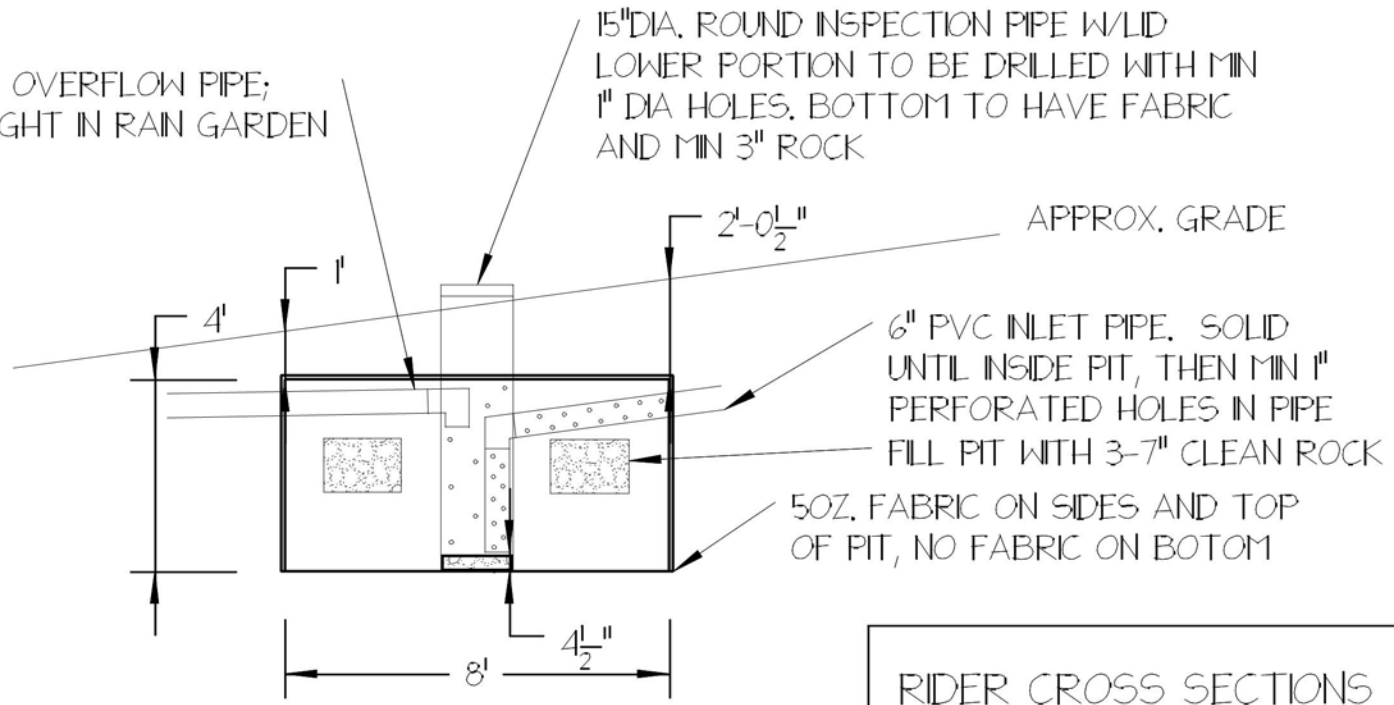
Wausau Homes St. Croix Falls
2012 US Hwy 8
St. Croix Falls, WI 54024
715.483.3101
smithj@wausauhomes.com
www.wausauhomes.com

Wausau Homes — Redefining the Building Experience

DATE:
12/14/2018
DRAWN BY:
VDG : APV
SHEET:
A-6

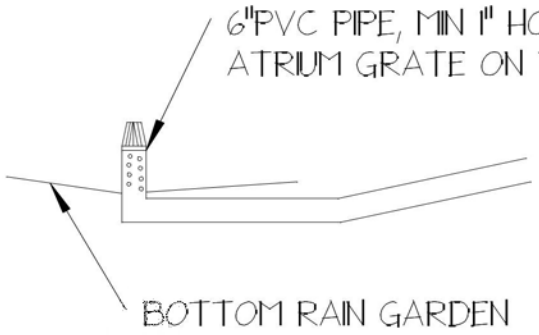


MAYO:
PRELIM CALCS
W pit: 75 + 265 + 450 = 790'ϕ
= 125 cubic ft.
4x7x5 = 140 cubic ft.
75'ϕ
265'ϕ
450'ϕ
175'ϕ
275'ϕ
260'ϕ
Driveway pit
2500'ϕ
400'ϕ 3
East Pit: 175 + 275 + 260 = 710'ϕ
4x6x5 = 120' 113
No. garage.
w/garage:
28x28 =
784'ϕ
15'
25'
4'
16'
+4' Bm
Driveway:
2500'ϕ
400'ϕ 3

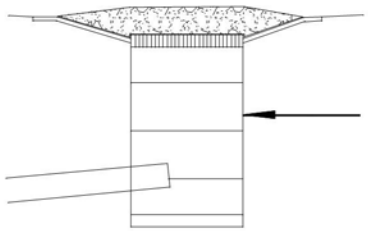


INFILTRATION PIT CROSS SECTION

RIDER CROSS SECTIONS
BALSAM LAKE PRO-LAWN INC.
DRAWN BY: JON HOL
SCALE: 1"=4'
8/17/2020



OUTLET PIPE SPECS



4 12" SEPTIC RISERS STACKED:
2-3" CONCRETE BOTTOM
6" PVC OUTLET PIPE TO PIT
STEEL GRATE OVER TOP
FABRIC AROUND BASIN WITH ROCK ON TOP

CATCH BASIN SPECS

Jacob and Angie Rider [redacted]
Deer Lake

Silt fence must be installed below any areas of excavation or where excavated or construction materials are placed. All areas disturbed during construction to be seeded with a shady lawn grass mix (unless otherwise specified by owners).

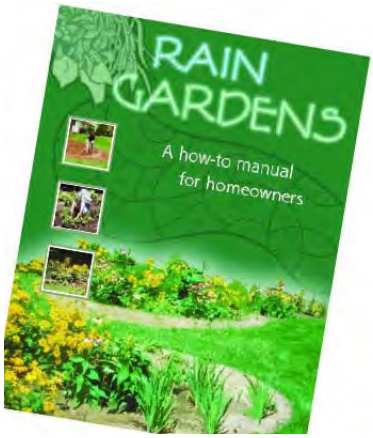
Rain Gardens

Rain garden locations are indicated on the site diagram overall top view. Top views and cross sections are also provided.

- Confirm utility locations with owner and Diggers Hotline prior to beginning construction.
- Be sure to avoid the use of heavy equipment within the proposed rain garden locations; it will compact the soil and decrease infiltration.
- Rain garden sizes, cross sections, planting layouts and plant lists, and project quantities are found in the plan set.

Installing rain gardens

The process for installing rain gardens is outlined in detail in *Rain Gardens: A how-to manual for homeowners* publication. The basic steps are as follows:



1. **Dig the rain gardens** (page 12) The rain gardens will be 8 inches deep (6 inches, once 2" of mulch is placed) and level at their base. For both rain gardens, excavate an extra 12 inches, then replace with a 70/30 sand compost mixture. EXCEPT IN THE AREA BETWEEN THE OAK TREES IN RAIN GARDEN #2. In this area native soils will be the bottom of the rain garden to avoid disturbance to tree roots. Native slopes indicated on the site plans are approximate and on-site adjustments will need to be made.

2. For rain garden 1: A 6"PVC pipe extends from a collection area to the base of the rain garden as shown on the site diagram. Place filter fabric then rock (3-6") at the outlet of the pipe.

3. **Level the rain gardens** (page 12). It is essential that the bases of the rain gardens are flat in order to prevent uneven pooling of water within the garden. To maximize infiltration capacity, the water must soak into the ground evenly throughout the garden's base.

4. **Making the berm –** (page 14). For rain garden #1 the top of the rock overflow will be 8 inches above the garden's base. This establishes the height of the rain garden. The berm on rain garden #1 will be 3" higher than the rock overflow. The berm on rain garden #2 will be level across the top for even overflow and be 8 inches above the garden's base. It will not be as high as the ice berm adjacent to the shore.

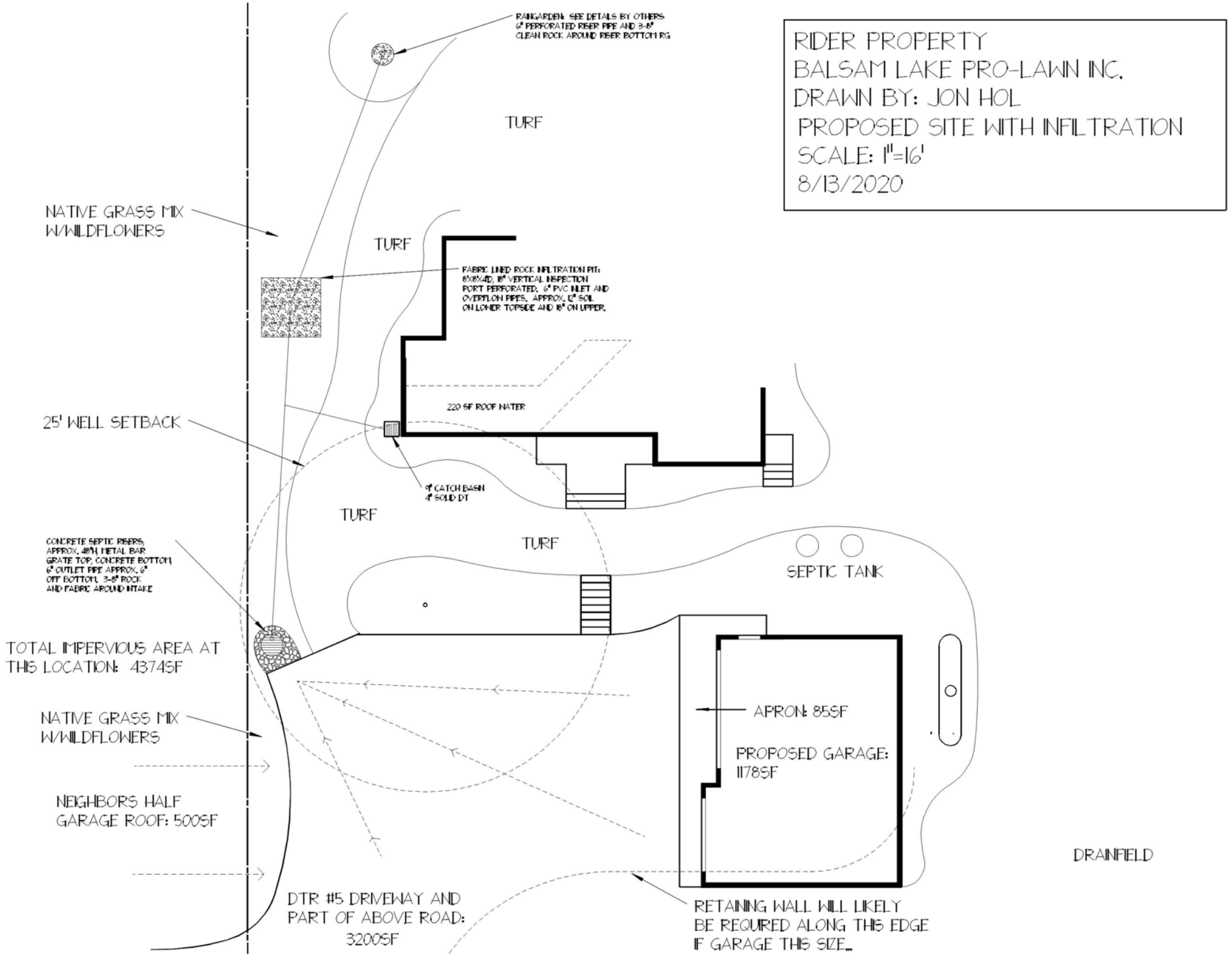
5. **Create rock dry creek bed to connect the two rain gardens.** The dry creek bed is underlain with filter fabric and covered by 3-6 inch rock (see cross section). Maintain a 4 inch dip in the channel so there is capacity for water flow.

6. **Plant the rain garden** (page 16). Plant the garden with species from the lists and table provided. Contact Harmony Environmental if you wish to propose substitutions.

   Begin by laying down 2 inches of shredded bark or wood mulch. Stake jute netting in place to prevent mulch from floating in large storm events. To plant, separate the mulch, dig a hole, sprinkle organic soil amendment, and place the plant in the hole. Press the soil gently around the plant roots and replace the mulch, being careful to keep mulch ½ inch from the stem of plants. Plant recommendations and spacing are included in the tables.

7. **Water immediately after planting.** Plan to water daily for the first few weeks or until the plants are well established. If plants wilt or droop, a repeated watering during the day may be necessary. Once plants are established, water only if prolonged dry periods occur. (Owner will provide maintenance watering unless otherwise arranged)

Information for maintaining the rain gardens is also included in the rain gardens publication (page 17). Like all gardens, it will require some weeding and watering. This is especially important during the first year or so after the garden is installed. Since the plants are native, however, they should require minimal care once established.



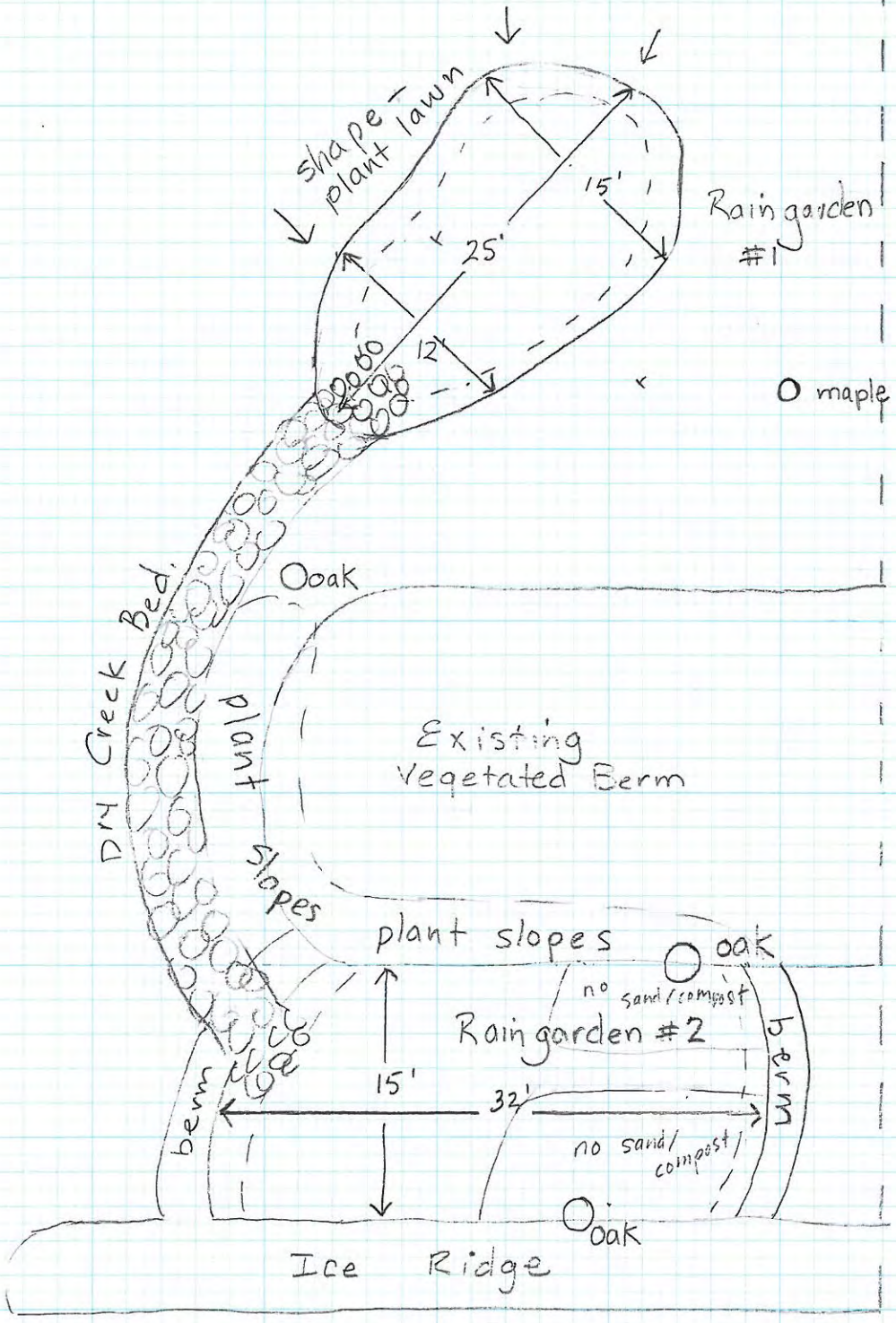
RIDER PROPERTY
BALSAM LAKE PRO-LAWN INC.
DRAWN BY: JON HOL
PROPOSED SITE WITH INFILTRATION
SCALE: 1"=16'
8/13/2020

Jacob + Angie Rider
Hungerford Pt. Rd.
Deer Lake

Cabin

N

10

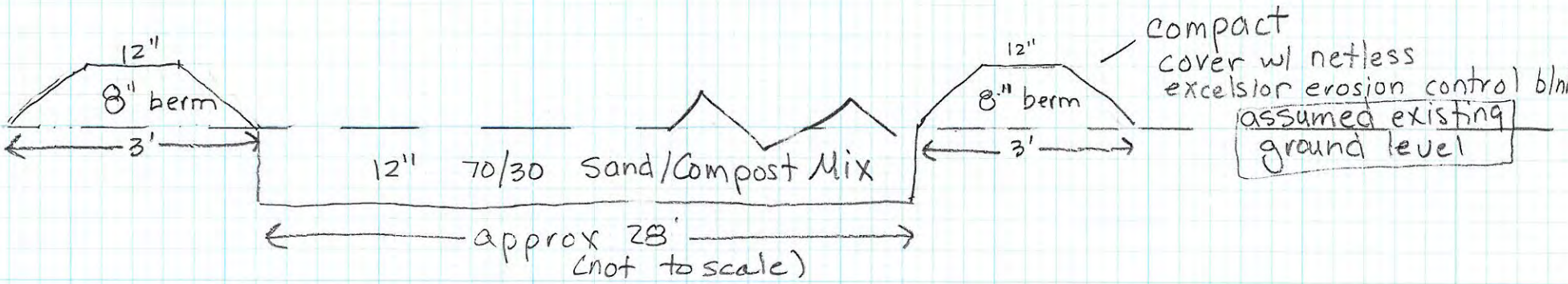


08/03/20

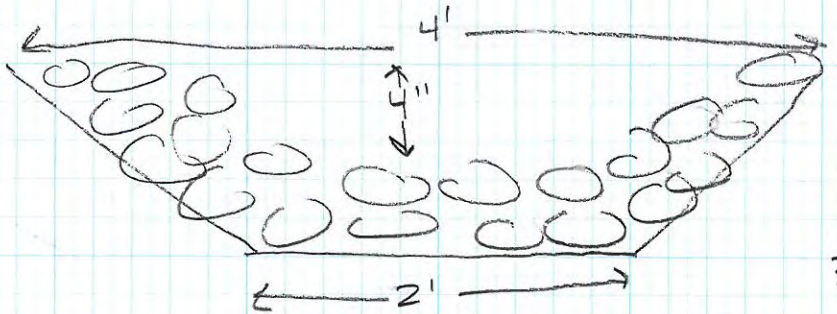
Cross Sections

Rain Garden #1 (actual slope varies)

Rain Garden #2 (use existing berms for side slopes)



Dry Creek Bed



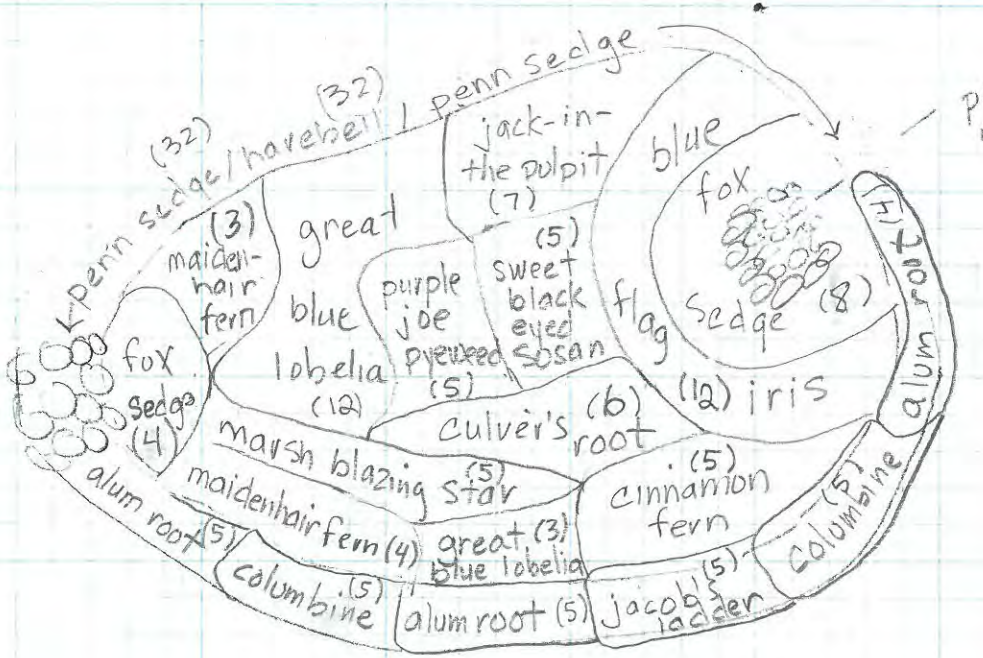
line w/ 8 oz. filter fabric
3-6" trap rock

08/03/20

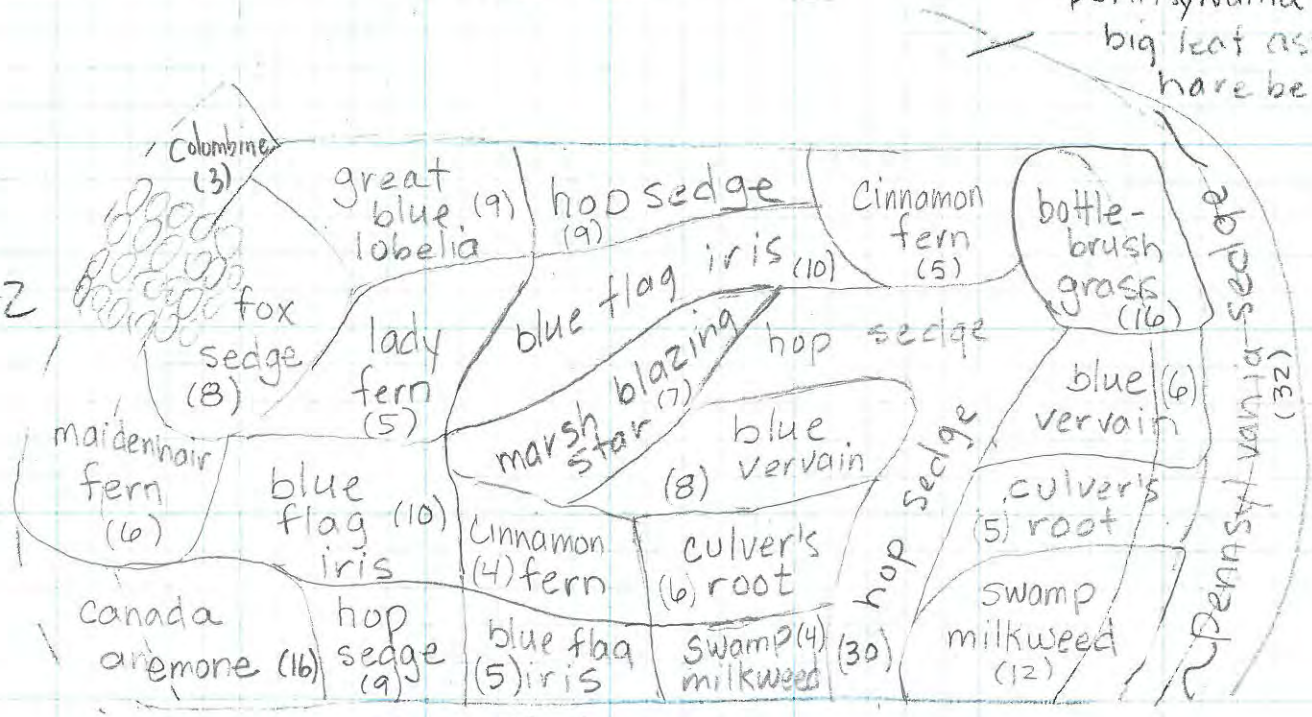
Rider Planting Layouts

5'

Rain Garden #1



Rain Garden #2



08/03/20

Ice Ridge

Rain Garden Project Quantities

Rider
Hungerford Pt Rd

	Materials	Quantity	Cost per unit	Total Cost
Rain Garden #1- 110 ft2 (slopes and berm) + 200 ft2 (bottom)				
	2" Pots	64		
	4" pots	66		
	6" Pots	12		
310 ft2	Shredded bark mulch (2")	2 yards		
	Jute netting	310 ft2		
200 ft3	Sand/compost mix	7.4 yards		
	Soil amendment			
3' X 3' X 0.75'	Rock for inflow (3-6")	6.75 ft3		
	Filter fabric for inflow (6')	3 linear feet		
repair - ?	excelsior erosion control fabric	200 ft2		
	Excavation and remove fill			
Rain Garden #2- 260 ft2 (slopes and berm) + 400 ft2 (bottom)			INCLUDES EXISTING SLOPES	
	2" Pots	272		
	4" Pots	93		
	6" Pots	20		
500 ft2	Shredded bark mulch (2")	3.1 yards		
	Jute netting	400 ft2		
250 ft3	Sand/compost mix	9.5 yards		
	Soil amendment			
4 feet wide	excelsior erosion control fabric	30 linear feet		
	Excavation and remove fill			
Dry Creek Beds				
4' X 50' X 0.75'	3-6 inch trap rock	5.6 yards		
	8 ounce filter fabric (6 feet)	50 linear feet		
Silt fence below construction area				
repair	Shady grass seed			

Rain Garden Plant Quantities

			Raingarden #1			Raingarden #2		
	Common Name	**Scientific Name**	**2" Pots**	**4" Pots**	**6" Pots**	**2" Pots**	**4" Pots**	**6" Pots**
	BERM AND SLOPE							
	Flowers							
	Columbine	*Aquilegia canadensis*		10			3	
	Big leaf aster	*Aster macrophyllus*				64		
	Harebell	*Campanula rotundifolia*	*32*			32		
	Alum root	*Heuchera richardsunii*		14				
	Wild geranium	*Geranium maculatum*						
	Jacob's ladder	*Polemonium reptans*		*5*				
	Sedges and Grasses							
	Pennsylvania sedge	*Carex pensylvanica*	32			96		
	GARDEN BOTTOM							
	Flowers							
	Canada anemone	*Anemone canadensis*				16		
	Jack in the pulpit	*Arisaema triphyllum*		7				
	Swamp milkweed	*Ascelpias incarata*					16	
	Blue flag iris	*Iris versicolor*		12			25	
	Purple Joe pyeweed	*Eupatorium purpureum*		5				
	Marsh blazing star	*Liatris spicata*		5			7	
	Great blue lobelia	*Lobelia siphilitica*		14			9	
	Sweet black-eyed Susan	*Rudbeckia subtomentosa*		5				
	Blue vervain	*Verbena hostata*					14	
	Culvers root	*Veronicastrum virginianum*		6			11	
	Ferns							
	Maidenhair fern	Adiantum pedatum			7			6
	Cinnamon fern	*Osmundo cinnamomes*			5			9
	Lady fern	*Athyrium filix-femina*						5
	Sedges and Grasses							
	Fox sedge	*Carex vulpinoidea*		12			8	
	Hop sedge	Carex lupulina				48		
	Bottlebrush grass	Elymus hystrix				16		
Plant 2" pots with 12-14" spacing			**64**	**66**	**12**	**272**	**93**	**20**

Plant 4-6 inch pots with 18-24" spacing

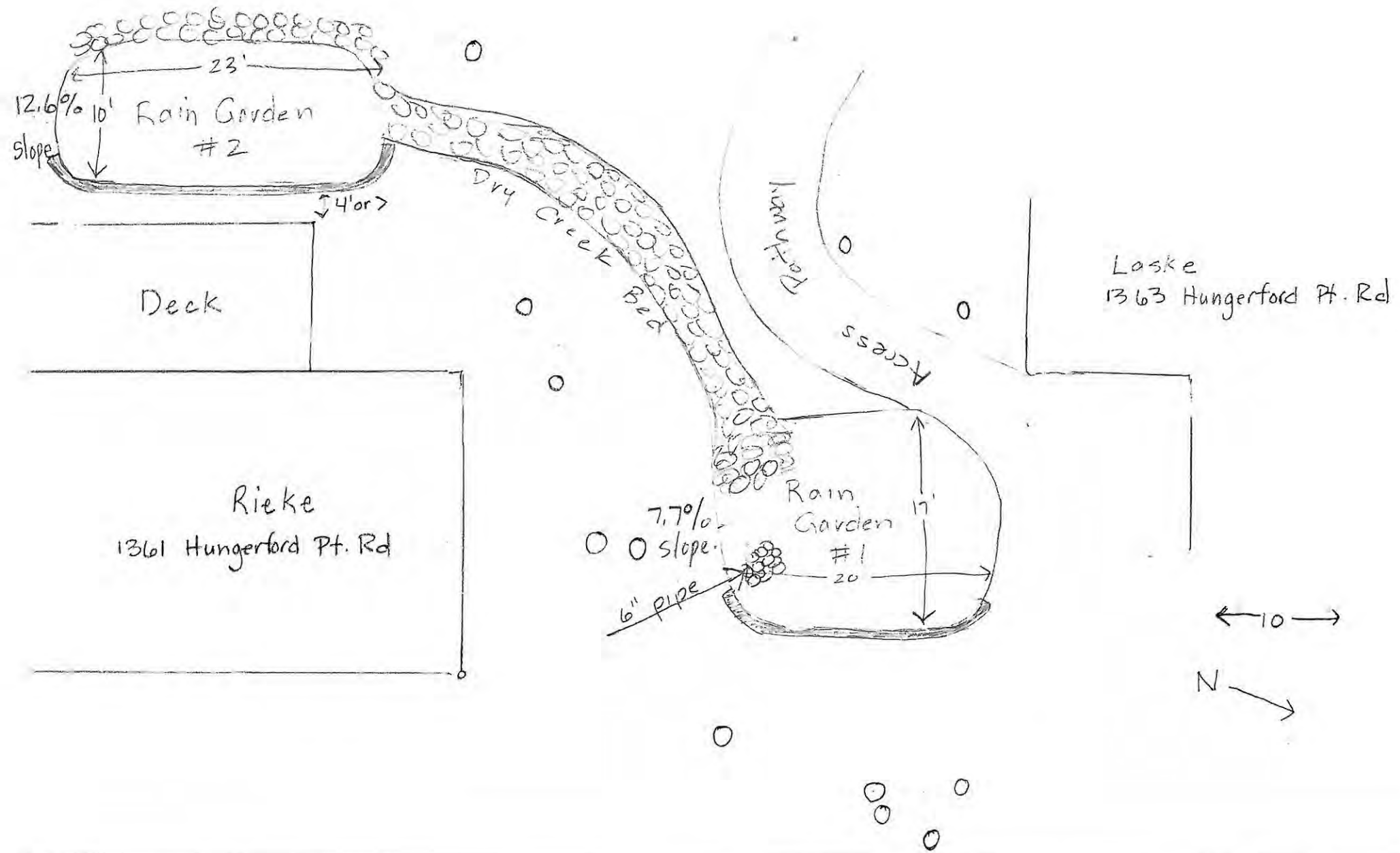
Pot sizes can be substituted with spacing indicated

Rain Garden Plant List

Rider

Common Name	Scientific Name	Height	Bloom Time	Bloom Color	
BERM AND SLOPE					
Flowers					
Columbine	*Aquilegia canadensis*	20-36 inches	May to June	Pink	
Big leaf aster	*Aster macrophyllus*	6-18 inches	August to October	Lavender	
Harebell	*Campanula rotundifolia*	12-20 inches	June to Sept.	Blue	
Alum root	*Heuchera richardsunii*	12-18 inches	May to July	White	
Wild geranium	*Geranium maculatum*	18 inches	May to June	Pink	sub
Jacob's ladder	*Polemonium reptans*	18 inches	May to June	Blue	
Sedges and Grasses					
Pennsylvania sedge	*Carex pensylvanica*	12 inches	NA	NA	
GARDEN BOTTOM					
Flowers					
Canada anemone	*Anemone canadensis*	12-24 inches	May to July	White	
Jack in the pulpit	*Arisaema triphyllum*	18-30 inches	May to June	Purple/Green	
Swamp milkweed	*Ascelpias incarata*	36-48 inches	June to August	Pink	
Blue flag iris	*Iris versicolor*	to 36 inches	June to July	Blue	
Purple Joe pyeweed	*Eupatorium purpureum*	24 to 36 inches	July to Sept	Purple	*Eupatorium maculatum (sub)*
Marsh blazing star	*Liatris spicata*	24-36 inches	July to August	Purple	
Great blue lobelia	*Lobelia siphilitica*	20 to 30 inches	July to Oct	Blue	
Sweet black-eyed Susan	*Rudbeckia subtomentosa*	36-48 inches	July to August	Yellow	*Rudbeckia fulgida (sub)*
Blue vervain	*Verbena hostata*	36-48 inches	June to Sept.	Blue	
Culvers root	*Veronicastrum virginianur*	36-48 inches	June to Sept.	White	
Ferns					
Maidenhair fern	Adiantum pedatum	24 in	None	None	
Cinnamon fern	*Osmundo cinnamomes*	36 in	None	None	
Lady fern	*Athyrium filix-femina*	24 in	None	None	
Sedges and Grasses					
Fox sedge	*Carex vulpinoidea*	12 to 36 in	NA	NA	
Hop sedge	Carex lupulina	24 to 42 in	NA	NA	
Bottlebrush grass	Elymus hystrix	36 to 48 in	NA	NA	

Top View
(overall)

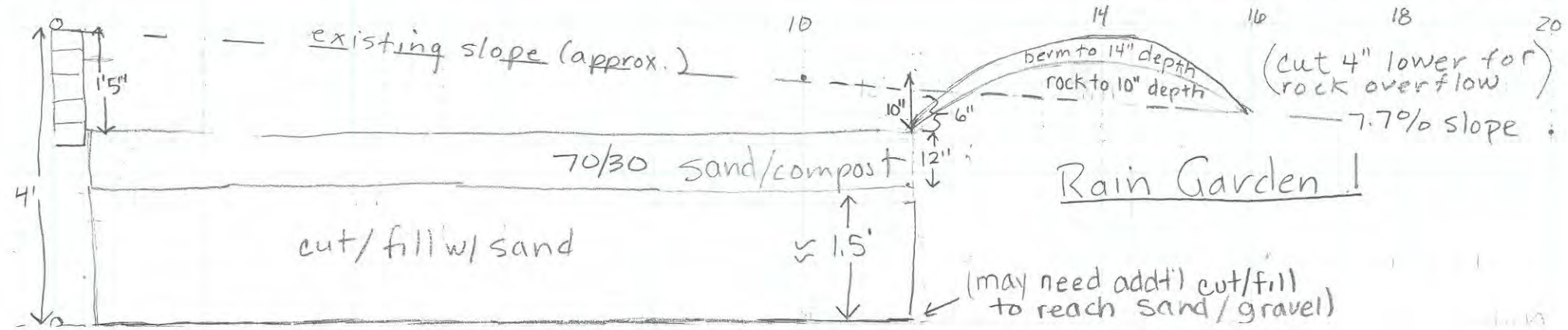


Rain Garden Project Quantities

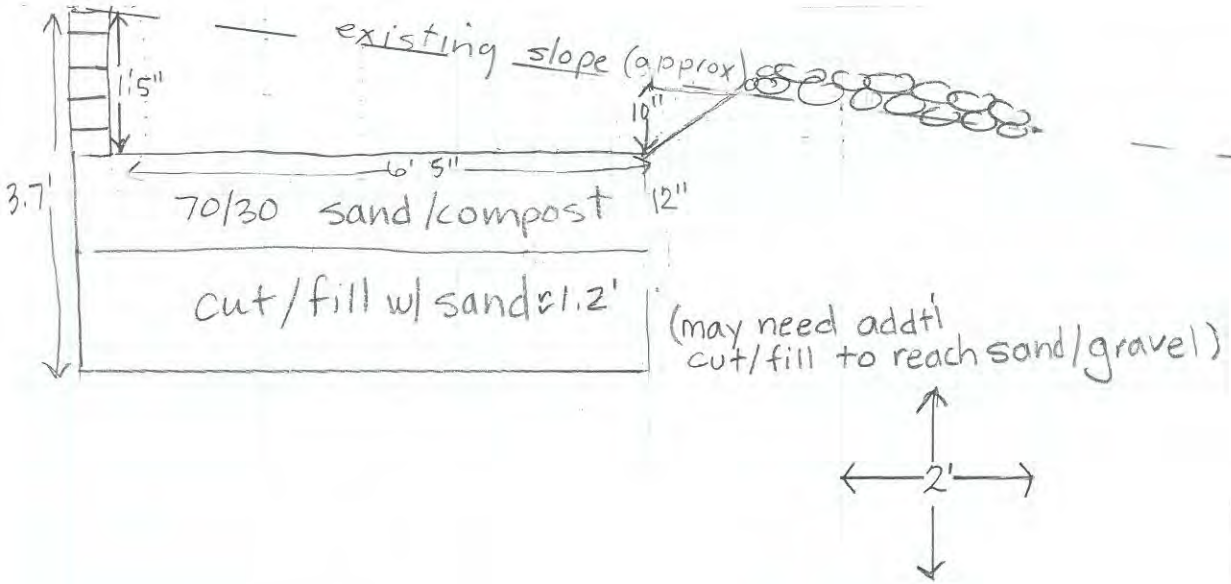
Rieke and Laske
1361 and 1363 Hungerford Pt Rd

	Materials	Quantity	Cost per unit	Total Cost
Rain Garden #1- 105 ft2 (slopes and berm) + 176 ft2 (bottom)				
	2" Pots	22		
	4" pots	77		
	6" Pots	21		
281 ft2	Shredded bark mulch (3")	2.6 yards		
	Jute netting	300 ft2		
70%/30%	Sand/compost mix	6.5 yards		
	Soil amendment			
	Rock for inflow (3-6")	in dry creek est.		
	Filter fabric for inflow (6')	in dry creek est.		
	retaining wall materials			
	Excavation and remove fill			
Rain Garden #2- 39 ft2 (slopes and berm) + 124 ft2 (bottom)				
	4" Pots	96		
	6" Pots	16		
163 ft2	Shredded bark mulch (3")	1.5 yards		
	Jute netting	170 ft2		
70%/30%	Sand/compost mix	4.6 yards		
	Soil amendment			
69 ft2	8 ounce filter fabric (overflow	24 linear feet (X 4 or 6')		
	3-6 inch trap rock	52 ft3	2.5 tons	
	retaining wall materials			
	Excavation and remove fill			
Dry Creek Beds				
4' X 48' X 0.75	3-6 inch trap rock	140 ft3	6.75 tons	
	8 ounce filter fabric (6 feet)	50 linear feet		
Silt fence below construction area				
repair	Shady grass seed			

Cross Sections



Rain Garden 1

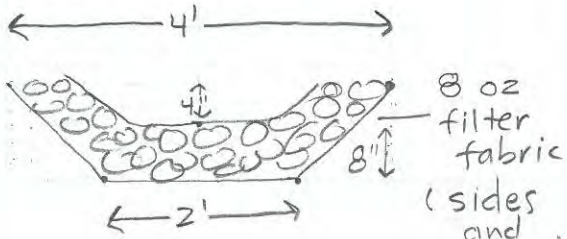


Rain Garden 2

Ricke
1361 Hungerford Pt

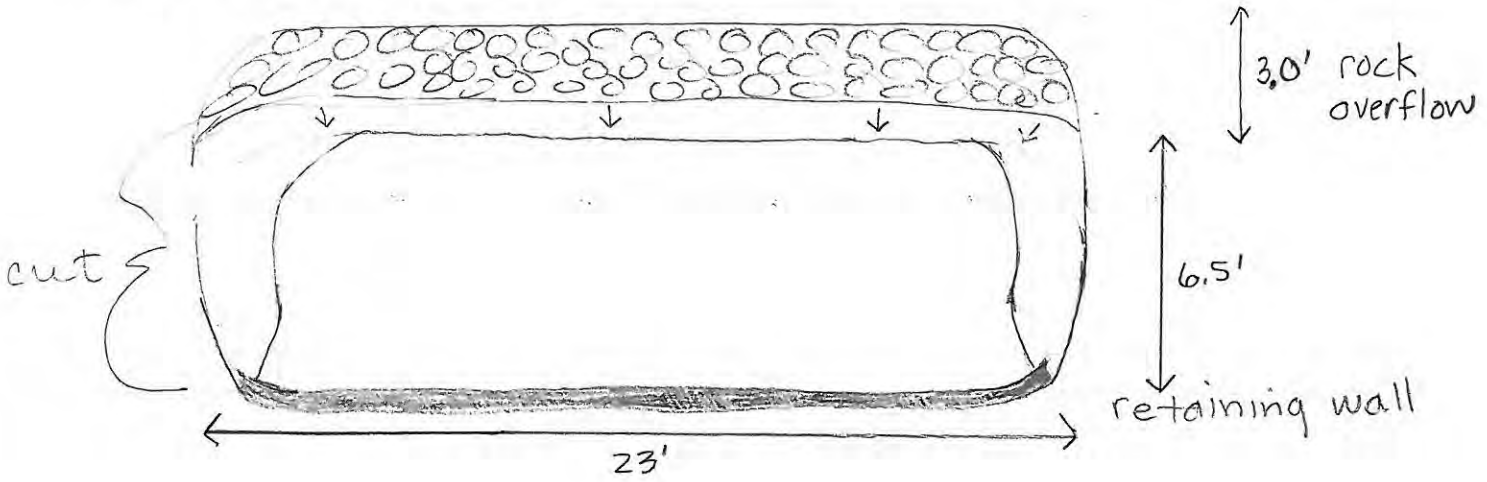
Laske
1363 Hungerford Pt

Dry Creek Bed

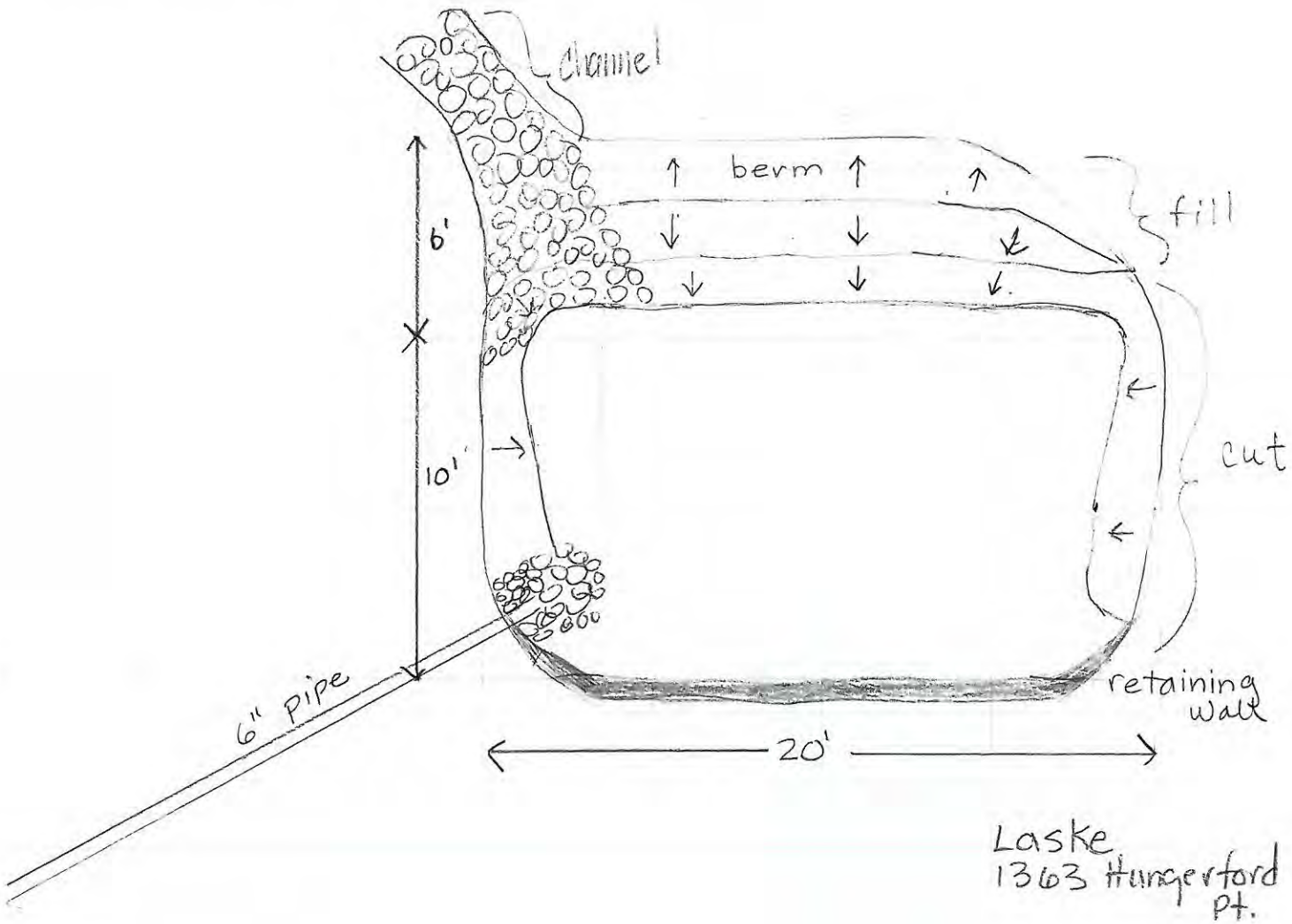


Top Views

Rain Garden #2



Rain Garden #1

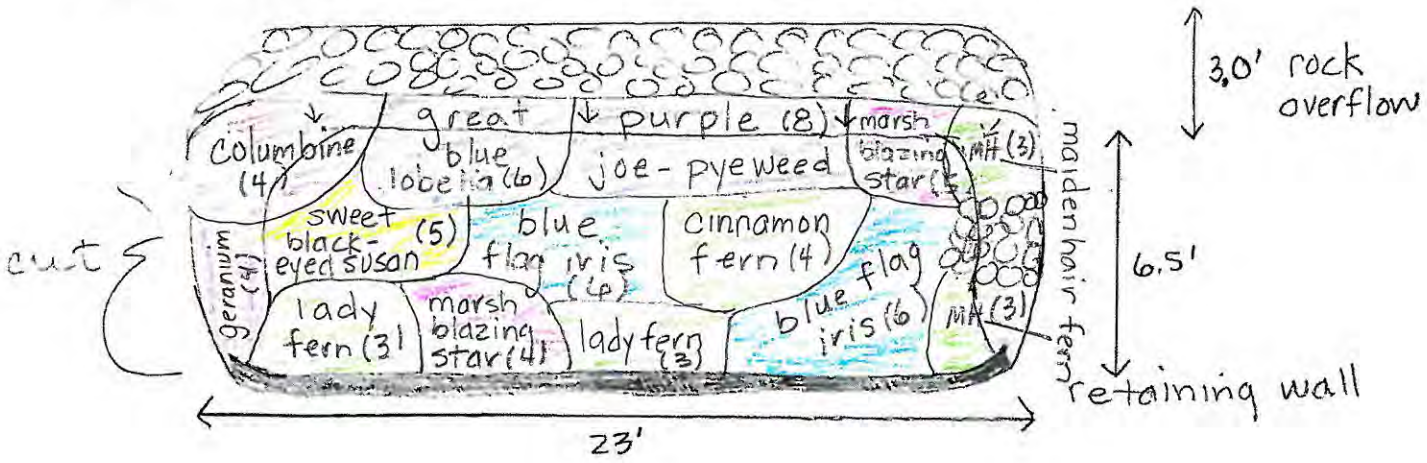


Laske
1363 Hungerford Pt.

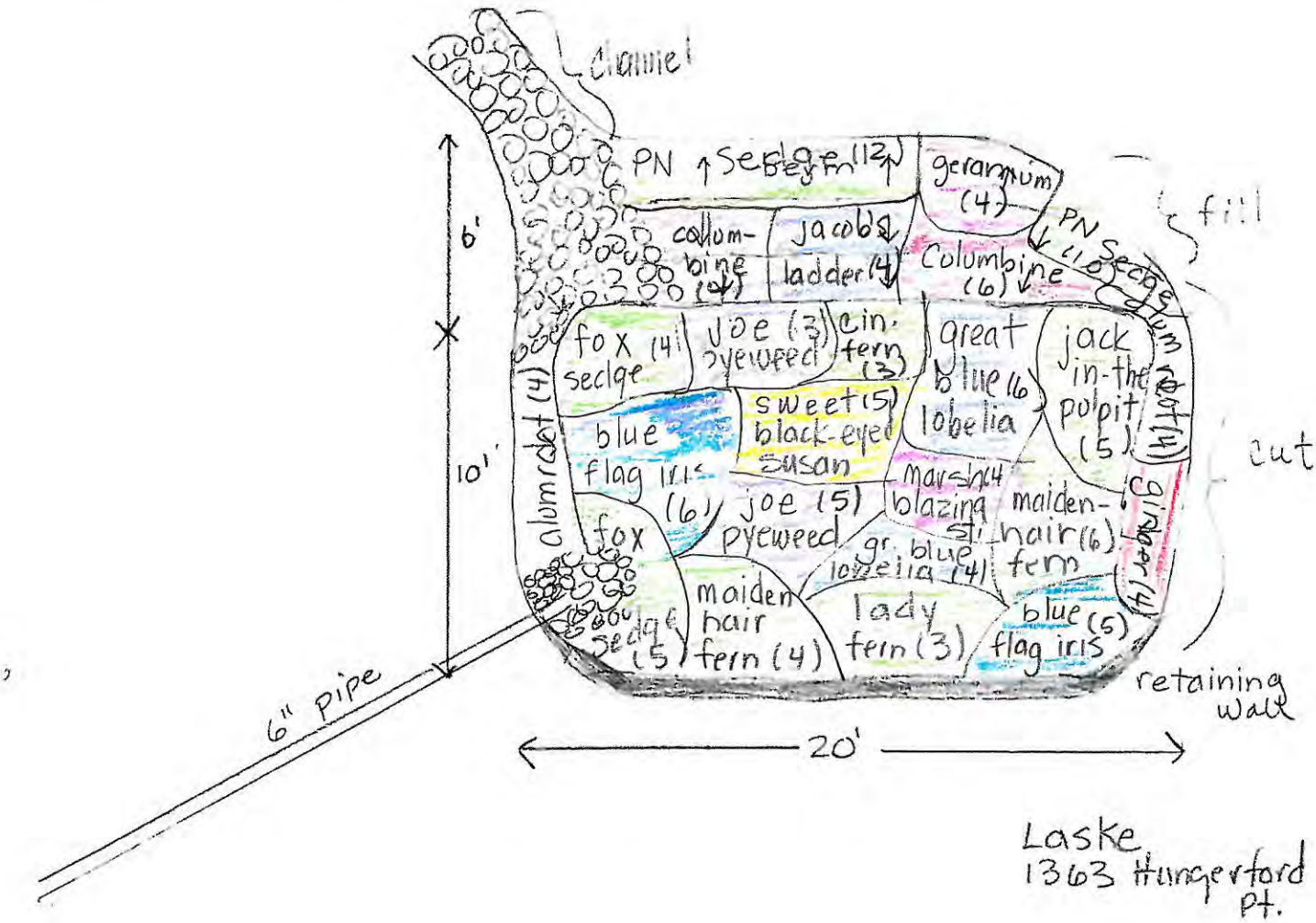
Planting Layout

Top Views

Rain Garden #2



Rain Garden #1



Rain Garden Plant Quantities

			Raingarden #1			Raingarden #2		
	Common Name	**Scientific Name**	**2" Pots**	**4" Pots**	**6" Pots**	**2" Pots**	**4" Pots**	**6" Pots**
BERM AND SLOPE								
	Flowers							
	Alum root	*Heuchera richardsunii*		8				
	Jacob's ladder	*Polemonium reptans*		*4*				
	Columbine	*Aquilegia canadensis*		*10*			4	
	Wild ginger	*Asarum canadense*		4				
WG	Wild geranium	*Geranium maculatum*		4			4	
	Sedges and Grasses							
PN	Pennsylvania sedge	*Carex pensylvanica*	*22*					
GARDEN BOTTOM								
	Flowers							
JIP	Jack in the pulpit	*Arisaema triphyllum*			5			
BF	Blue flag iris	*Iris versicolor*		11			12	
	Great blue lobelia	*Lobelia siphilitica*		*10*			6	
	Purple Joe pyeweed	*Eupatorium purpureum*		8			8	
	Marsh blazing star	*Liatris spicata*		4			9	
	Sweet black-eyed Susan	*Rudbeckia subtomentosa*		5			5	
	Ferns							
MF	Maidenhair fern	Adiantum pedatum			10			6
CN	Cinnamon fern	*Osmundo cinnamomes*			3			4
LF	Lady fern	*Athyrium filix-femina*			3			6
	Sedges and Grasses							
FS	Fox sedge	*Carex vulpinoidea*		9				
			22	**77**	**21**		**48**	**16**

Plant 2" pots with 12-14" spacing

Plant 4-6 inch pots with 18-24" spacing

Pot sizes can be substituted with spacing indicated

Rain Garden Plant List

Rieke and Laske

Common Name	Scientific Name	Height	Bloom Time	Bloom Color	
BERM AND SLOPE					
Flowers					
Alum root	*Heuchera richardsunii*	12-18 inches	May to July	White	
Jacob's ladder	*Polemonium reptans*	18 inches	May to June	Blue	
Columbine	*Aquilegia canadensis*	20-36 inches	May to June	Pink	
Wild ginger	*Asarum canadense*	6-12 inches	May to June	Red	
Wild geranium	*Geranium maculatum*	18 inches	May to June	Pink	
Sedges and Grasses					
Pennsylvania sedge	*Carex pensylvanica*	12 inches	NA	NA	
GARDEN BOTTOM					
Flowers					
Jack in the pulpit	*Arisaema triphyllum*	18-30 inches	May to June	Purple/Green	
Blue flag iris	*Iris versicolor*	to 36 inches	June to July	Blue	
Great blue lobelia	*Lobelia siphilitica*	20 to 30 inches	July to Oct	Blue	
Purple Joe pyeweed	*Eupatorium purpureum*	24 to 36 inches	July to Sept	Purple	*Eupatorium maculatum (sub)*
Marsh blazing star	*Liatris spicata*	24-36 inches	July to August	Purple	
Sweet black-eyed Susan	*Rudbeckia subtomentosa*	36-48 inches	July to August	Yellow	*Rudbeckia fulgida (sub)*
Ferns					
Maidenhair fern	Adiantum pedatum	24 in	None	None	
Cinnamon fern	*Osmundo cinnamomes*	36 in	None	None	
Lady fern	*Athyrium filix-femina*	24 in	None	None	
Sedges and Grasses					
Fox sedge	*Carex vulpinoidea*	12 to 36 in	NA	NA	

Steve and Cathy Rieke
Tim and Susan Laske

[redacted]
Deer Lake

Silt fence must be installed below any areas of excavation or where excavated or construction materials are placed. All areas disturbed during construction to be seeded with a shady lawn grass mix (unless otherwise specified by owners).

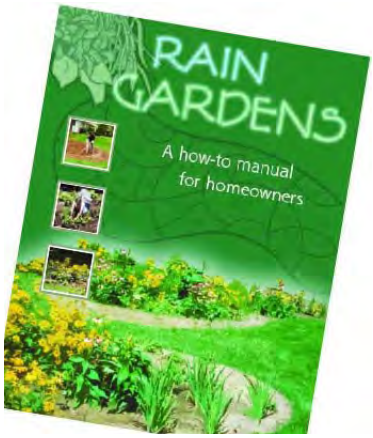
Rain Gardens

Rain garden locations are indicated on the site diagram overall top view. Top views and cross sections are also provided.

- Confirm utility locations with owner and Diggers Hotline prior to beginning construction.
- Be sure to avoid the use of heavy equipment within the proposed rain garden locations; it will compact the soil and decrease infiltration.
- Rain garden sizes, cross sections, planting layouts and plant lists, and project quantities are found in the plan set.

Installing rain gardens

The process for installing rain gardens is outlined in detail in *Rain Gardens: A how-to manual for homeowners* publication. The basic steps are as follows:



1. **Dig the rain gardens** (page 12) The rain gardens will be 10 inches deep (7 inches, once 3" of mulch is placed) and level at their base. For both rain gardens, excavate below the gardens until permeable sand and gravel is reached. The site plans show this occurring at about 3 feet on the lowest slope based on the soils map (more may need to be cut). Fill to within one foot of the garden bottom with sand then fill the final foot below the garden bottom with a 70/30 sand compost mixture. Native slopes indicated on the site plans are approximate and on-site adjustments may need to be made.

2. For rain garden 1: A 6"PVC pipe extends from a collection area to the base of the rain garden as shown on the site diagram. Place filter fabric then rock (3-6") at the outlet of the pipe.

3. **Construct a retaining wall** on the uphill side of each rain garden. Retaining wall material to be determined by owner and contractor. Rain garden #1: 20 feet long and 1.75 ft. tall, and approx. 6" wide. Rain garden #2: 23 feet long, 1.75 feet tall and approx.

6" wide. Install filter fabric and drainage rock behind the wall. Construct according to manufacturer's directions and owner/contractor's discretion. The top of the retaining walls should be flush the ground to capture surface runoff and extend at least 4 inches underground.

4. **Level the rain gardens** (page 12). It is essential that the bases of the rain gardens are flat in order to prevent uneven pooling of water within the garden. To maximize infiltration capacity, the water must soak into the ground evenly throughout the garden's base.

5. **Making the berm –** (page 14). See the cross-section diagram. For rain garden #1 the top of the rock overflow will be 10 inches above the garden's base. This establishes the height of the rain garden. The berm on rain garden #1 will be 4" higher than the rock overflow. The top of the rock-reinforced berm on rain garden #2 will be level across the top for even overflow.

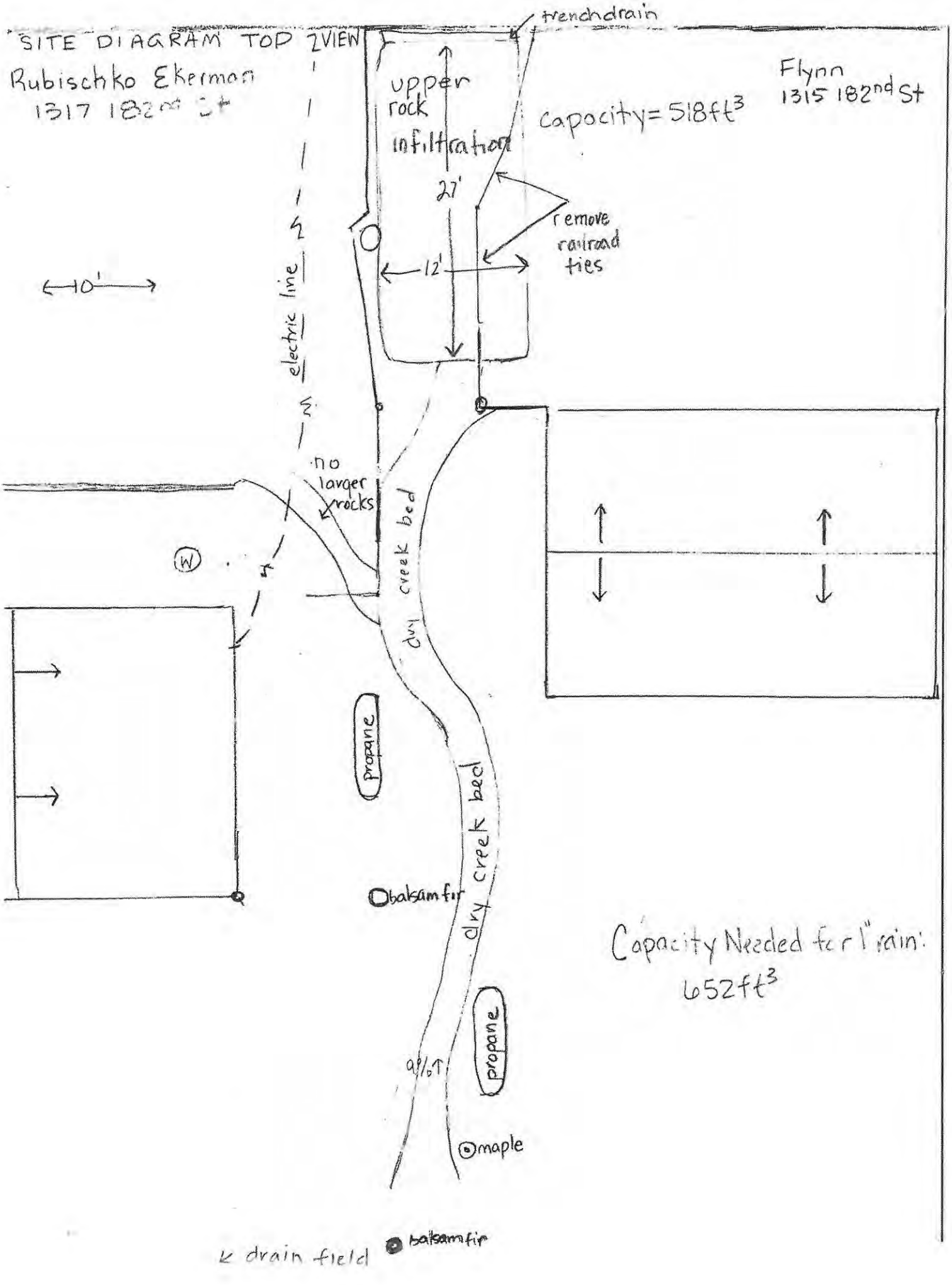
6. **Create rock dry creek bed to connect the two rain gardens.** The dry creek bed is underlain with filter fabric and covered by 3-6 inch rock (see cross section). Maintain a 4 inch dip in the channel so there is capacity for water flow.

7. **Plant the rain garden** (page 16). Plant the garden with species from the lists and table provided. Contact Harmony Environmental if you wish to propose substitutions.

   Begin by laying down 3 inches of shredded bark or wood mulch. Stake jute netting in place to prevent mulch from floating in large storm events. To plant, separate the mulch, dig a hole, sprinkle organic soil amendment, and place the plant in the hole. Press the soil gently around the plant roots and replace the mulch, being careful to keep mulch ½ inch from the stem of plants. Plant recommendations and spacing are included in the tables.

8. **Water immediately after planting (contractor).** Plan to water daily for the first few weeks or until the plants are well established. If plants wilt or droop, a repeated watering during the day may be necessary. Once plants are established, water only if prolonged dry periods occur. (Owner will provide maintenance watering unless otherwise arranged)

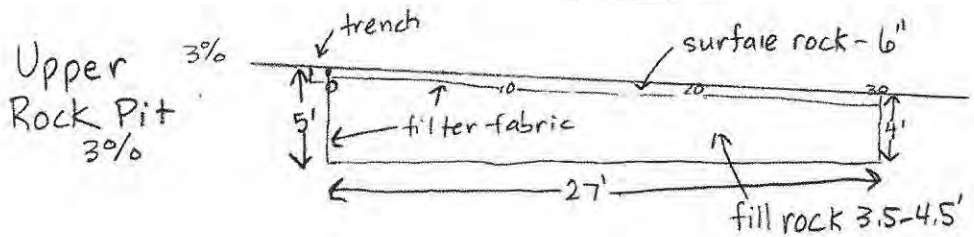
Information for maintaining the rain gardens is also included in the rain gardens publication (page 17). Like all gardens, it will require some weeding and watering. This is especially important during the first year or so after the garden is installed. Since the plants are native, however, they should require minimal care once established.


SITE DIAGRAM TOP VIEW
Rubischko Ekerman
1317 182nd St
Flynn
1315 182nd St
trench drain
upper rock infiltration
capacity = 518ft³
27'
12'
remove railroad ties
10'
electric line
no larger rocks
dry creek bed
propane
dry creek bed
balsam fir
propane
9% ↑
maple
Capacity Needed for 1" rain:
652ft³
drain field
balsam fir

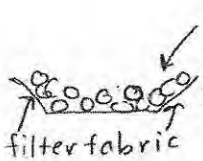
Rubischko Ekerman
1317 182nd St.

Flynn
1315 182nd St.

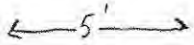
Slopes



Dry Creek Beds



(add occasional larger rocks for interest)



Upper Rock Infiltration Pit	
1 1/2" clean sewer rock	54 yards
trench drain (approx. 6")	12 feet
filter fabric (6' X 136')	816 ft2
Dry Creek Beds - 65' X 4'	
2-4" river rock	6.5 yards
filter fabric (4' X 87')	348 ft2

Runoff Reduction Plan (REV3) Deer Lake

Flynn [redacted]

Rubischko-Eckerman [redacted]

- Upper Rock Infiltration Pit (shared)
- Dry Creek Bed

Silt fence must be installed below any areas of excavation or where excavated or construction materials are placed.

All areas disturbed during construction to be seeded with a lawn grass mix.

Rock infiltration pit and rain garden locations are indicated on the site diagram.

- Confirm utility locations with Diggers Hotline prior to beginning construction. Previously checked utilities for planning purposes indicate that utilities are clear of installation locations except for an electrical line below dry creek bed in lower part of Rubischko parking area.
- Rock trench size, cross section, and project quantities are found in the plan set.

Project includes removal of ash tree next to upper rock infiltration pit.

Homeowners will provide project maintenance. Maintenance includes removing accumulated sediment from a 6" wide trench installed near the road.

Upper Rock Infiltration Pit

The designed pit (12' X 27' X 4' deep) will have a capacity of 1296 cubic feet (retaining 518 cubic feet of water). Extra excavation and rock is needed because the area has a slight slope (3%).

The proposed infiltration pit may not be able to contain *all* of the runoff from a major storm, but it will reduce the amount and improve the quality of runoff water making its way across your lake properties and to the lake. A 6" wide trench installed along the edge near the road is used as a pretreatment device. This trench will need to be cleaned periodically to minimize debris accumulating on the rock surface.

Top view and cross section diagrams are included.

A. Constructing the upper rock infiltration pit

1. Remove railroad ties nearest the paved driveway.

2. Dig a 12 foot by 27 foot pit as indicated on the site diagram. The bottom of the pit will be level (4.5 feet deep on the uphill side and 4' deep on the downhill side). The pit is located one foot from the paved driveway.

3. Line the pit sides with filter fabric. Do not line the bottom of the pit

4. Fill the pit with clean 1.5 inch washed rock. Larger rock could be used for the first 3.5 feet of depth if desired. The rock must be of relatively uniform size to allow for maximum pore spaces.

5. Add a horizontal layer of filter fabric on top of the rock.

6. Cover the filter fabric with clean 1.5 inch rock to the surface.

C. Constructing the dry creek beds

The dry creeks will be sloped to carry water, underlain with filter fabric, and covered by 2-4 inch river rock. Larger rocks can be occasionally placed in the dry creek bed for visual interest. Be sure that the downspout from the Flynn garage which exits behind the fence is captured by the dry creek bed.

B. Maintaining a rock infiltration pit

<u>Trench</u>

Remove the cover and clean accumulated sediment and debris from the trench periodically – at least when it fills halfway. This will keep the rocks clean and as a result, the surface layer will require less maintenance.

<u>Surface layer maintenance</u>

Regularly remove pine needles, fallen leaves, and any other debris that collects on the surface of the infiltration area. A leaf blower works well for this purpose. When sedimentation begins to slow infiltration:

1. Remove the top layer of rock and sift with mesh to remove sediment.*

2. Rinse rock.*

3. Remove remaining sediments from the surface of the filter fabric.*

4. Rinse and return filter fabric, or replace with new filter fabric.*

5. Refill with cleaned rock.

*Discard sediment and dirty water in a contained area on your property, such as a garden or flowerbed. This will prevent excess sediment from making its way into the lake.

Robert and Pamela Senkler
13760 Hungerford Pt. Rd.

- move mulch back to flags. rock border

Victor Family Rain Gardens
[redacted]
Deer Lake

Runoff Reduction Plan

The runoff reduction plan set provides top views and cross sections of the practices to be installed. The plan includes 4 Rain Gardens and maintenance of an existing rock pit.

Silt fence must be installed below any areas of excavation or where excavated or construction materials are placed.

All areas disturbed during construction to be seeded with a lawn grass mix suitable for shade.

Rain garden and (existing) infiltration pit locations are indicated on the top view site diagrams.

- Be sure to avoid the use of heavy equipment in the proposed rain gardens; it will compact the soil and decrease infiltration.

Rain garden planting layouts and plant lists are found in the plan set.

Installing rain gardens

The process for installing the rain gardens is outlined in detail in the *Rain Gardens: A how-to manual for homeowners* publication. The basic steps are as follows:

1. **Contact Diggers Hotline to check for underground utilities prior to excavation.**

2. **Remove and dispose of railroad tie retaining wall** along parking area. **Grade area below railroad ties** to drain to rain garden #1.

3. **Dig the rain gardens** (page 12). A cross section is included for each rain garden. Because slopes vary, review cross sections carefully. While each rain garden will be 9 inches deep – including 3 inches allowed for mulch, downslopes and berms are different with each garden. In addition, the berms hold 12" of depth, and if there is a rock overflow, it is 3" lower establishing a 9" depth. <u>For rain garden #2, the elevation of the discharge point is fixed because it will flow to an existing rock infiltration pit. Start measuring elevations from this point, to ensure discharge will function properly.</u> The bottom of the rain gardens must be flat and the berms level across the slope. An extra foot is excavated then filled with a 70/30 sand compost mixture. The edges of the garden should slope from ground level to the garden's base at a ratio of approximately 2:1 (these vary slightly, see cross sections).

4. **Install collection boxes** below downspouts for rain garden #1 and #3. **Install 4" PVC pipe** to move roof water to the rain gardens. Install rock underlain with filter fabric where the PVC pipe discharges into the rain garden.

5. **Level the rain gardens** (page 12). It is essential that the base of the rain garden be flat in order to prevent uneven pooling of water within the garden. To maximize infiltration capacity, the water must soak into the ground evenly throughout the garden's base. The top edge of the berm must be level as well; a low spot could cause erosion of the berm.

6. **Making the berms** (page 14). See the cross-section diagrams. Compact berms in six inch lifts for stability. Berms are covered with filter fabric and planted to Pennsylvania sedge at about 12 inch spacing. A rock overflow 3 inches lower than the berm, establishes the 9 inch depth of each garden. There is no rock overflow for rain garden #4.

7. **Plant the rain garden** (page 16). Plant the garden with species from the lists and table provided.

Begin by laying down 3 inches of shredded bark or wood mulch. To plant, separate the mulch, dig a hole, sprinkle organic fertilizer, and place the plant plug in the hole. Press the soil gently around the plug and replace the mulch, being careful to keep mulch ½ inch from the stem of plants.

8. **Water immediately after planting**. Plan to water daily for the first few weeks or until the plants are well established (homeowner will generally complete this task). If plants wilt or droop, a repeated watering during the day may be necessary. Once plants are established, water only if prolonged dry periods occur.

Information for maintaining rain gardens is also included in the rain gardens publication (page 17). Like all gardens, it will require some weeding and watering. This is especially important during the first year or so after the garden is installed. Since the plants are native, however, they should require minimal care once established.

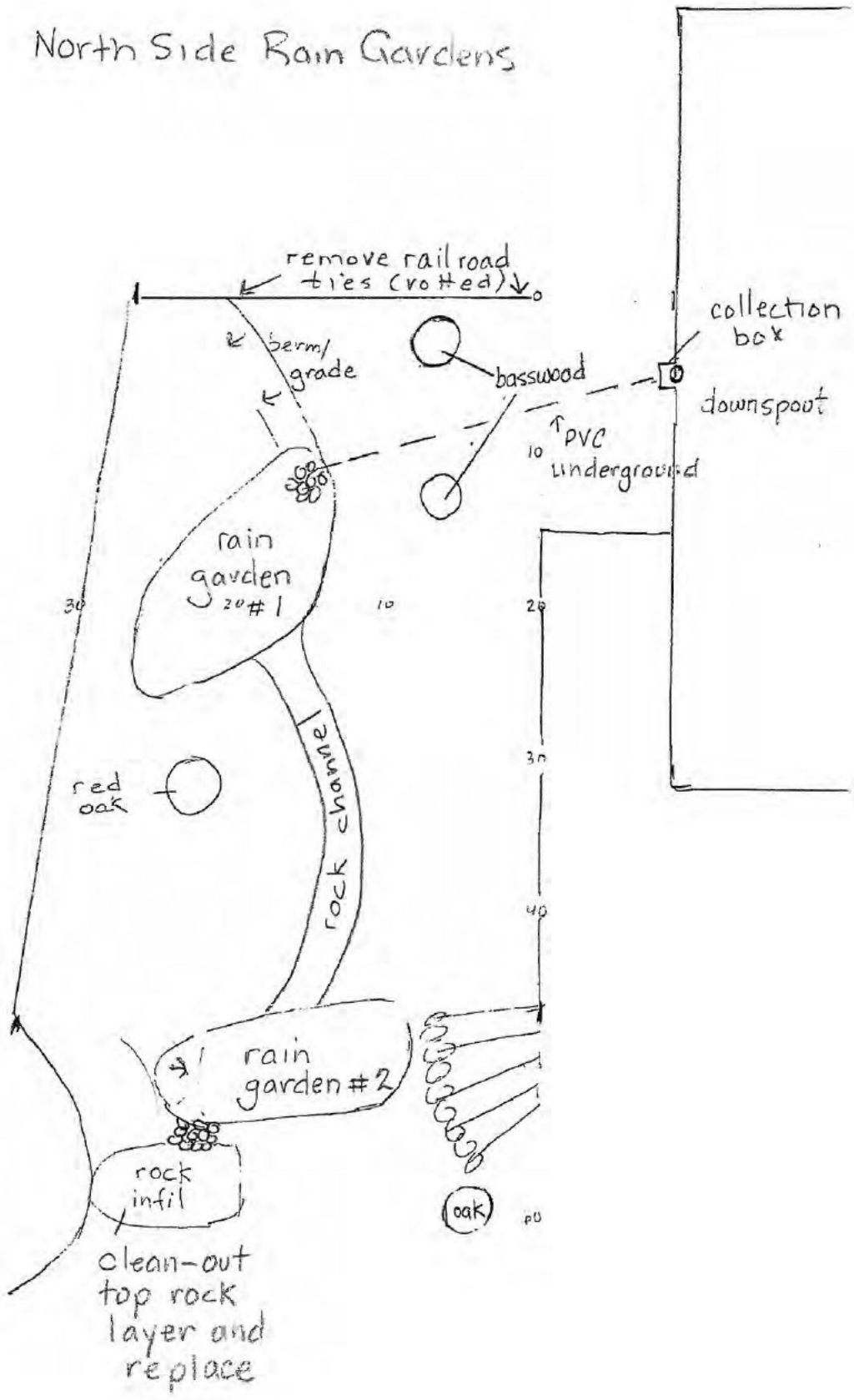
Clean (or remove and reinstall) Surface Rock of Existing Infiltration Pit below Rain Garden #2

Victor

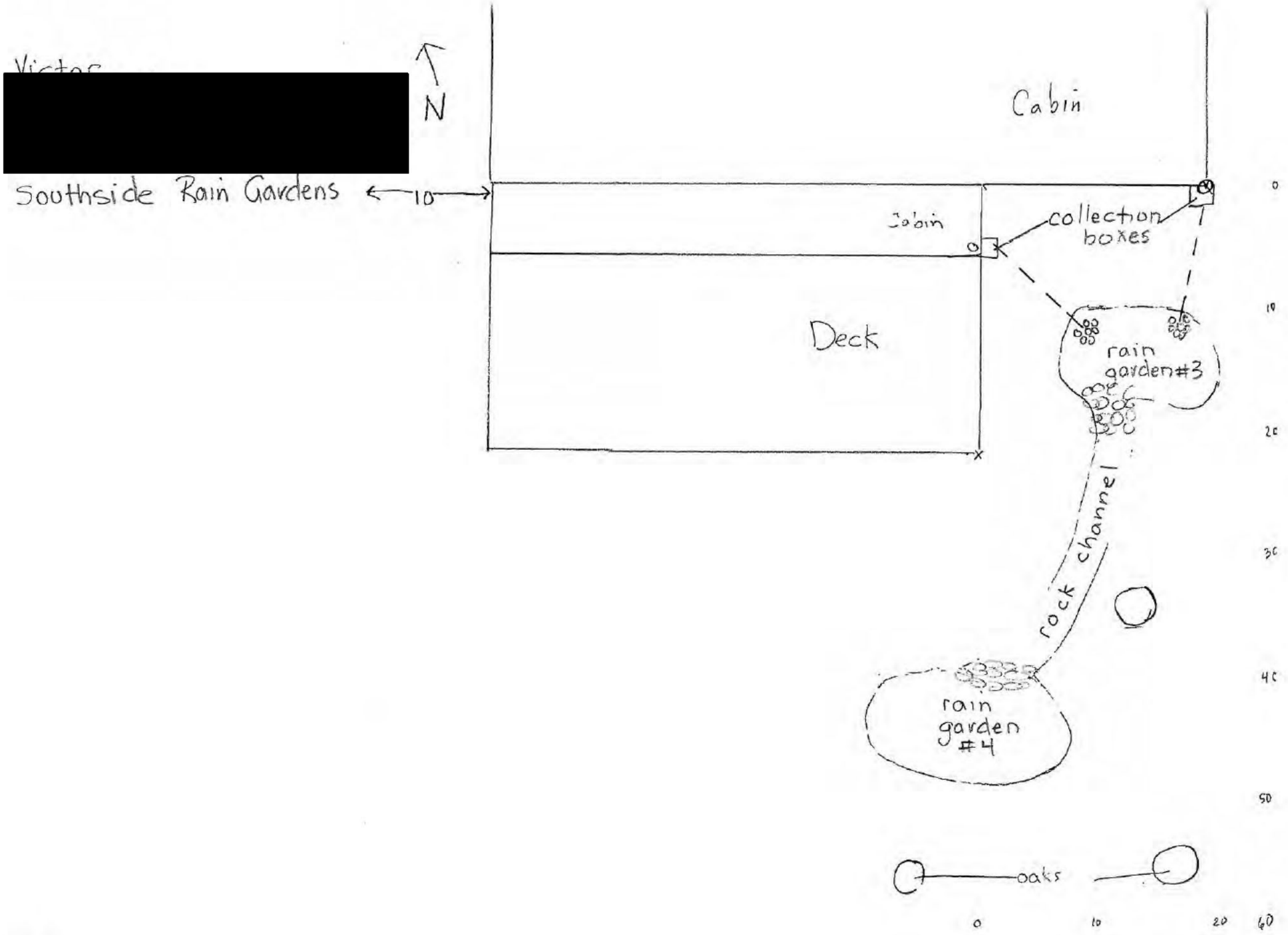
[redacted]

← N ← 10 →

North Side Rain Gardens



4/27/20
C Clemens



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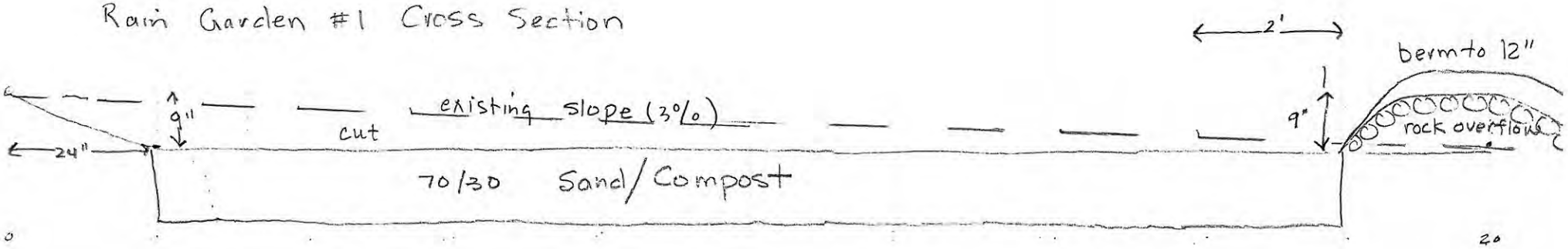
C Clemens

Rain Garden Project Quantities

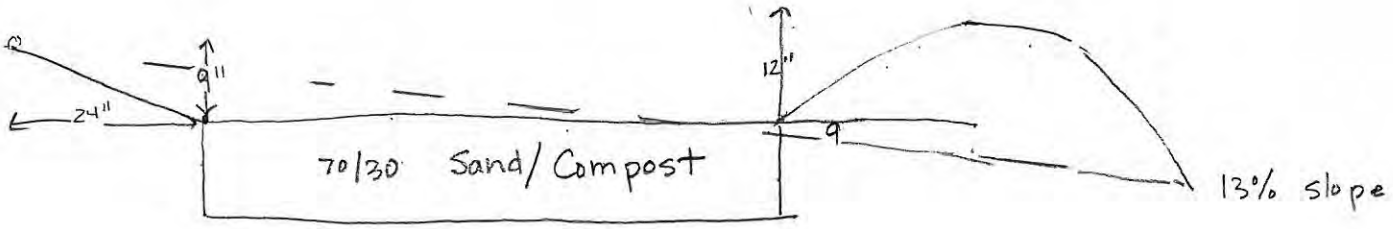
Victor Family, [redacted]

	Materials	Quantity	Cost per unit	Total Cost
Rain Garden #1- 70 ft2 + 70 ft2 (slopes) + 30 ft2 (berm)				
	2" pots	35		
	4" pots	12		
	6" Pots	12		
	2 gal shrubs	5		
140 ft2	Shredded bark mulch (3")	1.3 yards		
70%/30%	Sand/compost mix (base)	2.6 yards		
	Soil amendment			
for berm	Erosion blanket	20' X 4'		
3' X 0.5 X 25	Rock for overflow (2-3")	1.4 yards		
1.5 X 1.5 X 0.5	Rock for inlet (2-3")	.1 yard		
	Filter fabric for inlet (4')	1.5' X 1.5'		
	Filter fabric for overflow (4')	25' X 4'		
	downspout collection box	1		
	4" PVC pipe + connectors	22'		
Rain Garden #2- 75 ft2 + 75 ft2 (slopes) + 50 ft2 (berm)				
	2" Pots	67		
	4" Pots	20		
	6" Pots	3		
	2 gal shrubs	6		
150 ft2	Shredded bark mulch (3")	1.4 yards		
70%/30%	Sand/compost mix	2.8 yards		
	Soil amendment			
	Erosion blanket for berm	25' X 4'		
3' X 0.5 X 5	Rock for overflow (2-3")	.3 yards		
	Filter fabric for overflow (4')	5' X 4'		
Rain Garden #3- 47 ft2 + 43 ft2 (slopes) + 36 ft2 (berm)				
	2" Pots	38		
	4" Pots	36		
90 ft2	Shredded bark mulch (3")	.85 yards		
47 ft2	Sand/compost 70/30 mix	1.7 yards		
	Soil amendment			
	Erosion blanket for berm	14 X 4'		
3' X 0.5 X 30	Rock for overflow (2-3")	1.7 yards		
	Filter fabric for overflow (6')	30' X4		
1.5 X 1.5 X 0.5	Rock for inlet (2-3")	.1 yard		
	Filter fabric for inlet (4')	1.5' X 1.5'		
	downspout collection box	2		
	4" PVC pipe + connectors	2, 10' ea.		
Rain Garden #4- 87 ft2 + 53 ft2 (slopes) + 36 ft2 (berm)				
	2" Pots	37		
	4" Pots	38		
	6" Pots	10		
140 ft2	Shredded bark mulch (3")	1.3 yards		
87 ft2	Sand/compost mix	3.25 yards		
	Soil amendment			
	Erosion blanket for berm	25' X 4'		
Rock Pit Maintenance (below Rain Garden #2)				
	Clean surface rock (2-4"	1.1 yards		
REPAIR DISTURBED AREAS w/straw blanket, seed with shady grass mix				
Silt fence below construction area				

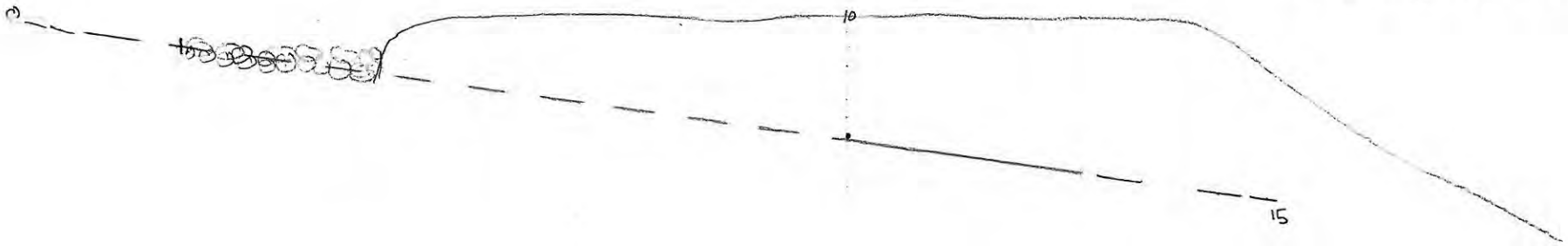
Rain Garden #1 Cross Section



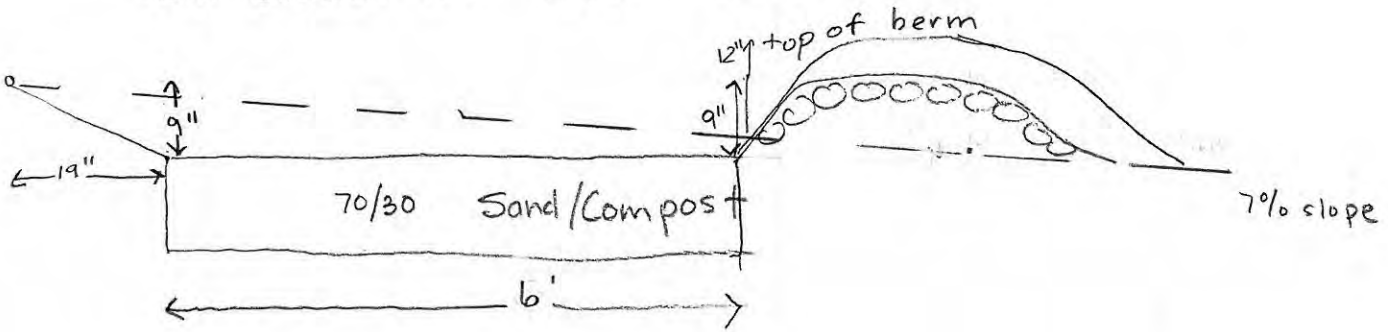
Rain Garden #2 Cross Section



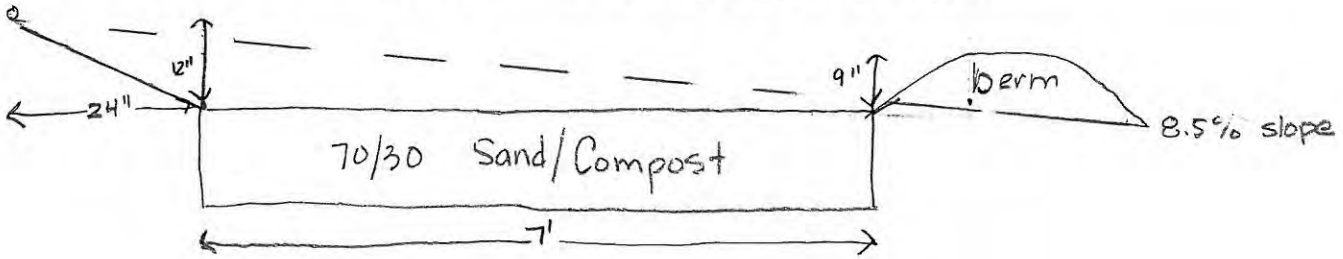
Rain Garden #2
N/S Cross Section (lake-side)

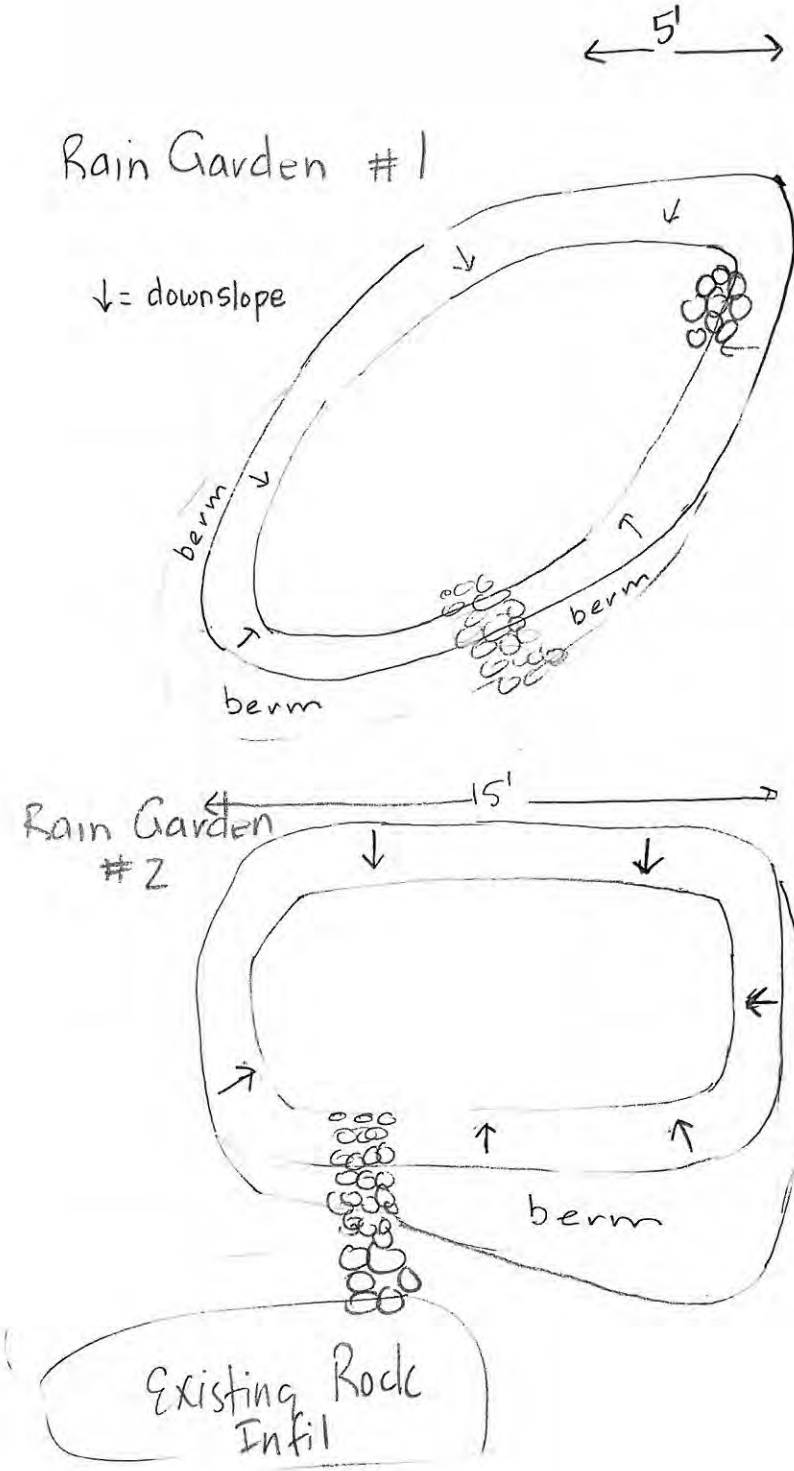


Rain Garden #3 Cross Section

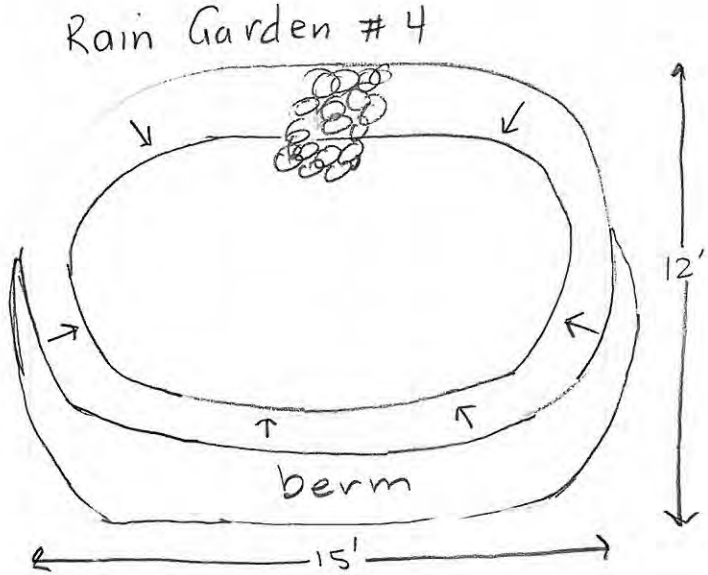


Rain Garden #4 Cross Section




5'
Rain Garden #1
↓= downslope
berm
berm
berm
Rain Garden #2
15'
berm
Existing Rock Infil


Rain Garden #3
10'
berm
12'


Rain Garden #4
12'
berm
15'

Rain Garden Plant List - Victor Family

	Common Name	Scientific Name	Height	Bloom Time	Bloom Color	
	Flowers					
	DOWNSLOPE					
PE	Pearly everlasting	Anaphilis margaritacea	18 to 24 in	June to Aug	White	part sun to sun
CL	Columbine	*Aquilegia canadensis*	20 to 36 in	May to June	Orange	shade to sun
	Wild ginger	*Asarum canadense*	6 to 12 inche	May to June	Red	shade/slope
	Wild strawberry	*Fragaria virginiana*	6 in	May to June	White	shade to sun
WP	Woodland phlox	*Phlox divaricata*	12 to 18 in	June to July	Blue	part sun to shade
SS	Solomon's seal	*Polygonatum biflorus*	18 to 30 in	May to June	White	part sun to shade
SP	Smooth penstemon	*Penstemon digitalis*	24 to 30 in	June to July	White	part sun to sun
	RAIN GARDEN BOTTOM					
SF	Sweet flag	Acorus calamus	36 in	July to Aug	Yellow (small)	part sun to sun
NE	New England aster	*Aster novae-angliae*	24 to 60 in	Aug-Oct	Purple	part sun to sun
JP	Purple joe pyeweed	*Eupatorium purpureum*	24 to 36 in	July to Sept	Purple	part sun to sun
BF	Blue flag iris	*Iris versicolor*	to 36 inches	June to July	Blue	part sun to sun
MB	Marsh blazing star	*Liatris spicata*	24 to 36 in	July to Sept	Purple	part sun to sun
CF	Cardinal flower	*Lobelia cardinalis*	36 to 48 in	July to Oct	Red	part sun to sun
BL	Great blue lobelia	*Lobelia siphilitica*	20 to 30 in	July to Oct	Blue	part sun to sun
OC	Orange coneflower	*Rudbeckia fulgida*	24 to 36 in	July to Oct	Yellow	part sun to sun
sub	Sweet coneflower	*Rudbeckia subtomentosa*	36 to 48 inch	July to August	Yellow	part sun to sun
	Ferns					
MF	Maidenhair fern	Adiantum pedatum	24 in	None	None	shade
CN	Cinnamon fern	*Osmundo cinnamomes*	36 in	None	None	shade
RF	Royal fern	*Osmunda regalis*	36 in	None	None	shade
LF	Lady fern	*Athyrium filix-femina*	24 in	None	None	shade
	Sedges and Grasses					
BG	Blue grama grass	*Bouteloua gracilis*	12 in	NA	NA	part sun to sun
PN	Pennsylvania Sedge	*Carex pennsyvanica*	12 in	NA	NA	shade
FS	Fox sedge	*Carex vulpinoidea*	12 to 36 in	NA	NA	
BS	Bottlebrush sedge	*Carex hystricina*	24 to 42 in	NA	NA	
sub	Sweet grass	*Hierochloe odorata*	12 to 24 in	NA	NA	
Shrubs						
SB	Snowberry	*Symphoricarpos albus*	3-4 feet	June	White/white berries	shade to sun
CB	Chokeberry	*Aronia melanocarpa*	to 6 feet	May	White/red berries	
sub	Red osier dogwood	*Cornus sericea*	6-12 feet	May to July	White	

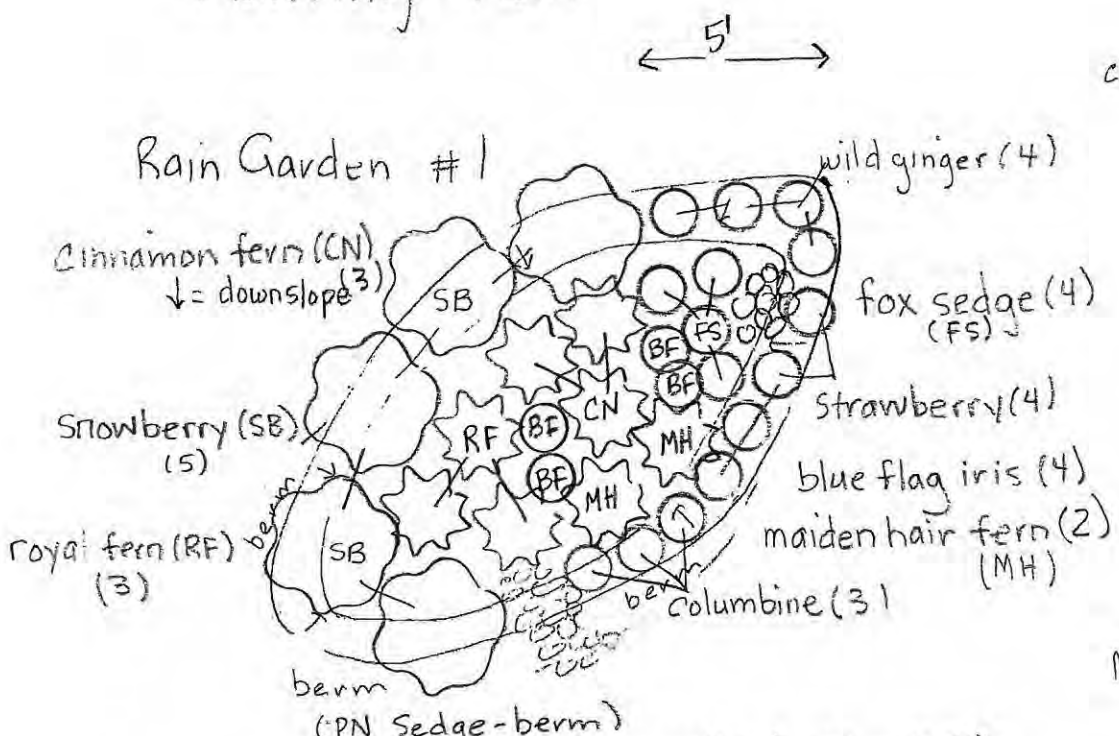
Rain Garden Plant Quantities - Victor Family

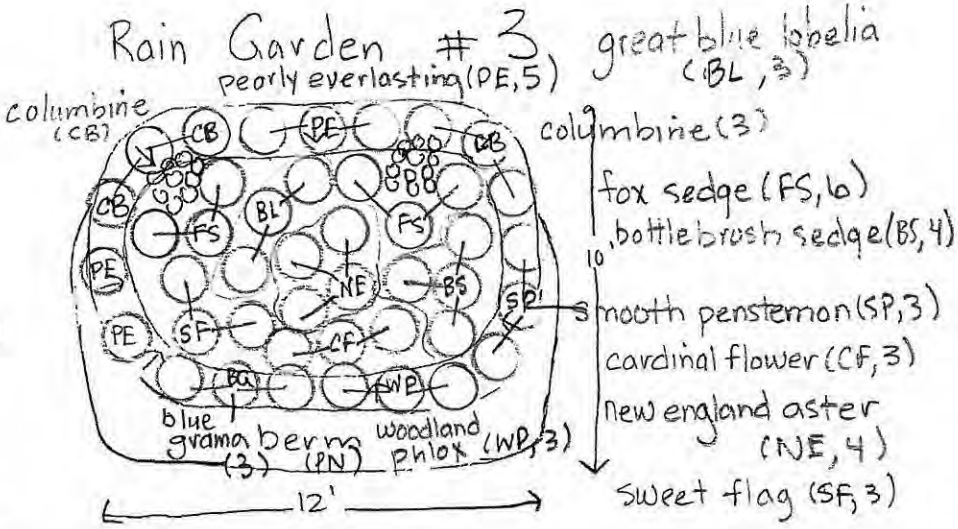
		RG#1- 70 ft2,70 ft2(slopes)30 ft2(berm)				RG#2- 75 ft2,75 ft2 (slopes)50 ft2 (berm)			
Common Name	**Scientific Name**	**2" Pots**	**4" Pots**	**6" Pots**	**2 gal**	**2" Pots**	**4" Pots**	**6" Pots**	**2 gal**
Flowers									
DOWNSLOPE									
Pearly everlasting	Anaphilis margaritacea								
Columbine	*Aquilegia canadensis*	*3*				*3*			
Wild ginger	*Asarum canadense*			*4*					
Wild strawberry	*Fragaria virginiana*		4						
Woodland phlox	*Phlox divaricata*						4		
Solomon's seal	*Polygonatum biflorus*						5		
Smooth penstemon	*Penstemon digitalis*								
RAIN GARDEN BOTTOM									
Sweet flag	Acorus calamus								
New England aster	*Aster novae-angliae*								
Purple joe pyeweed	*Eupatorium purpureum*						4		
Blue flag iris	*Iris versicolor*		4				4		
Marsh blazing star	*Liatris spicata*						3		
Cardinal flower	*Lobelia cardinalis*								
Great blue lobelia	*Lobelia siphilitica*								
Orange coneflower	*Rudbeckia fulgida*								
Sweet coneflower	*Rudbeckia subtomentosa*								
Ferns									
Maidenhair fern	Adiantum pedatum			2					
Cinnamon fern	*Osmundo cinnamomes*			3					
Royal fern	*Osmunda regalis*			3					
Lady fern	*Athyrium filix-femina*							3	
Sedges and Grasses									
Blue grama grass	*Bouteloua gracilis*								
Pennsylvania Sedge	*Carex pennsyvanica*	32				64			
Fox sedge	*Carex vulpinoidea*		4						
Bottlebrush sedge	*Carex hystricina*								
Sweet grass	*Hierochloe odorata*								
Shrubs									
Snowberry	*Symphoricarpos albus*				5				4
Chokeberry	*Aronia melanocarpa*								2
Red osier dogwood	*Cornus sericea*								
		35	**12**	**12**	**5**	**67**	**20**	**3**	**6**

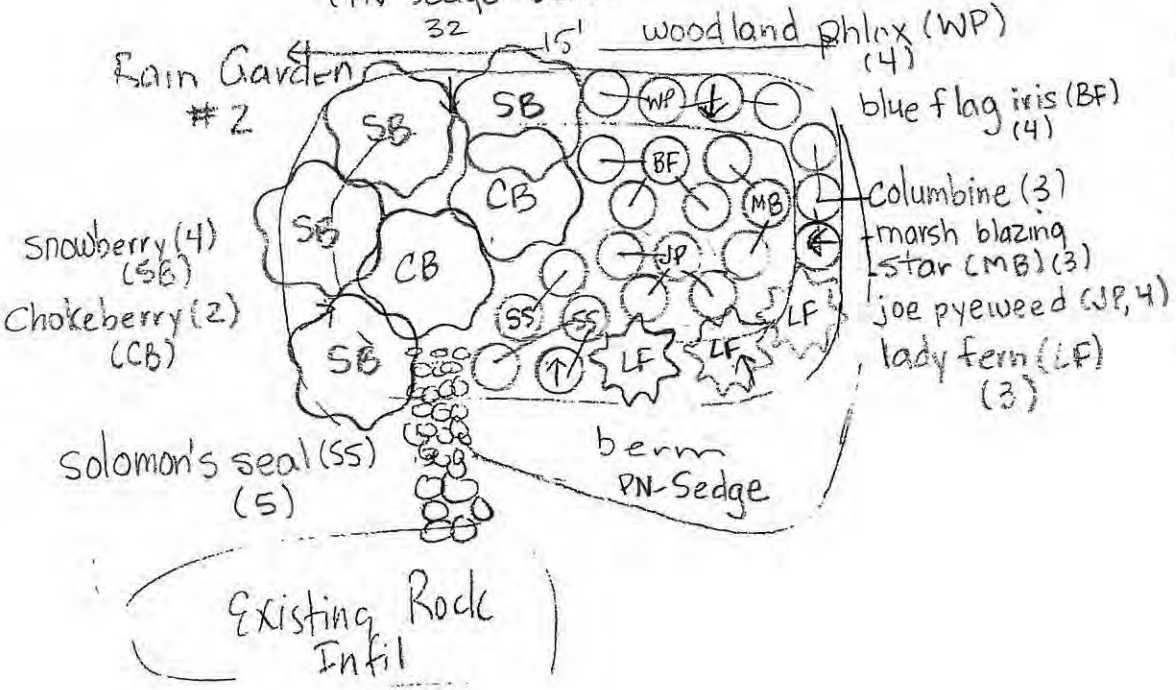
Rain Garden Plant Quantities - Victor Family

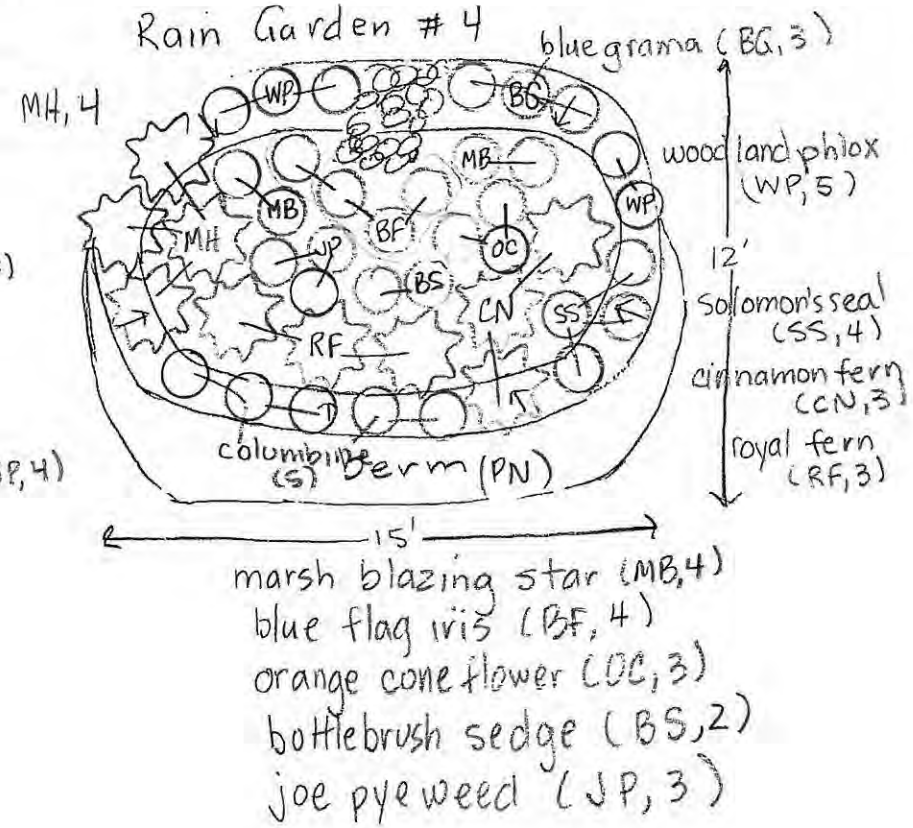
		RG #3- 47 ft2, 43 ft2 (slopes), 36 ft2 (berm)				RG #4- 87 ft2,53 ft2 (slopes),36 ft2 (berm)		
Common Name	**Scientific Name**	**2" Pots**	**4" Pots**	**6" Pots**	**2 gal**	**2" Pots**	**4" Pots**	**6" Pots**
Flowers								
DOWNSLOPE								
Pearly everlasting	Anaphilis margaritacea		5					
Columbine	*Aquilegia canadensis*	6				5		
Wild ginger	*Asarum canadense*							
Wild strawberry	*Fragaria virginiana*							
Woodland phlox	*Phlox divaricata*		*3*				5	
Solomon's seal	*Polygonatum biflorus*						4	
Smooth penstemon	*Penstemon digitalis*		*3*					
RAIN GARDEN BOTTOM								
Sweet flag	Acorus calamus		*3*					
New England aster	*Aster novae-angliae*		*4*					
Purple joe pyeweed	*Eupatorium purpureum*						3	
Blue flag iris	*Iris versicolor*						4	
Marsh blazing star	*Liatris spicata*						4	
Cardinal flower	*Lobelia cardinalis*		3					
Great blue lobelia	*Lobelia siphilitica*		3					
Orange coneflower	*Rudbeckia fulgida*						3	
Sweet coneflower	*Rudbeckia subtomentosa*							
Ferns								
Maidenhair fern	Adiantum pedatum							4
Cinnamon fern	*Osmundo cinnamomes*							3
Royal fern	*Osmunda regalis*							3
Lady fern	*Athyrium filix-femina*							
Sedges and Grasses								
Blue grama grass	*Bouteloua gracilis*		3				3	
Pennsylvania Sedge	*Carex pennsyvanica*	32				32		
Fox sedge	*Carex vulpinoidea*		6					
Bottlebrush sedge	*Carex hystricina*		3				2	
Sweet grass	*Hierochloe odorata*							
Shrubs								
Snowberry	*Symphoricarpos albus*							
Chokeberry	*Aronia melanocarpa*							
Red osier dogwood	*Cornus sericea*							
		38	**36**	**0**	**0**	**37**	**28**	**10**

Victor Family Raingardens
Planting Plan









Victor Family Raingardens
Planting Plan