

An aerial photograph of a residential property. In the center is a two-story house with a grey roof and a large window. To the right is a swimming pool with a green cover. A driveway leads to a garage on the left. The yard is mostly grass with some trees and shrubs. A road with cars is visible at the top.

EAS 702

MASTER'S PRACTICUM

**THE APPLICATION OF EAS 588 & EAS 691
IN RESIDENTIAL RAIN GARDEN DESIGN**

STUDENT: ZHAOWEI SHI

ADVISOR: RUNZI WANG

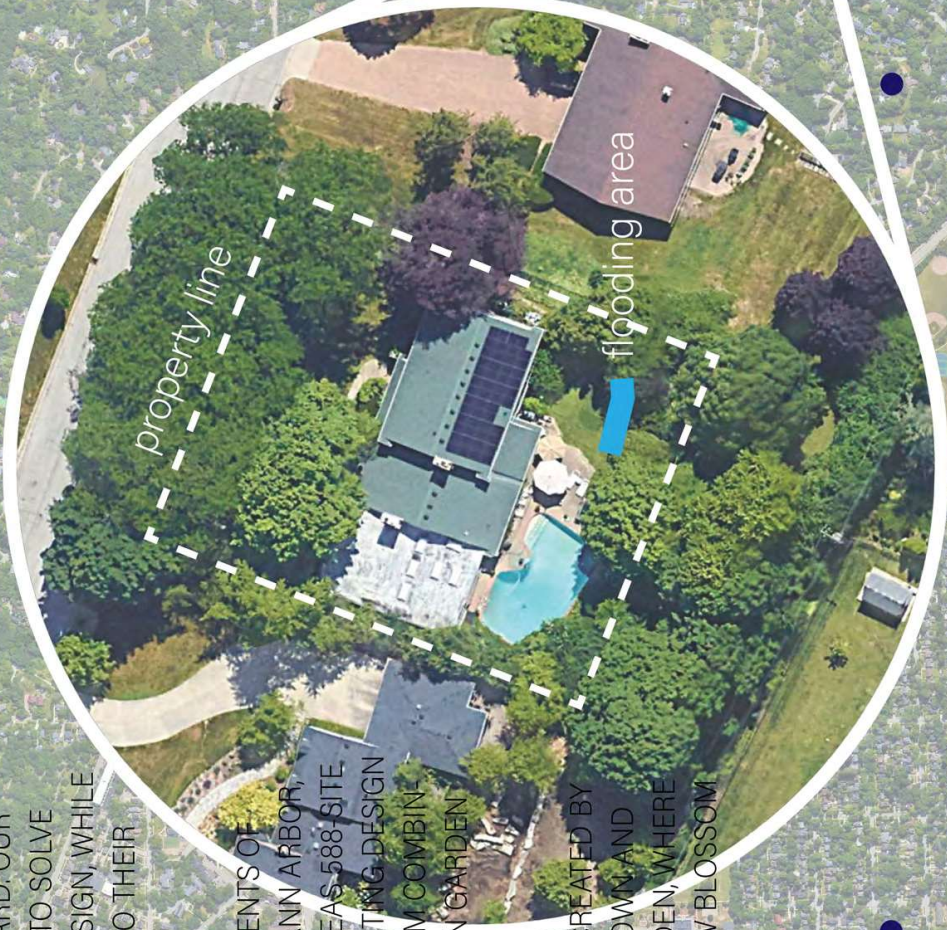
BACKGROUND:

THE SITE IS A PRIVATE PROPERTY SOUTH-EAST TO UMICH, OWNED BY AN OLD COUPLE, WITH FLOODING ISSUES IN THE BACKYARD. OUR CLIENTS REACH TO US, WISHING TO SOLVE THIS ISSUE WITH LANDSCAPE DESIGN, WHILE ALSO BRINGING MORE COLORS TO THEIR HOUSE.

THE LARGE AMOUNT OF PRECEDENTS OF RESIDENTIAL RAIN GARDENS IN ANN ARBOR, ALONG WITH LESSONS GIVEN IN EAS 588 SITE ENGINEERING AND EAS 691-PLANTING DESIGN GIVE US IDEAS TO BUILD A SYSTEM COMBINING EROSION CONTROL AND RAIN GARDEN TOGETHER TO FIX THE ISSUE.

THE SYSTEM WILL USE SWALES, CREATED BY CONTOUR GRADING, TO SLOW DOWN AND DIRECT RUNOFF INTO RAIN GARDEN, WHERE TO STORE RAINWATER AND GROW BLOSSOM PLANTS

Residential Rain Garden



Site

INTRODUCTION

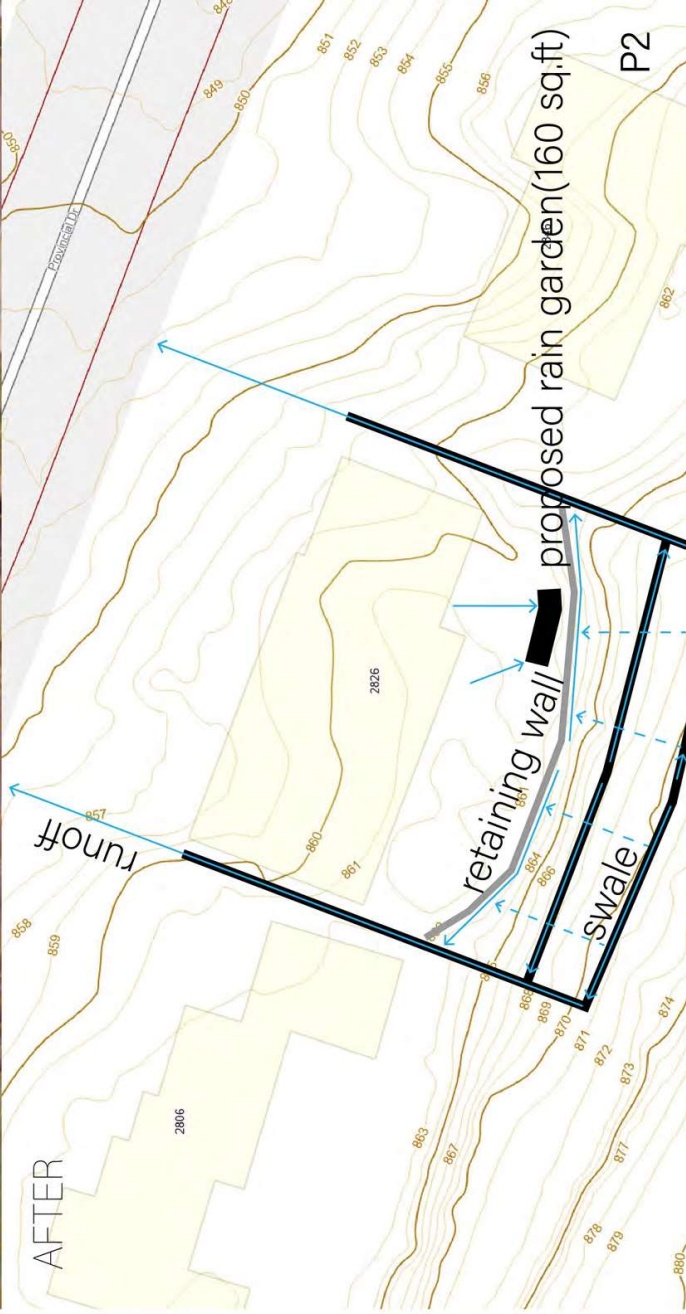
PROBLEMS:

1. RAINWATER AND SNOW ACCUMULATE IN THE LOWEST AREA OF BACKYARD;
2. DAMAGED WOODEN RETAINING WALL;
3. BIG SLOPE BETWEEN CONTOUR LINES;
4. TREES AND GRASSES ONLY PROVIDE GREEN COLOR TO THE BACKYARD.

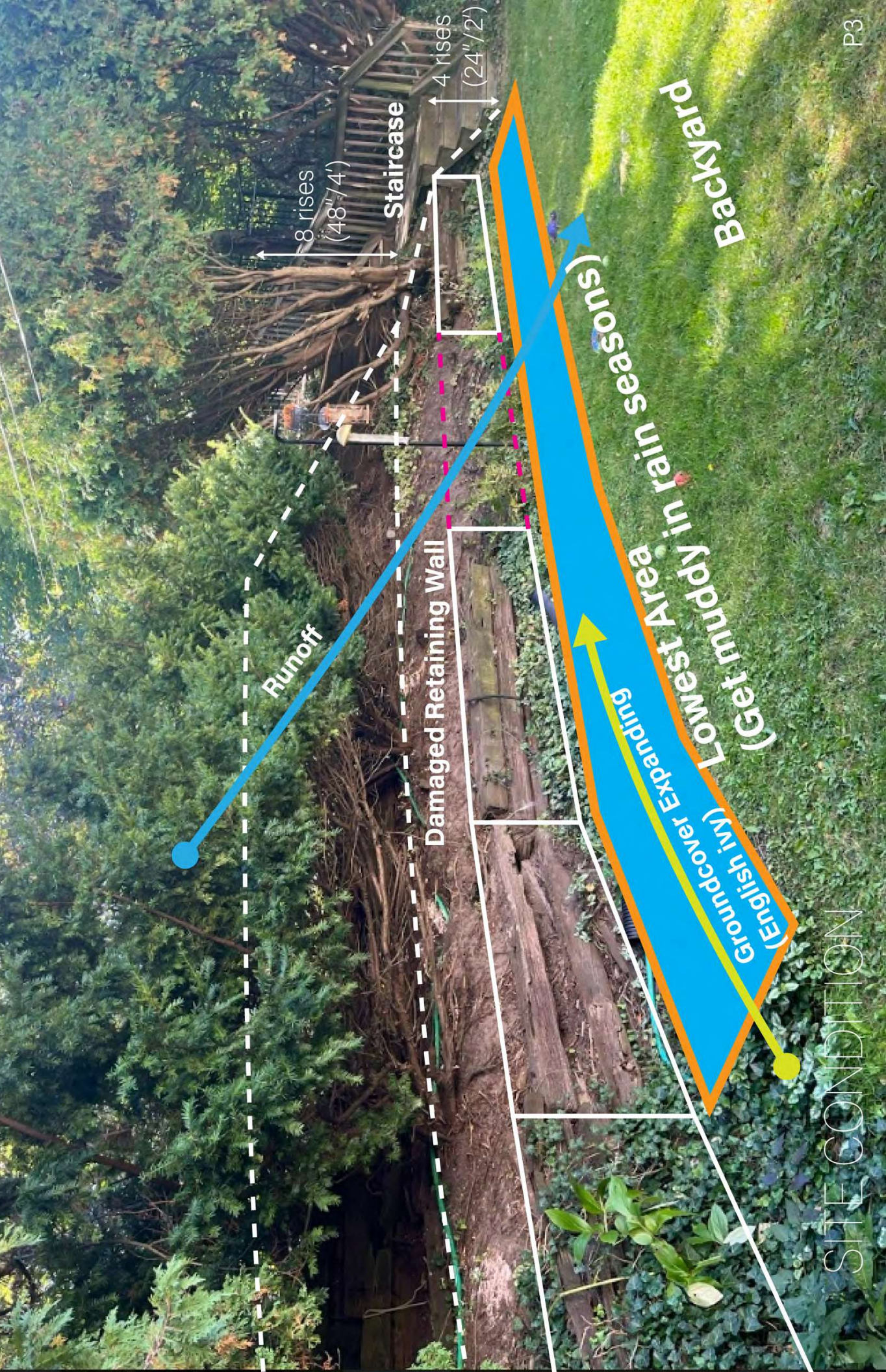


SOLUTIONS:

1. USE RAIN GARDEN TO CAPTURE AND HOLD WATER IN A PROPOSED AREA;
2. REPLACE WITH CONCRETE RETAINING WALL;
3. DIG CONTOUR SWALES TO BREAK AND DIRECT RAINWATER TO DRAINAGE SWALES;
4. USE BLOSSOM PLANTS IN RAIN GARDEN TO PROVIDE SEASONAL COLORS.



SITE ANALYSIS



Runoff

Staircase

8 rises
(48"/4')

Damaged Retaining Wall

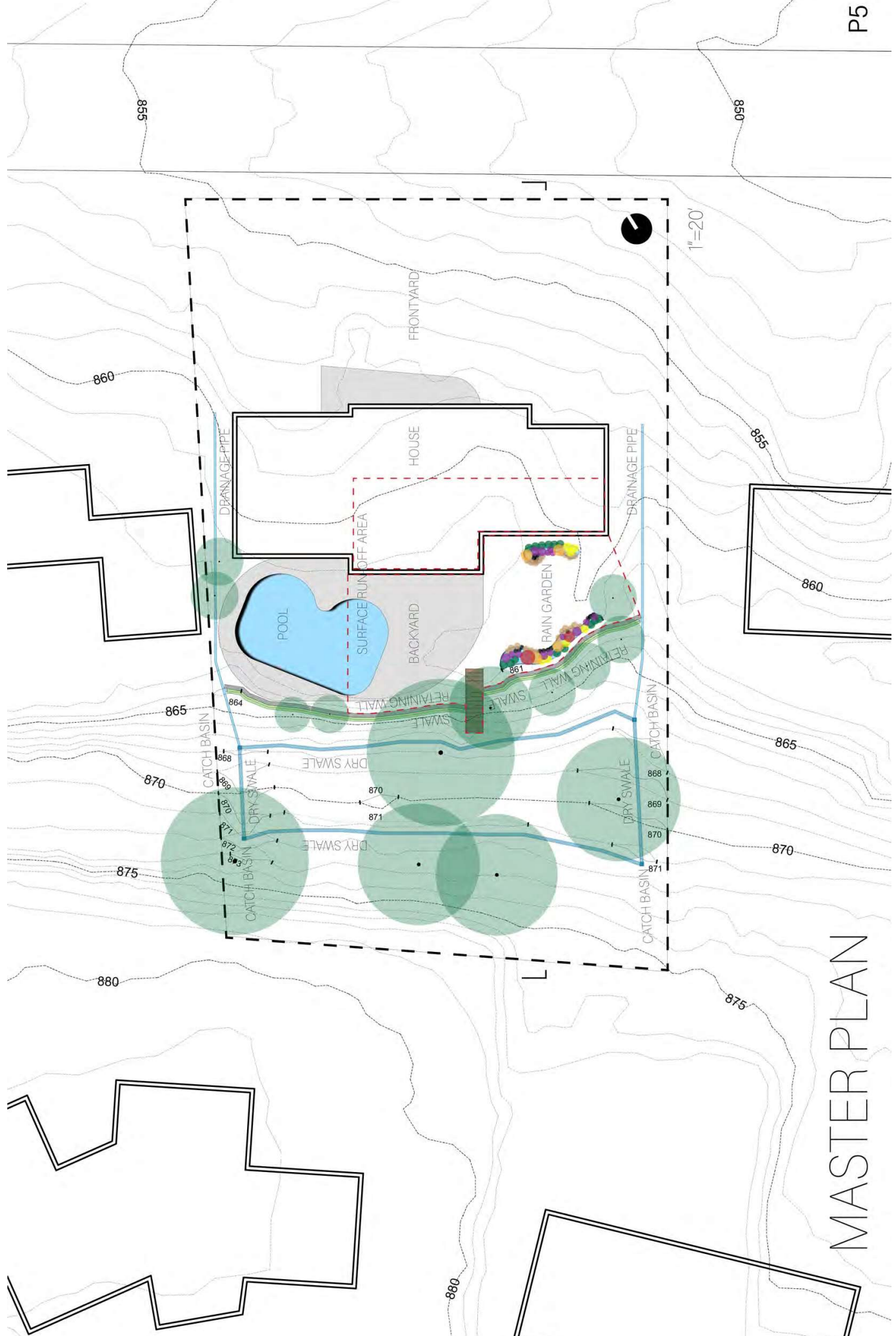
4 rises
(24"/2')

(English ivy)
Groundcover Expanding

(Get muddy in rain seasons)
Lowest Area

Backyard

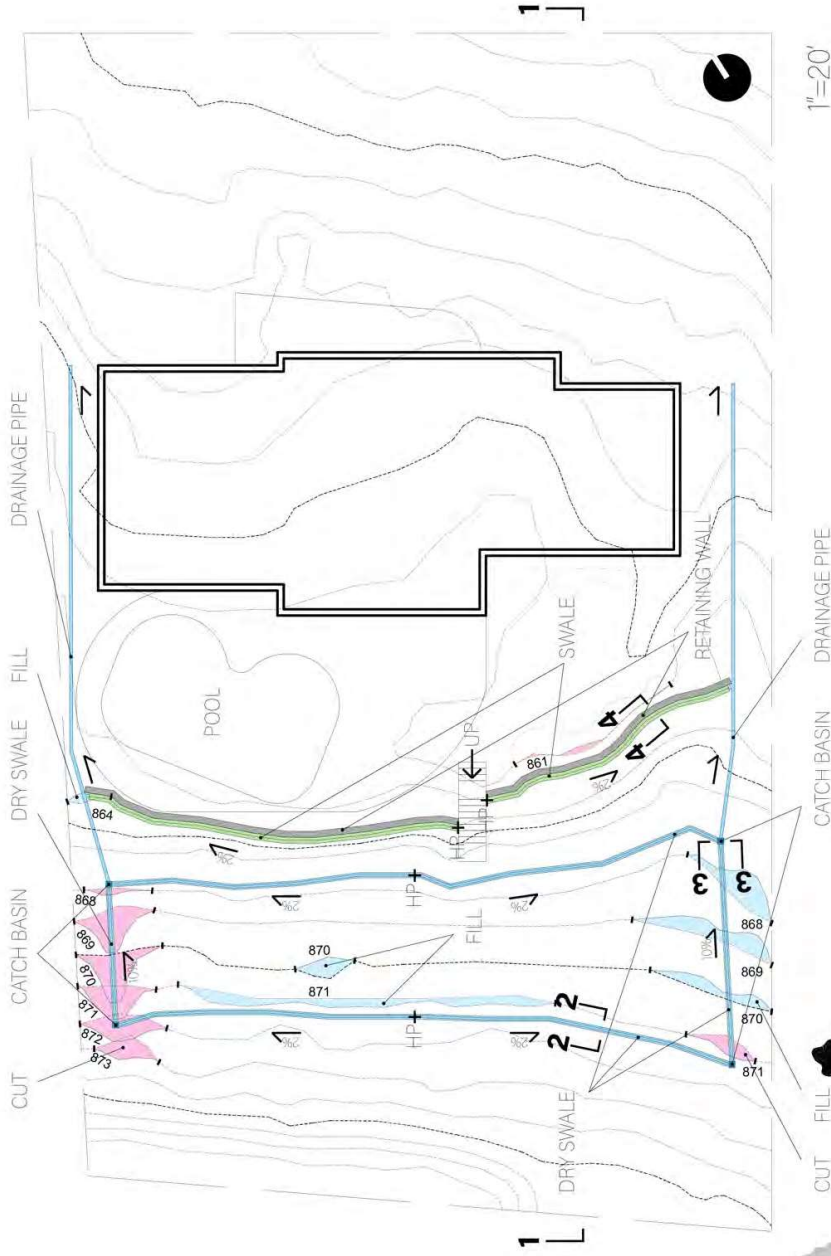
SITE CONDITION



MASTER PLAN

EROSION CONTROL GOALS:

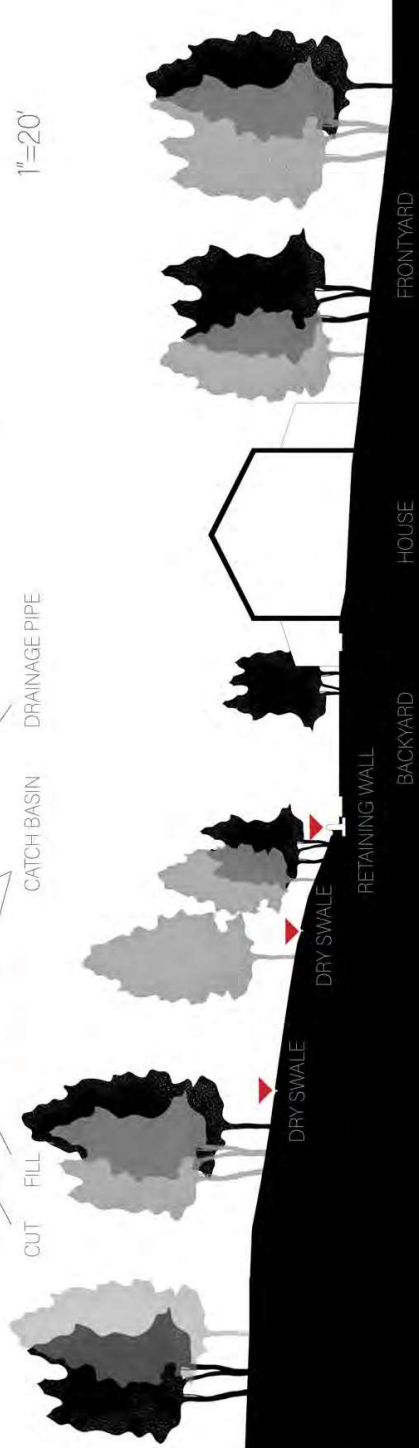
1. REDESIGN THE STORMWATER FLOW DIRECTIONS TO AVOID BACKYARD;
2. USE DRY SWALES TO CARRY THE SURFACE RUN-OFF AWAY;
3. CONNECT SWALES BY CATCH BASINS AND WATER WILL BE CARRIED BY PIPES TO FRONTYARD;
4. BALANCE CUT AND FILL CAUSED BY LANDFORM CHANGES FOR SWALES;
5. BUILD RETAINING WALL TO BLOCK SURFACE RUN-OFF FROM ENTERING BACKYARD



EROSION CONTROL PLAN

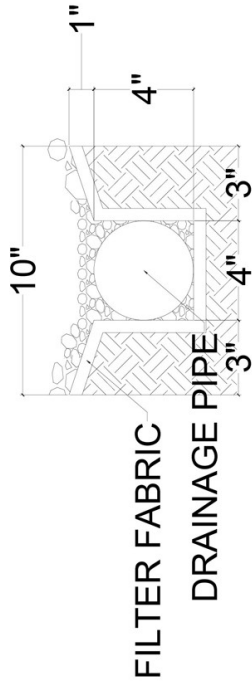
1"=20'

1-1 EROSION CONTROL SECTION

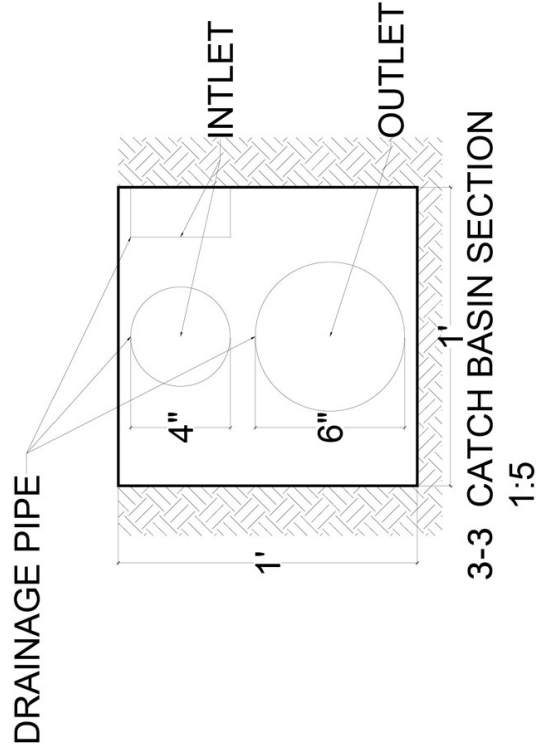


EROSION CONTROL DESIGN

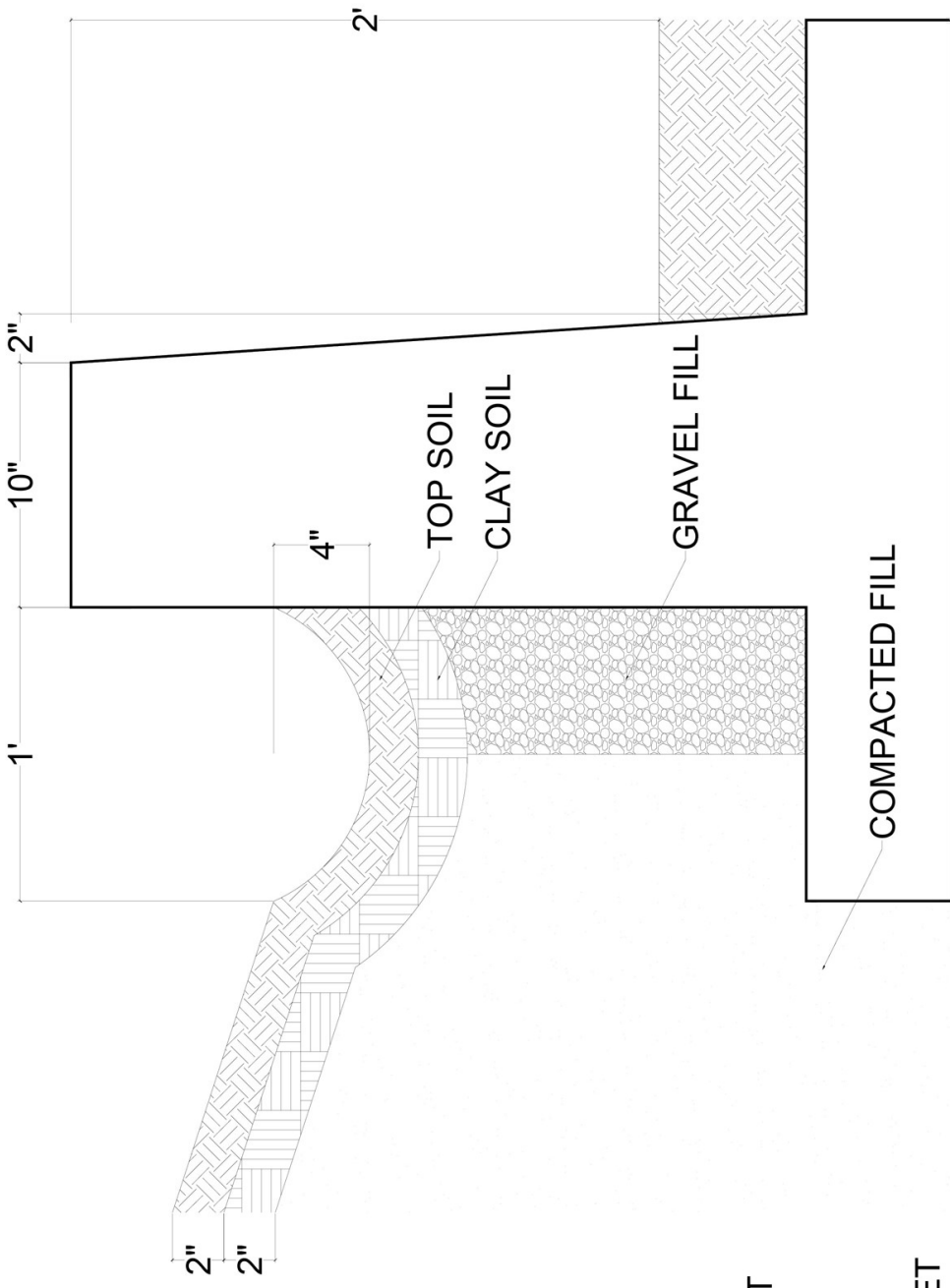
TECHNICAL DRAWING



2-2 DRY SWALE SECTION
1:5



3-3 CATCH BASIN SECTION
1:5

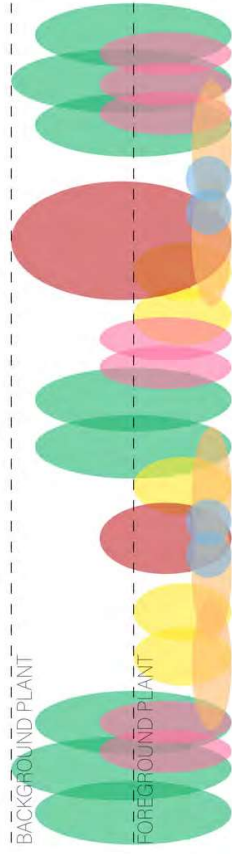


4-4 RETAINING WALL SECTION
1:5

RAIN GARDEN GOALS:

1. COLLECT AND INFILTRATE RAIN RUN-OFF FROM BACKYARD AREA;
2. CAPTURE EXCESS RUN-OFF FROM SWALES;
3. BOTH SIZE AND DEPTH ARE LARGER THAN THE CFS REQUIRED;
4. BEAUTIFUL NATIVE FLOWERS TO VIEW FROM KITCHEN WINDOW;
5. ATTRACT BIRDS TO YARD;
6. PLANTS THAT DO WELL IN SHADY AND WET CONDITIONS.

BLOSSOM COLOR PATCH



BOTTLEBUSH SEDGE



SWAMP MILKWEED



GOLDEN ALEXANDER



FOX SEDGE



BLACK EYED SUSAN



RED BANEERRY



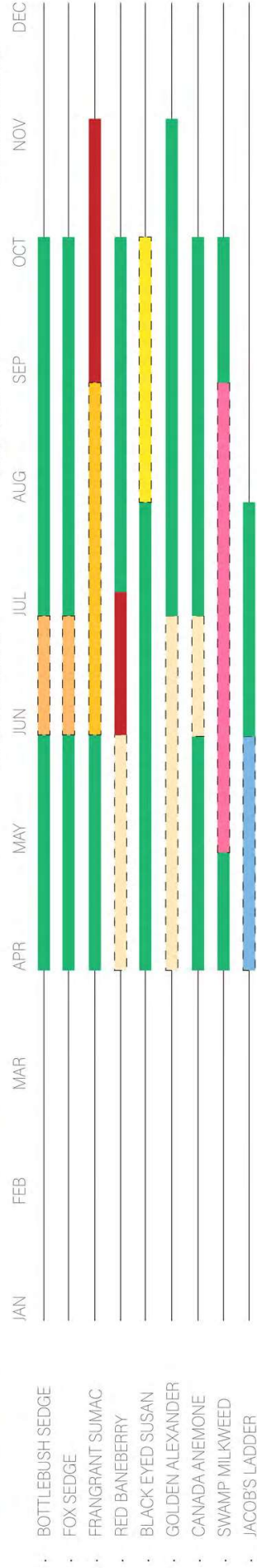
FRAGRANT SUMAC



JACOB'S LADDER



CANADA ANEMONE



RAIN GARDEN DESIGN

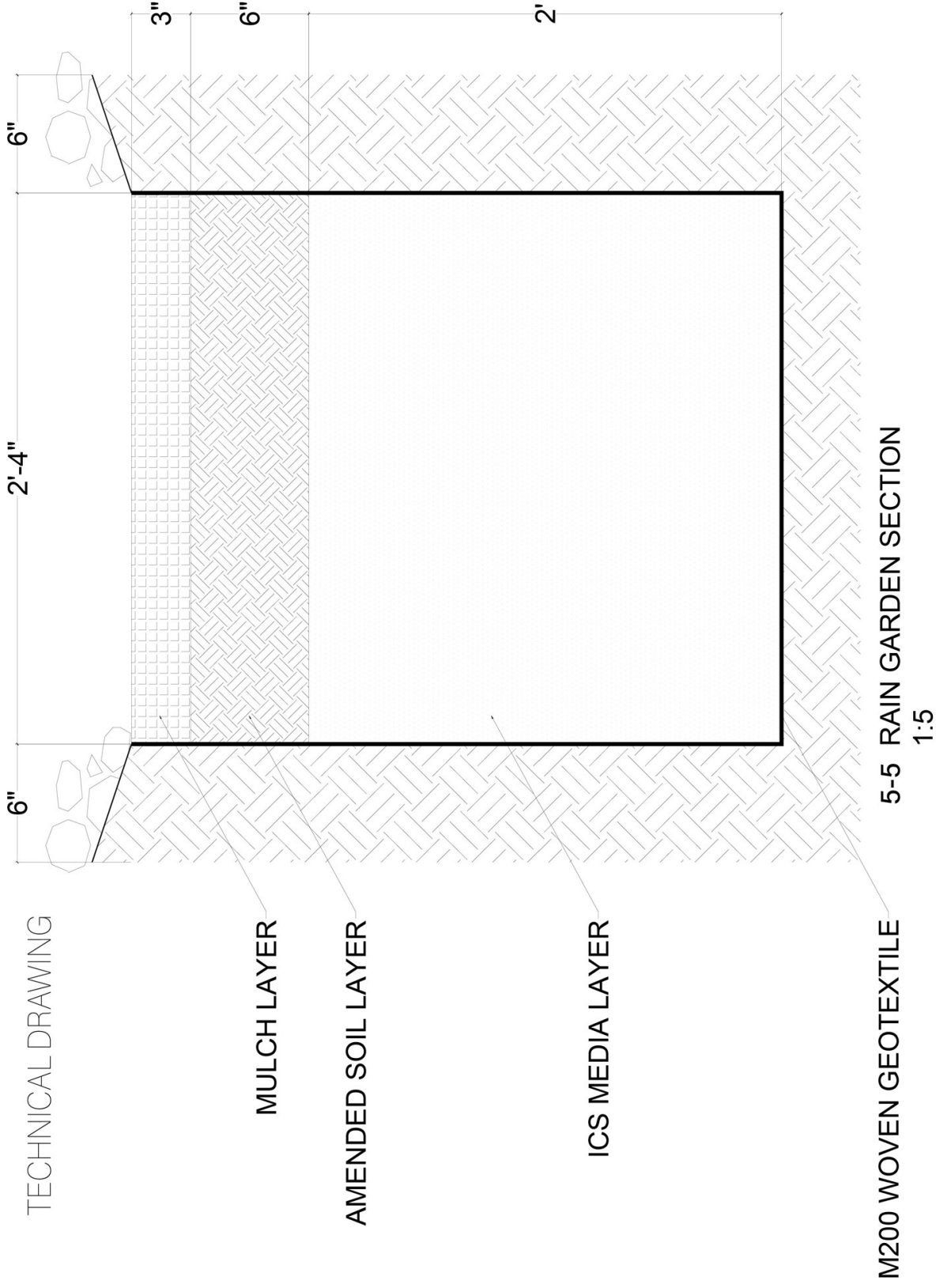
RAIN GARDEN PLANT LIST

NAME	HEIGHT	SPREAD	NUMBER
Canada Anemone <i>Anemone canadensis</i>	0.5-1'	1'	RG1 11 RG2 5
Jacob's Ladder <i>Polemonium reptans</i>	1-2'	1'	6 3
Fox Sedge <i>Carex vulpinoidea</i>	1-3'	1'	12 9
Golden Alexander <i>Zizia aurea</i>	1-3'	1-2'	4 3
Bottlebush Sedge <i>Carex comosa</i>	2-4'	1'	8 6
Swamp Milkweed <i>Asclepias incarnata</i>	3-5'	1-2'	3 2
Red Baneberry <i>Actaea rubra</i>	1-2'	2-3'	1 0
Black Eyed Susan <i>Rudbeckia subtomentosa</i>	4-6'	2-3'	2 2
Fragrant Sumac <i>Rhus aromatica</i>	2-4'	5-10'	1 0



RAIN GARDEN PLAN

TECHNICAL DRAWING



RAIN GARDEN SECTION



PERSPECTIVE