A Woodland Landscape

Acknowledgements

I would like to thank my family for the support they have given to me throughout this masters program. Also, to professors Rod Barnett and Charlene LeBleu for all their help along the way.

A Woodland Experience

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Research Question

How can a woodland landscape be achieved within a degraded urban river environment?

Abstract

This project follows the design process of a woodland landscape in Columbus, Georgia. Woodlands provide ecological and aesthetic values to urban environments, which makes them necessary for a healthy city. The center point of the design is around Weracoba Creek, which is partial piped underground. The daylighting of this section will provide a destination point for visitors. The project is set up in progression, we as one moves closer to the creek, tree density will increase. This ordering system set up a grid pattern where trees are placed accordingly. Other similar ordering systems were used to position trails, understory shrubs, and rocks, all of which increase the woodland experience. Plant selection was based upon existing conditions of the site, which will provide for optium growth. The final design will provide a woodland landscape in a degraded section of Columbus, using native vegetation to reestablish the forest footprint of what was once there.

Introduction

In North America, the deciduous forest is among our daily views in our everyday lives. Over the years, the forest has become a patchwork of remnants of what once covered the eastern part of the United States. While the deciduous forest is predominantly composed of deciduous hardwood species, it also includes a mix of numerous conifer and evergreen hardwoods. "It is a place of intense recycling and reuse, and because of this, the organic soils of the deciduous forest are often deep and rich" (Darke 2002). This provides an endless cycle of plant life where each season new and beautiful things are brought into existence. The woodlands provide an aesthetic beauty that can change from season to season. The sunlight streaming through the canopies, the fragrance of spring flowers, and the sound of wind blowing in the trees provide an escape from everyday life.

This project tries to capture this essence of the woodland and bring it to downtown Columbus, GA. Columbus has covered up any trace of what was once there. It has become a hot and bare city where buildings have taken the place of trees. Weracoba Creek, which once flowed openly through the downtown district, has now become encased within a culvert and in one location buried underground. This project will bring life back to the underground portion of the creek by providing a woodland experience around this section.

"Trees are indicators of a community's ecological health" ("Urban Forests"), so with that being said, Columbus is in poor health. Urban Forestry can be any tree cover across an urban area, so in this way, this project is considered an urban forest with aspects of stream enhancement. Urban forests reduce stormwater runoff, increase air and water quality, store and sequester atmospheric carbon, and reduce energy consumption due to direct shading of buildings. This project will provide all aspects of urban forests, but also give the people of Columbus a place to get away.

Over the years, the Columbus forest has been reduced to remnants, especially in the downtown district. This project will bring back the woodland footprint around Weracoba Creek. Planting a woodland will cool the area by providing shade and also filter air pollutants discharged from the industrial area. Trees are important to human psychic health, and studies have shown "people are more inclined to get outdoors and exercise when their surroundings are greener" ("Tree Benefits") Woodlands are important to cities because they make the community more livable, while providing softer edges in a concrete world.

Chapter 1

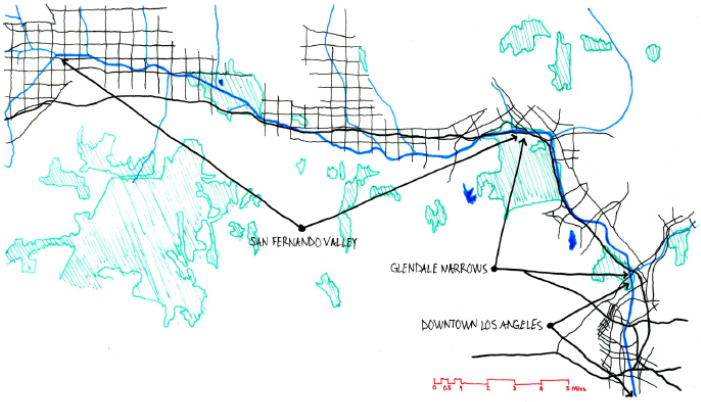
Site Context + Histories + Analysis

LA River Revitalization Plan

Precedent Study

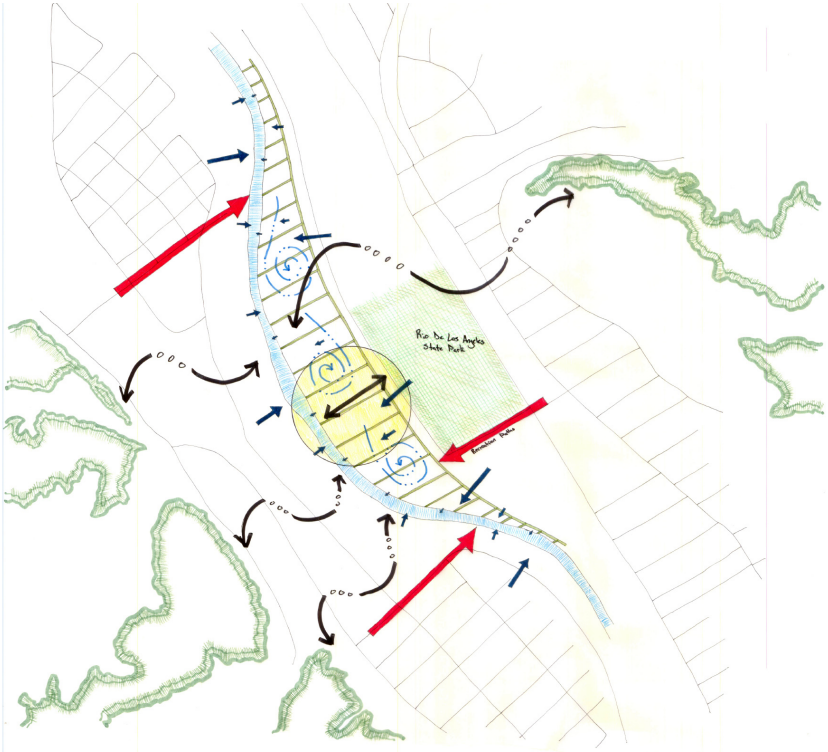
LA River

Existing picture of the LA River



The plan calls for a 51-mile stretch of the river to be designed; reaching from the San Fernando Valley to downtown Los Angeles.

The Los Angeles River Revitalization Plan is a way to reconnect the river back to the community by restoring its riparian zones, water quality, and native vegetation. I chose this project to study in order to understand how the designers' plan to bring people back to the river. As of now, the river is situated within a concrete swale with most, if not all, existing vegetation removed. The plan calls for 'green installation' around the river. Street trees will be used to connect the river back to existing woodland stands. The riparian zone will be reestablished around the river. The installation of pocket parks will be used to bring people to the river. Native vegetation will be planted within the design.



This diagram shows the relationships between the existing terrain and the plan for the new LA River. Riparian zones catch and clean runoff, and the implementation of new vegetation will connect with the existing vegetation already on site.

Site Selection

Site selection was based on a series of requirements set forth from precedent studies. The requirements included: a creek/ river situated within an artificial corridor; located within an urban environment; and lacked native vegetation within the riparian zones.

Savannah, GA

Images courtesy of Goolge Images

The first site that was studied was Savannah, Georgia. This site did meet the requirements of the precedent study, but the distance that needed to be traveled to reach it was too great, making it difficult to conduct site analysis on a regular basis.

Columbus, GA

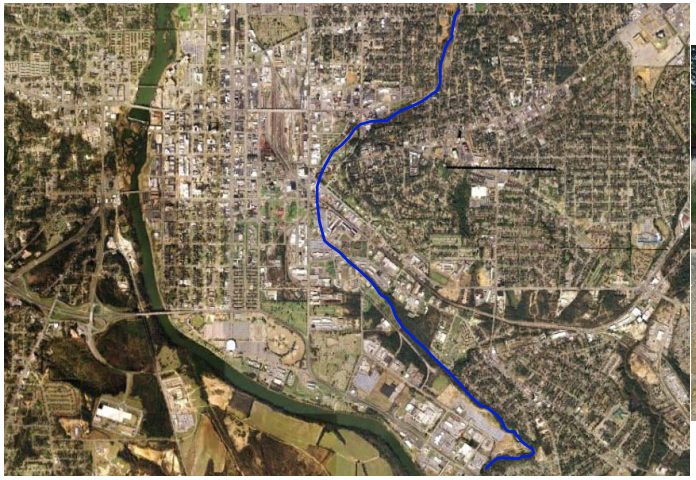
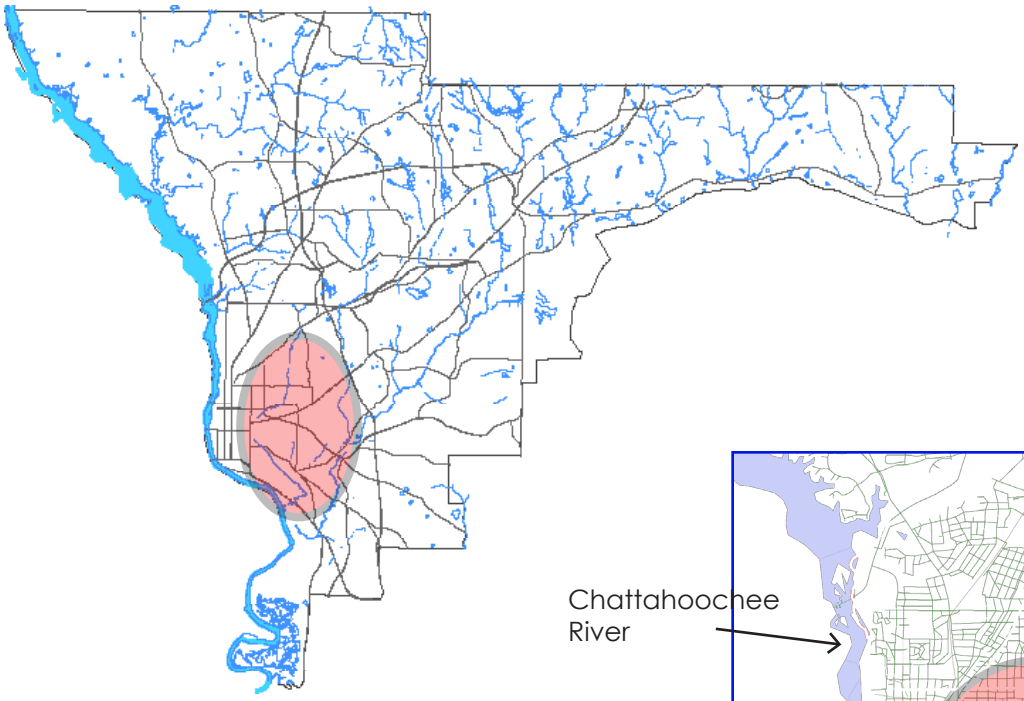


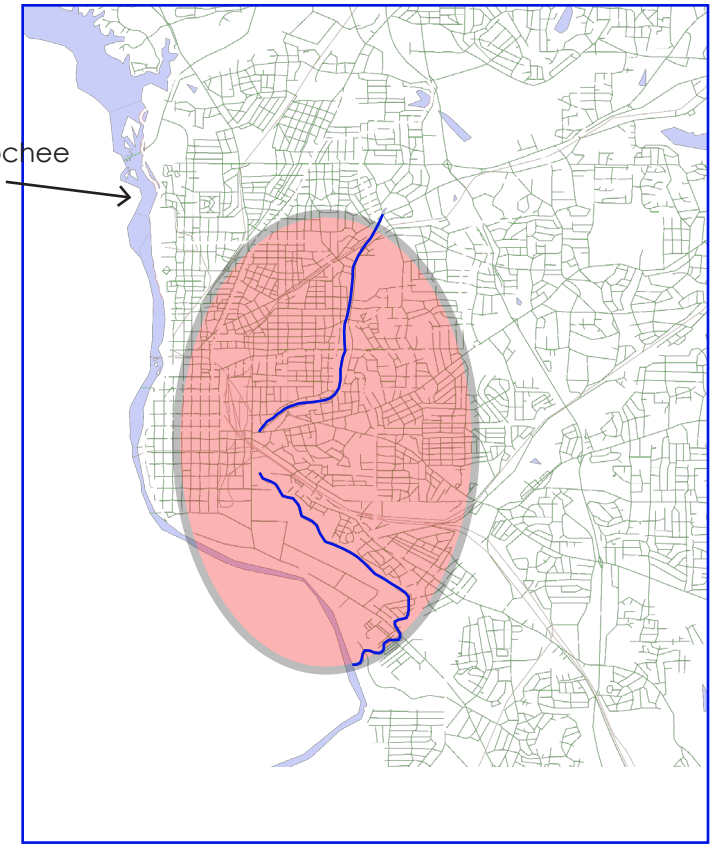
Image courtesy of Goolge Images

The second site that was studied is in Columbus, GA. This site also met the requirements that were set up, and only a short drive away. The creek is a little smaller and flows through industrial, residential, and commercial zones. Also, there are small pocket parks surrounding the creek which give potential areas to work with in order to achieve the design.

Site Context



Chattahoochee River

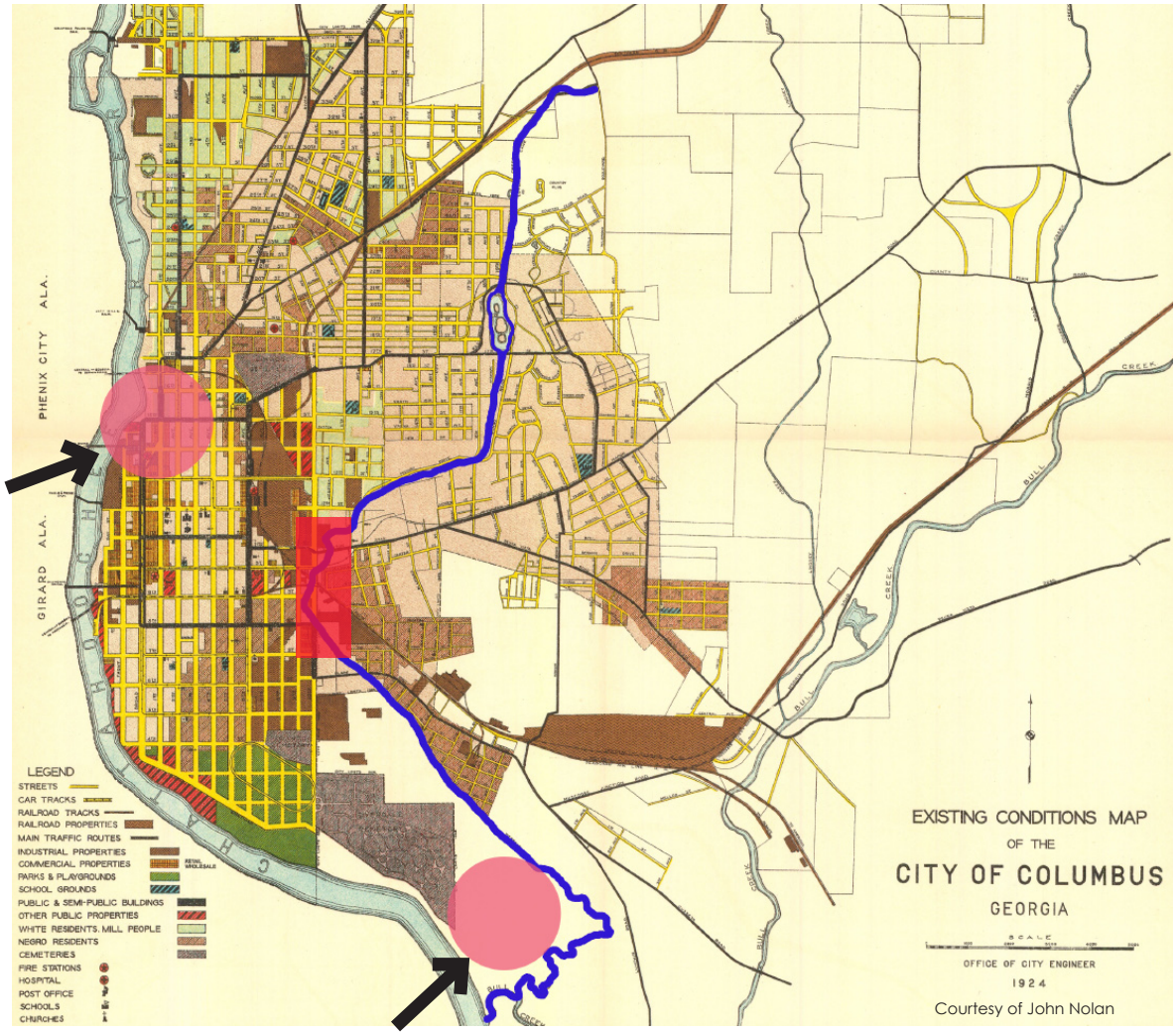


The site chosen for this thesis project is Weracoba Creek in Columbus, Georgia. Columbus lies on the most western side of Georgia along the Chattahoochee River. It is located in Muscogee County, which is the seventh most populated county in Georgia, according to the most recent census data. The map above shows where downtown Columbus lies within the county. The map to the left shows where Weracoba Creek flows in relation to the downtown district of Columbus.

Site Context cont'd

An aerial perspective shows the downtown district of Columbus around Weracoba Creek. It indicates where the headwater of the creek rises, flowing southwards, before it empties into the Chattahoochee River. The map shows a vegetative cover disconnect on the east and west sides of Weracoba Creek in the section where it is piped underground. This area will become the center point for the design.

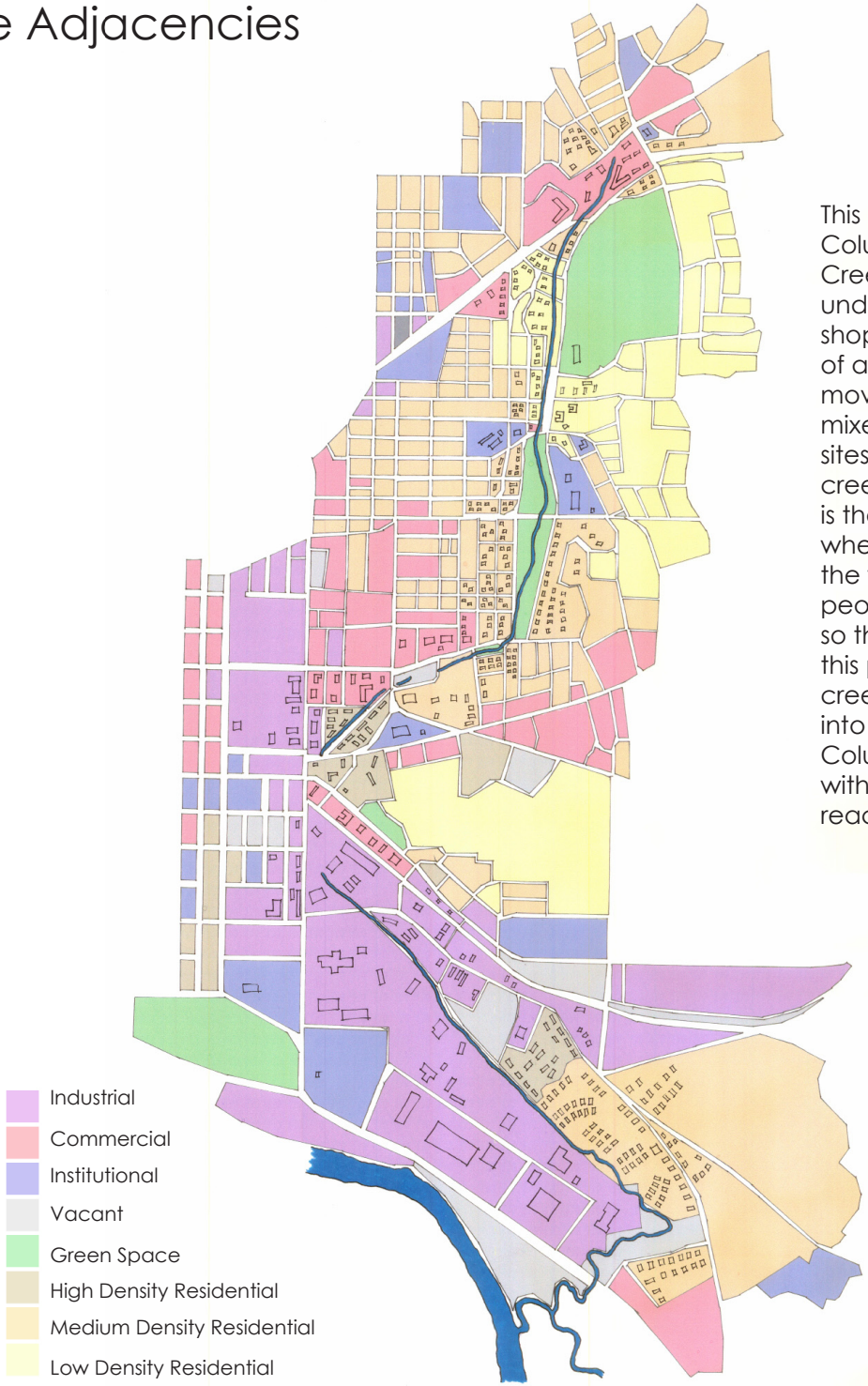
Site Histories



Courtesy of John Nolan

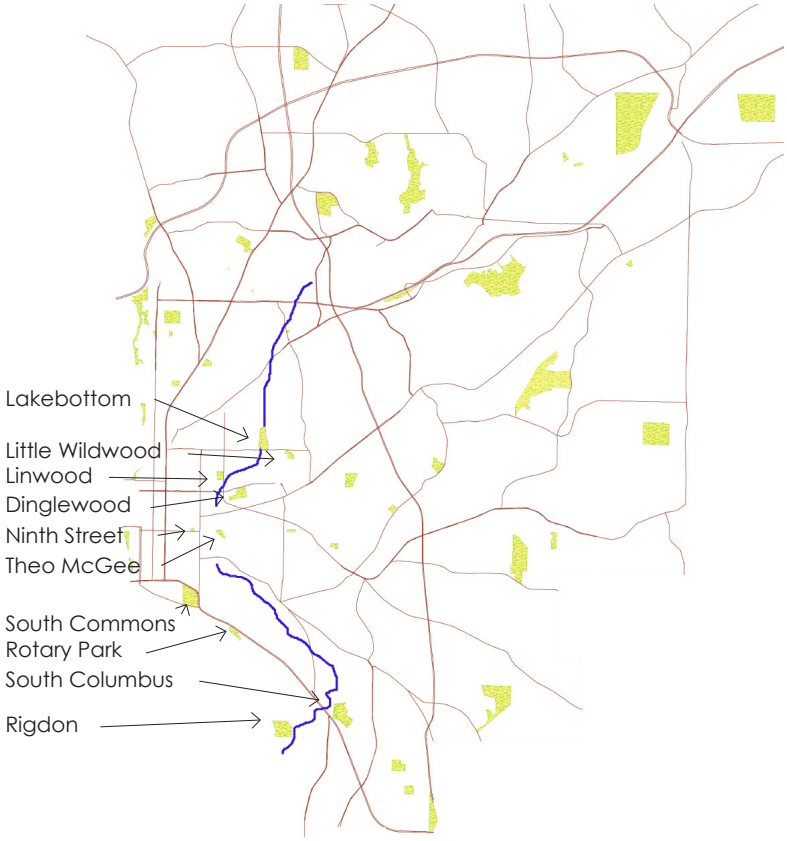
This 1924 historic map of Columbus, composed by John Nolan, shows how the original zoning districts were distributed. It also indicates where Weracoba Creek originally flowed before it was diverted and piped underground (the red rectangle). Columbus was a major Creek Indian site before the Europeans arrived and pushed them westward. The pink circles highlight where two Creek towns were once established, the Cussetas and the Cowetas. The Creek Indians were known as 'woodland people,' meaning that they lived off the forest for every aspect of daily life. As the built environment, which stands today, began to emerge, the woodlands that once covered this region began to diminish. Returning the woodlands to Columbus will engage a history that goes further back than most of its citizens.

Site Adjacencies

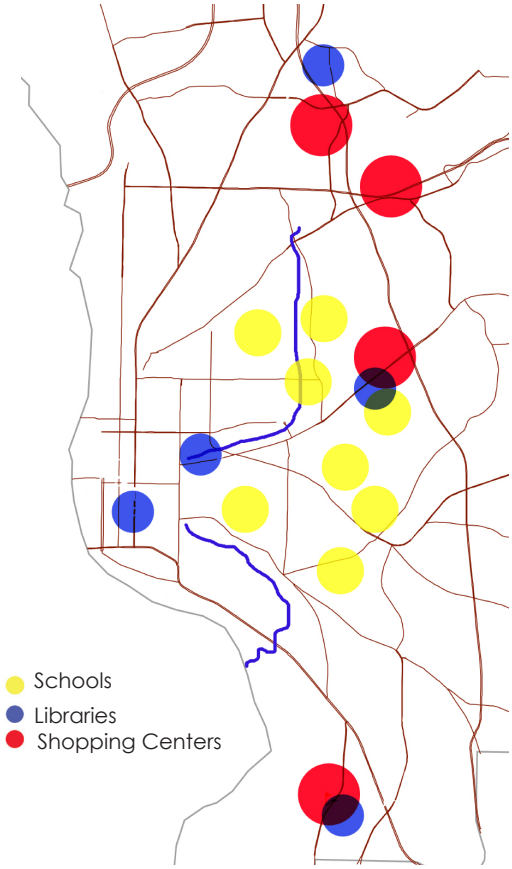


This is a zoning map of downtown Columbus surrounding Weracoba Creek. The headwaters is situated underneath a commercial shopping center, where it flows out of a concrete pipe. From here it moves through residential housing mixed in with some commercial sites. Also within this section, the creek flows through a park, which is the only section of the creek where people can interact with the water. In the downtown district people do not have a spot to visit, so they have to travel upstream to this park. From the point where the creek flows underground, it moves into a large industrial zone of Columbus, where it is situated within an artificial corridor before reaching the Chattahoochee.

Site Adjacencies cont'd



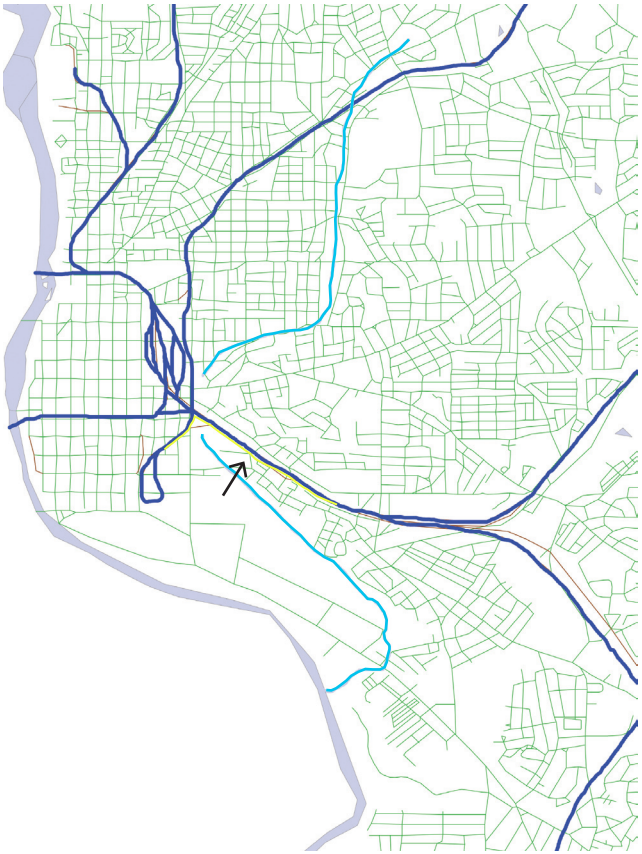
This map shows where all existing parks are located around the downtown area of Columbus. Some of the these parks have been reduced to grassed lot, while others are managed and maintained. Ninth Street Park will be incorporated into the design, enabling the woodland to be brought closer into the downtown district.



This map shows where schools, libraries, and large shopping centers are located around downtown Columbus. These are areas where people congregate. By situating the design in close proximity to these densities, it will attract people that are already within the area.

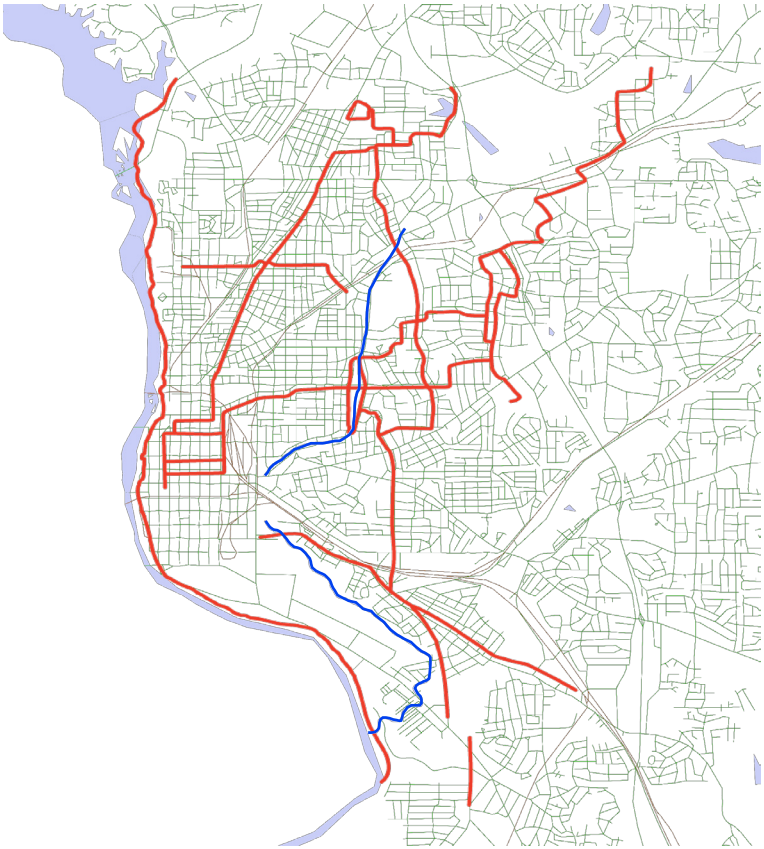
Site Circulation

Railroads



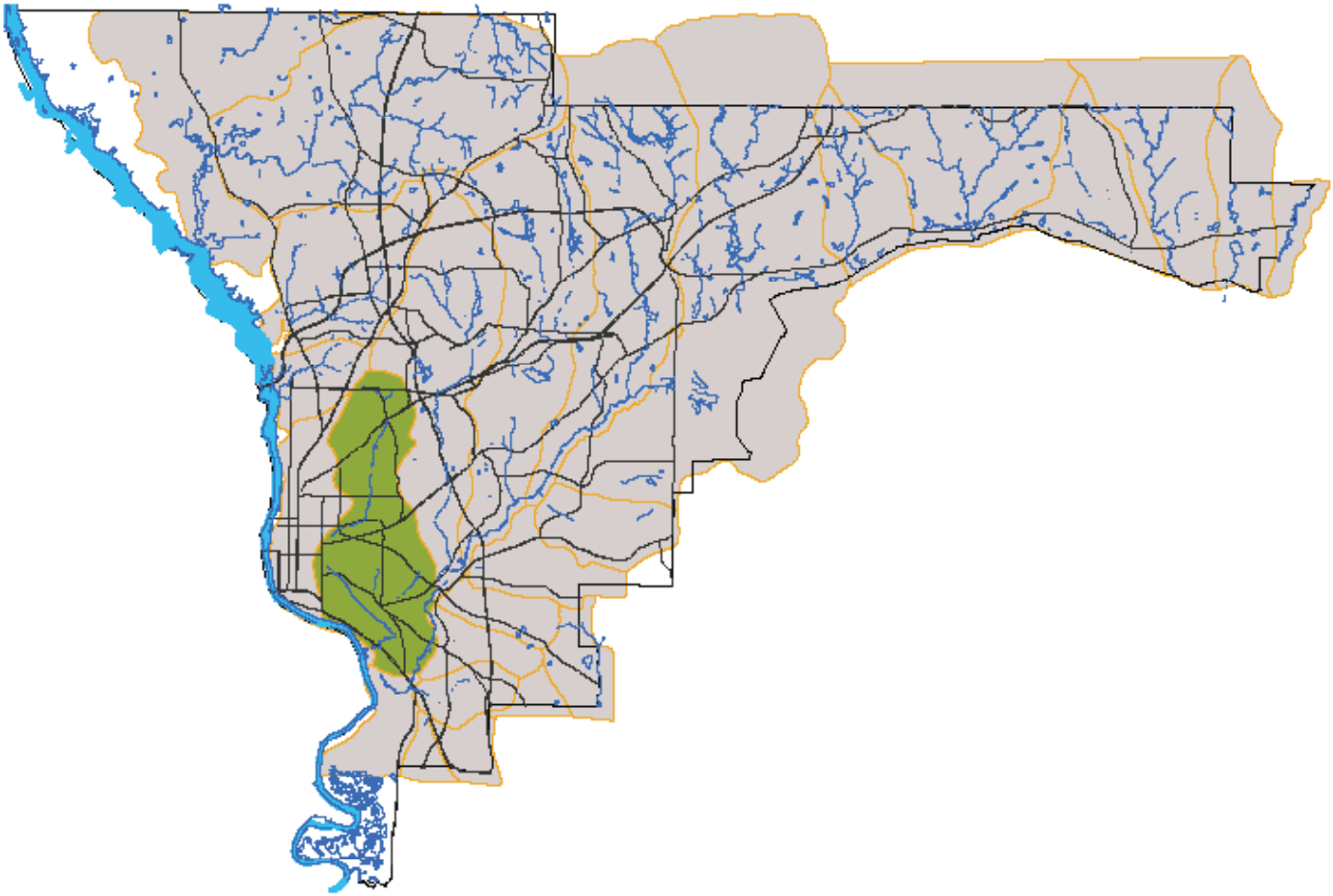
This map shows the existing railroads that cross through the downtown of Columbus. The highlighted line shows one line of the railroad that is not in use, which will be converted into a walking trail connecting the far east part of the site back to the center.

Bike Routes



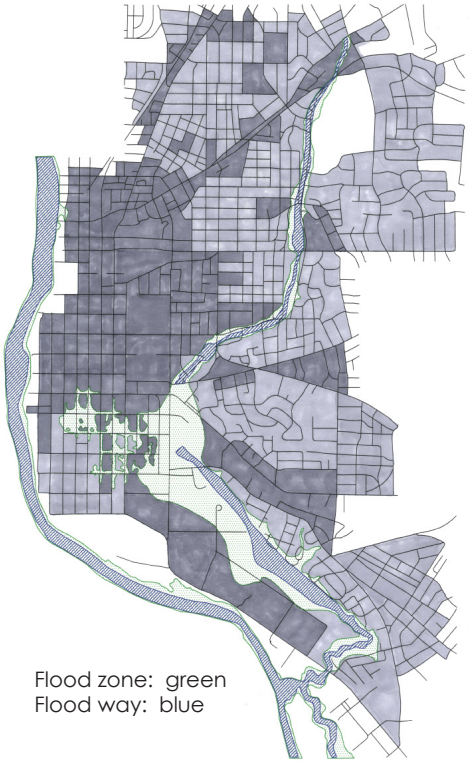
This map shows the existing bike routes around Columbus. Some around the downtown are situated on the road, where others have their own path. The most well-known route is located along the Columbus River Walk, which follows the riverbank of the Chattahoochee. This shows where people are currently traveling.

Site Hydrology



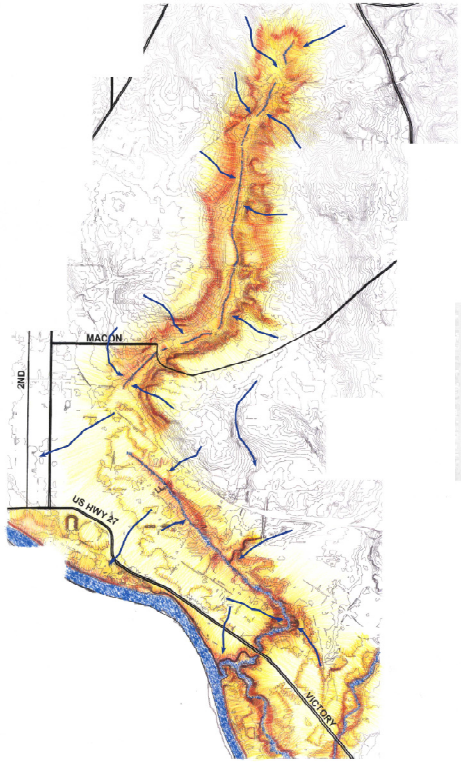
The hydrology map shows the various rivers, streams, and creeks of Muscogee County. Muscogee County is situated within the Bull Creek watershed, which is the creek directly to the east of Weracoba. The two creeks join up before reaching the Chattahoochee River. Within this large watershed are numerous sub-watersheds. The highlighted area is the Weracoba sub-watershed, which includes Weracoba Creek. This map shows how much of Columbus' downtown runoff flows into Weracoba Creek.

Site Hydrology cont'd



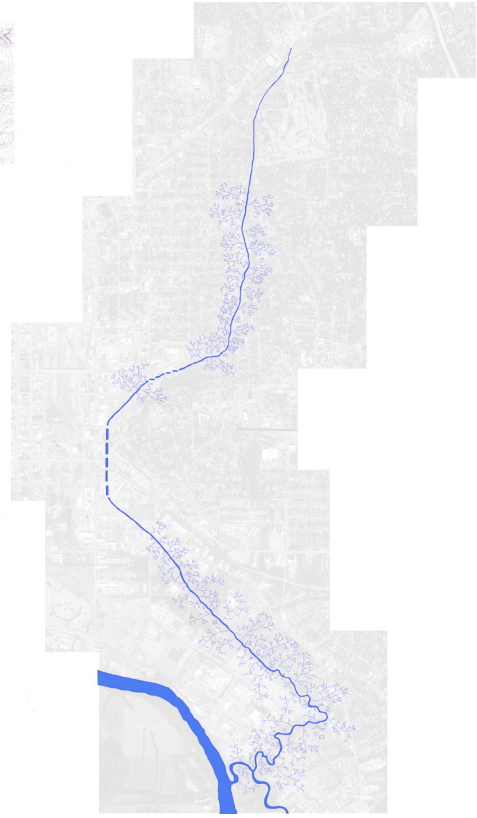
Flood zone: green
Flood way: blue

This map shows the flood way and flood zone of Weracoba Creek. The flood zone is how far outside the stream bank the creek will flood. The flood way is the actual water flow within the banks. This is helpful to determine what areas are prone to flooding when heavy rain occurs. This indicates that the design site sits within the flood zone, so tree selection will be selected accordingly.



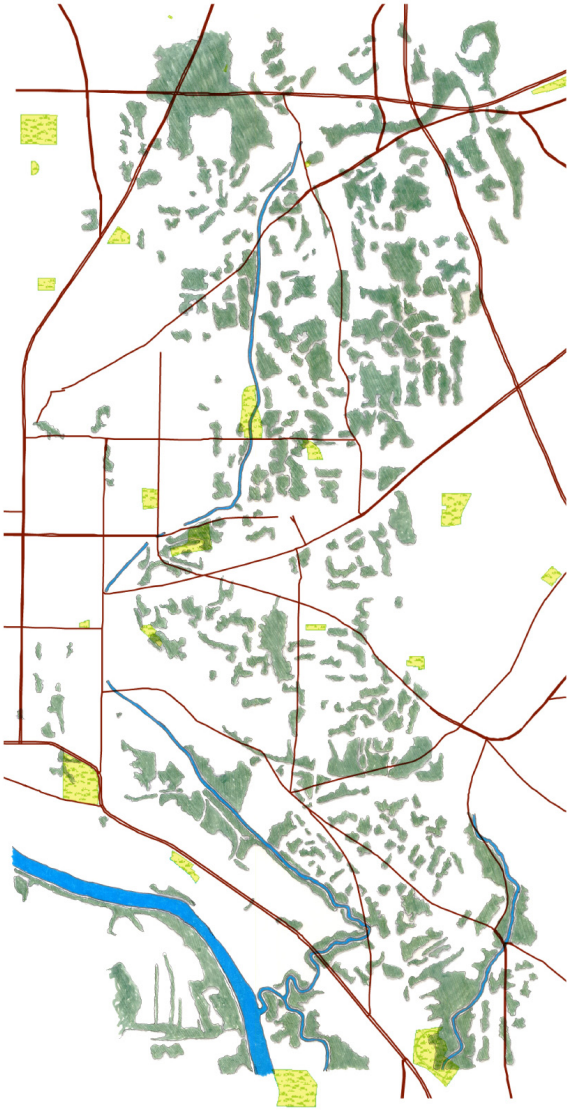
Red: greater slope

This is an elevation/ direction of water flow map of Weracoba Creek. Red colors shows a greater elevation where the slope is greater than 10 percent. Yellow is a fairly flat slope of around or less than 2 percent. The designated site is located in an area with less than 2 percent slope, indicating that
runoff will cross the site slowly, allowing greater water penetration through the ground surface.



This map indicates that Weracoba Creek is situated within an artificial corridor. The areas where blue lines are coming off the stream represent underground water flows which discharge into the creek. The site is situated where the creek flows through a concrete culvert, meeting the requirement for finding a creek within an artificial corridor.

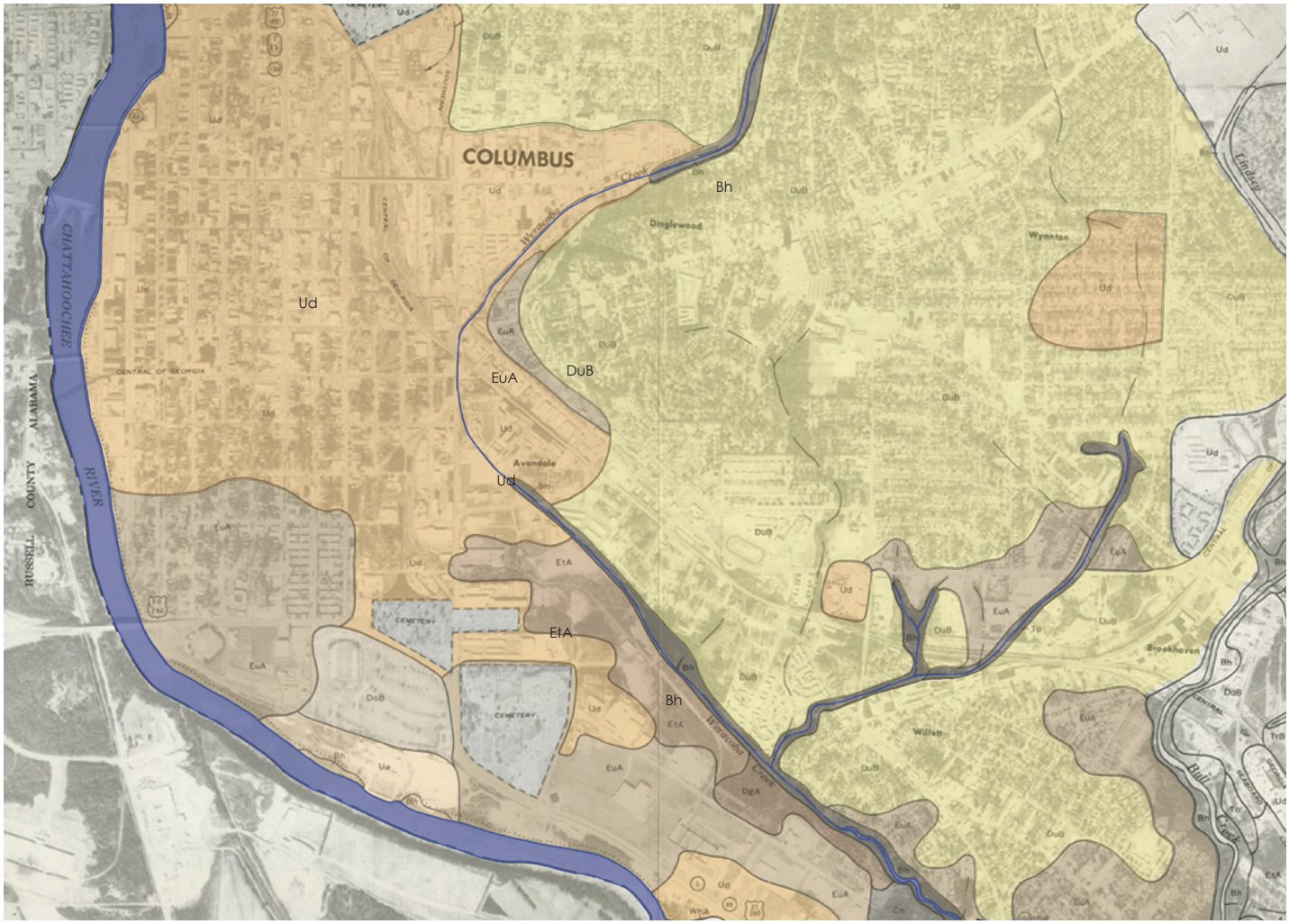
Site Vegetation



The vegetative cover map shows where large areas of tree cover are located around downtown Columbus. West of the underground section of Weracoba Creek moving into the downtown district, tree cover becomes very sparse, if not non-existent. The map highlights the disconnect of vegetative cover from the residential to the downtown districts of Columbus.

A tree study was conducted to determine what species are growing around the creek. In order to determine what might have been growing there before city development, the study was extended to the unbuilt area near the Chattahoochee River. This begins to set up the plant palette that will be used in plant selection.

Soil Map



Ud: This map unit is mainly in the metropolitan area of Columbus. Urban land is not assigned to a woodland suitability subclass.

EuA: Consists of areas of moderately well drained Eunola soil and Urban land. Low in natural fertility and organic matter content. They are strongly acid. This complex is not assigned to a woodland suitability subclass.

EtA: This moderately well drained, nearly level and very gently sloping soil is on low lying stream terraces of the Southern Coastal Plain. The soil is low in natural fertility and organic matter content; it is strongly acid; and permeability is moderate. The Eunola soil is in woodland suitability subclass 2w.

Bh: This poorly drained, nearly level soil is on alluvial plains of the Southern Coastal Plain. It is frequently flooded. This soil is low in natural fertility and medium in organic matter; it is strongly acid; and permeability is moderate. This Bibb soil is in woodland suitability subclass 2w.

DuB: This complex consists of areas of well drained Dothan soil and Urban land. Dothan soil is low in natural fertility and organic matter content; it is strongly acid; and permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. The root zone is easily penetrated by plant roots. This complex is not assigned to a woodland suitability subclass.

Soil Types

Understanding the existing soil conditions of the site is necessary to determine how much soil preparation will need to occur and what tree species will thrive.

Dothan Soil Profile

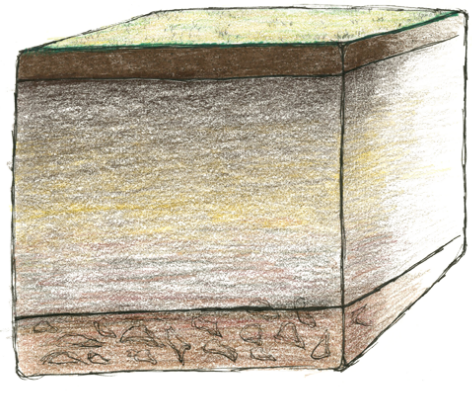
Top Soil; 8"

* Loamy sand; Weak fine granular structure; Very friable; Many fine roots; Strongly acid

Sub-Soil; 60"

* Loamy sand; Weak fine granular structure; Very friable; Many fine roots; Strongly acid
* Sandy clay loam; Weak medium subangular blocky structure; Friable; Fine roots; Strongly acid
* Sandy clay loam; Moderate medium subangular blocky structure; Frialbe; Few fine roots and pores; Very strongly acid
* Sandy clay loam; Moderate medium subangular blocky structure; Friable; Common fine pores; Very strongly acid
* Sandy clay loam; Moderate medium subangular blocky structure; Friable; Common fine pores; Very strongly acid

Bedrock



* These soils are located in loamy marine sediment on uplands of the Southern Coastal Plain
  - Well-drained
  - Moderate permeability
  - 2 - 5 percent

Eunola Soil Profile

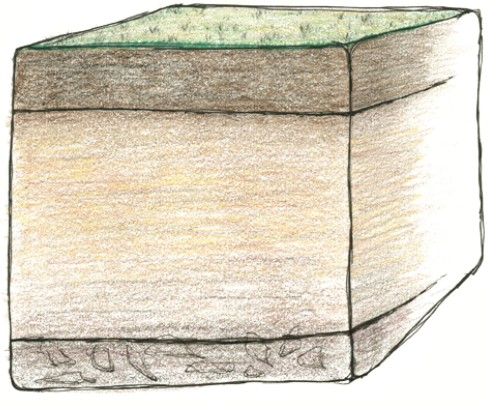
Top Soil; 9"

* Sandy loam; Weak fine granular structure; Very friable; Many fine and medium roots; Strongly acid

Sub-soil; 60"

* Sandy loam; Weak fine granular structure; Very friable; Many fine and medium roots; Strongly acid
* Sandy clay loam; Moderate medium subangular blocky structure; Fraible; Few fine roots; Strongly acid
* Sandy clay loam; Moderate medium subangular blocky structure; Firm; Few clean coarse sand grains; Very strongly acid
* Sandy loam; Weak fine granular structure; Very friable; Very strongly acid

Bedrock

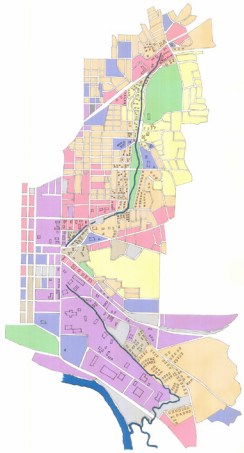


* These soils are located on low lying stream terraces of the Southern Coastal Plain
  - Moderately well-drained
  - Moderately permeable
  - The water table is at a depth of 1.5 to 2.5 feet in fall through winter
  - 0 - 3 percent slope

Site Connections

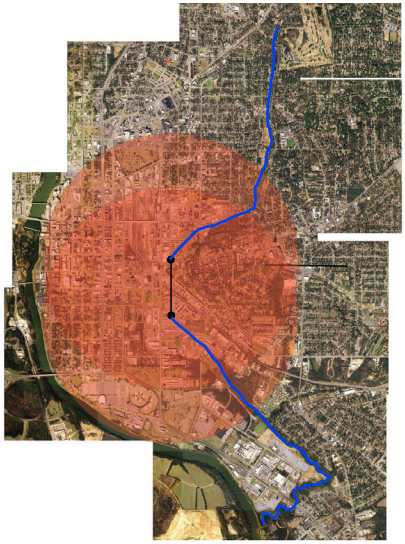
This map shows the site in relation to surrounding roads in downtown Columbus. The orange lines are major arterial roads adjacent to the site, and the yellow lines are smaller connector roads. The arterial roads are highly used. The red areas indicate the terrain to be planted with woodland trees. The map shows how the woodland will be visible from these busy roads, which both surround and penetrate the site.

Site Connections cont'd



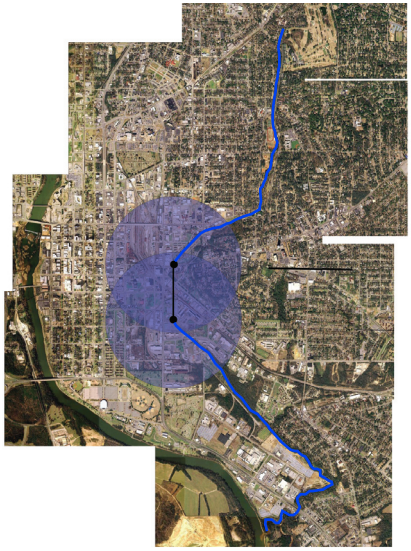
These pedestrian sheds show walking distances from the center points of the design into the downtown district:

1 Mile Radius



The 1 mile ped-shed, (about a fifteen minute walk) encompasses all of the downtown district, as well as a large portion of residential housing.

$^1/_2$ Mile Radius



Included within a half mile ped-shed, (about a ten minute walk) are a number of residential and commercial zones, and all industrial sites around the design.

$^1/_4$ Mile Radius

Within a quarter mile ped-shed, (about a five minute walk) all of the design site and most of the surrounding industrial zones are incorporated.

Chapter 2

Initial Design + Process

Area 1 Initial Design

Area 1 is on the north side of the underground portion of the creek along Warren Williams Road.

Figure 1

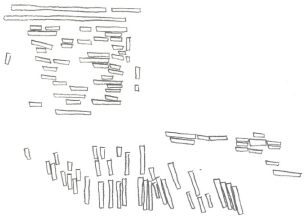


Figure 4

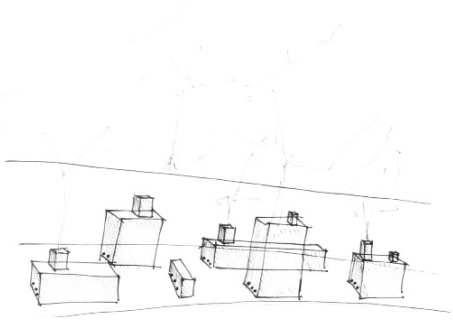


Figure 2

Figure 3

Area 1 Initial Design cont'd

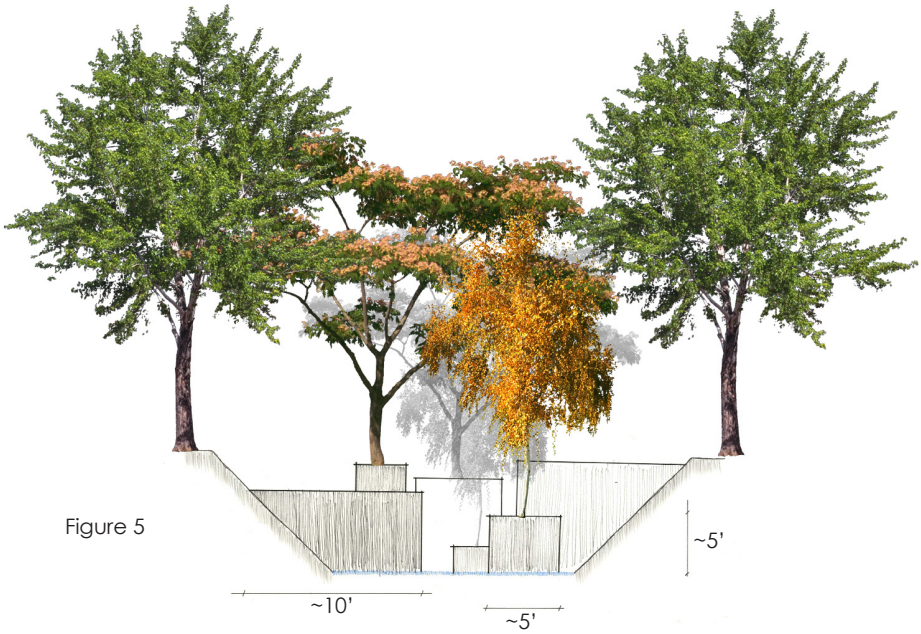


Figure 5

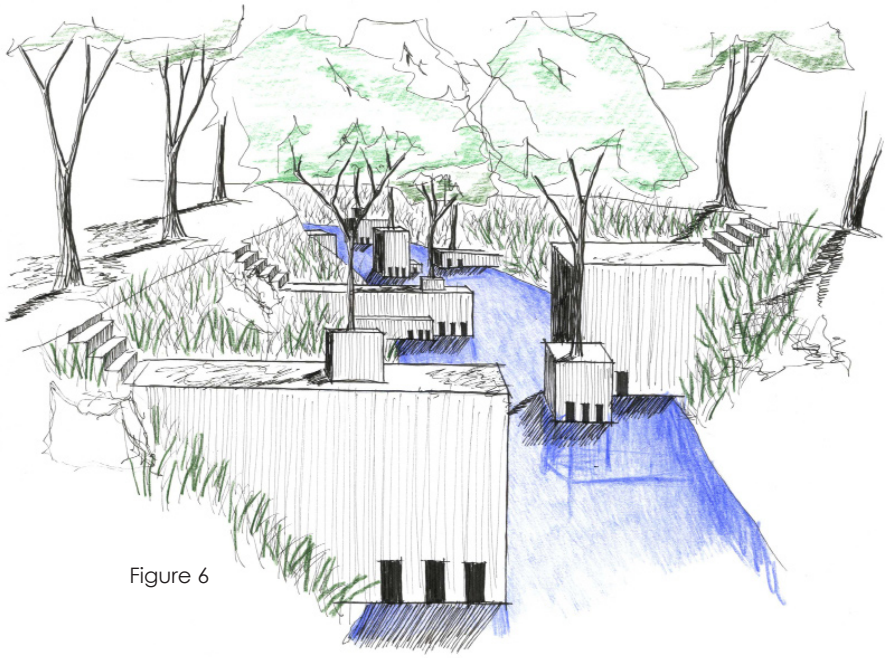


Figure 6

This section, located near Federal Housing units along Warren Williams Rd, is a very narrow section of the creek with limited room to work with outside of the streambanks. In order to create a woodland, along this section of the stream, tree placement within the stream was studied. Using existing conditions from the site, Figure 1, the rectangular train cars were used for the idea of placing planter boxes within the creek in order the create a woodland in this narrow section, see Figure 2 & 3. In Figure 4, a site plan was created to show placement and spacing of the boxes, and how they work with the surrounding landscape. In Figure 5, dimensions of the planter boxes are given in relation to the streambanks, as well as tree size and form. Figure 6 shows what this section of Weracoba Creek will possibly look like with the planter boxes placed along the streambanks.

Area 2 Initial Design

Area 2 is located through an industrial site, east of 10th Ave. Within this area, Weracoba Creek is piped underground in a concrete culvert.

Figure 7

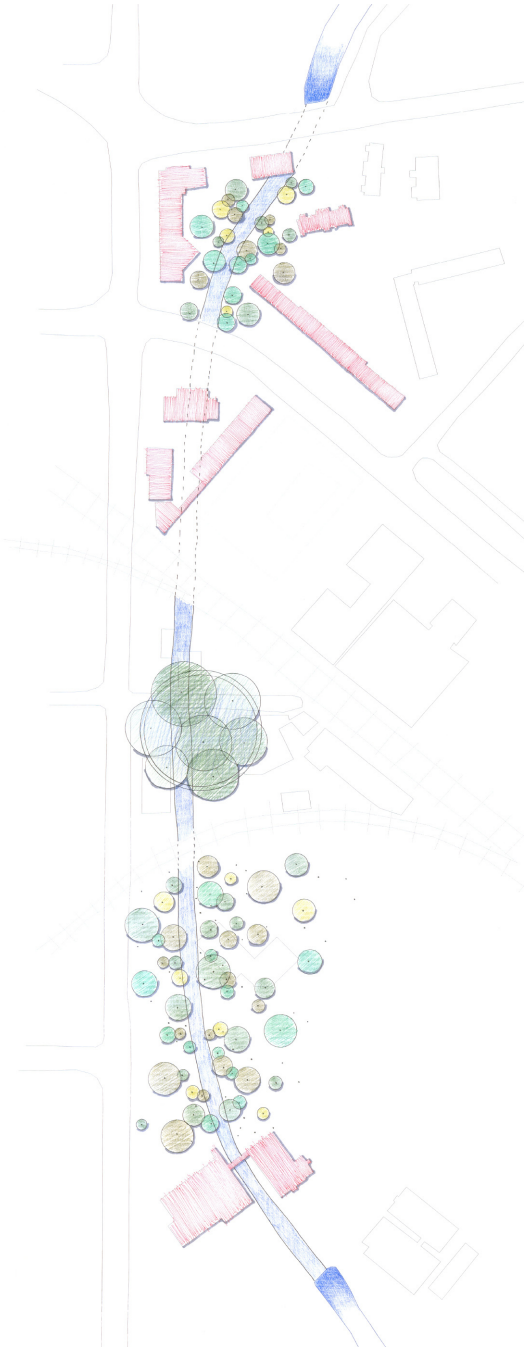


Figure 8

Area 2 Initial Design cont'd

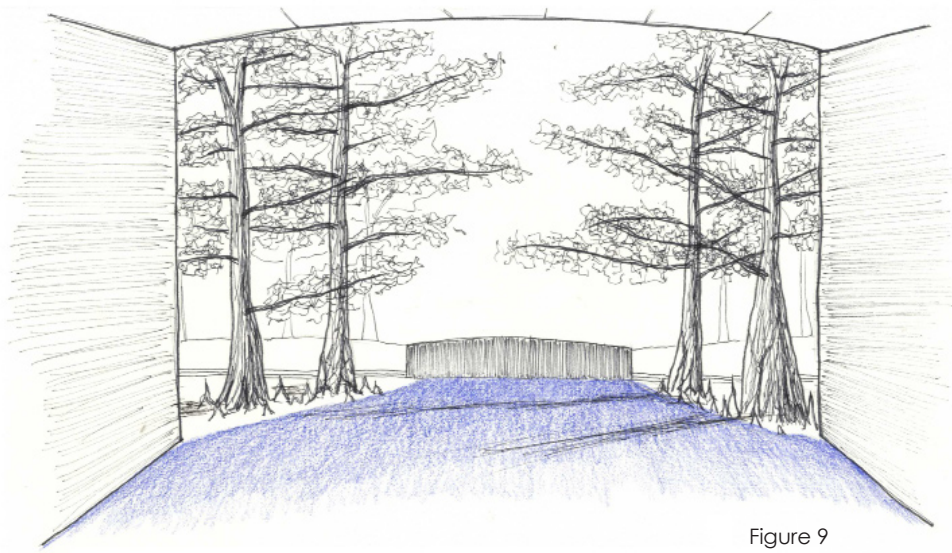


Figure 9

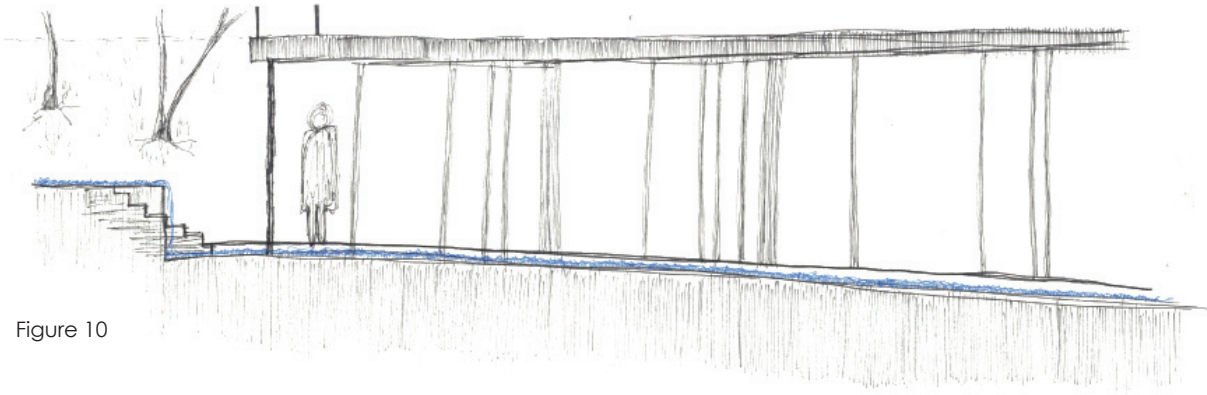


Figure 10

In Area 2 the idea for this section was to daylight Weracoba Creek. In one scenario, Weracoba is day lighted and diverted in two different areas to provide sinuosity back to the creek, see Figure 7. In Figure 8, the design is very similar, but lacks the diversion of the creek. In both designs, where the water is day lighted, it flows through a wetland area to cleanse and filter the water before going downstream, Figure 9. For the underground sections of the creek, the possibility of creating an underground woodland was studied; which would give the idea of still being in a woodland, but in an abstract way, Figure 10.

Area 3 Initial Design

Area 3 incorporates the section of Weracoba Creek where it exits the underground culvert from under the industrialized site. The creek flows southeast under Cusseta Rd.

Figure 11

Figure 13

Figure 12

Area 3 Initial Design cont'd

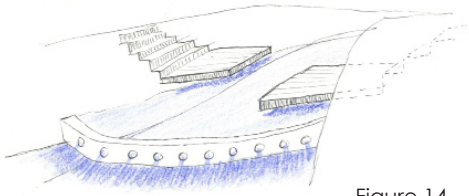


Figure 14

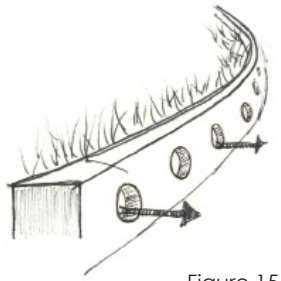


Figure 15

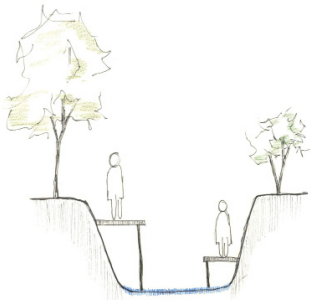


Figure 16

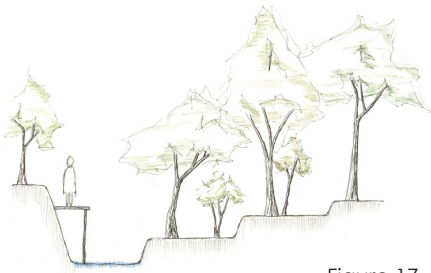


Figure 17

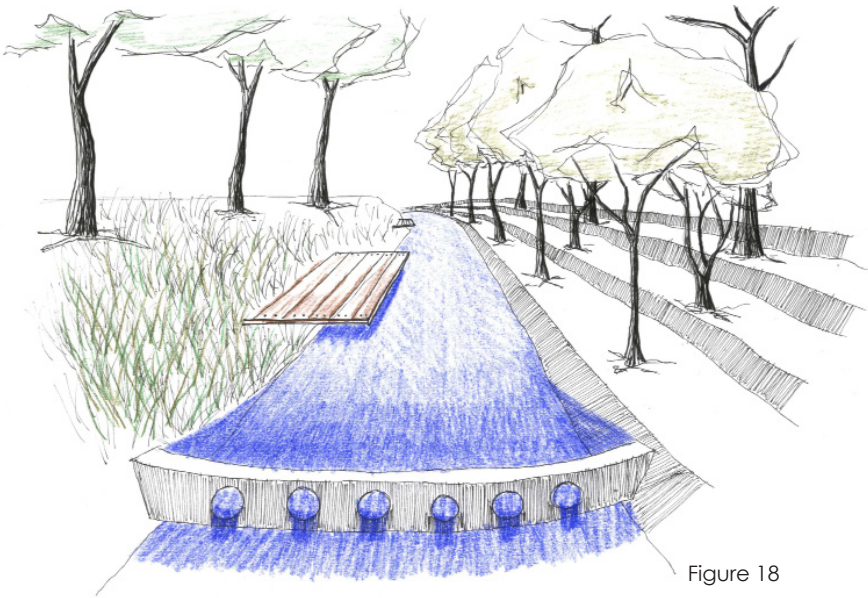


Figure 18

The initial design intentions for this section of Weracoba Creek were to create an area where people could interact with the water. Similar to Area 1 in the way the train cars were used to place the planter boxes, the cars from the industrial park, Figure 11, were used to place trees around the creek within this section, Figure 12. To create a place where people have access to the water, a series of check dams were designed to slow water flow, Figure 14 & 15. When implemented, water would slow causing it to build up behind the dams creating small pooled areas, Figure 13. To gain access to the water, terraces would be constructed to allow a gradual step down. Also, the idea of platforms will project outwards into the stream which would allow people to hover above the creek, Figure 16 &17. In Figure 18, the perspective shows what this section of Weracoba Creek might look like if this design were implemented.

Initial Design Reflections

After a thorough investigation of the site, the initial design process began. This was a first attempt at a design, getting the design ideas on paper. It was a process that took on too large of a site, where there were too many things going on. It did begin to set up an ordering system on how to set up a woodland in Columbus. Using the existing conditions of the site, the car park and rail car layout, these horizontal and vertical rows will be used later in the finalized site plan. The center of the design is area 2, the underground section, because it will be day lighted, giving visitors a destination point. The way the streambanks are designed in Area 3 will be used later in the final design of the day lighted section of Weracoba Creek. These initial design ideas will set the basis for the finalized woodland design.

Woodland Design Scheme 1

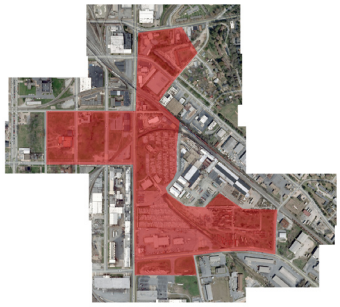


Figure 19

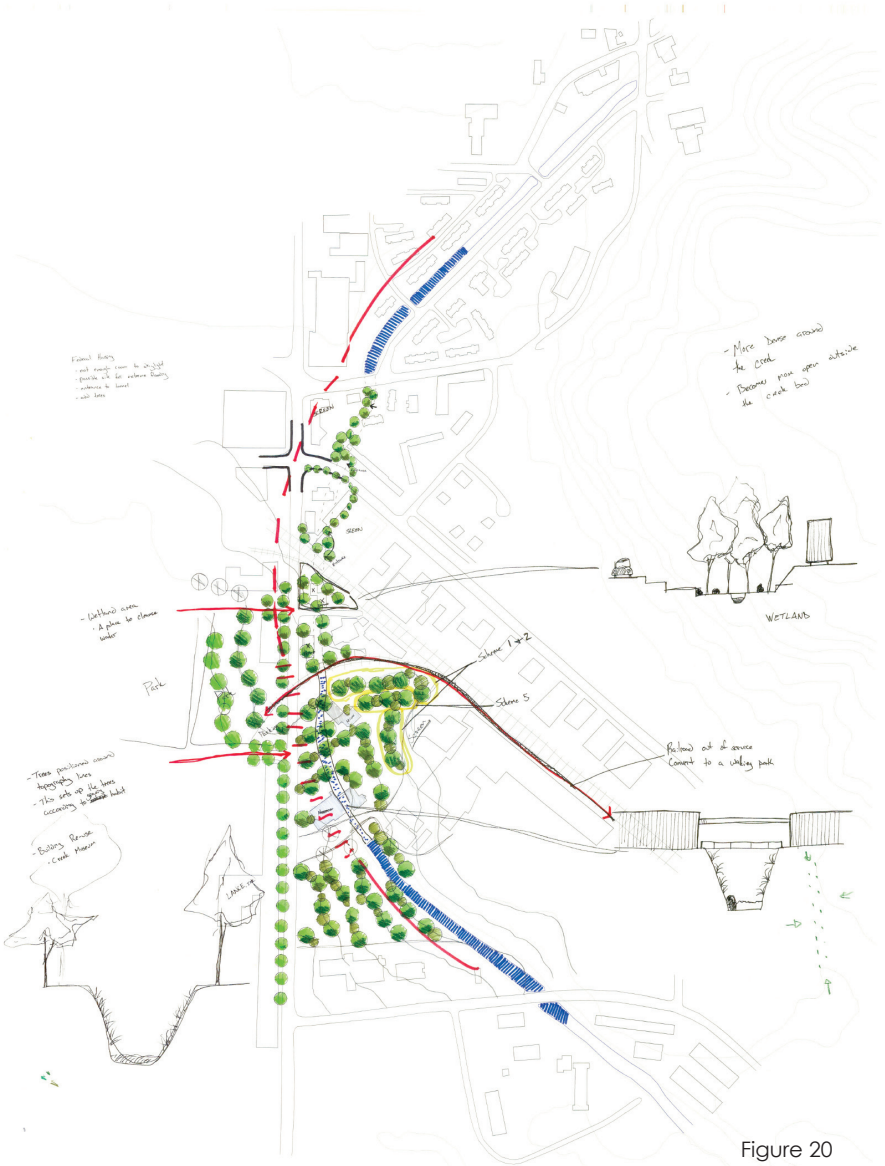


Figure 20

For this first attempt at a woodland design around Weracoba Creek, topography and direction of water flow were re-examined. For the most part, the slope across downtown Columbus is less than 5 percent, meaning that the topography lines, for ten foot intervals, are very spread out across a map. The direction of water flow is generally to the southwest towards the Chattahoochee River, Figure 19. For this design trees were placed on topography lines according to what areas were more wet or dry than others, Figure 20.

Woodland Design Scheme 2

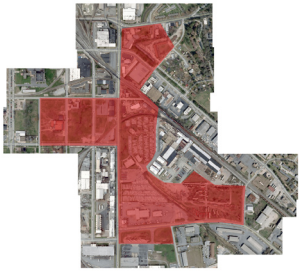


Figure 21

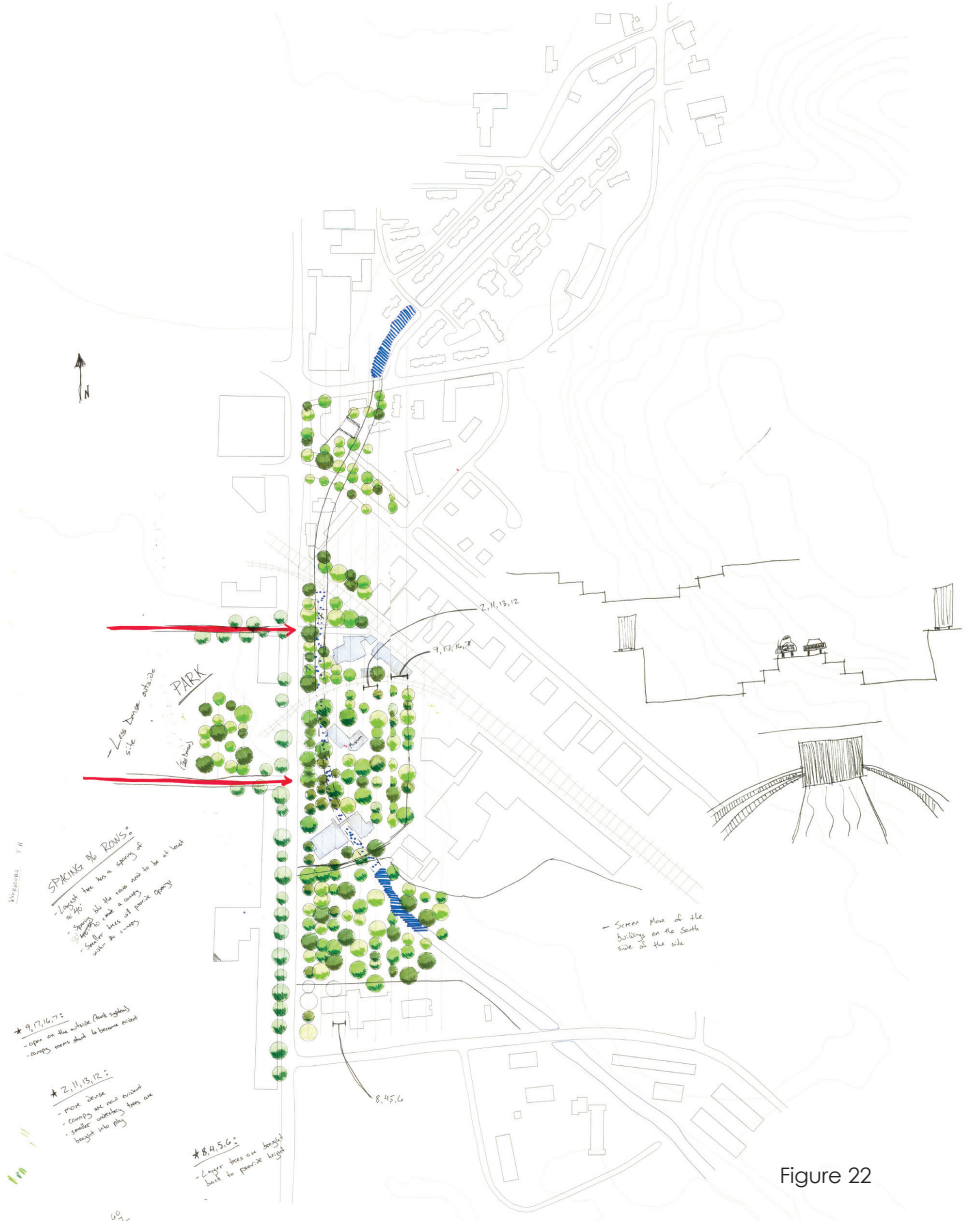


Figure 22

In the same way the initial designs were based off existing conditions of the land, scheme 2 transposes the vertical and horizontal rows of cars (Figure 21) into vertical rows of trees set up on 20 foot spacings.

Woodland Design

For the actual woodland design, scheme 2 was chosen because It uses the existing conditions from the site to help lay out tree placement. The idea was to create a woodland that becomes more dense, in terms of tree spacing, as you move towards Weracoba Creek. The tree placement was based on a linear progression that intensifies the woodland experience the closer the visitor approaches the creek.

Woodland Design Reflections

After the initial design process, the site was narrowed down and the woodland became the main focus of the design. Two different design schemes were studied in order to achieve the best tree placement for the project. For the first design of the woodland, the tree placement was set in a way to become more dense the closer one got to the creek. But the ordering of the trees were equally spaced, which did not give the progressive density that was required. The design tried to connect the northern part of the underground creek with the southern part. This became a problem because on the north part of the design, the creek flows beneath Federal Housing, which limited the number of trees that could be planted in this area. They became lost and broke the density pattern that was trying to be achieved.

Chapter 3

Final Design

Analysis + Process + Design

Introduction to Final Design

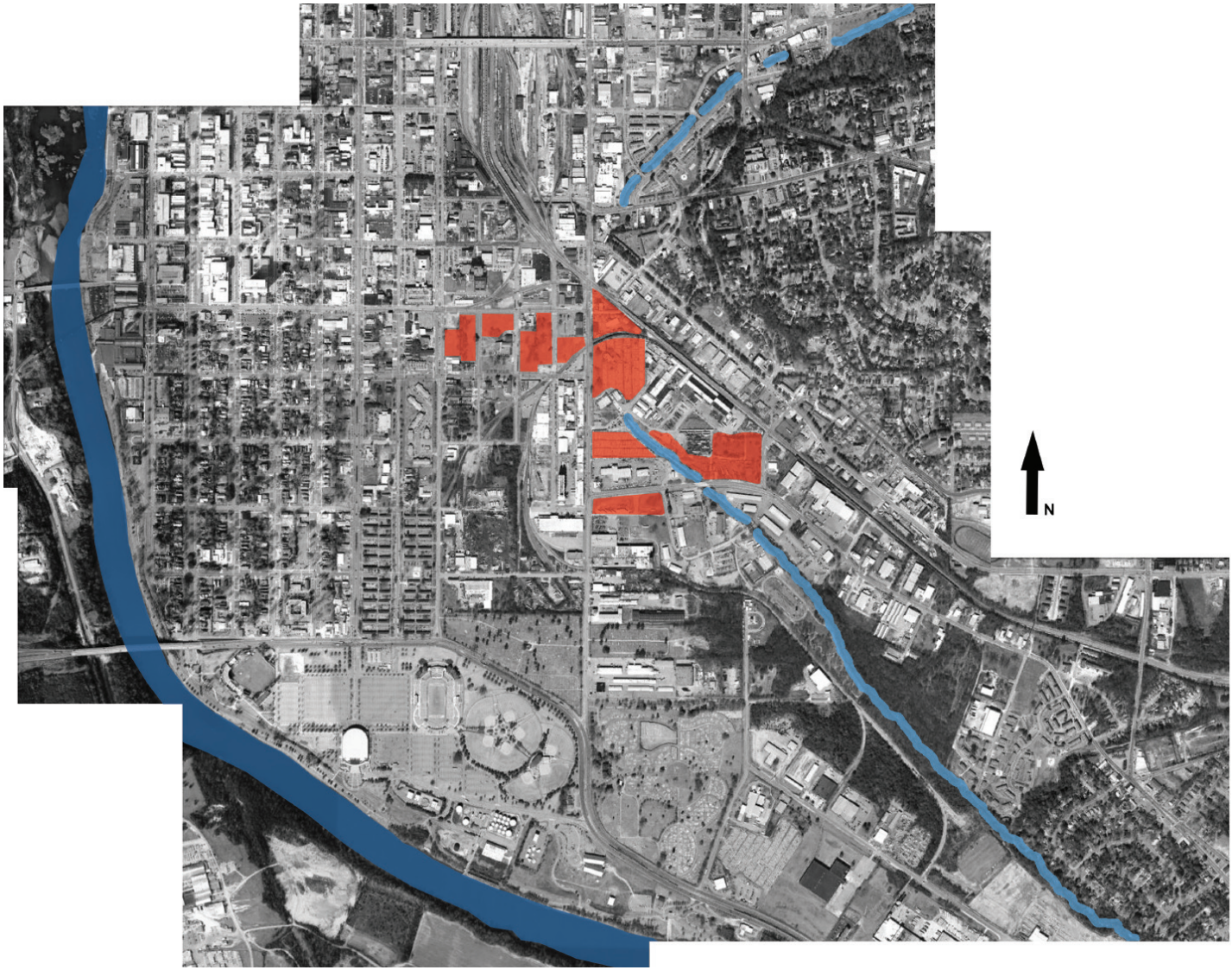
For the final design of the woodland, the idea was to create a progressive density across the site which becomes greater as one moves closer to Weracoba Creek. This "reinforces the centuries-old feeling that forests become denser the further into them one ventures (Dunnett 2004)." To create this progressive density, a series of tree placement studies were conducted. This allowed the tree placement to be set up where the spacing will increase closer to the creek. Similar ordering systems were used to place trails, understory shrubs, and rocks. Trails are positioned according to geometric lines. Understory shrubs are planted at trail corners, using the same guidelines from the tree placement studies. Rocks are placed across the site using a scattering method.

Tree Density

Direction of greater tree density

Increasing tree density was used as an ordering system. The highlighted area is the middle of the project where the density is the greatest, and from this point it becomes less as it moves outwards. Density components include: tree spacing; foliage color, size and density; tree bark; light conditions; and scale.

Finalized Site



The above map shows the outline for the finalized site for the woodland project. In earlier design studies, a section of Weracoba Creek, above where it is piped underground, was designed as a way to gain entrance to the underground section of the creek. Now that section is removed and the highlighted areas to the west are included within the boundary of the design. This enables the density progression to be established.

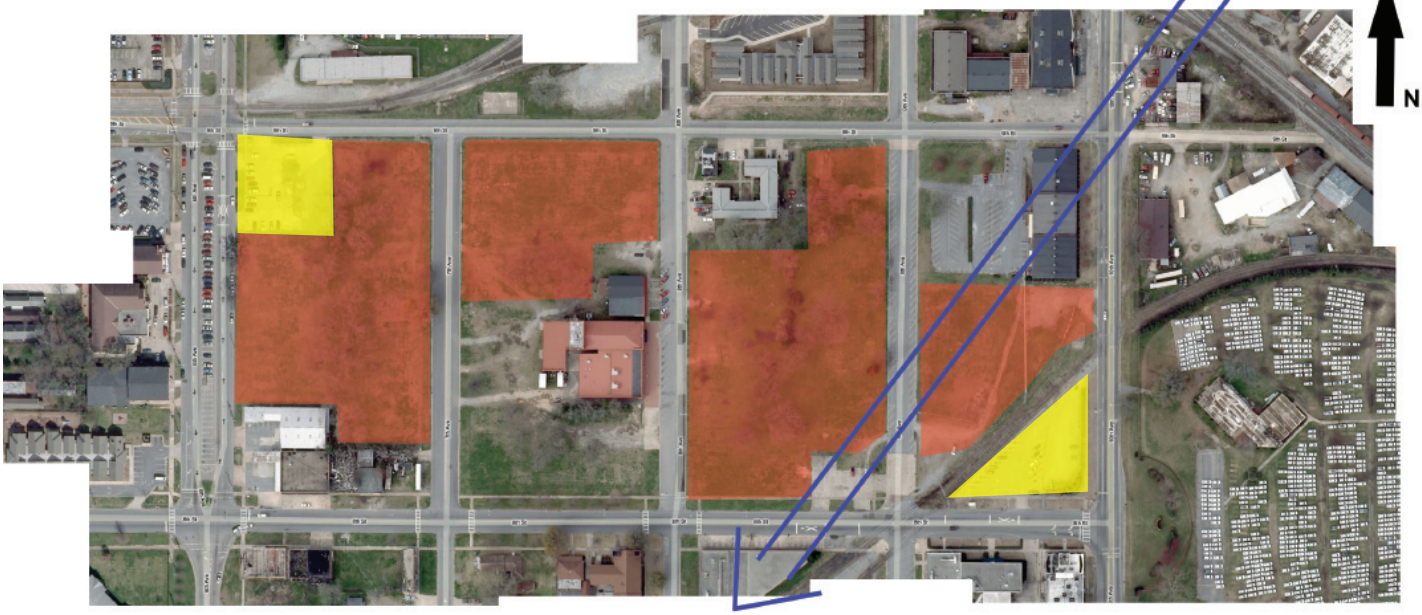
Parking Areas

This map shows where parking areas will be located around the park. These areas will act as entrances into the woodland. From these points, which are situated along the edges of the design, the woodland will be less dense, but as one moves closer to Weracoba Creek the density will increase. Two of the parking areas, shown by arrows, already exist. The other two will be reclaimed sites. Parking area 1 is currently a scrap metal storage yard, whereas site 2 is an area of open field where tractor trailers are stored.

Area 1

Least Dense → More Dense

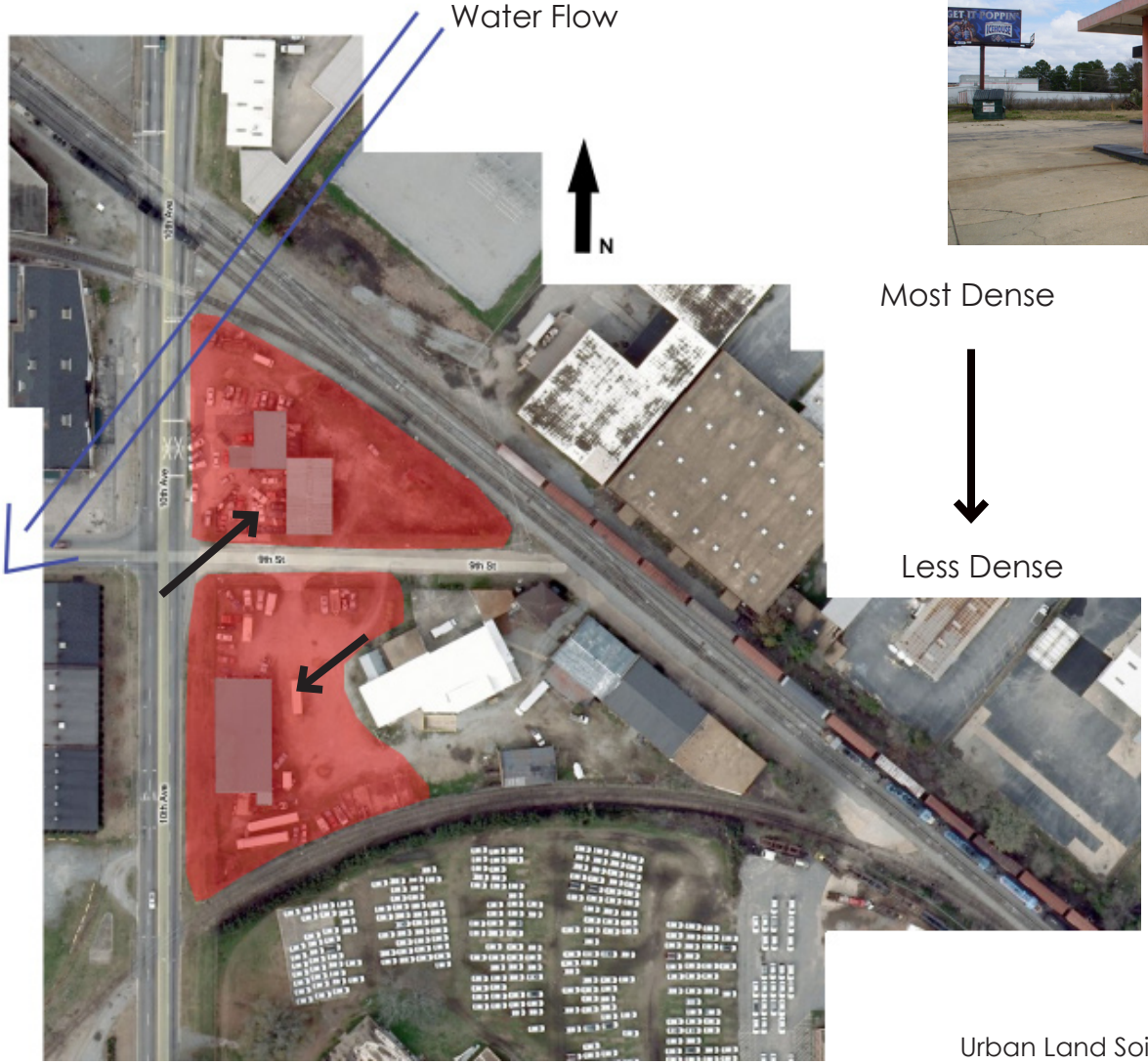
Direction of Water Flow



Urban Land Soil:
- Well-drained soils
- Nearly level
- Made up of Dothan and Eunola Soils
- The soil has been modified by cutting, filling, shaping, and smoothing; in places, cuts are deep and weathered bedrock or clay and sandy sediment are exposed

Site 1 is the most western point of the design. This is the location of Ninth Street park. Across the site there is about a 2 percent slope, where water runoff flows from the northeast to southwest. The site is located in full sun with a few scattered trees, which will be incorporated into the design. This section of the design is designated to be less dense, which gives potential for larger trees to be planted where they will have more room to grow. Also, this site is the location of two parking areas, which are highlighted in yellow.

Area 2

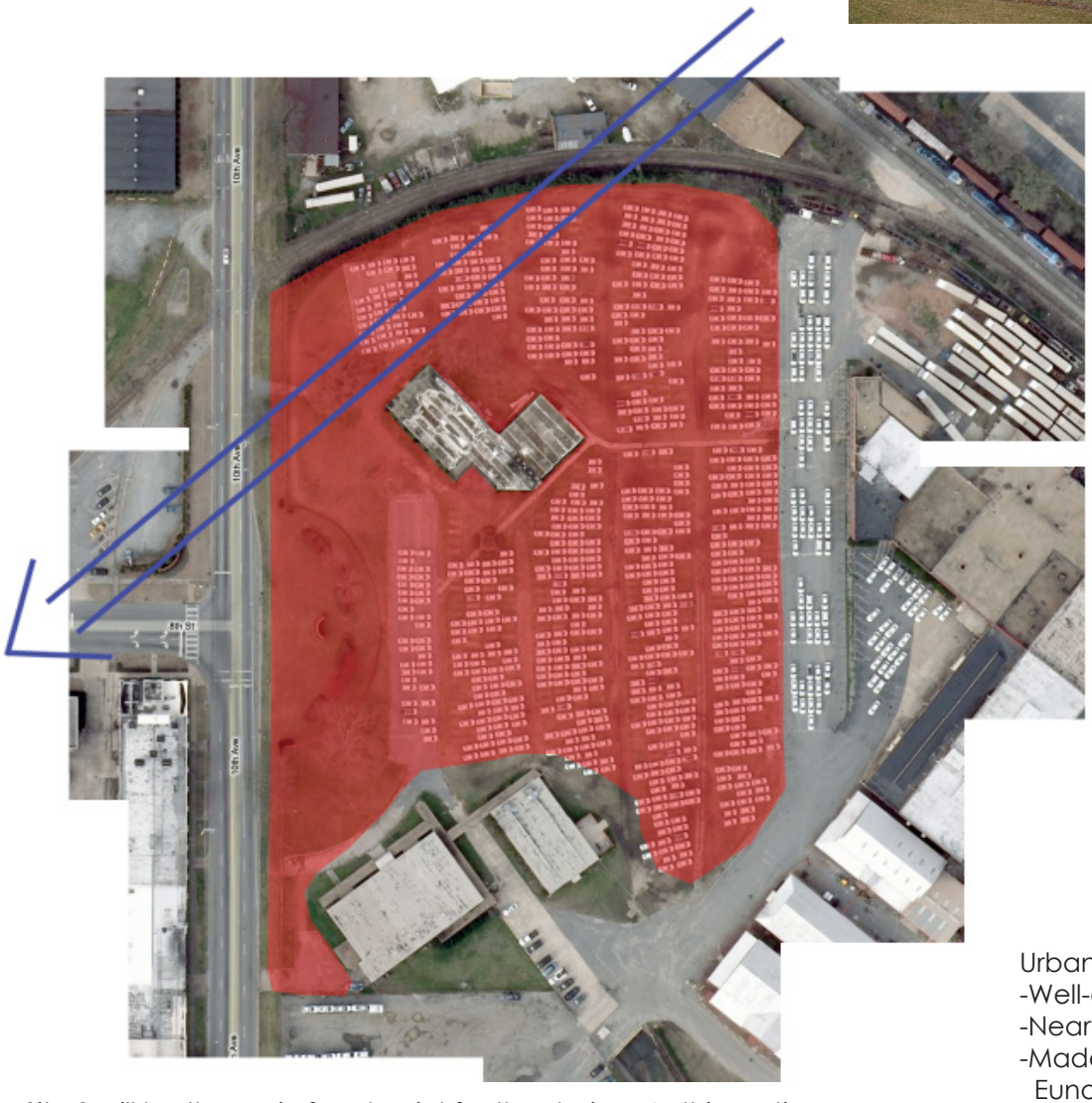


Site 2 will be the center point of the design, where the tree density will be the greatest. On site there are two unused buildings, marked with arrows, that will be removed, where as the other two will be left. The railroad that cuts along the edge of the site is not in use any more, so the idea is to convert this into a walking path to connect to other parts of the design. There is a 2 percent slope across the site with a slight elevation change around the railroad.

Urban Land Soil:
-Well-drained soils
-Nearly level
-Made up of Dothan and Eunola Soils
-The soil has been modified by cutting, filling, shaping, and smoothing; in places, cuts are deep and weathered bedrock or clay and sandy sediment are exposed

Area 3

Direction of Water Flow



N

Most Dense

Dense

Less Dense

Urban Land Soil:
-Well-drained soils
-Nearly level
-Made up of Dothan and Eunola Soils
-The soil has been modified by cutting, filling, shaping, and smoothing; in places, cuts are deep and weathered bedrock or clay and sandy sediment are exposed

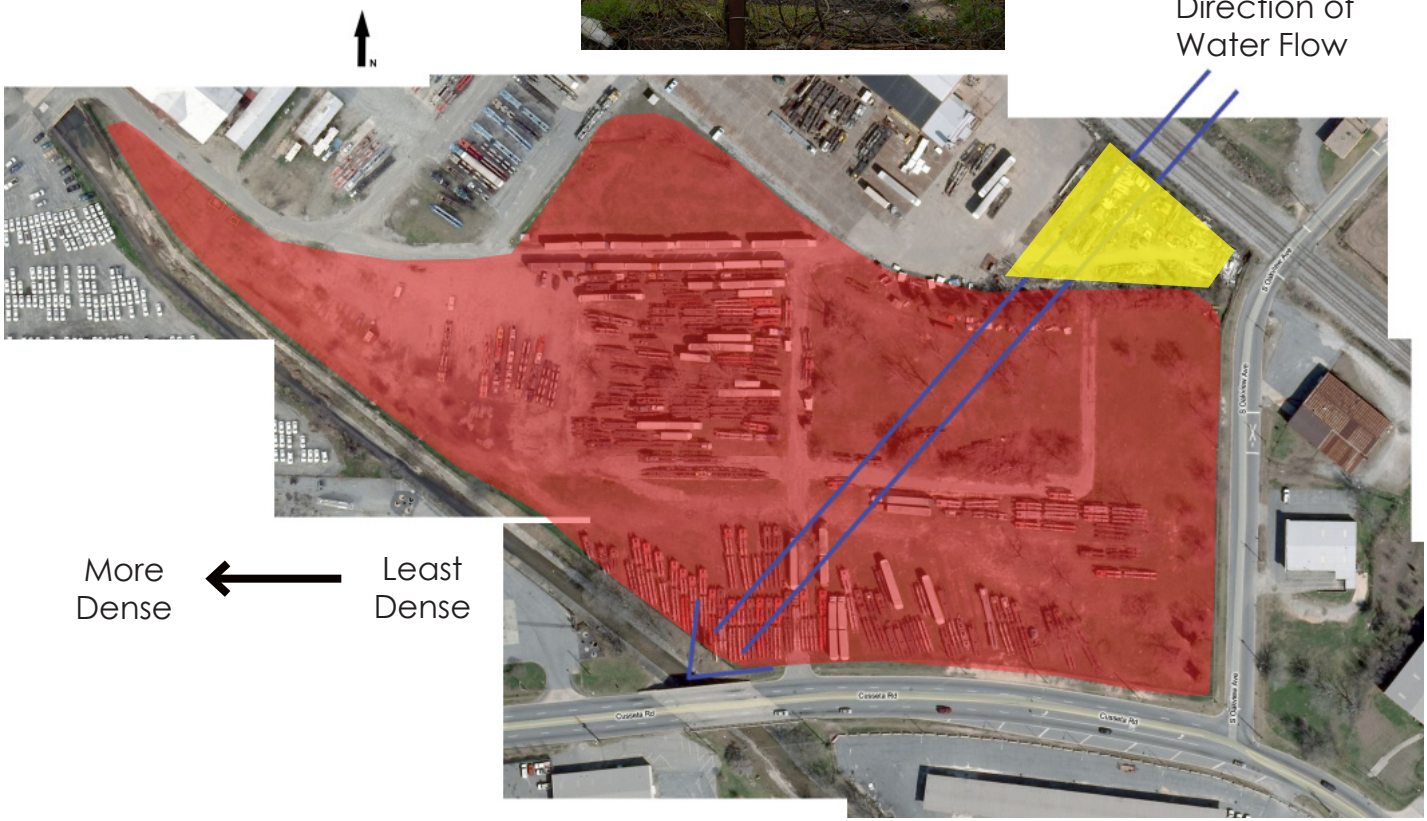
Site 3 will be the main focal point for the design. In this section, Weracoba Creek will be day lighted, which will provide a destination point within the design. As of now, this site is in full sun with very few trees. There is a 2 percent slope across the site, which means not much runoff will empty into the creek. To the north of this site is the most dense in terms of tree cover, where as this area will begin to allow for sunlight to penetrate through.

Area 4

Urban Land Soil:
-Well-drained soils
-Nearly level
-Made up of Dothan and Eunola Soils
-The soil has been modified by cutting, filling, shaping, and smoothing; in places, cuts are deep and weathered bedrock or clay and sandy sediment are exposed

In site 4, there are no trees which leaves the site open in full sun. The concrete throughout the parking lot will be removed prior to tree planting. There is less than a 2 percent slope across the lot, and since this area is moving further away from the central focal point of the design, density tree cover will become less.

Area 5



Urban Land Soil:
-Well-drained soils
-Nearly level
-Made up of Dothan and Eunola Soils
-The soil has been modified by cutting, filling, shaping, and smoothing; in places, cuts are deep and weathered bedrock or clay and sandy sediment are exposed

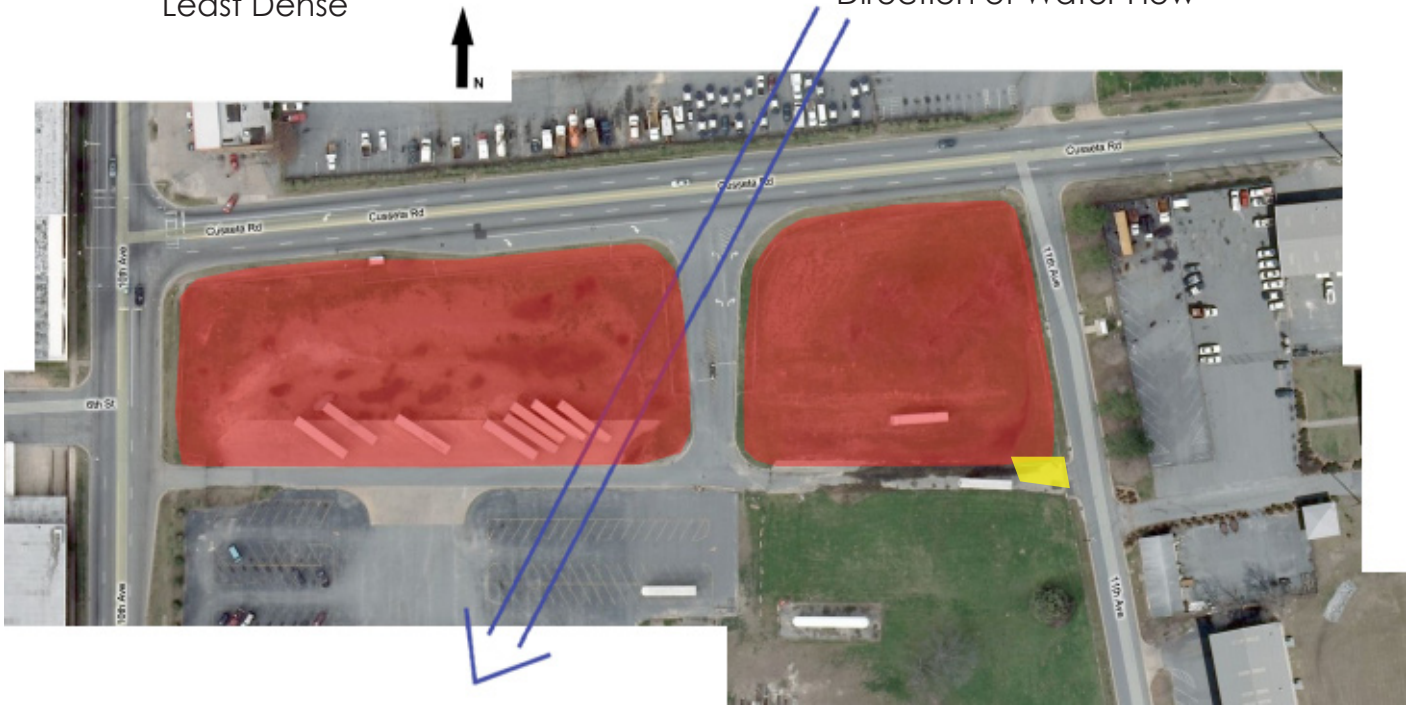
Area 5 is currently being used to store abandoned railroad cars. The site needs to cleared before any tree planting takes place. There are few scattered trees across the site, which leaves it open in full sun. With this being one of the least dense areas in the design, trees will have greater room to grow. This area will also be one of the entrances to the project with a parking area being constructed on the north side of the site, highlighted in yellow. There is a 2 percent slope across the site, where runoff is being directed towards Weracoba Creek.

Area 6

More Dense

Least Dense

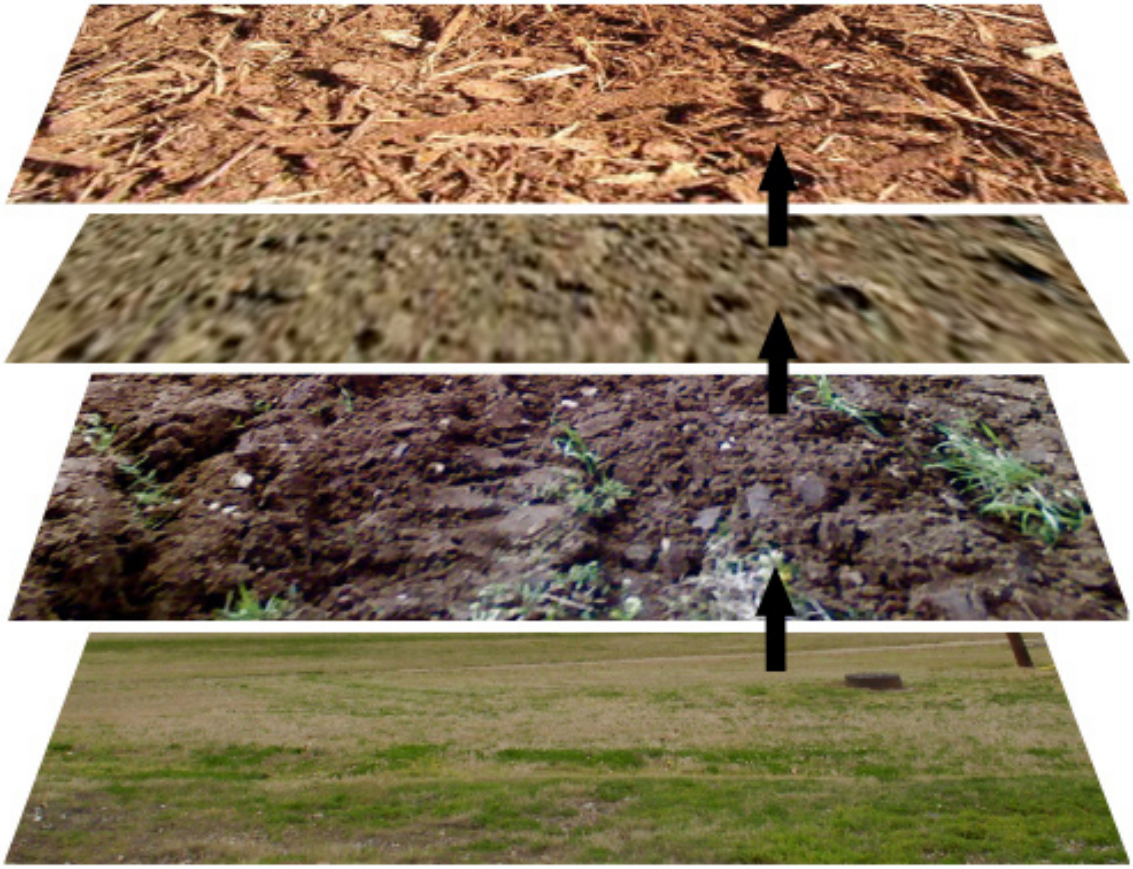
Direction of Water Flow



Area 6 is the southern most site in the project. It is currently an open field with no trees. Within this area the density of the tree cover is the least among the entire project. This is the final entrance into the design from a parking area. It is located by the yellow highlighted box. Once again the slope across the site is 2 percent.

Urban Land Soil:
-Well-drained soils
-Nearly level
-Made up of Dothan and Eunola Soils
-The soil has been modified by cutting, filling, shaping, and smoothing; in places, cuts are deep and weathered bedrock or clay and sandy sediment are exposed

Soil Preparation



2" mulch layer

Smooth over after being plowed

36" subsoiler plow

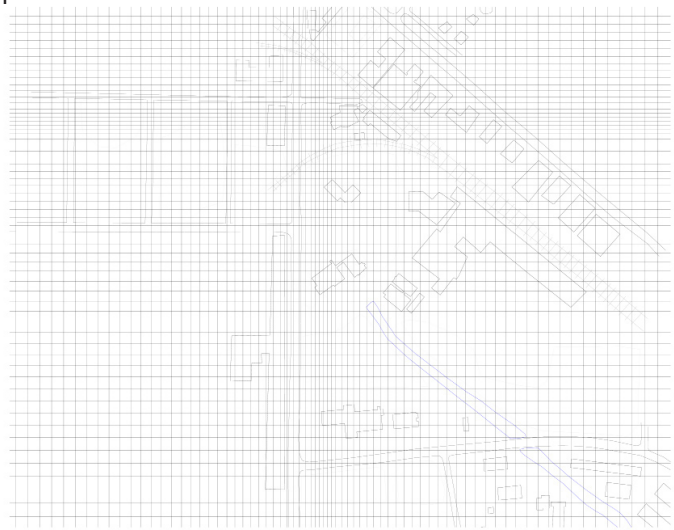
Existing ground surface

Across the entire site, the soil has been shaped by cutting and filling from when Columbus started to expand. In order to give the trees the best growing conditions, some soil preparation is required. A 36" subsoiler plow will be used to break up the existing hard pan below the soil surface. This will leave a rough uneven surface, which will be smoothed over. Afterwards, a 2" mulch layer will be placed across the site to prevent the soil from eroding.

Tree Placement

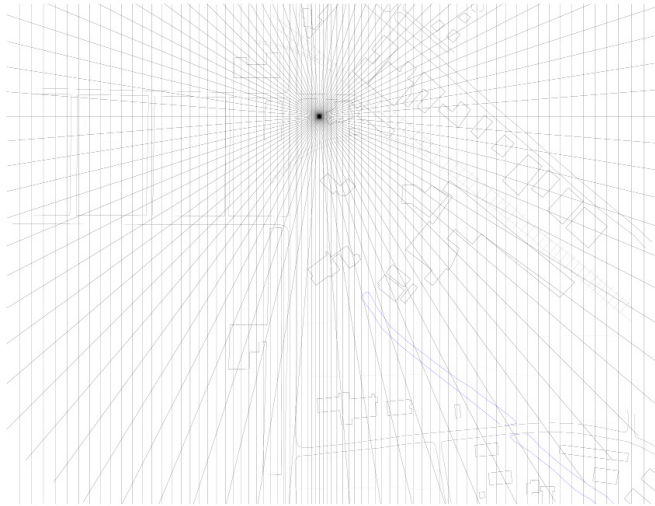
In the initial designs, the linear diagrams laid out did not work because the lines were originally equally spaced, which did not give the progressive densification that was required. So a range of new diagrams were investigated.

1



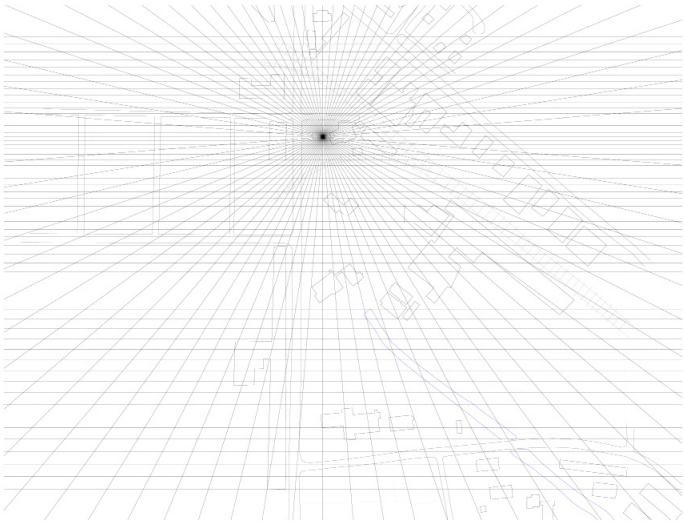
A grid of increasing spaces, 5' spacing for every 5 lines on both vertical and horizontal lines. Trees are placed on line intersections.

2



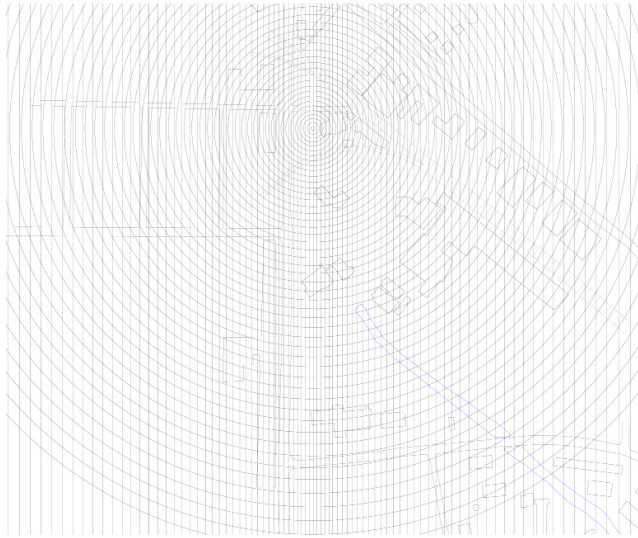
The vertical lines from 1, with radial lines projecting outwards, 80 in number.

3



The horizontal lines from 1, with the radial lines from 2.

4



A combination of concentric circles, 5' spacing for every 5 lines, and the original vertical lines from 1.

Tree Placement cont'd

1

Tree placement from scheme 1

2

Tree placement from scheme 2

3

Tree placement from scheme 3

4

Tree placement from scheme 4.
Stopped because tree placement did not fit within the boundary of the site.

Finalized Tree Placement

Tree placement 1 was chosen as the final design. This worked best for the project because it gave a progressive density, which became greater towards Weracoba Creek. Trees outside of the dense areas were not lost, where as in other schemes, some became lost within the project. This scheme provided an even woodland-type canopy cover across the entire site. So, now there is an ordering system for the woodland typology, and tree species have been laid out accordingly.

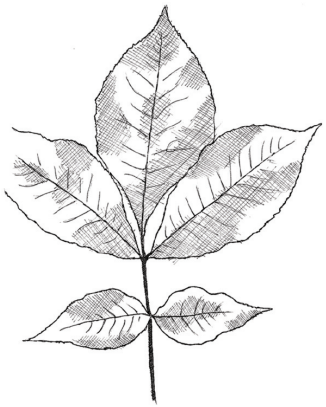
Tree Selection

Red Maple (*Acer rubrum*)

- 40' to 60' tall and 40' to 50' wide
- leaf color ranges from dark green in summer changing to yellow to brilliant red in fall
- irregular to rounded crown/form
- soft grey to grey/brown bark
- slightly acid, moist soils

River Birch (*Betula nigra*)

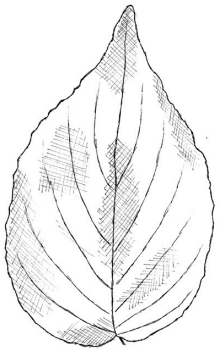
- 40'to 70' tall and 40' to 60' wide
- leaf color ranges from dark green in summer changing to pale yellow in fall
- rounded crown/form, often seen as a multi-stemmed trunk
- brown, exfoliating bark
- moist, well-drained, acid soils



Shagbark Hickory (*Carya ovata*)

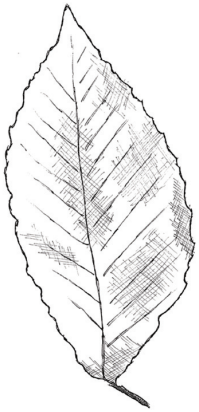
- 60' to 80' tall and 30' to40' wide
- leaf color ranges from yellow/green in summer changing to yellow/ golden brown in fall
- straight trunk with an oblong crown with ascending and descending branches
- gray/brown bark which breaks into thin plates
- found in both drier uplands and in moist, well-drained soils

Tree Selection cont'd



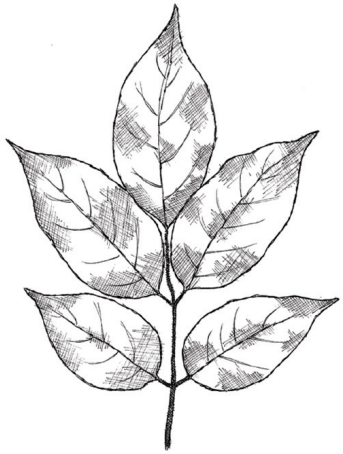
Flowering Dogwood (*Cornus florida*)

- 20' to 30' tall and 30' wide
- leaf color ranges from dark green in summer changing to red/purple in fall
- low branched, multi-trunked with a flat-topped crown
- showy, white flowers
- gray/brown bark with black blocks
- partial shade in well-drained, acid soils



American Beech (*Fagus grandifolia*)

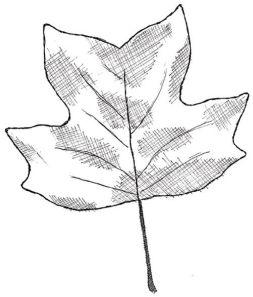
- 50' to 70' tall and 40' to 60' wide
- leaf color ranges from dark green in summer changing to golden/bronze in fall
- short trunk with a wide-spreading crown
- smooth, gray bark
- moist, well-drained soils



White Ash (*Fraxinus americana*)

- 50' to 80' tall and wide
- leaf color ranges from dark green in summer changing to yellow or deep purple in fall
- open, rounded crown
- gray to brown bark
- deep, moist, well-drained soils

Tree Selection cont'd

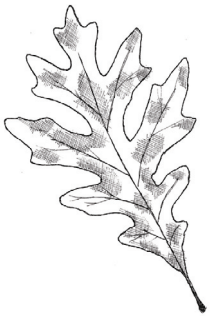


Yellow Poplar (*Liriodendron tulipifera*)

- 70' to 90' tall and 40' to 50' wide
- leaf color ranges from bright green in summer changing to golden yellow in fall
- oval-rounded crown with large sinuous branches
- grayish brown bark
- moist, well-drained soils

Sycamore (*Platanus occidentalis*)

- 80' to 100' tall and 60' to 80' wide
- leaf color ranges from dark green in summer changing to tan/brown in fall
- massive trunk with a wide-spreading, open crown and irregular branching
- smooth, gray-brown bark gradually becoming whitish
- moist, rich soils



White Oak (*Quercus alba*)

- 50' to 80' tall and wide
- leaf color ranges from dark green in summer changing to brown/rich red in fall
- upright-rounded with wide-spreading branches
- light gray bark
- deep, moist, well-drained, acid soils

Tree Collaboration

Tree selection was based upon existing analysis of the site from Chapter 1. Throughout the design process, the idea is to set up a progression of density. In terms of color, the darker it is the more dense things seem to become. The trees are set up according to fall color, where the closer towards the creek, fall color becomes darker.

Density (Fall Color) ⟶

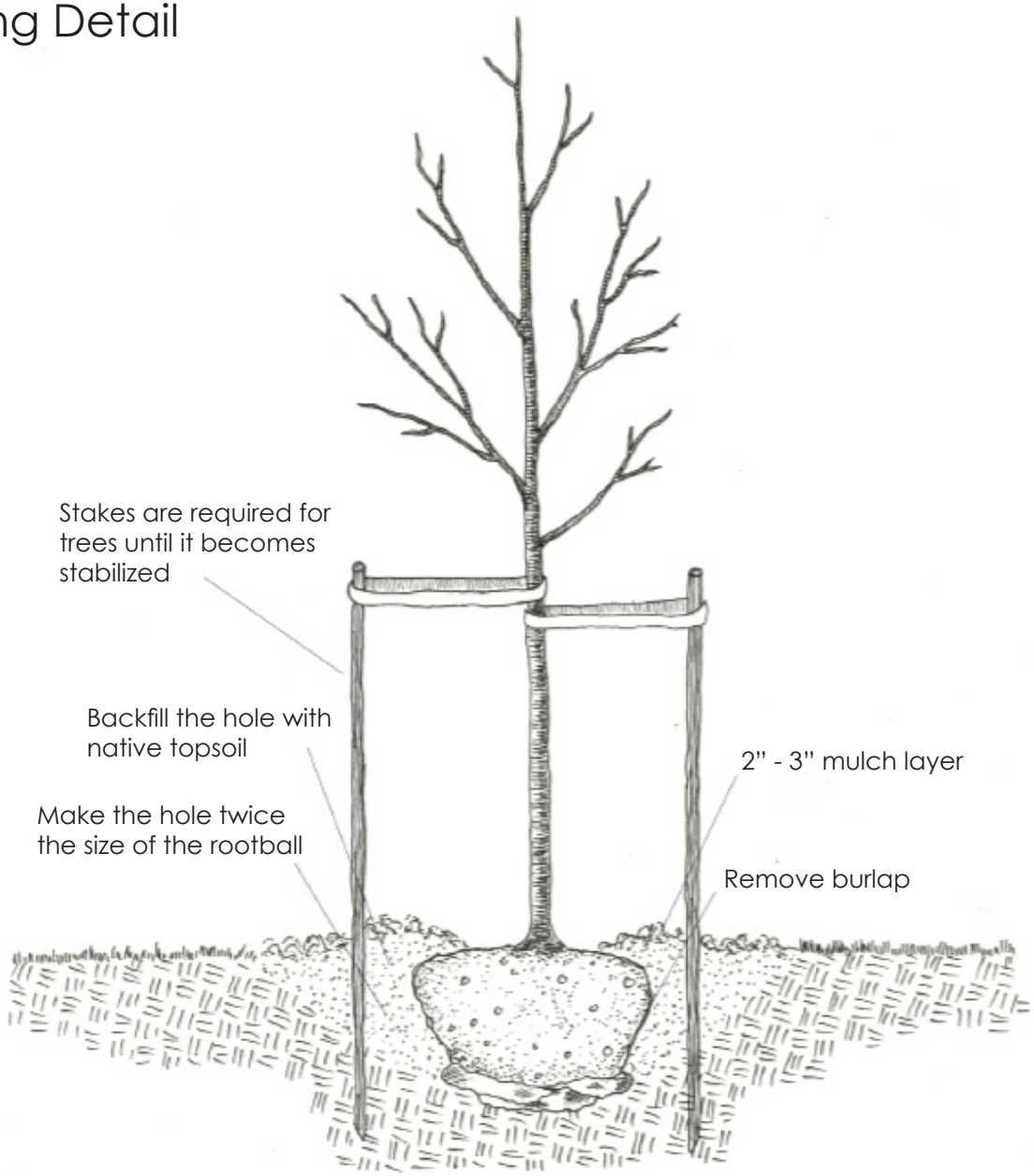
White Oak	**American Beech**	**Shagbark Hickory**	**Yellow Poplar**	**White Ash**	**Red Maple**	**Sycamore**	**River Birch**	**Flowering Dogwood**
(reddish/ brown)	(golden/ bronze)	(rich yellow)	(goldern/ yellow)	(bonze/ purple/ reddish)	(brilliant red)	(brown/ tan)	(pale yellow)	(reddish/ purple)

As one moves closer to the creek, 9 different tree species will come into view. These species have similar characteristics that when planted together will flow throughout the design. Bark was studied and three different trees have exfoliating bark, and as one passes through, one of these species will always be present.

Density (Bark) ⟶

Shagbark Hickory - Sycamore - River Birch

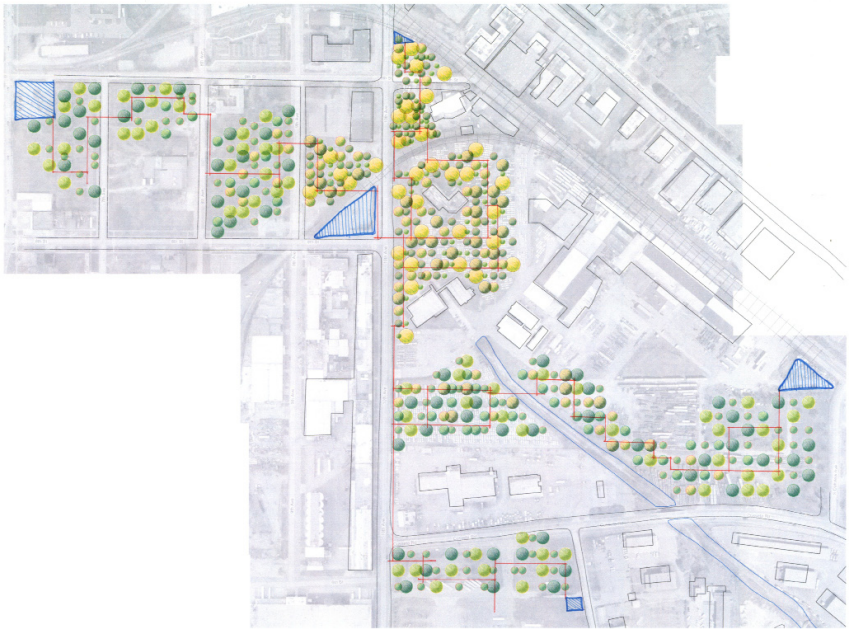
Planting Detail



Planting the correct way will give the tree the optimal growing conditions.

Trail System: Scheme 1

1a



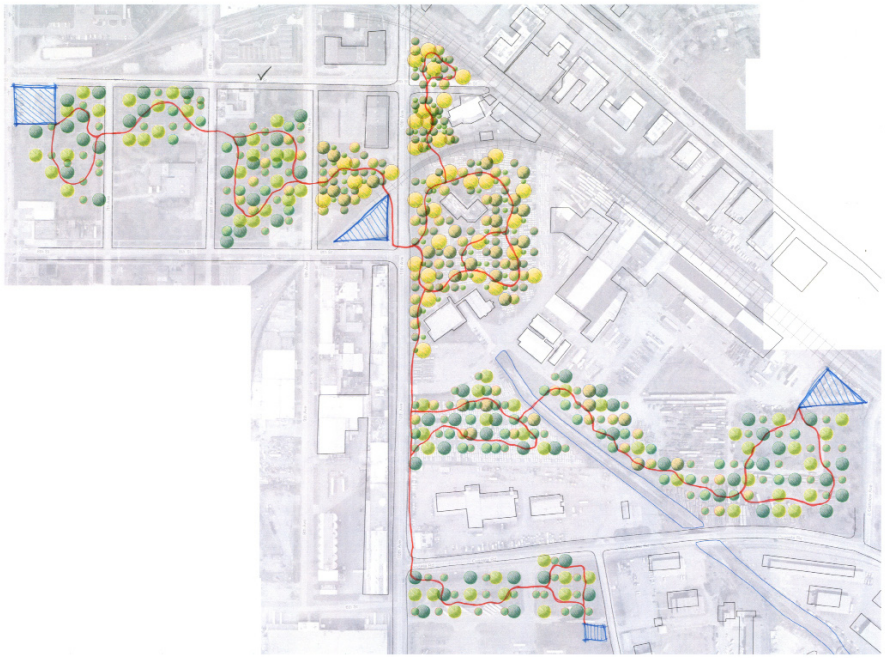
1b

In order to create the most appropriate layout for the trail system, four different design schemes were studied. For scheme 1, the trail system was laid out according to perpendicular lines. The lines are similar to the tree placement, and how they are taken from the car layout that are existing on site.

Trail System: Scheme 2

2a

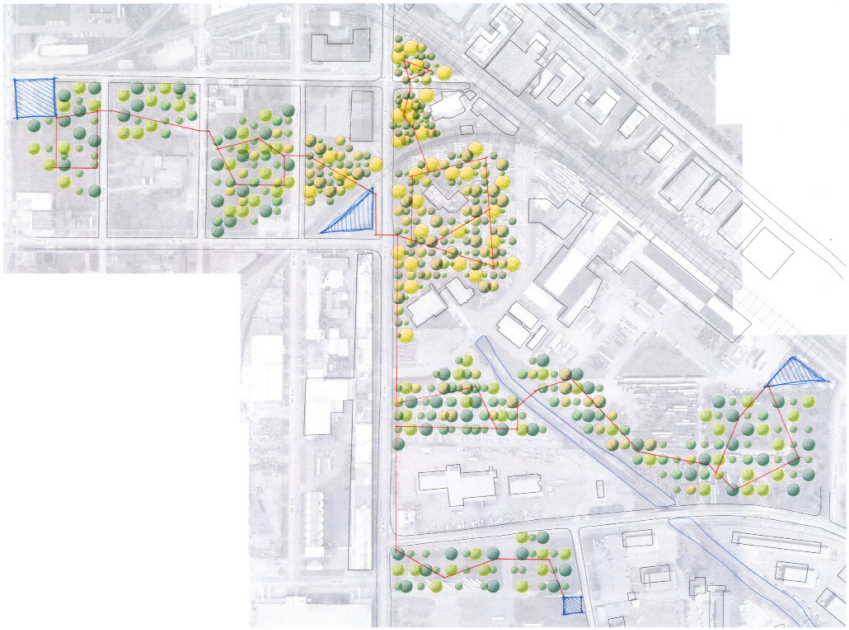
2b



For scheme 2, the trail system was ordered according to curvilinear lines.

Trail System: Scheme 3

3a



3b

For scheme 3, the trail system uses straight diagonal lines.

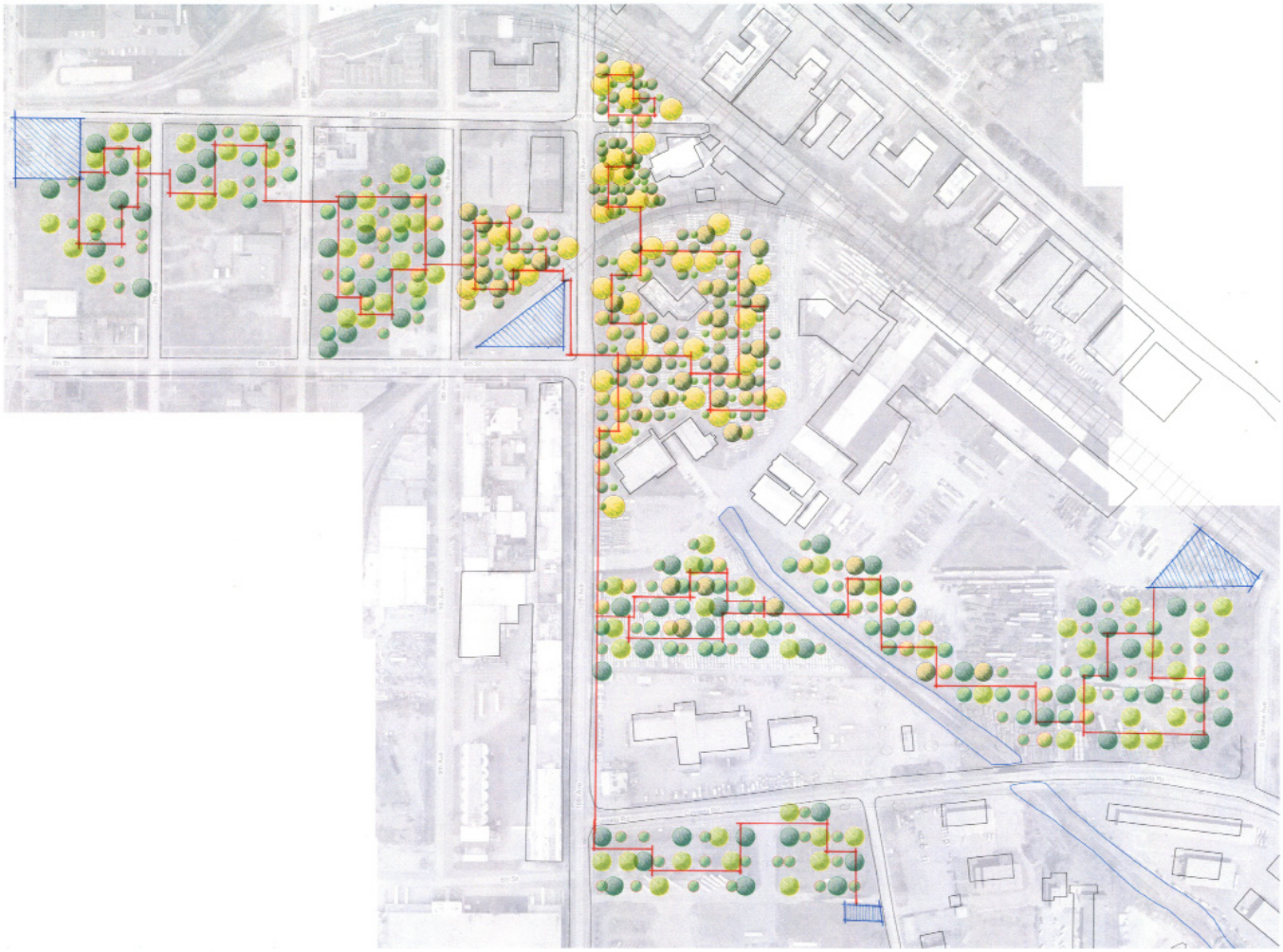
Trail System 4: Scheme 4

4a

4b

Scheme 4 is based on dropping sticks and reviewing where they fall. The way the sticks fall became the placement for the trails. This lead to dead ends and random straight lines.

Finalized Trail System



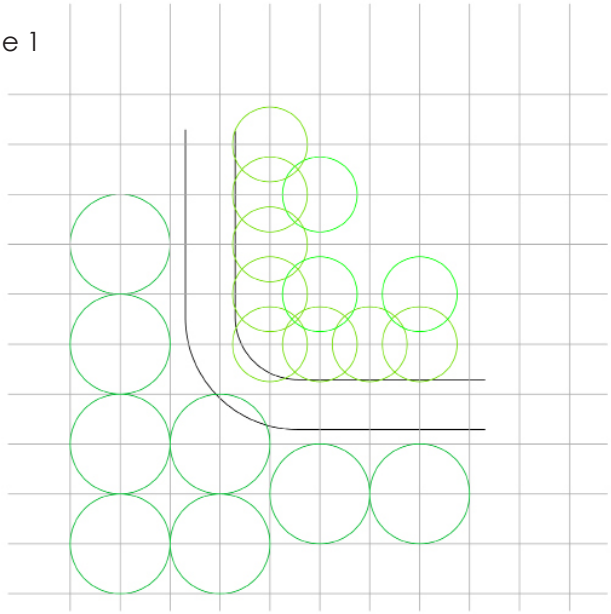
For the final trail system, scheme 1, straight perpendicular lines, was chosen. This correlates to the grid layout of the tree placement. The layout of the trails is a mixture of all four schemes, where within each section the pattern that best fit was chosen, but revised to fit the perpendicular pattern of scheme 1.

Trail Material

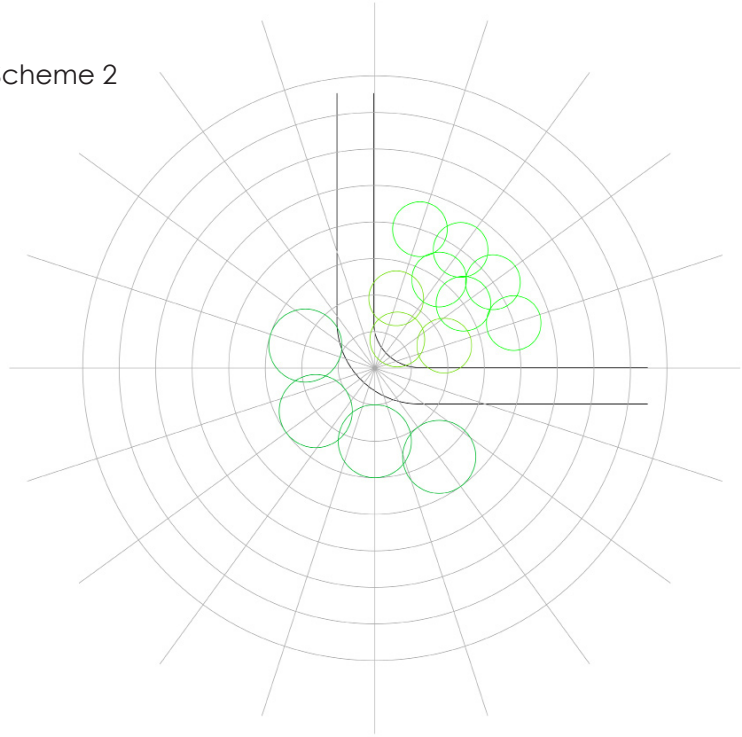
The trail material that was chosen is Turf Pour-in-Place, a product by Rainbow Turf Products. "It looks natural and provides permeable surface that slows down the effect of rushing water and its porous nature allows it to be placed around trees and shrubs without effecting the root systems or nutrient access" (Rainbow Turf Pour in Place). Its natural look will blend in with the woodland design, instead of an unattractive look of a concrete or asphalt. The surfacing meets the federal guidelines for Handicap Accessibility, and will be 4 feet wide, allowing for two people to pass or one wheelchair.

Shrub Placement

Scheme 1



Scheme 2



Shrub placement is positioned around the trail curves. This will keep pedestrians from venturing off the path and cutting corners. Two different schemes were studied, where both patterns were taken from the tree placement studies. In scheme 1, vertical and horizontal lines were drawn, and the shrubs were placed on line intersections. In scheme 2, concentric circles with radiating lines were drawn. For the final shrub placement, scheme 1 was chosen, because it follows the same grid guidelines from the tree placement.

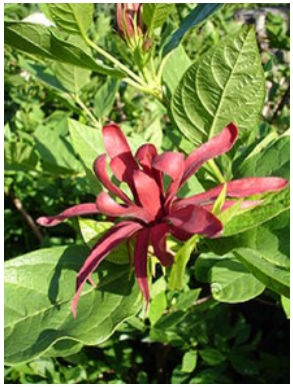
Shrub Selection

Oakleaf Hydrangea (*Hydrangea quercifolia*)

- 4' to 6' tall and wide
- This shurb starts with the lightest shades of green in spring changing to bronze/reddish colors in the fall. The cinnamon-colored, exfoliating bark provides an excellent focal point in winter. In summer, large panicles of white flowers show this plant its true beauty.

Alabama Azalea (*Rhododendron alabamense*)

- 5' to 6' tall and wide
- This shrub is possibly the most fragrant of all native azaleas. It is found in central Alabama into west Georgia. The white and yellow flowers are truly a pleasure to see in its woodland habitat.



Common Sweetshrub (*Calycanthus floridus*)

- 6' to 9' tall and wide
- This shrub will be used along the streambanks of the daylight section. It is native to moist woods and streambanks. When in bloom the flowers cast off a fruity fragrance.

Virginia Sweetspire (*Itea virginica*)

- 3' to 5' tall and 6' to 8' wide
- This shrub is native to moist areas, often found along streambanks. It is grows in clusters which become more dense in sun. In fall, the leaves turn a reddish purple. Long white flowers, slightly fragrant, emerge in summer months.

Groundcover Selection

Bottlebrush Grass (*Hystrix patula*)

- 2' to 3' tall
- This grass is native to moist shade areas
- Full sun to part shade
- This grass will be used as a groundcover around the edge of the design in the less dense areas. It will be transitioned into New York Fern.

Hay-Scented Fern (*Dennstaedtia punctilobula*)

- 1' to $1^1/_2$' tall
- Native to shaded woods
- This will be the last groundcover, situated within the dense section of the design. This fern has bronze fall color.

New York Fern (*Thelypteris noveboracensis*)

- 1' to 2' tall
- Native to moist woodland with filtered light
- This fern will be second groundcover after Buttlebrush Grass. It is a spreading fern which will take over a small area.

Rock Placement: Scheme 1

The same geomorphic conditions that, over long periods of time, produce woodlands and forests, also produce a great variety of rock configurations. Accordingly, rocks will be incorporated to mix hardscape materials with the softscape of the trees. In order to achieve the placement of the rocks, the method of the way rocks are scattered across the land was mimicked. During great floods, the velocity of the water moves rocks around the landscape, and over time earth is built, covering rocks, and eroded, exposing rocks. So, for the design, small rocks were scattered in this manner, and two schemes emerged.

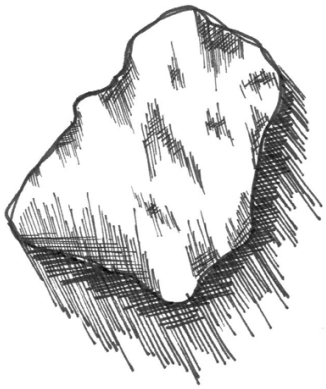
Scheme 1 provides a moderately even coverage across the site, but clusters of rocks are positioned on the outer edge of the design which may become lost.

Rock Placement: Scheme 2

Scheme 2 provides an even coverage across the site, without losing the rocks outside of the design. So, this scheme will be chosen for the final rock placement for the design.

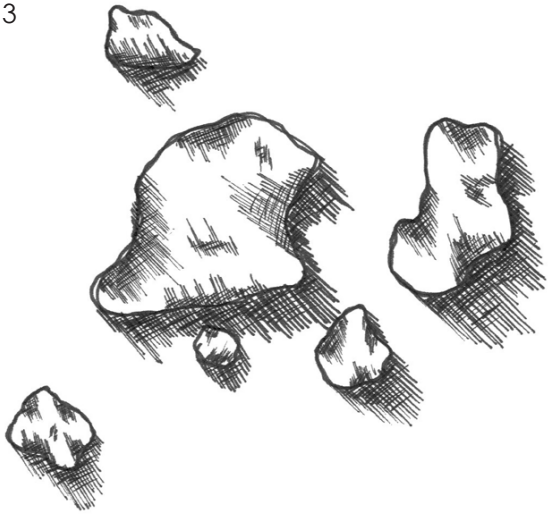
Rock Arrangement

1



2

3

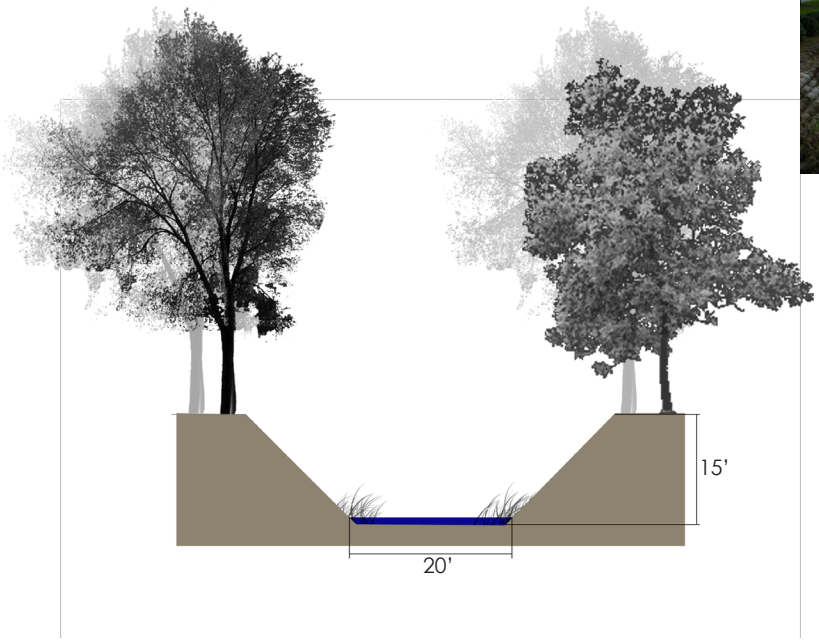


Three different rock arrangements are used within the site to complete the rock design. The first arrangement is a single rock. The second is a clustered arrangement. The third is a scattered pattern from the second arrangement. In each arrangement, there is something unique, but all three can be found in nature, depending on how they were naturally placed.

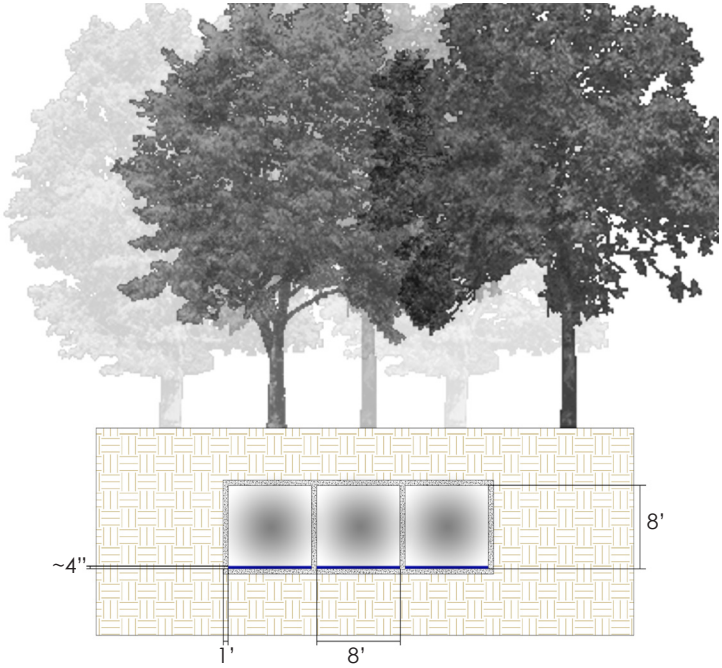
Daylight Weracoba

Within this section of the design, Weracoba Creek is piped underground. In the two highlighted section, the creek is proposed to be day lighted. It is roughly a 400' section where the underground pipe will be removed and the streambanks re-established.

Weracoba Creek: Existing Condition



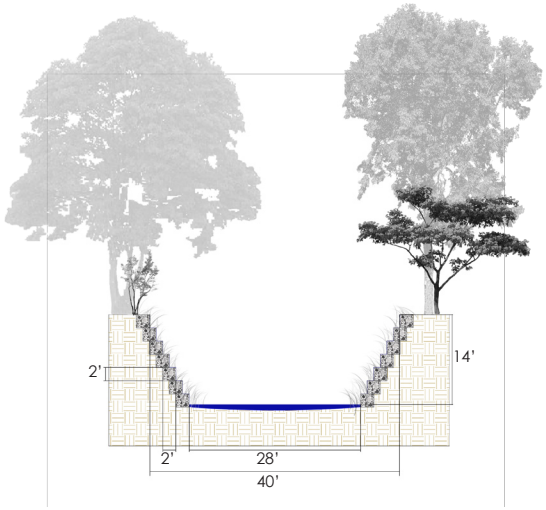
This section shows the culvert Weracoba Creeks flows through. The creek itself is approximately 20' wide, and is about 15' below ground level. The streambanks are made up of concrete with various stands of crabgrass growing through.



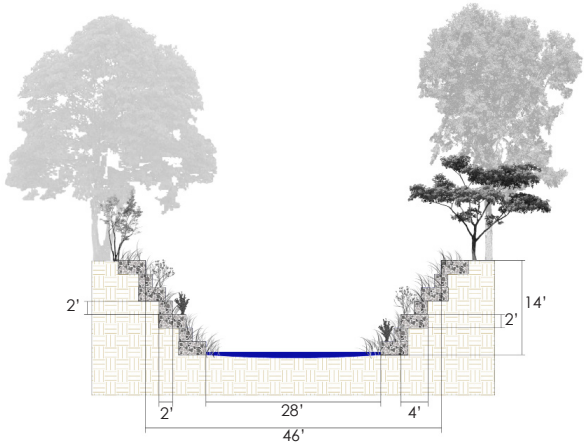
When Weracoba Creek is diverted underground, it is channeled through three 8' x 8' square pipes. The two outside pipes are designated as overflow channels.

Streambank Study

1



2



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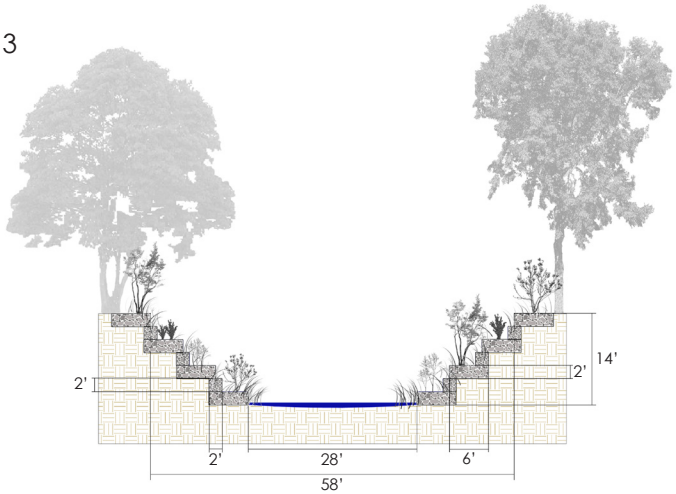
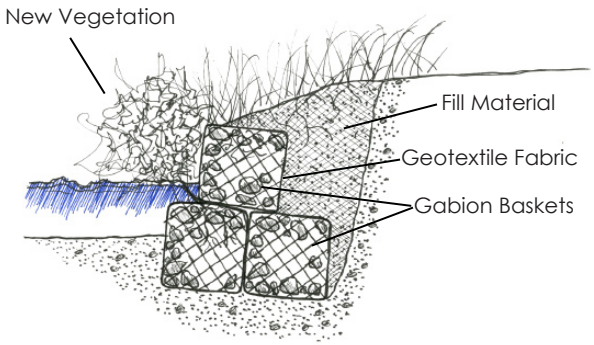


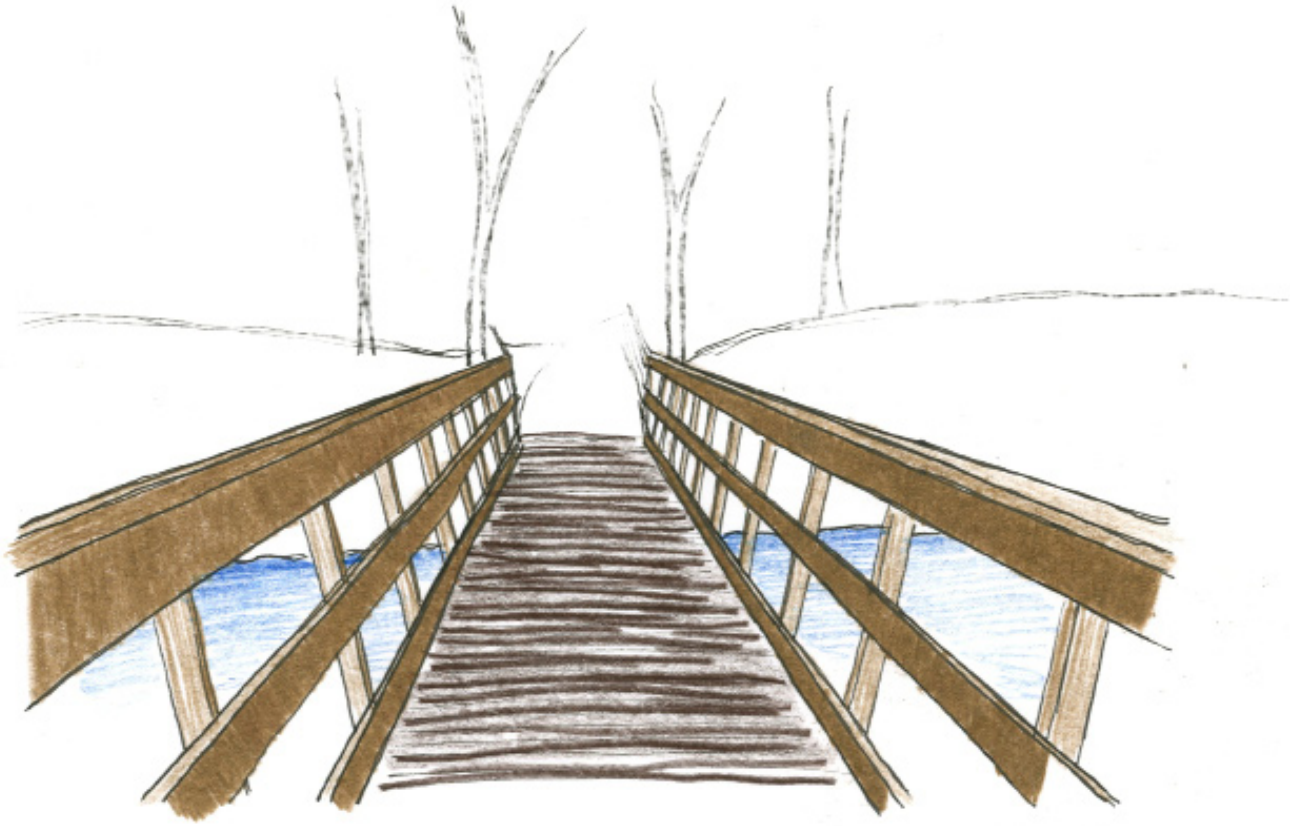
Throughout the daylight section of Weracoba, the streambanks need to be redesigned from what is existing. Three different studies were reviewed using Gabion baskets for the banks. In the first study, 2' x 2' baskets were used. This caused the flood way channel to be very narrow and the banks too vertical. Also, this did not allow for other vegetative material to be planted. In the second study, 2' x 4' baskets were stacked on top of 2' x 2' baskets. This widened the channel by six feet, allowing for plants to grow on every other terraced level. This study is very similar to the existing stream channel width. In the third study, 2' x 6' baskets were stacked on top of 2' x 2' baskets. This study widened the channel by an extra twelve feet. This causes the channel to be too wide, taking away from the surrounding woodland tree plantings. After reviewing the three studies, the second design was chosen as the way to daylight Weracoba Creek. The idea for this daylight design goes back to Area 3 Initial Design Investigation, Figures 17 and 18.

Stream bank Construction



For the daylight section of Weracoba, Gabion Baskets will be used instead of concrete. "They provide immediate and long-term erosion control and create hospitable conditions for plant establishment" ("Green Gabion"). The integration of plant material provides extra support, and as root systems develop it reinforces the soil. This technique provides a stable structure, which will house the creek and give the streambanks an aesthetic
appeal.

Bridges

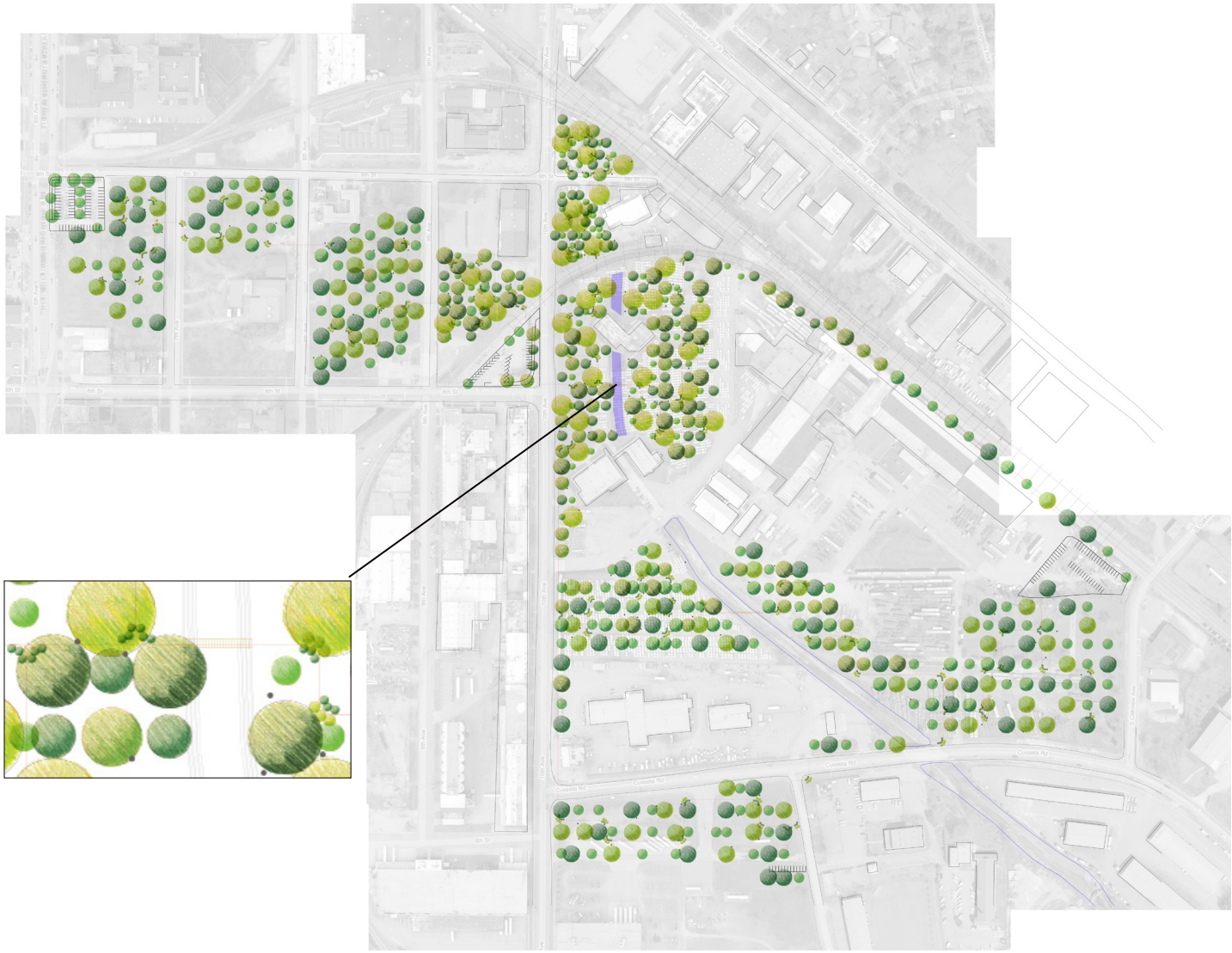


Building Material

Courtesy of Google Image

Within the design, there are three points were the trail crosses Weracoba Creek. To get from one side to the other, a simple wooden bridge will be constructed. The image above shows the idea for what the bridge will look like. Handrails will line both sides to prevent from falling off, as well as it meets federal guidelines.

Finalized Woodland Design



This is the final woodland design, including trail system, tree placement, shrub placement, rock placement, and day lighted section of Weracoba Creek. The image to the left shows shrubs, rocks, and bridge.

Finalized Woodland Design cont'd

Sketch of woodland and walking trail

Sketch of day lighted section of Weracoba Creek

Conclusions

In conclusion, this project provides a woodland landscape within Columbus' downtown district. Native tree, shrub and groundcover species are used according to existing site conditions. In total, 490 trees are planned:

Shagbark Hickory: 84
American Beech: 63
White Oak: 61
Yellow Poplar: 37
White Ash: 32
Red Maple: 54
River Birch: 65
Sycamore: 34
Dogwood: 34

Together, these species will reestablish the forest footprint that once covered the area.

References

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