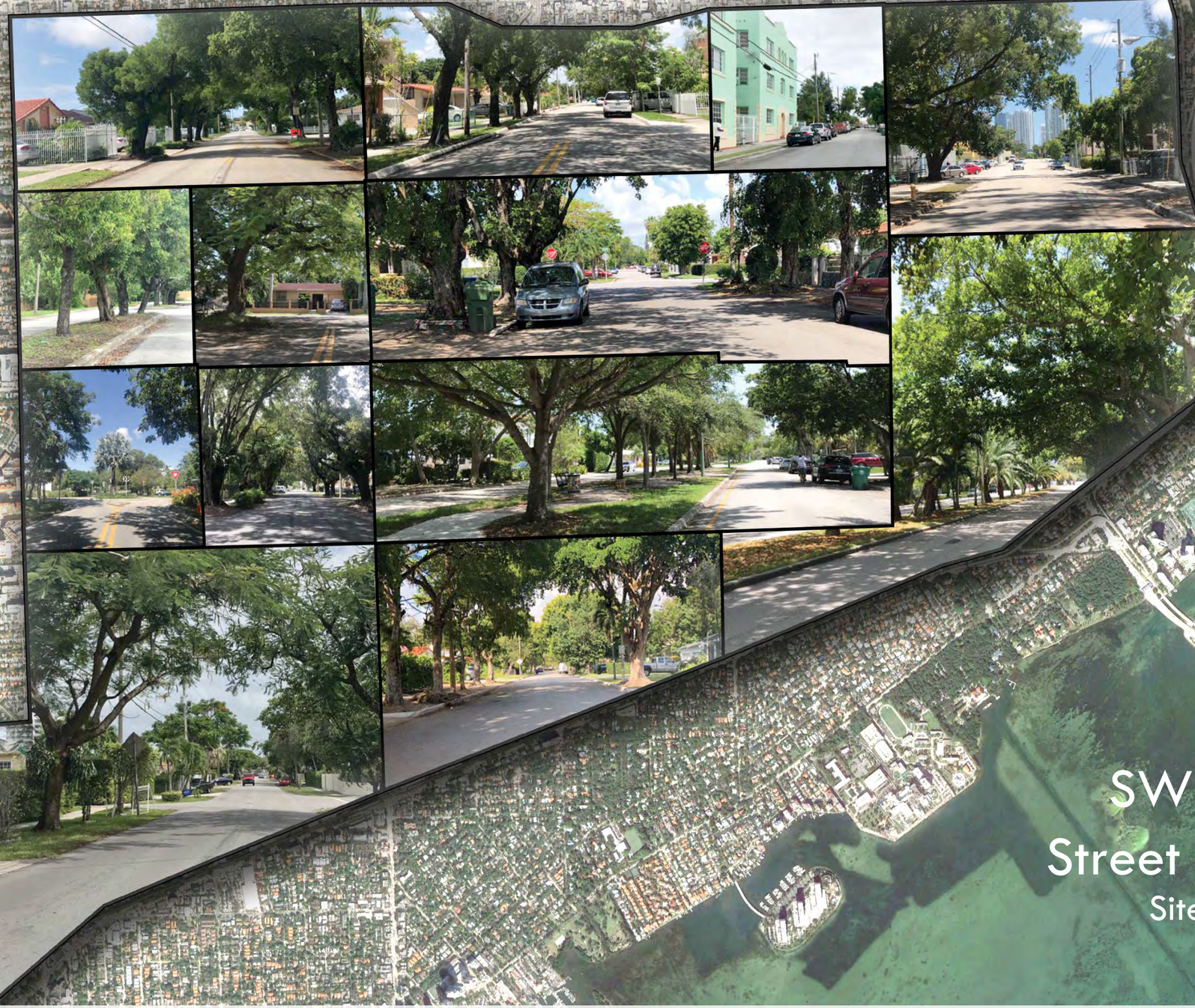

SW Streetscape and Street Tree Master Plan

Site Analysis and Assessment

bcc engineering

ESciences
ENGINEERING
ENVIRONMENTAL
ECOLOGICAL

LOCAL OFFICE
LANDSCAPE & URBAN DESIGN

CURTIS+ ROGERS
DESIGN STUDIO INC.

THE CITY OF MIAMI
INCORPORATED 1896
DADE CO., FLORIDA

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Southwest Streetscape and Street Tree Master Plan

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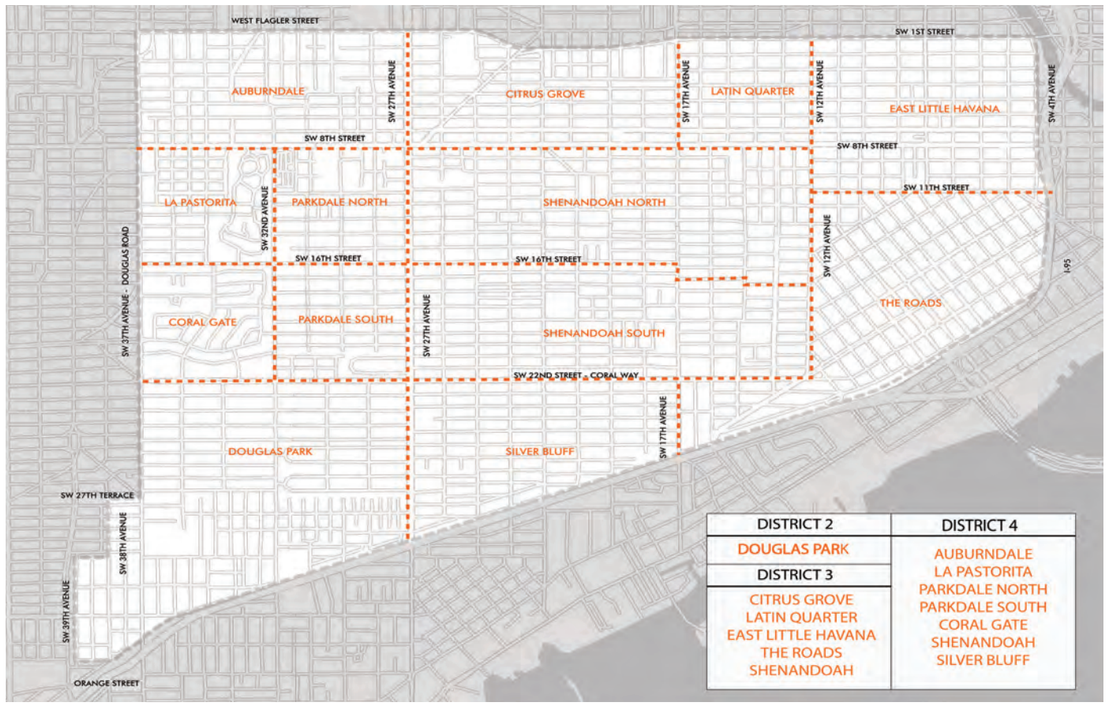
Project Scope

The City of Miami is located within the eastern coastal portion of Miami-Dade County, Florida. Incorporated in 1896, the southwestern portion of the City is comprised of several distinct neighborhoods and commercial corridors. The area identified consists of approximately 6.7 square miles and is one of the City's most densely populated regions with the greatest tree canopy deficiency.

The limits of the project extend to the north to SW 1st Street, to the South US 1, to the West to SW 37th Avenue (Douglas Road) and to the East to I-95. This area includes the following neighborhoods: Auburndale, La Pastorita, Parkdale North, Parkdale South, Coral Gate, Shenandoah North, Shenandoah South, Silver Bluff, Citrus Grove, the Latin Quarter, East Little Havana, The Roads, and Douglas Park.



SW Streetscape Project Limits

Project Goals

This project will look at the interconnectedness of the City's natural resources, current greening projects, as well as other on-going projects, including the Stormwater Masterplan, to propose possible solutions towards making the streets more resilient to sea level rise and global warming. At its conclusion, the goal for the project is to develop a blueprint for the City's use as a tool for implementing greater resiliency within the street conditions of the project area.

The Plan will demonstrate how to maximize the City's environmental and place-making objectives, while identifying strategic opportunities which will:

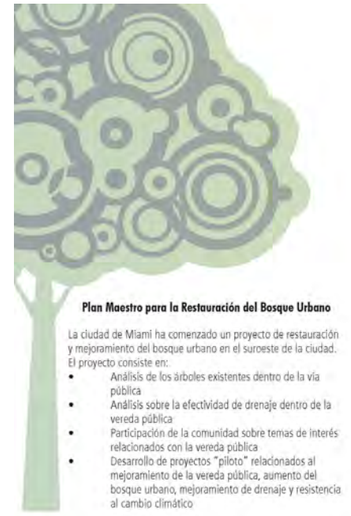
- Strengthen the sense of place, neighborhood identity and aesthetics, through the identification of strategic tree planting locations at gateways, thoroughfares and choice of species to identify specific districts along major corridors, and the reintroduction of native local plant species
- Build the community's resilience to the impacts of climate change through tree shading to reduce the heat island effect
- Maintain and enhance the quality of the air, water and land through a mature tree canopy's ability to sequester carbon and release oxygen, and filter storm water
- Promote and encourage actions that reduce greenhouse gas emissions through the creation of attractive and comfortable pedestrian and cycling routes which foster the use of alternate modes of transportation
- Create a road map by which a sustainable urban forest can be developed, and implement a planning process that will support and cultivate the maintenance of ecological, social and economic functions and benefits, over time
- Promote awareness with City residents, on the benefits of trees, through community education and outreach

Executive Summary

Completed Tasks

The Design team completed the following actions in gathering the information provided in this report:

- Research Completed and Documented:
  - History of Project area and Neighborhoods, including visiting and consulting with History Miami.
  - Demographics & Statistics: Information was pulled and compiled from the US Census Bureau, The City of Miami and Miami-Dade County open GIS systems and websites.
  - Climate related issues were researched from a variety of sources and compiled for the project area specifically, looking at Sea-Level Rise, Storm Surge, Heat-Island Effect, Flooding and Air Quality.
- Each street was physically visited and documented via photographs
- Each street was inventoried for the following characteristics: Width of ROW, Size of Swale, Sidewalks, Street Lights, On-Street Parking, Street Trees/Palms, Curbs, Lanes of Traffic, Ownership of Road, Overhead utility wires, medians, any non-standard improvements.
- Selected thoroughfares were analyzed for their potential to have additional planting areas added, and possibility or likelihood of being able to change the existing layouts (size of lanes, number of lanes, etc).
- Information was gathered and configured to create an accurate mapping of the topography and watersheds for each neighborhood.
- The street trees were geolocated in GIS and documented to their: Species, DBH, Spread, Condition, Utility Conflicts, and up to three additional observations.
  - This information was then configured into diagrams and charts, and statistical data compiled.
- Community outreach was initiated by finding and reaching out to any Community Home Owner Associations within the project area. This resulted in our attendance at four meetings in the Roads, Little Havana, Silver Bluff and Shenandoah. We also met with the NET offices within our Project area (Coral Way & Little Havana).
- Information was collected on the city's current tree planting efforts. Planting practices being utilized were reviewed, both those specified as well as those occurring in the field. Further recommendations and coordination will occur in Phase II.



Executive Summary

Summary of Initial Impressions

Upon compiling the information included in this report, the following trends and patterns were observed within the project area.

Neighborhoods with the lowest amounts of tree canopy tend to also have greater density (multi-family buildings or duplexes) leading to a greater need for parking on the street or within swales. Due to this need for parking, residents in these neighborhoods also tend to be more resistant to the idea of planting, reaching out the city much less frequently. Upon further investigation, residents give the impression that along with issues of parking, tree maintenance and sidewalk repair are some of their other big areas of contention towards trees. Residents did not want to be left with additional financial burdens that could be linked to trees within their nearby swale.

There are some opportunities to add planting on some of the major thoroughfares running North and South, especially on SW 22nd Avenue which is particularly void of trees. Most of the thoroughfares have already minimized their lane widths, so re-configuration of the travel lanes is not an option, but planting could be added in areas where there is currently only striping to prohibit cars.

Many of the high density residential neighborhood streets are currently using the swale for parking. Therefore, the swales are no longer effective as pervious areas to absorb rainwater. The team found many code violations regarding the swales, instances where the swale had been partially, or in some cases entirely paved. Additional code violations were found within the properties in some of these areas, with some homes found to have completely paved frontages.

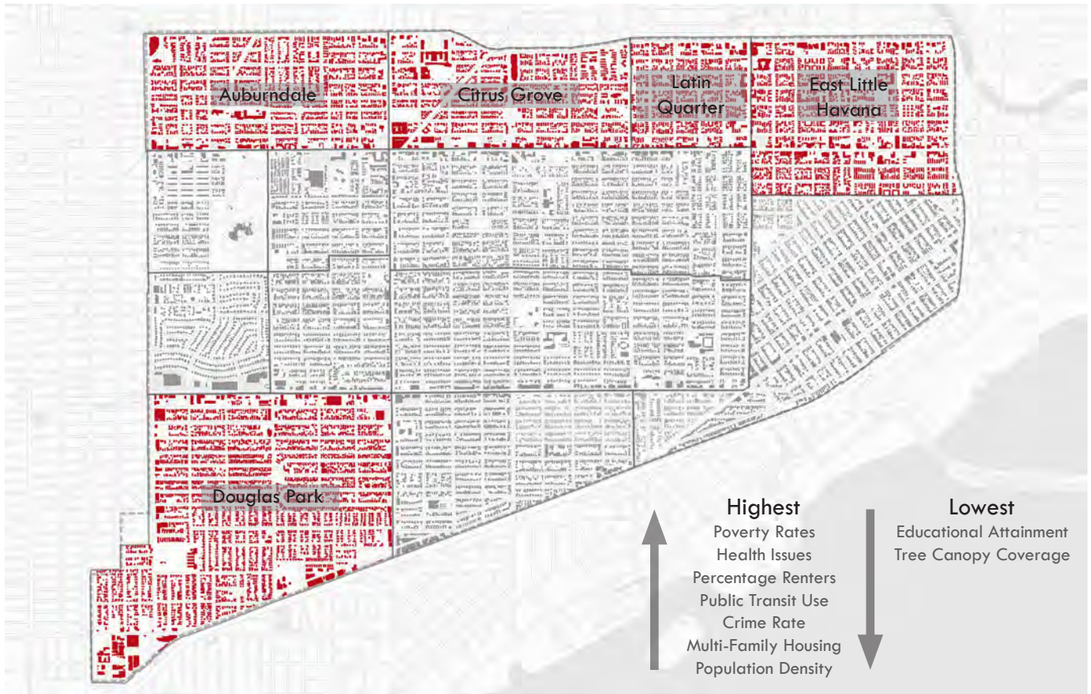
Summary of Initial Conclusions

One of the conclusions the team has come to is that the City would greatly benefit from a shift in their perception of and classification of trees. The current culture of the City classifies trees as beautification and enhancement - an aesthetic benefit only. This culture does not allow for the importance of the benefits of trees to the community to be clearly seen and funded. The City needs to embrace and promote the multiple benefits of trees to the City and its Communities, not the least of which is a greater resiliency to climate change and sea level rise, and the ever increasing occurrences of King Tide flooding. The trees should be classified as necessary infrastructure. Trees can help with storm water management if they are allowed to. Too often they are not given the proper connectivity to surface water to help manage it. Trees are a natural way to absorb and filter surface water, but are not currently included in Engineering calculations for stormwater management. A shift in the catagorization of the trees could greatly help the City in a multitude of ways with just one action - more trees. The trees should to be managed as an asset to the City, not as an ammenity.

The team also feels that the City should reconsider and explore ways to improve their enforcement of Code violations. The City Code may contain great ideas and forward thinking, but if it is not enforced, the ideas will never come to fruition. The City currently imposes these standards upon new development, however, once a Certificate of Occupancy is issued, owners make changes that often violate these standards and are not held accountable or forced to comply.

We also found a general lack of coordination and understanding between the City Departments, particularly Public Works, CIP, Resiliency Planning and Maintenance. Re-classifying trees as infrastructure will require buy-in, cooperation and coordination between all departments of the City. Clear methods of interdepartmental cooperation should be established.

The team will elaborate on and document specific recommendations and pilot projects during othe next phase of this project, and outline of which can be found in the last pages of this Volume under “Next Steps”.



Opportunities + Constraints

Opportunities

Some of the Opportunities this project has are:

- Reduce flooding in some areas and increase filtration of surface waters
- Reduce heat island effect in the most vulnerable neighborhoods
- Increase equity of canopy coverage and the corresponding benefits it brings
- Increase the health and diversity of the City's tree canopy and make it more resilient to Sea Level rise
- Increase the residents understanding of the benefits of trees to their communities and enlist them as partners in preservation and improvements
- Increase walkability
- Test several models of adaptability that have been developed to determine which models work best for these communities.

The Design team has started to look at the information gathered and develop strategies for improvements that can be developed into the Pilot Projects. Curtis + Rogers has identified streets and areas in the greatest need of tree canopy: LOLA has identified streets and areas that where improvements would be most beneficial for water management: Together, the team will choose areas for recommendations of interventions and strategies for these pilot projects.

Fortunately, many of the neighborhoods have pervious space available for green and blue infrastructure, so re-working of the limits of the ROW will not be necessary. However, getting the residents to accept and respect new trees in their swales has its challenges adressed below.

Constraints

Some of the Constraints this project has are:

- High groundwater table and coastal proximity
- Most of the project area has been built out and developed already
- We are already seeing increased incidences of saltwater intrusion
- We are already seeing incresed incidences of high tide flooding
- There is often a lack of balance between the poiticians wanting to keep their constituency happy and what is required for the betterment of the entire City
- Many residents do not want trees
- The residents do not always know what is best for them and need to be educated
- The City appears to have a reputaion of poor maintenance of its existing street trees

First impressions with public outreach show a resistance from the communities to more trees in the ROW.

Recently planted street trees are being parked against and sometimes hit by cars parking in the swales.

The species of trees that may be the best for resiliency for the City which will be recommended by this project, may be resisted by the communities. Most citizens feel they should have a say in what kind of tree is planted in front of their property - especially since they are being asked to maintain it. The problems that arise out of this are multiple: The species the citizens choose may be :inappropriate for the size of the swale, non-native, not salt water tolerant, not shade trees (Palms), not wind resistant, monocultures. C+R found in our involvement with the City of Coral Gables in their tree succession plan, that when given a choice, the majority of the home-owners wanted Oak trees. The City allowed the home-owners to choose if they objected to the proposed species, and the result of this is a distinct lack of diversity within the City. Lack of diversity is dangerous due to outbreaks of pest and disease that can attack a particular species of tree, leaving the City devastated of canopy. The team feels that in order to achieve the most resilient canopy for the area, that the choices need to be limited to species appropriate for the locations. We found a great deal of diversity within the project area, and would recommend that this trend be continued. Monocultures of a particular species on a street are problematic because of the issues previously discussed with potential die-back, as well as the fact that most of these streets have overhead utility lines on one side of the street.

The overhead lines should not have large trees underneath them as they interfere with the electrical service and can cause outages during high wind events. If both sides of the street have the same species of trees in these case, they would have to all be smaller species, which would limit the amount of shade possible on the street. In order to maximize the amount of shade, larger species should be planted on the side of the street where there are no power lines and smaller species on the side where they are. When this is ignored and large trees are planted under the utility lines, it makes more work for the Power companies to trim back the trees. Trimming the large trees in this manner (Y-cut) which we saw multiple instances throughout the project area, makes the trees less resilient and more prone to limb failure.

Availability of appropriate trees is an issue. We will recommend to the City that they "Contract Grow" appropriate trees for their streets, as most nurseries do not carry the diversity and sizes required. Otherwise, the City will always be limited by what the commercial growers carry.

SW Streetscape Project Area - as seen from Brickell Avenue

HISTORY

History of the Area

The City of Miami is a total of 56.6 square miles situated between the Everglades and the Biscayne Bay in the eastern portion of Miami-Dade County. Known as the “cultural, economic, and financial center of South Florida” the project area, in the south-west portion of the city, includes neighborhoods with some of the most historically and culturally rich backgrounds, while also some of the most economically disadvantaged residents.

Within those neighborhoods some, like that of Shenandoah, Roads, and Riverside (a part of today’s Little Havana), have histories dating back to their settlement and development in the late 19th and early 20th century.

Early settlement of Miami dates back to around 10,000 years ago with the native American Tribes of the Tequesta people living along the Miami River with villages extending as far north as southern parts of today’s Palm Beach County. European settlement began in the 16th century with visits from Juan Ponce de Léon and the landing of Pedro Menéndez de Avilés bringing the first permanent settlers arriving around 1800.

Major development within the area of study dates back to some of Miami’s early pioneers such as William and Mary Brickell, Julia Tuttle, J. H. Tatum and the homesteading Belcher family in the mid to late 19th century. Large tracts of land owned by these families transformed into sub-urban developments over the next century coupled with the expansion of the Florida East Coast Railway South to Miami provided the perfect storm for a greater settlement. The city of Miami became incorporated within the county on July 28, 1896 and experienced continued rapid growth up until World War II.

Though not greatly affected by the great depression, the city was largely impacted by World War II with a military headquarters being moved to the DuPont building, as a result of a series of attacks throughout the years, and following the war an influx of soldiers moving to the area increased the city population to nearly half a million by 1950.

Cuban migrations began in the 1960’s after Fidel Castro became the Prime Minister of Cuba. Many of those migrating were middle and upper-class Cubans coming with few possessions. “Freedom flights” coming from Havana to Miami brought as many as 100,000 Cubans in 1965 with the overall Cuban population in Miami being well over 400,000 by the start of the 1970’s. Subsequent waves of migration took place in the 1980’s with the Mariel boatlift incident bringing 150,000 refugees as well as in the 1990’s more Cuban migrants left for better economic, political and social opportunities.

The neighborhood distinctions and exact extents vary person to person however a widely accepted break down of our study area includes the neighborhood distinctions of: Little Havana (which includes the sub-neighborhood of Riverside, as well as the Latin Quarter, half of Citrus Grove, Shenandoah north), West Flagler (which includes Auburndale and the remaining half of Citrus grove), the Roads, and Coral Way (which includes the sub-neighborhoods of La Pastorita, Parkdale North and South, Coral Gate, Shenandoah South, and Silver Bluff).

The area that would later become Little Havana was initially a place for lower-middle-class Southern and thriving Jewish neighborhoods into the 1930’s however in the 1960’s as the population of Cubans grew rather quickly the area became known as “Little Havana”. Since the 1970’s however, Cuban populations have been decreasing while immigrants from other countries in Central and South America have increased making the area more diverse but still largely Cuban-American owned. The neighborhood is now the best-known place for Cuban Exiles in the world and was declared a national treasure by the National Trust for Historic Preservation in 2017.

“The Roads” neighborhood was originally owned, designed and developed by Mary Brickell in the early 1920’s. The auction to sell the plots was held in 1923 with all being sold off in one day. Though initially planned to be affordable housing, the area became quite prestigious and exclusive quickly during development and still holds such status today. This neighborhood is planned completely off the standard grid that the rest of Miami-Dade county follows, breaking the pattern and using a 45 degree and that then runs northeast-southwest and has crossings running perpendicular.

The Coral Way area is defined by Coral Way or SW 22nd Street which runs directly through the center connecting Coral Gables to Brickell. The corridor for Coral Way began in 1922 with citrus lined streets but grew to house street car tracks and cars. In 1929 the Roadside Beautification program brought 1200 Banyan Trees to the street which some are still standing today. The Shenandoah neighborhood was developed in the early 1920’s by developers from Virginia has some of the older homes in the area with some dating back to the 1920’s and 30’s.

Figure 1: Florida Photographic Collection/ Florida Memory

Historic Sites

South River Drive Historic District

Initially consisting of 10 buildings, this historic district just west of the Miami River is a testament to the utility and architectural style of the City and its early development. Buildings within the district are former rooming houses built at the top of the 19th century as short-term accommodation alternatives to the Royal Palm Hotel for tourists and potential new residents. The framing architectural style is that of some of the only remaining frame architecture in close proximity to the river leaving behind a district of great historic significance.

Figure 2: CCS Restoration/Pinterest

Figure 3: Mike Ragusa/ Google Images

Figure 4: Kate Huentelman

Figure 5: Libor Pilstak

Miami River Inn

Part of the South River Drive Historic district the Miami River Inn was amongst the rooming houses built in the early development of the City. In the most recent years the Inn has been permanently closed and reopened as Roam Miami, the Miami location for a co-living and coworking community with locations around the world. https://www.roam.co/about

Figure 6: Estela Jimenez

Figure 7: Google

Tower Hotel

Built in 1920 the Tower Hotel has stood the test of time being transformed from a hotel to apartments, to a hospital, theater and YMCA. Having been a refuge for the blues artists like Billie Holiday the hotel was once a stomping ground for the many visitors that passed through the Miami area. After being sold from the long time owners in 2012 the hotel has seen a reinvestment from the city to become Little Havana's first boutique hotel.

Figure 8: barlington group

Figure 9: barlington group

Historic Sites

Miami Hispanic Ballet/ JW Warner House

Currently home to the Miami Hispanic ballet, the JW Warner house was the home and commercial space of the Warner family, founders of the Miami Floral Company a staple in the Florida cut flowers industry for 66 years. After the closing of the Miami Floral company private citizens fought for the preservation and restoration of this historic home which in 2009 became the permanent home of the Miami Hispanic ballet, a non-profit founded in 1993 dedicated to identifying and supporting local dance talent of Hispanic decent within the county. https://miami-history.com/the-warner-house/

Figure 10: Miami History

Figure 11: Arianna Prothero/WLRN

Figure 12: Gregory Castillo/Miami Herald

Calle Ocho Walk of Fame

Just outside of the famous Domino Park the Calle Ocho Walk of Fame honors over two dozen Latin stars who have left a mark on the neighborhood of Little Havana and/or Latin culture.

Figure 13: mytravelnotations.com

Figure 14: mytravelnotations.com

Saint Peter and Paul Orthodox Church

This Eastern orthodox church was established in 1951, making it one of the oldest parishes in South Florida. Since its inception being held in a downtown YMCA in 1951 the church has grown to be able to find a permanent home the Shenandoah North neighborhood since 1960.

Figure 15: JC/ Google

Tower Theater

Initially built in 1926 the Tower Theater was once a hub of cinematic arts. After Cuban migrations began in the 1960's the theater became a hub for cultural experiences as Cuban immigrants were able to observe and learn American culture and language though art. After being in operation for almost sixty years the theater closed to the public however Miami Dade College, the owner, has been able to keep the space and spirit alive by allowing it to serve as an place for education, exhibition and culture.

Figure 16: Tower Theater Miami/Miami Dade College

Figure 17: Tower Theater Miami/Miami Dade College

Historic Sites

Miami Senior High School

First opening in 1905 in a wooden building, Miami Senior High is the first high school in Miami-Dade County. Rebuilt in the late 1920's after pressures from the community, the French and Italian influenced Spanish Mediterranean style building that we see of today was completed in 1928. Remembered for its architectural grandeur Miami Senior High was also the former stomping grounds for many notable people coming out of the City of Miami.

Figure 18: Knowledge of Careers

Figure 19: Flashback Miami/Miami Herald

Domino Park

This highly used park was an investment from the City into a space to formalize the programming and usage that was already occurring amongst it visitors. Built back in 1976 the park provides a much needed meeting space for residents to come together share stories and play dominos.

Figure 20: The Atlantic

Figure 21: Miami to the Max

Bay of Pigs Museum and Library

Funded for construction by the state of Florida in 1987 the museum opened it doors in 1988. The museum is dedicated to the showcasing the small collection of memorabilia surrounding the Cuban Bay of Pigs invasion of 1961.

Figure 22: Courtesy CC/Flickr/C-Monster

Figure 23: Penny Parrish

Little Havana

Historically a predominantly Jewish neighborhood in the 1930's Little Havana as most know it today began to emerge in the 1960's after the start of Fidel Castro's coming to power created large migrations of Cuban refugees into the United States and more specifically Miami. Over time as demographics in the area changed and became predominantly Cuban the area became know as little Havana with largely Cuban occupied households and owned businesses.

Figure 24: EFE/National Trust for Historic Preservation/Steven Brooke

Figure 25: Washington Park Hotel

Historic Sites

Cuban Memorial Boulevard/Bay of Pigs Monument

This one mile linear park stretches down SW 13th Ave in Little Havana. The park celebrates Cuban history and showcases monuments of various historic figures culminating in the Bay of Pigs Monument at SW 8th Street commemorating the Bay of Pigs invasion that took place in 1961.

Figure 24:Stephen Michael F

Figure 25: Amaury

Coral Way Elementary School

Built in 1936 in a Mediterranean revival style this K-8 school was a pioneer in bilingual teaching within the US. Starting teaching in both English and Spanish in 1963 the school is still the only bilingual school in Miami-dade Public Schools.

Figure 26: Flashback Miami

Figure 27: UANews University of Arizona

Cultural

Calle Ocho Festival

Started in 1977 as a street festival to cool ethnic tensions and celebrate culture, the Calle Ocho festival has developed into the biggest Latin festival in the nation. The festival was started by eight Cuban-Americans based around the idea of celebrating the different ethic groups and cultures of Little Havana by having a large block party that would bring everyone together. Throughout the years the festival has been granted entry into the Guinness Book of World Records in 1988 for the worlds longest conga line and been graced by the likes of artists such as Gloria Estefan, Oscar D'Leon, and Desi Arnaz. Over the last 4 decades the music festival has grown in scale and exposure bringing over 2 million people to Calle Ocho and being designated as an official state festival by the state of Florida in 2010.

Figure 25: Miami to the Max

Figure 26: Flashback Miami/Miami Herald

Figure 27: Visit Florida

Figure 28: Miami Herald

Viernes Culturales/ Cultural Fridays

Viernes Culturales or Cultural Fridays is a monthly art, music and culture festival held on the third Friday of each month in Little Havana. The festival was started in May 2000 as a means of promoting and preserving the culture of the Little Havana neighborhood. Since its inception the festival has been a cultural and economic stimulant for the neighborhood bringing with it recognition as a National Treasure for the neighborhood and national and international media attention and notoriety.

Figure 29: Constant Contract/ Viernes Culturales/Cultural Fridays, Inc

Figure 30: Viernes Culturales/Cultural Fridays, Inc

Figure 31: Miami Today News

Vegetation

The majority of development within the City of Miami took place on the Miami Rock ridge where land was historically the highest and driest. The native plant community along that ridge was the pine rocklands, what is today a globally imperiled plant community due to its extreme degradation and fragmentation. The pine rockland plant community is characterized by its open canopy of Dade County Slash Pine trees which were at the time of development cut down and used as a building material for their strength and resistance to pests, the dense understory of saw palmettos and the exposed limestone substrate.

Figure 32: SW 8th St at Douglas Rd in 1920s / HistoryMiami

Figure 33: Pine rockland forest in Everglades National Park
Jay Frost

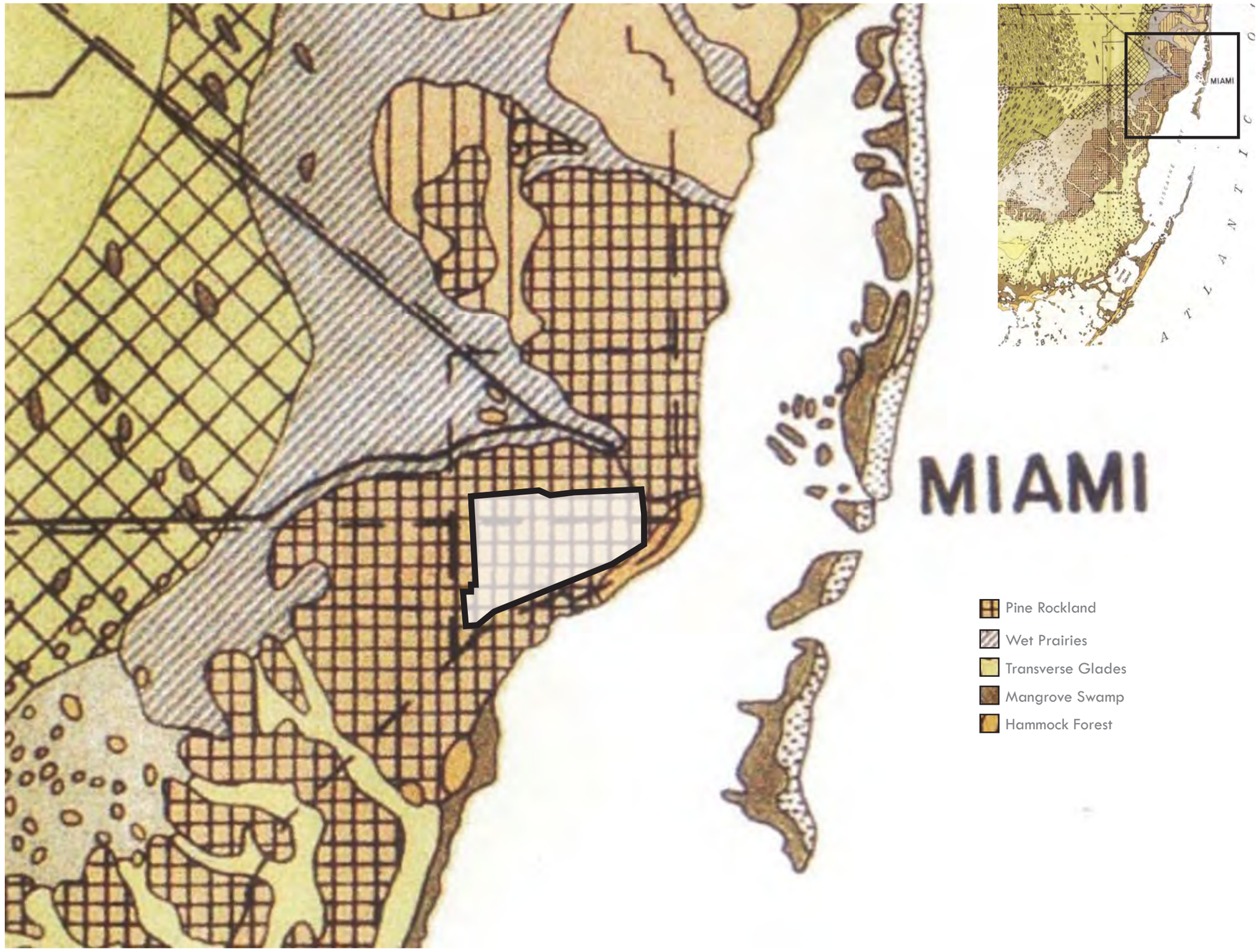
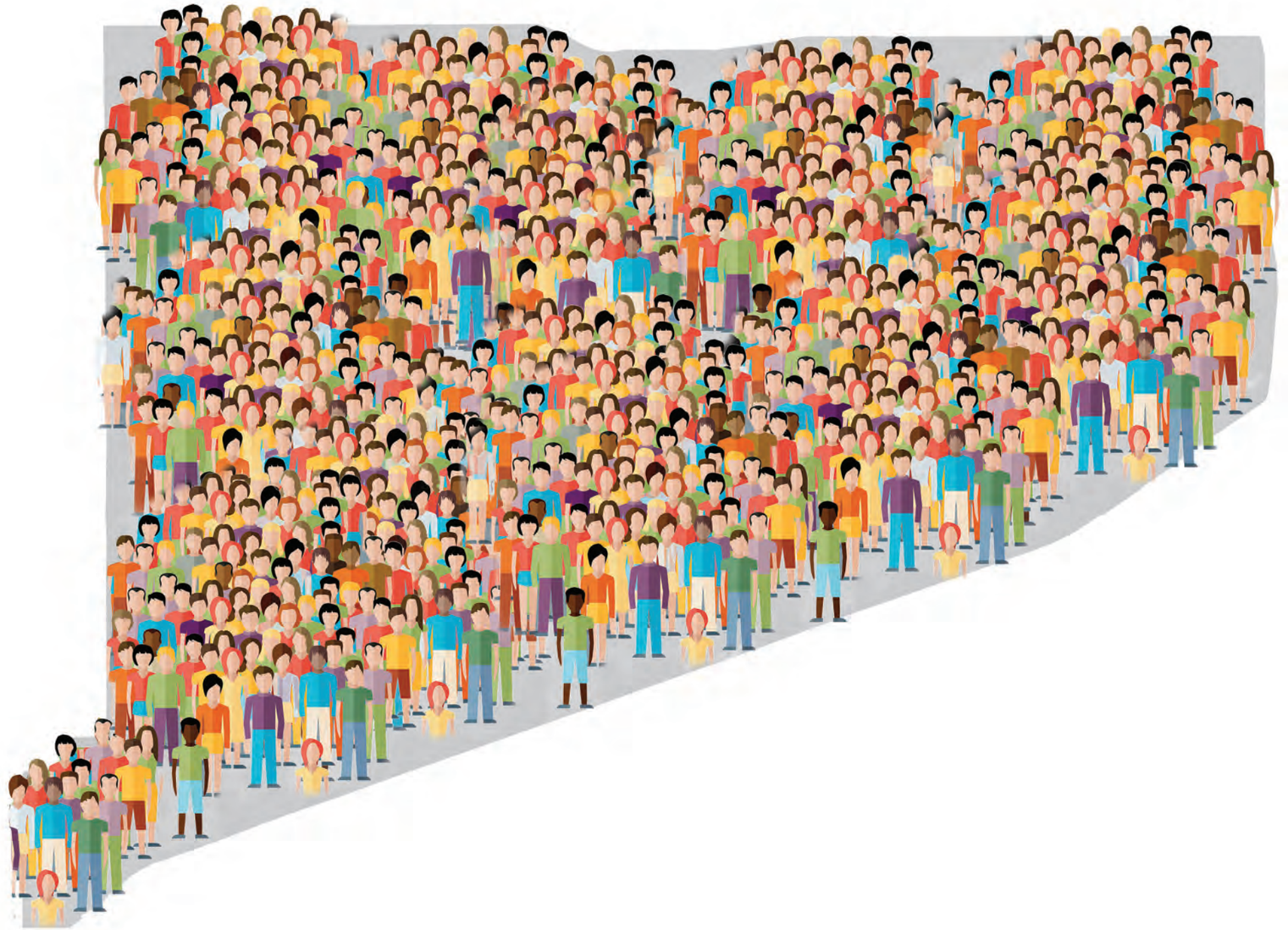


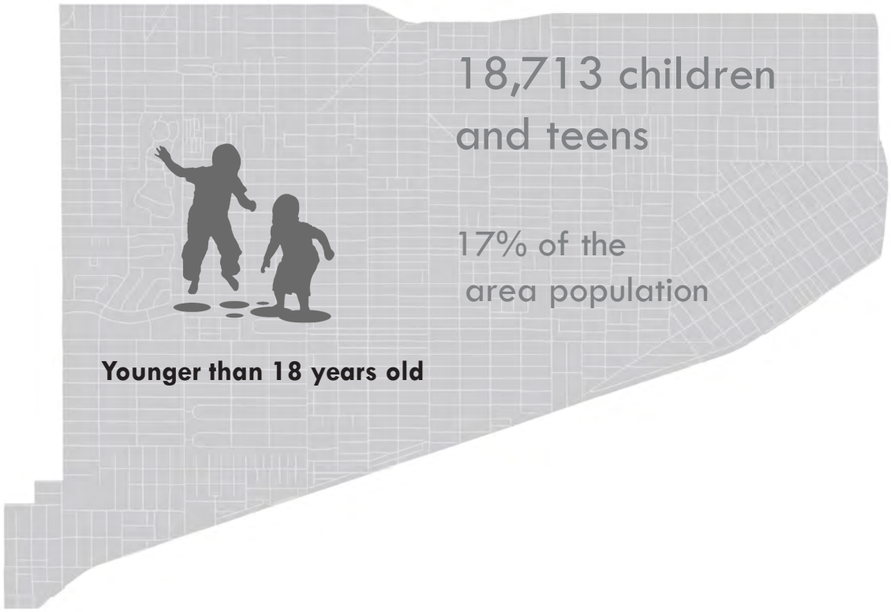
Figure 34: Vegetation Map of Southern Florida, University of Florida Digital Collections

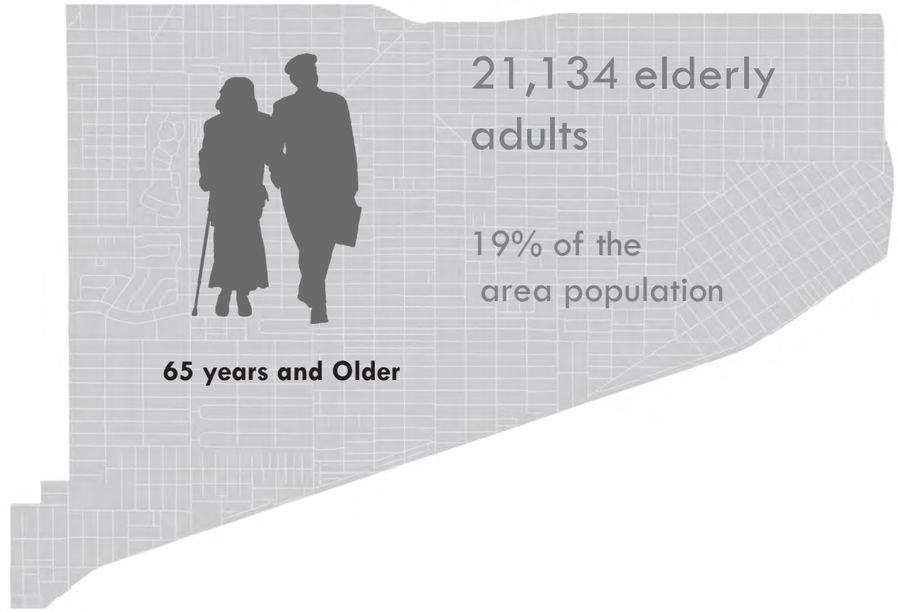
COMMUNITY STATISTICS



Demographics

Age Distributions





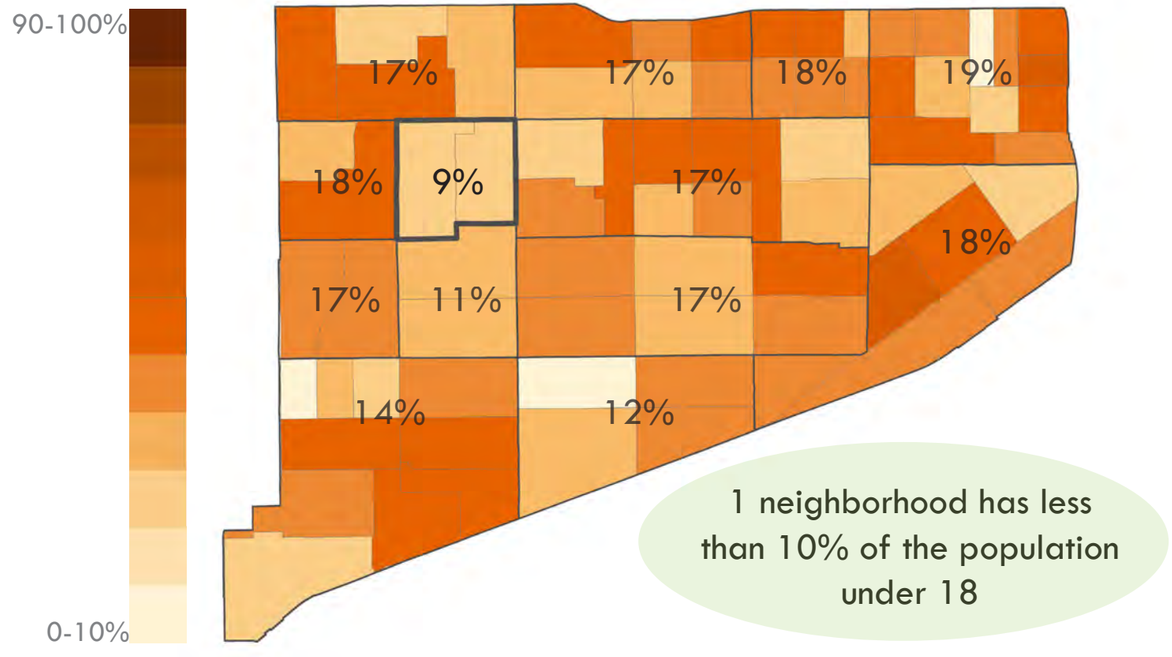


Figure 1: Age Distribution under 18 years of Age

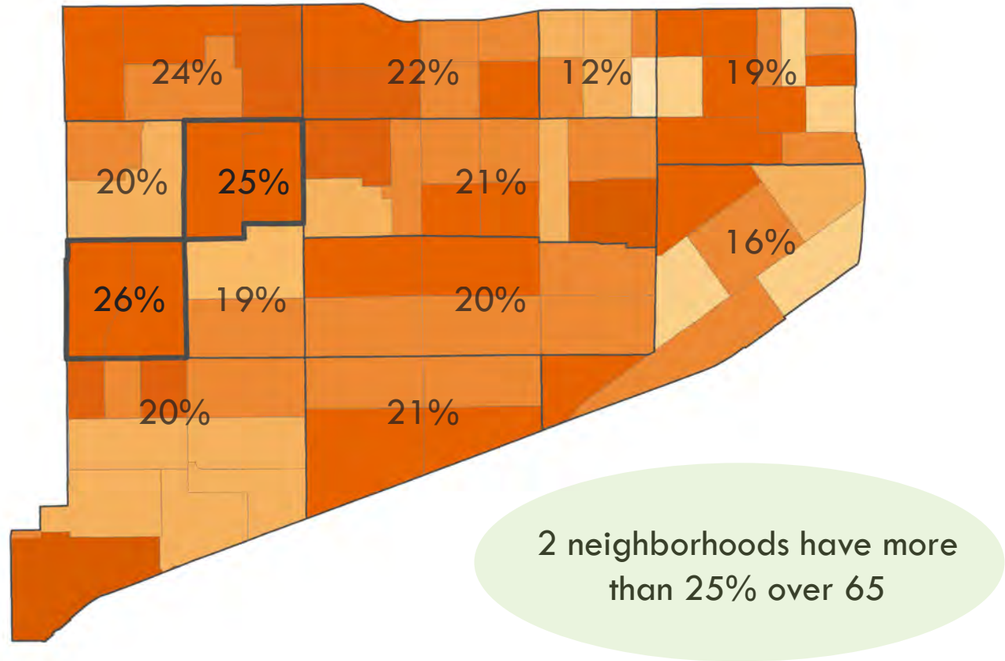


Figure 2: Age Distribution over 65 years of Age

Source: U.S. Census Bureau American Community Survey (2017)

Demographics

Household Type

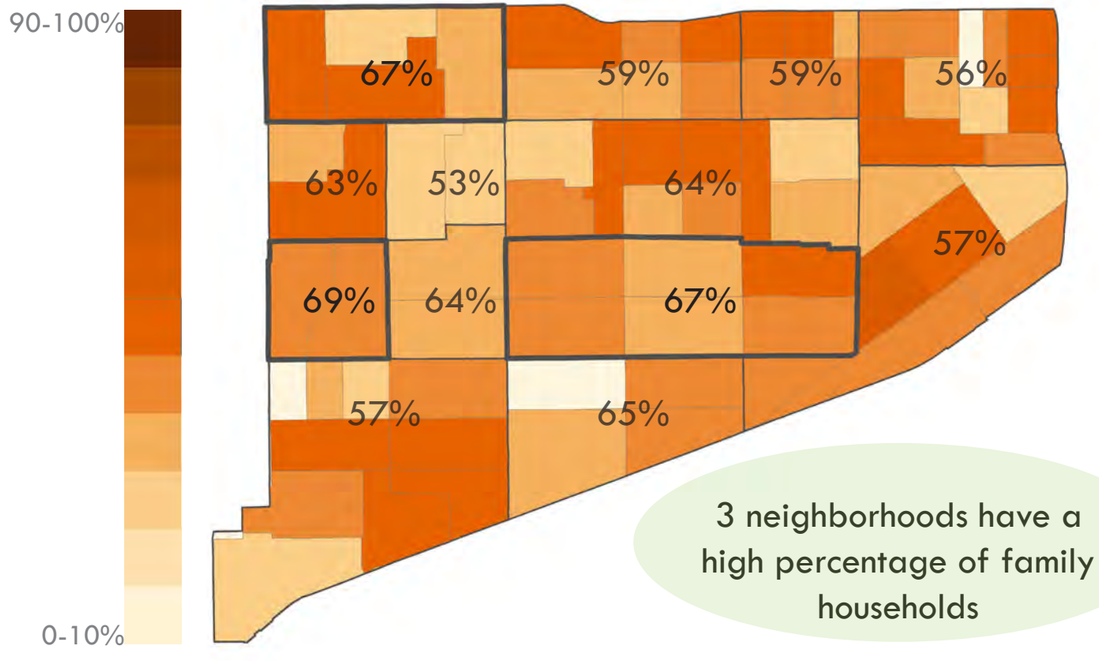
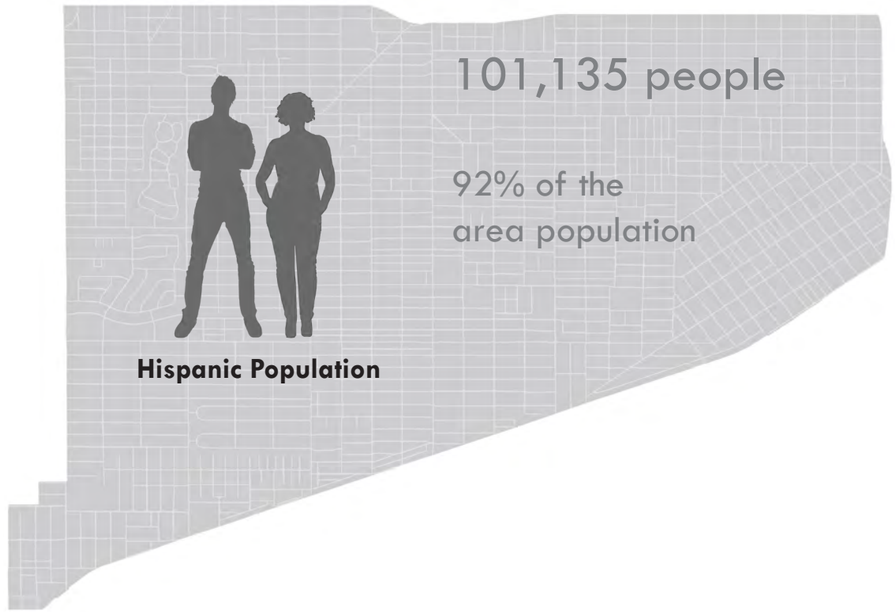


Figure 3: Family households

Source: U.S. Census Bureau American Community Survey (2017)

Ethnicity



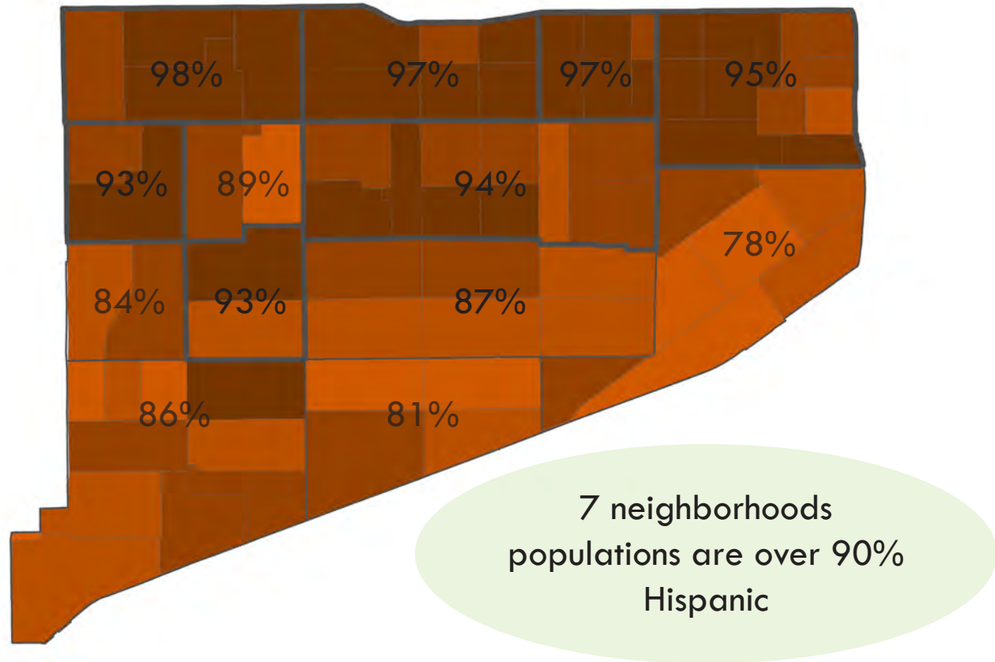


Figure 4: Minority Populations

Median Home Values

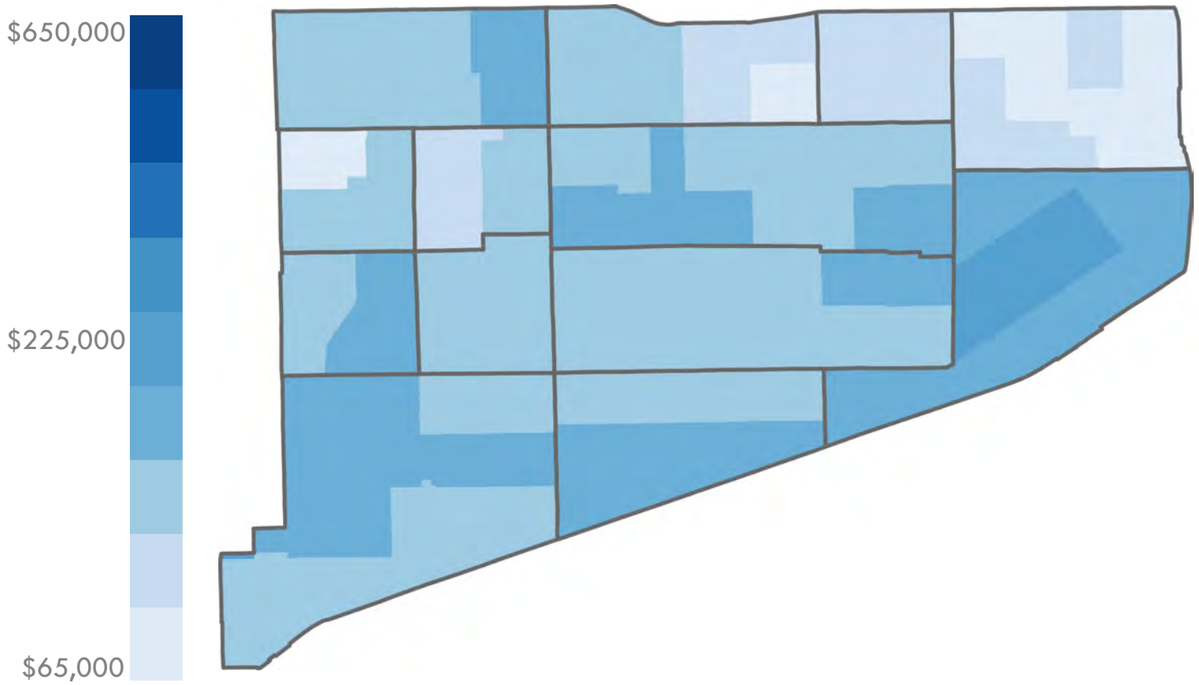


Figure 5: Median Home Value in 2000

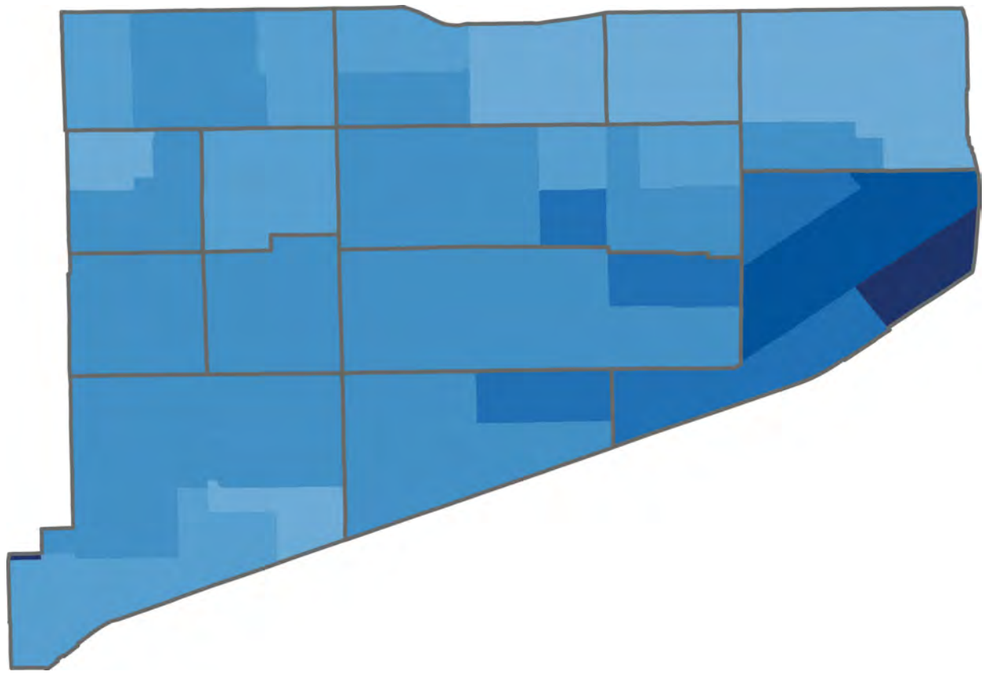


Figure 6: Median Home Value in 2018

Home Values have increased by an average of $179,000, with the greatest increase in the southern portion of the project area.

Source: U.S. Census Bureau American Community Survey (2017)

Household Vacancies

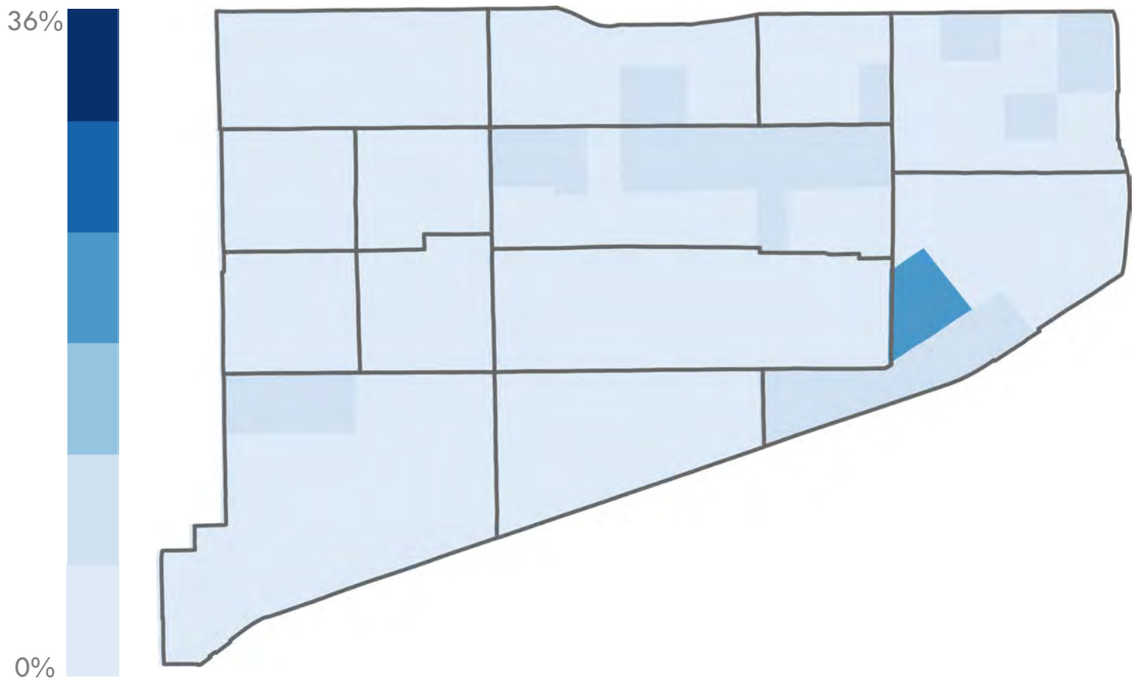


Figure 7: Household Vacancies in 2000

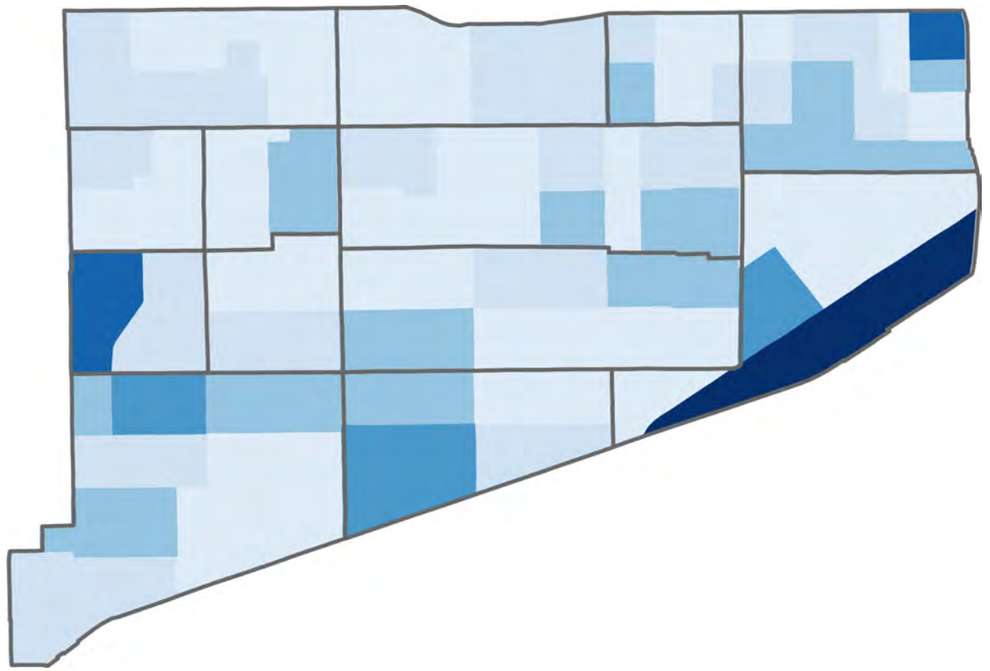


Figure 8: Household Vacancies in 2018

There has been an 5% increase in home vacancies in many of the neighborhoods, especially in the homes along US 1.

Source: U.S. Census Bureau American Community Survey (2017)

Income/Home Costs

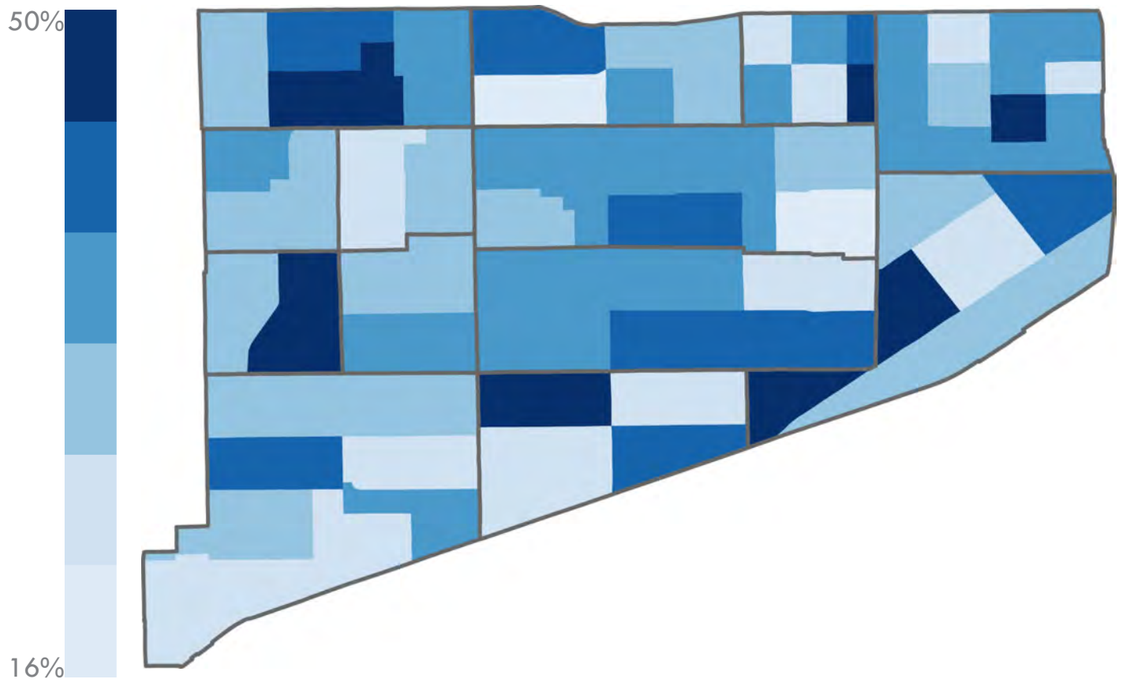


Figure 9: Percentage of Household Income going towards Rent in 2000

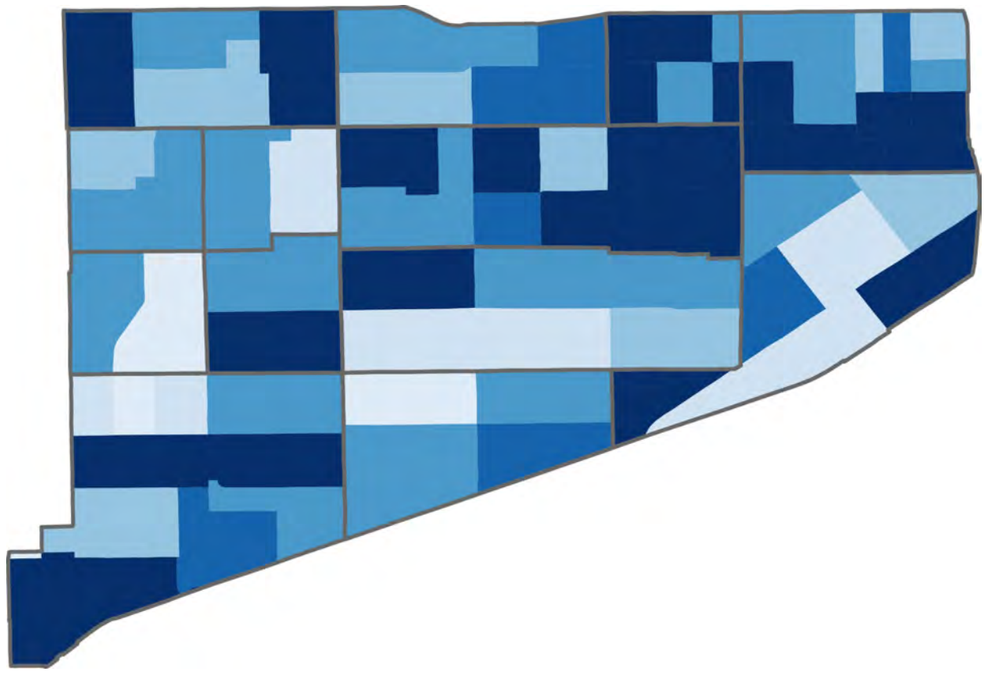


Figure 10: Percentage of Household Income going towards Rent in 2018

Families are spending 5% more of their earnings to pay for housing

Source: U.S. Census Bureau American Community Survey (2017)

Poverty/Income

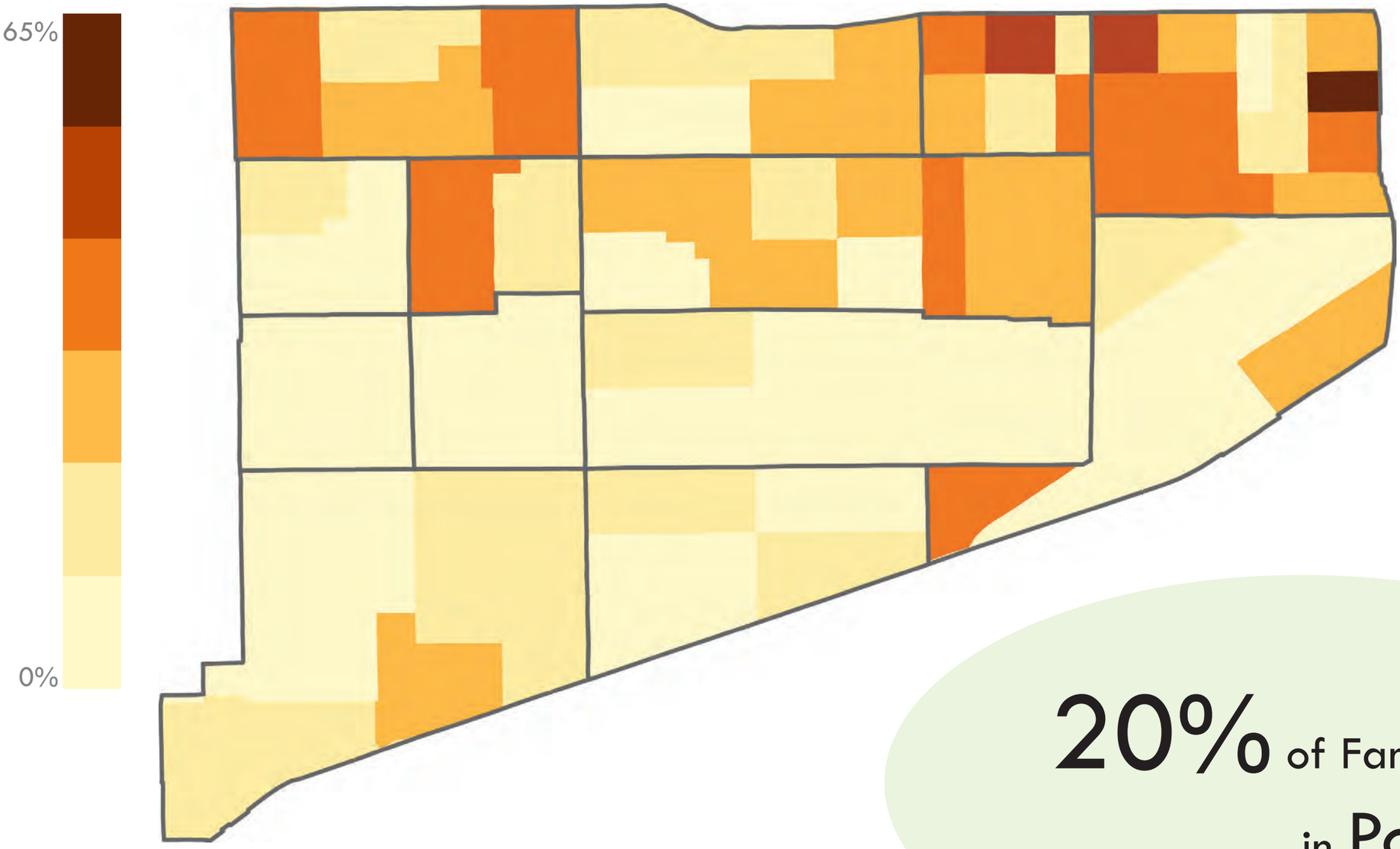


Figure 11: Percentage of Families Below Poverty Line

20% of Families Live in **Poverty**

Source: U.S. Census Bureau American Community Survey (2017)

Unemployment

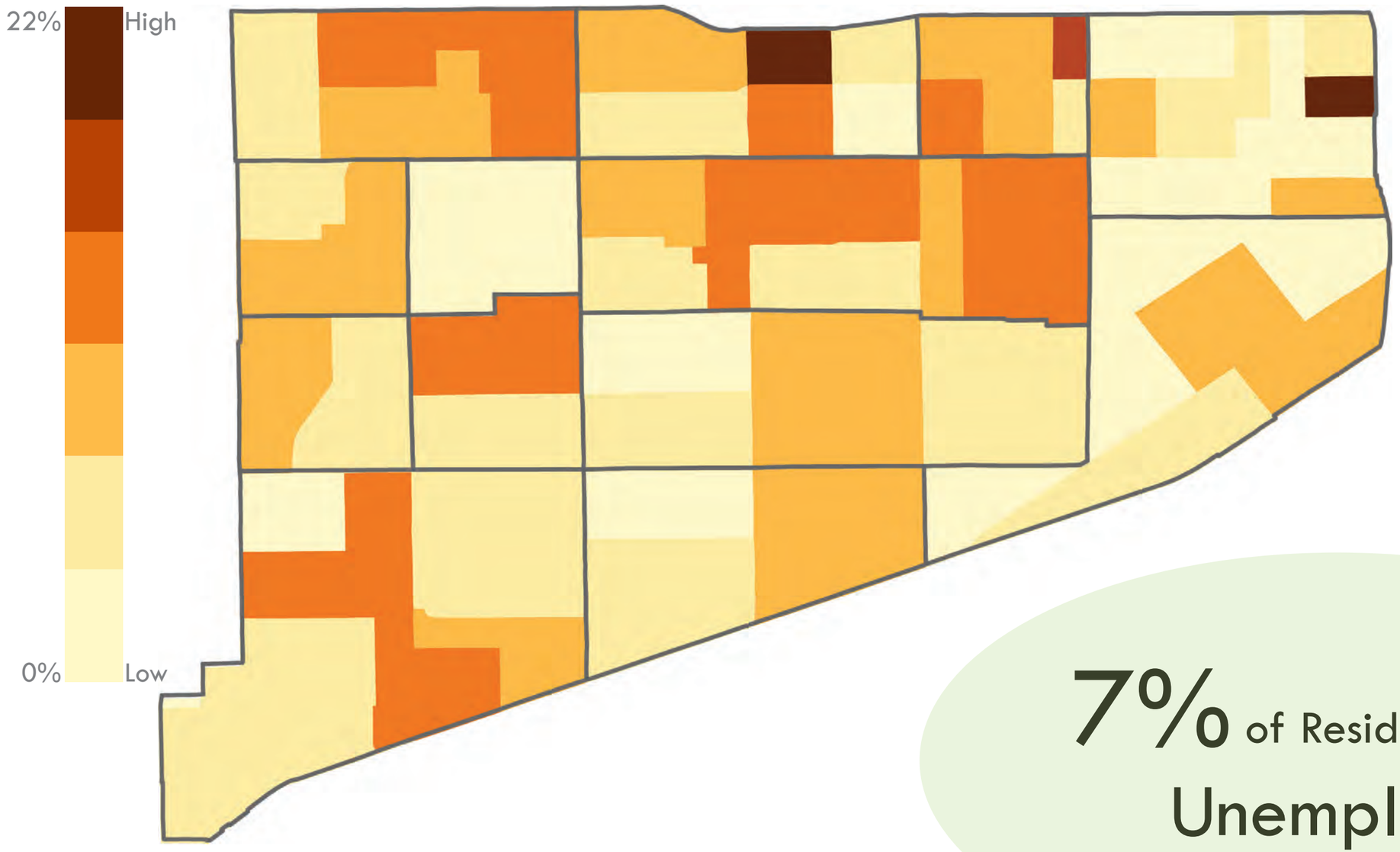


Figure 12: Unemployment Rate of Population in the Labor Force

7% of Residents are **Unemployed**

Source: U.S. Census Bureau American Community Survey (2017)

Health/Chronic Illness

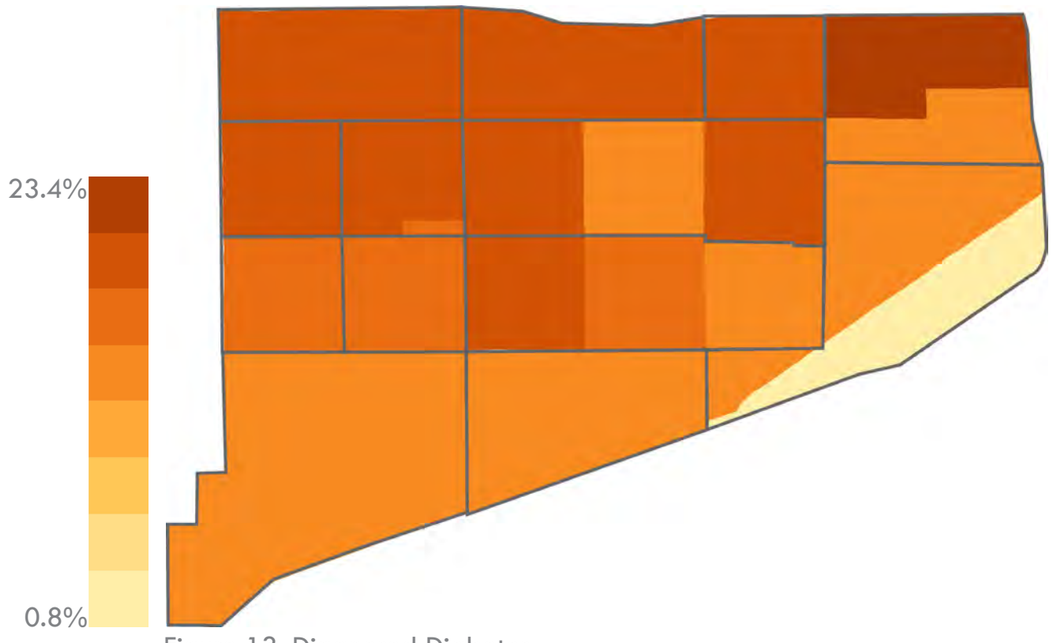


Figure 13: Diagnosed Diabetes

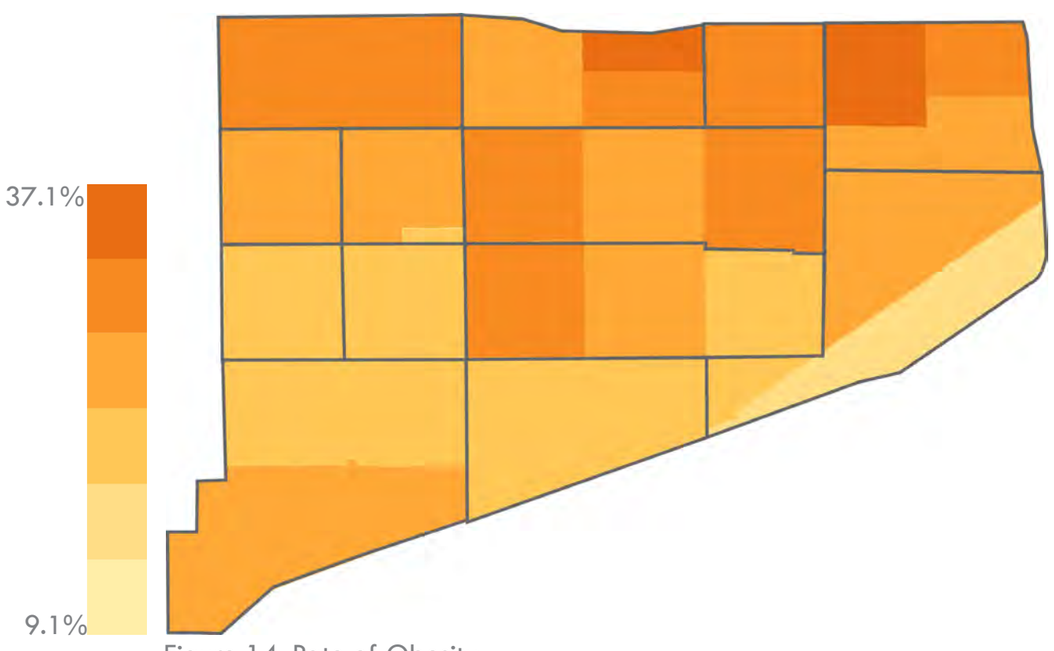


Figure 14: Rate of Obesity

Source: U.S. Census Bureau American Community Survey (2017)

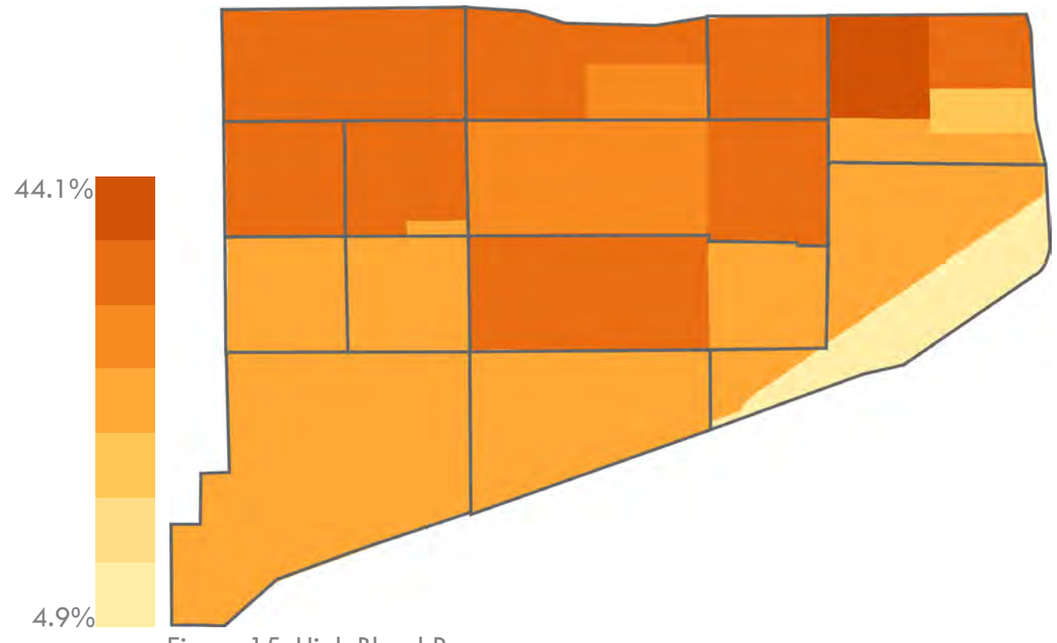


Figure 15: High Blood Pressure

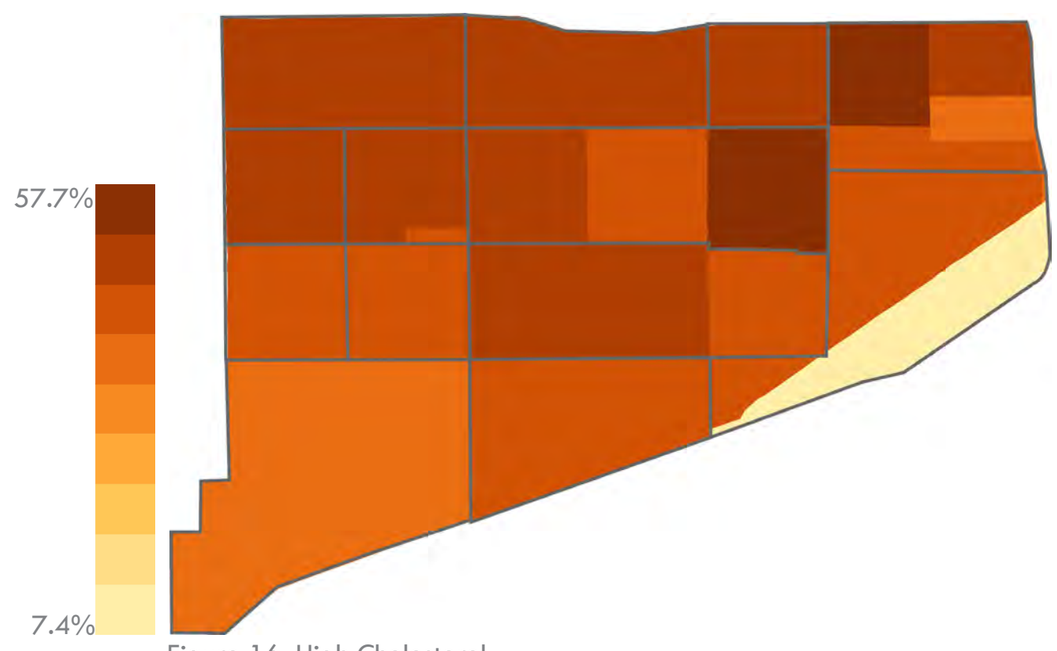


Figure 16: High Cholesterol

Health/Chronic Illness

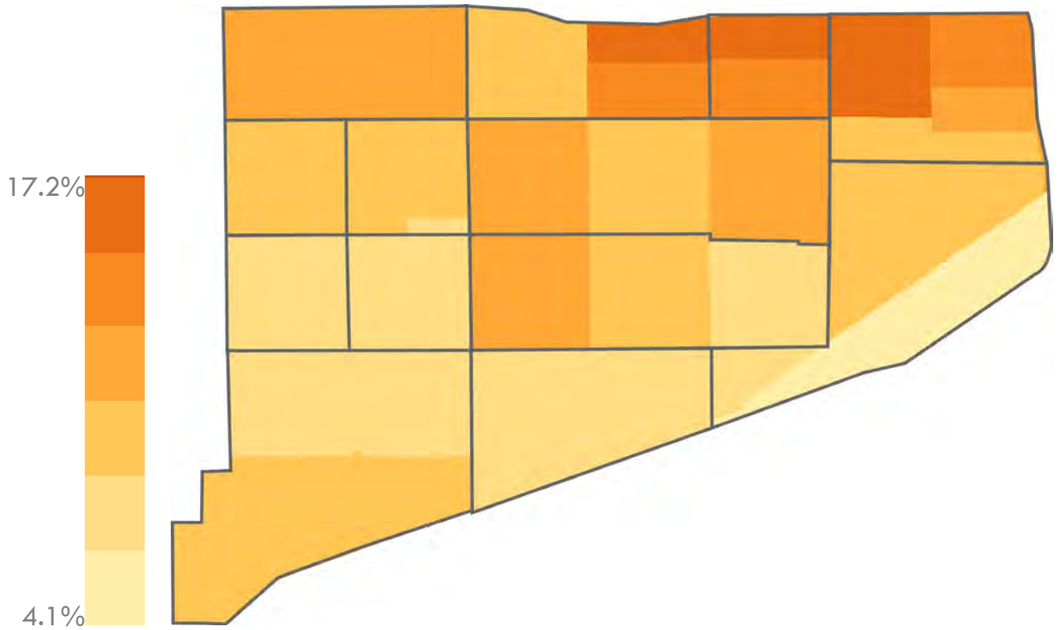


Figure 17: Poor Mental Health

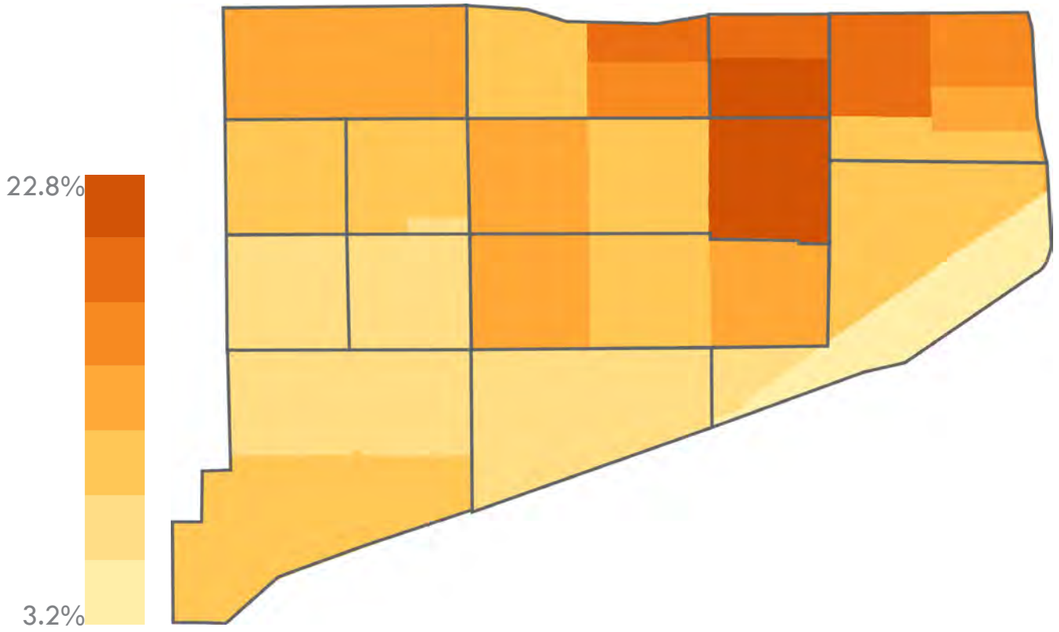


Figure 18: Poor Physical Health

Source: U.S. Census Bureau American Community Survey (2017)

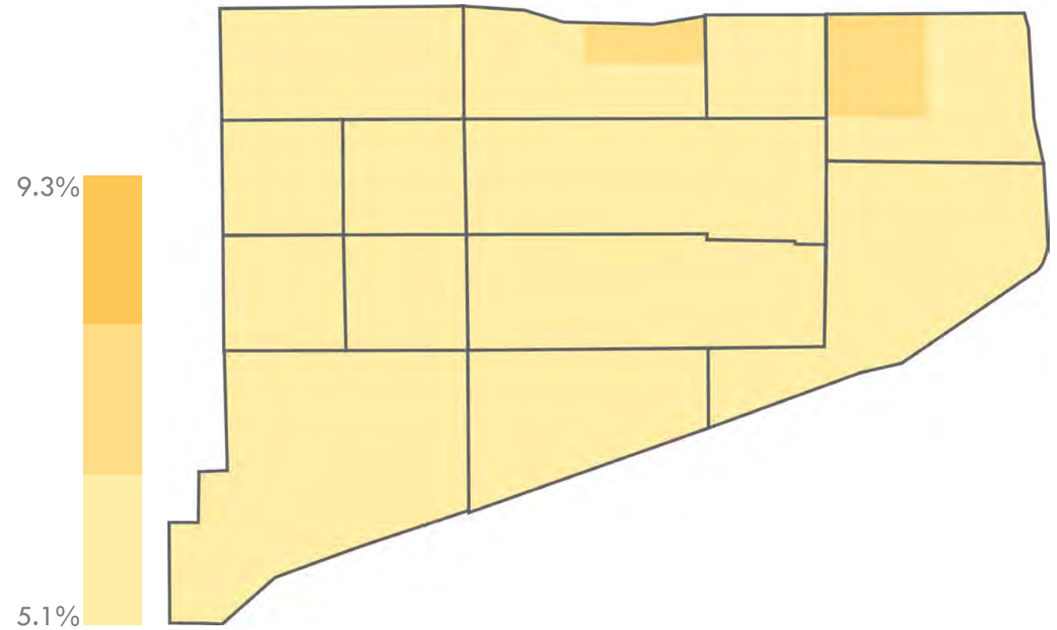


Figure 19: Asthma Prevalence

The Northern neighborhoods of the project area have the greatest incidence of Diabetes, High Blood Pressure, Obesity, High Cholesterol, Poor Mental Health, & Asthma

Crime Statistics

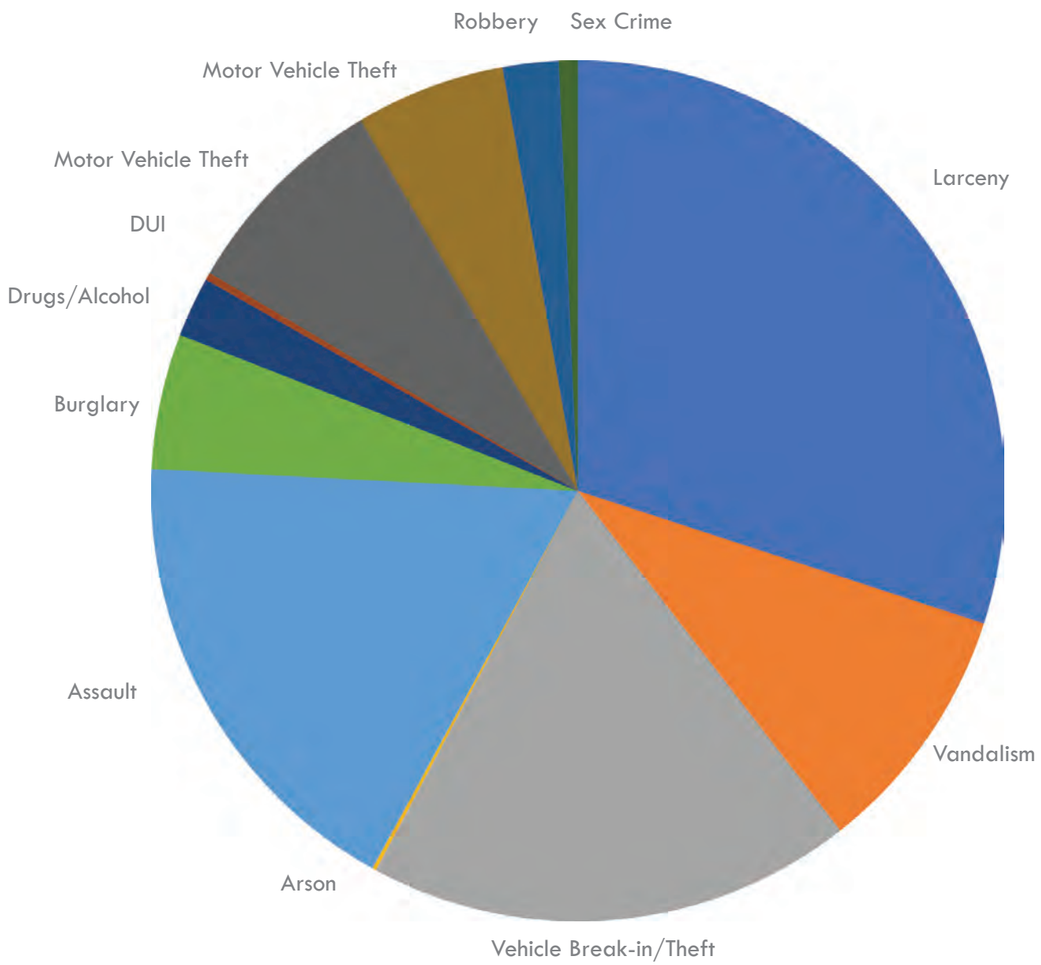


Figure 20: Breakdown of Crimes in the Past Six Months

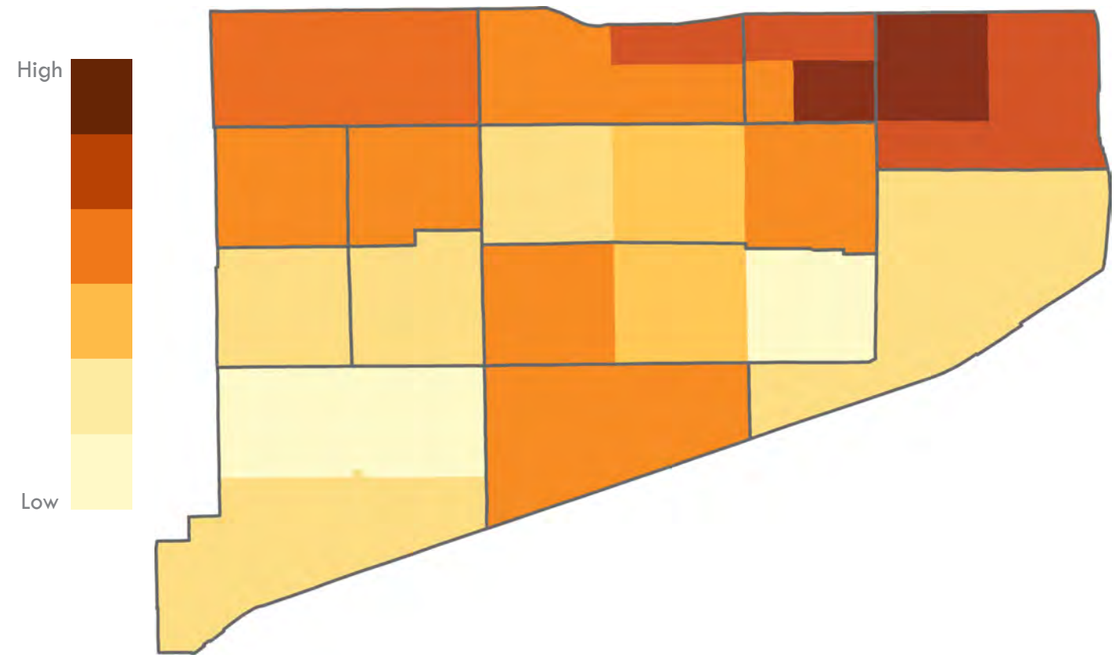


Figure 21: Prevalence of Crime

The Northern neighborhoods of the project area have the most reported incidences of crime

Source: Miami-Dade County Crime Mapper Tool

Levels of Educational Attainment

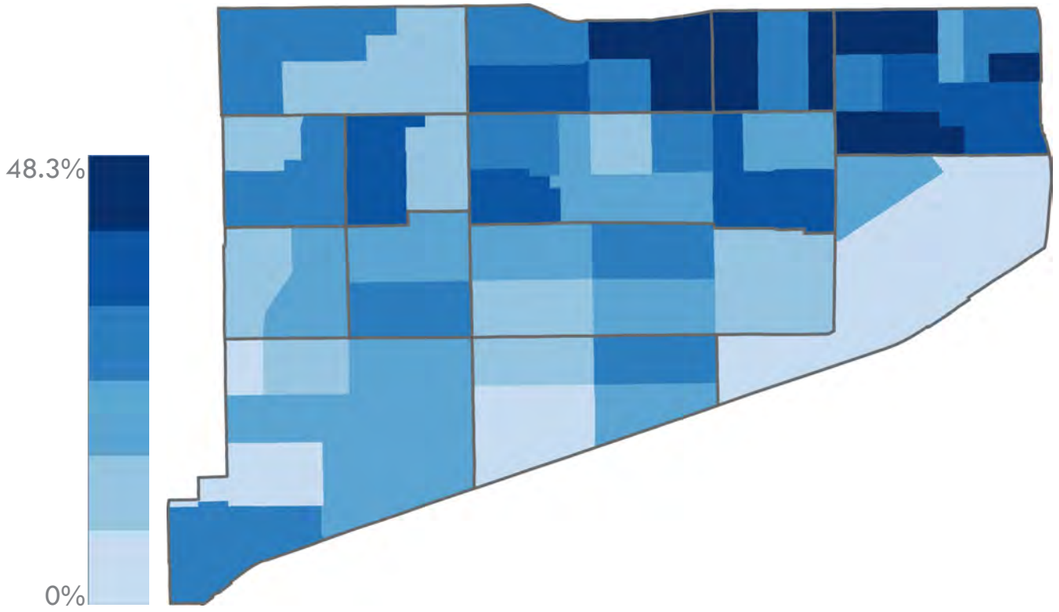


Figure 22: Less Than Highschool

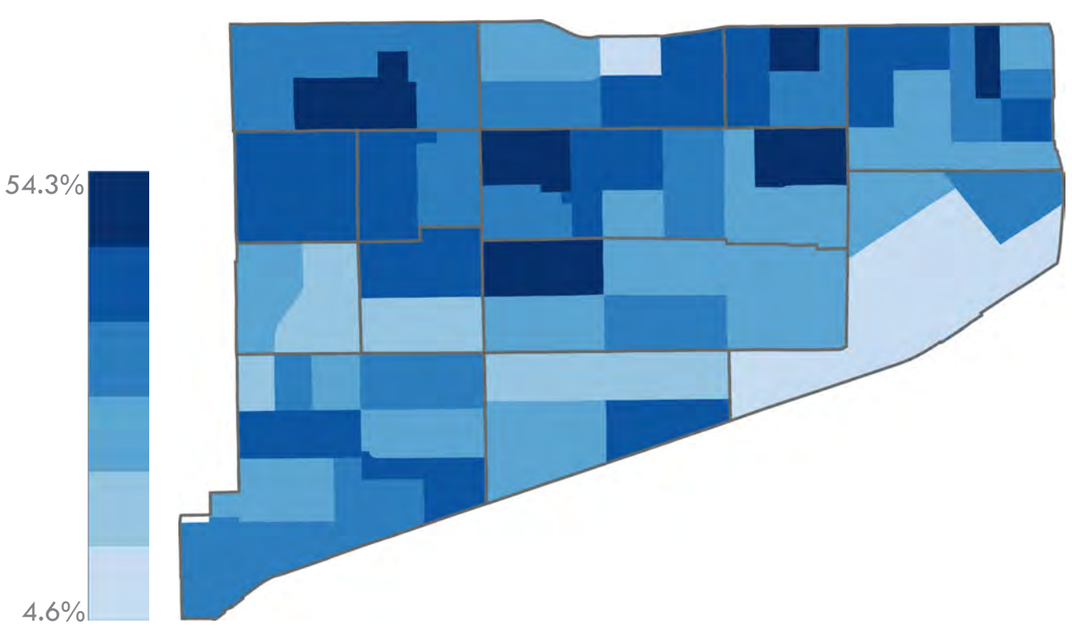


Figure 23: High School Degree

Source: U.S. Census Bureau American Community Survey (2017)

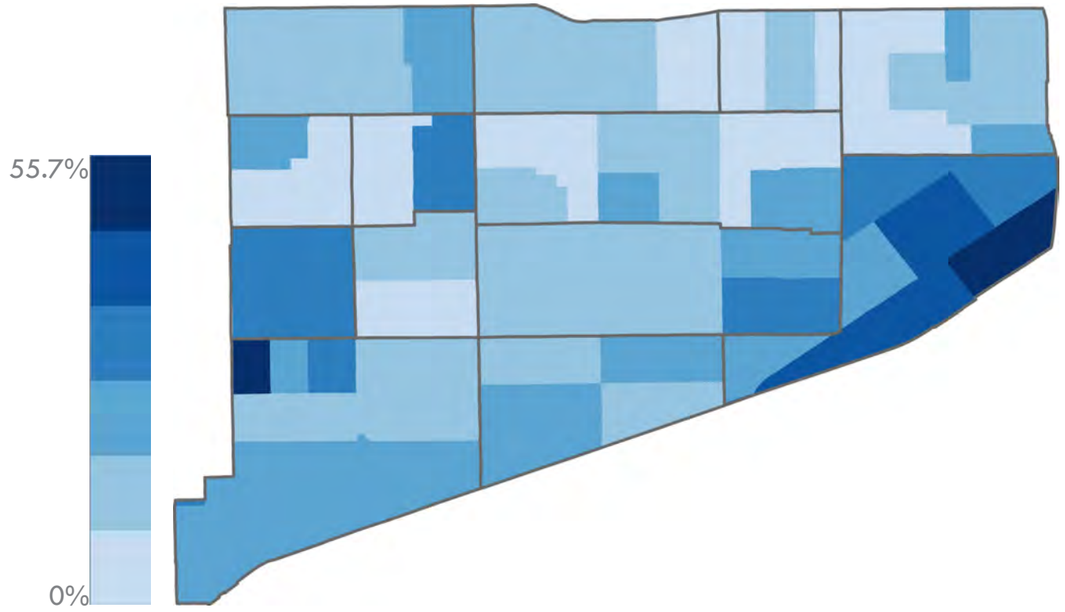
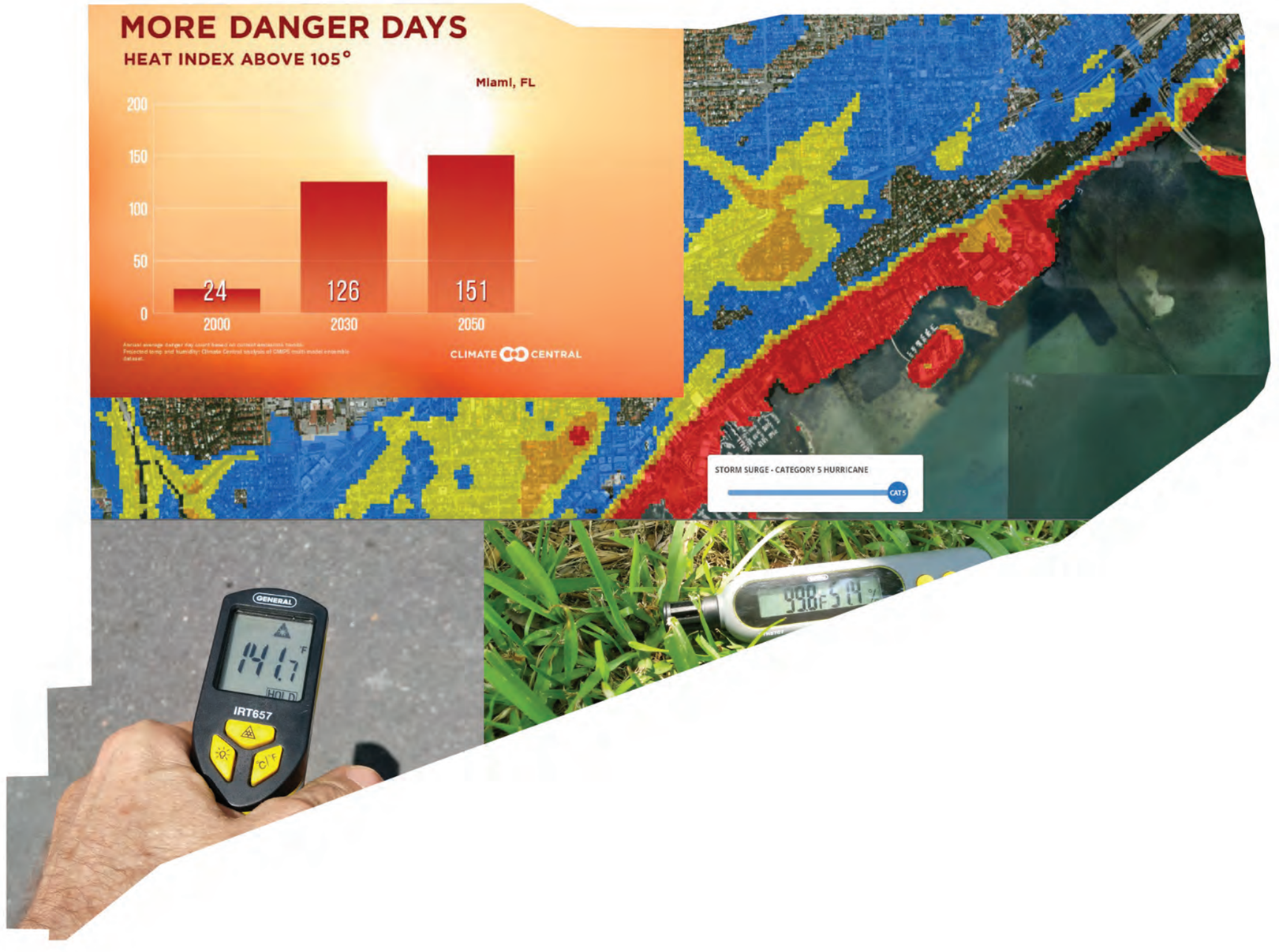


Figure 24: Bachelors Degree

The Northern neighborhoods of the project area have the lowest levels of education


MORE DANGER DAYS
HEAT INDEX ABOVE 105°
Miami, FL
200
150
100
50
0
24
126
151
2000
2030
2050
CLIMATE CENTRAL
STORM SURGE - CATEGORY 5 HURRICANE
CAT 5
GENERAL
141
IRT657

CLIMATE

Site Climate + Microclimate

Site Location:

General Location: (Miami, FL. 33130, 33135, 33145, 33133, 33129, USA)
The City is located within the eastern coastal portion of Miami-Dade County, Florida. Incorporated in 1896, the southwestern portion of the City is comprised of several distinct neighborhoods and commercial corridors. The area identified consists of approximately 6.7 square miles (4,283 ac) and is one of the City's most densely populated regions with the greatest tree canopy deficiency.

Site Location and Limits:

Latitude / Longitude: 25.753° N, -80.233° W | Elevation: 9 ft
East: SW 4th Avenue from SW 1st to US-1
South: US-1
West: SW 37th Avenue from US-1 to Flagler St. (*Note: Refer to SWS Study Area Map)
North: W Flagler Street from SW 37th Avenue to SW 24th Avenue + SW 1st from SW 24th Avenue to SW 4th Avenue.

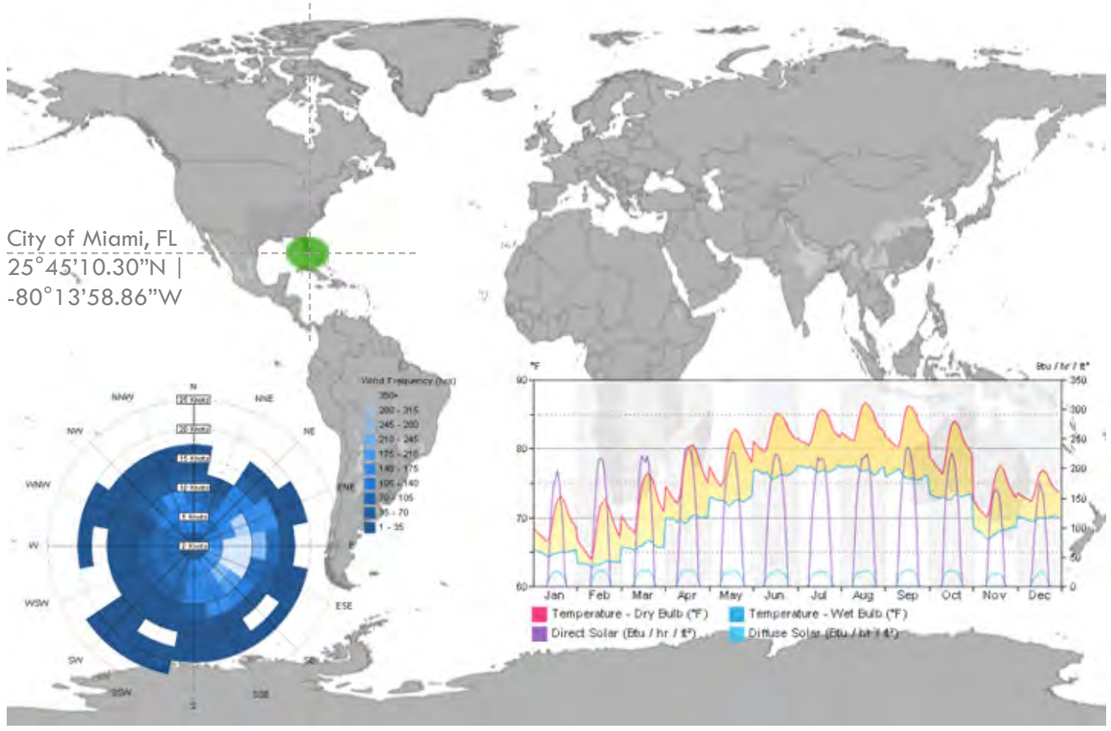
Local Climate:

The various environmental conditions, that characterize "local climate" are: temperature, humidity, wind, precipitation, and sky conditions. These are some of the most important factors to consider in the high-performance landscape design process. Not only does climate have big implications for materiality and construction, it's also very telling about the types of passive design that are going to work best.

koppen climate classification

According to the koppen climate classification, Miami has a tropical monsoon climate (Köppen climate classification Am) with hot, humid summers and short, warm winters marking the dry season. Its sea-level elevation, coastal location, position just above the Tropic of Cancer, and proximity to the Gulf Stream shapes its climate. With January averaging 67.2 °F (19.6 °C), winter features mild to warm temperatures; cool air usually settles after the passage of a cold front, which produces much of the little amount of rainfall. Lows sometimes fall below 50 °F (10 °C), but very rarely below 35 °F (2 °C). Highs generally range between 70–77 °F (21–25 °C). The wet season begins in May, ending in mid-October. During this period, temperatures are in the mid 80's to low 90's (29–35 °C), accompanied by high humidity. High temperatures are often relieved by afternoon thunderstorms or a sea breeze that develops off the Atlantic Ocean, lowering temperatures but keeping humidity relatively high. Much of the year's 55.9 inches (1,420 mm) of rainfall occurs during this period.
Extreme temperatures have ranged from lows of 27 °F (2.8 °C) on February 3, 1917 to highs of 100 °F (38 °C) on July 21, 1940. Miami has never recorded any snowfall although there were disputed claims of snow flurries on January 19, 1977. Hurricane season officially runs from June 1 through November 30, although hurricanes can develop beyond those dates. The most likely time for Miami to be hit is during the peak of the Cape Verde season, which is mid-August through the end of September. Although tornadoes are uncommon in the Miami area, a tornado struck the city in 1925 and again in 1997.

Climate is the long term behavior of the surroundings in a selected region, with specific features such as, temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables. Climate differs from weather, in that weather only describes the short-term conditions of these variables in a given region.

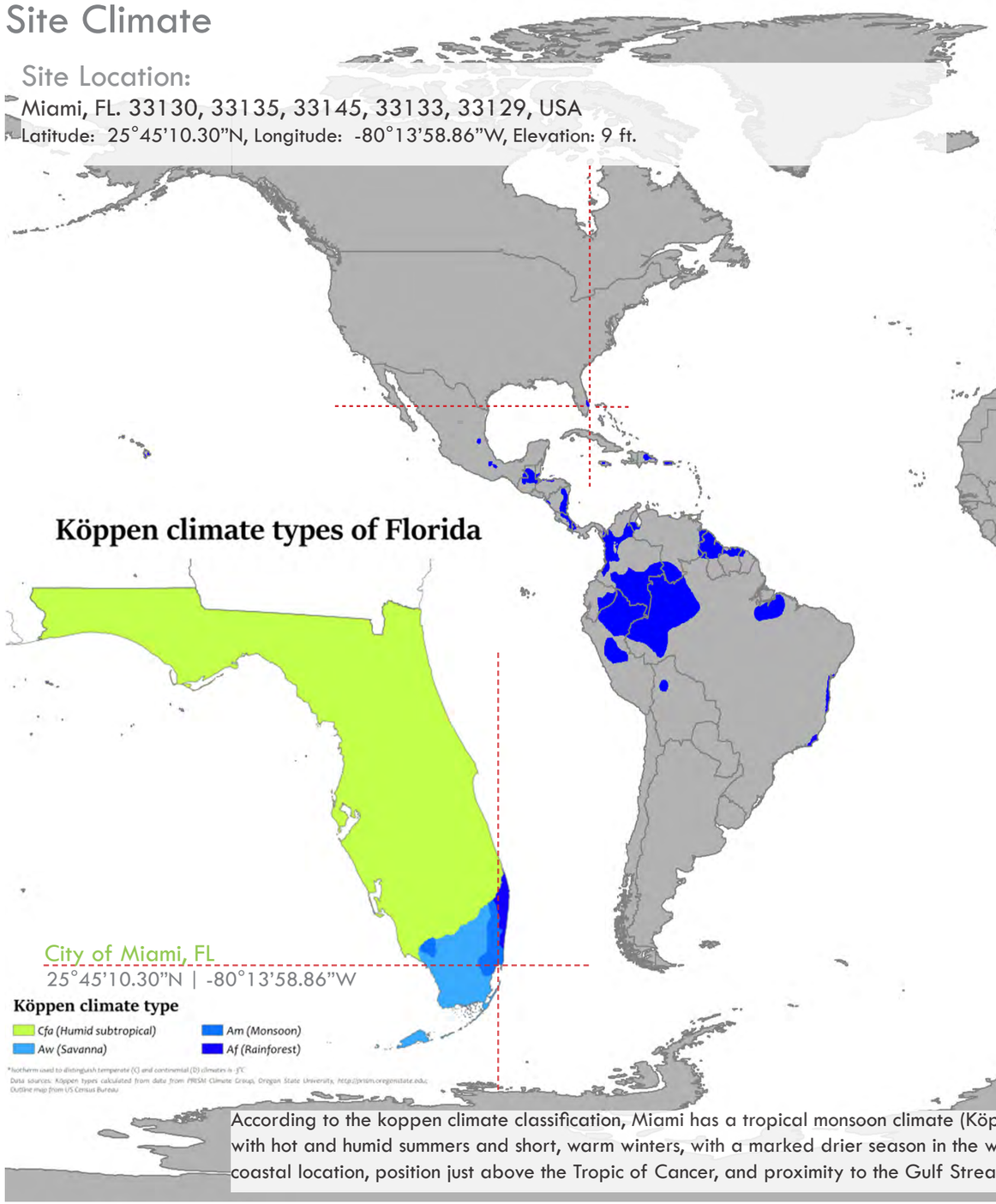


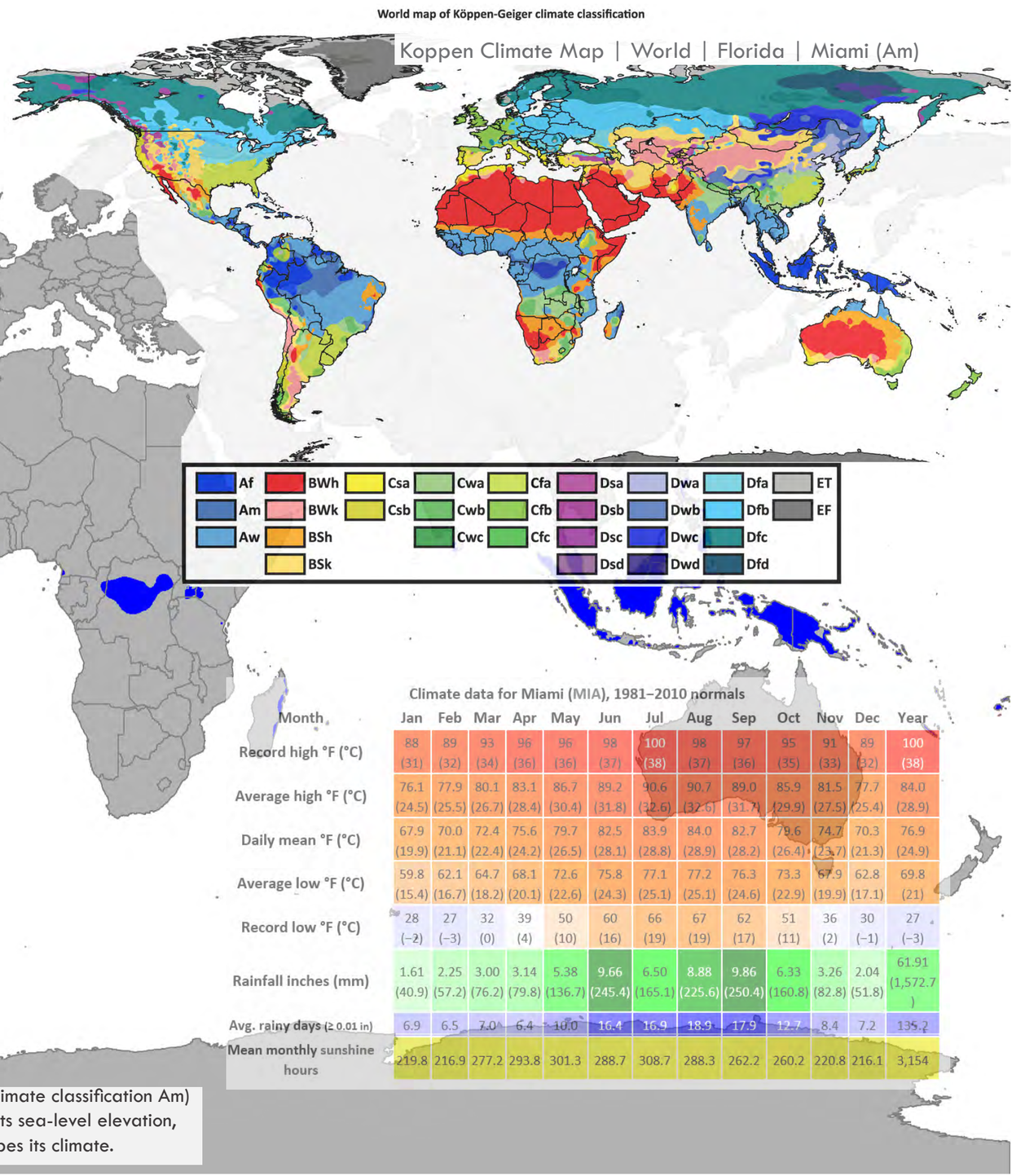
Site Climate

Site Location:

Miami, FL. 33130, 33135, 33145, 33133, 33129, USA

Latitude: 25°45'10.30"N, Longitude: -80°13'58.86"W, Elevation: 9 ft.





Climate data for Miami (MIA), 1981–2010 normals

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	88 (31)	89 (32)	93 (34)	96 (36)	96 (36)	98 (37)	100 (38)	98 (37)	97 (36)	95 (35)	91 (33)	89 (32)	100 (38)
Average high °F (°C)	76.1 (24.5)	77.9 (25.5)	80.1 (26.7)	83.1 (28.4)	86.7 (30.4)	89.2 (31.8)	90.6 (32.6)	90.7 (32.6)	89.0 (31.7)	85.9 (29.9)	81.5 (27.5)	77.7 (25.4)	84.0 (28.9)
Daily mean °F (°C)	67.9 (19.9)	70.0 (21.1)	72.4 (22.4)	75.6 (24.2)	79.7 (26.5)	82.5 (28.1)	83.9 (28.8)	84.0 (28.9)	82.7 (28.2)	79.6 (26.4)	74.7 (23.7)	70.3 (21.3)	76.9 (24.9)
Average low °F (°C)	59.8 (15.4)	62.1 (16.7)	64.7 (18.2)	68.1 (20.1)	72.6 (22.6)	75.8 (24.3)	77.1 (25.1)	77.2 (25.1)	76.3 (24.6)	73.3 (22.9)	67.9 (19.9)	62.8 (17.1)	69.8 (21)
Record low °F (°C)	28 (−2)	27 (−3)	32 (0)	39 (4)	50 (10)	60 (16)	66 (19)	67 (19)	62 (17)	51 (11)	36 (2)	30 (−1)	27 (−3)
Rainfall inches (mm)	1.61 (40.9)	2.25 (57.2)	3.00 (76.2)	3.14 (79.8)	5.38 (136.7)	9.66 (245.4)	6.50 (165.1)	8.88 (225.6)	9.86 (250.4)	6.33 (160.8)	3.26 (82.8)	2.04 (51.8)	61.91 (1,572.7)
Avg. rainy days (≥ 0.01 in)	6.9	6.5	7.0	6.4	10.0	16.4	16.9	18.9	17.9	12.7	8.4	7.2	135.2
Mean monthly sunshine hours	219.8	216.9	277.2	293.8	301.3	288.7	308.7	288.3	262.2	260.2	220.8	216.1	3,154

According to the koppen climate classification, Miami has a tropical monsoon climate (Köppen climate classification Am) with hot and humid summers and short, warm winters, with a marked drier season in the winter. Its sea-level elevation, coastal location, position just above the Tropic of Cancer, and proximity to the Gulf Stream shapes its climate.

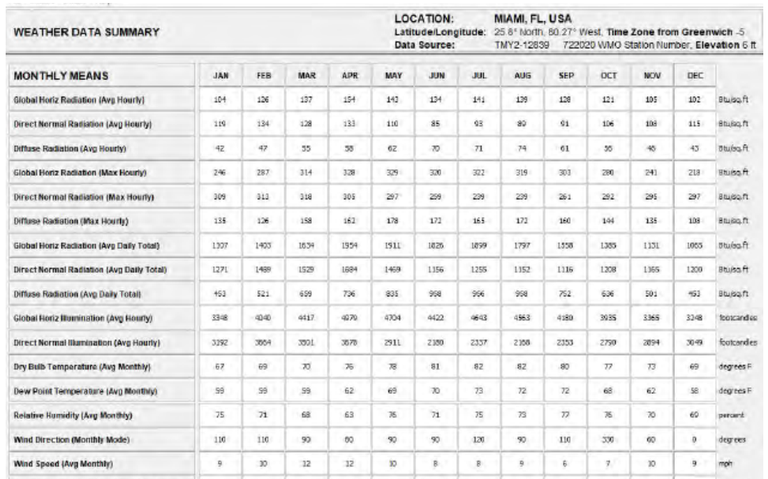
Site Climate

Site Location:

Miami, FL. 33130, 33135, 33145, 33133, 33129, USA
Latitude: 25°45'10.30"N, Longitude: -80°13'58.86"W, Elevation: 9 ft.

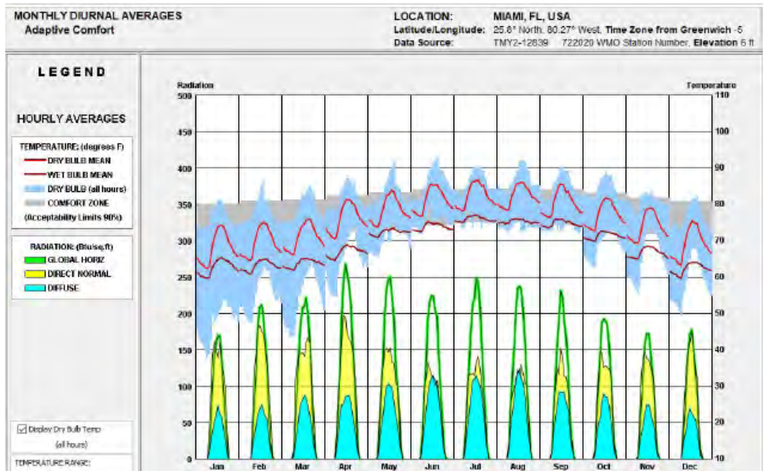
Climate Consultant Energy Design Tool Data adaptive model is based on the idea that outdoor climate influences indoor comfort because humans can adapt to different temperatures during different times of the year. The adaptive hypothesis predicts that contextual factors, such as having access to environmental controls, and past thermal history can influence outdoor thermal comfort expectations and preferences.

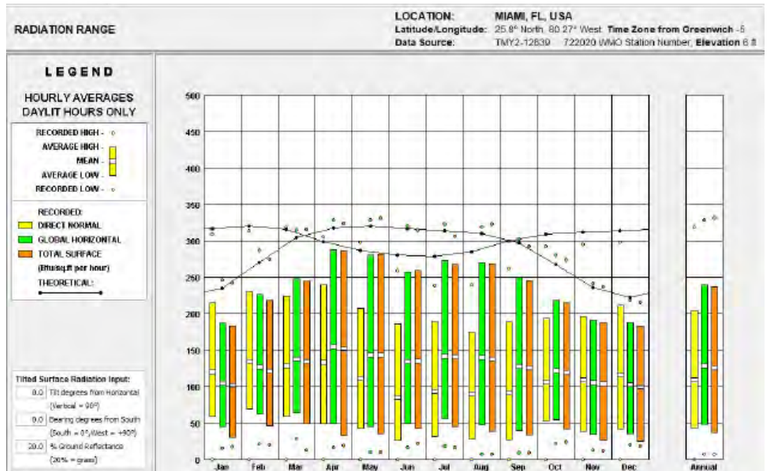
Climate Consultant 6.0 | Energy Design Tool Data

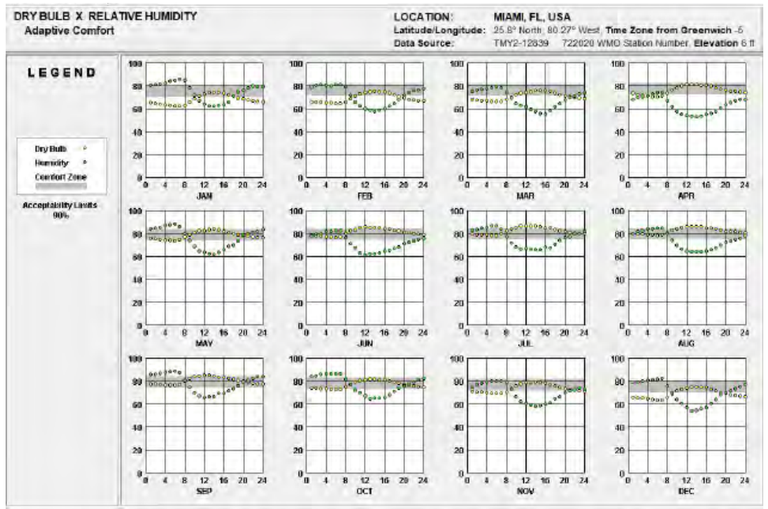


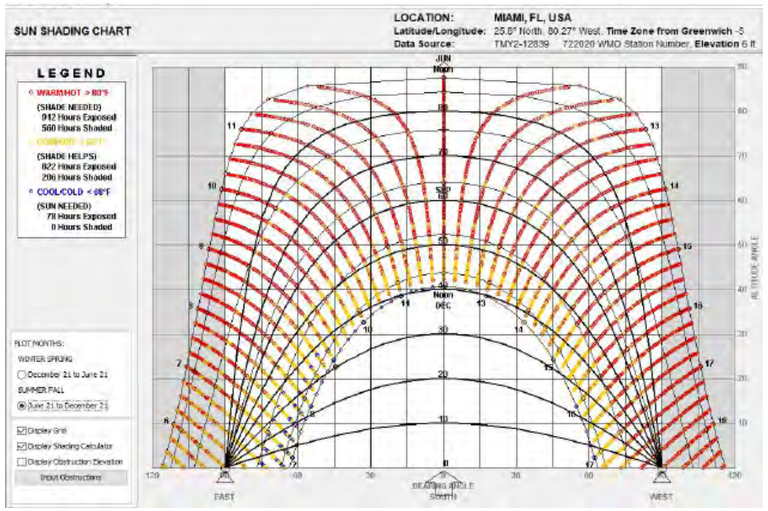
WEATHER DATA SUMMARY — LOCATION: MIAMI, FL, USA; Latitude/Longitude: 25.8° North, 80.27° West, Time Zone from Greenwich -5; Data Source: TMY2-12839 722020 WMO Station Number, Elevation 6 ft

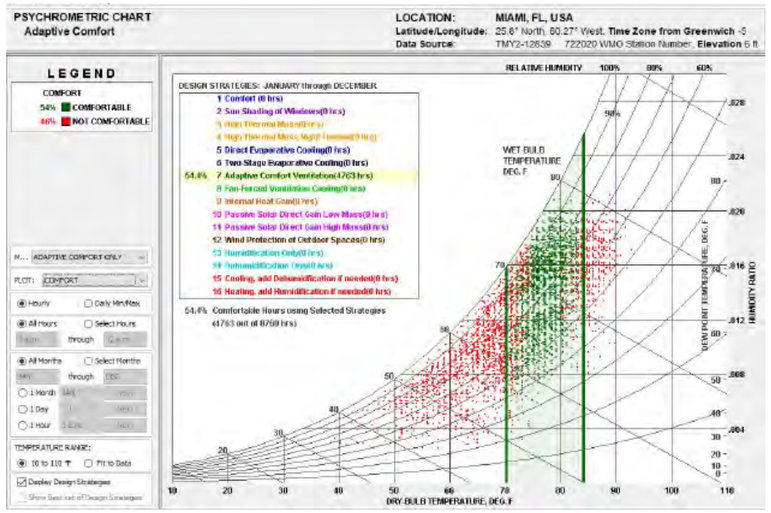
MONTHLY MEANS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Global Horiz Radiation (Avg Hourly)	104	126	137	154	142	134	141	139	128	121	103	102	Btu/sq.ft
Direct Normal Radiation (Avg Hourly)	116	134	128	133	110	85	93	89	91	106	108	115	Btu/sq.ft
Diffuse Radiation (Avg Hourly)	42	47	55	58	62	70	71	74	61	55	46	43	Btu/sq.ft
Global Horiz Radiation (Max Hourly)	246	287	314	328	329	306	322	319	303	280	241	218	Btu/sq.ft
Direct Normal Radiation (Max Hourly)	269	311	318	303	297	299	299	299	291	292	295	297	Btu/sq.ft
Diffuse Radiation (Max Hourly)	135	126	158	162	178	172	165	172	160	144	138	108	Btu/sq.ft
Global Horiz Radiation (Avg Daily Total)	1307	1493	1634	1854	1911	1826	1899	1797	1558	1385	1131	1065	Btu/sq.ft
Direct Normal Radiation (Avg Daily Total)	1271	1489	1529	1684	1469	1156	1255	1152	1116	1208	1165	1209	Btu/sq.ft
Diffuse Radiation (Avg Daily Total)	493	521	699	736	835	998	996	998	752	606	591	492	Btu/sq.ft
Global Horiz Illumination (Avg Hourly)	3348	4040	4417	4979	4704	4422	4643	4563	4189	3935	3365	3248	footcandles
Direct Normal Illumination (Avg Hourly)	3292	3864	3901	3978	3911	3380	3357	3356	3353	3799	3894	3949	footcandles
Dry Bulb Temperature (Avg Monthly)	67	69	70	76	78	81	82	82	80	77	73	69	degrees F
Dew Point Temperature (Avg Monthly)	59	59	59	62	69	70	73	72	72	68	62	58	degrees F
Relative Humidity (Avg Monthly)	75	71	68	63	76	71	75	73	77	76	70	69	percent
Wind Direction (Monthly Mode)	110	110	90	60	90	90	120	90	110	300	60	0	degrees
Wind Speed (Avg Monthly)	9	10	12	12	10	8	8	9	6	7	10	9	mph
Ground Temperature (Avg Monthly of 3 Depths)	71	70	71	71	74	77	79	80	80	78	76	73	degrees F











Resource: https://energyplus.net/weather | Weather data available in EnergyPlus weather format (.epw)
Weather Data Download - Miami 722020 (TMY2)

Climate Consultant 6.0 | Energy Design Tool Data | http://www.energy-design-tools.aud.ucla.edu/

Site Microclimate

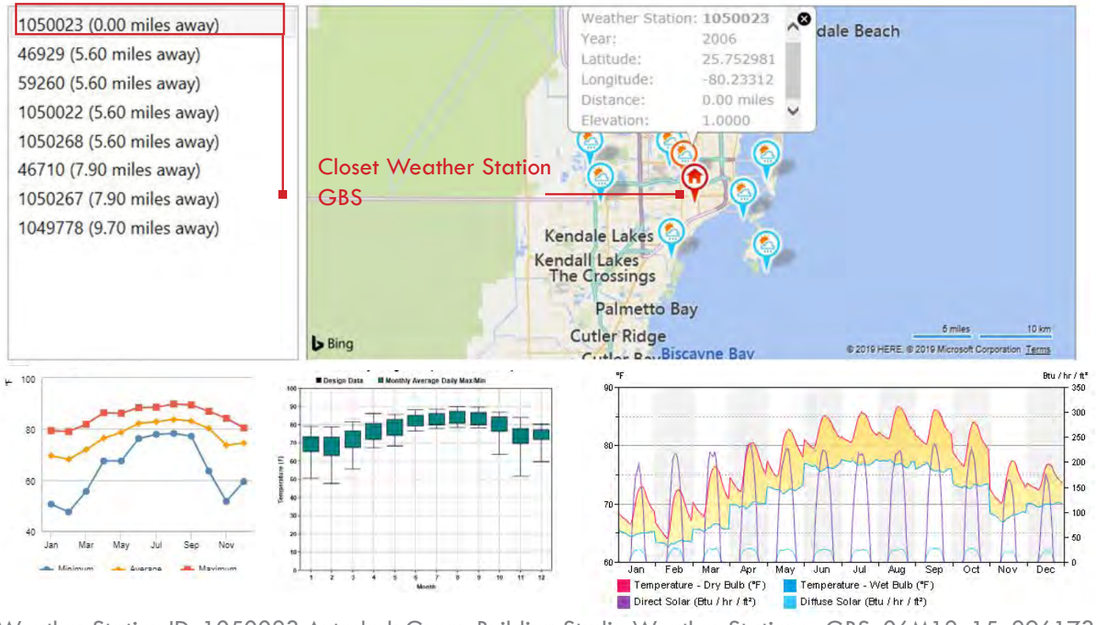
Site Location and Limits:

Latitude / Longitude: 25.753° N, -80.233° W | Elevation: 9 ft
East: SW 4th Avenue from SW 1st to US-1
South: US-1
West: SW 37th Avenue from US-1 to Flagler St. (*Note: Refer to SWS Study Area Map)
North: W Flagler Street from SW 37th Avenue to SW 24th Avenue + SW 1st from SW 24th Avenue to SW 4th Ave..

Site Microclimate

The site microclimate is controlled by a multitude of different man-made and natural elements forming the urban landscape. Theses individual characteristics influence the formation of wind flows, radiation patterns and air temperature we recognize as the outdoor thermal environment.
Architecture, landscape architecture and human thermal comfort & health are all causal elements though which microclimate can be analyzed.

Data collected from a local weather station can provide information about street level conditions. In order to study the local microclimate at Street Level (air temperature, mean radiant temperature, air speed, and humidity) the closest Weather Station located on site was selected.



Weather Station ID: 1050023 Autodesk Green Building Studio Weather Stations _GBS_06M12_15_296173

Local microclimates can be wildly different from the closest physical weather station - particularly with elevation changes or locations near geographic features like large bodies of water. Depending on terrain and water features, a single year of simulated data may conform more closely with a location's climate than typical conditions from the closest physical weather station.

Air temperature, relative humidity, air motion, and radiant temperature in a site microclimate are key to achieving sustainable human thermal comfort conditions for outdoor spaces. Improvements to roadway geometry and orientation, sidewalk widths, shading structures, materials, building heights and air movement can make outdoor thermal conditions more favorable.

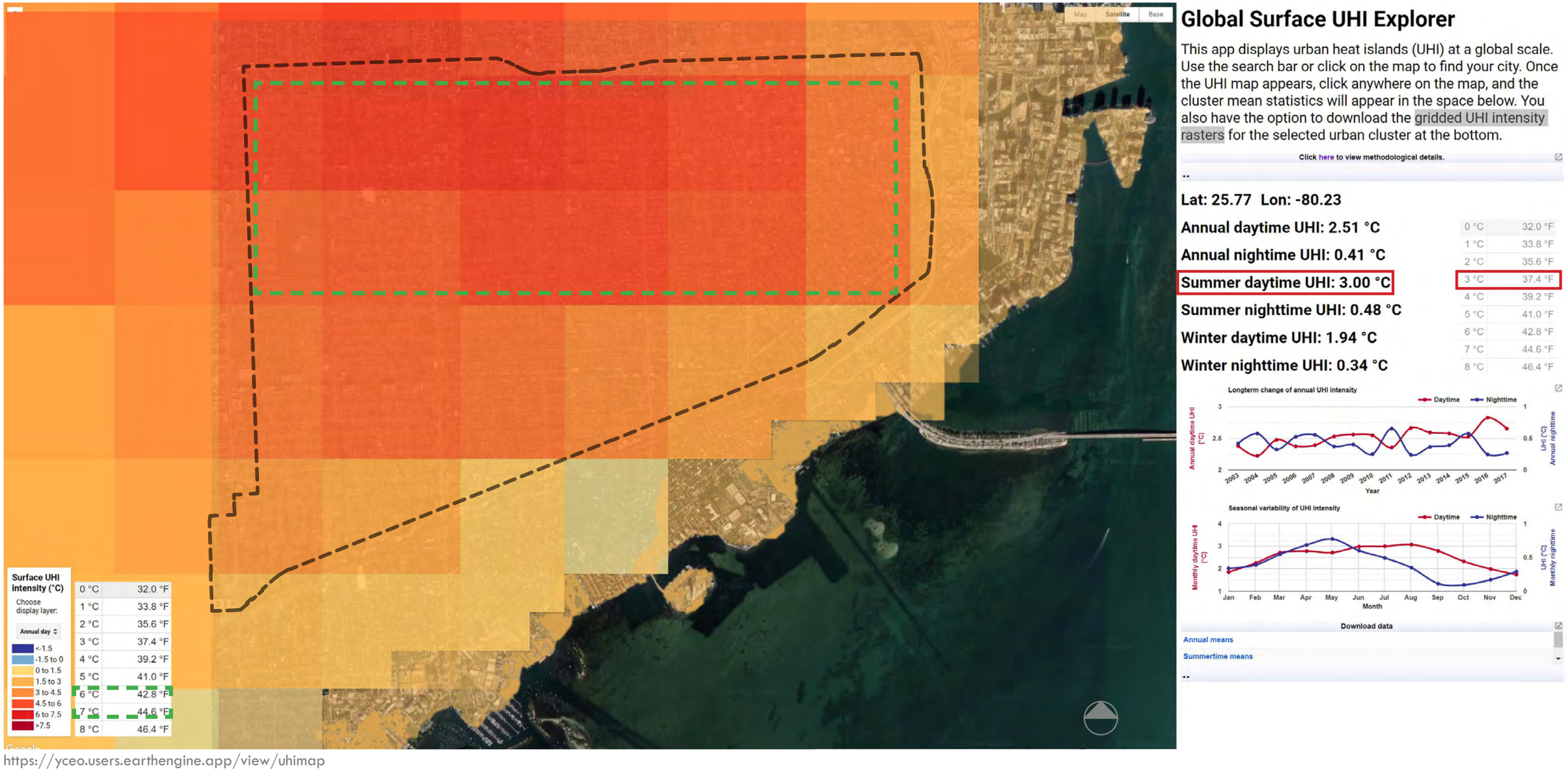
Heat Island

The term “heat island” describes built up areas that are hotter than nearby rural areas. The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings. In the evening, the difference can be as high as 22°F (12°C). Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water pollution.

Site “Heat Island”

Urban heat island (UHI) intensities | Satellite Thermal Imagery

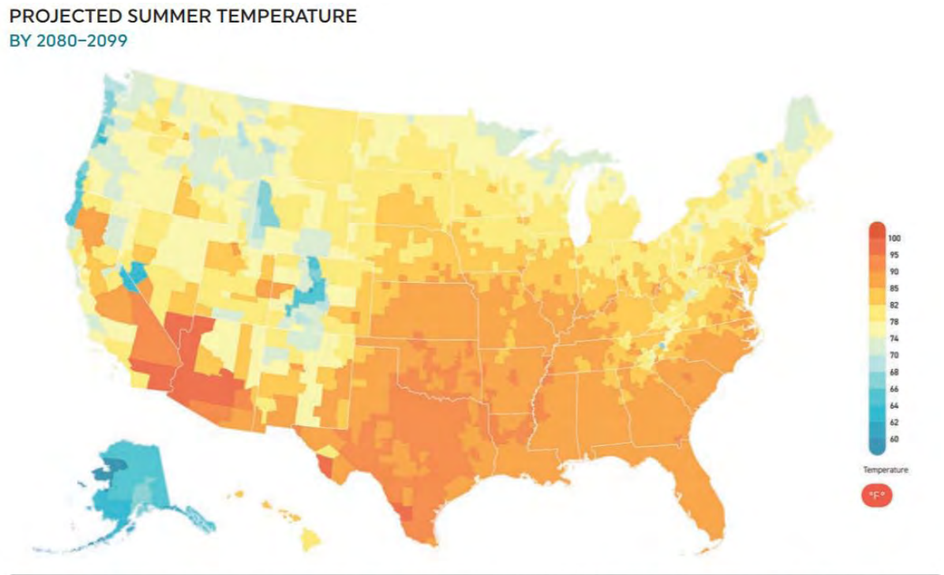
The north half area of the project shows a very high Urban Heat Island intensity with an increase ranging form 42.8 to 44.6 Fahrenheit Degrees. This is most likely a reflection of a poor tree canopy coverage and an excess of hardscape materials.



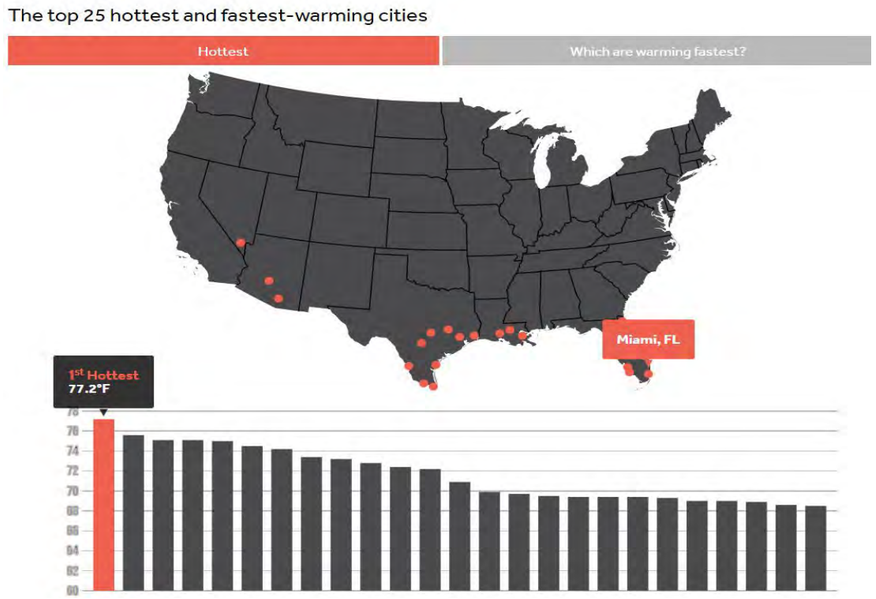
https://yceo.users.earthengine.app/view/uhimap

Heat Island

At the city level, rising temperatures are also consistent with the broader warming trend of annual temperatures rising over the past 50 years, consistent with global warming caused by increasing greenhouse gas emissions. Urban heat islands may also be contributing to some local warming.



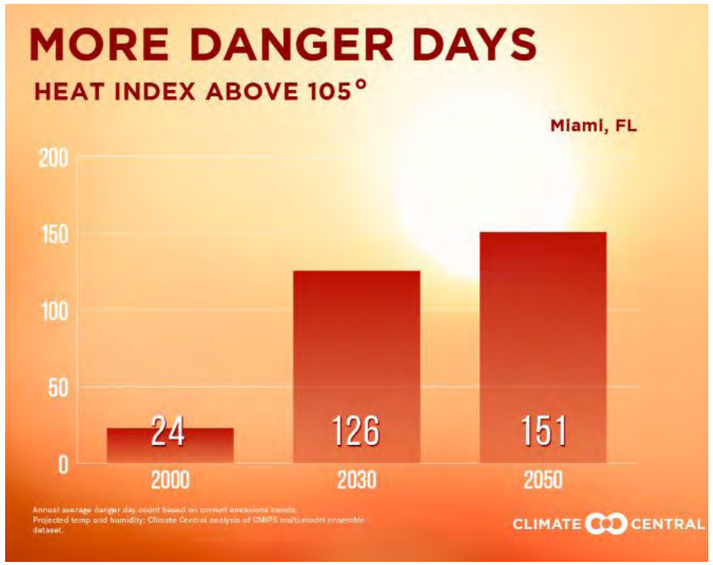
https://www.climatecentral.org/news/fastest-warming-cities-20535



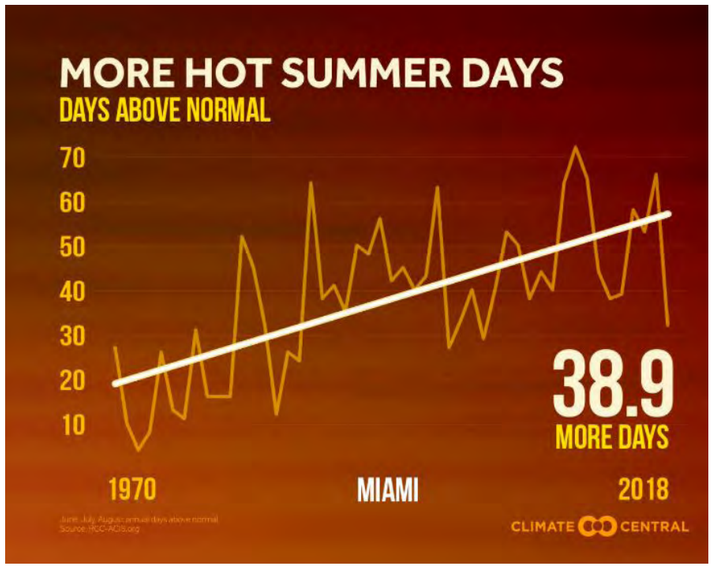
https://www.climatecentral.org/news/fastest-warming-cities-20535

Miami faces by far the greatest increase in the dangerous combination of heat and humidity over the next several decades. The 13 metro areas in the U.S. projected to see the greatest increase in danger days by 2050, are all in Florida. Every one of these cities is ***projected to see an increase of more than 100 dangerous heat days*** *- when the heat index, a combination of heat and humidity, is more than 104°F - by that time. This will only accelerate changes already seen in Miami, where the city tops the nation with the greatest increase in annual average of 90 days per year since 1970 with 46 more such days*

The combination of hot temperatures and high humidity create dangerous conditions for humans. The National Weather Service defines as dangerous any day when the heat index (the combination of heat and humidity, commonly known as the "feels like temperature") exceeds 104°F. Under these conditions, sunstroke and heat exhaustion are likely, and physical activity or being outside for long periods is risky, potentially leading to heat stroke



https://www.climatecentral.org/news/sizzling-summers-20515

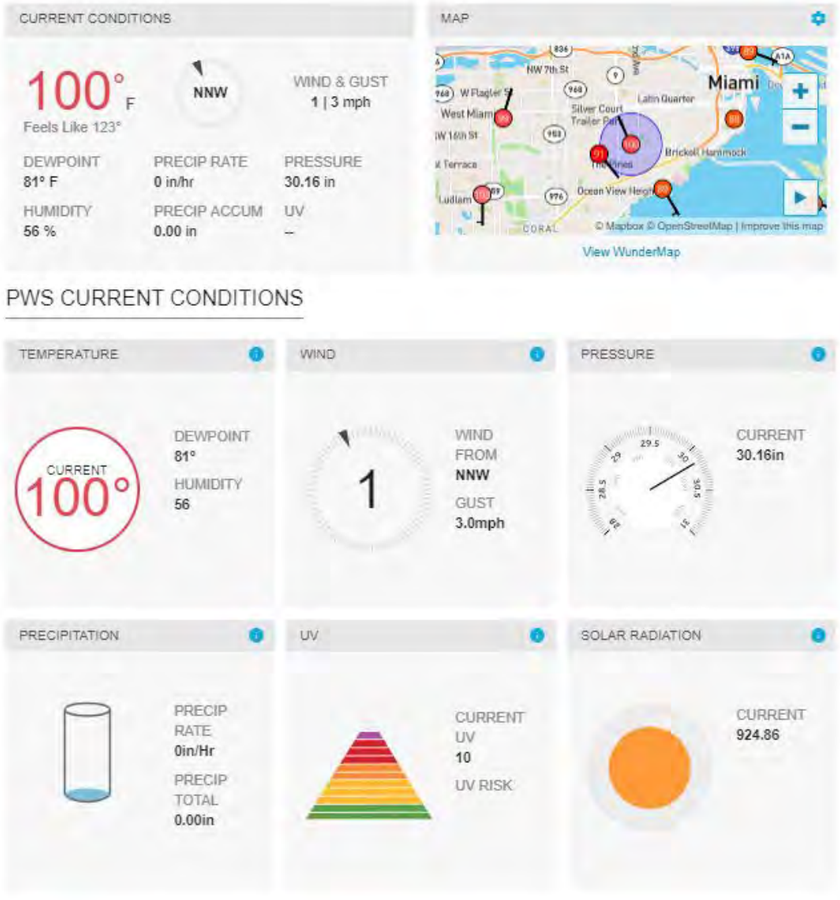


https://www.climatecentral.org/gallery/graphics/more-summer-days-above-normal-2019

Heat Island

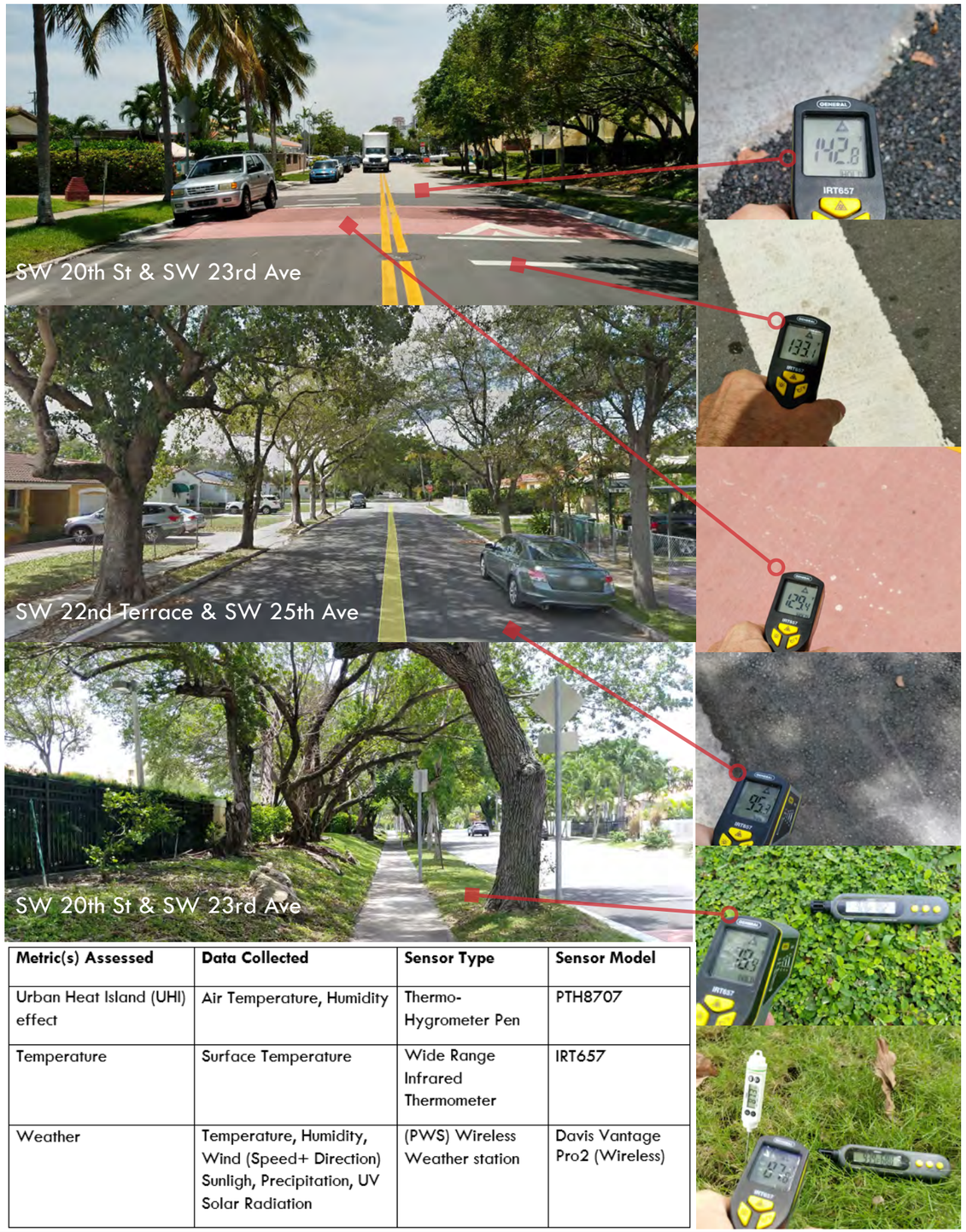
Urban Heat Island (UHI) effect| Street Performance analysis

Street Performance analysis were assessed through direct on-site measurement during the Summer Solstice | June 21, 2019 from 12 pm to 1 pm SW 20th St & SW 23rd Ave | SW 22nd Terrace & SW 25th Ave Comparing temperatures of surfaces in the sun and the shade when the air temperature was 100°F. Estimation of the surfaces' temperature considering: construction materials, solar reflectance.



Personal Weather Station (PWS) Weather Station ID: KFLMIAMI403
Station Name: Coral Gables Station | City: Miami | State: FL
Latitude / Longitude:25.753° N, -80.233° W | Elevation: 9 ft
Hardware:Davis Vantage Pro2 (Wireless) Software:weatherlink.com 1.10
https://www.wunderground.com/weather/us/fl/miami/KFLMIAMI403

Our Street Performance analysis on-site measurement confirmed ULI's research on Heat Stress.
Vegetation lowers surface and air temperature by providing shade and evapotranspiration.
Shaded surfaces/ materials are 20 up to 45 degrees Fahrenheit cooler than the peak temperatures of unshaded surfaces/ materials.



Metric(s) Assessed	Data Collected	Sensor Type	Sensor Model
Urban Heat Island (UHI) effect	Air Temperature, Humidity	Thermo-Hygrometer Pen	PTH8707
Temperature	Surface Temperature	Wide Range Infrared Thermometer	IRT657
Weather	Temperature, Humidity, Wind (Speed+ Direction) Sunligh, Precipitation, UV Solar Radiation	(PWS) Wireless Weather station	Davis Vantage Pro2 (Wireless)

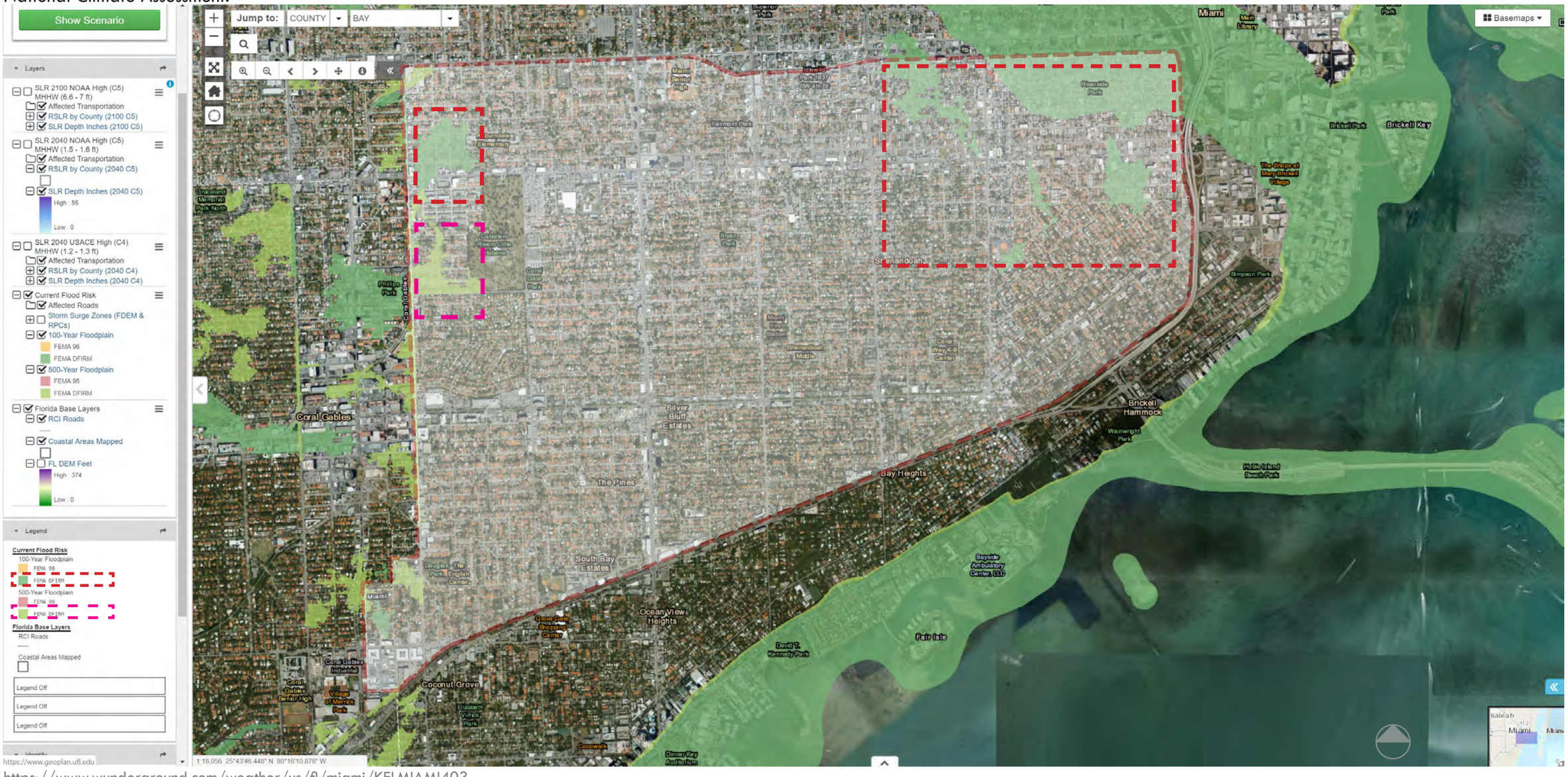
Flood Areas

Flood Areas per FEMA | 100 Year Flood Plain and 500 Year Flood Plain

The purpose of the Sea Level Scenario Sketch Planning Tool is to help identify transportation infrastructure vulnerable to current and future flood risks. The tool analyzes and visualizes current flood risks (100-year and 500-year floodplains and hurricane storm surge zones) as well as future flood risks using sea level rise (SLR) scenarios from the U.S. Army Corps of Engineers (USACE) and the National Oceanic and Atmospheric Administration (NOAA)/ National Climate Assessment.

Site Specific

The north east corner area of the project denotes exposure to flood risk for the 100-year storm . This is due to the very low elevation and proximity to the Miami River basin.
The north west area is also vulnerable in smaller areas to the 100 year storm on the northern area and to the 500 year storm in the central area.



https://www.wunderground.com/weather/us/fl/miami/KFLMIAMI403

Flood Areas

FEMA Flood Zones

Within the project area are high-risk for A and V flood zones (1% annual chance, or 100-year floodplain) and moderate-risk (0.2% annual chance, or 500-year floodplain) designated by the Federal Emergency Management Agency (FEMA). Visit FEMA web pages to learn about flood zones and see definitions of A zones and V zones.

Some parts of the flood zone may experience frequent flooding while other areas are only affected by severe storms. Incorporated in the studies are statistical data for river flow and storm tides, hydrologic and hydraulic analyses, rainfall and topographic surveys, and storm frequency and intensity models.
Note: High-risk flood zones are also commonly referred to as Special Flood Hazard Areas.

https://coast.noaa.gov/floodexposure/@-8930806,2968264,15z/eyJiljoiZGFyayIsImgiOiJmZW1hRmxvb2Rab25lc3wwLjU4fCIsInliOmZhbHNlfQ==

Flood Areas

Coastal Flood Hazard Composite | Site Specific

Highlighted below are areas prone to flooding from one or more of the following hazards:

- High tide flooding
- High risk (1% annual chance for A and V zones) and moderate risk (0.2% annual chance) flooding (designated by the Federal Emergency Management Agency)
- Storm surge for category 1 through category 3 hurricanes
- Sea level rise scenarios of 1, 2, and 3 feet
- Tsunami run-up zones (where available)

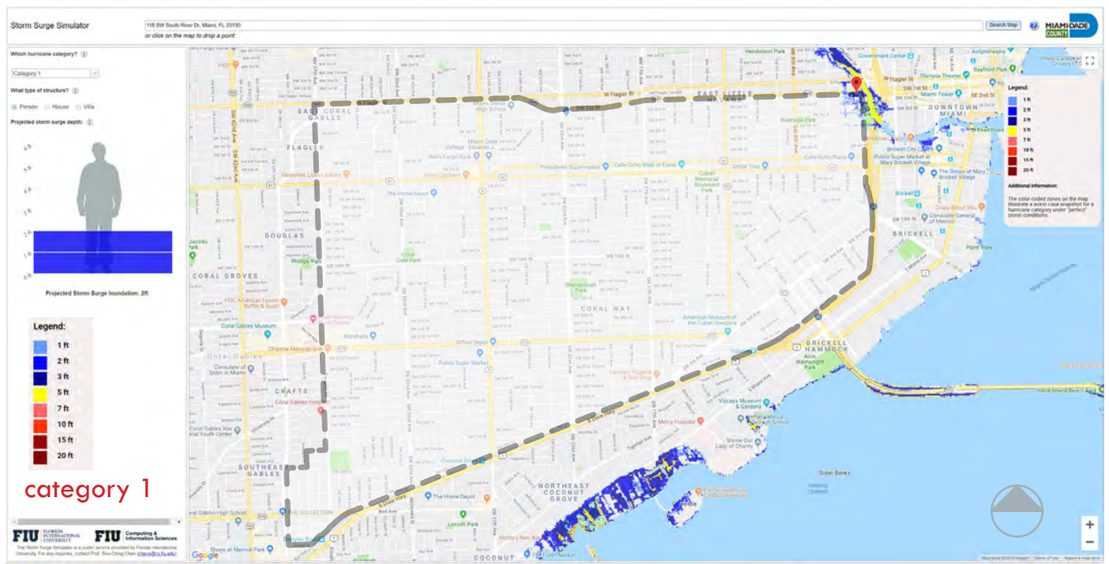
The darker the color on the map, the more flood hazard zones there are for that area. The more severe food hazard is on the East Little Havana Neighborhood, while the most extensive flood hazard area is between Coral Way and Highway 1.

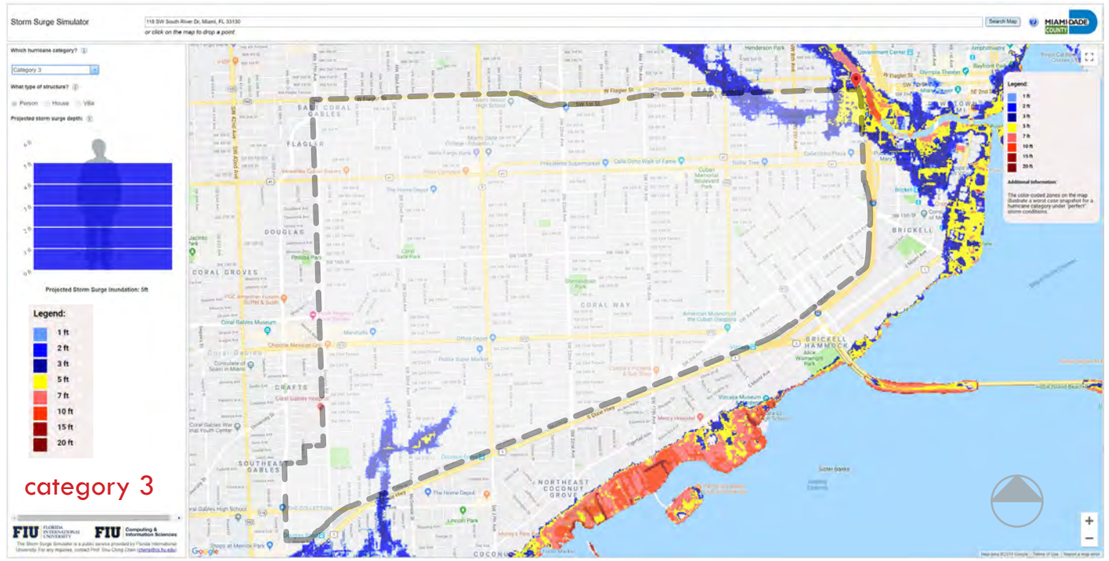
Note: High-risk flood zones are also commonly referred to as Special Flood Hazard Areas.

https://coast.noaa.gov/floodexposure/@-8930806,2968264,15z/eyJiljoiZGFyayIsImgiOiJoYXphcmRDb21wb3NpdGV8MXwiLCJyIjpmYWxzZX0=

Storm Surge

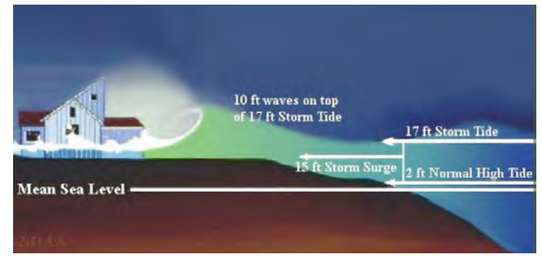
Storm surge refers to abnormally high water levels generated by severe storms such as hurricanes, cyclones, and nor'easters. The weather systems can produce sea levels much higher than normal high tide, resulting in extreme coastal and inland flooding. A surge forms when strong winds over the ocean combine with low pressure to drive water onshore. Sometimes called "storm tides," storm surges can cause tremendous damage; if they coincide with high tide, being able to raise water levels by 20 feet or more above mean sea level.





http://frances-a.cs.fiu.edu/gic/#lat=25.77240469384962&lon=-80.20110333834839

As a result of global sea level rise, storm surges that occur today are eight inches higher than they would have been in 1900. By 2100, storm surges will happen on top of an additional 8 inches to 6.6 feet of global sea level rise

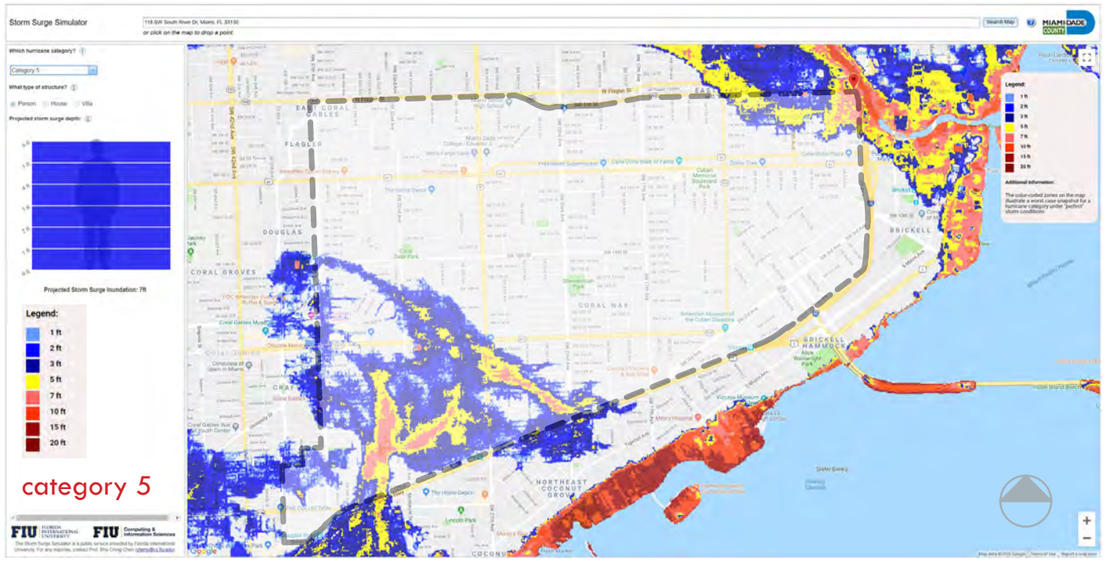


Site Specific

Category 1 : initial surge impacts on Northeast corner of project area, in the vicinity of the Miami River .

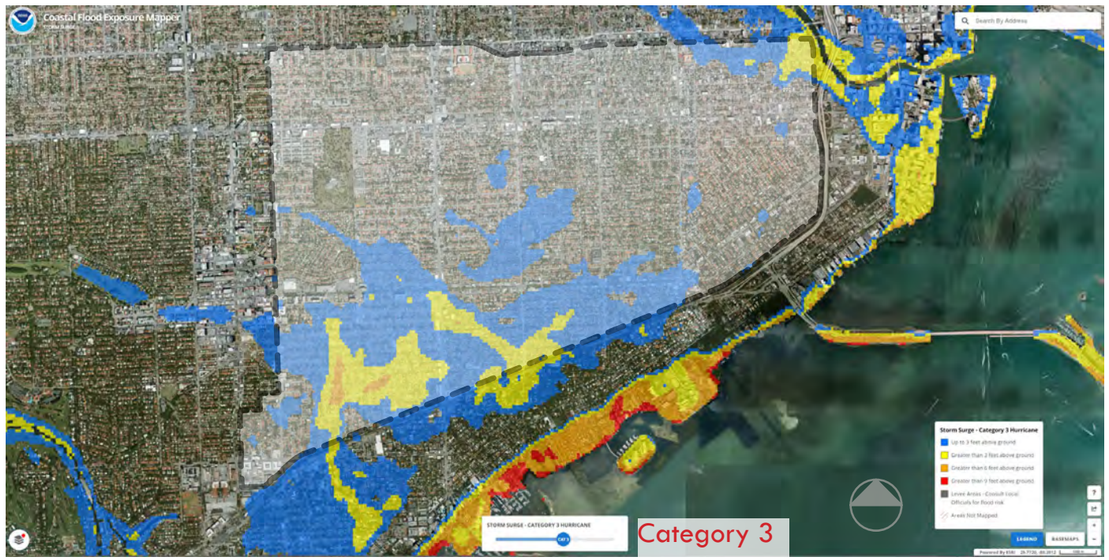
Category 3: larger impacts on the Northeast project area plus some +5 storm surge on the south west corner along SW 34th Ave.

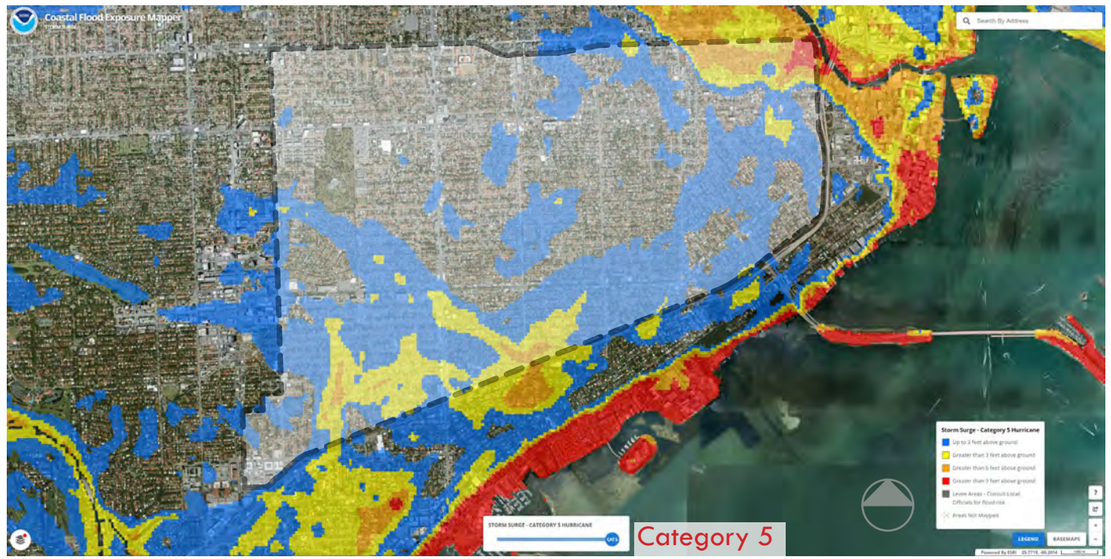
Category 5: significant increase on vulnerability to impacts on the Northeast project area plus some +6 to +10 storm surge on the Southwest corner which has extended its area of impacts north to Coral Way and SW 22nd Av



Storm Surge

Below are storm surge inundation scenarios created by the National Hurricane Center (NHC) Storm Surge Unit with the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model. SLOSH is used to calculate storm surge heights and the extents of inundation for hurricane evacuation studies. Hurricane storm surge heights are influenced by many factors, including hurricane intensity (categorized by the Saffir Simpson hurricane wind scale, ranging from 1 to 5), size (radius of maximum winds), forward speed, the angle of approach to the shoreline, and the characteristics of the coastline. Since many factors influence storm surge heights, maximum inundations from multiple storm surge scenarios are composited into one data layer. For each category of hurricane (1-5), the depth of storm surge inundation is displayed in ranges of water depth above ground—from less than 3 feet above ground (in blue) to greater than 9 feet above ground (in red). Areas within storm surge zones for a category 1 hurricane have the greatest exposure.





Site Specific

Areas within storm surge zones for a category 1 hurricane have the greatest exposure.

Severe storms of the future will cause more damage than storms of equal intensity occurring at today's sea level.

A Category 1 Surge by 2060 will cause significant impact on the Northeast corner of the project area.

https://coast.noaa.gov/floodexposure/@-8930806,2968264,15z/eyJiljoiZGFyayIsImgiOiJzdG9ybVN1cmdlfDF8IiwiciI6ZmFsc2V9

Storm Surge

Storm Surge and Sea Level Rise

Storm Surge and Sea Level Rise (SLR) are independent coastal processes that when occurring simultaneously lead to compounded impacts. Sea level rise will increase the inland areal extent inundated by surges, the depth of flooding and power of the surge and the extent and intensity of damage associated with storm surge and waves. As a result, severe storms of the future will cause more damage than storms of equal intensity occurring at today's sea level. Tebaldi et al. (2012) estimate a 100-year magnitude surge flooding (by today's standards) will begin to occur every 20 years at the projected mean sea level in 2050. Regional hazard mapping does not yet include the combined effects of sea level rise and surge but the impacts are anticipated to be significant.

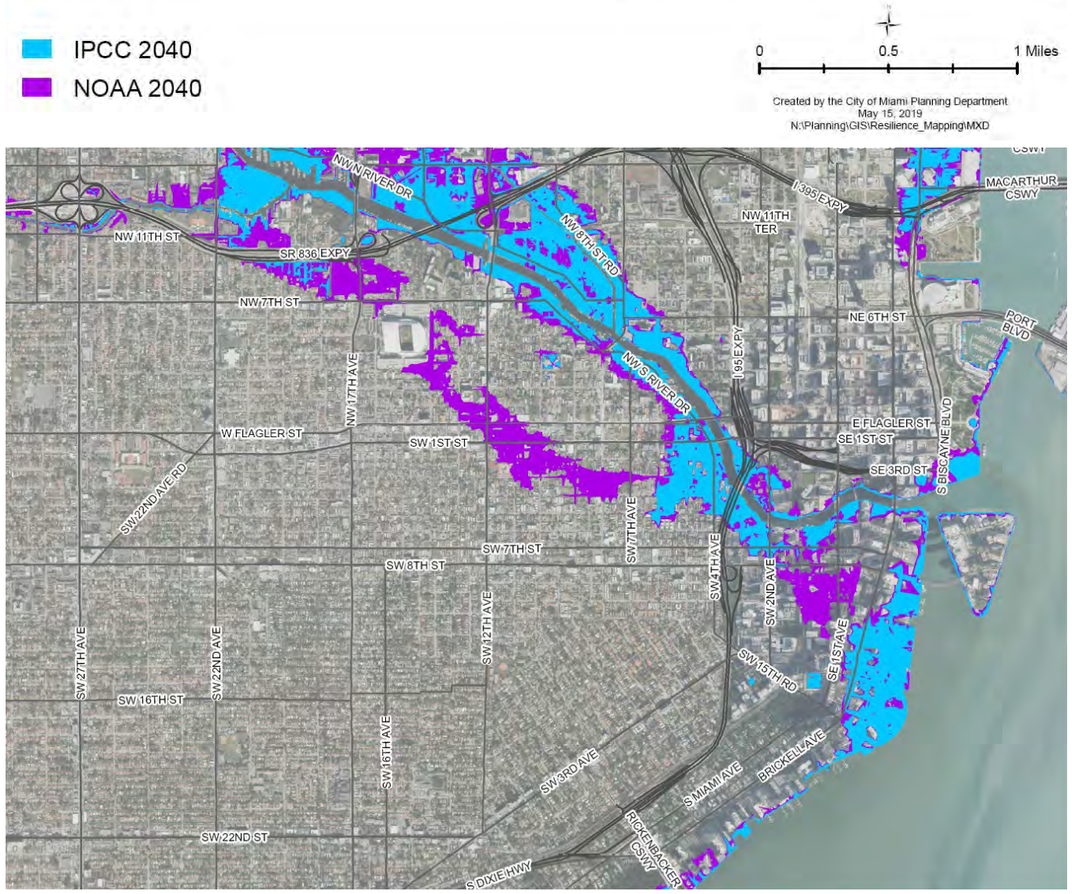
Site Specific

Severe storms of the future will cause more damage than storms of equal intensity occurring at today's sea level.

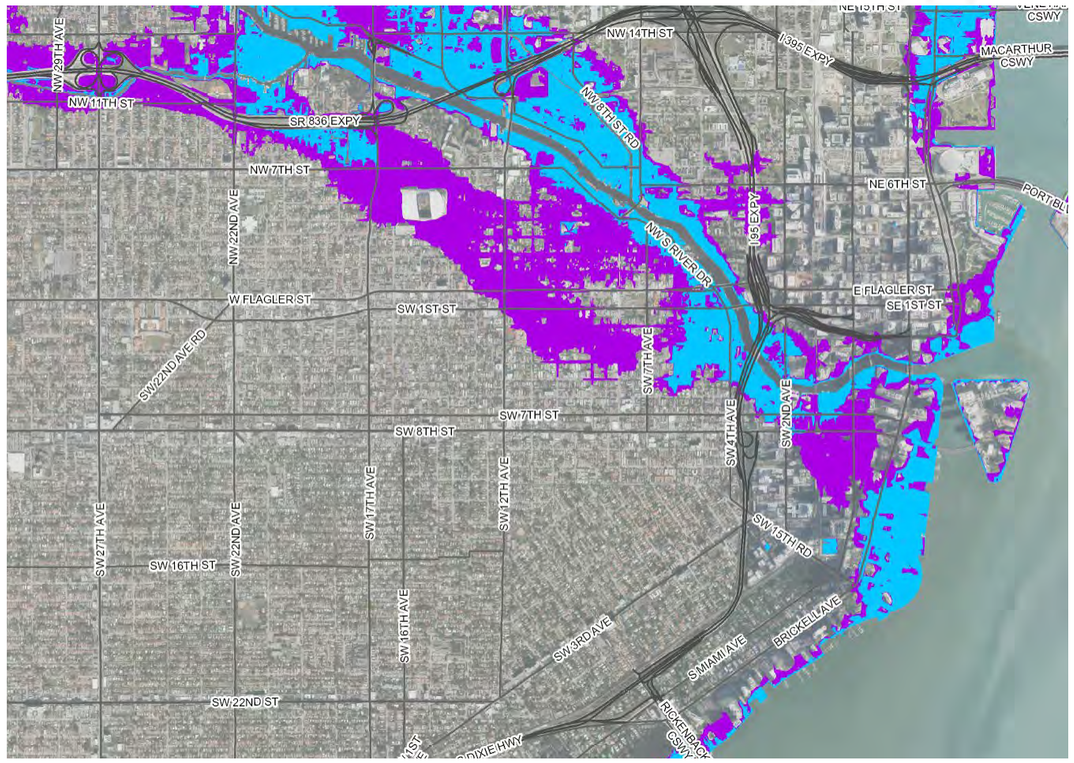
A Category 1 Surge by 2060 will cause significant impact on the Northeast corner of the project area.

IPCC = Intergovernmental Panel on Climate Change
NOAA = National Oceanic and Atmospheric Administration sea level projections
USACE = U.S. Army Corp of Engineers sea level projections

2040 - Area of Inundation from a Category 1 Storm



2060 - Area of Inundation from a Category 1 Storm



http://southeastfloridaclimatecompact.org/wp-content/uploads/2015/10/2015-Compact-Unified-Sea-Level-Rise-Projection.pdf

Sea Level Rise + Compound Flooding

Sea Level is rising

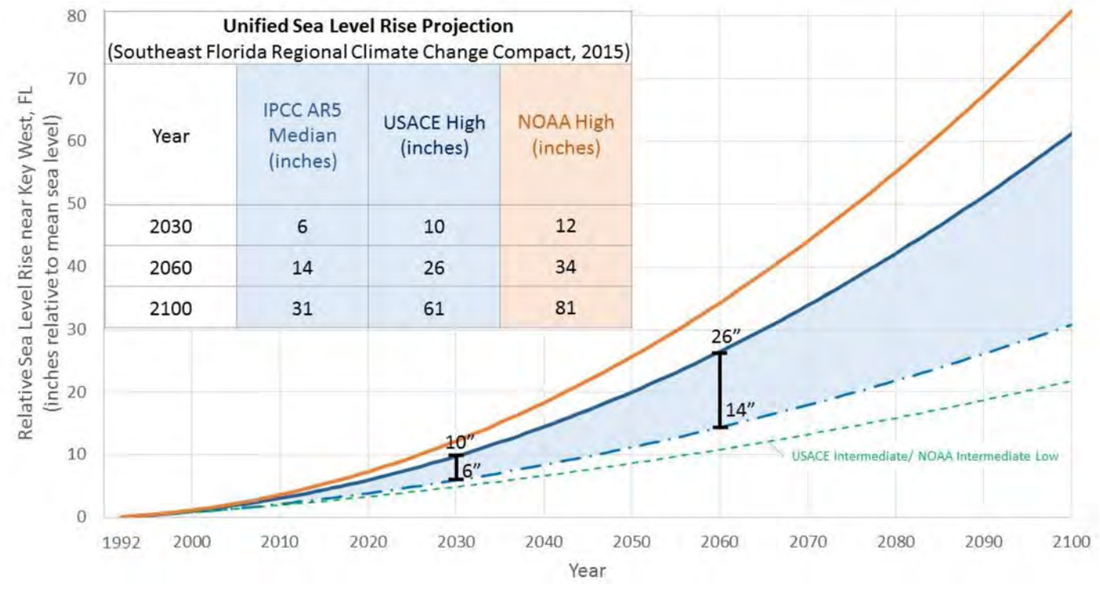
Changes in local sea level result from of a combination of global, regional, and local change. At the global scale, sea level is rising. Measured at tide gauges on every continent and by satellites on orbit, global average sea level has risen about 7 to 8 inches since 1900, with about 3 of those inches occurring since 1993. The observed global increase is due to melting of glaciers and ice sheets on land and the thermal expansion of ocean water as it warms.

The table below, adapted from Table 5 in Global and Regional Sea Level Rise Scenarios for the United States, shows estimated total global average sea level rise by the indicated years for each of the six scenarios. All values are in inches.

Low	0.0	2.4	5.1	7.5	9.8	11.8
Intermediate-Low	0.0	3.1	7.1	11.4	15.7	19.7
Intermediate	0.0	3.9	9.8	17.7	28.0	39.4
Intermediate-High	0.0	3.9	11.8	23.6	39.4	59.1
High	0.0	4.3	14.2	30.3	51.2	78.7
Extreme	0.0	4.3	16.1	35.4	63.0	98.4

toolkit.climate.gov/topics/coastal/sea-level-rise

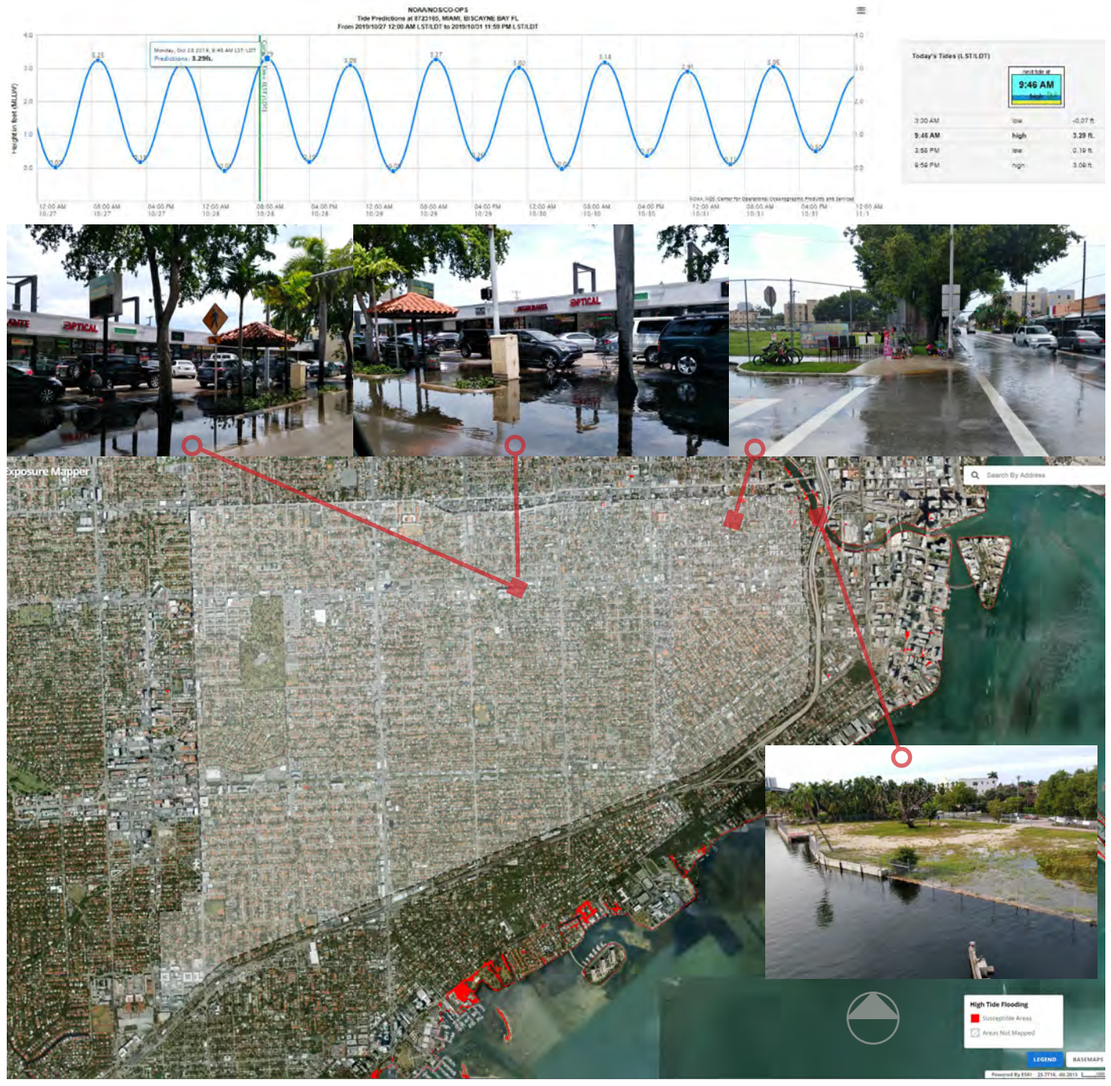
This Unified Sea Level Rise projection for Southeast Florida updated in 2015 projects the anticipated range of sea level rise for the region from 1992 to 2100 (Figure 1). The projection highlights three planning horizons:
1) short term, by 2030, sea level is projected to rise 6 to 10 inches above 1992 mean sea level,
2) medium term, by 2060, sea level is projected to rise 14 to 34 inches above 1992 mean sea level,
3) long term, by 2100, sea level is projected to rise 31 to 81 inches above 1992 mean sea level.
Projected sea level rise in the medium and long term has a significant range of variation as a result of uncertainty in future greenhouse gas emissions and their geophysical effects, the incomplete quantitative understanding of all geophysical processes affecting the rate of sea level rise in climate models and current limitations of climate models to predict the future. . The projection consists of the NOAA High Curve, the USACE High Curve (also known as the NOAA Intermediate- High) and the median of the IPCC AR5 RCP8.5 scenario.



southeastfloridaclimatecompact.org/wp-content/uploads/2015/10/2015-Compact-Unified-Sea-Level-Rise-Projection.pdf

Compound Flooding

Rainfall or wind pushing water over land can increase flooding levels. low-lying coastal areas prone to flooding during extreme high tides are shown below. Extreme high tides (King Tides) occur a few times per year when the sun, moon, and earth align, or during storm events. Annual occurrences of high tide flooding—exceeding local thresholds for minor impacts to infrastructure—have increased 5- to 10-fold since the 1960's in several U.S. coastal cities. Current flooding will become future high tide, as sea level rise will increase the frequency and during of these events.

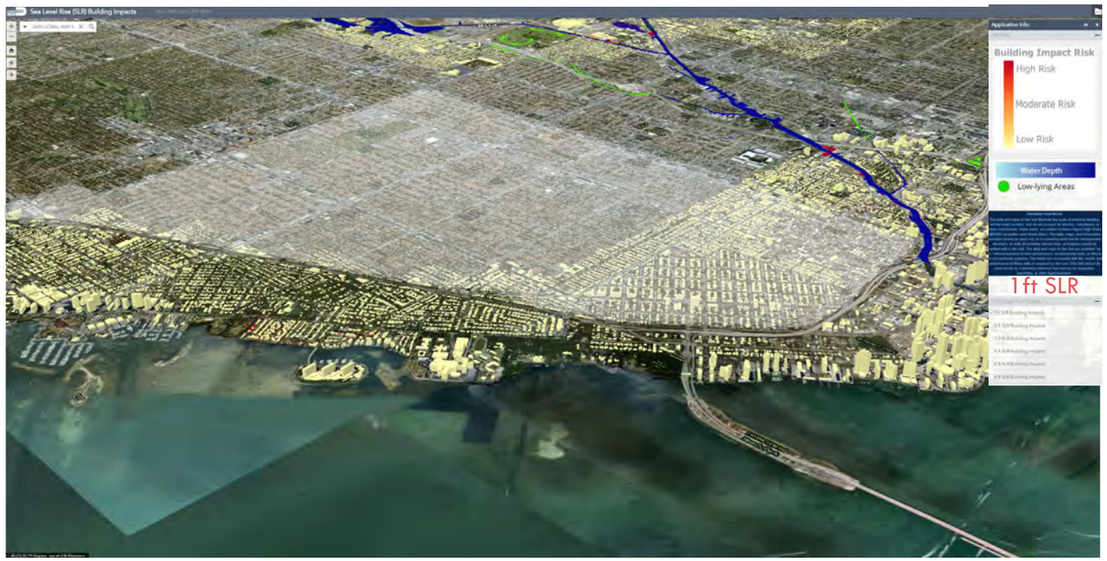


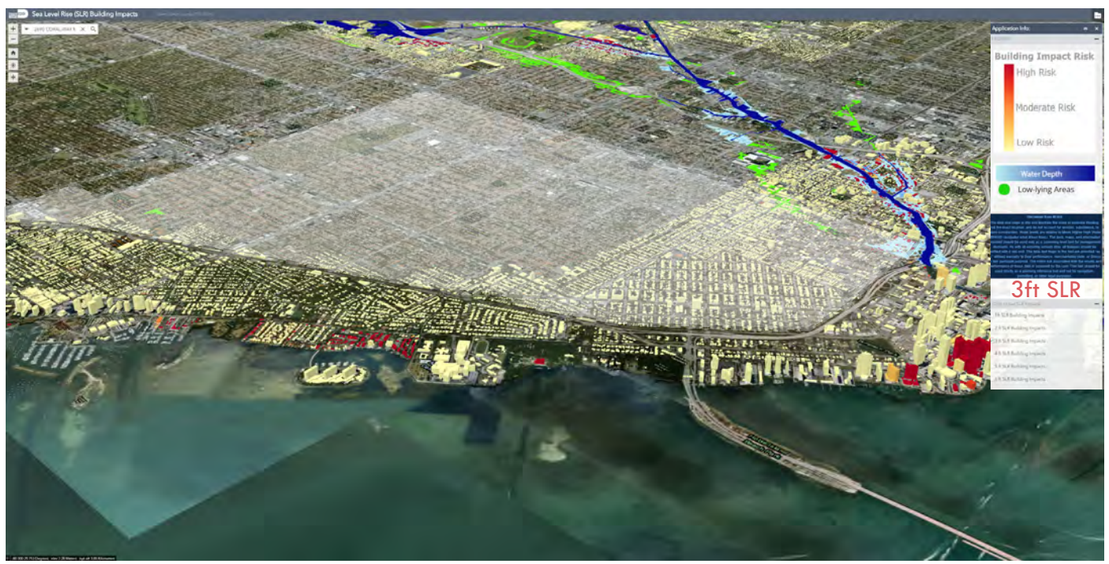
coast.noaa.gov/floodexposure/

Sea Level Rise

Sea Level Rise 3D Building Impacts Viewer

The data and 3D maps below illustrate the scale of potential flooding, not depicting exact locations or accounting for erosion, subsidence, or future construction. Water levels are relative to Mean Higher High Water (MHHW) (excludes wind driven tides). As with all remotely sensed data, all features must be verified with a site visit however, the data, maps, and information provided can be used as a screening-level tool for management decisions.





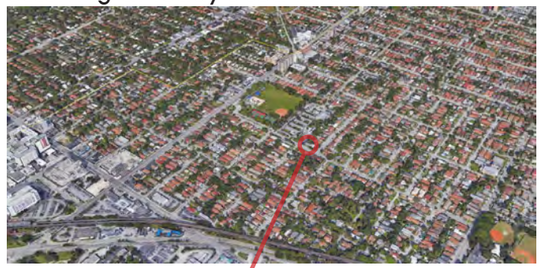
https://mdc.maps.arcgis.com/apps/webappviewer3d/index.html?id=b92a9fa4ff8847bf97f3e628a195a398

Site Specific

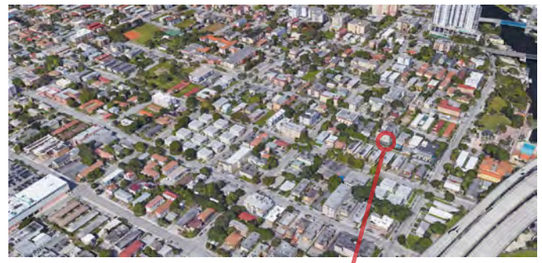
The 3D Building Impact Viewer denotes the vulnerability on the Northeast corner of the project area affects low and medium density residential urban fabric.

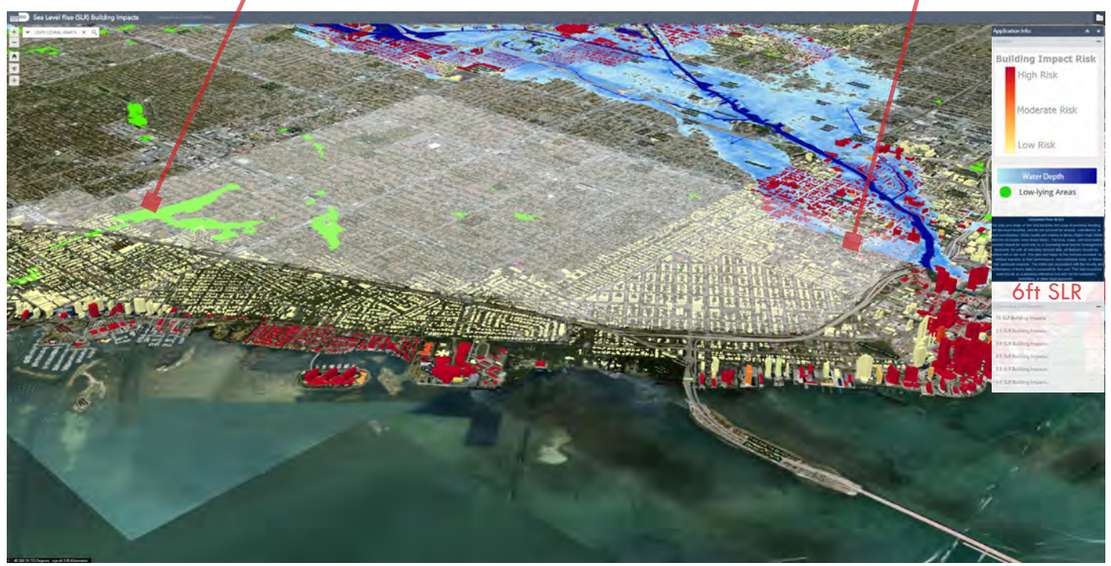
Areas within storm surge zones for a category 1 hurricane have the greatest exposure.

Severe storms of the future will cause more damage than storms of equal intensity occurring at today's sea level.



A Category 1 Surge by 2060 will cause significant impact on the Northeast corner of the project area.





Sea Level Rise

Sea Level Rise | Scenarios of 0 to 6 feet

Sea level rise scenarios of 0 to 6 feet, which simulate a rise in water above the average of the highest high tides (called mean higher high water, or MHHW) for hydrologically connected areas are shown . Areas that are hydrologically connected to the ocean are shown in shades of blue (darker blue = greater depth).

https://coast.noaa.gov/floodexposure/@-8930806,2968264,15z/eyJiljoiaW1hZ2VyeSIsImgiOiJzZWFMZXZlbFJpc2V8MXwiLCJyIjpmYWxzZX0=

Site Specific

Sea level rise scenarios of 1 ft: initial impacts on Northeast corner of project area, in the vicinity of the Miami River .

Sea level rise scenarios of 3 ft: larger impacts on the Northeast project area plus on the south west corner along SW 34th Ave.

Sea level rise scenarios of 6 ft: significant increase on vulnerability to impacts on the Northeast project area plus on the Southwest corner. Low-lying areas, displayed in green, are hydrologically "unconnected" areas that may also flood.

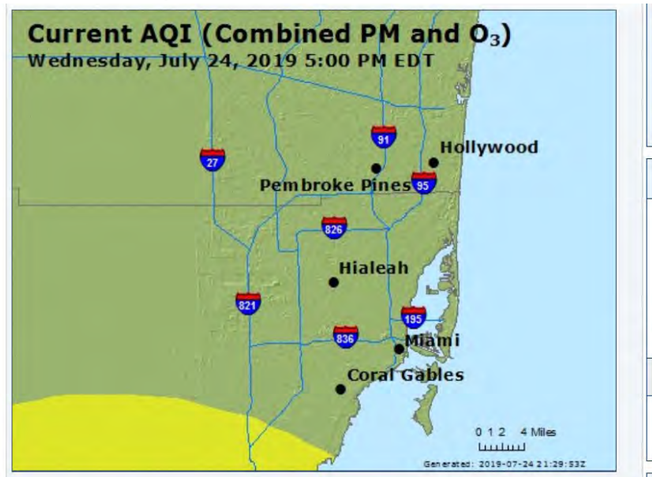
Changes in local, or relative, sea level have long-term implications, including increased extent and frequency of events such as storm surge, as well as permanent changes to shorelines and coastal habitats.

Air Quality

Cities & Health | Air Pollution

Clean air is essential for the well-being of humans, animals and plants, but high traffic density, fuel combustion, biomass burning and industries create a mixture of air pollutants that create major risks to health.

Even when emissions are not that severe, the combination of pollutant sources and poorly aerated areas such as narrow street corridors can quickly lead to the accumulation and local enrichment of air pollutants that exceed air quality standards. Moreover, studies have shown that even low pollutant concentrations can increase allergic responses e.g. to pollens.



Department, City of Jacksonville - Environmental Quality Division, Environmental Protection Commission of Hillsborough County, Florida Department of Environmental Protection, Miami-Dade County - Department of Environmental Resources Management, Orange County Environmental Protection Division, Palm Beach County - Environmental Public Health Service, Pinellas County Environmental Management

Current Conditions

Air Quality Index (AQI)
observed at 17:00 EDT

53 **Moderate**

Health Message: Unusually sensitive people should consider reducing prolonged or heavy exertion.

Note: Values above 500 are considered Beyond the AQI. Follow recommendations for the Hazardous category. Additional information on reducing exposure to extremely high levels of particle pollution is available here.

AQI - Pollutant Details

Ozone	24	Good
Particles (PM2.5)	53	Moderate

Air Quality Forecast

Today	Tomorrow
Air Quality Index (AQI)	Air Quality Index (AQI)
Good	Good
Health Message: None	Health Message: None
AQI - Pollutant Details	
Ozone Good	Ozone Good
Particles (PM2.5) Good	Particles (PM2.5) Good

Good | Moderate | USG | Unhealthy | Very Unhealthy | Hazardous | ! Action Day

8/11/2019

Air Quality Forecast

Air Quality: Good

Primary Pollutant: Particulate Matter PM2.5

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	*...air quality conditions are:*	*...as symbolized by this color:*
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

The air quality in Miami-Dade tends to fall within the "Good" range throughout the year. However, there are a couple of times during the year when the Air Quality Index (AQI) falls to below the good range, and can be harmful to certain sensitive groups such as the elderly, the young and those with respiratory conditions.

Air Quality Standards and Trends

The purpose of the Air Quality Index is to help you understand what local air quality means to your health.

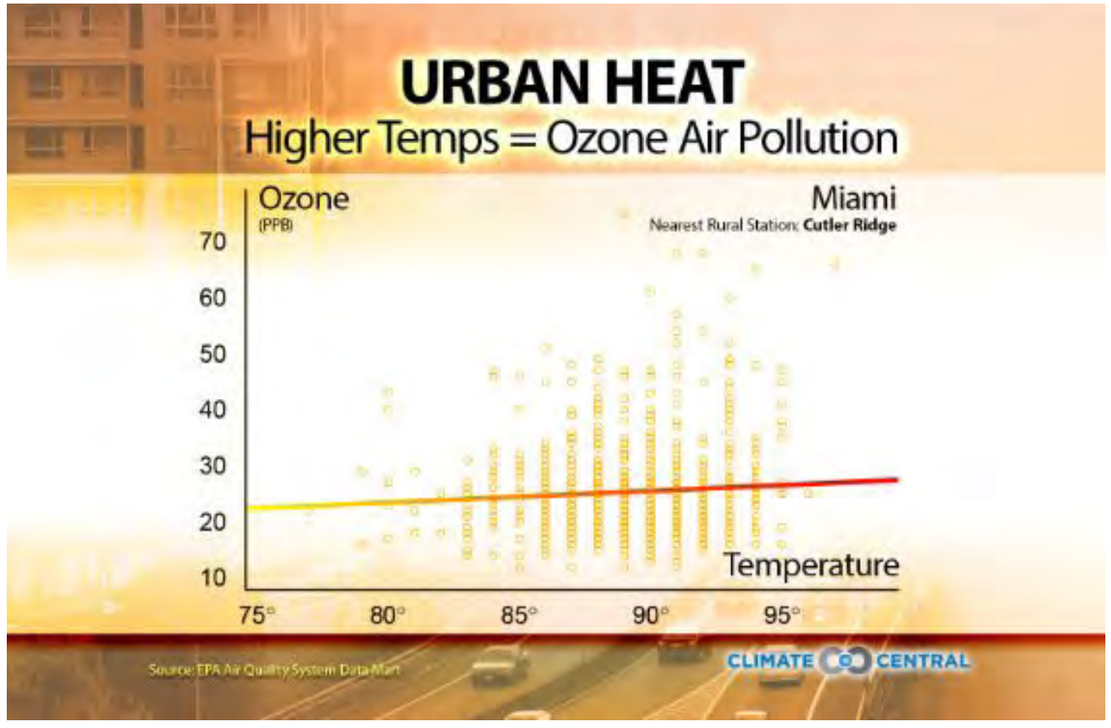
https://www.climatecentral.org/gallery/graphics/air-quality-gets-worse-as-temperatures-rise

Air Quality Gets Worse as Temperatures Rise

Heat is one of the leading weather-related hazards, as well as a significant contributing factor in creating ground-level ozone.

In the upper atmosphere, ozone is a good thing. shielding the Earth from harmful ultraviolet rays from the sun (that's why the so-called "ozone hole" over Antarctica is cause for concern). Close to the ground, however, ozone contributes to an increased incidence of lung inflammation, asthma attacks, and other respiratory problems, particularly in children and young adults.

As temperatures rise, ground-level ozone rises reducing air quality. Though ground level ozone has many contributing factors, sunlight, heat, and air pollution are three of the biggest; and as temperatures continue to rise, it's going to become more difficult to meet ozone standards.



Heat is one of the leading weather-related hazards, as well as a significant contributing factor in creating ground-level ozone.

https://www.climatecentral.org/gallery/graphics/air-quality-gets-worse-as-temperatures-rise

TRANSPORTATION

Street Ownership & Maintenance

Figure 1: Breakdown of Street Ownership

Public Transportation

Figure 2: Miami-Dade County Bus Routes

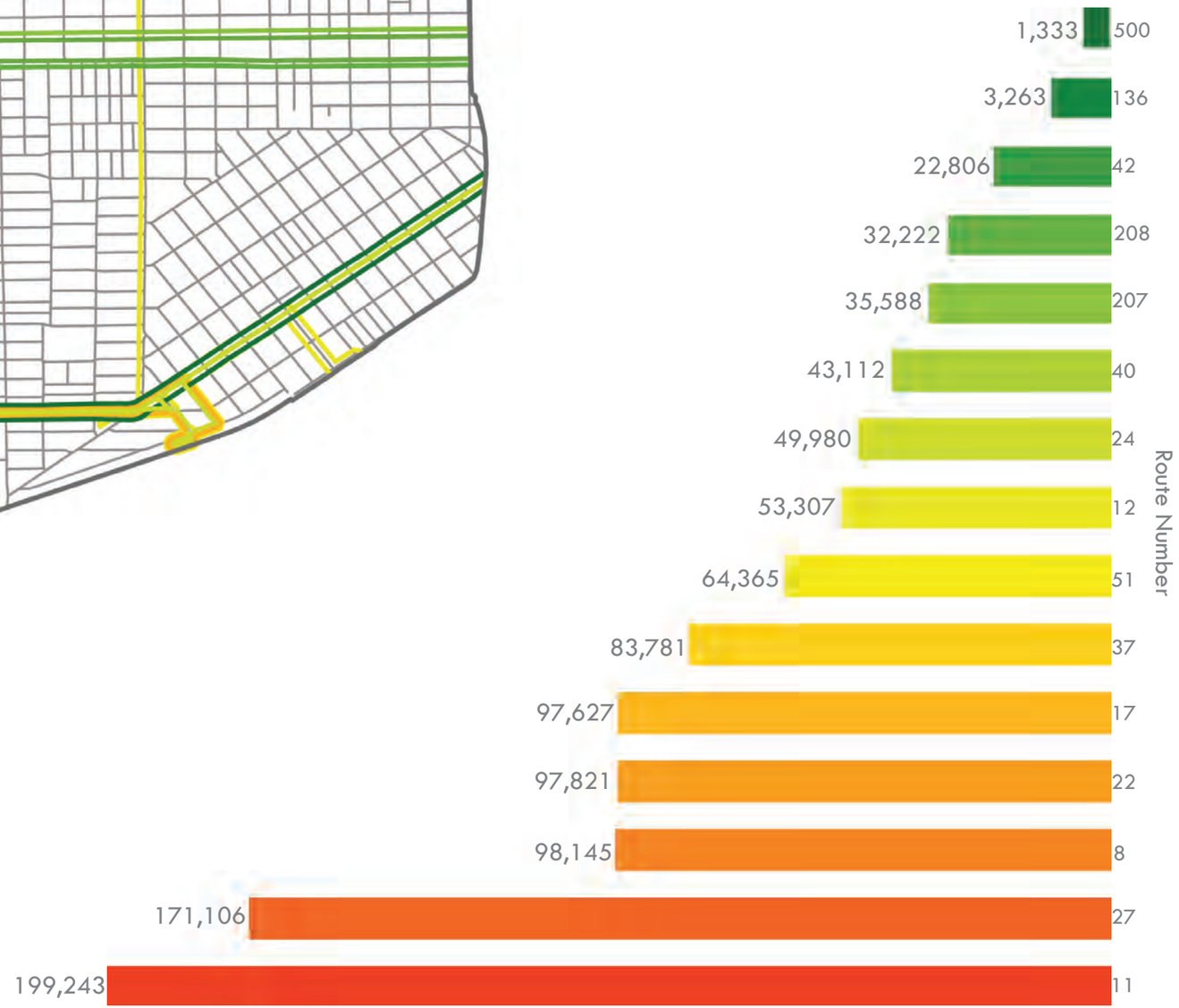


Figure 3: Average Amount of Riders by Route in the Past 12 months

Public Transportation

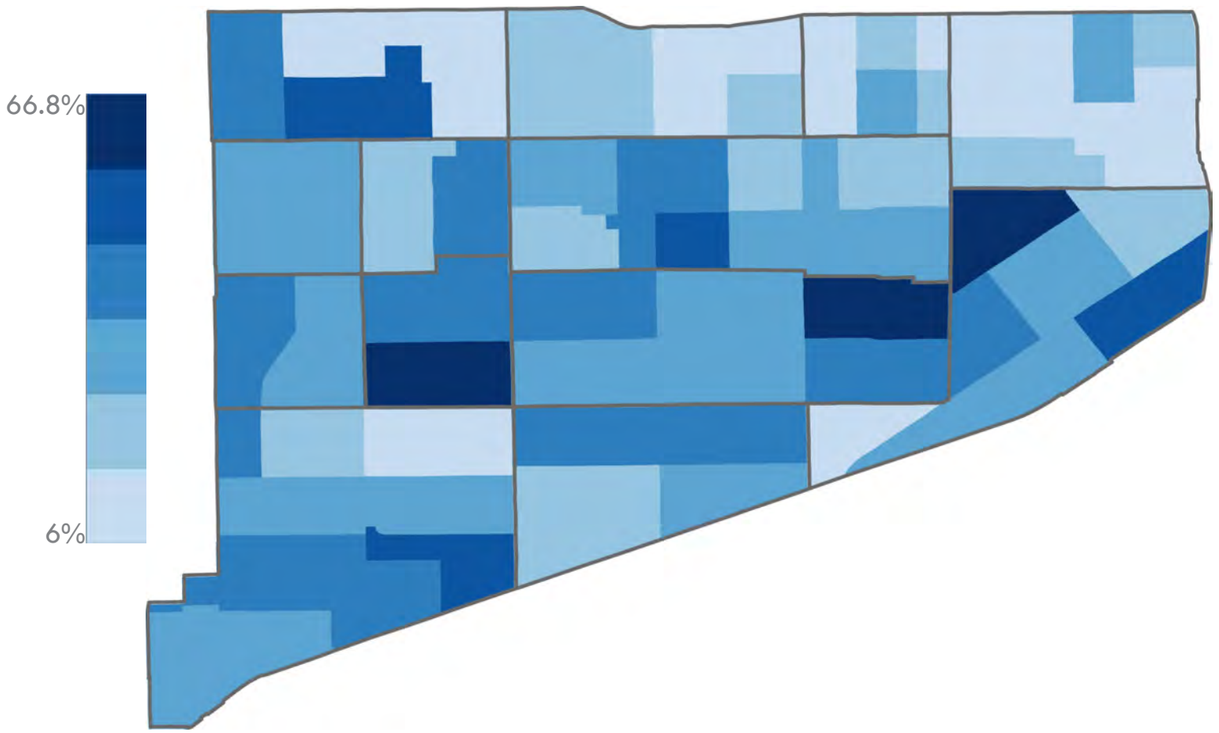


Figure 4: Percentage of Households with Two Cars Available

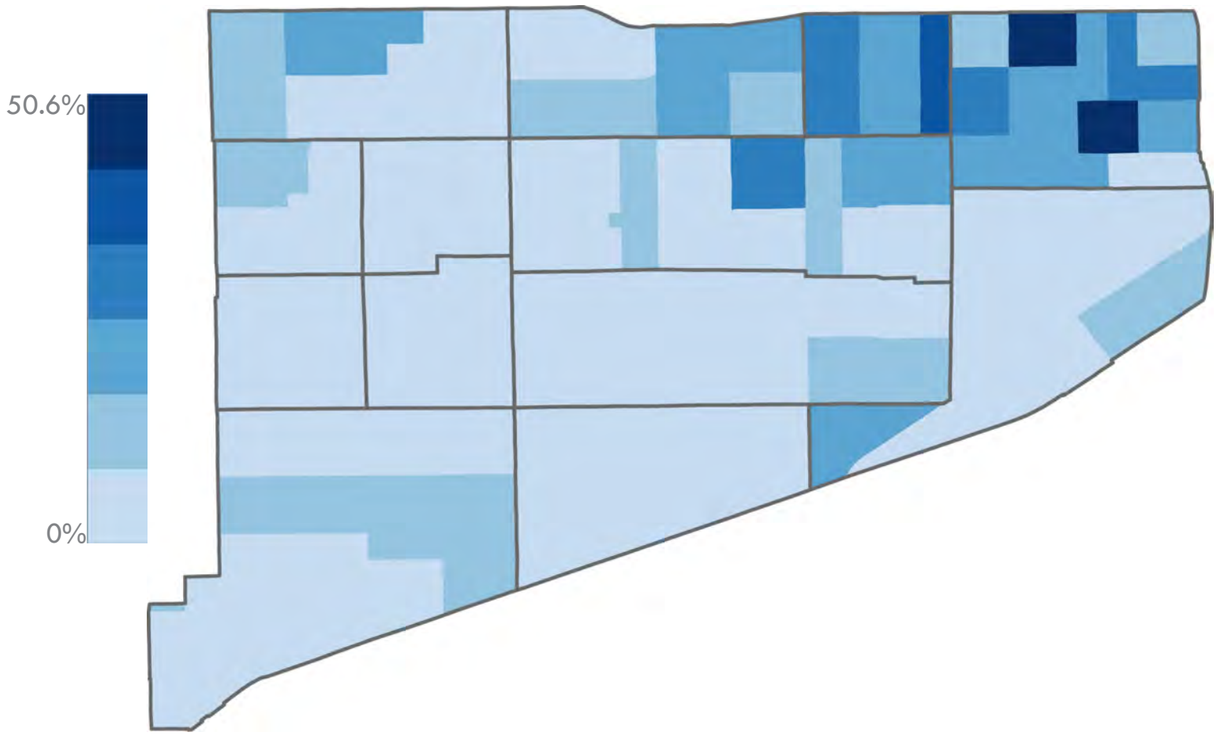


Figure 5: Percentage of Population using Public Transportation

The Northern neighborhoods of the project area have the lowest car ownership and the highest public transit use

Bike Transportation

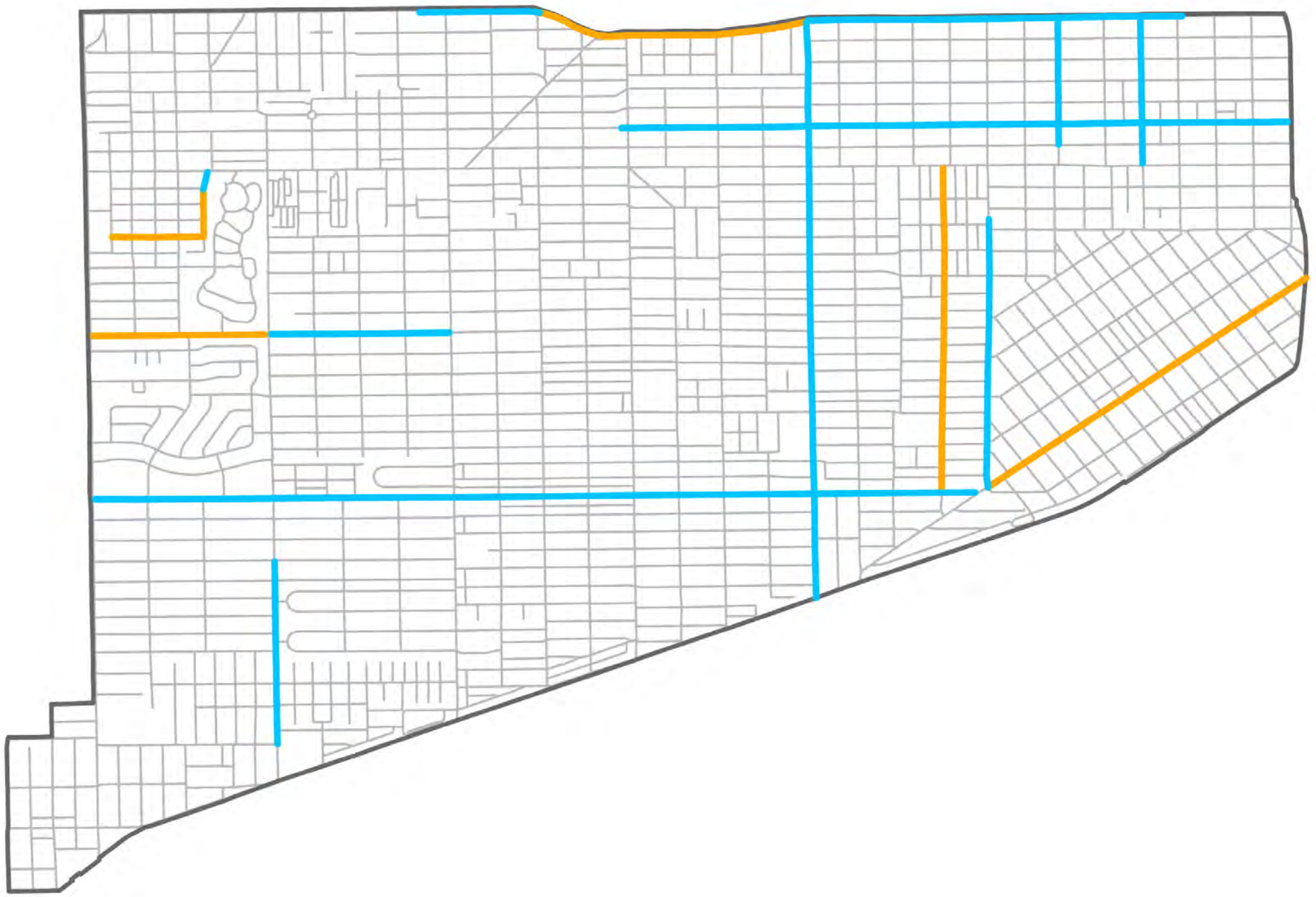


Figure 6: Distribution of Bicycle Routes

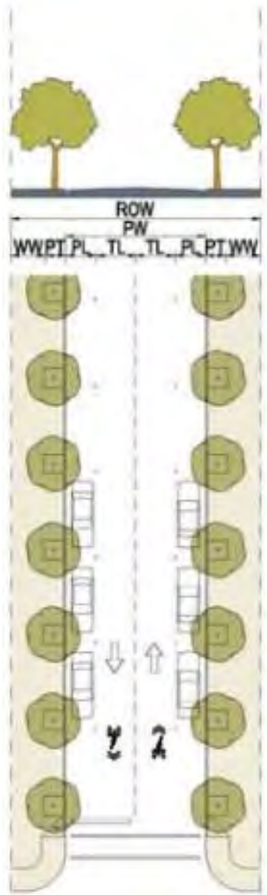


Figure 7: Shared Use Lane

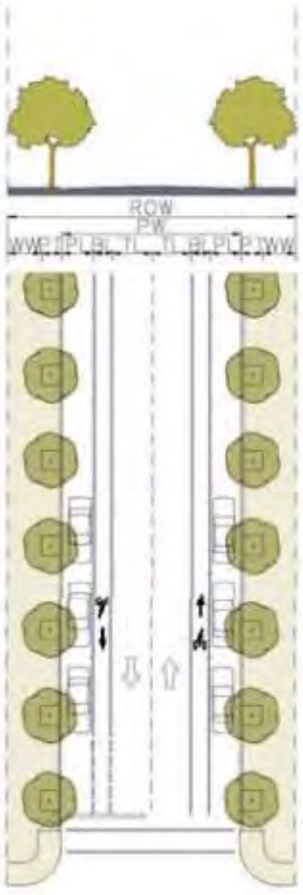


Figure 8: Bicycle Lane

Pedestrian Connections - W Flagler Street

Figure 9: SW 37th Avenue

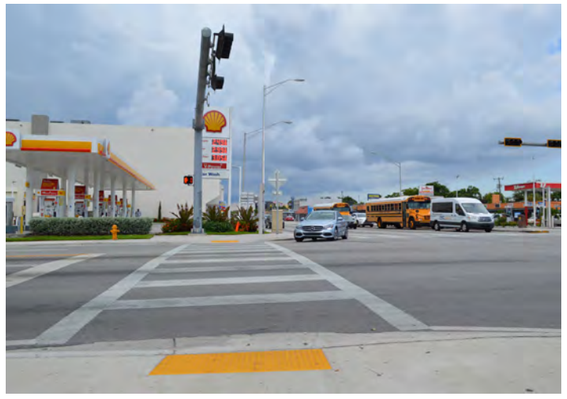


Figure 10: SW 27th Avenue

Figure 11: SW 17th Avenue

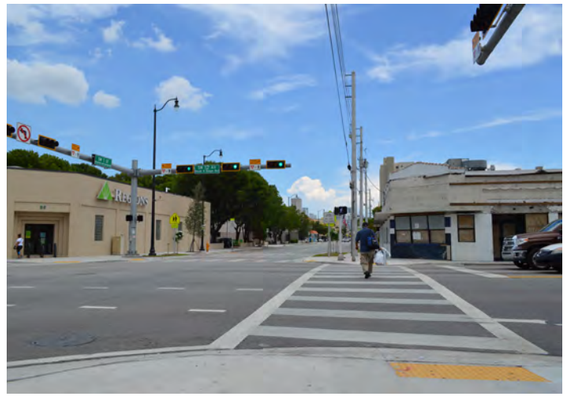


Figure 12: SW 12th Avenue

Pedestrian Connections - SW 8th Street

Figure 13: SW 37th Avenue

Figure 14: SW 27th Avenue

Figure 15: SW 17th Avenue

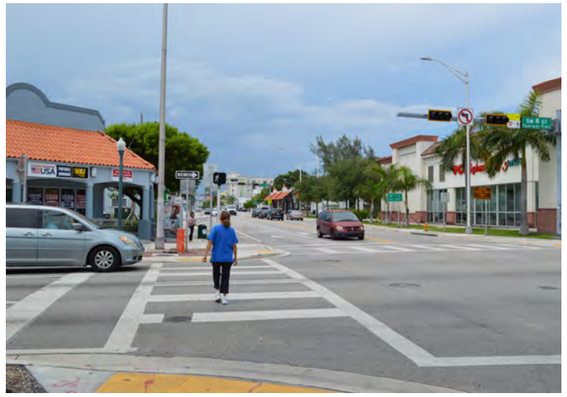


Figure 16: SW 12th Avenue

Pedestrian Connections - SW 22nd Street

Figure 17: SW 37th Avenue

Figure 18: SW 27th Avenue

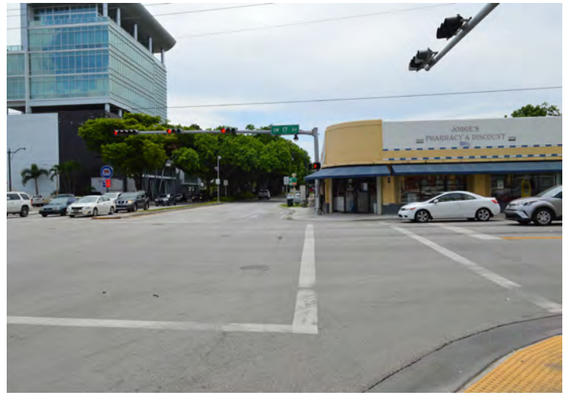


Figure 19: SW 17th Avenue

Figure 20: SW 12th Avenue

Morning Traffic and Circulation

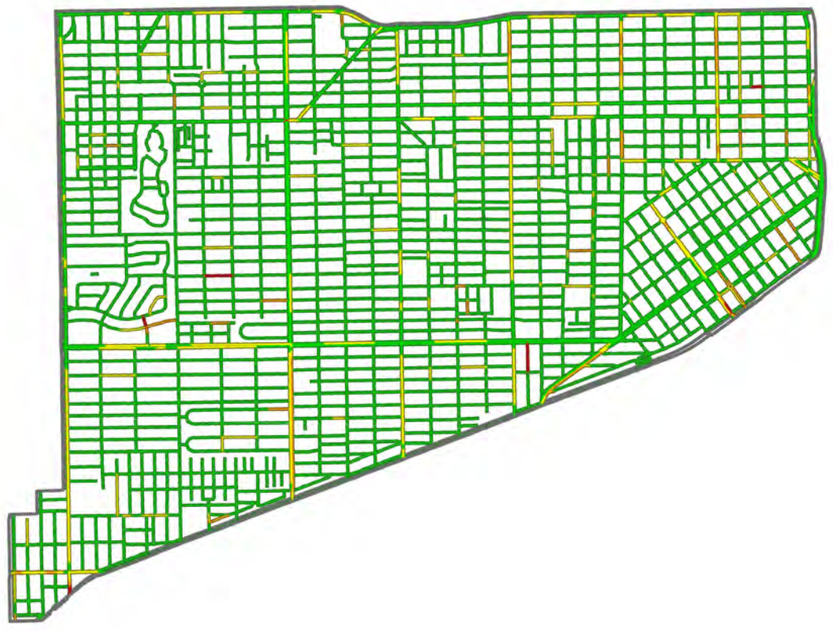


Figure 21: Traffic Levels at 8:00am

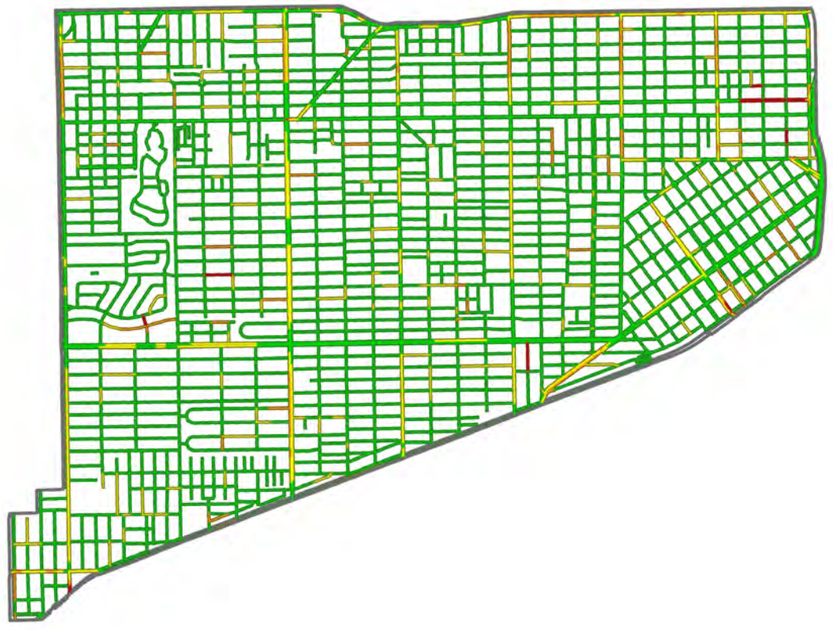


Figure 22: Traffic Levels at 9:00am

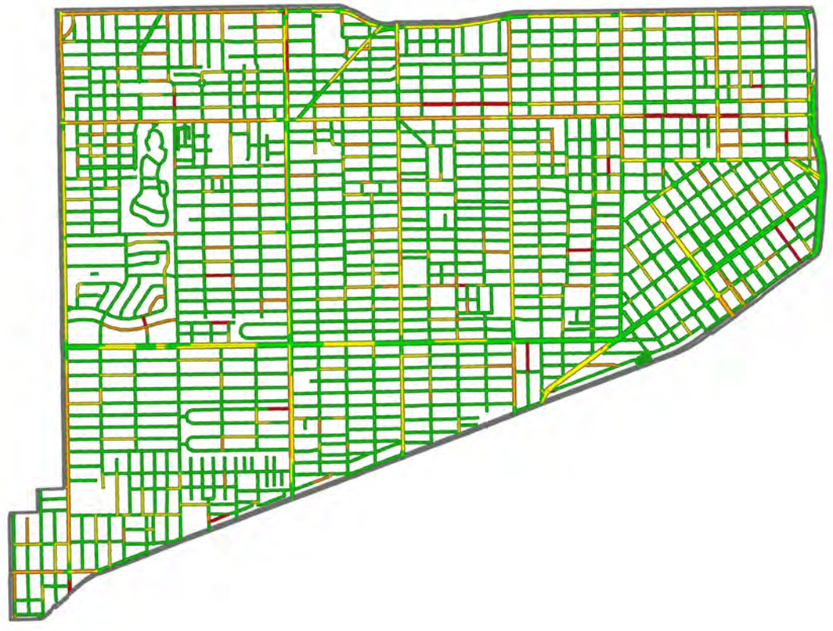


Figure 23: Traffic Levels at 10:00am

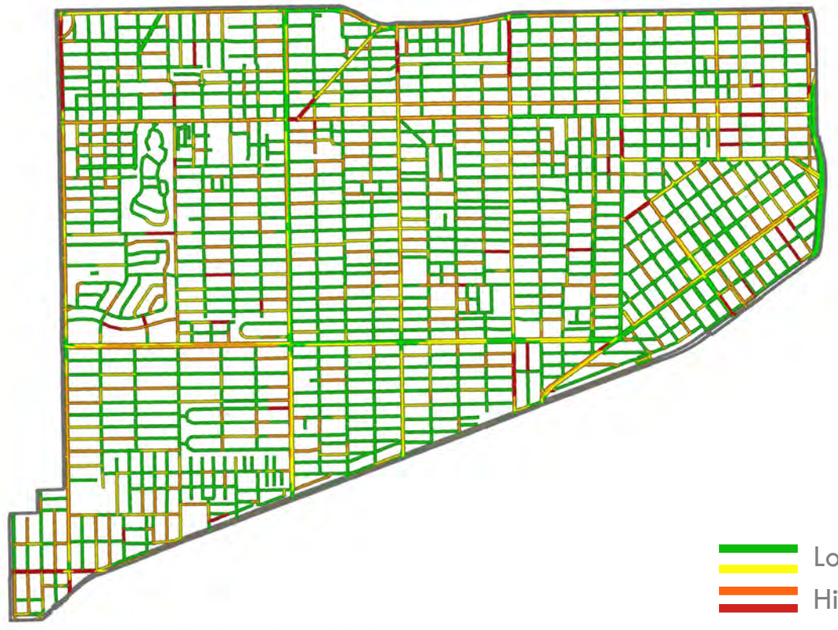


Figure 24: Traffic Levels at 11:00am

Afternoon Traffic and Circulation

Figure 25: Traffic Levels at 3:00pm

Figure 26: Traffic Levels at 4:00pm

Figure 27: Traffic Levels at 5:00pm

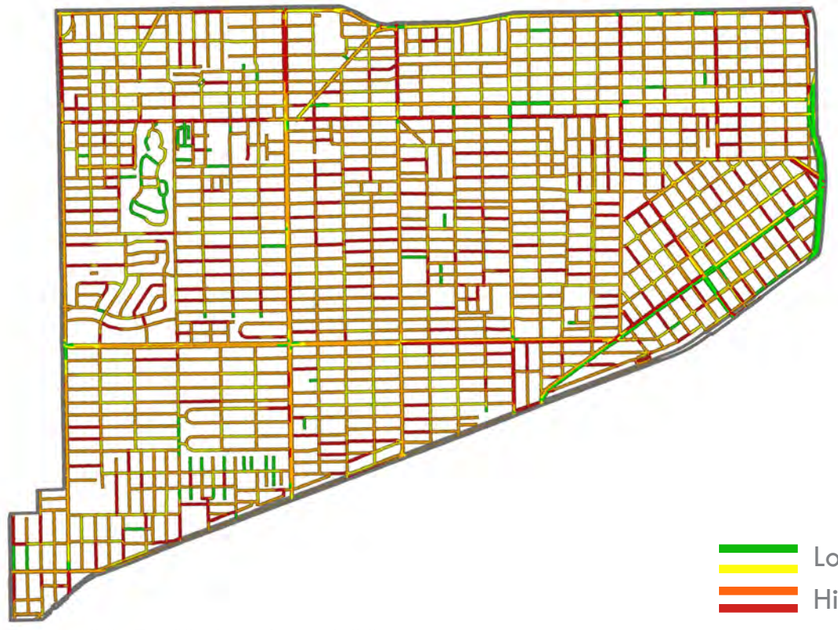


Figure 28: Traffic Levels at 6:00pm

INFRASTRUCTURE

Waste/Utility Distribution

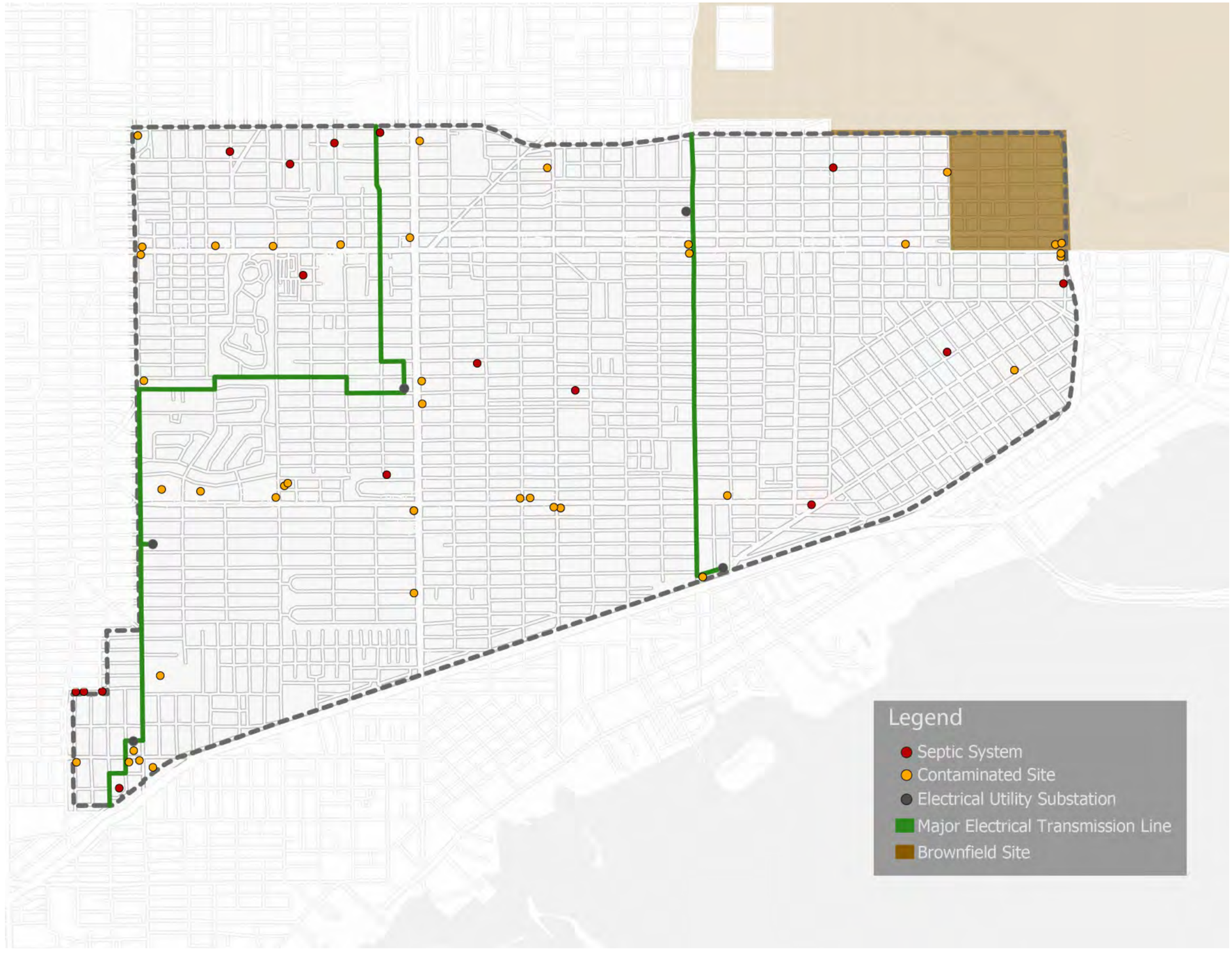


Figure 1: Location of Utility and Waste Infrastructure

Wastewater System

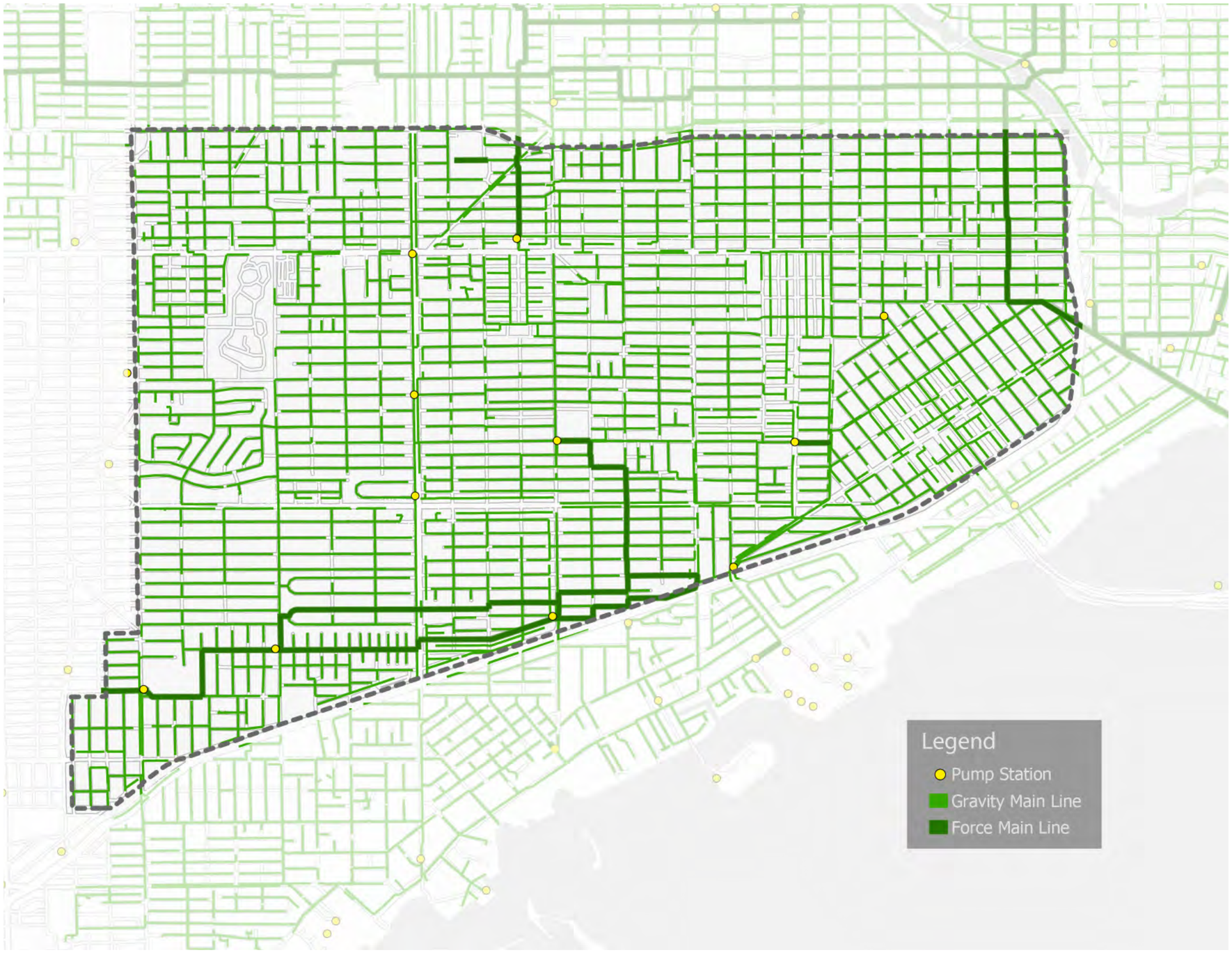


Figure 2: Miami-Dade Sanitary Sewer System

Drinking Water System

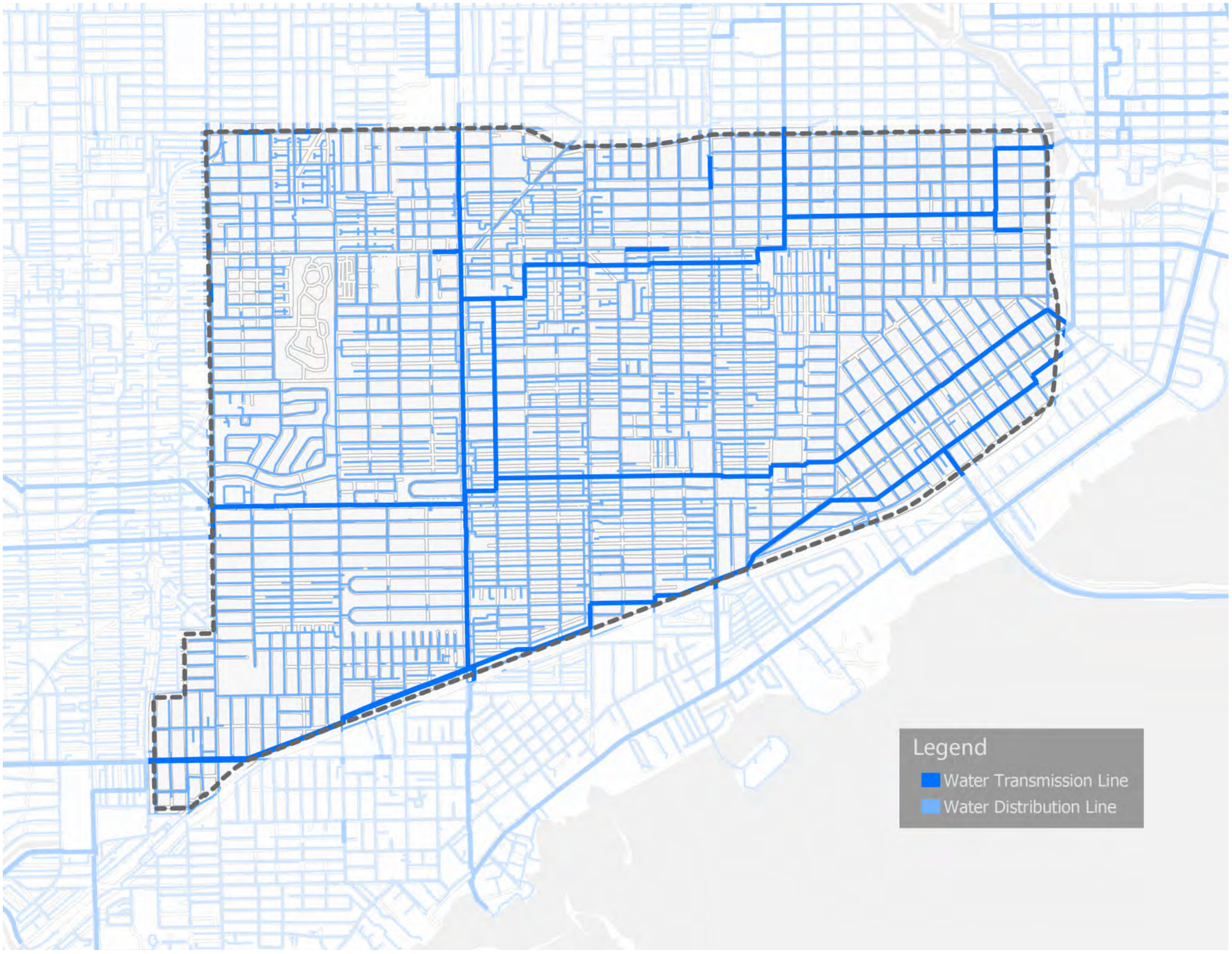


Figure 3: Miami-Dade Drinking Water System

Community Assets

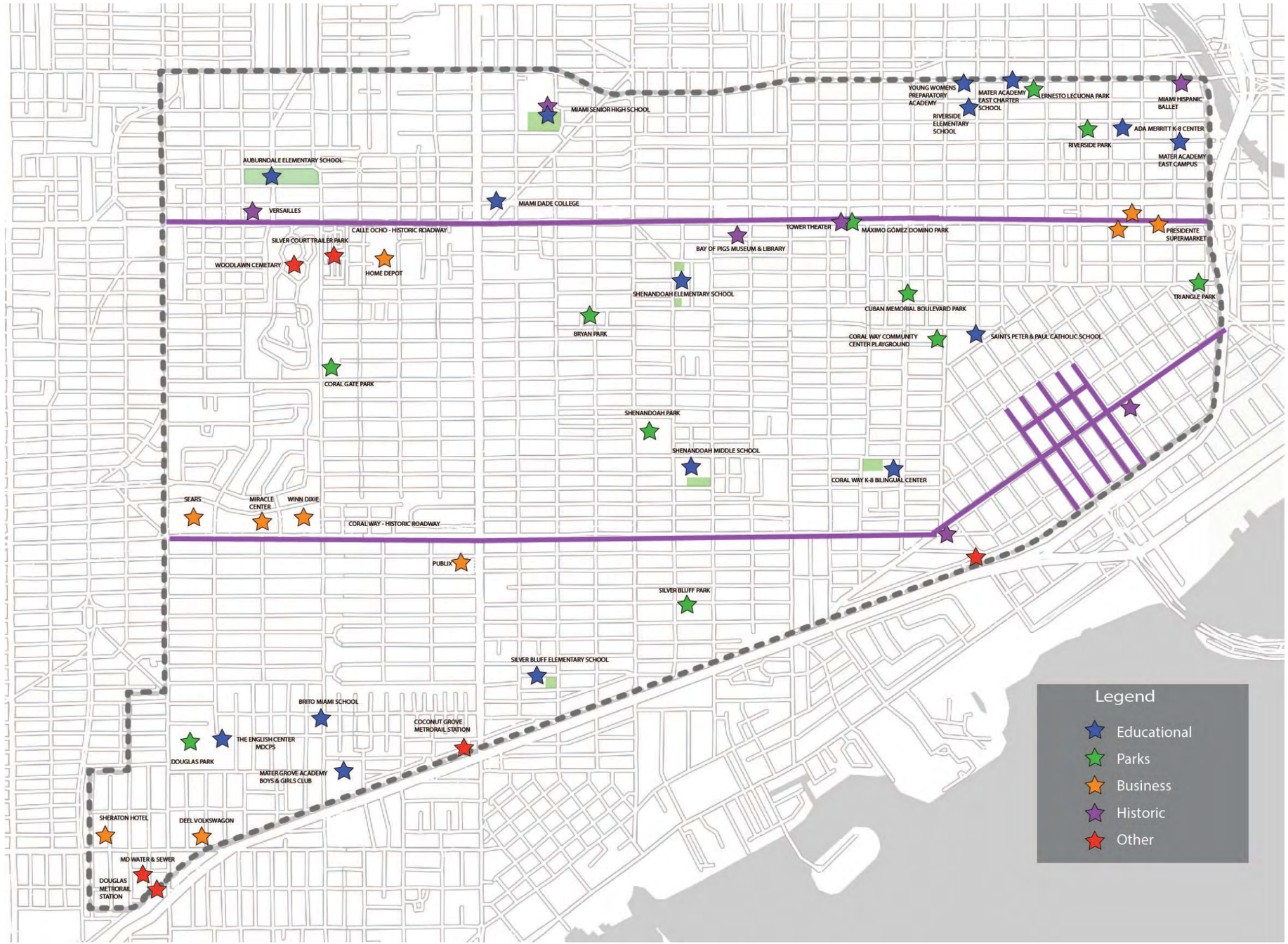


Figure 4: Community Assets

URBAN CHARACTER

Land use

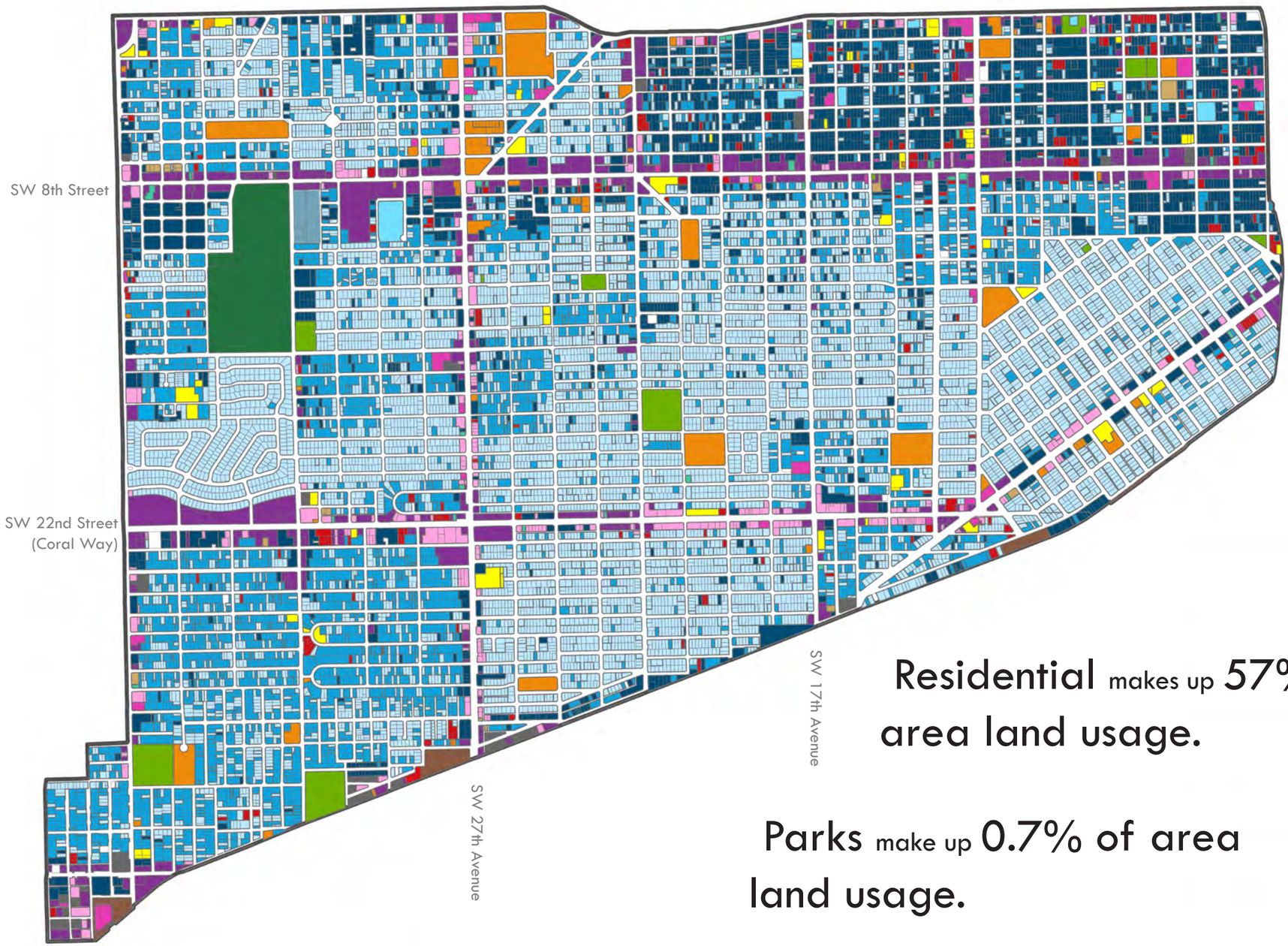


Figure 1: City of Miami Future Landuse Map

Residential makes up **57%** of area land usage.

Parks make up **0.7%** of area land usage.

- Industrial
- Parking
- Railways
- Parks
- Cemeteries
- Religious Institutions
- Schools
- Office
- Social Services
- Commercial
- Vacant
- Mixed Use
- Single Family Residential
- Government Owned Residential
- Duplexes and Town homes
- Mobile Homes
- Multifamily Residential

Zoning

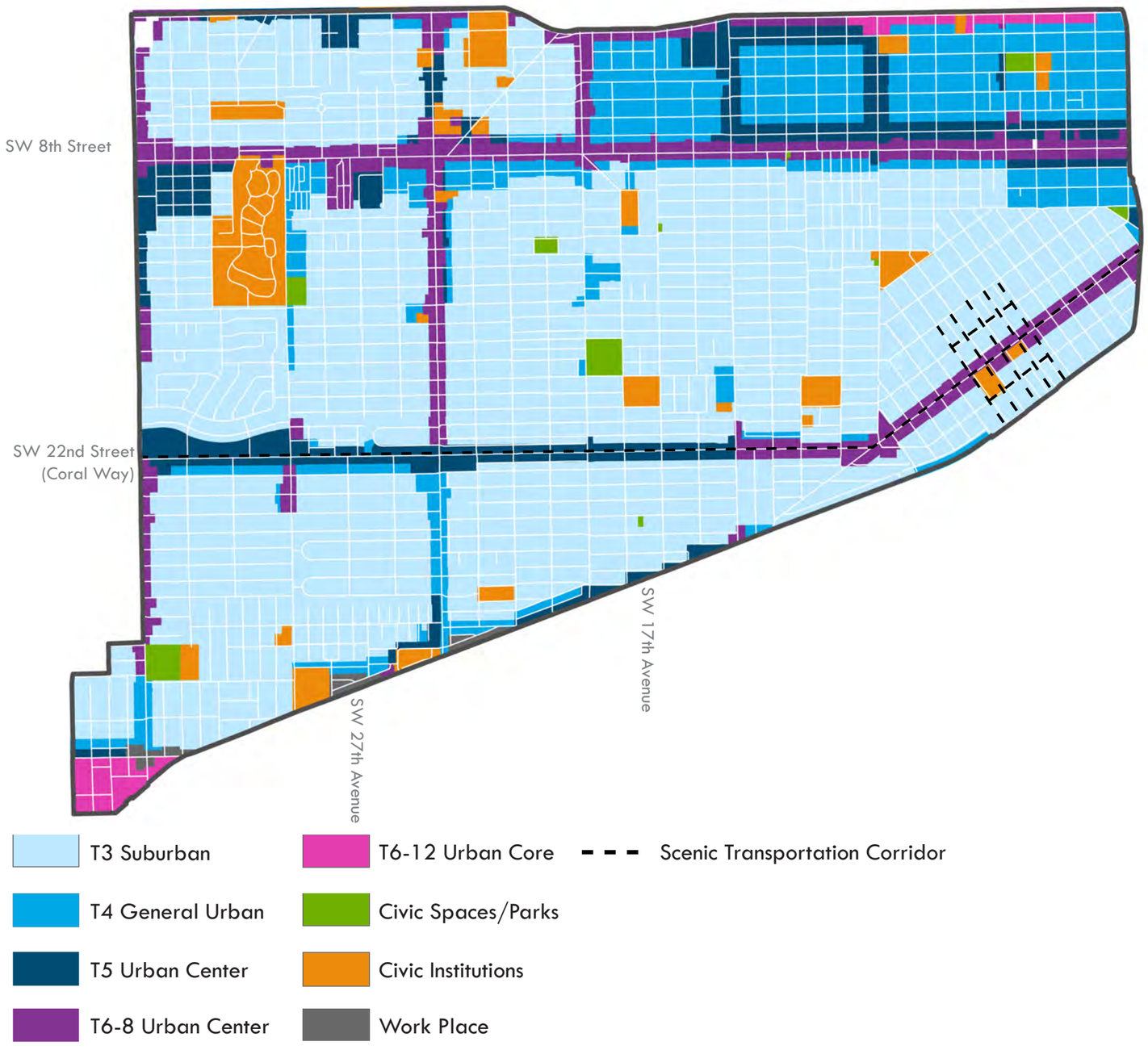


Figure 2: Miami21 Zoning Map

MIAMI 21 ARTICLE 4. TABLE 6 FRONTAGES

AS ADOPTED - JANUARY 2018

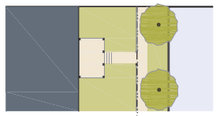
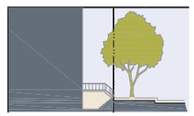
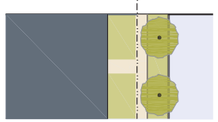
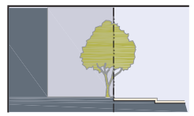
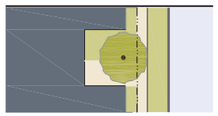
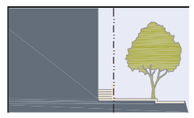
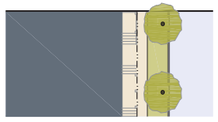
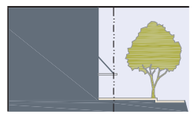
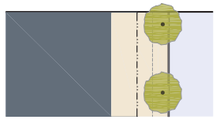
	SECTION (LOT PRIVATE ► Frontage | R.O.W. ◄ PUBLIC Frontage)	PLAN (LOT PRIVATE ► Frontage | R.O.W. ◄ PUBLIC Frontage)	
a. **Common Lawn:** a Frontage wherein the Façade is set back substantially from the Frontage Line. The front yard created remains unfenced and is visually continuous with adjacent yards, supporting a common landscape. The Setback can be densely landscaped to buffer from higher speed Thoroughfares.			T3 T4
b. **Porch & Fence:** a Frontage wherein the Façade is set back from the Frontage Line with an attached Porch permitted to encroach. A fence at the Frontage Line maintains the demarcation of the yard while not blocking view into the front yard.			T3 T4
c. **Terrace or Light Court:** a Frontage wherein the Façade is set back from the Frontage Line by an elevated terrace or a sunken light court. This type buffers residential use from urban sidewalks and removes the private yard from public encroachment. The raised terrace is suitable for outdoor cafes.			T4
d. **Forecourt:** a Frontage wherein a portion of the Façade is close to the Frontage Line with a portion set back. The forecourt with a large tree offers visual and environmental variety to the urban Streetscape. The Forecourt may accommodate a vehicular drop off.			T4 T5 T6-8 T6-12
e. **Stoop:** a Frontage wherein the Façade is aligned close to the Frontage Line with the first Story elevated from the sidewalk sufficiently to secure privacy for the windows. The entrance is usually an exterior stair and landing. This type is recommended for ground-floor Residential Use.			T4 T5 T6-8 T6-12
f. **Shopfront:** a Frontage wherein the Façade is aligned close to the Frontage Line with the Building entrance at sidewalk grade. This type is conventional for retail Use. It has substantial glazing at the sidewalk level and an Awning that may overhang the sidewalk.			T4 T5 T6-8 T6-12

Figure 3: Miami21 Frontage Table

Commercial Corridors

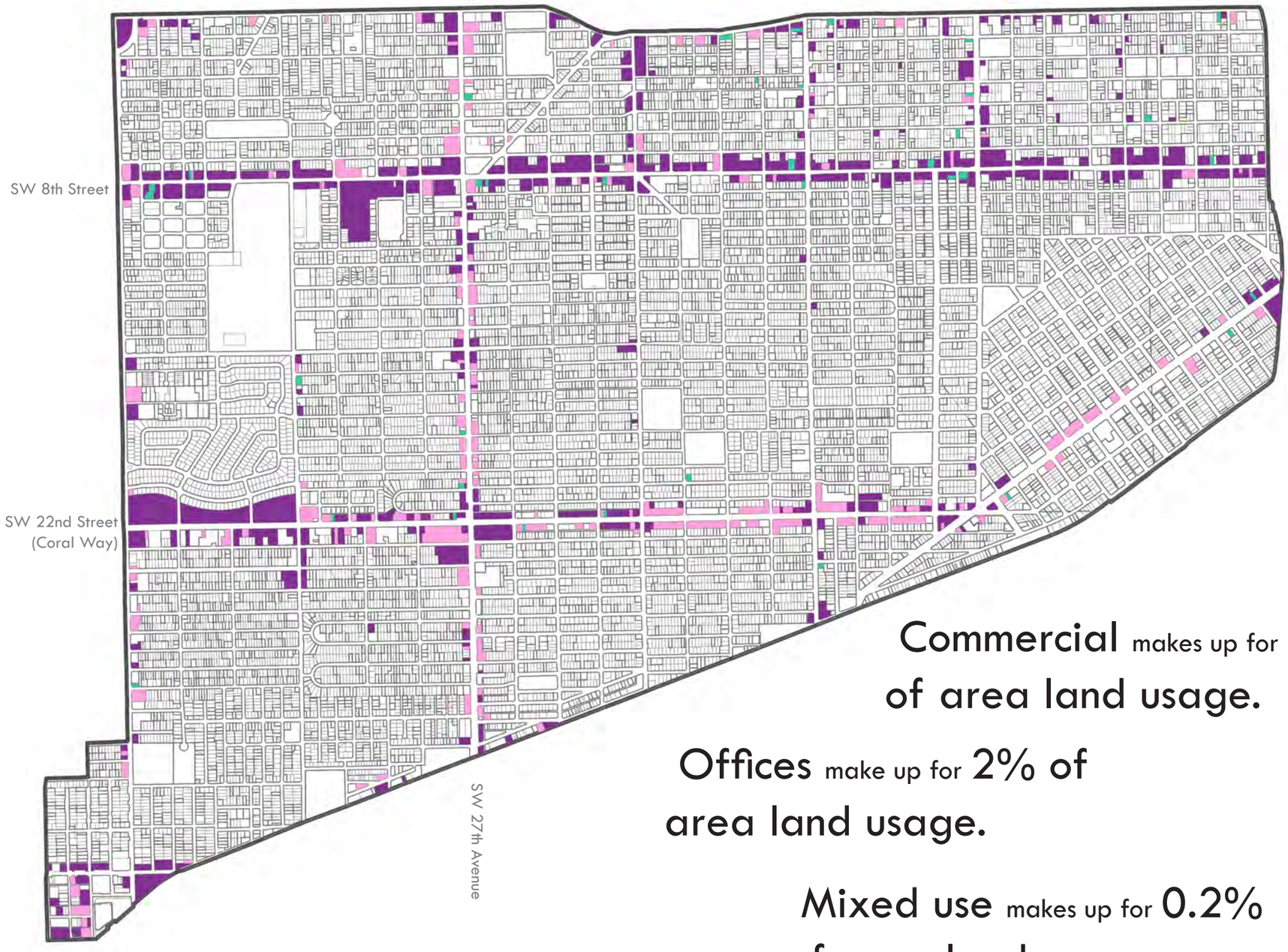


Figure 4: Future Landuse Commercial Corridors Map

Commercial makes up for 5% of area land usage.

Offices make up for 2% of area land usage.

Mixed use makes up for 0.2% of area land usage.

Commercial

Offices

Mixed Use

Population Density

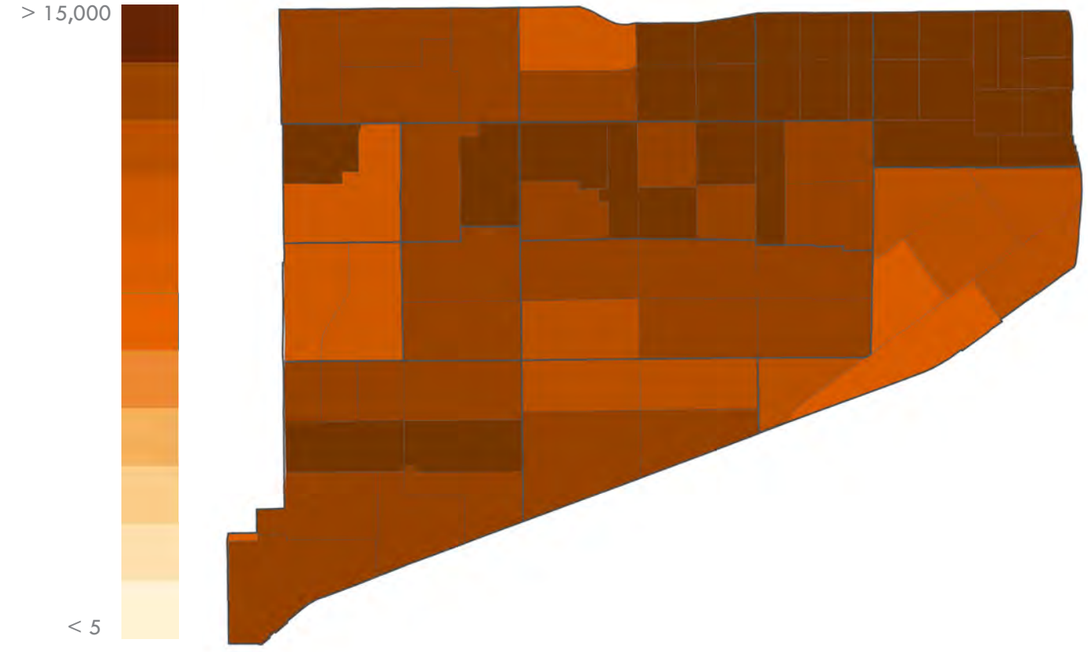


Figure 5: 2000 Population Density

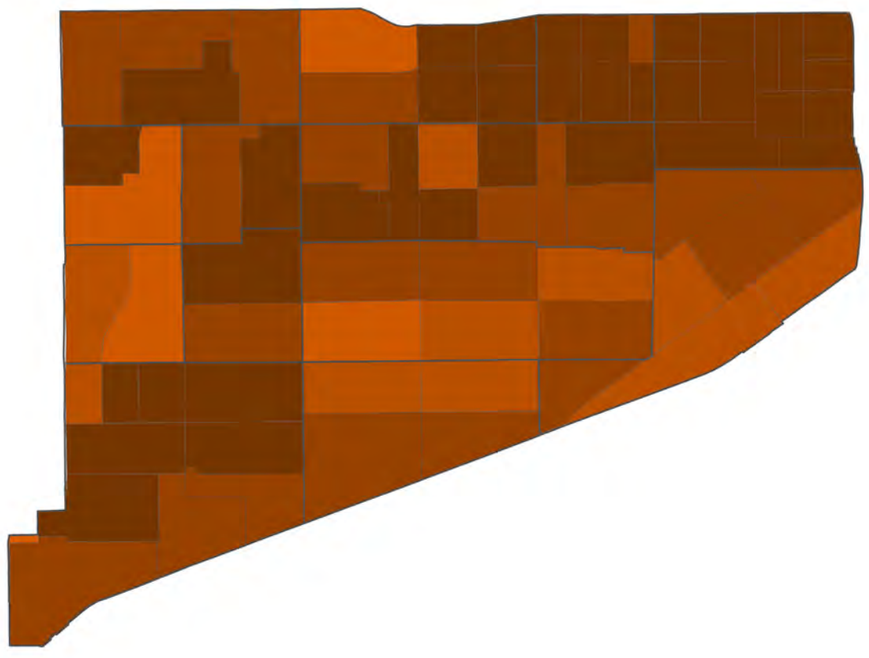


Figure 6: 2010 Population Density

Figure 7: 2017 Population Density

12.2% increase in population density per sq. mile **past 17 years**

Overview

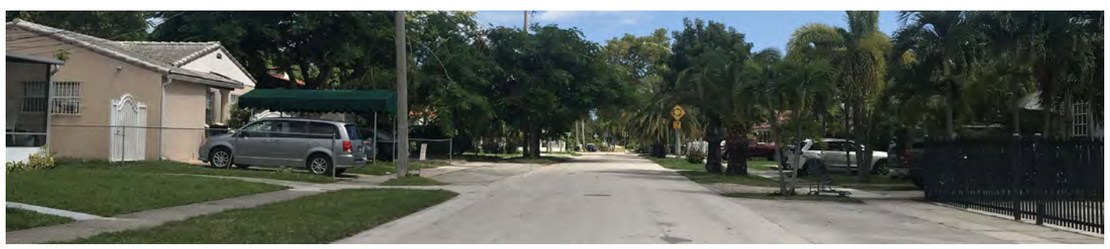
The project area is over 6.7 square miles and contains many thousands of linear feet of roadway. In order to better categorize and determine commonalities in the streets of the project area, C+R looked at key characteristics of each street relevant to our scope of work. These characteristics were: Presence of Swales, Condition of Swales, Street Parking, Medians. Overall the predominant size of the ROW within our project boundaries is 50 feet. There are some major corridors at 70 feet and 100 feet. There are also a few streets within neighborhoods that have 60 foot ROW. Less common are streets with 30 - 40 foot ROW, but we did find some. The majority of the Streets have 5 foot sidewalks, and no curbs.

C+R has done a complete inventory of each street that calls out the following elements:

- Width of ROW
- Number of Travel Lanes
- Size of Swales (if present) and condition (Dirt/Paved)
- Size of medians (if present) and Paved or Vegetated
- Street Trees
- Street Palms
- Overhead Utility Lines
- Bike Lanes
- Specialty paving, Crosswalks, Roundabouts, or Speed Humps

Summaries for each neighborhood are in the body of this report, with detailed breakdowns by street as an Appendix.

The purpose of the Typologies is to allow general recommendations and guidelines to be applied to each of the Typologies in the next volume of this report.



TYPOLOGIES

Are determined by three factors:

1. Swale :
    a. Vegetated Swale
    b. Paved/Dirt Swale
    c. No Swale
2. Parking:
    a. No Parking
    b. On-Street Parking
3. Median:
    a. Vegetated Median
    b. No Median

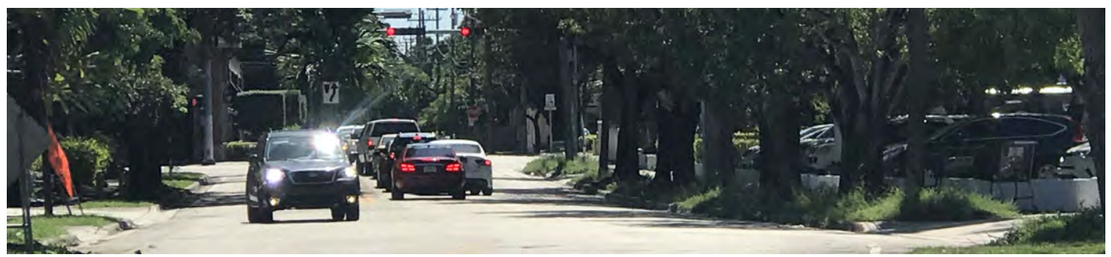
VARIATIONS

Typologies may vary regarding the following factors:

- Size of ROW
- Number of Travel Lanes
- Bike Lanes
- Utility Corridors
- Size of Swales
- Size of Medians
- Sidewalks

NOTE: TYPOLOGY X designates Streets that have unusual or varying conditions and do not fit into any of the defined typologies.

The following pages illustrate these typologies in typical Section and Plan, using real streets within the project area as sample streets. In the next volume of this report, the design team will look at ways to improve the conditions within each of these typologies.



SAMPLE STREET:
SW 19TH TERRACE NEAR SW 31ST AVENUE
PARKDALE SOUTH

A

TYPOLOGY A

GENERAL CHARACTERISTICS:

- VEGETATED SWALES
- NO PARKING
- SIDEWALKS

A

TYPOLOGY A

GENERAL CHARACTERISTICS:

- VEGETATED SWALES
- NO PARKING
- SIDEWALKS

SAMPLE STREET:
SW 23RD STREET NEAR SW 29TH AVENUE
DOUGLAS PARK

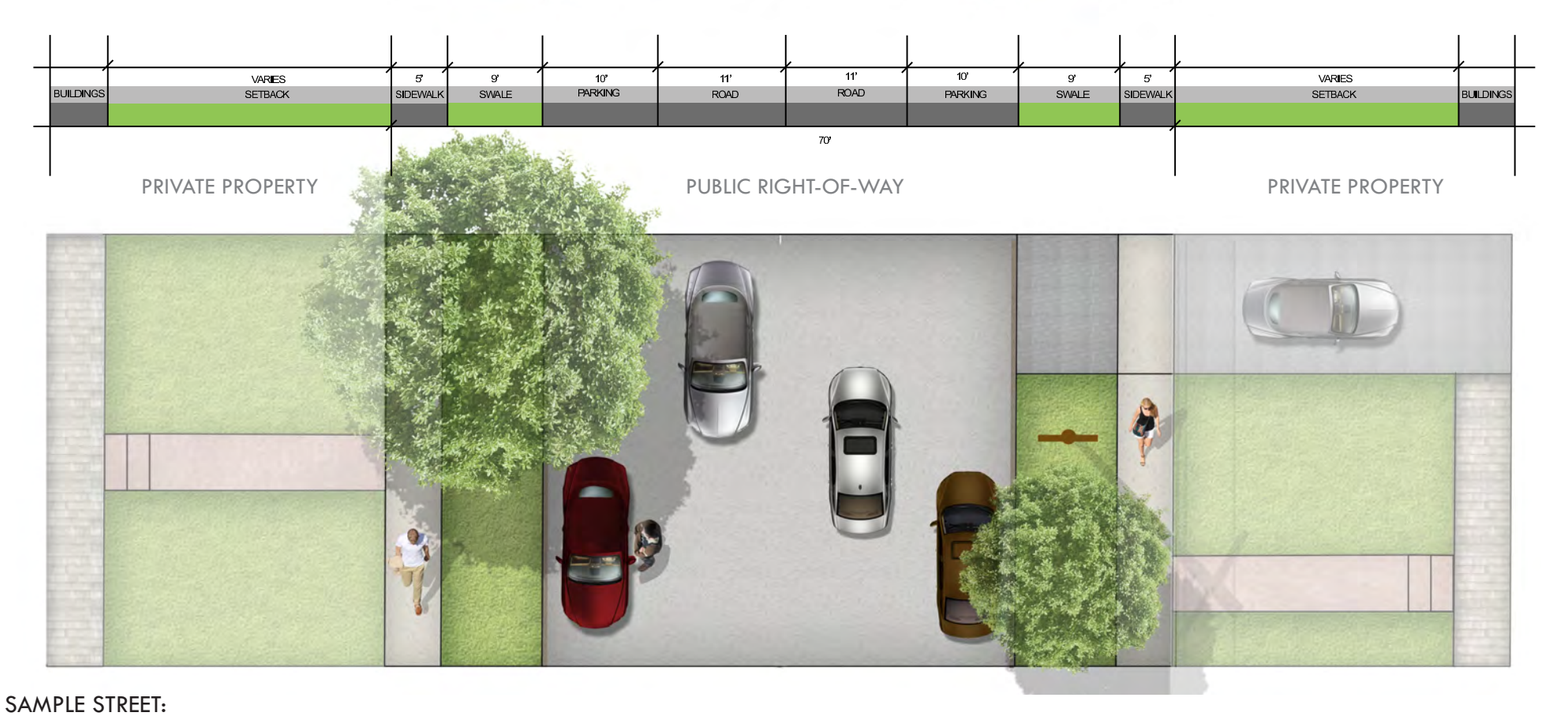
SAMPLE STREET:
SW 17TH STREET NEAR SW 23RD AVENUE
SHENANDOAH SOUTH

B

TYPOLOGY B

GENERAL CHARACTERISTICS:

- VEGETATED SWALES
- ON STREET PARKING
- SIDEWALKS



SAMPLE STREET:
SW 22ND ROAD NEAR SW 4TH AVENUE
THE ROADS

B

TYPOLOGY B

GENERAL CHARACTERISTICS:

- VEGETATED SWALES
- ON STREET PARKING
- SIDEWALKS

SAMPLE STREET:
SW 14TH STREET NEAR SW 36TH AVENUE
LA PASTORITA

C

TYPOLOGY C

GENERAL CHARACTERISTICS:

- PAVED/DIRT SWALES
- NO OFFICIAL PARKING (CARS PARKING ON SWALE)
- SIDEWALKS

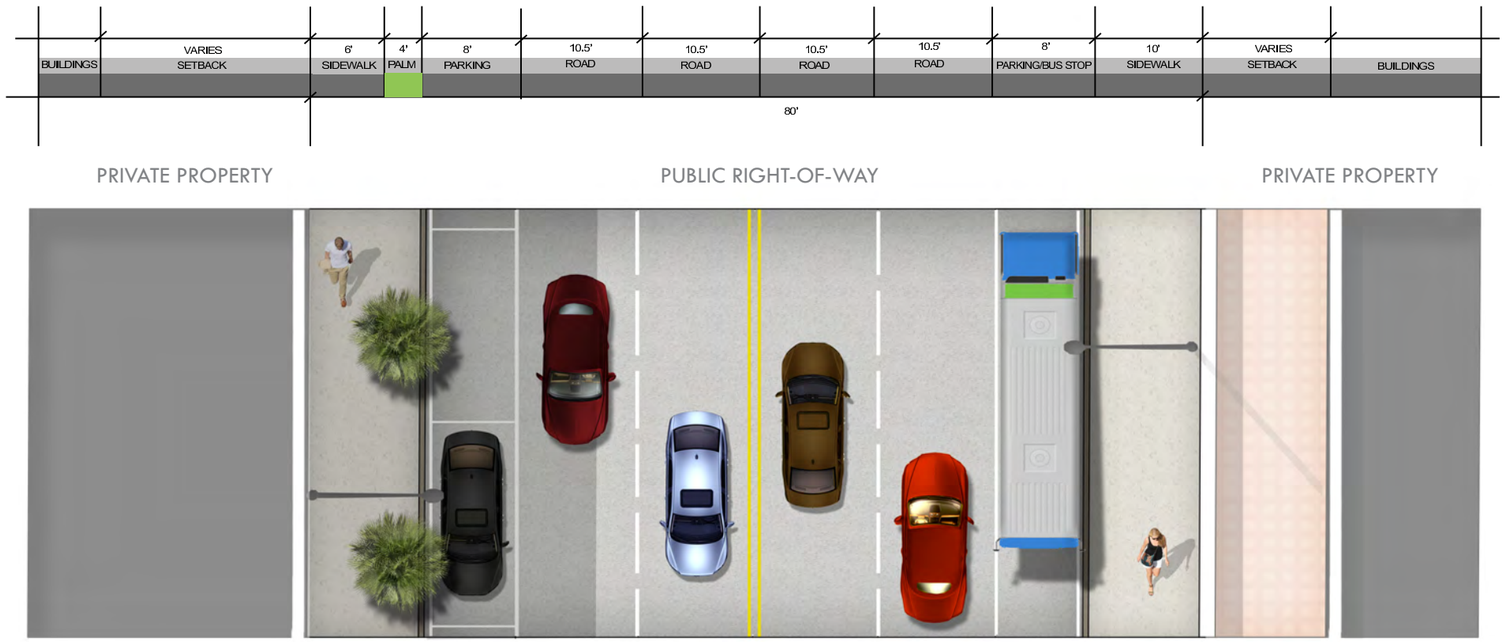
SAMPLE STREET:
SW 4TH STREET NEAR SW 5TH AVENUE
EAST LITTLE HAVANA

D

TYPOLOGY D

GENERAL CHARACTERISTICS:

- NO SWALES
- ON-STREET PARKING
- SIDEWALKS



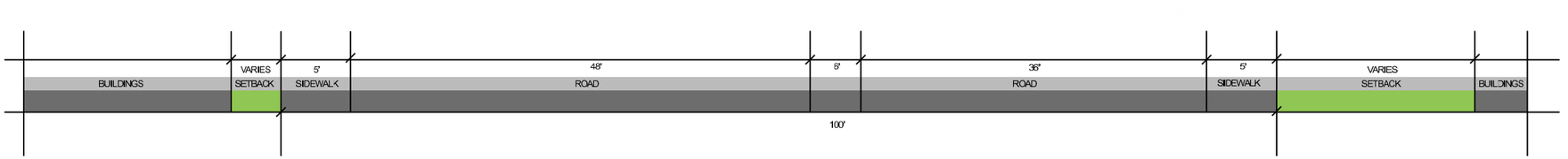
SAMPLE STREET:
SW 12TH AVENUE NEAR SW 4TH STREET
EAST LITTLE HAVANA

D

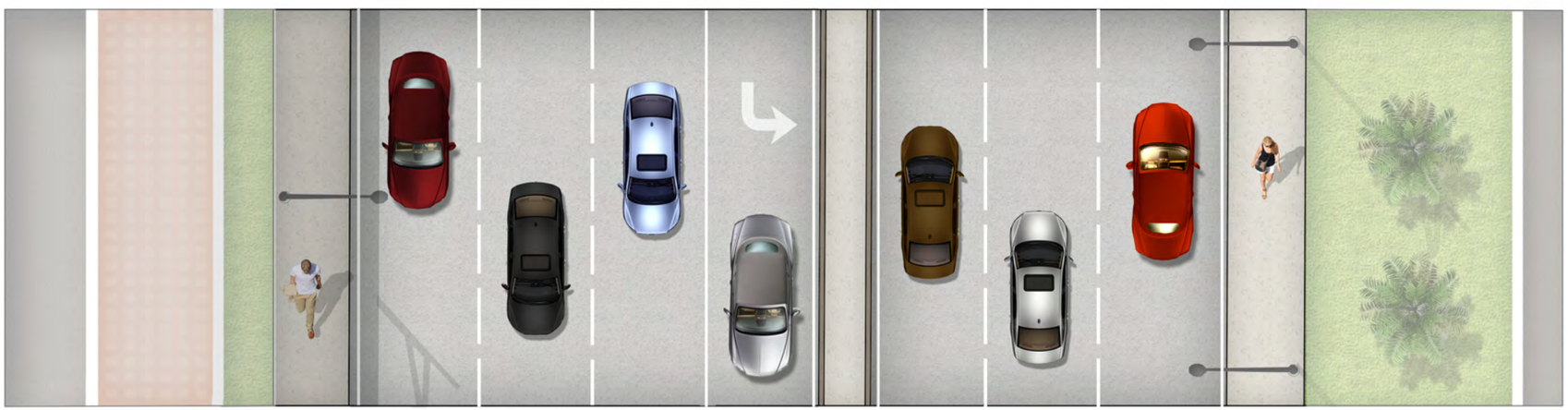
TYPOLOGY D

GENERAL CHARACTERISTICS:

- NO SWALES
- ON-STREET PARKING
- SIDEWALKS



PRIVATE PROPERTY PUBLIC RIGHT-OF-WAY PRIVATE PROPERTY



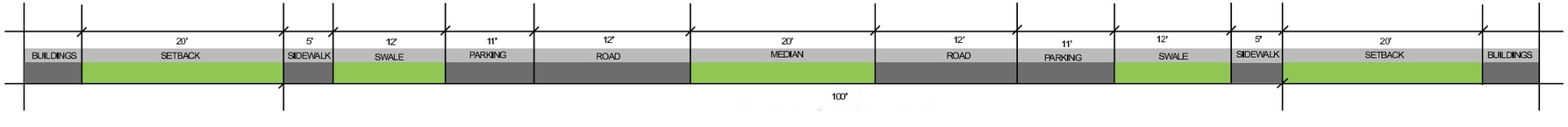
E

TYPOLOGY E

GENERAL CHARACTERISTICS:

- NO SWALES
- NO PARKING
- SIDEWALKS

SAMPLE STREET:
SW 27TH AVENUE NEAR SW 3RD STREET
CITRUS GROVE/AUBURNDALE



SAMPLE STREET:
SW 25TH ROAD NEAR SW 4TH AVENUE
THE ROADS

F

TYPOLOGY F

GENERAL CHARACTERISTICS:

- VEGETATED SWALES
- ON-STREET PARKING
- VEGETATED MEDIAN
- SIDEWALKS

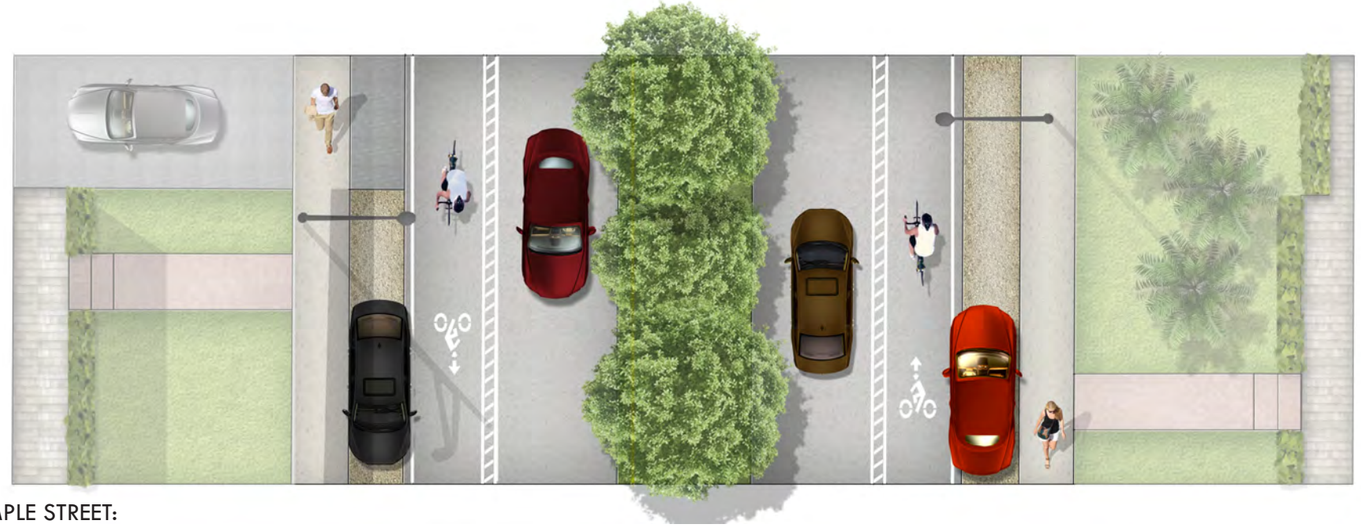
SAMPLE STREET:
SW 33RD AVENUE NEAR SW 9TH STREET
LA PASTORITA

G

TYPOLOGY G

GENERAL CHARACTERISTICS:

- VEGETATED SWALES
- NO PARKING
- VEGETATED MEDIANS
- SIDEWALKS



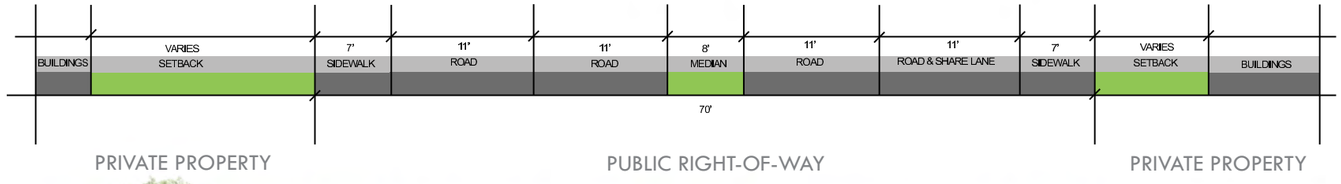
SAMPLE STREET:
SW 11TH STREET NEAR SW 34TH AVENUE
LA PASTORITA

H

TYPOLOGY H

GENERAL CHARACTERISTICS:

- PAVED/DIRT SWALE
- NO PARKING
- VEGETATED MEDIAN
- SIDEWALKS



SAMPLE STREET:
SW 17TH AVENUE NEAR SW 17TH TERRACE
SHENANDOAH SOUTH

TYPOLOGY I

GENERAL CHARACTERISTICS:

- NO SWALE
- VEGETATED MEDIAN
- NO PARKING
- SIDEWALKS

AUBURNDALE

Auburndale

Figure 1: The Auburndale neighborhood location within project limits

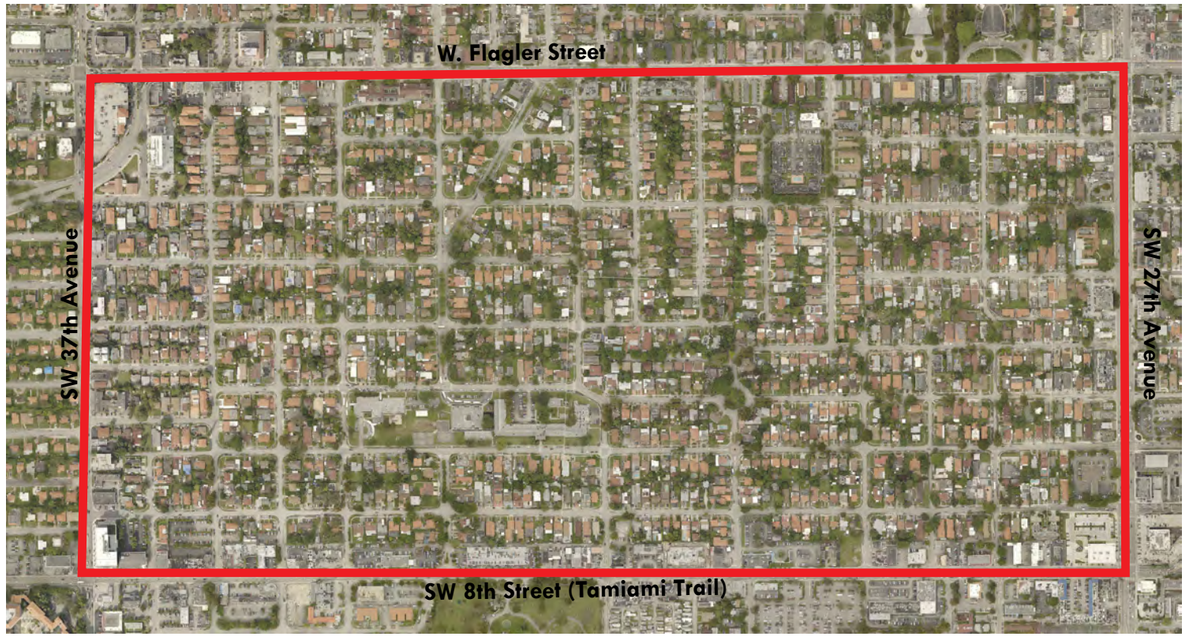


Figure 2: Aerial of Auburndale (2016)

Main Takeaways

The Auburndale neighborhood occupies approximately 320 acres (0.5 square miles) of land in the north-west corner of the Southwest Streetscape project area. The neighborhood is bordered by West Flagler Street along the northern edge and SW 8th Street to the south while its east and west borders are SW 27th Avenue and SW 37th Avenue respectively. The commercial thoroughfares of the neighborhood can be found on SW 8th Street as well as SW 27th Avenue with some small scale businesses along SW 37th Avenue, leaving the core of the neighborhood as residential. Auburndale's residential areas are comprised mostly of single or two- family homes with greater density apartment buildings along W. Flagler Street and SW 27th Avenue. The neighborhood contains several civic institutions throughout the area being mostly schools, one private and two public schools/universities as well as one religious house of worship.

Drainage Concerns

Flooded Sidewalk at SW 32nd Avenue & SW 5th Street

Flooded Swale at SW 30th Avenue & SW 2nd Street

Flooded Swale at SW 4th Street

Flooded Swale at SW 2nd Street

Flooded Swales at SW 29th Avenue

Flooded Swale at SW 29th Avenue

Flooded Swales at SW 29th Avenue and SW 7th Street

Flooded Swale at SW 29th Avenue and SW 6th Street

Street Tree Assessment | Species

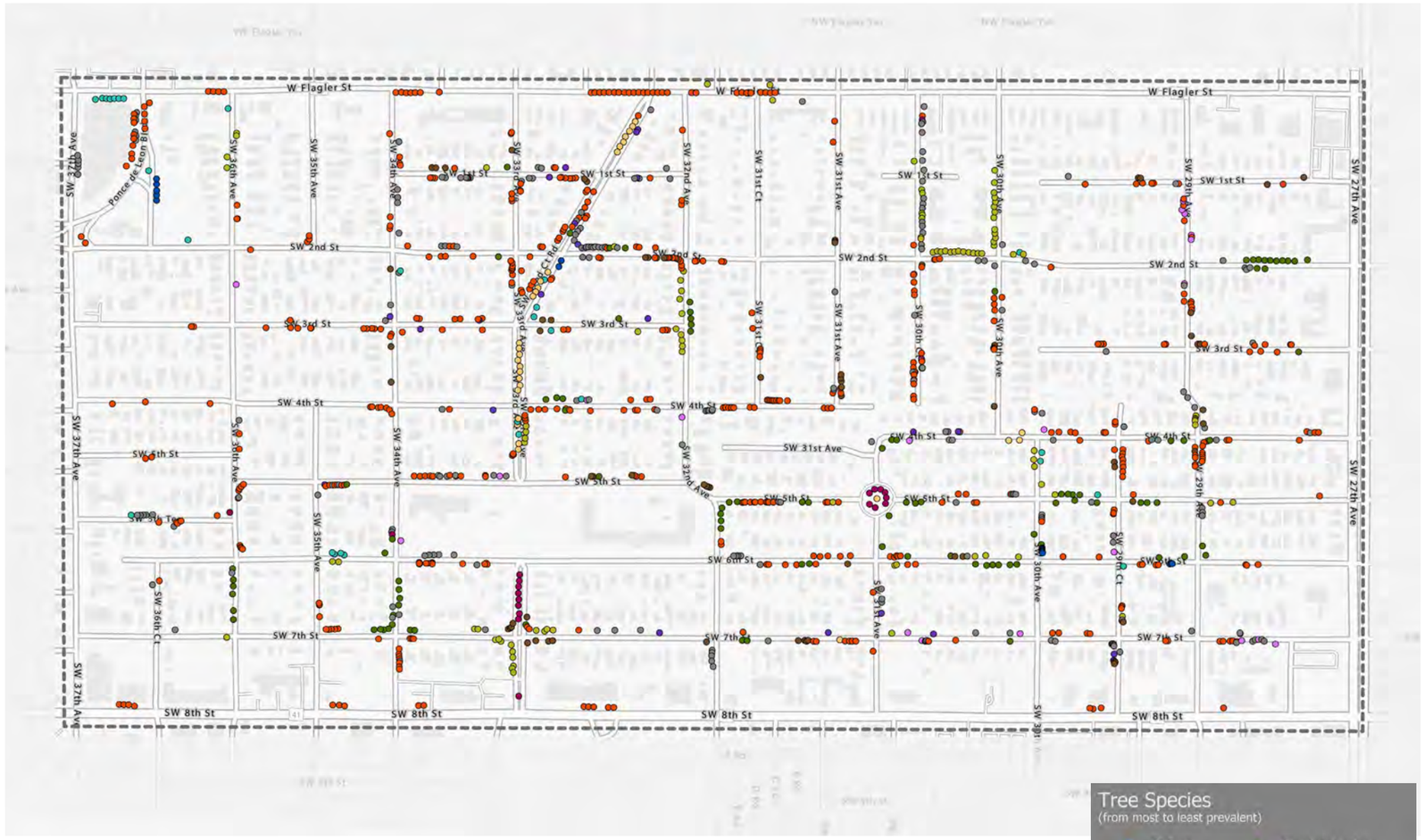
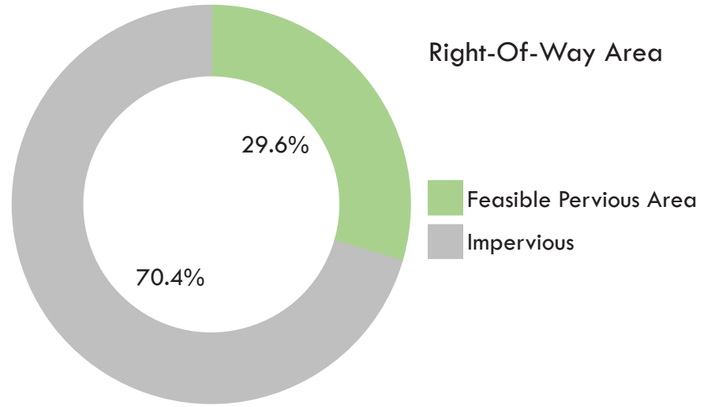
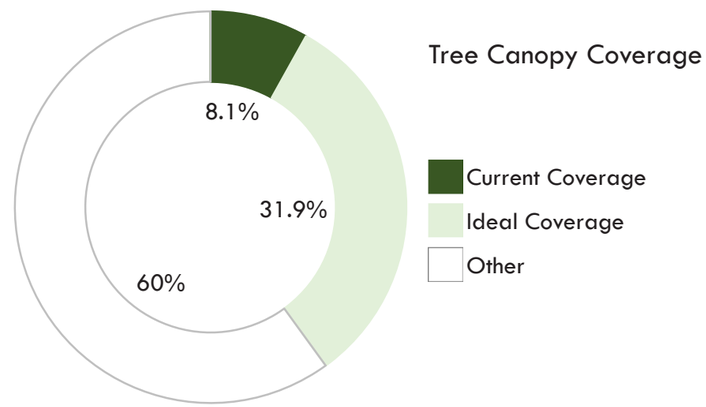


Figure 3. Auburndale Tree Species Inventory

Main Takeaways

- Overall very little street tree canopy with the exceptions of SW 30th Court, SW 30th Avenue as well as SW 32nd Court Road and SW 33rd Avenue.
- Predominant trees for the neighborhood are Mahogany (Sweitenia mahagoni) and Black Olive (Bucida buceras)
- Streets with one predominant species
  - SW 33rd Avenue - Tamarind (Tamarindus indica) in Median
  - SW 30th Avenue - Black Olive (Bucida buceras) surrounding





Street Tree Assessment | Size

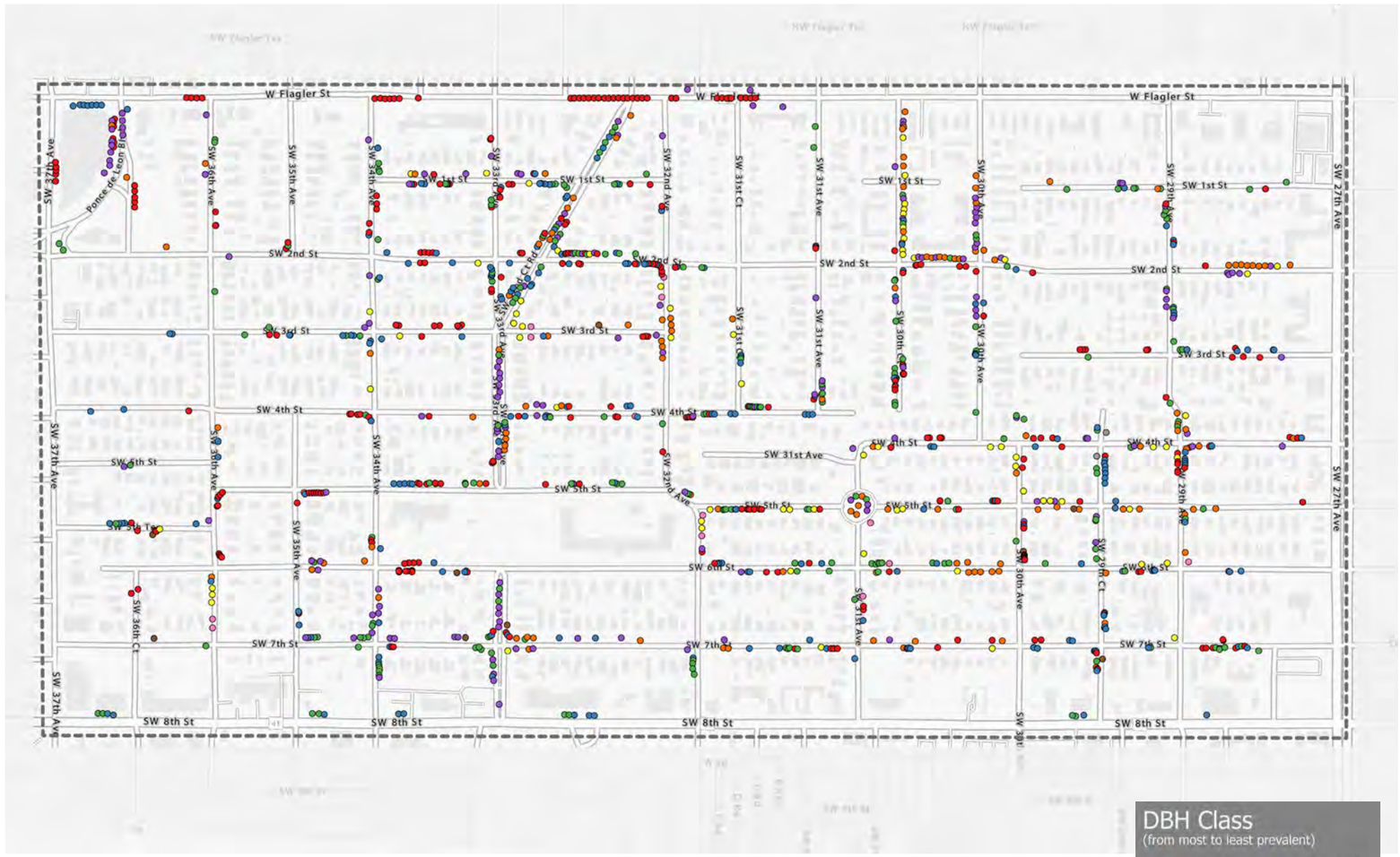


Figure 4. Auburndale Tree DBH Inventory

Main Takeaways

- Large number of mature Tamarinds (Tamarindus indica) along 33rd Avenue
- Row of young Live Oaks (Quercus virginiana) along West end of West Flagler Street
- Row of Solitaire Palms (Ptychosperma elegans) along center of Wesr Flagler Street
- Large number of mature Java Plums (Syzygium cumini) along SW 30th Court
- Significant number of mature trees in Southeast corner of neighborhood.

Street Tree Assessment

SW 33rd Avenue - Black Olive (Bucida buceras) in median

SW 2nd Street -Mahogany (Sweitenia mahagoni) in swale

SW 6th Street - Some Black Olives (Bucida buceras) on the left and Live Oaks (Quercus virginiana) on the right side

SW 16th Street - Street palms - Royal Palms (Roystonea regia) and Date Palms (Phoenix dactylifera)

SW 33rd Avenue - Tamarinds lining the median

SW 36th Court - Intersecting with Ponce de Leon Blvd - Green Buttonwoods (Conocarpus erectus) on the right and a Live Oak (Quercus virginiana) on the left

SW 31st Avenue within round-about park - Sapodilla (Manilkara zapota) trees

LA PASTORITA

La Pastorita

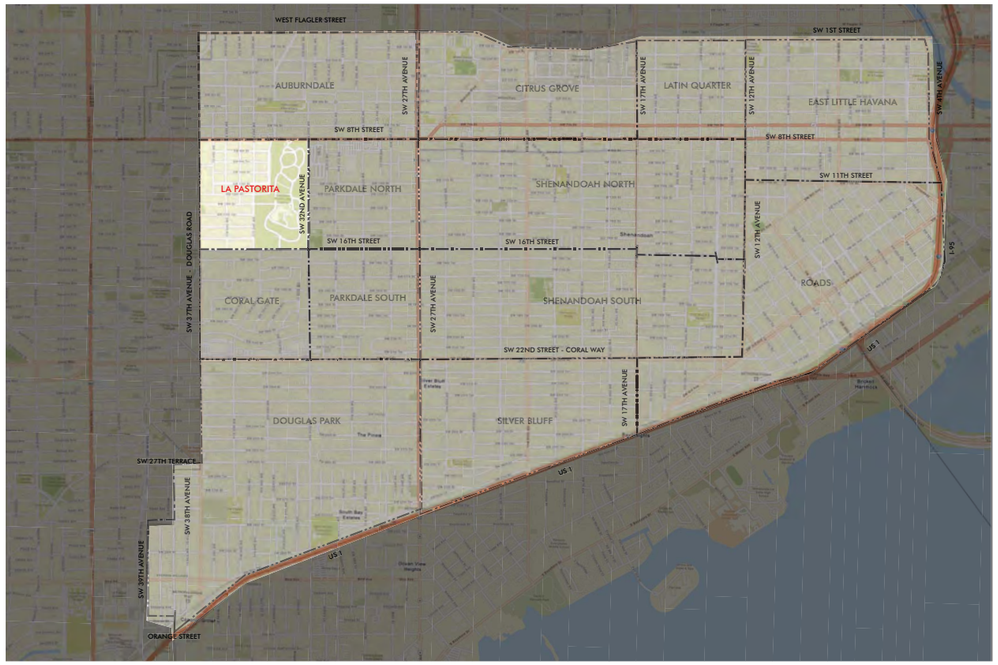


Figure 1: La Pastorita Neighborhood location within Project Limits

Main Takeaways

Half of the La Pastorita neighborhood is occupied by the Caballero Rivero Woodlawn Cemetery, which is 66 acres of primarily green space with large trees. This area is open to the public most days. The rest of the neighborhood is primarily zoned Duplex/Town residential or Multi-Family Residential, with a commercial area along SW 8th Street. Another large presence in this neighborhood is the Coral Gardens Condominiums which occupy 17 acres between SW 9th Street and SW 11th Street and between SW 34th Avenue and SW 36th Court (7 square blocks).

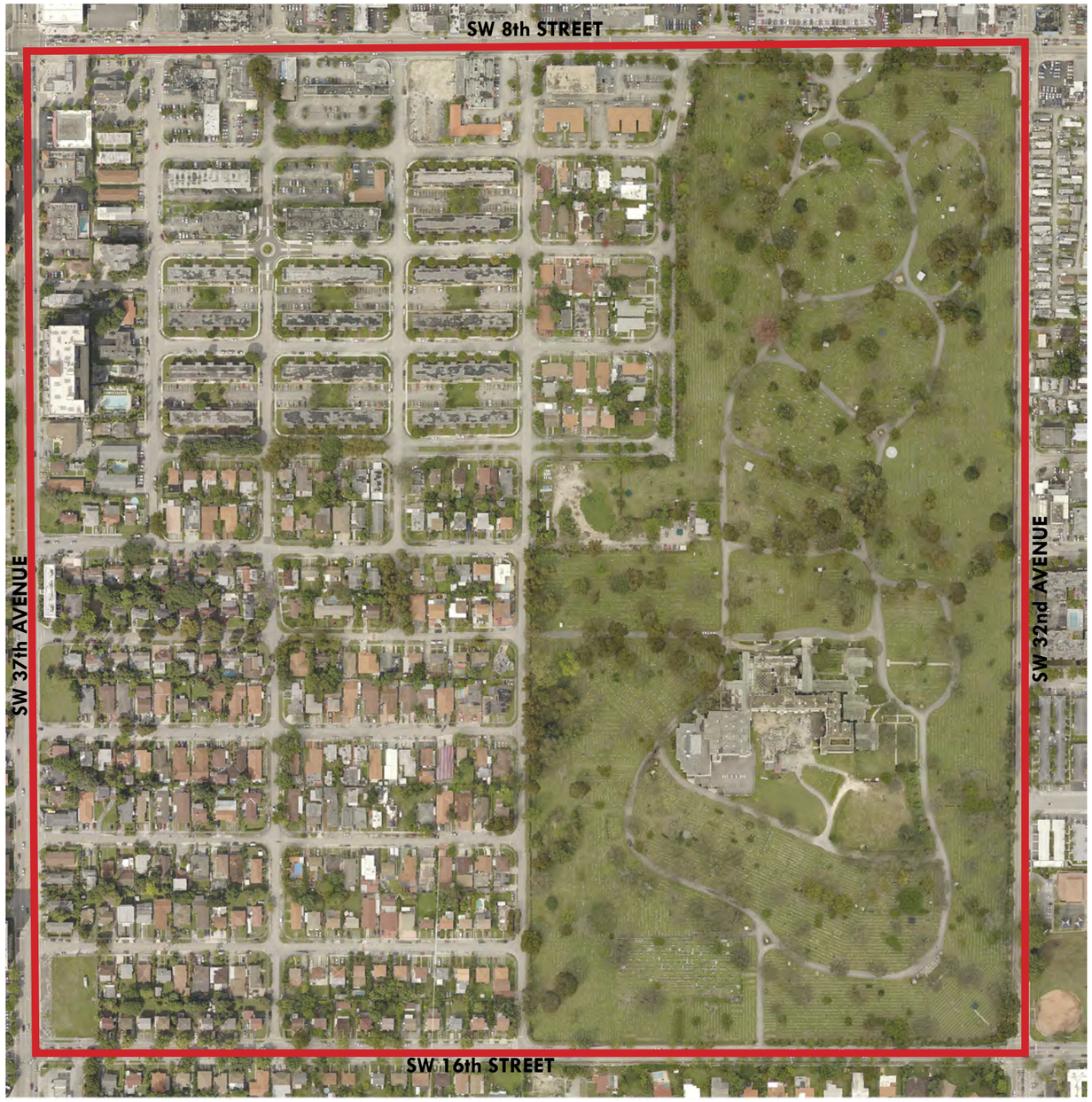
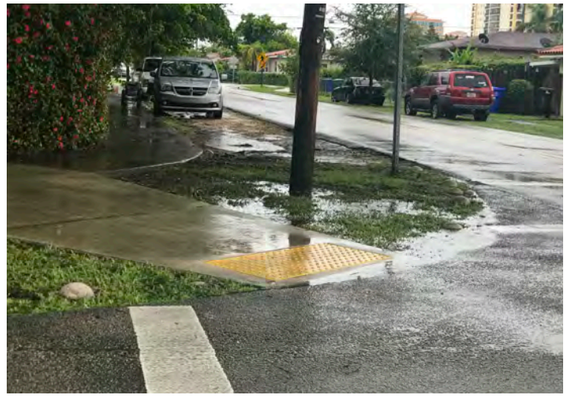


Figure 2: Aerial of La Pastorita (2018)

Drainage Concerns

Flooded Swale at SW 36th Avenue & SW 10th Street



Flooded Swale at SW 36th Avenue & SW 13th Terrace

Flooded Swale at SW 15th Street

Flooded Road & Swale at SW 33rd Avenue

Flooded Swales at SW 9th Terrace

Flooded Swale at SW 15th Street

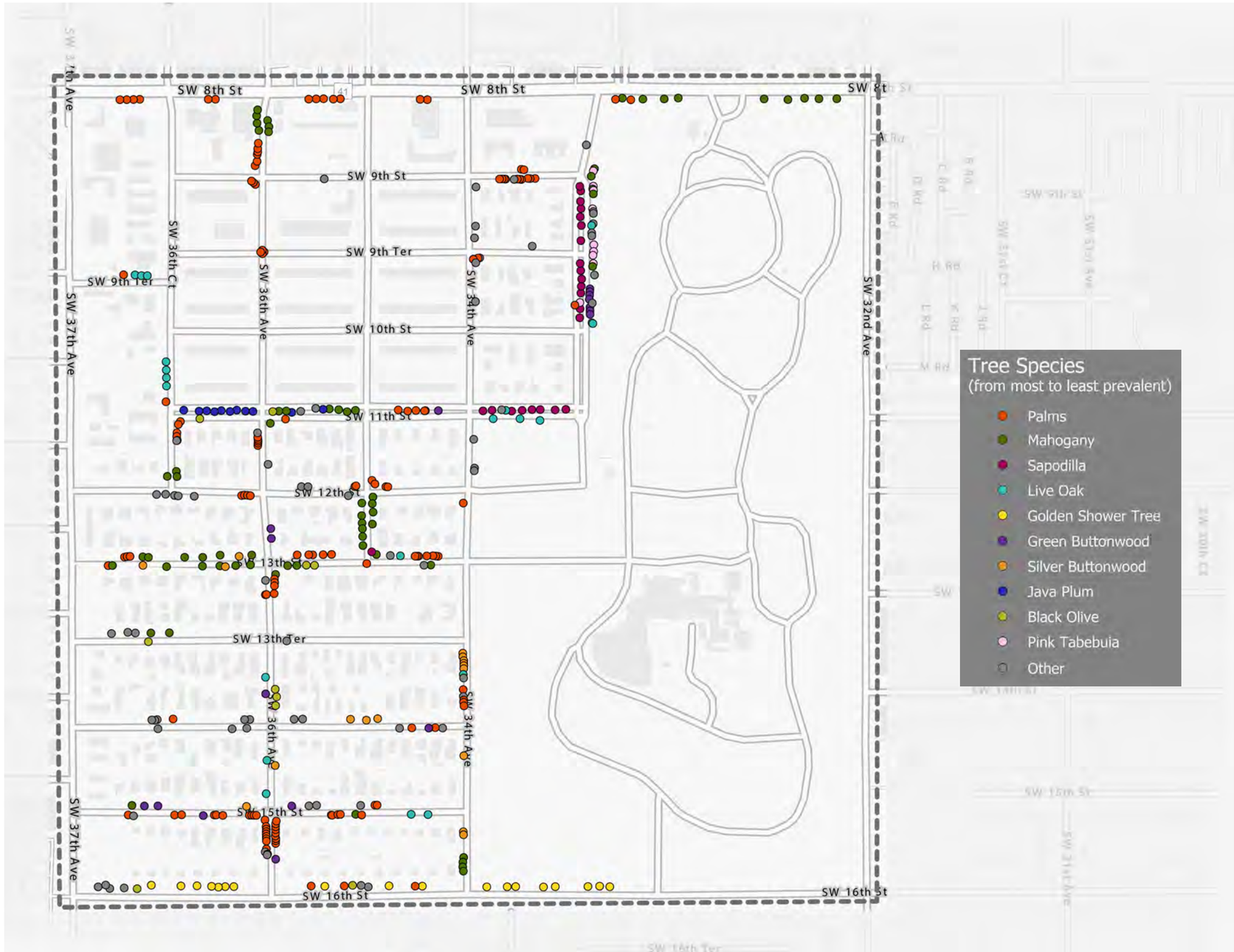
Flooded Road & Swale at SW 33rd Avenue & SW 9th Street

Flooded parking lot off of SW 36th Avenue

Flooded Swales at SW 36th Avenue

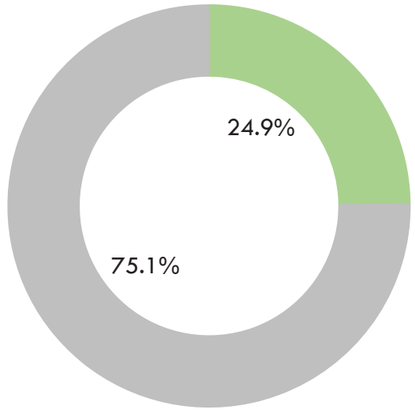
Flooded Swale at SW 13th Terrace

Street Tree Assessment | Species



Main Takeaways

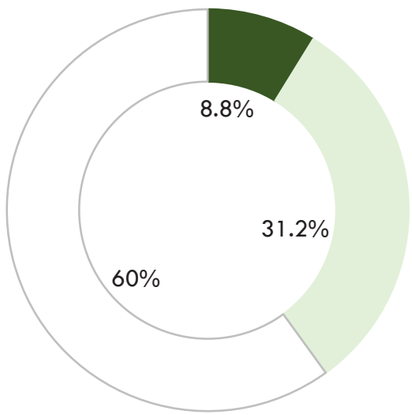
- Overall very little street tree canopy with the exceptions of SW 11th Street, SW 16th Street and SW 33rd Avenue.
- Recent new plantings of trees in the southwest part of the neighborhood. Mostly small species trees (Silver Buttonwood & Crape Myrtle)
- Predominant tree for the neighborhood is Mahogany (Sweitenia mahagoni)
- Streets with one predominant species
  - SW 33rd Avenue - Sapodilla (Manilkara zapota) in Median
  - SW 16th Street - Golden Shower tree (Cassia fistula)



Right-Of-Way Area

Feasible Pervious Area

Impervious



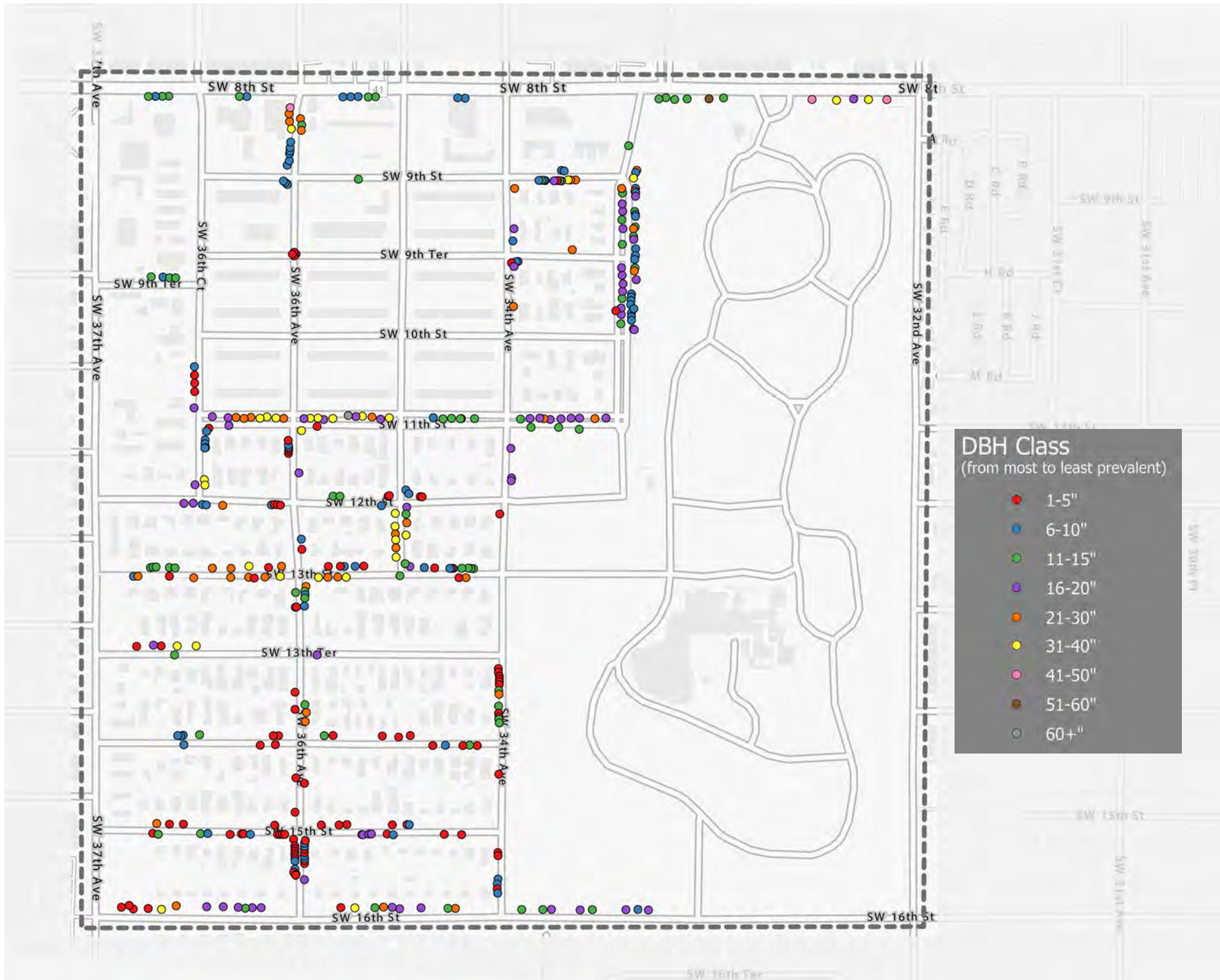
Tree Canopy Coverage

Current Coverage

Ideal Coverage

Other

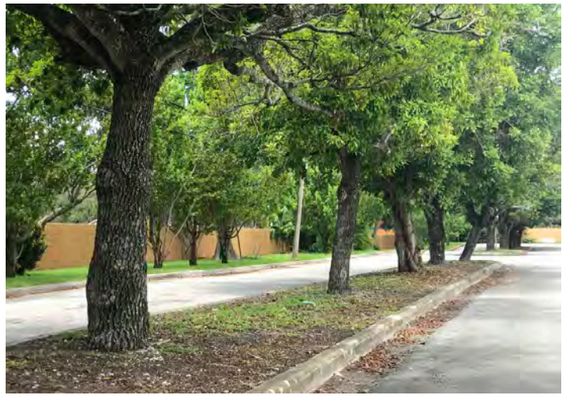
Street Tree Assessment | Size



Main Takeaways

- Majority of trees in neighborhood fall into smallest DBH classes
- Newly planted smaller trees located South of SW 15th Terrace.
- Significant amount of larger trees along SW 11th and 13th Street.
- Large number of mature Sapodilla (Manilkara zapota) planted in median on SW 33rd Avenue, between SW 9th and 10th Street.

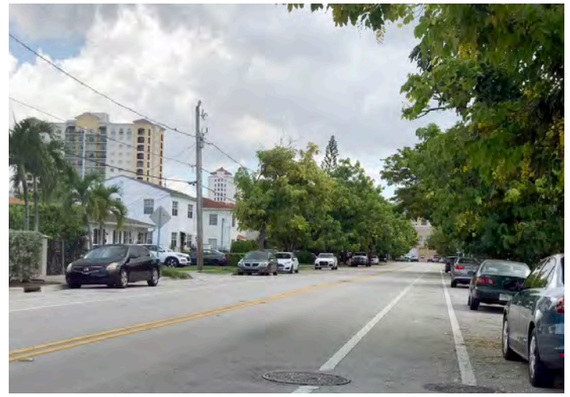
Street Tree Assessment



SW 33rd Avenue - Sapodilla (Manilkara zapota) in median

SW 33rd Avenue - Sapodilla (Manilkara zapota) in median

SW 15th Street - Some Coconut palms, some small Oak trees and Green Buttonwoods.



SW 16th Street - Street trees - Golden Shower (Cassia fistula) trees

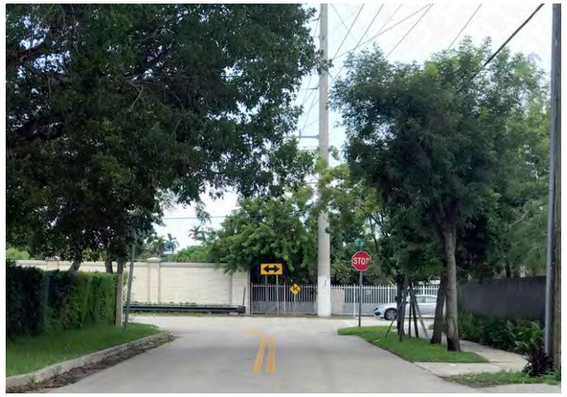
SW 11th Street - Between 35th and 36th Avenues - Mahogany (Sweitenia mahagoni)

SW 11th Street - Between 34th and 33rd Avenues - Sapodilla (Manilkara zapota)

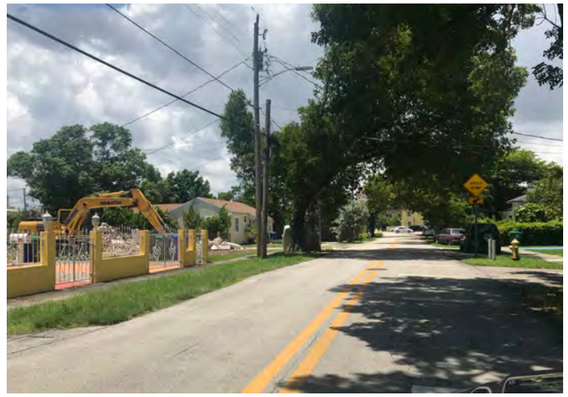
SW 14th Street - Some newly planted Crepe Myrtle (Lagerstroemia indica) trees

SW 13th Terrace - newly planted Crepe Myrtle (Lagerstroemia indica)

Street Tree Assessment



SW 34th Avenue - Mahogany (Sweitenia mahagoni) under power lines on right - probably planted in 2009.



SW 13th Terrace - Mahogany (Sweitenia mahagoni) under power lines being pruned in Y formation by FPL

SW 36th Avenue - Solitaire Palms (Ptychosperma elegans) in Round-About

SW 36th Avenue - Small palms and trees on left and large Mahogany on right

SW 11th Street - Between 34th and 35th Avenues - One Gumbo Limbo (Bursera simaruba) and Cabbage palms (Sabal palmetto

SW 11th Street - Between 36th Avenue and 36th Court - Java Plum (Syzygium cumini) - Prohibited species

SW 36th Avenue - Between 8th and 9th Streets - Mahogany (Sweitenia mahagoni)

SW 35th Avenue - Between 12th and 13th Streets - Mahogany (Sweitenia mahagoni)

PARKDALE NORTH

Parkdale North

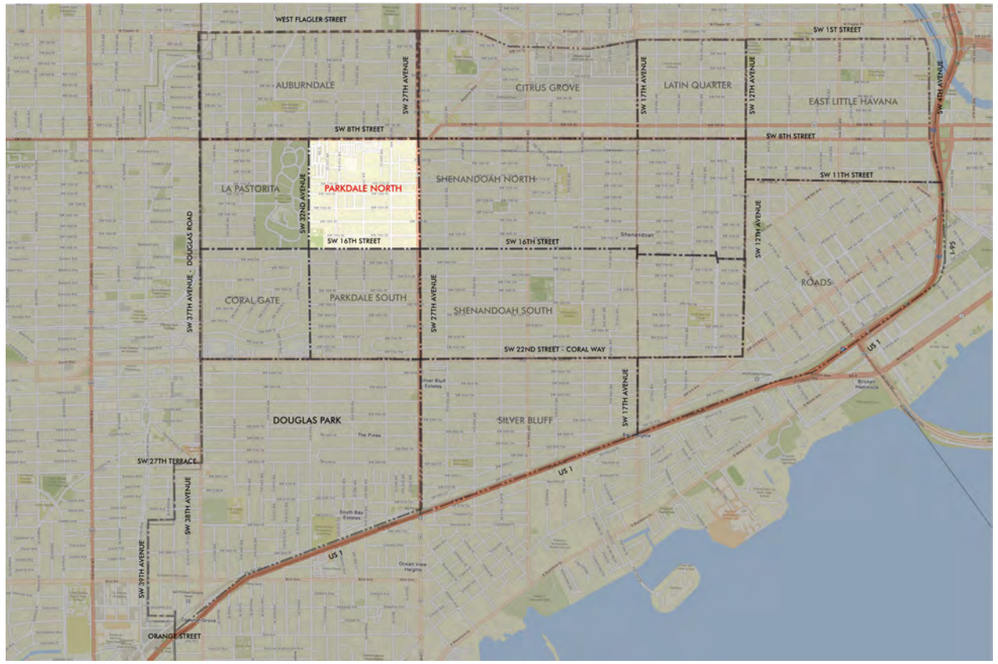


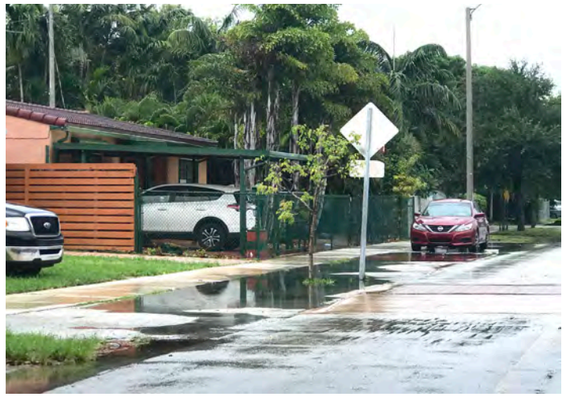
Figure 1: Parkdale North Neighborhood location within Project Limits

Main Takeaways

Parkdale North is primarily single family homes with intermittent duplexes throughout and at the edges, with commercial and business corridors on the North, East and West. There is a large Mobile home park in the NW corner on SW 8th Street. There is a large Home Depot Store on SW 8th Street that is a major hub for contractors in the area. There is a large Public Senior Housing Complex adjacent to the Home Depot. Coral Gate Park is located in the SW corner which includes the Coral Way NET Office for this area. There are several streets that have had speed humps installed and roundabouts at several intersections to slow cut-through traffic.

Figure 2: Aerial of Parkdale North (2018)

Drainage Concerns



Flooded swale with tree at SW 11th Street

Flooded Swale at SW 11th Street

Flooded swale at SW 13th Street

Flooded Swales at SW 11th Street

Flooded Swale SW 12th Street

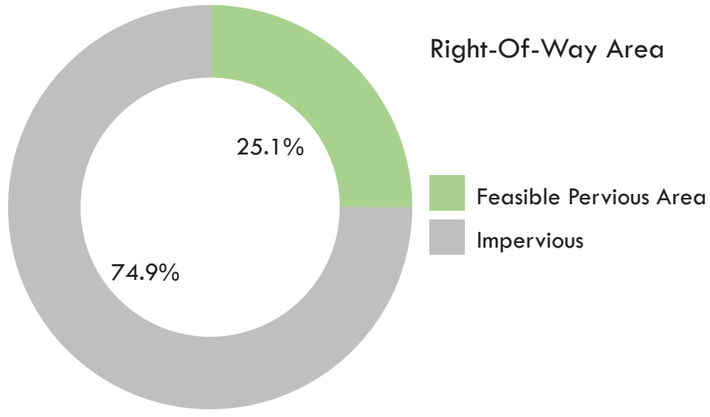
Street Tree Assessment | Species

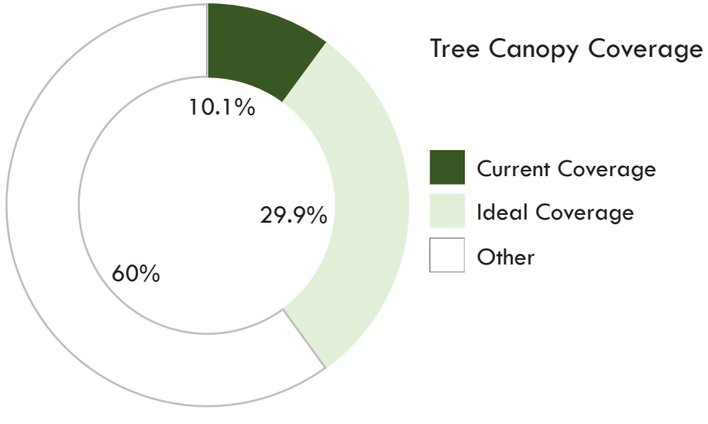
Main Takeaways

- Overall very little street tree canopy with some streets that have multiple palms.
- The northern half of the neighborhood is especially deficient in canopy
- Predominant tree for the neighborhood is Black Olive (Bucida buceras)

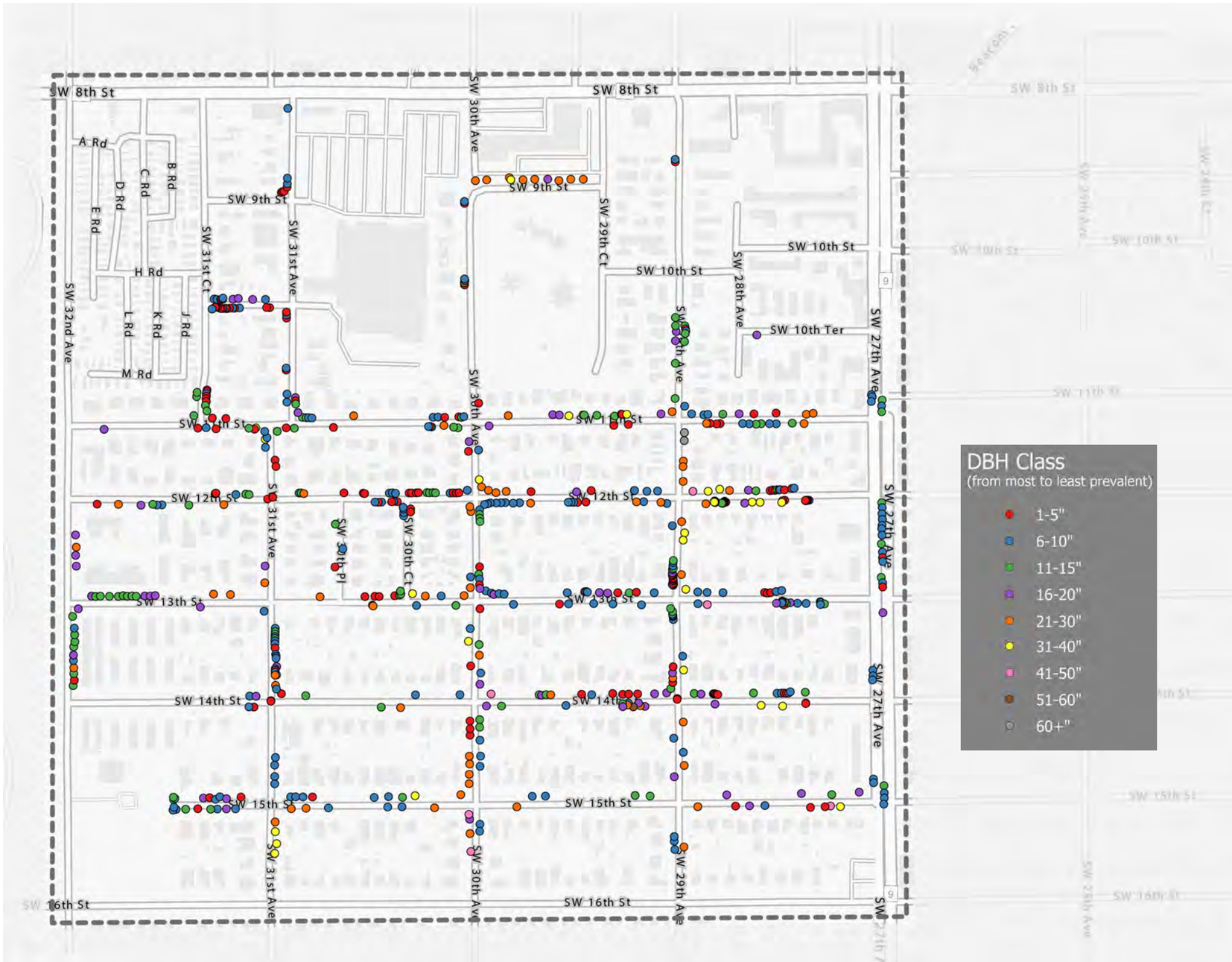
Streets with one predominant species

- SW 13th Street - Pink Tabebuia (Tabebuia heterophylla) and Black Olive (Bucida buceras)





Street Tree Assessment | Size



Main Takeaways

- Majority of trees in this neighborhood fall into smallest DBH classes.
- Row of large mature Black Olive (Bucida buceras) on west segment of SW 9th Street
- Row of young Live Oak (Quercus virginiana) on SW 27th Street, between SW 12th and 13th Street.
- Significant number of mature trees along SW 12th Street, between SW 27th and 29th Avenue.
- Two large mature Black Olive (Bucida buceras) over 60" on Southeast corner of SW 11th street and 29th Avenue intersection.

Street Tree Assessment

SW 13th Street - Pink Tabebuia (Tabebuia heterophylla) on right and Tropical Almond (Terminalia catappa) on left

SW 13th Street - Royal Poinciana (Delonix regia) in front Pink Tabebuia (Tabebuia heterophylla) behind

SW 13th Street - mature Black Olive (Bucida buceras)

SW 14th Street - Left: Royal Palms (Roystonea elata) right: Live Oak (Quercus virginiana)

SW 15th Street - new Jacaranda (Jacaranda mimosifolia) in strange planter

SW 29th Avenue - Royal Poinciana (Delonix regia) on left and Black Olive (Bucida buceras) under power lines on right

SW 30th Avenue - Mature trees left: Mahogany (Swietenia mahagoni) right: Orchid (Bauhinia spp.)

SW 30th Avenue - Mature trees left: Royal Poinciana (Delonix regia) right: Gumbo Limbo (Bursera simaruba)

SW 31st Avenue - Live Oak (Quercus virginiana) under power lines - being V-Cut

SW 31st Avenue - Black Olive (Bucida buceras)

SW 31st Court & SW 8th Street - Mahogany (Swietenia mahagoni) paved up to trunk in concrete

SW 31st Court - No canopy in Mobile Home Park

PARKDALE SOUTH

Parkdale South

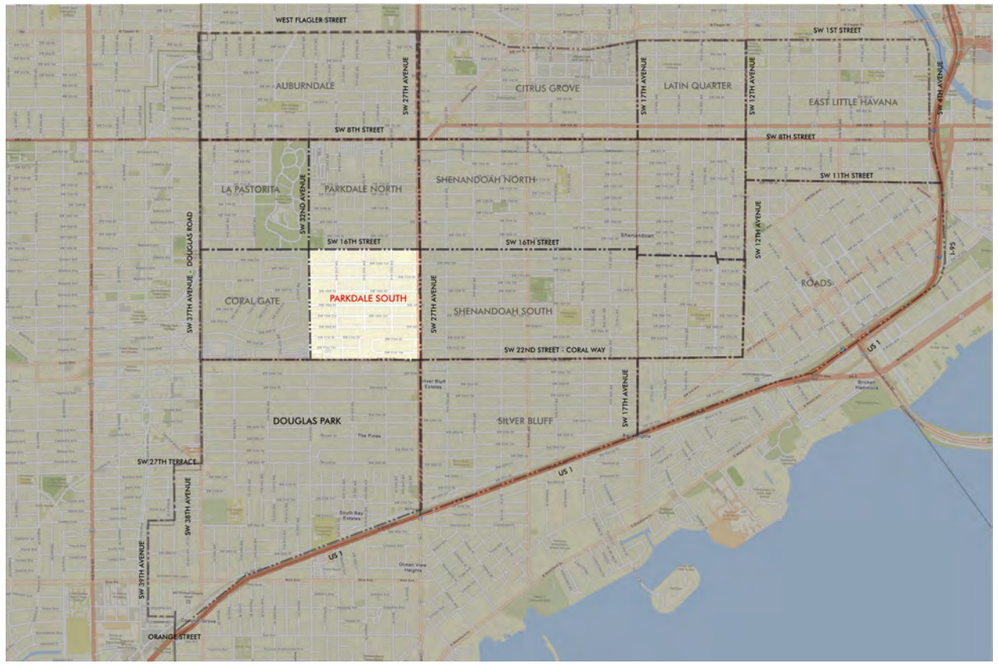


Figure 1: Parkdale South Neighborhood location within Project Limits

Main Takeaways

Parkdale South is primarily residential with Single Family homes in the southern portion and Duplexes in the northern half. There are Commercial corridors on the South (Coral Way) and the East (SW 27th Avenue). The Single Family home areas have more canopy on the private property, and more available green space in the swale areas, with less cars using the swales for parking. There are streets where the swales have been paved with porous asphalt, which appears to have been done by the City, but we were unable to obtain details regarding this. The existing trees in the swales are predominantly palm trees.

Figure 2: Aerial of Parkdale South (2018)

N

Drainage Concerns

Pooling Water at SW 13th Street

Flooded Swale at SW 12th Street

Porous Asphalt installation on SW 19th Terrace - seen in several locations in this neighborhood

Flooded Sidewalk on SW 17th Street

Flooded Swale at SW 11th Street

Sunny day pooled water in Swale SW 13th Street

Curbs on SW 20th Street - appear to be only in some places

Curbs and porous asphalt - only at this house - SW 20th Street

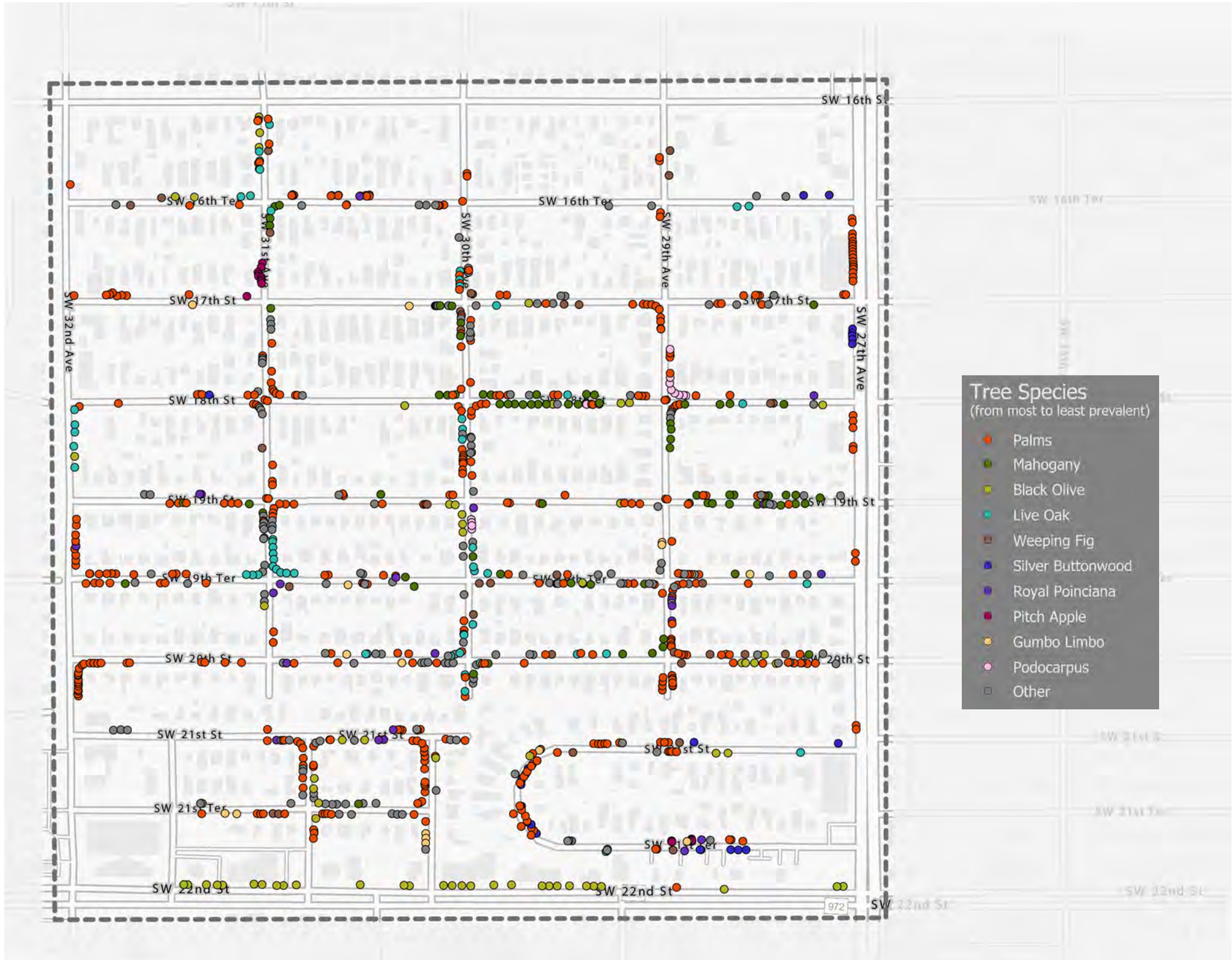
House with completely paved frontage and standing water in driveway on SW 21st Street

Completely paved swale with standing water on SW 21st Terrace near SW 27th Avenue

Standing water in road on SW 16th Terrace

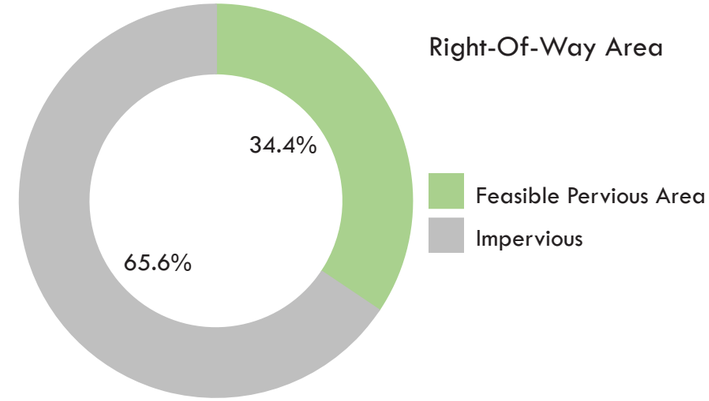
Completely paved frontage, showing elevation change typical of houses in this area - porous asphalt in front

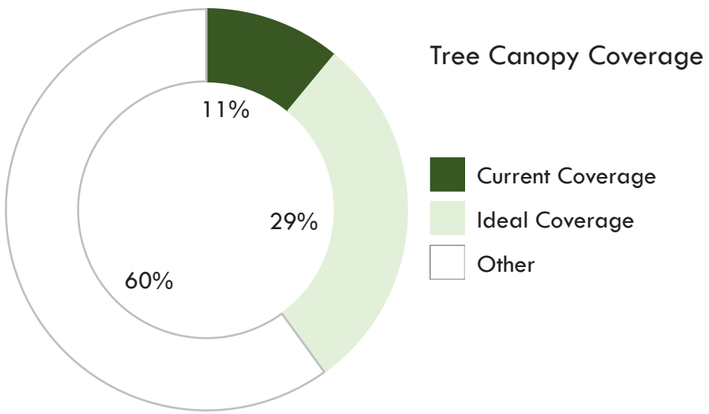
Street Tree Assessment | Species



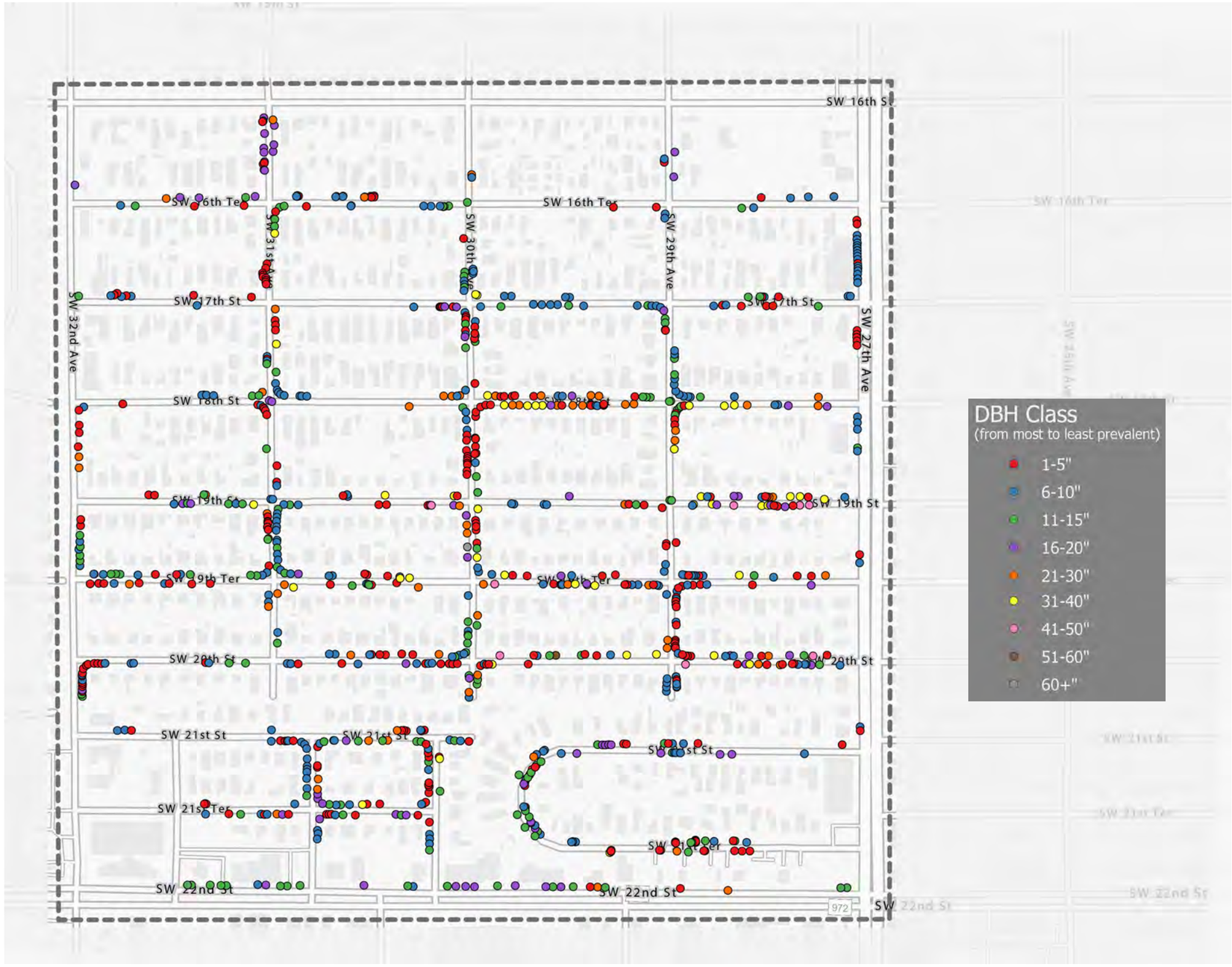
Main Takeaways

- Predominantly palms
- A few portions of streets have mature Mahogany trees (Swietenia mahagoni)
- Most of the canopy in this neighborhood is in the southern portion
- SW 16th Street - The Golden Shower trees do not continue in this neighborhood





Street Tree Assessment | Size



Main Takeaways

- Majority of trees in this neighborhood fall into smallest DBH classes.
- Significant number of large mature trees along Eastern portions of SW 18th and 19th Street.
- Large number of mature Black Olive along SW 22nd Street.
- Row of young Live Oak (Quercus virginiana) along East side of SW 31st Avenue, between SW 19th Street and Terrace.

Street Tree Assessment

SW 19th Street between SW 29th - SW 27th Avenues - mature Mahogany trees (Swietenia mahagoni)

SW 18th Street between SW 30th - SW 29th Avenues - mature Mahogany trees (Swietenia mahagoni)

SW 30th Avenue near SW 19th Street - mature Black Olive (Bucida buceras) and Royal Poinciana (Delonix regia)

SW 30th Avenue no outlet at south end - mature Live oaks(Quercus virginiana) and Mahogany (Swietenia mahagoni)

SW 30th Court - mature Black Olive (Bucida buceras) under power lines - being V-Cut

SW 29th Avenue - mature Mahogany (Swietenia mahagoni) under power lines - running through canopy

SW 27th Avenue - new plantings in median - Thrinax radiata, Sabal palmetto, Pinus elliottii, Quercus virginiana

Typical roundabout planting - Multi-trunk Christmas Palms (Adonidia merrillii)

CORAL GATE

Coral Gate

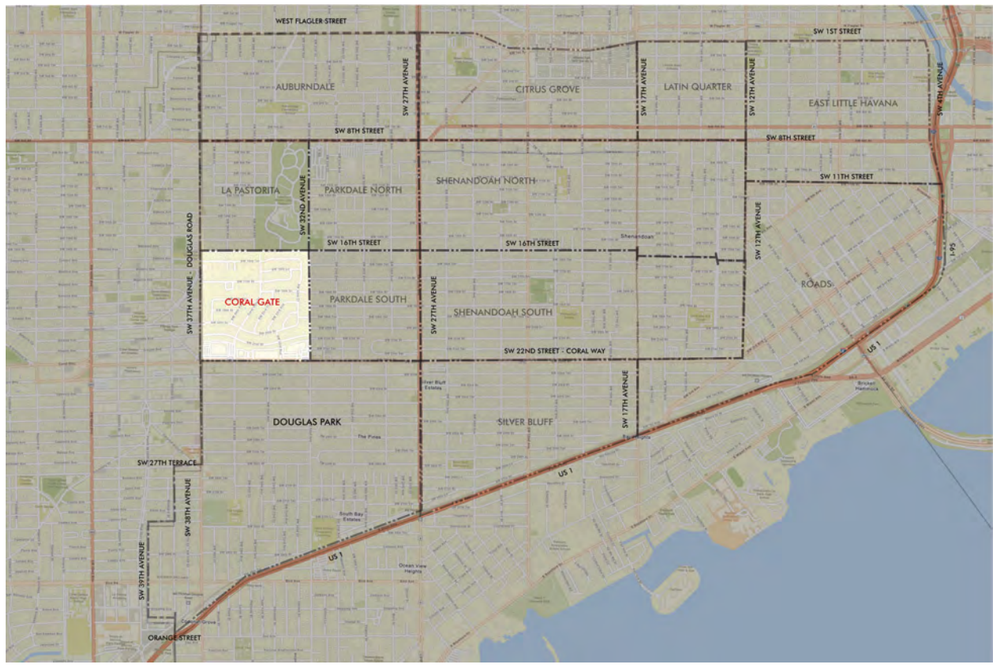


Figure 1: Coral Gate Neighborhood location within Project Limits

Main Takeaways

Coral Gate is primarily residential Single Family homes with some Duplexes in the northern block and with major commercial use on the southern edge along Coral Way and minor businesses along the western edge on SW 37th Avenue. Coral Gate has limited access points to enter the Community: There are three streets on the western edge from SW 37th Avenue where you can enter; SW 20th Street, SW 17th Street, and SW 16th Terrace. There is only one other entry point which is on the southern edge at Coral Gate Drive. All streets on the eastern and northern boundaries are closed to traffic from SW 32nd Avenue and SW 16th Street. Coral Gate Drive and SW 20th Street are also blocked at their intersection to deter drive through traffic. Due to the limited access and the curving streets that are not on the Miami grid, there is relatively little drive through traffic in this neighborhood. The streets are generally wider with 60 foot Right-of-Ways, with very little evidence of parking in the swales. There are a number of trees in this neighborhood, both in the swales and on private properties. A number of new Oak trees were recently planted by the City of Miami in the swales.

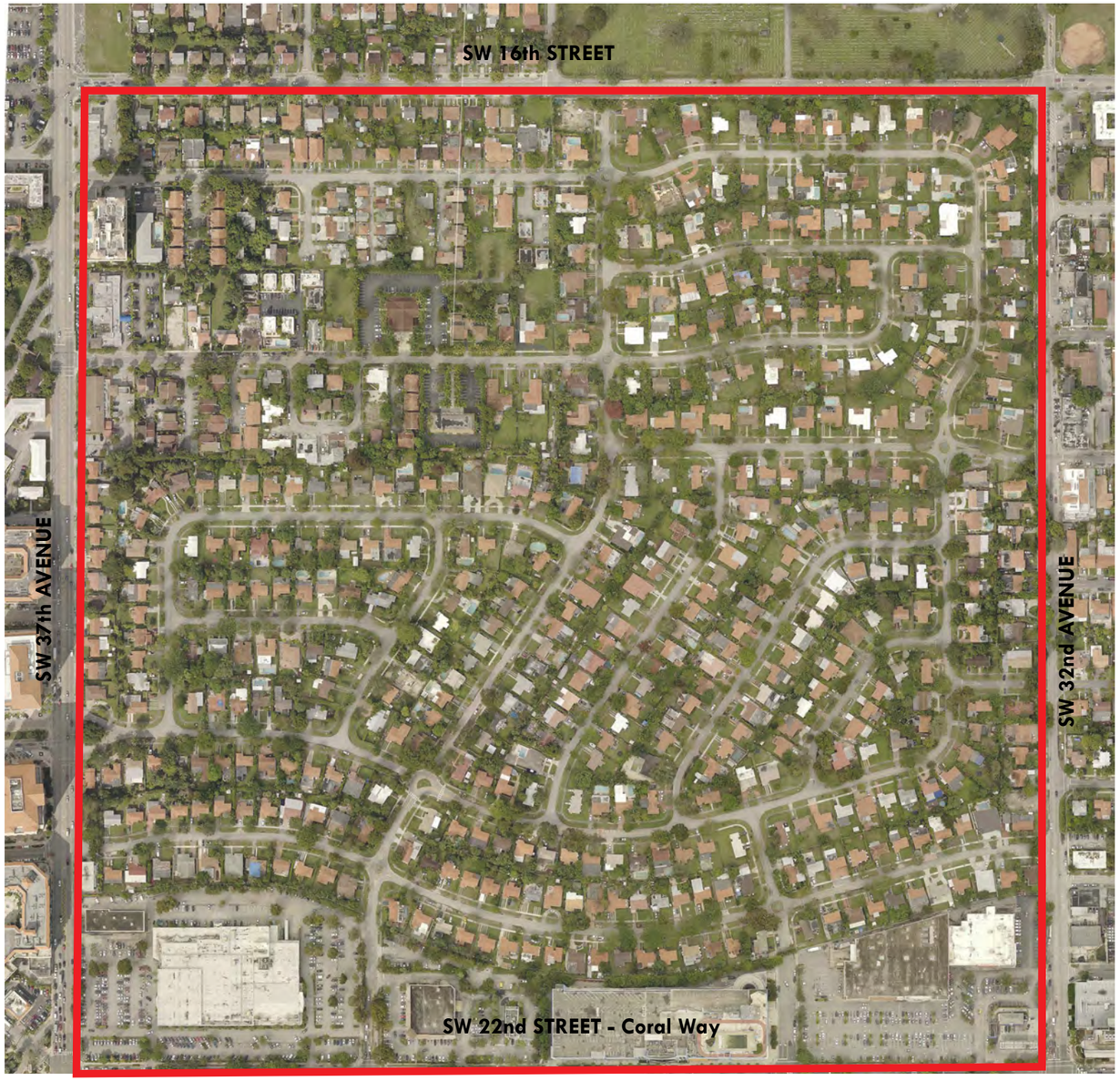


Figure 2: Aerial of Coral Gate (2018)

N

Drainage Concerns

Flooded swale along Coral Gate Drive

Flooded driveway along SW 36th Avenue

Flooded corner at SW 18 Terrace and SW 36th Avenue

Flooded on-street parking on SW 33rd Avenue

Flooding along street at SW 16 Terrace and Coral Gate Drive

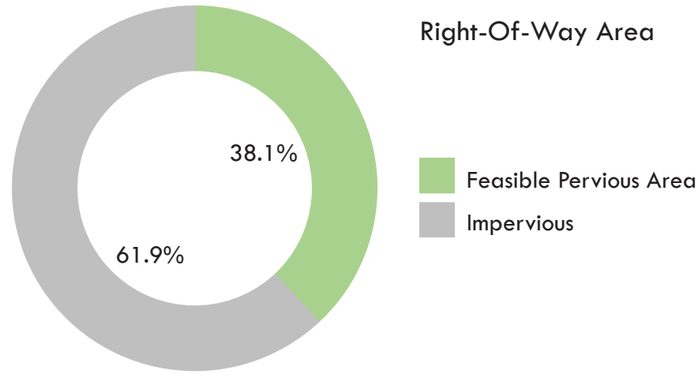
Flooding along street at SW 17th Street and SW 35th Court

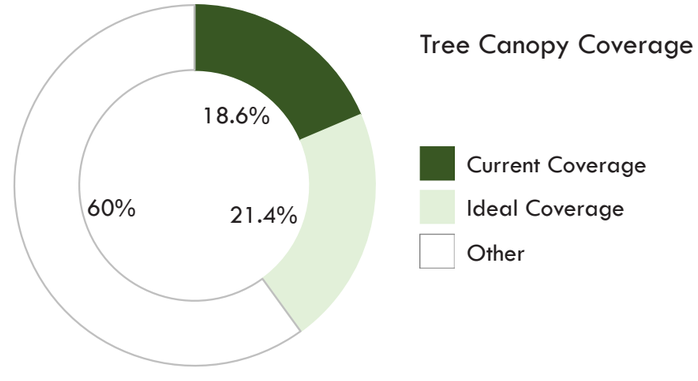
Flooded street at SW 20th Street and Coral Gate Drive

Street Tree Assessment

Main Takeaways

- Predominant tree for the neighborhood is Live Oak (Quercus virginia) whose numbers were heavily boosted with new plantings.
- New plantings of trees, mainly oaks, are throughout the neighborhood with an exception along SW 17th Street, west of Coral Gate Drive.
- Predominant trees for specific streets include:
  - SW 16th Street - Golden Shower Tree (Cassia fistula)
  - SW 32nd Avenue - Royal Poinciana (Delonix regia) and Black Olives (Bucida buceras)



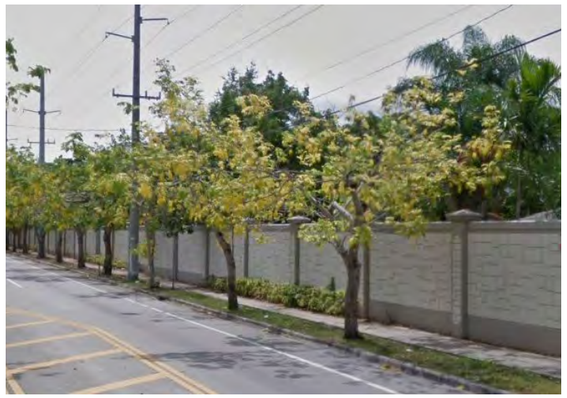


Street Tree Assessment

Main Takeaways

- Significant number of small trees throughout the neighborhood, largely new plantings.
- Large number of young Live Oak (Quercus virginia) thoughout the neighborhood mostly new plantings complemeting existing, larger oaks.
- Significant number of young Golden Shower Tree (Cassia fistula) trees along SW 16th Street newly planted to complement the older existing trees along the corridor.

Street Tree Assessment



SW 16th Street between SW 34th Avenue and SW 12th Street - Golden Shower trees (Cassia fistula)

SW 32nd Avenue between SW 16th - SW 17th Streets - mature Royal Poinciana trees (Delonix regia)

SW 16th Terrace near Coral Gate Drive - newly planted Live Oak (Quercus virginia)

SW 17th Street - Heavily pruned Mahogany (Sweitenia mahagoni) trees below overhead utilities

SW 20th Street - mature Live Oak (Quercus virginia)

SW 33rd Avenue - mature Mahogany (Sweitenia mahagoni)

SW 18th Avenue - Crepe Mrytle (Lagerstroemia indica) within swale with vehicles parking in close proximity

Coral Gate Drive - Roundabout with Bismark palms typical. Large canopy trees.

DOUGLAS PARK

Douglas Park

Figure 1: Douglas Park Neighborhood location within Project Limits

Main Takeaways

The Douglas Park neighborhood is bisected by SW 32nd Avenue, and has a dense commercial/Industrial area in its southwest corner. The neighborhood is primarily Residential with predominantly Duplex and Townhouse use. There are two major recreational spaces within the neighborhood (Douglas Park (Public) and Mater Grove Academy (Private)).
The northern boundary is Historic Coral Way and is lined with commercial and dense High-rise residential. There are additional high-rise residential along the major thouroughfares of SW 27th Avenue, SW 37th Avenue, US 1, and SW 40th Street (Bird Road). The southern boundary is the Metrorail and US 1. There are two metrorail stations within the neighborhood: Coconut Grove Station at SW 27th Avenue, and Douglas Station at SW 37th Avenue. Major development is currently underway at both of these locations to build high density residential.

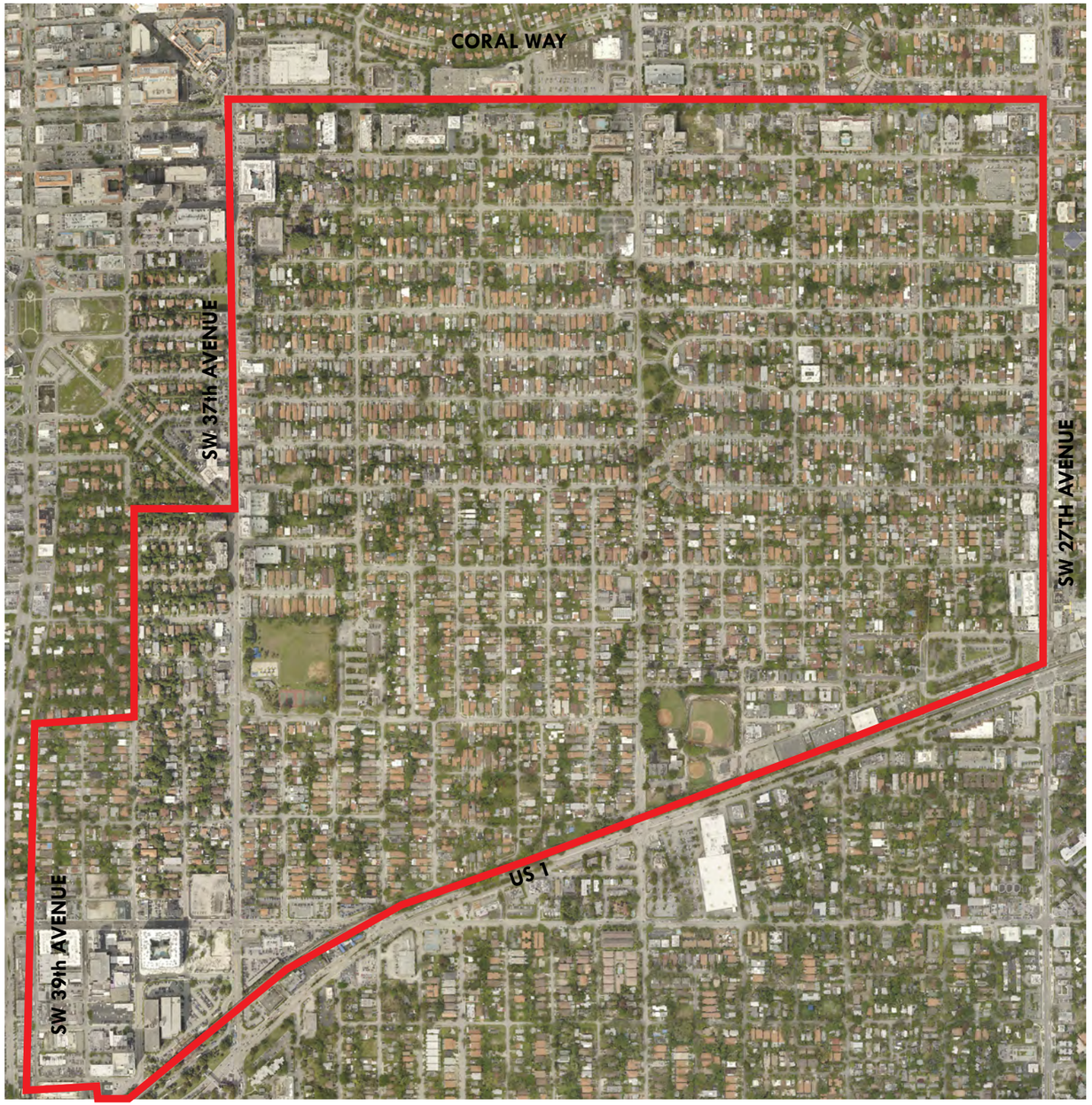


Figure 2: Aerial of Douglas Park (2018)

Drainage Concerns

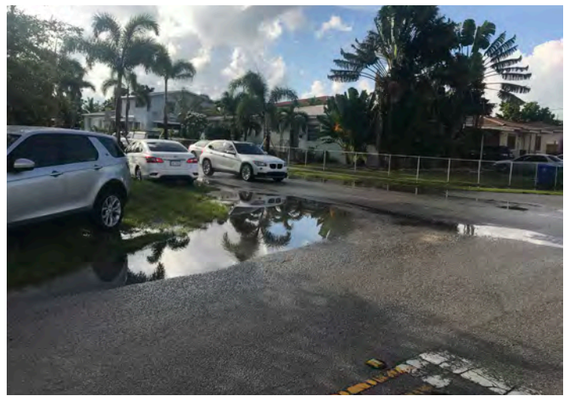
Flooded Swale at SW 26th Street & SW 34th Ave

Flooded Swale at SW 26th Street near SW 34th Ave

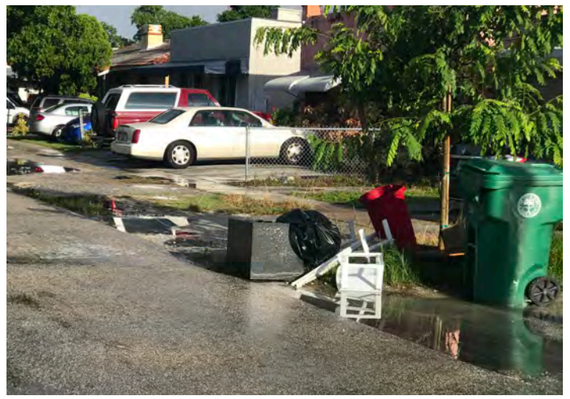
Flooded Swale at SW 34th Ave near SW 28th St.

Flooded Swale at SW 34th Ave near SW 28th St.

Flooded Swales at SW 27th Street near SW 33rd Ct

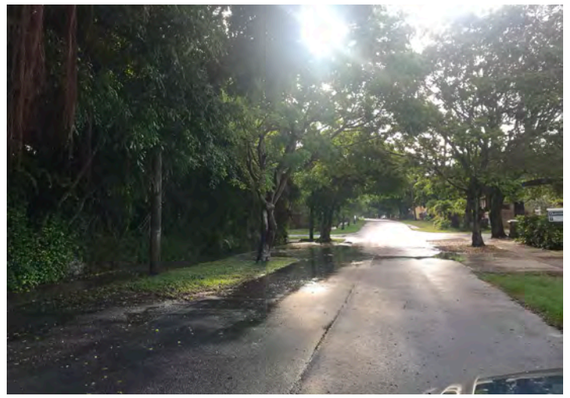


Flooded Swale at SW 33rd Avenue near SW 27th Terr.



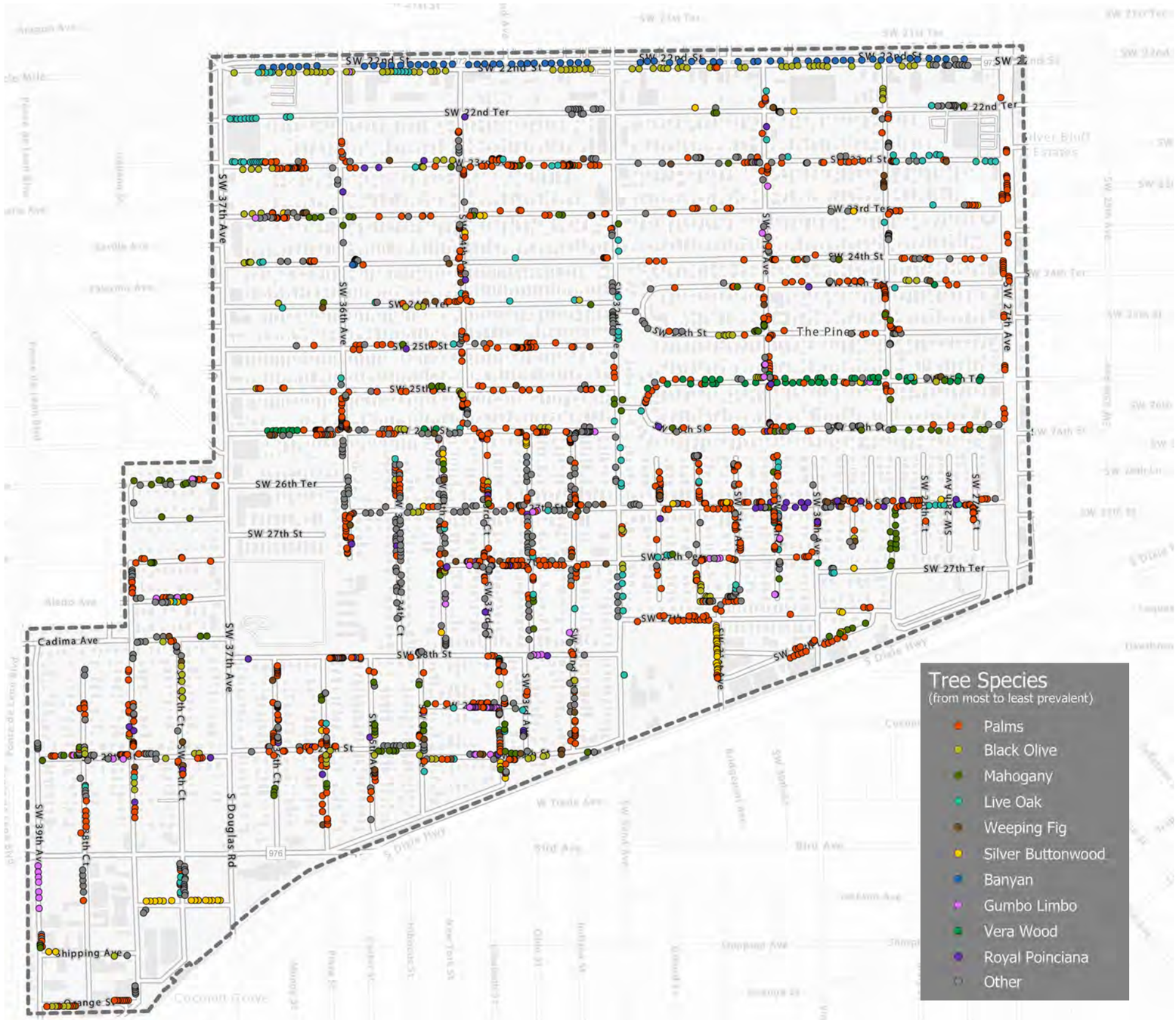
Flooded Swale at SW 26th Street near SW 34th Ave

Flooded Swales at SW 36th Avenue



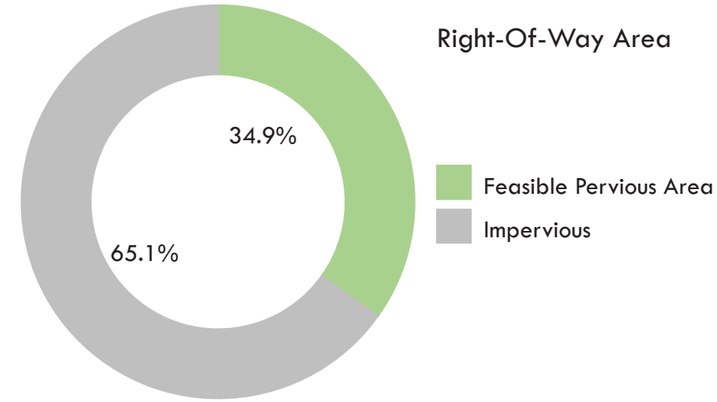
Flooded Swale at SW 29th St near SW 33rd Ct.

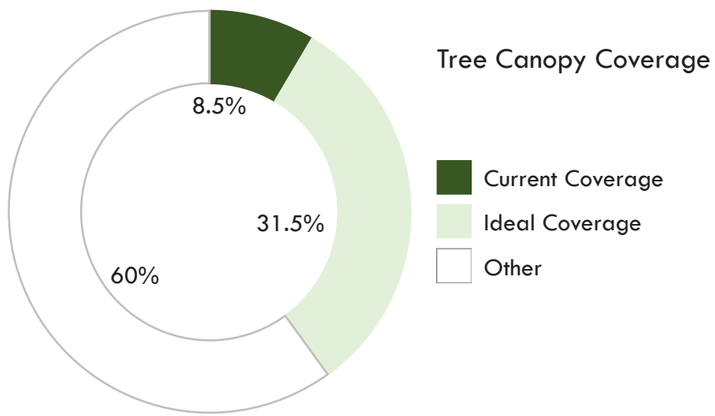
Street Tree Assessment | Species



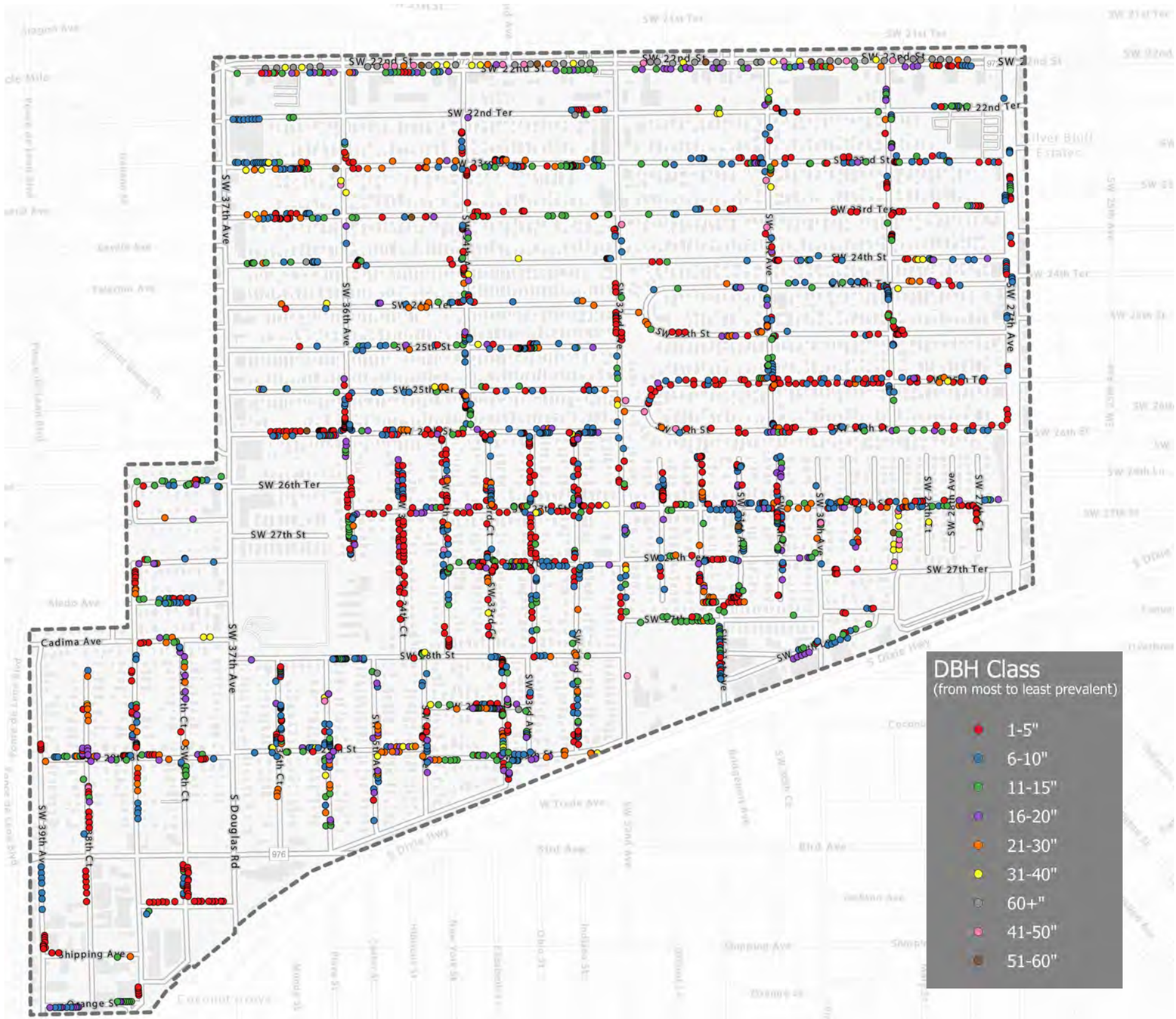
Main Takeaways

- Predominantly Palm trees
- Recent new plantings of trees in the southwest part of the neighborhood.
- Predominant tree for the neighborhood is Mahogany (Sweitenia mahagoni), although Black Olive (Bucida buceras) lists first this is because of the large number of them along Coral Way.
- Streets with one predominant species
  - SW 25th Terrace - Verawood (Bulnesia arborea)
  - SW 22nd Street - Banyan (Ficus benghalensis) in median and Black Olive (Bucida buceras) in swale.





Street Tree Assessment | Size



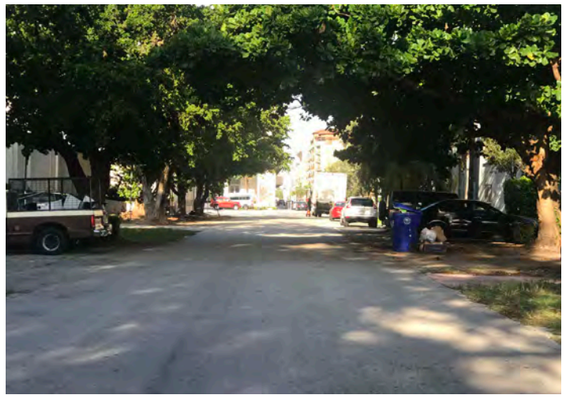
Main Takeaways

- Significant number of small trees South of SW 25th Street.
- Significant number of mature trees North of SW 25th Street.
- Large number of mature Banyan (Ficus benghalensis) and Black Olive (Bucida buceras) trees along SW 22nd Street.
- Significant number of young Black Olive (Bucida buceras) trees along SW 25th Terrace.
- Newly planted row of Silver Buttonwood (Conocarpus erectus) along Southern segment of SW 31st Street.

Street Tree Assessment

SW 35th Avenue - Mature Royal Poinciana (Delonix regia)

Mature Mahogany trees along SW 29th Avenue between SW 27th Street & SW 27th Terrace



SW 23rd Street near SW 37th Avenue - mature Black Olive Trees (Bucida buceras)

SW 23rd Street near SW 36th Avenue - mature Australian PineTree (Casaurina equisetifolia)

SW 24th Street near SW 37th Avenue - Specimen Kapok Tree (Ceiba pentandra)

SW 27th Terrace - Mature Mahogany Trees (Swetenia mahagoni)

SW 24th Terrace - Looking East at SW 32nd Avenue - Specimen Mahogany tree (Swetenia mahagoni)

SW 28th Street - Looking East at SW 37th Avenue. Specimen Mahogany (Swetenia mahagoni) under electric lines being trimmed in Y formation

Street Tree Assessment

SW 28th Terrace - Looking East. mature Gumbo Limbo Trees (bursera simaruba)

SW 29th Street - Looking East near SW 36th Avenue. Mature Mahogany Trees (Swetenia mahagoni)

New Foxtail Palms on SW 27th Terrace west of SW 32nd Avenue

SW 26th Street near SW 36th Ave. new Apple Blossom Tree (Cassia javanica)

New tree plantings on SW 26th St. near SW 34th Avenue

New tree plantings on SW 34th Ct. near SW 27th Street

New Mahogany (Sweitenia mahagoni) planted under power lines on SW 27th Terrace

New Mahogany (Sweitenia mahagoni) planted under power lines on SW 34th Avenue

CITRUS GROVE

Citrus Grove

Figure 1: Citrus Grove Neighborhood location within Project Limits

Main Takeaways

The Citrus Grove neighborhood is characteristically divided by SW 22nd Avenue. To the East, the neighborhood is zoned as T4-General Urban and used primarily as multifamily residential. Streets in this portion generally lack swales and, subsequently, street trees as well. To the West, the neighborhood is primarily zoned as T3-Suburban and is composed mostly of single family homes. In this portion, approximately 30 acres are devoted to Miami Senior High school and Miami-Dade Interamerican Campus. SW 8th Street and 22nd Avenue, make up the main commercial corridors in this neighborhood.

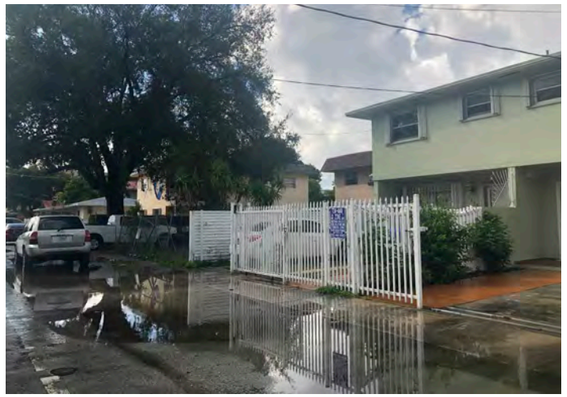
Figure 2: Aerial of Citrus Grove (2016)

N

Drainage Concerns

Flooded driveway at 4th street and 18th Avenue

Standing water on compacted dirt swale at 4th street and 21st avenue



Flooded driveway and on-street parking on 4th street

Flooded sidewalk on 4th street

Street Tree Assessment | Species

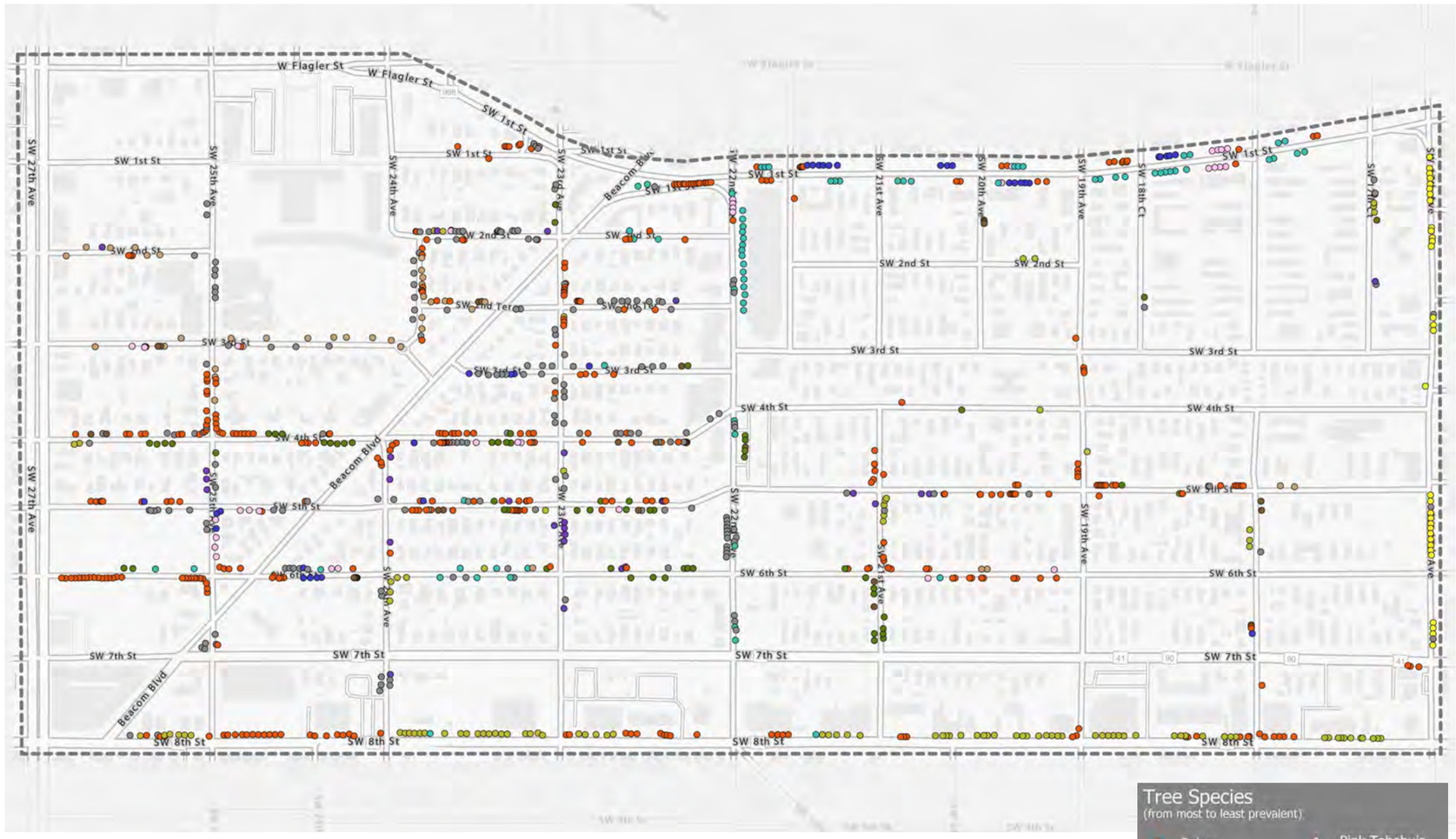
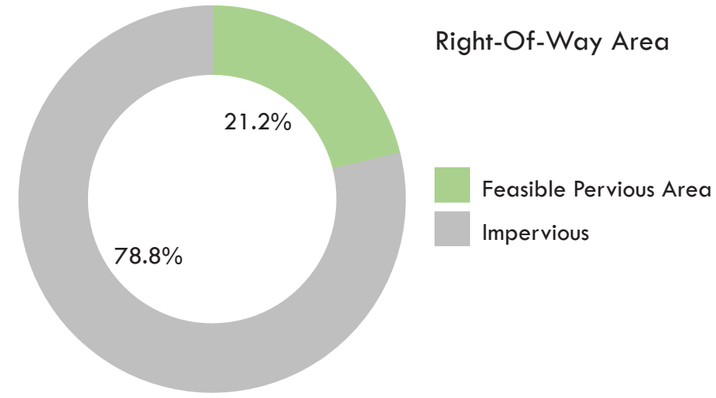
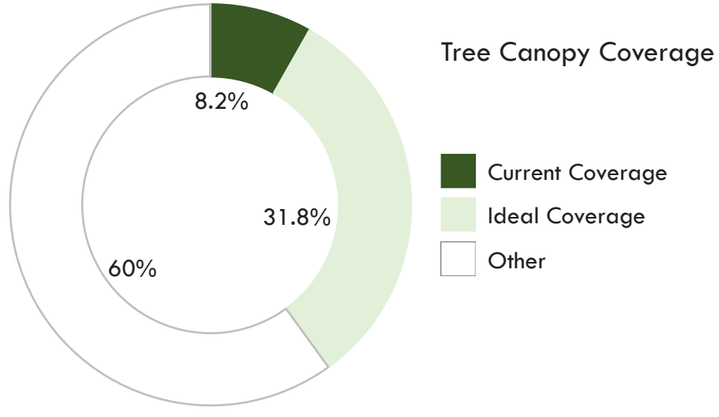


Figure 3. Citrus Grove Tree Species Inventory

Main Takeaways

- No street tree canopy on 27th Avenue and Beacom Boulevard.
- Overall lack of canopy in NE corner of neighborhood.
- Predominant tree for the neighborhood is Black Olive (Bucida buceras)
- Predominant palm for the neighborhood is Christmas Palm (Adonidia merrillii)
- Streets with one predominant species:
- SW 1st Street - Live Oak (Quercus virginiana)
- SW 4th Street - Christmas Palm (Adonidia merrillii)
- SW 8th Street - Black Olive (Bucida buceras)
- SW 17th Avenue - Pigeon Plum (Coccoloba diversifolia)





Street Tree Assessment | Size

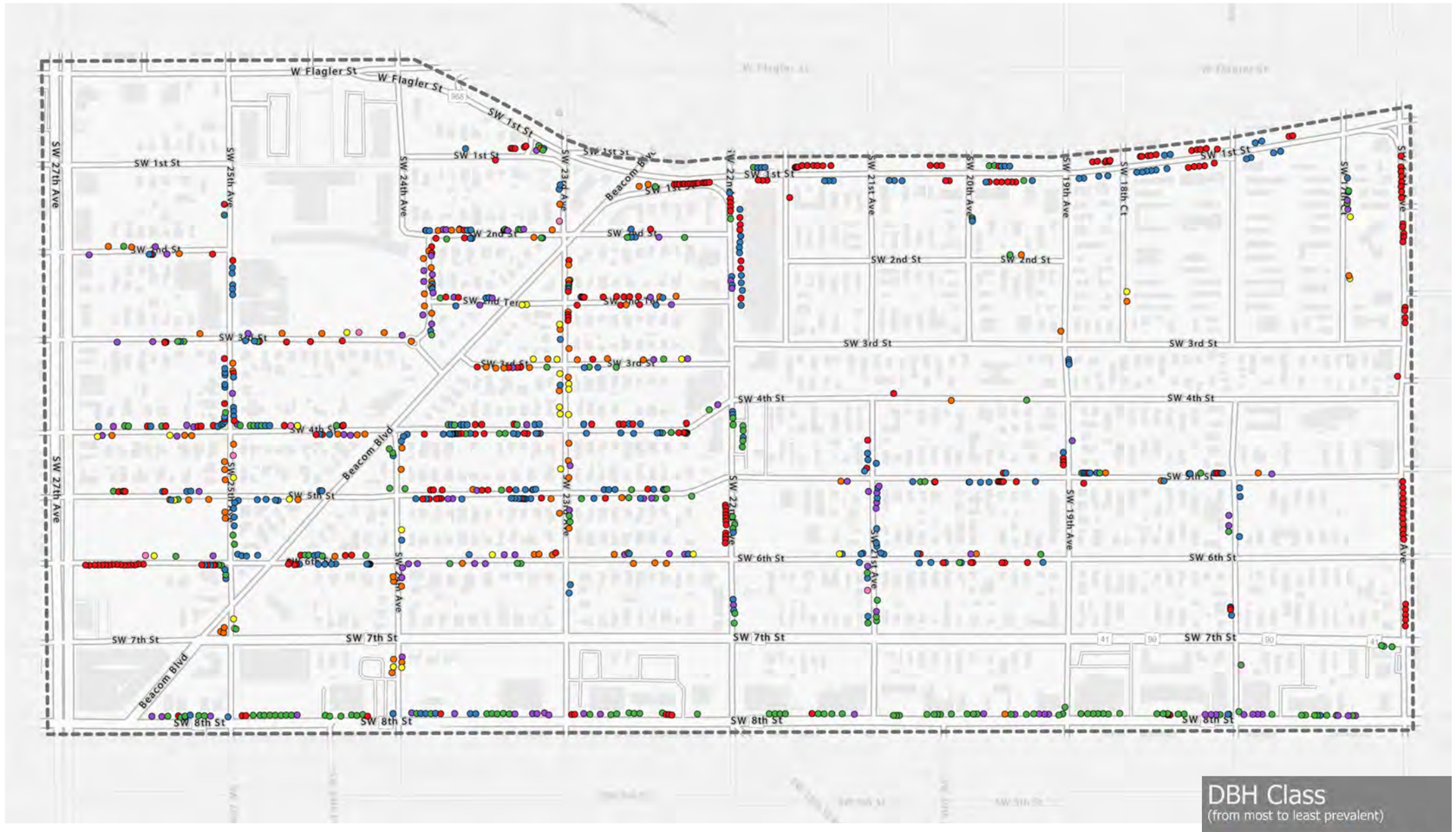


Figure 4. Citrus Grove Tree DBH Inventory

Main Takeaways

- Large number of mature Black Olives (Bucida buceras) along SW 8th Street
- Newly planted Pigeon Plums (Coccoloba diversifolia) along SW 17th Avenue
- Newly planted Live Oaks (Quercus virginiana) along North end of SW 22nd Avenue
- Newly planted Crape Myrtle (Lagerstroemia indica) and Live Oak (Quercus virginiana) along SW 1st Street.
- Significant number of mature trees along SW 23rd and 25th Avenue.
- No trees above 50”

Street Tree Assessment

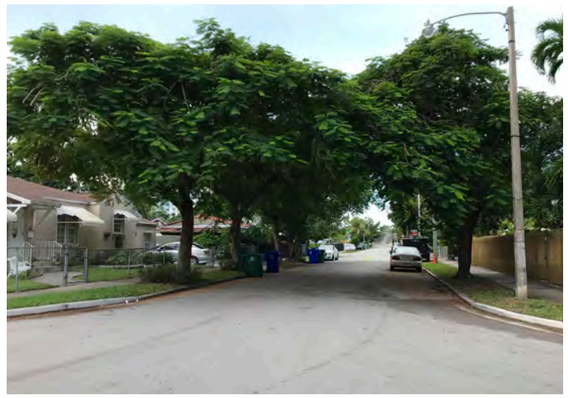
SW 25th Avenue and 5th Street - Horseflesh Mahogany (Lysiloma sabicu) with utility line conflict on right, Crape Myrtle (Lagerstroemia indica) and Pink Trumpet Tree (Tabebuia heterophylla) on left.

SW 3rd Street and 23rd Avenue - Dense cluster of Yellow Poinciana (Peltophorum pterocarpum)

SW 24th Avenue and 3rd Street - Java Bishopwood (Bischofia javanica) on left and Tamarind (Tamarindus indica) on right pruned in V-shape.

SW 2nd Street - Black Olive (Bucida buceras)

SW 4th Street and Beacom Boulevard - Golden Shower (Cassia fistula) on left and Mahogany (Swietenia mahagoni) on right conflicting with utility lines



SW 23rd Avenue and 5th Street - Dense cluster of Royal Poinciana (Delonix regia)

SW 5th Street - Australian Pine (Casuarina equisetifolia) prohibited species

SW 6th Street - Coconut Palm (Cocos nucifera) and Mahogany (Swietenia mahagoni)

Street Tree Assessment

SW 8th Street - Black Olive Trees (Bucida buceras)

SW 8th Street - Royal Palm Trees (Roystonea regia)

SW 18th Avenue - Weeping Fig (Ficus benjamina)

SW 18th Court - Gumbo Limbo (Bursera simaruba) and Mahogany (Swietenia mahagoni)

SW 17th Avenue - Newly planted Pigeon Plums (Coccoloba diversifolia)

SW 17th Court - Mahogany (Swietenia mahagoni) and Black Olive (Bucida buceras)

SW 19th Avenue - Black Olive (Bucida buceras) conflicting with power lines.

SW 21st Avenue - Weeping Fig (Ficus benjamina) conflicting with power lines

SHENANDOAH NORTH

Shenandoah North

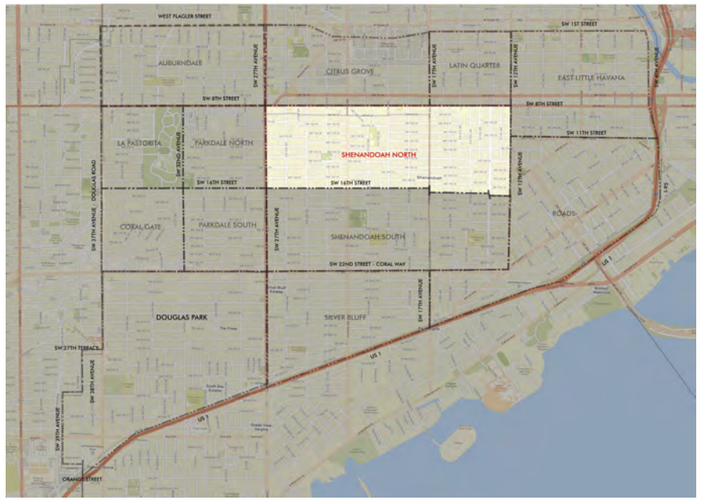


Figure 1: Shenandoah North Neighborhood location within Project Limits

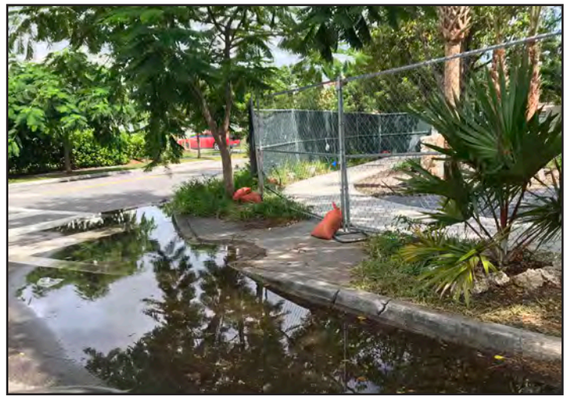
Main Takeaways

Shenandoah North is approximately 510 acres with SW 8th and SW 16th Street as the northern and southern borders respectively. The neighborhood is bordered on the West side by SW 27th Avenue and East by SW 12th Avenue. A primarily residential neighborhood, Shenandoah North has single-family residential mixed with duplexes, town homes and multi-family interspersed throughout. SW 8th Street is the primary commercial corridor with SW 27th Avenue being primarily office space. The neighborhood has one central park, being Bryan Park on SW 12th Street, as well as the Cuban Memorial Boulevard Park along SW 13th Street. There are four schools and three religious institutions throughout the neighborhood varying between private and public institutions.

Figure 2: Aerial of Shenandoah (2018)

Drainage Concerns

Flooded median at SW 20th Avenue & SW 10th Street



Flooded Swale at SW 21st Avenue & SW 13th Street

Flooded Swales at SW 19th Avenue & SW 9th Street

Flooded Swale at SW 19th Avenue & SW 9th Street

Flooded Swales at SW 10th Street Road & SW 9th Street

Street Tree Assessment | Species

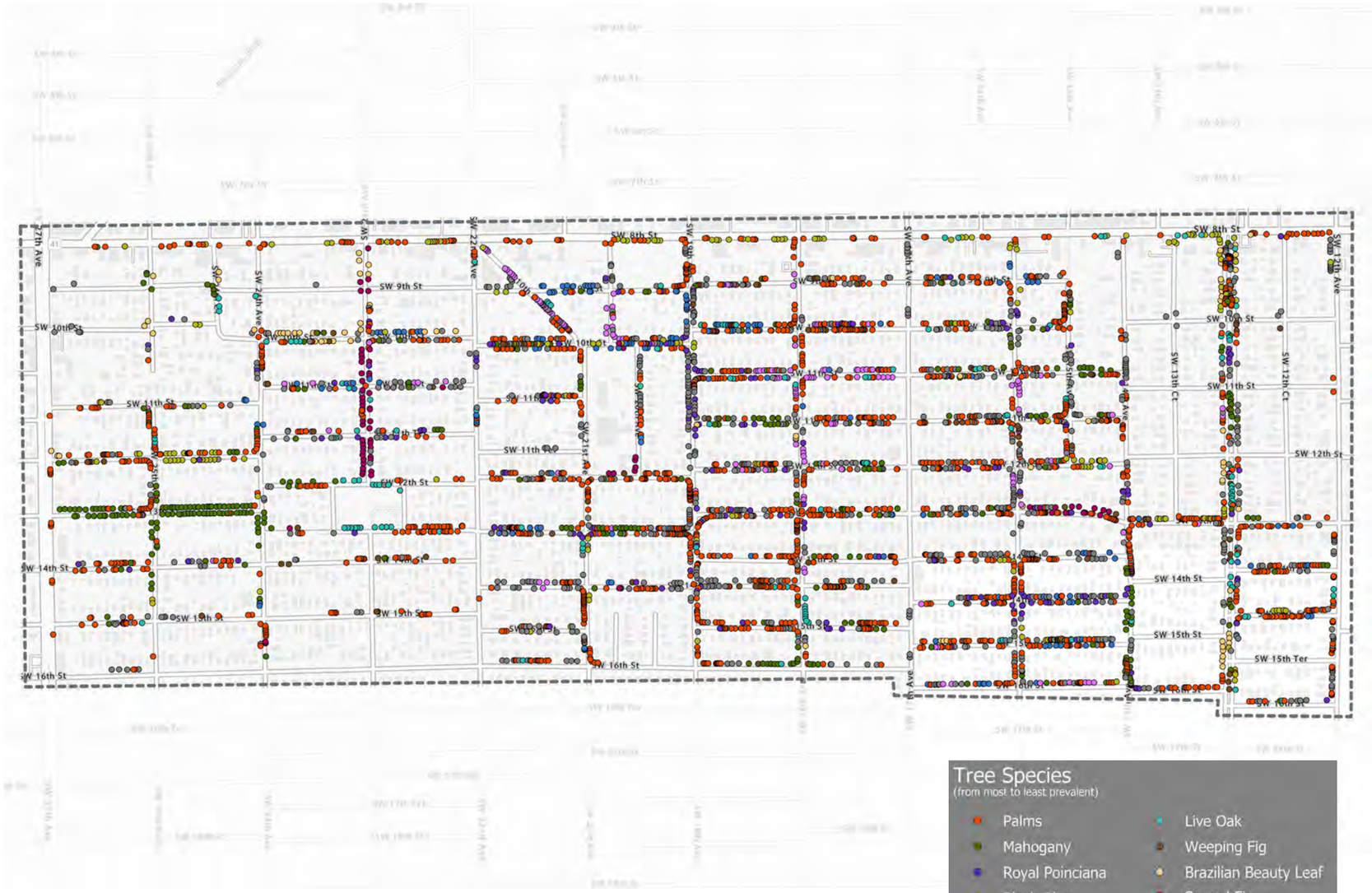
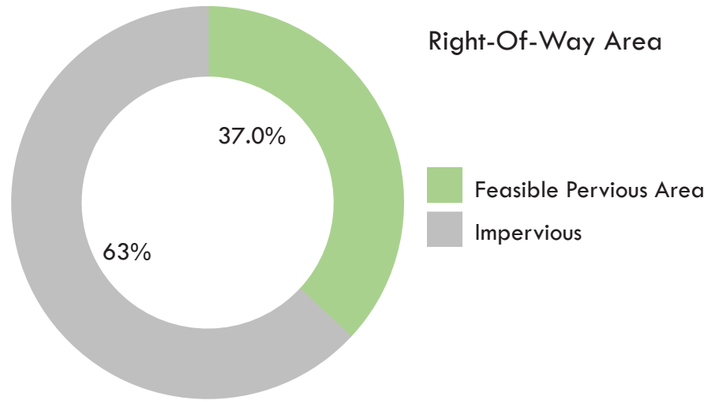
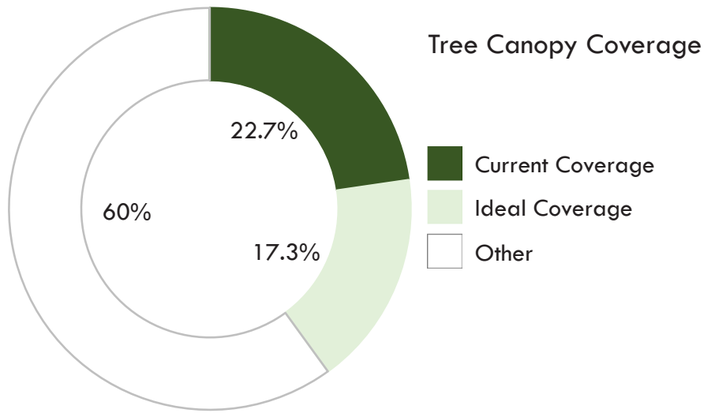


Figure 3. Shenandoah North Tree Species Inventory

Main Takeaways

- Higher canopy coverage throughout the majority of the neighborhood except in the eastern portion of the neighborhood outside of SW 13th Ave and North and South-west corners.
- Predominant tree for the neighborhood is Mahogany (Sweitenia mahagoni)
- Streets with one predominant species
- SW 23rd Avenue - Sacred Fig (Ficus religiosa)
- SW 13th Street - Mahogany (Sweitenia mahagoni)





Street Tree Assessment | Size

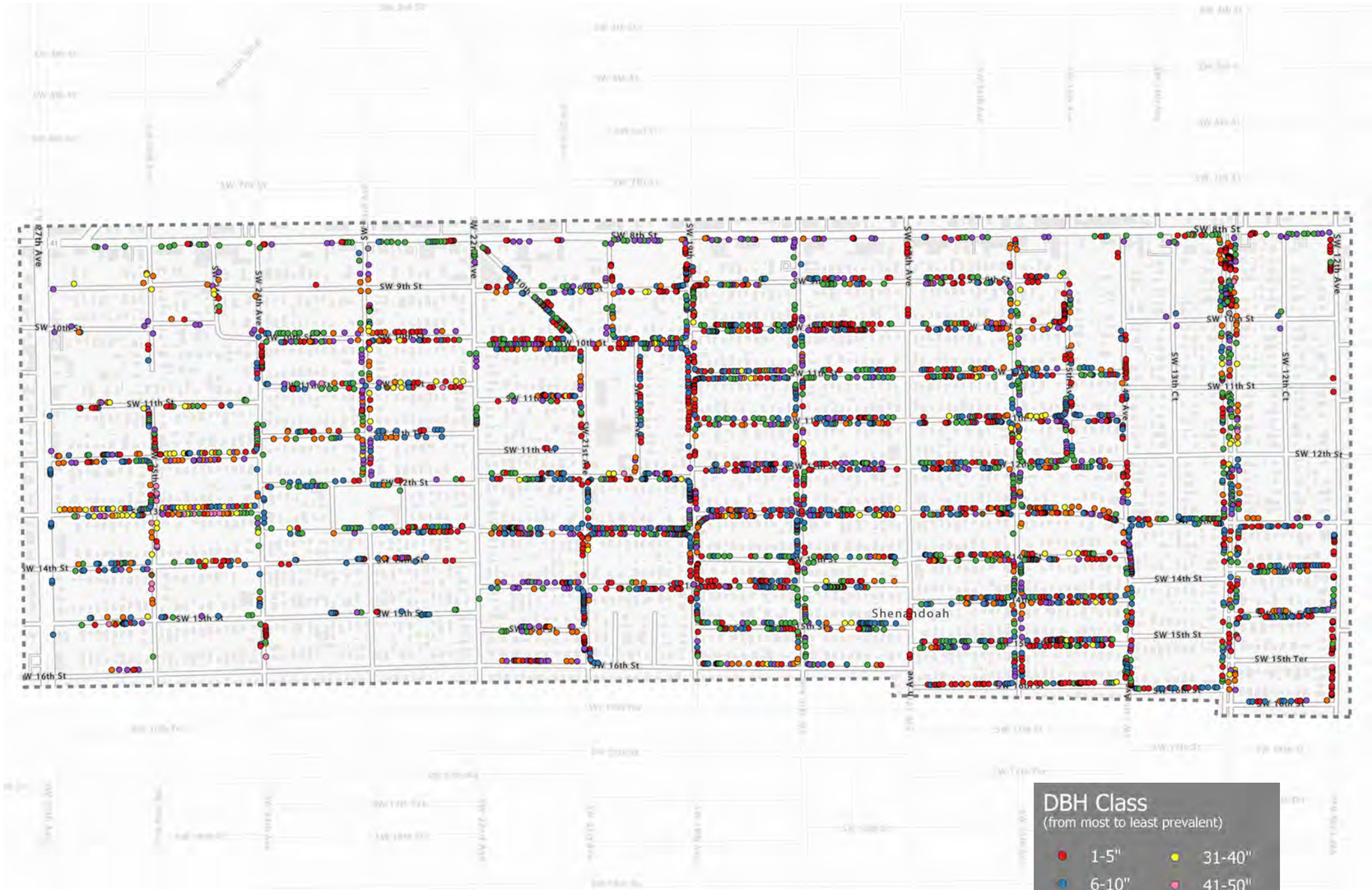


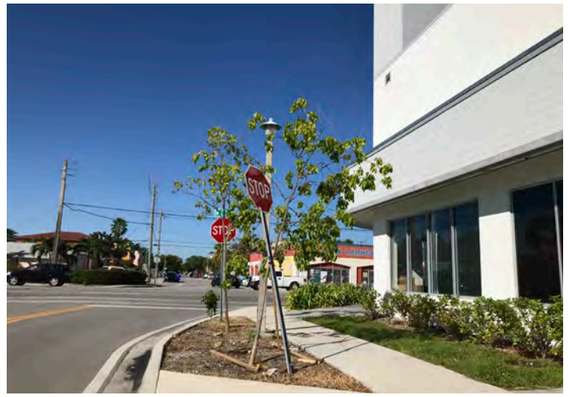
Figure 4. Shenandoah North Tree DBH Inventory

Main Takeaways

- Majority of trees in this neighborhood fall into smallest DBH classes
- Significant number of large mature Mahogany (Swietenia mahagoni) along SW 13th Street, between SW 24th and 27th Avenue.
- Row of large mature Mahogany (Swietenia mahagoni) along SW 11th Terrace, between SW 15th and 16th Avneue.
- Significant number of large trees along SW 13th Avenue.
- Notably large Kapok (Ceiba pentandra) on Northern corner of SW 13th Avenue
- Large number of small trees clustered along SW 19th Avenue.

Street Tree Assessment

SW 9th Street near 19th Avenue - Live Oak (Quercus virginiana) in poor condition with reduced canopy



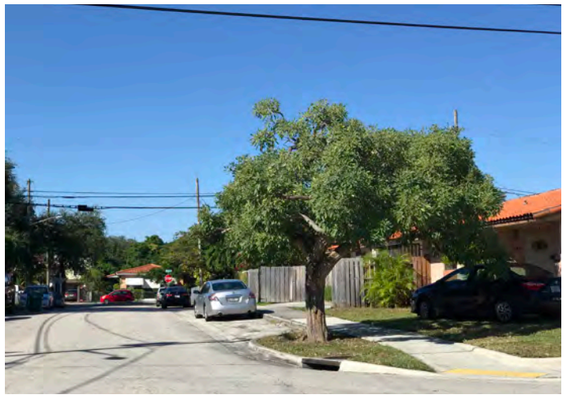
SW 9th Street near 22nd Avenue - Recently planted Purple Tabebuia (Tabebuia impetiginosa) leaning significantly

SW 10th Street near 21st Avenue - Weeping Fig (Ficus benjamina) in critical condition, completely topped.

SW 11th Street near 19th Avenue - Mahogany (Swietenia mahagoni) with constricted roots lifting curb and sidewalk

SW 11th Terrace near 15th Avenue - Hong Kong Orchid (Bauhinia x blakeana)

SW 12th Street - Mahogany (Swietenia Mahagoni) conflicting with utility lines, pruned heavily.



SW 13th Court near 10th Street - Yellow Tabebuia (Tabebuia cassinoides)

SW 13th Street - Brazilian Pepper (Schinus terebinthifolius) invasive prohibited species and Weeping Fig (Ficus benjamina) both conflicting with utility lines.

SW 14th Avenue - Newly planted Silver Buttonwood (Conocarpus erectus)

SW 14th Avenue - Newly planted Silver Buttonwood (Conocaprus erectus) between bulky trash pile

SW 14th Terrace near 18th Avenue - Tropical Almond (Terminalia catappa) conflicting with utility lines

SW 14th Terrace - Royal Poinciana (Delonix regia) in poor condition with reduced canopy.

Street Tree Assessment

SW 16th Avenue - Golden Rain Tree (Koelreuteria paniculata) critical condition, reduced canopy.

SW 16th Avenue - Weeping Fig (Ficus benjamina) decaying and conflicting with utility line, hazardous.

SW 16th Avenue - Jacaranda (Jacaranda mimosifolia) leaning significantly and some damge to trunk.

SW 16th Street near 14th Avenue - Newly planted Gumbo Limbo (Bursera simaruba)

SW 16th Avenue near 12th Street - Gumbo Limbo (Bursera simaruba)

SW 18th Avenue near 14th Terrace - Mango Tree (Mangifera indica)

SW 19th Avenue near 16th street - Black Olive (Bucida buceras)

SW 19th Avenue near 11th Terrace - Royal Poinciana (Delonix regia) poor condition, topped.

SW 21st Avenue near 14th Terrace - Newly planted Bridal Veil (Caesalpinia granadillo) under utility lines.

SW 22nd Avenue - Green Buttonwood (Conocarpus erectus) planted in median.

SW 24th Avenue - Live Oak (Quercus virginiana) leaning away from utility lines.

SW 24th Avenue - Black Olive (Bucida buceras)

SHENANDOAH SOUTH

Shenandoah South

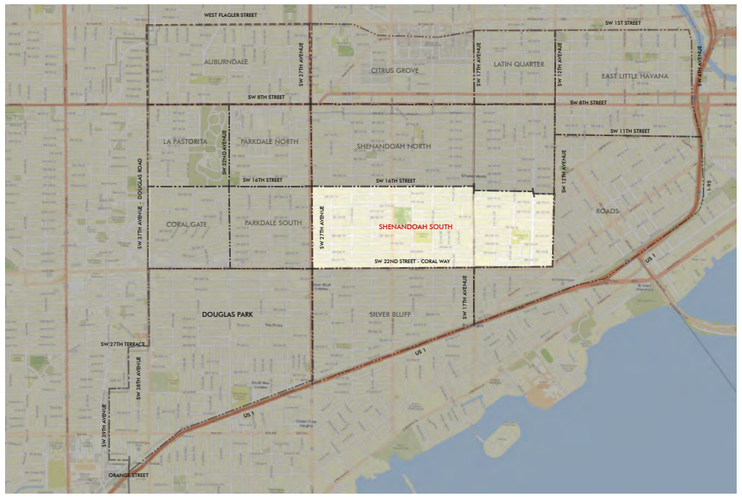


Figure 1: The Shenandoah South neighborhood location within project limits

Main Takeaways

The Shenandoah South neighborhood is approximately 480 acres in the central section of the project area. The neighborhood is separated from Shenandoah North by SW 16th Street and bordered on the other sides by SW 27th and 12th Avenue and SW 22nd Street. Shenandoah South is a primarily single family residential neighborhood with concentrations of duplexes and multi-family housing near the northern portion of SW 27th Ave and in the area surrounding Coral Way K-8 Bilingual Center. The commercial and business corridors of the neighborhood fall along SW 27th Avenue and SW 22nd Street (Coral Way), both also having high instances of office space. The neighborhood has one large central park being Shenandoah park that borders SW 22nd Avenue, and two schools both along SW 19th Street.

Figure 2: Aerial of Shenandoah South (2016)

Drainage Concerns

Flooded swale at SW 13th Avenue & SW 20th Street

Flooded Swale at SW 14th Avenue & SW 20th Street

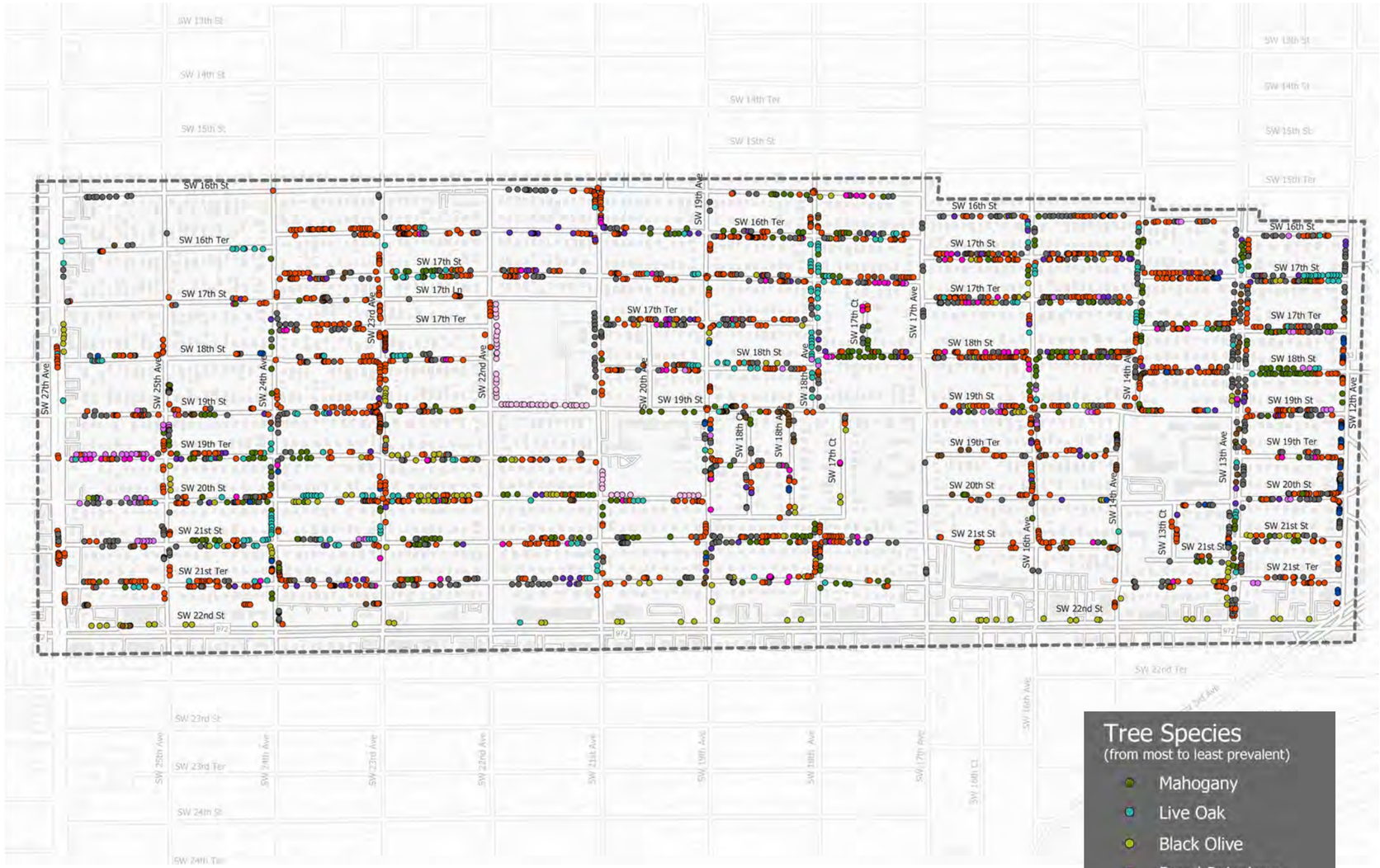
Flooded Swales at SW 16th Avenue & SW 21st Street

Flooded Swale at SW 16th Avenue & SW 22nd Street

Flooded Swales at SW 14th Avenue & 21st Street

Flooded Swale at SW 16th Avenue & SW 21st Street

Street Tree Assessment

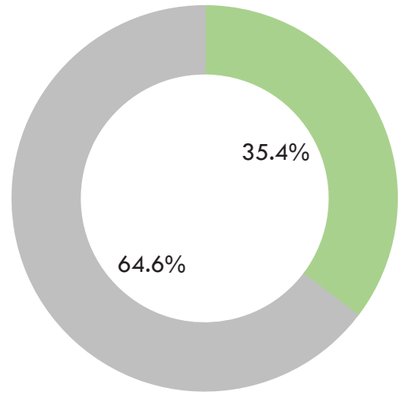


Main Takeaways

- The overall neighborhood has a spread out street tree canopy with largely dense areas and intermittent sparse sections.
- Predominant trees for the neighborhood are Mahogany (Sweitenia mahagoni) and Live Oak (Quercus virginiana) both of which having existing numbers boosted by recent plantings.
- Predominant trees for specific streets include:
  - SW 22nd Avenue and SW 19th Street - Arjun Tree (Terminalia arjuna)
  - SW 22nd Street - Banyan (Ficus benghalensis)

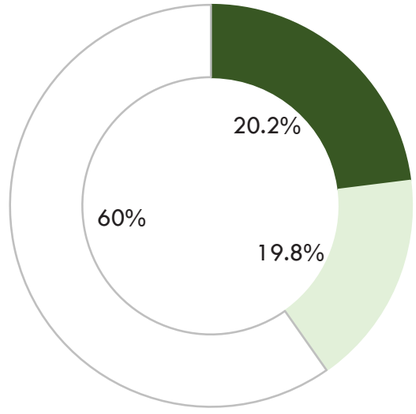
Tree Species
(from most to least prevalent)

- Mahogany
- Live Oak
- Black Olive
- Royal Poinciana
- Weeping Fig
- Gumbo Limbo
- Japanese Privet
- Silver Buttonwood
- Arjun Tree
- Palms
- Other



Right-Of-Way Area

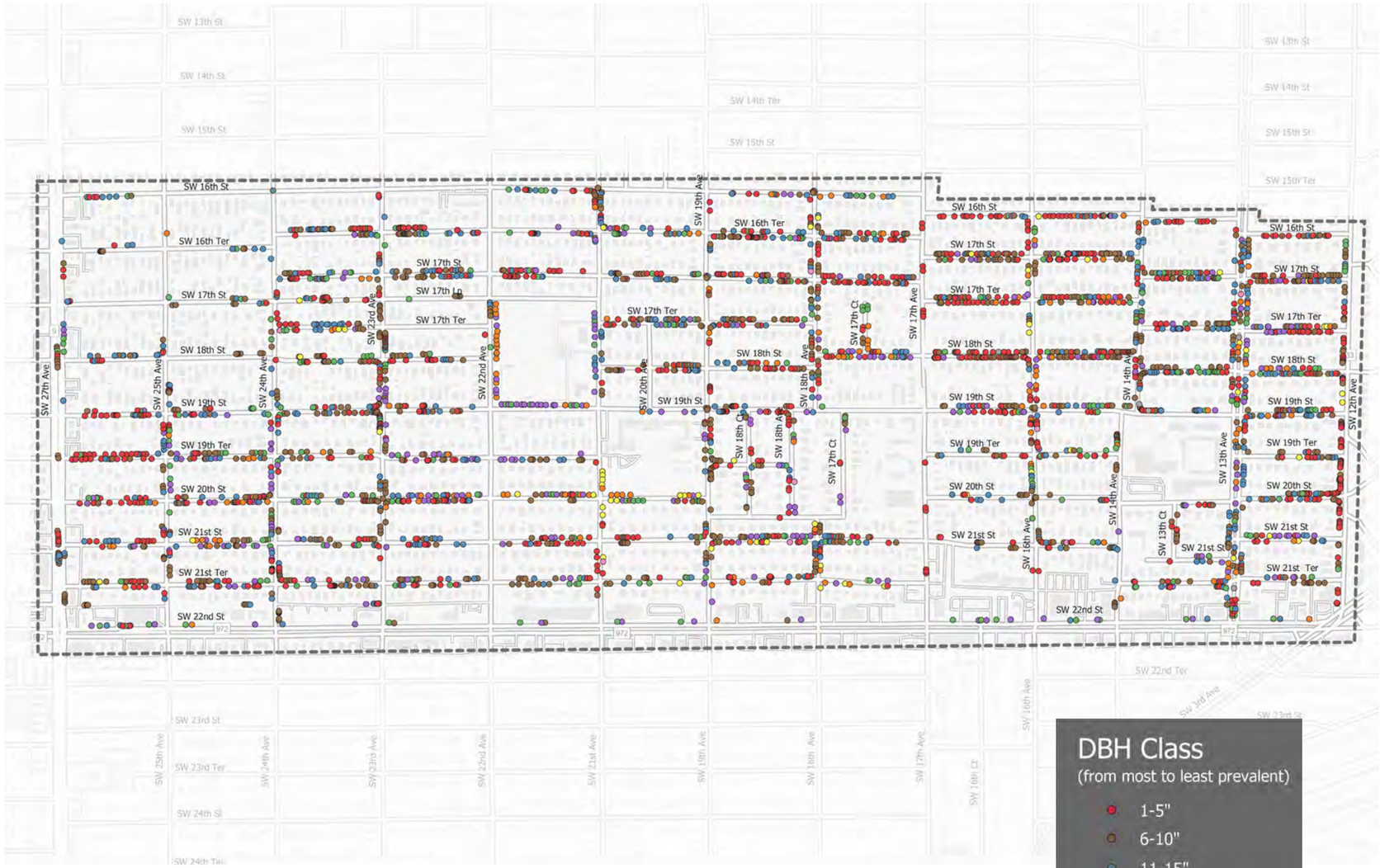
- Feasible Pervious Area
- Impervious



Tree Canopy Coverage

- Current Coverage
- Ideal Coverage
- Other

Street Tree Assessment



Main Takeaways

- Existing canopy is largely younger species with a sigificant number of palms contributing to the smaller classes of trees.
- Large number of mature Arjun (Terminalia arjuna) surrounding Shenandoah Park and Shenandoah Middle School
- Row of younger Gumbo Limbo (Bursera simaruba) on SW 19th Terrace

Street Tree Assessment

SW 13th Avenue - Royal Poinciana (Delonix regia) in swale

SW 21st Terrace -Mahogany (Sweitenia mahagoni) on both sides

SW 19th Terrace - Live Oaks (Quercus virginiana) on the left side

SW 22nd Street - Banyan trees (Ficus benghalensis) in the median

SW 21st Avenue - Arjun Tree (Terminalia arjuna)

SW 19th Avenue - Black Olives (Bucida buceras)

SILVER BLUFF

Silver Bluff

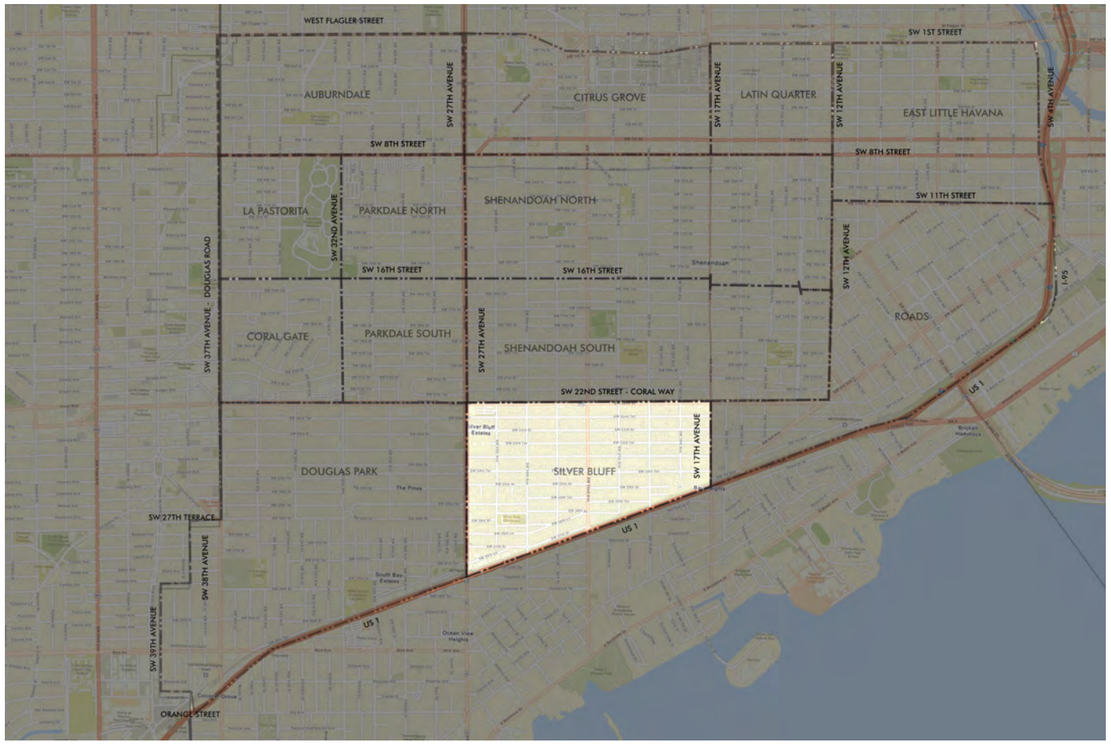


Figure 1: The Silver Bluff neighborhood location within project limits

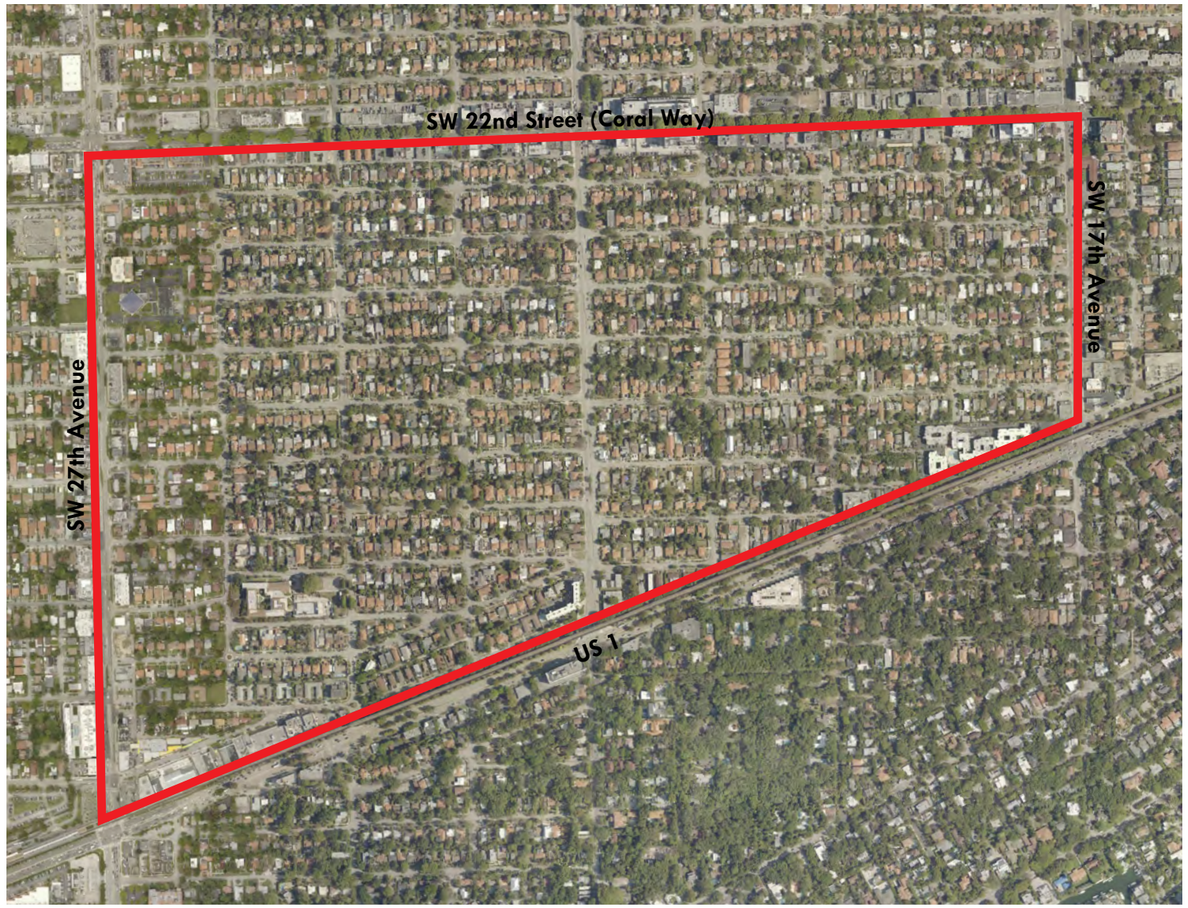


Figure 2: Aerial of Silver Bluff (2016)

N

Main Takeaways

The Silver Bluff neighborhood occupies approximately 340 acres (0.53 square miles) of land within the Southwest Streetscape. The neighborhood is bordered by Coral Way along the northern edge and US1 to the south. Its east and west borders are SW 17th Avenue and SW 27th Avenue respectively. With commercial uses staying to the edges of the neighborhood along the bordering streets, Silver Bluff is a primary single-family residential neighborhood. Most residential streets are curbed with wide enough right-of-ways to allow for on-street parking however there is some variety. Along many of the avenues which have a much lower frequency of residential frontages, there are also more smaller right-of-ways which, in cases where there were homes with many vehicles, there was much more congestion along the roadway.

Drainage Concerns

Flooded Sidewalk at SW 19th Avenue & SW 22nd Terrace

Flooded Swale at SW 21st Avenue & SW 23rd Street

Flooded Swale at SW 24th Street & 26th Terrace

Flooded Swale at SW 24th Avenue & SW 26th Lane

Flooded Swales at SW 22nd Avenue & 24th Street

Flooded Swale at SW 24th Avenue & SW 24th Street

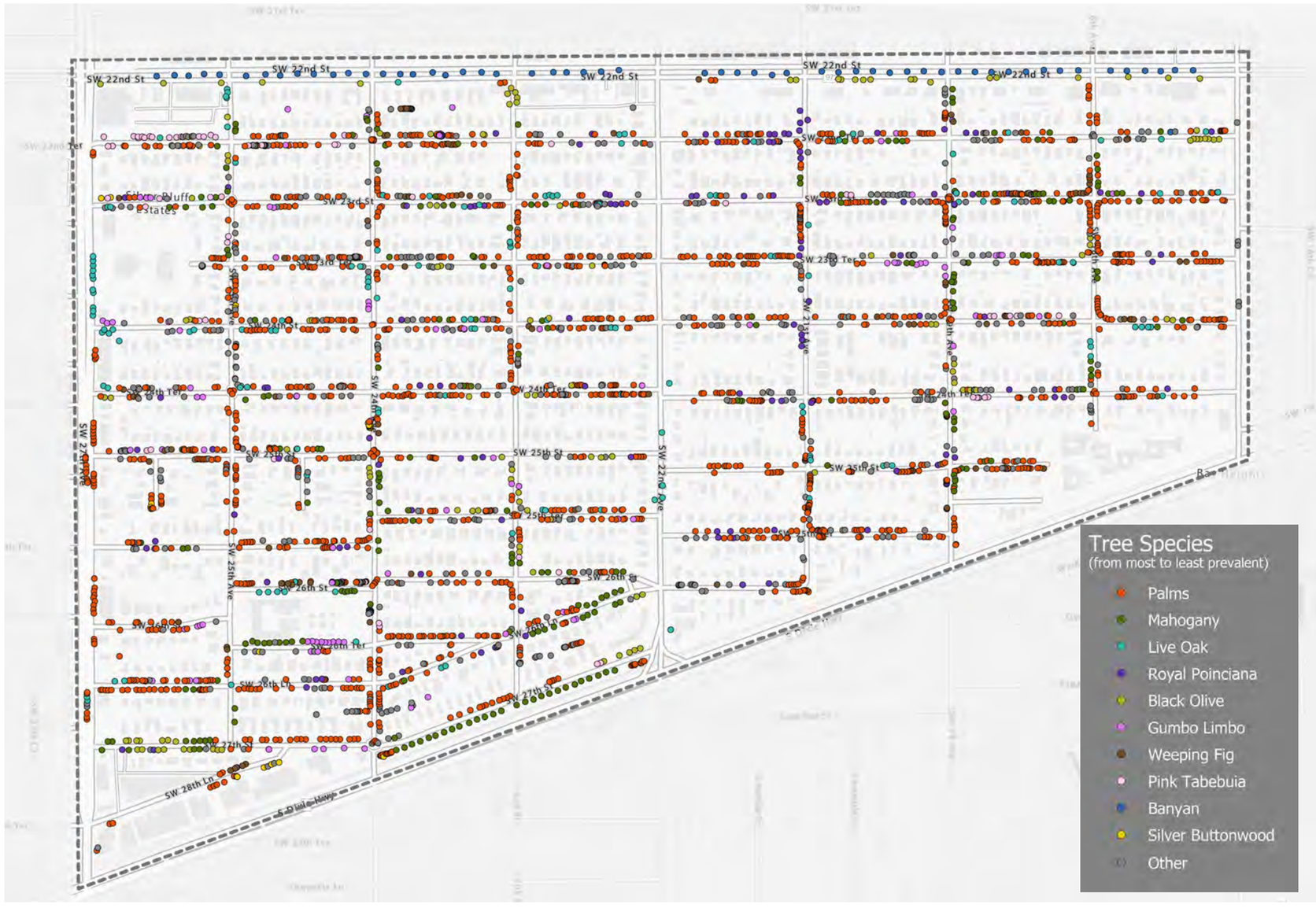
Flooded Swales at SW 21st Avenue & 24th Terrace

Flooded Swale at SW 19th Avenue & SW 25th Terrace

Flooded Swales at SW 24th Avenue & SW 23rd Terrace

Flooded Swale at SW 21st Avenue & SW 25th Terrace

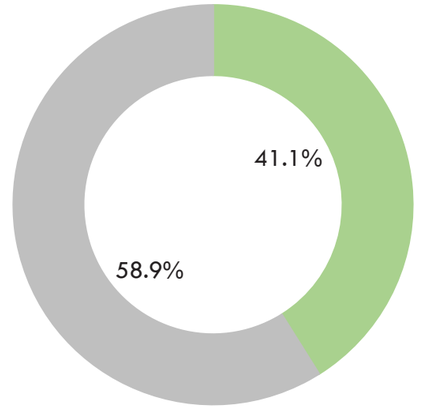
Street Tree Assessment | Species



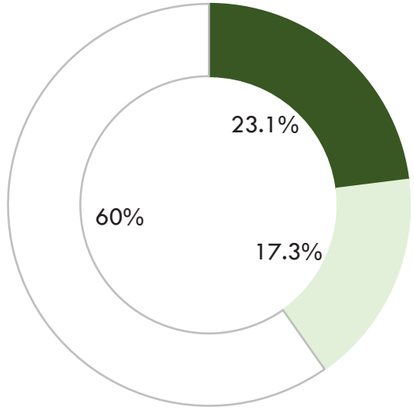
Main Takeaways

- The canopy of this neighborhood is dominated by palms throughout with larger trees mixed in. SW 22nd Avenue is the only road severely lacking any canopy coverage.
- Predominant trees for the neighborhood are Mahogany (Swietenia mahagoni), Royal Poinciana (Delonix regia), and Live Oak (Quercus virginiana)
- Streets with one predominant species:
  - SW 22nd Avenue - Banyan (Ficus benghalensis) in Median
  - SW 27th Street - Mahogany (Swietenia mahagoni)

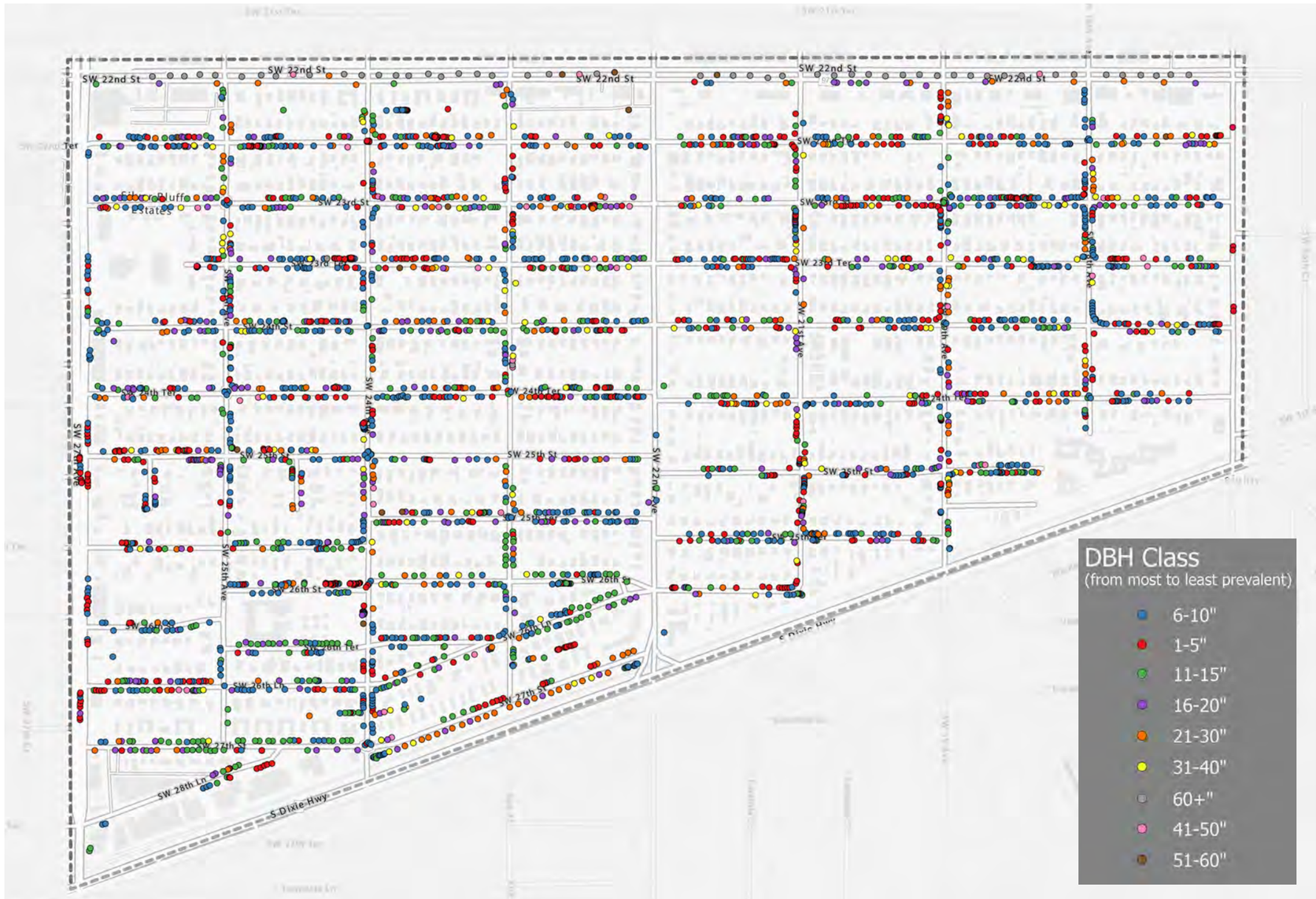
Right-Of-Way Area



Tree Canopy Coverage



Street Tree Assessment | Size



Main Takeaways

- Majority of trees in this neighborhood fall into 6-10” DBH class.
- Majority of larger trees located in Northern portions of the neighborhood.
- Significant number of large Banyan (Ficus benghalensis) over 60” along SW 22nd Street.
- Row of large mature Mahogany (Swietenia mahagoni) along SW 27th Street.
- Significant number of trees in 11-15” DBH class in Southwest portion of neighborhood

Street Tree Assessment

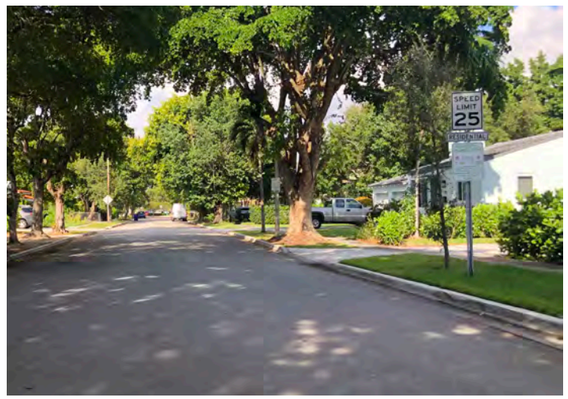
SW 25th Terrace - Royal Poinciana (Delonix regia) in swale

SW 2nd Street -Mahogany (Swietenia mahagoni) on left

SW 26th Lane - Live Oaks (Quercus virginiana) on the left side

SW 22nd Terrace - Pink Tabebuia (Tabebuia spp.)

SW 23rd Terrace - Gumbo Limbos (Bursera Simaruba)



SW 22nd Terrace - Black Olives (Bucida buceras) with swales

SW 22nd Street - Banyan trees (Ficus benghalensis) in the median

LATIN QUARTER

Latin Quarter

Figure 1: Latin Quarter Neighborhood location within Project Limits

Main Takeaways

The Latin Quarter neighborhood is zoned primarily as a T4-General Urban area and mostly consists of Multi-family residential homes. Streets in this neighborhood mostly fall under the B Typology, with vegetated swales and on-street parking on both sides, with the exception of all streets between SW 5th and SW 8th Streets, which lack swales and the sidewalks are paved using red brick (Typology D). Most streets in this part of the neighborhood are One-Way only. Latin Quarters bordering streets make up the primary commercial corridors of this area.

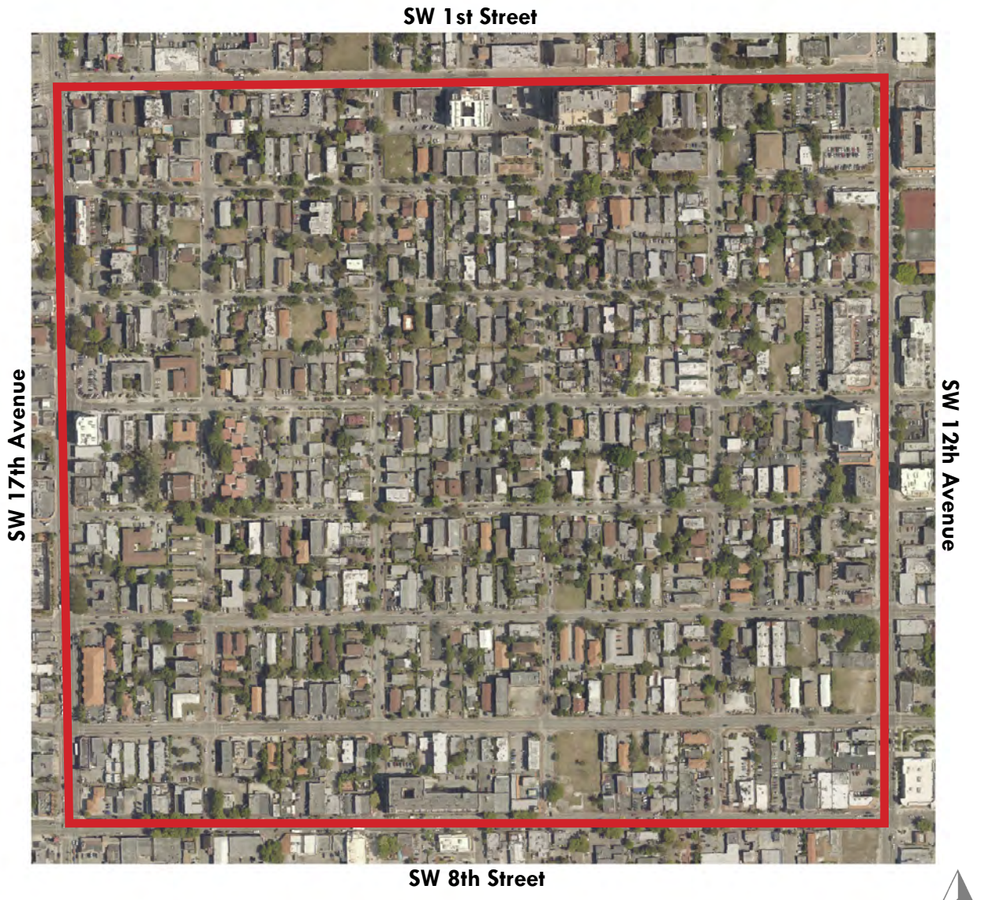
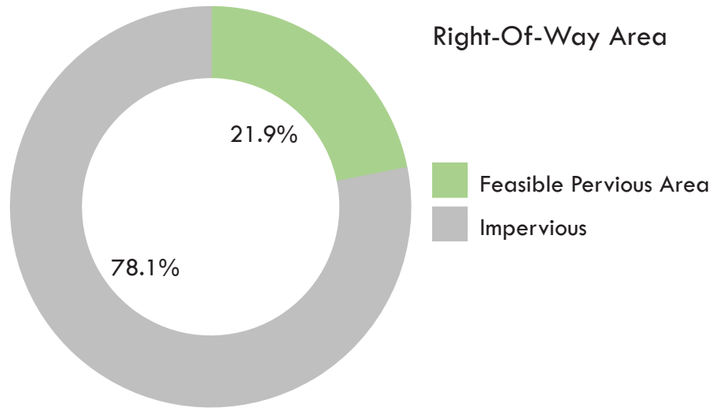


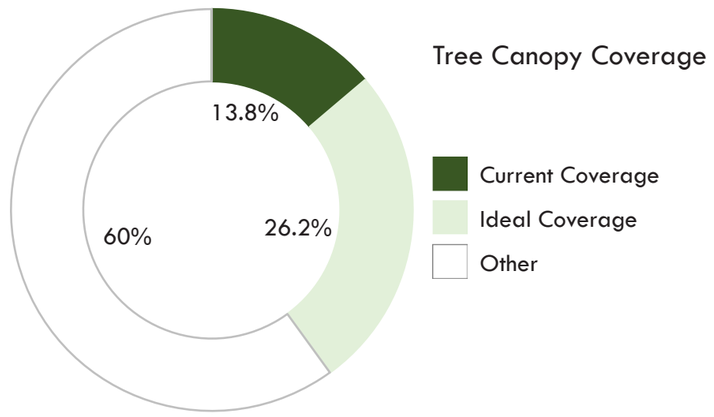
Figure 2: Aerial of Latin Quarter (2016)

Street Tree Assessment | Species

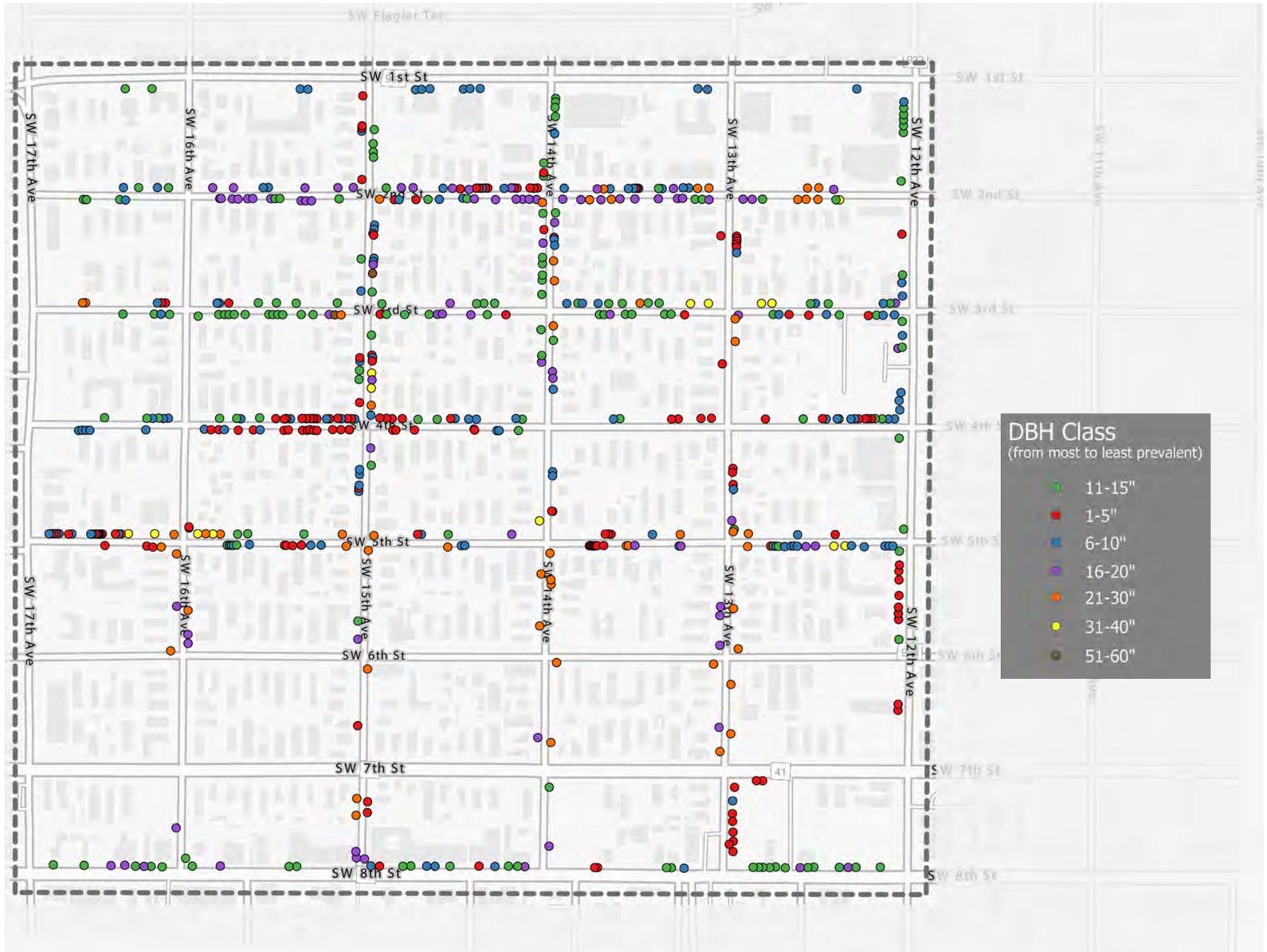
Main Takeaways

- No street tree canopy on 6th and 7th street
- Trees planted in areas with brick sidewalks (avenues between 5th and 8th street) are lifting up pavers causing significant damage.
- Predominant tree for the neighborhood is Green Buttonwood (Conocarpus erectus)
- Streets with one predominant species:
  - SW 2nd and 3rd Street - Green Buttonwood (Conocarpus erectus)
  - SW 13th Avenue - Black Olive (Bucida buceras)





Street Tree Assessment | Size



Main Takeaways

- Significant number of large mature Green Buttonwood (Conocarpus erectus) on SW 2nd and 3rd Streets.
- Significant number of new smaller trees planted in some locations.
- Large Black Olives (Bucida buceras) dispersed along SW 13th and 14th Avenue.
- Significant amount of Solitaire Palms (Ptychosperma elegans) planted along SW 4th Street, between SW 15th and 16th Avenues.
- Newly planted Royal Palms (Roystonea regia) along SW 1st Street.
- No trees above 60”

Street Tree Assessment

SW 1st Street - Newly planted Spindle Palms (Hyophorbe verschaffeltii).

SW 2nd Street - Black Olives (Bucida buceras) with severe trunk damage, potentially hazardous and conflict with power lines.

SW 3rd Street - Mahogany (Swietenia mahagoni) conflicting with power lines

SW 3rd Street - Two Indian Laurel Fig (Ficus microcarpa) prohibited invasive species, growing in very constricted space.

SW 2nd Street - Row of mature Mahogany (Swietenia mahagoni)

SW 3rd Street - Row of Green Buttonwood (Conocarpus erectus)

SW 2nd Street - Row of Gumbo Limbo (Bursera simaruba)

SW 5th Street - Washington Palm (Washingtonia robusta) on left and Mahogany (Swietenia mahagoni) conflicting with utility lines on right.

Street Tree Assessment

SW 5th Street - mature Black Olive trees (Bucida buceras) utility conflict on one side of the street.

SW 8th Street - Row of Royal Palms (Roystonea regia)

SW 15th Avenue - Young Orange Geiger (Cordia sebestena) leaning significantly.

SW 15th Avenue - Umbrella Tree (Schefflera actinophylla) invasive species and Papaya Tree (Carica papaya)

SW 8th Street - Juvenile Live Oak (Quercus virginiana)

SW 12th Avenue - Cabbage Palms (Sabal palmetto)

SW 17th Avenue - Newly planted Pigeon Plum (Coccoloba diversifolia) in median.

SW 13th Avenue - Newly planted Weeping Fig (Ficus Benjamina) in poor condition.

EAST LITTLE HAVANA

East Little Havana

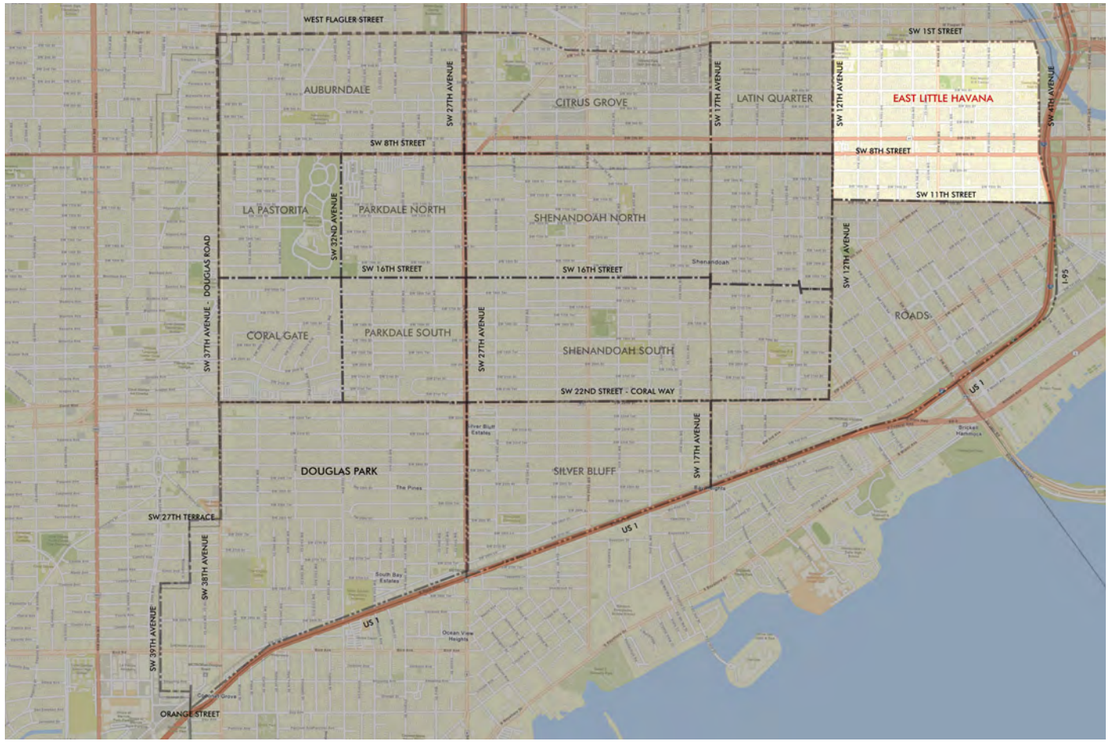


Figure 1: East Little Havana Neighborhood location within Project Limits

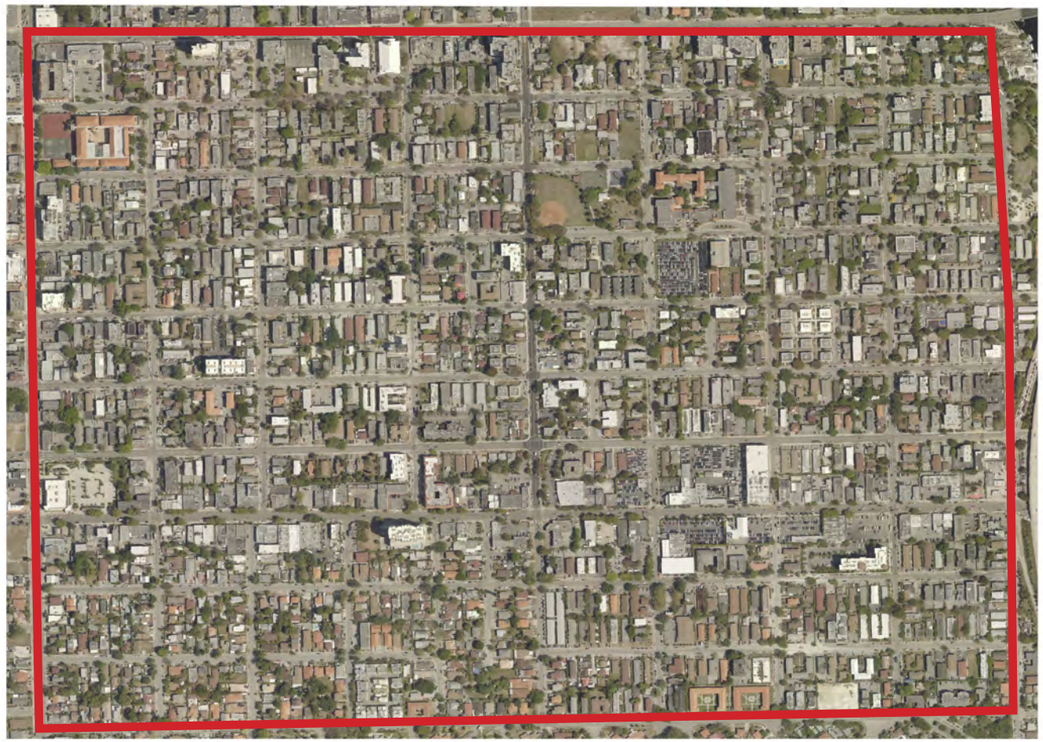


Figure 2: Aerial of East Little Havana (2016)

Main Takeaways

The East Little Havana neighborhood is mostly comprised of streets with no swales, on-street parking with valley gutters separating road from parking area, and vegetated curb extensions at intersections. Areas south of SW 8th Street take on more characteristics of Roads neighborhood, more street trees and townhomes/duplexes and areas North of 8th Street are primarily zoned as Multi-Family Residential. SW 6th and 7th Street have no street trees. SW 8th Street makes up the major commercial corridor in this neighborhood. Two parks, Ernesto Lecuona and Riverside make up 4 acres of the 367 acre neighborhood.

Drainage Concerns

Backed up storm drain at SW 5th Street and SW 4th Avenue

Flooded valley gutter at NW corner of SW 5th and SW 6th Avenue

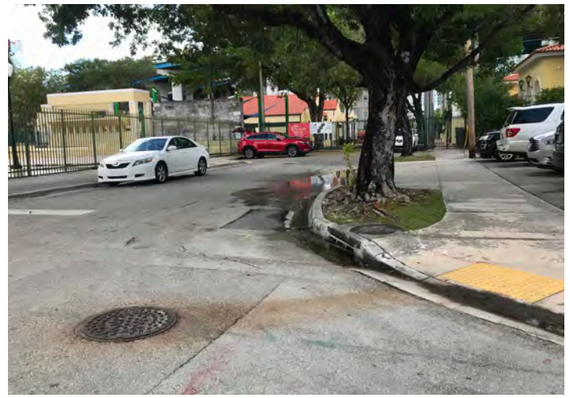
Backed up storm drain at SW 8th Street and SW 9th Avenue

Flooded street side at SW 9th Street and SW 7th Avenue

Flooded valley gutter at SW corner of SW 5th St. and SW 6th Ave.

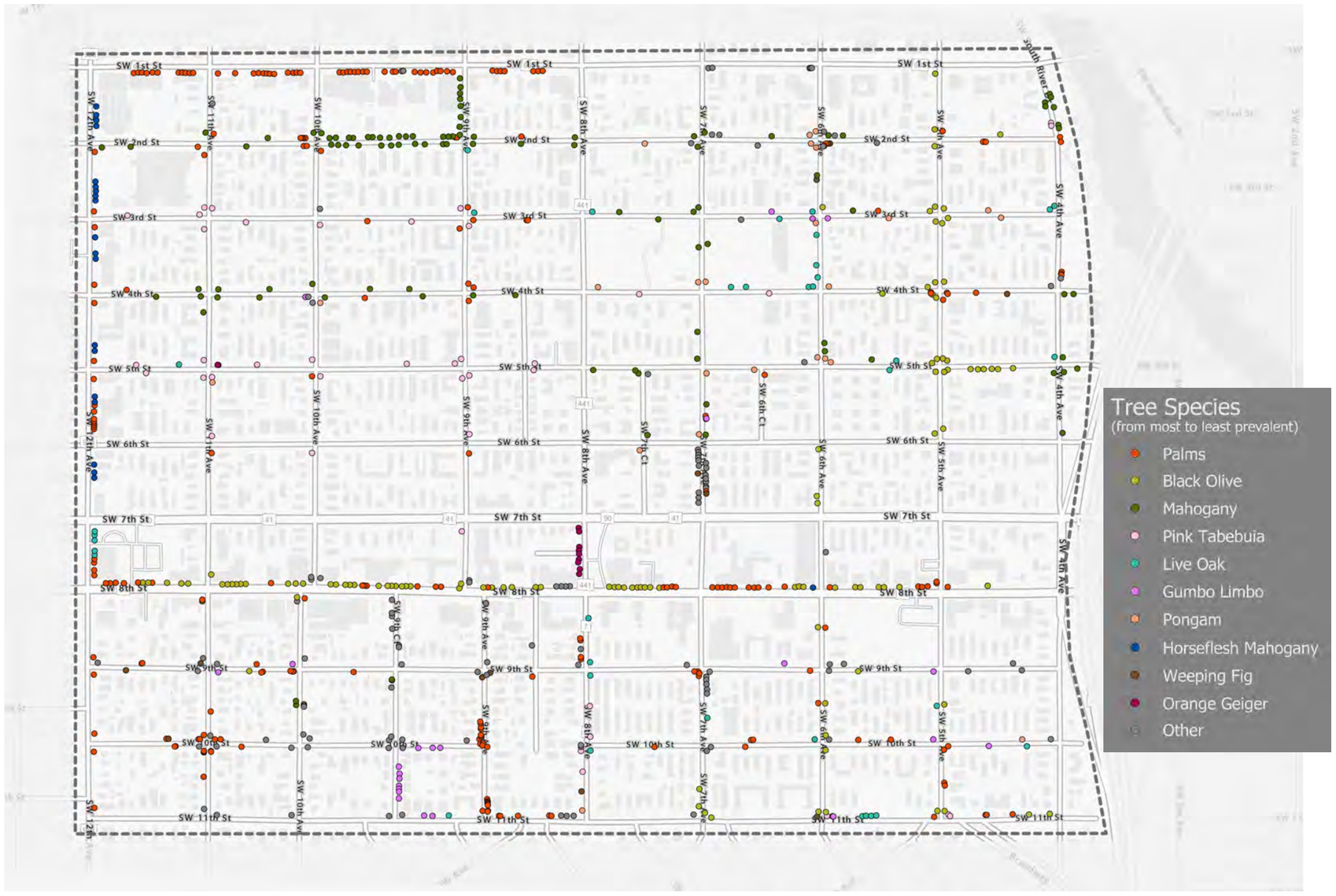
Backed up storm drain at SW 4th Street and SW 6th Avenue

Flooded valley gutter at SW 10th Street and SW 7th Avenue



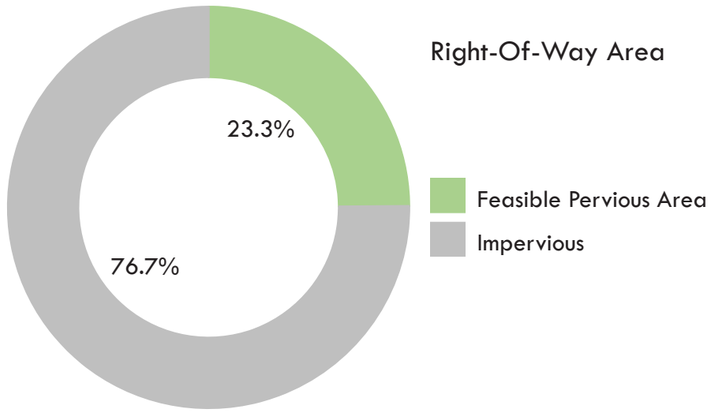
Backed up storm drain at SW 4th Street and SW 4th Avenue

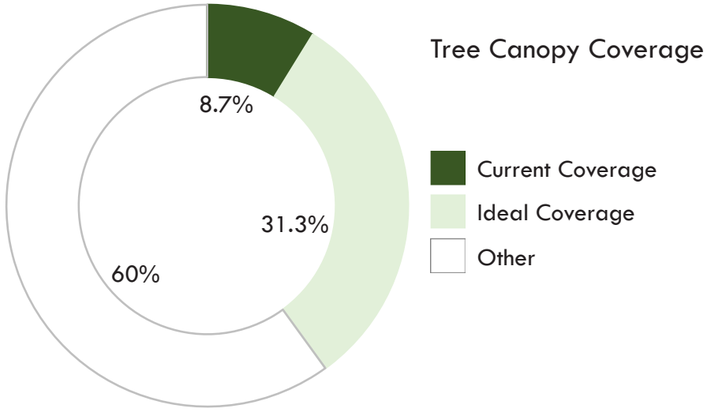
Street Tree Assessment | Species



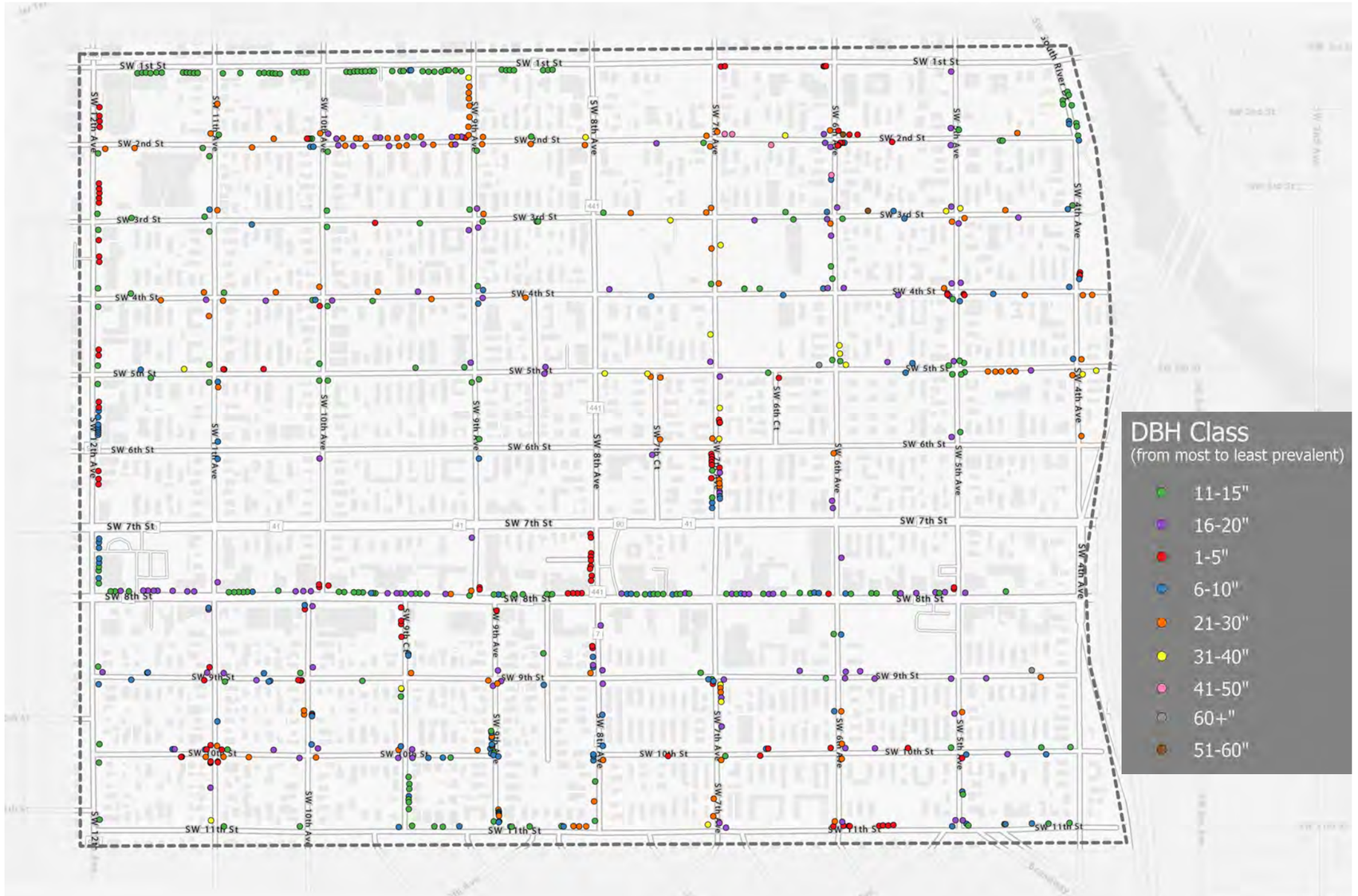
Main Takeaways

- No street tree canopy on SW 6th and SW 7th Streets
- Trees predominantly planted at street intersections.
- Predominant tree for the neighborhood is Black Olive (Bucida buceras)
- Streets with one predominant species
  - SW 1st Street - Royal Palm (Roystonea regia)
  - SW 2nd Street - Mahogany (Swietenia mahagoni)
  - SW 8th Street - Black Olive (Bucida buceras)





Street Tree Assessment | Size



Main Takeaways

- Significant number of mature trees dispersed throughout the neighborhood.
- Large number of Black Olive (Bucida buceras) trees planted along SW 8th Street and at intersections along SW 5th Avenue.
- Row of mature Mahogany (Swietenia mahagoni) planted on SW 2nd Street, between SW 9th and 10th Avenue.
- Singificant number of young Horseflesh Mahogany (Lysiloma sabicu) along SW 12th Street
- Overall higher concentrations of trees South of SW 8th Street.

Street Tree Assessment

SW 1st Street - Bridal Bouqet (Plumeria pudica) on left and newly planted Live Oak (Quercus virginiana) on right.

SW 2nd Street - Eucalyptus (spp.) on right and Mahogany (Swietenia mahagoni) on left both conflicting with utility lines

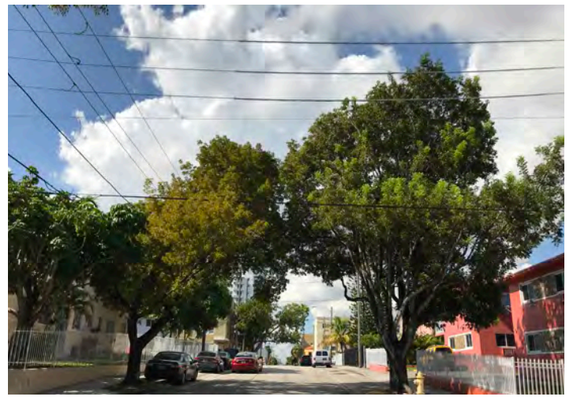
SW 3rd Street - Pink Trumpet Tree (Tabebuia heterophylla)

SW 3rd Street - Pink Trumpet Trees (Tabebuia heterophylla) excessive pruning on left tree.

SW 2nd Street - Mahogany (Swietenia mahagoni) trees on left being Y-Cut for utility lines.

SW 2nd Street - Mahogany (Swietenia mahagoni) lopsided with utility line conflict

SW 4th Street - Mahogany (Swietenia mahagoni) utility line conflict pruned in Y-shape



SW 4th Street - Mahogany (Swietenia mahagoni) under power lines

Street Tree Assessment

SW 5th Street - Pink Trumpet Tree (Tabebuia heterophylla) will conflict with utility lines when grown

SW 5th Street - Pink Trumpet Tree (Tabebuia heterophylla) severe trunk damage.

SW 8th Street - Black Olive Trees (Bucida buceras)

SW 9th Street - Mahogany (Swietenia mahagoni) conflicting with utility lines.

SW 5th Street - Black Olive Trees(Bucida buceras)

SW 8th Street - Bridal Veil Trees (Caesalpinia granadillo) in bound aggregate cut-outs

SW 9th Court - Mature Gumbo Limbo Trees (Bursera simaruba)

SW 9th Street - Jamaican Dogwood (Piscidia piscipula) conflicting with utility lines

THE ROADS

Roads

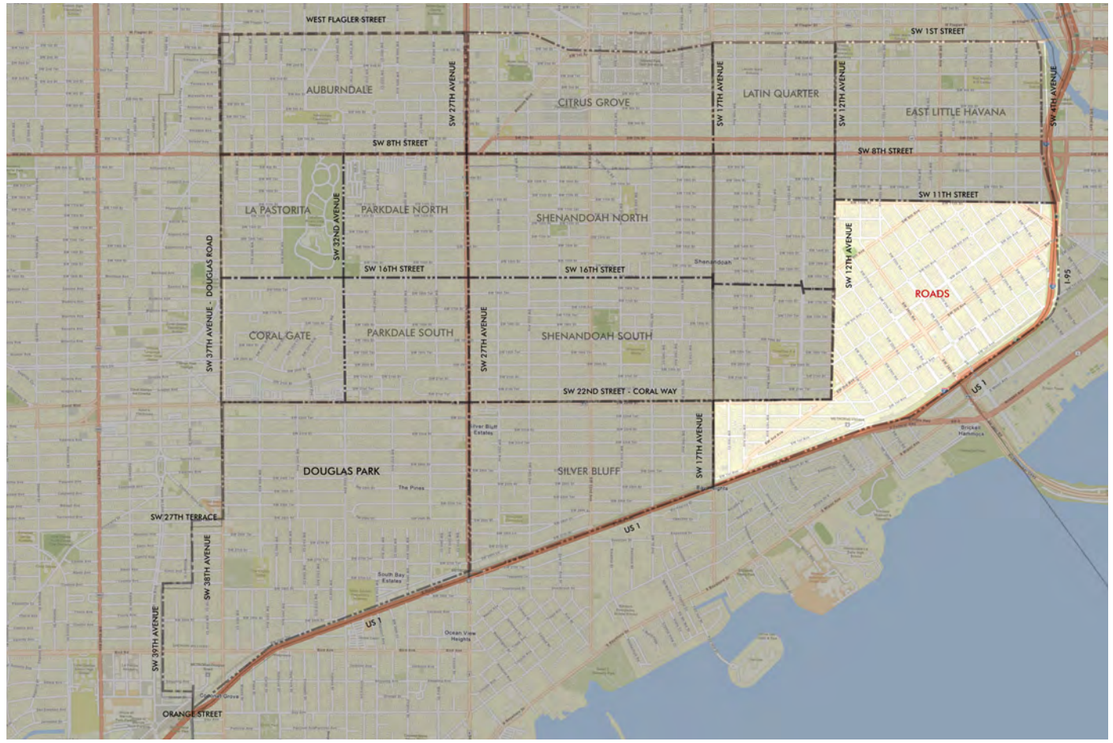


Figure 1: Roads Neighborhood location within Project Limits

Main Takeaways

The Roads neighborhood is mostly comprised of large Right-of-Ways with swales, on-street parking, and some medians. The neighborhood is mostly zoned as T3-Suburban and used as Single Family Residential with a commercial corridor along SW 3rd Avenue and 22nd Street. Triangle Park makes up roughly one acre of the neighborhood. SW 23rd Road to SW 27th Road, and SW 2nd Avenue to SW 4th Avenue are classified as historic transportation corridors and are characterized by large medians with dense tree canopy.

Figure 2: Aerial of Roads (2016)

Drainage Concerns

Flooded driveway and Backed up storm drain at SW 20th Road

Backed up storm drain at SW 20th Road

Flooded Driveways, on-street parking and crosswalk over-flowing onto swale at SW 28th Road

Flooding at curb cut-out gatheirng at low point of swale at SW 4th Avenue.

Flooded on-street parking and portion of swale at SW 7th Ave.

Flooded street corner and crosswalk at SW 23rd Road

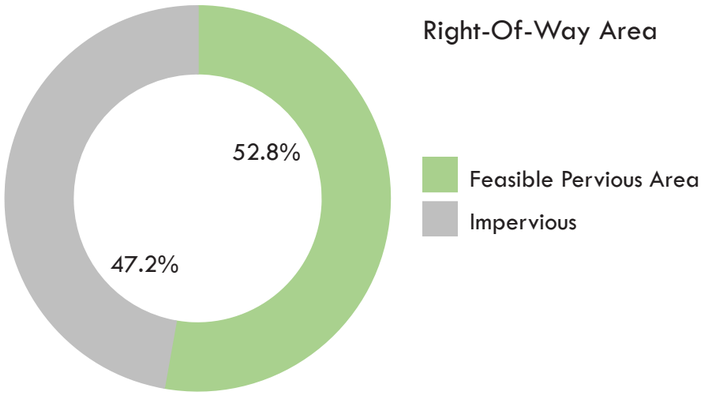
Flooded driveway and on-street parking at SW 4th Avenue.

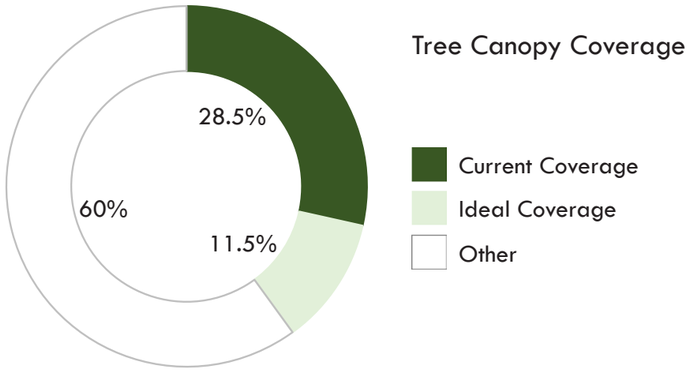
Flooding overflowing onto swale at SW 29th Road

Street Tree Assessment | Species

Main Takeaways

- The street tree canopy is evenly spread thoughtout the neighborhood with an exception of the north-west area in the four blocks directly north of Saints Peter and Paul Catholic Church.
- Aside from streets with a predominent tree, most streets are fairly diverse in what species are found.
- Predominent trees for specific streets include:
- SW 3rd Avenue- Banyan (Ficus benghalensis)
- SW 4th Avenue- Mahogany (Sweitenia mahagoni)





Street Tree Assessment | Size

Main Takeaways

- There is a siginficant number of large trees with nearly 10% being over 30”
- The Banyan (Ficus benghalensis) trees along SW 3rd Avenue are nearly all within the 60”+ DBH class cantributing greatly to the canopy along that street.
- Outside of the palms throughout the neighborhood a notable number of the smallest DBH class of 1-5” are new planting to replace canopy which has been damaged in past storms
- Species having been recently planted include Live Oaks (Quercus virginiana), Mahogany (Sweitenia mahagoni) , Crepe Myrtle trees (Lagerstroemia spp.) and Gumbo Limbo (Bursera simaruba).

Street Tree Assessment

SW 3rd Avenue - Canary Date Palms in Median and Ficus trees in swales

SW 3rd Avenue - Historic Coral Way - Banyon Trees

SW 5th Avenue - Remains of trees that look like they were hatracked and are now dead and possibly hazardous.

SW 10th Avenue - Weeping Fig (Ficus benjamina) and Rubber tree (Ficus elastica)

SW 4th Avenue - Mature Horseflesh Mahogany (Lysiloma sabicu) non-native Tamarind in median.

SW 5th Avenue - Bismark Palms in Roundabout

SW 12th Street - Mature trees interfering with utility lines

SW 16th Avenue - Mature tree being Y-cut for utility lines

Street Tree Assessment

SW 18th Terrace - New Crape Myrtle trees (Lagerstroemia spp.)

SW 23rd Road - Mature trees in the median, small palms in the swales

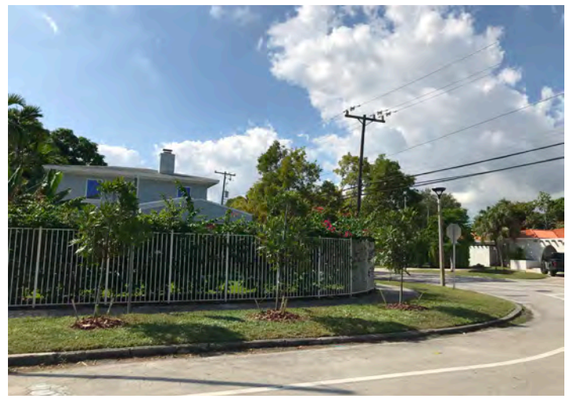
SW 25th Road - Canary Date Palms in median, Mahogany trees in swale

SW 25th Road - Weeping Fig (Ficus benjamina) in the median

SW 23rd Street - Crape Myrtle Trees in roundabout

SW 24th Road - fairly new trees in median

SW 27th Road - Mixed species in median



SW 30th Road - Newly planted Japanese Fern Trees (Filicium decipiens) - probably not planted by the City.

TREE CANOPY

Quantity

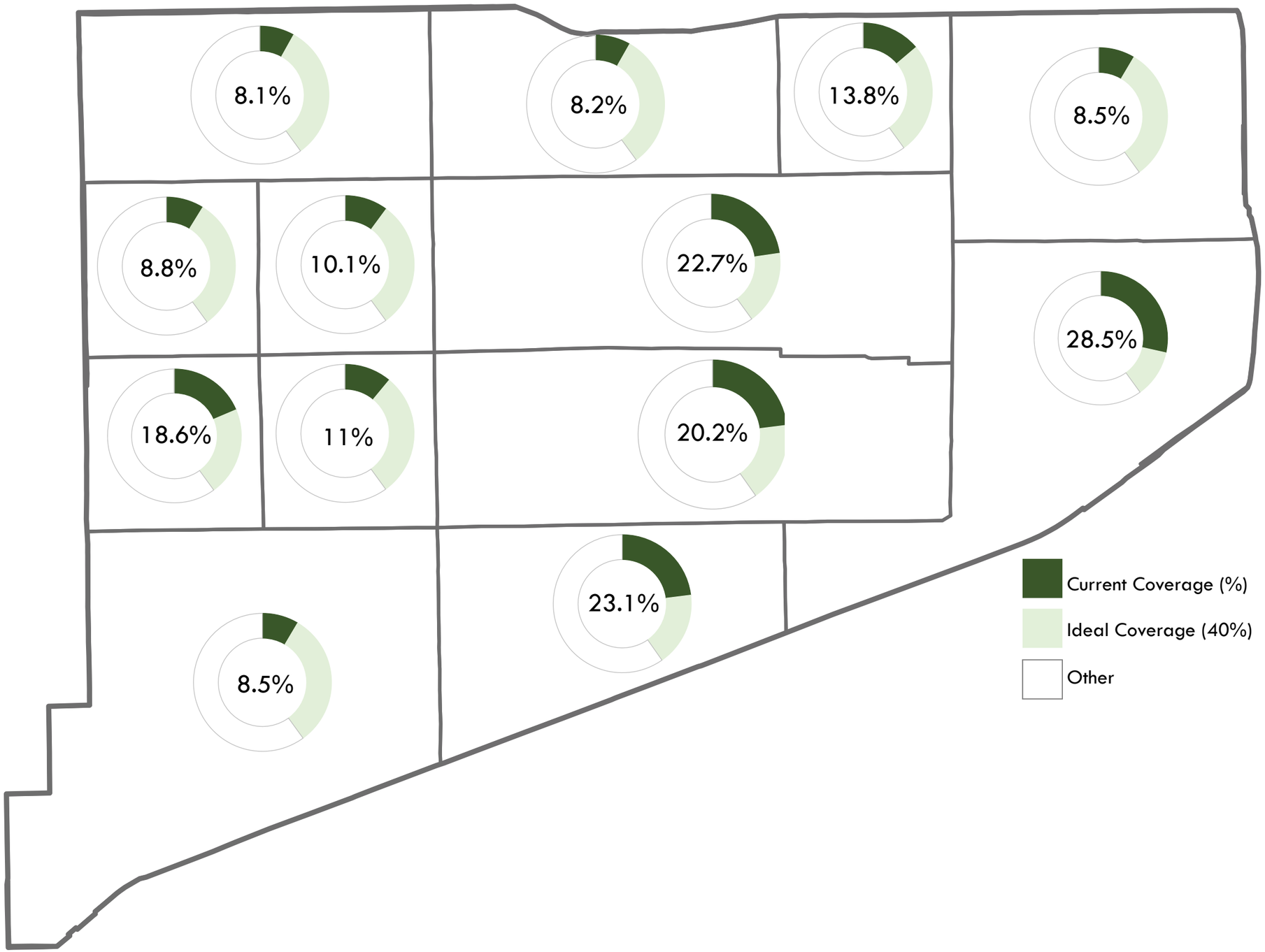


Figure 1: Percentage of Canopy Coverage in ROW area

Main Takeaways

The dark green portion of this graphic represents the total percentage of canopy coverage within the Right-Of-Way in each of the neighborhoods. Research suggest that these areas require at least 40% canopy coverage to counteract the effects of urban heat islands. This 40 percent is represented by the light green portion of each pie chart. The percentage at the center of each chart represents the total canopy coverage for that area

The neighborhoods with the highest percentage of tree canopy are the Roads,Silver Bluff, Shenandoah North & South, and Coral Gate. While the neighborhoods with the least amount of canopy are Citrus Grove, Auburndale, East Little Havana, and Douglas Park. While Latin Quarter shows a relatively large canopy coverage, it accomplishes this with a relatively small amount of trees that are very large; we find this calculation to be somewhat deceptive for this neighborhood, as there are many streets with little to no canopy coverage at all within it.

Figure 2: Percentage of feasible pervious areas in the ROW

Main Takeaways

The green portions of this graphic represent the percentage of the ROW, in each neighborhood, that could feasibly be pervious. Much of these areas have been heavily compacted due to parked cars, and significant parts of the swales have been paved over, which are not indicated in this calculation.

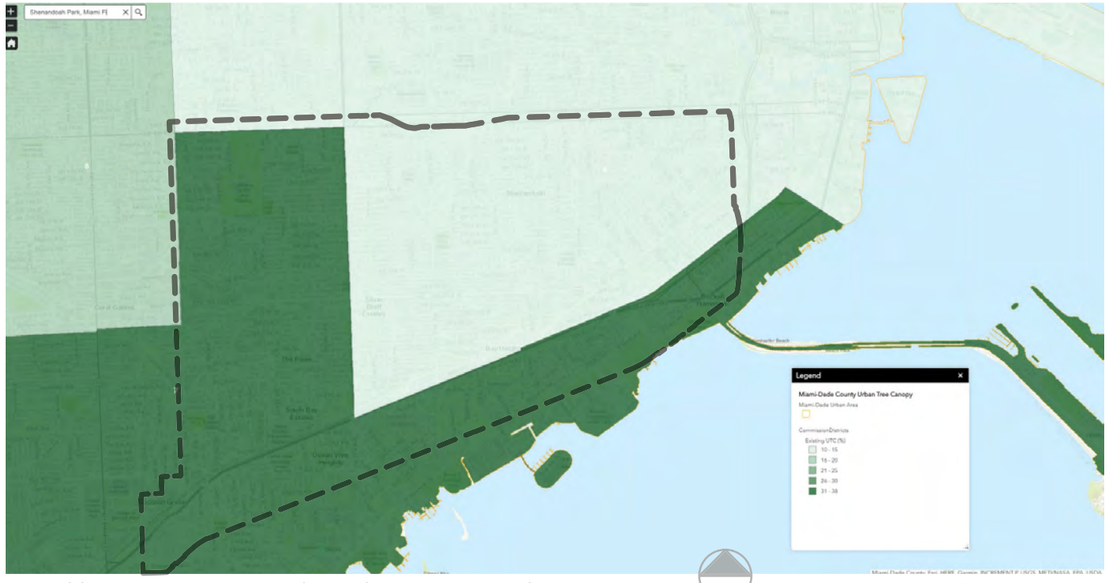
These percentages have been determined by calculating the difference between the ROW area and the area devoted to roadways (asphalt).
The Roads, Coral Gate, Silver Bluff, Shenandoah North & South, and Douglas Park rank the highest in terms of space available to be made pervious. East Little Havana, Latin Quarter, and Citrus Grove rank the lowest in the project area.

Tree Canopy

Urban tree canopy

In 2015, the World Economic Forum's (WEF) Global Agenda Council (GAC) on the Future of Cities included increasing green canopy cover on their list of top ten urban initiatives: "Cities will always need large—infrastructure projects, but sometimes small—scale infrastructure—from cycle lanes and bike sharing to the planting of trees for climate change adaptation—can also have a big impact on an urban area."

Increasing a city's tree canopy contributes to lowering urban temperatures by blocking shortwave radiation and increasing water evaporation. Creating more comfortable microclimates, trees also mitigate air pollution caused by everyday urban activities. Their absorptive root systems also help avoid floods during severe rains and storm surges.



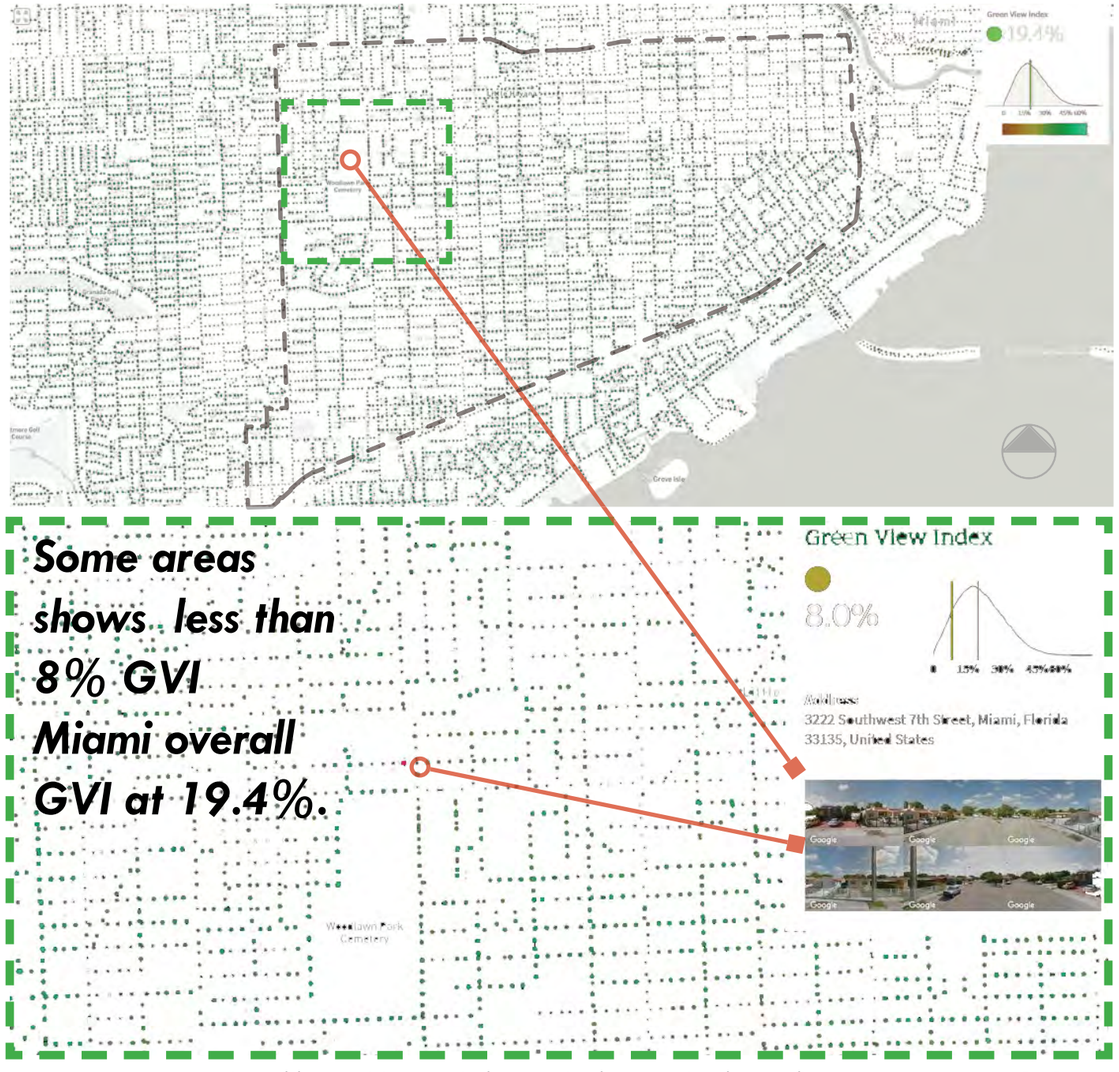
https://mdc.maps.arcgis.com/apps/webappviewer/index.html?id=460e90afb4ce464581231031cc80c590

According to the existing data collected by Miami Dade County, the project area has the lowest percentage of tree canopy cover (10-15% UTC) .

Exploring the Green Canopy in Miami

Treepedia measures the canopy cover in cities. Rather than count the individual number of trees, it uses a scalable and universally applicable method by analyzing the amount of green perceived while walking down the street.

The Green View Index (GVI) was calculated using Google Street View (GSV) panoramas. This method considers the obstruction of tree canopies and classifies the images accordingly. By using GSV rather than satellite imagery, they represent human perception of the environment from the street level.



http://senseable.mit.edu/treepedia/greenindex/miami/kKLZiWoyp4ymp4NU0AG5ag

Tree Canopy

The Benefit of Urban Trees

Natural Carbon Eaters

When a tree breathes, it inhales carbon dioxide and exhales oxygen - the exact opposite of humans. As a tree matures, **it can consume 48 pounds of carbon dioxide per year** (among other greenhouse gases like ozone), and releases enough oxygen for one person to breathe for two years. Removing carbon dioxide from the atmosphere and releasing oxygen in its stead also helps limit global warming, providing for a cleaner, healthier climate

Energy Savers

The significance of the shade provided by trees cannot be understated.

Trees in an urban setting make temperatures in cities bearable. According the to EPA, **the shade from trees, in combination with the water vapor they release, can reduce peak temperatures by as much as 20–45°F (11–25°C) compared to unshaded areas.**

When shade is cast on an office building or home, internal temperatures can drop 8–10°F. Some estimates indicate the shade from a single tree can save the same amount of energy used to power 10 room-sized air conditioners for 20 hours a day.

This reduction in energy goes a long way when it comes to shrinking your carbon footprint because more than a third of U.S. carbon emissions are caused by the production of electricity.

Beyond Carbon Benefits

Helping reduce carbon emissions is only one aspect of how trees help improve our lives.

Trees have an incredible ability to absorb and retain water. As rainwater falls, much of it gets picked up by trees, preventing it from ending up in storm drains. **On average, a mature tree in a city can absorb up to 1,000 gallons of rainfall every year** that would otherwise need to be pumped and filtered, requiring additional energy.

In New York City, urban trees help retain nearly 900 million gallons of rainwater annually, saving the city more than $35 million dollars in stormwater management costs.

Trees also provide social, economic and health benefits. They create jobs, shelter, medicine and so much more. These more indirect benefits of trees help raise people out of poverty and achieve sustainable development ultimately improving our environment.

Trees in an urban setting make temperatures in cities bearable. According the to EPA, the shade from trees, in combination with the water vapor they release, can reduce peak temperatures by as much as 20–45°F (11–25°C) compared to unshaded areas.

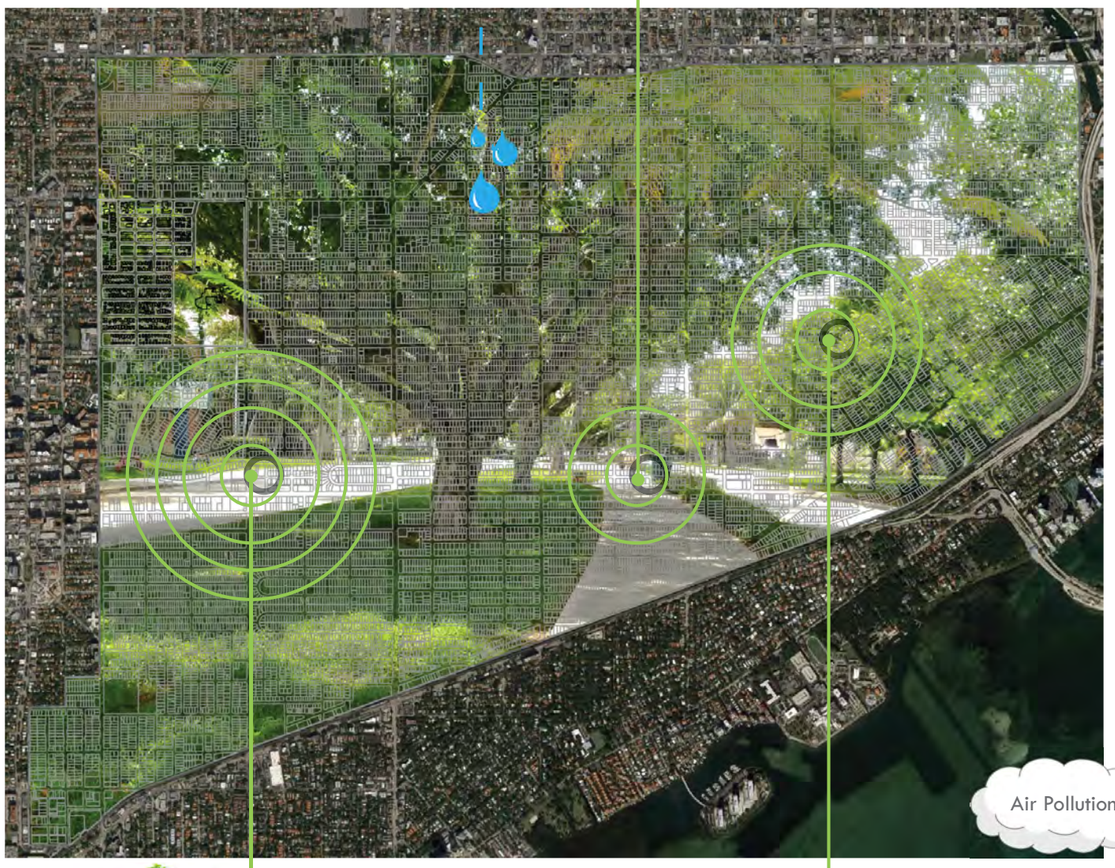
https://onetreeplanted.org/blogs/stories/planting-trees-reduce-carbon-footprint

Rainfall Capture

On average, a mature urban tree can absorb up to 1,000 gallons of rainfall every year that would otherwise need to be pumped and filtered, requiring additional energy.

Temperature Reduction

Strategic tree placement in urban areas can mitigate urban heat island effect, dropping temps as much as 20–45°F (11–25°C) compared to unshaded areas.



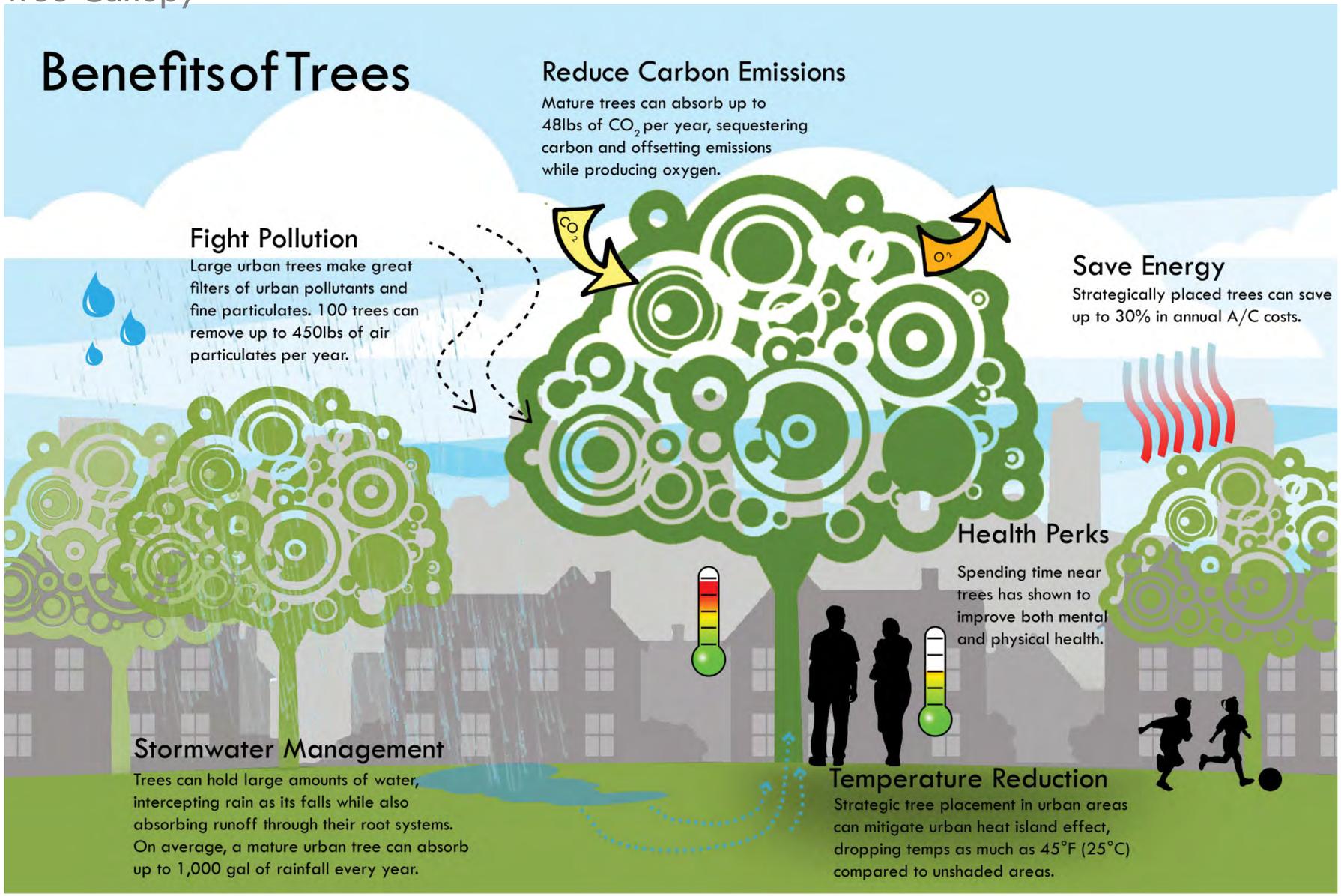
Reduce Carbon Emissions

Mature urban trees can absorb up to 48 lbs. of CO_2 per year sequestering carbon and offsetting emissions.

Fight Pollution

Large urban trees make great filters of urban pollutants and fine particulates while also regulating stormwater flow and water quality.

Graphic by Curtis + Rogers Design Studio



Graphic by Curtis + Rogers Design Studio

Public Outreach

C+R has developed easy to digest graphics for public outreach to educate the communities on the importance of trees.

Planting trees can help reduce our carbon footprint.

Large urban trees are excellent filters for urban pollutants and fine particulates. Spending time near trees improves physical and mental health by increasing energy level and speed of recovery, while decreasing blood pressure and stress. Trees properly placed around buildings can reduce air conditioning needs by 30% and save energy used for heating by 20–50%. Trees provide habitat, food and protection to plants and animals, increasing urban biodiversity...planting trees today is essential for future generations!

As a tree matures, it can consume 48 pounds of carbon dioxide per year (among other greenhouse gases like ozone), and releases enough oxygen for you to breathe for two years!

Tree Canopy

The Benefit of Urban Trees

Pavement is an urbanite's worst enemy in the summer. It traps the sun's rays in two ways: first, by absorbing the incoming sunshine, trapping heat and boosting the daytime temperature, then releasing that heat as darkness falls, preventing colder nighttime temps from cooling things off. This phenomenon, known as heat island effect, is a long-standing problem in urban areas with more asphalt, becoming increasingly problematic as global warming heats the planet more rapidly than ever before.

One method to mitigate the heat island effect has come out on top: that being trees. By blocking the sunlight and using evapotranspiration (in other words evaporating water from their leaves), trees cool the air around them.

How many urban trees do we need?

The answer is simple: More trees is almost always better. Understanding the relationship between the number of trees in a given area, and the overall cooling effect that amount of urban forest has is necessary. ***Some studies have shown at the city block level, it took at least 40 percent canopy coverage to counteract the warming effect of the asphalt. More coverage induces more of a cooling effect, but even at less than half the street shaded, cities were able to see real benefits.***

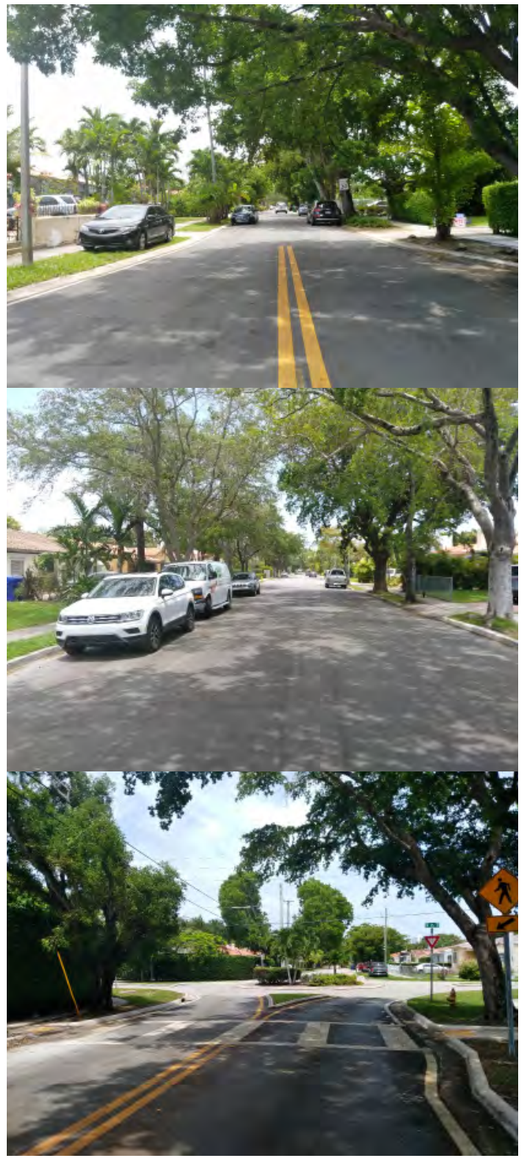
40 percent is an over all number however, the degree to which a tree can help cool the air depends on the percent of impervious ground cover there is—more pavement works against the trees cooling effect. With three-quarters of a low-pavement area covered, we could see more than 2.5°C in cooling, but that level was unachievable on blocks with mostly asphalt. Most of the effects seen were smaller, more on the degree of 0.5 to 1.0°C.

This does not, however, mean the addition of trees is insignificant. The benefits that various blocks saw increased by 0.2 to 0.6°C on the hottest summer days, amplifying the effect on days when residents would be most likely to have health problems from the heat (and to up their energy consumption). Additionally, planting trees had proportionally higher effects than did reducing the impervious surfaces on a street. As most cities are less likely to remove asphalt the addition of canopy can be another solution for reducing heat.

The best thing, of course, would be to eliminate as much pavement as possible while also installing more trees. In lieu of that ideal world, focusing on those areas with the lowest canopy coverage initially is encouraged rather than try to help already-shady blocks. As we combat climate change, we have to be aware of the socioeconomic and racial inequities already plaguing cities. Low income areas with high proportions of minorities generally have less access to green space already, whereas wealthy neighborhoods tend to have much higher vegetation coverage. To create the biggest and most equitable impact, planting trees must start in areas that don't already have them.

https://www.popsci.com/shade-city-streets-trees-cooling/

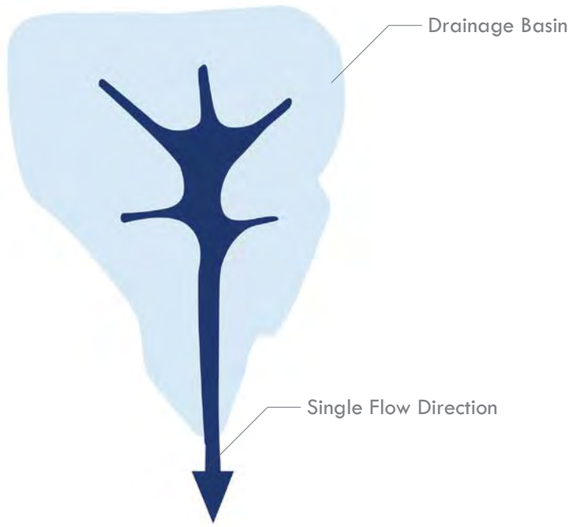
Research notes that the best strategy would be to cover as much of the site as possible in greenery, but even planting more trees along a single block produced measurable cooling. Strategically placing trees to shade yards, walking paths, and even the insides of homes can make a significant difference for the experience of residents.



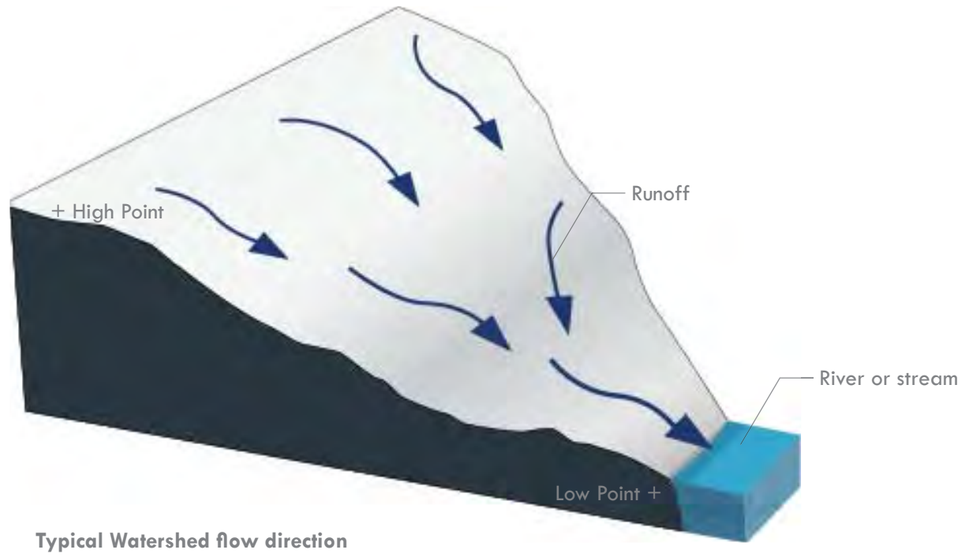
WATERSHED MAPPING

Watershed Morphology

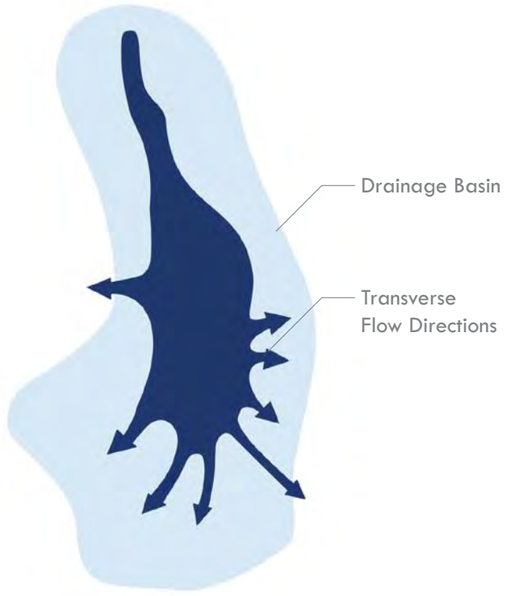
We typically think of watersheds as areas bounded by a ridgeline, with a recognizable high point and a singular low point, and a well-defined, uniform flow of water from uphill to downhill. Miami's geomorphology gives rise to unique watersheds, often having multiple, subtle transverse flowlines. The hydrology of the everglades, in concert with the porous geology of the Miami region and the influence of tidal pressure, creates a complex relationship between land and water and between saltwater and fresh water. Water moves with the tides, and from east to west along glades or sloughs.



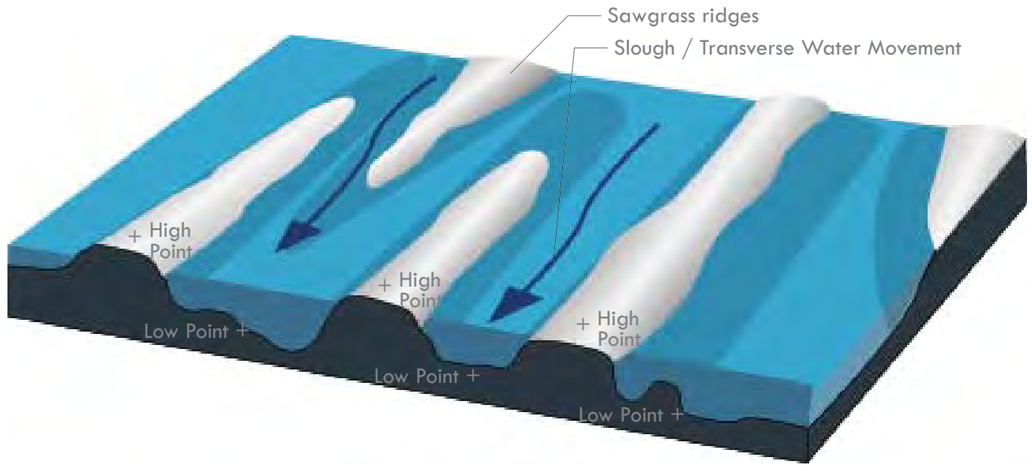
Typical Watershed plan diagram



Typical Watershed flow direction



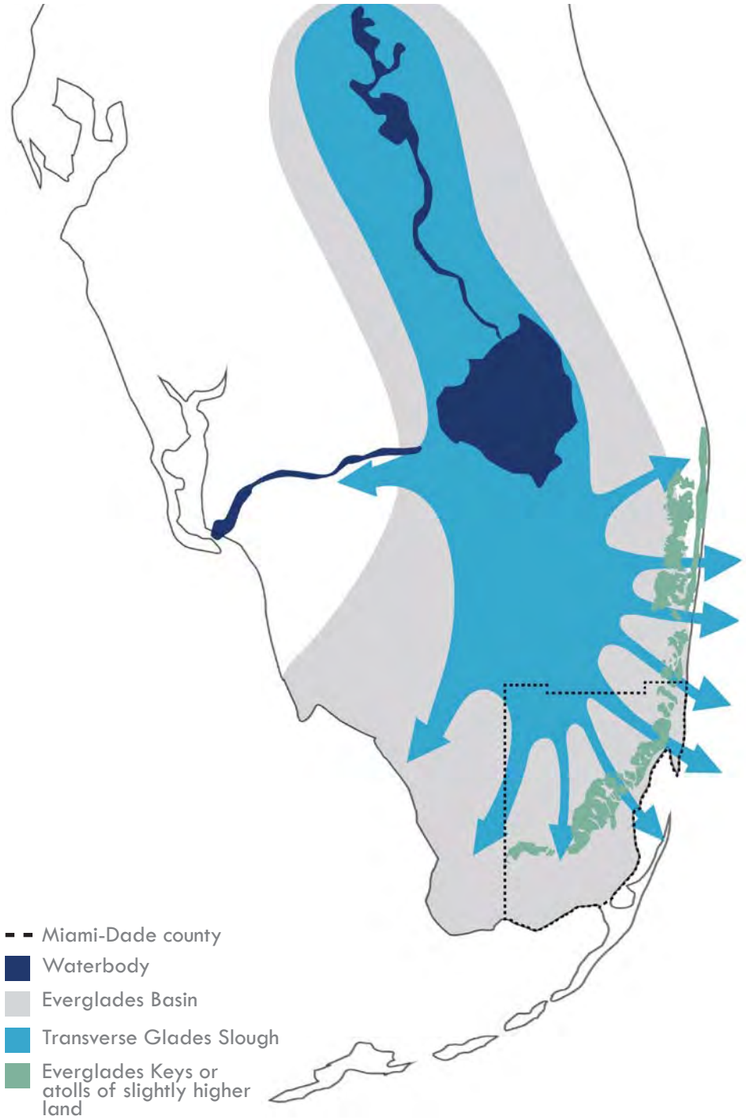
Everglades Watershed plan diagram



Everglades Watershed flow direction

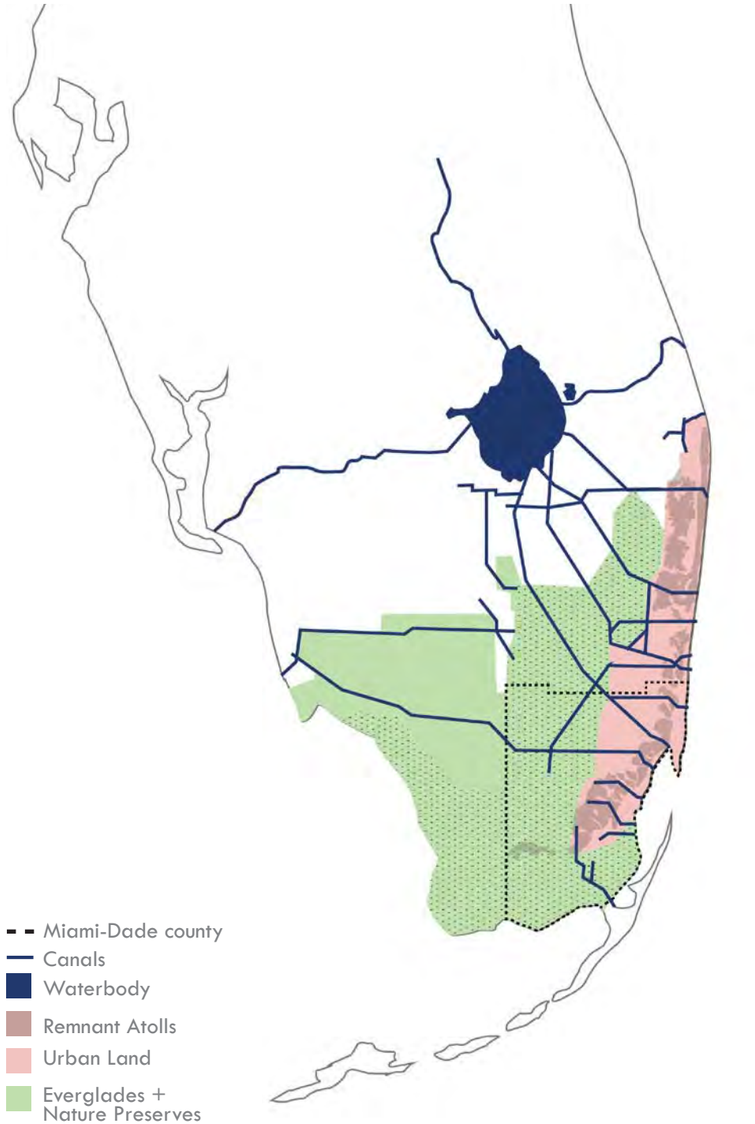
Source: Analytic graphics generated by LOLA

Geographic Context



19th Century Everglades

As the Miami region developed, vast extents of the Everglades were drained, lowlands filled, and transverse waterways channelized into present-day canals. Despite these dramatic alterations to the natural hydrology, during extreme weather and high tides, the historic network of transverse glades still asserts itself. A careful study of the topography reveals a chain of higher "Everglades Keys" rising above the lower sloughs. These subtle changes in elevation are barely noticeable but play a vital role in shaping the city's flood vulnerabilities.



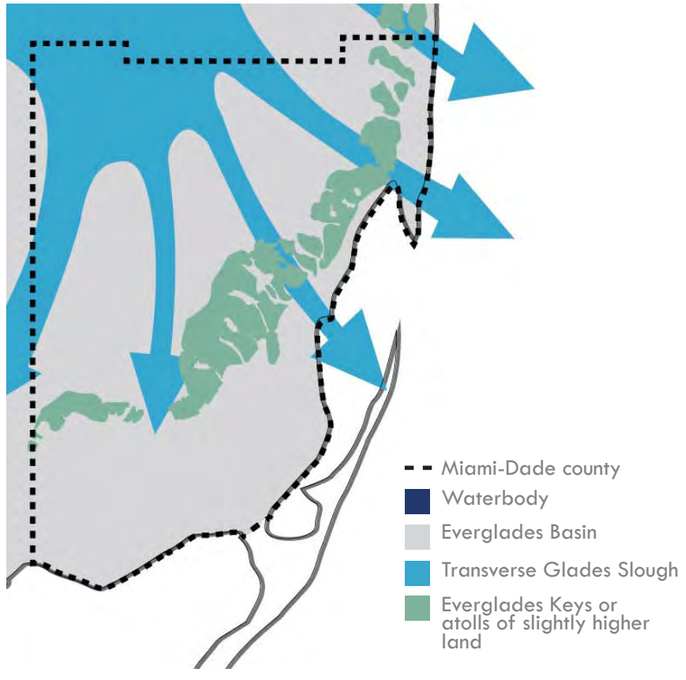
Current day Everglades

Source: Analytic graphics generated by LOLA

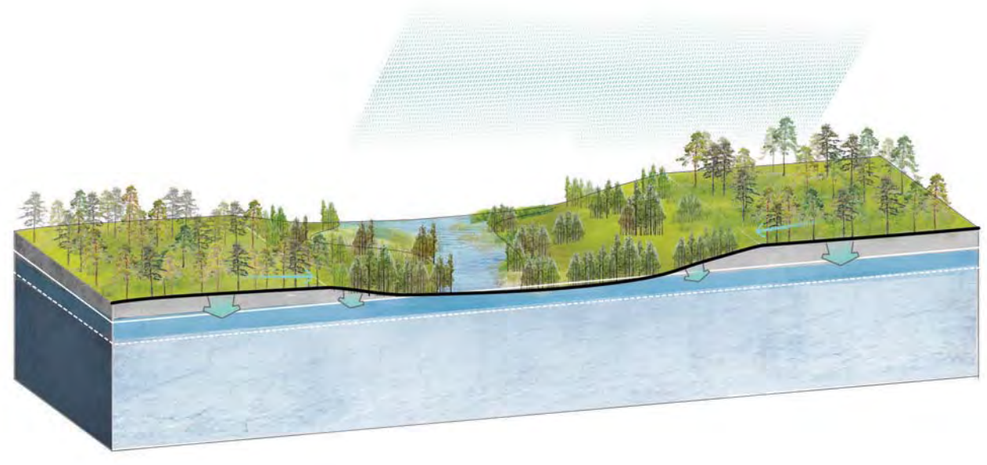
Urbanization and Low-land Vulnerabilities

A comparison between the 19th century hydrology of Miami-Dade County and the current patterns reveal how the movement of water has changed due to wide-scale drainage of the Everglades. As urbanization expanded, the hydrology system was altered to create additional areas for urban infill.

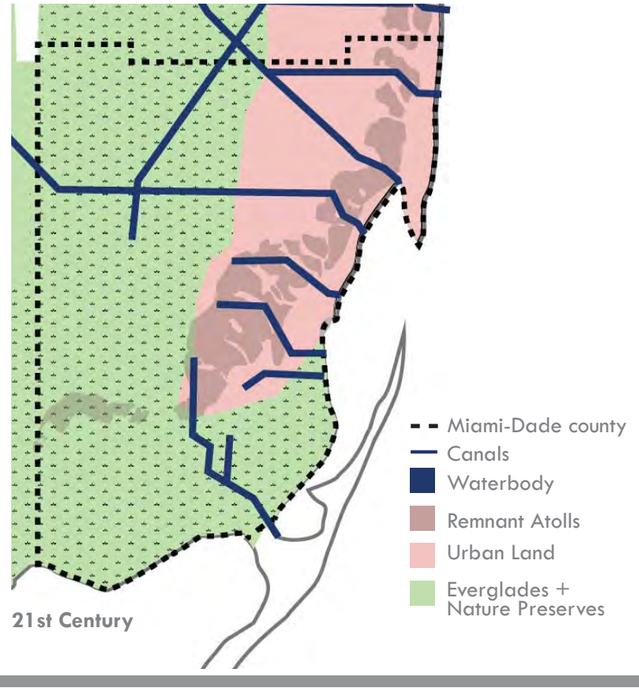
However, with urbanization comes an increase in impervious surfaces. Fast-moving runoff flows toward these lower areas of infill, jeopardizing homes built within the former sloughs. As a result, these areas are vulnerable to flooding even during minor rain events.



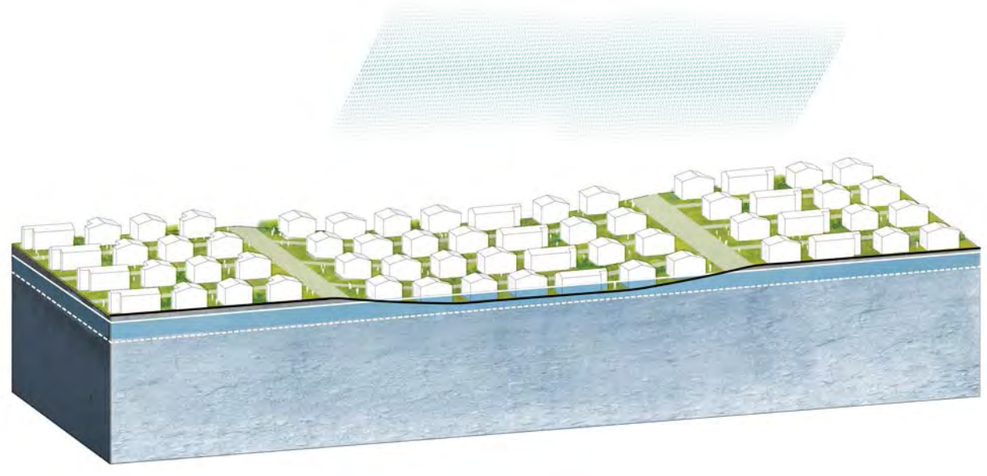
19th Century



19th Century Slough



21st Century

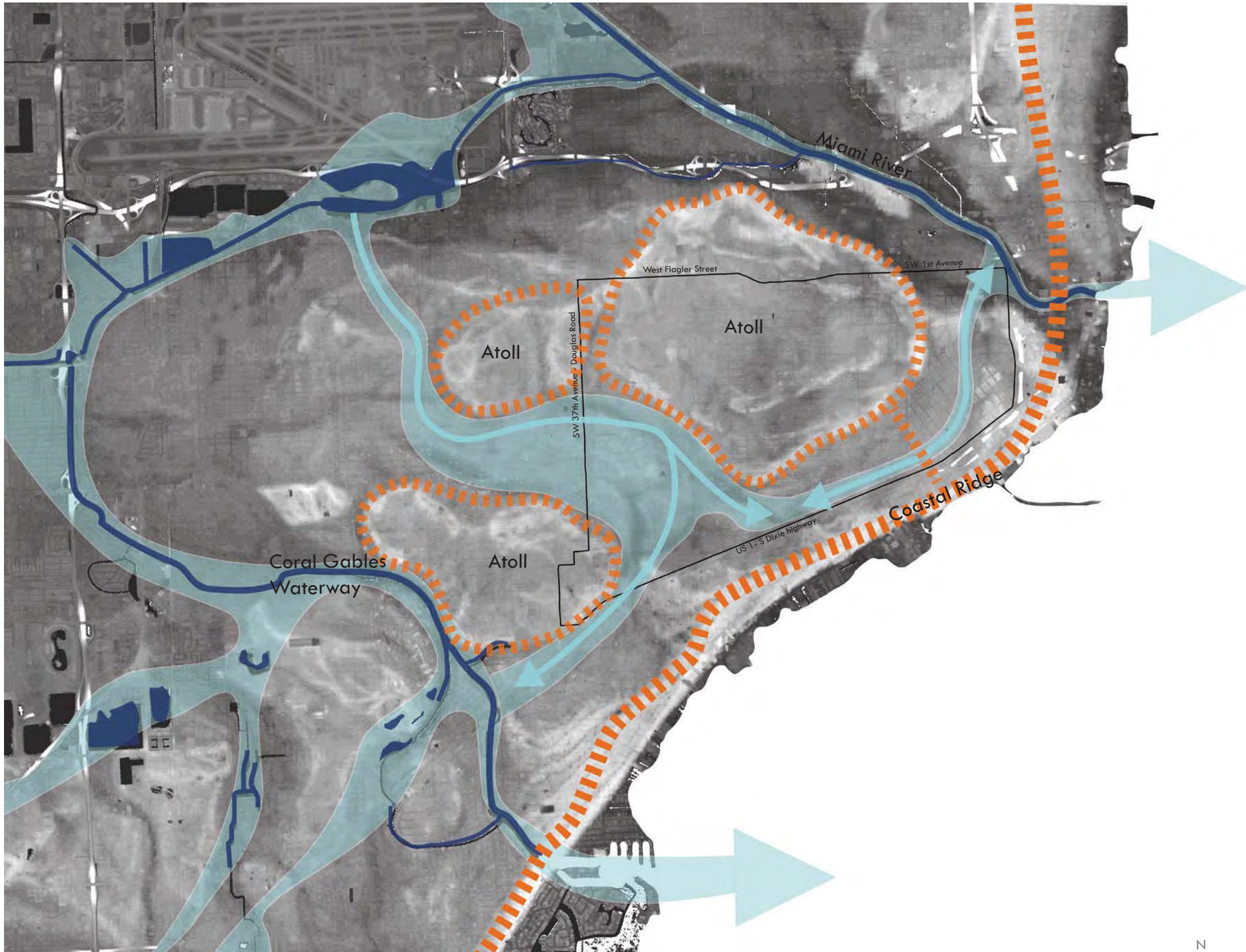


20th Century Slough

Source: Analytic graphics generated by LOLA

Study Area Vulnerabilities

The study area is not only defined by street grids and neighborhood boundaries, but also by the surrounding contextual landforms and related hydrology. The relative high ground of the study area is due to its location within the remnant Everglade Keys. Higher ground is protected from immediate risks of coastal flooding and sea level rise, but transverse water movement persists due to the geology of the Everglades watershed. Within the study area we can see subtle elevations and depressions that illustrate how water moved in pre-development sloughs. The remnants of atolls and sloughs reveal specific vulnerabilities within the study area boundary.

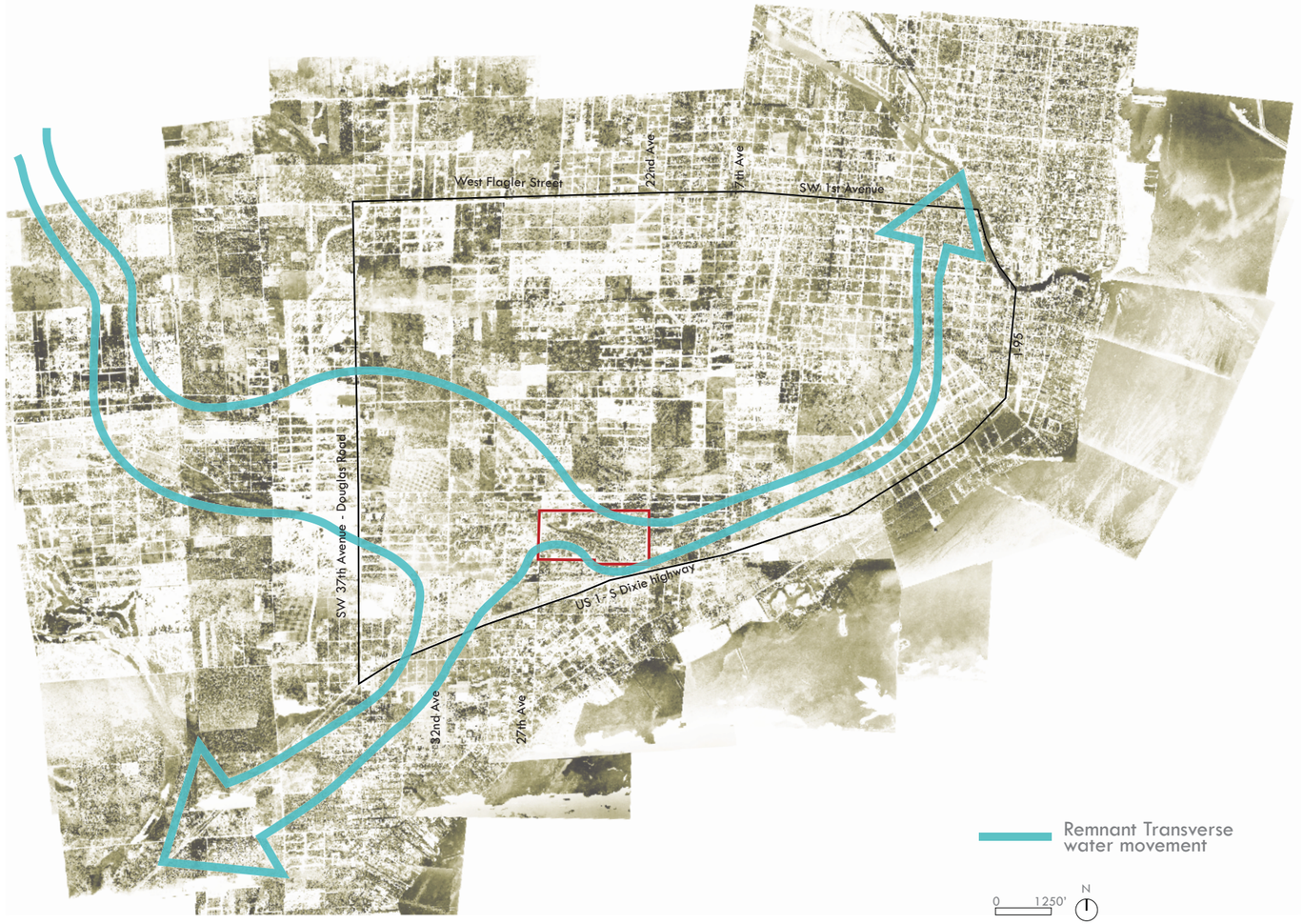


Source: Hydrology flow study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

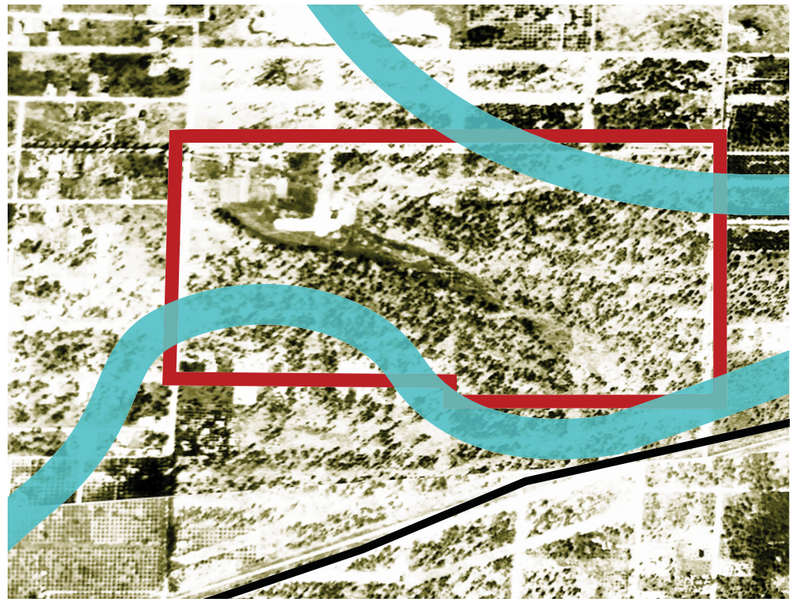
Urbanization Patterns

A compilation of historic images of the study area shows the pattern of development over time. In 1924, undeveloped land and farmland was concentrated in the southeast. Smaller communities filled in between the low lands, largely avoiding flood prone areas.

Today, the former tracts of open space have been developed with a continuous street grid that does not differentiate between low and high land.



Composite images of 1924 Aerial photographs



1924 Aerial

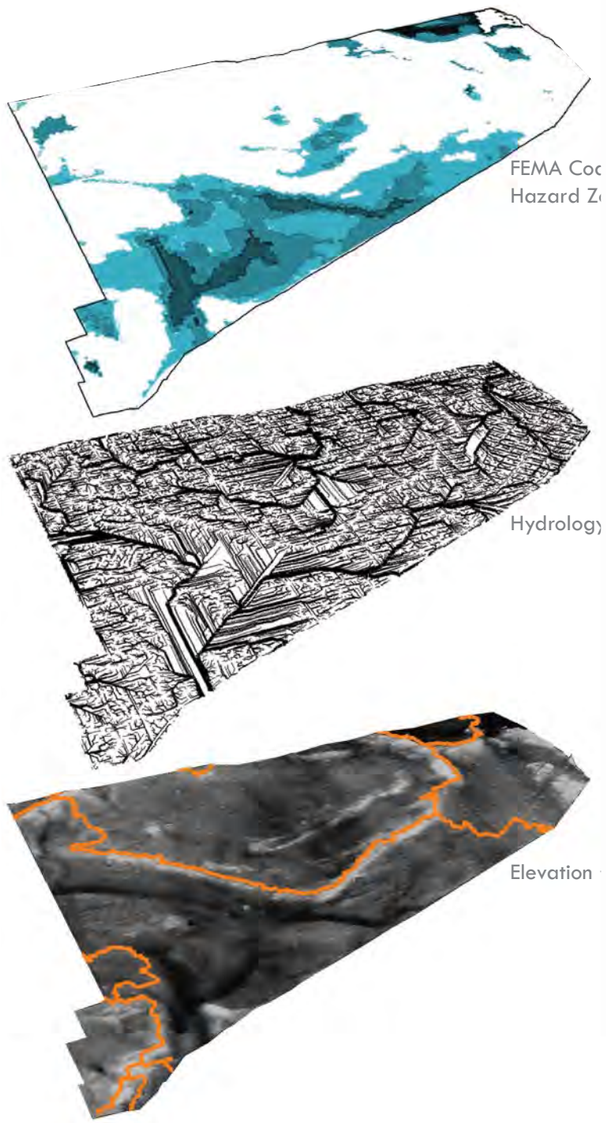
2019 Aerial

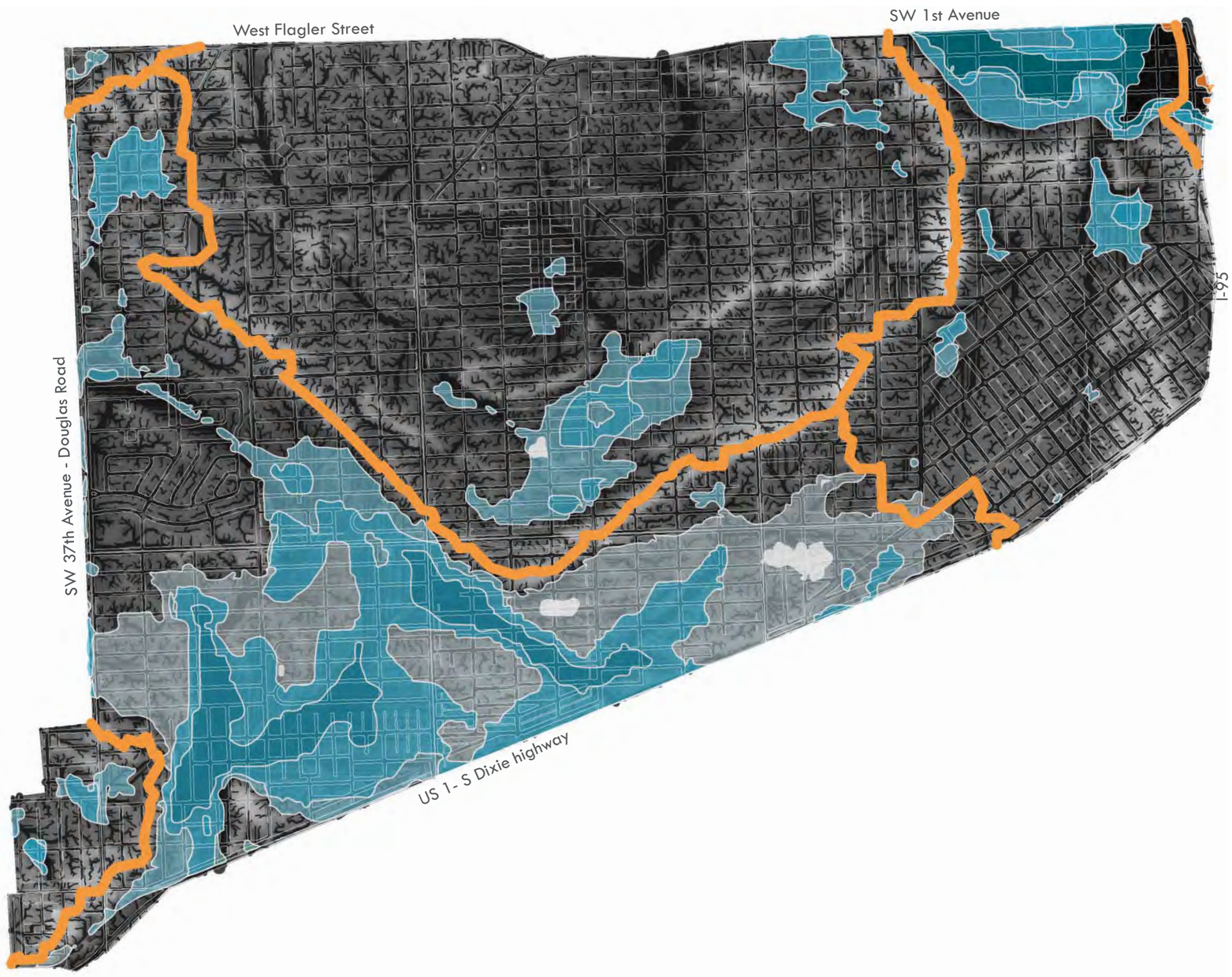
1924 aerial photo
Source: Miami-Dade Public Library Aerial Image Tiles, LOLA generated compiled image and slough areas.

0 1250' N

Hydrology Modeling

Using computer-generated analysis tools to accurately model the existing hydrology, we can see how even slight variations in topography greatly affect the movem water. Flood risk zones (as designated by FEMA) ov the pre-development sloughs, and the boundaries c form ridgelines, creating distinct sub-watersheds.



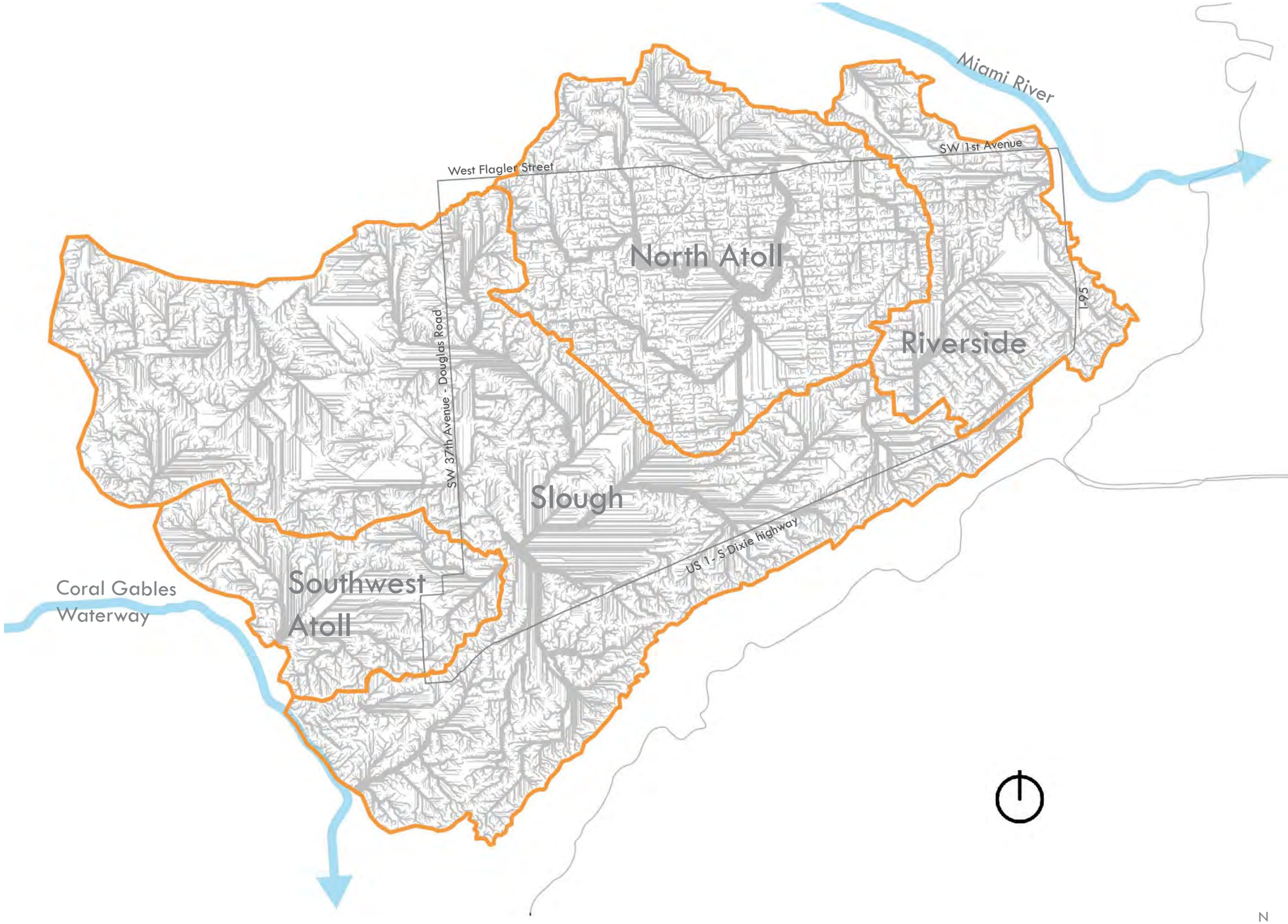


Source: 1. Hydrology flow study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA
2. Coastal Hazard data generated by FEMA

N
0 1250'

Study Area Watersheds

Four watersheds, outlined by ridges, occur within the study area and extend beyond its boundary. The hydrology of each is unique. We have analyzed each watershed to understand how the neighborhoods in the study area are interlinked by hydrology.



Source: Hydrology flow study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

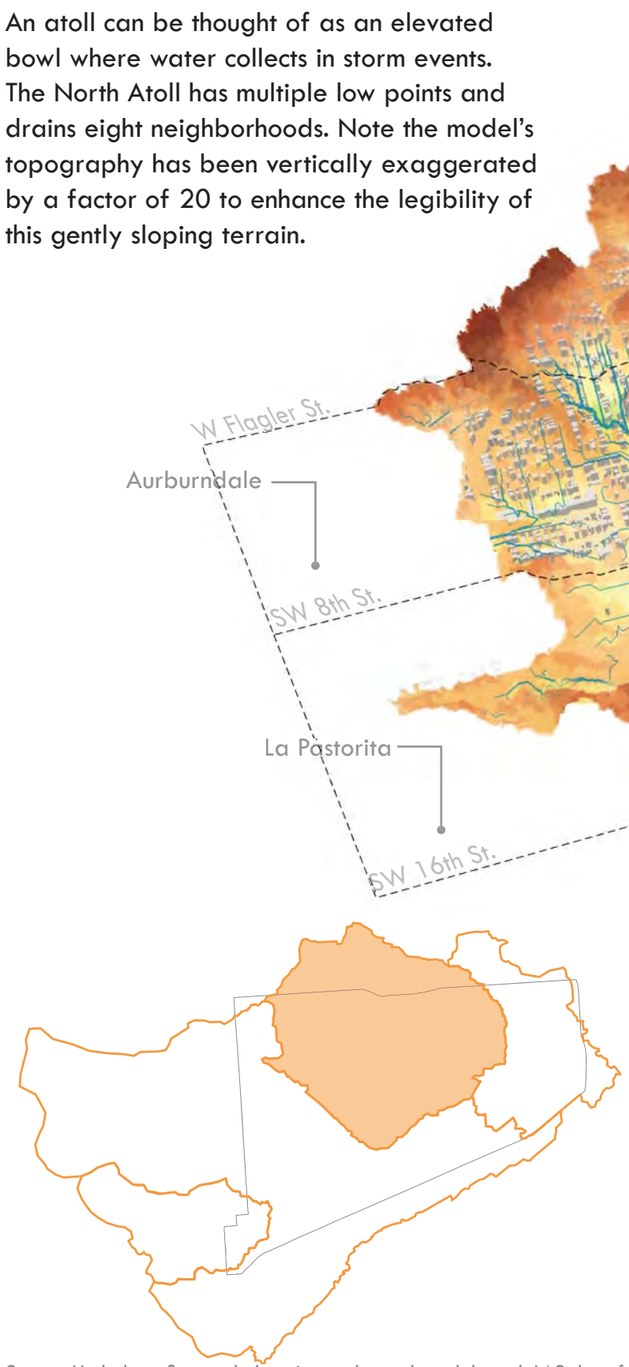
Elevation Map

LIDAR mapping provides a high-resolution, three-dimensional picture of the topography. Low points are shown in light green, while ridges and high points appear orange or red.

Source: 1. Hydrology flow study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

North Atoll Watersheds

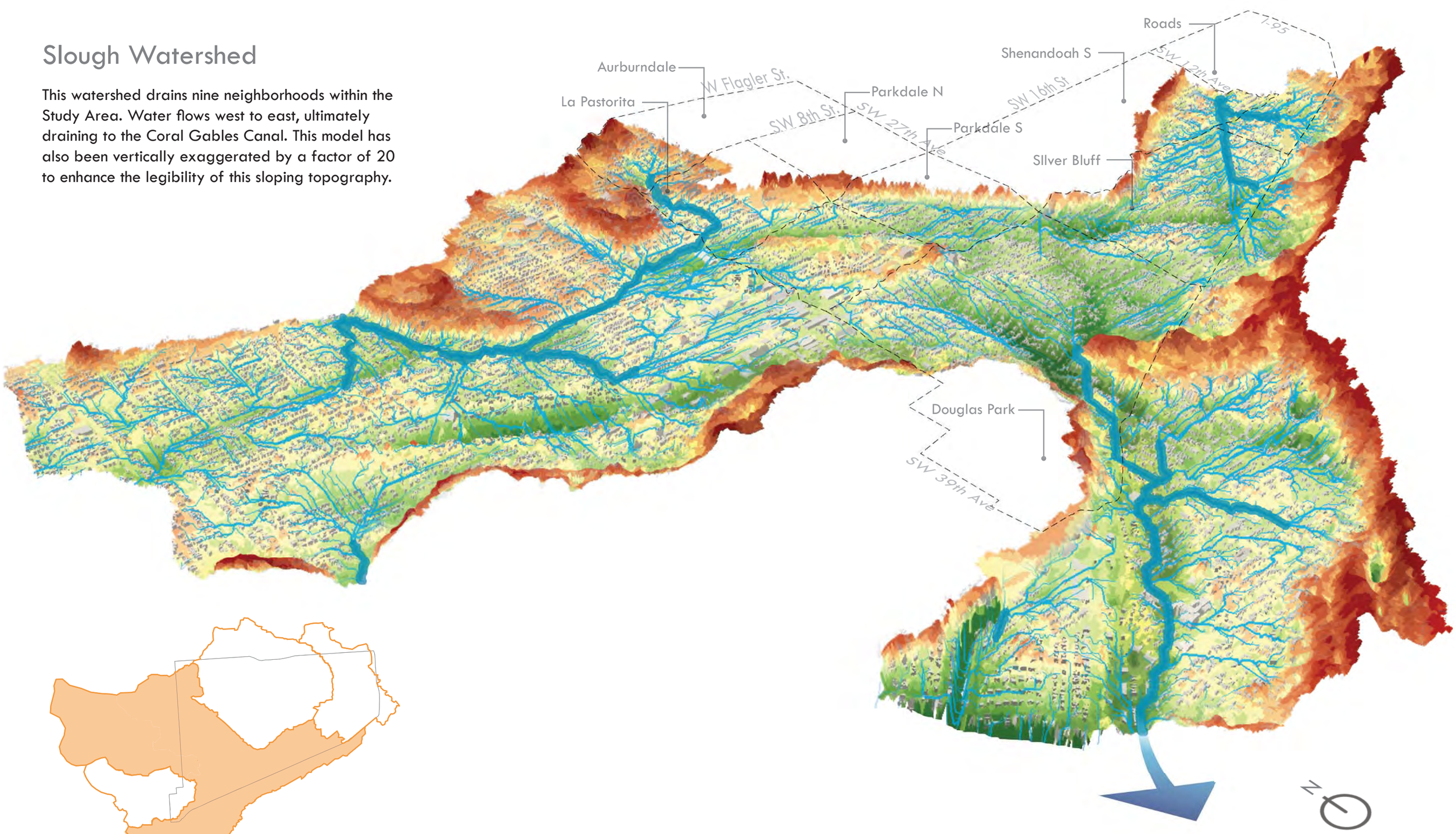
An atoll can be thought of as an elevated bowl where water collects in storm events. The North Atoll has multiple low points and drains eight neighborhoods. Note the model's topography has been vertically exaggerated by a factor of 20 to enhance the legibility of this gently sloping terrain.



Source: Hydrology flow and elevation study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

Slough Watershed

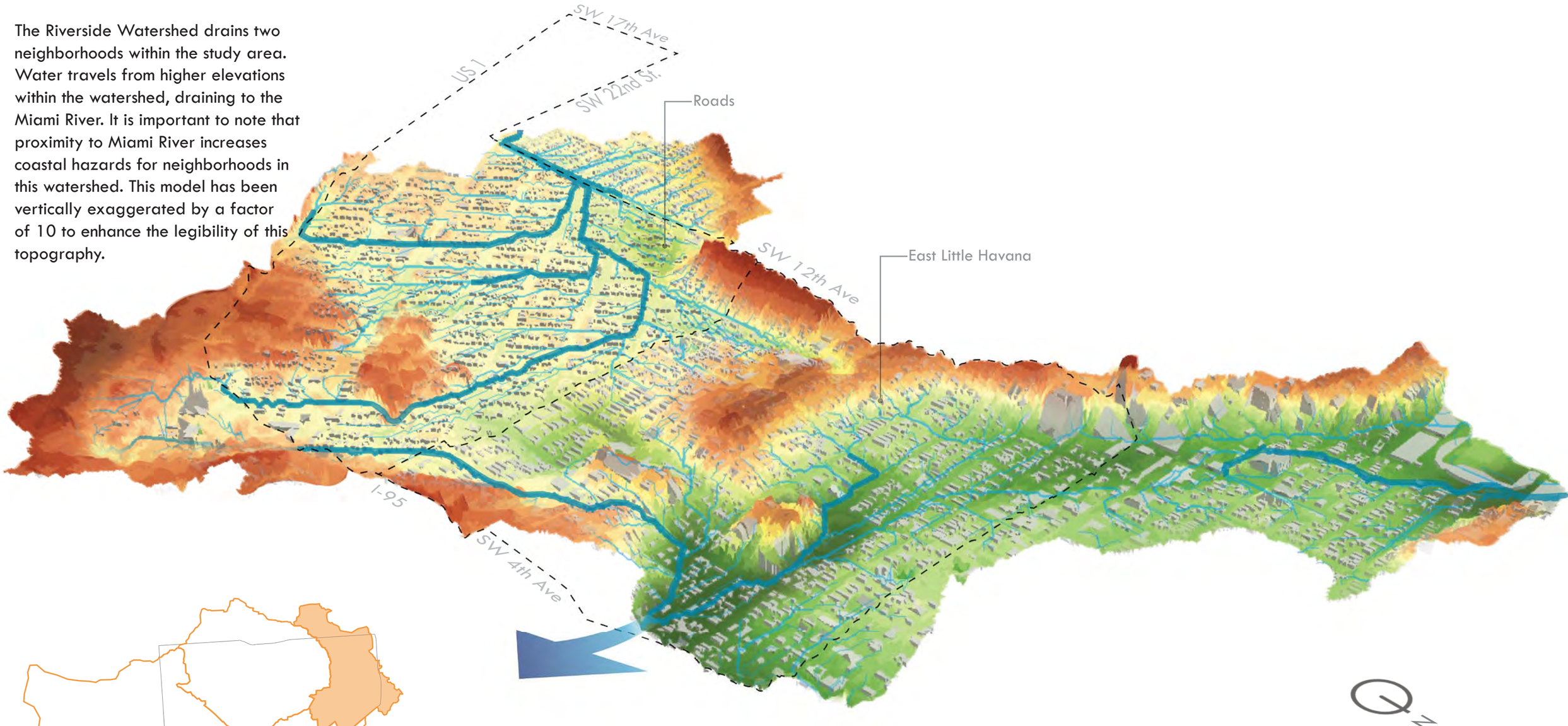
This watershed drains nine neighborhoods within the Study Area. Water flows west to east, ultimately draining to the Coral Gables Canal. This model has also been vertically exaggerated by a factor of 20 to enhance the legibility of this sloping topography.

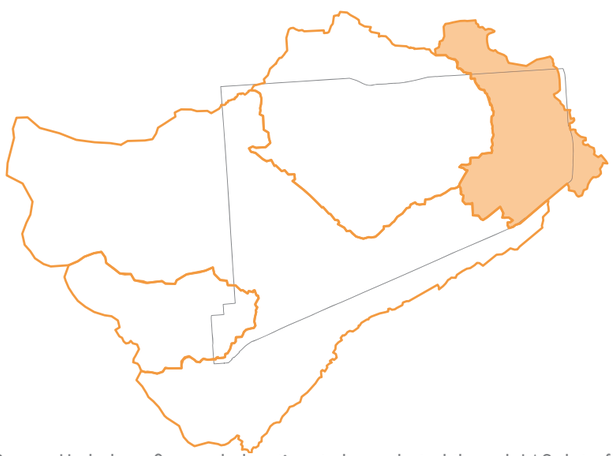


Source: Hydrology flow and elevation study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

Riverside Watershed

The Riverside Watershed drains two neighborhoods within the study area. Water travels from higher elevations within the watershed, draining to the Miami River. It is important to note that proximity to Miami River increases coastal hazards for neighborhoods in this watershed. This model has been vertically exaggerated by a factor of 10 to enhance the legibility of this topography.

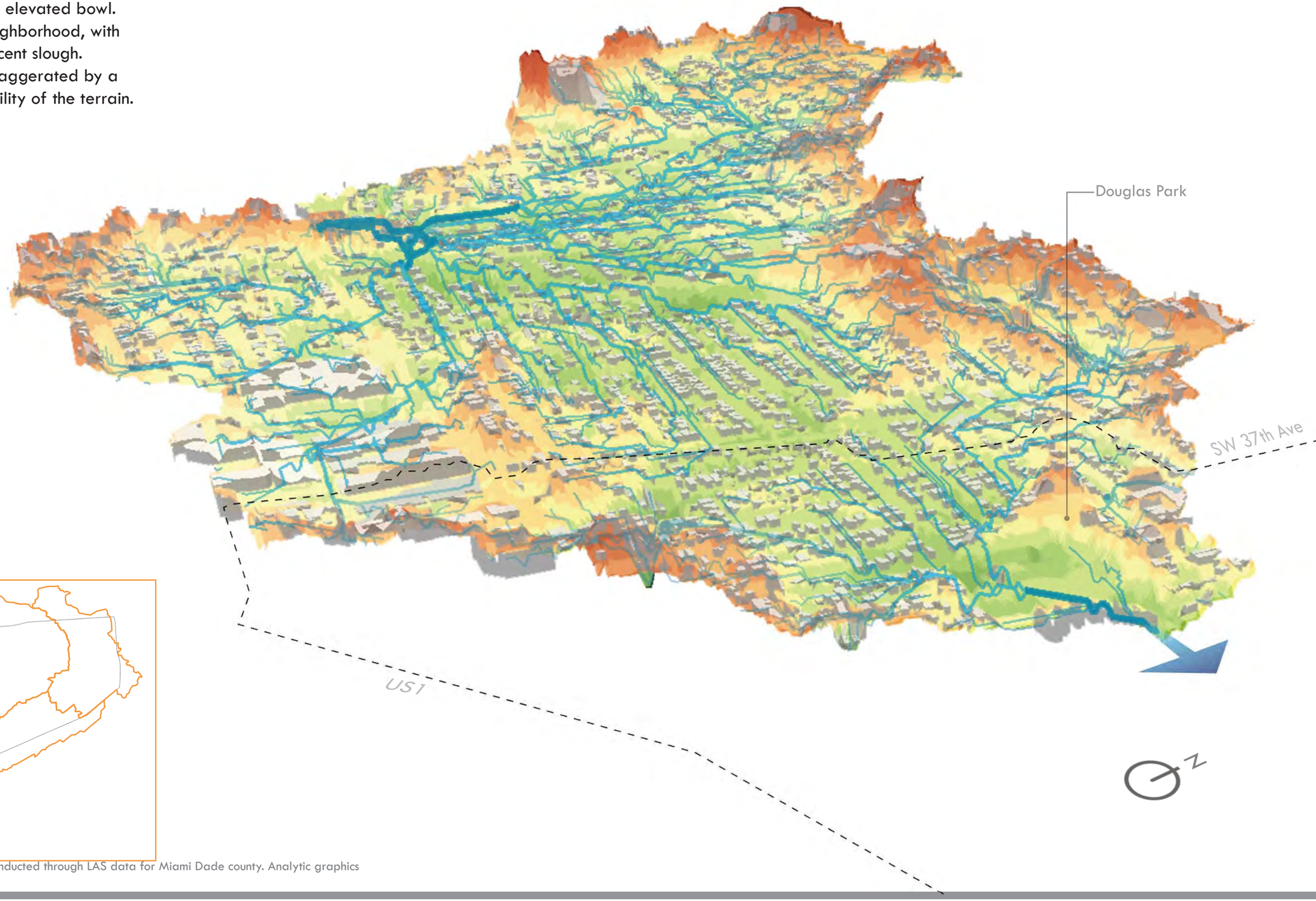


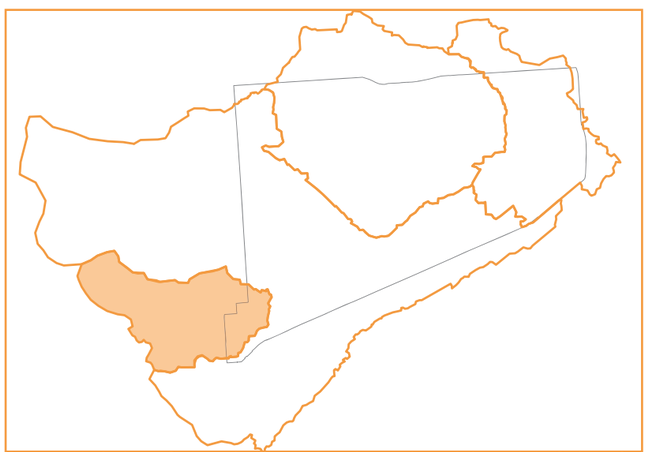


Source: Hydrology flow and elevation study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

Southeast Atoll Watershed

This watershed is another atoll, or elevated bowl.
The watershed drains a single neighborhood, with storm water flowing into the adjacent slough.
This model has been vertically exaggerated by a factor of 15 to enhance the legibility of the terrain.

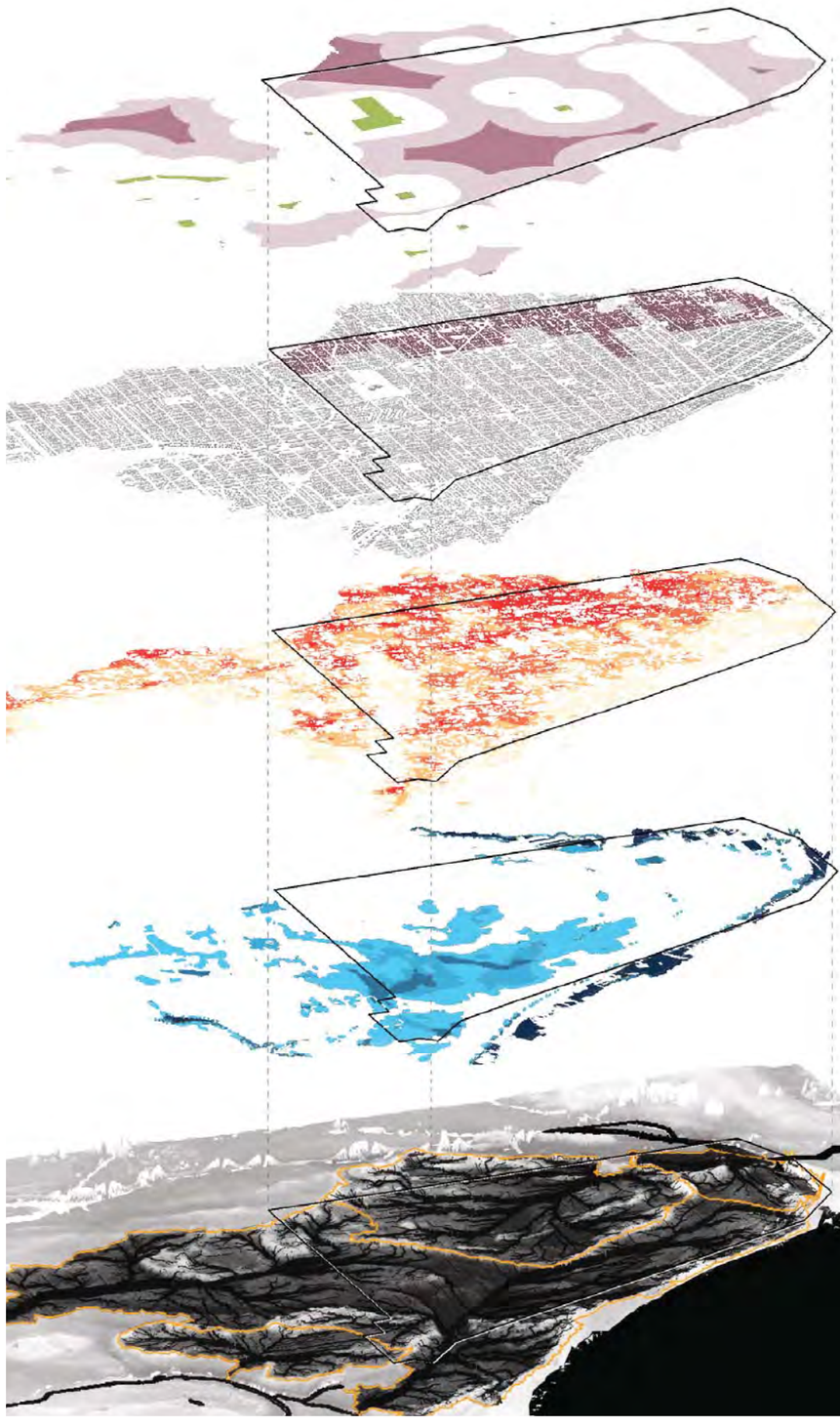




Source: Hydrology flow and elevation study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

Synthesis of Priorities

Investment in streetscape improvements within the study area can be prioritized based on what we have learned about the hydrological function of the watersheds, to maximize positive change through implementation of green infrastructure. We can also look beyond hydrological function to seek ways to impact other aspects of the urban ecology, climate mitigation, and public health. In this way, our investment in the streetscapes of Southwest Miami can have broad-reaching benefits.



Areas underserved by open space

Area Median Income below $25,000

Urban Heat Island

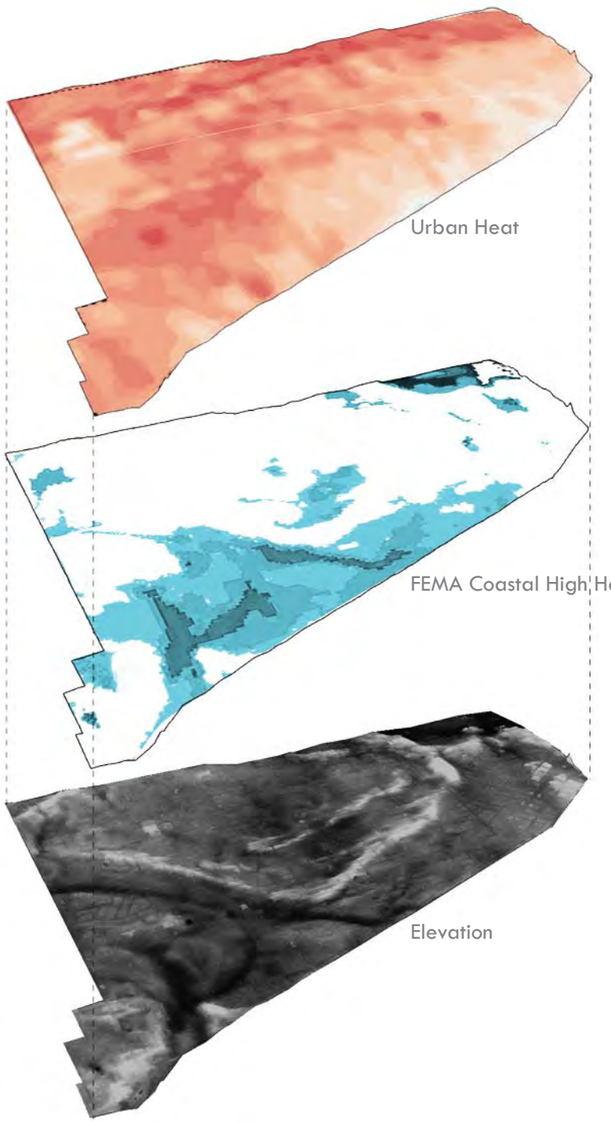
FEMA Coastal High Hazard Zones

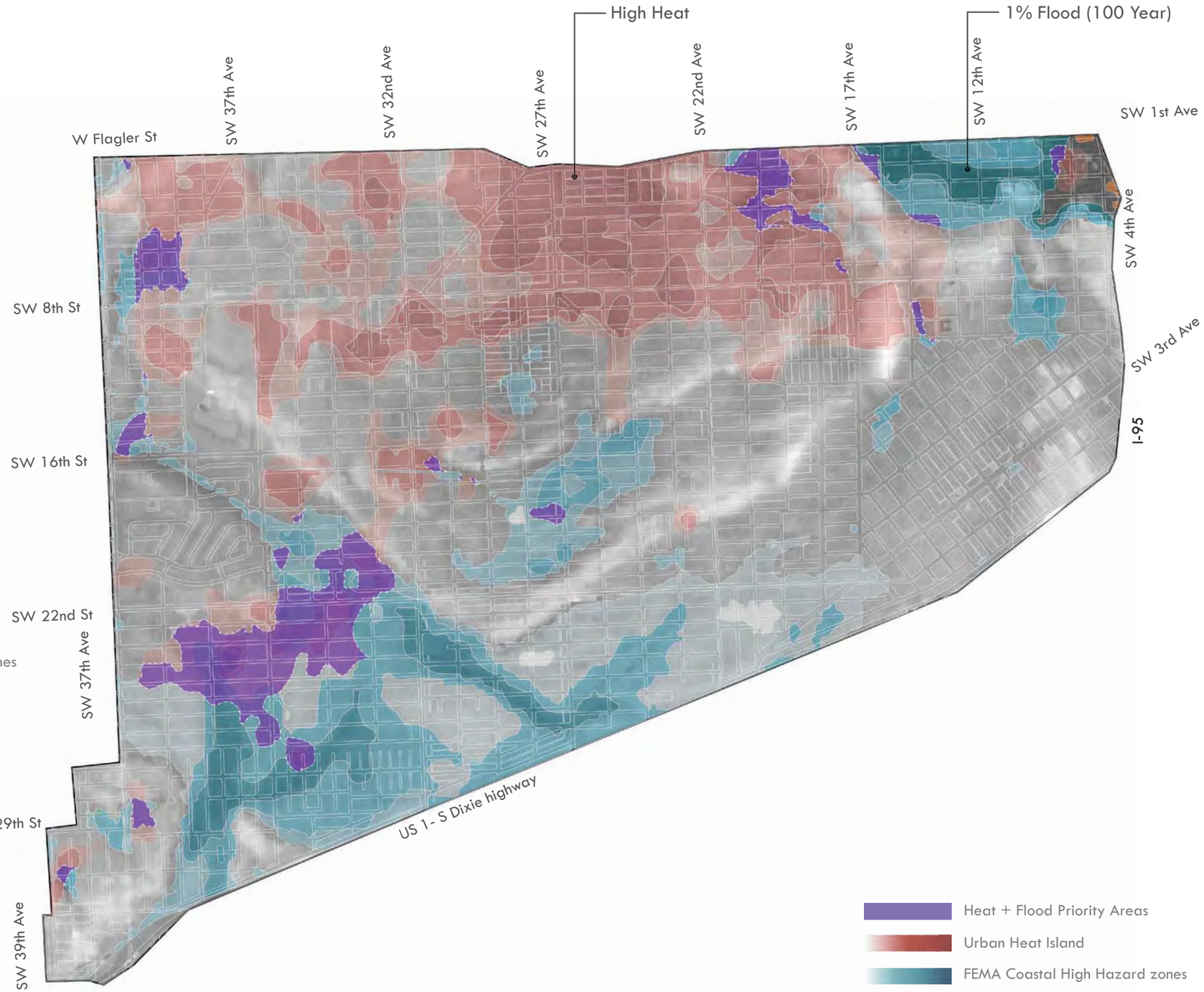
Hydrology and Elevation

Source: 1. Hydrology flow and elevation study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA
2. Coastal Hazard zones generated by FEMA
3. Urban heat data obtained from Climate Central, graphics created by LOLA

Urban Heat Island and Flood Risk

Where areas with elevated urban heat risks overlap with areas of flood risk, green and blue infrastructure in the streetscape can have multiple benefits. Increasing porosity and infiltration buffers temperature spikes and mitigates storm surges.

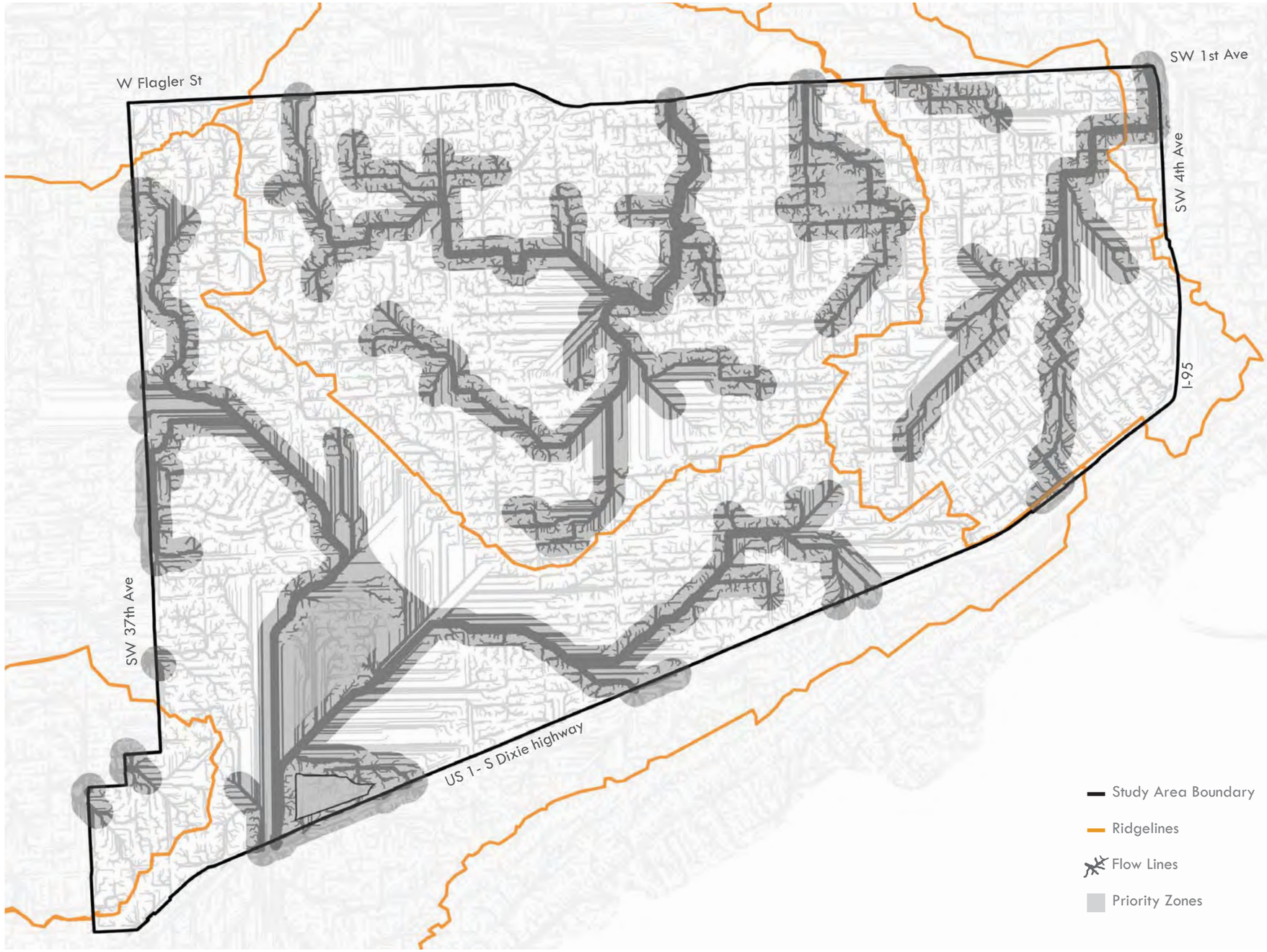




Source: 1. Hydrology flow study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA
2. Coastal Hazard data generated by FEMA

Inter-Agency Decision Making Framework

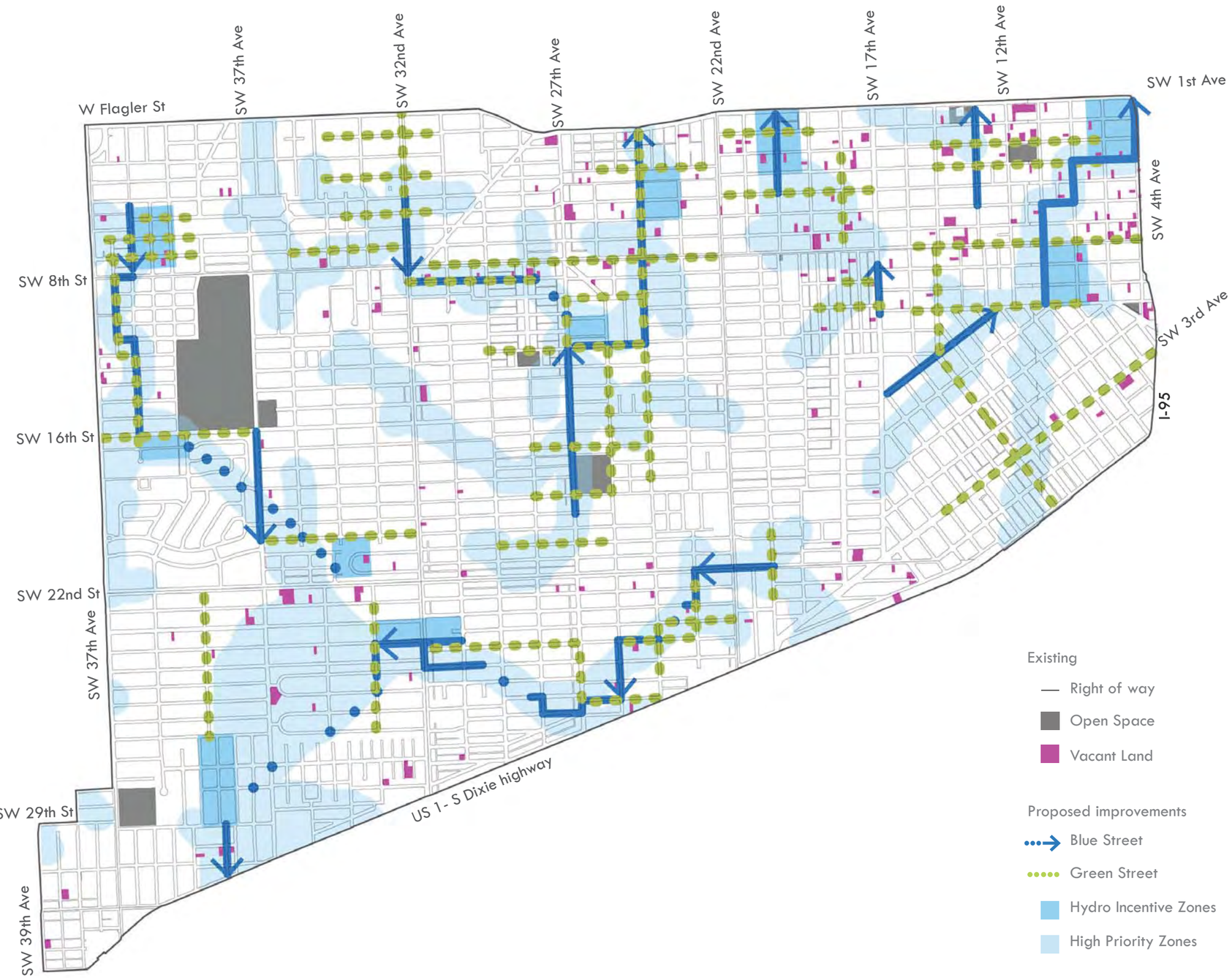
This map highlights **1528 Acres** of priority zones, covering approximately **35%** of the total study area. Designating this priority zone as a jurisdictional boundary can serve as a tool for incentivizing sustainable and resilient interventions where the public investment will have the most impact.



Source: Hydrology flow study conducted through LAS data for Miami Dade county. Analytic graphics generated by LOLA

Implementation Strategies

Implementation of blue and green streetscape adaptations should follow the hydrology. Blue streets, which convey water flow, and green streets, which allow infiltration, are deployed throughout the Priority Zone to mitigate downstream flash flood risks. The lowest and wettest areas within the Study Area are targeted for incentives to encourage investment beyond the right-of-way limits, so that improvements on private property leverage the public interventions.



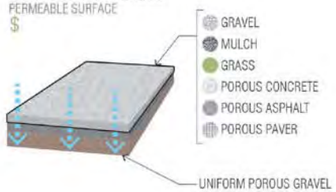
Source: 1. Analytic graphics generated by LOLA
2. Heat map data generated by Climate Central, graphically analyzed by LOLA

Blue-Green Infrastructure Toolkit

Water can be collected, stored and slowed down by various methods and at a range of scales. Providing options at different price points illustrates a path toward accessible and incremental change. The methods shown can be deployed as appropriate to the context, budget, available right-of-way, and community interests.

GREEN STREET

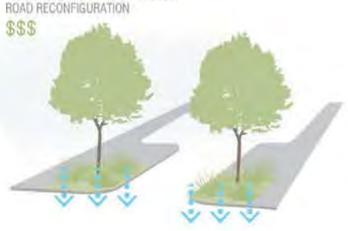
MULTI-SURFACE POROUS
PERMEABLE SURFACE
$



STREET TREE
PLANTED IN POROUS STRUCTURAL SOIL
$$

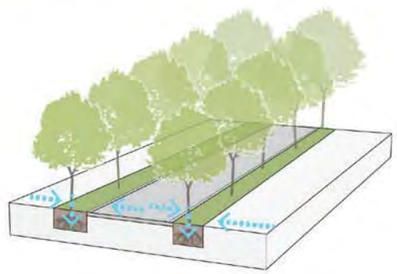
STREET TREE CLUSTER
PLANTED IN POROUS STRUCTURAL SOIL
$$

INTERSECTION BUMP-OUTS
ROAD RECONFIGURATION
$$$

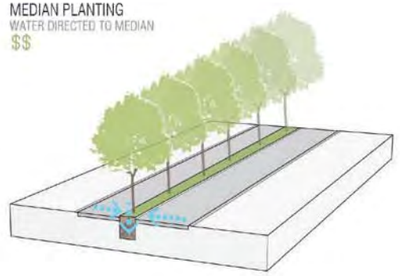


BLUE STREET

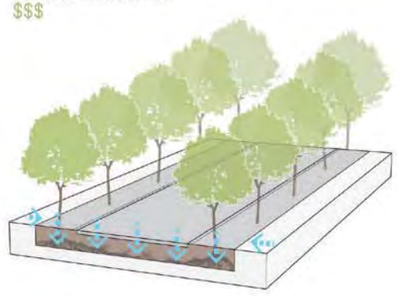
STREET WITH ROADSIDE BIOSWALE
WATER DIRECTED TO BIOSWALES
$



MEDIAN PLANTING
WATER DIRECTED TO MEDIAN
$$



EXCAVATED STREET WITH STRUCTURAL SOIL
CONTINUOUS POROUS SURFACE
$$$

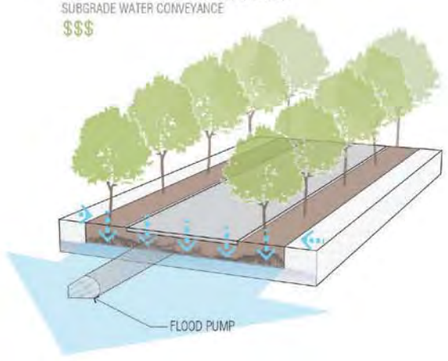


FLOODPLAIN

LIVING PUMP STREET TREE PLANTING
PLANTED IN POROUS STRUCTURAL SOIL
$

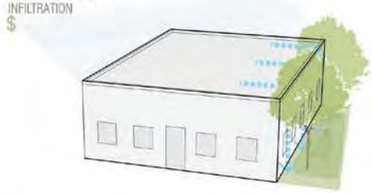
FLOOD PUMP ADJACENT CLUSTER PLANTING
PLANTED IN POROUS STRUCTURAL SOIL
$$

FLOOD PUMP ADJACENT BLUE STREET
SUBGRADE WATER CONVEYANCE
$$$

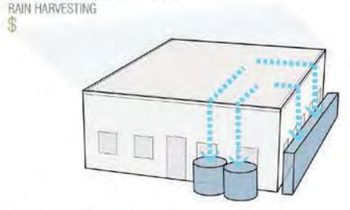


BUILDING

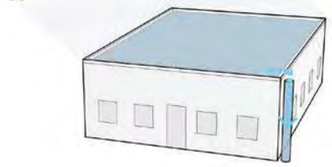
RAIN GARDEN
INFILTRATION
$



RAIN COLLECTION BARRELS
RAIN HARVESTING
$



BLUE ROOF WTTH CISTERN
WATER STORAGE
$$



GREEN ROOF
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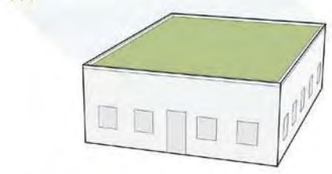


VACANT LOT GREEN INFRASTRUCTURE
RAIN GARDEN
$$$$

Source: Analytic graphics generated by LOLA

Adapting Tree Planting Standards to Mitigate Vulnerabilities

Current tree planting standards do not address the many opportunities for street trees to serve as networked green infrastructure. A healthy tree can absorb storm water and transfer moisture into the air. This ameliorates urban heat impacts and reduces vulnerabilities from flash floods and groundwater surges. The proposed planting standards provide adequate soil for trees to grow to maturity, allow deep- and wide-rooting of the trees to stabilize against hurricane winds, and connect the root systems of multiple trees underground, operating as a connected urban ecosystem.

Roots uplifting pavement

Unstable roots increase emergency cost of clearing roads

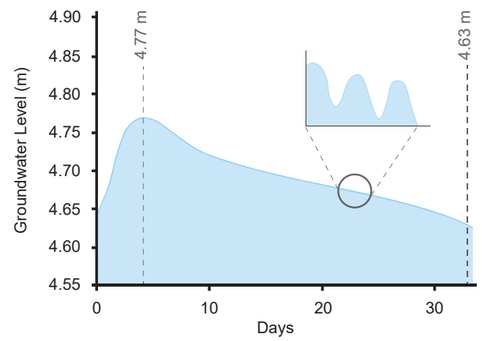
Existing

- Tree does not grow to mature size, becomes unhealthy
- Shallow roots with unstable canopy increase maintenance and emergency clearing cost after wind storms
- Root guard causes roots to grow under the pavement creating pavement damage. It also isolates the roots
- No connection to groundwater

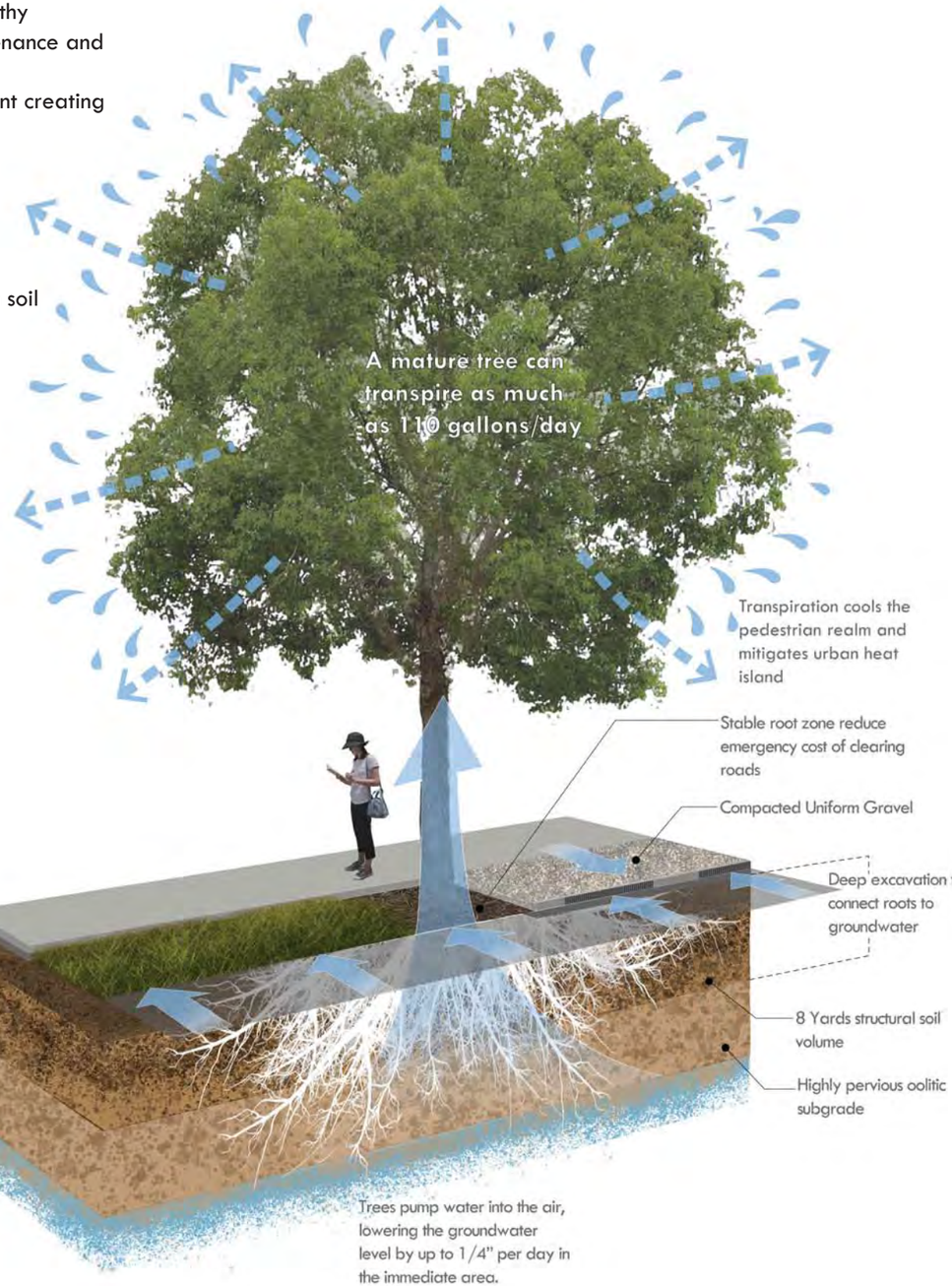
Proposed

- Tree grows to its mature size, robust canopy
- Deep roots stabilize canopy against wind
- Root system is connected to other microorganisms in soil that allows nutrient flow and reduces maintenance
- Connection to groundwater to lower water table

Effect of Evapotranspiration on Groundwater Level



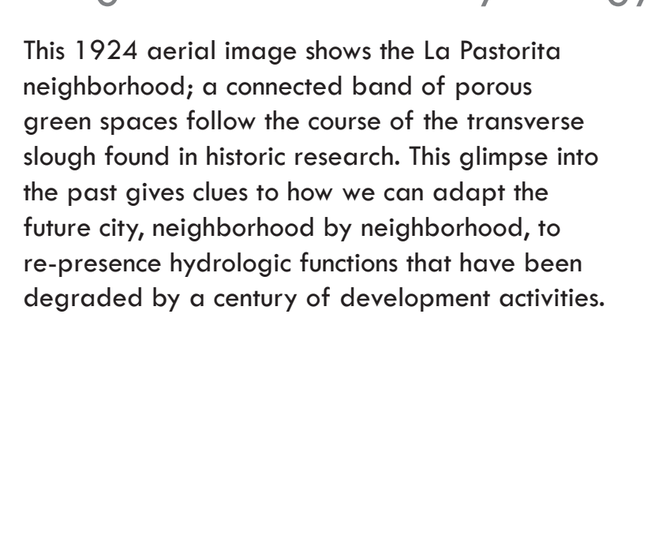
Everglades Tree Island

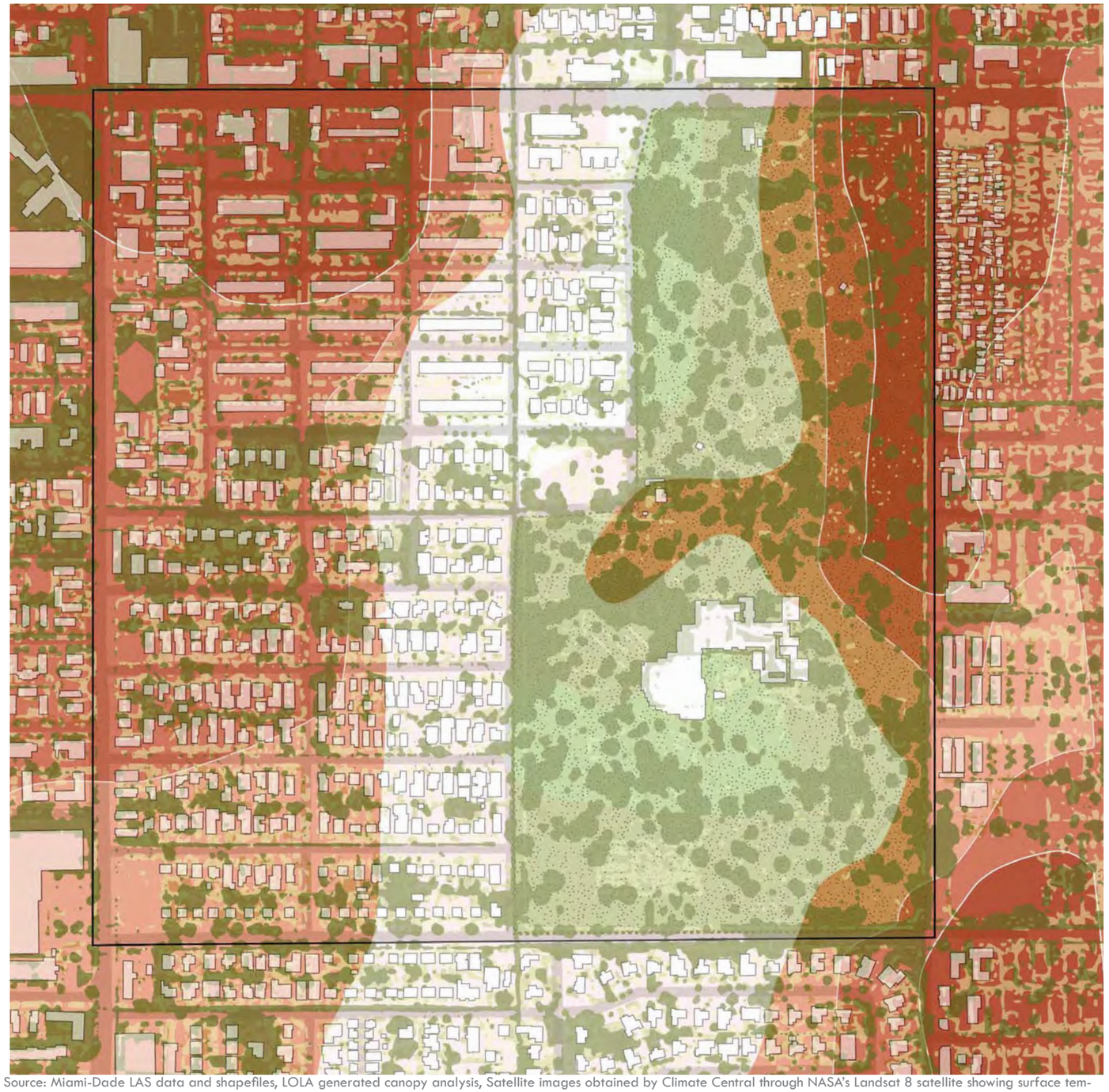


Source: 1. Analytic graphics generated by LOLA
2. Tree graph generated by FIU
3. Google image for root uplifting pavement and unstable roots

Neighborhood-scale Hydrology Adaptations

This 1924 aerial image shows the La Pastorita neighborhood; a connected band of porous green spaces follow the course of the transverse slough found in historic research. This glimpse into the past gives clues to how we can adapt the future city, neighborhood by neighborhood, to re-presence hydrologic functions that have been degraded by a century of development activities.





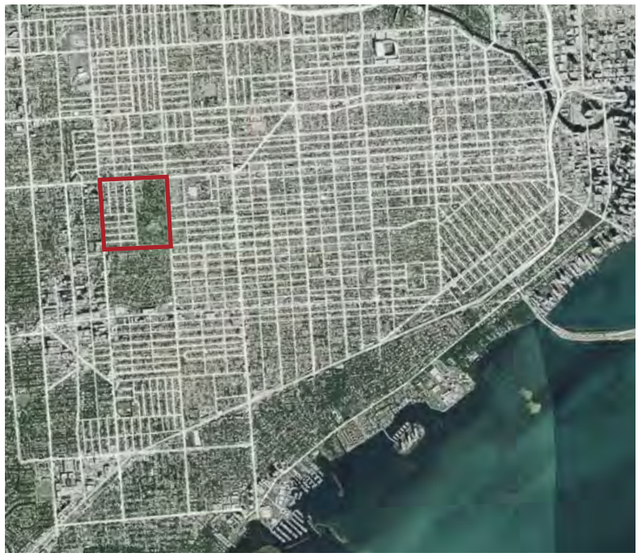
Source: Miami-Dade LAS data and shapefiles, LOLA generated canopy analysis, Satellite images obtained by Climate Central through NASA's Landsat 8 satellite showing surface temperature data over the course of 2013 and 2014.

Neighborhood-scale Microclimate Management

Lastly, this analysis of La Pastorita serves as a compass for how the streetscape master plan can address the management of microclimates at the neighborhood scale. Here we see both Northeast and Southeast tradewinds cool the buildings next to the Caballero Rivero Woodlawn. Canopy cover, ground cover, open space and parks all contribute to environmental comfort and can be enhanced through our interventions in the public right of way.

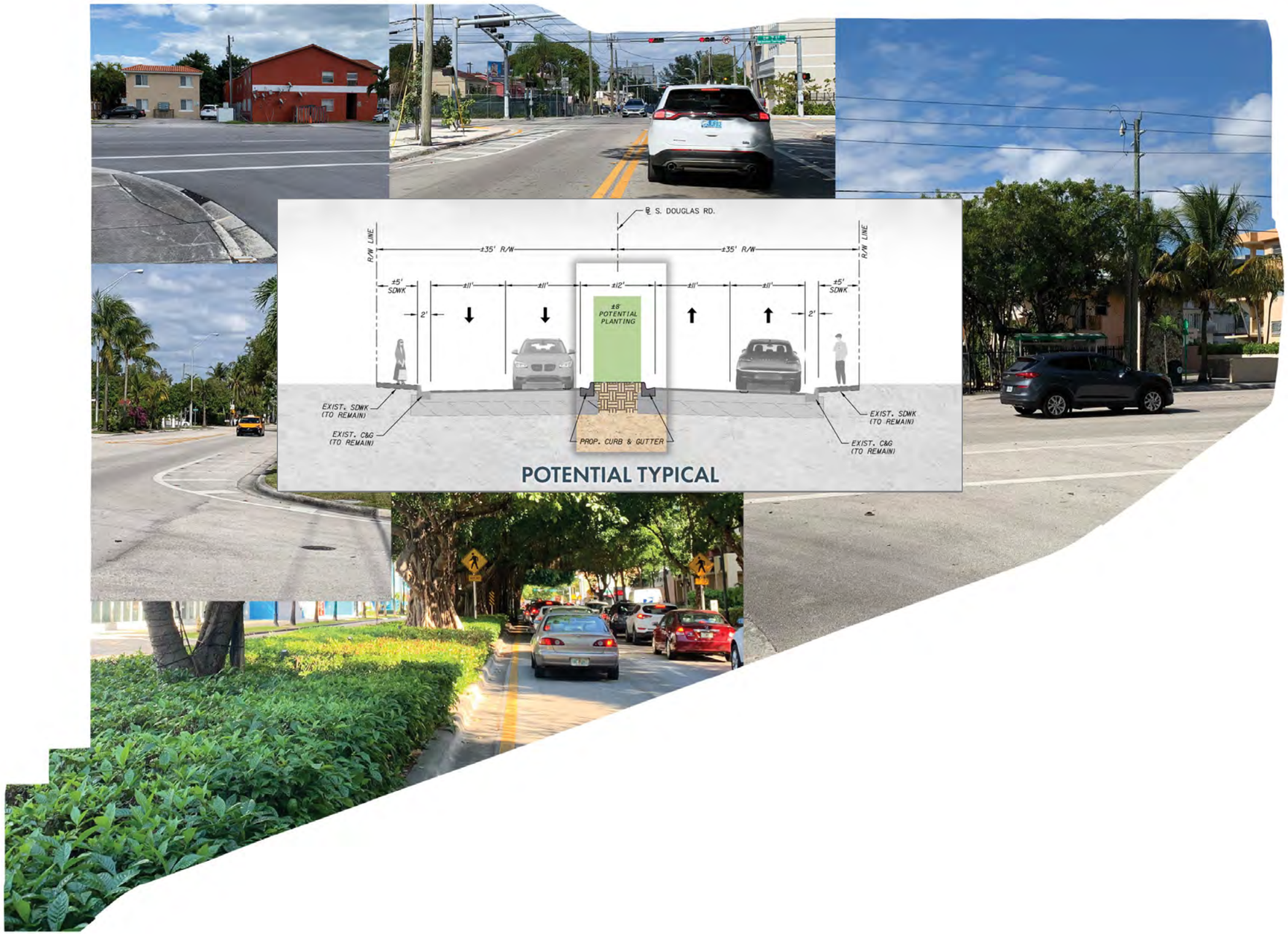
Properties in the “Cool Bubble” of open space canopy have reduced utility cost and less A.C. demand

Properties outside the bubble of open space canopy have more utility cost and A.C. demand



Source: Miami-Dade LAS data and shapefiles, LOLA generated canopy analysis, Satellite images obtained by Climate Central through NASA’s Landsat 8 satellite showing surface temperature data over the course of 2013 and 2014.

ROADWAY MODIFICATIONS



Potential Landscape Areas

SW 37th Avenue from US-1 to Flagler Street

SW 37th Avenue is an undivided arterial five-lane section with four travel lanes and a dual opposing left turn center lane. The posted speed limit is 40 MPH. The existing typical section corridor details are shown in Figure 1-1A. The corridor is approximately 14,300 LF long running from US-1 to Flagler Street. Within this corridor the roadway corridor analysis identified areas were all located in the center turn lane as indicated in the potential typical section shown in Figure 1-1B.

Figure 1-1A: Existing Typical Section

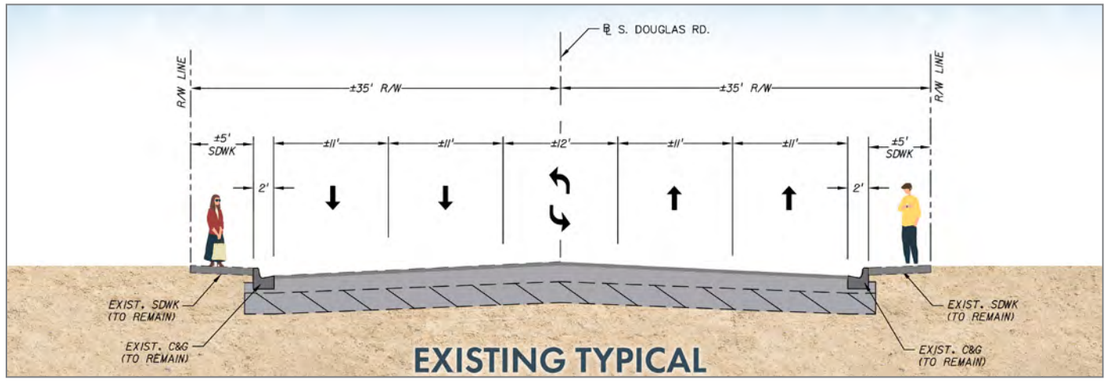
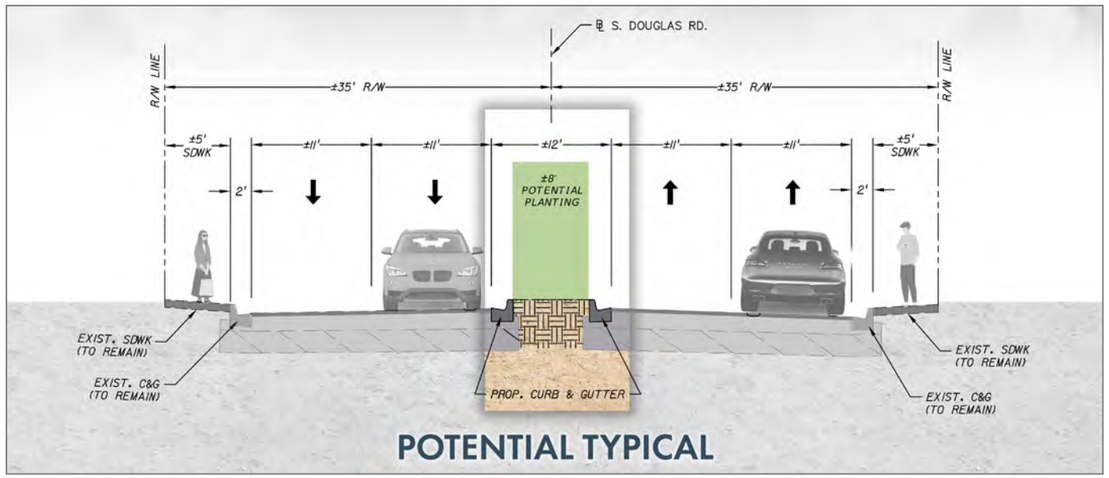


Figure 1-1B: Potential Typical Section



The corridor currently has sections of the median center lane striped out with yellow chevron markings. Some of these striped areas are large enough to be converted to median landscaped islands. Also, along the corridor there were areas of the center turning lane which could also be converted and not adversely impact traffic operations. The initial analysis identified approximately 13,490 SF of potential landscape area. The locations and size of the potential landscape areas are indicated in Table 1-1. Three of the potential landscape areas are shown in Figure 1-2, Figure 1-3 and Figure 1-4.

Table 1-1: Potential Landscape Locations

No.	Location Along SW 37th Avenue	Type of Modification	Approx. Potential Area (SF)	Approx. Potential Landscape Area (SF)
1	From SW 40th St. to Peacock Ave.	Center Turning Lanes could be replaced by planting area	640	427
2	From SW 25th Terr. To SW 26th St.	Center Turning Lanes could be replaced by planting area	550	367
3	From SW 25th St. to Santander Ave.	Painted Median could be replaced by planting area	740	494
4	From SW 23rd Terr. to Sevilla Ave.	Painted Median could be replaced by planting area	720	480
5	From SW 22nd Ter. To SW 23rd St.	Painted Median could be replaced by planting area	1,300	867
6	From Giralda to SW 22nd St.	Painted Median could be replaced by planting area	1,300	867
7	From Navarre Ave. to Minorca Ave.	Painted Median could be replaced by planting area	780	520
8	From SW 17th St. to Navarre Ave.	Painted Median could be replaced by planting area	3,650	2,435
9	From Madeira Ave. to SW 17th St.	Painted Median could be replaced by planting area	490	327
10	From SW 16th Terr. to Madeira Ave.	Painted Median could be replaced by planting area	1,450	967
11	From SW 14th St. to Menores Ave.	Painted Median could be replaced by planting area	1,260	840
12	From SW 13th Terr. To Salamanca Ave.	Painted Median could be replaced by planting area	1,420	947
13	From SW 13th St. to Sidonia Ave.	Painted Median could be replaced by planting area	1,150	767
14	From SW 12th St. to SW 13th St.	Painted Median could be replaced by planting area	620	414
15	From Santillane Ave. to Phoenetia Ave.	Painted Median could be replaced by planting area	1,250	834
16	From SW 9th Terr. to Santillane Ave.	Painted Median could be replaced by planting area	850	567
17	From SW 8th St. to Calabria Ave.	Painted Median could be replaced by planting area	820	547
18	From Montilla Ave. to Veragua Ave.	Painted Median could be replaced by planting area	820	547
19	From SW 3rd Ave. to Fonseca Ave.	Painted Median could be replaced by planting area	415	277
		TOTAL	20,225	13,490

Figure 1-2: Location 2 - Center Turn Lane

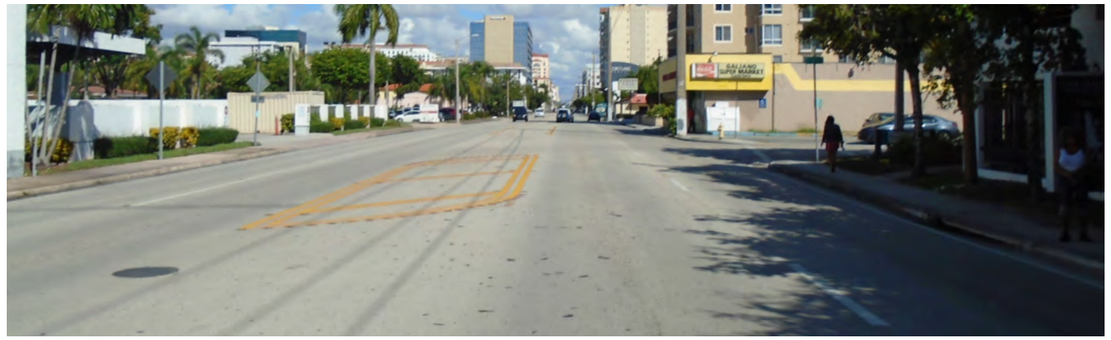


Figure 1-3: Location 8 - Striped Out Median

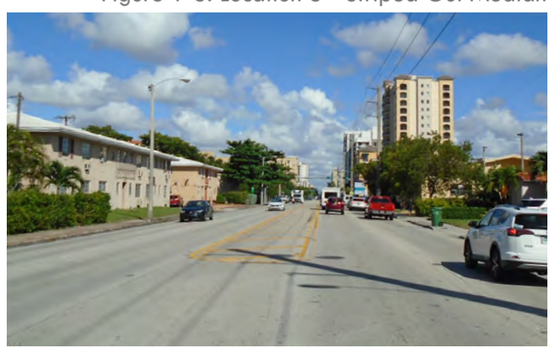


Figure 1-4: Location 16 - Striped Out Median

Potential Landscape Areas

SW 32nd Avenue from US-1 to Flagler Street

SW 32nd Avenue is an undivided roadway with a two-lane section containing two travel lanes and intermittent parking on the outside. The posted speed limit is 30 MPH. The existing typical section corridor details are shown in Figure 2-1A. The corridor is approximately 12,700 LF long running from US-1 to Flagler Street. The roadway corridor analysis identified potential landscape areas mainly located on the outside shoulder as indicated in the potential typical section shown in Figure 2-1B.

Figure 2-1A: Existing Typical Section

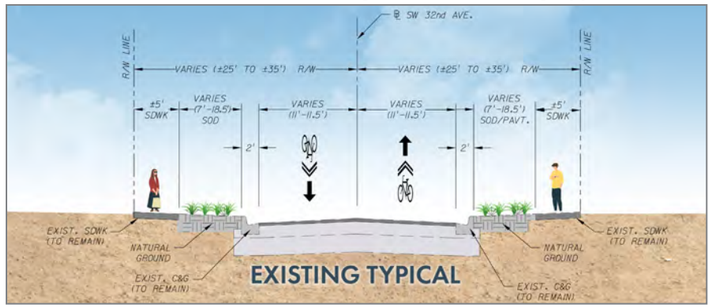


Figure 2-1B: Potential Typical Section

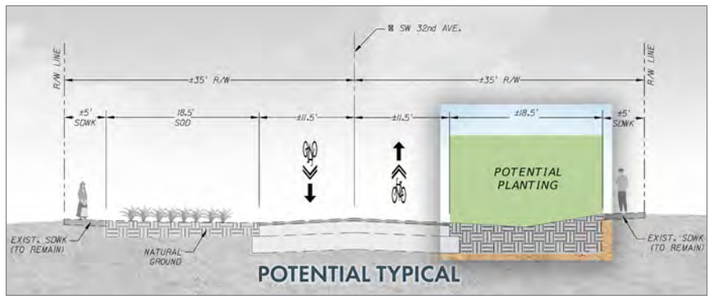
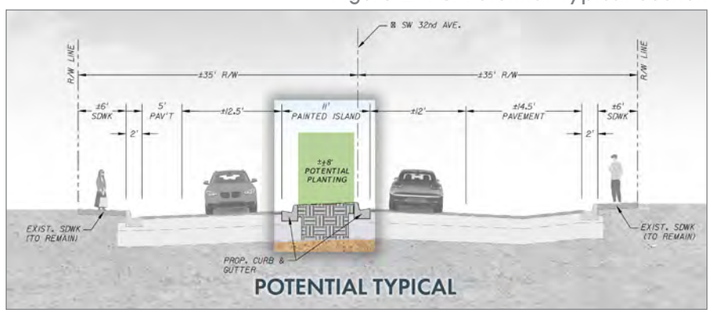


Figure 2-1C: Potential Typical Section



This corridor currently on the outside has green swale areas and sections which were paved for parking. There are locations where creation of intersection bulb outs are identified to add green area. Also, median areas of the existing paved roadway are identified as potential new areas for landscaping. The initial analysis identified approximately 8,133 SF of potential landscape area. The locations and size of the potential landscape areas are indicated in Table 2-1. Three of the potential landscape areas are shown in Figure 2-2, Figure 2-3 and Figure 2-4.

Table 2-1: Potential Landscape Locations

No.	Location Along SW 37th Avenue	Type of Modification	Approx. Potential Area (SF)	Approx. Potential Landscape Area (SF)
1	From SW 28th St. to SW 29th St.	Painted Island replaced by planting area	350	233
2	From SW 23rd Terr. to SW 23rd St.	Painted shoulder replaced by planting area	950	634
3	From SW 23rd St. to SW 22nd Terr.	Painted Island replaced by planting area	1,550	1,034
4	From SW 22nd Terr. To SW 23rd St.	Shoulder replaced by planting area	1,660	1,107
5	From SW 22nd Terr. To SW 23rd St.	Painted Median replaced by planting area	500	334
6	From SW 21st St. to SW 21st Terr.	Painted Median replaced by planting area	740	494
7	SW 21st St.	Painted shoulder replaced by planting area	1,375	917
8	SW 21st Ter. to SW21st St.	Painted Island replaced by planting area	920	614
9	From SW 20th St. to SW 21st St.	Parking Area replaced by Planting Area	950	634
10	From SW 19th St. to SW 18th St.	Shoulder pavement replaced by Planting Area.	1,520	1,014
11	From SW 16th Terr. to SW 16th St.	Painted shoulder replaced by planting area	1,080	720
12	From SW 12th St. to SW 13th St.	Pavement Area replaced by Planting Area	600	400
		TOTAL	12,195	8,133

Figure 2-2: Location 2 - Painted Shoulder

Figure 2-3: Location 5 - Striped out Median

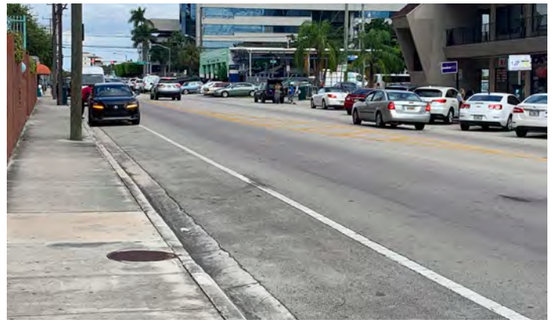
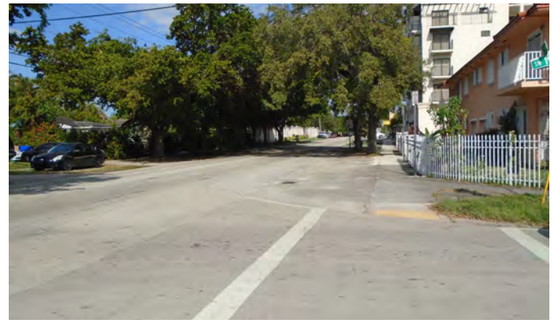


Figure 2-4: Location 10 - Shoulder Pavement



Potential Landscape Areas

SW 27th Avenue from US-1 to Flagler Street

SW 27th Avenue is a divided arterial four-lane section with parking on both sides. The posted speed limit is 40 MPH. The existing typical section corridor details are shown in Figure 3-1A. The corridor is approximately 11,800 LF long running from US-1 to Flagler Street. Within this corridor, the roadway corridor analysis identified areas were mainly located on the outside shoulder areas as indicated in the potential typical section shown in Figure 3-1B.

Figure 3-1A: Existing Typical Section

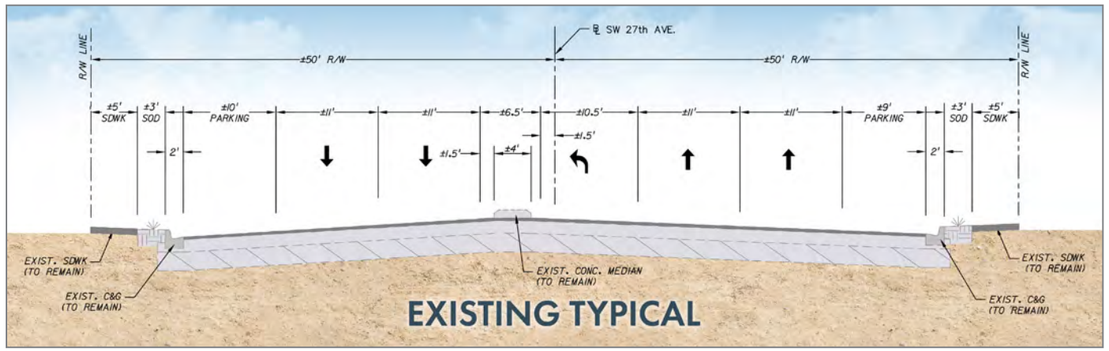
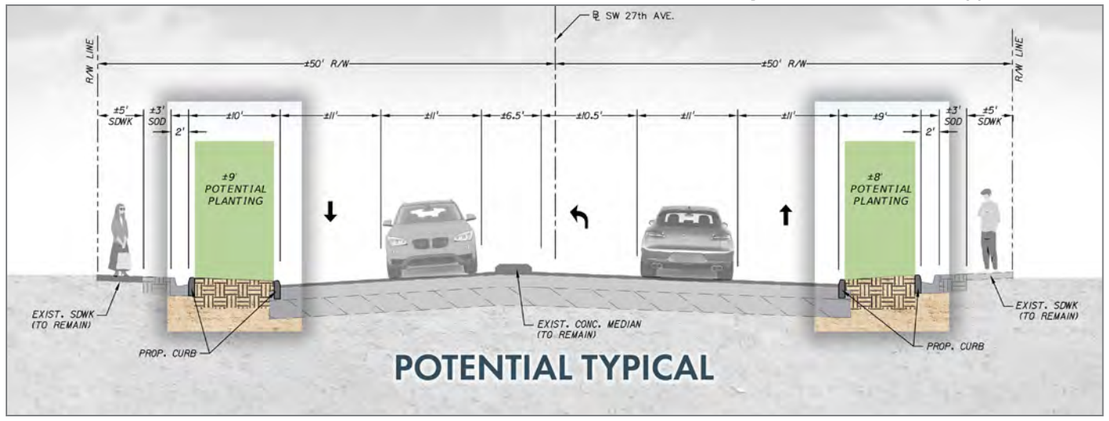


Figure 3-1B: Potential Typical Section



This corridor currently has sections of the outside parking area striped out with white chevron markings. Some of these striped areas are large enough to be converted to landscaped islands. The areas converted to landscaped islands would not adversely impact traffic operations. The initial analysis identified approximately 6,106 SF of potential landscape area. The locations and size are indicated in Table 3-1. Two of the potential landscape areas are shown in Figure 3-2 and Figure 3-3.

Table 3-1: Potential Landscape Locations

No.	Location Along SW 27th Avenue	Type of Modification	Approx. Potential Area (SF)	Approx. Potential Landscape Area (SF)
1	SW 26th Ln.	Painted Shoulder replaced by planting area	408	272
2	From SW 26th Ln. to SW 26th St.	Painted Shoulder replaced by planting area	404	269
3	From SW 26th St. to SW 25th Terr.	Painted Shoulder replaced by planting area	571	381
4	From SW 26th St. to SW 25th Terr.	Painted Shoulder replaced by planting area	691	461
5	From SW 25th St. to SW 24th Terr.	Painted Shoulder replaced by planting area	453	302
6	From SW 24th Terr. to SW 24th St.	Painted Shoulder replaced by planting area	691	461
7	SW 23rd St.	Painted Shoulder replaced by planting area	599	400
8	From SW 23rd St. to SW 22rd Terr.	Painted Shoulder replaced by planting area	368	245
9	From SW 23rd St. to SW 22rd Terr.	Painted Shoulder replaced by planting area	592	395
10	From SW 22nd Terr. to SW 22nd St.	Painted Shoulder replaced by planting area	504	336
11	From SW 21st St to SW 20th St.	Painted Shoulder replaced by planting area	384	256
12	SW 20th St. to SW 19th Terr.	Painted Shoulder replaced by planting area	992	662
13	SW 18th St.	Painted Shoulder replaced by planting area	445	297
14	SW 17th St. to SW 16th Terr.	Painted Shoulder replaced by planting area	495	330
15	SW 15th St. to SW 14th St.	Painted Shoulder replaced by planting area	629	420
16	SW 12th St. to SW 11th St.	Painted Shoulder replaced by planting area	1,009	673
17	SW 11th St. to SW 10th Terr.	Painted Shoulder replaced by planting area	600	400
		TOTAL	9,235	6,160

Figure 3-2: Location 6 - Striped out outside shoulder

Figure 3-3: Location 12 - Striped out outside shoulder

Potential Landscape Areas

SW 22nd Avenue from US-1 to Flagler Street

SW 22nd Avenue is a divided arterial four-lane section. The posted speed limit is 35 MPH. The existing typical section corridor details are shown in Figure 4-1A. The corridor is approximately 10,900 LF long running from US-1 to Flagler Street. Within this corridor, the preliminary analysis identified areas mainly located in the wide T-intersections and on the striped out median islands as indicated in the potential typical section shown in Figure 4-1B.

Figure 4-1A: Existing Typical Section

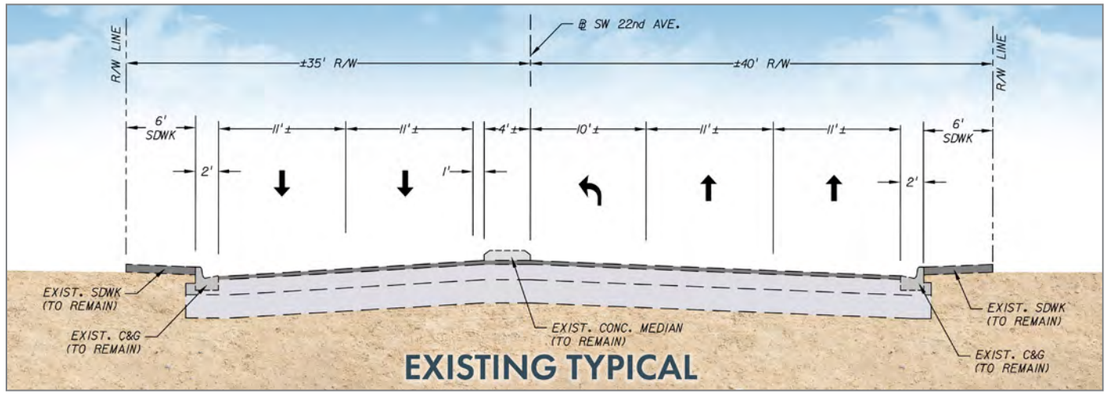
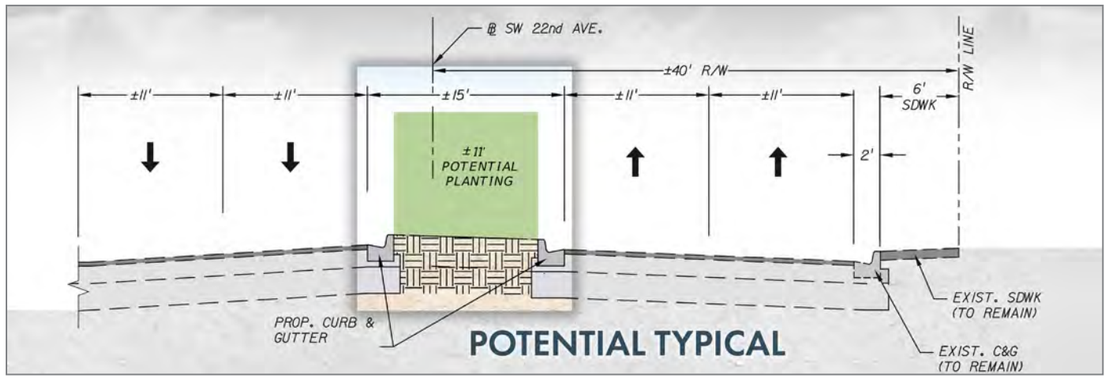


Figure 4-1B: Potential Typical Section



The corridor currently has areas where a median landscape islands can be created offering a canalizing island to drivers and improving beautification to the neighborhood. Following AASHTO Standards for urban intersections the smallest allowable island should have an area of approximately 50 square feet. Adding this type of landscape areas along the corridor does not adversely impact the traffic operation. The initial analysis identified approximately 1,049 SF of potential landscape area. The locations and size are indicated in Table 4-1. Three of the potential landscape areas are shown in Figure 4-2 and Figure 4-3.

Table 4-1: Potential Landscape Locations

No.	Location along SW 22nd Avenue	Type of Modification	Approx. Potential Area (SF)	Approx. Potential Landscape Area (SF)
1	SW 25th Terr.	Painted median Island replaced by planting area	280	187
2	SW 25th St.	Median pavement replaced by planting area	254	169
3	SW 15th St.	Median pavement replaced by planting area	258	172
4	SW 14th Terr.	Median pavement replaced by planting area	247	165
5	SW 11th Terr.	Median pavement replaced by planting area	264	176
6	SW 11th St.	Median pavement replaced by planting area	269	179
		TOTAL	1,572	1,049

Figure 4-2: Location 3 - Paved Median

Figure 4-3: Location 4 - Paved Median

Potential Landscape Areas

SW 17th Avenue from US-1 to Flagler Street

SW 17th Avenue is an undivided arterial five-lane section with four travel lanes. The center lane is used mainly for left turns with intermittent curb islands. The posted speed limit is 35 MPH. The existing typical section corridor details are shown in Figure 5-1A. The corridor is approximately 9,900 LF long running from US-1 to Flagler Street. Within this corridor, the preliminary analysis identified areas mainly located on the wide T-intersections as indicated in the potential typical section shown in Figure 5-1B.

Figure 5-1A: Existing Typical Section

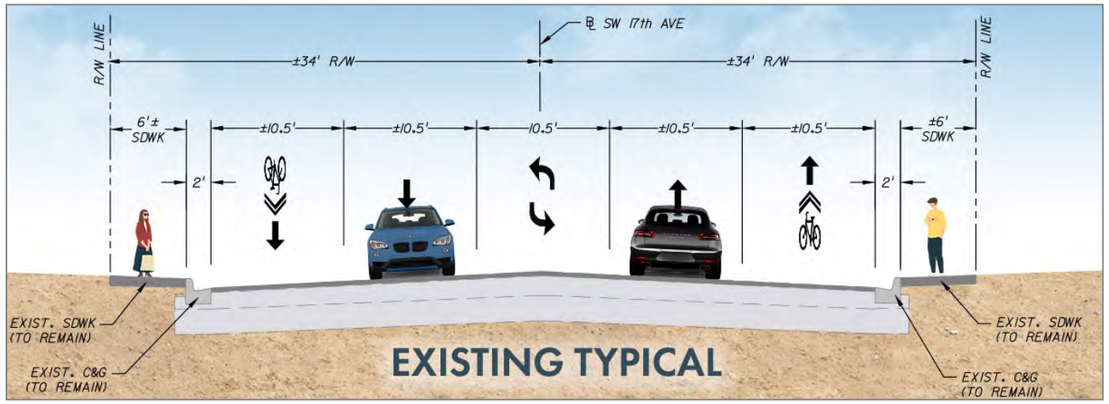
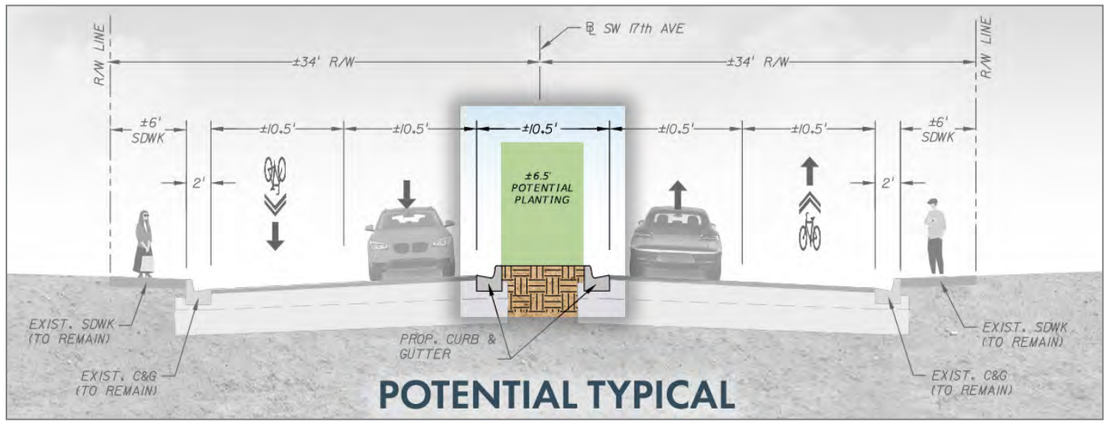


Figure 5-1B: Potential Typical Section



Following AASHTO Standards for urban intersections the smallest allowable island should have an area of approximately 50 square feet. Adding this type of landscape areas along the corridor does not adversely impact the traffic operation. However, our recommendation is since these are small areas of landscape, they may not be desirable as construction cost would be high compared to the size of the new landscape provided. The initial analysis identified approximately 467 SF of potential landscape areas. The locations and size are indicated in Table 5-1. Two of the potential landscape areas are shown in Figure 5-2 and Figure 5-3.

Table 5-1: Potential Landscape Locations

No.	Location along SW 17th Avenue	Type of Modification	Approx. Potential Area (SF)	Approx. Potential Landscape Area (SF)
1	SW 24th St	Painted median replaced by planting area	225	150
2	SW 22nd Terr.	Painted median replaced by planting area	137	91
3	SW 20th St.	Painted median replaced by planting area	120	80
4	SW 19th Terr.	Painted median replaced by planting area	102	68
5	SW 4th St.	Painted median replaced by planting area	116	77
		TOTAL	700	467

Figure 5-2: Location 4 - Paved Median

Figure 5-3: Location 3 - Paved Median

Potential Landscape Areas

SW 12th Avenue from SW 3rd Ave to Flagler Street

SW 12th Avenue is an undivided roadway with a two-lane section containing two travel lanes, a center flush median and intermittent parking on the outside. The posted speed limit is 35 MPH. The existing typical section corridor details are shown in Figure 6-1A. The corridor is approximately 8,200 LF long running from SW 3rd Avenue to Flagler Street. Within this corridor, the analysis identified potential landscape areas mainly located on the outside shoulder and some in the flush median as indicated in the proposed typical section shown in Figure 6-1B.

Figure 6-1A: Existing Typical Section

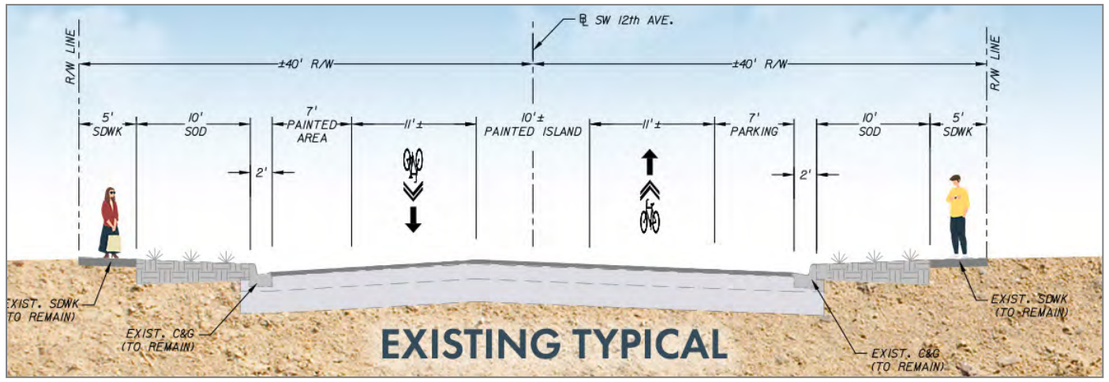
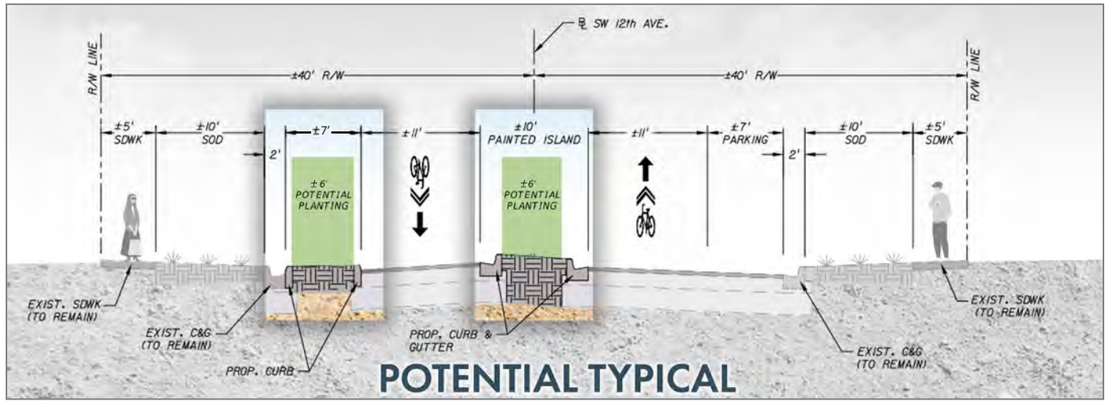


Figure 6-1B: Potential Typical Section



The corridor currently has sections of the flush median striped out with yellow chevron markings. Some of these striped areas are large enough to be converted to median landscaped islands without any adversely impact to the traffic operations. Also, there are striped out areas on the shoulders which are large enough to be converted to landscape areas. The initial analysis identified approximately 10,221 SF of potential landscape areas. The locations and size of the potential landscape areas are indicated in Table 6-1. Three of the potential landscape areas are shown in Figure 6-2, Figure 6-3 and Figure 6-4.

Table 6-1: Potential Landscape Locations

No.	Location along SW 12th Avenue	Type of Modification	Approx. Potential Area (SF)	Approx. Potential Landscape Area (SF)
1	SW 21st Terr.	Painted Island replaced by planting area	1,457	972
2	SW 21st Terr.	Painted Island replaced by planting area	542	362
3	SW 21st Ter to SW 20th St.	Painted Island replaced by planting area	582	388
4	SW 21st Ter to SW 20th St.	Painted Island replaced by planting area	336	224
5	SW 19th Terr.	Painted shoulder replaced by planting area	366	244
6	SW 19th Terr.	Painted shoulder replaced by planting area	498	332
7	From SW 19th St. to SW 18th St.	Painted median replaced by planting area	610	407
8	From SW 18th St. to SW 17th Terr.	Painted shoulder replaced by planting area	432	288
9	From SW 18th St. to SW 17th Terr.	Painted shoulder replaced by planting area	255	170
10	From SW 17th Terr. to SW 17th St.	Painted shoulder replaced by planting area	293	195
11	From SW 17th Terr. to SW 17th St.	Painted median replaced by planting area	901	601
12	From SW 17th St. to SW 16th St.	Painted shoulder replaced by planting area	416	277
13	From SW 17th St. to SW 16th St.	Painted shoulder replaced by planting area	383	255
14	From SW 16th St. to SW 15th Terr.	Painted shoulder replaced by planting area	309	206
15	From SW 16th St. to SW 15th Terr.	Painted median replaced by planting area	590	394
16	From SW 15th Terr. to SW 15th St.	Painted shoulder replaced by planting area	700	467
17	From SW 15th Terr. to SW 15th St.	Painted median replaced by planting area	820	547
18	From SW 15th St. to SW 14th St.	Painted shoulder replaced by planting area	366	244
19	From SW 15th St. to SW 14th St.	Painted median replaced by planting area	761	508
20	From SW 14th St. to SW 13th St.	Painted shoulder replaced by planting area	327	218
21	From SW 14th St. to SW 13th St.	Painted median replaced by planting area	1,511	1,008
22	SW 4th St.	Painted shoulder replaced by planting area	641	428
23	SW 4th St.	Painted shoulder replaced by planting area	492	328
24	From SW 3rd St. to SW 2nd St.	Painted shoulder replaced by planting area	161	107
25	From SW 3rd St. to SW 2nd St.	Painted shoulder replaced by planting area	141	94
26	SW 2nd St.	Painted shoulder replaced by planting area	590	394
27	SW 2nd St.	Painted shoulder replaced by planting area	533	356
28	SW 2nd St.	Painted shoulder replaced by planting area	311	207
		TOTAL	15,324	10,221

Figure 6-2: Location 3 - Striped out Median

Figure 6-3: Location 6 - Striped out Shoulder

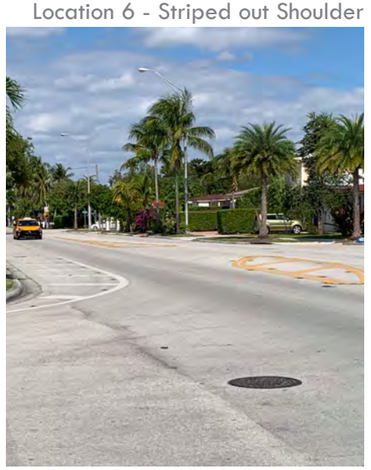
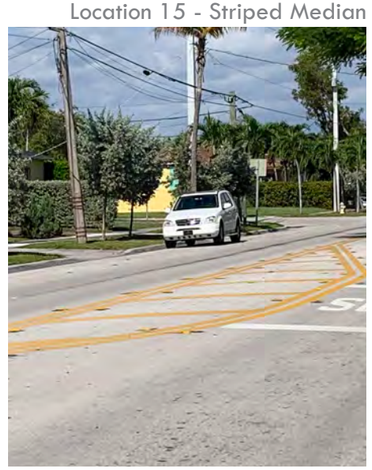


Figure 6-4: Location 15 - Striped Median



Potential Landscape Areas

SW 8th Avenue from SW 11th Ave to Flagler Street

SW 8th Avenue is an undivided roadway with a two-lane section containing two travel lanes and intermittent parking on the outside. The posted speed limit is 30 MPH. The existing typical section corridor details are shown in Figure 7-1A. The corridor is approximately 3,900 LF long running from SW 11th Avenue to Flagler Street. Within this corridor, the analysis identified potential landscape areas mainly located on the outside shoulder as indicated in the potential typical section shown in Figure 7-1B.

Figure 7-1A: Existing Typical Section

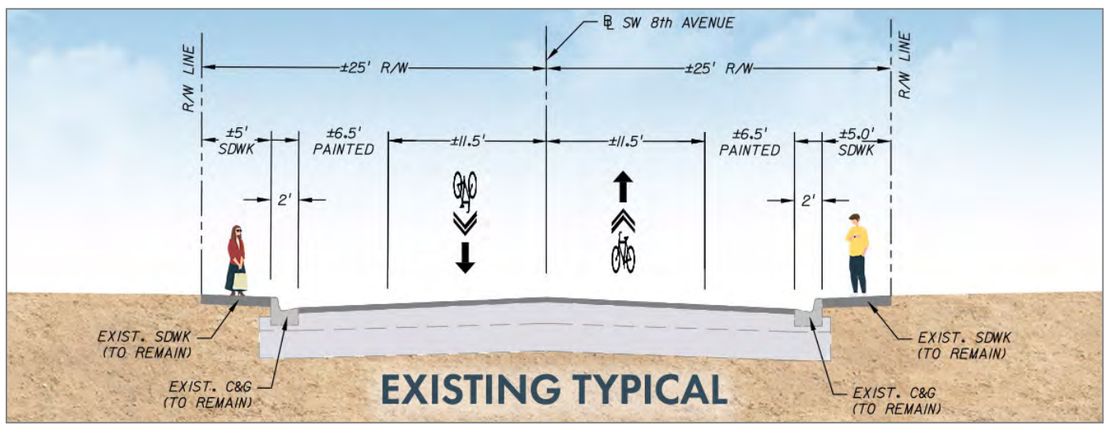
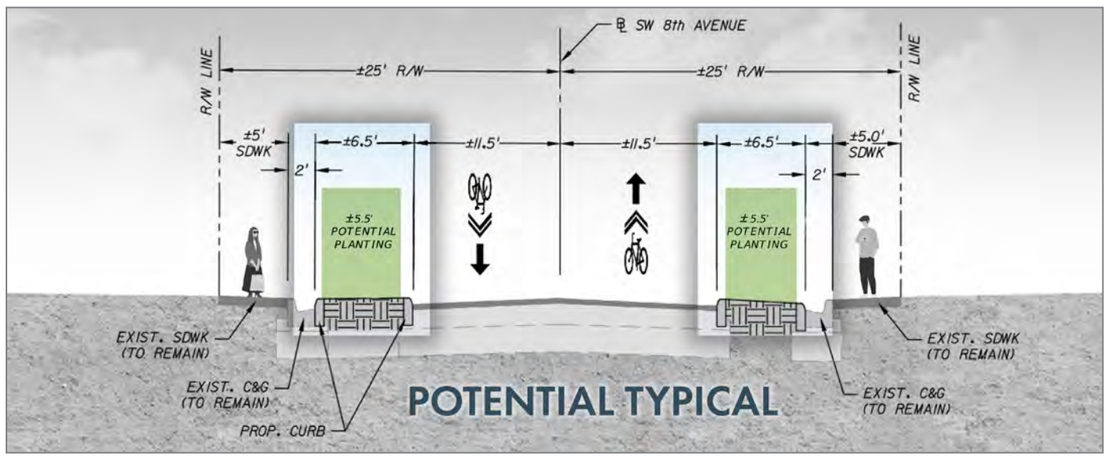


Figure 7-1B: Potential Typical Section



Some of these striped-out areas on the outside shoulder are large enough to be converted to landscaped areas without any adverse impact to the traffic operations. Some the potential areas are located at the block corners providing the additional opportunity to create bulb outs which improve safety for pedestrians. The initial analysis identified approximately 5,200 SF of potential landscape areas. The locations and size of the areas are indicated in Table 7-1. Three of the potential landscape areas are shown in Figure 7-2, Figure 7-3 and Figure 7-4.

Table 7-1: Potential Landscape Locations

No.	Location along SW 8th Avenue	Type of Modification	Approx. Potential Area (SF)	Approx. Potential Landscape Area (SF)
1	From SW 7th St. to SW 8th St.	Painted shoulder replaced by planting area	840	560
2	From SW 6th St. to SW 5th St.	Painted shoulder replaced by planting area	589	393
3	From SW 6th St. to SW 5th St.	Painted shoulder replaced by planting area	345	230
4	From SW 5th St. to SW 4th St.	Painted shoulder replaced by planting area	255	170
5	From SW 5th St. to SW 4th St.	Painted shoulder replaced by planting area	270	180
6	From SW 5th St. to SW 4th St.	Painted shoulder replaced by planting area	244	163
7	From SW 5th St. to SW 4th St.	Painted shoulder replaced by planting area	241	161
8	From SW 4th St. to SW 3rd St.	Painted shoulder replaced by planting area	352	235
9	From SW 4th St. to SW 3rd St.	Painted shoulder replaced by planting area	417	278
10	From SW 4th St. to SW 3rd St.	Painted shoulder replaced by planting area	103	69
11	From SW 4th St. to SW 3rd St.	Painted shoulder replaced by planting area	247	165
12	From SW 4th St. to SW 3rd St.	Painted shoulder replaced by planting area	493	329
13	From SW 3rd St. to SW 2nd St.	Painted shoulder replaced by planting area	309	206
14	From SW 3rd St. to SW 2nd St.	Painted shoulder replaced by planting area	364	243
15	From SW 3rd St. to SW 2nd St.	Painted shoulder replaced by planting area	836	558
16	From SW 2nd St. to SW 1st St.	Painted shoulder replaced by planting area	451	301
17	From SW 2nd St. to SW 1st St.	Painted shoulder replaced by planting area	378	252
18	From SW 2nd St. to SW 1st St.	Painted shoulder replaced by planting area	341	227
19	From SW 2nd St. to SW 1st St.	Painted median replaced by planting area	721	481
		TOTAL	7,796	5,200

Figure 7-2: Location 1 - Striped out Shoulder

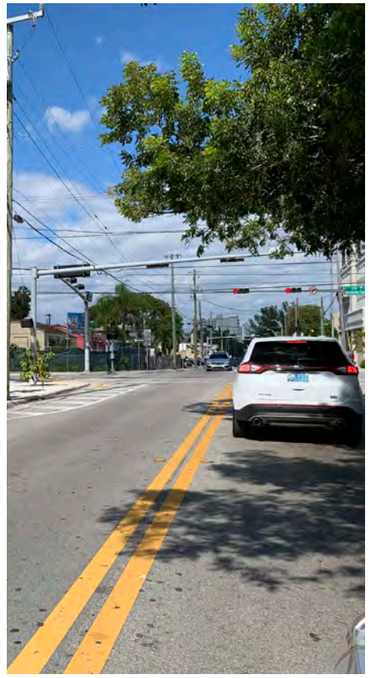


Figure 7-3: Location 5 - Striped out Shoulder

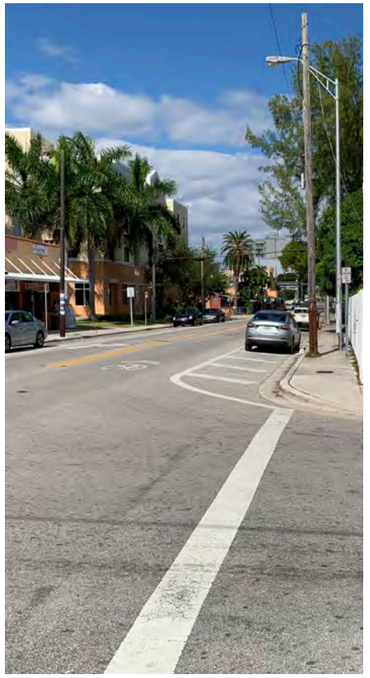
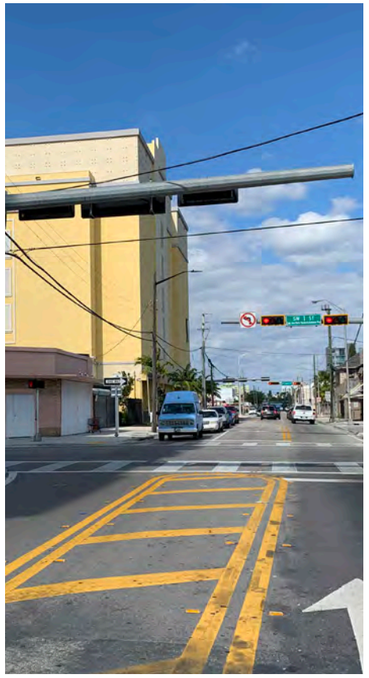


Figure 7-4: Location 19 - Striped out Median

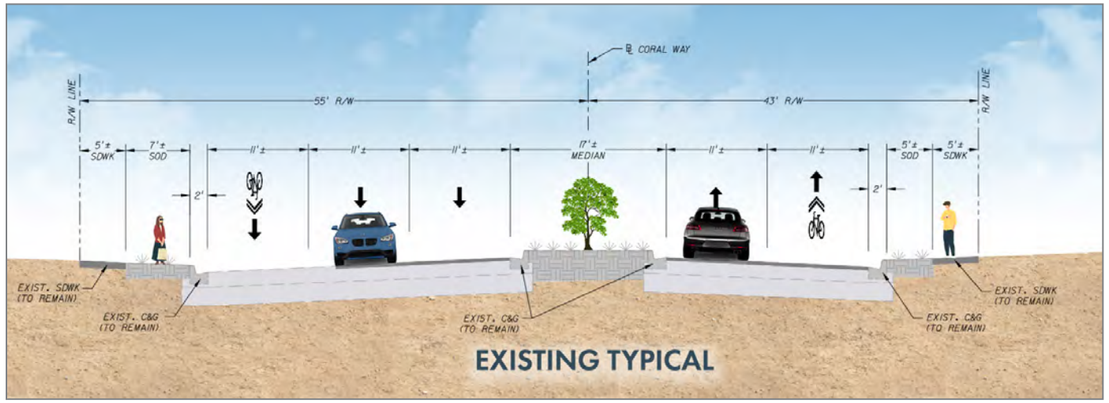


Potential Landscape Areas

Coral Way from SW 37th Avenue to SW 31st Road

SW 37th Avenue is a divided arterial four-lane section with four travel lanes and intermittent parking on the outside. The posted speed limit is 35 MPH. The existing typical section corridor details are shown in Figure 8-1. The corridor is approximately 14,200 LF long running from SW 37th Avenue to SW 31st Road. Within this corridor the roadway corridor analysis did not identify any potential landscape areas. The inability to find new landscape areas was mainly due to the corridor having extensive existing landscape in both the median and where possible on the outside.

Figure 8-1: Existing Typical Section



The extensive existing landscaped areas are depicted in Figure 8-2 and Figure 8-3.

Figure 8-2: Existing Median

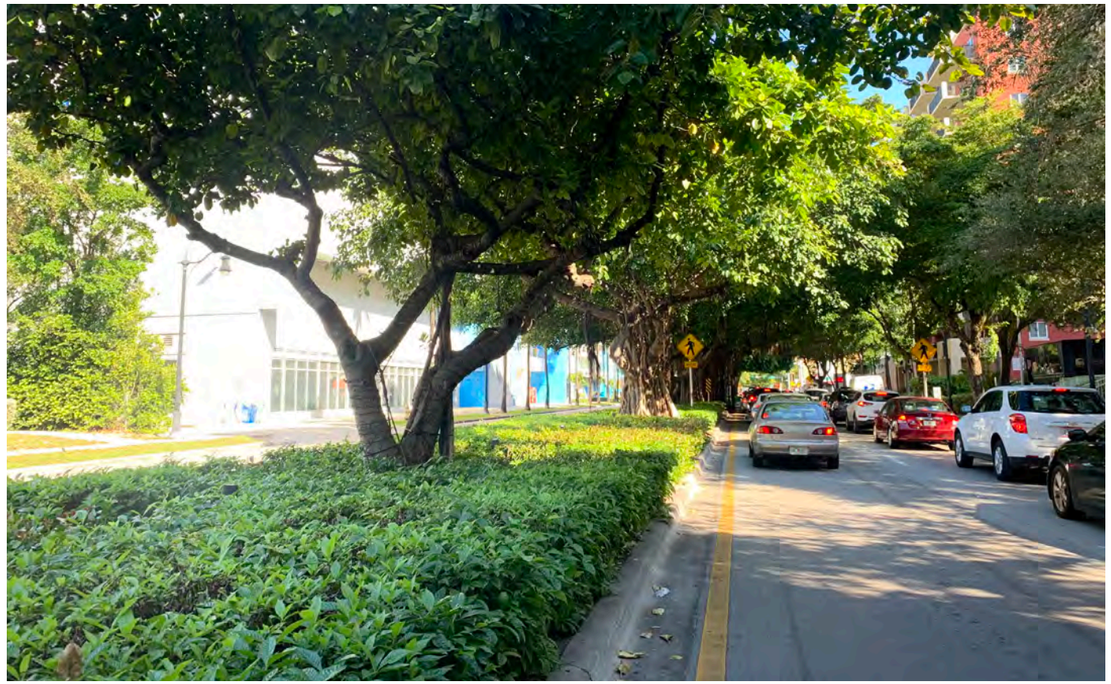


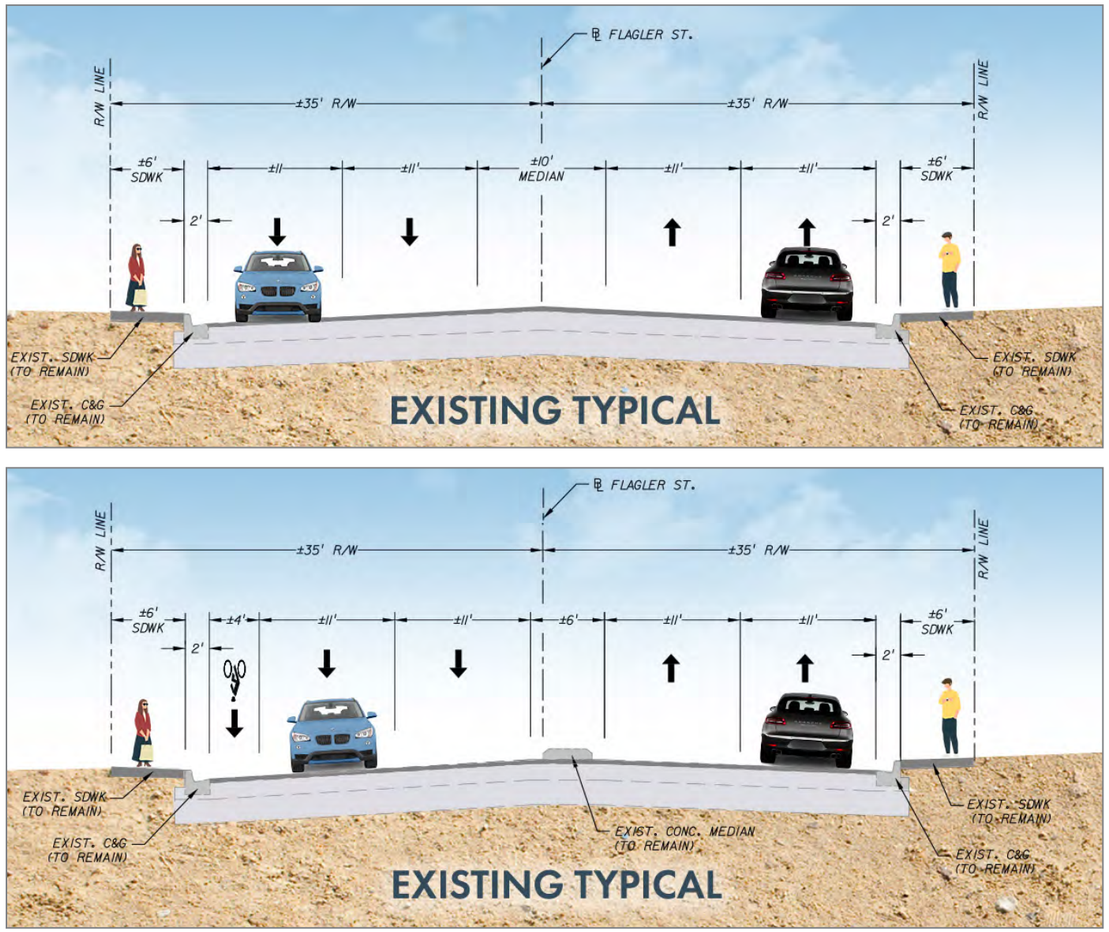
Figure 8-3: Existing Outside Area

Potential Landscape Areas

Flagler Street from SW 37th Avenue to SW 24th Avenue

Flagler Street is an undivided arterial five-lane section with four travel lanes and intermittent landscaped islands in the center lane with a posted speed limit of 40 MPH. The existing typical section corridor details are shown in Figure 9-1. The corridor is approximately 7,000 LF long running from SW 37th Avenue to SW 24th Avenue. Within this corridor the roadway corridor analysis was not able to identify potential landscape areas. This was mainly due to the existing corridor having recently (2015) being reconstructed with median islands and landscape areas where possible on the outside.

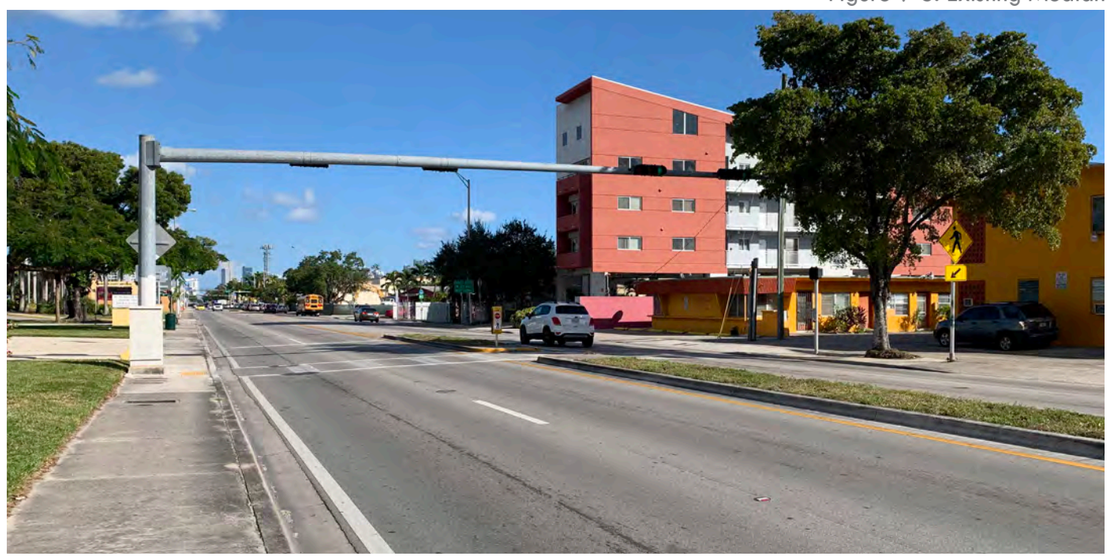
Figure 9-1: Existing Typical Sections

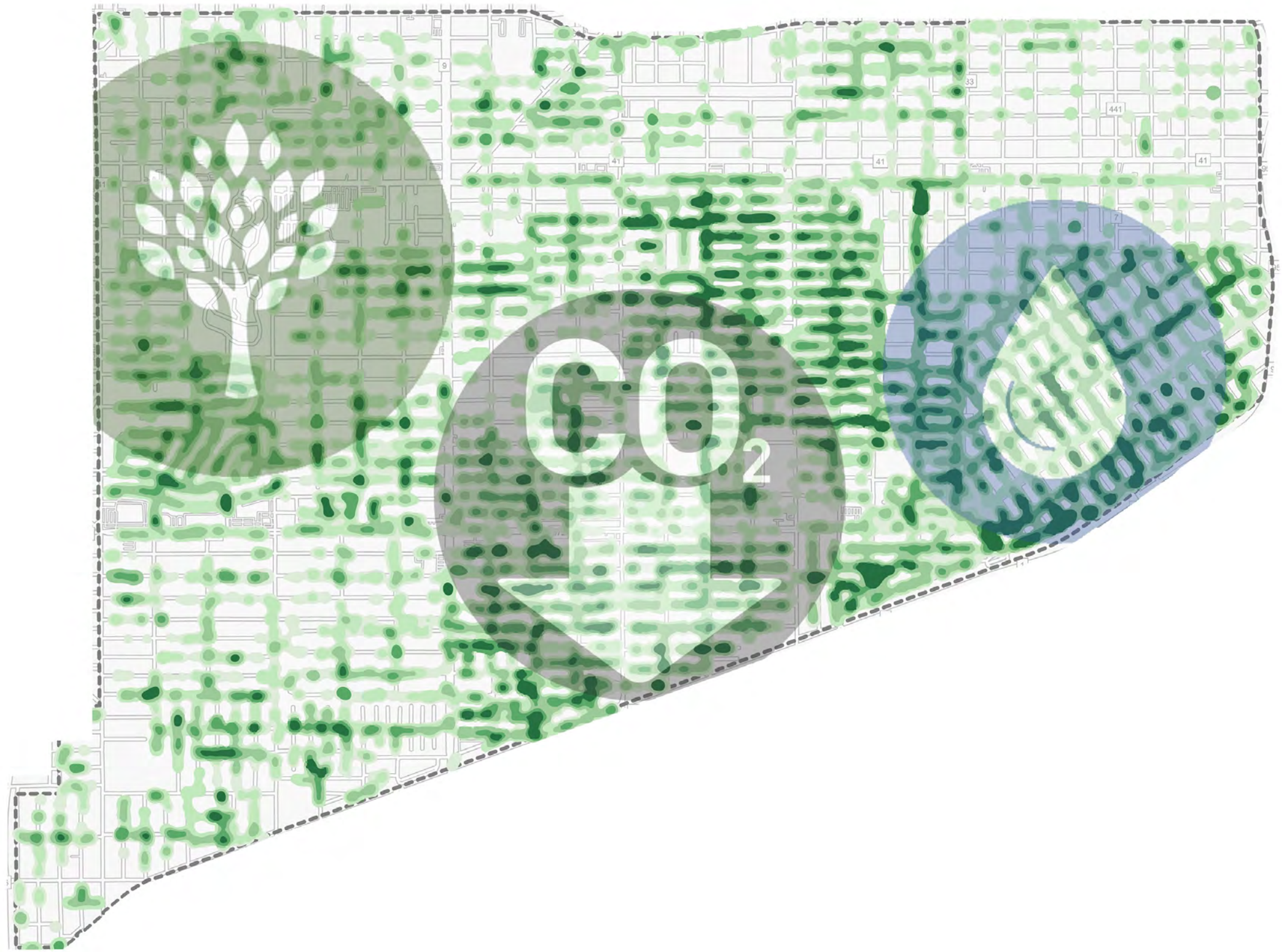


The existing landscaped areas are depicted in Figure 9-2 and Figure 9-3.

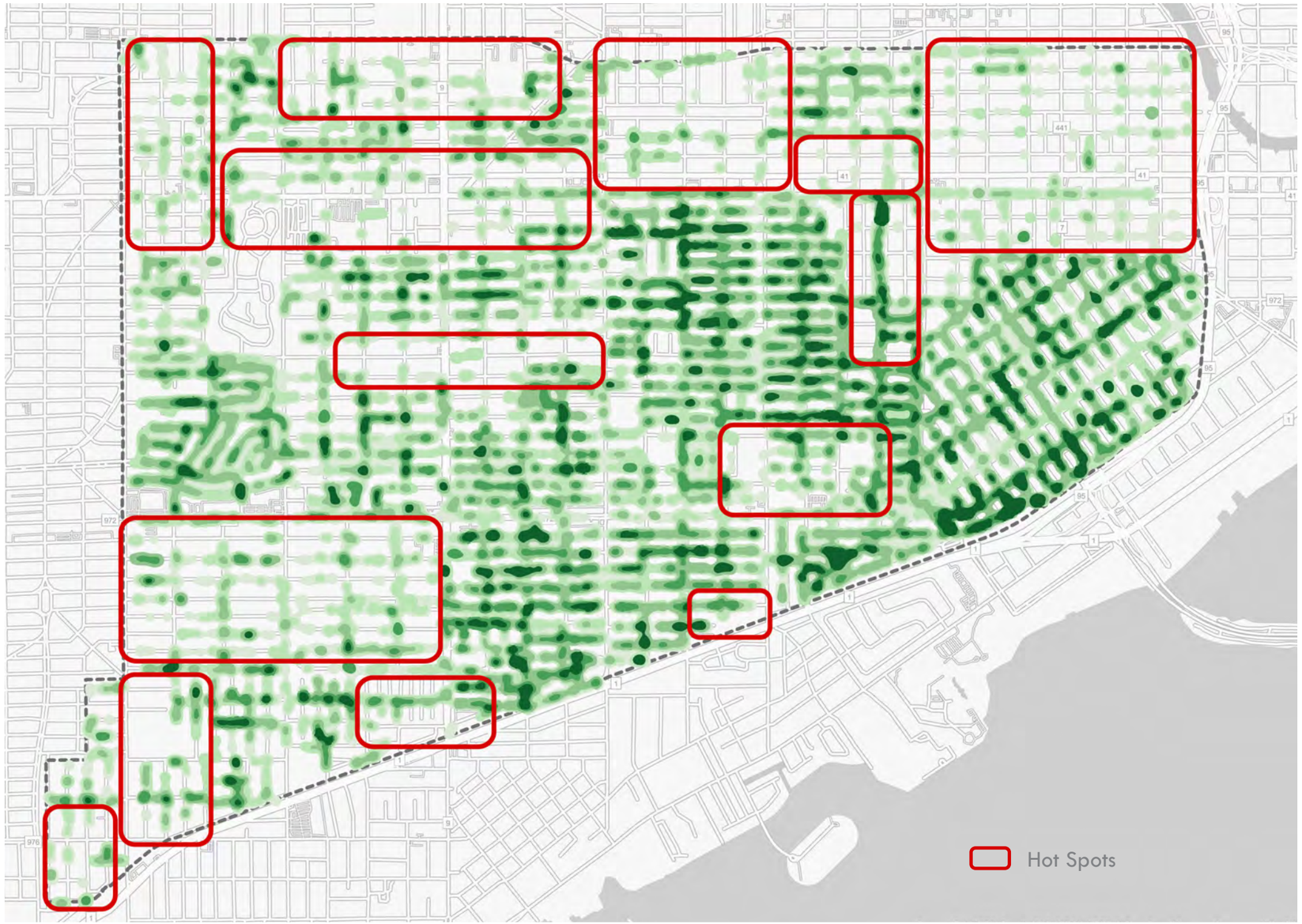
Figure 9-2: Existing Median

Figure 9-3: Existing Median




CO2

Hot Spots



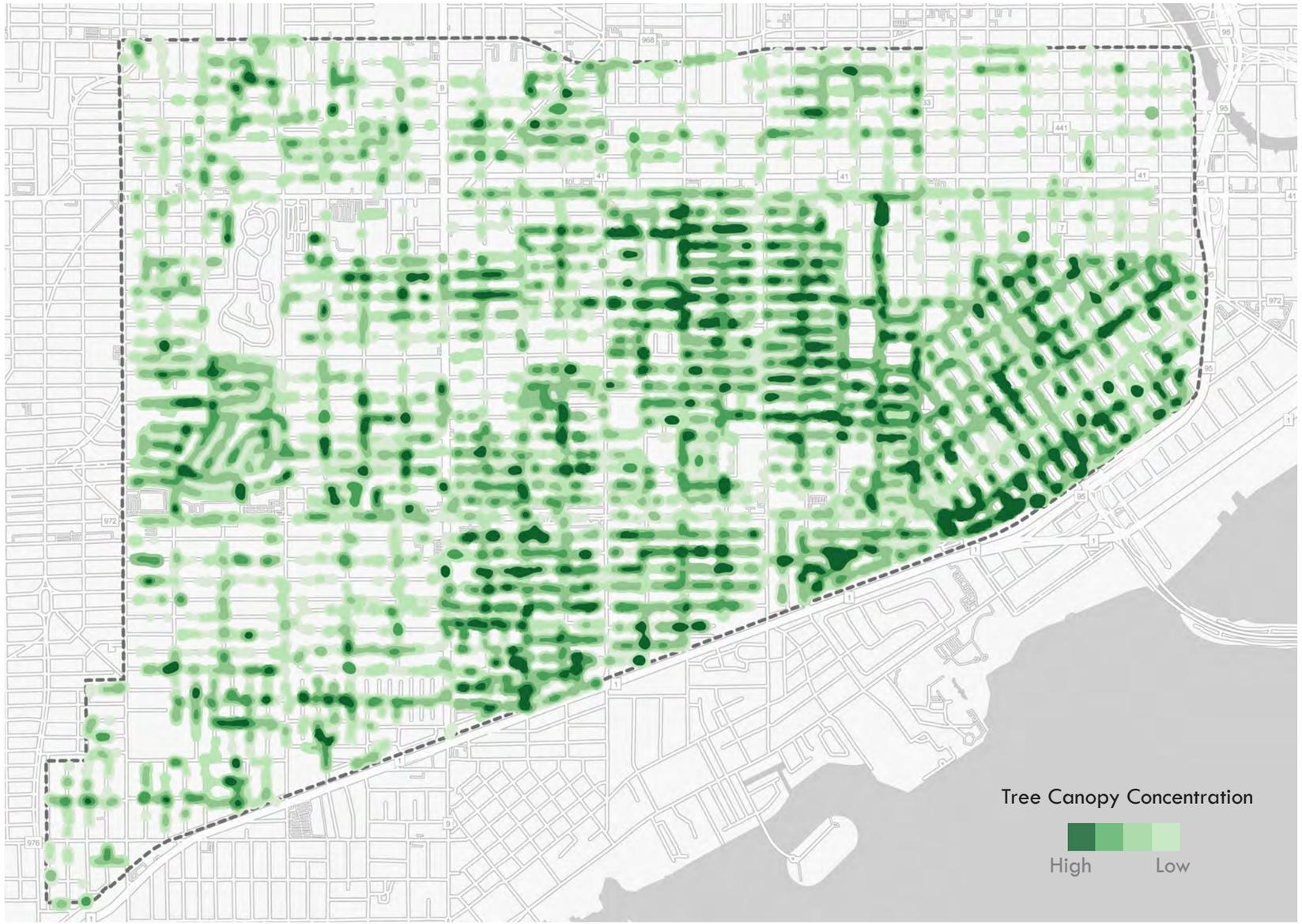
Main Takeaways

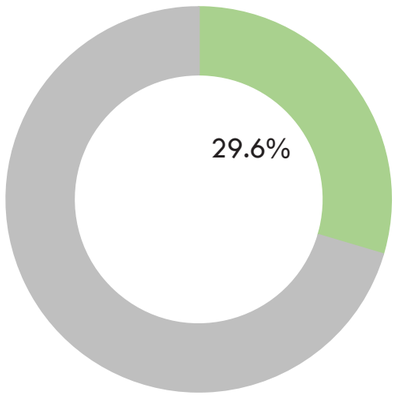
The variations of green represent the existing canopy coverage within the project area; darker shades indicating greater coverage and lighter indicating less. The areas lacking in canopy are easily recognized within the neighborhoods. Red line-work indicates hot spots, or areas within the neighborhoods where, due to inadequate canopy coverage, temperatures and the effects of heat island are likely much higher.

In neighborhoods such as Silver Bluff, Shenandoah North, Coral Gate, and the Roads, where canopy coverage is generally higher there are far less incidences of these hot spots, except along major roadways or in some case higher density areas such as that in Silver Bluff. However, in neighborhoods with some of the least canopy coverage, like those in the northern half of the project area i.e., Auburndale, Citrus Grove and East Little Havana as well as Douglas Park to the Southwest, there are large swaths of neighborhoods that fall within a hot spot. These low canopy areas leave already vulnerable populations at an even greater risk to excessive heat exposure, poor air quality, and increased flooding due to poor stormwater drainage and uptake.

To address one of the project goals of greater equity of canopy coverage among the different neighborhoods, hot spots begin to set the tone for where the greatest sense of urgency should be towards new planting initiatives.

Canopy Map



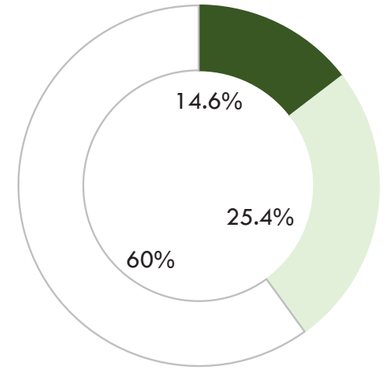


Right-Of-Way Area

Feasible Pervious Area

Impervious

Potential pervious areas based on the remaining right-of way after removing streets. This calculation currently includes driveways and paved areas as well as swales.



Tree Canopy Coverage

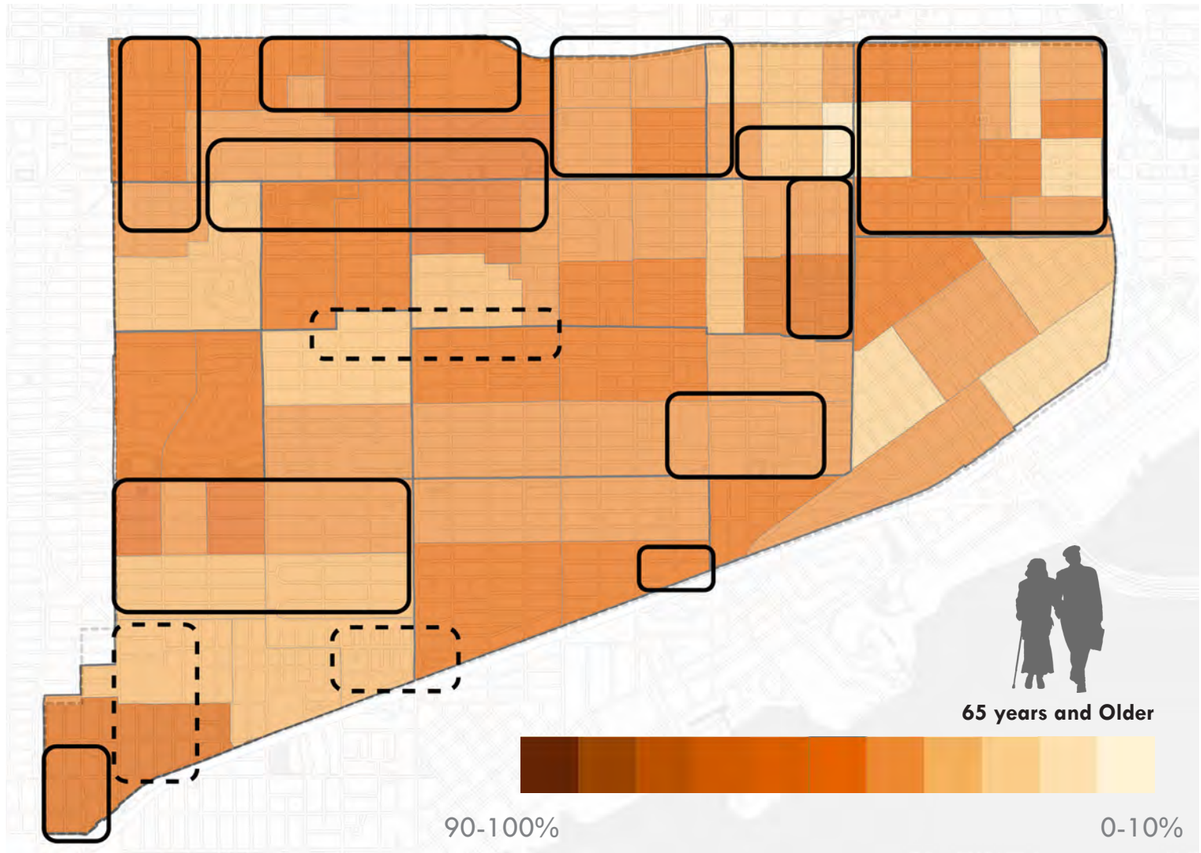
Current Coverage

Ideal Coverage

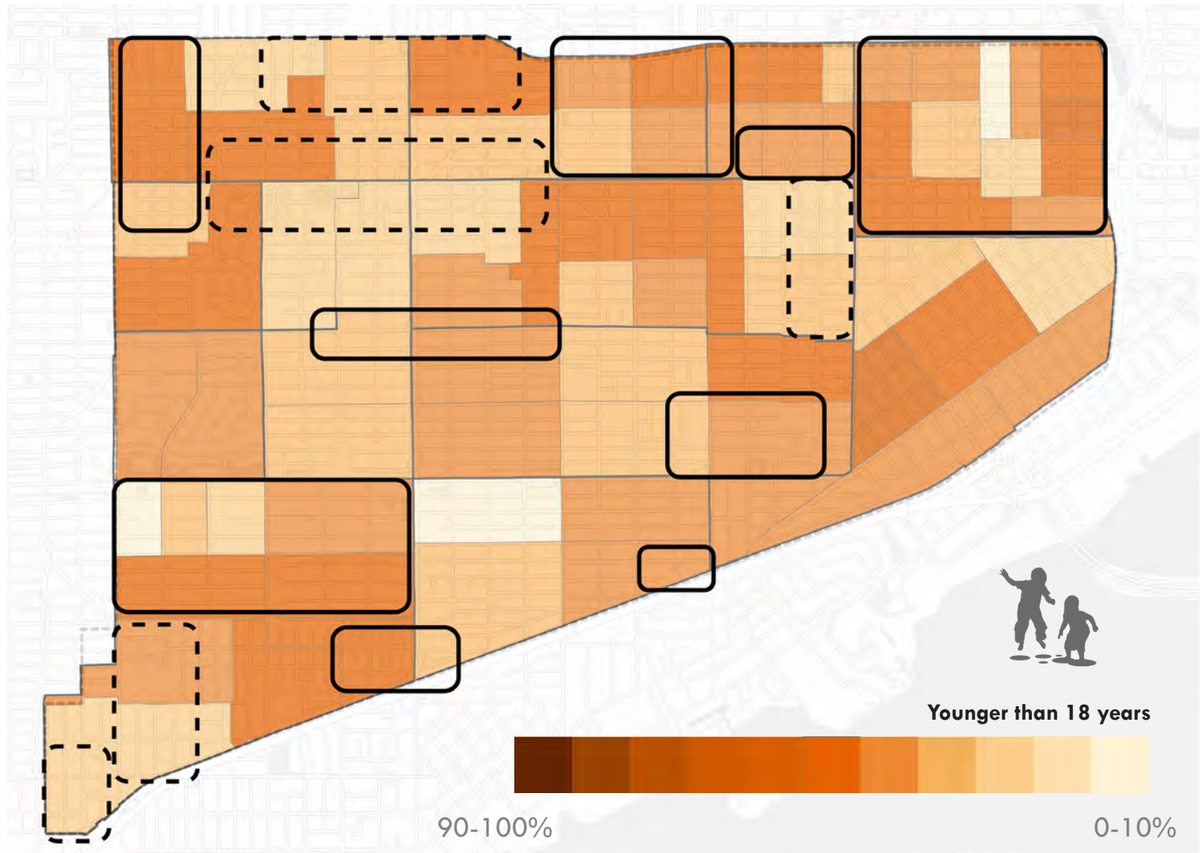
Other

Current canopy coverage percentages compared to the ideal goal of 40% canopy, showing what is the remaining percentage to be achieved.

Age-related Vulnerable Populations



Populations 65 and older

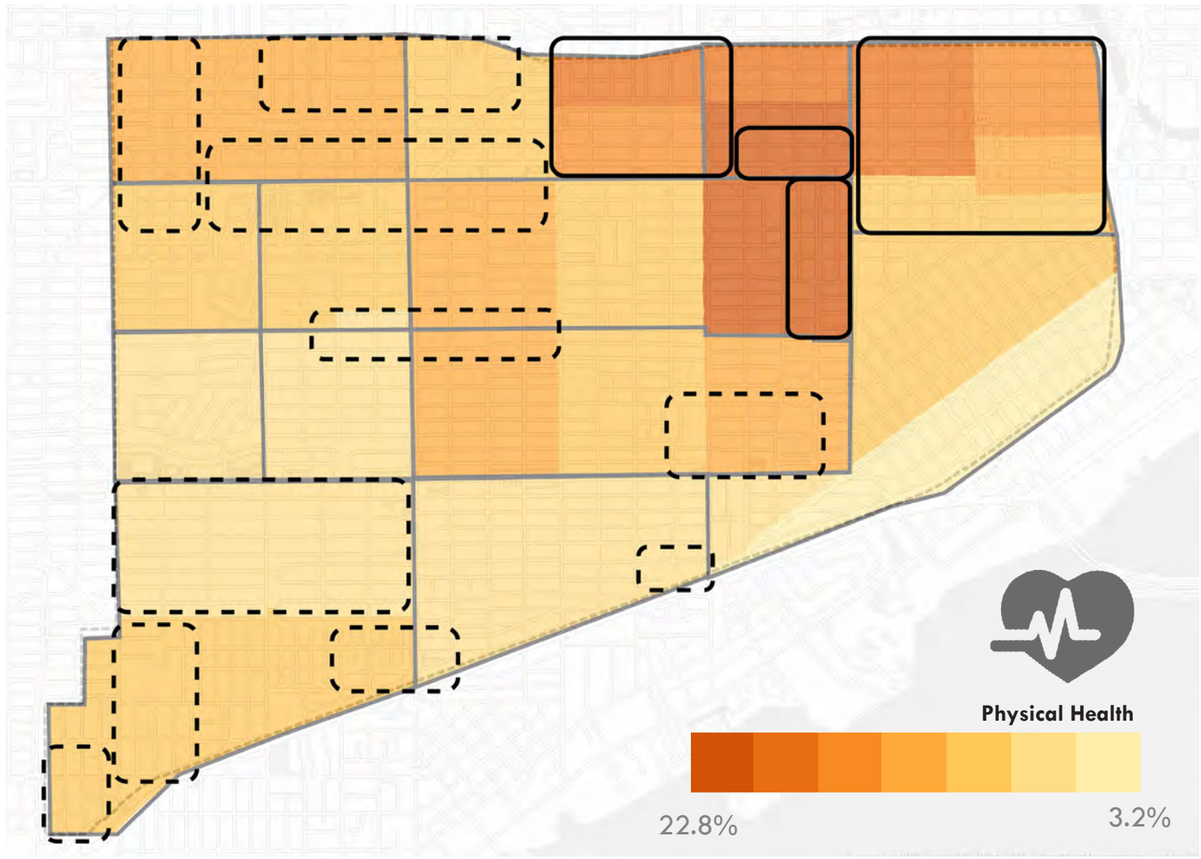


Populations between 0-18 years old

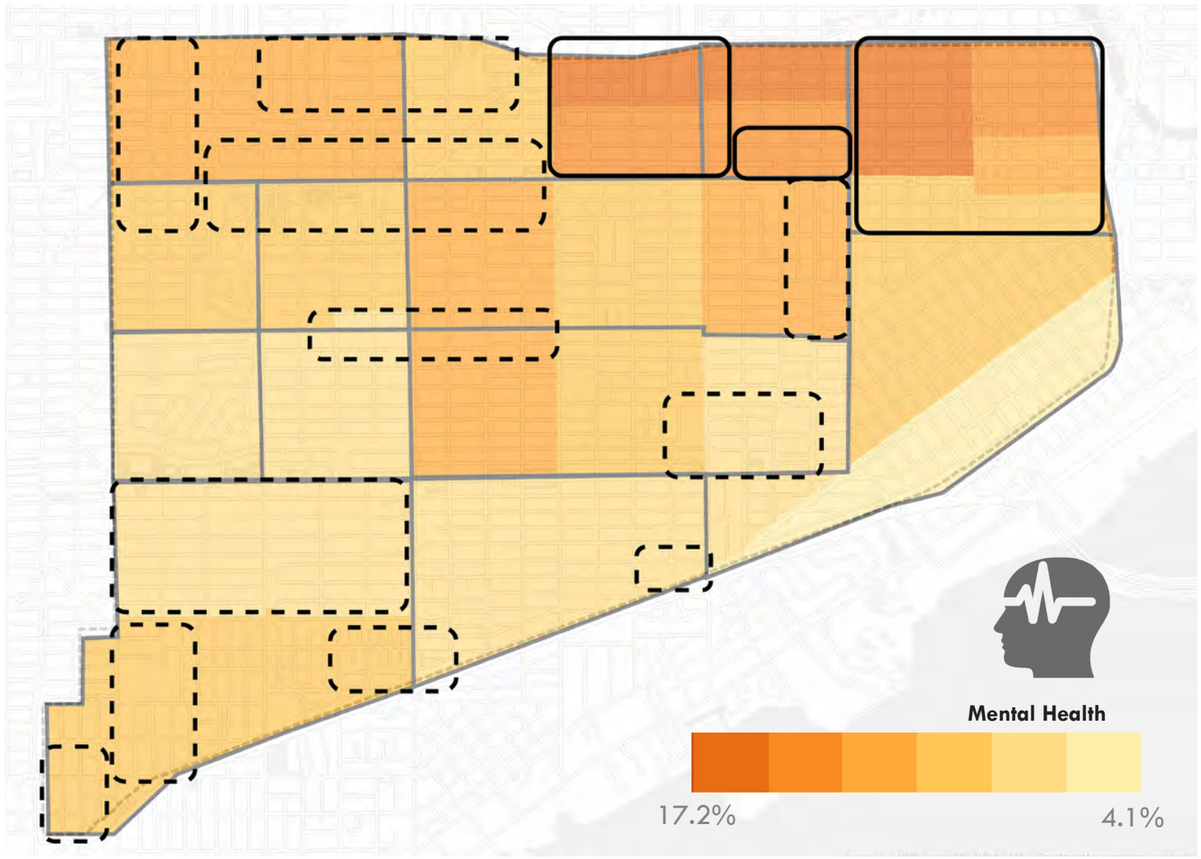
High Instances Low Instances High Instances Low Instances

Hot spots within Auburndale, Citrus Grove, East Little Havana and Douglas Park have the greatest instances of vulnerable age groups

Health related Vulnerable Populations



Physical Health



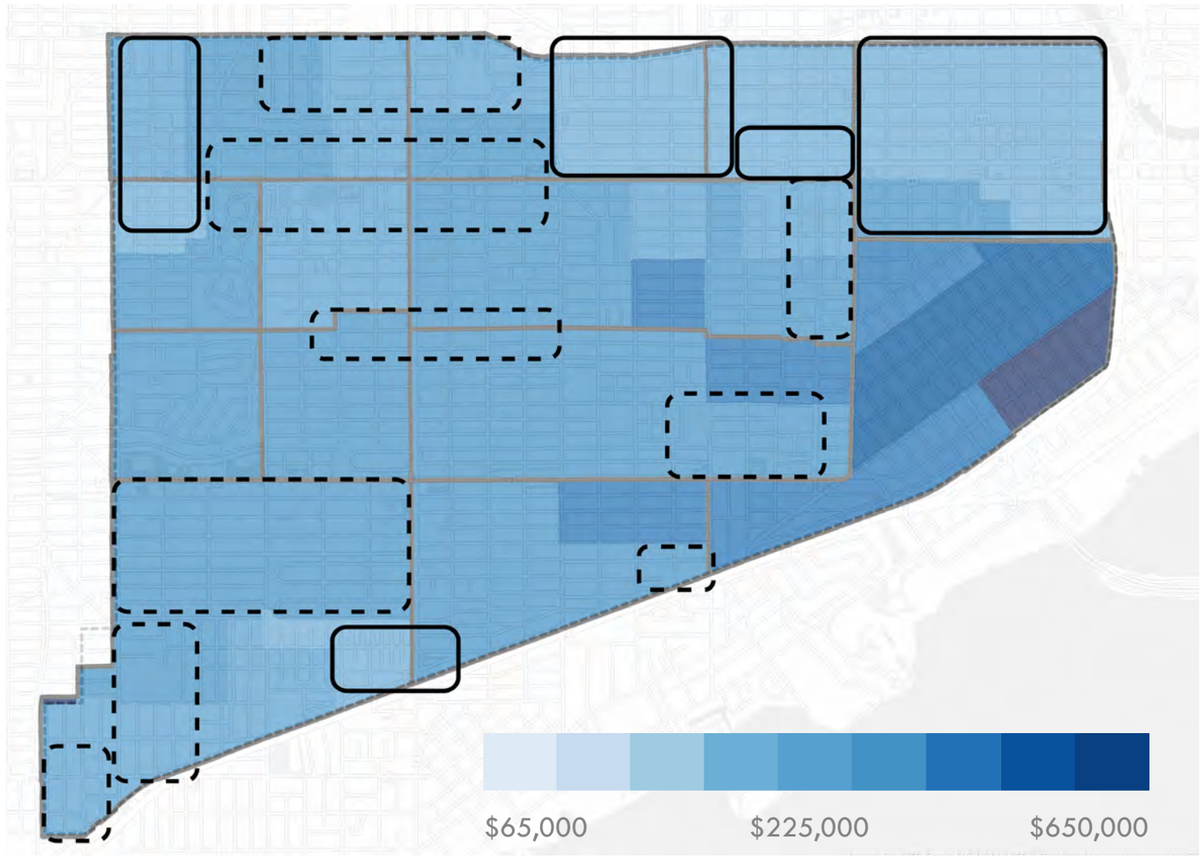
Mental Health

High Instances Low Instances

High Instances Low Instances

Hot spots of Citrus Grove, East Little Havana and Shenandoah North have populations with the poorest physical and mental health

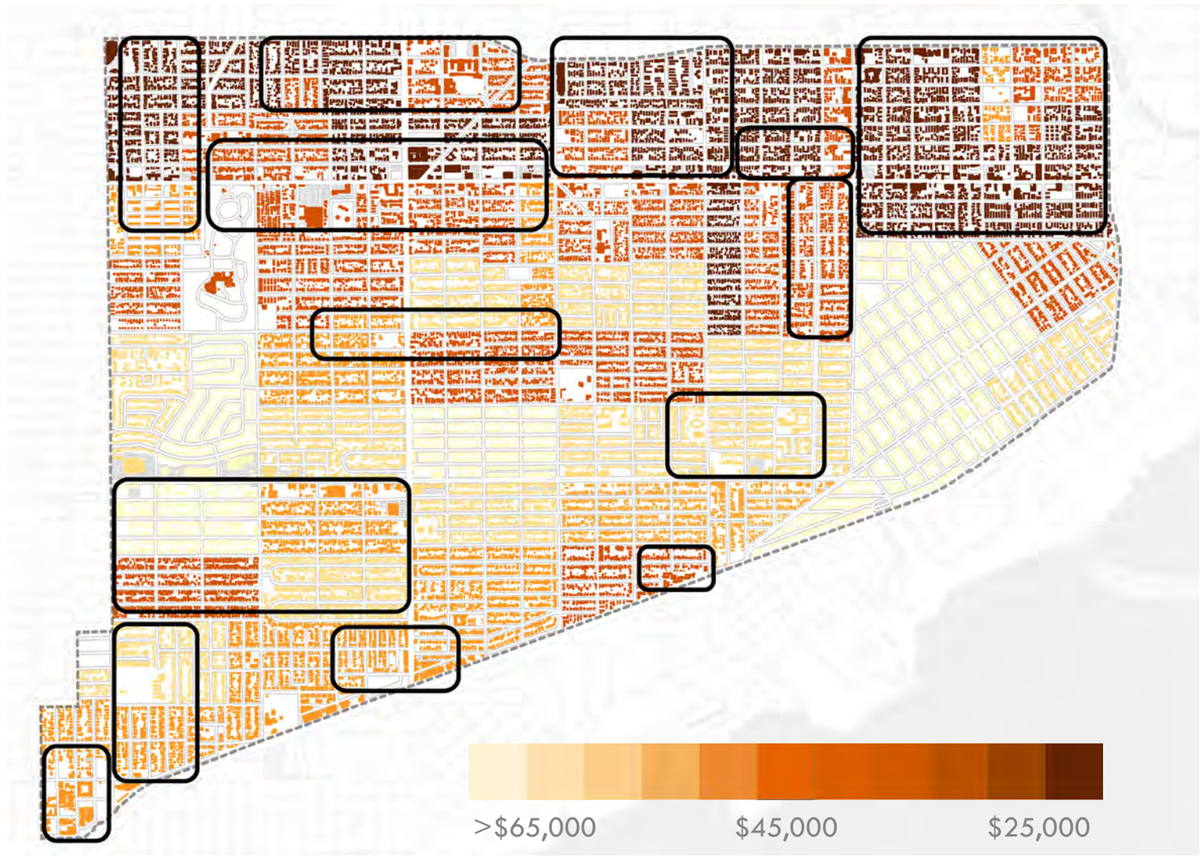
Home Value + Income



Median Home Value (2018)

High Instances

Low Instances



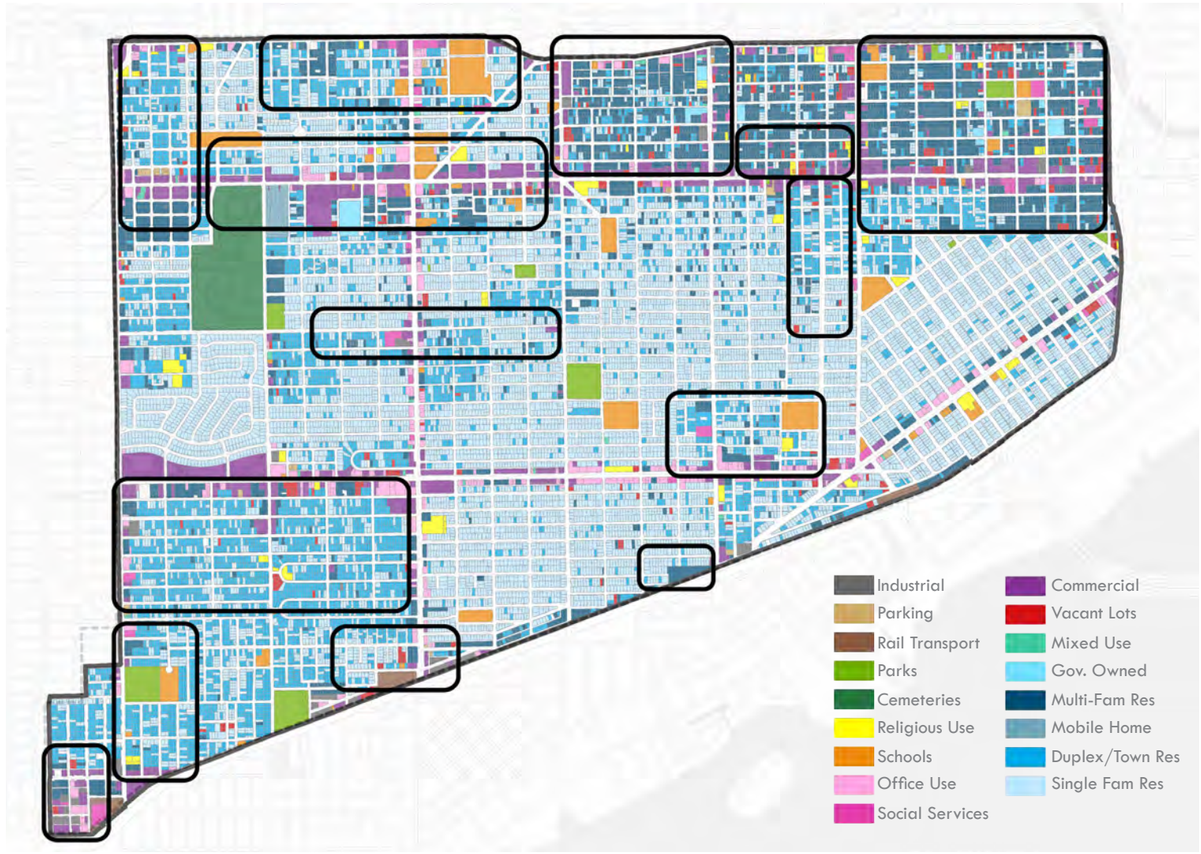
Income

High Instances

Low Instances

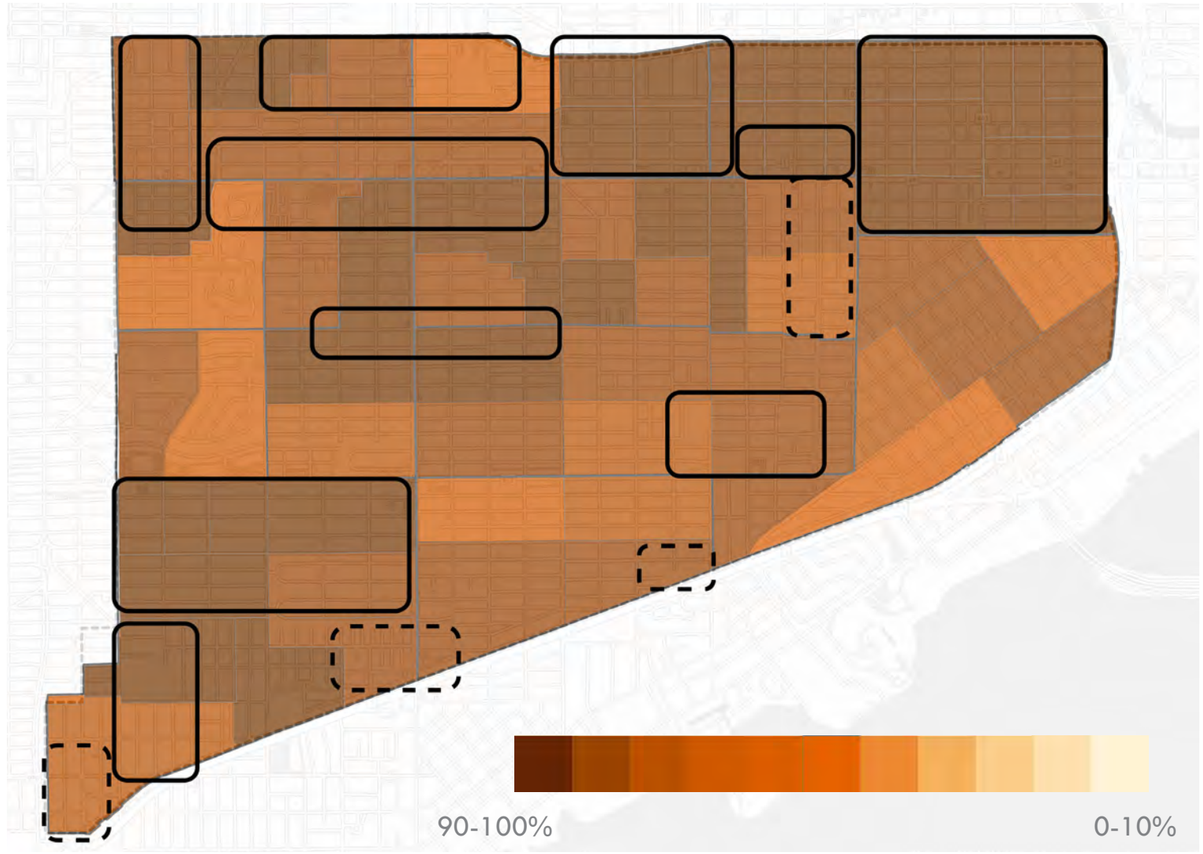
Within or in close proximity to most hot spots there are higher instances of low income and lower home values

Land use + Population Density



Land use

Hot Spot



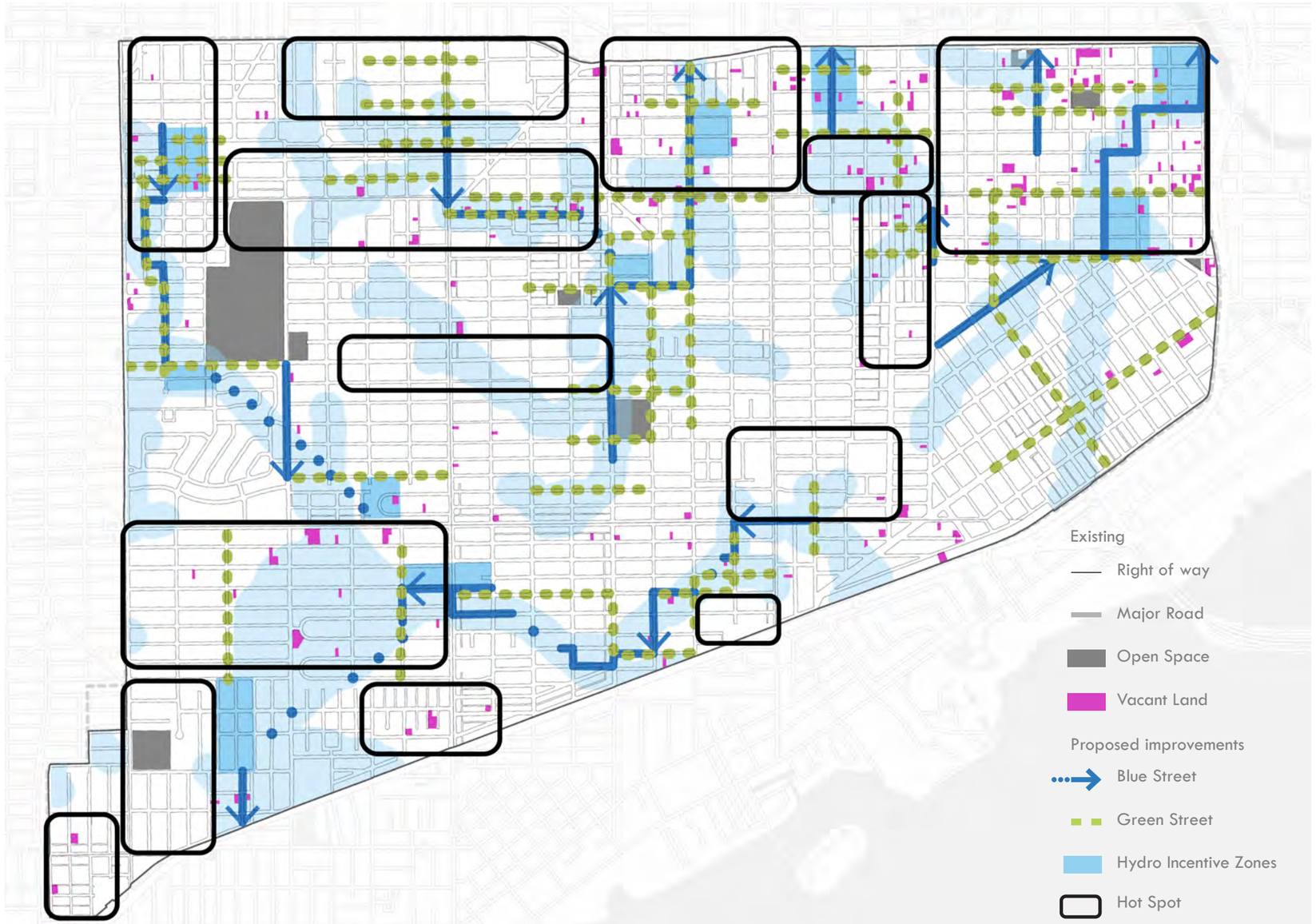
Population Density

High Instances

Low Instances

Neighborhood hot spots often contain areas of greater density

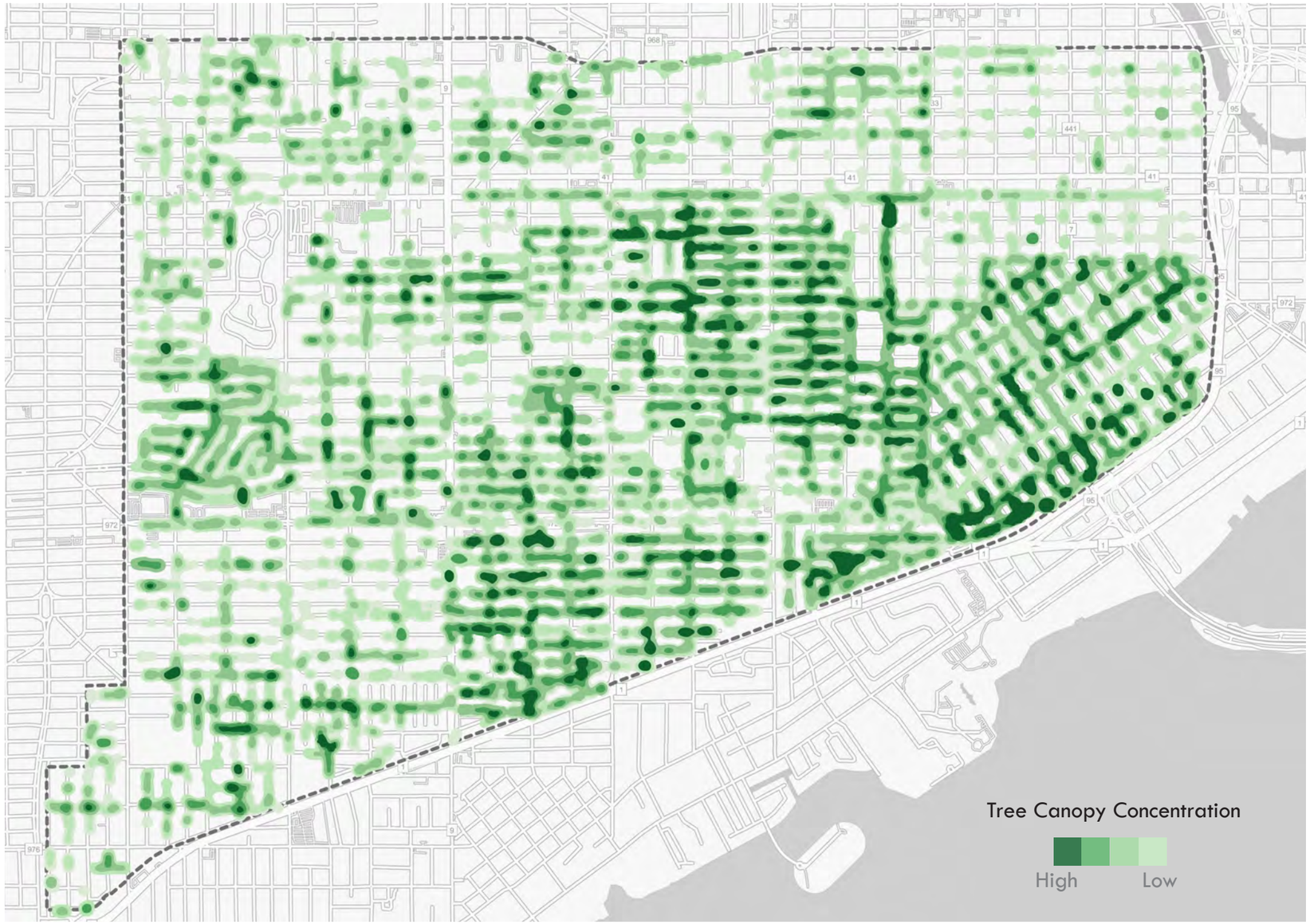
Implementation Hierarchy

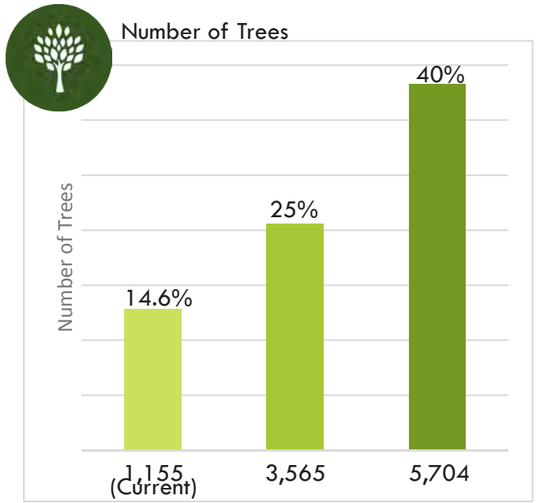


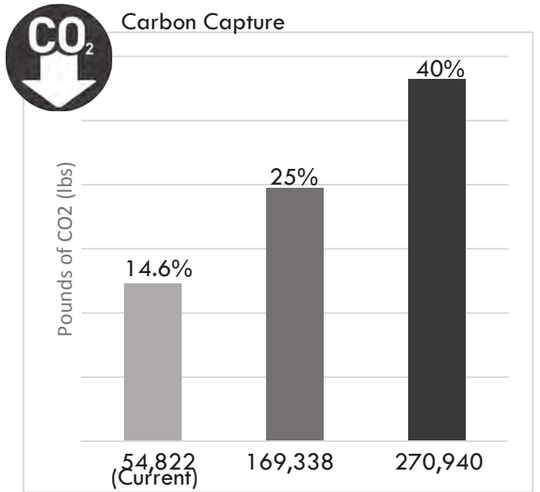
*Refer to Implementation Strategy Diagram in Watershed Mappings section

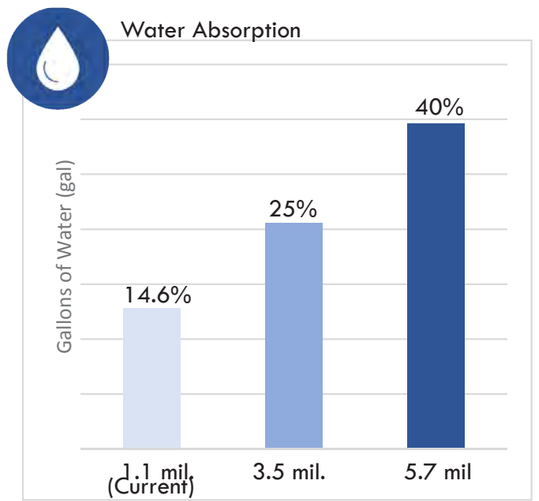
Implementation Hierarchy

A layering of the identified low canopy hot spots with the areas of opportunity generated by neighborhood hydrology modeling data reinforces the proposed strategies and helps to create a hierarchy of which areas to focus on first.



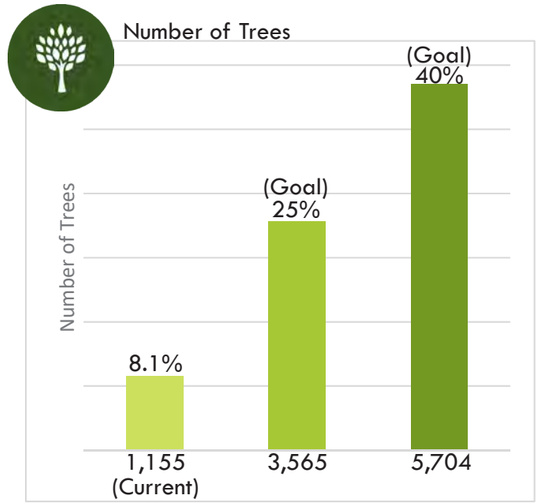


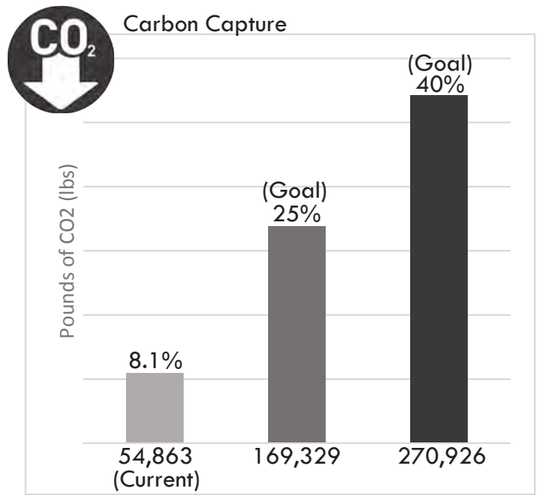


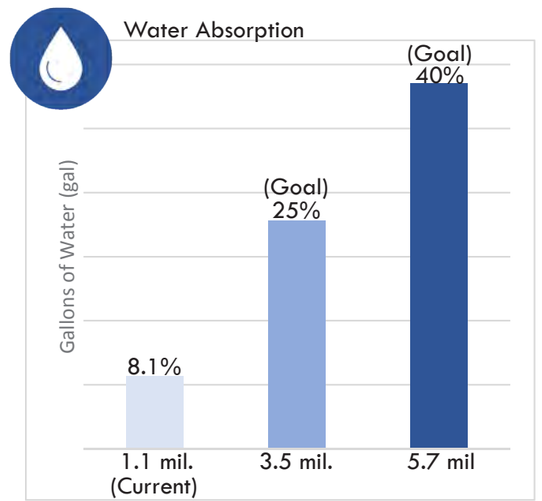


Studies show that the benefits from trees and tree canopy become optimal at 40% cover or higher to counteract the effects of urban heat islands. The graphs shown provide the numbers behind what 40% canopy coverage means for the project area in terms of the number of trees as well as the amount of carbon to be captured and the gallons of water to be absorbed, highlighting these data points as key factors in mitigating the effects of climate change. The graphs show current numbers and percentages at the far left with an initial goal of 25% canopy coverage at the center and the ultimate goal of 40% on the far right. The following pages break down this information by neighborhood.

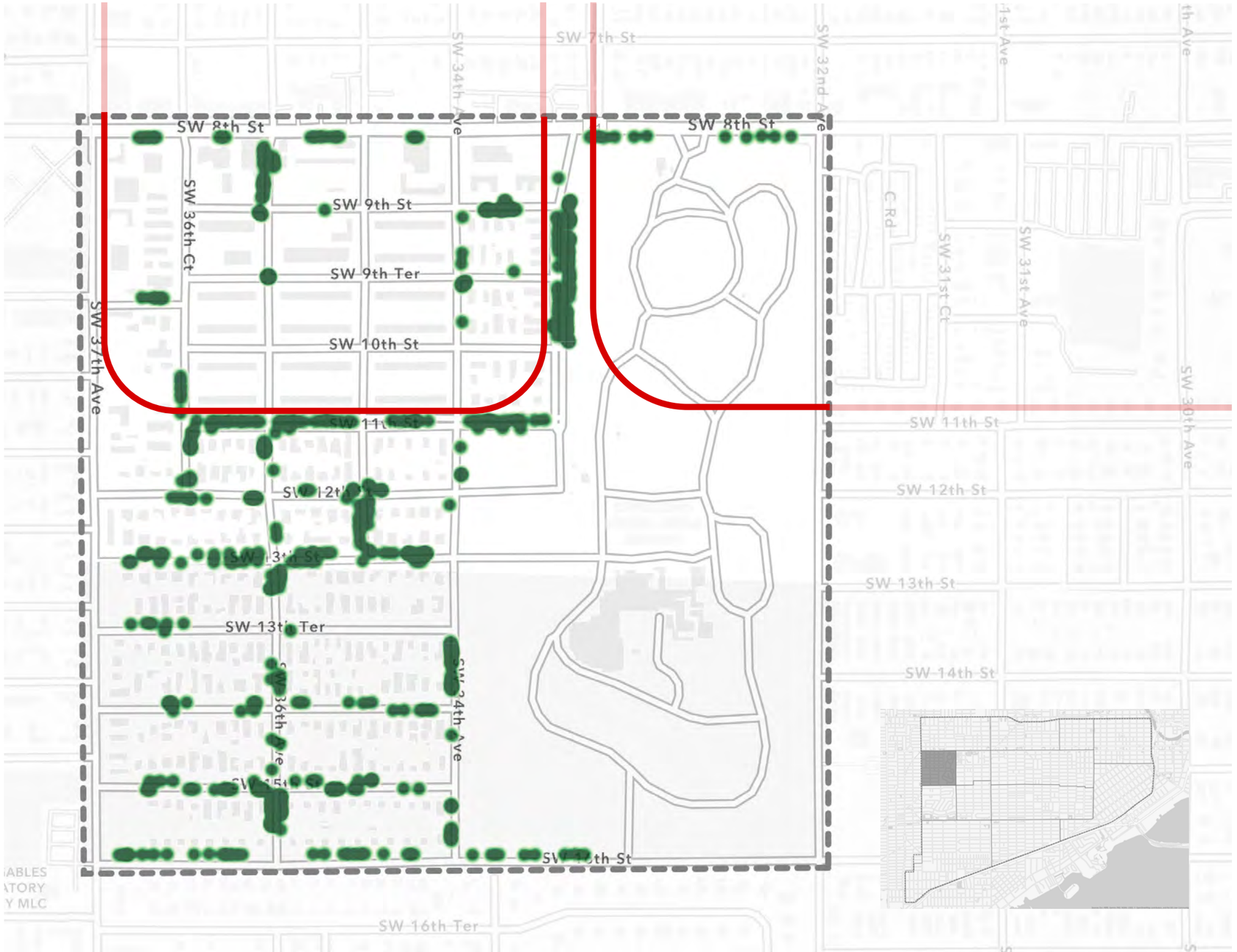
Neighborhood Specific Breakdown: Auburndale

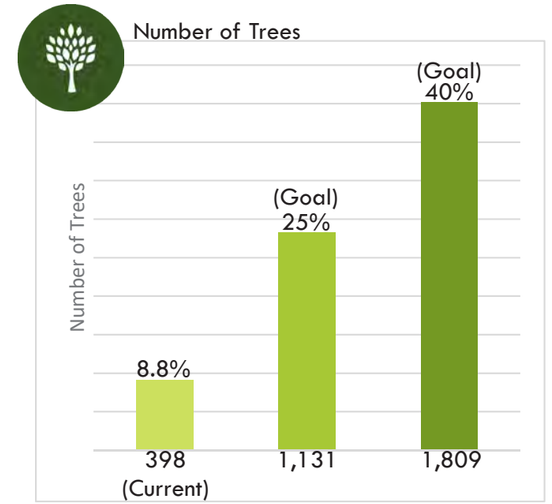


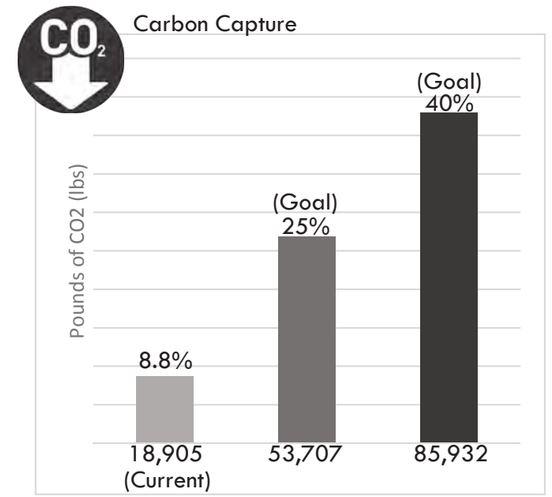


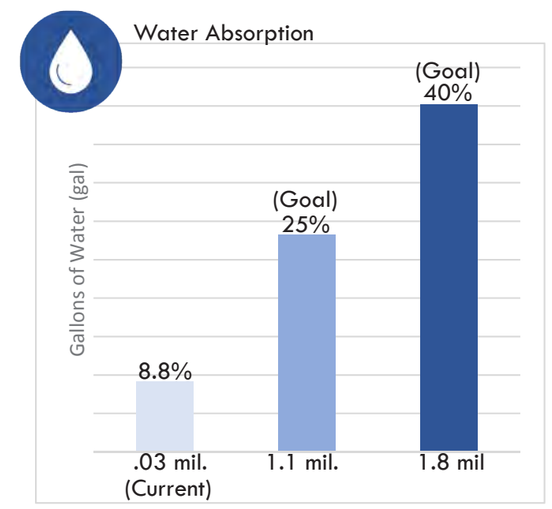


Neighborhood Specific Breakdown: La Pastorita

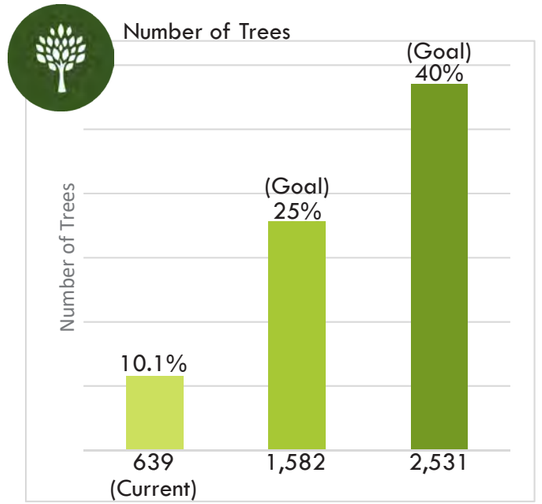


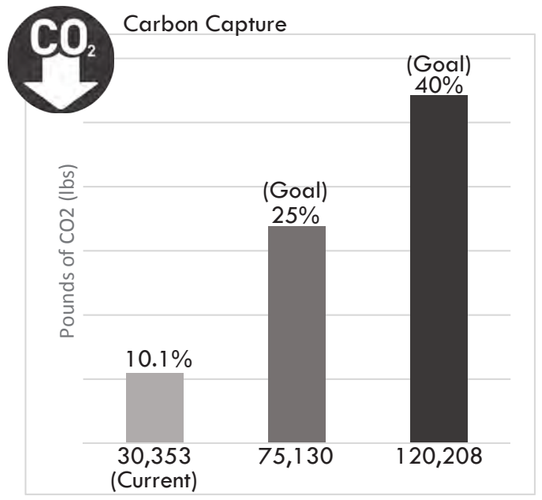


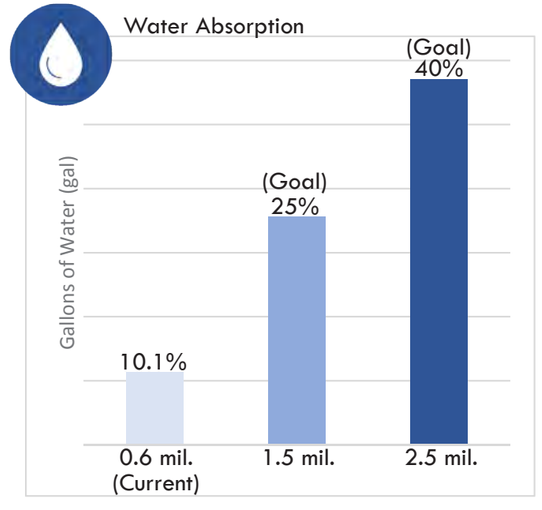




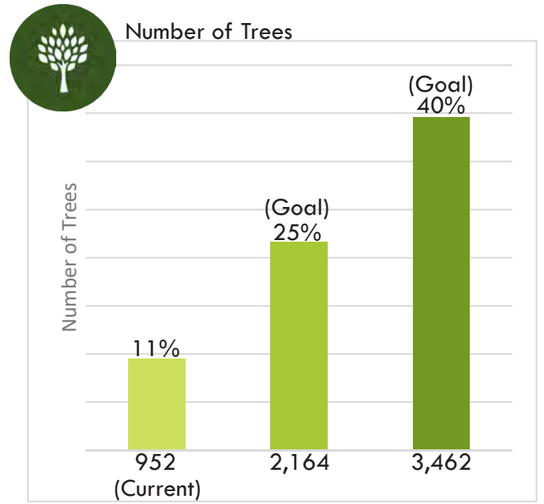
Neighborhood Specific Breakdown: Parkdale North

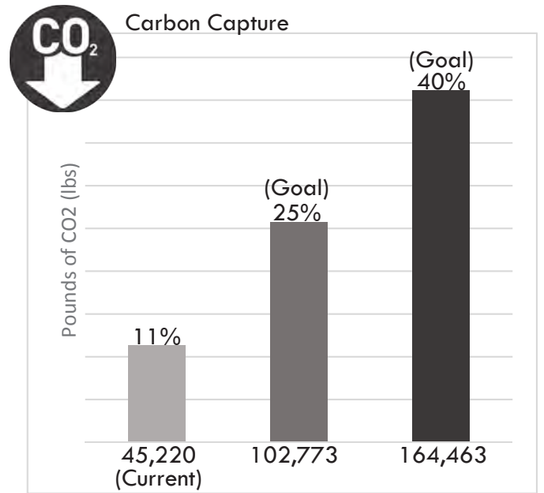


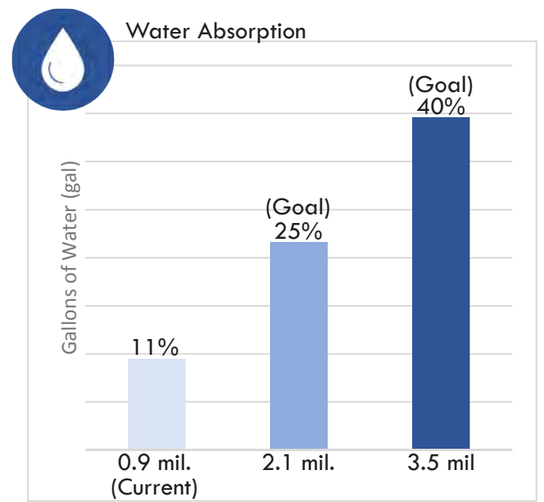




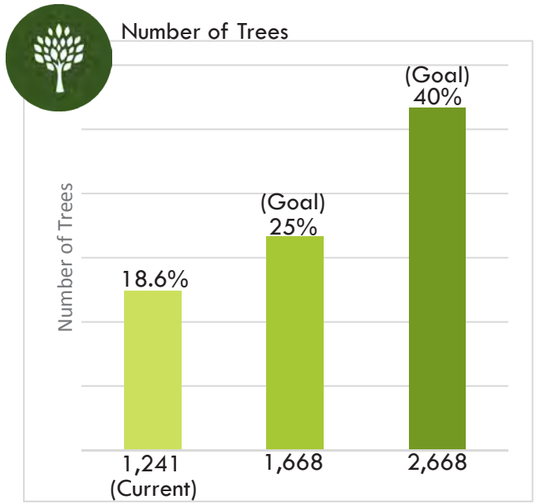
Neighborhood Specific Breakdown: Parkdale South

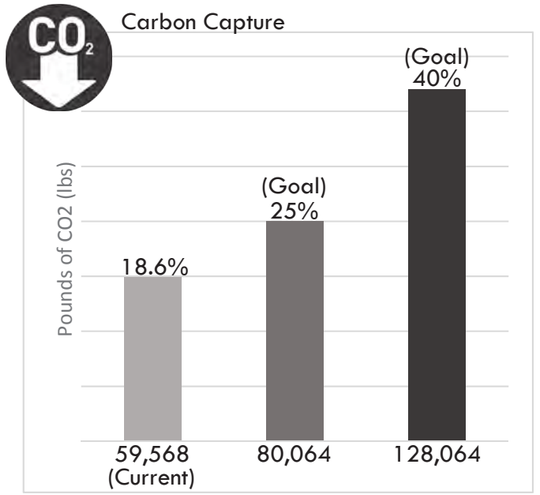


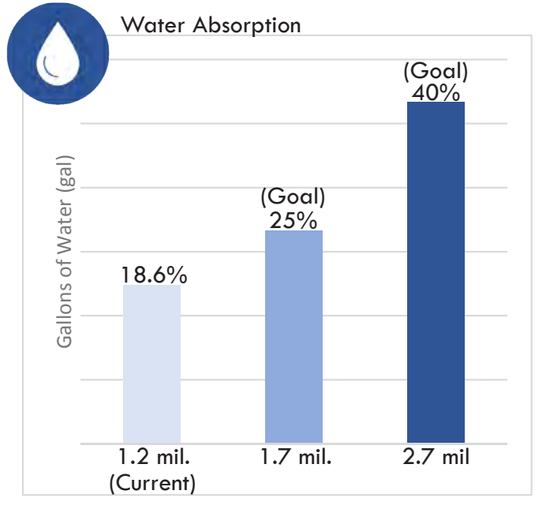




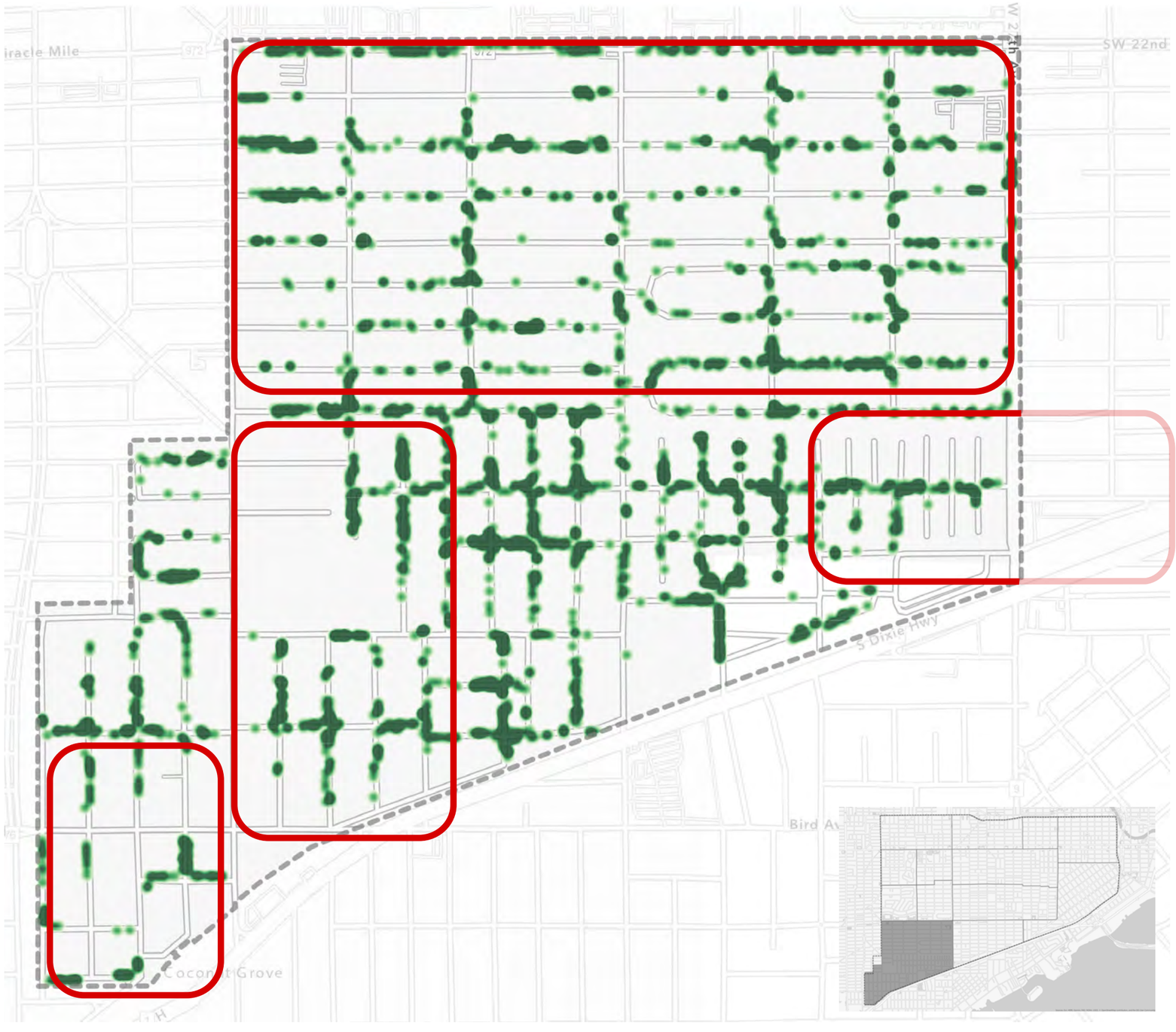
Neighborhood Specific Breakdown: Coral Gate

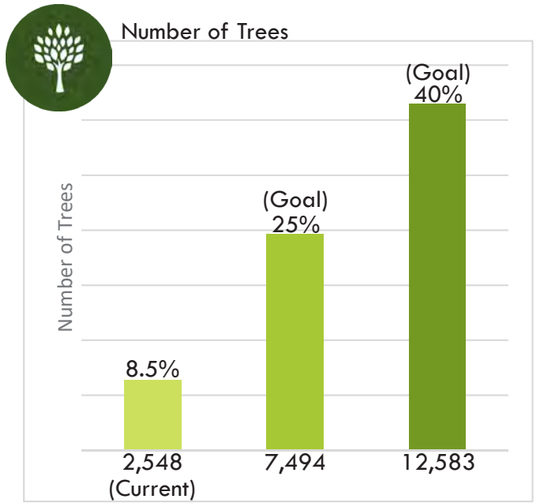


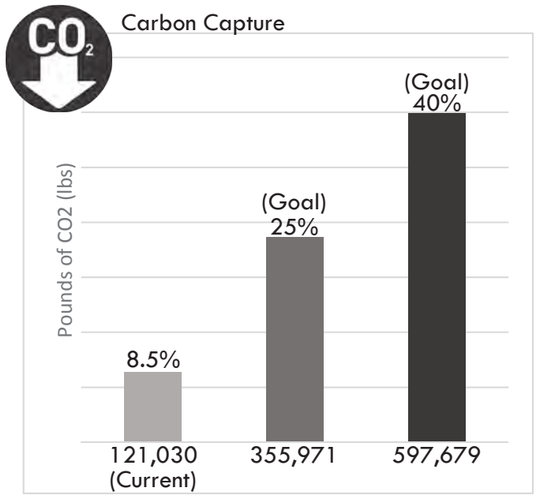


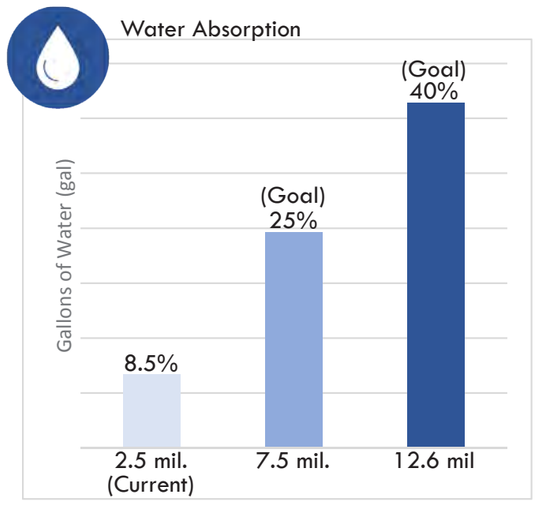


Neighborhood Specific Breakdown: Douglas Park

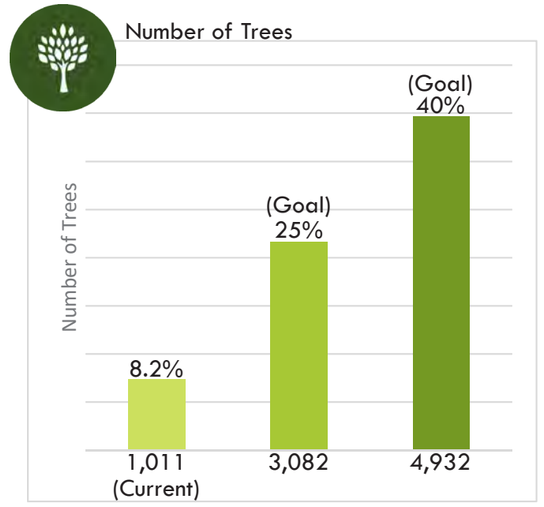


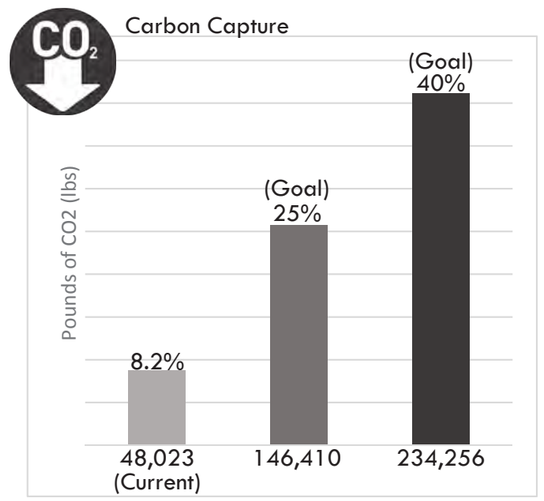


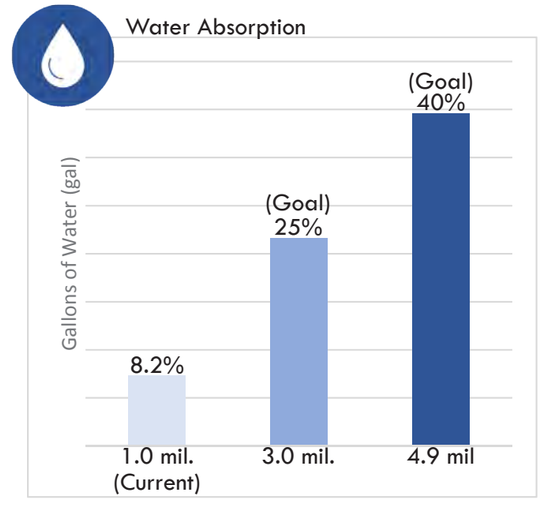




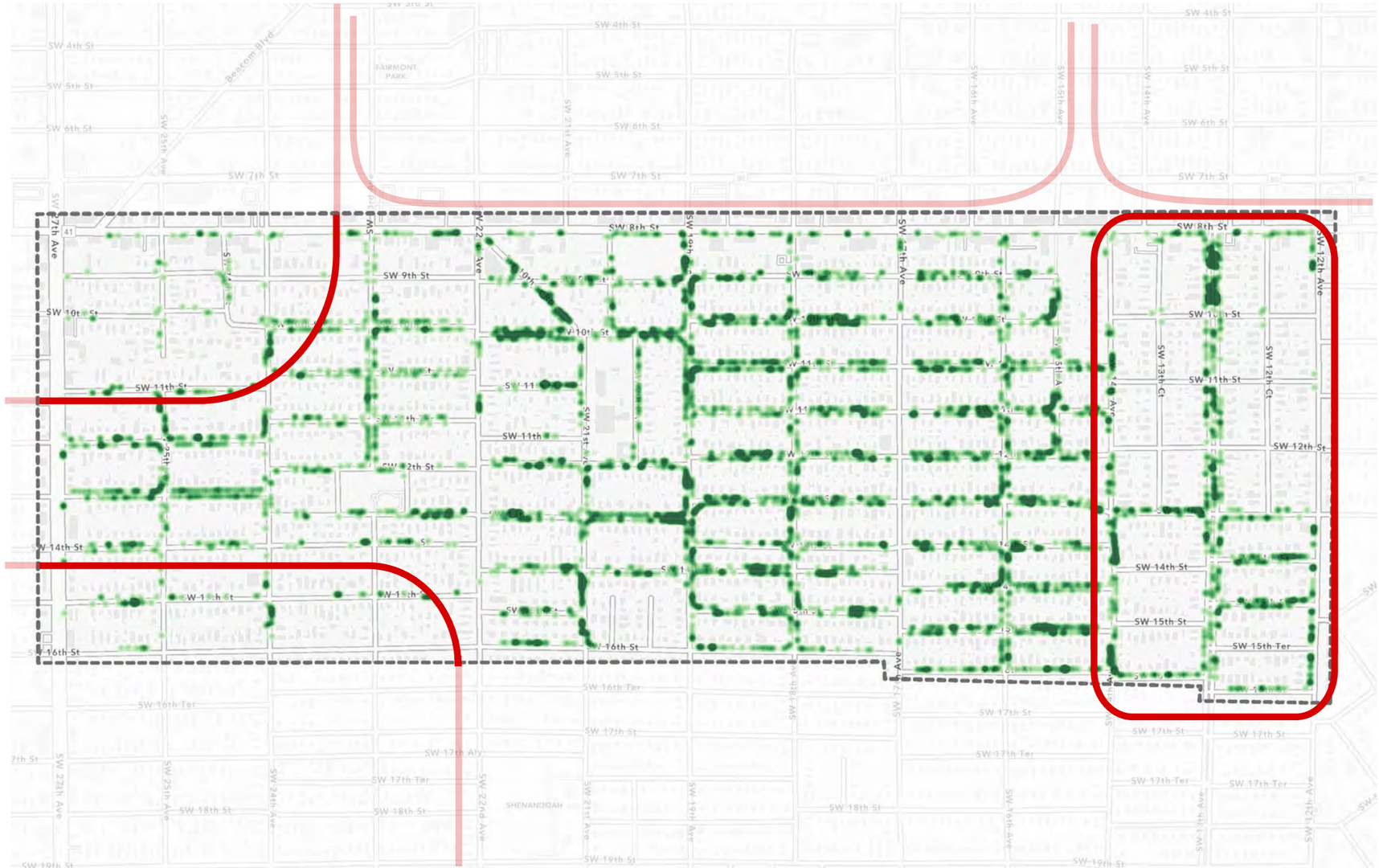
Neighborhood Specific Breakdown: Citrus Grove

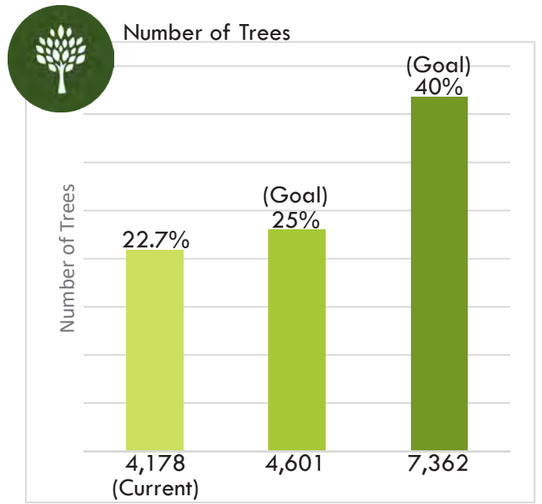


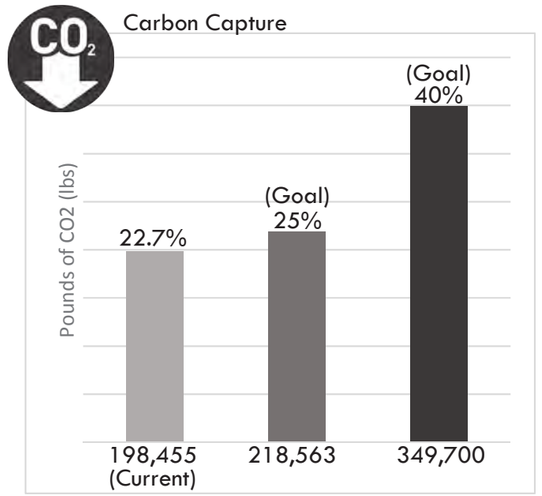


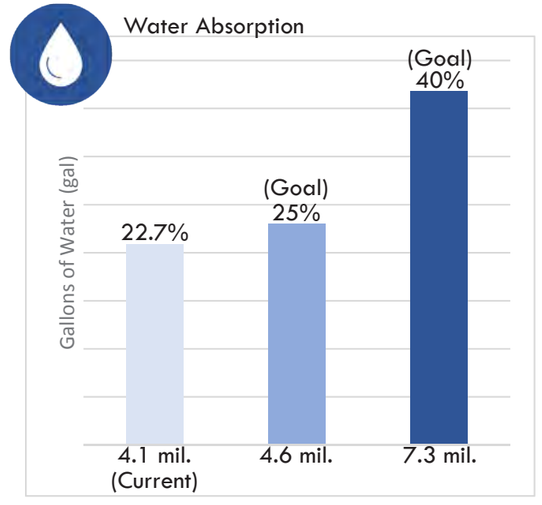


Neighborhood Specific Breakdown: Shenandoah North

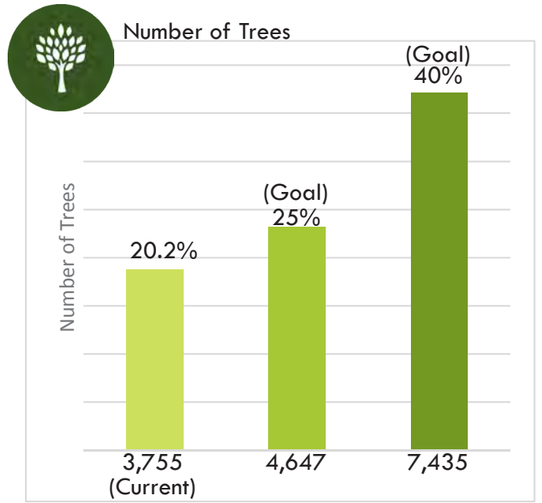


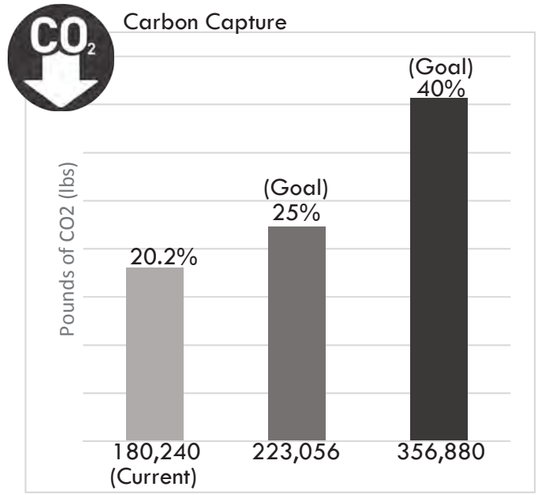


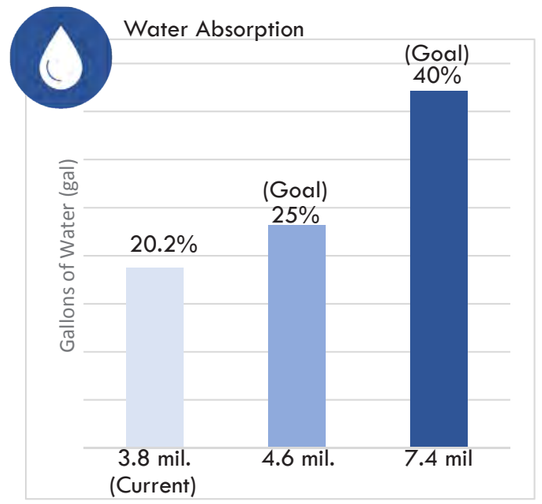




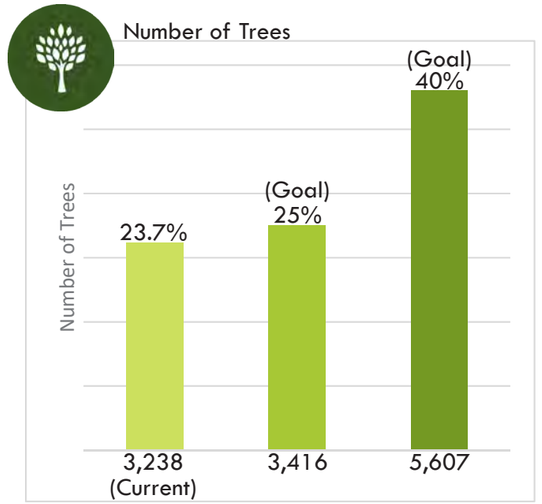
Neighborhood Specific Breakdown: Shenandoah South

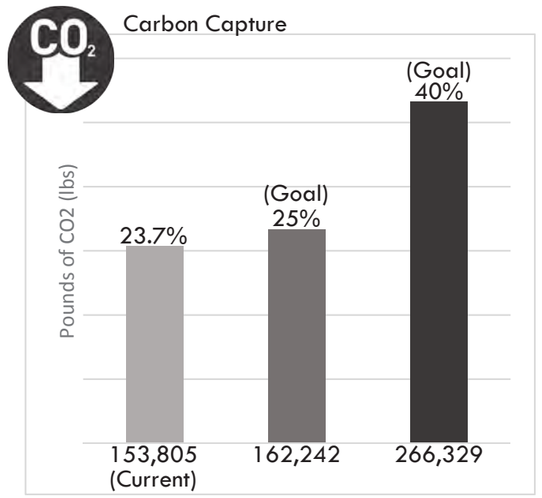


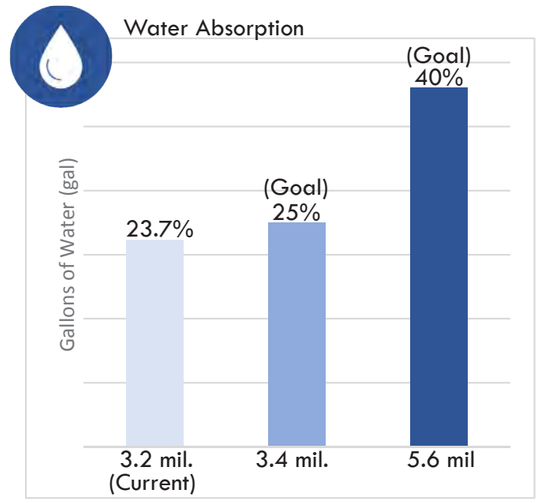




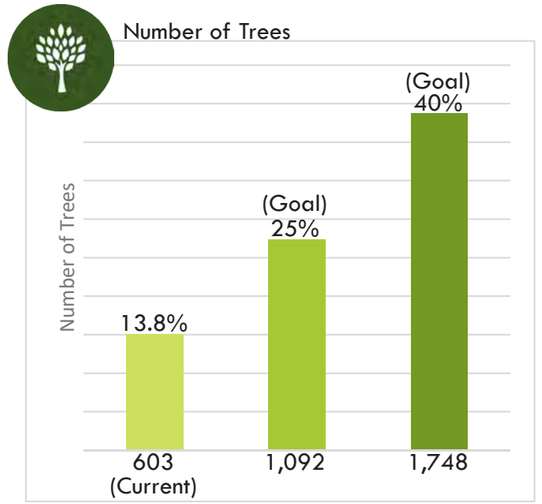
Neighborhood Specific Breakdown: Silver Bluff

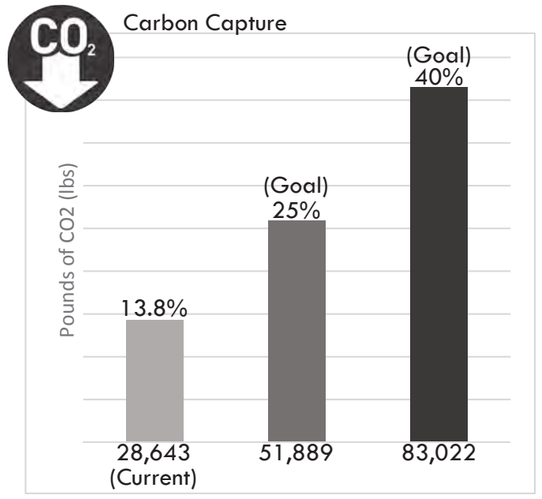


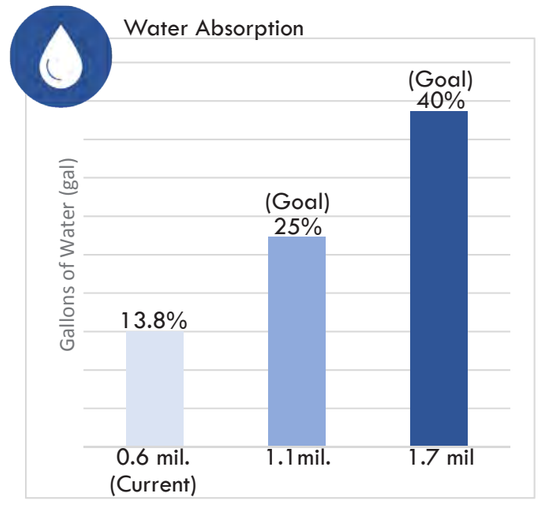




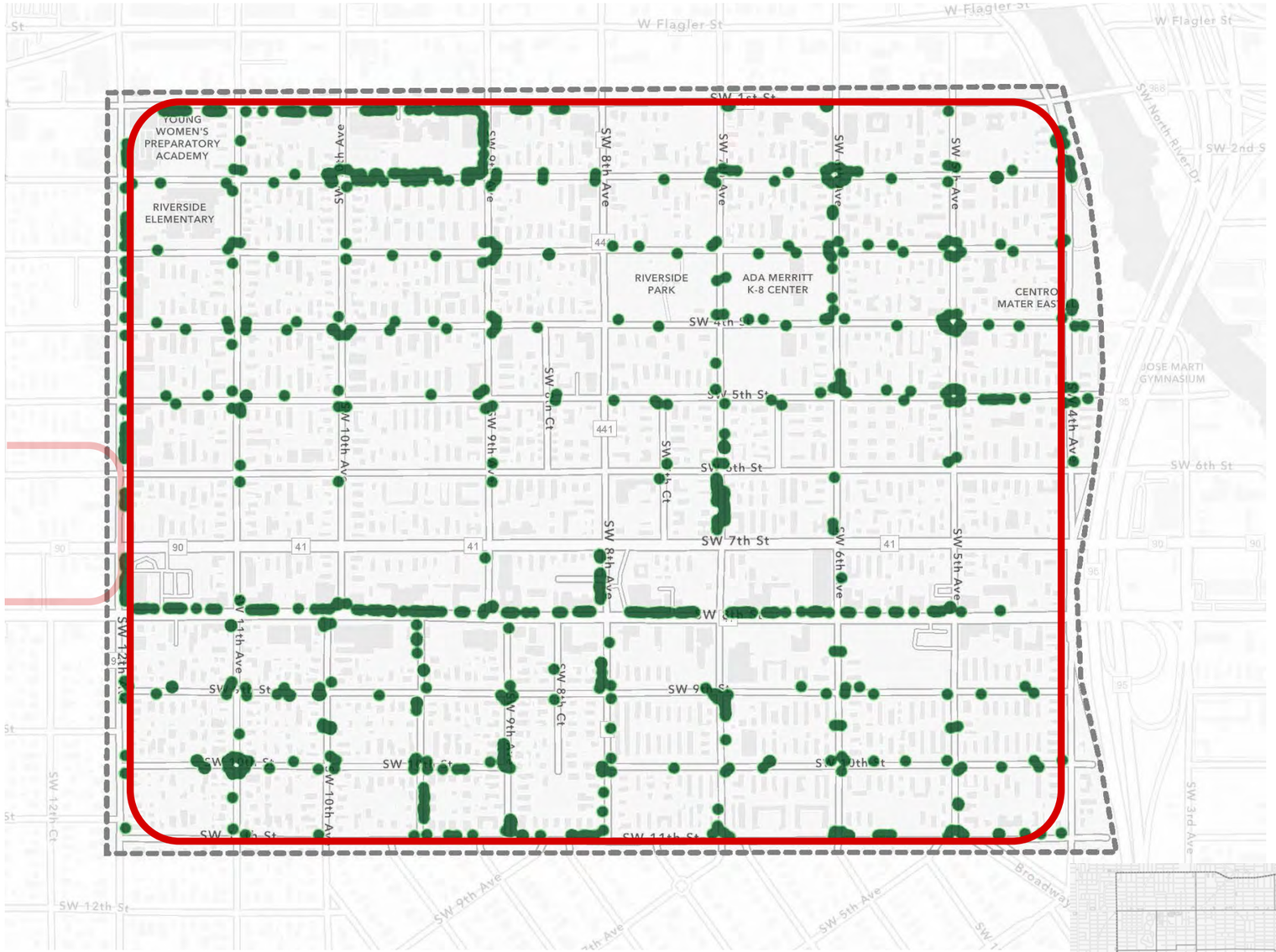
Neighborhood Specific Breakdown: Latin Quarter

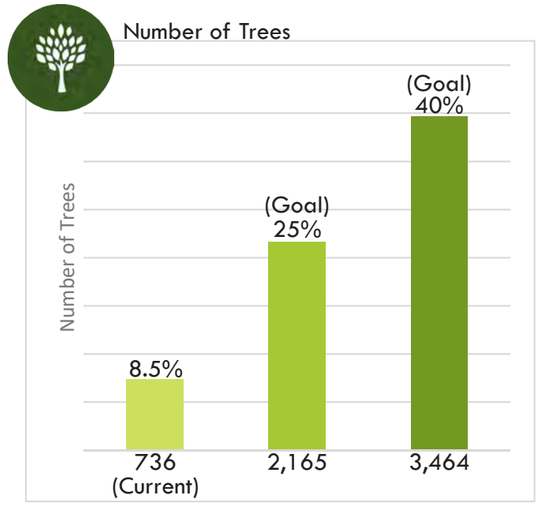


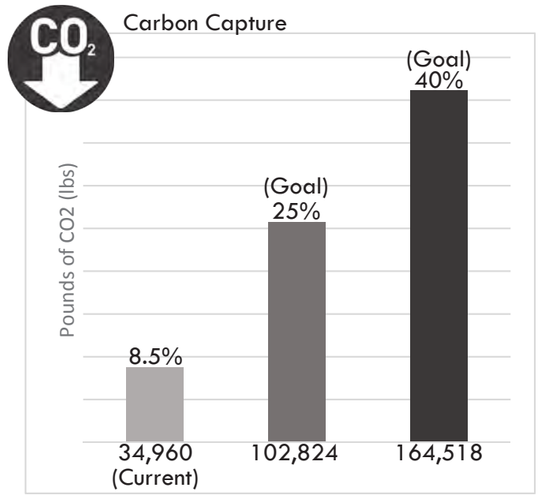


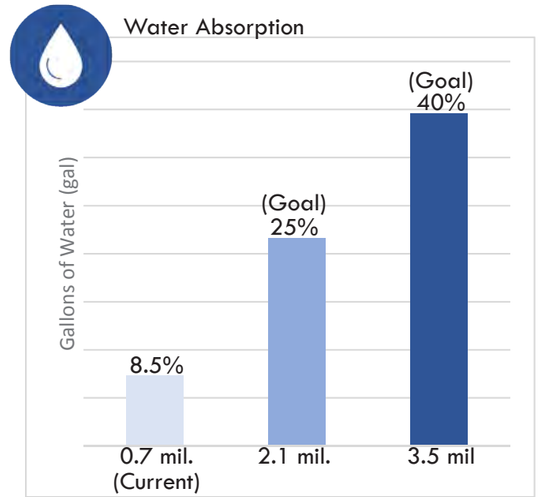


Neighborhood Specific Breakdown: East Little Havana

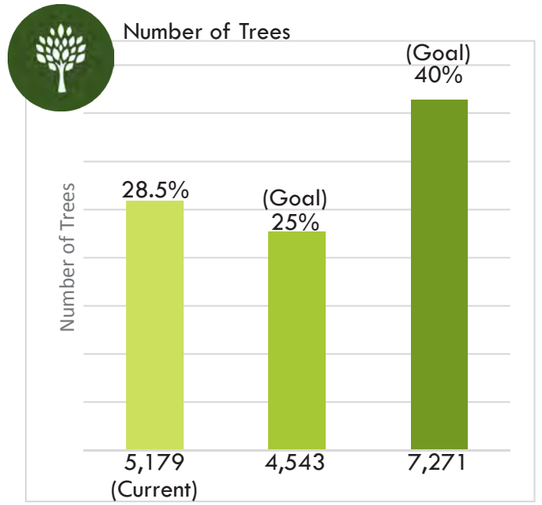


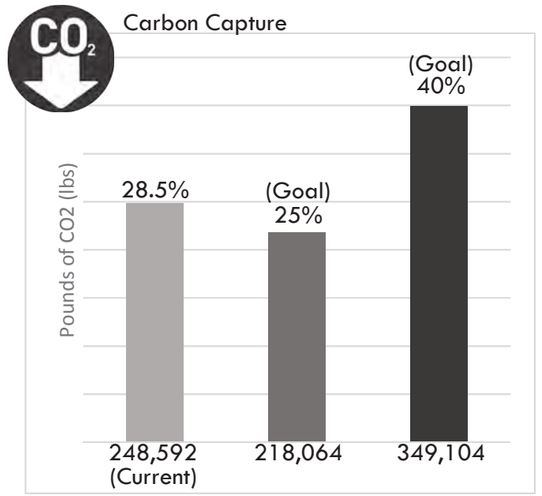


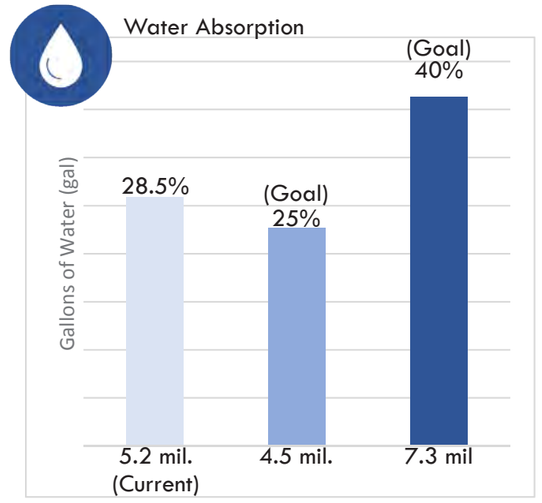




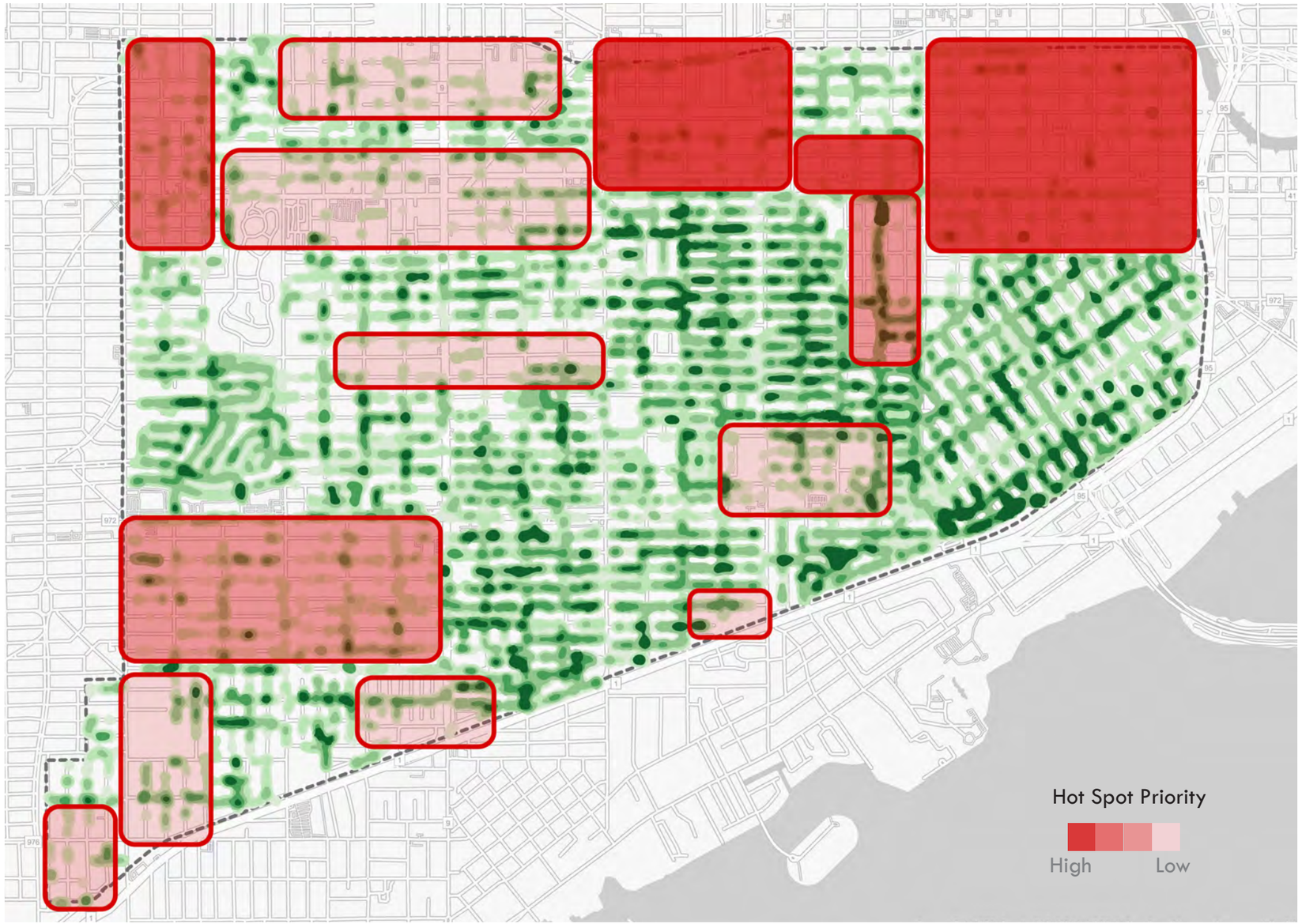
Neighborhood Specific Breakdown: Roads







Hot Spot Priority



Main Takeaways

Hot spots highlight priority zones for planting initiatives. The project goal of creating greater equity of canopy coverage among the different neighborhoods hinges upon using demographic, economic and land use data to show the areas of greatest need. Exposing these hot spots with higher instances of vulnerable populations within the project area assists with the generation of a priority hierarchy begins to develop the strategies for increasing canopy coverage across the entire project area to a modest goal of 25% to start, and ultimately 40% in each neighborhood. Planting initiatives should start in the areas shown graphically as High priority, as these are the areas most vulnerable to the impacts of low canopy coverage, and are therefore the areas where the most significant changes can be made.

Next Steps

We have broken down the strategies and actions proposed to achieve each of the project goals:

Goal 1: *Strengthen the sense of place, neighborhood identity and aesthetics, through the identification of strategic tree planting locations at gateways, thoroughfares and choice of species to identify specific districts along major corridors, and the reintroduction of native local plant species*

Strategy & Actions: The team shall use the tree species identified in the tree survey to help develop a recommended plant pallette for each neighborhood. We will identify general locations for different species according to; available planting space, proximity to overhead utilities, and proximity to saltwater. i.e.: Large canopy trees for larger swales and smaller canopy trees for placement under power lines and in restricted swales. Accent species for the neighborhoods will also be identified and potential locations for important entry/accent points to the different neighborhoods.

Goal 2: *Build the community's resilience to the impacts of climate change through tree shading to reduce the heat island effect*

Strategy & Actions: The team will take the information and analysis from this volume to identify areas of higher priority for intervention. The team will then develop locations where, based on the analysis, pilot projects can be developed that will be used to set standards within the City for improvements within the ROW that will increase resiliency and reduce the heat island effect.

Goal 3: *Maintain and enhance the quality of the air, water and land through a mature tree canopy's ability to sequester carbon and release oxygen, and filter storm water*

Strategy & Actions: The team will examine ways that the City can encourage and incentivize property owners to increase the amount of mature canopy within their property. The ROW only makes up about 25% of the overall acreage of this portion of the City; therefore, even if 100% of the ROW was tree canopy, the City would not meet the current recommendations for coverage. Education of the importance of tree canopy will be addressed, but the team will specifically look for other ways that the City can encourage more planting on private property, through Code Enforcement, Code Requirements, City lead initiatives and ways to improve implementation of existing programs like the Tree Trust Fund, and new Incentive programs for tree canopy and water filtration and storage.

Goal 4: *Promote and encourage actions that reduce greenhouse gas emissions through the creation of attractive and comfortable pedestrian and cycling routes which foster the use of alternate modes of transportation*

Strategy & Actions: The team will look at ways to make all neighborhoods equitable in terms of walkability. Current analysis shows that the neighborhoods that are currently the most walkable (shaded sidewalks) are also the areas where more residents drive. Whereas the neighborhoods with less vehicles and more residents relying on public transportation or other methods, like walking or biking, are currently the least walkable areas within the project area. We will identify high priority areas where residents connect to public transportation corridors and need to walk to the bus stops.

Goal 5: *Create a road map by which a sustainable urban forest can be developed, and implement a planning process that will support and cultivate the maintenance of ecological, social and economic functions and benefits, over time*

Strategy & Actions: The Team will create this road map through:

- The development of the neighborhood plant pallettes which emphasize diversity and resiliency of species.
- Recommendations for planting specifications that will help new trees develop into healthy and safe trees
- Recommendations for maintenance practices to ensure that the new trees are being properly cared for and enabling them to meet their full potential.
- Recommendations for placement of trees in swales in areas where parking has been problematic. These recommendations may include different infrastructure for the trees than what is currently specified.

Goal 6: *Promote awareness with City residents, on the benefits of trees, through community education and outreach*

Strategy & Actions: Starting on the next phase of this project includes Community meetings. One at the beginning of this phase which will gather public opinions as well as educating the communities on the benefits of trees and the statistics of what we have found for each of the neighborhoods. The team has begun to develop simple graphics and diagrams to help convey and educate the residents, as well as questionnaires and surveys to gather information.
The Second meeting will happen after the Pilot projects and Master Plan have been developed and will inform the residents of our strategies for improving their communities.