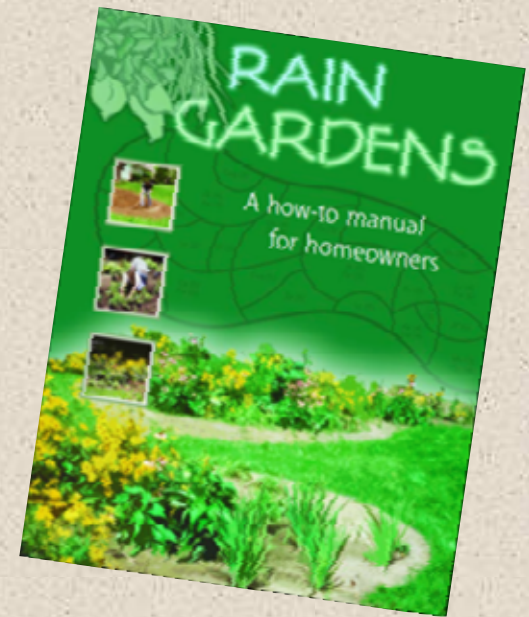


Site Evaluation and Planning *for Infiltration*



Cheryl Clemens

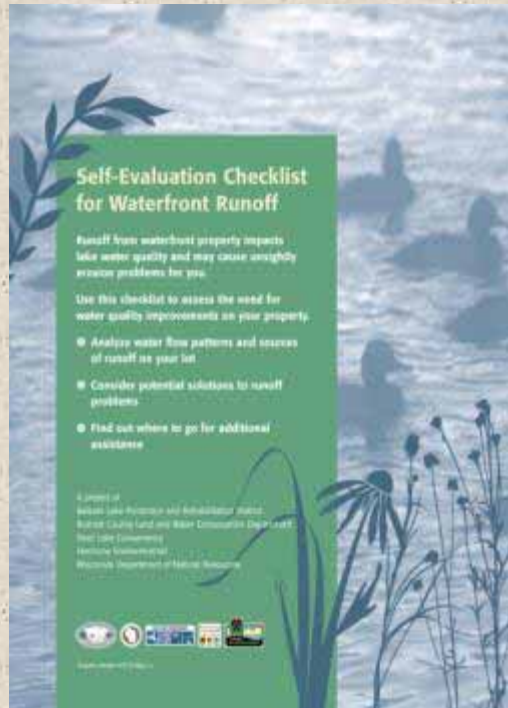
Site Evaluation Overview

- Site Analysis
- Review Runoff Patterns
- Consider Site Constraints
- Analyze Soils
- Estimate Runoff Volume
- Place Practices
- Divert Water



Analyze Site

Use the Checklist

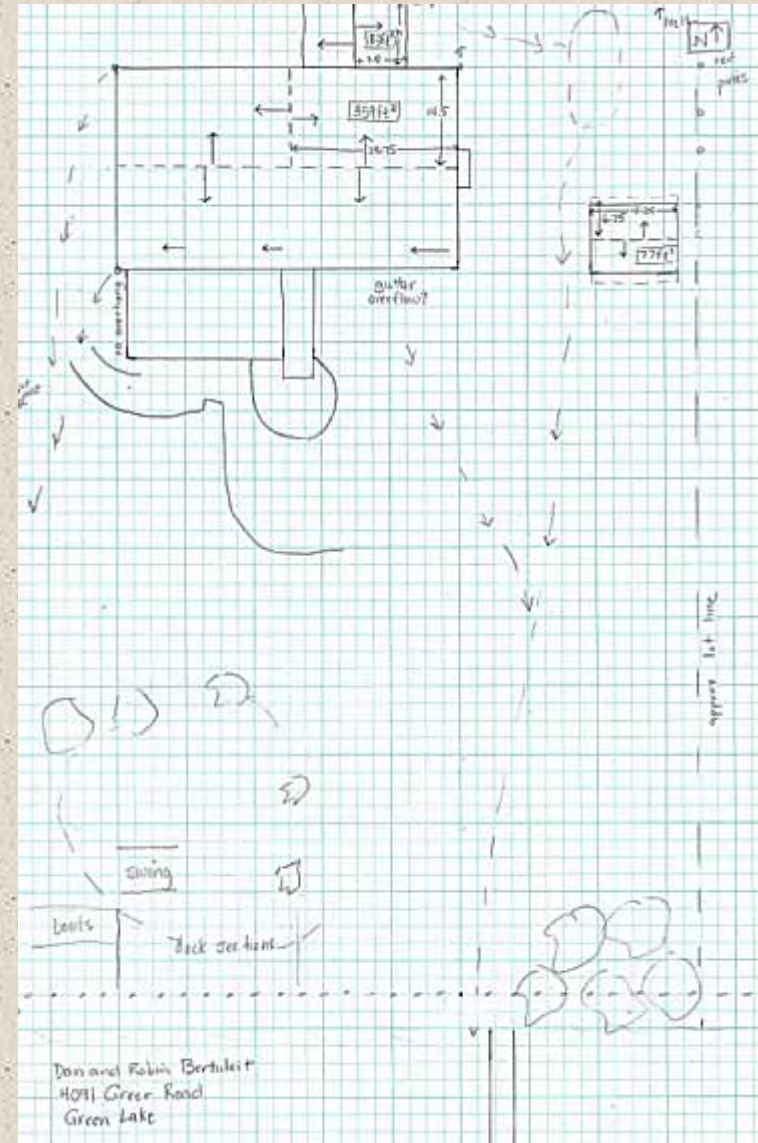


Look For

- Areas of bare soil
- Deposits of sand
- Channelized flow
- Get out during a rain storm!

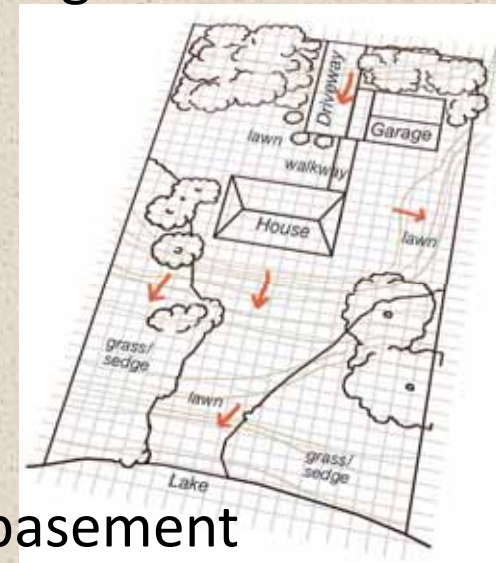


Example Site Analysis



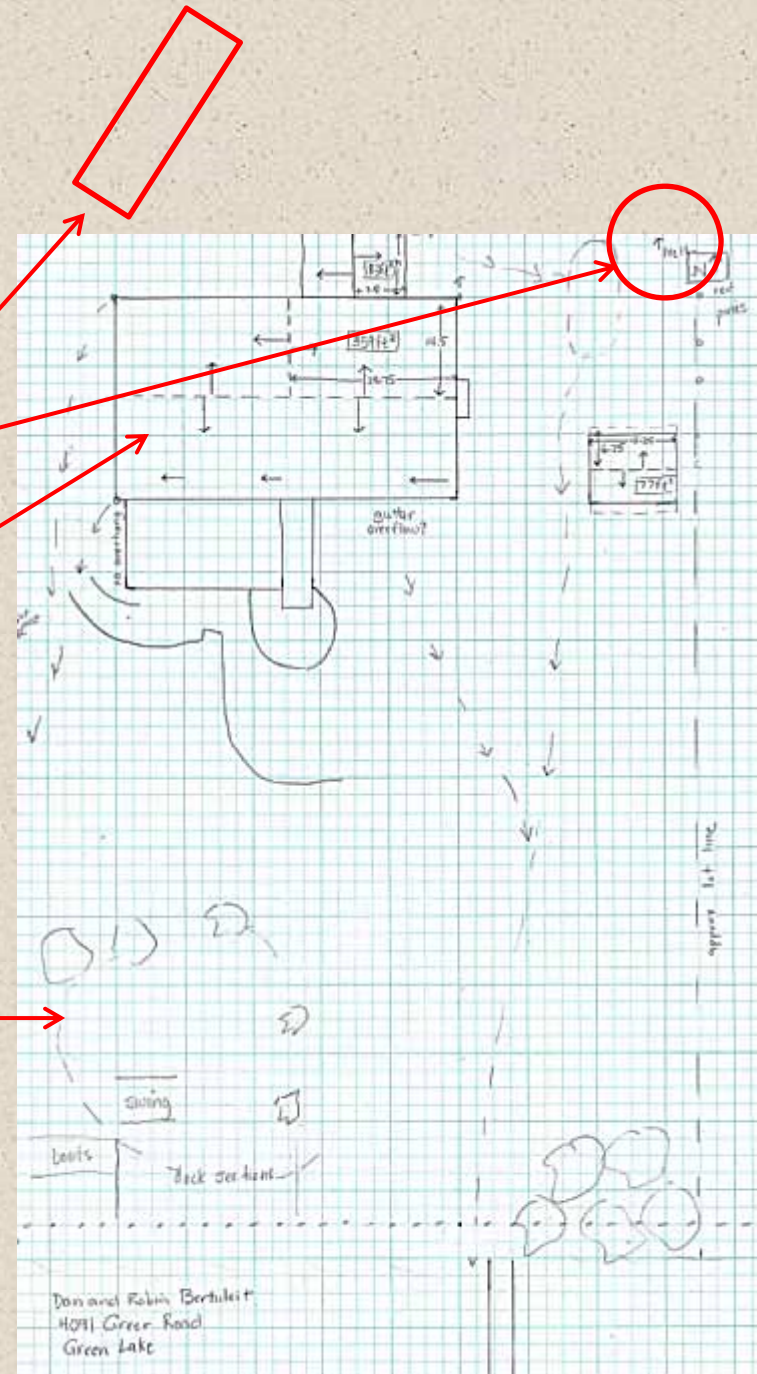
Site Constraints

- Utilities – call Diggers Hotline for planning
 - Work around if possible
- Septic systems
 - Don't infiltrate above
- Wells
 - Set back 50 feet to shallow wells
- Structures – don't soak water next to basement
- Trees – back off to minimize disturbance to roots
- Avoid areas where water ponds!

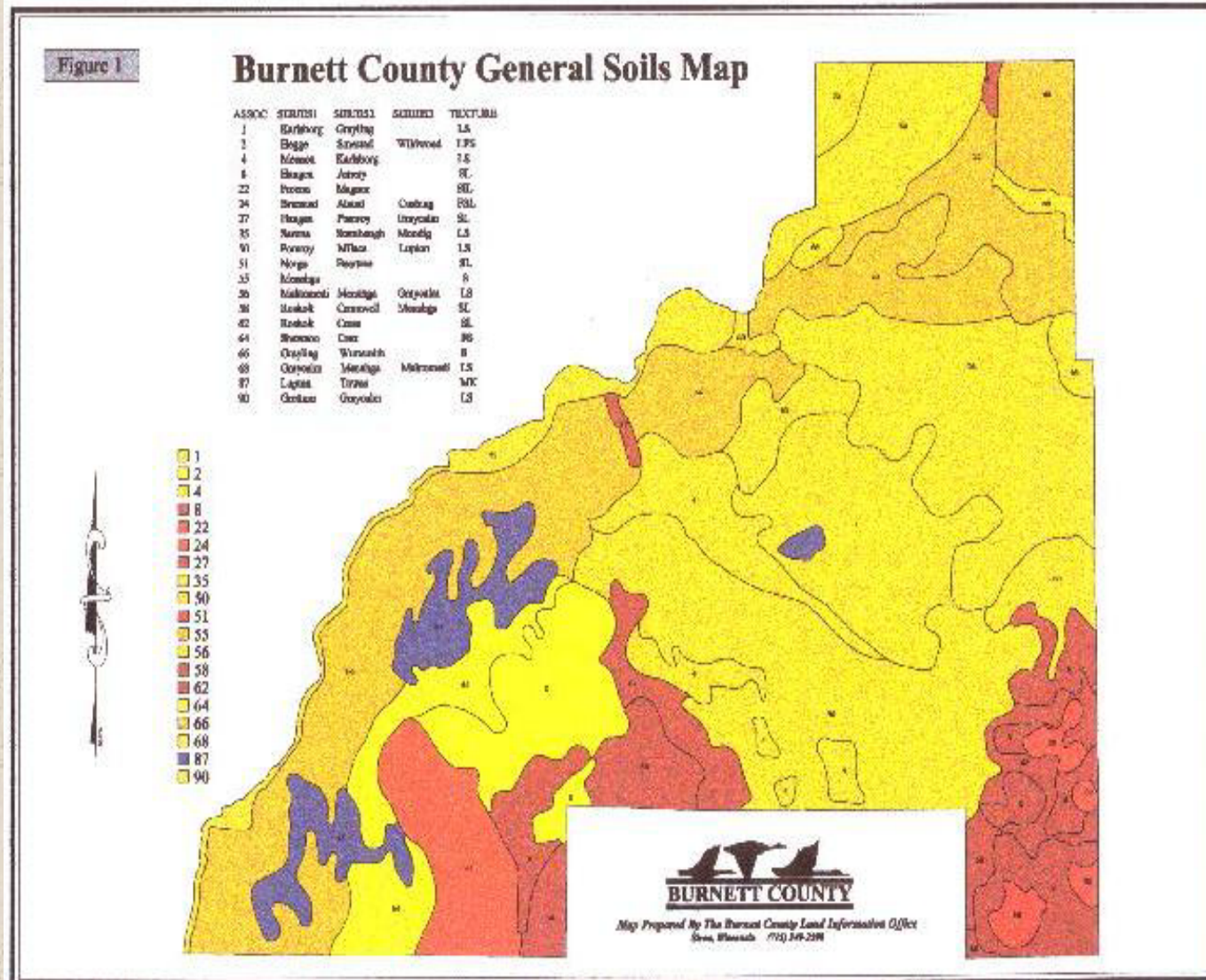


Site Constraints

- Well
- Septic system
- Structures
- Utilities
- Trees
- Steep slopes



Soils are Critical



Assessing Your Soil Type

- Hints:
 - Sand feels gritty and coarse
 - Silty soil feels smooth not sticky
 - Clayey soil feels sticky
- Send soil in for analysis
- Use certified soil tester
- Perform a perc test



Importance of Soil Type

Infiltration rate

determines appropriate practice and size:

- Sandy Soils: 2.5+ in/hr
- Silty Soils: 0.5 in/hr
- Clayey Soils: 0.3 in/hr

Some soils don't allow much infiltration – best bet may be native vegetation!

Calculating Runoff Volume



- Start with area of erosion concern
- Consider direction of flow
 - Roof peaks and downspouts
- Measure area of hard surfaces above
- Calculate volume for a design storm – 1" or 2" rain
- Design practice to capture volume

Simple Tools:

Tape, wheel, laser

Hard surface area (ft²) X
Inches of rain/12 = cubic
feet

1 cubic foot = 7.48
gallons

Options for Infiltration

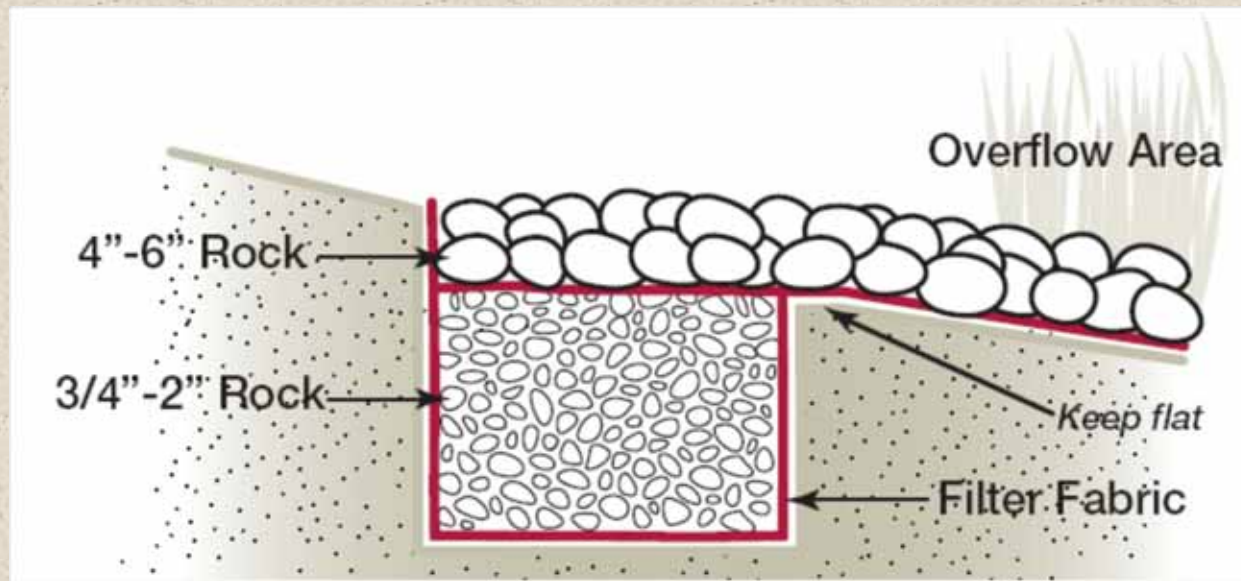


Rock Infiltration Pit



Rock Infiltration Trench

Rock Infiltration Construction



Rain Gardens



Determining Rain Garden Size

Type of Soil	3 to 5 Inches Deep	6 to 7 Inches Deep	8 Inches Deep
Sandy	0.19	0.15	0.08
Silty	0.34	0.25	0.16
Clayey	0.43	0.32	0.20

**Less than 30 feet
from downspout**

Soil Type	All Depths Between 3 and 8 inches
Sandy	0.03
Silty	0.06
Clayey	0.10

**More than 30 feet
from downspout**

Example 1: 500 sq ft x .25 = 125 sq ft rain garden

Example 2: 500 sq ft x .43 = 215 sq ft rain garden



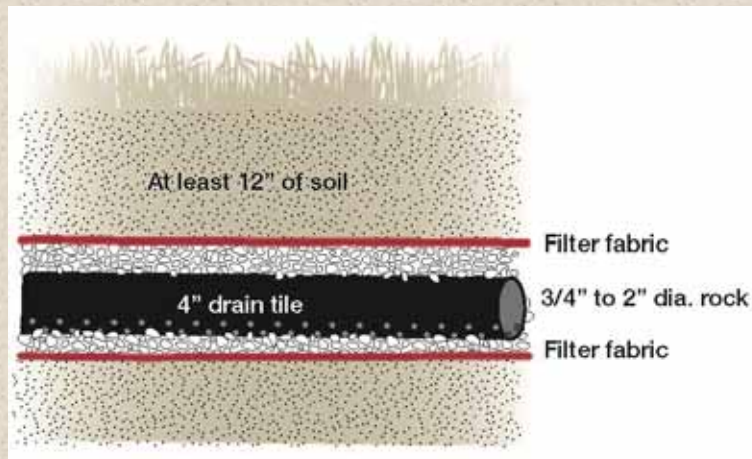
Rain Garden in Shady Site





Diversions

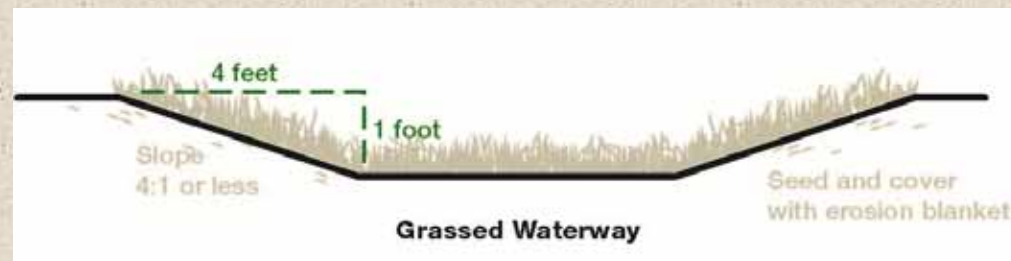
- Rain Gutters
- Drain Tile
- Grass Swales
- Vegetated Berms
- Gravel Berms



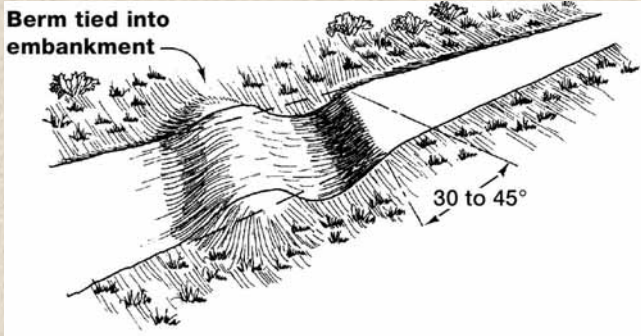
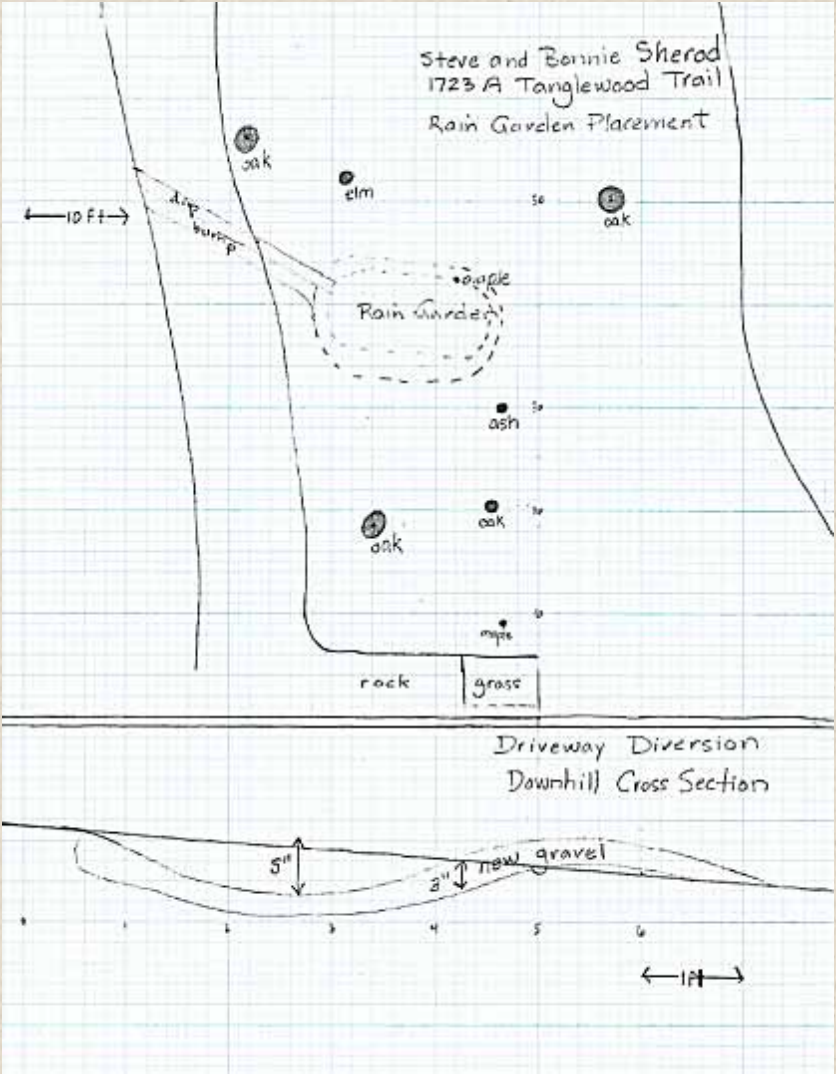
Rain Gutters



Grassed Waterway



Driveway Diversion



Dry Creek Bed

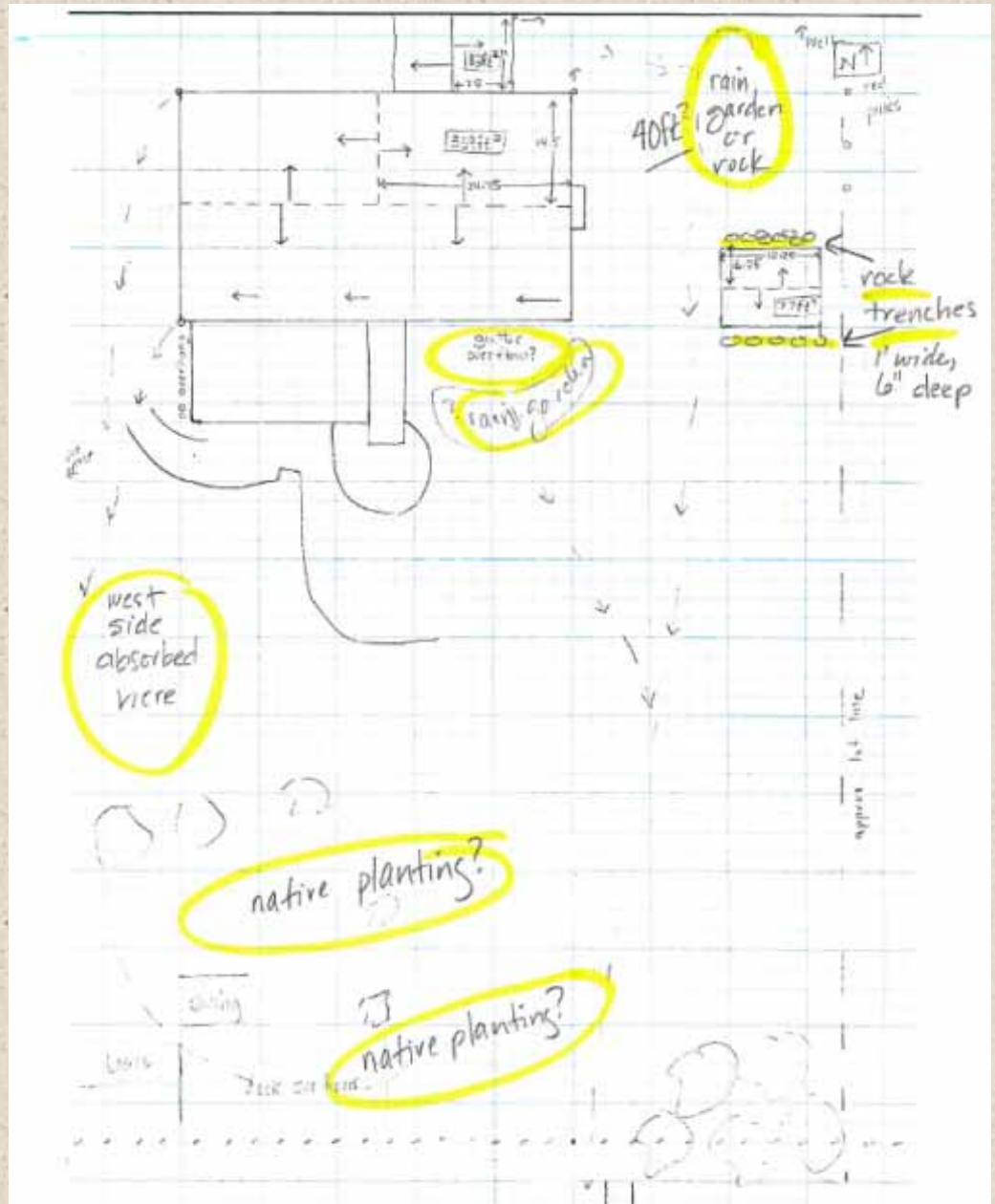


Rain Barrels

- Capture water from roof
- Use to water plants
- Very limited capacity
- Connect soaker hose



Site Suggestions



Keep Your Limits In Mind

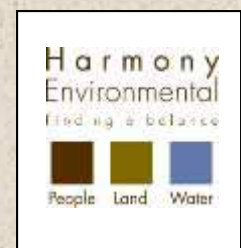
Too Much for Landscaping?

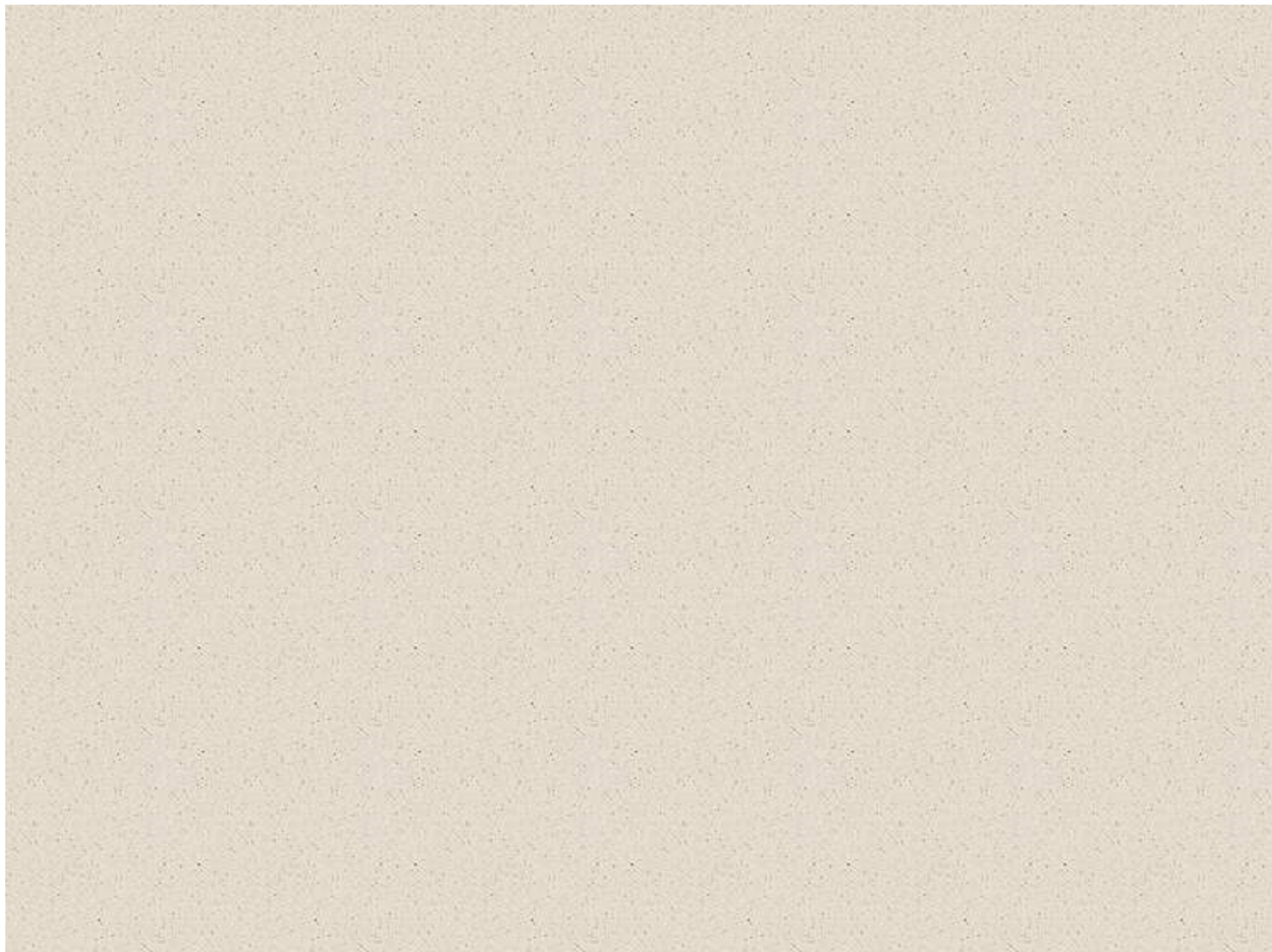
- Construction on slopes >20%
- More than 20,000 ft² cleared
- Drainage area > 2 acres
- Deep gullies (> 1 foot deep)
- Can't come up with a solution

(even with a landscaper to guide you)



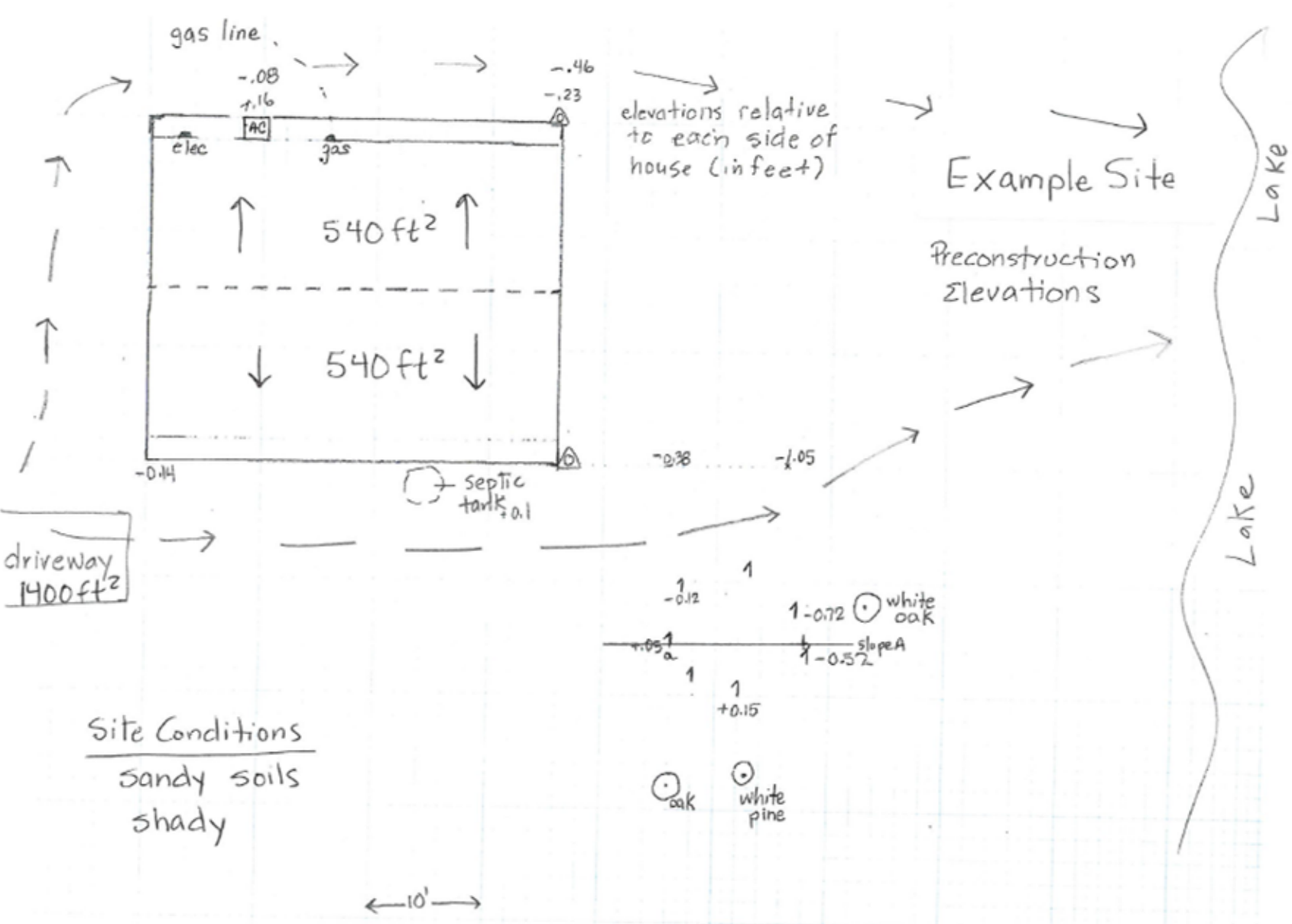
Questions????





Example Site



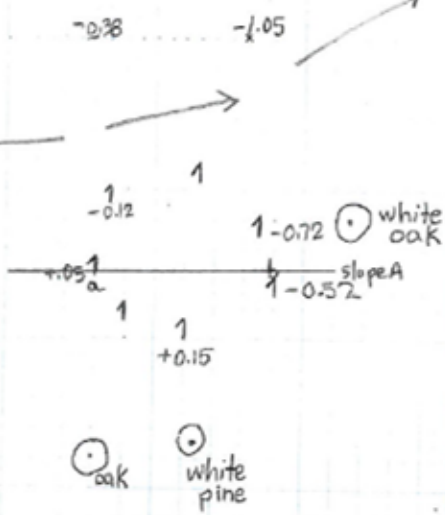


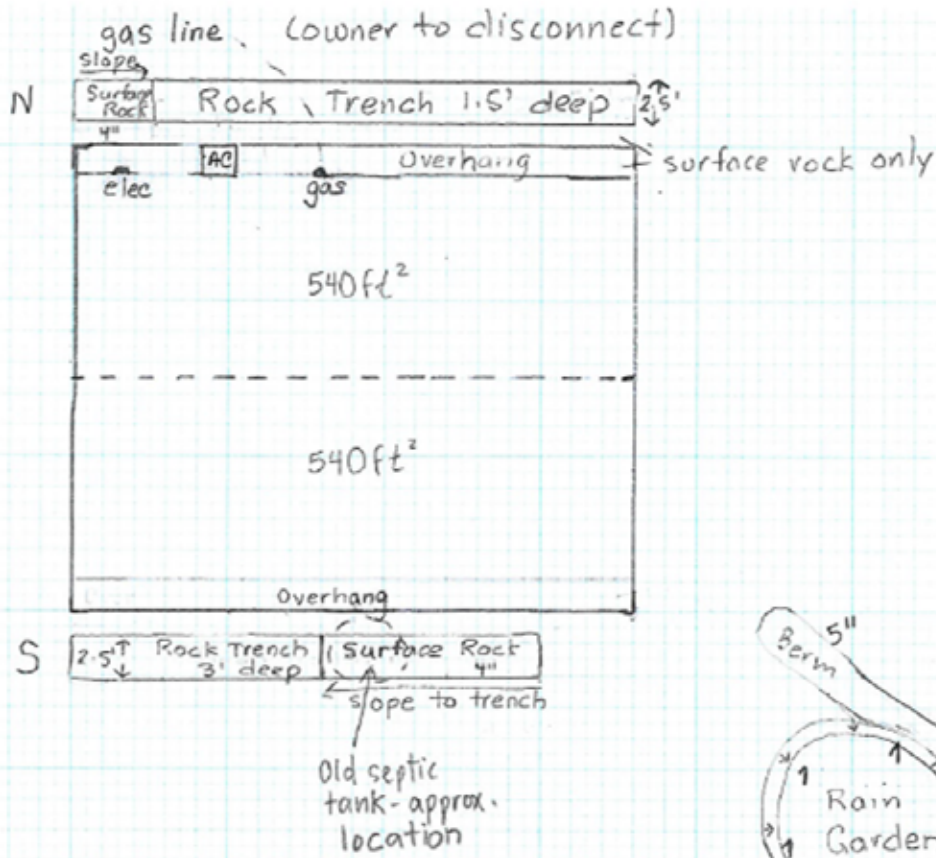
elevations relative to each side of house (in feet)

Example Site

Preconstruction Elevations

Site Conditions
 sandy soils
 shady

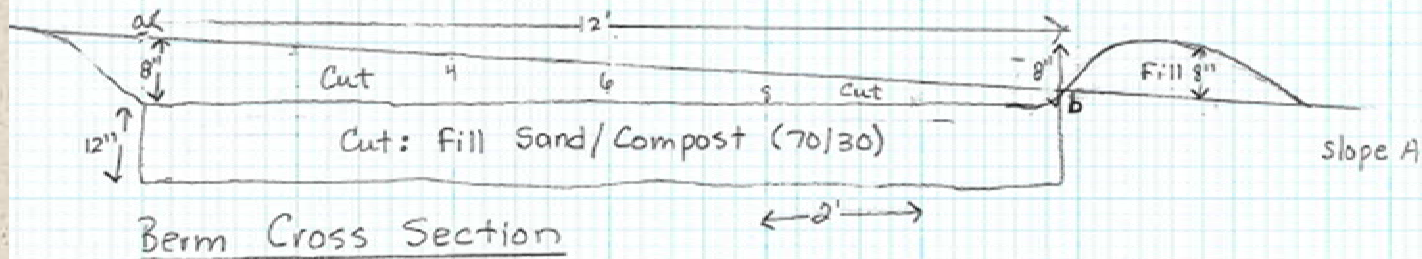




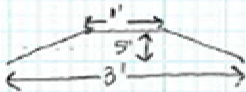
Actual Design Drawing



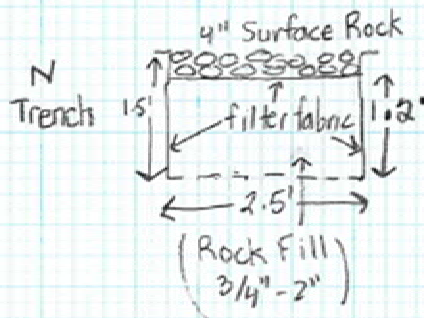
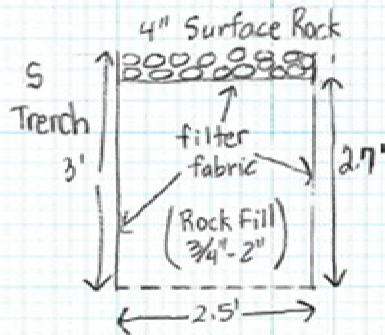
Rain Garden Cross Section Slope A (a-b)



Berm Cross Section

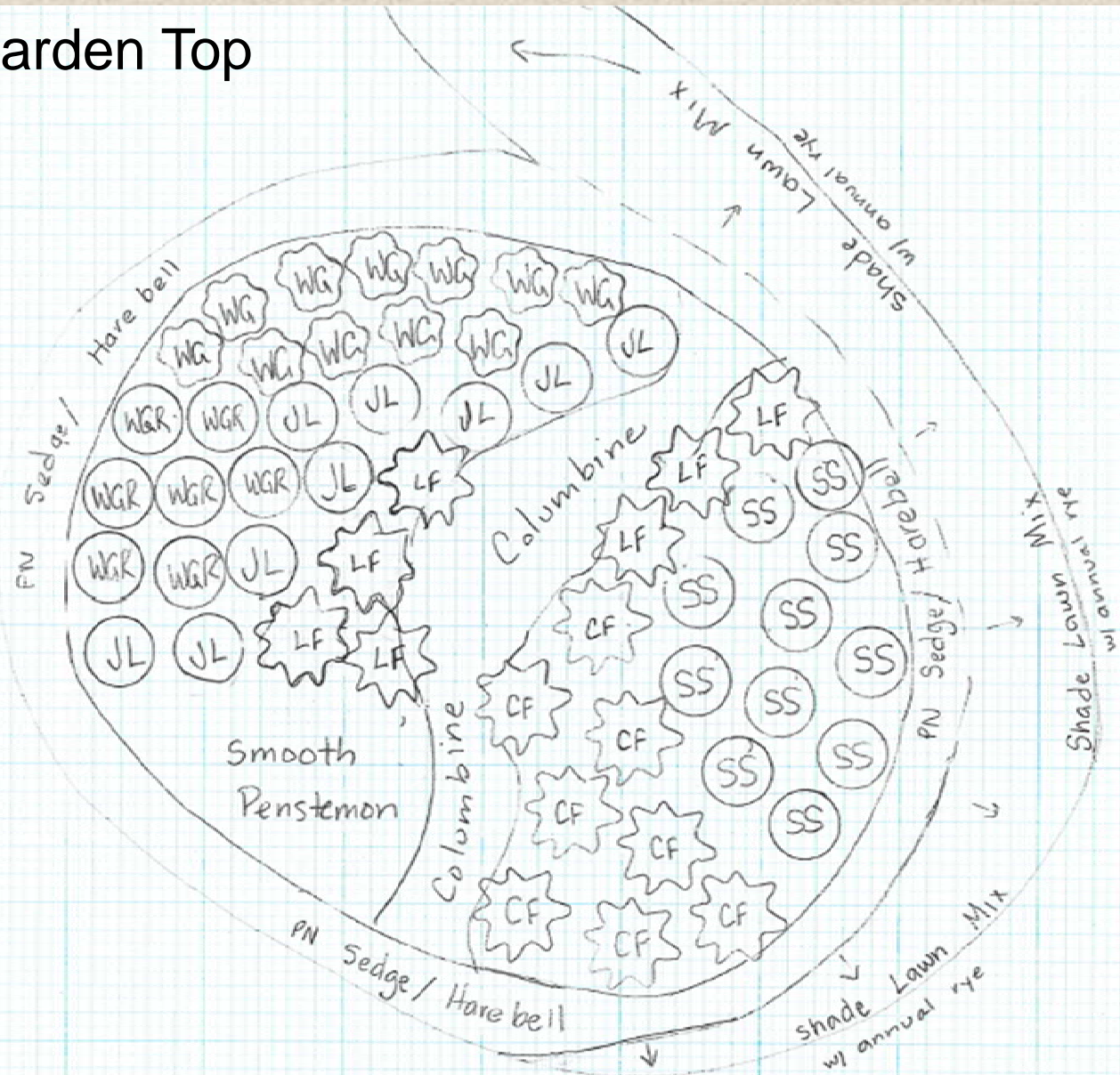


Rock Trench Cross Section



Design
Cross
Sections

Rain Garden Top View



Rain Garden Plant Selection

	Common Name	Scientific Name	Height	Bloom Time	Bloom Color
Flowers					
WGR	Wild ginger	<i>Asarum canadense</i>	4 to 8 in	May to June	Red
CL	Columbine	<i>Aquilegia canadensis</i>	8 to 24 in	May to June	Pink
WG	Wild geranium	<i>Geranium maculatum</i>	18 inches	May to June	Pink
SS	False solomon's seal	<i>Smilacina racemosa</i>	36 inches	May to July	White
JL	Jacob's ladder	<i>Polemonium reptans</i>	18 inches	May to June	Blue
SP	Smooth penstemon	<i>Penstemon digitalis</i>	36 inches	June to July	White
HB	Harebell	<i>Campanula rotundifolia</i>	4 to 20 inches	June to September	Lavender
Ferns					
CF	Cinnamon fern	<i>Osmundo cinnamomes</i>	36 in	None	None
LF	Lady fern	<i>Athyrium filix-femina</i>	24 in	None	None
OF	Ostrich fern	<i>Matteuccia struthiopteris</i>	24 in	None	None
Sedges and Grasses					
FX	Fox Sedge	<i>Carex vulpinoidea</i>	12 to 36 in	NA	NA
PN	Pennsylvania sedge	<i>Carex pensylvanica</i>	6 to 18 in	NA	NA

Rain Garden Plant Quantities

	Common Name	Scientific Name	Rain Garden		
			Seedlings	3" Pots	6" Pots
Flowers					
WGR	Wild ginger	<i>Asarum canadense</i>		7	
CL	Columbine	<i>Aquilegia canadensis</i>	12		
WG	Wild geranium	<i>Geranium maculatum</i>		11	
SS	False solomon's seal	<i>Smilacina racemosa</i>			11
JL	Jacob's ladder	<i>Polemonium reptans</i>		8	
SP	Smooth penstemon	<i>Penstemon digitalis</i>	6		
HB	Harebell	<i>Campanula rotundifolia</i>	16		
Ferns					
CF	Cinnamon fern	<i>Osmundo cinnamomes</i>			8
LF	Lady fern	<i>Athyrium filix-femina</i>			7
OF	Ostrich fern	<i>Matteuccia struthiopteris</i>			
Sedges and Grasses					
FX	Fox Sedge	<i>Carex vulpinoidea</i>			
PN	Pennsylvania sedge	<i>Carex pensylvanica</i>	16		
			50	26	26

Plant seedlings with 12" spacing
 Plant 3 inch pots with 14" spacing
 Plant 6 inch pots with 18" spacing
 Pot sizes can be substituted with spacing indicated

Project Quantities

Jon Scheibel
2092 Pipe Lake Lane

	Materials	Quantity	Cost per unit	Total Cost
Rain Garden - 120 ft2 + 34 ft2 (slopes)				
	Seedlings	50		
	3" Pots	37		
	4-6" Pots	26		
	Wood mulch (3")	1 yd		
70%	Sand	3 yds		
30%	Leaf mulch compost	1.3 yds		
	Soil amendment			
	Erosion blanket	100 ft2		
	Excavation			
	Shady grass seed			
Rock Trenches				
	filter fabric	360 ft2		
	3/4" - 2" rock	9.1 yds		
	rock near house	2.8 yards		
	heavy duty plastic	231 ft2		

Four Page Project Narrative Included with Design

Completed Rain Garden



Total Cost
Rain Garden, Diversions,
and Rock Trenches: \$4,142.25

Completed Rock Trenches

