

HUGO DR. REVITALIZATION

Clemson University

LARC 2150 | LARC 3620

Haley Carpenter, Janina McDuffie, Jack Faulooner, and Tyler Bentley

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	PAGE 1	GRADING PLAN	PAGE 9
AUTHORS	PAGE 2	GRAPHIC PLANTING PALETTE	PAGE 10
PROJECT INTRODUCTION	PAGE 3	ILLUSTRATIVE MASTER PLAN	PAGE 13
PROCESS DESCRIPTION	PAGE 4	SYMBOLIC PLANTING PLAN	PAGE 14
RESEARCH: LOW IMPACT DEVELOPMENT	PAGE 5	SEASONAL DIAGRAM	PAGE 15
RESEARCH: GREEN INFRASTRUCTURE	PAGE 6	SEASONAL ILLUSTRATION	PAGE 16
SITE ANALYSIS	PAGE 7	SUPPORT IMAGES	PAGE 17
CONCEPT STATEMENT	PAGE 8	MANAGEMENT PLAN + PRICING	PAGE 23
		SOURCES	PAGE 24

ACKNOWLEDGEMENTS

WE WOULD LIKE TO EXTEND A SPECIAL THANK YOU TO **BILLY BOLGER** AND **TOMMY FALLAW** FOR PROVIDING US WITH USEFUL RESOURCES + BEING ADVOCATES FOR STUDENT DESIGN HERE AT CLEMSON.

WE WOULD ALSO LIKE TO THANK OUR INSTRUCTORS **LARA BROWNING** AND **PAUL RUSSELL** FOR THEIR CONTINUED GUIDANCE AND SUPPORT THROUGHOUT THIS PROJECT.

1

AUTHORS

HALEY CARPENTER
JANINA MCDUFFIE
JACK FAULCONER
TYLER BENTLEY



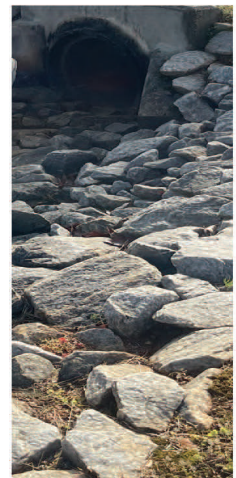
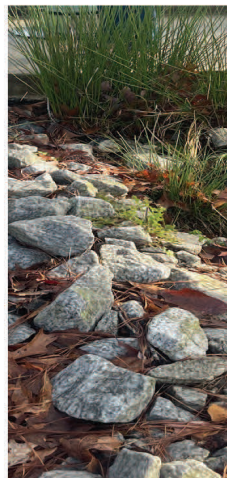
2

PROJECT INTRODUCTION

THIS PROJECT AIMS TO CREATE A **LOW- IMPACT DEVELOPMENT** PLAN FOR THE BIORETENTION AREA AT CLEMSON ARTS FACILITY. STUDENTS WERE TASKED TO CREATE DETAILED PLANTING PLANS, IMPLEMENTATION STRATEGIES, AND PLANT PALETTES THAT ARE CONSISTENT WITH NATIVE SOUTH CAROLINA PLANTS. CURRENTLY, OVER **12,000 GALLONS** OF WATER ARE DUMPED AND FILTERED AT THIS SITE, TWICE A DAY, TO ENSURE THE WATER IN CLEMSON AND SURROUNDING AREAS IS AS CLEAN AS POSSIBLE. AS A RESULT OF CONSTANT WATER FLOW, THE AREA HAS BEEN GREATLY DEVASTATED, LEAVING PLANTINGS IN SAD CONDITIONS. THE **GOAL** OF THIS PROJECT IS TO CREATE STRATEGIES TO RECHAN- NEL THE WATER FLOW AND CREATE AESTHETIC SPACES, THAT CAN ALSO BE UTILIZED BY THE ARTS FACILITY STAFF AND VISITORS.

3

PROCESS DESCRIPTION



4

LOW IMPACT DEVELOPMENT

THE TERM **LOW IMPACT DEVELOPMENT (LID)** REFERS TO SYSTEMS AND PRACTICES THAT USE OR MIMIC NATURAL PROCESSES THAT RESULT IN THE INFILTRATION, EVAPOTRANSPIRATION OR USE OF STORMWATER IN ORDER TO PROTECT WATER QUALITY AND ASSOCIATED AQUATIC HABITAT.

LID IS AN APPROACH TO LAND DEVELOPMENT (OR RE-DEVELOPMENT) THAT WORKS WITH NATURE TO MANAGE STORMWATER AS CLOSE TO ITS SOURCE AS POSSIBLE. THE GOAL IS TO MINIMIZE EFFECTIVE IMPERVIOUSNESS TO CREATE FUNCTIONAL AND APPEALING SITE DRAINAGE THAT TREAT STORMWATER AS A RESOURCE RATHER THAN A WASTE PRODUCT.

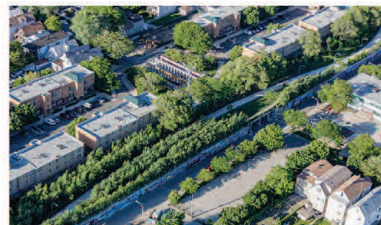
SOME COMMON LID PRINCIPLES AND PRACTICES INCLUDE BIORETENTION FACILITIES, RAIN GARDENS, VEGETATED ROOFTOPS, RAIN BARRELS, AND PERMEABLE PAVEMENTS. THROUGH THESE, WATER CAN BE MANAGED IN A WAY THAT REDUCES THE IMPACT OF BUILT AREAS AND PROMOTES THE NATURAL MOVEMENT OF WATER WITHIN AN ECOSYSTEM OR WATERSHED.

GREEN INFRASTRUCTURE

THE WATER INFRASTRUCTURE IMPROVEMENT ACT DEFINES GREEN INFRASTRUCTURE AS "THE RANGE OF MEASURES THAT USE PLANT OR SOIL SYSTEMS, PERMEABLE PAVEMENT OR OTHER PERMEABLE SURFACES OR SUBSTRATES, STORMWATER HARVEST AND REUSE, OR LANDSCAPING TO STORE, INFILTRATE, OR EVAPOTRANSPIRATE STORMWATER AND REDUCE FLOWS TO SEWER SYSTEMS OR TO SURFACE WATERS." IN SHORT, GREEN INFRASTRUCTURE **FILTERS AND ABSORBS STORMWATER WHERE IT FALLS**. GREEN INFRASTRUCTURE HAS THE ABILITY TO PROVIDE **CLEANER AIR AND WATER** AS WELL AS SIGNIFICANT VALUE FOR THE COMMUNITY WITH FLOOD PROTECTION, DIVERSE HABITAT, AND BEAUTIFUL GREEN SPACES, AS OPPOSED TO GRAY INFRASTRUCTURE COMMONLY USED IN COMMUNITIES.

BENEFITS OF GREEN INFRASTRUCTURE

WATER QUALITY AND QUANTITY, AIR QUALITY, CLIMATE RESILIENCY, HABITAT AND WILDLIFE,



SITE ANALYSIS

CONSTRAINTS

1. STANDING WATER | INADEQUATE ABSORPTION/ MOVEMENT
2. UTILITIES | NOT AESTHETIC + PLACES HEIGHT RESTRICTIONS
3. EXIT PIPE | SILTED PIPE DUE TO LARGE WATER TRAFFIC
4. SUN | OPEN FIELD WITH NO SHADE SPACES

OPPORTUNITIES

1. EXISTING SLOPE | "VALLEY EFFECT" | FLOWS TOP TO BOTTOM
2. EXISTING LANDSCAPE | GRASS VARIETY | MOWING INTERVENTIONS
3. OUTDOOR SPACES | CREATE WORKSPACE FOR SITE USERS
4. CIRCULATION | NATURAL MOVEMENT OF WATER

SITE INFO

- 12,500 GALLONS OF WATER DUMPED 2X/ DAY FOR GOOD WATER QUALITY
- SITE CONTAINS MOSTLY CLAY, HEAVILY SATURATED SOILS
- HEAVY EROSION OCCURS WITHIN LOWEST PARTS OF TOPOGRAPHY
- WATER ENTERS THE SITE VIA WATER TOWER
- THE SITE GETS MORE RAIN IN WINTER, BUT MORE FLASH FLOOD TYPE STORMS IN SUMMER MONTHS.
- EXISTING PLANTS INCLUDE FRAGRANT FLATSEDEGE

LEGEND



CONCEPT STATEMENT

THIS PROJECT AIMS TO CREATE A **LOW- IMPACT DEVELOPMENT** PLAN FOR THE BIORETENTION AREA AT CLEMSON ARTS FACILITY. AS A RESULT OF CONSTANT WATER FLOW, THE AREA HAS BEEN GREATLY DEVASTATED, LEAVING PLANTINGS IN SAD CONDITIONS. THE **GOAL** OF THIS PROJECT IS TO CREATE STRATEGIES TO RECHANNEL THE WATER FLOW AND CREATE AESTHETIC SPACES, THAT CAN ALSO BE UTILIZED BY THE ARTS FACILITY STAFF AND VISITORS.

THROUGH MASS PLANTINGS, ENVIRONMENTAL CREATIONS AND A SIMPLISTIC INTERVENTION APPROACH, OUR GOAL IS TO CREATE A CHANGE OF SCENERY FOR THOSE UTILIZING THE ART BUILDING AND SURROUNDING AREAS, WHILE ALSO ADDRESSING THE WATER AND INFILTRATION ON SITE. WE AIM TO INTEGRATE EXISTING CONDITIONS INTO AN AESTHETIC DESTINATION TO EXPERIENCE A NEW ENVIRONMENT AWAY FROM EVERYDAY LIFE. THE DESIGN FEATURES A DRY CREEKBED, WATER TOLERANT PLANTINGS AND A VIEWING INTERVENTION FOR MEETING.



MEADOW MIX



GRAPHIC PLANTING PALETTE

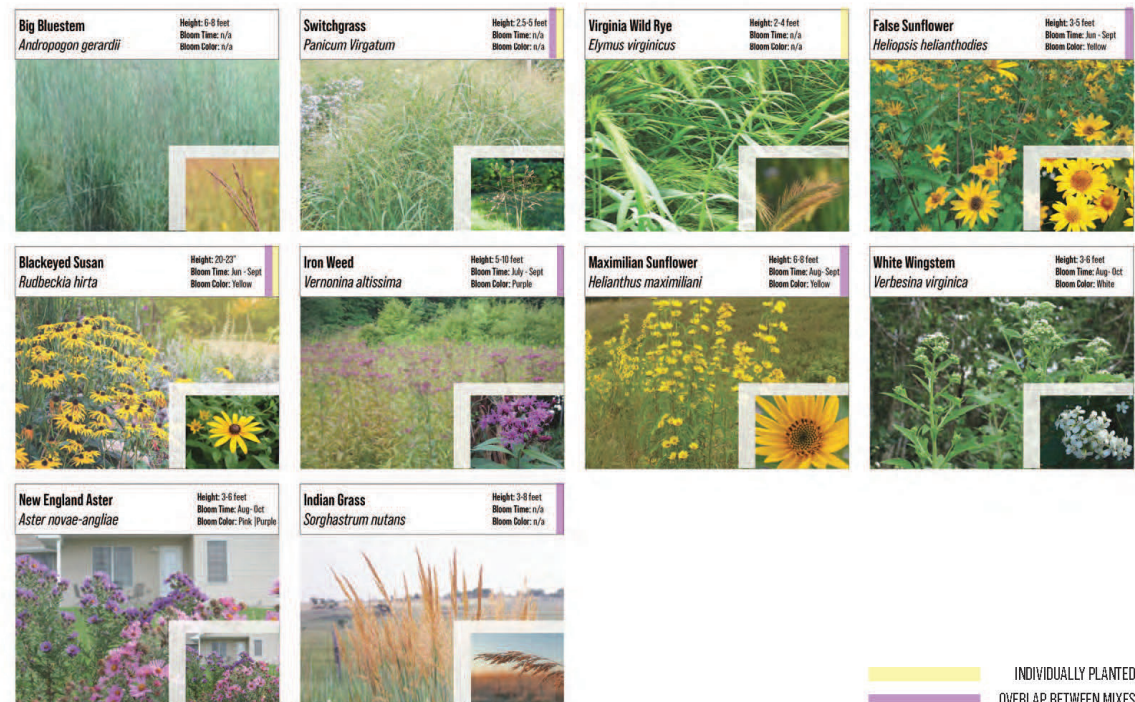
MEADOW MIX



44

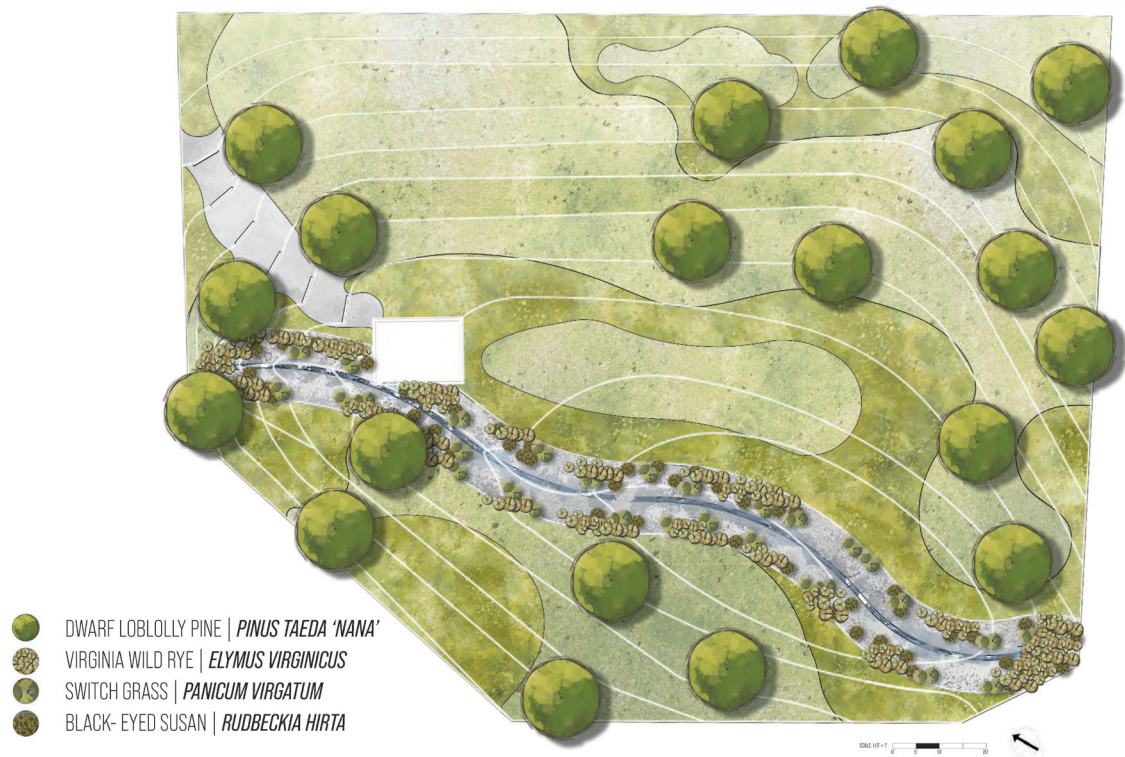
GRAPHIC PLANTING PALETTE

GRASSES MIX

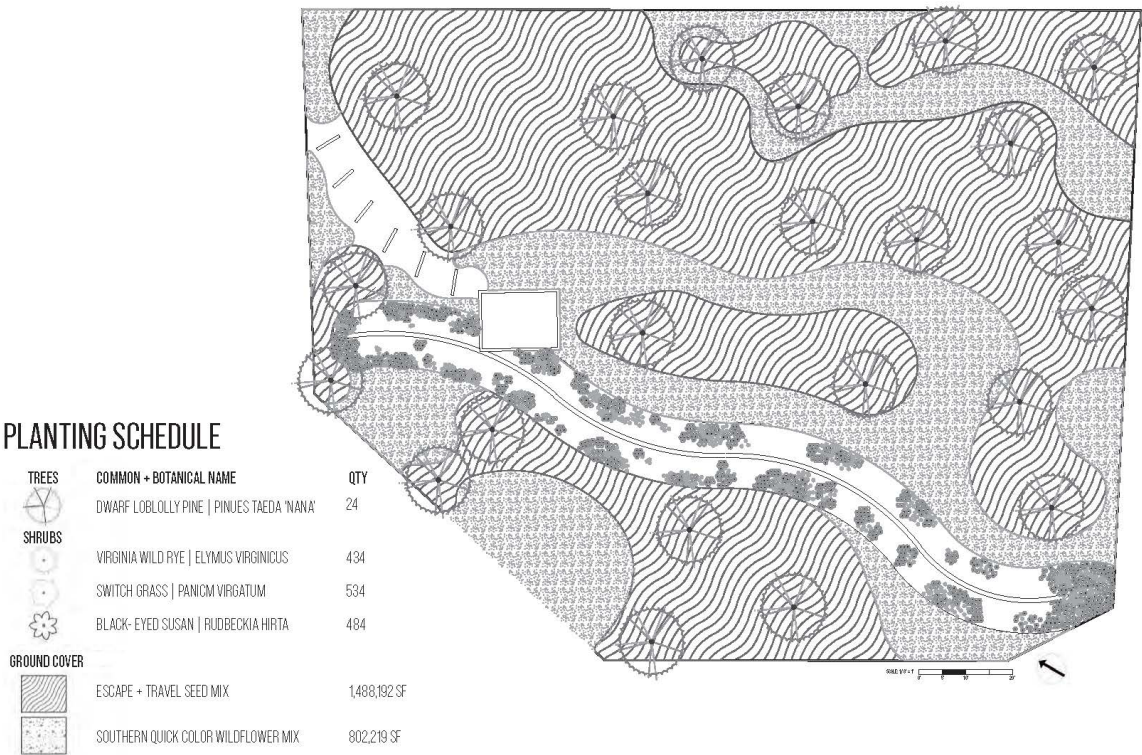


12

ILLUSTRATIVE MASTER PLAN



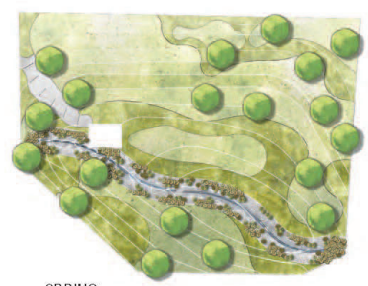
SYMBOLIC PLANTING PLAN



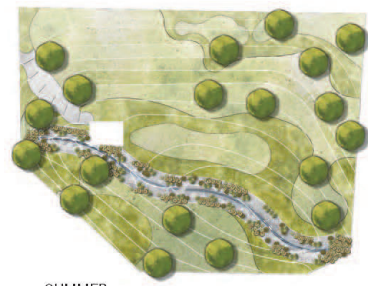
SEASONAL INTEREST DIAGRAM



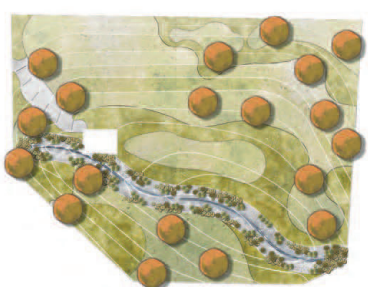
SEASONAL ILLUSTRATION



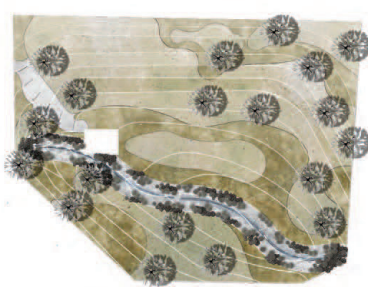
SPRING



SUMMER



FALL



WINTER



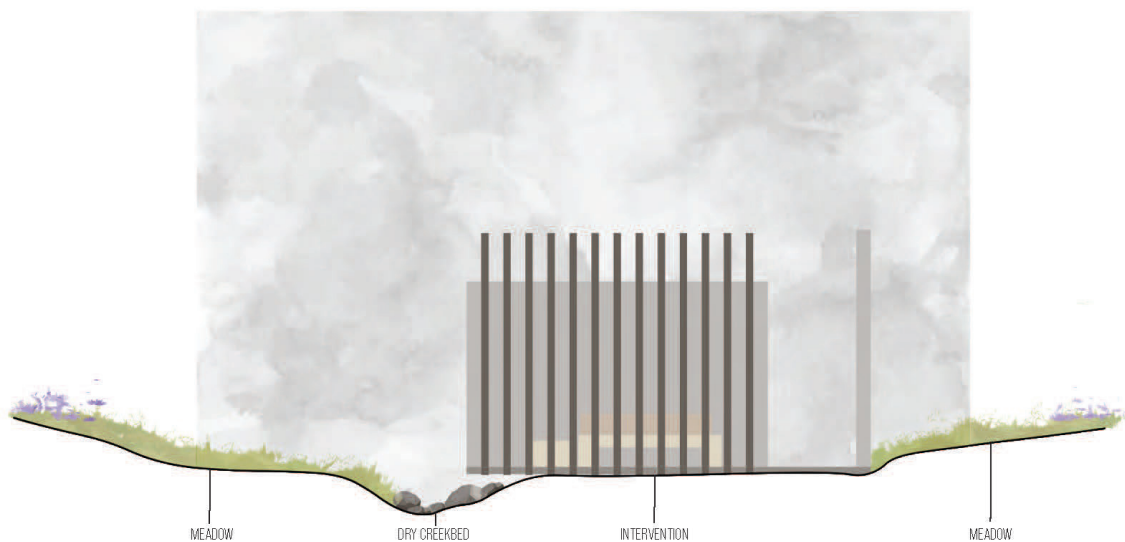
SUPPORT IMAGES

MEADOW

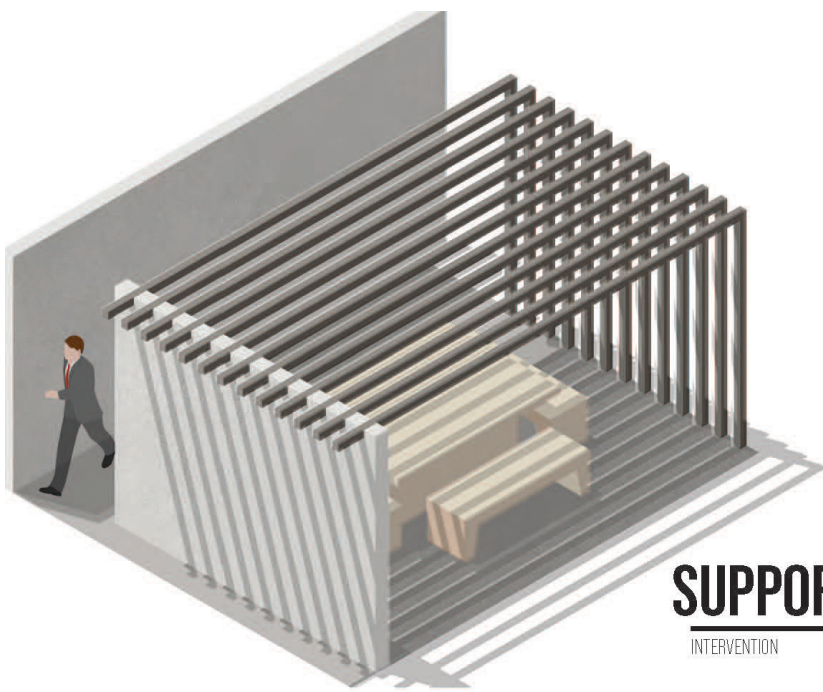
47

SUPPORT IMAGES

DRY CREEKBED + INTERVENTION



18



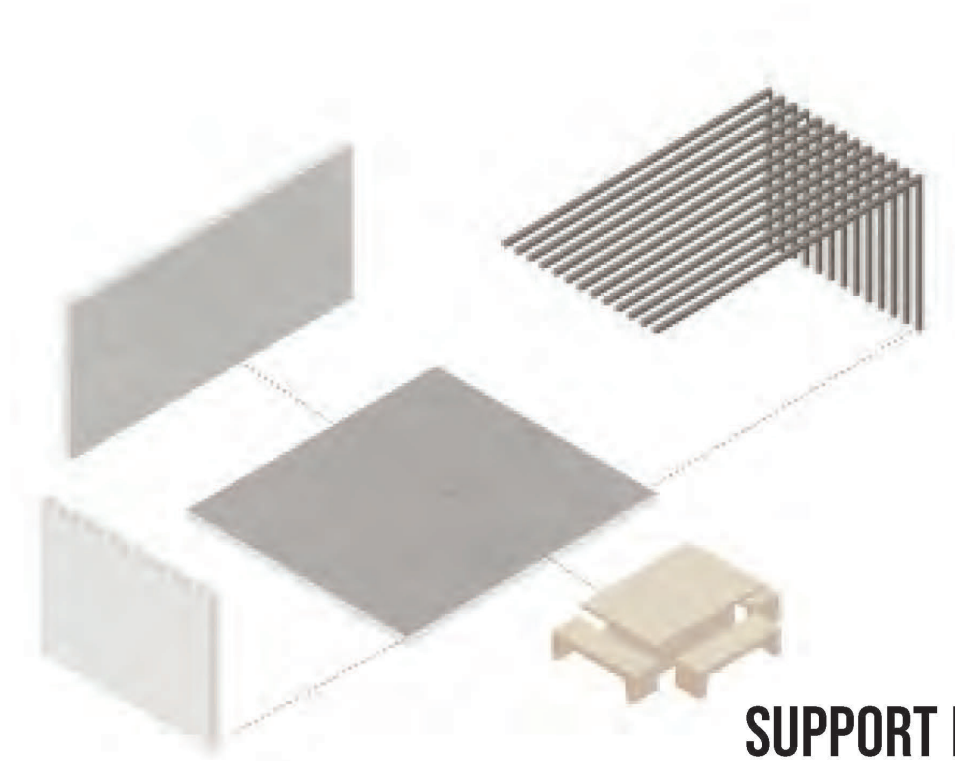


SUPPORT IMAGES

INTERVENTION

AIMS TO DEFINE A **THRESHOLD** BETWEEN THE WORKPLACE AND SURROUNDING RECREATIONAL ENVIRONMENT. FROM THE LENS OF THE ENGINEERING OFFICE, ALL THAT IS SEEN IS A SIMPLE **CONCRETE WALL**. AS YOU PEER AROUND IT, THE TIGHT DOOR REVEALS A NEW ENVIRONMENT. ONE FILLED WITH INTENTIONAL, WATER-TOLERANT PLANTINGS. THE NEW ENVIRONMENT IS BLOCKED BY THE CONCRETE WALL. A **THRESHOLD THAT CREATES SEPERATION BETWEEN THE TWO SPACES.**

04



SUPPORT IMAGES

INTERVENTION AXONOMETRIC

MANAGEMENT PLAN

BOTH MIXES TAKE A WHILE TO ESTABLISH ONCE PLANTED. TO KEEP MAINTAINED, DURING YEAR

ONE: MONITOR THE SITE. IF SITE PREPARATIONS WERE DONE CORRECTLY, NO WEEDS SHOULD OCCUR. IF THEY DO, CLIP THE SEED HEADS.

TWO: CONTINUE CLIPPING SEED HEADS

THREE: BURN EVERY THIRD YEAR IN FEBRUARY OR EARLY MARCH [THE EARLIER THE BETTER, TO REDUCE HARM]

SEED MIX MANAGEMENT

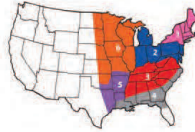
MIX 109 : SOUTHERN TALL GRASS MEADOW MIX

FULL SUN
REGIONS 3+ 5
DRY TO MEDIUM SOIL MOISTURE
6.65- 9.60 PLS POUNDS/ ACRE SEEDING RATE
PRICE OF \$51.85 PER POUND



MIX 156 : ESCAPE + TRAVEL COVER MIX

FULL SUN
REGIONS 1, 2, 3, 4, 5, 6
DRY TO MEDIUM SOIL MOISTURE
7.50-10.75 PLS POUNDS/ ACRE SEEDING RATE
PRICE OF \$69.28 PER POUND



PRICE BREAKDOWN

MIX 156 CONTAINS 1,489,192 SF = 34.16 ACRES
SEEDING 34.16 ACRES AT A RATE OF 8LBS/ ACRE = 273.28 LBS
TOTAL COST OF MIX 156: 273.28 LBS AT \$69.28/ LBS= \$18862.30

MIX 109 CONTAINS 802,219 SF = 18.42 ACRES
SEEDING 18.42 ACRES AT A RATE OF 7LBS/ ACRE = 128.94 LBS
TOTAL COST OF MIX 109: 128.94 LBS AT \$51.85/ LBS= \$6,685.54

TOTAL COST: \$25,347.60

SOURCES

<https://roundstoneseed.com/wildlife-habitat-mixes/1283-escape-and-travel-cover-mix.html>
<https://roundstoneseed.com/wildflower-meadow-mix/1014-tall-grass-meadow-mix.html>
<https://dyckarboretum.org/tag/plant-sociability/>
<https://plants.ces.ncsu.edu/plants/pinus-taeda-nana/>
<https://www.epa.gov/green-infrastructure/benefits-green-infrastructure>
<https://www.epa.gov/green-infrastructure/what-green-infrastructure>
<https://www.epa.gov/nps/urban-runoff-low-impact-development>

Connie Maxwell Bridge Park Planting Design

Kinzer Hurt - LARC 2150 - Spring 2022

The Site

The Main Campus, to the north, is separated from the Farm, in the south, by several railroad tracks



▲ The only railroad crossing on site



▲ Recently renovated pavilion

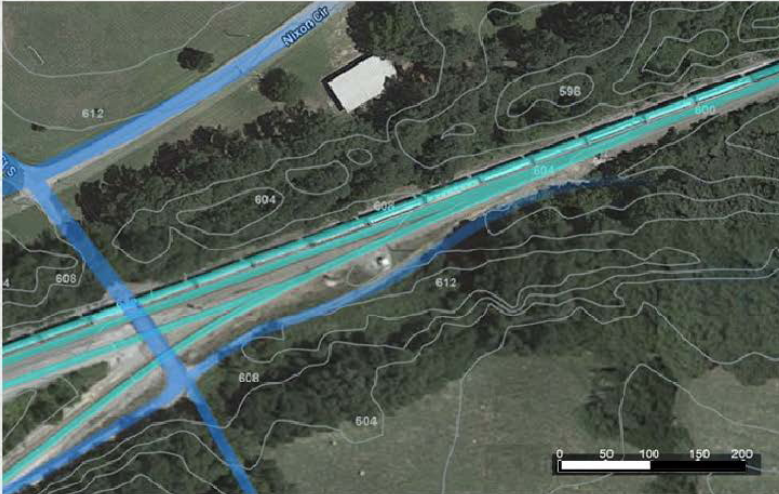


▲ Farm access road



▲ CSX Transportation right-of-way

The Site (continued)



Topographic map and circulation diagram ▲



▲ The site contains Cecil sandy loam



▲ Shaded relief terrain map

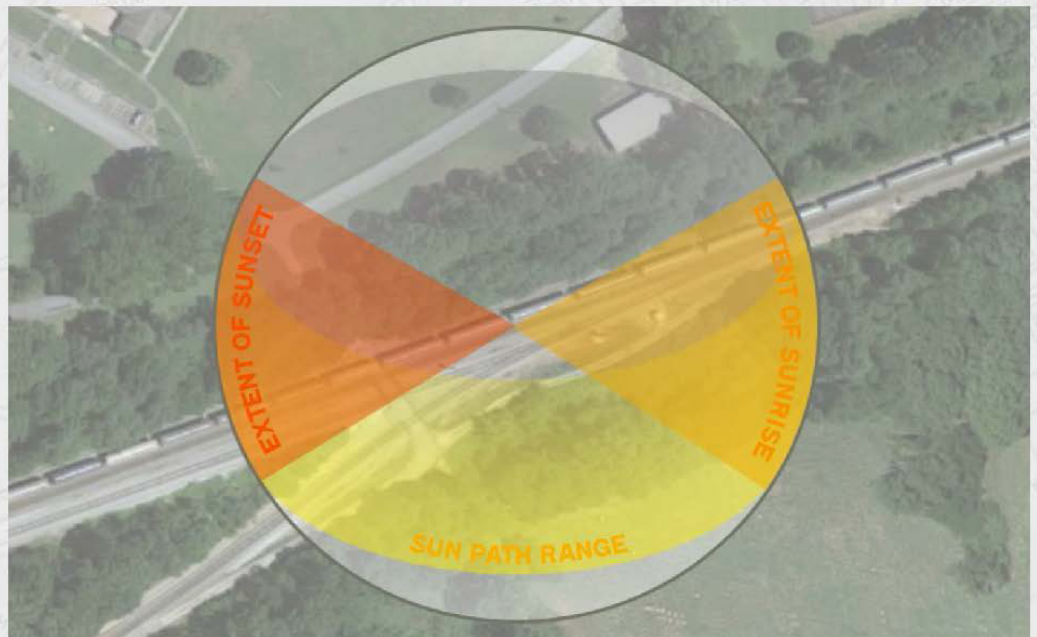
The Site (continued)

The sun reaches its peak between 12:30 and 2:30pm throughout the year.

Summer Solstice: appx. Jun 21

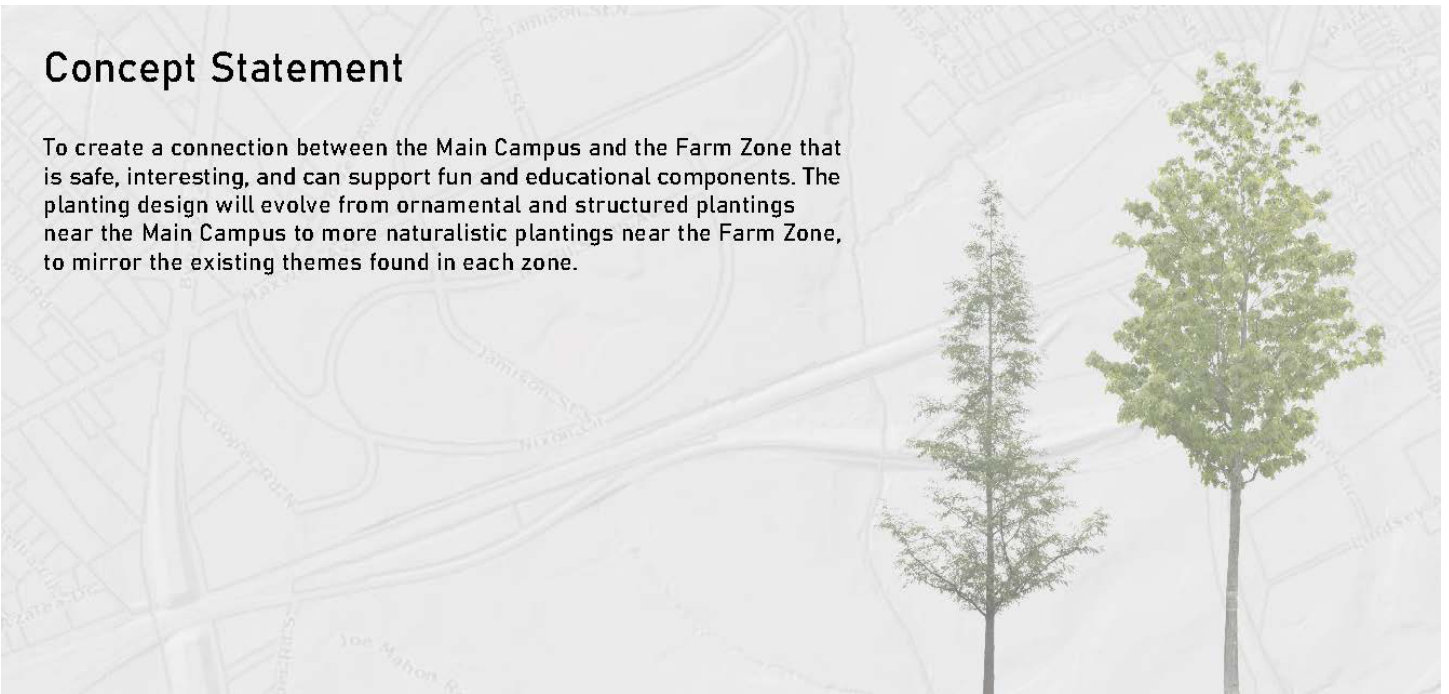
Winter Solstice: appx. Dec 21

Sun analysis diagram ►



Concept Statement

To create a connection between the Main Campus and the Farm Zone that is safe, interesting, and can support fun and educational components. The planting design will evolve from ornamental and structured plantings near the Main Campus to more naturalistic plantings near the Farm Zone, to mirror the existing themes found in each zone.

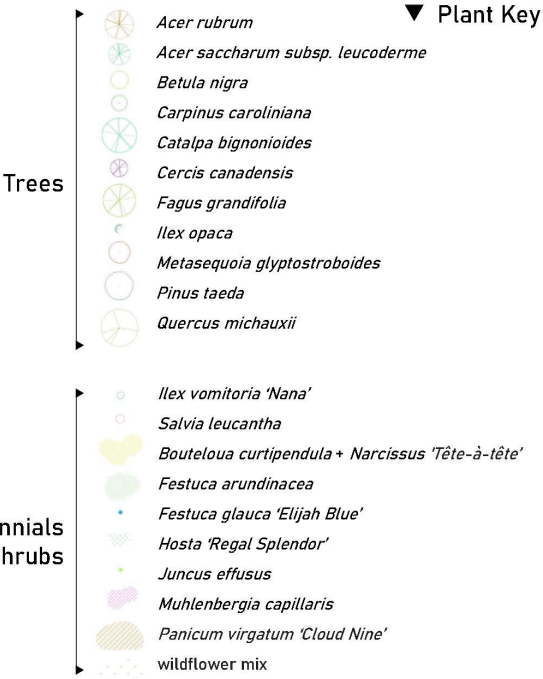
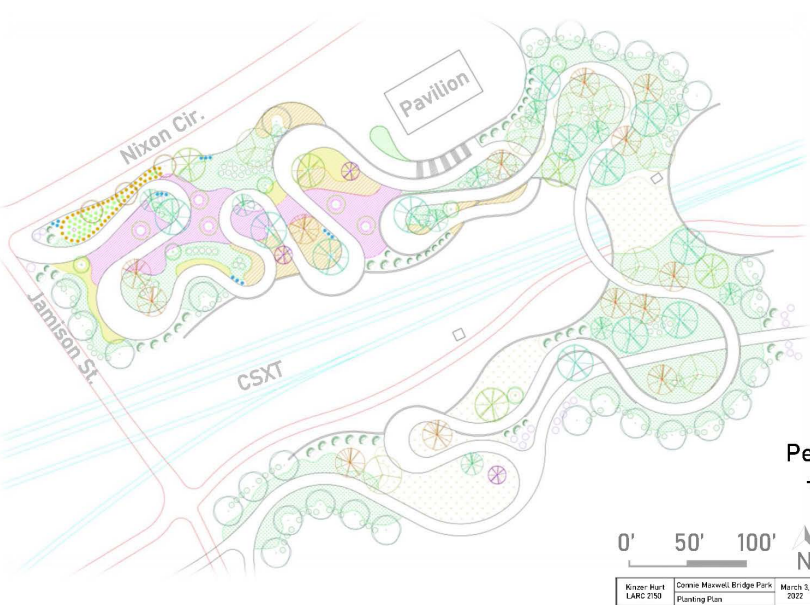


Master Plan

The park contains a series of looping trails that gain elevation and cross over the railroad tracks via a pedestrian bridge and wildlife bridge. The trail in the park leads to a larger network that circles the Farm Zone and connects to Greenwood's existing greenway system.



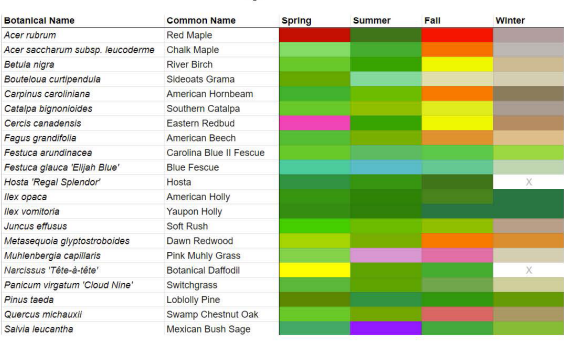
Planting Diagram



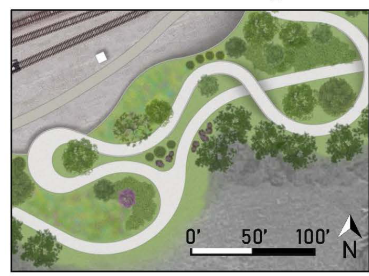
Planting Schedule

Botanical Name	Common Name	Quantity	Size
Trees:			
<i>Acer rubrum</i>	Red Maple	13	2" CAL
<i>Acer saccharum subsp. leucoderme</i>	Chalk Maple	10	2" CAL
<i>Betula nigra</i>	River Birch	5	2" CAL
<i>Carpinus caroliniana</i>	American Hornbeam	6	2" CAL
<i>Catalpa bignonioides</i>	Southern Catalpa	12	3" CAL
<i>Cercis canadensis</i>	Eastern Redbud	3	2" CAL
<i>Fagus grandifolia</i>	American Beech	5	3" CAL
<i>Ilex opaca</i>	American Holly	45	2" CAL
<i>Metasequoia glyptostroboides</i>	Dawn Redwood	3	2" CAL
<i>Pinus taeda</i>	Loblolly Pine	28	2" CAL
<i>Quercus michauxii</i>	Swamp Chestnut Oak	8	3" CAL
Shrubs:			
<i>Ilex vomitoria</i> 'Nana'	Yaupon Holly	185	5 GAL
<i>Salvia leucantha</i>	Mexican Bush Sage	21	5 GAL
Perennials:			
<i>Bouteloua curtipendula</i>	Sideotsa Grama	1321	1 GAL
<i>Festuca arundinacea</i>	Carolina Blue II Fescue	392 43 R*	
<i>Festuca glauca</i> 'Elijah Blue'	Blue Fescue	15	1 GAL
<i>Hosta</i> 'Regal Splendor'	Hosta	2860	1 GAL
<i>Juncus effusus</i>	Soft Rush	35	1 GAL
<i>Muhlenbergia capillaris</i>	Pink Muhly Grass	1241	1 GAL
<i>Narcissus</i> 'Tête-à-tête'	Botanical Daffodil	881	1 GAL
<i>Panicum virgatum</i> 'Cloud Nine'	Switchgrass	795	1 GAL
Seed Mixes:			
<i>Echinacea purpurea</i>	Purple Coneflower	15.28%	
<i>Coreopsis leucocoma</i>	Lance Leaved Coreopsis	11.90%	
<i>Glycosiphia elegans</i>	Annual Baby's Breath	11.90%	
<i>Linum grandiflorum rubrum</i>	Scarlet Flax	11.90%	
<i>Cosmos sulphureus</i> 'Bright Lights'	Sulphur Cosmos	7.93%	
<i>Lupinus perennis</i>	Perennial Lupine	7.93%	
<i>Mirabilis jalapa</i>	Formula mix Four-O'clock	7.93%	
<i>Salvia coccinea</i>	Saville Sage	7.93%	
<i>Lavatera trimetris</i>	Tree Malva	5.95%	
<i>Gaillardia puchella</i>	Indian Blanket	3.97%	
<i>Gaura lindheimeri</i>	Gaura	1.98%	
<i>Rudbeckia amplexicaulis</i>	Clasping Coneflower	1.98%	
<i>Rudbeckia fulgida</i>	Black-Eyed Susan	1.31%	
<i>Coreopsis tinctoria</i>	Plains Coreopsis	0.99%	
<i>Aster novae-angliae</i>	New England Aster	0.52%	

Seasonal Diagram



▲ Site Enlargement 1



▲ Site Enlargement 2

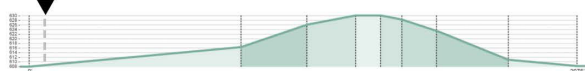
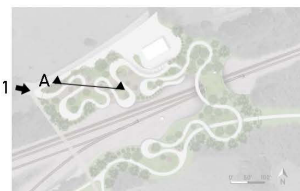


-  *Betula nigra*
River Birch
-  *Cercis canadensis*
Eastern Redbud
-  *Muhlenbergia capillaris*
Pink Muhly Grass

▼ Perspective 1

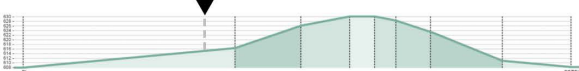
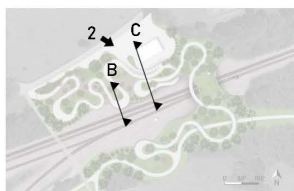
Section A

The beginning of the park is very ornamental and structured, with eye-catching plants and beautiful colors. Many of the ornamental plants contain pink tones, to make the garden feel especially child-friendly. As the lowest part of the park, the entrance also includes a bioretention area.



Section B

-  *Pinus taeda*
Loblolly Pine
-  *Catalpa bignonioides*
Southern Catalpa



The pavilion area contains a small patch of fescue for lawn games. The plantings in this part of the park are becoming less ornamental and blending in better with the existing flora.



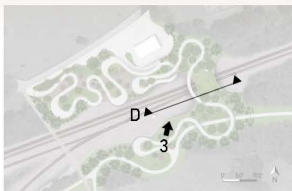
Section C



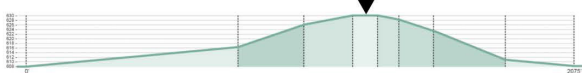
Perspective 2 ►



Section D



The bridge over the tracks has both a pedestrian component and a natural component. The natural bridge has a wildflower field, rather than trees, due to the shallow soil. The wildflower motif continues to permeate through the forested areas on the Farm Zone side of the park.



Perspective 3 ►



Acer rubrum
Red Maple



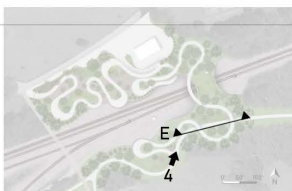
Quercus michauxii
Swamp Chestnut Oak



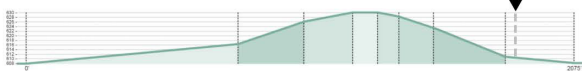
Salvia leucantha
Mexican Bush Sage

▼ Perspective 4

Section E



The Farm Zone is almost entirely simulated forest, with trees typical of South Carolina. There are some flowering shrubs and one ornamental tree where the park trail meets the downtown connector.

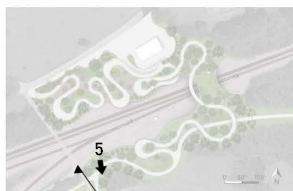




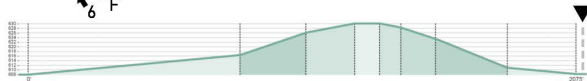
Perspective 5 ▲



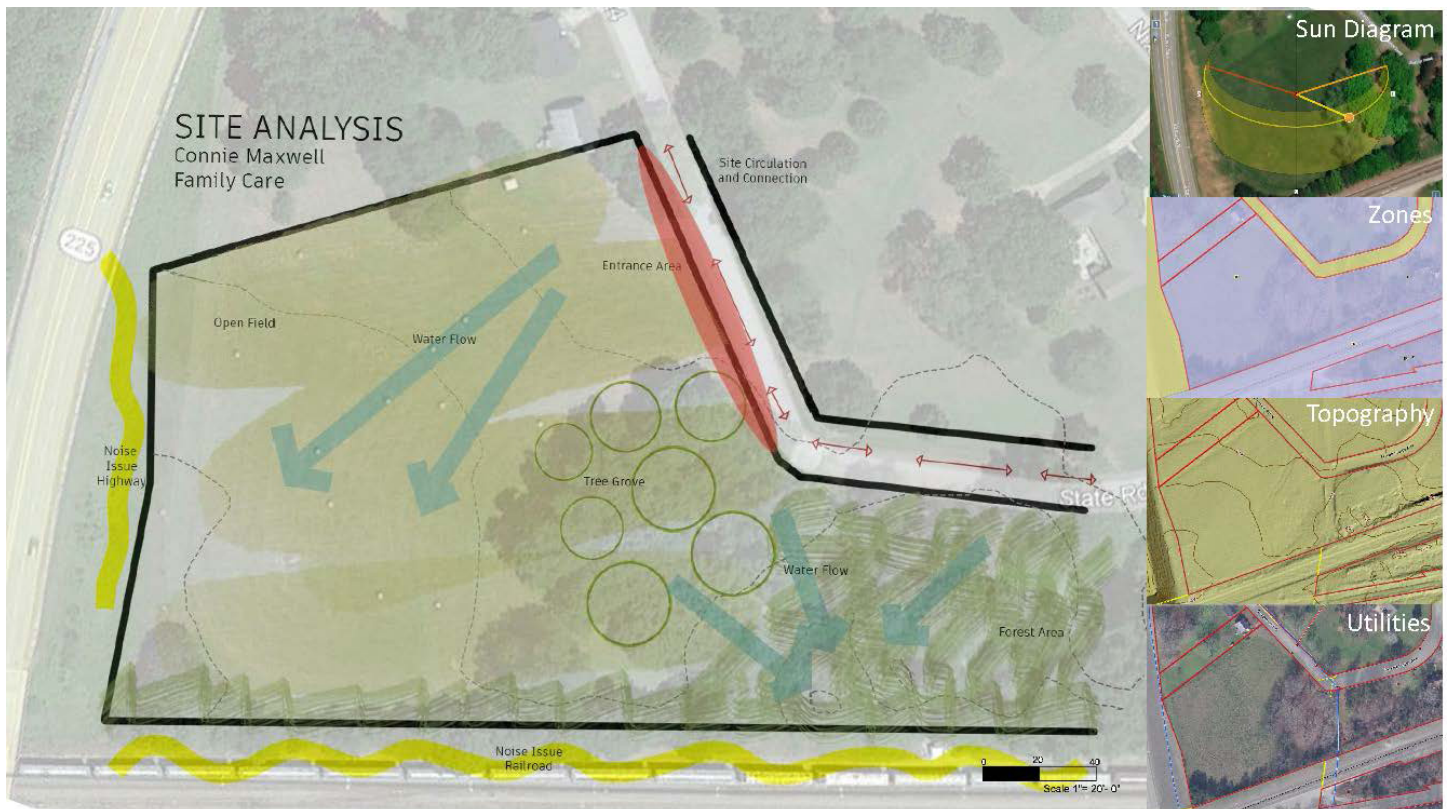
▲ Perspective 6



The Jamison Park trail (0.5 mi) eventually reaches the Farm Zone and does a wide loop around the property. This part of the trail (1.0 mi) is more naturalistic.



Section F



PLANS



CONCEPT STATEMENT

With a courtyard already in place, the planting design to be implemented is designed in such a way to draw the user in and create a feeling of safety and comfort. The entrance will be lined with smaller Dogwoods and Redbuds in order to create an obvious entrance and lead the user into the site, with wonderful colors in the spring and fall. These trees also create a buffer between the road and the site. Within the courtyard are a variety of perennials to draw interest through color and pollinators, while also providing and educational opportunity for the children. From a functionality standpoint, they create buffers between seating areas and walkways to make the user feel safe so that no one will walk up directly behind them. Overall, the planting design is very simple, yet functional in its purposes.

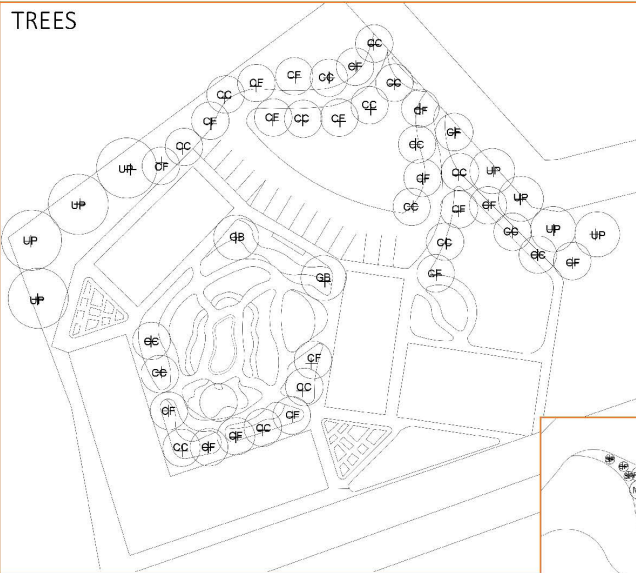


SEASONAL DIAGRAM

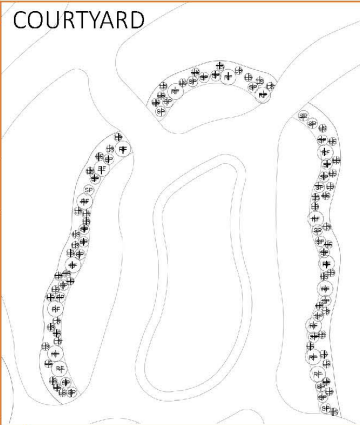
Type	Botanical Name	Common Name	Winter	Spring	Summer	Fall
Perennials						
	<i>Echinacea purpurea</i>	Purple Coneflower				
	<i>Leucanthemum x superbum</i>	Shasta Daisy				
	<i>Rudbeckia fulgida</i>	Black-Eyed Susan				
	<i>Solidago rugosa</i>	Rough Goldenrod				
	<i>Symphoricarpos patens</i>	Late Purple Aster				
Shrubs						
	<i>Ilex vomitoria</i>	Yaupon Holly				
Grasses						
	<i>Muhlenbergia capillaris</i> "White Cloud"	White Cloud Muhly Grass				
Trees						
	<i>Cercis canadensis</i>	Eastern Redbud				
	<i>Cornus florida</i>	Flowering Dogwood				
	<i>Ginkgo biloba</i>	Maidenhair Tree				
	<i>Ulmus parvifolia</i>	Chinese Elm				

SYMBOLIC PLANS

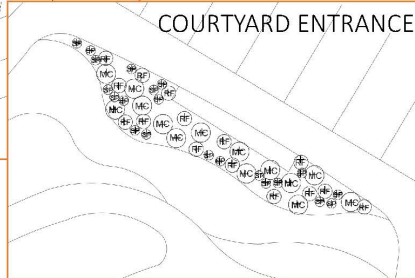
TREES



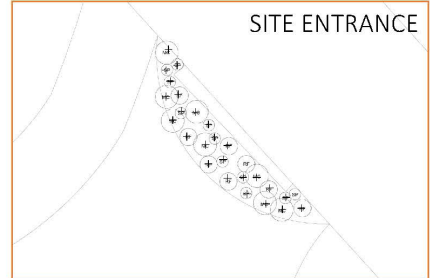
COURTYARD



COURTYARD ENTRANCE

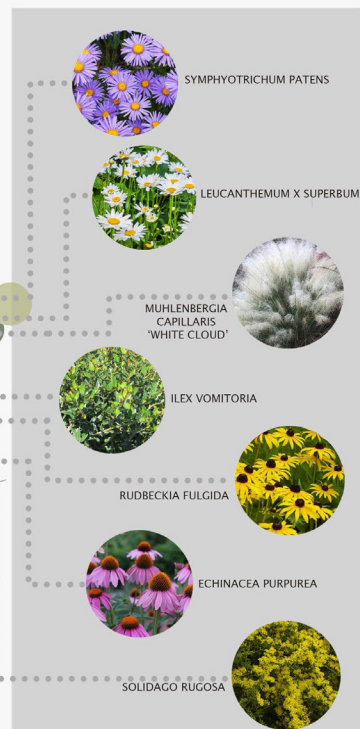
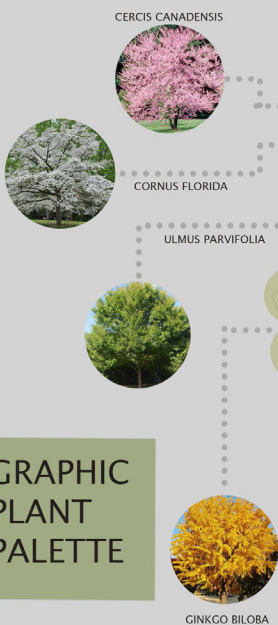


SITE ENTRANCE

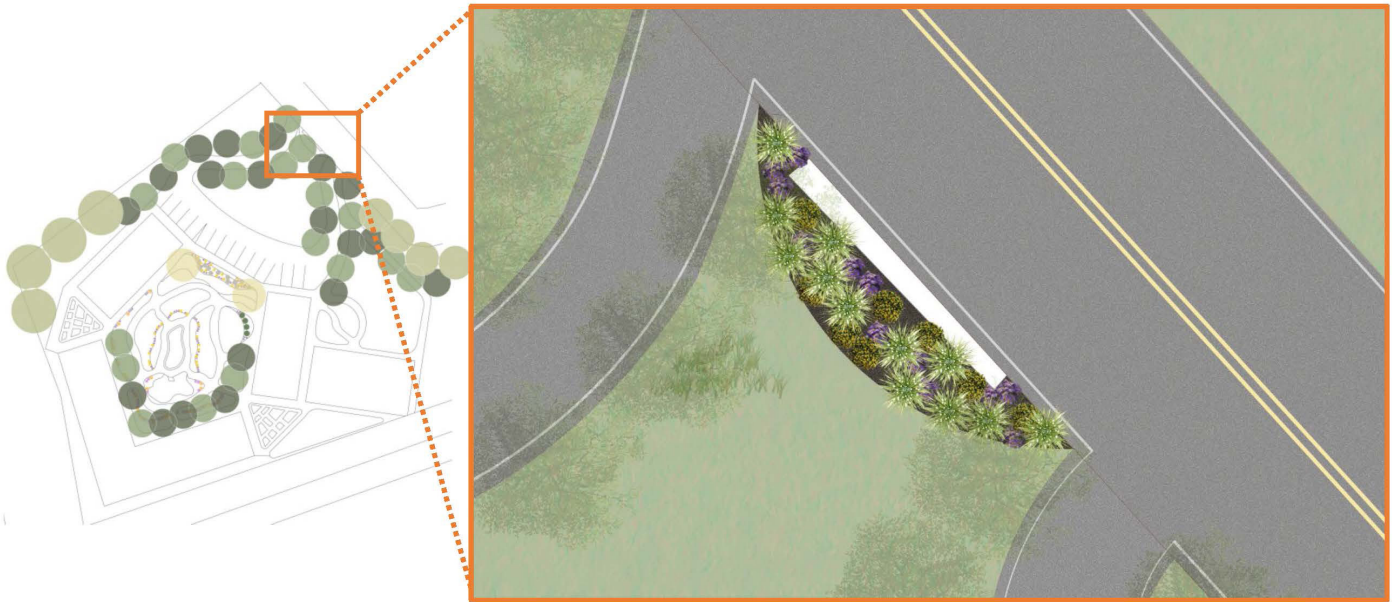


Type/Symbol	Botanical Name	Common Name	Quantity	Size	Notes
Perennials					
EP	<i>Echinacea purpurea</i>	Purple Coneflower	25	1 gallon	Spacing as shown
LS	<i>Leucanthemum x superbum</i>	Shasta Daisy	49	1 gallon	Spacing as shown
RF	<i>Rudbeckia fulgida</i>	Black Eyed Susan	41	1 gallon	Spacing as shown
SR	<i>Solidago rugosa</i>	Rough Goldenrod	25	1 gallon	Spacing as shown
SP	<i>Symphyotrichum patens</i>	Late Purple Aster	85	1 gallon	Spacing as shown
Shrubs					
IV	<i>Ilex vomitoria</i>	Yucca Holly	4	5 gallon	Spacing as shown
Grasses					
MC	<i>Muhlenbergia capillaris</i>	White Cloud Muhly Grass	29		Spacing as shown
Trees					
CC	<i>Cercis canadensis</i>	Eastern Redbud	18	2" caliper	Spacing as shown
CF	<i>Cornus florida</i>	Flowering Dogwood	19	2" caliper	Spacing as shown
GB	<i>Ginkgo biloba</i>	Maidenhair Tree	2	2" caliper	Spacing as shown
UP	<i>Ulmus parvifolia</i>	Chinese Elm	8	2" caliper	Spacing as shown

GRAPHIC PLANT PALETTE



SITE ENTRANCE PLANTING



LEGEND



Muhlenbergia capillaris 'White Cloud'



Rudbeckia fulgida



Symphyotrichum patens



Cercis canadensis



Rudbeckia fulgida



Symphyotrichum patens



Muhlenbergia capillaris 'White Cloud'

SITE ENTRANCE



COURTYARD ENTRANCE PLANTING



LEGEND



Muhlenbergia capillaris 'White Cloud'

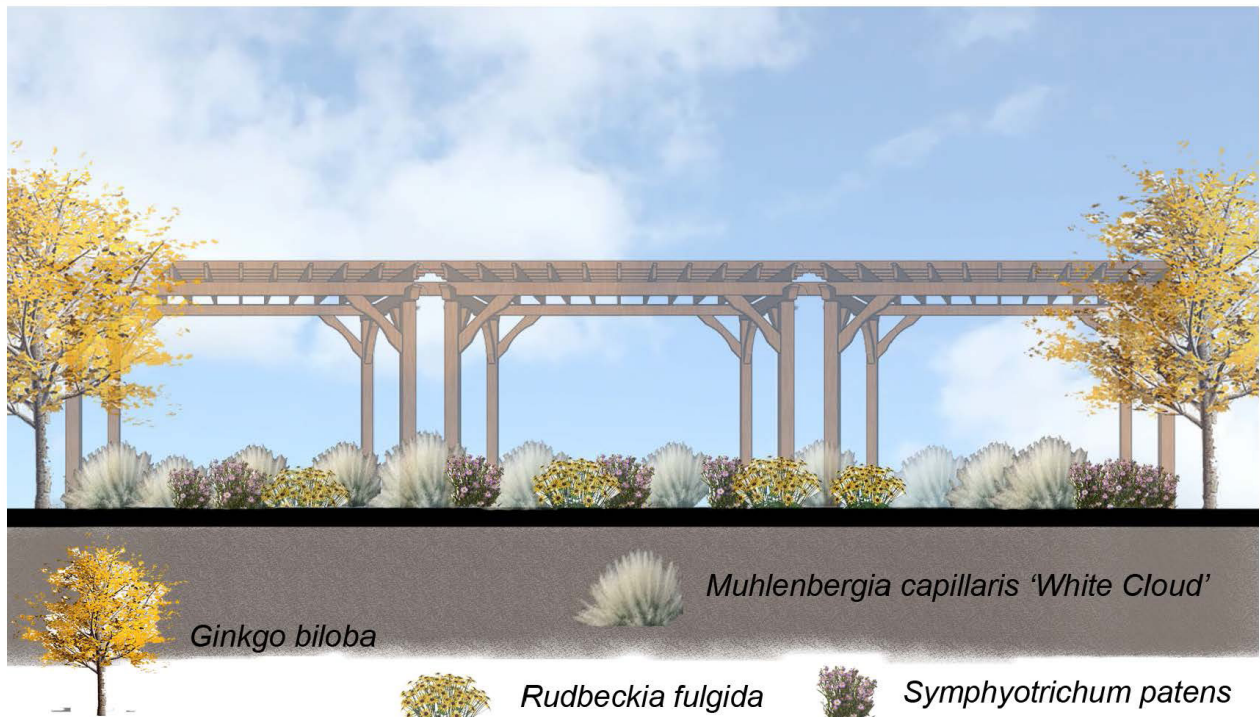


Rudbeckia fulgida

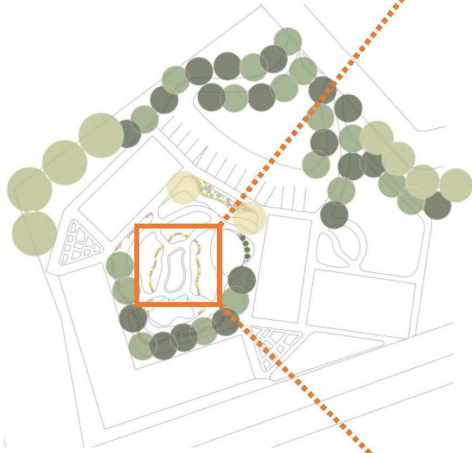


Symphyotrichum patens

COURTYARD ENTRANCE SECTION



COURTYARD PLANTING



LEGEND



Rudbeckia fulgida



Symphyotrichum patens



Leucanthemum x superbum