

SUB 9

Atlanta Beltline Subarea 9 bottom of Westside Quarry Transit Oriented Commercial Core



A terminal project presented to the Graduate School of Clemson University
School of Landscape Architecture Program
by
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ABSTRACT

Cities are setting of our collective future, cities are habitats, cities are ecosystems, cities are communities where people live in. Urban design is a powerful tool of adaptation Through meticulous urban design, creating a comfortable and elegant urban living environment, and bringing the improvement of the quality of life that is closely related to the people. It highlights the city's ease of identification and cohesion, which is conducive to the formation of urban cultural atmosphere and the adoption of cultural revival. Which brings a virtuous cycle of development.

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INTRODUCTION

Cities are setting of our collective future, cities are habitats, cities are ecosystems, cities are communities where people live in. Urban design is a powerful tool of adaptation (Anne p.3). The activities of humans in urban a society requiring spaces and places. outdoor activities of urban residents including communication, politics, commerce, culture, and other activities all require a certain quantity and quality of open space. The higher the social and cultural level, the higher the demand for person. Likewise, building a resilient place requires a multilayered approach, attuned to social patterns as much as to physical structures. We understand our environment as a complex, connected network in which every decision has far-reaching consequences: a system in which ecology, economic exchange, policy, and social justice inform and intersect one another. Spontaneously, we introduced a concept-Sustainable Landscape, a sustainable landscape is designed to be both attractive and in balance with the local climate and environment and it should require minimal resource inputs. Thus, the design must be "functional, cost-efficient, visually pleasing, environmentally friendly and maintainable". And, Urban design is a comprehensive discipline and a continuous decision-making process. Therefore, management of the design process and post-design management are all very important. Moreover, urban design is a comprehensive design work that requires the coordinated development of multiple disciplines. Urban planning, architecture, landscaping, and project management are the major disciplines. Therefore, we must cultivate a spirit

of collaboration in the process of urban design.

Through meticulous urban design, creating a comfortable and elegant urban living environment, and bringing the improvement of the quality of life that is closely related to the people. It highlights the city's ease of identification and cohesion, which is conducive to the formation of urban cultural atmosphere and the adoption of cultural revival. Which brings a virtuous cycle of development. Sustainability science and technology is not a discipline but is the grand challenge of our time. (Meyers p.19) The environmental sustainability is a core value of the High Line (Began in 2006). The park is an inherently green structure, as it repurposes a piece of industrial infrastructure into a uniquely designed public space. Equally important is the way the High Line operates—every day, designers strive toward sustainability with the same level of care reflected in the park's design.

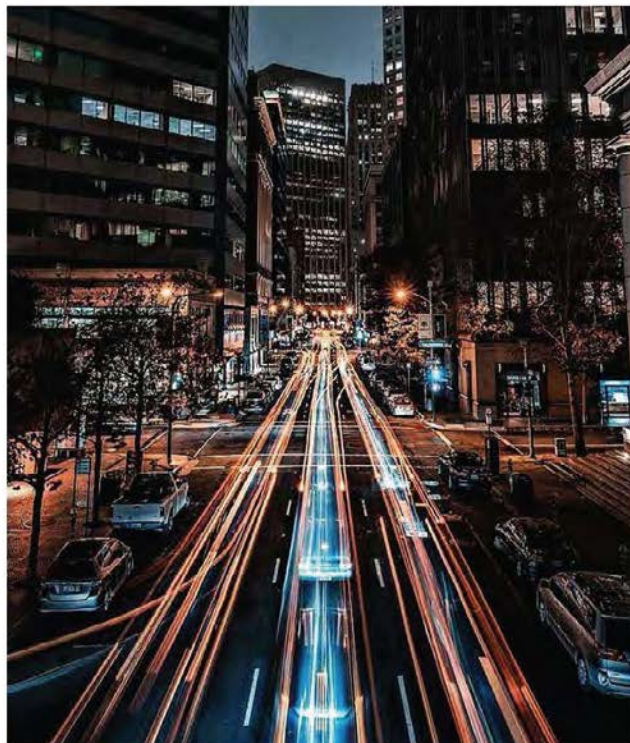
In order to apply the sustainable concept to the site and cooperate the Beltline, a creative and appropriate use must be implemented. Atlanta Beltline Subarea Nine afford unrealized potential. This proposal seeks to use the area as an urban sustainable landscape that embraces its setting; a public green area which encourages social interaction between each neighborhood and strengthens connectivity to the regional Westside Reservoir of the site. Showing the ecological environment and deliberate circulation, enhanced

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soil condition, preserve existing/native plants, conserve material resources, also, care about the human Green infrastructure as well as services in ecosystem. Transit-oriented development is a type of urban development that maximizes the amount of residential, business and leisure space within walking distance of public transport. A TOD typically includes a central transit stop (such as a train station, or light rail or bus stop) surrounded by a high-density mixed-use area, with lower-density areas spreading out from this center.

A TOD is also typically designed to be more walkable than other built-up areas, through using smaller block sizes and reducing the land area dedicated to automobiles.

Metropolitan Atlanta Rapid Transit Authority (MARTA) TOD efforts involve partnering with business and residential developers to create spaces for people close to transit. MARTA then receives proceeds from rents as well as an increase in fare revenues from the addition of riders produced by the TOD. MARTA has plans for several such nodules in the future (and the Beltline is hoped to inspire many more). Atlanta Beltline Subarea Nine district one (see the matrix three) is a typical potential nodule.



Classic city intersection Figure : I.1.1_1

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PROBLEM STATEMENT

The Problem for this graduate project is to design a Transit-oriented development Node master plan that contributes to the renovation of Subarea Nine within Atlanta Beltline.

The brand-new area will respect the sustainability of the urban public space, indicate its concern about the urban ecology and ecosystem as well as green infrastructure. The principle of Beltline Subarea nine is trying to find the better way to deal with circulation, accessibility for communities, water treatment, enhance soil condition, preserve existing plants, conserve material resources. Like the Subarea five, The Historic Fourth Ward Park reconfigured for a program that combines a sustainable stormwater detention facility with active and passive open space components.

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LITERATURE REVIEW

TRANSIT-ORIENTED DEVELOPMENT

New Urbanism is strongly influenced by urban design practices that were prominent until the rise of the automobile prior to World War II; it encompasses ten basic principles such as traditional neighborhood design (TND) and transit-oriented development (TOD). These ideas can all be circled back to two concepts: building a sense of community and the development of ecological practices. TOD is a type of urban development that maximizes the amount of residential, business and leisure space within walking distance of public transport.

A TOD typically includes a central transit stop (such as a train station, or light rail or bus stop) surrounded by a high-density mixed-use area, with lower-density areas spreading out from this center. A TOD is also typically designed to be more walkable than other built-up areas, through using smaller block sizes and reducing the land area dedicated to automobiles.

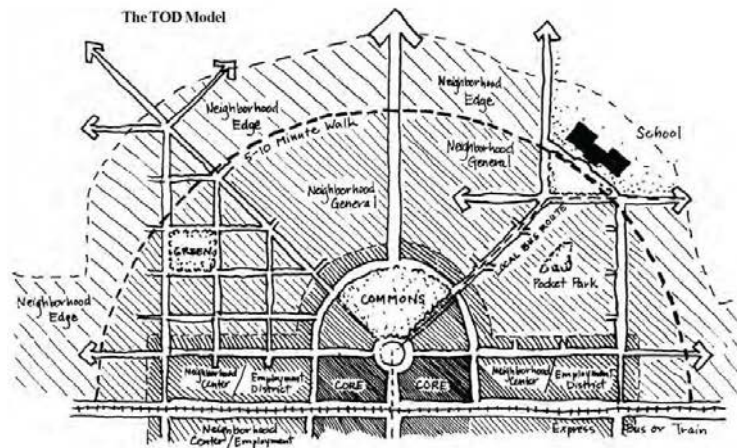


Figure : 1.3.1_1
TOD Diagram. Image credit: Peter Calthorpe.

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Peter Calthorpe developed and expanded the notion in the "The Regional City" 2001 and "Urbanism in the Age of Climate Change" 2011. He viewed TODs as the holistic alternative to sprawl, not only providing a pleasant and walkable neighborhood, but also providing an economic, ecological, and social foundation for regional development. (Calthorpe, 1993)

Several key principles of TODs are to:

- Organize growth on a regional level to be compact and transit-supportive;
- Place commercial, housing, jobs, parks, and civic uses within walking distance of transit stops;
- Create pedestrian friendly street networks which directly connect local destinations;
- Provide a mix of housing types, densities, and costs;
- Preserve sensitive habitat, riparian zones, and high-quality open space;
- Make public spaces the focus of building orientation and neighborhood;
- Encourage infill and redevelopment along transit corridors within existing neighborhoods"

The creation of successful TODs requires the convergence of many complex factors, such as social conditions, demographics, economic conditions, political support, community support, promotion of alternative transportation, plus many more. However, these factors become irrelevant if the proper foundation to build upon does not exist. A functioning urban structure/ urban design provides the proper framework for TODs. It provides the framework for a walkable, transit friendly community to develop. When identifying TOD suitability around existing transit stations, identification of the urban fabric should always be the first step in the analysis.

Metropolitan Atlanta Rapid Transit Authority (MARTA) TOD efforts involve partnering with business and residential developers to create spaces for people close to transit. MARTA then receives proceeds from rents as well as an increase in fare revenues from the addition of riders produced by the TOD. MARTA has plans for several such nodules in the future (and the Beltline is hoped to inspire many more) (Miriam p.148)



Landscape green island in the middle of city road

Figure : I. 3.1_2

11 Proposals

ATLANTA BELTLINE

Getting at what lies beneath the asphalt, interrogating what drives the paving of America, along with the seemingly unstoppable space, energy, and money consumption that the current mode of mobility entails will perhaps allow for future decision-making that includes a more nuanced reading of the landscape. (Konrad p.2) Atlanta is located in the eastern United States on the platform of the Appalachian foothills at an altitude of 350 meters. It is one of the three highland cities in the United States. It is the county government resident of Fulton County and the ninth largest metropolitan area in the United States. It is also the capital of Georgia and the largest industrial and commercial city in the United States.

Metropolitan Atlanta Rapid Transit Authority (MARTA) TOD efforts involve partnering with business and residential developers to create spaces for people close to transit. MARTA then receives proceeds from rents as well as an increase in fare revenues from the addition of riders produced by the TOD. MARTA has plans for several such nodules in the future (and the Beltline is hoped to inspire many more) (Konrad p.148) The Atlanta Beltline is a planned loop of 22 miles of modern streetcar (an expansion of the Atlanta Streetcar), 33 miles of multi-use trail, and 2,000 acres of parks. It will open in phases through the anticipated completion in 2030. The planned Atlanta Beltline utilizes an existing 22-mile historic rail corridor that encircles the City of Atlanta as its foundation, all within a few miles of Downtown.

The Atlanta Beltline is the most comprehensive transportation and economic development effort ever undertaken in the city of Atlanta and among the largest, most wide-ranging urban redevelopment programs currently underway in the United States. When completed, it will provide first and last mile connectivity for regional transportation initiatives and put Atlanta on a path to 21st century economic growth and sustainability.



Atlanta Beltline Bicycle Lane Figure : I. 3.2_1

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The Atlanta Beltline is made up of five segments, which are split into ten subareas for planning. The ten subareas are organized as: Southwest (subareas 1 and 2), Southeast (subareas 3 and 4), Northeast (subareas 5 and 6), Northside (subareas 7 and 8), and Westside (subareas 9 and 10).

From the Marietta Street Artery, Subarea 9 runs south to Donald Lee Hollowell Parkway. Neighborhoods include: Grove Park, Howell Station, Knight Park, Marietta Street Artery, and Rockdale. Subarea 9 amenities include the Atlanta Beltline's Westside Reservoir Park, proximity to Georgia Tech, and a connection at the Bankhead MARTA station.

Daily life is changing for people who live along already developed section of the Beltline. The park corridor is becoming the place where residents of every ethnicity, income level, and social class encounter one another, cycle skate, jog, or just wander. Furthermore, as more and more of the Beltline opens for public use, it will have greater and greater impact on city residents.

Atlanta is demonstrating how to achieve better balanced, less congested urbanization and create a park system that will supplant the city's interstate highways as the focus of daily life for hundreds of thousands of Atlantans. Still more important, the Beltline demonstrates how cities in the twenty-first century can repurpose neglected, obsolete property, in the process creating a public realm that not only alters daily life but can pay for itself with tax revenues generated by private real estate development that would otherwise not have occurred. (Garvin p.277)

Development of the Atlanta Beltline, like Brooklyn Bridge Park, converted property previously used for shipping freight into an actively used part of the city's public realm. Like the Brooklyn Bridge Park, even before completion it attracted thousands of citizens. The Beltline, however, also has provided a public realm framework that has already triggered a widespread and sustained private market reaction and will change daily life in Atlanta. (Garvin p.272)



Atlanta Beltline Figure : I. 3.2_2

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Today, for the first time in human history, more than half the world's population lives in towns and cities rather than in the countryside. Hence, what happens in cities is profoundly important for sustainability, both for the welfare of the people who live there and for the demands that humankind makes on the earth's resources. (Benson p.167)

Although I can't currently quantitatively determine what landscape is a sustainable landscape (and because of the ambiguity of the concept of "sustainability", many people object to the use of this term), I can at least say something "sustainable" among the landscapes should have some basic characteristics.

As ASLA Declaration on Environment and Development said:

It is our responsibility to achieve healthy, natural systems and cultural communities through our design, planning, management and policy development, as well as harmony, fairness and balance between the two. (ASLA 1993)

Landscape planning, management strategies and policy development at local, regional and global scales must be based on the context of the culture and ecosystem in which the particular landscape is located. (ASLA 1993)

So, I would say that probably the sustainability is a framework, a systematic way of linking ourselves with the natural systems that support us. (Thompson & Sorvig p.2)



Historic Fourth Ward Park along the Beltline's Eastside Trail segment Figure : I. 3.2_3

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Ecosystem Services

Cities are a center of demand for ecosystem services and with projected doubling of urban populations there will be an accelerating demand of these services. ... Rapid expansion of urban areas present fundamental challenges but there are also opportunities to restore ecological functions to design more livable, healthy and resilient cities.

Cities are a key nexus of the relationship between people and nature and are huge centers of demand for ecosystem services and also generate extremely large environmental impacts. Current projections of rapid expansion of urban areas present fundamental challenges and also opportunities to design more livable, healthy and resilient cities (e.g. adaptation to climate change effects).” (Elmqvist 2005)
Nature is both given and constructed. There is always a tension between the autonomy of nonhuman features and phenomena and the meanings ascribed to them. (Johnson p.36)

Landscapes are shaped by rain and sun, plants and animals, human hands and minds. Whether wild or clipped, composed of curved lines or straight, living plants or plastic, every garden and every region is a product of natural phenomena and human artifice. (Johnson p.31)

Hcharg invented ways to map the individual attributes of large landscapes, with each attribute mapped separately, and then to layer these semitransparent maps, one over the other. Through examining the transparent maps, one could determine areas of the landscape that were most sensitive, and thus exempt from urbanization, and others where urbanization might occur with minimal damage. (Mcharg 1967)
The landscape is a complex of a series of ecosystems that need to be understood from spatial patterns and horizontal processes, including wind processes, water processes, biological migration, and human spatial movements. The health and sustainability of these processes are directly affected by the landscape pattern. Healthy landscapes are ecosystems, and they survive by constant change. (Thompson p.338)
The structural pattern of a landscape or region is composed entirely of three types of elements. Indeed, these universal elements-patches, corridors, and matrix-are the handle for comparing highly dissimilar landscapes and for developing general principles. They also are the handle for land-use planning and landscape architecture, since spatial pattern strongly controls movements, flows, and changes. (Dramstad p.14)



Green ecological sedimentation tank structure. Figure : I. 3.3_1

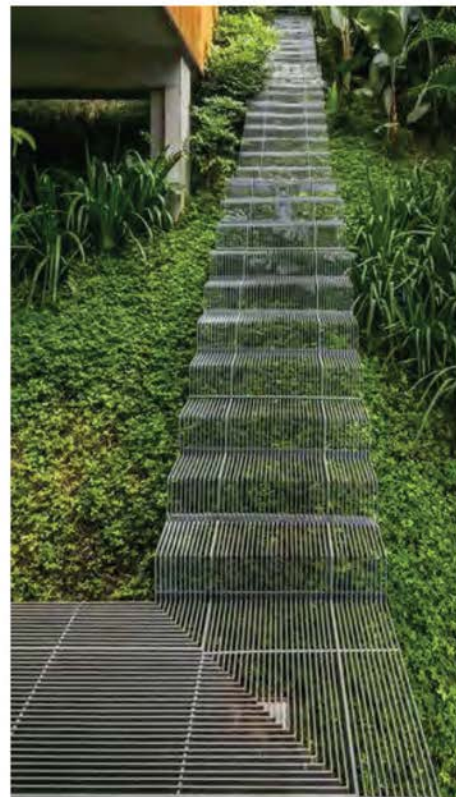
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In human as well as natural ecosystems, flows of energy and materials are the engines that drive everything else. As a rule, they are taken for granted. We tend to forget well as for other organisms, is dependent on a continuing supply of energy, water, and the chemical elements necessary to its dynamics and that the most essential function of all ecosystems, both human and natural, is to make the needed energy and materials available to their inhabitants. (Lyle p.228)

Ecosystems that provide such services are distributed spatially and temporally in urban, suburban, and rural landscapes. They include environmentally sensitive areas that are vital to the long-term maintenance of biological diversity, soil, water, or other natural resources, locally and regionally. Although these environmentally sensitive areas occur within every landscape, their importance in maintaining the health of a locality is relative to their ecological values, and to the type and management regime of adjacent landscapes. (Forman p.19)

Ecological greenway networks have huge potentials in ecological perspectives. Among the most important potentials is their function as both an ecological and social network on different levels. The network has a potential to in-crease co-ordination across the human borders of ad-ministrations, countries, regions and local spots and to increase co-operation between administrative sec-tors, local people and NGOs. (Jongman p.73)
Eco-service function: If the landscape is recognized from the needs of life and people, then the life support function of the landscape can be understood as the service function of the ecosystem, such as providing rich and diverse habitats, food production, regulating local microclimate, and slowing down drought, disasters, purify the environment, meet perceived needs and become a source of spiritual culture and educational sites, etc. (Daily, Cunha 1997)

We need to know where the environment is healthy, because the environment there is adapted, and adaptation is a creation. There is a creation-adaptation-healthy environment. We must know what it is made of in order to build a city with humanity.



Stairs are integrated into the environment as much as possible.

Figure : I. 3.3_2

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Green Infrastructure

Green infrastructure is a term that can encompass a wide array of specific practices, and a number of definitions exist. In our view: Green infrastructure is an approach to water management that protects, restores, or mimics the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life.

It means planting trees and restoring wetlands, rather than building a costly new water treatment plant. It means choosing water efficiency instead of building a new water supply dam. It means restoring floodplains instead of building taller levees.

Green infrastructure incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions, and provide a wide array of benefits to people and wildlife.

Green infrastructure solutions can be applied on different scales, from the house or building level, to the broader landscape level. On the local level, green infrastructure practices include rain gardens, permeable pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting systems. At the largest scale, the preservation and restoration of natural landscapes (such as forests, floodplains and wetlands) are critical components of green infrastructure.

Green infrastructure investments boost the economy, enhance community health and safety, and provide recreation, wildlife, and other benefits.



Landscape green infrastructure for collecting rainwater. Figure : I. 3.4_1

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Rivers, streams, wetlands, floodplains, and forests provide a suite of critical services like clean water and flood protection and should be viewed as essential and effective components of our water infrastructure. New York City has great quality tap water because the city invested in water protection by purchasing land around its Catskills reservoirs to ensure that polluted runoff from roads and lawns doesn't enter the water supply. The city's \$600 million investment in Catskills land protection and restoration did the job of \$6 billion in capital costs to construct a water filtration plant as well as \$200-300 million in annual operation and maintenance costs.

Traditional infrastructure isn't designed to handle the increased floods and droughts that come with global warming, so we need a modern approach to protect public health, safety, and quality of life. Green solutions give communities the security and flexibility they need. Napa, CA solved flooding problems by choosing to restore the Napa River's natural channel and wetlands, rather than lining the river with concrete. The effort has protected 2,700 homes and prevented \$26 million in flood damage each year and has created new parks and open space.

Restore the streetcar city, Design an interconnected street system, Locate commercial services/frequent transit/schools within a five-minute walk, Locate good jobs close to affordable homes, Provide a diversity of housing types, Create a linked system of natural areas and parks, Invest in lighter/greener/cheaper/smarter infrastructure. (Condon 2010)

The City of Atlanta Department of Watershed Management has been working to transform the quarry into a two-billion-gallon emergency drinking water reservoir for the City that will increase the emergency water supply from three days to thirty days.

Visitors will be able to experience the quarry using ADA-accessible trails leading to the grand overlook. The Bellwood Quarry has been under construction since September 2016.



Landscape green infrastructure for collecting rainwater. Figure : I. 3.4_1

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RESEARCH

METHODOLOGY

1. Field research of existing TOD landscape to document issues.
2. Case studies of successful and unsuccessful TOD landscape areas for the function of the sustainable design in it.
3. Observe specific resident & tourism groups, interview the community centers officer around the Beltline, discuss their views of the issues and needs, as well as potential solutions.
4. Correlation research: By understanding the variables about the ecosystem services & green infrastructure impact in landscape, to compare the effects of different ecological bringing, and to know if it possible exist a certain degree of sustainability.
5. Historical information of the Beltline needs to be gathered and analyzed. Browsing the official website to know more about why the Beltline is divided into ten dominant subareas as well as some previous conceptual idea of the whole Beltline will also be helpful in order to get a comprehensive understanding of the Atlanta Beltline.

First according to Rational Design and Planning Method, I am researching various landscape projects related TOD. Create the matrix to compare them (*Figure : II. 2.1_1*). After that, I personally chose the metropolis of Atlanta located in the south of America (*Figure : II. 2.1_2*).

A very famous project in Atlanta --- Beltline, Under this huge concept, there are countless possibilities for making good landscape designs (*Figure : II. 2.1_3*).

City planners divided it into ten parts --- ten subareas. Then I went to Beltline website reviewed a lot information in the website and create the matrix to select the best part for my final project (*Figure : II. 2.1_4*). Which is the subarea nine.

I divided it into six different areas, because TOD is related to traffic, and there is an important transportation hub in the fourth district (*Figure : II. 2.1_6*).

I found the huge potential advantages in this region. One of them is the largest public park in Atlanta --- Westside Quarry Park located in north side of my project site (*Figure : II. 2.1_5*).

SITE IDENTIFICATION

SUSTAINABLE LANDSCAPE

MATRIX CRITERIA
 - 100% GREEN
 - 100% SUSTAINABLE
 - 100% SUSTAINABLE

	DESIGN										ECO SERV				GREEN INFRASTRUCTURE									
	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
MODULAR PARKING	N/A	Public	7	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
TRIP GENERATION OUTSTAYS	TOD	Public	7	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
WATERWAY CORRIDOR	TOD	Public	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
ROCKWELL STREET/BRIDGE AND TRAIL	N/A	Public	5	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
YUQUA INNOVATION CLUSTER	TOD	Public	5	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
EAST BAY/INDUSTRIAL DISTRICT	TOD	Public	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

CASE STUDY

Figure : II. 2.1.1

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Figure : II. 2.1.2 Source : GIS Project SUB9

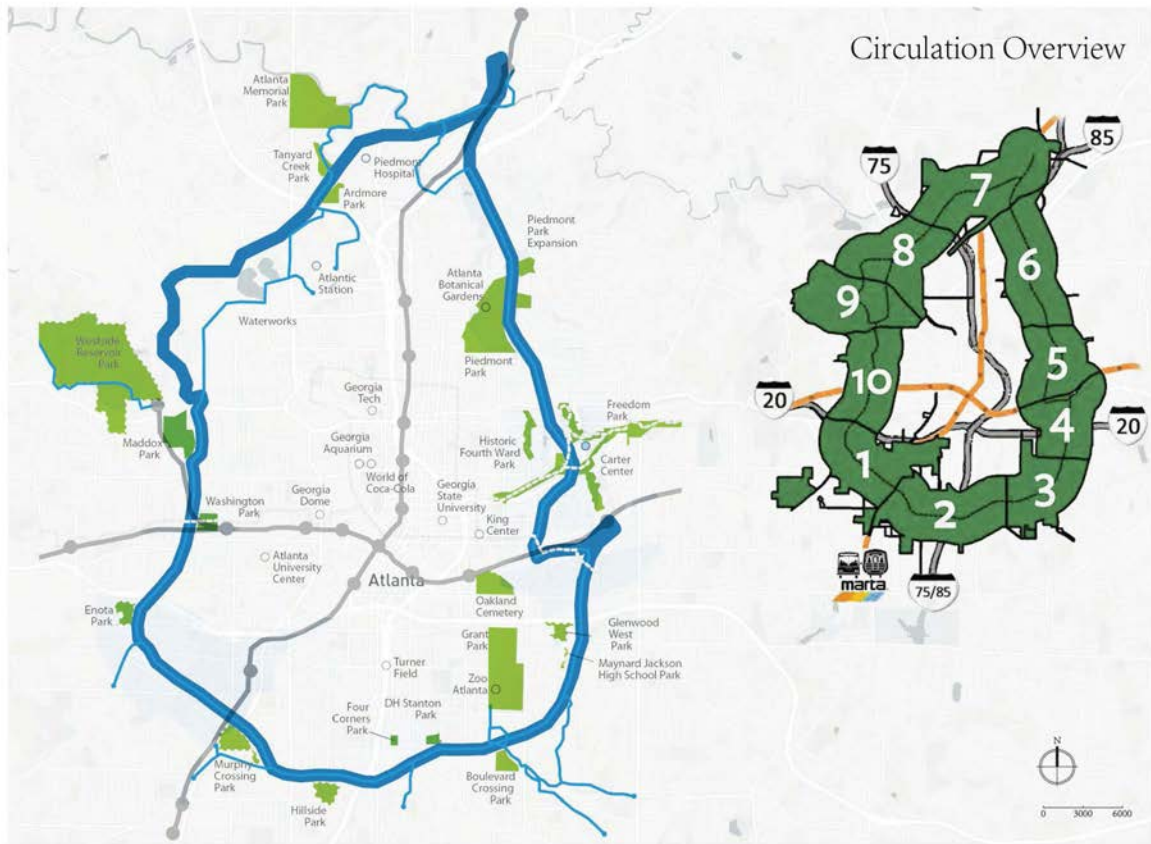


Figure : II. 2.1_3 Source : GIS & Atlanta Beltline Inc.

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ATLANTA BELTLINE MATRIX CRITERIA		SOUTHWEST		SOUTHEAST		NORTHEAST		NORTHSIDE		WESTSIDE	
		SUBAREA ONE	SUBAREA TWO	SUBAREA THREE	SUBAREA FOUR	SUBAREA FIVE	SUBAREA SIX	SUBAREA SEVEN	SUBAREA EIGHT	SUBAREA NINE	SUBAREA TEN
SUBAREAS EVALUATION	LOCATION	[Map]		[Map]		[Map]		[Map]		[Map]	
	REGIONAL INTRODUCTION	[Text]		[Text]		[Text]		[Text]		[Text]	
	DEVELOPMENT PERIOD	Construction		Open Construction		Open		Design		Planning & Acquisition	
	REACHABLE PARK	[Map]		[Map]		[Map]		[Map]		[Map]	
	LAND USE	[Map]		[Map]		[Map]		[Map]		[Map]	
	THE STREET CONNECTIVITY	[Map]		[Map]		[Map]		[Map]		[Map]	
	HYDROLOGY	[Map]		[Map]		[Map]		[Map]		[Map]	
CONCLUSION		[Text]		[Text]		[Text]		[Text]		[Text]	

Figure : II. 2.1_4 Source : Atlanta Beltline Inc. Project SUB9 24

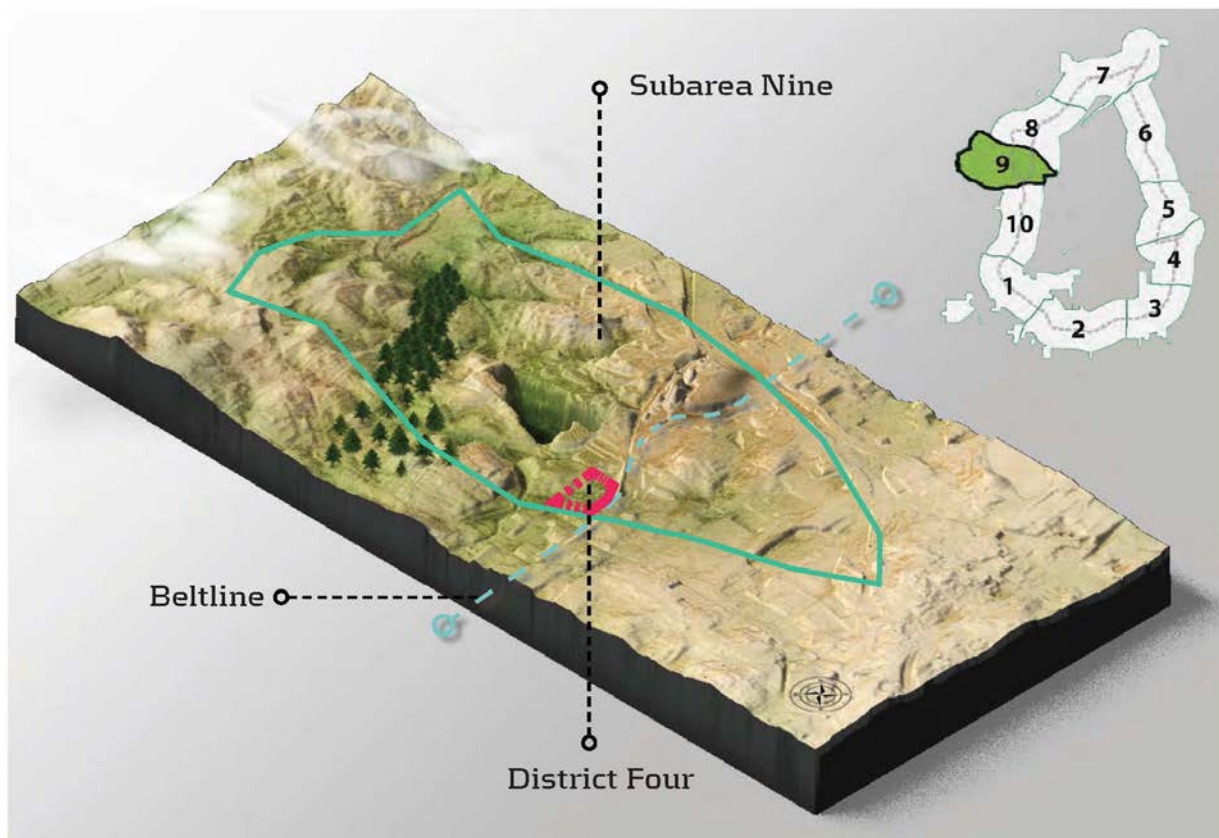
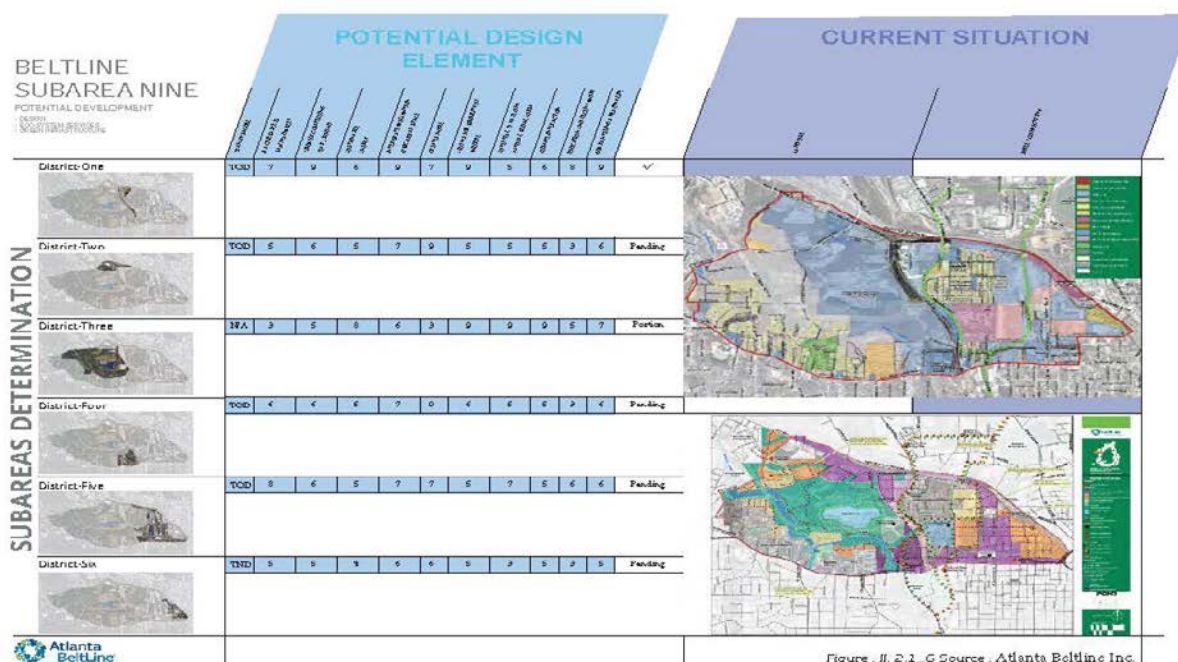


Figure: II. 2.1_5 Source: USGS





HISTORICAL OVERVIEW OF SUBAREA NINE



DESTROYED



Figure : III.1.1_1 Destruction of the Howell Station Neighborhood due to the Civil War.

The first exposition was the International Cotton Exposition of 1881 held in the upper Marietta Street artery where the Exposition Cotton Mills were built along the Atlantic and Western Railway, just south of present-day King Plow Art Center and Ashby Street Trolley Barn. This exposition drew 350,000 people to it from 33 states and 7 countries. At the end of the exposition these buildings were converted into a textile mill that began operation in 1882, which was one of the original goals of the creators and businessmen behind the Exposition. The Exposition Cotton Mills had a trolley car route at its front door for the convenience of the mill workers.

RENEWED



Figure : III.1.1_2 Revitalization of the Howell Station Neighborhood in 1890s.



Figure : III.1.1_3 The View of Marietta Street.



Figure : III.1.1_4 The View of International Cotton Exposition in 1881.



Figure : III.1.1_5 The 1893 City Directory praised the new streetcar service saying "one of the chief features of a visit to Atlanta is a ride on this delightful line."

INTRODUCTION

The Howell Station Historic District is located northwest of downtown Atlanta in an area dominated by light industry associated with the development of Marietta Street. The district consists of intact residential buildings, a recreational park, and four churches in a historically blue-collar neighborhood. Almost all the built environment in this area constructed before the Civil War, including plantation and farm houses, was destroyed during General William T. Sherman's March to the Sea in 1864. Interest in the area was renewed when real estate developers in the 1890s laid out a grid pattern and subdivided the land into lots.



Figure : III.1.1_6 Fulton County Jail abandoned by the city in 1960 when a new jail was opened on Jefferson St. Demolished in 1962.

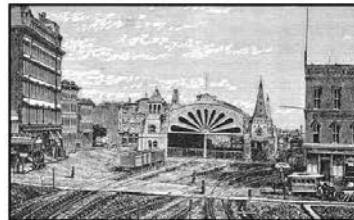


Figure : III.1.1_7 Developments of Bankhead Avenue.

In the 1920s, west-reaching Bellwood Avenue was changed to Bankhead Avenue in honor of Governor Bankhead of Alabama. Original industrial land use patterns in the upper Artery included the first wave buildings, as well as landed estates. In the late 19th Century this area was originally within the second and third railway mile rings of Atlanta.

Project SUB9 30

DEMOGRAPHY

DESCRIPTION

Demography is presented in the accompanying relief map as a blocks of different color depths, the darker the color, the greater the population density. The red outline indicates the subarea nine's position.

ANALYSIS

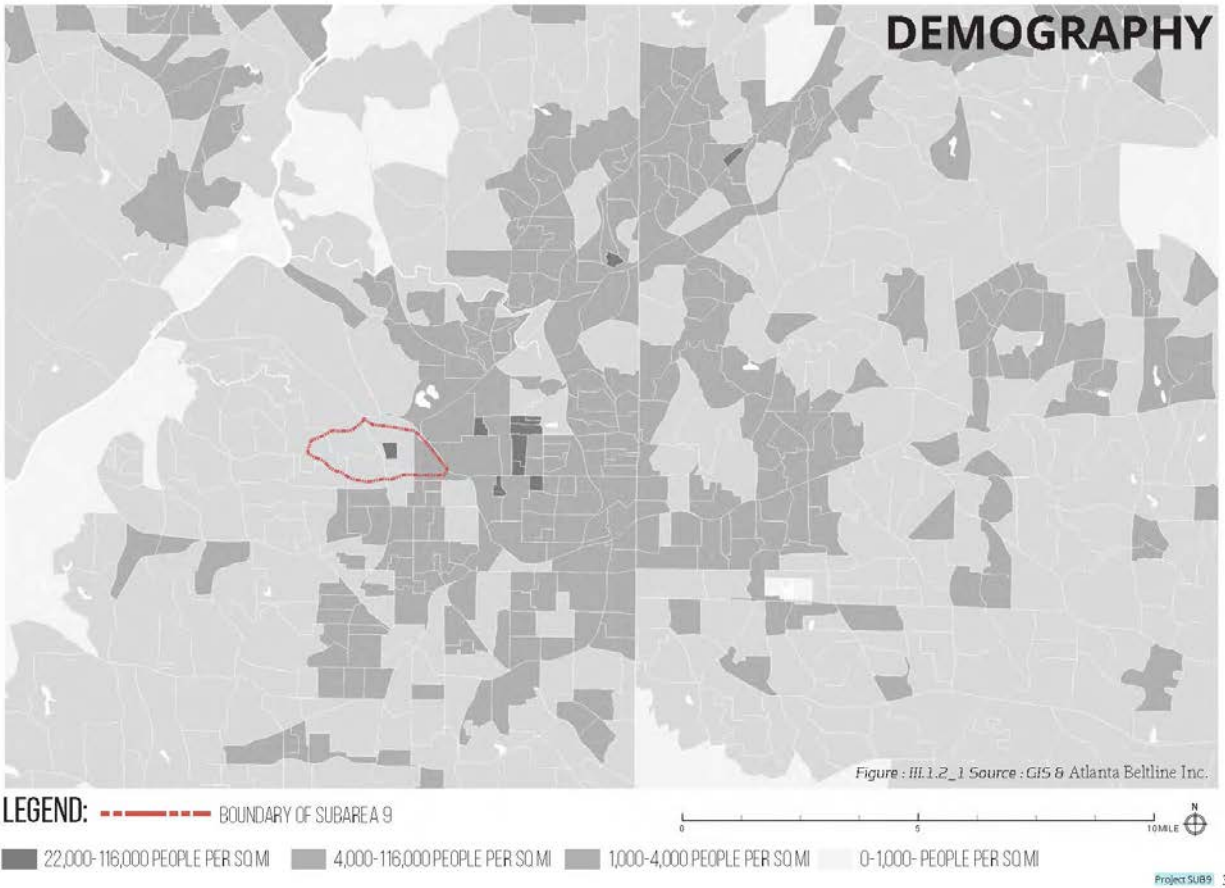
Demography of Sub-Area 9 is about 3000 people per square miles. Is a reasonable population density area. Because Atlanta is a metropolis, its population density is quite high overall.

OVERALL CONCLUSION

Lack of diverse food supplies, the average income of people in the region is not very high, and more job opportunities are needed to prevent population loss. In terms of color, population density is slowly fading out.

PROJECT AREA CONCLUSION

The Sub 9 can provide a variety of food supplies, while attracting many businesses to settle in to create more job opportunities, so that more people are willing to move into the subarea 9. Also we are very persistent about the concept of a affordable house.



CIRCULATION

DESCRIPTION

Circulation is presented in the accompanying relief map as a labeled icon destination and the main road names. It is obviously that our site is located at the bottom center of the subarea 9.

ANALYSIS

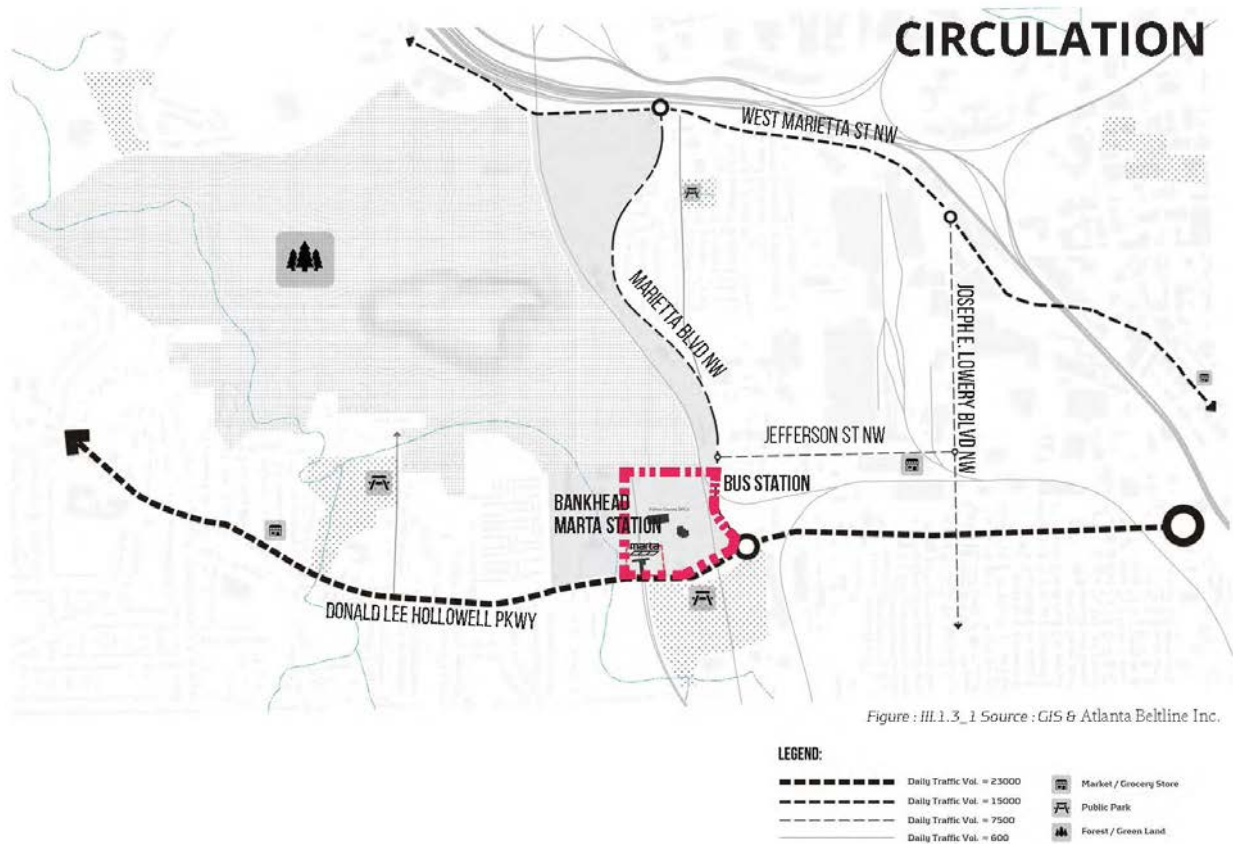
The railway network in the north is very dense, and the south is close to Highway 78. Simultaneously, the Beltline cross through the subarea 9. The daliy traffic volume is alsovery large.

OVERALL CONCLUSION

The Bellwood Quarry itself is readily identifiable on the topographic map, as is the hilltop site of Atlanta Overlook Apartments just north of the intersection of Hollowell Parkway with Chappe-ll Road.

PROJECT AREA CONCLUSION

The Project area is bearily along the Bellwood Quarry, it begin with high elevation in north intersection and south intercection which en- trance to Hollowell Parkway is low elevation. Also the slope is not very deep around 2% - 3%. Ideally place to establish the corridor.



Project SUB9 34

LAND USE

DESCRIPTION

Landuse is presented in the accompanying relief map as a different functional colors, according to the urban landuse color. Site is on the Mixed use area.

ANALYSIS

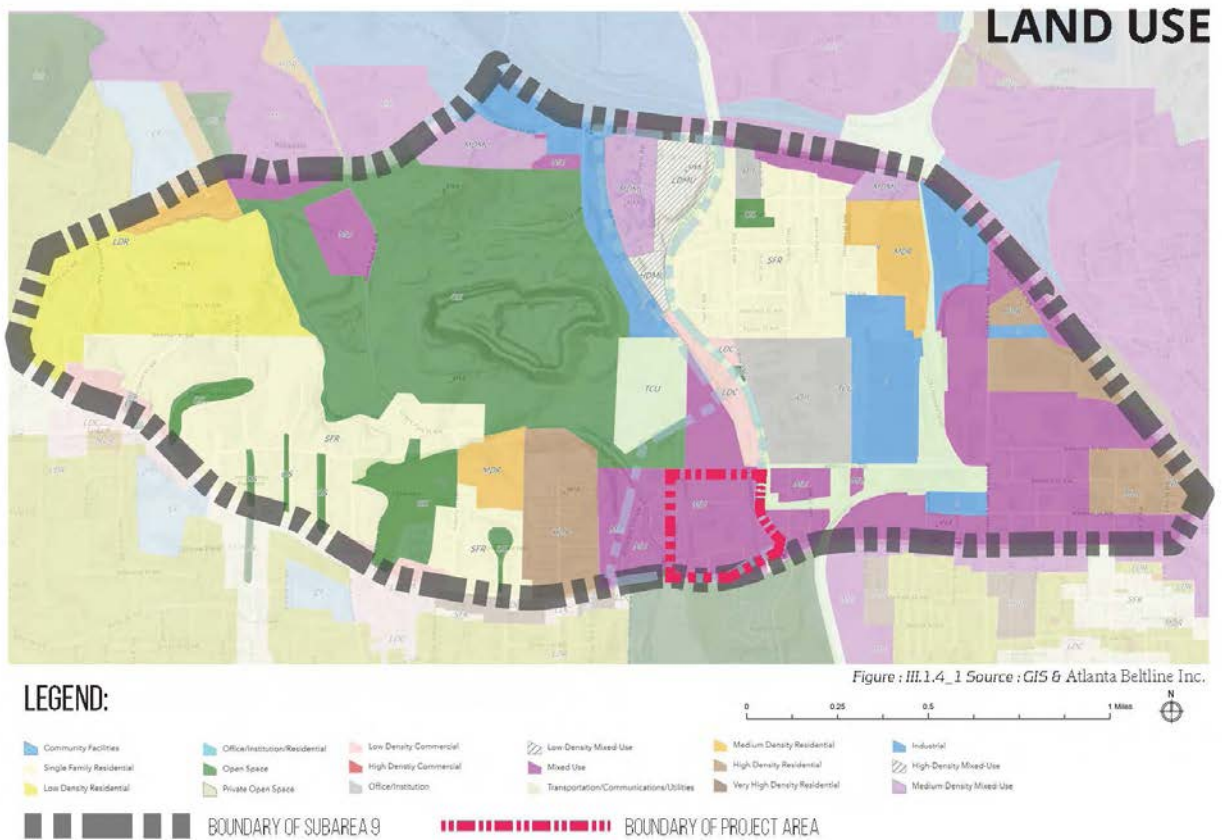
Because it is a mixed use land, this place has tons of possibilities, but mainly idea is to meet people's daily consumption and residential purpose. At the same time, making it possible to better connect with the surrounding land.

OVERALL CONCLUSION

It can be clearly seen that it was mainly occupied by the residential landuse. At the same time, the edge zone and the core zone are mostly mixed land. If we reasonable planning this area, it will become full of vitality.

PROJECT AREA CONCLUSION

Project area is Mixed use land, which means not only meeting people's daily consumption needs, but also providing the work of surrounding residents. at the same time, to meet the housing needs of the growing population is very important.



Project SUB9 36

SOIL

DESCRIPTION

Soil is presented in the accompanying relief map as a different functional colors, according to the different type of soil color. Site is on the urban land.

ANALYSIS

Urban land represents this land completely developed for urban development, with no special conditions.

OVERALL CONCLUSION

Good developable location.

PROJECT AREA CONCLUSION

Good developable location.



Figure : III.2.1_1 Source : GIS & Atlanta Beltline Inc.

LEGEND:



Project SUB9 38

TOPOGRAPHY

DESCRIPTION

Topography is presented in the accompanying relief map as a labeled representation of surface contour line, the detailed contour will include in project area.

ANALYSIS

Topographic surface of Sub-Area 9 generally drops from Marietta Street, which parallels those tracks, down to the southwest following Proctor Creek as it flows westward toward the Chattahoochee River.

OVERALL CONCLUSION

The Bellwood Quarry itself is readily identifiable on the topographic map, as is the hilltop site of Atlanta Overlook Apartments just north of the intersection of Hollowell Parkway with Chapel Road.

PROJECT AREA CONCLUSION

The Project area is bearily along the Bellwood Quarry and Hollowell Parkway. No special steep slope terrain, convenient to set up as a commercial residence mixed use core.



TOPOGRAPHY

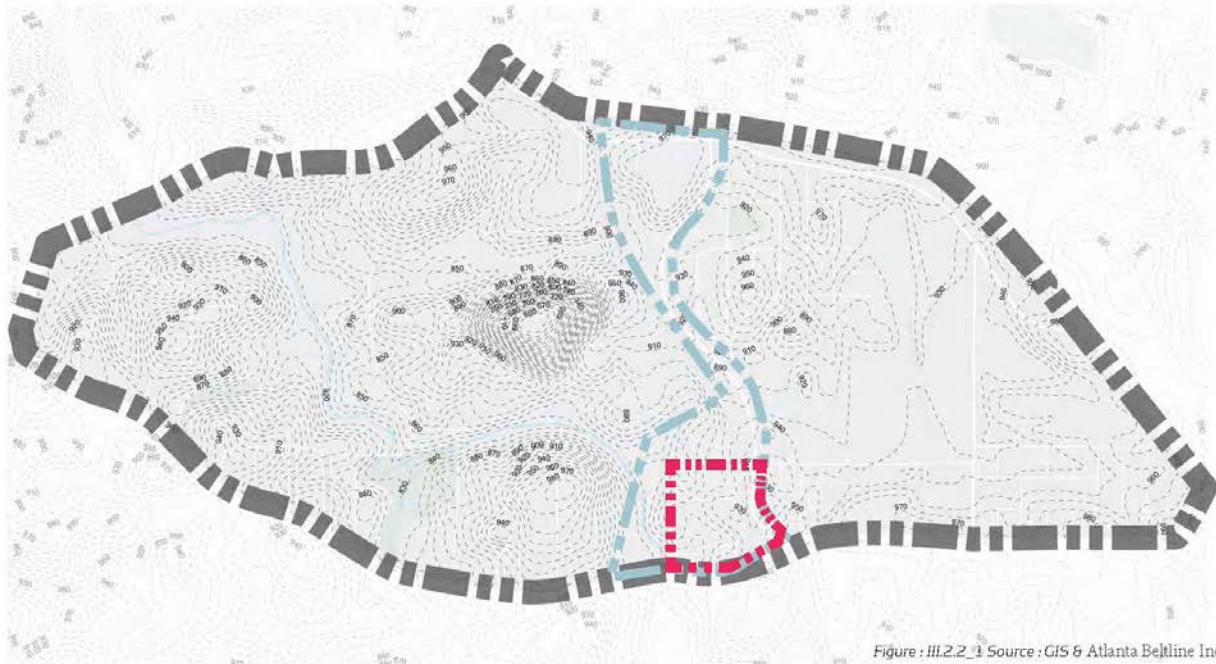


Figure : III.2.2_1 Source : GIS & Atlanta Beltline Inc.

LEGEND:

■■■■■ BOUNDARY OF SUBAREA 9 ■■■■■ BOUNDARY OF PROJECT AREA

Project SUB9 40

VEGETATION

DESCRIPTION

Vegetation is presented in the accompanying relief map as a different functional colors, according to the different type of vegetations color. Mainly subarea 9 is occupied by pine wood.

ANALYSIS

In the part of the wild wood we try to preserve its natural posture as much as possible. The urban part uses trees suitable for local climatic conditions.

OVERALL CONCLUSION

Native plants priority.

PROJECT AREA CONCLUSION

Native plants priority.

VEGETATION

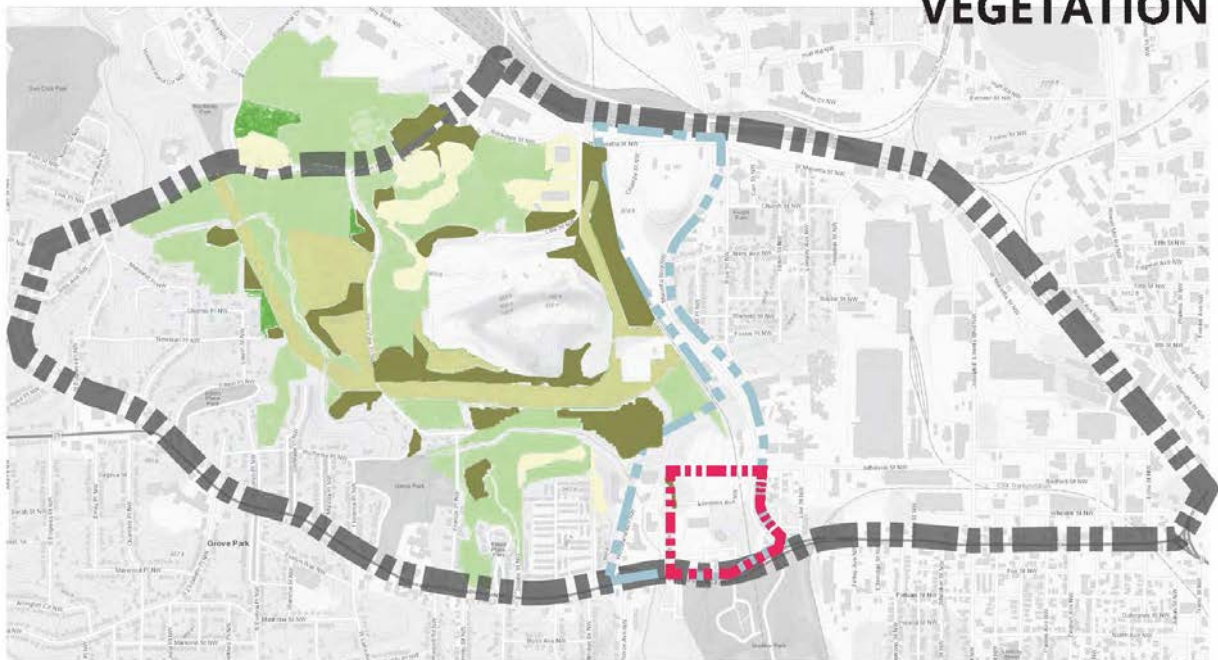


Figure : III.2.3_1 Source : GIS & Atlanta Beltline Inc.

LEGEND:



Figure : IV.2.5_1

Project SUB9 42

SLOPE

DESCRIPTION

Slope is presented in the accompanying relief map as a different color. Which is followed the topography and calculated that out. The interesting place is the dark concentrated area-Quarry

ANALYSIS

Topographic surface of Sub-Area 9 generally drops from Marietta Street, which parallels those tracks, down to the southwest following Proctor Creek as it flows westward toward the Chattahoochee River.

OVERALL CONCLUSION

The Bellwood Quarry itself is readily identifiable on the topographic map, as is the hilltop site of Atlanta Overlook Apartments just north of the intersection of Hollowell Parkway with Chappe-ll Road.

PROJECT AREA CONCLUSION

The Project area is beatty along the Bellwood Quarry and Hollowell Parkway. It begin with high elevation in north intersection and south intersection which entrance to Hollowell Parkway is low elevation. Also the slope is not very deep around 2% - 3%.

SLOPE



LEGEND:

BOUNDARY OF SUBAREA 9 BOUNDARY OF PROJECT AREA

Project SUB9 44

HYDROLOGY

DESCRIPTION

Hydrology is presented in the accompanying relief map as a labeled representation of surface contour line. Followed contour line , outline the floodway and located floodline.

ANALYSIS

This water flow only passes through the left side of the site, and at the same time, according to the land survey project, there is not much underground water in the site, so an underground parking lot can be established.

OVERALL CONCLUSION

It is possible that quarry can be used as temporary reservoirs to provide water for residents around the dry season.

PROJECT AREA CONCLUSION

Underground parking lot feasible.

HYDROLOGY

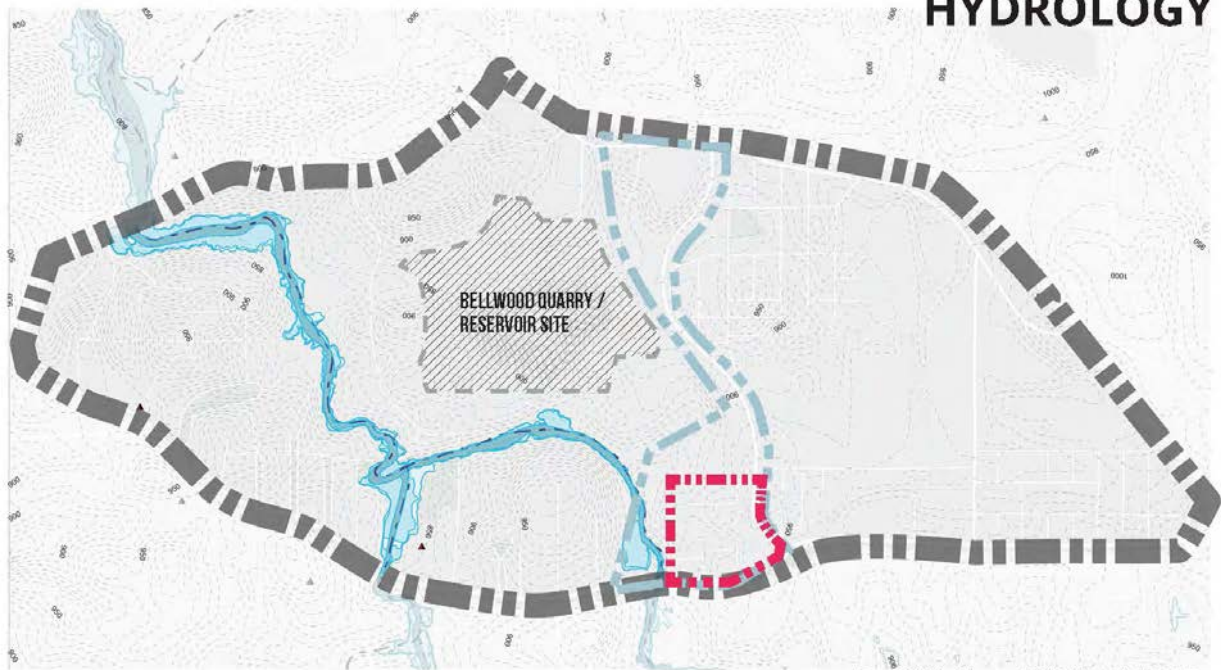


Figure : III.2.5_1 Source : GIS & Atlanta Beltline Inc.

LEGEND:



Project SUB9 46

SYNTHESIS

OPPORTUNITY

Develop an incentive program that promotes the adaptive reuse of properties that support job creation.
Advance improvements that provide enhanced access for pedestrians and bikers.
Incorporate park uses that are unique and not found in other area parks.

CONSTRAINTS

Land Use Designation Change: Increase density (MLU 10+ stories and Multi-family 5-9 stories) around the Bankhead MARTA station.
Historic structures must have a preservation plan.

CRITICAL ISSUES

Lost the connection to Westside Reservoir Park and surrounding pocket parks. Need a plan to promote neighborhood stabilization tool, such as federally funded homeowner rehabilitation programs.
Less variety of housing options for the affordable housing.

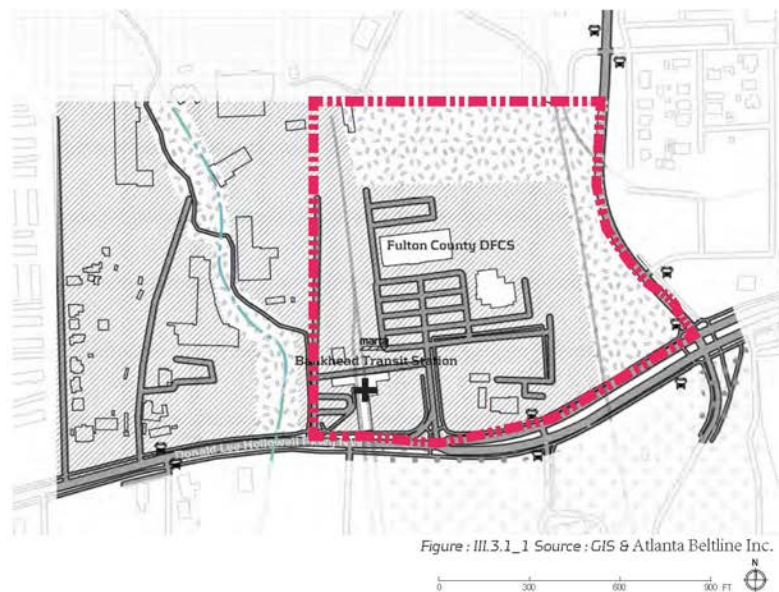


Figure : III.3.1_1 Source : GIS & Atlanta Beltline Inc.

LEGEND:



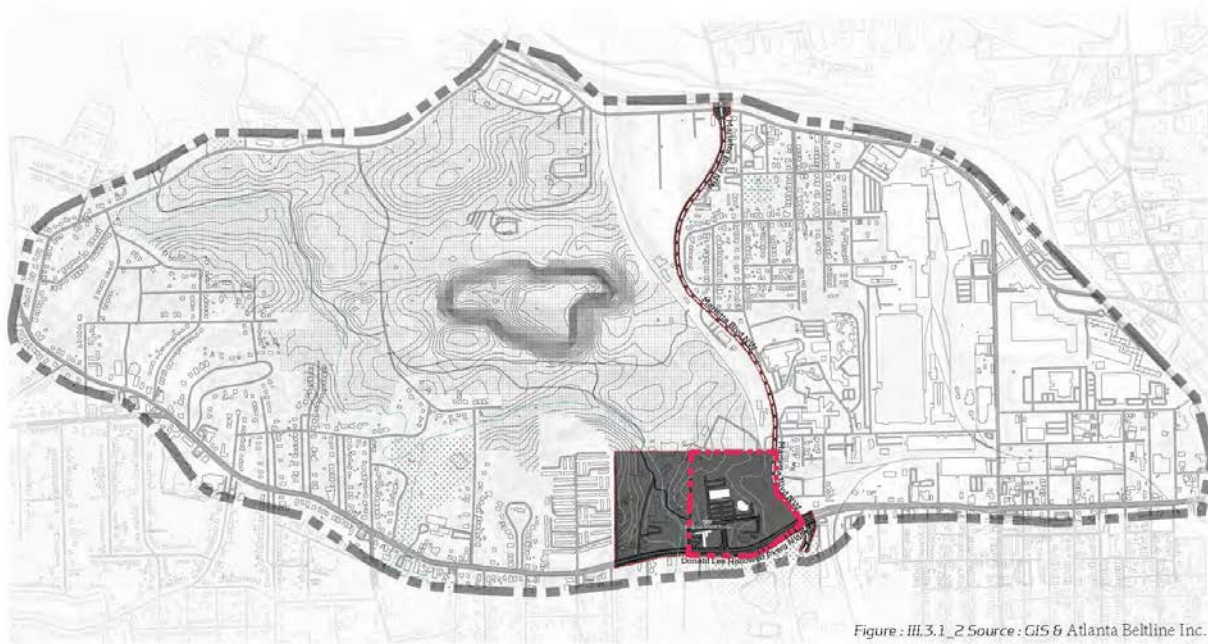


Figure : III.3.1_2 Source : GIS & Atlanta Beltline Inc.

LEGEND:

- | | | |
|--------------------------------|----------------------------|---------------|
| --- BOUNDARY OF SUBAREA 9 | RESERVOIR RESTRICTION SITE | ■ SITE |
| - - - BOUNDARY OF PROJECT AREA | □ POCKET PARKS | Proctor Creek |

Figure : IV.2.3_1
Project SUB9 48





Sub 9 is dedicated to bringing the entire Atlanta Beltline Subarea nine together into one. At the same time, create a new business community and provide affordable housing for the future population. The new system and landscape make Sub 9 unique.

51 Project SUB9

1 A Connection to Everywhere

SUB 9 IS THE BEST
SITE TO OFFER:

1. On-site connection to **MARTA**
2. Access to the **Atlanta Beltline Westside Trail**
3. Adjacency to Atlanta's largest park (**Westside Quarry Park**)

LEGEND:

	QUARRY COMMERCE CENTER
	ATLANTA SUBMARKET
	MARTA LINE
	BELTLINE
	PARK
	ROADWAYS



Figure IV.1.1.1 The Connection. Source: GIS & Quarry Yard

Project SUB9 52

1 A Connection to Everywhere



53 Project SUB9



1 A Connection to Everywhere

DIRECT CONNECTION
OPEN BY 2030



Project SUB9 54

1 A Connection to Everywhere

Westside Park at Bellwood Quarry
ADJACENT TO ATLANTA'S LARGEST
PARK. OPENING 2030



Figure: IV.1.1_8



Figure: IV.1.1_9

55 Project SUB9



Figure: IV.1.1_10 The Connection. Source: GIS & Quarry Yard

2 Creating Community

Life at Sub 9



Figure: IV.1.1_11

ACTIVE
LIVES



Figure: IV.1.1_12



Figure: IV.1.1_13

SOCIAL
LIVES



Figure: IV.1.1_14

Project SUB9 56

3 Establish your Brand

VIBRANT
URBAN
INNOVATIVE
UNBOUND
ADVENTUROUS



Figure : IV.1.1_16



Figure : IV.1.1_17

57 Project SUB9

CURRENT PLAN & DRAFT

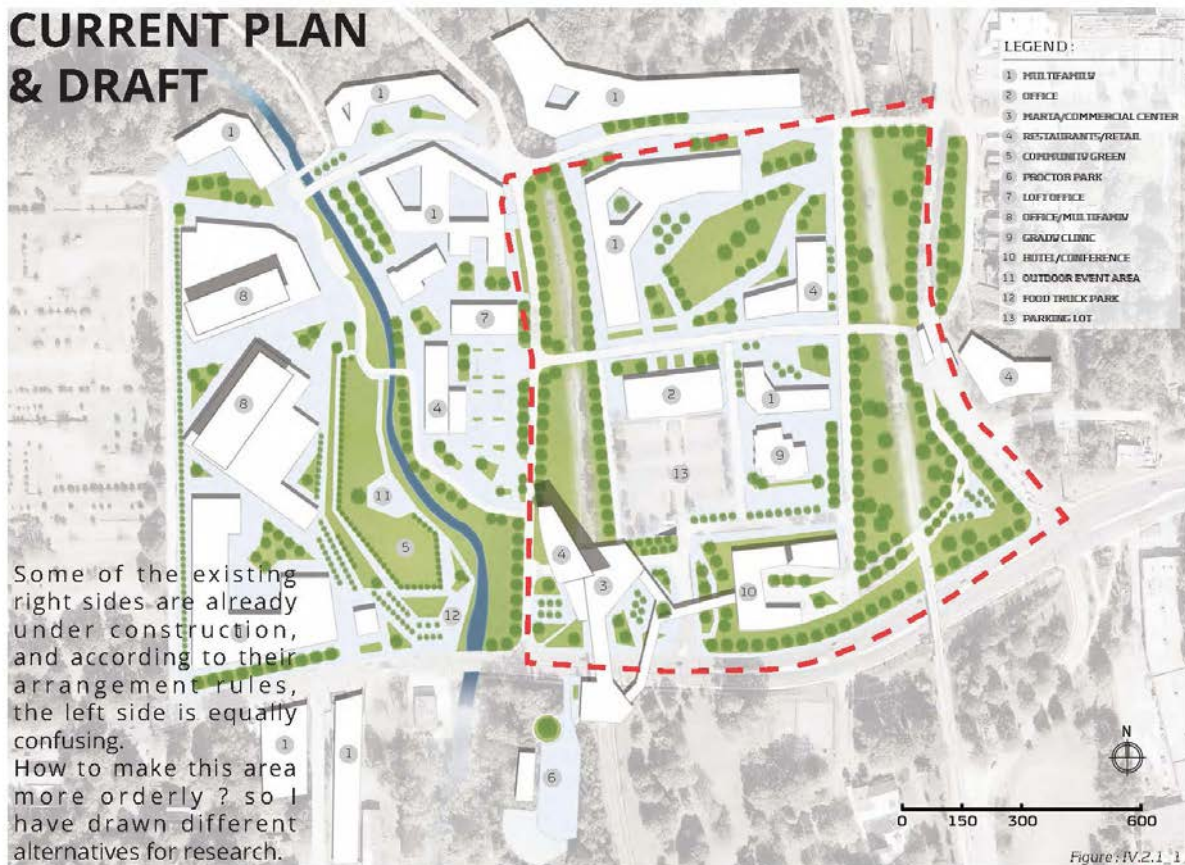
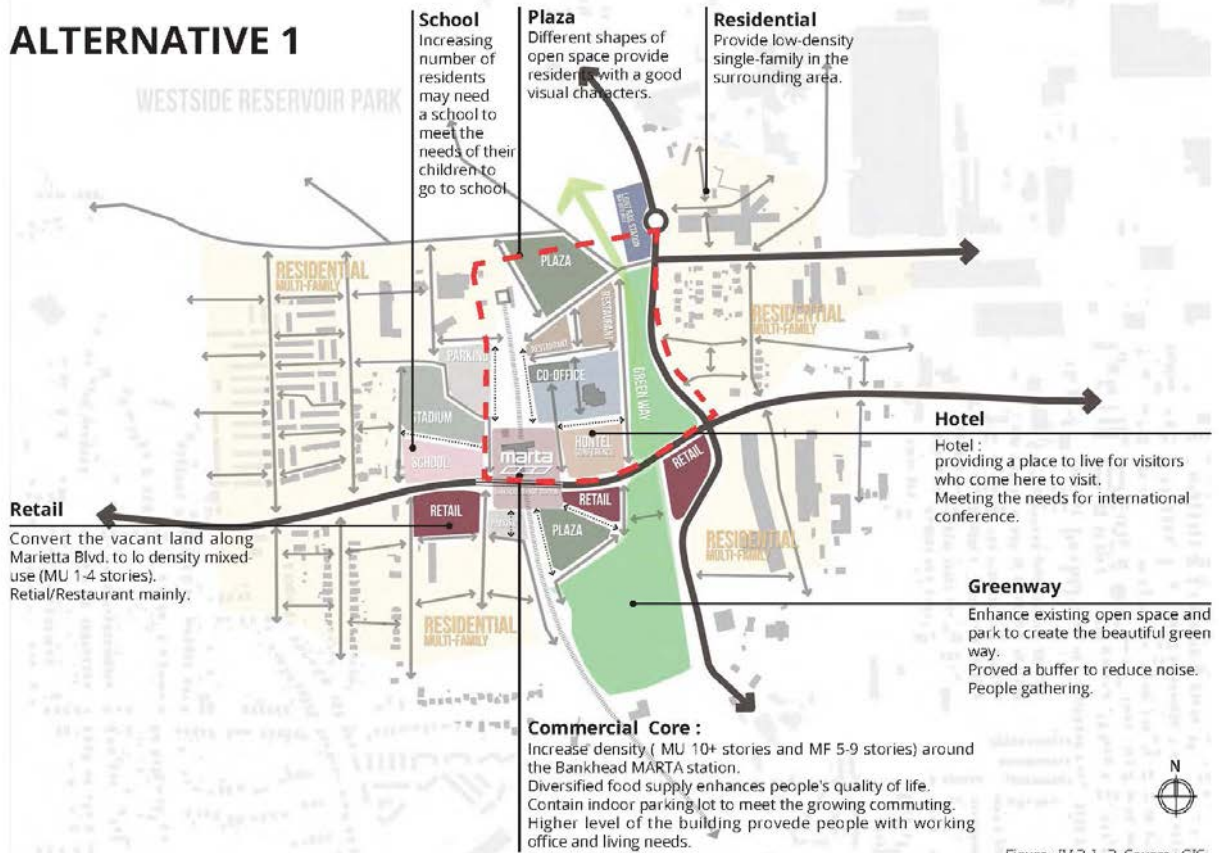


Figure: IV.2.1_1

Project SUB9 58

ALTERNATIVE 1



59 Project SUB9

Figure : IV.2.1_2 Source : GIS

ALTERNATIVE 2

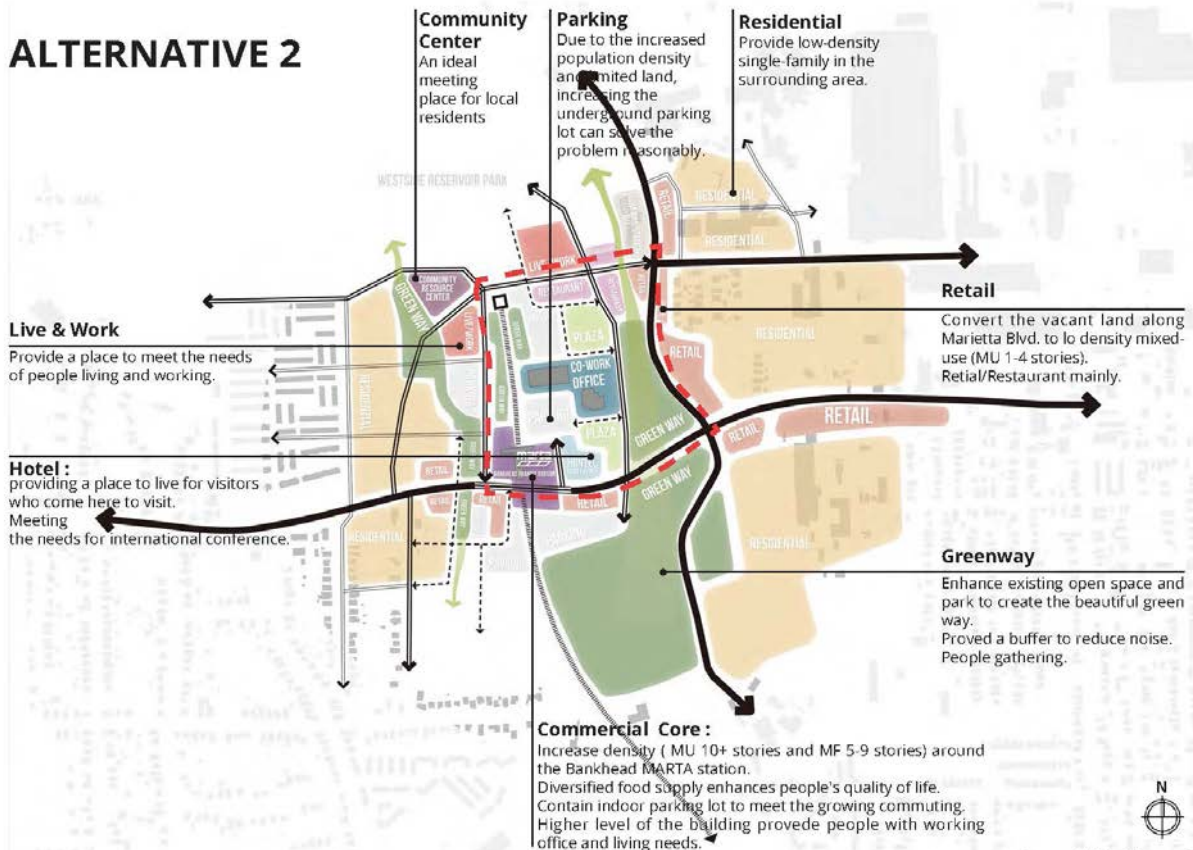
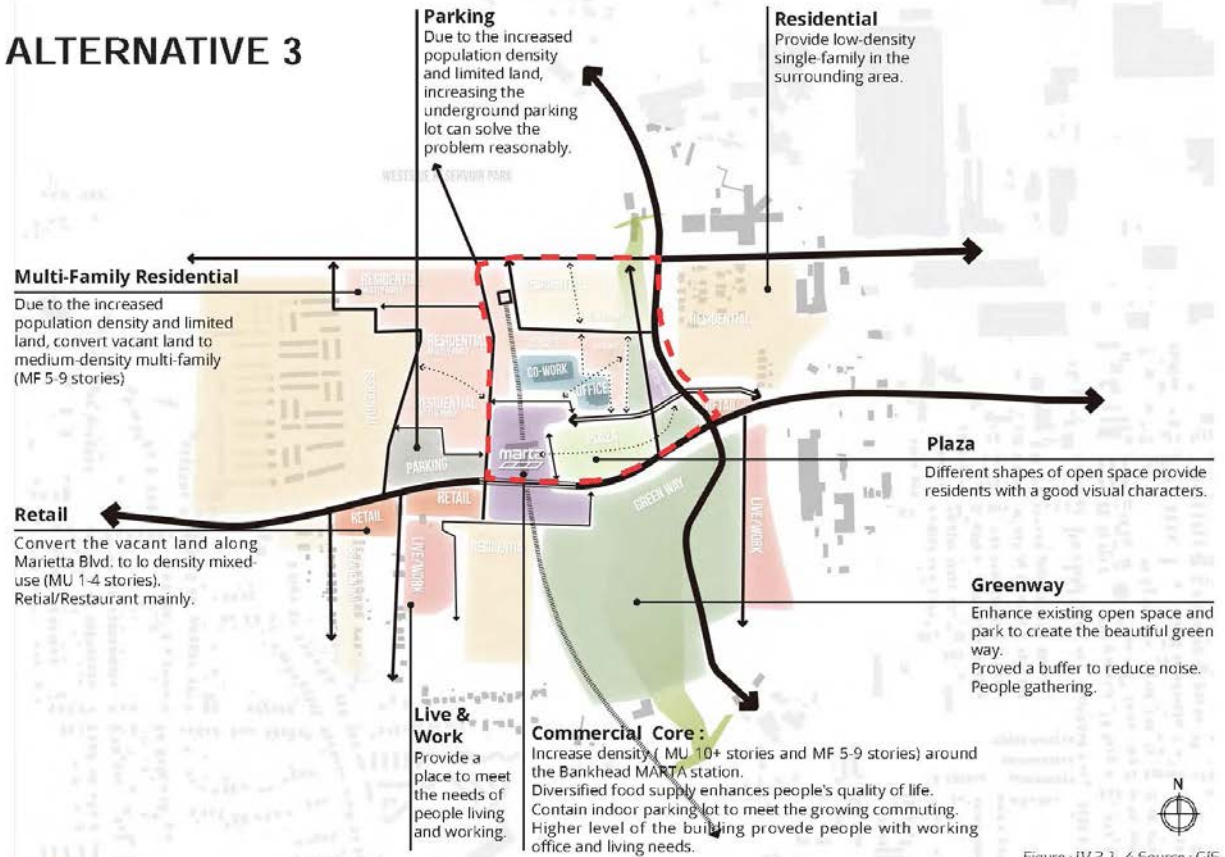


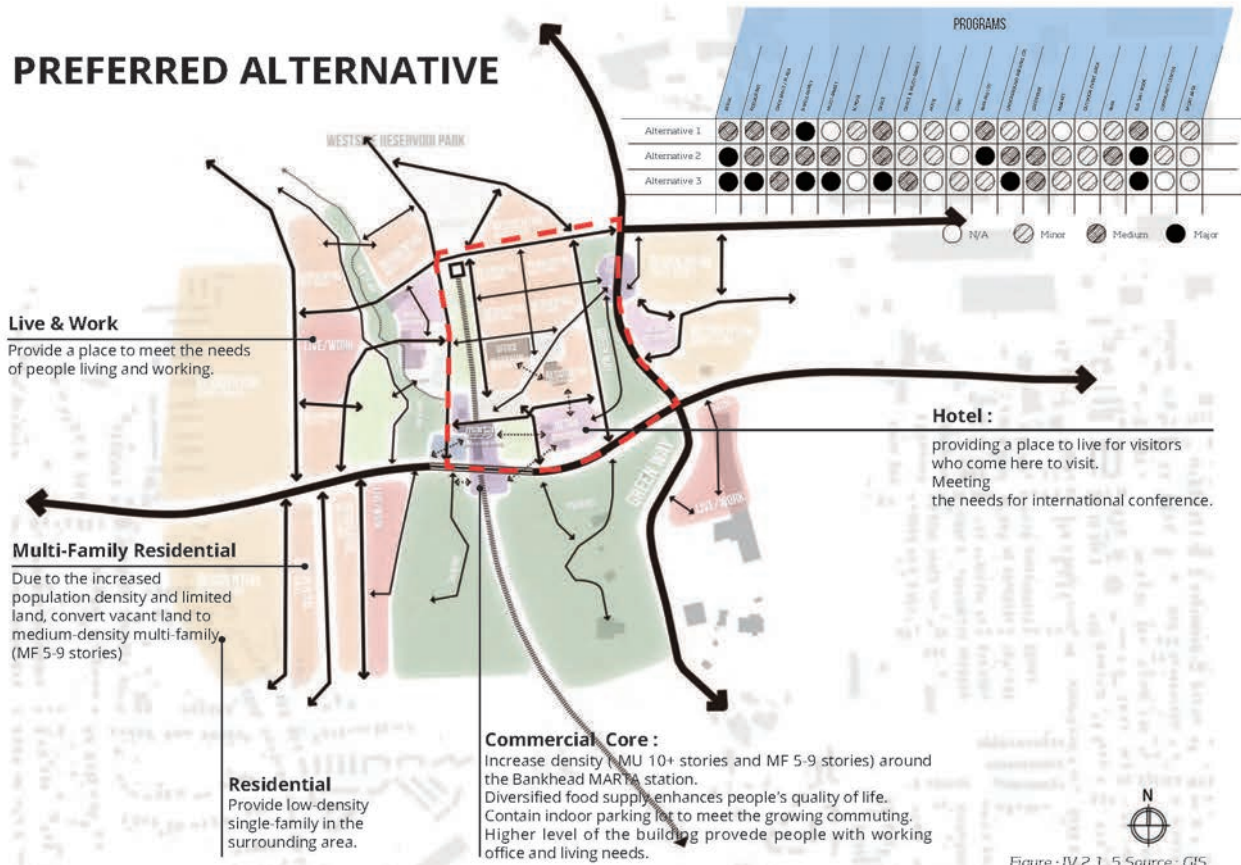
Figure : IV.2.1_3 Source : GIS
Project SUB9 60

ALTERNATIVE 3



61 Project SUB9

PREFERRED ALTERNATIVE



Project SUB9 62

TOD

In the late 1980s, Peter Calthorpe reintroduced and codified the idea of Transit-Oriented Development (TOD). While other designers and planners had supported similar ideas, it was Calthorpe, who popularized and coined the concept of TODs when he authored "The New American Metropolis" in 1993 (Carlton 2007). He further developed and expanded the notion in the "The Regional City" 2001 and "Urbanism in the Age of Climate Change" 2011. He viewed TODs as the holistic alternative to sprawl (Calthorpe, The New American Metropolis 1993), not only providing a pleasant and walkable neighborhood, but also providing an economic, ecological, and social foundation for regional development.

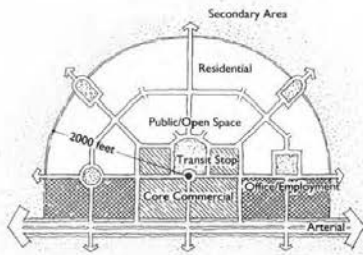


Figure : IV.2.1.6 TOD Diagram. Image credit: Peter Calthorpe.

63 Project SUB9

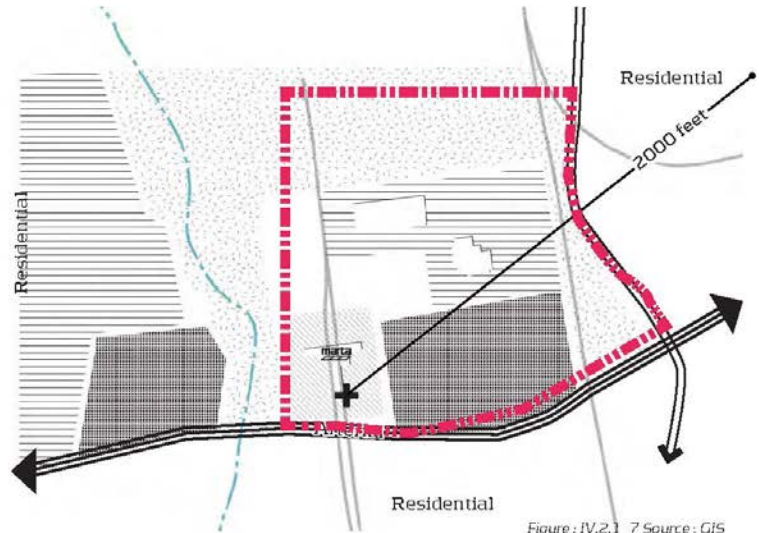


Figure : IV.2.1.7 Source: GIS

LEGEND:

- BOUNDARY OF PROJECT AREA
- PROCTOR CREEK
- OFFICE/EMPLOYMENT
- CORE COMMERCIAL
- PUBLIC/OPEN SPACE
- + MARTA BANKHEART TRANSIT STATION



Figure : IV.2.1.8

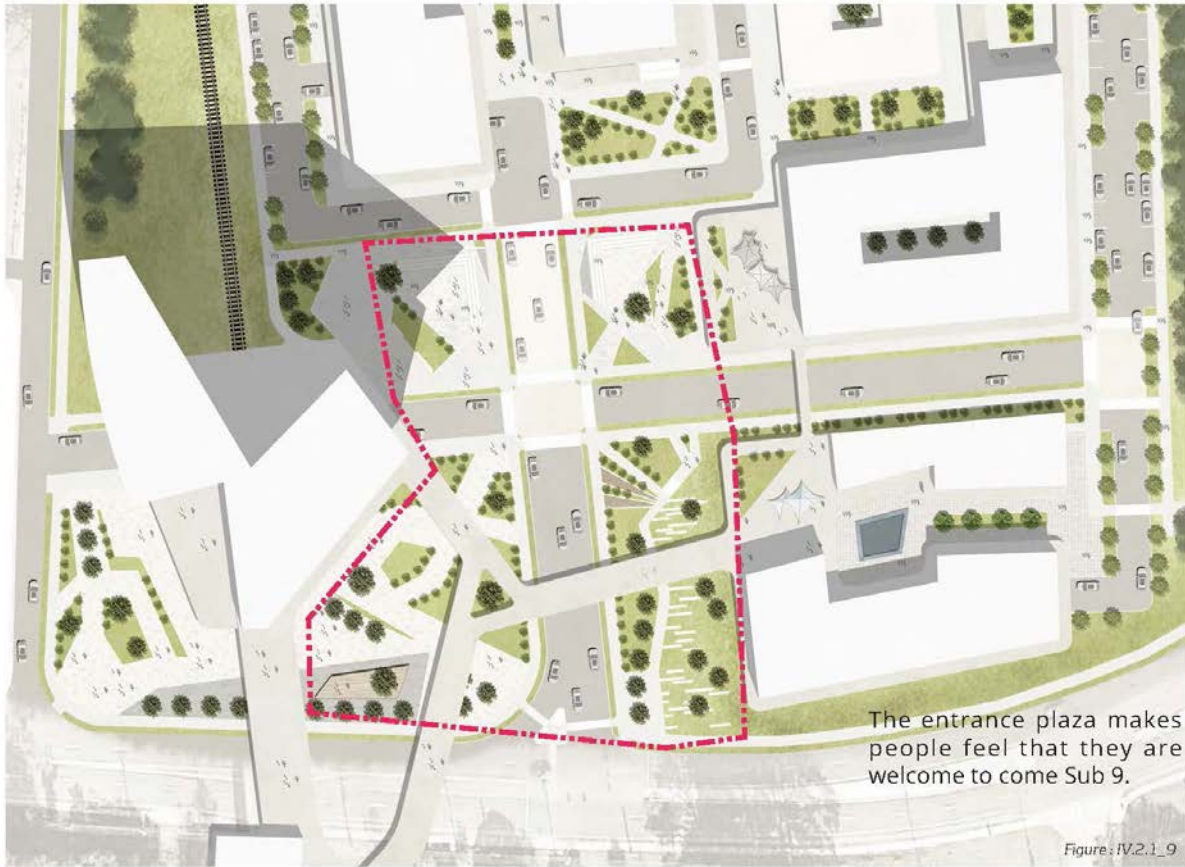
CONCEPTUAL PLAN

Based on the study of the TOD pattern, I decided to make the architectural arrangement more orderly during the concept phase, and the outer contour of the building determines the open space.

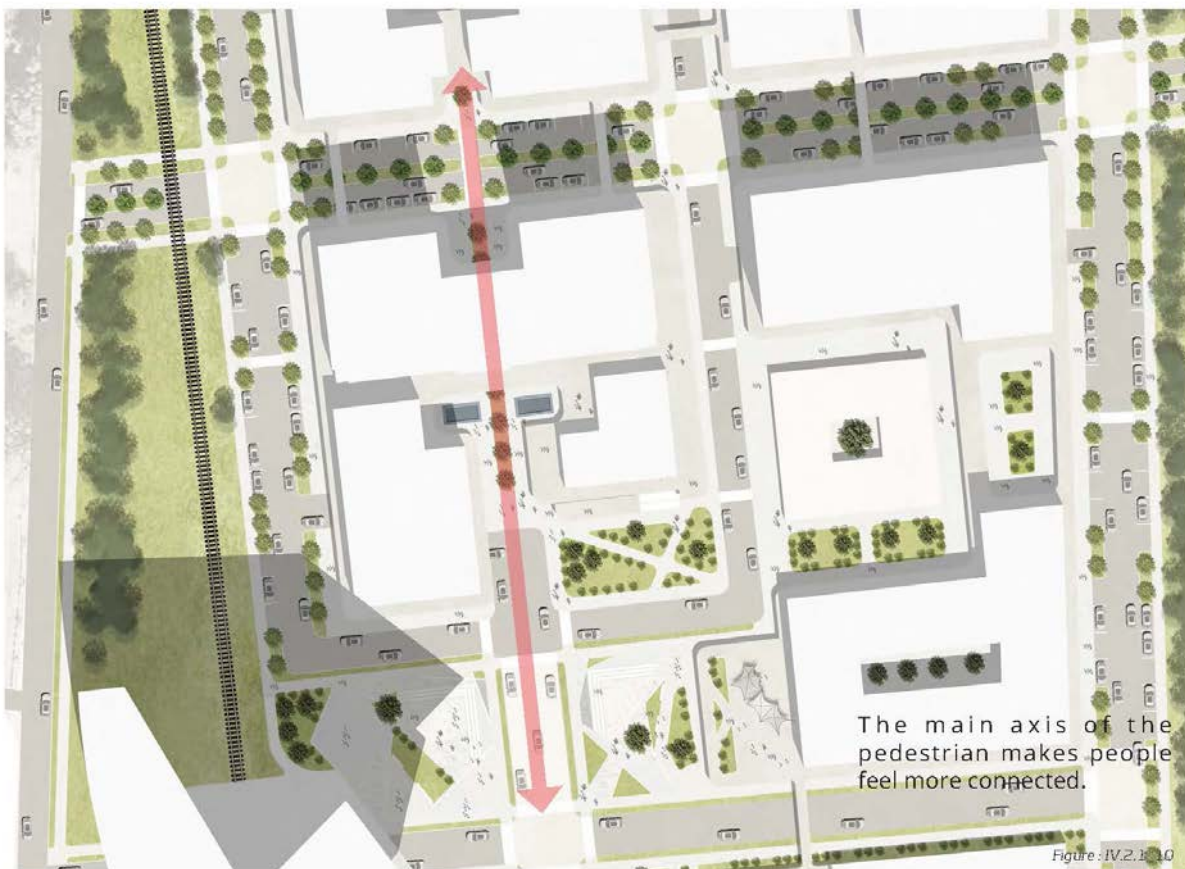
LEGEND :

- 1 COMERCIAL/MULTIFAMILY
- 2 OFFICE/MULTIFAMILY
- 3 MARTA/COMMERCIAL CENTER
- 4 RESTAURANTS/RETAIL
- 5 COMMUNITY GREEN
- 6 OUTDOOR EVENT AREA
- 7 BTL LIGHT RAIL STATION
- 8 PARKING STRUCTURE
- 9 HOTEL/CONFERENCE

Project SUB9 64

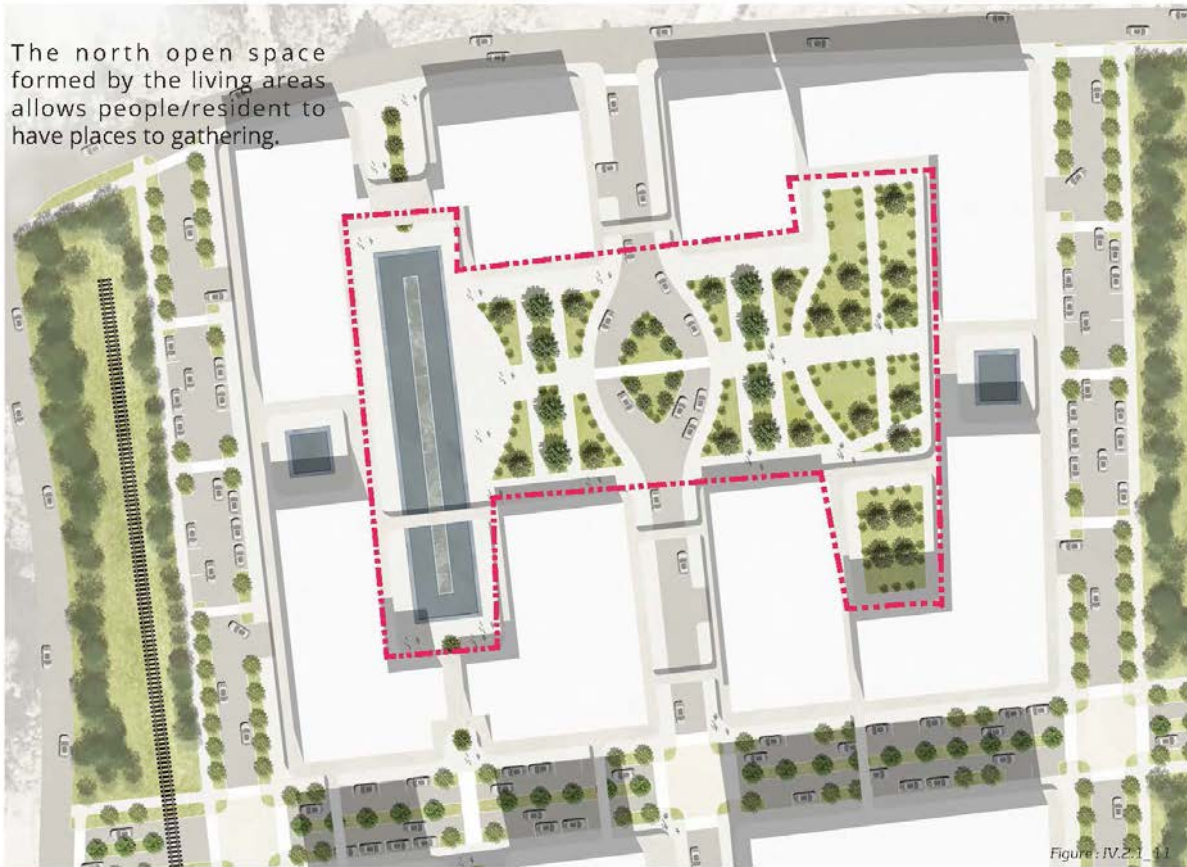


65 Project SUB9



Project SUB9 66

The north open space formed by the living areas allows people/resident to have places to gathering.



67 Project SUB9

Figure : IV.2.1.1.1



Figure : IV.3.1.1

PRELIMINARILY PLAN

In the preliminary plan I found that building space too massive, which would cover too much green space. I have reduced the building area appropriately so that the open space has a greater opportunity of processing on the landscape. At the same time, it emphasizes the main axis of the landscape pedestrian.

LEGEND :

- 1 MULTIFAMILY
- 2 OFFICE
- 3 MARTA/COMMERCIAL CENTER
- 4 RESTAURANTS/RETAIL
- 5 HOTEL/CONFERENCE
- 6 OUTDOOR EVENT AREA

PROGRAMS



Figure : IV.3.1_2

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Figure : IV.3.1_3

Project SUB9 70



71 Project SUB9



A - A

Figure : IV.3.1_5

The section of this area is a building that combines restaurants and retail stores. The design of the atrium green belt allows people to have a space to gather and is a continuation of the external green space.

Project SUB9 72



73 Project SUB9



B - B

The relationship between the road and the surrounding buildings, together with the decoration of the green belt, makes people more willing to get off the vehicle to take a walk along this road.

0 8 24

Project SUB9 74



75 Project SUB9



B - B

Figure : IV.3.1_9

There are many interesting little facilities at the entrance to the rear residential area, such as a still water platform.

0 30 90

Project SUB9 76

WELCOME TO THE SUB 9



77 Project Area

Figure: IV.3.1_10



Figure: IV.3.1_11

78

MASTER PLAN

Sub 9 master plan focuses mixed-use development on the intersection of major streets in order to create an identifiable, walkable place that is well connected to surrounding development.



Figure : IV.4.1_1

79 Project SUB9

LEGEND :

- 1 MULTIFAMILY
- 2 OFFICE
- 3 MARTA/COMMERCIAL CENTER
- 4 RESTAURANTS/RETAIL
- 5 HOTEL/CONFERENCE
- 6 OUTDOOR EVENT AREA



Figure : IV.4.1_2

Project SUB9 80

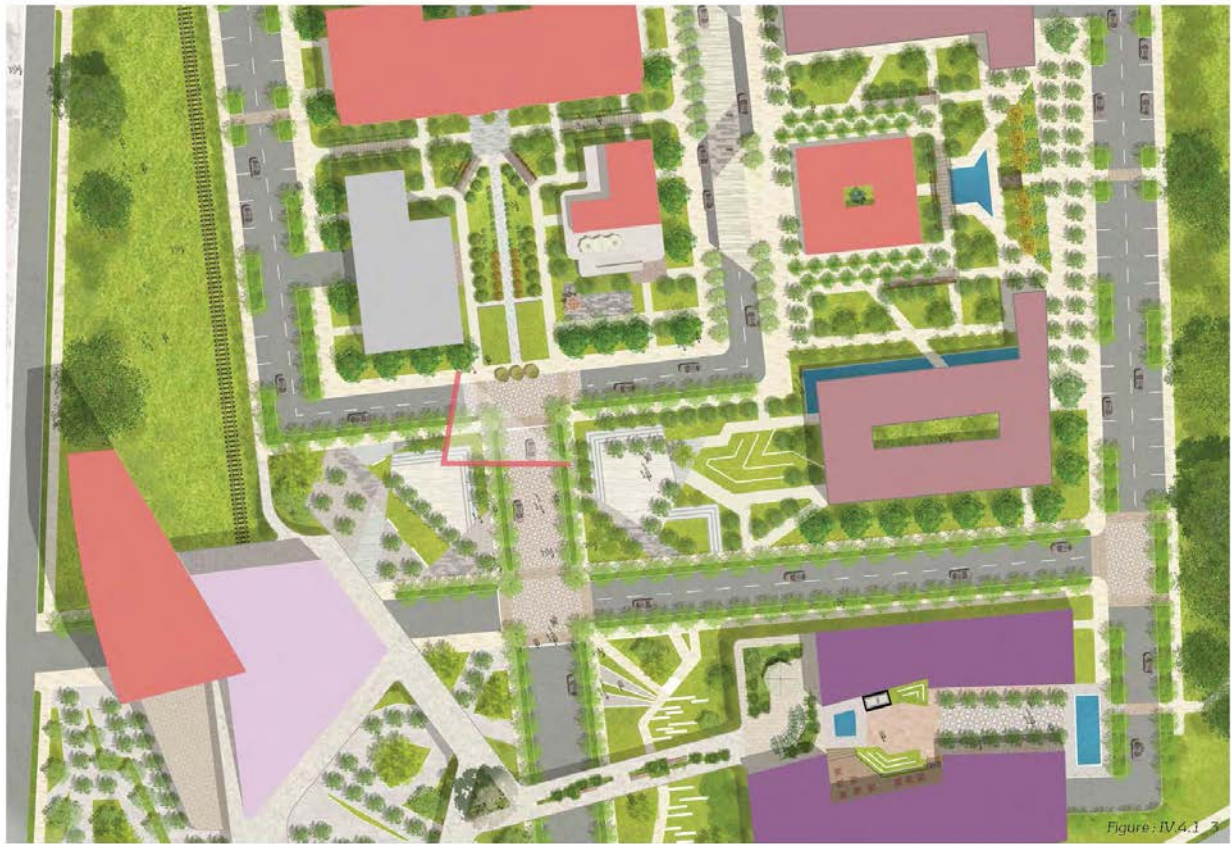


Figure : IV.4.1_3

81 Project SUB9



Figure : IV.4.1_4

Project SUB9 82



Figure: IV.4.1_5

83 Project SUB9



Sub 9's Neighborhood parks can form a good transition to surrounding residential.

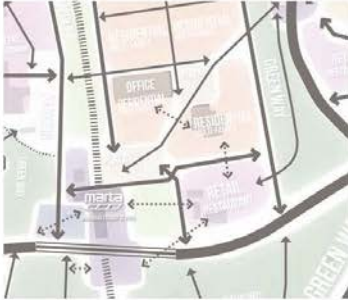
PERSPECTIVE VIEW

Figure: IV.4.1_6

Project SUB9 84

INTENDED OUTCOMES

This is a very huge project, which is dominated by landscape design combines the concepts of urban planning and architectural design to create a TOD landscape design that I personally understand. There are many places still could to consider and improve throughout the work, and many sub-spaces of the project can be used separately for more detailed landscape design. It is a project that can be continuously studied and researched with many potentials.



Project SUB9 86

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- "Urban design is a powerful tool of adaptation"

ASLA 1993_Declaration on Environment and Development adopted unanimously by the ASLA Board of Trustees in Chicago, Illinois.

- "It is our responsibility to achieve healthy, natural systems and cultural communities through our design, planning, management and policy development, as well as harmony, fairness and balance between the two."

- "Landscape planning, management strategies and policy development at local, regional and global scales must be based on the context of the culture and ecosystem in which the particular landscape is located."

Benson J. and Roe M., 2000_ Landscape and Sustainability- John & Stephan & Susannah Landscape, sustainability and the city

_ " Today, for the first time in human history, more than half the world's population lives in towns and cities rather than in the countryside. Hence, what happens in cities is profoundly important for sustainability, both for the welfare of the people who live there and for the demands that humankind makes on the earth's resources."

Condon P.M. 2010_Seven Rules for Sustainable Communities

- "Restore the streetcar city, Design an interconnected street system, Locate commercial services/frequent transit/schools within a five-minute walk, Locate good jobs close to affordable homes, Provide a diversity of housing types, Create a linked system of natural areas and parks, Invest in lighter/greener/cheaper/smarter infrastructure."

Calthorpe, 1993_The New American Metropolis

- "Peter Calthorpe developed and expanded the notion in the "The Regional City" 2001 and "Urbanism in the Age of Climate Change" 2011. He viewed TODs as the holistic alternative to sprawl, not only providing a pleasant and walkable neighborhood, but also providing an economic, ecological, and social foundation for regional development."

Dramstad W.E., James D. O, & Forman R.T.T. 1996_Landscape ecology principles in landscape architecture and land-use planning

- "The structural pattern of a landscape or region is composed entirely of three types of elements. Indeed, these universal elements-patches, corridors, and matrix-are the handle for comparing highly dissimilar landscapes and for developing general principles. They also are the handle for land-use planning and landscape architecture, since spatial pattern strongly controls movements, flows, and changes."

Daily G.C. 1997_Introduction: what are ecosystem services? In: Nature 's Services. Island Press. da Cunha D. 1997_ Ecological design Landscape and Urban Planning.

- "Eco-service function: If the landscape is recognized from the needs of life and people, then the life support function of the landscape can be understood as the service function of the ecosystem, such as providing rich and diverse habitats, food production, regulating local microclimate, and slowing down drought, disasters, purify the environment, meet perceived needs and become a source of spiritual culture and educational sites, etc."

Elmqvist T., et al 2005_ Benefits of Restoring Ecosystem Services in Urban Areas

- "Cities are a key nexus of the relationship between people and nature and are huge centers of demand for ecosystem services and also generate extremely large environmental impacts. Current projections of rapid expansion of urban areas present fundamental challenges and also opportunities to design more livable, healthy and resilient cities (e.g. adaptation to climate change effects)."

Project S089 88

- "Cities are a center of demand for ecosystem services and with projected doubling of urban populations there will be an accelerating demand of these services. ...Rapid expansion of urban areas present fundamental challenges but there are also opportunities to restore ecological functions to design more livable, healthy and resilient cities."

Forman, R. T. T. 1995_Land Mosaics: The Ecology of Landscapes and Regions

- "Ecosystems that provide such services are distributed spatially and temporally in urban, suburban, and rural landscapes. They include environmentally sensitive areas that are vital to the long-term maintenance of biological diversity, soil, water, or other natural resources, locally and regionally. Although these environmentally sensitive areas occur within every landscape, their importance in maintaining the health of a locality is relative to their ecological values, and to the type and management regime of adjacent landscapes."

Garvin A. 2016_What makes a great city

- "Development of the Atlanta Beltline, like Brooklyn Bridge Park, converted property previously used for shipping freight into an actively used part of the city's public realm. Like the Brooklyn Bridge Park, even before completion it attracted thousands of citizens. The Beltline, however, also has provided a public realm framework that has already triggered a widespread and sustained private market reaction and will change daily life in Atlanta."

- "Daily life is changing for people who live along already developed section of the Beltline. The park corridor is becoming the place where residents of every ethnicity, income level, and social class encounter one another, cycle skate, jog, or just wander. Furthermore, as more and more of the Beltline opens for public use, it will have greater and greater impact on city residents."

- "Atlanta is demonstrating how to achieve better balanced, less congested urbanization and create a park system that will supplant the city's interstate highways as the focus of daily life for hundreds of thousands of Atlantans. Still more important, the Beltline demonstrates how cities in the twenty-first century can repurpose neglected, obsolete property, in the process creating a public realm that not only alters daily life but can pay for itself with tax revenues generated by private real estate development that would otherwise not have occurred."

Johnson B. & Hill K. 2002_ Ecology and Design: Frameworks for Learning

- "Landscapes are shaped by rain and sun, plants and animals, human hands and minds. Whether wild or clipped, composed of curved lines or straight, living plants or plastic, every garden and every region is a product of natural phenomena and human artifice."

- "Nature is both given and constructed. There is always a tension between the autonomy of nonhuman features and phenomena and the meanings ascribed to them."

Jongman R. and Pungetti G., 2004_ Ecological Networks and Greenways

- "Ecological greenway networks have huge potentials in ecological perspectives. Among the most important potentials is their function as both an ecological and social network on different levels. The network has a potential to increase coordination across the human borders of administrations, countries, regions and local spots and to increase co-operation between administrative sectors, local people and NGOs."

Konrad M. 2006_ Transporting Atlanta: The Mode of Mobility Under Construction

- "Getting at what lies beneath the asphalt, interrogating what drives the paving of America, along with the seemingly unstoppable space, energy, and money consumption that the current mode of mobility entails will perhaps allow for future decision-making that includes a more nuanced reading of the landscape."

- "Metropolitan Atlanta Rapid Transit Authority (MARTA) TOD efforts involve partnering with business and residential developers to create spaces for people close to transit. MARTA then receives proceeds from rents as well as an increase in fare revenues from the addition of riders produced by the TOD. MARTA has plans for several such nodes in the future (and the Beltline is hoped to inspire many more)"

Project SUB9 90

Lyle, J.T. 1999_ Design for Human Ecosystems

- "In human as well as natural ecosystems, flows of energy and materials are the engines that drive everything else. As a rule, they are taken for granted. We tend to forget well as for other organisms, is dependent on a continuing supply of energy, water, and the chemical elements necessary to its dynamics and that the most essential function of all ecosystems, both human and natural, is to make the needed energy and materials available to their inhabitants."

Mcharg I. 1967_ Design with Nature

- "Hcharg invented ways to map the individual attributes of large landscapes, with each attribute mapped separately, and then to layer these semitransparent maps, one over the other. Through examining the transparent maps, one could determine areas of the landscape that were most sensitive, and thus exempt from urbanization, and others where urbanization might occur with minimal damage."

Meyers R. A. 2012_ Encyclopedia of sustainability science and technology.

- "Sustainability science and technology is not a discipline but is the grand challenge of our time."

Thompson & Sorvig 2008_ Landscape Construction: A Guide to Green Building Outdoors.

- "Sustainability is a framework, a systematic way of linking ourselves with the natural systems that support us."

- "Healthy landscapes are ecosystems, and they survive by constant change."

Wey W.M. 2018_ Sustainable Urban Transportation Planning Strategies for Improving Quality of Life under Growth Management Principles

- "As the traffic and population growing has become a serious concern and put a tremendous pressure on both environment and urban dwellers. It is therefore important to find ways or new lifestyles such as sustainable urban transportation planning formulations that are more flexible, inclusive, and sustainable."

- "The migration of people from a rural to urban lifestyle is leading to extensive change in the drivers and systems of human health vulnerability. Within cities, the ecological contributions to urban health vulnerability depend on the coupling among biological communities, ecologically mediated material and energy exchanges, diverse social networks, and highly engineered technological features"

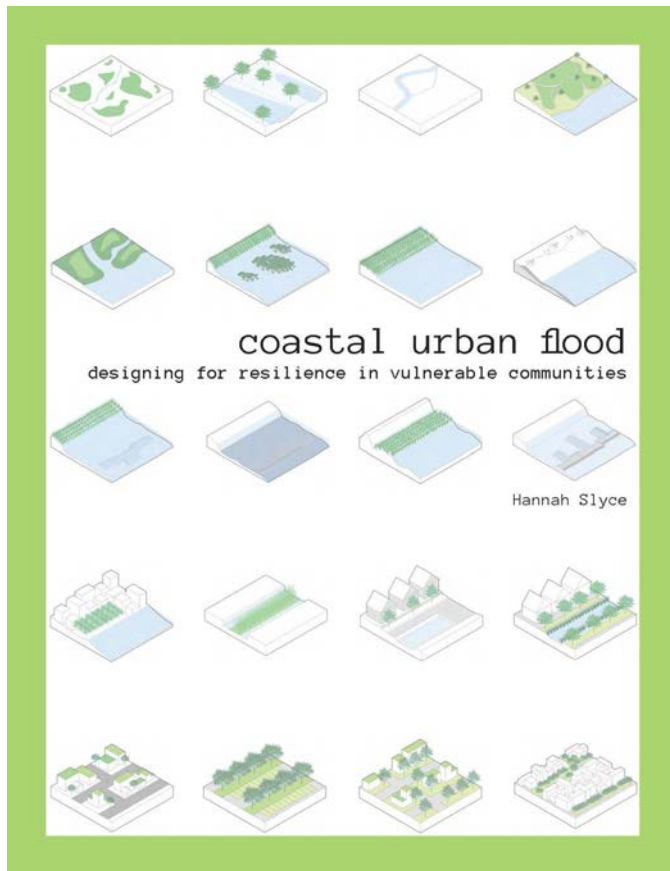
Online Resources

<https://beltline.org/about/the-atlanta-beltline-project/atlanta-beltline-overview/>

<https://www.ite.org/technical-resources/topics/transportation-and-health/>

<https://thefield.asla.org/2018/05/22/the-atlanta-beltline-an-interview-with-the-principal-landscape-architect-part-1/>

<https://www.americanrivers.org/threats-solutions/clean-water/green-infrastructure/what-is-green-infrastructure/>.



coastal urban flood

designing for resilience in vulnerable communities

Master of Landscape Architecture Thesis
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01 INTRODUCTION

background

As we progress further into the Anthropocene and continue to rely on fossil fuels for energy, the rapidly changing climate will only get worse. At this point, the United States and other countries must shift into a realm of thinking that progresses away from reversing the effects of climate change and onto a method of mitigation strategies. The damage to the environment has been done, ecosystems have been destroyed, atmospheric changes have been monitored, and urban environments experience increasingly more devastating flood events each year. Because the policy required to alter the course of the Earth's global future is not standardized or agreed upon, the way cities are organized, planned and developed must be reevaluated. Without this major upheaval in the urban landscape, enormous ecological, social, physical,



40% of America's population lives on the coast
35% of marine habitats have been destroyed by human touch
60% of the world's major marine ecosystems are degraded or being used unsustainably

and financial strain will occur and displace and devastate human and animal communities. Major issues with urban flood are obvious. Urban environments are typically densely populated and house the major commercial and business districts of a city fabric. Not only do 55% of the world's population live in urban environments but also a good majority of developed country's impoverished reside within urban environments as well. The causes of urban flood are not as obvious. The problem is not the city itself but the way that the city has been developed and designed over the centuries. The most populous and successful cities are located along bodies of water.

In order to better suit shipping industries many cities have devastated their coastlines to create shipping ports, dug out natural rivers to make way for larger shipping vessels and in turn replaced a natural system with hard concrete infrastructure to prevent the inevitable, flood and erosion. Other atrocities to the landscape and aquatic edges come from humanity's need to be as close to the water as possible and the ultimate creation of the tourism industry. Following the Baby Boom, American's coastal landscapes changed forever with the development of the hospitality industry. Natural buffers between the coastline and inland areas were destroyed to build vacation homes and hotels, removing dunes and maritime forests, exposing the cities within to tidal flooding. The combined effort of climate change, poor development practices, removal of natural landscape buffers, and human settlement choice, has led to a problem known as urban flood. The removal and destruction of natural landscape buffers has not only posed a series of problems for humanity but has proven to be disastrous for ecology as well. Coastline species diversity has been greatly impacted by human development patterns. Destruction of coastal and other aquatic habitat has caused many rare and endemic species to go extinct, something that unlike human property cannot be replaced.

In addition to the major destruction to ecological habitat, centuries of systematic poverty and social injustice has led to trickle-down devastation to many lower income and vulnerable groups, especially in coastal environments. Most infrastructures to mitigate the effects of flood are concentrated in wealthy areas, or places where the most income is generated due to tax revenue. When flood events occur, the disenfranchised are most impacted, losing property and lives due to dangerous conditions associated with rapid flooding. In addition to the property damage, there is immense psychological stress and impacts to human health from living in a flooded environment.



significance

The goal of this study is to assess current flood mitigation techniques and evaluate them based on:

- » contribution to wildlife habitat,
- » ability to protect the urban fabric, and
- » how they protect vulnerable groups.

Additionally, the study aims to determine the best management practice to maximize benefits in these three areas.



The typological analysis of techniques will then be used to design a flood mitigation plan that utilizes the landscape to protect the urban fabric, restore wildlife habitat while protecting vulnerable groups and preventing environmental injustice.

The frequency and intensity of storm events will increase as we venture further into the Anthropocene. Because the policies required to reduce the effects of climate change require global participation, the only thing we can do is prepare our cities for future disaster events.



By understanding the current technologies for mitigating flood and evaluated their impacts to the environment and urban ecological fabric, this research will provide designers and policymakers with the information they require to make the best decisions regarding flood mitigation. This information can then be utilized to retrofit or replace current outdated techniques and begin to reestablish aquatic edges as functioning ecosystems and flood buffers.

research question

- i. What are the best methods to mitigate flood that benefits wildlife habitat, vulnerable groups and the urban fabric?
- ii. What is the benefit of each technique to wildlife habitat, vulnerable groups and the urban fabric?
- iii. What is the best contextual framework for implementation of green infrastructure that will maximize benefits to wildlife habitat, vulnerable groups and the urban fabric?

The focus of research will be on green and grey infrastructure. Green meaning landscape techniques involving plant materials and grey to be concrete or other man-made materials. Additional focus will be given to combinations of green and grey methods along with large-scale restoration techniques. Additionally, I will utilize current literature to evaluate the impacts of flood on urban environments, wildlife habitat, and vulnerable groups, while assessing the economic impacts of each flood mitigation technique. I will also look at case studies that utilize new techniques as a method of evaluation in addition to the scientific literature.





02 LITERATURE REVIEW

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urban ecology

Nearly 60% of the world's population resides in urbanized areas. As expected, more developed countries tend to have more urbanized populations. In the United States, approximately 80% of the population lives in urban areas. An increase in urbanized landscapes means there is a decrease in natural landscapes. Urbanisation has extreme effects on regional landscapes. Historic settling of land has led to the conversion of many low lying, fertile lands into agricultural areas. As populations continue to grow, urbanisation influences the continued conversion of wild lands and even agricultural lands into urban and suburban uses. As city populations continue to grow, the growth is not compact or infilled, but sprawled and spindled, growing in patchy linear strips along highway corridors. The ever-increasing sprawl has even led to the integration of housing into wildlands. Because of this growth, ecologists have come to recognize that there are very few wildlife habitats and ecosystems that are completely devoid of human touch (Pickett et al. 2001 p. 128).



The field of urban ecology is a relatively new field of science and stands as a confluence of traditional ecology, human geography and urban studies. The definition of an urban ecosystem has been determined by Pickett et al. as one in which humans live in high densities or have built infrastructure that covers a significant percentage of the landscape. Boundaries of urban ecosystems are often set by the extent of the urban influence and include watersheds, airsheds, commuting radii or even just conveniences of the population. These boundaries are constantly at flux and can be changed and defined by political, research, or biophysical reasons (Pickett et al. 2001 p. 129). For urban ecologists there exists two pedagogies of research: ecology in the city and ecology of the city. An ecology in the city concerns functions of habitats or organisms within the city limits. This approach focuses on the physical environment, soils, vegetation and wildlife within the city framework. Ecology of the city examines the entire urban area from an ecological perspective. This approach involves the examination or even experimentation of existing urban assemblages of native and exotic species. The idea is that the novel assemblages can prove to be useful for assessing the effects of climate change on biodiversity in the future since many species assemblages within cities are well versed to disturbances and can thrive in a diversity of conditions. (Pickett et al. 2001 p. 130-139).

While urban ecology serves as a method of understanding urban environments it can also be used as a planning approach for future development of cities. Ian McHarg revolutionized planning and design when he created an environmental approach to site analysis, focusing on layers of natural and ecological systems within a site along with the usual engineering, economic and social criteria. Anne Winston Spirn detailed an approach that focuses on natural processes embedded into the city, and how those processes impact the economy, human health and community. Her research was used to determine how natural processes within the city impact environmental justice (Pickett et al. 2001p. 142).



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urban ecology

The understanding of urban ecology lead to the creation of the new field of landscape ecology. Landscape ecology evaluates the impacts of urbanization on the greater landscape region, shaping regional planning approaches to greenfields, restoration of brownfields and the integration of a designed ecology into urban systems. This has led to the generation of landscape urbanism and considering the ecology of and within a city as a mechanism of design. As the world continues to urbanize, there is a greater demand for land worldwide. No longer is there a traditional timeline of transition of wildlands to rural to urban. Many regions are experiencing direct land conversion due to the increase in demand for urban lifestyles. Investments can turn an undeveloped rural area into a booming urban acropolis seemingly overnight. With unchecked development, extreme damage to ecosystems and the existing ecology will occur. That is why in recent years, there has been an increase in interest in sustainable design solutions and sustainability plans to address years of detrimental development practices. While sustainability is at the forefront of many city planners' minds, the sustainability plans often suffer from a lack of holistic planning. Many sustainability plans do not consider the overall connections between each designed approach.

For example, there is a heavy focus on the retrofit of existing hard infrastructure like roads and sewers, and establishment of large, easy to deploy green infrastructures like street trees and parks. Because of these focuses, smaller towns and smaller neighborhoods are often left out of the conversation and sustainable approaches are not designed into these small-scale developments (Childers, 2015 p. 3776-3777).



Urban ecosystems are the front lines of environmental and sociological change. From an ecological perspective, they provide the perfect experimental setting to observe the human amplification of succession. Spatial heterogeneity and localized feedbacks play a large role in the ecology of these urbanized systems and provide the perfect test subject to see how small changes within these environments can impact the success of tactics. However, it must be understood that no two urban environments are the same. The urban environment is not created anew but is developed over time and within the context of the region. As climate change accelerates, this regional context will play an important role in the challenges that are faced due to urbanization. Because these cities are products of human planning and regional contexts, urban areas are going to change and respond in different ways depending on location. Climate change will apply stress to the human-made infrastructure and shift ecosystems in new and often unfamiliar states.

The real challenge of urban ecology is to create a mechanism for predicting the changes that face urban areas in the future. As cities grow and mature, they have the potential to act as hotspots for microevolution and provide a space to understand the "new wild" that will become normal as the world progresses into the Anthropocene and as existing urban infrastructure is stressed by changes in frequency and intensity of disaster events and the intrusion of invasive species (see kudzu and electrical poles) (Tanner et al. 2014 574-576).



urban ecology

On the topic of disaster events, hurricanes and storm events are forecast to increase due to global climate change. The combination of a rising global mean temperature and increase in mean sea surface temperature has been shown through modeling studies to increase hurricane intensity (Meixler, 2017 p. 24). Hurricanes cause the most damage to coastal areas due to storm surge. High intensity storm surge can cause massive damages due to erosion, creating and enlarging ponds, removing natural vegetation and damaging existing infrastructure within coastal wetlands. Coastal wetlands are increasingly important as they provide disturbance regulation and prevention by operating as a buffer against normal storm surge. This buffer protects inland natural areas and wildlife habitat along with urban infrastructure. In North America, following Hurricane Sandy, Meixler et al. found that low salt marsh (ecological benefit) and paved surfaces (human infrastructure) were the most impacted. They also found that 38% of the damage was long term, meaning that the function would not return after repairs were made. An estimated \$6.5 million in possible loss of ecosystem services was determined, with flooding and deposition making up much of the financial loss. The ecosystem services that were damaged by the hurricane were disturbance regulation, waste treatment, habitat, aesthetics, recreation and cultural values (2017).

\$6.5 MILLION lost in ecosystem services
38% of damage was long term and unrepairable



infrastructure

As the battle to combat the effects of climate change continues, policymakers often have a unique opportunity to learn from previous decisions and the effects of those policies to the urban environment. Such as the urban fabric provides urban ecologists the opportunity to study the potential impacts and state of a rapidly changing world, policymakers can also use the outcomes of their policies after disaster to learn and change the course of action.

The average amount of yearly flood has increased six-fold since the 1960's, causing an estimated \$19 billion of damage a year (Brody et al., 2009 p.912). Since the costs of retrofitting existing construction and development would exceed governmental budgets financially and in government reach, local communities resort to policy-based mitigation techniques to stem risks to public and private property. Often these strategies are embedded in planning documents such as development codes, land use plans and zoning ordinances. Because flood is repetitive spatially and often chronic, planners have an opportunity to learn from the events and update policy to proactively buffer the effects of subsequent floods. Brody et al., states that "an adaptive approach to environmental risk management is one of the most effective decision frameworks for facilitating policy learning," (Brody et al. 2009 p. 913). Meaning that planning departments are acting as scientists, testing hypotheses as to how well policies work as mitigation techniques.

Adaptive management is a tool that local policymakers use to update codes, plans and ordinances under constant changing environmental conditions, political shifts, or a new understanding of information. Adaptive management means that policymakers can react swiftly to new information and can use that to make better informed policies. However, often policy learning and adaptive management is tied up in fiscal responsibility.

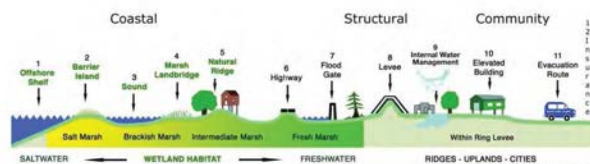


Additionally, people, property and infrastructure can also be moved out (or into for infrastructure) a coastal hazard region (Ruckelshaus et al, p. 507). Through case study, Ruckelshaus also determined factors that affect flooding and erosion damages. These factors include wave height and period, relief, substrate type, natural habitats, wind speed and duration, distance from coast and distance from natural habitats. For example, sites located at higher elevations above average sea level are safer than those at or below. Often management cannot change this as sediment and elevation building is created by wetlands. Communities or infrastructure located near the coast are obviously more at risk than those further inland meaning that good management would include relocation of these communities and infrastructures inland to reduce risk. Additionally, communities or infrastructure located near natural habitats benefit more from ecosystem services than those farther away. Therefore, good management would include prioritizing habitat restoration projects near communities or infrastructure.

infrastructure

Coastal communities are going to continue to be adversely impacted by storm events and the associated floods. Current infrastructure in place to mitigate and protect inland communities is often hard and grey. While historically, grey infrastructure did a fine job in protecting private and public investments, the rapidly changing environment from anthropogenic climate change, has caused storms to increase in frequency and intensity. At its infancy, grey infrastructure was paired with unaltered natural habitat. Coastal cities were protected by rich wetland, coastal marsh, or maritime forest which created a buffer against storm surge. If any floodwaters did surpass the natural buffer the levees or dams created by humans protected the city. Innovations in mitigation infrastructure have recently been discussed as policy initiatives. While these techniques, known as green infrastructure, seem innovative, they are just mimicking natural processes that humans have removed.

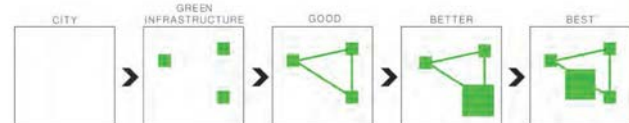
Examples of green infrastructures include vegetative buffers and reestablishment of coastal wetlands, while grey infrastructures include bulkheads, breakwaters, levees, revetments, and sea walls. The real innovation comes from the combination of green and grey infrastructures to create green new technologies. These novel infrastructures include the combination of coastal vegetation and sills, breakwaters and edgings, or can even include hard infrastructure that is made up of natural materials such as oyster shells, or materials that can provide habitat for aquatic life (NOAA, Living Shorelines).



When planning for future urban resilience there must be consideration of multiple benefits of urban infrastructure. Adaptation to climate change can be viewed as an opportunity to improve urban infrastructure by using green and blue infrastructures to provide multiple benefits such as protection and habitat restoration (Alves et al. 2020 p.2). While many jurisdictions are skeptical of green infrastructures from one reason or another, green infrastructure is ecologically and socially required to move forward amidst climate change. It is also economically viable in the long run. Alves defines green infrastructure as "a network of interconnected multi-functioning green spaces that maintain and enhance ecosystem services and resilience," (Alves, 2020, p.2). Many studies have determined that green infrastructure alone may not be able to combat extreme climate hazards, just as grey infrastructure alone is not able to do so either. As suggested by NOAA, a combination of green and grey infrastructures should be implemented to maximize flood mitigation.

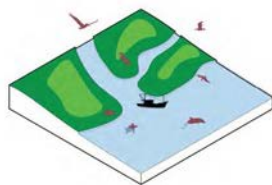


Grey infrastructure is already implemented throughout the world and should be retrofitted and improved and connect to a series of green infrastructural techniques. Simple green infrastructural techniques include pervious paving. Benefits of this technology includes lowering reflection and evaporation which includes energy savings and pollutant reduction. Additionally, pervious pavements enhance water quality by reduction of runoff and allowing groundwater recharge to occur (Alves, 2020, p. 6). While these simple techniques alone cannot prevent flood, the combination of grey infrastructures such as drains and collection basins with these simple green infrastructures can make a big difference.



infrastructure

Habitat restoration is a big driver behind a lot of green infrastructure projects. The reestablishment of salt marshes, reefs, mangroves, and dunes can greatly improve biodiversity and reduce erosion and flooding. Beyond the coastal protection services, restoration can provide recreation, fisheries, carbon sequestration and storage, and allow the coastal environment to sustain and adapt to climate change processes with minimal human intervention due to ecologically function. This means that once established, a restored coastal site is more economically viable than a technique that must be consistently maintained such as a drainage system (Ruckelshaus et al. 2016, p. 505). However, coastal protection benefits can vary dramatically over space and geographic contexts. The value of restoration projects in providing protection services is extremely site and context specific. Whether or not green infrastructure at this scale can contribute to coastal protection depends entirely on the physical and social vulnerabilities of an area including economic constraints and the extremity and nature of the flood or storm. There are many factors that affect the spatial distribution of vulnerability hazards along coastlines. These factors include shoreline type, relief, natural habitat, sea-level change, wave exposure, surge potential, and social exposure.



Additionally, people, property and infrastructure can also be moved out (or into for infrastructure) a coastal hazard region (Ruckelshaus et al. p. 507). Through case study, Ruckelshaus also determined factors that affect flooding and erosion damages. These factors include wave height and period, relief, substrate type, natural habitats, wind speed and duration, distance from coast and distance from natural habitats. For example, sites located at higher elevations above average sea level are safer than those at or below. Often management cannot change this as sediment and elevation building is created by wetlands. Communities or infrastructure located near the coast are obviously more at risk than those further inland meaning that good management would include relocation of these communities and infrastructures inland to reduce risk. Additionally, communities or infrastructure located near natural habitats benefit more from ecosystem services than those farther away. Therefore, good management would include prioritizing habitat restoration projects near communities or infrastructure.

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environmental justice

Pickett claims that the study of social structures and how these structures came to exist is critical in understanding the complexity of the ecology of urban systems (Pickett et al. 2001 p. 143). Urban ecosystems allowed for human populations to no longer be dictated by the limitations of their local ecosystem. Human social development enabled the human species to escape those limitations wherein the local ecosystem no longer regulated population size, structure or genetic diversity. This led to what social scientists call social differentiation. Often this differentiation comes through a form of race, class, gender, age, and clan. Social differentiation is critical for human ecological systems because it dictates who gets what, when and how. The allocation of resources including natural, socioeconomic, and cultural, is highly dependent on social differentiation. As it is rarely equitable, the uneven allocation of resources creates hierarchies and rank amongst the human ecosystem and split groups into communities, regions, nations and societies. Even within smaller communities, rank is still determined based on wealth, power, status, knowledge and territory. Within each community, there is an unequal distribution of wealth, power, status, knowledge and territory.

Social differentiation occurs at all different scales. It can take different spatial patterns and have varying biophysical effects on human population including the distribution of land use within urban areas, the stratification of communities and the social differentiation of ownership and households (Pickett et al. 2001 p. 145).



A history of disenfranchisement and forcing people of color and minority communities to the outskirts of urban areas has led to a long and hard history of mistrust of planning and policymaking jurisdictions. These communities often receive unequal impacts in the form of environmental injustices. While many times this is because of a misunderstanding of how the community thrives within their landscape, the communities are still rendered invisible to the decision-making process (Barra, 2020, p. 12). For example, several coastal restoration projects are underway to preserve the Louisiana coastline and to prevent inland flooding to New Orleans and other urban environments. The largest and most controversial portion of this project includes a stretch of land within a historic African American community with 'good sediment.' The master plan aims to harvest the 'good sediment' with massive sediment diversions placed along the coast of this community to remove and replace within areas that are flood prone, hoping to reestablish wetlands and prevent the further sinking of the Mississippi River Delta. Residents of the community are rightfully fearful that this diversion will put several feet of additional water into the local wetlands causing potential flooding during storm events and removal of the ecology that supports the local fishing industry (Barra, 2020, p. 1-2).

Barra makes the claim that "race and nature work as instruments of power to render narrow visions of nature and racial hierarchies as natural or common sense, (p.4). Like the old-world view of the sublime and dominance over nature, mankind views race as something that man must hold dominance. In the rural coastal south and most of the United States, race and nature have been elements of control. Predatory real estate practices have historically forced African American and other minority communities out of areas deemed 'prime real estate' for coastal development, and even now, it is happening for environmental protection (Barra, 2020, p. 4). The ironic conjecture is that these coastal areas because they were deemed 'unlivable' by the wealthy white communities. Climate change and the emergence of the Anthropocene is having an unequal effect on minority communities. Because of rapidly changing environments, many members of these communities become climate refugees and must leave their homes and property behind due to natural disasters. Environmental protection must be done but it also must be done in a way that is equitable for minority communities and those historically marginalized.

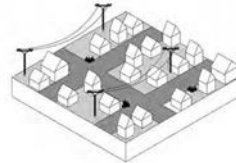
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environmental justice

Amenities such as parks and green space are unequally distributed along racial and socioeconomic lines. These amenities have proven physiological, psychological, and economic benefits to communities in which have them, yet historically marginalized communities are left out (Hasala et al. 2020, p. 2). When parks and greenspaces are installed in these communities often gentrification occurs, pushing these communities to undesirable areas. The placement of technology and infrastructure aimed at mitigating environmental issues such as flooding often follow these same patterns of gentrification when those communities are the ones who need it the most. In addition, when green infrastructure is placed within these communities, it is often not as well maintained as those within white communities.

This further provides means for skepticism within these communities and a mistrust that creates a barrier to well-meaning implementation of green infrastructure projects, which in all is rooted within a deep history of environmental racism mentioned above (Hasala, 2020, p. 3). In addition, when green infrastructure is placed within these communities, it is often not as well maintained as those within white communities. This further provides means for skepticism within these communities and a mistrust that creates a barrier to well-meaning implementation of green infrastructure projects, which in all is rooted within a deep history of environmental racism mentioned above (Hasala, 2020, p. 3).



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Due to environmental injustice, blight and a general lack of planning efforts, many vacant, abandoned and unproductive land parcels exist on the margins of urban fabrics and exist within marginalized communities. These parcels can offer opportunities to create functional green spaces for communities. Community benefits of vacant lot beautification projects have immense benefits to the wellbeing of the residents. Many resident-led projects seek to change the narrative and overturn the stigmatized negative images of their communities (Draus, 2020, p. 1). Because of the realities of gentrification, park programs and beautification must include provisions to ensure that the benefits primarily go to the long-term residents; these considerations are often left out of privately developed parks or even joint efforts between private investors and planning agencies. With the popular notion that urban parks can provide green infrastructure and ecosystem services to the communities they exist within; marginalized communities are further damaged by the shift from traditional infrastructures to green technologies. James Corner claims, "landscape is bound to the marketplace and only available at a price, (Corner, 1999 p. 157). For those marginalized communities dictated by their socioeconomic status, they are left out of the conversation due to a lack of participation within the white marketplace.

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environmental justice

The High Line, a very notable park project in New York City, spent over \$150 million to create just the first two sections of a park project that establishes a semi-wild landscape within the city center, when prior to development it existed as a prime example of a ruderal landscape inhabited by primary succession and providing habitat for urban ecology and recreation for those that were brave enough to dare (Draus, 2020, p. 4). The park masquerades as an attempt to better the city and provide space for residents, but as Corner, the notable High Line park designer suggests, "landscape is bound to the marketplace," access to the park is tied up with private partnerships providing security and issuing out permits to sell goods and provide restaurant services along the park space (Loughran, 2014). The idea of a public park has become a mere commodity of neoliberal capitalism. The goals of the High Line are not to provide amenities or green infrastructure to the community, (and let's not forget the community that was pushed out of lower Manhattan to make way for the project and new development associated) it was to make money for the city and the developers that invested (Loughran, 2014). Public parks should benefit the public, they are funded using tax dollars and should provide essential services to the communities they are located within. As soon as parks become money making industries, they are no longer public and enter the private industry.

Tax dollars, that are paid by all individuals including those excluded from spaces like the High Line, should go to providing essential services to communities, not making rich white people richer. The future of park design can follow two trajectories: green gentrification and green reparations. Green gentrification meaning the transformation of working-class areas into upper middle-class areas through the establishment of parks and greenways. Green reparations meaning the establishment of green spaces that are undertaken with a specific intent of achieving social equity (Draus, 2020, p. 5). Transforming ruderal landscapes such as the High Line raises several questions concerning the ecosystem services these projects claim to provide, especially considering the high costs of maintenance in a time of climate change. Perhaps the ruderal and 'weedy' landscapes provide an informal green space that acts as a buffer to gentrification, establishing the green infrastructural benefits while neglecting to feed into gentrification and displacement driving markets. Perhaps the best method is a combination of bottom-up and grassroots park creation that is supported by local governments (Draus, 2020, p. 13).



30 | coastal urban flood

hannah slyce '21 | 31

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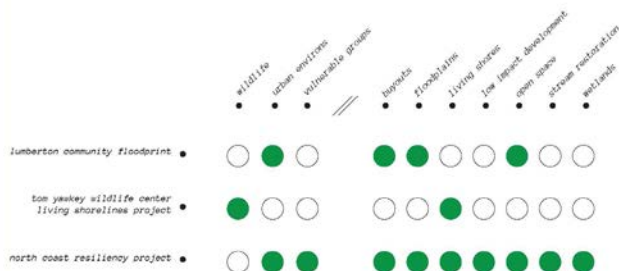
03 CASE STUDY

case study

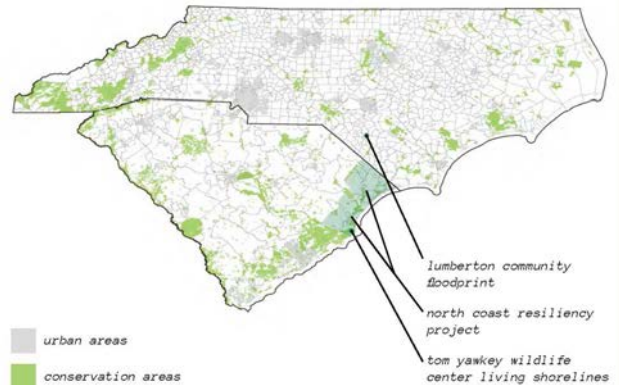
A series of regional case studies were conducted to understand and document existing landscape infrastructure projects with goals to restore biodiversity, protect urban infrastructure and respect vulnerable communities. Each case study was chosen for its response to the following terms:

- » development
- » generative
- » protection

Each case study was analyzed based on the three main criteria of contribution to wildlife, protection of urban fabric and protection of vulnerable groups and also for what green technique was utilized.



The following graphic depicts the location of each case study selected. Lumberton Community Footprint was selected for its response to the term "development," and is located in Lumberton, NC. The North Coast Resiliency Project was selected for its response to the term "protection," and is a dual-county based project in Horry and Georgetown Counties in SC. Tom Yankey Wildlife Center Living Shorelines was selected for its response to the term "generative" and is located in Georgetown, SC.



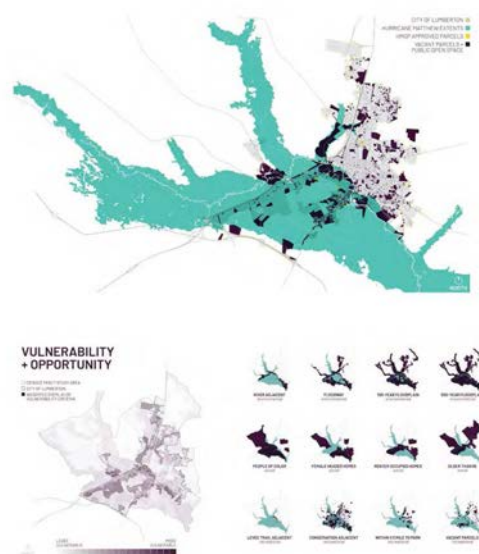
lumberton community floodprint

Lumberton, NC
NC State Coastal Dynamics Design Lab

The Lumberton Community Floodprint is a project dedicated to finding strategies for re-purposing vulnerable landscapes after disaster. The project's main goal is to provide more equitable access to open space and parks while reducing the risk to vulnerable populations within the community. Back to back hurricanes in 2016 and 2018 mirrored the 100- and 500-year floodplains. Many housing developments were situated within these areas causing displacement and vacancy. Approximately \$300 million in damages occurred following Hurricane Matthew in 2016, while over \$400 million in damages occurred following Hurricane Florence. The Lumberton Community Floodprint project aimed to re-envision the blighted and vacated properties that fell victim to repetitive flood loss. Census data determined indicators of social vulnerability. This data was analyzed to understand areas most vulnerable to the impacts of flooding. The information analyzed included:

- a. River adjacency
- b. Floodway
- c. Floodplains
- d. People of color
- e. Female headed households
- f. Renter occupied homes
- g. Older than 65
- h. Trail adjacency
- i. Conservation area adjacency
- j. Within 1/3 mile to park
- k. Vacant parcels

This data allowed for the team to determine a vulnerability matrix and classify parcels based on this information. This areas with the most vulnerability became the bones of an integrated trail network that utilized vacant properties to create over 800 acres of stormwater recharge and recreation areas, over 99% of which was within the 100-year floodplain. For properties that were acquired, there was a matrix based on if it was flooded during Hurricane Matthew or Florence. For those that were flooded the homes could either be bought out or raised above the mean flood level. Those that were within the floodplain and not flooded were set to remain as is. Community workshops were held to determine the best means of practice and to ensure social equity.



courtesy of the NC State Coastal Dynamics Design Lab

north coast resiliency project

Horry + Georgetown County, SC
The Nature Conservancy

The North Coast region of South Carolina includes Horry and Georgetown Counties. While home to some of SC's most famous sunny beaches and estuarine rivers, these counties often are neglected when it comes to resilience. Consistent heavy rains and hurricanes has devastated this region, these counties receive a mix of oceanic flooding and riverine flooding from the Waccamaw and Pee Dee Rivers. The concept of the "100-year flood" describes the 1% chance of a flood occurring in any given year. Therefore, in theory, there would be only one such flood every 100 years. However, in SC there have been four such floods since 2015. Twenty percent of South Carolina's population lives in areas at risk of 100-year floods, marking nearly 1 million South Carolinians at risk each year from catastrophic flooding. As the world continues to experience the ramifications of climate change, even people outside of flood zones are impacted. In 2015, 40% of the 1,000 claims for FEMA insurance within Horry and Georgetown Counties were outside of FEMA's designated flood zones. In 2018, more than half of the nearly 400 homes flooded due to Hurricane Florence in Conway, SC were outside of these zones.



In 2016, the Nature Conservancy (TNC) launches the North Coast Resiliency Project to educate cities and towns on resilience planning tools and to support the development of community resilience plans. The goals of the project are to understand and address local flood risks in these two SC counties and to focus on nature-based solutions to reduce flood, fire and/or drought risk. Additionally, the project sets to identify site-specific projects to restore, protect and improve local waterways to improve flood storage and drainage. Data collected determined three flood types along the North Coast:

- Coastal flooding from high tides and sea-level rise
- Riverine flooding
- Stormwater flooding in low-lying and heavily paved areas

In response, the following nature-based solutions were identified as potential interventions:

- Land conservations
- Stream and floodplain restoration
- Reforestation of repetitive flooding buyouts
- Low-impact development retrofits
- Living shoreline installations

The Nature Conservancy also developed a mapping tool that used past storm flooding data to create GIS models for the North Coast floodplains in 2017, 2035 and 2050. The maps showed and predicted flood risk with updated information that considered land use. Additionally, this mapping tool outlined social vulnerabilities and national wetland inventories as matrices to allow planners to determine where nature-based solutions should be implemented. Currently, TNC is outlining the City of Conway and the Town of Andrews in Horry County as "shovel-ready" communities for nature-based projects experiencing repetitive flood impacts from riverine and stormwater sources.

tom yawkey wildlife center

Winyah Bay, Georgetown, SC
Tom Yawkey Wildlife Center Living Shorelines

With consistent loss of intertidal oyster populations over the last 100 years, Georgetown, SC has only 1-10% of their historic populations remaining. The decline in oyster populations is due to a combined effect of pollution, unsustainable harvesting practices and dredging activities. The major source of population decline in Carolina Bays is due to lack of substrate necessary for attachment and growth. The Nature Conservancy (TNC) identified oyster restoration as a conservation priority in the 2006 Carolinian Conservation Action Plan, which I will outline later. The oysters and the living reefs that they form provide valuable ecosystem services including habitat creation, protection to juvenile fish and invertebrates, water quality improvements due to filtration capacities, and wave and wind energy reduction along shorelines which reduces the loss of land, promotes marsh grass development, and encourages adaptation to rising sea levels; all of which contributes to the protection of inland urban and suburban developments. The Nature Conservancy has prioritized oyster restoration and conservation and plans to return the populations a "fair or good" status by 2025. The living shorelines project in Winyah Bay is one of six projects installed in the Southeast Atlantic since 2008 (document referenced was written in 2013).



This oyster restoration grant involved the installation of two projects in Winyah Bay. The first project was along a mile stretch of beach on South Island (see Article 1) and the second included a portion of less than a half mile of beach on North Island. These restorations included the planting of *Spartina alterniflora*, a native beach grass. The South Island project involved stacking 1,000 castle blocks into ten sets of configurations that were planted with *S. alterniflora* shoreside of the blocks.

The project was monitored for twelve months and major findings showed that there was a significant loss of grass in the southern aspect of the project but there was a slow settlement of oysters on the blocks. Analysis from the TNC concluded that the high energy in the system runs along the stretch of beach on South Island and then diverts in towards the middle of the bay just before the location of the most northern sites. The TNC assumed that the high energy tidal flow was partially at fault for the lack of significant oyster settlement and was what washed away the planted marsh grass. Additionally, the erosion of sand under the castle blocks was also likely caused by this high energy tidal system. During the monitoring period, there was observed unintentional oyster settlement on unconventional materials such as discarded tires and old concrete. The experience from the South Island project led to a slightly different approach at the North Island project. This time, the castle blocks were situation below the mean low water line (MLW) to alleviate some of the high energy freshwater erosion. The North Island project included the installation of 360 castle blocks that were situated on the edges of the existing marsh grass population that were showing signs of erosion. Coastal Carolina University (CCU) provided the TNC with historic shoreline maps that depicted the South Islands constant erosional pattern and North Island's slightly accreting pattern (See Article 2).

After partnering with CCU to monitor the success of the North Island restoration, they concluded after 12 months that the living shorelines castle blocks were relatively successful in recruiting oyster growth and sediment accumulation. This area is a relatively low energy section of estuarine shoreline, yet there was significant subsidence and/or sediment burial of the castle blocks. However due to the relatively sustained shoreline in North Island, it was difficult to assess the true potential for shoreline stabilization in this study site. However, it was determined that the lower elevation and more linearly placed castle structures resulted in significantly improved oyster recruitment and sediment accumulations when compared to the installation at South Island. Suggestions from the TNC included additional testing of a mixture of living materials and geo-textiles to reduce the rapid erosion along the high energy location in the South Island and for future oyster restoration projects to follow the process in the North Island location, locating the installations below the MLW.





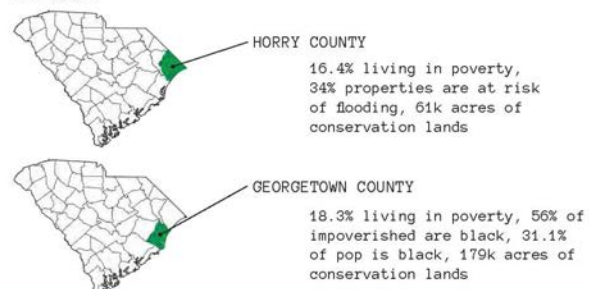
04 GIS ANALYSIS

GIS analysis

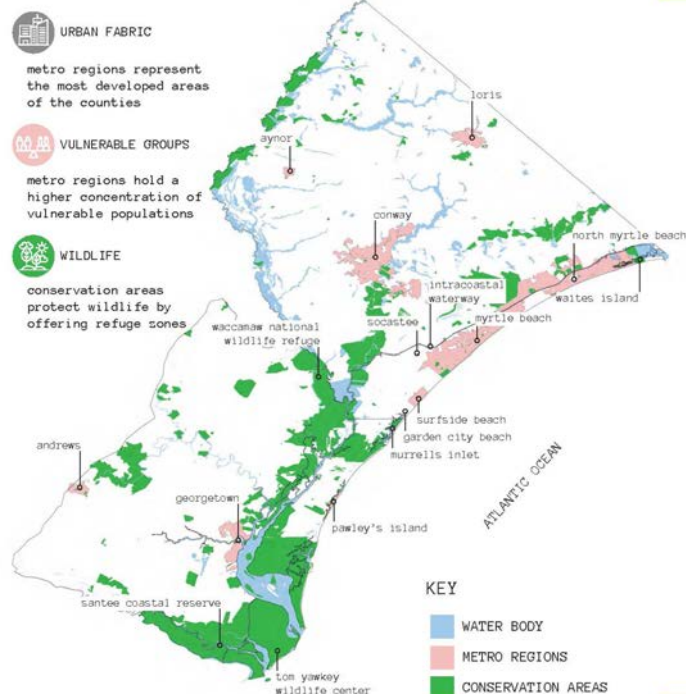
An extensive GIS analysis was conducted on Horry and Georgetown Counties in coastal South Carolina to determine appropriate site selected for landscape intervention. Using the information obtained from scientific literature and the case study, the two counties were selected based on the following factors:

- » chronic flooding
- » high numbers of people living in poverty
- » coastal
- » underutilized / poorly developed

A regional focus was decided as the best means of analysis because the specific site for intervention was to be determined based on connection to the greater regional landscape in order to create corridors for wildlife and biodiversity. Additionally, demographic indicators point to the communities most vulnerable in the face of flood disaster. FEMA flood zones, social vulnerability, climate resiliency, and wetland presence were also analyzed to determine the areas most vulnerable in terms of flood and resiliency for the future.



METRO_CONSERVATION



PERCENT IN POVERTY

* average % poverty rate in the US is 10.5%



URBAN FABRIC

areas with the highest % of poverty are within the metro regions



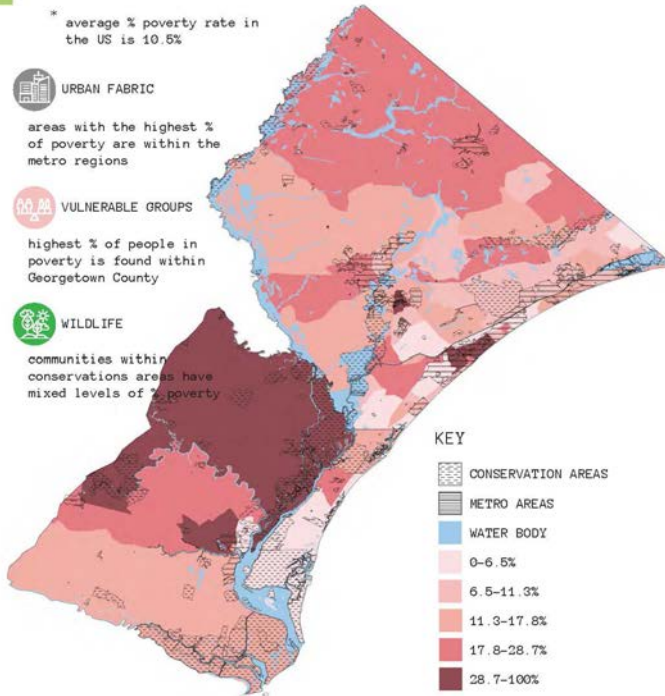
VULNERABLE GROUPS

highest % of people in poverty is found within Georgetown County

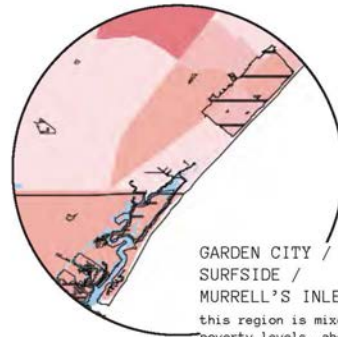
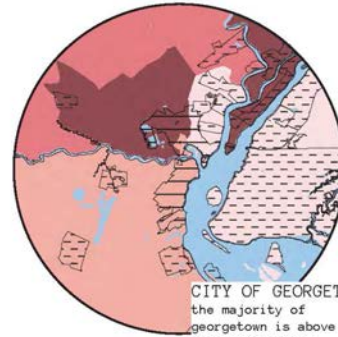


WILDLIFE

communities within conservation areas have mixed levels of % poverty



PERCENT IN POVERTY



KEY

- CONSERVATION AREAS
- METRO AREAS
- WATER BODY
- 0-6.5%
- 6.5-11.3%
- 11.3-17.8%
- 17.8-28.7%
- 28.7-100%

WETLANDS



URBAN FABRIC

urban areas have less natural wetlands than undeveloped areas



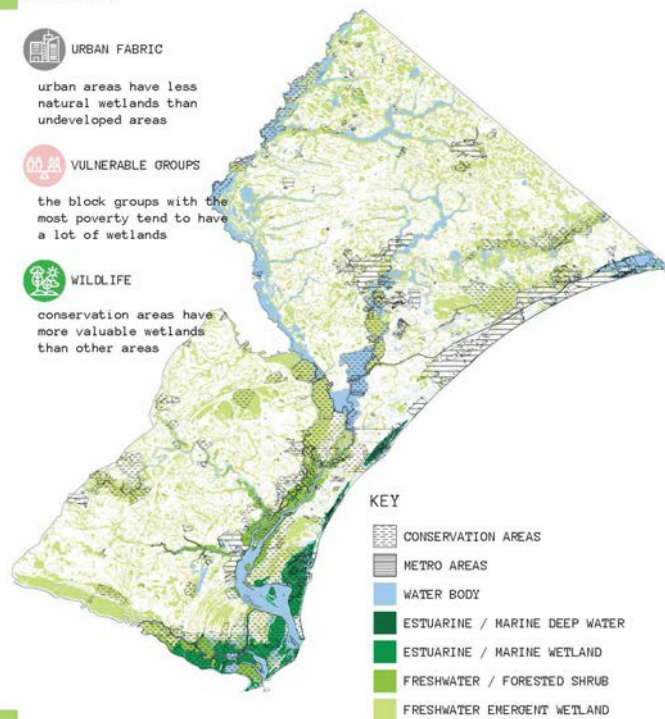
VULNERABLE GROUPS

the block groups with the most poverty tend to have a lot of wetlands

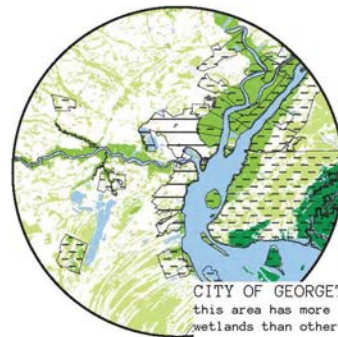


WILDLIFE

conservation areas have more valuable wetlands than other areas



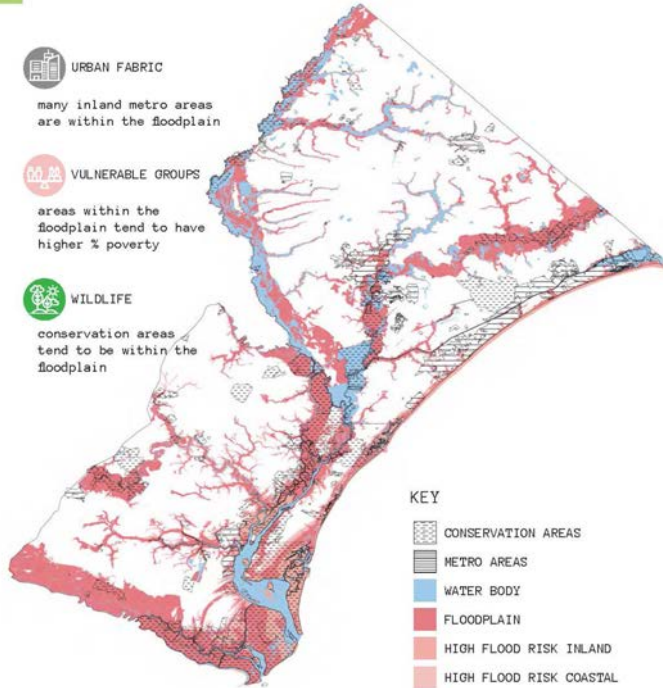
WETLANDS



KEY

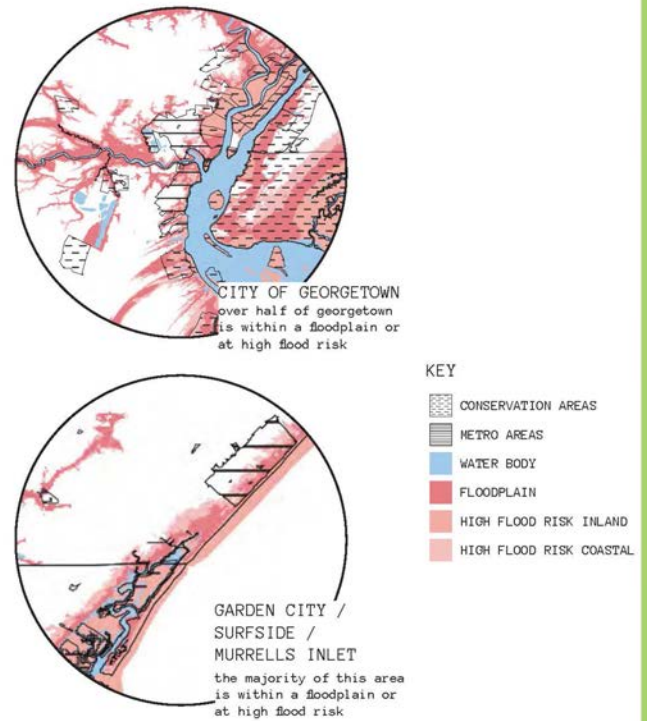
- CONSERVATION AREAS
- METRO AREAS
- WATER BODY
- ESTUARINE / MARINE DEEP WATER
- ESTUARINE / MARINE WETLAND
- FRESHWATER / FORESTED SHRUB
- FRESHWATER EMERGENT WETLAND

FEMA FLOOD ZONES



52 | coastal urban flood

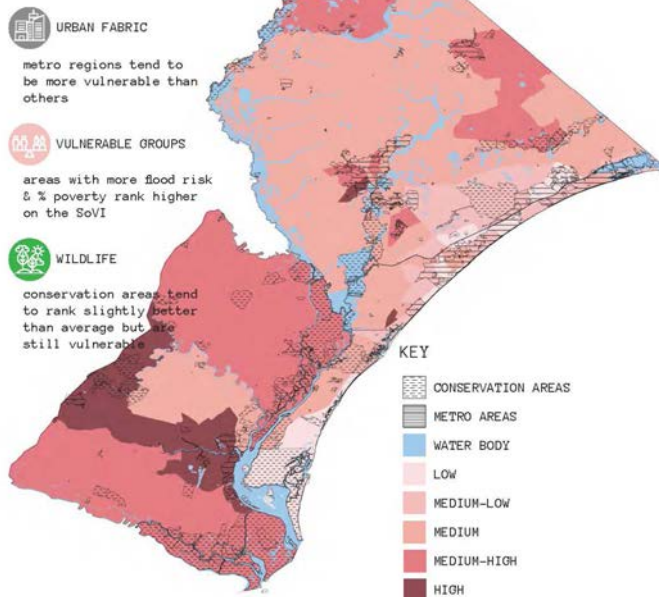
FEMA FLOOD ZONES



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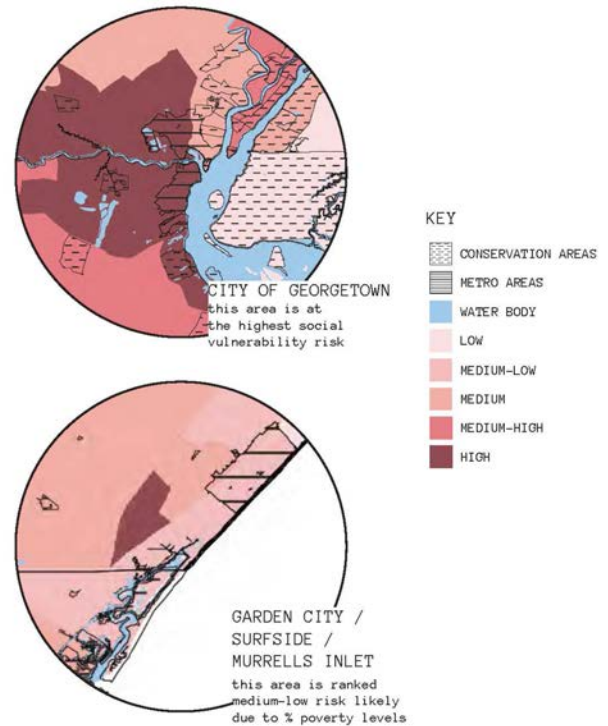
SOCIAL VULNERABILITY INDEX

* index is based on poverty levels, rental housing, proximity to environmental threat & other demographic data.



54 | coastal urban flood

SOCIAL VULNERABILITY INDEX



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COMBINED RESILIENCY

* this index is based on
wildlife vulnerability &
social vulnerability



URBAN FABRIC

metro regions & developed
beaches have the lowest
resiliency



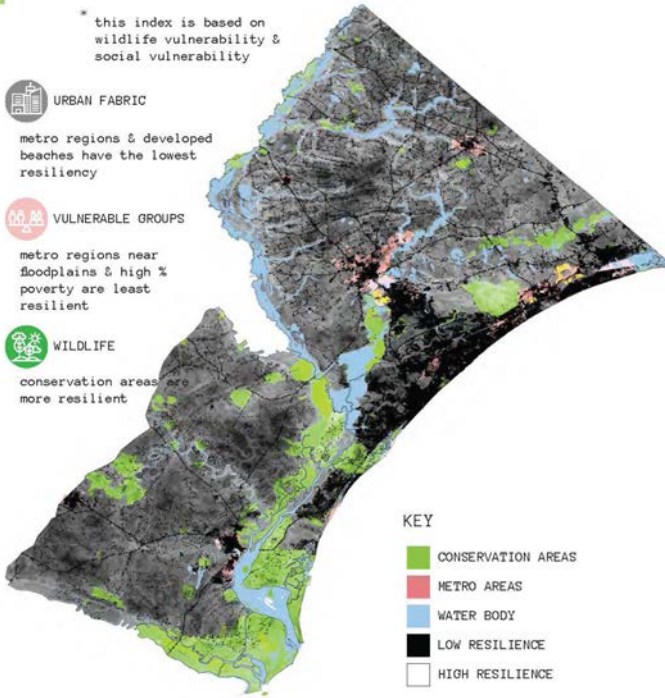
VULNERABLE GROUPS

metro regions near
floodplains & high %
poverty are least
resilient

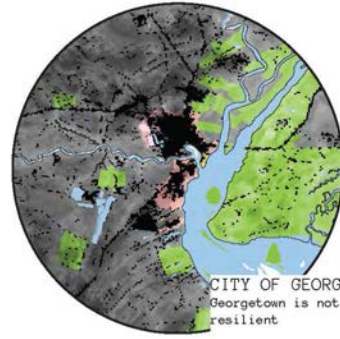


WILDLIFE

conservation areas are
more resilient

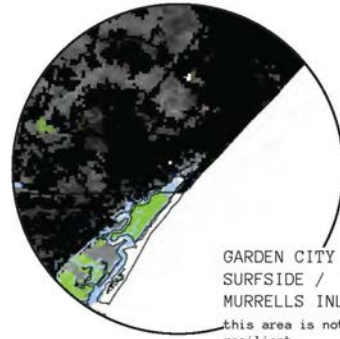


COMBINED RESILIENCY



KEY

- CONSERVATION AREAS
- METRO AREAS
- WATER BODY
- LOW RESILIENCE
- HIGH RESILIENCE



05 TYPOLOGICAL ANALYSIS

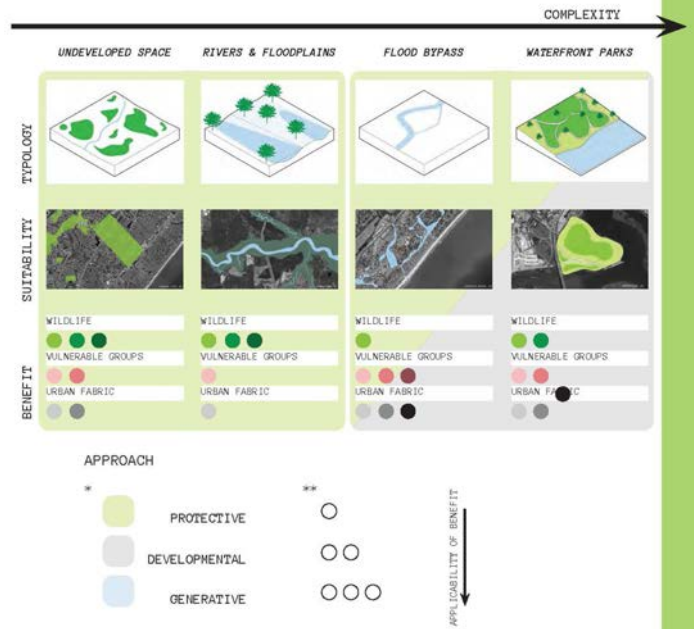
typological analysis

A typological analysis was conducted to rank and stratify coastal infrastructures and restoration techniques for use in coastal management. Each physical technique will be evaluated based on three basic concepts that contribute to landscape infrastructure:

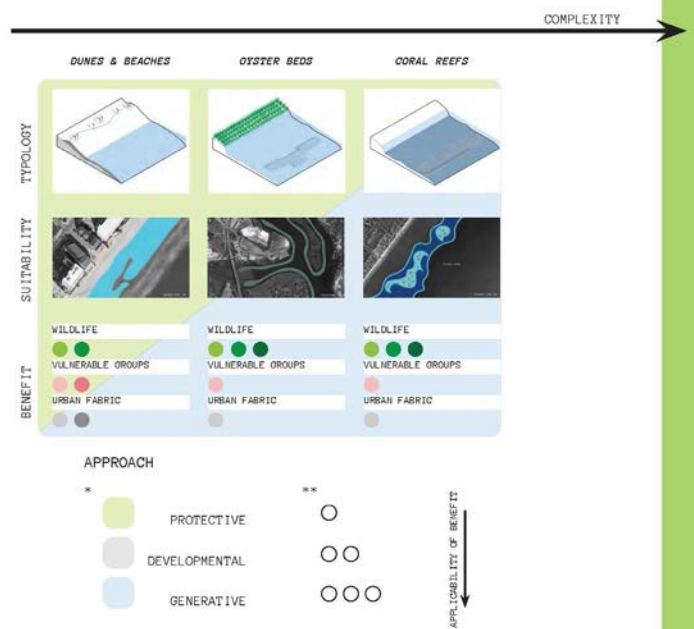
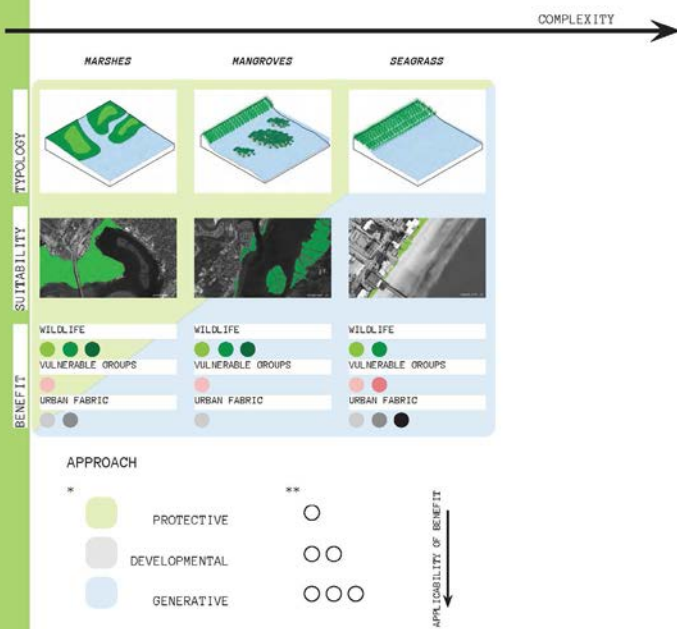
- » contribution to wildlife habitat
- » ability to protect the urban fabric
- » protection of vulnerable groups

Additionally, each technique is categorized based on the three terms used to stratify the case studies:

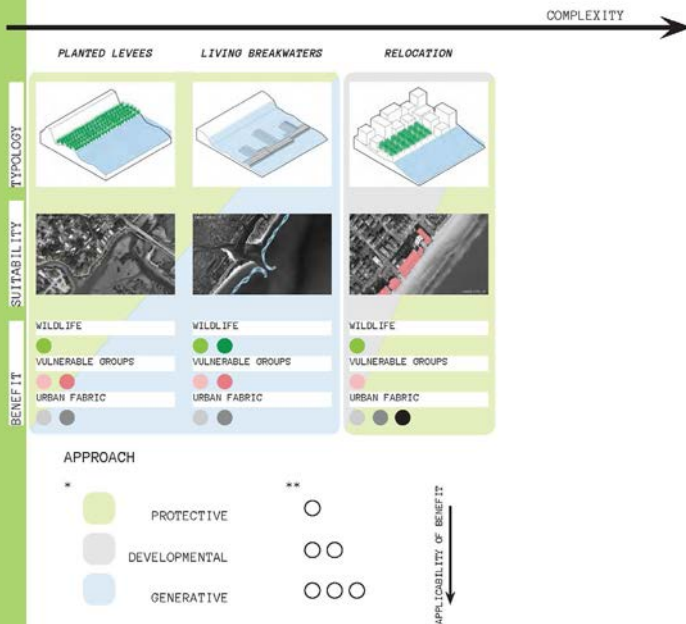
- » development
- » generative
- » protection



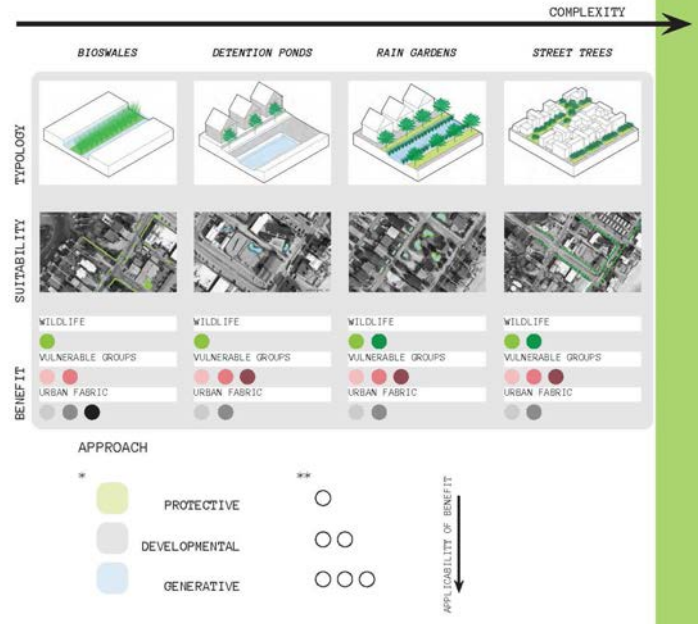
typological analysis



typological analysis



64 | coastal urban flood



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typological analysis



66 | coastal urban flood

While each typology may not be appropriate for every site condition, this matrix is a useful tool to aid other landscape architects and planners in determining the best approach to designing for future resilience by means of green infrastructure. The goal of the matrix is to analyze techniques based on the simple set of criteria of contribution to wildlife habitat, protection of the urban environment and protection of vulnerable groups. The applicability of benefit depicted as the series of filled circles was determined based on financial complexity, suitability for the regional context and physical site restraints (i.e. density of development, land availability, etc).

Each typology falls within the following three categories in the matrix. The terms are defined in the boxes below:



PROTECTIVE

The preservation of existing ecological infrastructure such as marshlands or open space, along with the consideration of community needs in order to prevent negative growth impacts. This can be achieved by restoring marshlands, establishing frontage parks and utilizing appropriate property buyouts.



GENERATIVE

Creating new landscape infrastructure to combat flooding issues while considering the needs of the community. This can be achieved by establishing new marshlands or breakwaters, connecting trails and sidewalks, and designing community facilities and outreach into the urban fabrics.



DEVELOPMENTAL

Smarter developmental practices that begin at the planning level and encourage land developers to make smarter choices when engaging the site. Also involves redesign of existing spaces such as underutilized parks and street networks.

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06 SITE ANALYSIS

site analysis

Based on the regional GIS analysis and the typological matrix, it was determined that the City of Georgetown was the best site for landscape intervention.

The City had the best connection to the greater landscape region in terms of wildlife corridors, more biological resilience, a more vulnerable population and much room for improvement in terms of protection for the urban fabric.



URBAN FABRIC

The City is juxtaposed with marshlands and dense development



VULNERABLE GROUPS

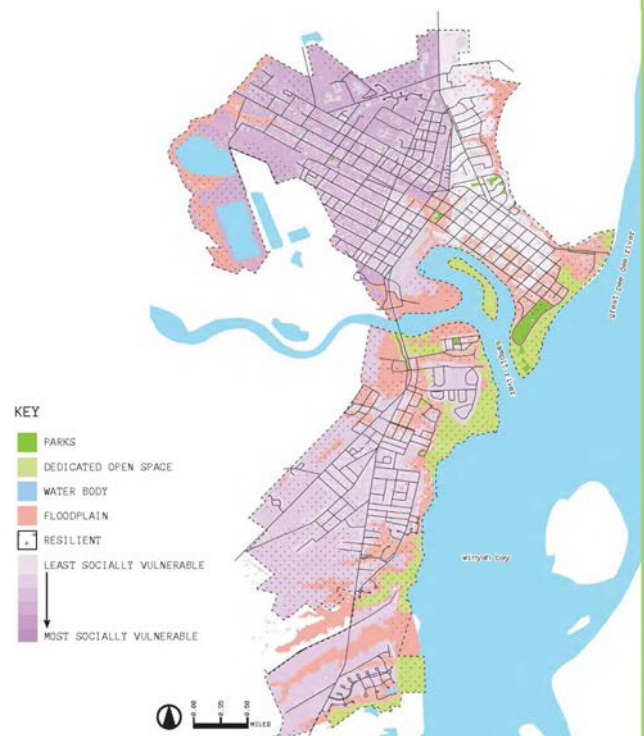
34.1% of the population in Georgetown is living below the poverty line



WILDLIFE

Resiliency models show the City is a climate corridor for wildlife

CITY OF GEORGETOWN



site analysis

Three sites for design were selected based on vulnerability & opportunity for redesign. Each site takes into consideration:

- » low income communities
- » wildlife corridors
- » flood resilient design

» SITE 01



DOWNTOWN & WATER'S EDGE

» SITE 02



INDUSTRIAL & RESIDENTIAL

» SITE 03



INDUSTRIAL & WATER'S EDGE

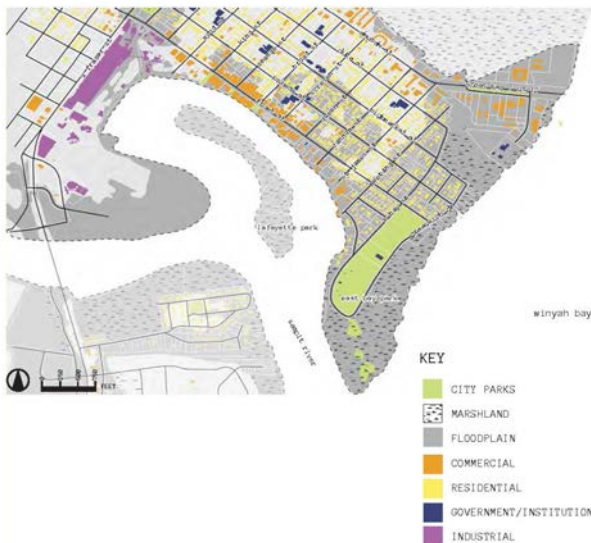
CITY OF GEORGETOWN



hannah slyce '21 | 73

site 01

DOWNTOWN & WATER'S EDGE



74 | coastal urban flood

STRENGTHS

170 acres of marshland.
25 acres of public space at East Bay Park.
Good urban tree cover downtown.

WEAKNESSES

Underutilized green infrastructure in East Bay Park.
Degraded marshlands. Parcels end at water's edge.

OPPORTUNITIES

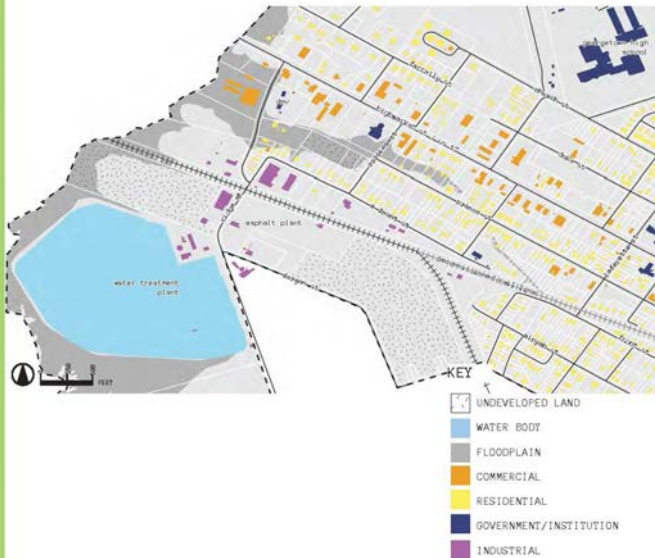
Redesign of East Bay Park, reinforce the marshlands in Winyah Bay.
Buyback parcels.



hannah slyce '21 | 75

site 02

INDUSTRIAL & RESIDENTIAL



76 | coastal urban flood

STRENGTHS

Marshlands to the western aspect. Open space within the floodplain.

WEAKNESSES

Industrial uses compete with residential. Poor connection to downtown. Limited accessibility to parks + infrastructure

OPPORTUNITIES

Transition of old industrial areas to park + green infrastructure. Rail line can become linear path to downtown.



hannah slyce '21 | 77

site 03

INDUSTRIAL & WATER'S EDGE



78 | coastal urban flood

STRENGTHS

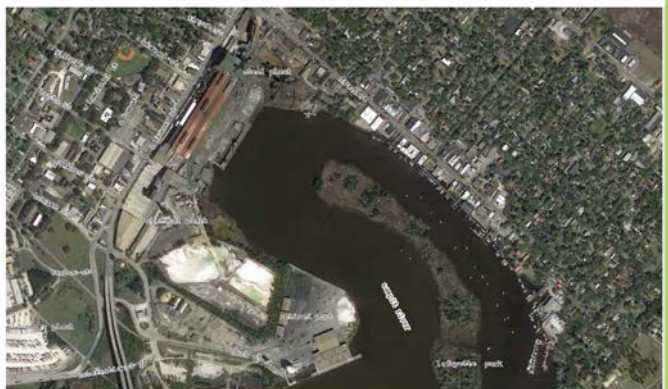
Some marshland present near old industrial plants.

WEAKNESSES

Highly degraded land at water's edge on western edge of Sampit River. Paved areas contribute to flood.

OPPORTUNITIES

120 acres (Retired port, steel plant + chemical plant) can become water's edge park + restored marshland.



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07 LANDSCAPE DESIGN

landscape design

The design process honored the three initial goals of the study, considering contribution to wildlife through corridor and habitat creation, protection of vulnerable groups through community projects and economic opportunity, and protection of the urban fabric by insightful placement of flood mitigation technology.

Additionally, developmental, generative and protective infrastructures were designed and utilized to ensure a well-rounded city flood mitigation plan than focused on three distinct park areas.

The first park area was a redesign of East Bay Park in the downtown area. The park's major goals included:



PROTECTIVE

By restoring the Winyah Bay water's edge with marshlands and breakwaters, downtown Georgetown will be reinforced from high waters. The infrastructure will slow water velocity and break a barrier between the storm surge and the city inland.



GENERATIVE

Establishing a water's edge park with deep rooted trees and a stormwater absorbing pond provides protection from storm surge. These features also create new habitat for urban ecology and provide a place for a sense of community and identity for the city.



DEVELOPMENTAL

The redesign of the park does not take land from adjoining open space and creates a better, upgraded amenity for tourists and residents. Green parking lots provide stormwater absorption and amenity, a trail provides recreation and education opportunity.

The second park area created a Wetland Water Treatment Park and a Rail-to-Trail connection. The park's major goals included:

PROTECTIVE

The aging industrial use is essentially a brownfield, negatively impacting the health of the community. By establishing a wetland park buffer between the developed land and the existing marshlands, there is a wildlife corridor and cleaner air and land.

GENERATIVE

The new wetland park creates educational opportunities for the nearby school to learn about sustainability, biodiversity and water treatment. This side of town does not have a public park so this will provide a place for play, education and relaxation.

DEVELOPMENTAL

The creation of a Rail-to-Trail park connects the underrepresented residential area to the downtown allowing for healthier lifestyles and ability to access government facilities through a safe, multimodal path. The also park encourages additional growth.

The last park area is a major restoration of an aging industrial port. The park's major goals included:

PROTECTIVE

The aging Port is a brownfield, polluting the mouth of the Sampit River to the Bay, by cleaning up the site, there is more habitat for wildlife, a cleaner environment for residents and a buffer from flood during storm surge and hurricane events.

GENERATIVE

Creating new marshlands and estuarine forest not only creates a buffer from flood, but also establishes a wildlife corridor along the bay. Additionally, this park will be a large community asset for both boaters and pedestrians, an icon for Georgetown.

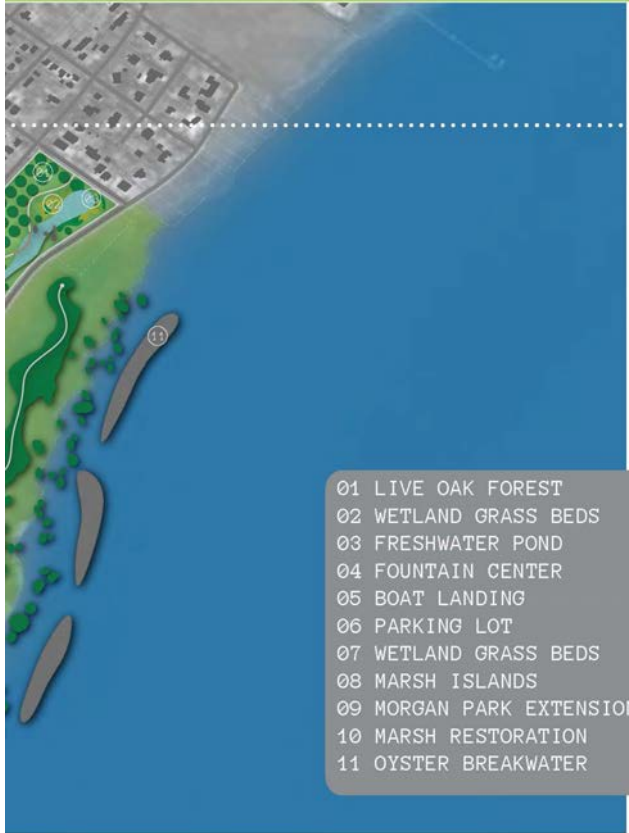
DEVELOPMENTAL

Industrial use next to sensitive waters is never a good choice, but cleaning up the brownfield and establishing new paths and trails, the eyesore becomes an icon. Additional commercial land also encourages economic growth for residents.

east bay park plan

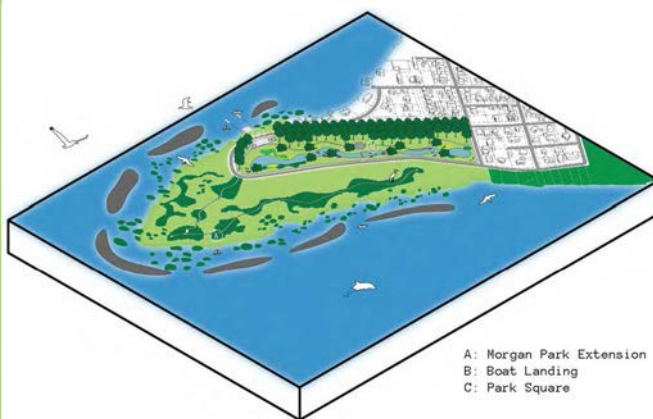


84 | coastal urban flood



hannah slyce '21 | 85

axons



A: Morgan Park Extension
B: Boat Landing
C: Park Square

PROTECTIVE

redesign of East Bay Park provides more + better green infrastructure such as water storage + drainage

GENERATIVE

oyster breakwaters + marsh restoration creates barriers to flood waters, reduces wave velocity + provides habitat

DEVELOPMENTAL

the underutilized park can become an icon of downtown Georgetown, provides access to the marshlands, and connects the city to the water's edge

Morgan Park



Boat Landing



Park Square



86 | coastal urban flood

hannah slyce '21 | 87

sections

East Bay Park Center



before



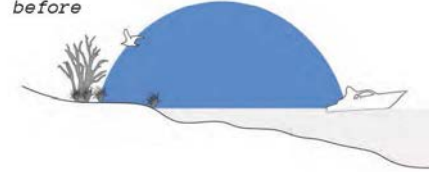
after



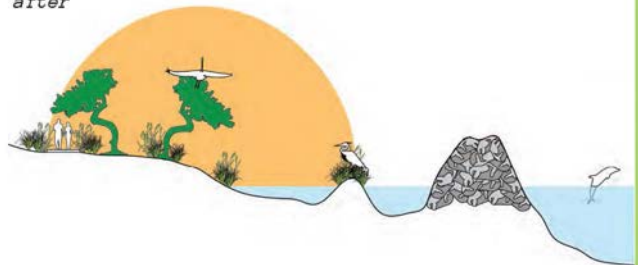
East Bay Park Marshlands



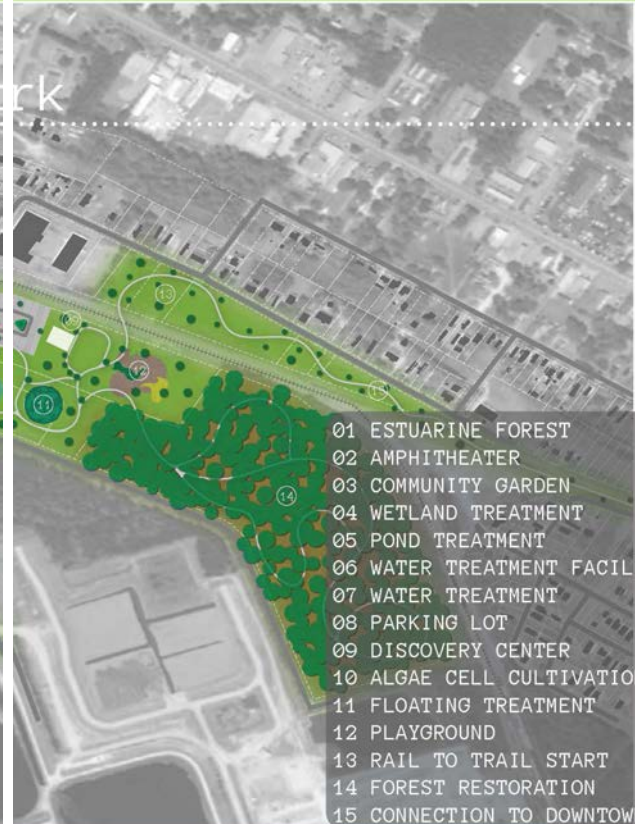
before



after

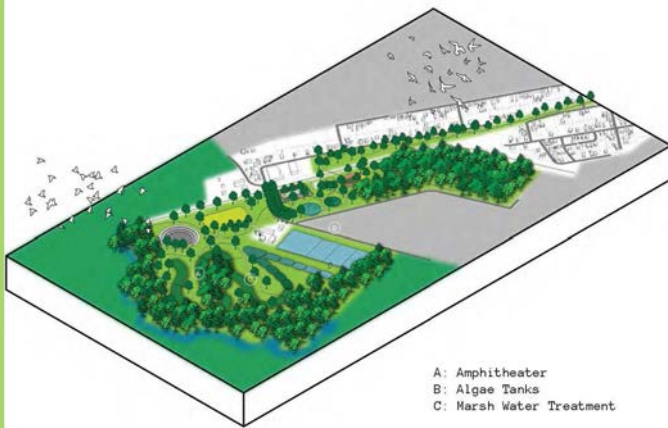


wetland treatment park



- 01 ESTUARINE FOREST
- 02 AMPHITHEATER
- 03 COMMUNITY GARDEN
- 04 WETLAND TREATMENT
- 05 POND TREATMENT
- 06 WATER TREATMENT FACILITY
- 07 WATER TREATMENT
- 08 PARKING LOT
- 09 DISCOVERY CENTER
- 10 ALGAE CELL CULTIVATION
- 11 FLOATING TREATMENT
- 12 PLAYGROUND
- 13 RAIL TO TRAIL START
- 14 FOREST RESTORATION
- 15 CONNECTION TO DOWNTOWN

axons



A: Amphitheater
B: Algae Tanks
C: Marsh Water Treatment

PROTECTIVE

removing industrial use from the neighborhood improves quality of life and water. wetland park provides buffer + education opportunities

GENERATIVE

restoring the marshland around the industrial use creates wildlife corridors, new trails enhance quality of life

DEVELOPMENTAL

new infrastructure to downtown creates catalyst for neighborhood improvement.

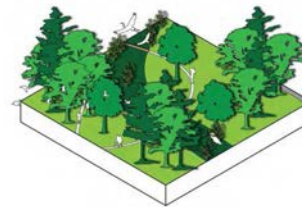
Amphitheater



Algae Tanks



Marsh Treatment



sections

Rail-to-Trail



before



after



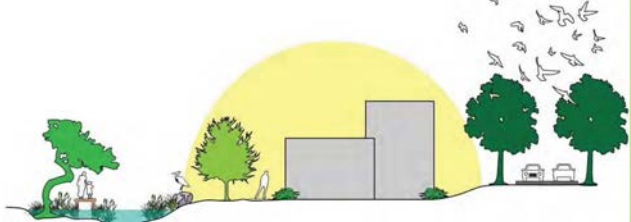
Wetland Treatment Park



before



after



the port



96 | coastal urban flood

- 01 RAIL TO TRAIL
- 02 NEW COMMERCIAL PARCELS
- 03 NEW COMMERCIAL PARCELS
- 04 PARKING LOT
- 05 BOAT LANDING
- 06 WATER'S EDGE TERRACING
- 07 CONNECTION TO RIVER
- 08 THE PEARL
- 09 MARSH ISLANDS
- 10 PONDS
- 11 ESTUARINE FOREST
- 12 LOOK OUT POINT
- 13 MARSH RESTORATION

hannah slyce '21 | 97

axons



A: Lookout Point
B: The Pearl
C: Water Storage Ponds

PROTECTIVE

retired port and massive steel manufacturing plant becomes infrastructure to protect the city. marshes slow wave velocity + flood intensity

GENERATIVE

new marshes and estuarine forest provides a wildlife corridor and establishes new habitat.

DEVELOPMENTAL

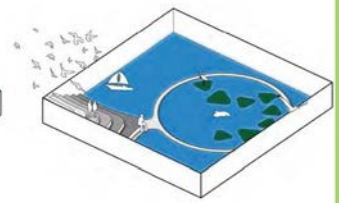
transition of industrial use to commercial + public space is a catalyst for economic growth that can be used for more renovations + infrastructure

98 | coastal urban flood

Lookout Point



The Pearl



Storage Ponds



hannah slyce '21 | 99

sections

Water's Edge

before



after

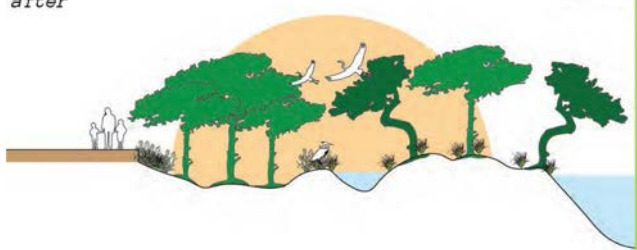


Lookout Point

before



after



Re-thinking memorial: Variant Landscape
MASTER OF LANDSCAPE ARCHITECTURE
TERMINAL PROJECT
SPRING 2022



XIAO XU
CLEMSON UNIVERSITY | LANDSCAPE ARCHITECTURE PROGRAM

01 | INTRODUCTION

Re-thinking memorial: Variant Landscape

- 01 | INTRODUCTION
- 02 | CASE STUDY
- 03 | SITE ANALYSIS
- 04 | CONCEPTUAL DESIGN
- 05 | DESIGN DELIVERY
- 06 | REFERENCE

My interest is memorial space design, particularly for those impacted by the Covid-19 effect. Memorial space is a particular type of public space, and the focus of this excursion into the mnemonic characteristics of the commemorative landscape. Meanwhile, it is also a respectful space that attempts to honor memories that have been deemed valuable and worthy of remembrance by the public.

When we talk about memorials, it is usual to remember the victims of significant events. For instance, 911 memorials project in memory of the loss of victims in the tragedy, but no one could ignore the feeling of someone who witnessed and survived that day. They might still suffer traumatic feelings in their current and future life.

In the social equality view, that is an unfair way to treat people still alive but suffering traumatic feelings from the events. Even a stranger would feel anger, fear, and sadness when they heard about the tragedy, a much stronger sense for people who lost their close families and friends. The influence of that would impact the future life of those persons.

For this intention, the research question is whether we can design a memorial space to commemorate the tragedy. This research will let people rethink the meaning of commemorative projects and evoke the awareness of looking forward to the future from the past.

2

ON-GOING PANDEMIC

"The pandemic triggered severe social and economic disruption around the world, including the largest global recession since the Great Depression." (Wikipedia contributors, 2022)

"**Educational institutions and public areas** were partially or fully closed in many jurisdictions, and many events were cancelled or postponed" (Wikipedia contributors, 2022)

I want to help human to **Recognize, Accept** and **Celebrate** the differences we have before and after the pandemic.

4

Landscape architecture is the study and practice of designing environments (outdoors & indoors) of varying scale that encompasses elements of art, environment, architecture, engineering, and sociology. (Holmes.D, 2021)

Environmental psychology is an interdisciplinary discipline that studies how people interact with their surroundings. (Wikimedia Foundation , 2022)

The designed environment is "instrumental in being supportive or detrimental to a person's psychological and emotional needs" (Kaplan & Kaplan, 1978).

A memorial space is a solemn place dedicated to honoring memories that have been judged important and worthy of public commemoration. (Lauzon,2019)

My project will explore the relationship between the designed environment and environmental psychology in an effort to create a more functional and healthier space.

3

-The vulnerability of life **remind the loss of memory**

-The panic feeling related to covid-19 **release stress**

-Feel panic to crowd

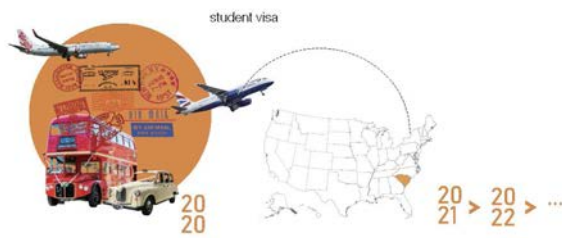
-Feel panic to open spaces without masks (worry about infect to families-especially kids, the old)

-Feel panic about being sick (worry about being positive when fever)

After arriving at Clemson, I need to have weekly testing, maintain social distance, and wear masks during classes and even in the library.

5

What I was experiencing during Covid-19 ?



Due to the pandemic effect, I have to take online courses in the first semester. At the end of 2020, I flew to the third party to get an F1 visa to continue the graduate degree.



6

7

What is your feeling and experience during the Covid-19?

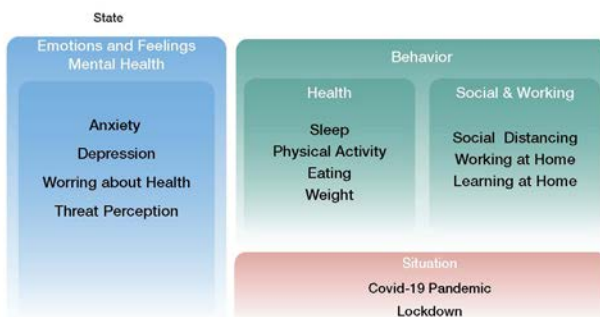


Figure 1. Illustration of the dynamic relationships between situation, a person's states character, and behaviour change

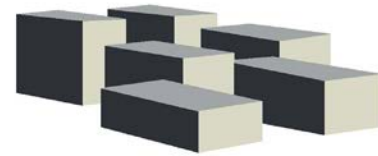
Source:
Herbert, El Boleck, A., & Abdennadher, S. (2021). How do you feel during the COVID-19 pandemic? A survey using psychological and linguistic self-report measures, and machine learning to investigate mental health, subjective experience, personality, and behaviour during the COVID-19 pandemic among university students. BMC Psychology, 9(1), 1-90. <https://doi.org/10.1186/s40359-021-00574-x>

How memorial projects achieve success?

Symbolism

8

9



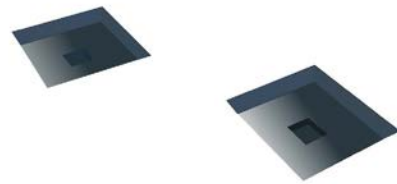
Memorial to the Murdered Jews of Europe, Berlin

11

12



Source: <https://freepalikhbar.com/holocaust-memorials-in-germany/>



9/11 Memorial, New York

Source: John MacDougall <https://wach.com/news/nation-world/world-remembers-holocaust-as-antisemitism-rises-in-pandemic>



13

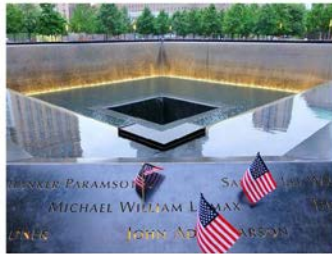
14



Source: 9/11 Memorial & Museum <https://twitter.com/sept11memorial/status/1120415722994323461>



93 Flight Memorial, Pennsylvania



Source: BEN HIDER <https://www.911memorial.org/20th-anniversary>

15

16



Source: Paul Murdoch Architects <https://www.paulmurdocharchitects.com/flight-93-national-memorial>

17

Memorial Space



Sad Atmosphere



Source: Paul Murdoch Architects <https://www.paulmurdocharchitects.com/flight-93-national-memorial>

18

Is it possible for a memorial area to be a cheerful place?



Diana Fountain

19

20



Source: Jason Hawkes <https://www.archdaily.com/803509/diana-princess-of-wales-memorial-fountain-gustafson-porter-plus-bowman>

03

SITE ANALYSIS

Source: Hélène Binet <https://landezine.com/diana-princess-of-wales-memorial-fountain-by-gustafson-porter-landscape-architecture/>



21

23

SITE LOCATION



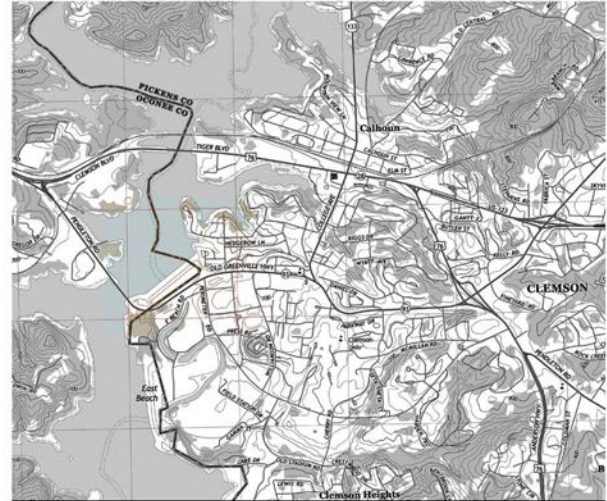
Campus Scale



Dike Scale

24

SITE SELECTION



The reason to choose dike as the site is because the space is the only open space near the campus.

25

SITE ANALYSIS

Clemson Dike

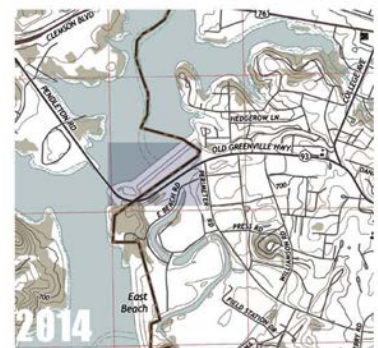
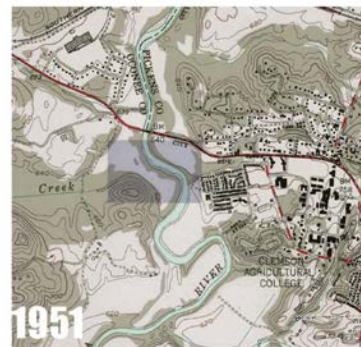
* The Hartwell Dam and Reservoir was constructed in the late 1950s and early 1960s by the Army Corps of Engineers as part of the Savannah River Project. The original purpose for the dam was to mitigate flooding along the Savannah River and to generate hydroelectric power.* (Spitler, N. 2021)



Source: Clemson Special Collections and Archives

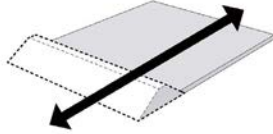
26

SITE ANALYSIS

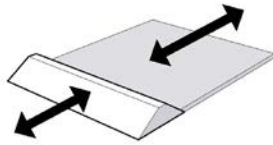


27

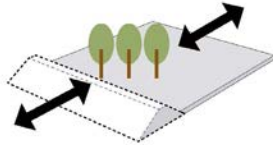
SITE ANALYSIS



The Dike
Function as a dam since 1956



The Dike
Physical protection for Clemson Area



The Memorial
Mental Defense for Clemson Area

Historically, the Dike cut off the Seneca river, preventing flood issues. It functions as physical protection to Clemson Areas. The Memorial Project would be mental protection for the Clemson Area.

28

SKETCHES



Sketch by Xiao Xu



Sketch by Xiao Xu

29

SKETCHES



Sketch by Xiao Xu

The three sketches show characteristics of the site: the lakeside scenery, the different slope on the landside area, and the surrounding vegetation.

30

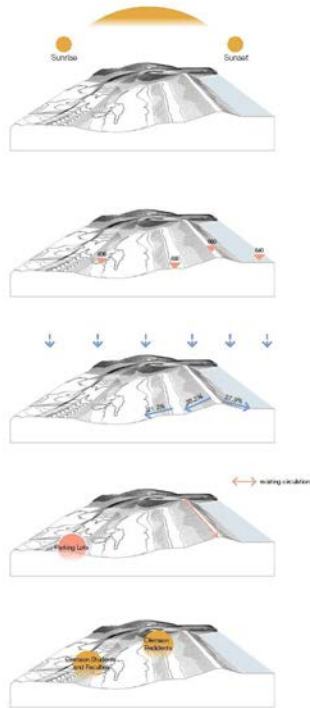
SITE ANALYSIS



Photo by Xiao Xu

31

SITE ANALYSIS



32



Photo by Xiao Xu

33

SWOT ANALYSIS

S	Strength: • Sunset and lakeside scenery. • Existing nature resources appeal wildlife	
W	Weakness: • Insufficient accessibility in the site • Weak connectivity between the site and surrounding areas	
O	Opportunity: • Potential activities could attract more people	
T	Threat: • human activities's damage to the environment • high frequency of the traffic accident around the site	

Photo by Xiao Xu

34

DESIGN STRATEGY

Economic Strategy
Build up a space to provide to donate trees to commemoration

Ecological Strategy
Provide a space to enrich local biodiversity

Social Strategy
Have several events to encourage human go outside

35



VARIANT

noun

a form or version of something that differs in some respect from other forms of the same thing or from a standard.



37

38

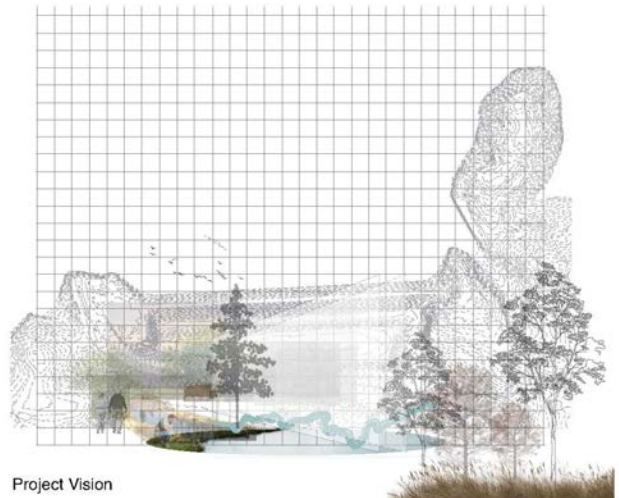
CONCEPT

VARIANT LANDSCAPE



Symbolism

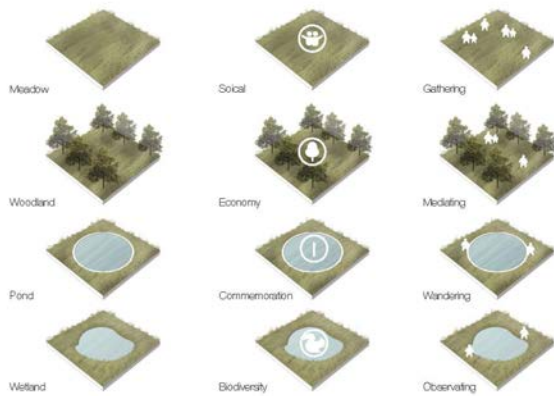
- I want to use the design to solve the existing issues over the site. to provide the residents, students, faculties a memorial space to in memory of the impact of the covid-19 to daily life. Use these abstract interpretation to remark the loss of normal life encourage public health measures that can prevent more deaths in the future.



- Project Vision

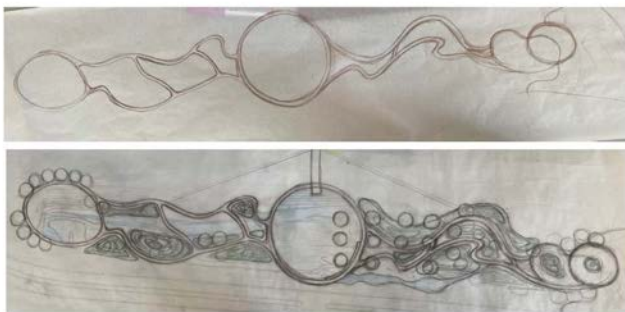
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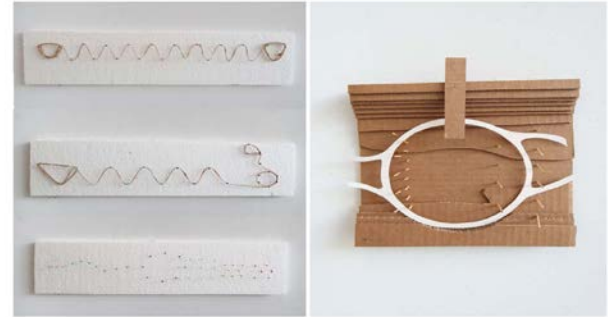
41

DRAFT PROCESS



43

CONCEPTUAL MODEL



The variant virus inspired conceptual models with biological meaning. Each specific virus has its regular natural sequence. The circulation changed and followed the pinpoints from regular to irregular and formed a particular sequence eventually. Different color pinpoints represent diversified pace and human experience in each space.

42

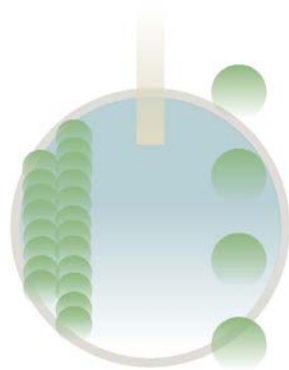
05

Design Delivery

45

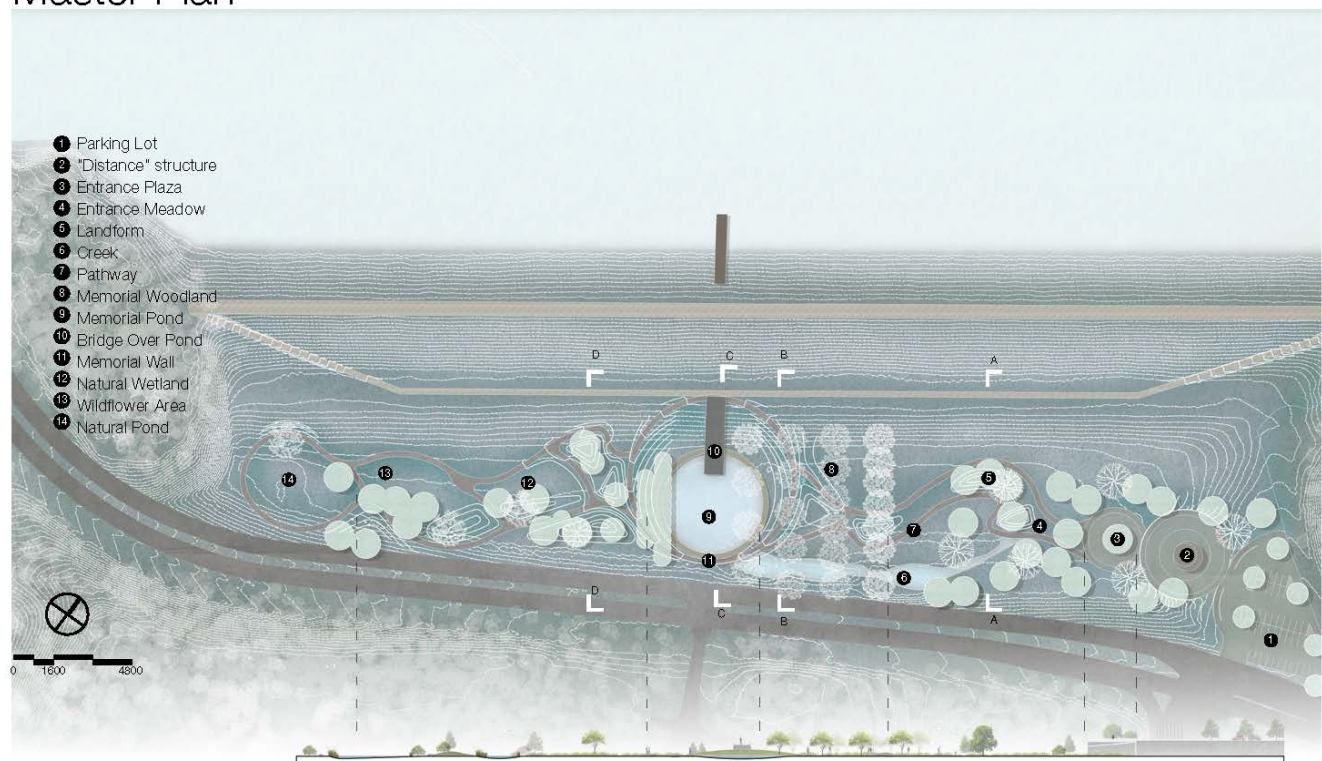
The reason to choose the site is that it is the only open space near the Clemson campus. Historically, the Dike cut off the Seneca river, preventing flood issues. It functions as physical protection to Clemson Areas. The Memorial Project would be mental protection for the Clemson Area.

The project's goal is to provide the Clemson community with a memorial space in memory of the impact of the covid-19 on daily life. Using these abstract interpretations to remark on the loss of everyday life encourages public health measures in the future.



46

Master Plan



This project expects to help the residents, students, and faculties recognize, accept and celebrate the changes in daily life we have experienced before and after the pandemic. The ongoing pandemic still impacts human life. I want humans to recognize and accept the vulnerability of life and the panic feeling of related activities (gathering, going to the hospital, etc). This design will provide humans a space to remember the loss of ordinary life and release stress from the panic feelings.

Transformation of the definition of variant, which connects to the virus, also states the diversity. The variant landscape represents several types of landscapes: meadow, woodland, pond, and wetland. Combined with social, economic, and ecological strategies, the built project would encourage humans to have more engaged activities over the site.

Over the entrance area, the design improves parking lots' current issues of parking lots, making circulation more feasible.

The distance structure uses steel tubes to show the different distances of 6', 12', and 24' to remind humans of the social space during the pandemic.

The memorial meadow will provide an open space for artistic and mediating events.

The woodland area will allow people to donate trees in memory of their families and friends. The donation will function as the funding to support and maintain the project. The gradual distances between trees represent the social distance we had during the pandemic.

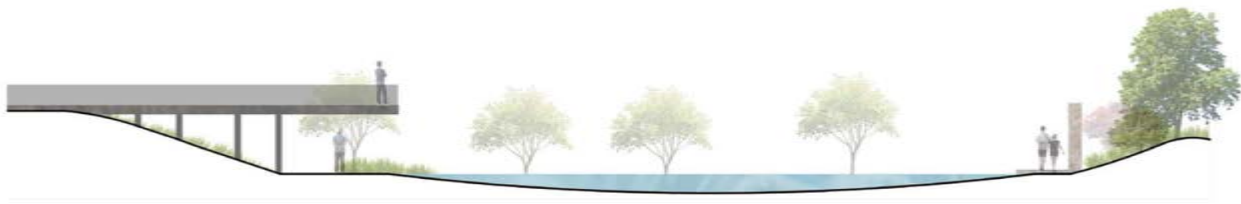
Section



A-A Section-Meadow



B-B Section-Woodland



C-C Section-Pond



D-D Section-Wetland



Wetland Area Perspective



Overview Perspective



Memorial Wall and Memorial Pond Perspective

The central area is the majority of the whole project. It includes the Memorial Wall, Memorial Pond, and the overlook bridge over the pond.

The Memorial wall will show three phases to help humans improve mental health. The "Recognize" phase will show the timeline of significant events during the cold-19, like the last day required to wear masks on campus. The "Accept" phase will show what is ongoing at the current time. The "celebrate" phase will have some events like Sky Laterns to commemorate.

The Wetland area has more moisture and existing creek and wetlands. Also, the design separates different types of wetlands to show various types of ecosystems.

53



Memorial Plaza with Fountain Structure



Memorial Wall and Pond Perspective with Overlook Point

54

06

REFERENCE

REFERENCE

1. Lauzon, R. C. (2019). Memorial space and its mnemonic function. *Memory Studies*, 175069801988872-. <https://doi.org/10.1177/1750698019888723>
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7. Herbert, El Bolock, A., & Abdennadher, S. (2021). How do you feel during the COVID-19 pandemic? A survey using psychological and linguistic self-report measures, and machine learning to investigate mental health, subjective experience, personality, and behaviour during the COVID-19 pandemic among university students. *BMC Psychology*, 9(1), 1–90. <https://doi.org/10.1186/s40359-021-00574-x>

55

56

Public Urban Farms

rethinking the role of parks to reflect the needs of urban populations

Terminal Project and Research Defense

Mary Carole Bourey

Clemson University
Candidate for Masters in Landscape Architecture

“There deserves to be a place in the middle of a very large,
dense, urban sprawl where you can take family, take friends,
take yourself to go see, taste and experience agriculture.”

-Aric Mei, founder and owner of Los Olivos Farm Park (Phoenix, Arizona)

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ABSTRACT

Urban agriculture that is zoned and woven into the fabric of cities and municipalities has the strength to transform communities and local food systems. Currently very few cities have policies and regulations that support or even allow farming. Based on the positive benefits economically, socially, and environmentally in current literature this project applies urban farming to Greenville in an area that is underserved. Regulations and policies must be set in place for this to occur. Modeling the framework from case studies the proposed designs follow the guidelines for existing urban agriculture systems.

PROBLEM STATEMENT

Urban agriculture is not incorporated into the zoning in Greenville. Without public farm spaces many underserved communities will not have access to local healthy produce and will not have the opportunity to see and learn about the natural cycle of food and food systems. To effectively include underserved communities urban agriculture needs to be zoned and protected in public spaces.

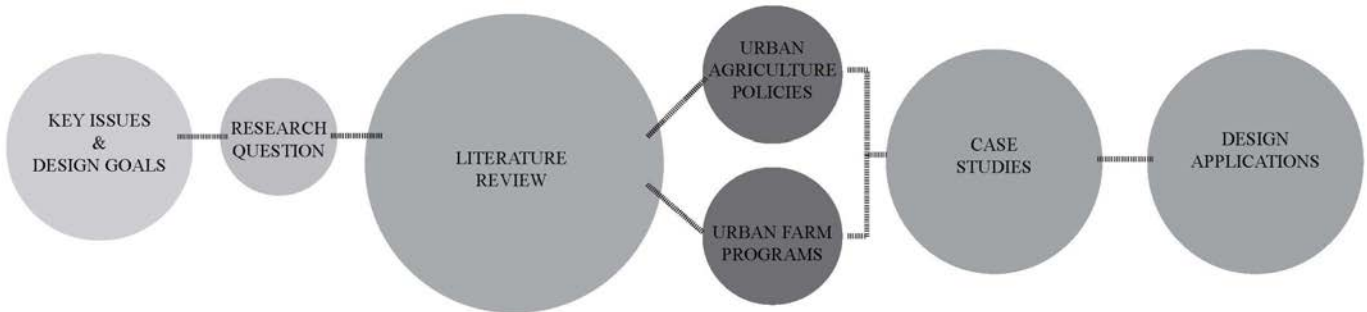
DESIGN GOALS

What: Design an urban farm park that serves as an incubator and resource center for urban agriculture practitioners, youth education and work development.
The site design targets functionality for farmers and educational programming for youth while serving the general public as a park space.

RESEARCH QUESTIONS

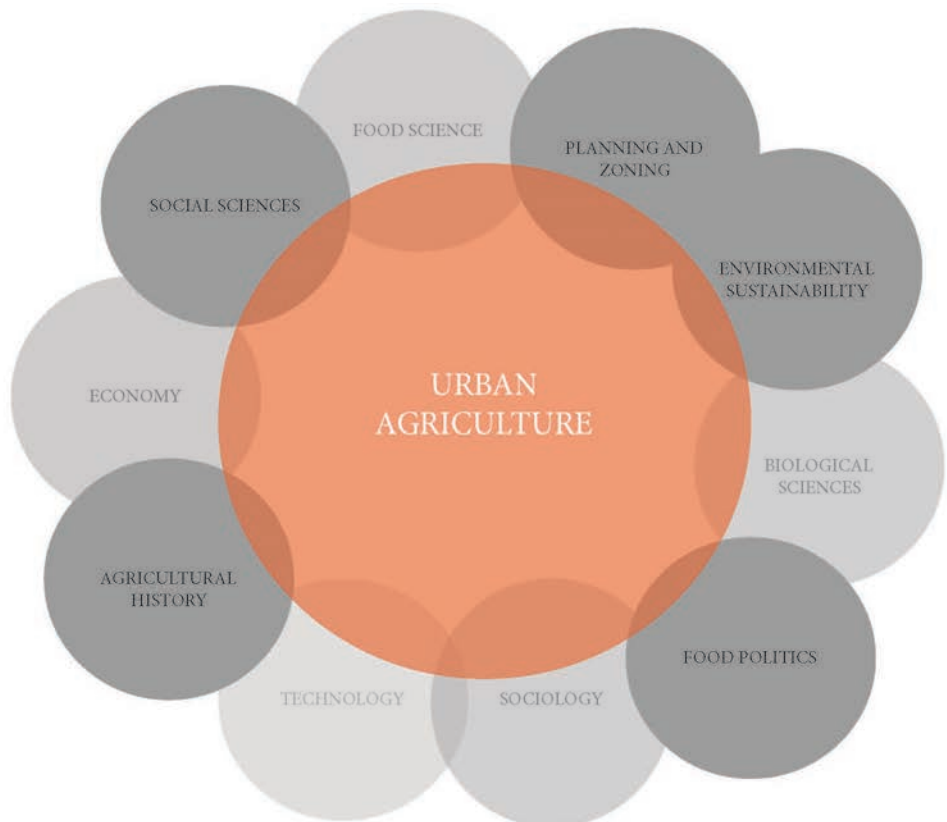
What is involved in making urban agriculture public and in central places in cities?
How should these sites be designed?
What programming is most effective in engaging the community?

METHODOLOGY



LITERATURE REVIEW Overlapping Research Areas

This is to show a mental process that I have had during my research. As I was picking my way blindly through the topic of agriculture I was mainly sifting through landscape architecture journals and google. What was sending me in circles is that agriculture is essentially a spaghetti bowl. Everytime I thought I found the MAIN reason behind them I wound up down rabbit trails such as millenial generational stereotypes, biodynamic farming techniques, climate change strategies, or policy controlling food system management. In the end I see that it is not a landscape architecture topic, rather it is a combination of multiple topics which as a landscape architect I must be aware in order to design an urban farm well. In this graphic I shaded darker the topics that cross my research trail the most and that I will be focusing on in my literature review.

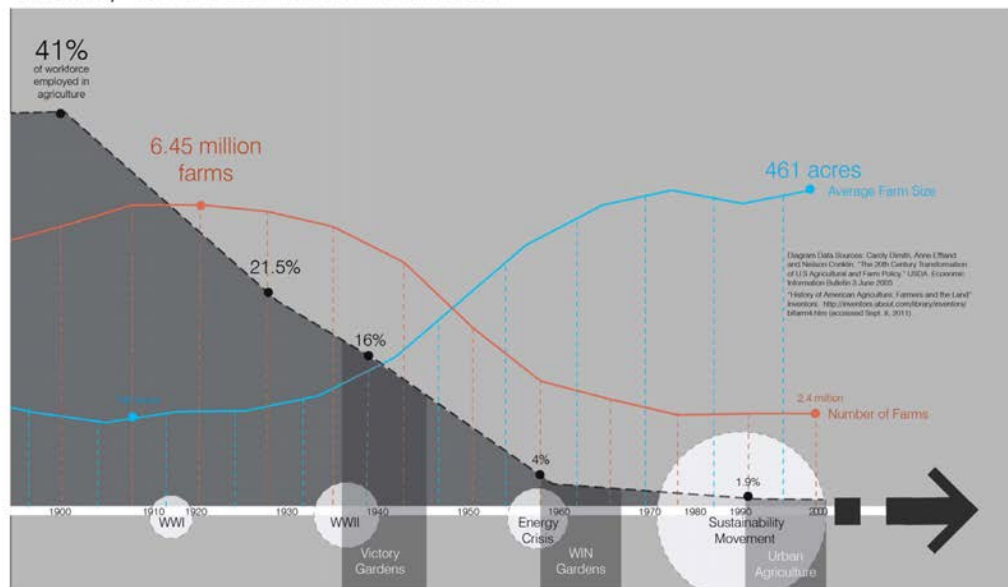


LITERATURE REVIEW

Background



Historically farming and agricultural knowledge was mostly common knowledge known by most classes on some level. The direct and constant relationship with the ground, produce, and animal husbandry inherently generated respect and valuation of the food system. Over the past 100 years the change in agriculture production has removed human interaction with food. The invisible food chain remove the context by which we are able to understand and value our food.



John Hopkins Bloomberg School of Public Health. (2016, August 05). Industrialization of Agriculture. Retrieved March 25, 2020, from <http://www.foodsystemprimer.org/food-production/industrialization-of-agriculture/>

LITERATURE REVIEW

Agriculture and Related Issues



- Within 12 years, 1964 and 1976, synthetic and mineral fertilizer applications in U.S. doubled while pesticide use increased 143%.
- By the 1960s, supermarkets were selling 70 percent of the nation's groceries, irrevocably altering not only the way Americans bought food but the very way they lived.



- A 2016 study found that nearly 60% of the calories consumed in the modern, American diet come from processed foods. Ultra processed foods contribute nearly 90% of all added sugars consumed in the U.S. diet.

Left: John Hopkins Bloomberg School of Public Health. (2016, August 05). Industrialization of Agriculture.)

Right: The Rise Of The Supermarket. (2020, March 01).

Right: Steele, E. M., Baraldi, L. O., Louzada, M. L., Moubarac, J., Mozaffarian, D., & Monteiro, C. A. (2016). Ultra-processed foods and added sugars in the US diet: Evidence from a nationally representative cross-sectional study. *BMJ Open*, 6(3), doi:10.1136/bmjopen-2015-009892

LITERATURE REVIEW

Agriculture and Related Issues



- Based on their results, the authors forecast a bleak farming future: no operators younger than 35 by 2033 and an average age of 60 by 2050
- Even if their children and grandchildren show an interest in agriculture, farmers often cannot afford to keep their land and equipment. They conclude that the loss of farmers, ranchers and their land is accompanied by the loss of local wisdom. "Agricultural wisdom, often built over generations, is irreplaceable once lost. ..."



- In 2010 in the United States, food waste is estimated at between 30% - 40% of the food supply.

Left: Glick, H. B., Bettigole, C., Routh, D., Seegmiller, L., Kuhn, C., Khadka, A., & Oliver, C. D. (2014). Wyoming's Aging Agricultural Landscape: Demographic Trends Among Farm and Ranch Operators, 1920-2007. *Rangelands Journal*

Right: Food Waste USADA. (n.d.). Retrieved from <https://www.usda.gov/foodwaste/faqs>

LITERATURE REVIEW

Agriculture and Related Issues



- We live in cities that do not zone for agriculture nor recognize farming as a formal land use.
- 35% of people do not own home.
- 84% of the population in the US live within urban centers. 89% by 2050.



- Multi family housing does not provide farming space.
- Affordable housing and lower income families do not have access to public garden or farming ventures.

Left: <http://eyeonhousing.org/2019/10/homeownership-rate-bounces-back/>

Right: Horst, M., Medintok, N., & Hoey, L. (2017). The Intersection of Planning, Urban Agriculture, and Food Justice: A Review of the Literature. *Journal of the American Planning Association*.

LITERATURE REVIEW

Agriculture and Related Issues



- Few people have time to farm or maintain gardens, especially not the economically vulnerable who work multiple jobs.
- Despite this there has been a 29% increase in homegardens between 2008-2013.



Left: [https://www.prnewswire.com/news-releases/food-gardening-in-the-us-at-the-highest-levels-in-more-than-a-decade-according-to-new-report-by-the-national-gardening-](https://www.prnewswire.com/news-releases/food-gardening-in-the-us-at-the-highest-levels-in-more-than-a-decade-according-to-new-report-by-the-national-gardening-association)

Right: Horst, M., McClintock, N., & Hoey, L. (2017). The Intersection of Planning, Urban Agriculture, and Food Justice: A Review of the Literature. Journal of the American Planning Association.

- 200% increase in community gardens in that same 5 years.
- However research shows that the benefits of urban agriculture are benefiting middle class economics and is not reaching into lower income equally. This is because of the location of the gardens and the costs involved in being involved in the scene.

LITERATURE REVIEW

Agriculture and Related Issues



- There was a 36% increase in farmers markets between 1994-2003. This reflects the markets interest in local organic produce.
- Surveys showed that managers felt more organic farmers were needed to meet consumer demand in many States.



Left: <https://www.ers.usda.gov/topics/natural-resources-environment/organic-agriculture/organic-market-overview/>

Right: Horst, M., McClintock, N., & Hoey, L. (2017). The Intersection of Planning, Urban Agriculture, and Food Justice: A Review of the Literature. Journal of the American Planning Association.

- There is overall concern that urban agriculture is turning into a white space. There is acknowledgement there research has gaps showing the demographics involved in UA across the nation. However, current research shows that there is a movement culturally for whites to be in leadership and most involved in UA. This ties back into zoning and policies allowing public agriculture in centers that are not privately funded sites.

LITERATURE REVIEW

Agriculture and Related Issues



- 44% of people are willing to pay 20% more for organic foods.
- Consumers prefer organically produced food because of their concerns regarding health, the environment, and animal welfare, and they show a willingness to pay the price premiums established in the marketplace.



- 17% of people live in food deserts according to USDA data.
- Assuming that healthy food is affordable and is not the root issue causing low income populations from consuming more organic produce what then is the reason there are not more grocery stores in food deserts?
- There is an underlying gap in knowledge and education that prevents all levels of society from eating more local healthy organic produce.

Left USDA Organic Market Overview. (2019, October 09).

Right: https://www.huffpost.com/entry/true-costs-of-so-called-cheap-food_b_4337423

LITERATURE REVIEW

Sustainable Developments and Climate Change



An artist's rendering of the community you dev planned for the Blatchford Redevelopment Project @ City of Edmonton, Canada.

- Urban agriculture is linked to sustainable and environmentally progressive development.
- Municipalities are now more involved in UA as it contributes to resource recycling and conservation, therapy and recreation, education and safe food provision, green architecture, open space management, social inclusion, and public health.



Left Mendes, W., Balmer, K., Kaethler, T., & Rhoads, A. (2008). Using Land Inventories to Plan for Urban Agriculture: Experiences From Portland and Vancouver. Journal of the American Planning Association.

Right: Kirshenbaum, S., & Buhler, D. (2018, March). "Americans are confused about food and unsure where to turn for answers, study shows." Cornell's Alliance for Science

- The United Nations currently projects that the world's population will rise from 7.5 billion today to 9.7 billion people by 2050. If food production fails to keep pace with anticipated growth, billions of people will go hungry. The biggest 21st-century agricultural challenge we face will be to produce more grains, fruits and vegetables on less land with fewer resources in the face of climate change.

LITERATURE REVIEW

Urban Ag Regulations and Policy

Planning research conclusions:

- Conduct comprehensive land inventory- make public
- Eliminate regulatory vacuums at local and state levels
- Legitimize and formalize urban agriculture as its own land use
- Use land banks, transferable rights, conservation easements, right of ways for tenure
- Inclusive decision making and community engagement
- Public Private partnerships
- Incentivize UA as a condition of approval for affordable and multifamily housing
- Prioritize UA in neighborhood and comprehensive city plans
- Offer meaningful participation for food justice organizations
- Relax taxes, fees, utility on UA
- Deliberately create and protect sites next to disadvantaged communities, parks, senior centers, and other public right of ways

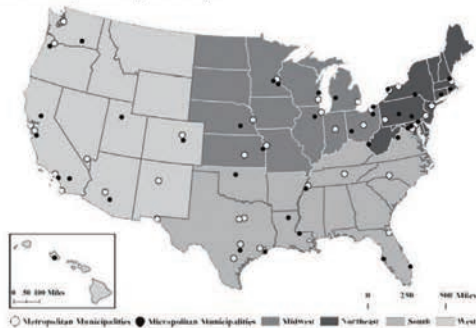


Figure 1. Locations of metropolitan and micropolitan municipalities studied (N = 80).

Gaps/needs in existing research:

- Complete typology list of regulatory possibilities
- What are the actual economic values of urban agriculture?
- No national cross sectional study showing how UA production is regulated, thus difficult to compare regulatory regimes and approaches without mixing in local norms and cultures.
- Need to test regulatory innovations across municipalities and regions
- Planners need to be more proactive in this arena as there are no direct authorities implementing UA



Meenar, M., Morales, A., & Bonarek, L. (2017). Regulatory Practices of Urban Agriculture: A Connection to Planning and Policy. Journal of the American Planning Association.

LITERATURE REVIEW

Urban Ag Regulations and Policy

This graphic visually represents the hierarchy for the necessary elements involved in implementing urban agriculture within a municipality. These examples and over all structure is based on the research from the work of Meenmar, Mendes, and Horst.

Urb Ag Hub

Urban Farms are dependent on the supportive and provisional engagement of city authorities. Policies and regulations dictate the existence and functionality of Urban Agriculture.

Urb Ag Policies

Supportive policy environment; comprehensive plans including UA; providing funding and resources; zoning for UA; removing barriers; incentives and promote UA reducing utility fees and taxes; access to land; food systems plan; housing authority involvement; consider UA as park and rec space; frequent PPP; cooperation with local groups and movements; establish mechanisms to collaborate with private entities; create database for public use on UA land; create headquarters

Office of Sustainable Development

Office of Sustainability -- Food Policy Council -- Urban Agriculture Commission -- Food Systems Commission
University Engagement -- National Food Programs Involvement -- Local UA Programs

Horst, M., McClintock, N., & Hoey, L. (2017). The Intersection of Planning, Urban Agriculture, and Food Justice: A Review of the Literature. Journal of the American Planning Association.

Meenar, M., Morales, A., & Bonarek, L. (2017). Regulatory Practices of Urban Agriculture: A Connection to Planning and Policy. Journal of the American Planning Association.

Mendes, W., Balmer, K., Kaethler, T., & Rhoads, A. (2008). Using Land Inventories to Plan for Urban Agriculture: Experiences From Portland and Vancouver. Journal of the American Planning Association.

TERMS AND DEFINITIONS

Urban Agriculture Terminology

COMMUNITY GARDENS:

a network of small plots that are supported by urban agriculture policies and regulations that make it possible to grow food within urban areas. Produce is meant for personal consumption not sale.



Philly - Schuylkill River Community Garden



Seattle - P Patch Neighborhood Plots



Baltimore - City Farms

URBAN FARM:

a piece of land used by one person or group to produce revenue by selling what is grown to local CSA, restaurants, food kitchens, markets, etc.



Ontario - Ryerson Urban Farm



Chicago - Chicago City Farm



Detroit - Michigan Urban Farm

LITERATURE REVIEW

Summary of Issues and Challenges

We live in cities, buy our food online.

We are interested in healthy local food because we all know that's better for us and the environment.

You need land, money, knowledge and time to garden.

Many people do not have access to land.

Sustainable planning is the best mechanism for creating the necessary entities to govern and regulate the implementation of urban agriculture.

Overall there is a gap in knowledge about our food origin and food value.

Urban agriculture as it functions currently disproportionately benefits middleclass economics

What needs to change to equally and evenly distribute urban agriculture practice and benefits to make it accessible to everyone without disparity on a regular basis?

RESEARCH METHODOLOGY

CASE STUDIES

Los Olivos Farm Park
MUFI Urban Farm

EXISTING URBAN AGRICULTURE

Michigan Urban Farming Institute is the poster child of all urban farms. In downtown Detroit this urban ag site is well run, highly maintained, very active and very productive. This farm holds the baseline as the ideal realistic urban farm in full glory. Produce is sold in farmers market, it is run by full time staff



PLANNED URBAN AGRICULTURE

A public private partnership privately funded within a budget of \$5.5 million. A urban farm, arts and education center, market and concession proposed for Los Olivos Park. Launched by the city of Phoenix and run by Parks and Recreation and Greenbelt Hospitality (run by an artist and farmer).



RESEARCH METHODOLOGY

CASE STUDIES

Elements for Examination

Throughout the literature that was reviewed there were recurring components that were frequently mentioned by the researchers. The following chart lists the elements involved in the successful creation and function of urban agriculture projects. These serve as a filter to analyze the potential effectiveness of each site.

LOCATION		SUPPORTIVE POLICIES		PROGRAMS AND MISSIONS	
Is it in an optimal place?		What makes it possible?		Who is it for? What does it do?	
LOCATION	TENURE	CITY POLICIES FOR URBAN AGRICULTURE		EDUCATION	PRODUCTION FARM
-Central -Accessible -Public -Surroundings -Types of zoning around -Public transit -Near greensystems -Pedestrian friendly by large population -Affordable housing within 20 min walking on sidewalks -Near affordable housing but not within low income neighborhoods	-City owned -Land trust -Conservation easement -Right of ways -Zoning type -Land bank	-Office of Sustainability -Food Policy Council -Supportive policies and regulations -PPP and collaboration -Conservation and greenway planning large scale		-Facilities -Programming -Networks with schools and city programs -Classes and events -Resource center	-Growing and selling produce -USDA specialty crops -Farming as an activity beyond scale of individual garden bed
					RECREATION
					-Open recreation space -Open to the public all the time as a park -Playground -Recreational sports adjacent -Lawn areas -Concessions -Food and beverage

RESEARCH METHODOLOGY

CASE STUDIES

Los Olivos Farm Park
Phoenix Arizona

"The most important crop for urban farms is the lessons they share with their volunteers, customers, and visitors. There's hardly a farm or garden profiled in these books that doesn't boast some kind of educational component—whether for schoolchildren, homelesspeople, or recent immigrants."

Jason Mark, Gastronomica Journal of Food and Culture

A 4-acre park in Phoenix to be transformed into a farm, education center and park concession designed to enhance the community and reconnect residents with Phoenix's agrarian roots. The Public Private Partnership (PPP) is between the city and the non profit Greenbelt Hospitality. The site is privately funded.



<https://www.azcentral.com/story/entertainment/dining/dominic-armato/2017/12/26/urban-farm-los-olivos-park-phoenix/948769001/>

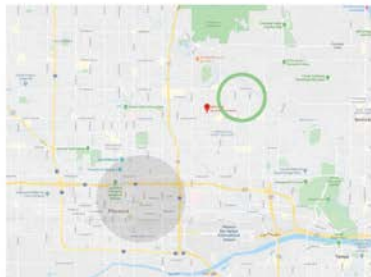


RESEARCH METHODOLOGY

CASE STUDIES

Los Olivos Farm Park
Phoenix Arizona

The duo (Aric and Matt- owners of Greenbelt Hospitality) plan to bring the most modern technology to bear on the Los Olivos farm, which would be walkable and open to the public — an integral part of the park itself. Their hope is that exposing people to a working farm will help foster interest in agriculture, and inspire the community to learn more about where their food comes from.



2 hour walk to the center; 45 minute bus ride



In an existing Parks and Rec 25 acre greenspace



Urban middle class neighborhood with high density housing and some commercial zoning.

RESEARCH METHODOLOGY

CASE STUDIES

Los Olivos Farm Park
Phoenix Arizona

Urb Ag Hub

Urban Farms are dependent on the supportive and provisional engagement of city authorities. Policies and regulations dictate the existence and functionality of Urban Agriculture.



https://www.phoenix.gov/pddsite/Documents/PZ/pdd_pz_pdf_00451.pdf

Urb Ag Policies

Supportive policy environment; comprehensive plans including UA; providing funding and resources; zoning for UA; removing barriers; incentives and promote UA reducing utility fees and taxes; access to land; food systems plan; housing authority involvement; consider UA as park and rec space; frequent PPP; cooperation with local groups and movements; establish mechanisms to collaborate with private entities; create database for public use on UA land; create headquarters

"Residents also want to add another element to our city's landscape – urban farming. Residents see a robust network of community gardens and urban farms activating underutilized properties and resulting in greater access to healthy foods, neighborhood revitalization, reduced pollution and improved opportunity for economic development."

-Comprehensive Plan 2015 Phoenix

Office of Sustainable Development

Office of Sustainability – Food Policy Council – Urban Agriculture Commission – Food Systems Commission
University Engagement – National Food Programs Involvement – Local UA Programs

RESEARCH METHODOLOGY

CASE STUDIES

Los Olivos Farm Park
Phoenix Arizona

Los Olivos Farm is successful because it is the perfect balance of all the elements. To the extent that I have done research there are very few public urban farms that have as a mission to create a recreational area that doubles as a producing and educational farm. The city supports and encourages this kind of development through the partnerships with private sectors and non profits. The great aspect of Los Olivos is that it is designed. Most urban farms operate only on the level of function. This does not usually foster or invite the public to come onto the site and relax or recreate. So the opportunity that Los Olivos has is to explore how to make a functional yet recreational farm site.

Another major factor in this site is that there is a variety of programming. This sets it apart from all production urban farms that again have one activity which is to farm but also narrows the potential users.



LOCATION

Is it in an optimal place?

SUPPORTIVE POLICIES

What makes it possible?

PROGRAMS AND MISSIONS

Who is it for? What does it do?

LOCATION	TENURE	CITY POLICIES FOR URBAN AGRICULTURE	EDUCATION	PRODUCTION FARM	RECREATION
Suburbs; high density housing; higher end residential; public transit nearby; existing park;	City owns land; zoned for R1-6; PPP agreement	Office of Environmental Sustainability Goals; Local Food System Commission	Arts and Education center about farming, agriculture, and cooking	2 acre farm and orchard; small scale working farm	Playground; disc golf; soccer; concession stand "The soil and climate will be in charge of our menu."

RESEARCH METHODOLOGY

CASE STUDIES

MUFI

Detroit, Michigan

A 3-acre 501-C3 non profit in North End of Detroit. Our mission is to use urban agriculture as a platform to promote education, sustainability, and community in an effort to empower urban communities, solve many social problems facing Detroit, and potentially develop a broader model for redevelopment for other urban communities.

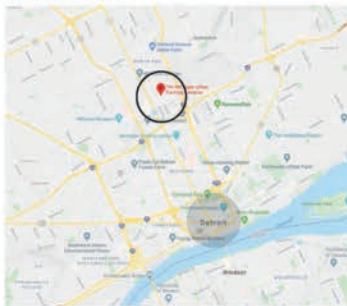


RESEARCH METHODOLOGY

CASE STUDIES

MUFI

Detroit, Michigan



1 hr walk; 25 min tram ride



Developed programming



Heavy industrial area; zoned for low density housing; lower income neighborhood



Building is being added on to for expansion of programming.



RESEARCH METHODOLOGY
CASE STUDIES
MUFI
Detroit, Michigan

Urb Ag Hub

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2018 Master Plan Policies Detroit

Issues: There is an abundance of vacant land in the city for which there is no specific plan for housing, commercial or industrial redevelopment. Community gardens and urban agriculture are productive, health-promoting, and community-building activities as both transitional and permanent land uses.

GOAL 5: Support and promote the reuse of vacant land for community and school gardens and urban agriculture.

Policy 5.1: Work with urban agriculture organizations and non-profits to develop an urban agriculture policy plan for the City.

Policy 5.2: Explore the possibilities of developing urban agri-business and agri-tourism.

Policy 5.3: Strengthen programs that promote use of vacant land for urban agriculture.

Policy 5.4: Support the use of school gardens as a hands-on teaching and community-building tool.

<https://detroitmi.gov/sites/detroitmi.localhost/files/2018-05/Master%20Plan%20Text.pdf>

RESEARCH METHODOLOGY
CASE STUDIES
MUFI
Detroit, Michigan

MUFI has a specific mission that they are targeting in all their programs. The funds are limited as they function as a non profit but with the help of city regulations they are gaining more space and attention. This site was chosen as a case study because it shows that urban farms can be highly productive, non profit, educational, and a community center. The location and recreation aspect of this site fall short of ideal. There are no recreational aspects to the site and is not located near any public green spaces. It is privately owned one hour walk from the city center. Despite the fallbacks this site is thriving and fully functional farm and community center. This shows me that there is lost opportunity and potential because of the lack of recreation/foot traffic and the overall location.



LOCATION

Is it in an optimal place?

LOCATION

Industrial suburbs; low density housing; lower residential values; public transit nearby;

Could be more central; accused of green gentrification; better near park system

SUPPORTIVE POLICIES

What makes it possible?

TENURE

Private land is allowed to be used for community gardens and urban farms; city might donate resources in some cases

Privately owned by non profit-risk of change;

CITY POLICIES FOR URBAN AGRICULTURE

Set guidelines and outlined procedures for urban farmers; city history of farming in face of diversity-identity factor; very active Urban Farming associations

Unknown extent of local policies

PROGRAMS AND MISSIONS

Who is it for? What does it do?

EDUCATION

Childrens sensory garden; adaptive reuse of the built environment; green and blue infrastructure innovation; sustainable agriculture techniques

Not extensive outreach to schools; needs more facilities

PRODUCTION FARM

3 acre farm and orchard

RECREATION

1 building to host meetings

No recreation involved

Recreation

Farming and Food systems

Education

SOUTH CAROLINA, GREENVILLE : WEST SIDE



DESIGN APPLICATION

Greenvilles Urb Ag Policies

Research shows that food systems and urban agriculture is usually nested under or associated with sustainability and environmental protection at the municipal level. Moving forward into design of a site in Greenville first requires a look into the existing policy climate and attitude concerning urban agriculture. Correlation methods were used to compare what information was available via:

- City of Greenville Website
- City Ordinances
- Masterplan and Comprehensive plans

These are the same sources used to conclude on policies and attitudes for the case studies. This comparison revealed there was little and inconsistent use of urban agriculture in plans and policies for the West Side.

Urb Ag Hub

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Urb Ag Policies

Supportive policy environment, comprehensive plans including UA; providing funding and resources; zoning for UA; removing barriers; incentives and promote UA reducing utility fees and taxes; access to land; food systems plan; housing authority involvement; consider UA as park and rec space; frequent PPP; cooperation with local groups and movements; establish mechanisms to collaborate with private entities; create database for public use on UA land; create headquarters

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Sustainability topics are found under Parks and Rec and mainly focus on water quality and green energy.



Home - Departments - Parks and Recreation - Get Involved - Sustainability

SUSTAINABILITY

Sustainability is the process of addressing environmental responsibility, economic development, and social equity in a manner that balances existing demands for products and services with the need to protect and enhance the community's environmental resources. "Sustainable" is an adjective describing those practices that encompass sustainability in their implementation. Sustainable strategies satisfy the current needs of the local community while acknowledging and considering how actions impact future generations and global concerns.



A GREENER GREENVILLE

In 2011, City Council established the Green Ribbon Advisory Committee to advise City Council and City staff on the development of programs and initiatives, including the development of a Sustainability and Climate Action Plan, to reduce the City's environmental impact and distinguish Greenville as a leader in sustainability efforts.

The Green Ribbon Advisory Committee also features the following ad-hoc subcommittees: Energy & Buildings, Mobility, Natural Systems, and Recycling & Waste Management. Read more about their goals, strategies, and tasks (PDF).



EV CHARGING STATIONS

To encourage and support the use of low-emission vehicles, the City has installed electric vehicle charging stations in many of its parking facilities. While there is no cost to use the chargers (beyond the regular garage rates), there is a four-hour limit per day.

DESIGN APPLICATION

Greenvilles Urb Ag Policies

EXPANDED MARKET AND ECONOMIC DEVELOPMENT ANALYSIS

WEST SIDE GREENVILLE

GREENVILLE, SOUTH CAROLINA

APRIL 2014

PREPARED BY

Robert M. Lewis, AICP, CEC
Yash Yedavalli
Claire Lucas



<https://www.greenvillesc.gov/DocumentCenter/View/4260/Expanded-Market-Analysis-Report-PDF?bidId=>

"ANOTHER partial solution can be creation of urban farms, community gardens, and farmers markets in or very near the West Side. At some times of the year, therefore, West Side residents could have more convenient access to fresh, locally grown food choices. This is an excellent idea and a productive use of otherwise under-used land in the West Side, though continued growth for housing and commercial purposes may one day eliminate some community gardens."

West Side Greenville Market and Economic Development 2014



The City of Greenville's Comprehensive Plan 2009



Preserve the Past, Plan for the Future, Put Greenville First!

<https://www.greenvillesc.gov/DocumentCenter/View/289/Plan-It-Greenville-Comprehensive-Plan-PDF?bidId=>

Community gardens seen as "short term potential" for neighborhood and corridor identity stability. No mention of urban agriculture or urban farming.

Greenville's Comprehensive Plan 2009

DESIGN APPLICATION

Greenvilles Urb Ag Policies

Key excerpts from the Comprehensive Plan mention urban agriculture, gardens, food, community centers, all in relation to the Swamp Rabbit Trail as being a valid mechanisms for revitalizing the West Side.

GREENVILLE WEST SIDE COMPREHENSIVE PLAN



<https://www.greenville.org/DocumentCenter/View/305/West-End-Comprehensive-Plan-PDF?bidId=>

"The Swamp Rabbit Trail would invigorate this spine as a connective tissue of **urban farms, gardens, and parks book-ended by community institutions**. Urban community hubs would dot the West Side corridor loop, serving, employing, and housing residents. The loop's interior would support safe and attractive residential neighborhoods anchored by **vibrant community institutions**."

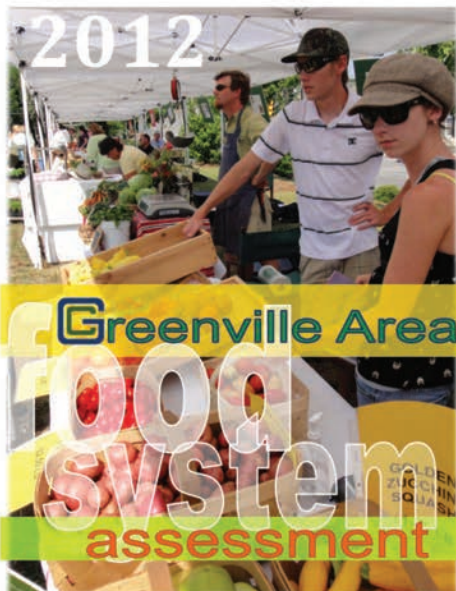
A key component is the development of an **urban agriculture and education center** (§6.3.1) to provide a mechanism for existing organizations already working to spread healthy food growing skills to collaborate for greater impact.

Recommendations include ways to **bring neighbors together around food**, such as through healthy church suppers, backyard **garden swaps**, and **cooking classes**.

Building on the work of Gardening for Good—a community garden program for all of Greenville County run by Greenville Forward—this plan proposes **using existing facilities to centralize food growing and education in the West Side**. With this program already in place, and several local community gardens already established, the community could focus on activating resident participation. **Developing a centralized location for an urban farm with teaching facilities would help to jump-start Gardening for Good's efforts in the West Side.**

DESIGN APPLICATION

Greenvilles Urb Ag Policies



https://www.greenvillecounty.org/gcpc/long_range_planning/pdf/food_system_assessment.pdf

Involved stakeholders and organizations in local food system at 4 scales:

Statewide - Carolina Farm Stewardship Association - Clemson Institute of Economic and Community Development, CIED - Clemson Extension - SC Department of Agriculture - SC Department of Commerce - Department of Health and Environmental Control - Lowcountry Local First - Grow Food Carolina	
Upstate Region - Furman University - Appalachian Regional Commission - Appalachian Council of Governments - Edible Upcountry - Clemson University Small Business Development Center, SBDC - Greenville State Farmer's Market - Hub City Farmers' Market - Piedmont Healthcare Foundation	
County - Greenville County Schools - Greenville Forward - LiveWell Greenville - Greenville County Redevelopment Authority - Greater Greenville Sanitation Commission's GreenWaste Program	
City/ Neighborhood - Slow Food Upstate - Gardening for Good (Greenville Forward) - Bon Secours St. Francis Hospital - Greenville Organic Food Organization, GOF - City of Fountain Inn's Farmers Market	



TOP CHALLENGES FOR FOOD SYSTEM

Greenville County 2012

- Land and water cost
- Marketing
- Labor
- Food processing facilities
- Certifications/regulations

DESIGN APPLICATION

Greenville Food System Needs



	LAND/WATER COST	MARKETING	LABOR	FOOD PROCESSING	CERTIFICATIONS
CHALLENGES	- New farmers have little to no access to affordable land near population centers that are of significant sizes. - Farming does not make 'highest and best' land use - Proximity to clients and transportation saving are lost	- time consuming - difficult in beginning years - often depend on word of mouth	- Mostly an issue for large farms - Small farms need labor strategies and partnerships - Labor cost is major issues in local food system - Limited labor availability limits business growth - Missed market share	- Consolidation of processing facilities - Shrinking local processing centers limit scope and number of start ups	- Consumers depend on packing to know foods quality and safety - Labeling regulations do not require showing the originating farm - Expensive to add another step in production costs
EXISTING OPTIONS	- Diversify business plan to include services for nearby residents and high population areas - Intensive farming methods reduce size of lot needed to be effective and still make profit - Target expensive lands in densely populated areas.	- Clemson Small Business offers courses and help for business plans for small farms. - Funding options through Chamber of Commerce - SCDA marketing slogans "Nothing Fresher. Nothing Finer." and "Locally grown. It's to dine for."	- Significant start up costs compiled with labor costs/availability translates to losing market opportunity and imported produce takes over - Ideally local labor is included in local products - Local laborers can afford local products	- Possible to use local certified kitchens to process in off-shift times - Vacant kitchens could be used - Existing infrastructure could be used as an incubator - Home based food production	CSAs and farmers market remove packing needs
OPPORTUNITIES	Provide plots at little to no expense in dense centers for farmers to practice intensive farming and serve the surrounding populations.	Farm Hub/Center/Incubator with Restaurant CSA built in so that time and money spent in marketing is removed from farmer's duties.	- Reduce other start up costs involved in the farm to pay laborers more - Youth development work - Work development training - Partner with non profits to teach new skills	Agricultural kitchen hub for processing by local farmers. This can serve as an educational kitchen for cooking classes both for children and adults	A hub that is certified and maintains labels for the farmers

DESIGN APPLICATION

Site Analysis

Food Desert and Academics

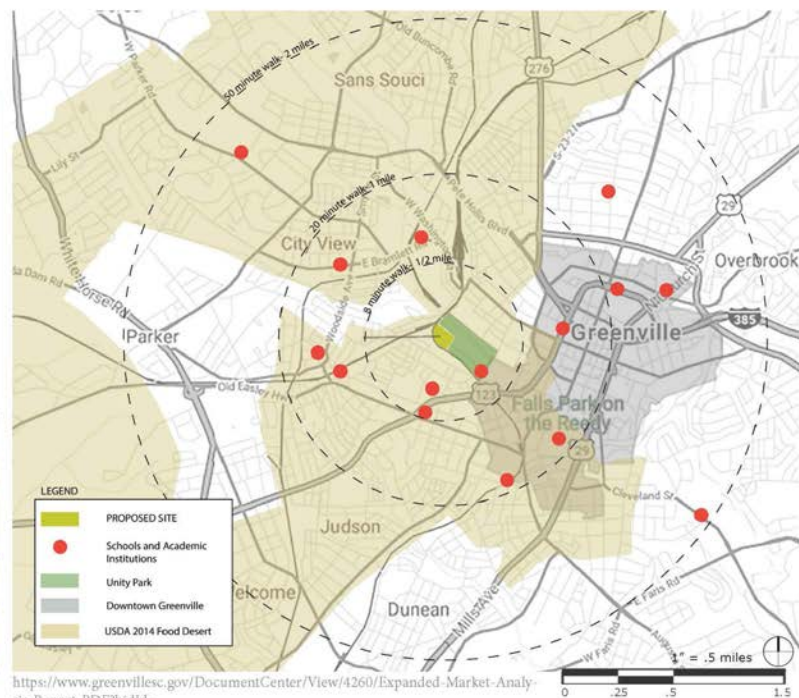
One way to help integrate schools would be to develop larger-scale urban farms that are used by students, their families, and surrounding residents. The educational components could grow out of the schools' existing curriculum, and add more after-school programming for neighborhood children.

Both AJ Whittenburg and Legacy Elementary already have a small community garden that could help to seed the urban farm. This new farm would probably be located in the floodplain, and soil conditions and water management would both need to be studied further to determine the best site.

-Greenville's West Side Comprehensive Plan 2014



A.J. Whittenburg Elementary School Garden



DESIGN APPLICATION

Site Analysis

Food Desert, Groceries, Gardens

There is one grocery store within the West Side project area: the Kash & Karry on Pendleton Street near the West Greenville neighborhood. Discussions with local residents indicate that this store provides a limited inventory, and few healthy food options.

While the Publix remains open, the store is not easily accessible from many parts of the West Side without the use of a personal vehicle.

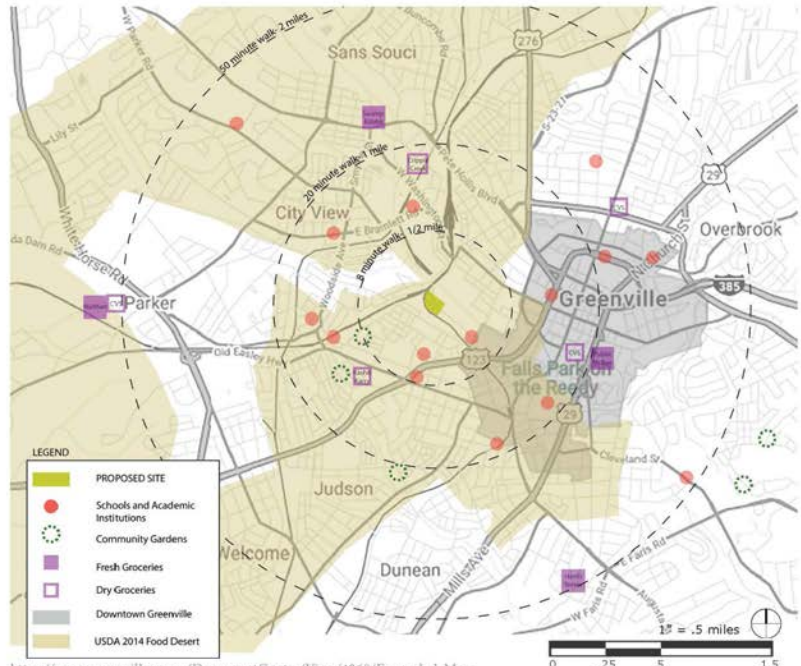
The Swamp Rabbit Café, located on the north end and next to the Swamp Rabbit Trail, offers a selection of organic and local produce. However, the cost of food and physical accessibility to the café is challenging for many West Side residents as well. The West Side is typical of many underserved areas in that the demographics do not make the area attractive to full-service grocery retailers.

Suggestions:

1. Recruiting a for-profit grocery store;
2. Supporting the creation of a nonprofit grocery store; and
3. Developing a local food co-op.
4. Mobile Markets like Good to Go and Mills Village
5. **Develop Urban Farm and Education Center to serve residents**

-Greenville's West Side Comprehensive Plan 2014

<https://www.greenvillesc.gov/DocumentCenter/View/305/West-End-Comprehensive-Plan-PDF?bidId=>



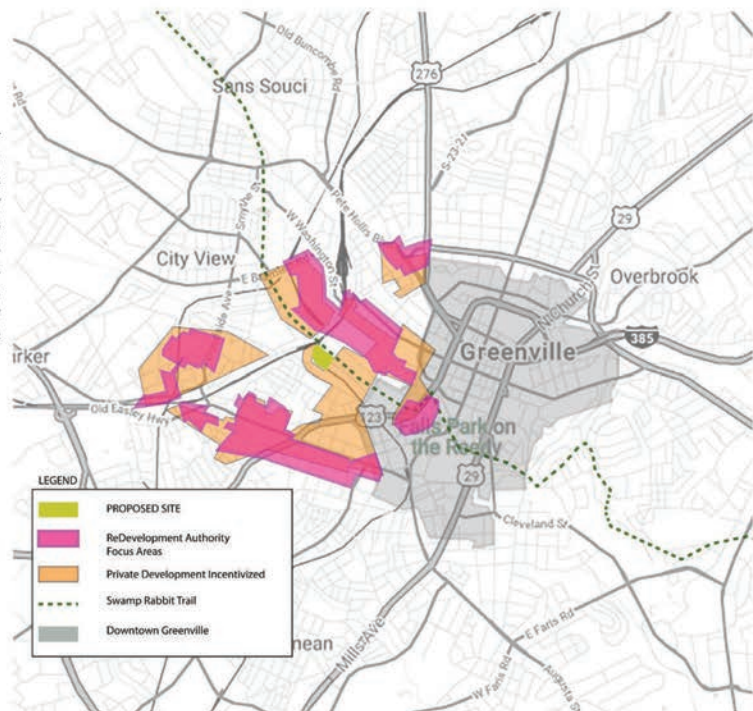
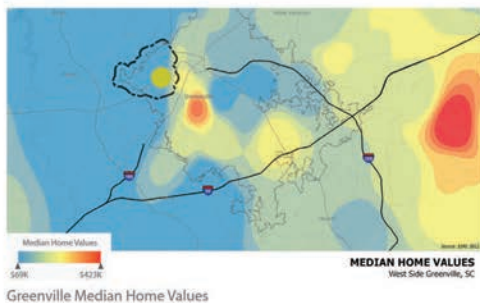
<https://www.greenvillesc.gov/DocumentCenter/View/4260/Expanded-Market-Analysis-Report-PDF?bidId=>

DESIGN APPLICATION

Site Analysis

Economic Development

The site is surrounded by very poor neighborhoods that are under threat of gentrification as the West Side of Greenville booms with development. The city has identified Redevelopment Areas and is incentivizing the market with private money. The West Side is very concentrated with very low incomes and the threat of gentrification is very real as Unity Park goes in. It is important that the city has reserved affordable housing within walking distance of this site. It is an important social aspect of urban farms benefiting the population of a city equally. Too often urban farms take advantage of the affordable land in low income areas and then end up ousting the long term residents as the phenomenon of green gentrification takes over.



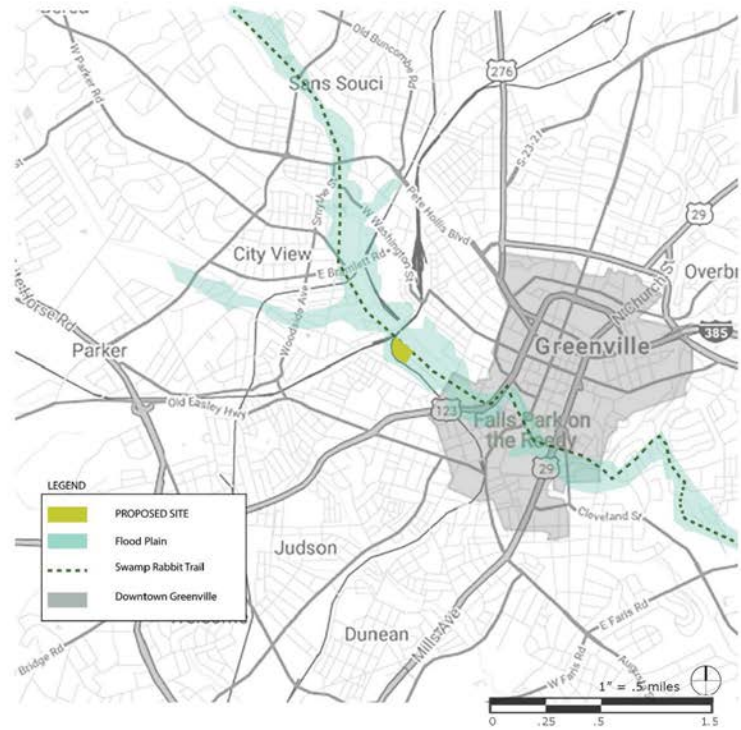
DESIGN APPLICATION

Site Analysis

Flood Ways and Flood Plain

Agriculture is a good use of flood plain land as it requires very little building space and change in topography. The Army Corps does not allow developers to remove or add any land mass within a flood plain. Any cut made to the topography must be balanced by the fill.

Environmentally there are pros and cons to having agriculture in a greenway, riparian, urban, floodway. It can create biodiversity and habitat as long as it is maintained without chemicals. Run off and airquality can become hazards if not maintained and regulated strictly.



DESIGN APPLICATION

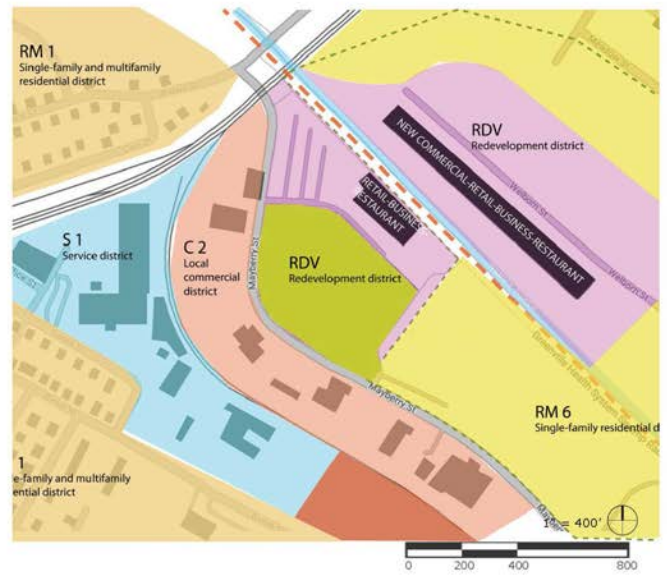
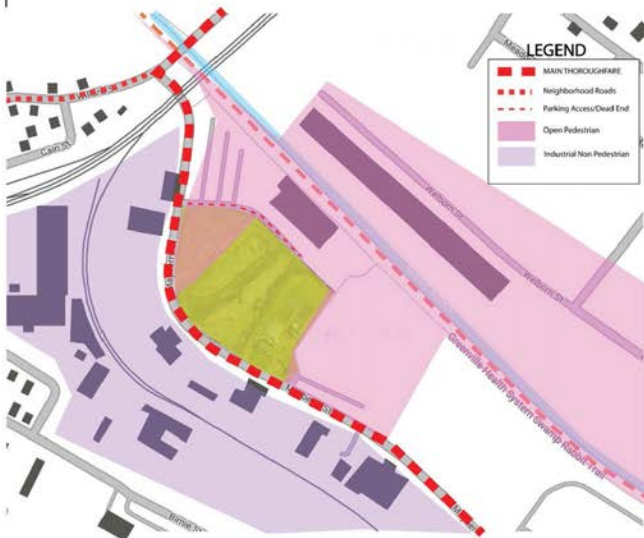
Site Analysis

Site Diagram



DESIGN APPLICATION
Site Analysis
Zoning and Circulation

The site is zoned for redevelopment



DESIGN APPLICATION
Design Process
Site Visit

1



2



DESIGN APPLICATION
Design Process
Site Visit

1



2

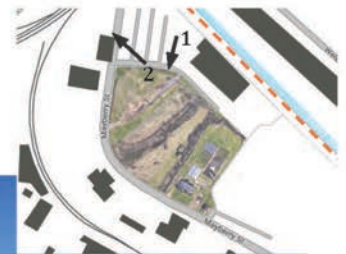


DESIGN APPLICATION
Design Process
Site Visit

1



2

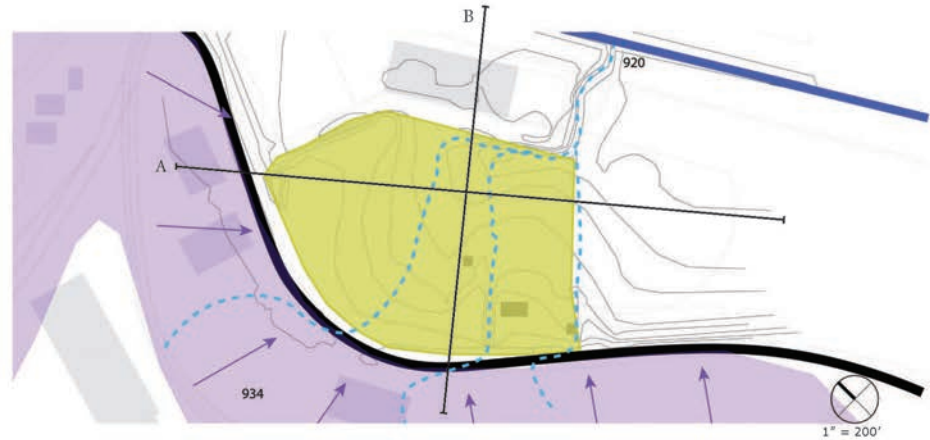


DESIGN APPLICATION

Site Analysis

Existing Topography and Drainage

The purple represents higher ground. There is a 14 ft drop between the purple area down to the Reedy River. The black line represents Mayberry St. The 3 drainage systems going across my site are also seen in the section cuts. This water needs to be addressed in the design of the site as there is a good bit of water traveling across the site right now.



Section A



Section B



DESIGN APPLICATION

Design Process

Proposed Organization Structure

I have talked to many of these organizations to discuss theoretical involvement in a public urban farm for Greenville. The public private aspect of this farm is the distinguishing factor from existing urban farms and is fundamental to the vision. A collective effort for a single purpose will always reach farther and longer than a single entity doing the same.

Project Host also presents successful components that could be replicated. Other possible partners include the Greenville Organic Foods Organization (GOFO), Mill Village Farms, and the St. Francis Agricultural Exchange.

- 2014 Westside Comprehensive Plan



DESIGN APPLICATION
Design Process
Local Farmer Input



Chis Miller

- Background in Environmental Science and Sustainability
- Head farmer at Horseshoe Farm
- Partner with the Anchorage



Rebecca McKinney

- Sustainability Specialist for Bon Secours St. Francis Health System,
- Academic Program Director for Greenville Tech's Sustainable Agriculture Program
- Executive Director of the SC Organization for Organic Living (SCOOL).



Nathan Vannette

- Growing Green Family Farm- Anderson
- Pendleton Street Farm
- Hydroponics experience



DESIGN APPLICATION
Design Process
Horseshoe Farm Visit



Thomas and Chris at HorseShoe Farms- Travelers Rest



Assessing the movements and facilities needed for functional small scale farming.



Washing space can become a bottleneck if it is a shared commodity. Overhead water hose is easy to maneuver. Water needs to be city water for sanitary reasons.



Both refrigerator and room temp storage is needed for different kinds of produce

Needs to be easily accessible. Can be shared.



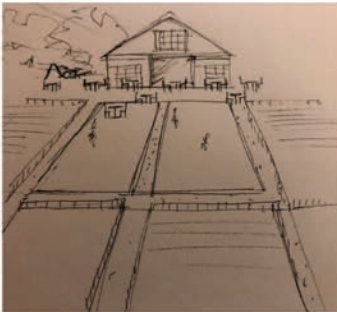
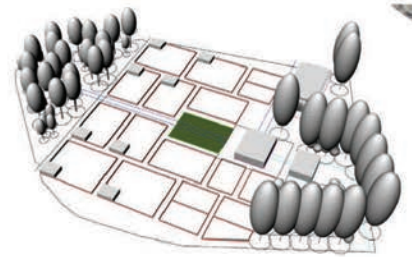
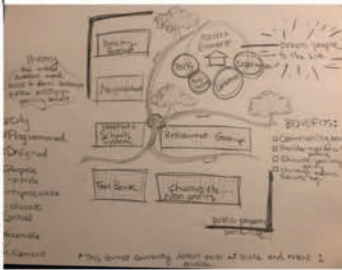
Greenhouse space is important for starting seeds. This can also double as storage if designed well.

Storage, storage, and more storage

DESIGN APPLICATION

Design Process

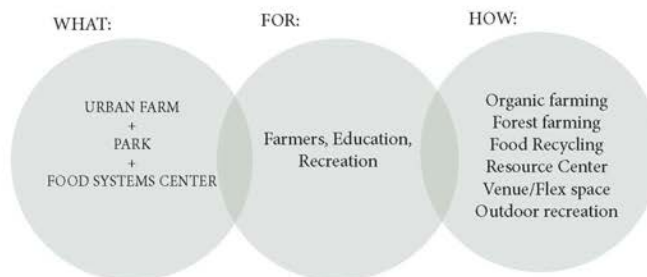
Previous Versions



DESIGN APPLICATION

Design Process

Concepts and Elements



PROGRAM ELEMENTS

Food Forest	Farming Plots	Multi Use Venue/Compost	Resource Center/Kitchen	Recreational Space	Small farm animals/Orchard
educational unconventional produce perennial harvests ecological layers plant communities soils microclimates vermicultures mushrooms	helps food systems production working farmers community organizations educational large/medium/small	venue multiuse open space compost area storage facilities	offices resource center coffee/concessions/ biertgarten kitchen	open lawn playground passive observation concessions path system connecting to trail and park	unique space observe chickens/goat/ sheep/pony compost recycling teaching opportunity full cycle system

DESIGN ELEMENTS

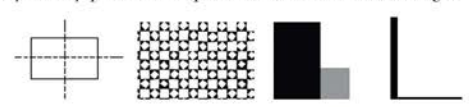
traditional agricultural architecture



old farming mechanisms

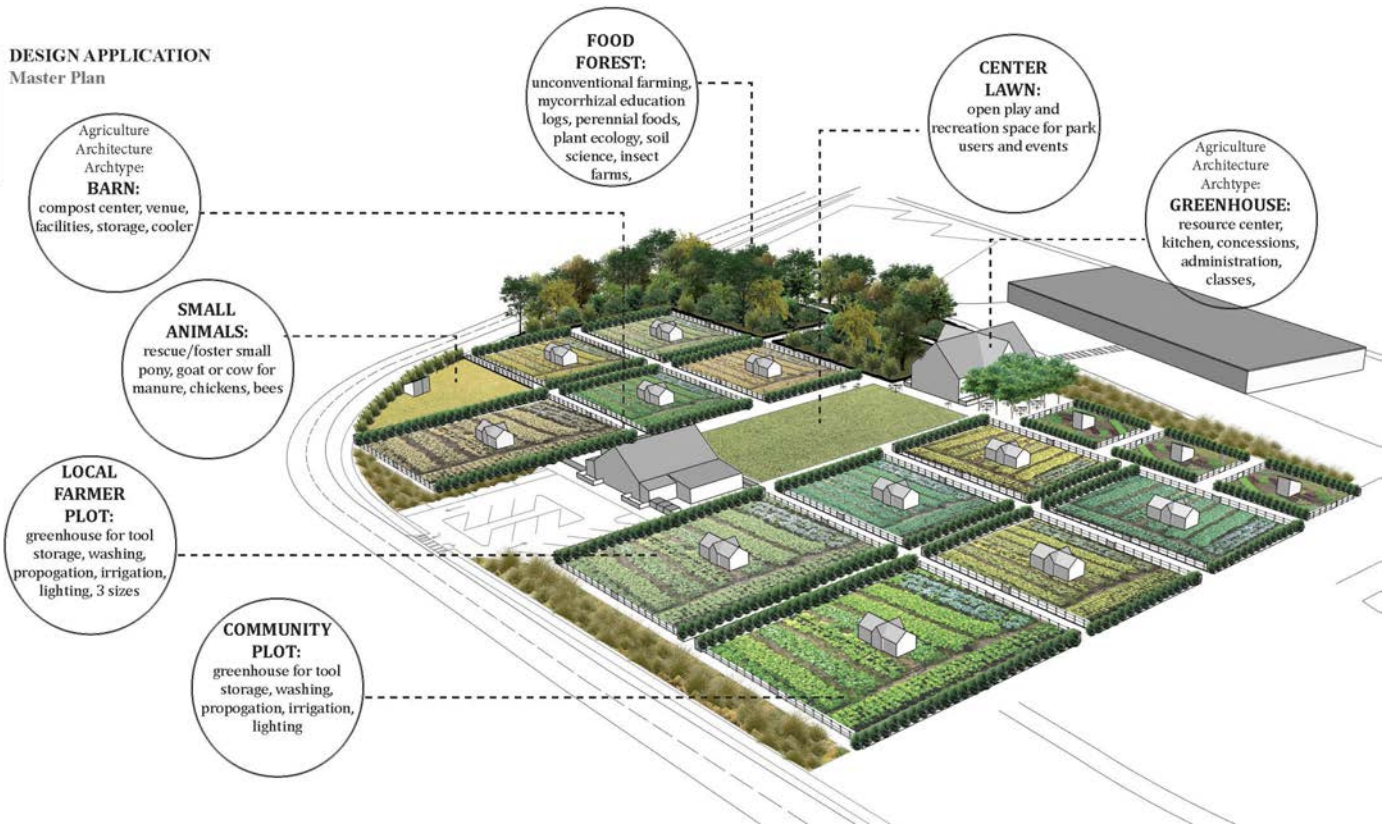


symmetry, pattern and repetition, blocked views, clean edges



DESIGN APPLICATION

Master Plan



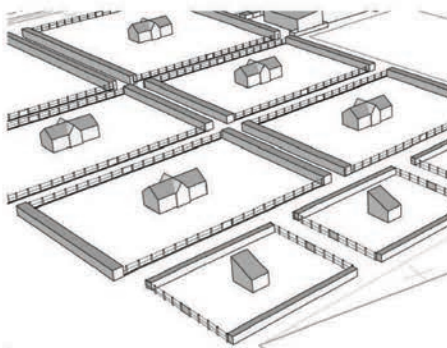
DESIGN APPLICATION

Individual Elements

Farm Plots

FARMING PLOTS

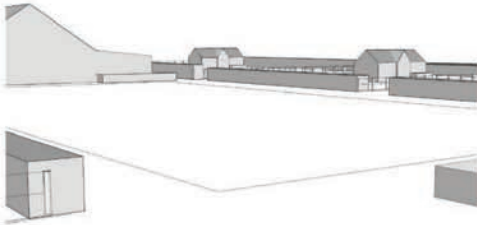
Large	size: 1/3 acre - 11,500 sq ft manpower: 60-90 hrs a week
Medium	size: 1/6 acre - 6,700 sq ft manpower: 30-40 hrs a week
Small	size: 1/17 acre - 2,500 sq ft manpower: 10-20hrs a week



DESIGN APPLICATION
Individual Elements
Lawn and Orchard

RECREATION

Lawn Total Area: 1/3 acre, 14000 sq ft
Orchard: 2, 200 sq ft



DESIGN APPLICATION
Individual Elements
Food Forest

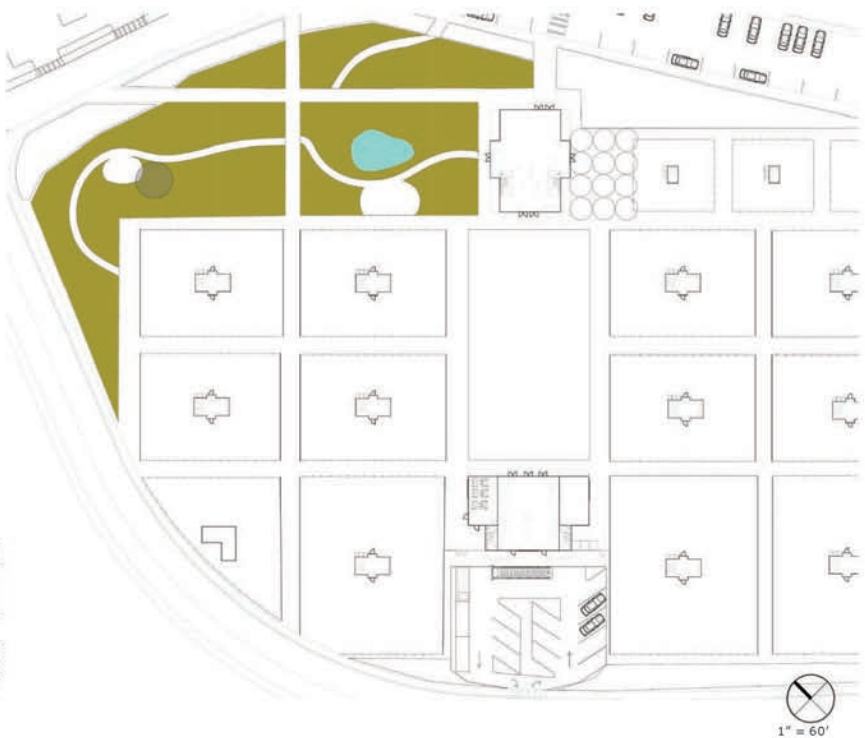
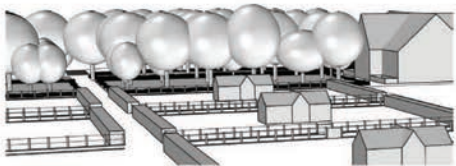
FOOD FOREST

Total area: 6/10 acre - 27,400 sq ft

Trails with casual, natural seating areas for outdoor classrooms or meeting spots.

Pond for ecosystem.

Water cistern is in the forest.



DESIGN APPLICATION
Individual Elements
Facilities and Access

FACILITIES AND ACCESS

Main Center

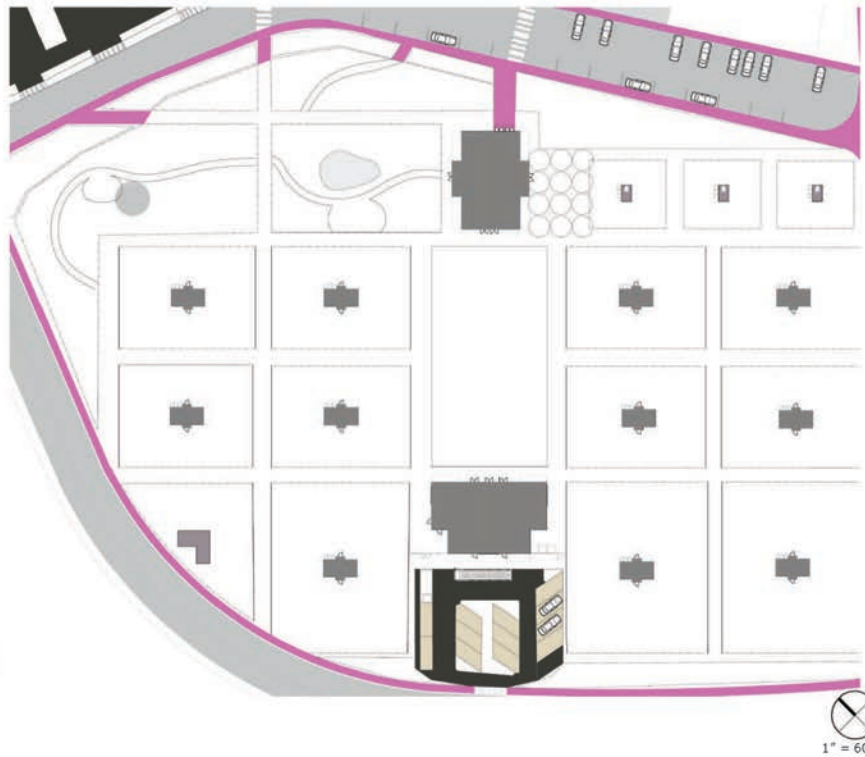
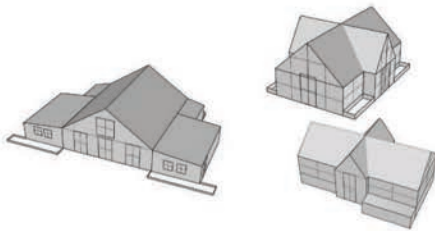
Kitchen: 800 sq ft
Offices: 300 sq ft
Concessions: 200 sq ft
Classes/Flex Space: 1500 sq ft
Bathrooms: 350 sq ft

Greenhouses

400 sq ft
270 sq ft
100 sq ft

Barn

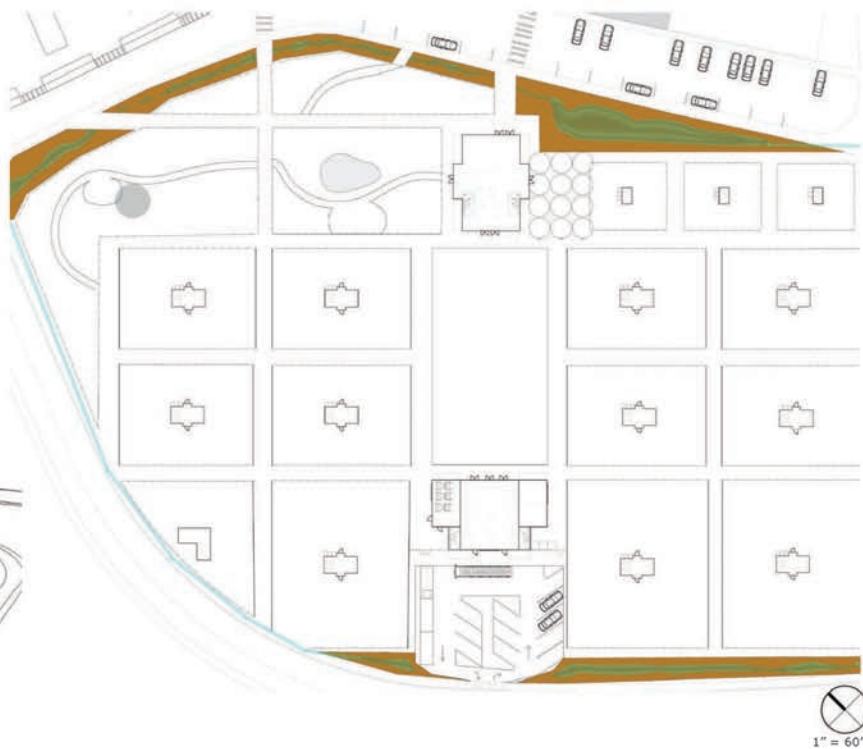
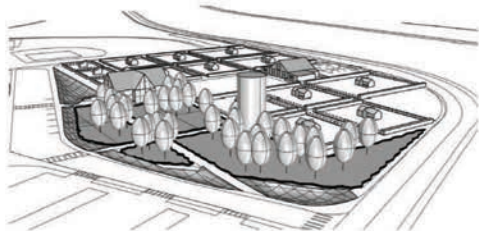
Venue: 2000 sq ft- 10 5'rounds- 166 people
Bathrooms: 300 sq ft
Storage: 640 sq ft
Cooler Space: 640 sq ft



DESIGN APPLICATION
Individual Elements
Stormwater Bioswales

BIO SWALES

Densely planted swales to slow and filter water

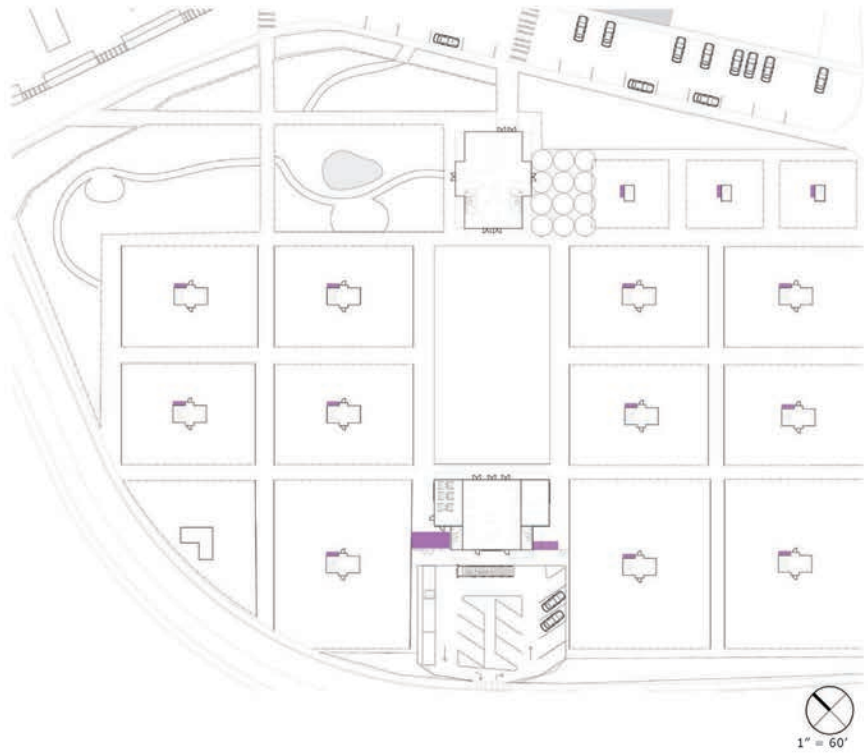
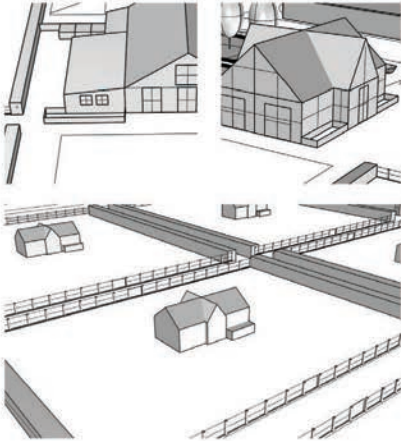


DESIGN APPLICATION
Individual Elements
Compost

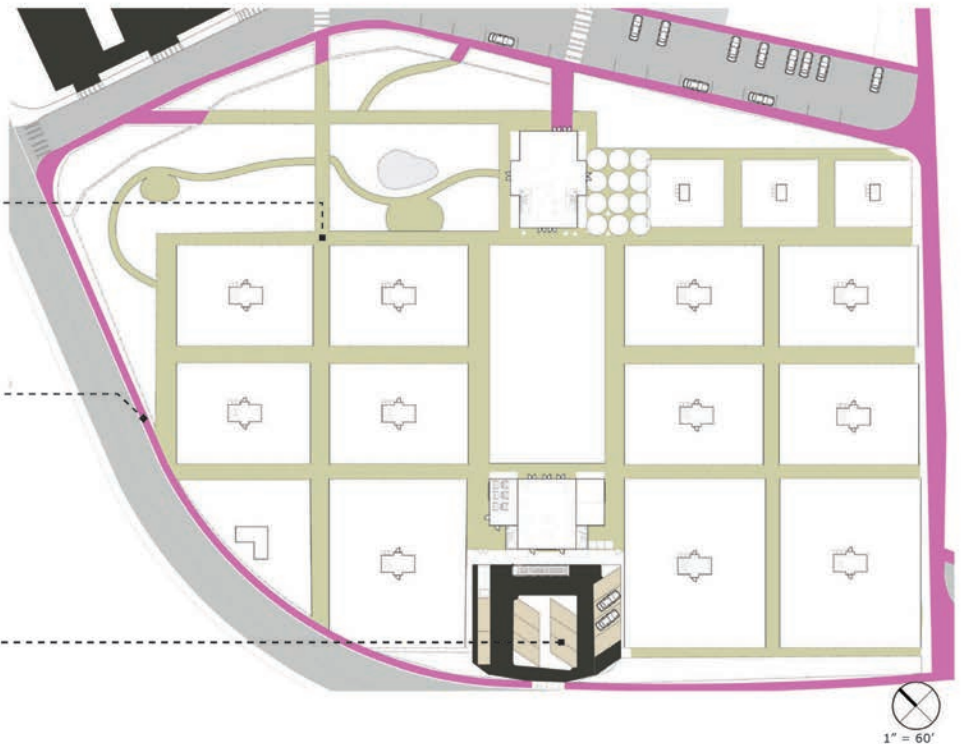
COMPOST SYSTEMS

Residential:
3 bin system
Drop off only
Can purchase

Farmer:
3 bin system on each lot
Coordinated delivery of local raw matter



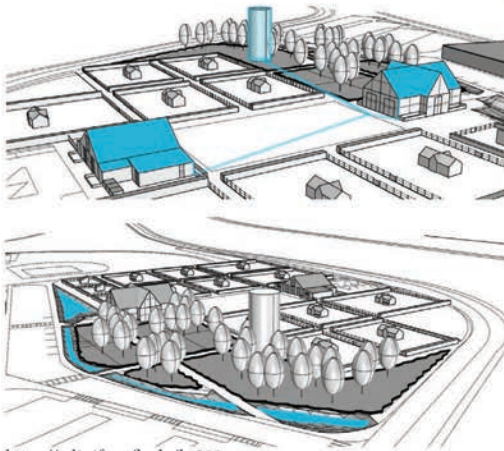
DESIGN APPLICATION
Individual Elements
Materials



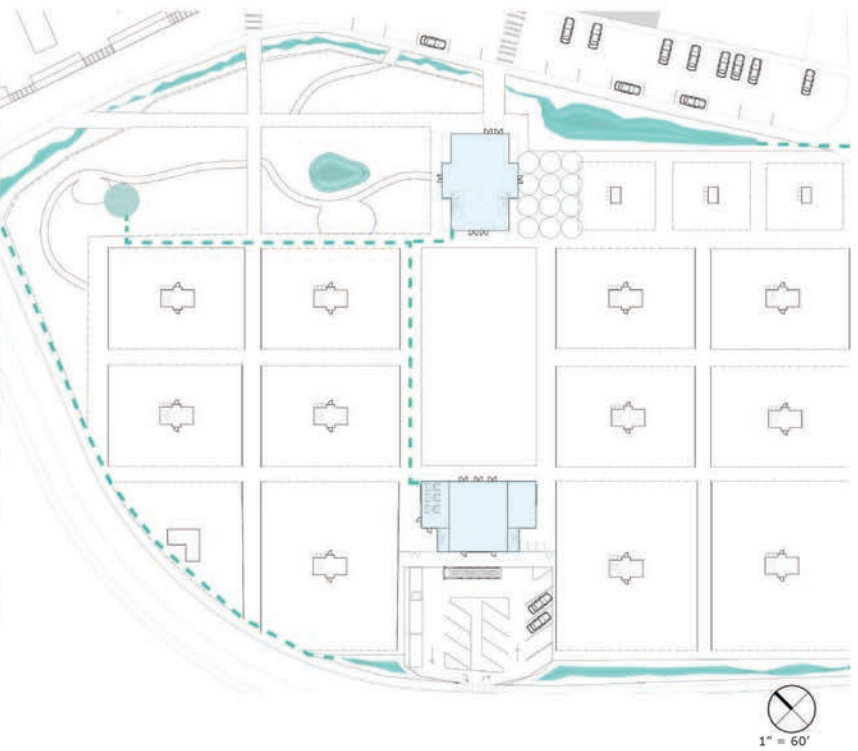
DESIGN APPLICATION

Individual Elements Sustainability

Water is an important part to sustainability and farming. The roof run off from the barn and center totals 200,000 gallons of water a year based on the calculation of 51" annual rain fall in Greenville. The cistern is built to hold this quantity. Organic methods exclude the use of grey water for irrigation and washing of produce and 200,000 is not even a fraction of what the plots would ultimately need. However the grey water can be used for general site usage and maintenance and as a teaching tool for sustainable development.



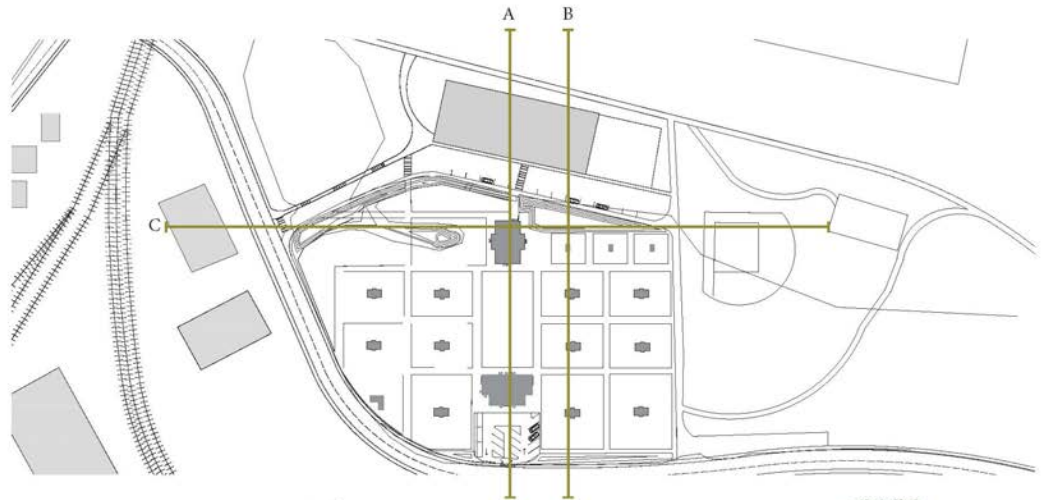
<https://edis.ifas.ufl.edu/hs388>



DESIGN APPLICATION

Proposed Grading and Sections

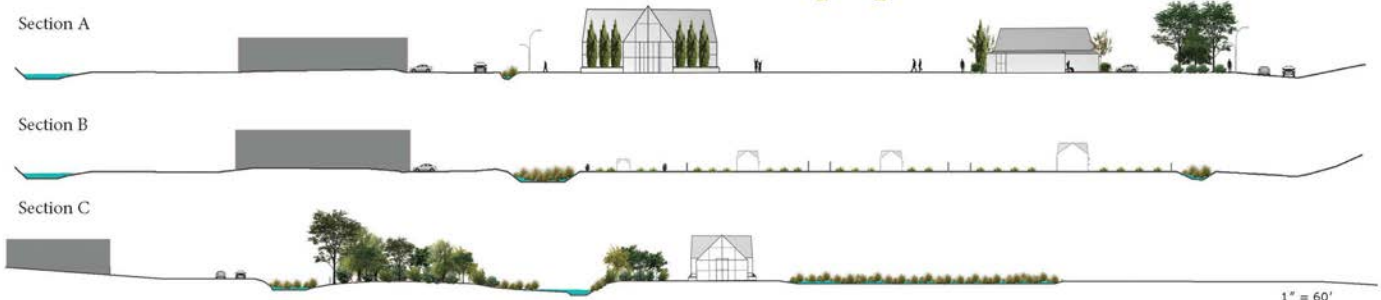
Sections show the topography, programming and general feel of the site. Overall the site is graded to be mostly flat with most water being directed through bioswales around the site.



Section A

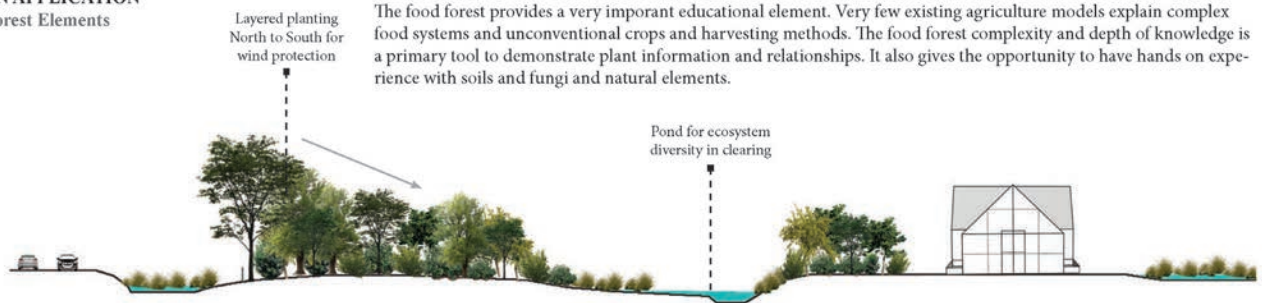
Section B

Section C



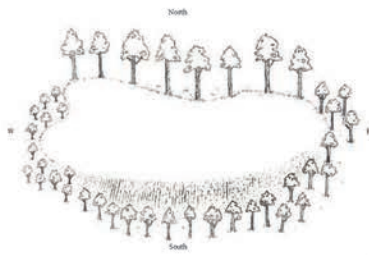
DESIGN APPLICATION

Food Forest Elements

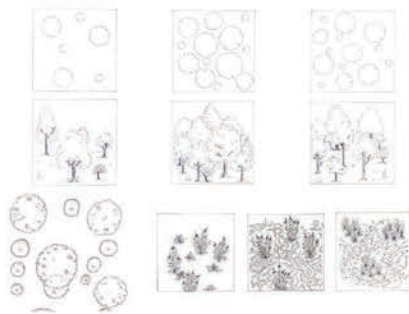


The food forest provides a very important educational element. Very few existing agriculture models explain complex food systems and unconventional crops and harvesting methods. The food forest complexity and depth of knowledge is a primary tool to demonstrate plant information and relationships. It also gives the opportunity to have hands on experience with soils and fungi and natural elements.

Edges



Layers



Education

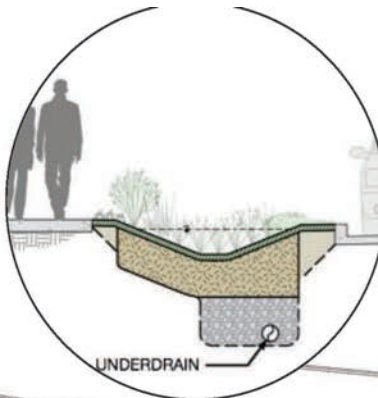


DESIGN APPLICATION

Food Forest Elements

The edges of the food forest are meant to be a wind barrier of tall deciduous trees with a lower layer of evergreen. The trees along the border are alleed to create rhythm and repetition that will counterbalance the apparent disorder of the food forest.

The diagram represents how the bioswales would work. Heavily vegetated grasses will help slow and filter the water. The underdrain transports the water off site as it sinks or in the case of overflow.



DESIGN APPLICATION
Aesthetics and Programming



DESIGN APPLICATION
Perspective Render



DESIGN APPLICATION

Conclusion

This site is responding to the societal knowledge gap about food systems and food origin knowledge. Urban agriculture has the potential to be the piece that bridges that gap and it is already in the process of doing that around the country. People are returning to the land to find out and be sure of the origin of their food. We want healthy good local food, everyone does. We need to know how to grow it for future prosperity. But with current systems and policies only middle class populations are the ones really getting access to gardens and farms produce. With this site I am placing agriculture into the public sphere by including it in the parks and rec system in a high pedestrian traffic zone and developing area. No land is being taken from low income neighborhoods to make this site happen. This site fulfills the local food system needs recognized by the County's research and what was observed from the literature review and case studies.

LOCATION	SUPPORTIVE POLICIES		PROGRAMS AND MISSIONS		
<i>Is it in an optimal place?</i>	<i>What makes it possible?</i>		<i>Who is it for? What does it do?</i>		
LOCATION	TENURE	CITY POLICIES FOR URBAN AGRICULTURE	EDUCATION	PRODUCTION FARM	RECREATION
Provide plots at little to no expense in dense centers for farmers to practice intensive farming and serve the surrounding populations.	A hub that is certified and maintains labels for the farmers. Provide plots at little to no expense in dense centers.	Reduce other start up costs involved in the farm to pay laborers more Youth development work Work development training Partner with non profits to teach new skills	Agricultural kitchen hub for processing by local farmers. This can serve as an educational kitchen for cooking classes both for children and adults	Farm Hub/Center/Incubator with Restaurant CSA built in so that time and money spent in marketing is removed from farmer's duties.	Youth development work Work development training Partner with non profits to teach new skills

DESIGN APPLICATION

Conclusion

Agriculture for the public to come interact with using park and rec space.

Benefits all equally.

Land does not belong to private groups, is not taken from neighborhoods, accessible and zoned for everyone.

Multiple layers of programs and educational opportunities.

Builds community.

Builds food cycle knowledge.



Resilient City Form
COASTAL RESILIENCE SOLUTION FOR CHARLESTON, SC
MASTER OF LANDSCAPE ARCHITECTURE
TERMINAL PROJECT
SPRING 2022

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05	CONCLUSION
5.1	Project Achievement

TAMAKI INAHATA
CLEMSON UNIVERSITY | LANDSCAPE ARCHITECTURE PROGRAM

01.

INTRODUCTION

1.1 PROJECT STATEMENT

1.2 WHERE WE ARE

1.3 WHAT IS "RESILIENT"?

1.4 ONGOING CONVERSATION IN CHARLESTON

1.1 PROJECT STATEMENT

This project takes a position as a typology of resilience city form to resilient water with the urban public realm in Charleston, SC. Integrated into the resilient water is an interpretative environmental and resting place to enjoy the landscape services by allowing visitors to have a unique experience.



Fig 1. Resilient City Form Approach Diagram



Fig 2. Final Design

1.2 WHERE WE ARE

The Rockefeller Foundation regards urban resilience as an important global conversation topic and needs to think about what we can all do to make our cities places of growth and opportunity now and in the future. 100 Resilient Cities - Pioneered by The Rockefeller Foundation (100RC) - provides support and resources for cities to build urban resilience and address social, economic, and physical challenges. Organization for Economic Co-operation and Development provides a framework for resilient cities provides a working definition of a resilient city, the drivers of resilience in order to better identify what resilience looks like in an urban context, and the policy mechanisms that could be of benefit. They mentioned that resilient cities are cities that have the ability to absorb, recover and prepare for future shocks (economic, environmental, social & institutional). Resilient cities promote sustainable development, well-being, and inclusive growth.

Resilient city is the fundamental topic among landscape architecture professional to consider the climate adaptation & response through landscape design.



Fig 3. 100 Resilient Cities by The Rockefeller Foundation (100RC)
<https://www.rockefellerfoundation.org/exp/100-resilient-cities/>



Fig 4. Organization for Economic Co-operation and Development
<https://www.oecd.org/cities/resilient-cities.htm>

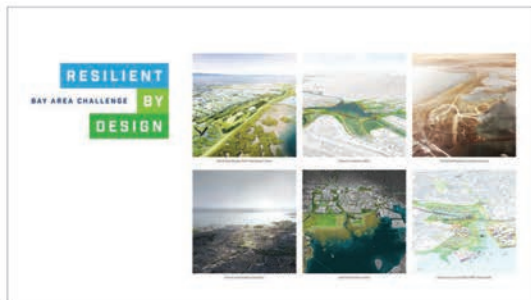


Fig 5. Resilient By Design Bay Area Challenge
<http://www.resilientbayarea.org/>

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1.3 WHAT IS "RESILIENT" ?

Here is the definition of a resilient and resilient city.

Resilient

/reˈzɪljənt/

Able to quickly return to its usual shape after being bent, stretched, or pressed

-Cambridge Dictionary

Able to withstand or recover quickly from difficult conditions.

-Oxford Languages

Resilient City

/reˈzɪljənt/ /ˈsɪdði/

Resilient city has the ability to absorb, recover and prepare for future shocks.

-100 Resilient Cities by The Rockefeller Foundation (100RC)

Resilient Cities are better positioned to protect and enhance people's lives, secure development gains, foster an investible environment, and drive positive change.

Mariani, LUISANA. "Urban Resilience Hub". urbanresiliencehub.org. Retrieved 2019-04-04.

Landscape offers regenerative possibilities as communities grapple with sea level rise, climate change, population growth, and emerging transportation alternatives. SWA's solutions are comprehensive and forward-thinking, responding not only to the demands of the moment but to the historical and projected context of the cities in which we work.

SWA - <https://www.swagroup.com/project/resilient-cities/>

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1.4 ONGOING CONVERSATION IN CHARLESTON

City of Charleston: define resilience as the capacity of a community, business or natural system to prevent, withstand, respond to, and recover from a disruption. Efforts to increase resilience to climate and non-climate impacts in Charleston are built on the foundation of understanding and reducing vulnerability. (<https://www.charleston-sc.gov/1971/Resilience>)

- City of Charleston efforts to increase resilience to climate and non-climate impacts in Charleston
- Charleston Vulnerabilities Assessment: Flooding, Sea level rise, Semic, Extreme heat, Water shortage
- To substantially reduce carbon pollution in an equitable way
- To improve the health and quality of life of Charlestonians now and in the future



Fig 6. City of Charleston Resiliency & Sustainability Advisory Committee
<https://www.charleston-sc.gov/1971/Resilience>

Climate Action Plan's vision is to substantially reduce carbon pollution in an equitable way and improve the health and quality of life of Charlestonians now and in the future.

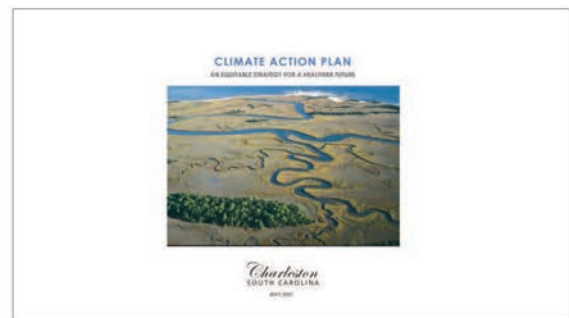


Fig 7. City of Charleston Climate Action Plan
<https://www.charleston-sc.gov/1971/Climate-Action-Plan>

10

11

Due to its climate, Charleston needs to prepare for water climate – flooding, storm. The Army Corps of Engineers has proposed protecting the city of Charleston from flooding caused by storm surge by encircling the city's historic peninsula with an eight-mile seawall and building a 4,000-foot wave attenuating structure in Charleston harbor. These walls would not encourage the intimate relationship between the city, the vegetation, and the water. And also, the Charleston peninsula has no public realm to create a cohesive riparian landscape that provides a unique experience for visitors.



Fig 8. US ARMY CORPS OF ENGINEERS CHARLESTON PENINSULA SEA WALL
https://www.coastalconservationtrust.org/wp-content/uploads/2021/09/21/0921_0921_Beyond-the-Wall_Final-SeaWall-Report.pdf

The Charleston Medical District (CMD) provides a "Resilient Water Management Strategy" to care for the city, county and South Carolina, the Southeast US, and beyond. Comprised of the Medical University of South Carolina, Ralph Johnson VA Medical Center, Roper Saint Francis Medical Center, and the City of Charleston, the CMD work collectively to provide the best healthcare possible by managing opportunities and challenges that are common to the CMD members. This is a new strategy to deal with sea level rise and increased flooding because they regard climate adaptation as critical as we seek to mitigate. They also argue that learning to live with water while improving the stability of healthcare delivery and while cooling the district is a key premise.



Fig 9. Charleston Medical District's Resilient Water Management Strategy
<https://www.charlestonmedicaldistrict.com/docs>

02.

SITE ANALYSIS

- 2.1 REGIONAL CONTEXT
- 2.2 PENINSULA CONTEXT
- 2.3 SITE HISTORY
- 2.4 TARGET AREA
- 2.5 EXISTING SITE CONDITION
- 2.6 EXSITING PROGRAM

2.1 REGIONAL CONTEXT

The city of Charleston is located in South Carolina's Lowcountry. The humid, semi-tropical environment supports a wide range of plant and animal species. Charleston is home to a plethora of islands, marshes, streams, rivers, and harbors that shape and configure man-made construction. Although urbanization and accompanying land development in the Charleston region might benefit the local economy, it puts stress on the estuary system and natural environment. The sustainable management of natural resources is critical to ensuring citizens' quality of life. (Allen, J. and K. Lu., 2003).



Fig 10. Site Location For Charleston



Fig 11. Site Location For Long Lake

16

2.2 PENINSULA CONTEXT

The project site, Long Lake, has a potential as a new type of waterfront condition and public realm.



Fig 12. Site Location For Long Lake

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2.3 SITE HISTORY

This tidal saltwater lake was created in the early 1960s when the newly built Lockwood Blvd separated the lake from the rest of Charleston Harbor. The lake was to be filled in with dirt and used as a building site but was preserved by the vision and dedication of Alberta Sottile Long. Her commitment led Mayor Palmer Gaillard and City Council to save this area from becoming a landfill. In 1982, the lake was named in her honor. Ms. Long's vision for the site as a location for people to enjoy nature has been enhanced with the Wetland Wonders Nature Study Center. The goal of this Center is to teach all visitors about the importance of wetlands. However, the current situation is far from her original thoughts and goals, with untouched vegetation, limited accessibility and spaces, and no connection with surroundings.

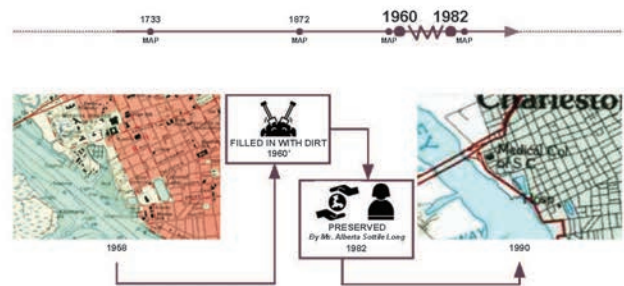


Fig 13. Historical Time Line

18

19

2.4 TARGET AREA

This project locates in the southwest area of the Charleston peninsula, Lockwood Drive extends along the Ashley River. The Medical District contains the largest concentration of healthcare infrastructure on the peninsula, including the Medical University of South Carolina and two other hospitals (Roper Hospital and Ralph H. Johnson Veterans Affairs Medical Center), the Lockwood Corridor comprises the zone between the south end of the Medical District and the north end of the U.S. Coast Guard Station.



Fig 14. Target Area Map

The Medical District contains the largest concentration of healthcare infrastructure on the peninsula, including the Medical University of South Carolina and two other hospitals.

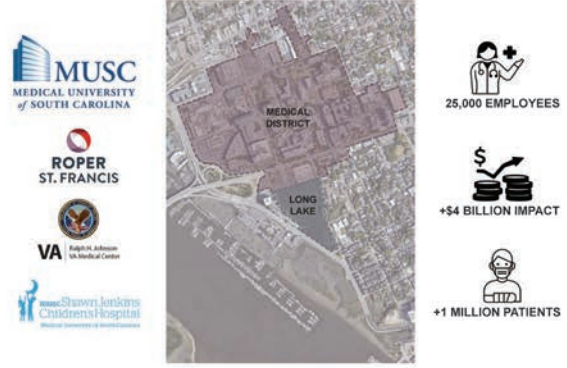


Fig 15. Medical District Detail

20

21

This map shows the approximate extent of nuisance flooding in the Medical District. The arrows indicate emergency vehicle access routes, which are impeded in each scenario. The Long lake is the key place to manage water for MUSC district.



Fig 16. Charleston Medical District's Resilient Water Management Strategy

The Lockwood Corridor and the Medical District are especially vulnerable to catastrophic tidal and runoff floods, especially during King Tides. This flooding has hampered key facility operations and necessitated regular maintenance of nearby streets, an issue that will only worsen in the future as sea levels rise, resulting in more frequent and severe tropical storms and, as a result, storm surge. Between the Charleston City Marina and Broad Street, the coastline of Lockwood Drive has some vestiges of the historic salt marsh. This salt marsh, while insufficient to prevent future flooding, is an important asset to the community and the ecology. However, the marsh is in great danger as sea level rise threatens to inundate and damage it further.

In normal conditions, a salt marsh would migrate inland in response to a rise in water surface elevations, but Lockwood Drive prevents this marsh from migrating and instead causes it to decrease over time. As this natural buffer recedes, wave damage in this portion of the corridor is anticipated to rise.

Fig.17 shows the increase of flood events at Charleston area. This data is from Charleston Medical District's Resilient Water Management Strategy.

 \$15 MILLION / YEAR  89 FLOODS = 154% INCREASE

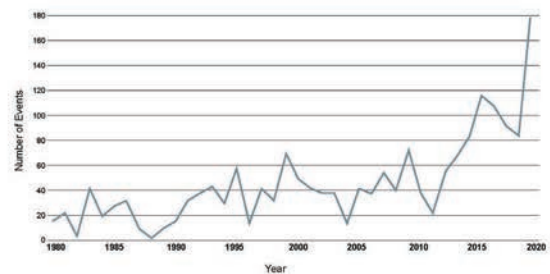


Fig 17. Charleston, Coastal Flood Events by Value Range (1980 to 2020)

22

23

2.5 | EXISTING SITE CONDITION



Fig 18. Panorama photos of the site



Fig 19. Site photos

24

25

2.6 | EXISTING PROGRAM

Basically, there haven't been enough activity on the long lake, but I could see some possibilities there. The graphics depict the potential/current/emphasized activity, the location, and the segment.

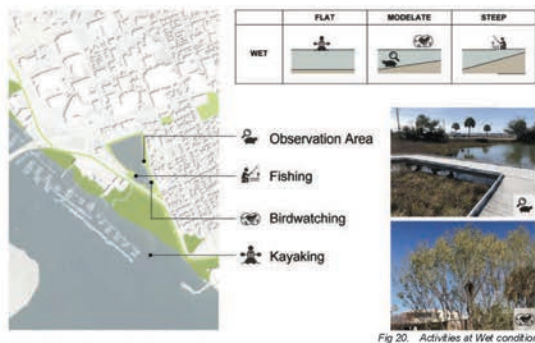


Fig 20. Activities at Wet condition



Fig 21. Activities at Semi-Wet condition

The location and elevation provide a one-of-a-kind opportunity for a design that takes use of closeness to water, wetness and dryness gradients, different slopes, and plant patterns. These qualities also result in distinct habitat and programming options, which may be enhanced by a designer's use of materials such as dirt, gabions, or pavers. When steepness (Steep, Moderate, Flat) is combined with closeness to water (Wet, Semi-wet, Dry) and slope size, a matrix of programming options for humans and wildlife is produced.



Fig 22. Activities at Dry condition

Creating Matrix of Programming opportunities: shows how a variety of programs and habitats are possible given particular conditions of steepness and proximity to water.

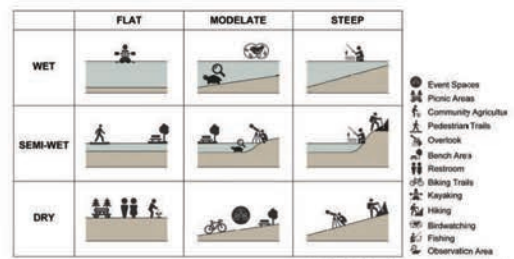


Fig 23. Matrix of Programming opportunities

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03.

PROJECT RESEARCH

3.1 LONG LAKE PROJECT

3.2 CHALLENGES

3.1 LONG LAKE PROJECT



The Charleston Medical District (CMD) provides a "Resilient Water Management Strategy" to care for the city, county and South Carolina, the Southeast US, and beyond. Comprised of the Medical University of South Carolina, Ralph Johnson VA Medical Center, Roper Saint Francis Medical Center, and the City of Charleston, the CMD work collectively to provide the best healthcare possible by managing opportunities and challenges that are common to the CMD members. This is a new strategy to deal with sea level rise and increased flooding because they regard climate adaptation as critical as we seek to mitigate. They also argue that learning to live with water while improving the stability of healthcare delivery and while cooling the district is a key premise.

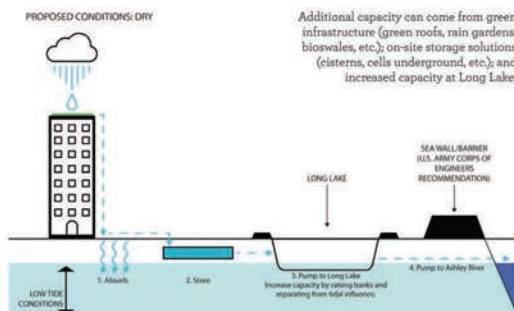


Fig 24. Proposal Diagram

Long Lake is currently a tidal lake. If it were removed from tidal influence, stormwater could be pumped there to provide more capacity for storage. The diagram below shows the potential increased capacity of Long Lake by building a levee around the shore.



Fig 25. Proposal Perspective from the Long Lake



Fig 26. Proposal Greenway connection with the Long Lake

Due to its climate, Charleston needs to prepare for water climate – flooding, storm. The Army Corps of Engineers has proposed protecting the city of Charleston from flooding caused by storm surge by encircling the city's historic peninsula with an eight-mile seawall and building a 4,000-foot wave attenuating structure in Charleston harbor. These walls would not encourage the intimate relationship between the city, the vegetation, and the water. And also, the Charleston peninsula has no public realm to create a cohesive riparian landscape that provides a unique experience for visitors.



Fig 27. US ARMY CORPS OF ENGINEERS CHARLESTON PENINSULA SEA WALL
https://www.credibleconversations.org/wp-content/uploads/2021/06/21/06210607_BeyondtheWall_FinalShawwoodSeawallReport.pdf

3.2 CHALLENGES

The site conditions posed three major challenges to the resilient landscape design:

- 1) What approach to resilient water management design should be taken?
 Ex... Adding increasing storage capacity? Cooperation by allowing the park to flood?
- 2) How can we create new public landscape amenities to provide unique experiences?
 Ex... Provide various activity depending on the existing city condition?
- 3) How can the separated city districts be connected to the natural water landscape to strengthen the community and cultural identity of the city of Charleston?
 Ex... Provide connection to each neighborhood features.

04.

DESIGN

- 4.1 SITE DESIGN DIAGRAM
- 4.2 PLAN
- 4.3 BIRD'S-EYE PERSPECTIVE
- 4.4 ZONE
- 4.5 FLOOD EVENTS VS. DESIGN
- 4.6 SECTION DETAILS



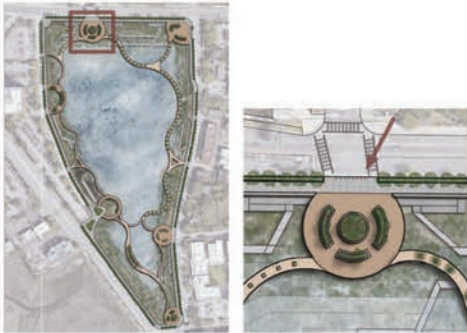
4.3 | BIRD'S-EYE PERSPECTIVE



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4.4 | ZONE

ZONE 01 MEDICAL PLAZA



- Connection to Medical District
- Leisure Activities, Provided View
- Street Tree: Live Oak (City manual)
- Plaza: Shade Trees, Fragrant Flower

40

ZONE 02 HALSEY PLAZA



- Food Truck Street Parking
- Community Used, Bus stop
- Crepe Myrtle, Japanese Maple as Identification Elements

41

ZONE 03
ASHLEY-HOUSE PLAZA



- Intimate atmosphere
- Connection to Apartments

- Shade Tree: Maple Trees
- Flowering Tree: Dogwood

42

ZONE 04
CORRIDOR



- Shaded Pathway (W15')
- Connects each plaza

- American Beech: Wind Resistant Tree, Shade Tree

43

ZONE 04
CORRIDOR



- Intimate atmosphere
- Connection to Apartments

- SC Piedmont FACW Mix: used for wetland mitigation where frequent flooding occurs.

44

ZONE 05
WATER ACTIVITY PLAZA

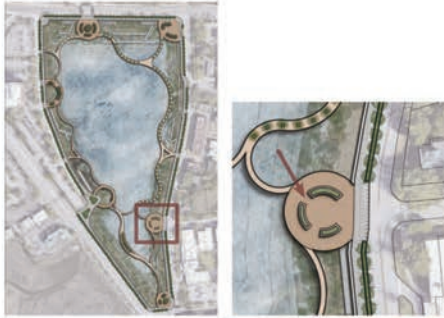


- Kayak launch
- Fishing Deck

- Water Oak, Overcup Oak: Water Tolerant - SC Piedmont FACW Mix

45

ZONE 06
POLLINATOR PLAZA



- Connection to Educational Institution & S-scale Neighborhood

- Pollinator Plants and Trees

46

ZONE 07
OVERVIEW BRIDGE

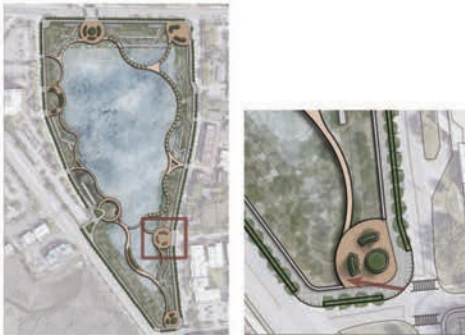


- Provides view of Ashley River
- Shaded Benches

- American Beech: Wind Resistant Tree - Wild SC Flower

47

ZONE 08
PALM PLAZA



- Intersection of South Side
- Bike Station

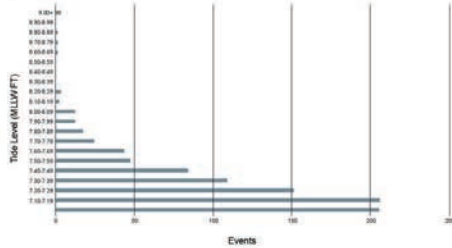
- Palm as Identification elements

48

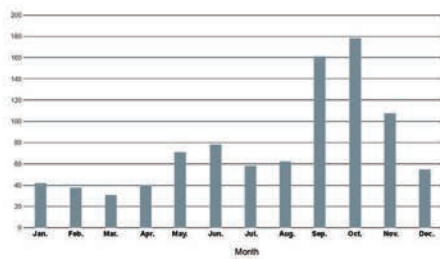
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4.5 FLOOD EVENTS VS. DESIGN

Rather than isolating the city from the water, this design creates a public space by building a water-resistant terraced river embankment covered with flood-adapted natural flora. Flood-resistant pedestrian walkways and pavilions connect to the planting terraces, which will be closed to the public for a short time owing to floods. Floods deposit fertile silt on the terraces, enhancing the growing conditions for the riparian ecosystem's tall grasses. As a result, no watering or fertilizing is required at any time of year. The terraced embankment will aid in the filtering and treatment of storm water runoff from the above-mentioned pavement.



Charleston, Coastal Flood Events by Value Range (1980 to 2020)



Charleston, Coastal Flood Events by Month (1980 to 2020)

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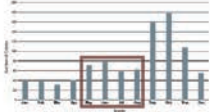
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WINTER / SPRING
December - April



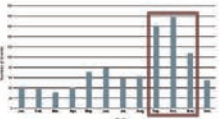
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☁☁
SUMMER
 May - August



52

☁☁☁
FALL
 September - November



53

4.6 DETAILS

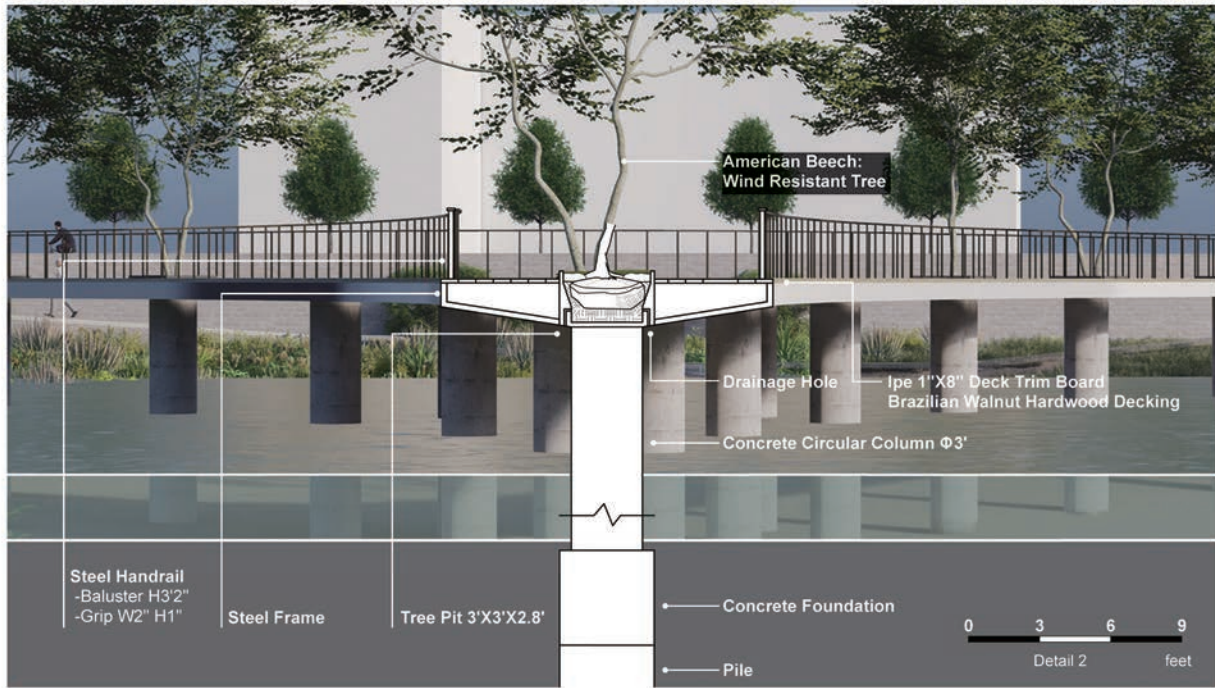


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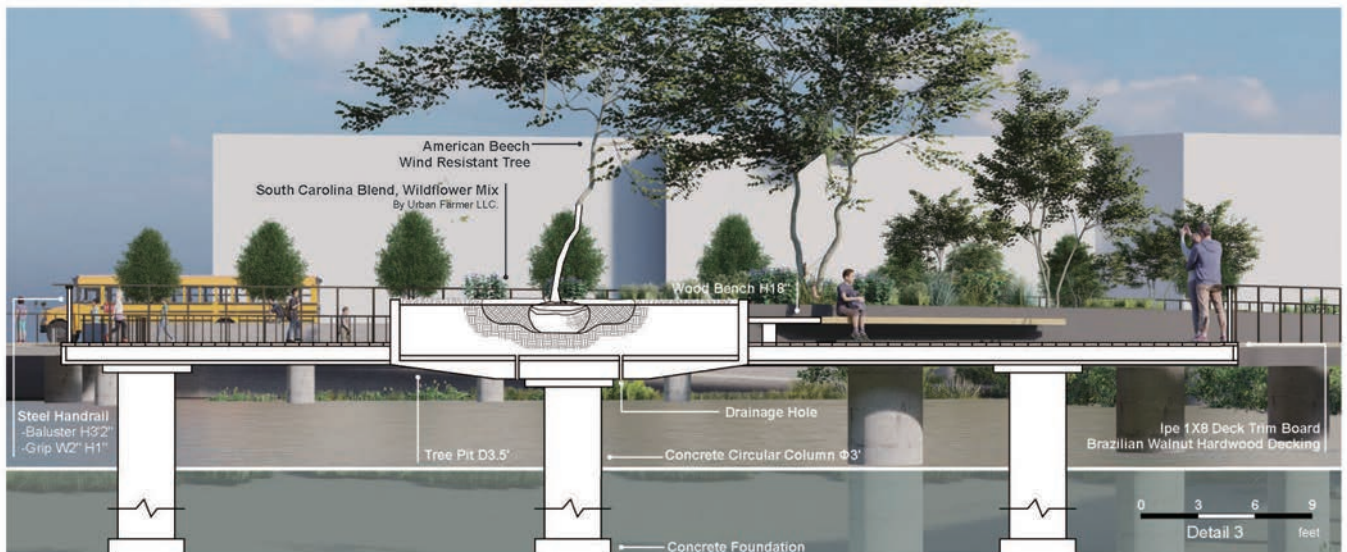
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05.

CONCLUSION

5.1 PROJECT ACHIEVEMENT

5.1 | PROJECT ACHIEVEMENT

This project takes a position as a typology of resilience city form to resilient water with the urban public realm in Charleston, SC. Integrated into the resilient water is an interpretative environmental system and resting places to enjoy the landscape services allow visitors to have a unique experience of the designed public realm. This design approach could take for the other site has the same water issue. Through this project, I would like to achieve the three points.

- 1) Resilient water management design
- 2) New public landscape amenities to provide unique experiences
- 3) Connected to the natural water landscape and the community



Dr. Thomas Schurch, Committee Chair
Professor Paul Russell, Committee Member
Barry Anderson, Committee Member
Harry Haritos, Committee Member
Professor Hyejung Chang, Studio Director

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EXECUTIVE SUMMARY

This graduate project focuses on the topics of Cultural Tourism and Adaptive Reuse. As defined, cultural tourism is tourism with history and culture as the basic reason to visit a certain location. Adaptive Reuse is the revitalization of an existing structure to be reused for a new purpose - sometimes referred to as 're-purposing' of historic buildings and site that are the subject of this study. North Canton, Ohio has great potential to satisfy both cultural tourism and adaptive reuse, specifically at the Hoover Company Complex site.

The Hoover Complex once housed the well known Hoover Company that produced the Hoover Vacuum. The complex has been vacant for over a decade. This complex and the surrounding area deserves to be revitalized for the community and for future visitors and residents, particularly given the land use needs in North Canton today. The restored Hoover Company site is located in the heart of North Canton and offers a considerable history of the city as well as the corporation legacy we know today. The revitalization of this site can contribute to the city in economic growth as well as its sense of history and culture.

North Canton is located just north of Canton, Ohio which houses the Pro Football Hall of Fame. This study concludes that there is great potential to attract tourists to visit North Canton and experience the city and its amenities. It is important to revitalize the building and provide places for people to gather, whether it be for housing, food, or cultural and recreational activity. In this regard, the creative reuse of the building by itself will bring people to the site. But to truly provide a beneficial outcome in this site, the site requires elements of landscape architecture to "connect" to the surrounding context. Because there is a lot of vacant lots currently surrounding the complex, the entire site is dealt with to make this a place to visit. A significant element that this study recommends is a major connector from the Hoover Complex to the Memorial Stadium parking lot. Due to a present lack of connectivity in this area, this connector provides circulation through the site with leisure and active elements along the way. In revitalizing the complex, The Hoover Company Historic District Master Plan offers a number of landscape architecture elements, such as:

- Major Plaza feature - with a mural wall, water feature, memorial grove, and memorial garden
- Preservation of the iconic green - in front of the complex
- New parking lot - with a green roof
- Large dog park - that invites dogs small and large
- History Trail - that serves as the site connection piece from the revitalized complex to Memorial Stadium
- Event Center - reuse of the current manufacturing company just north of the complex
- Large recreation pond - in place of current retention ponds
- Open green space - for leisure and activity
- Outdoor event space - for local shows and activities

This design creates a function for the existing site as well as connects the site to its current surroundings. In summary, this design incorporates adaptive reuse as a main design element with the current Hoover Complex, while cultural tourism is represented in conjunction with the historic elements throughout the site as well as the creation of a place that becomes a destination that draws people to it. To this end, this master plan can be used by the city in the current ongoing Hoover District Project.

[CHAPTER ONE]

PROJECT BACKGROUND



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CHAPTER ONE

PROJECT BACKGROUND INTRODUCTION AND OVERVIEW

North Canton is a small town in Ohio. Not unlike Ghirardelli Square, North Canton holds a structure that is near and dear to the hearts of the community. The Hoover Company, whose headquarters were located in the heart of North Canton for nearly a century. The family owned company opened a large factory where they produced horse collars and leather goods. However, the sweeper is what made the Hoover name into a global brand. The Hoover family and company had a huge influence on the small town. Everyone in the town either worked at the Hoover company or had a family member who worked there. Unfortunately, in 1983 Chicago Pacific Corp bought Hoover which officially ended family control over the company. Maytag Corp. purchased Chicago Pacific four years later. Over the next few years Maytag cut hundreds of jobs. In 2006 Whirlpool Corp. purchased Maytag and put Hoover up for sale. The International Brotherhood of Electrical Workers Local 1988 tried to organize an employee purchase of the Hoover Company but in late 2006 Whirlpool sold Hoover to the company TTI, based in Hong Kong. In September of 2007 the factory closed.

Since the closing of the factory in 2007 the Hoover Company building has remained vacant. Sitting in the heart of the town serving as a sad reminder of what once was. I remember as a child they would utilize the large open space in front of the factory to display the huge community Christmas tree filled with lights. The Hoover Company was truly the heart of the community. After its closing, as the years went on, that Christmas tree started to get smaller and smaller and eventually disappeared altogether.

Reminiscent of the Ghirardelli Sign that lit up sky overlooking the water, the factory smokestack with the word Hoover written on it peers over the whole town. Where the factory sits in the town makes it unique. It is located in the center of North Canton and is surrounded by an array of businesses and community buildings such as, the local YMCA, Bitzer Park, a local Church, the North Canton Police Department, Public Library, and restaurants. This building is unique in the culture and history it brought to this small town. Over the past few years there have been plans emerging to revitalize the building to include apartment units with restaurants and shops. An independent contractor has already started making these plans happen little by little. With something so close to the community's heart the design and plan for the building and the area that surrounds it must be creative and include appropriate uses. The Hoover Company in North Canton, Ohio can build off of the model set by Lawrence Halprin in his design for Ghirardelli Square. This proposal strives to use this area and building as a cultural tourist attraction that embraces the local culture and history while providing a means for tourism and economic benefit for local residents.



Figure 1: Vintage Hoover Vacuum Ad

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MLA

CHAPTER ONE

PROJECT BACKGROUND PROBLEM STATEMENT

The problem for this project is to develop a master plan using landscape architecture that establishes approaches to cultural tourism and adaptive reuse that incorporates tourism without losing sight of the history and culture of The Hoover Company site and structure.

The design of this master plan will honor the cultural aspects of The Hoover Company Factory and The Hoover District while acquiring cultural tourists and providing economic benefit for the local residents.



Figure 2: Historic photo of The Hoover Company

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CHAPTER ONE

PROJECT BACKGROUND BACKGROUND NARRATIVE WITH LITERATURE REVIEW

Cultural Tourism

Cultural tourism is a term not easily defined. There is not a set definition for this term but rather a number of definitions within four broad categories. The term fits into the categories of tourism deprived, motivational, experiential, and operational (McKercher, 3).

Tourism Deprived

Cultural tourism is recognized as a form of special interest tourism, or rather where culture forms the basis of either motivating people to travel or attracting visitors.

Motivational

Cultural tourism is defined as movements of people for cultural motivation such as study tours, cultural tours, performing arts, festivals, events, sites and monuments, study nature, folklore or art, and pilgrimages.

Experiential

Cultural tourism is defined as experiencing or having contact of different intensities with the unique social fabric, heritage, and special character places.

Operational

Cultural tourism is defined by participation in one of many activities or experiences.

Cultural tourism is not strictly bound by absolute parameters. Cultural tourism has actually become an umbrella term for a number of related activities such as, historical tourism, ethnic tourism, museum tourism, arts tourism, and many others. These terms all share a common set of management issues, resources, and desired outcomes (McKercher, 6). Cultural tourism contains four key elements; tourism, use of cultural heritage assets, consumption of experiences and products, and the tourist. These elements are somewhat obvious when you look at cultural tourism as separate words and how they function together. But what makes a cultural asset a tourist attraction? Not all cultural assets are going to be able to generate tourism. Cultural places that have tourism potential share a wide range of common features. These places are known beyond the local community, they are interesting and unique, they provide experiences that can be consumed, they are robust, they are accessible, and they can absorb visitation. The most important thing these places can provide is a compelling reason for the tourist to visit, even if they are lower-order attractions (McKercher, 33).



Figure 3: Historic photo inside the Hoover Company Factory

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CHAPTER ONE

PROJECT BACKGROUND

BACKGROUND NARRATIVE WITH LITERATURE REVIEW



Cultural tourism falls into two sectors of planning, private and public. The cultural management of the place lies within the public sector and tourism within the private sector. The hardest part when dealing with cultural tourism is the volume of tourism and the conservation methods necessary for the specific area. When planning for cultural tourism is important that these two private and public sectors work in tandem to keep the cultural or historical integrity of a place while also providing for the tourism demand.

The United States is filled with cultural and tourist opportunities. People for centuries have been traveling the world as tourist to experience new things and places. Tourism used to just be associated with the beach resorts and an opportunity to relax. But more recently in the twenty-first century a new term was coined. Cultural tourism began to occur where tourists were no longer interested in visiting the beach for vacation. Tourists started to change their idea for a vacation as a means to learn about another place's history and culture. This is inherently so throughout Europe. Many people travel to the European countries such as Italy, Germany, and Spain for example, to experience a new culture. Cultural tourism has not only occurred throughout Europe but also within the United States.

An early example of location that acquires culture tourism is in San Francisco, California. Ghirardelli Square, designed by Landscape Architect Lawrence Halprin, used to be a neglected chocolate factory that was transformed into a shopping and tourist destination. It was a space that was unused for a long period of time but still near and dear to the local community. The original brick building was designed around 1862 and later purchased by the Ghirardelli Company in 1893. This project serves as an adaptive reuse model for other cities. Shops were installed at the street level with an elaborate entry stairway to bring visitors from the waterfront. Ghirardelli Square is an early and successful example of historic preservation. It has progressed to one of the top tourist destinations in San Francisco. Ghirardelli Square is just one of many examples of places that have been designed that incorporates the local culture and history with tourism.

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CHAPTER ONE

PROJECT BACKGROUND

BACKGROUND NARRATIVE WITH LITERATURE REVIEW

Adaptive Reuse

Adaptive reuse fits along with cultural tourism in that it typically is the preservation of a structure or the character of an existing structure. Adaptive reuse can be defined as a neighborhood revitalization strategy that employs a series of connected procedures to plan for, inventory, acquire, manage and reuse surplus or abandoned real estate. Adaptive reuse is the process of implantation that results in physical revitalization. Physical revitalization can take the form of augmented or intensified public services, residential or nonresidential conversion, neighborhood parking development, transportation system upgrading, active / passive recreation improvements, municipal land banking, interior lot annexations, or urban gardening plots (Burchell, 1). Adaptive reuse can take many forms but the goal is to take a structure unused in its current state and revitalizing it to be used for today's functions.

Adaptive reuse in its passive mode, is the removal of existing commercial or residential structures to improve traffic flow, enhance public services for the remaining structures, provide on-site recreation facilities, decrease structure density, and much more. The reuse of properties indicates that land or structures being planned for have had a prior use that may no longer be appropriate or viable. Adaptive reuse typically deals with structures that have been used unsuccessfully for other purposes or have been associated with surplus-cleared lands that once had structures occupying them (Burchell, 2). Adaptive reuse is the embodiment of conservation, preservation, and recycling objectives for previously used, now surplus, real property.

Abandoned structures throughout the United States in not a new phenomenon, it is a constant problem and cities grow and even reduce densities over the years. There have been studies that show northern regions contain most of the abandoned industrial and commercial structures compared to the South and West of the United States. These studies also show that the cities with higher populations contain more abandoned commercial and industrial structures than cities with lower populations (Burchell, 23). As densities have changed larger cities have had a lot more property lots and structures that have been left abandoned over the years. For development purposes, it becomes more beneficial to adaptively reuse the old structures and create a new function out of them that can be used by today's society. Not only is adaptive reuse an economic benefit for cities it can also provide a means of cultural and historical preservation.



Figure 4: Old Graphic of The Hoover Company

CHAPTER ONE

PROJECT BACKGROUND

BACKGROUND NARRATIVE WITH LITERATURE REVIEW



The Hoover Company

At the corner of Maple and Main Street, the Hoover Company ties the city of North Canton together. In 1873 William H. "Boss" Hoover moved his family's tanner to the center of New Berlin. Thirty years later, the W.H. Hoover Co. had 200 employees, and thrived making leather goods and horse collars. In 1908 the Electrical Suction Sweeper Co. sold 300 sweepers. That year Hoover bought the patent and reorganized the company, soon becoming the Hoover Company. The sweeper became the product that turned the Hoover name into a global brand. In 1933, a year after Hoover's death, the company became the largest maker of vacuum cleaners in the world (Hoover,1). Almost everyone that lived in New Berlin worked for the Hoover Company.

William H. "Boss" Hoover was the first mayor of New Berlin and had an almost paternal relationship with his workers. The community and company shared police and fire departments for decades. Hoover built homes for employees to buy as well as covered their mortgages. In addition, the company and the Hoover family contributed to schools, community buildings, a stadium, a library, and many other community projects. The Hoover Company even played a role in naming the town. During World War I when anti-German sentiment swept the United States, the Hoover Company pushed to change New Berlin's name to North Canton.

Being a part of the Hoover Company was like being part of a family. The Hoover company gave so much to this community. However, in 1985 was when the family control of the company ended when Chicago Pacific bought Hoover. It was later purchased by Maytag Corp. In 1999 in Stark County, the Hoover Company employed 2,800 workers. As the years passed Maytag cut hundreds of jobs. After the company and employees started to dwindle Whirlpool Corp. bought Maytag in April of 2006. Just two months later they put Hoover up for sale. At that time the Hoover Company had 800 workers in North Canton. While the International Brotherhood of Electrical Workers Local 1985 tried to organize an employee purchase of the Hoover Company, it could not be done in time because in late 2006 Whirlpool sold Hoover to TTI, a Hong Kong based company (Hoover,1). The factory officially closed its doors in September of 2007.

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CHAPTER ONE

PROJECT BACKGROUND

BACKGROUND NARRATIVE WITH LITERATURE REVIEW

The Hoover Company

The community was very upset as something so special was gone. The company's departure cost the city 2,400 jobs. Income tax collections dropped in 2000 from a high of about \$7 million to less than \$5.4 million in 2010. People almost became depressed by the company's demise but soon remembered that it was not the only thing in town. In 2008 Maple Street Commerce bought the former Hoover lot and turned it into offices, shops, apartments and industrial space (Hoover,1). While some things have worked on the lot others have not quite made an impact. The majority of the building still remained vacant.

However, the city and location shows promise for entrepreneurs because of the low tax rate, high quality services, few traffic problems, a low crime rate, and a good workforce. Despite the loss of Hoover, between 2000 and 2014 North Canton's population grew 7 percent to 17,500. Even though the poverty rate increased from 6.7 percent to 7.6 percent between 2000 and 2014, the median household income for the city of \$52,530 is higher than that of any other city in the county (Hoover,1). While the city has essentially shifted their "go-to" place to the city's eastern gateway, the older generation still reminisces about the Hoover Company and how they made of living the city of North Canton. While everyone knows the Hoover Company is never coming back it should not be forgotten. This is where cultural tourism can play its key role.

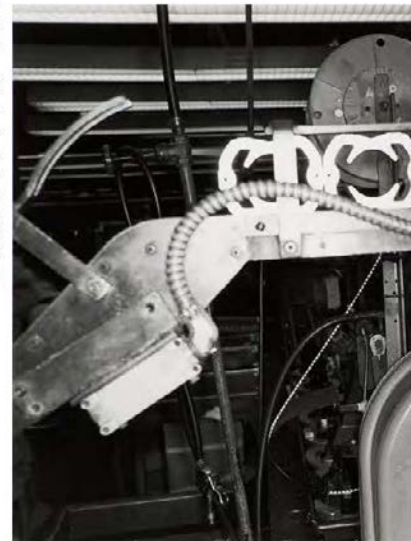


Figure 5: Historic photo of worker inside the Hoover Company factory

CHAPTER ONE

PROJECT BACKGROUND METHODOLOGY



The methodology used for this project includes the rational design and planning method, qualitative research approach, case studies in the form of a matrix. The rational design and planning method is used to obtain the natural and human cultural factors involved with this site and the city that surrounds the Hoover District. It will help inform the design development and program the Factory and site could utilize. This method will identify the client needs and wants for the site as well and the visual characteristics of the site.

It is important to find and analyze the history and information related to the Hoover Factory. Understanding the history of the factory will help inform how the factory came to be and what it means to the city today even though it has been out of business for over a decade. Most of this information can be obtained online through local sources and local newspapers. It would be helpful to get in contact with the North Canton's Mayor as he has been with the town before and after the factory's closing. He is also staying in contact with those involved with the revitalization of the factory.

It will be crucial to visit the local library in North Canton as well as the North Canton Historical Society. They could have information that may not be present on the internet about the factory and the beginning of the city of North Canton. And finally it would also be important to talk with the Maple Street Commerce as well as the current developers to understand their thoughts of the future of the factory and everything they have faced in order to bring the factory back to life. Understanding the history of the factory with help inform why is the center and key component of this town. The history and culture this factory brings, especially to this town, will explain why it can become a part of the cultural tourism movement.

Case studies are used to initially analyze cultural tourism and break it down. Breaking down the built work associated with cultural tourism will allow us to see the elements that make a project part of the cultural tourism movement whether that was the initial intention of the project or not. The case studies researched have been compiled into a matrix which has allowed for a comprehensive list of elements to help choose a potential sight, which is now the Hoover Company Factory. The projects studied include:

- The High Line
- Ghirardelli Square
- Main Street (Greenville, SC)
- Seaport Village
- Navy Pier
- South Park Plaza (at Queen Elizabeth Olympic Park)
- The Short North

A common element among these case studies that really stood out was that each one included existing infrastructure, whether it be railroad tracks, a chocolate factory, or even arches following a street. Each case study contained a sense of history that led to the preservation of the history and culture of the place that was being revitalized. The previously unused spaces revealing a history of the place led to an increase in tourism.

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CHAPTER ONE

CASE STUDIES

PROJECT	THE HIGH LINE	GHIRARDELLI SQUARE	MAIN STREET	SEAPORT VILLAGE	
LOCATION	New York, New York	San Francisco, California	Greenville, South Carolina	San Diego, California	
LANDSCAPE ARCHITECT	James Corner Field Operations	Lawrence Halprin & Associates	Lawrence Halprin & Associates	Prtoea Waterfront Development, LLC	
LAND USE	Industrial to Parks and Recreation	Industrial to Commercial	Commercial & Business Corridor	Commercial & Residential	
SCALE	6 - Acres	One - Block	5 - Blocks	70 - Acres	
DATE	Opened in 2009		Late 1970s	Original 1980 - New 2022	
BACKGROUND INFORMATION	The High Line was the former West Side industrial Railway. Built in the 1930s, this 1.45 mile long elevated, steel structure was built for freight trains. The last train ran on it in 1980. The railway stretches across the west side of the city, running from Canarsie Street, in the Westpacking District, through the West Chelsea gallery neighborhood, and finally ends at 34th street, next to the Jacob Javits Convention Center	Ghirardelli Square, what used to be a neglected chocolate factory transformed into a shopping and tourist destination. The original brick building was designed around 1862 and purchased by the Ghirardelli Company in 1893	Main Street in Greenville had numerous vacant storefronts making it feel abandoned and neglected due to the relocation by commercial business to the suburbs	This 14 acre waterfront shopping, dining and entertainment complex recreates a harbor side setting of a century ago. It includes 54 one of a kind shops, 13 casual dining eateries, 4 fine dining waterfront restaurants, all located in close proximity to local hotels. Seaport Village is located in downtown San Diego on West Harbor Drive and Pacific Highway	
DESIGN	In 2003, an open competition was held to convert the existing structure into a public park. James Corner Field Operations with Diller Scofidio + Benfro had the winning proposal for the elevated park. This 33 city block-long elevated railway was reclaimed as a public space in the heart of Manhattan's West Side. Inspired by the wild seeded landscape that was left after the line had been abandoned. The surface is digitized into discrete units of paving and planting which are assembled along the 1.5 miles into a variety of gradients from 100% paving to 100% soft and richly vegetated biotopes. As each piece of the rail was removed, it was mapped and marked so that later it could be returned to its original location as an integrated planting piece	This project serves as an adaptive reuse model for other cities. Shops were installed at the street level with an elaborate entry stairway to bring visitors from the waterfront. Serves as an early and successful example of historic preservation. Ghirardelli Square has become one of the top tourist destination in San Francisco	Halprin's plan consisted of two objectives, lure commercial businesses back downtown and beautify the neighborhood so that people will want to shop there. Halprin reduced traffic from four lanes to two, added street parking widened sidewalks, and initiated a tree plan that has become a character defining feature of downtown Greenville. Today Main Street is bustling with people eating at cafes, with shoppers, and the occasional event or conference crowd. The landscape is punctuated with public art and plazas	The current revitalisation plan for Seaport Village includes parks, plazas, public space, beaches, seaside tidal pools, an expanded esplanade, public market, kids zone, dining and entertainment, shopping, hospitality, aquarium, educational center, butterfly wonderland, observation tower, waterside plan, commercial fishing, boating, outdoor exercise, sports and recreation, mobility, lighting, sustainability and resilience, and security	
APPROACHES	ADAPTIVE REUSE ENVIRONMENTAL CONNECTIVITY PHYSICAL CONNECTIVITY HUMAN CULTURAL CONNECTIVITY SOCIAL CONNECTIVITY	ADAPTIVE REUSE PHYSICAL CONNECTIVITY HUMAN CULTURAL CONNECTIVITY SOCIAL CONNECTIVITY ECONOMIC BENEFITS	ADAPTIVE REUSE PHYSICAL CONNECTIVITY SOCIAL CONNECTIVITY HUMAN CULTURE CONNECTIVITY ENVIRONMENTAL CONNECTIVITY ECONOMIC BENEFITS	PHYSICAL CONNECTIVITY ENVIRONMENTAL CONNECTIVITY EDUCATIONAL CONNECTIVITY ECONOMIC BENEFITS	
REOCCURRING VISITOR USE	YES	YES	YES	YES	
IMAGE					

NAVY PIER	SOUTH PARK PLAZA	THE SHORT NORTH
Chicago, Illinois	London, United Kingdom	Columbus, Ohio
James Corner Field Operations	James Corner Field Operations	The Short North Special Improvement District
Industrial to Recreational	Sports Arena to Public Olympic Park	Commercial & Business Corridor
1995		1984
The Navy Pier, originally named "Municipal Pier," opened to the public in 1916. It was built under architect Charles Sumner Frost based on Daniel Burnham's "Master Plan of Chicago." It was originally designed for shipping and recreational purposes. In 1927 it was renamed Navy Pier as a tribute to the Navy personnel who were housed at the Pier during World War I. In 1977 it was designated as a Chicago Landmark. In 1984 the Navy Pier underwent redevelopment with improvements made to almost every aspect of the Pier. It reopened in July 1988 offering a diverse and eclectic experience with its position in one of the most unique settings in the world.	Former site of the 2012 Olympic Games	Used to be a rough area comprised of mostly deserted buildings with boarded up windows. It was the local police who coined the area the "Short North" as it was north of Downtown Columbus and south of The Ohio State University campus. A successful renewal project of German Village in the 1960s have developers' ideas for the Short North Arts District. In 1980, a group of people were integral in founding the Short North Arts District. They worked to create its identity as a place where small businesses and artistic culture are celebrated. Gallery owners debuted new exhibits in 1984, creating the monthly event called the Gallery Hop.
A design proposal and team search was launched in 2011 for redevelopment of the Navy Pier. In 2018 James Corner Field Operations was chosen out of 58 submissions. The design included a three part strategy: strengthening connections between the city and the lake, refreshing and de-cluttering the pier to make way for new green infrastructure, and embracing Chicago, its culture and character to create a place that is reflective of the city's identity. There are two phases of redevelopment. The first phase, completed in 2018 included the redesign of the Pier's public spaces, known as Piercapes, and the improvements to the interior of the Family Pavilion and South Arcade. The second phase includes the development of a seven-story, 840 room hotel, adjacent to the south side of the Festival Hall; marquee additions to the East End Plaza, including a proposed arched, elevated overlook walkway and reflective water feature; a Welcome Pavilion in Polk Bros Park with 4,000 square feet for guest services and programmatic space; a seasonal ice rink within the footprint of the Polk Bros Park's fountain plaza; and a short-term, north-side boat docking facility for use by recreational boaters seasonally.	Transformed the South Park Plaza into the publicly dedicated Queen Elizabeth Olympic Park. The landscape is situated between the 2012 Games Stadium, Aquatics Centre and Arsenal/Minal Orbit by Anish Kapoor. A hub building associated with the landscape provides leisure and visitor facilities. Contains a legacy of unique sports venues, gardens, and new parkland.	In 1999 the Short North Improvement District was established to improve the cleanliness, beauty and safety of the District. One of the most recognizable elements in the District's lighted arches, which dates back to 1888 when Columbus first became known as "Arch City." Since Ohio was the first state carved out of the Northwest Territory, Ohio was chosen to host the centennial celebration of the creation of the Northwest Territory. Wooden arches were lit by gaslight and built to both light the streets and dazzle visitors. In 1896, steel and electric light replaced the arches, but in 1916 they were torn down and replaced again by light poles. Almost 100 years later, in 2006, 17 steel arches were reinstalled on High Street, giving the Short North Arts District its identifying feature. Today it is home to over 300 businesses, the majority of which are locally owned or headquartered.
ADAPTIVE REUSE PHYSICAL CONNECTIVITY ENVIRONMENTAL CONNECTIVITY HUMAN CULTURAL CONNECTIVITY SOCIAL CONNECTIVITY ECONOMIC BENEFIT	ADAPTIVE REUSE PHYSICAL CONNECTIVITY SOCIAL CONNECTIVITY	PHYSICAL CONNECTIVITY SOCIAL CONNECTIVITY HUMAN CULTURAL CONNECTIVITY ECONOMIC BENEFITS
YES	YES	YES
		

Figure 6: Case Studies Matrix

CHAPTER ONE

PROJECT BACKGROUND INTENDED AUDIENCE & PRODUCT

Intended Audience

This project will support the community of North Canton with economic benefits while preserving the history and culture of the city. The master plan and techniques used in this project will provide as a guide to other cities and towns looking to increase tourism while revitalizing abandoned or vacant areas that provide history or culture to a place. The intended audience of this graduate proposal will include the community of North Canton, the Mayor of North Canton, Professionals and students interested in cultural tourism, educational institutions, professionals and students interested in adaptive reuse, and students of landscape architecture.

Product

The product is a package of materials that will include written text with supporting maps and graphics, inventory and analysis, case study matrix, sketches, perspectives, and a master plan. The information is put together in book form to present to the Mayor of North Canton and the Department of Landscape Architecture at Clemson University. For the presentation, a PowerPoint presentation was made that will help the viewer visually understand the site and the supporting design and guide the viewer through the decisions that were made and the aspects of the project.



Figure 7: Original Hoover Vacuum Ad

CHAPTER ONE

PROJECT BACKGROUND TASKS AND SCHEDULE

Fall 2018

- Week 1 - Research cultural tourism
- Week 2 - Continue research on cultural tourism & begin case study matrix
- Week 3 - Work on case study matrix
- Week 4 - Complete rough draft of problem statement, calendar, intended audience & Methodology
- Week 5 - Analyze research and parameters/elements in case studies, refine topic
- Week 6 - Make rough draft of Project Proposal
- Week 7 - Make adjustments to proposal, continue research
- Week 8 - Complete Final Proposal
- Week 9 - Make any additional adjustments to proposal
- Week 10 & beyond - Develop Graduate Project Research data base

Spring 2019

- Week 1 - Meet with committee
- Week 2-3 - Preliminary Design
- Week 4-8 - Complete Inventory & analysis
- Intermediate Design
- Design Development
- Design responds to topic, research questions, issues, conceptual position, literature, environmental factors and site conditions
- Make adjustments to Analysis diagrams
- Conceptual & Schematic Design
- Week 9-13 - Final Design
- Week 14-16 - MLA Defense
- Final Presentation & Submission
- Make adjustments to final design
- Deliverables & Documentation



Figure 8: Historic photo of the Hoover Company & North Canton City Residents



[CHAPTER TWO]

INVENTORY & ANALYSIS



CHAPTER TWO

INVENTORY & ANALYSIS HISTORY

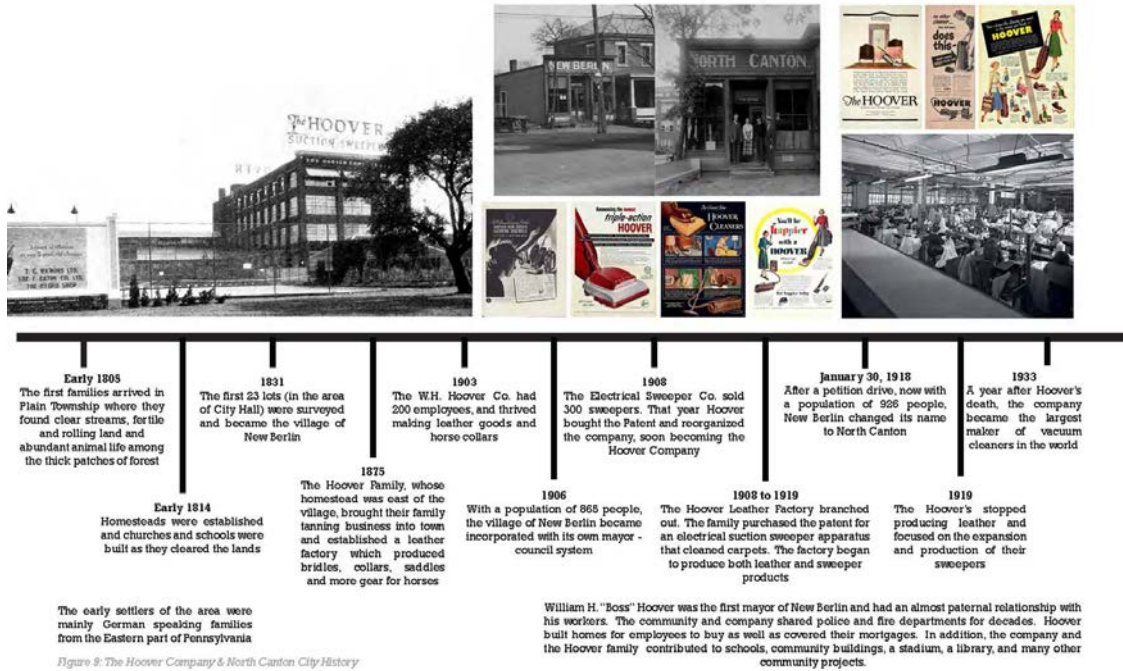
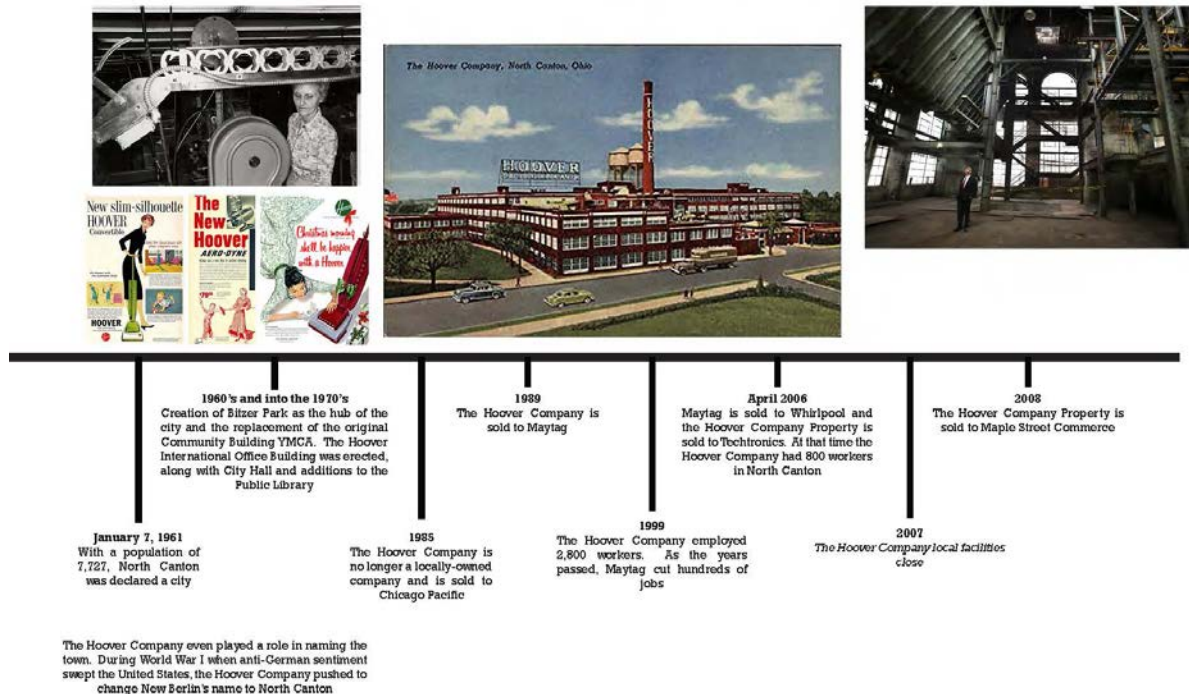


Figure 9: The Hoover Company & North Canton City History

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CHAPTER TWO

INVENTORY & ANALYSIS HISTORY



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CHAPTER TWO

INVENTORY & ANALYSIS MAJOR CITY CENTERPIECE



This map allows us to understand that North Canton is in the center of three major cities. With cultural tourism as the main topic of this project this means there is a high potential for tourism to reach North Canton.

Figure 10: Map locating North Canton as the centerpiece between three major cities; Columbus, Cleveland, and Pittsburgh

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CHAPTER TWO

INVENTORY & ANALYSIS CONNECTION TO PRO FOOTBALL HALL OF FAME

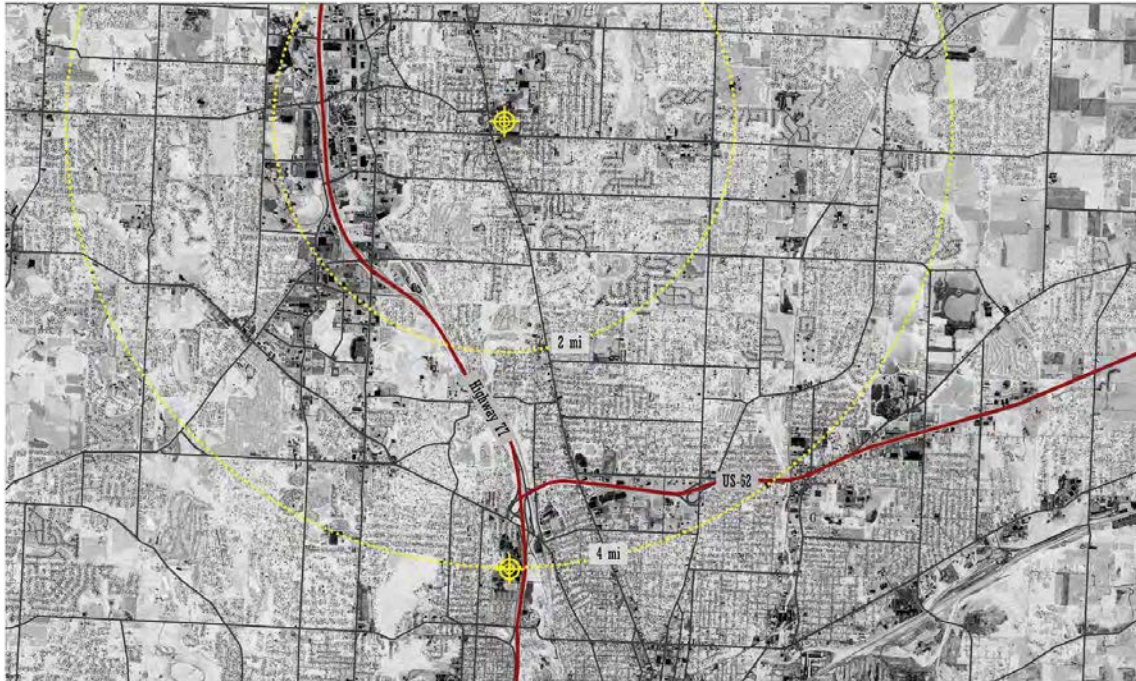


Figure 11: Map identifying the distance between The Hoover Complex and the Pro Football Hall of Fame

This map allows us to make the connection from a major tourist hub (The Pro Football Hall of Fame) to The Hoover Complex. The Pro Football Hall of Fame is very close which also adds to the potential for tourists to reach North Canton and the Hoover Complex.

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CHAPTER TWO

INVENTORY & ANALYSIS

HISTORIC BUILDINGS IN NORTH CANTON, OHIO



This map identifies the important and historic buildings within the city. They both relate to William H. Hoover and the Hoover Company. They are also both located along East Maple Street which allows us to understand the importance of this corridor.

Figure 12: Map locating the buildings listed on the Historic Buildings Register in the City of North Canton

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CHAPTER TWO

INVENTORY & ANALYSIS

ZONING VS. LAND USE

These maps allow us to look at the zoning versus the land use of city. These allow us to understand that the zoning shows major corridors and sections that of the city for certain subject. Whereas most of the land use maps show either a major or slight difference. It is important to compare zoning and land use to understand how the city is laid out and how it actually functions

Zoning: General Business

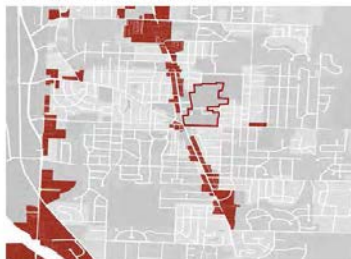


Figure 13: Map identifying the plots zoned as General Business in the City of North Canton. Information obtained by Stark County GIS

Zoning: Industrial



Figure 14: Map identifying the plots zoned as Industrial in the City of North Canton. Information obtained by Stark County GIS

Zoning: Office

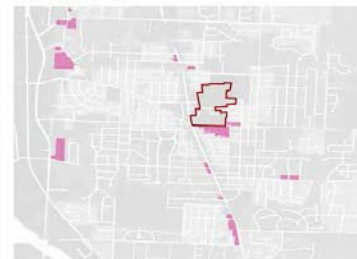


Figure 15: Map identifying the plots zoned as Office in the City of North Canton. Information obtained by Stark County GIS

Land Use: General Business



Figure 16: Map identifying the Land Use of the plots as General Business in the City of North Canton. Information obtained by Stark County GIS

Land Use: Industrial



Figure 17: Map identifying the Land Use of the plots as Industrial in the City of North Canton. Information obtained by Stark County GIS

Land Use: Office



Figure 18: Map identifying the Land Use of the plots as Office in the City of North Canton. Information obtained by Stark County GIS

CHAPTER TWO

INVENTORY & ANALYSIS

LAND USE

Zoning: Parks / Institutions

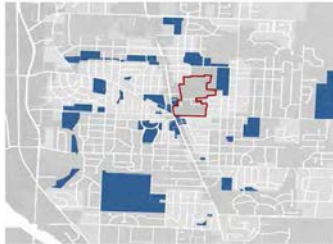


Figure 19: Map identifying the plots zoned as Parks / Institutions in the City of North Canton. Information obtained by Stark County GIS

Zoning: Parks / Institutions

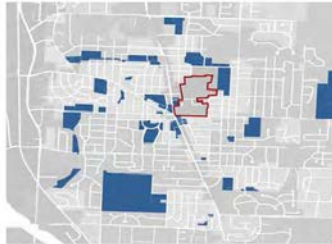


Figure 20: Map identifying the plots zoned as Parks / Institutions in the City of North Canton. Information obtained by Stark County GIS

Zoning: Rural Residential



Figure 21: Map identifying the plots zoned as Rural Residential in the City of North Canton. Information obtained by Stark County GIS

Land Use: Institutions

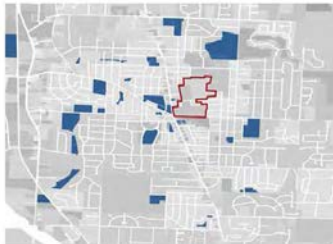


Figure 22: Map identifying the Land Use of the plots as Institutions in the City of North Canton. Information obtained by Stark County GIS

Land Use: Parks



Figure 23: Map identifying the Land Use of the plots as Parks in the City of North Canton. Information obtained by Stark County GIS

Land Use: Rural Residential



Figure 24: Map identifying the Land Use of the plots as Rural Residential in the City of North Canton. Information obtained by Stark County GIS

CHAPTER TWO

INVENTORY & ANALYSIS

ZONING VS. LAND USE

Zoning: Multi-Family Residential

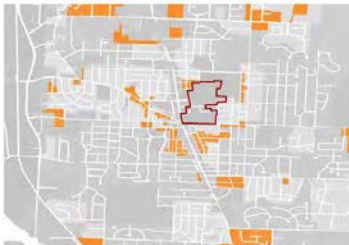


Figure 25: Map identifying the plots zoned as Multi-Family Residential in the City of North Canton. Information obtained by Stark County GIS

Zoning: Single Family Residential Lrg. Lot

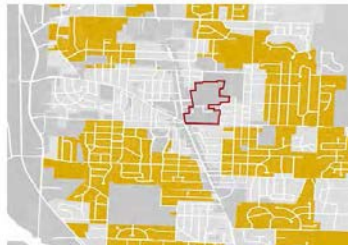


Figure 26: Map identifying the plots zoned as Single Family Residential Large Lot in the City of North Canton. Information obtained by Stark County GIS

Zoning: Single Family Residential

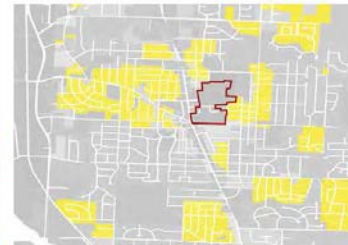


Figure 27: Map identifying the plots zoned as Single Family Residential in the City of North Canton. Information obtained by Stark County GIS

Land Use: Multi-Family Residential

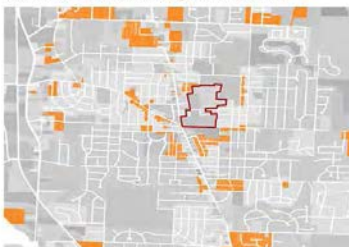


Figure 28: Map identifying the Land Use of the plots as Multi-Family Residential in the City of North Canton. Information obtained by Stark County GIS

Land Use: Single Family Residential Lrg. Lot

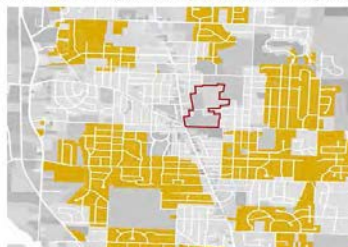


Figure 29: Map identifying the Land Use of the plots as Single Family Residential Large Lot in the City of North Canton. Information obtained by Stark County GIS

Land Use: Single Family Residential



Figure 30: Map identifying the Land Use of the plots as Single Family Residential in the City of North Canton. Information obtained by Stark County GIS

These maps allow us to look at the zoning versus the land use of city. These allow us to understand that the zoning shows major corridors and sections that of the city for certain subject. Whereas most of the land use maps show either a major or slight difference. It is important to compare zoning and land use to understand how the city is laid out and how it actually functions

CHAPTER TWO

INVENTORY & ANALYSIS LAND USE

Land Use: Religious Institutions

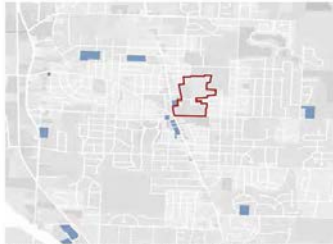


Figure 31: Map identifying the Land Use of the plots as Religious Institutions in the City of North Canton. Information obtained by Stark County GIS

Land Use: Commercial



Figure 32: Map identifying the Land Use of the plots as Commercial in the City of North Canton. Information obtained by Stark County GIS

Land Use: Green Space



Figure 33: Map identifying the Land Use of the plots as Green Space in the City of North Canton. Information obtained by Stark County GIS

Land Use: Hospitality



Figure 34: Map identifying the Land Use of the plots as Hospitality in the City of North Canton. Information obtained by Stark County GIS

Land Use: Restaurants

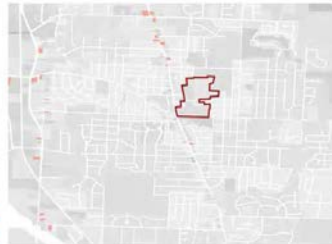


Figure 35: Map identifying the Land Use of the plots as Restaurants in the City of North Canton. Information obtained by Stark County GIS

Land Use: Retail



Figure 36: Map identifying the Land Use of the plots as Retail in the City of North Canton. Information obtained by Stark County GIS

These maps allow us to look at the land use of city that was not represented in the zoning maps. These land use maps allow us to see the true use of the city and how that related to the Hoover Complex site. These maps show us that there is clearly a retail and commercial corridor. It also allows us to understand that the majority of the area surrounding the site is actually a food desert. That means there is little to no restaurants or food sources nearby. So it becomes apparent to fix this

CHAPTER TWO

INVENTORY & ANALYSIS LAND USE & DEMOGRAPHICS

Land Use: Parking Lots

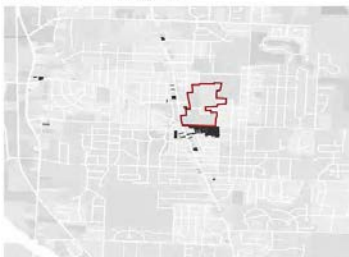


Figure 37: Map identifying the Land Use of the plots as Parking Lots in the City of North Canton. Information obtained by Stark County GIS

Land Use: Sports Fields



Figure 38: Map identifying the Land Use of the plots as Sports Fields in the City of North Canton. Information obtained by Stark County GIS

Land Use: Vacant Lots



Figure 39: Map identifying the Land Use of the plots as Vacant Lots in the City of North Canton. Information obtained by Stark County GIS

These maps allow us to look at the land use of city that was not represented in the zoning maps. These land use maps allow us to see the true use of the city and how that related to the Hoover Complex site. These three maps show us that there is a large mass of parking lots directly next to the site which is a large amount of impervious surface in one location. It also shows the variety of sports fields and vacant lots in and around the site.

DEMOGRAPHICS:

- Population (2014): 17,490, 100% urban, 0% rural – population change since 2000: +6.8%
 - Males: 8,059 (46.1%)
 - Females: 9,431 (53.9%)
- Median resident age: 43.9 years
 - Ohio median age: 39.3 years
- Median Household income in 2016: \$58,489
 - North Canton: \$58,489
 - Ohio: \$52,334
- Median House or condo value in 2016: \$142,989
 - North Canton: \$142,989
 - Ohio: \$140,100
- Race:

- White: 93.8%	- African American: 2.0%	- Hispanic: 1.5%
- Asian: 1.1%	- American Indian: 0.1%	- Native Hawaiian & Pacific Islander: 0.02%

The population has grown as well as the economy over the past few years. Currently the average age is a little bit on the higher end. Something to consider would be to design for the generation that is currently living there but also design for the younger generations. One observation is that the city does not have a place of gathering for the younger people. The master plan should highly consider the usage by all ages and hopefully create a place for the younger generation

Source: <http://www.city-data.com/city/North-Canton-Ohio.html>

CHAPTER TWO

INVENTORY & ANALYSIS CLIMATE

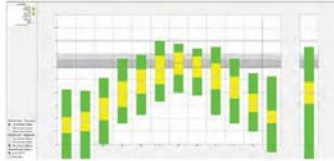


Figure 40: Graph identifying the average temperature throughout the year. The gray bar represents an average comfort level. Information obtained from Climate Consultant

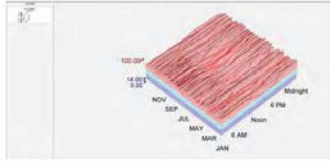


Figure 41: Graph identifying relative humidity throughout the year. The read indicates that the humidity is above average. Information obtained from Climate Consultant



Figure 42: Graph incorporating average temperature, humidity, and wind speed. The yellow represents the # of hours. The blue represents temp. The green represents relative humidity. And the orange represents wind speed.

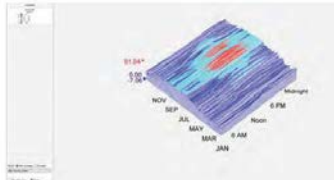


Figure 43: Graph identifying average temperature throughout the year. The blue represents a temperature of 52 degrees or lower. The red represents a temp. of 81 degrees or higher.

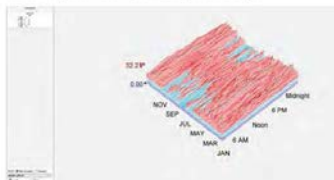


Figure 44: Graph identifying average wind speed throughout the year. The red represents a wind speed of 10 mph or higher. The cyan color represents a wind speed of 5-10 mph.

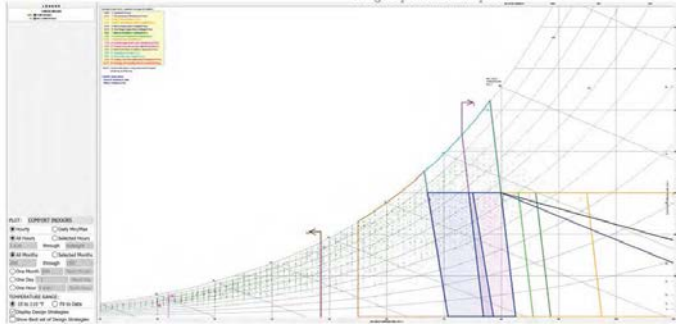


Figure 45: Graph identifies the design strategies to achieve an ideal comfort level indoors. The blue box represents the ideal comfort zone and the design strategies that can be taken within this zone. This zone is analyzed by dry bulb temperature and relative humidity. Information obtained from Climate Consultant

Climate Analysis:
This information helps us understand that the average temperature in North Canton Ohio is low, the relative humidity is high, and the wind speed is fairly high throughout the year. This informs us that the design must adhere to this information to allow the space to be comfortable for people throughout all seasons. We want visitors to be able to utilize the spaces designed throughout the year.

CHAPTER TWO

INVENTORY & ANALYSIS CIRCULATION

It is important to analyze the circulation in and around the site. The information shows us that there is not much circulation through the site. The site is located on the corner of the major intersection of East Maple Street and Main Street. These are major traffic corridors that incorporate heavy vehicular traffic. This intersection is starting to adapt to a pedestrian friendly area but the majority of the area surrounding the site is not pedestrian friendly. There are no bike lanes. It is mainly vehicles that are the main mode of transportation in this area. This map allows us to understand that the design should provide a way to be pedestrian friendly and provide at least one route through the site.

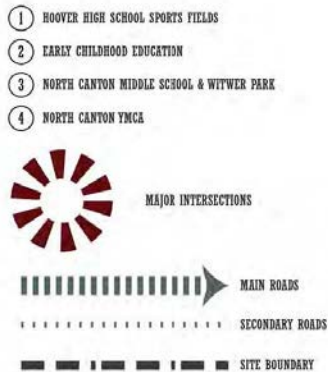
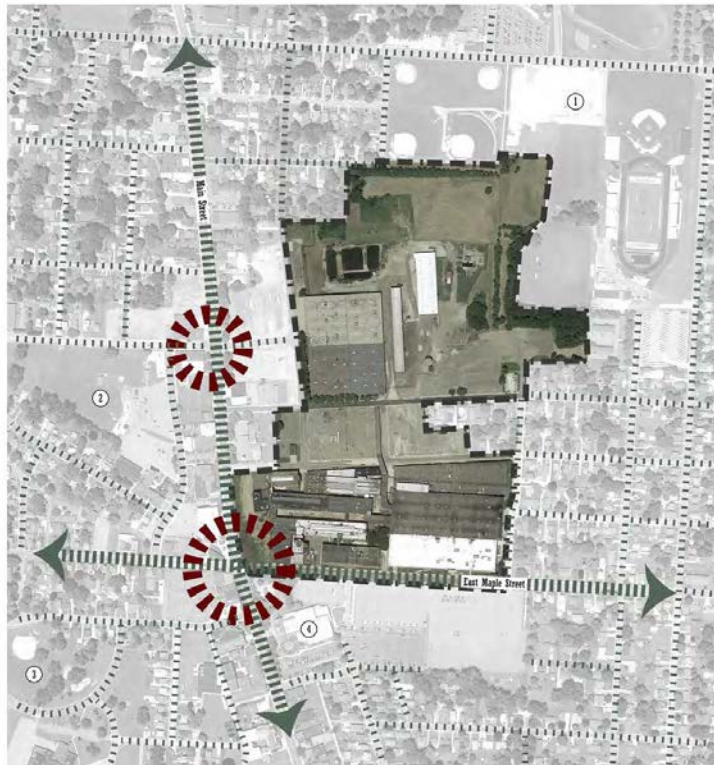


Figure 46: Map identifying the site area, as well as the major intersections and circulation around the site. It also points out key locations for the city.



CHAPTER TWO

INVENTORY & ANALYSIS VISUAL AESTHETICS



Figure 47: Sidewalk along East Maple Street



Figure 48: Materiality of the Hoover Complex. Difference of Brick used throughout the building

These images allows us to understand the character of the place. The site and the surrounding area incorporates traditional materials such as brick to correspond with the Historic Hoover Complex. This tells us that the design should continue to incorporate these traditional materials throughout the site and respond to the existing conditions



Figure 49: The current state of the building



Figure 50: Panorama of the current Hoover Complex

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CHAPTER TWO

INVENTORY & ANALYSIS VISUAL AESTHETICS



Figure 51: William H. Hoover Statue in Bitter Park across the street



Figure 52: View of Complex & Surroundings from Bitter Park

These images allows us to understand the character of the place. The site and the surrounding area incorporates traditional materials such as brick to correspond with the Historic Hoover Complex. This tells us that the design should continue to incorporate these traditional materials throughout the site and respond to the existing conditions



Figure 53: Historic Police Traffic Booth



Figure 54: Panorama of The Hoover Complex from City Hall

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CHAPTER TWO

INVENTORY & ANALYSIS CITY CENTER REVITALIZATION

1. Hoover "Complex" is a series of 8 buildings
 2. 3 currently occupied by offices & manufacturing companies
3. Buildings closest to center of town to be considered "West Factory" and is comprised of 3 buildings
 - Cost \$700,000 to revitalize the iconic smokestack
 - Took apart brick by brick to increase stability and use original brick
4. ½ acres of green space at intersection of Main Street and East Maple Street
 - Goal: landscape for all seasons
5. Street tree plantings along East Maple Street
- 6-9. 4 corners revitalization
 - Defines the given name "Hoover Historical District"
 - Bitzer Park to be the next corner revitalization
1. EPA held up current project
 - Hoover Company neglected disposal of waste causing vapors to come through the ground into the complex
 - Established a Vapor Attenuation System
 - Series of 15 sub slab depressurization systems
 - Radon systems
 - Process started in October of last year – to be finished end of February or early March
 - Required to run monitoring tests for 3-4 months to ensure safe air quality within the buildings
 - Surrounding property had to put in these same systems at the expense of the Hoover Company
 - Goal: to gut inside of buildings and complete the first phase within 2 years after EPA approval



OTHER FACETS OF NATURE:

VEGETATION: The city has started to incorporate street trees along the main corridors in the city's center. Within this site there is not currently a large variety of vegetation. The final design should pick up on the city's effort in tree plantings and enhance that for the health and wellness of the city.

SOILS: As stated to the left to soils within this area have been contaminated by improper disposal of waste. The EPA is making efforts to change this and make the building and site usable and increase air quality as well as provide a good foundation for future plant life within the city.

Figure 55: Aerial of site with site boundary

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CHAPTER TWO

INVENTORY & ANALYSIS CITY CENTER REVITALIZATION

- Developers: IRG (Industrial Realtor Group)
- Recession initially killed Adaptive Reuse idea
- Named the project survivor because of how long they have had to keep the project on hold but are still actively pursuing
- Focus for the future:
 - Re-zoning to make North Canton like a millennial village
 - NC is currently the 7th most populous place to retire in Ohio
 - 10. Buildings along 5th, 6th, and 7th Street to be removed or retro-fitted to fit today's demographics
 - Cater to the people who want to walk and ride their bikes everywhere (become more pedestrian friendly)
 - Sustain the city and attract younger people
 - Example: Squirrel Company (national high tech company) resides in NC and wants to continue to grow in NC
 - NC is a very safe city which could be a high selling point
 - Close enough to other major city's, like Akron (15-20 miles away) to commute to work
- HOF Village to be built on the safe side of Canton (closest to NC)
 - Arrowhead Golf Course to be redeveloped as a connector between Canton and North Canton
 - This development could give the opportunity to blend the two communities



Figure 56: Aerial of site with site boundary

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CHAPTER THREE

DESIGN DEVELOPMENT
PROGRAM PRIORITY

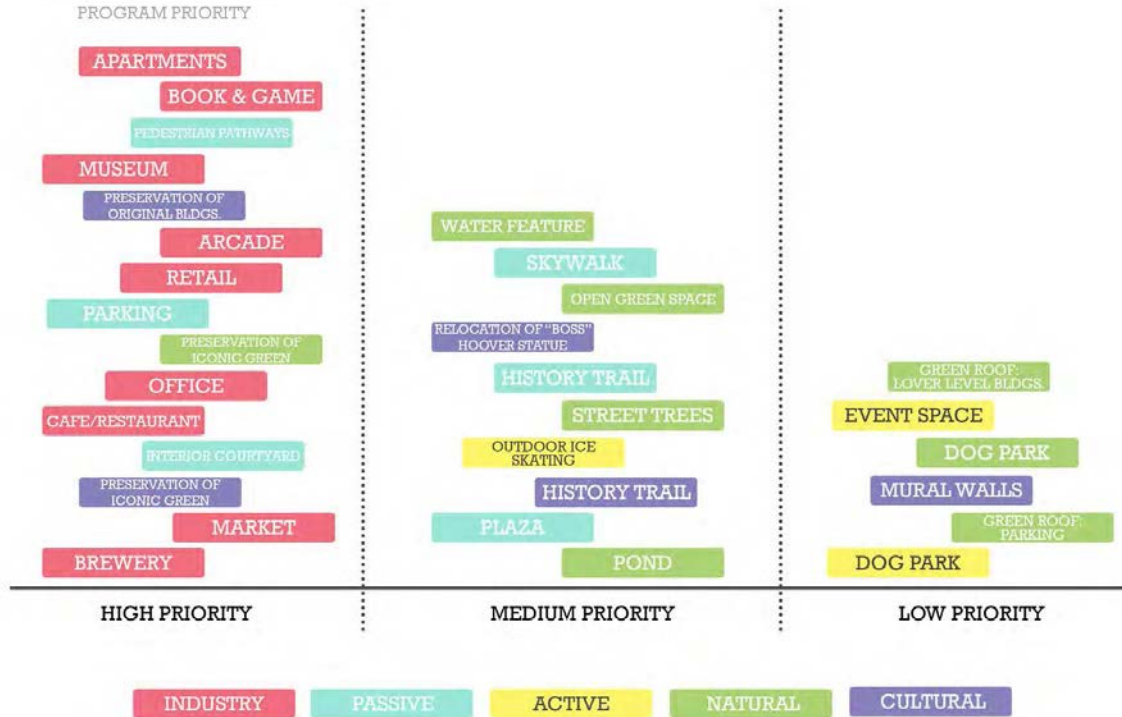


Figure 57: Program Priority Diagram shows potential phasing for each program element

CHAPTER THREE

DESIGN DEVELOPMENT
TYPOLOGIES & CHARACTERISTICS

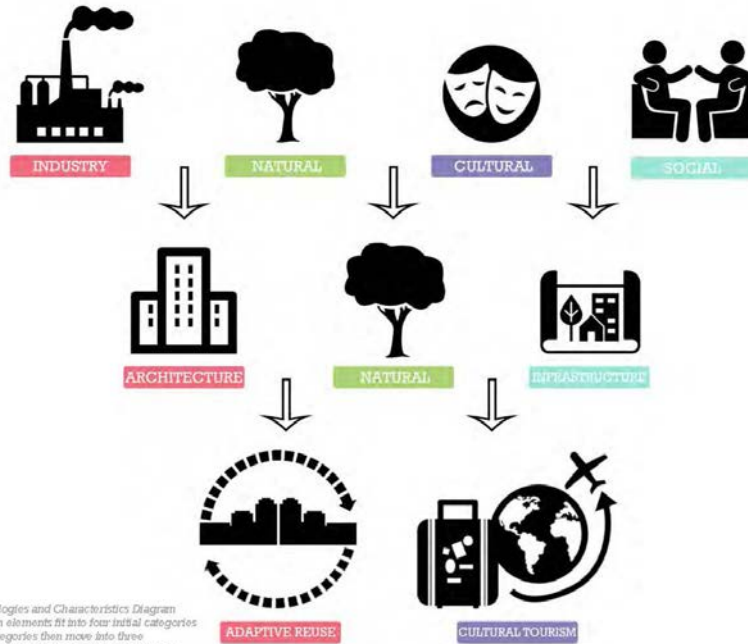


Figure 58: Program Typologies and Characteristics Diagram explains that the program elements fit into four initial categories of design. These four categories then move into three categories and then finally into the main topic of the project, Adaptive Reuse and Cultural Tourism.

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CHAPTER THREE

DESIGN DEVELOPMENT
TYPOLOGIES & CHARACTERISTICS

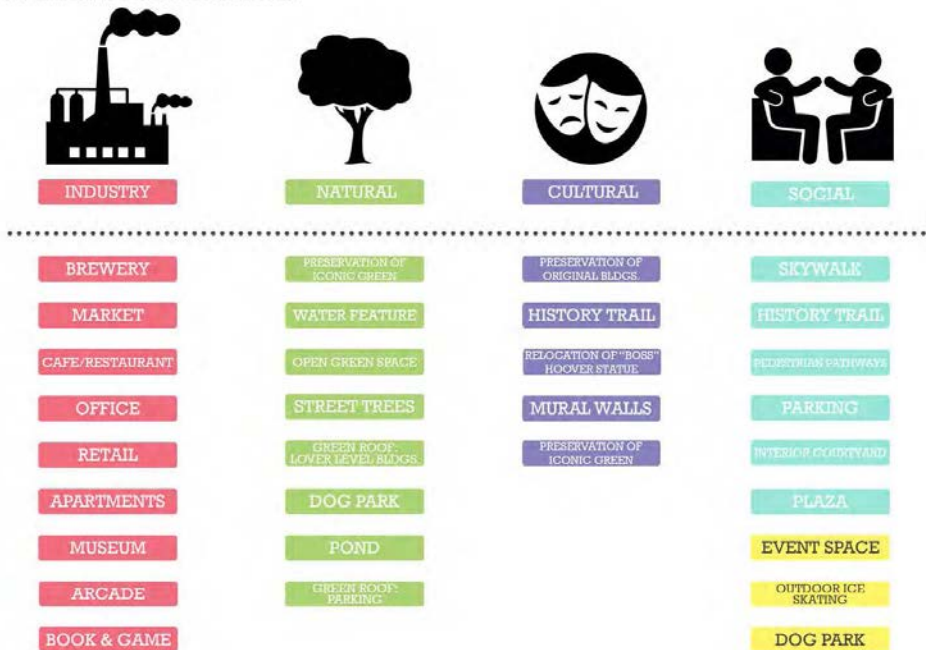


Figure 59: Typologies and Characteristics Diagram identifies the first four categories and where the program elements fit in each. The program elements are color coded to correspond with the categories in Figure 58. Salmon: Industry, Green: Natural, Purple: Cultural, Cyan: Passive, and Yellow: Active.

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CHAPTER THREE

DESIGN DEVELOPMENT TYPOLOGIES & CHARACTERISTICS

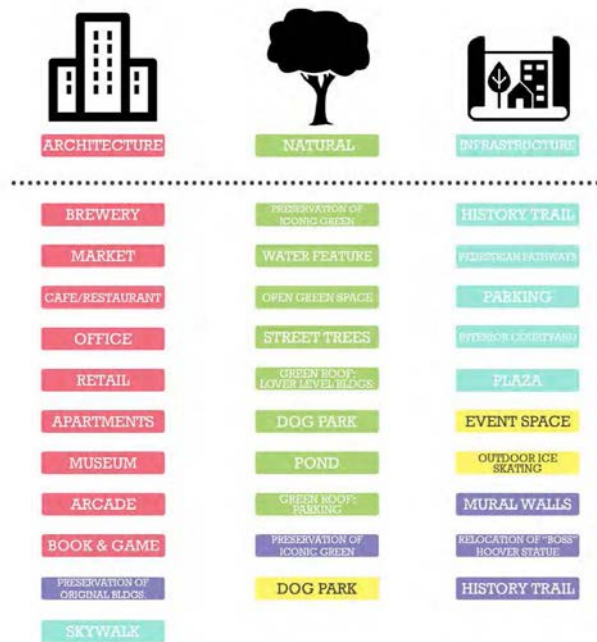


Figure 60: Typologies and Characteristics Diagram identifies the second three categories and where the program elements fit in each. The program elements are color coded to correspond with the categories in Figure 58. Salmon: Industry, Green: Natural, Purple: Cultural, Cyan: Passive, and Yellow: Active

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CHAPTER THREE

DESIGN DEVELOPMENT TYPOLOGIES & CHARACTERISTICS

DESIGN CRITERIA STATEMENT:

The master plan of the Hoover Complex must contain a variety of programmatic elements that fits within the scope of the city's view and the idea of cultural tourism and adaptive reuse. The Hoover Complex itself must be revitalized into a Mixed-Use development because of its location and future function for the city. The Complex will contain a Brewery, Market, Café/Restaurant, Office Space, Retail Stores, Arcade, Museum, and a Book and Game Shop on the lower two levels of the buildings. And the upper two levels will be apartment units. What goes into the buildings is very important how the space will continue to function and how the city will utilize it in the future for further growth in the economy and the city as a whole. The other major factor within this master plan is connectivity. There is a lack of connectivity to high trafficked areas within the city, such as the High School Sports fields. Including pedestrian pathway from these areas to the site will increase visitation to the site and everything this space has to offer. Additional things to consider with the programmatic elements within this site are what is in between the actual buildings, the buildings and the pedestrian pathways, and the street to the buildings and pathways. With that being said, additional program elements should be included to close these gaps, such as an interior courtyard and a plaza.

One thing missing from this site is a lack of nature. The city has started to put street trees along the main corridors, but it is still missing that sense of nature. The further addition of street trees will be necessary to not only provide green for the city but also provide a buffer from the main roads that surround the complex. In addition to the street trees, there should be added green space and landscaping throughout the site and along the pedestrian pathways; to almost give a park like feel as people move through the site. Another natural element to consider is the addition of a man-made pond along the circulation pathways. This feature gives could provide for an ecosystem that currently doesn't thrive in this site and could provide for additional recreational use for visitors during the colder months of the year. If the water freezes it could provide for a natural outdoor ice rink for people to enjoy during the time of the year that most people would not want to be outside. The new sense of nature will make the entire site feel softer and less rigid.

Figure 61: Typologies and Characteristics Diagram identifies the final two categories and where the program elements fit in each. The program elements are color coded to correspond with the categories in Figure 58. Salmon: Industry, Green: Natural, Purple: Cultural, Cyan: Passive, and Yellow: Active



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CHAPTER THREE

DESIGN DEVELOPMENT
PROGRAMMING ATTRIBUTES

PROGRAMMING ATTRIBUTES										
SPACE / FUNCTION	PRIVATE	PUBLIC	SERVED	SERVANT	STREET	SKY	WATER	VIEW	SUN	SHADE
Brewery		●	○	●	●			●	○	●
Interior Courtyard		●				●		●	●	●
Preservation of Iconic Green		●	●	○	●				●	○
Market		●	●	●	○			●	○	●
Outdoor Ice Skating		●		○			●			
Mural Walls	●	●	●			●	●	●	●	●
Cafe/Restaurant		●	●	●	●			●	○	●
Parking		●	●			●			●	●
Street Trees		●	●		●	●	●	●	●	
Apartments	●		●	●	○	●		●		●
Relocation of "Bee" Beaver Statue	●		●							
Pedestrian Pathways		●	●		●	●	○	●	●	●
Dog Park		●	●	○		●		●	●	●
Office	●		●		●			●	●	●
Pond		●	●	○		●	●	●	●	●
Plaza		●	●	○	○		●	●	●	●
Retail		●	●	●	○			●	○	●
Green Roof - Parking	○	●	●	○	●	●	●	●	●	●
History Trail		●	●	○	○		●	●	●	●
Arcade		●	●	●				○		●
Skywalk	●	●	●		○	●	●	●	○	●
Green Roof - Lower Level Ramps	●		●	○		●	●			
Museum		●	●	●	○			●	●	●
Water Feature		●	●			●	●	●	●	●
Book & Game Shop		●	●	●	○			●	○	●
Event Space		●	●	●		●		●	●	○
Open Green Space		●	●	○				●	●	○

Figure 62: Programming Attributes Matrix identifies the program elements and how they relate to space and function categories. This matrix helps to make connections to certain program elements which will help determine the final design and layout and where these elements should be located on the site

● COMPLETE ● MODERATE ○ PARTIAL

CHAPTER THREE

DESIGN DEVELOPMENT
PROGRAM CHARACTERISTICS

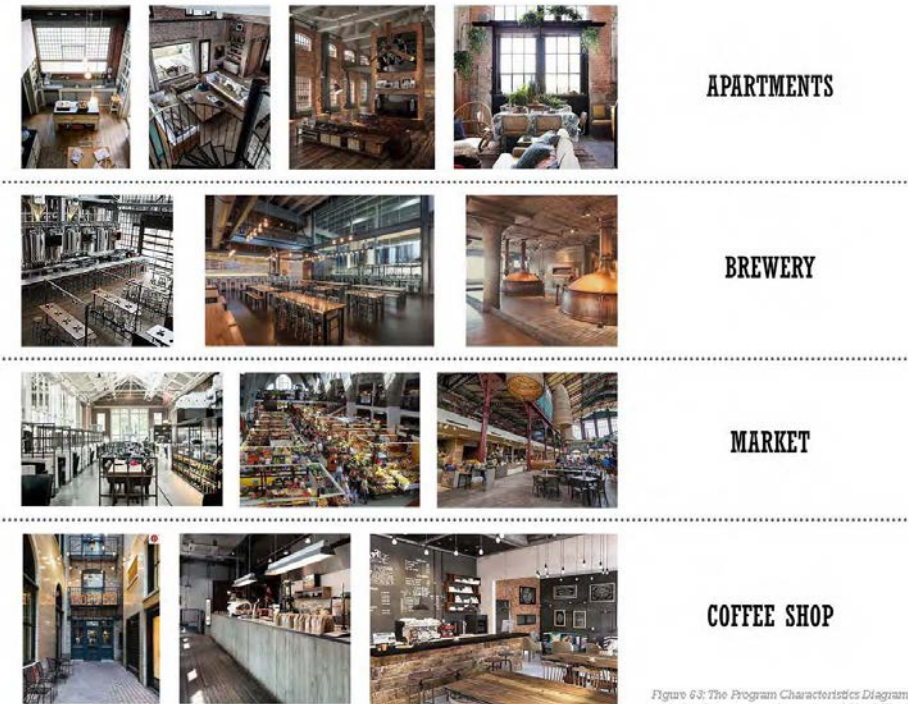


Figure 63: The Program Characteristics Diagram provides a visual of what the program elements could look like & how it maintains a certain characteristic of the existing site

CHAPTER THREE

DESIGN DEVELOPMENT
PROGRAM CHARACTERISTICS



PLAZA



WATER FEATURE



PARK



LINEAR COURTYARD

Figure 64: The Program Characteristics Diagram provides a visual of what the program elements could look like & how it maintains a certain characteristic of the existing site

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CHAPTER THREE

DESIGN DEVELOPMENT
PROGRAM CHARACTERISTICS



BIKE LANES &
GREEN ROOF PARKING



DOG PARK



POND W/
OUTDOOR ICE SKATING



PRESERVATION OF
ICONIC GREEN

Figure 65: The Program Characteristics Diagram provides a visual of what the program elements could look like & how it maintains a certain characteristic of the existing site

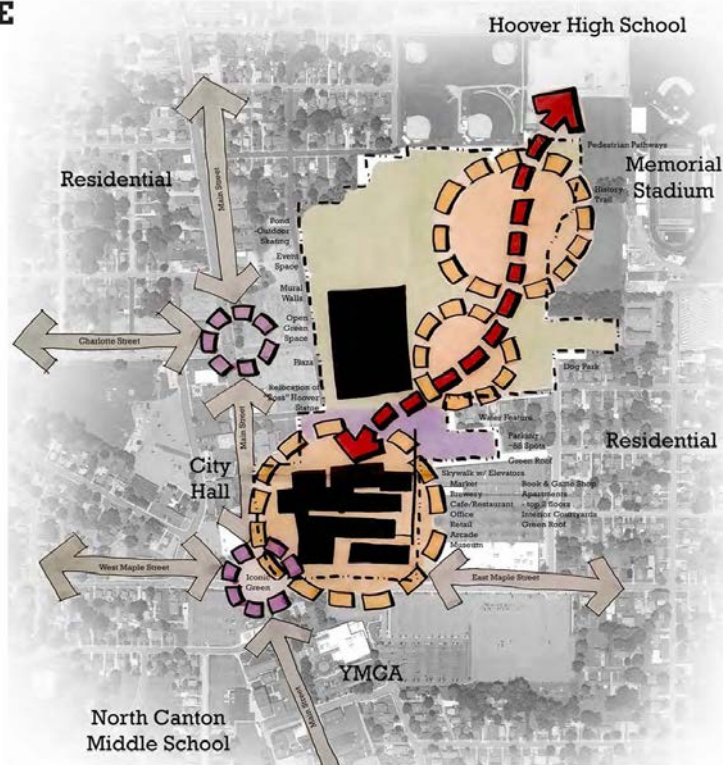
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CHAPTER THREE

DESIGN DEVELOPMENT CONCEPTUAL DESIGN

1. MAJOR INTERSECTIONS
2. NODES OF FUTURE ACTIVITY
3. MAIN CONNECTOR
4. NATURAL
5. INFRASTRUCTURE
6. ARCHITECTURE

Figure 66: Conceptual Diagram with program elements and surrounding elements. The concept of have a main connector that goes through the entire site that links Hoover High School with the Hoover Complex. There are 3 major nodes throughout the site along the main corridor. The program elements are listed along the edges of the site where they may be located.



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CHAPTER THREE

DESIGN DEVELOPMENT CONCEPTUAL DESIGN

1. HOOVER COMPLEX

- Brewery
- Market
- Cafe/Restaurant
- Apartments
- Office
- Interior Courtyards
- Retail
- Arcade
- Skywalk
- Museum
- Book & Game Shop

2. PLAZA

- Water Feature
- Memorial Grove
- Memorial Garden
- Relocation of "Boss" Hoover Statue
- Mural Wall
- Splash Pad

3. ICONIC GREEN

- Outdoor Seating

4. PARKING LOT

- Green Roof

5. DOG PARK

- Large & Small Dog Parks

6. HISTORY TRAIL

- Hoover Company & City History

7. EVENT CENTER

- Indoor City Events

8. POND

- Outdoor Ice Skating

9. OPEN GREEN

- Pedestrian Pathways
- Gathering & Recreation Space

10. EVENT SPACE

- Outdoor Amphitheater

Figure 67: Conceptual Design Option #1



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CHAPTER THREE

DESIGN DEVELOPMENT CONCEPTUAL DESIGN

1. HOOVER COMPLEX

- Brewery
- Market
- Cafe/Restaurant
- Apartments
- Office
- Interior Courtyards
- Retail
- Arcade
- Skywalk
- Museum
- Book & Game Shop

2. PLAZA

- Water Feature
- Memorial Grove
- Memorial Garden
- Relocation of "Boss" Hoover Statue
- Mural Wall
- Splash Pad

3. ICONIC GREEN

- Outdoor Seating

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- Green Roof

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- Large & Small Dog Parks

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- Hoover Company & City History

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8. POND

- Outdoor Ice Skating

9. OPEN GREEN

- Pedestrian Pathways
- Gathering & Recreation Space

10. EVENT SPACE

- Outdoor Amphitheater

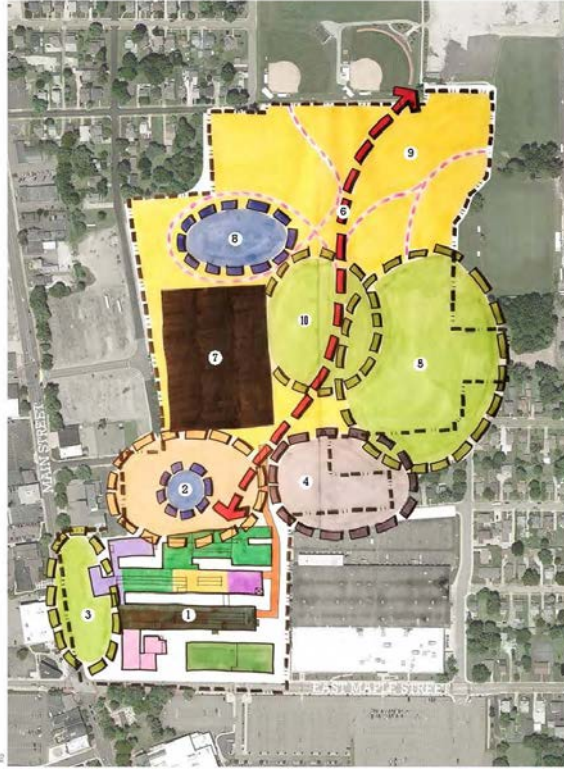


Figure 68: Conceptual Design Option #2

[CHAPTER FOUR] FINAL DESIGN





CHAPTER FOUR

FINAL DESIGN MASTER PLAN

1. HOOVER COMPLEX

- Brewery
- Market
- Cafe/Restaurant
- Apartments
- Office
- Interior Courtyards
- Retail
- Arcade
- Skywalk
- Museum
- Book & Game Shop

2. PLAZA

- Water Feature
- Memorial Grove
- Memorial Garden
- Relocation of "Boss" Hoover
- Mural Wall
- Splash Pad

3. ICONIC GREEN

- Outdoor Seating

4. PARKING LOT

- Green Roof

5. DOG PARK

- Large & Small Dog Parks

6. HISTORY TRAIL

- Hoover Company & City History

7. EVENT CENTER

- Indoor City Events

8. POND

- Outdoor Ice Skating

9. OPEN GREEN

- Pedestrian Pathways
- Gathering & Recreation Space

10. EVENT SPACE

- Outdoor Amphitheater



Figure 10: PROMENADE: to plaza & history trail

CHAPTER FOUR

FINAL DESIGN
PERSPECTIVES



Figure 71: INTERIOR COURTYARD, through Hoover Complex

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CHAPTER FOUR

FINAL DESIGN
OBLIQUE VIEW



Figure 72: OBLIQUE VIEW: site design with context

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CHAPTER FOUR

FINAL DESIGN PERSPECTIVES



Figure 73: POND: pedestrian pathways & gazebo

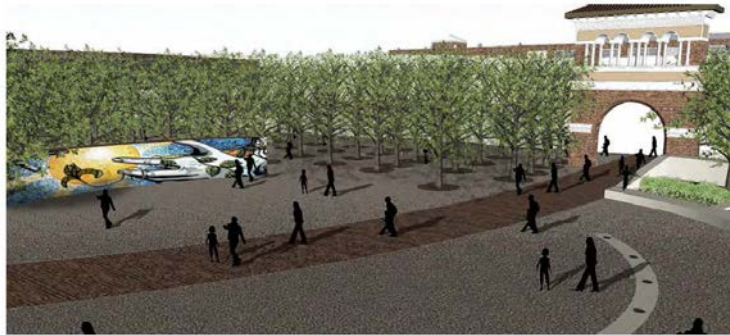


Figure 74: OBLIQUE VIEW: plaza, Hoover Complex & Iconic Green



Top Right: Figure 76: GATEWAY: to history trail from Memorial Stadium
Bottom Left: Figure 75: INTERIOR COURTYARD: through Hoover Complex

Figure 77: PLAZA: gateway to history trail, mural wall, water feature & memorial grove



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INTENDED OUTCOMES

INVENTORY & ANALYSIS TYPOLOGIES & CHARACTERISTICS

Intended Outcomes

The intended outcome of the project is to design a master plan that contributes to the revitalization of the factory and its surrounding area. Despite the Hoover Company Factory closing over a decade ago, the city of North Canton still regards the building as the core of the city. While there are adaptive reuse plans for the factory in the works, this study suggests opportunities preserving and enhancing the historical and cultural significance of the place for the community. The master plan will maintain and enhance the culture and history of the place while also providing opportunities for economic benefit for the city through tourism. As the counterpart to the city of Canton that holds the Pro Football Hall of Fame, the revitalization of the Hoover Company Factory can bring more people into the city of North Canton and therefore add to its vitality.

Primary Goals

- To revitalize the vacant and unused space around and through the factory
- To adaptively reuse the existing factory for community benefits and gathering
- To develop a program that can contribute to additional landscape architecture projects associated with cultural tourism
- To continue to research cultural tourism concepts to help support the design
- To enhance economic develop for North Canton, Ohio

The community will regain use of the factory while visitors have a chance to understand the importance of this historic vacuum factory to the city of North Canton. The master plan can therefore contribute to the community by bringing something near and dear to local inhabitants' heart back to life while providing new economic benefits to the city.

Conclusions

This project taught me more about the history of the City of North Canton, Ohio and how much the Hoover Company influenced the city. William H. "Boss" Hoover truly cared for the community. This project is to follow in his footsteps and give the community back something that meant so much. The research and analysis informed me that through principles of landscape architecture, there is much more involved with the complex and what the city has been trying to accomplish than I would have ever known. This master plan will provide for the community as well as the city as a whole. This project has a sense of nostalgia associated with it that can be brought back to life for the current and past residents while also providing an interest for future residents and visitors. Furthermore, this project will hopefully provide an influence for the city in its current revitalization efforts.

APPENDIX A

ANNOTATED BIBLIOGRAPHY

Books

Austin, Richard I. *Adaptive Reuse*. Van Nostrand Reinhold., 1988.

- Discusses the theories and philosophies of Adaptive Reuse and its implementation within real cities. It looks at real projects and locations that utilized adaptive reuse and how it was done at that specific location. Examples specifically looked at include Monmouth Park Place, The Stern Building, Wacker Plaza, and much more.

Burchell, Robert W., and David Listokin. *The Adaptive Reuse Handbook: Procedures to Inventory, Control, Manage, and Reemploy Surplus Municipal Properties*. Center for Urban Policy Research, 1981.

- Provides an insight into planning and inventory, property control, property management and disposition, and physical revitalization. It specifically discusses the necessity for adaptive reuse planning, the adaptive reuse process, adaptive reuse planning, inventory and early warning systems for surplus real estate, partial property control, dealing with tax delinquent properties, permanent property control, predisposition strategies, physical revitalization strategies, adaptive reuse resources available from state governments and the federal government, and much more.

Geigis, Priscilla, et al. *Preserving and Enhancing Communities: a Guide for Citizens, Planners, and Policymakers*. University of Massachusetts Press, 2007.

- Examines gathering perspectives and assess how to get involved. It specifically looks at comprehensive planning, multiple cultures forming one community, current and future land use, the preservation of natural resources, enhancing the community strengths, adaptive reuse of buildings, historic landscape preservation, and community preservation.

Halprin, Lawrence. *Notebooks: 1959-1971*. MIT Press, 1973.

- Provides insight into one of the greatest minds of Landscape Architecture with his notebooks written in his own handwriting. It explores Halprin's thought process through the years of 1959-1971 he had with his projects at the time. It gives a glimpse of his analytical process and his creative process with his sketches and how he approaches a project.

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APPENDIX A

ANNOTATED BIBLIOGRAPHY

Books

Hirsch, Alison Bick. *City Choreographer: Lawrence Halprin in Urban Renewal America*. University of Minnesota Press, 2014.

- Discusses the origins of Lawrence and Anna Halprin and their creative inquiry. Talking about the built work and community workshops. Specifically, it looks at designing with nature as an archetypal precedent, framing civic rituals, manipulation and facilitation, the conclusion of how to choreography influences the contemporary city.

McCormick, Rosemary Rice. *Marketing Cultural & Heritage Tourism: A World of Opportunity*. Routledge, 2016.

- Discusses how tourism works and how culture and heritage can work with tourism. Looks at tourist studies and strategies to build the tourism business. Discusses how one can market towards a certain user group and develop a cultural and heritage tourism marketing plan with the focus of innovation and cultural entrepreneurship.

McKercher, Bob, and Hilary Du Cros. *Cultural Tourism: The Partnership between Tourism and Cultural Heritage Management*. Routledge, 2012.

- Provides insight into the understanding of the partnership and mutual benefits of tourism heritage management. To be successful tourism and heritage managers need to be working together. It breaks down tourism and heritage management to gather insight into why both need to understand one another to produce successful cultural tourism environments.

Polakowski, Kenneth J. *Zoo Design: The Reality of Wild Illusions*. University of Michigan, 1987.

- Provides an insight into the design approaches to zoological exhibits, the evolution of the zoo, the goals of development, planning for the long term, and site organization themes for zoological parks. It also provides a look into the Landscape Architect's viewpoint of exhibit design as well as the plant habitats that function for the animals and for the people visiting the park.

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APPENDIX A

ANNOTATED BIBLIOGRAPHY

Books

Rabun, J. Stanley. *Structural Analysis of Historic Buildings: Restoration, Preservation, and Adaptive Reuse Applications for Architects and Engineers*. John Wiley & Sons, Inc., 2007.

- Discusses the methodology, chronology, early building laws and loads, while looking at the foundation systems of American Historic buildings as well as their systems such as wall, columns, beams, floor systems, roof systems, and the lateral bracing of buildings. This book finishes with a Historic material assessment.

Richards, Greg, and Wil Munsters. *Cultural Tourism Research Methods*. CABI, 2010.

- Discusses the evolution of cultural tourism research, looking at the development and perspectives in cultural tourism research along with the quantitative approach and a comparison between the quantitative approach to the qualitative approach regarding cultural tourism research. Continues to discuss the mixed qualitative and quantitative approaches as well as the interdisciplinary approaches to cultural tourism research.

Richards, Greg. *Cultural Tourism in Europe*. ATLAS, Association for Tourism and Leisure Education, 2005.

- Breaks down the role cultural tourism plays in Europe along with the significance, social context, economic context, and policy of cultural tourism. Looks at cases in several European countries such as, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, The Netherlands, Portugal, Spain, and the United Kingdom. After exploring cultural tourism throughout Europe, it discusses the trends and future prospects of European cultural tourism.

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- Examines the idea of cultural tourism in a broad sense. Draws on postmodern perspectives and emphasizes the importance of cultural tourism. The main focus is on the role that cultural tourism plays in the impacts and globalization process of global tourism development on culture, traditions and identity, regional, ethnic and minority groups.

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APPENDIX A

ANNOTATED BIBLIOGRAPHY

Articles

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UNESCO, et al. "Baltic Cultural Tourism Policy Paper." 2003.

- Discusses the goal of cultural tourism in the Baltic countries to ensure a sustainable economy with social and cultural development combined with preservation and active enhancement of cultural resources. Explores the idea of an improvement in cultural tourism in the Baltic countries and how cultural tourism can become a leading power of national tourism economies that is recognized in the Baltic Sea Region and known throughout the international market as a product concept based on genuine culture and heritage in a way that is sustainable.

APPENDIX B

WEB SOURCES

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APPENDIX C

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- Figure 3: Historic photo inside the Hoover Company Factory. <https://northcantonheritage.org/category/featured/page/2/>
- Figure 4: Old Graphic of The Hoover Company. <https://www.amazon.com/Hoover-Company-Original-Vintage-Postcard/dp/B00P9L7082>
- Figure 5: Historic photo of worker inside the Hoover Company Factory. <https://akronartmuseum.org/collection/Obj3787?aid=1&x=29657998>
- Figure 6: Case Studies Matrix. Inzetta, Taylor
- Figure 7: Original Hoover Vacuum Ad. <https://www.pinterest.com/pin/329748003936382848/?ip=true>
- Figure 8: Historic photo of the Hoover Company & North Canton City Residents. <https://www.cantonrep.com/article/20160201/NEWS/160129139>
- Figure 9: The Hoover Company & North Canton City History. Inzetta, Taylor
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ACTIVATING INERT
LANDSCAPES
MASTER OF LANDSCAPE ARCHITECTURE
TERMINAL PROJECT

TORY GARLAND
CLEMSON UNIVERSITY | LANDSCAPE ARCHITECTURE PROGRAM



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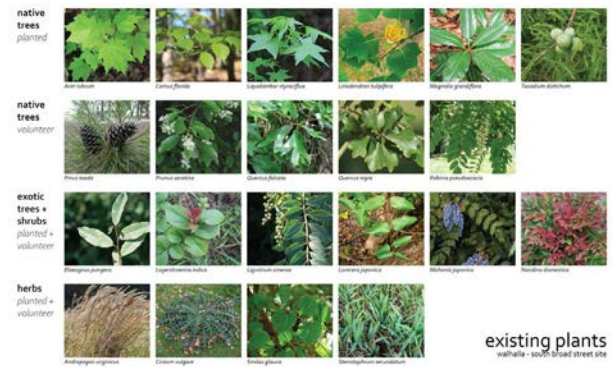
01|

INTRODUCTION

'Landscape... deals not with integration but with intensification. It meets the demands not of order but of activation. Landscape withers and vanishes—loses tension—if what we perceive in it is figures and schemes, models of the ideal, and if we think of it as a garden.'

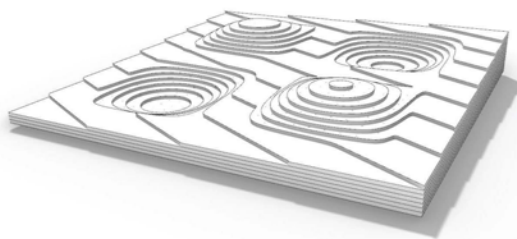
François Jullien, *Living Off Landscape* p. 71

'Inert landscapes' are landscapes that have been kept inactive by the people who manage them, usually due to a perceived lack of land value. My project explores the possibility of "reactivating" these landscapes using relatively cheap, simple, and modular methods of altering the topography and vegetation of the site - methods adapted from forestry, ecological restoration, and landscape practices.



02

EARTHWORK



'It all starts with earthworks, which have an irreversible quality because they determine water flows. Once the trees are planted, the levels cannot be changed. There are therefore physical invariables: the ground and its gradient, water – its flow and storage are inescapable – and some plantings. Everything else is subject to constant variation: land use, paths, subsequent plant layers and, of course, all the objects that can be inserted into these defined structures. Consequently, certain layout drawings, at least topographical ones, are necessary from the outset to establish permanence.'

Michel Desvigne, *Transforming Landscapes*, p. 58

Earthwork is the necessary first step to activating inert landscapes. Topographical modification is integral to disrupting the frozen hydrology of inert sites; in my project I've utilized a modular grid system of "pits and mounds", an idea adapted from the natural topographical variation caused by treefall and erosion in undeveloped forests. These pits and mounds disrupt the flow of stormwater through the site and allow for the creation of microhabitats. Dry-adapted plant species colonize mounds and wetland species colonize pits, creating a broad range of diversity even on small sites.

Thompson et al. (2010) found that increasing the amplitude of simulated pit-mound microrelief significantly increased the proportion of rainfall infiltration on a modelled slope. Therefore, deeper pits would be always more effective in water retention on slopes than would a larger number of more shallow pits of equal cumulative volume.

Pit-mound microrelief in forest soils: Review of implications for water retention and hydrologic modelling

Microsite diversity was positively related to overstory species diversity and stem density and negatively related to average tree size... Plots with higher microsite diversity... [allow] more species and individuals to establish and created varied niches that allowed these individuals to coexist and generate greater stand-level diversity.

Long-term influence of disturbance-generated microsites on forest structural and compositional development

Creating irregular microtopography increased overall species richness at the site compared to leaving the site level. Eleven of twenty-nine species are unique to created Swale or Hummock features. Though the diversity was low at Swales and Hummocks compared to Flats, the addition of hydrophytes species to the wetland that would not have otherwise occurred is valuable.

Edaphic and Vegetative Responses to Forested Wetland Restoration with Created Microtopography in Arkansas

Species richness in pits and on mounds decreased with increasing elevation from the bottom of the hillside, although the effect of elevation on mound species richness was less than that of elevation on pit species richness... However, total biomass of both pit and mound microsites was unrelated to elevation. Total stem density decreased with elevation in pits, but was unaffected by elevation on mounds.

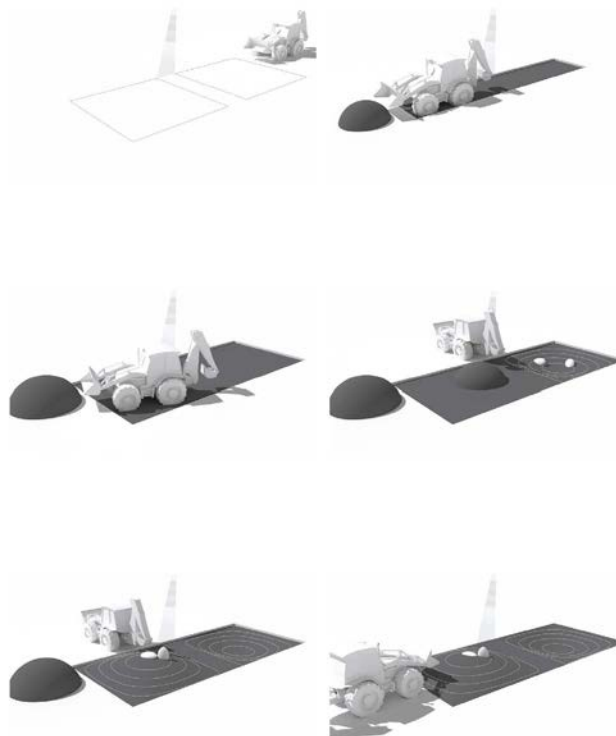
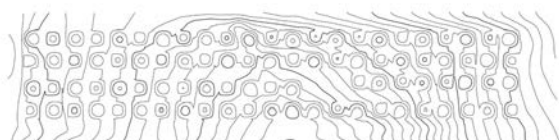
Microsite and elevational influences on early forest regeneration after catastrophic windthrow

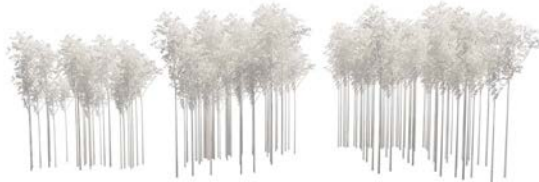
Colonizing species distribution and abundance were also strongly related to topographic position. Despite differences in soil nutrient concentration among topographic zones, hydrologic condition likely had the strongest influence on growth and survival of planted species and distribution of colonizing species. Creating microtopography resulted in a spatially heterogeneous system that reflected variations in natural bottomlands, and introducing a mix of species (pioneer and later-successional) across topographic and hydrologic gradients may improve the establishment and survival of a diverse community when hydrologic condition is highly variable or difficult to predict.

Plant and Soil Responses to Created Microtopography and Soil Treatments in Bottomland Hardwood Forest Restoration

"Pit and mound microtopography is an important structural component of most forests, influencing soil processes and habitat diversity. These features have diminished greatly in northeastern U.S. forests since European settlement, as a result of repeated logging, land-clearance followed by reforestation, and the smaller size of trees (and therefore windthrow features) comprising the prevailing second-growth forests."

Microtopography and ecology of pit-mound structure in second-growth versus old-growth forests





From the perspective of ecological restoration, a main practical consideration relates to the 'self-design' or 'self-organisation' concept. As described by Bergen et al. (2001), the self-design concept addresses the question of how much and what should be actively planted (restored), what can be left for natural processes and the interrelationship between the two. In afforestation, the initial species mixture and the structure of the forest to come are the result of purposeful design. Once created, however, natural processes take over and the surviving species and vegetation structure become those best suited to respond to the conditions imposed.

Effects of planting design on planted seedlings and spontaneous vegetation 16 years after establishment of forest edges

Inserting vegetation is the quickest way to activate an inert site. The main goal in the design is to encourage as much plant diversity as possible; trees and shrubs are to be planted bareroot, densely on a grid and culled over time. Herbaceous plants are scattered from seed mix by hand and allowed to grow and spread. The goal is not to have every species and every plant survive long-term, but to have all of them influence each other's growth habit and encouraging broader site heterogeneity. For example, "weeds" would be allowed to grow in between the gaps left by plantings, creating a more full palette than planting alone.

Even a single species can create great variety... They change by themselves as they grow and a form emerges as they evolve over time. I am fascinated by indeterminism, by randomness, where only one adult subject will emerge from one hundred saplings. When you plant very densely along a perfectly orthogonal grid, as some foresters do, the selection process that takes place over the long term means that the geometric order disappears, in favour of an afforestation whose origin can no longer necessarily be detected.

Michel Desvigne, *Transforming Landscapes*, p. 65

Recognition of the more dynamic nature of forests has led scientists to realize that each species has regrown in a variety of partial and stand-replacing disturbances, and thus there are a variety of ways in which each species can be sustained in a stand. The variety of ways in which a stand can be successfully treated has led silviculturists to begin describing stand management through 'operations' and 'pathways' instead of through silvicultural systems.

Restoration of Boreal and Temperate Forests, p. 39

When we view the forest restoration as if it resembled a garden or landscape installation that can be completed in one phase, we preclude opportunities for the site to design itself and impose our own preconception of what the landscape can become.

Leslie Sauer, *The Once and Future Forest*, p. 92

In the most degraded conditions, after the pollution or other land use ceases, the forest may recover to a natural forest condition in a century or longer. The recovery period may be shorter, possibly decades, with human intervention (reconstruction or reclamation).

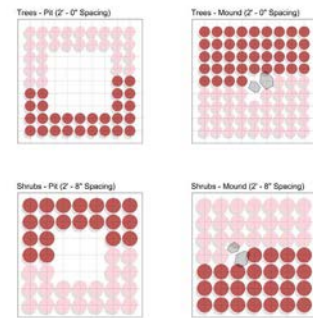
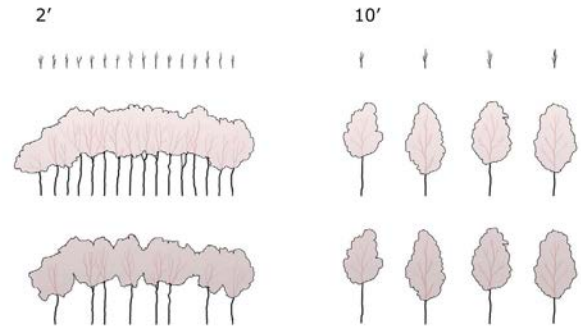
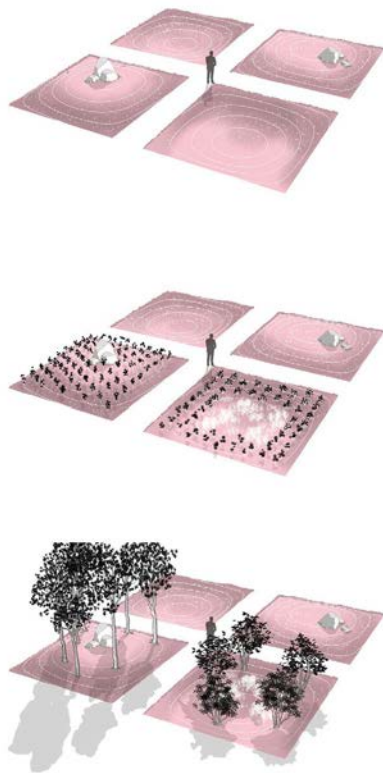
Restoration of Boreal and Temperate Forests, p. 5

Turf areas, when even only gently sloped, shed water nearly as rapidly as pavement. A lawn is not only a preempted natural area but often means a lot of fertilizer, lime, herbicides, and oil and gasoline from mowers polluting nearby natural landscapes by way of runoff.

Leslie Sauer, *The Once and Future Forest*, p. 139

An important way for active management to provide sustainability values is by restoring and maintaining a diversity of stand structures across the landscape. Using active management to mimic, avoid, and recover from natural disturbances, the variety of structures can be maintained, thus providing habitats for biodiversity... and maintaining the forest health and soil and water quality.

Restoration of Boreal and Temperate Forests, p. 35



MOUND PLANTING PALETTE

TREES (NATIVE FOREST NURSERY: "PREMIUM 18" - 24" BAREROOT")



SHRUBS (NATIVE FOREST NURSERY: "PREMIUM 18" - 24" BAREROOT")



PERENNIALS (GARRETT SEED "CONSERVATION RESERVE MIX")



PIT PLANTING PALETTE

TREES (NATIVE FOREST NURSERY: "PREMIUM 18" - 24" BAREROOT")



SHRUBS (NATIVE FOREST NURSERY: "PREMIUM 18" - 24" BAREROOT")



PERENNIALS (GARRETT SEED: "WETLAND SEED MIX")



'Only oscillation makes progress possible; energy is renewed through change. A flat, even course would be contrary to this spontaneous reactivation of energy and would inevitably lead to discontinuity: uniformity is always deadly.'

François Jullien, *The Propensity of Things* p. 153



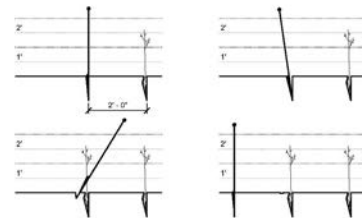
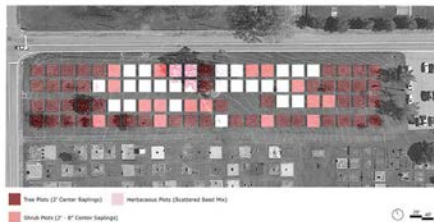
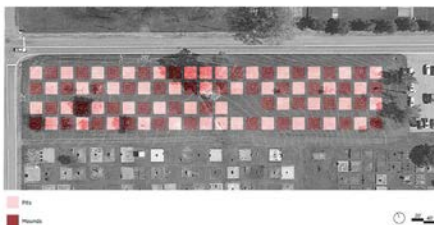
The following graphics project site conditions at time of planting as well as ten years in the future after planting. The site incorporates a proposed bike path, as well as various tree, shrub, and herbaceous plots planted on the pits and mounds scattered throughout. Pits and mounds would be alternated on a checkerboard grid to provide as much hydrological diversity as possible, and tree, shrub, and herb plots were distributed semi-randomly in bands from tallest to shortest, simulating a "natural" forest edge. The site would be maintained following a yearly maintenance schedule of mowing, culling, and pruning. Over time, it is expected that the pits and mounds would wear down and shift as a result of erosive and vegetative processes, and that the species mixes present at time of planting would begin to merge and redistribute due to seeding, spreading, and natural die-off.

Planting Rules

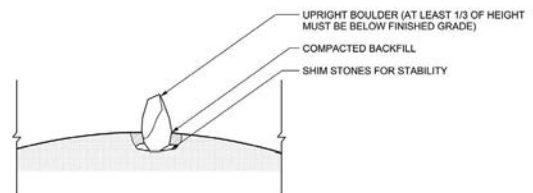
- White clover (*Trifolium repens*) to be planted as a cover crop over entire site after grading
- Tree plots to be planted at 24" on center in grid (2 species per plot)
- Shrub plots to be planted at 28" on center in grid (2 species per plot)
- Herbaceous plots to be planted with hand-scattered seed mix

Management Rules

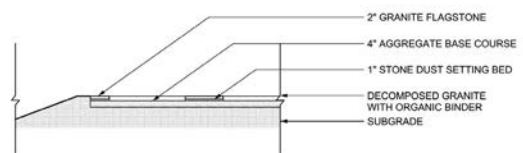
- Pathways to be mowed every 3 months
- Thin trees and shrubs by 25% every 5 years, using the following conditions as a selection guide for removal in descending order:
 - Dead plants/plants that have grown into blocking the main pathway
 - Trees that have the smallest leaf volume among their cohort
 - Trees that are significantly smaller in DBH in comparison to others of their species
- Prune dead lower limbs of remaining trees



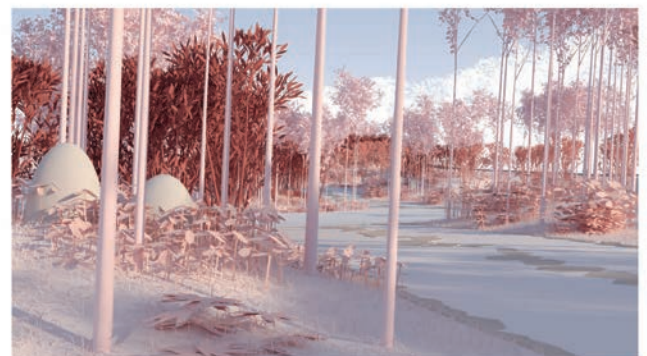
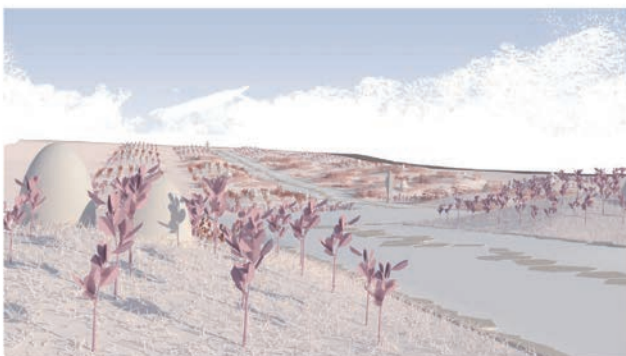
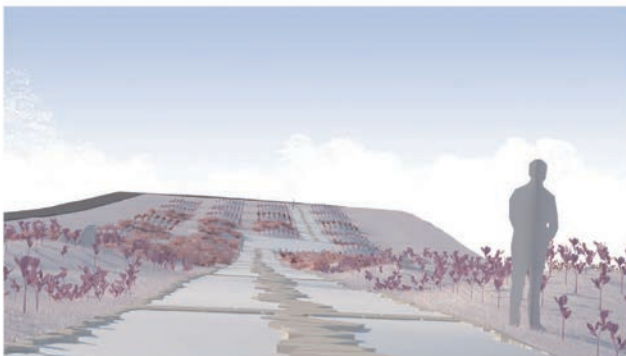
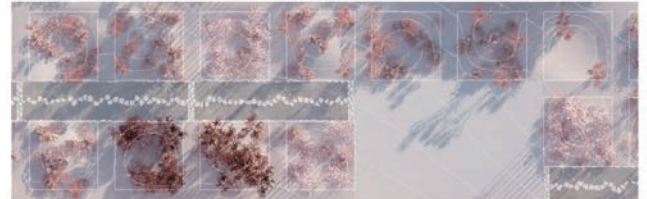
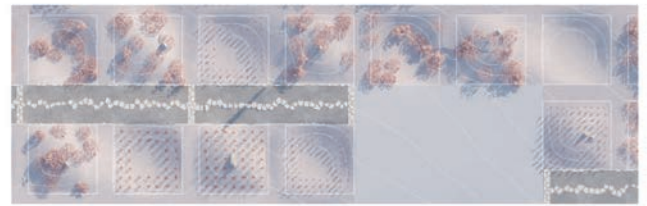
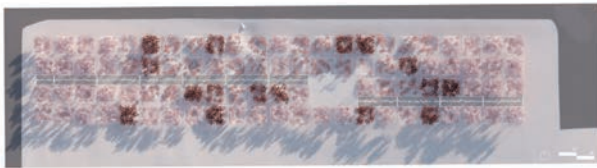
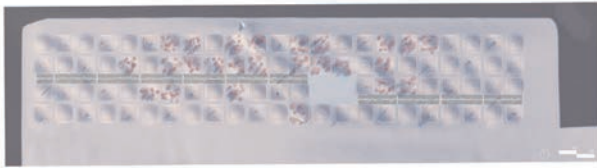
BAREROOT PLANTING WITH DIBBLE BAR
1" = 1' - 0"

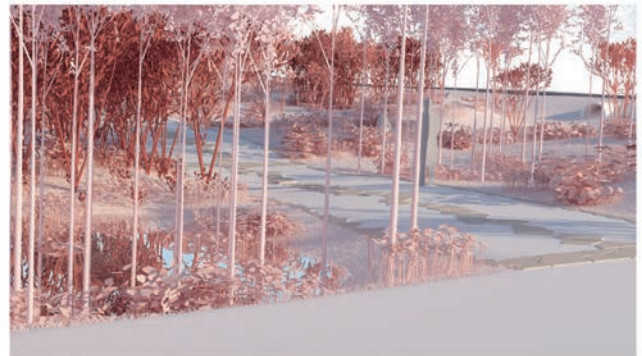
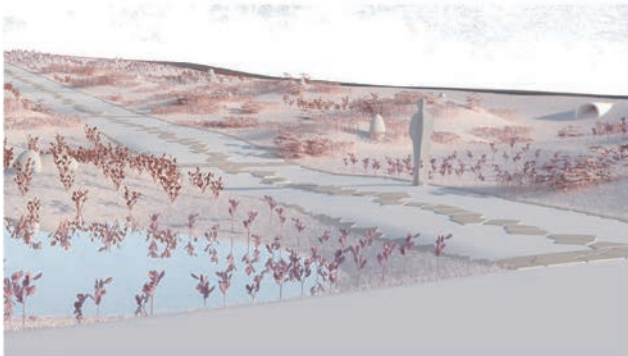
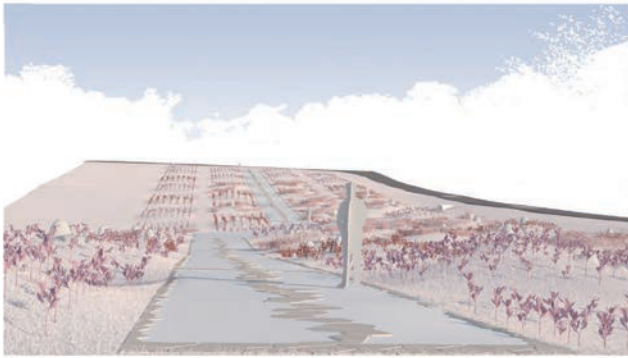


BOULDER SETTING
1" = 3' - 0"



DECOMPOSED GRANITE PATH WITH FLAGSTONE EDGING
1" = 3' - 0"





05

CONCLUSION

The most straightforward way to restore natural hydrologic patterns is to reforest as much of the watershed as possible. When you look for the areas that might be returned to forest, you will find many and varied opportunities, from roadside margins and vacant lands to closed landfills and mines and waste sites to cemeteries, schoolyards, and front or backyards.

Leslie Sauer, *The Once and Future Forest*, p. 139

The inert site activation process was designed to be applied to as many places as possible; the modularity of the pit-mound-planting system allows it to be inserted into a variety of conditions, and can be scaled up or down based on funds or manpower available. The process can be modified to suit residential, retail, or abandoned sites, and incorporated into more traditional design structures.



