

RECLAIM, REMEDIATE, & REVITALIZE: ENVIRONMENTAL INJUSTICE IN DETROIT, MI

A Thesis

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ABSTRACT

This thesis study investigates the effects of living in toxic communities and the relationship between humans and the natural environment. The industrial revolution brought many new forms into urban/industrial cities. With the rise of factories, automobiles, and landfills near residential neighborhoods, air, and soil pollution have become an issue. Focused on how racist and bad city planning has affected residents' health causing cancer and asthma by allowing hazardous facilities in residential neighborhoods. During the research process in learning about toxic communities, it was found that poor people and minorities live in low-cost real estate/land, and that attracts polluters such as industrial factories. It was found in Hamilton's research that polluters are actively trying to be in the low-priced and income communities because the locations had lower chances that polluters would get fined for breaking zoning laws. City landfills, factories, cars, and residents all play a role in the negative effects of air quality.

This thesis explores how architecture and urban design are complicit in and can offer solutions to, the ongoing legacy of pollution in industrial cities. The design purpose of my thesis is to be a community asset that represents all the history of the site, remediate the environment and be a resource to the community. The goal of the my thesis is to Reclaim, Remediate, and Revitalize the Oakwood Heights neighborhood of Detroit MI. My main thesis question is "How can architectural designs contribute to environmental well-being while also finding imaginative alternatives to traditional plaques for preserving memories?" How does pollution affect architecture? What does the integration of nature and architecture look like? Do you integrate nature in architecture as a precedent of building form or as an architectural component? How can architectural materials combat air immersions of smoke and smog? The goal of my research is not to solve the problem of air pollution but instead to show how we may have to make changes to architecture and lives if air quality continuously decreases. Also, the goal is to create a program that can be implemented in highly polluted areas that help combat air pollution. This topic takes us down a deep dive into how racial discrimination has affected housing and zoning. The racial discrimination of redlining and clustering, made industrial factories cluster in certain neighborhoods which caused residents to gain health issues. How can communities use architecture to visualize invisible conditions of harm, such as pollution? Rather than positioning any solution as one that assumes or seeks to recreate an unadulterated natural environment, this project explores how architecture can respond to real, rather than ideal, forms of environment. Research for this thesis was collected from secondary qualitative and quantitative sources. Structured interviews were conducted with 5 residents.

KEYWORDS- INDUSTRIALIZATION, SMOG, EXHAUST, GREEN, ENVIRONMENT, HAZARD, EMISSION, COMMUNITY, ENGAGEMENT, RECLAIM

RESEARCH

As the industrial revolution began and many people started to move out of rural areas and into the big cities for job opportunities, Detroit was a destination city. Detroit, MI is known as the Motor City which was the birthplace of the automotive industry. From 1900 to 1950 Detroit's population increased sixfold because it was becoming a prominent city with high wages and abundant jobs which attracted immigrants.

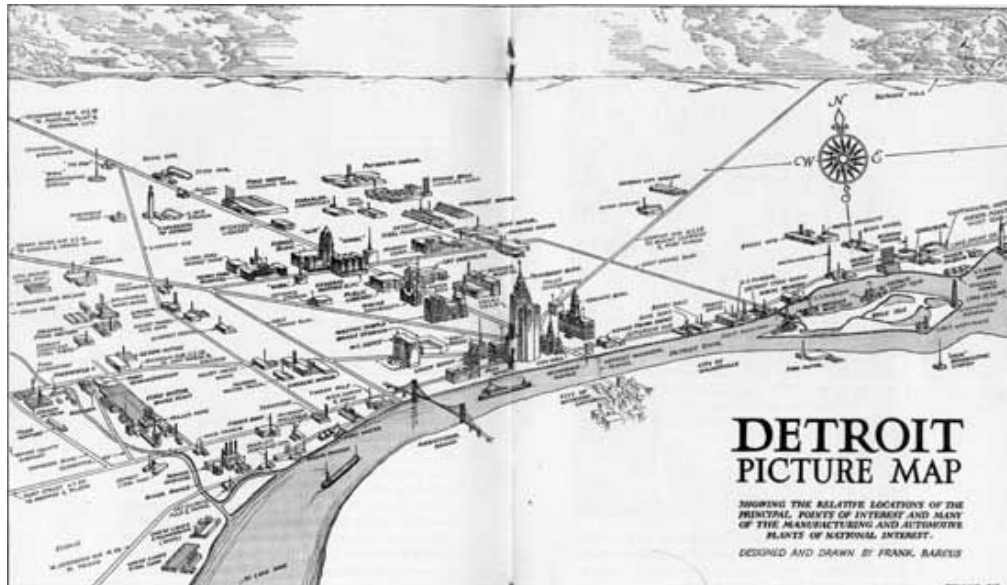


Figure 1: A map of the city of Detroit showing all the factories located throughout the city.

There were many factories sprawled throughout the city but specifically in the Downriver area of Detroit. Downriver is made of multiple cities which are Allen Park, Ecorse, Flat Rock, Gibraltar, Lincoln Park, Melvindale, and River Rouge just to name a few. The main focus is on the northern and middle cities of Ecorse and River Rouge as they have been home to large industrial manufacturers in the southeast area from past to present. Building factories in Ecorse and River Rouge allowed manufacturers to expand production and shipments with the use of all forms of transportation. The residents in the Downriver community consisted of working-class families that held jobs in auto factories, steel mills, chemical plants, or other manufacturers. Henry Ford seized on the opportunities that the Downriver community offered and built the Ford River Rouge Complex. The River Rouge Complex sat on 2,000 acres and when it was completed in 1928 the complex consisted of 93 buildings and had its railway system with more than 90 miles of track so that supplies could be transported between buildings.¹ Ford supplied many jobs to the neighboring residents and by 1929 the River Rouge plant had 75,000 employees.² When the complex and industrial industry was at its best the factory employed over 100,000 people.³ Another prominent factory in the community is Michigan Steel Works in Ecorse MI. Opening its doors in 1923 Michigan Steel Works gave the residents of Ecorse the hope of a new era by supplying jobs to 500 men.⁴

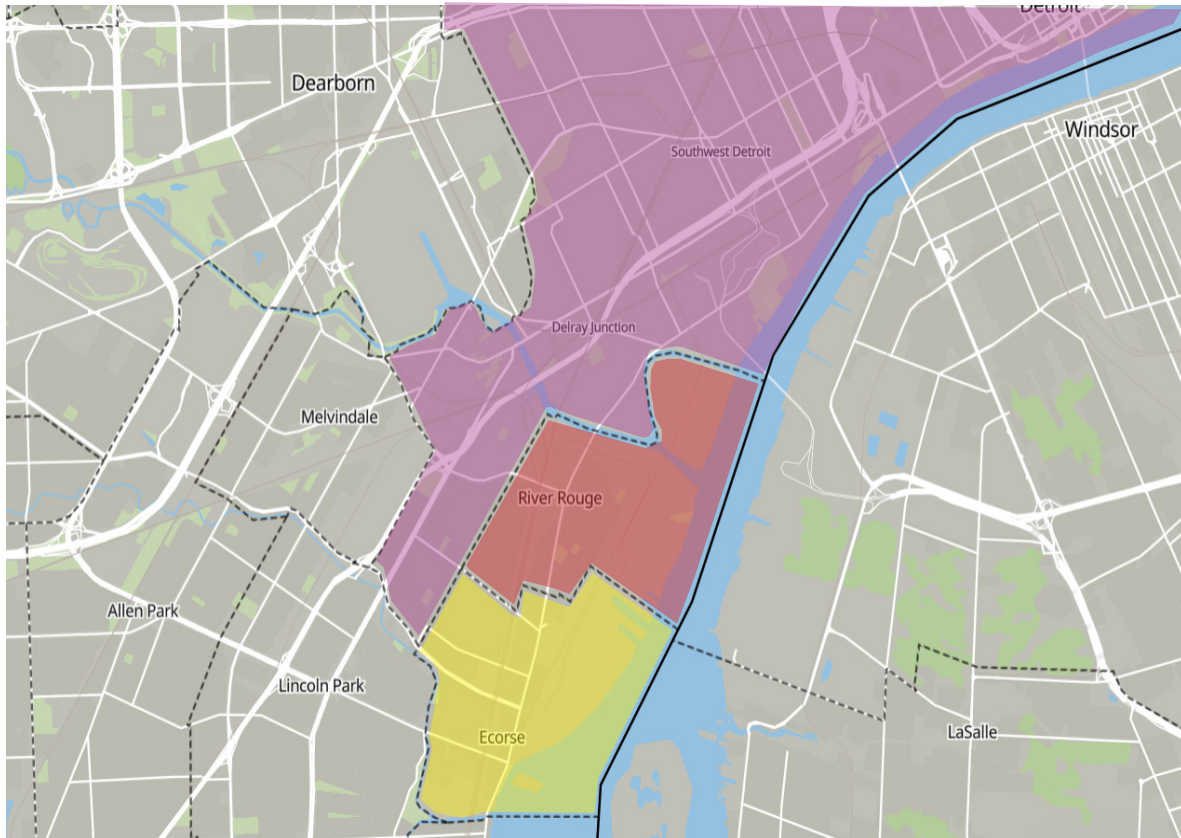


Figure 2: This map of Downriver is showing the boarder relations between the Tri-Cities (Detroit-purple, River Rouge-red, & Ecorse-yellow)

The Detroit Tri-City area consists of Detroit, Ecorse, and River Rouge Michigan. River Rouge sits snuggled between Detroit and Ecorse and Detroit spans down to connect to Ecorse as well. If you refer to Figure 2 you will see Detroit highlighted in purple, River Rouge in red, and Ecorse in yellow to give a better understanding of how the cities connect and the surrounding areas. In 5 years from 1923-1928 2 steel mills were built in the Downriver community 5.1 miles apart and as Detroit continued to industrial factories emissions created a smog in the air that was so thick residents could see it. The industrial industries during this time had no environmental regulations so they had no concern with pollution and the effects it would have on residents. During the 50s Michigan residents started to become concerned about their living conditions and effects on the public's health. Due to these concerns of residents in 1965 Act 348 was passed which created the Air Pollution Control Commission, a nine-member board that would regulate air pollution.⁵ Many residents and committees wrote letters to Senator Hart and one came from Ecorse, MI. A neighborhood committee came together to compose a letter to Senator Hart stating that they are standing together in protest against their living conditions and the air pollution. The committee did come and complete an evaluation and decided they needed to come up with a plan directed to the lumber company to suppress coal dust.⁶

As environmental decline continued it was found that the Steel Mill in Ecorse had pipes that were emptying oil into the nearby creek that flows into the Detroit River.⁷ Between the 1930s and 1960, public health and planning professionals, Black and White concerned citizens, and policymakers wanted to create a more sustainable city through the removal of slums, racial segregation, pollution abatement, central business district rehabilitation, and improved urban planning techniques.⁸ The goal to create a healthier city was not fair to all residents and many urban planning goals were not met and those burdens fell on the Black communities. The story of the Black Detroiters' activism for a healthier and more sustainable city is often left and looked over. Living in Detroit was a challenge for all but not more than African Americans. Residents faced environmental health problems from air and water pollution resulting in tuberculosis.⁹ Black activists throughout the city wanted to ignite environmental change but were met with resistance from politics, institutions, employers, and racist White residents.

HOUSING DISCRIMINATION / REDLINING

The parts of the city there were becoming more sustainable and healthier were not allowing Black residents to move into the area. Racial segregation and redlining was an issue in Detroit and this resulted in the city being able to place hazardous factories in the residential areas. This type of zoning allowed factories to move into low-income residential areas so they could get the benefit of cheaper land and the advantages of loose air regulatory laws.¹⁰ In metropolitan Detroit, as in other areas of the United States, racial segregation and what ecological economists call environmental load displacement which is the process of when the rich can shift environmental cost responsibilities on others. This displacement affected a lot of minority communities by making them have to live and be taxed for the issues caused by the industrial factories. With many residential neighborhoods becoming filthy with garbage and smog residents began to move to different neighborhoods throughout the city and segregation began.

Black residents were not allowed to move into White neighborhoods and were forced to live in urban decay. The creation of restrictive covenants has stopped the chance for Black residents to obtain nice homes in great numbers. In large parts of the city in the late 1940s, racial restrictions on real estate prevented Black residents from buying homes. Figure 3 is a diagram of the redlining throughout the city but highlighted in the white dotted circles are Ecorse and Lincoln Park. Ecorse which is a predominantly Black community was highlighted as red while the less industrial neighborhood of Lincoln Park is highlighted yellow. Most of the surrounding areas are highlighted in red and yellow and these maps locked minority residents into these communities that were endangering their health. One sociological study that was conducted showed that covenants were present in almost 80% of homes outside of the inner city.¹¹ Black residents were being forced to live in overpopulated communities with unhealthy living conditions. It was found that there was a rise in Black tuberculosis deaths.

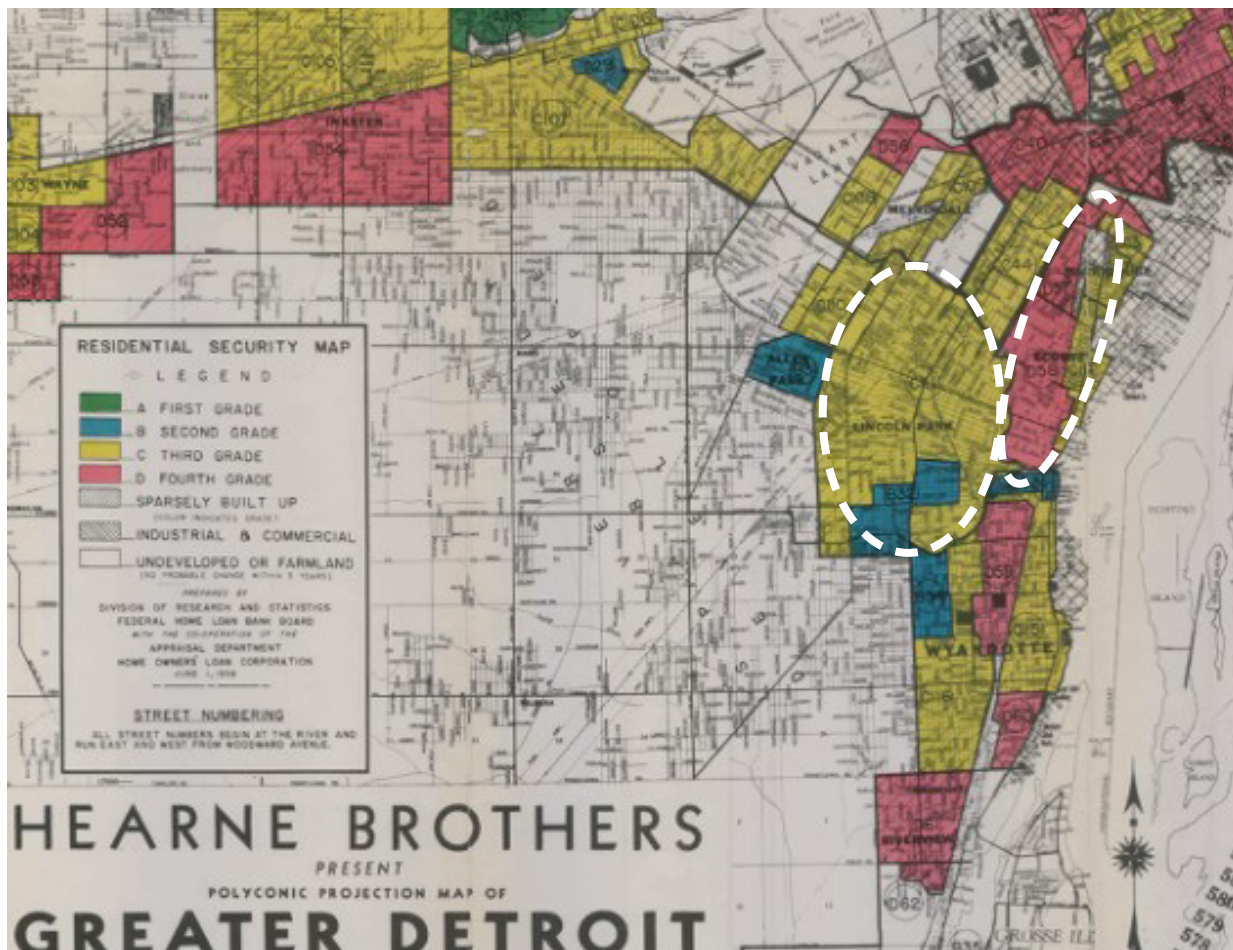


Figure 3: Diagram showing the redlining throughout the city with the red being the predominantly Black communities and green being the White.

According to epidemiological studies, TB is more common in those who are exposed to air pollution.¹² Black residents were dying 4.7 times quicker than White residents and between 1939-1941 the highest number of TB deaths was 100,000 and it was predominantly Black women.¹³ This began to become a concern for the health of Black residents and some thought the environment played a role in health issues. A few White public health officials disagreed and thought the environment had no role and that Black people are just more likely to get TB.

This was not the case at all because due to racism and redlining Black residents were living in unsanitary conditions. Redlining and job discrimination kept residents locked into communities and jobs that were not safe, or healthy. Many of the jobs held by Black residents such as factory workers, ship builders, and refinery workers caused lung disease leaving them with lifelong health problems.¹⁴ Issues with air pollution and pulmonary diseases go back to Detroit in 1882 when the Detroit Board of Health published their first annual report and they stated that the leading cause of death in Detroit is pulmonary disease.¹⁵ As racial tensions rose in the city the 1967 Detroit Riots began and with that came white flight. Many White Detroit residents fled to the suburbs and that is when Detroit's decline began. The city went from booming to poor quickly and as the jobs left so did the people. During the 1970s the oil crisis began and it was the ultimate demise of the domestic automobile industry.¹⁶ The factory jobs were gone and that left the majority Black resident out of work and more impoverished.¹⁷

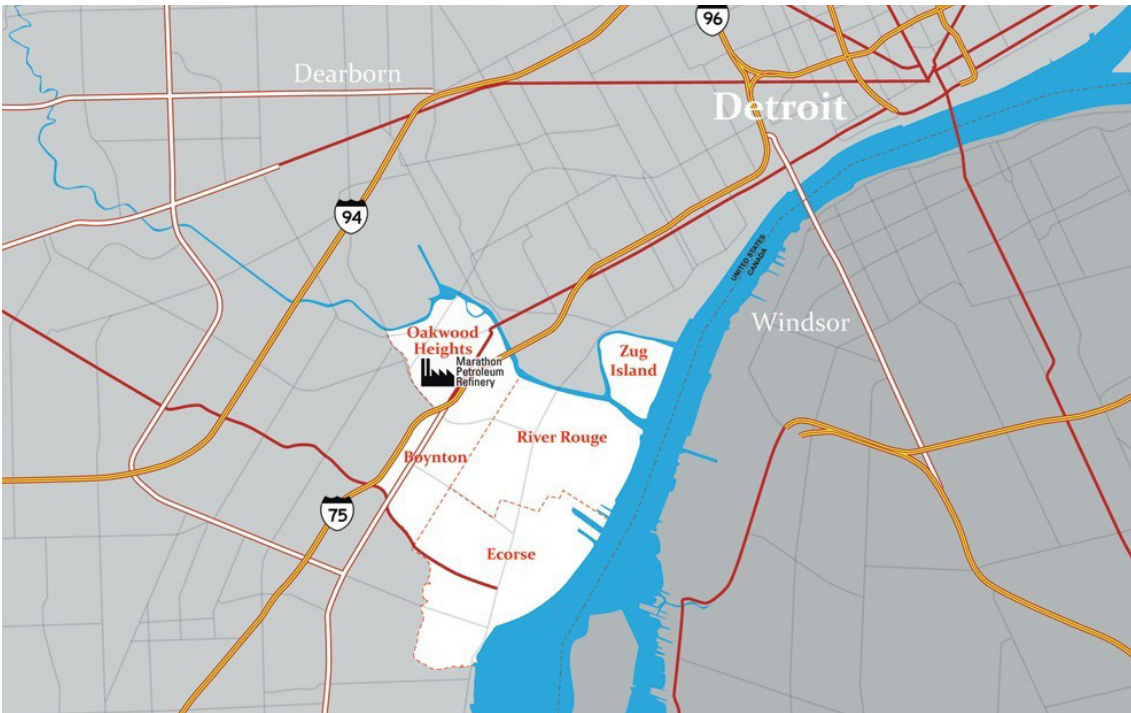


Figure 4: Map showing the Tri-City area with Oakwood Heights and Boynton (48217) being located in Detroit, MI.

The cities of Ecorse, Detroit and River Rouge were greatly affected by these ecological changes with many minority residents finding themselves out of work. With the industrial industry being such a major employer in the area it affected many residents. While the factories were closing the pollution remained. Collectively in the Downriver communities the Tri cities house more than 35 factories. The Environmental Protection Agency (EPA) deemed the area a non attainment zone after discovering high levels of sulfur dioxide. A non attainment area is an area that has low air quality. Other chemicals were found in the air as well such as benzene, hydrogen cyanide, and chromium. Sulfur dioxide causes asthma and low levels of hydrogen cyanide can cause headaches, nausea, breathing trouble, and chest pain.¹⁸ The population of the Tri-Cities is mainly minority with the majority being Black and Hispanic. Many residents in the area have fallen victim to diseases that can be connected to air pollution such as asthma, cancer, brain damage, respiratory problems, heart disease, birth defects, and miscarriages.¹⁹ Many of the households that are being affected and directly impacted by air pollution in the area have an average household income of \$34,000.²⁰

Creating this challenge made life harder for families since they couldn't afford to move and they gained many health defects. Industrials lead pollution in southeast Michigan grew intensely in the majority of African American areas in southwest Detroit, River Rouge, Ecorse, and the Arab American neighborhoods of Dearborn. This release of emissions has continued to increase over time and more residents have health problems related to air pollution.

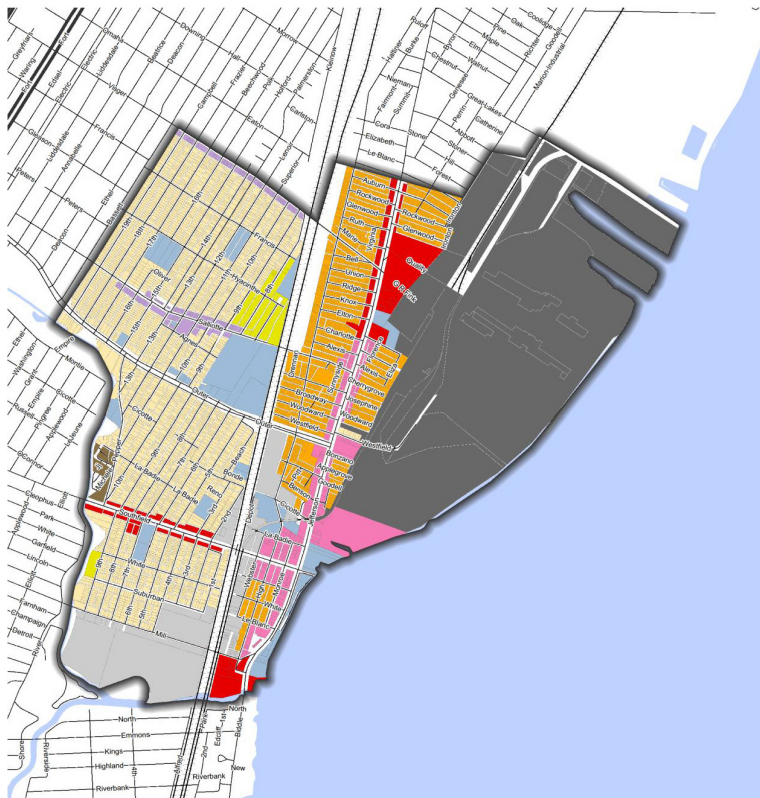


Figure 5: Diagram showing the industrial (dark and light grey) with the residential being yellow and orange.

In 2017 a study conducted by the Community Action to Promote Healthy Environments found that every year in Detroit air pollution has caused an average of 690 excess deaths, 1,800 hospitalizations, and 3,400 asthma-related doctor visits.²¹ Detroit is always given the title of being a dangerous place due to gun-related violence but in this study, it was found that air contaminants are killing residents more than gun violence.²² The heavy industrial industry in the area is to blame for the toxic emissions and health effects. The EPA monitors many of the factories throughout the Tri-City area and in a 3-mile radius, there are 48 factories. These cities are packed with industrial facilities and residents are being affected due to zoning allowing a combination of industrial and residential to continue even while seeing a pattern of residential health effects.

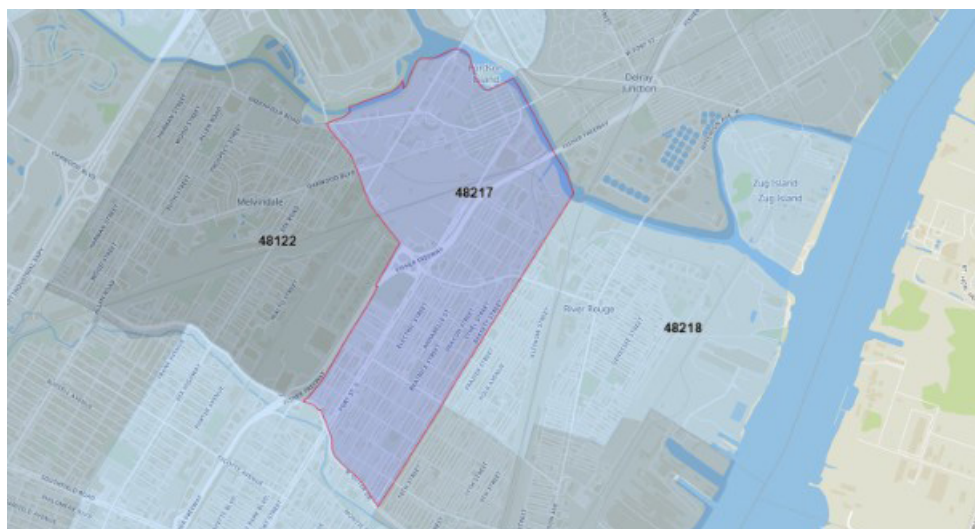


Figure 6: Map showing the exact neighborhoods that are located inside the 48217 zip code.

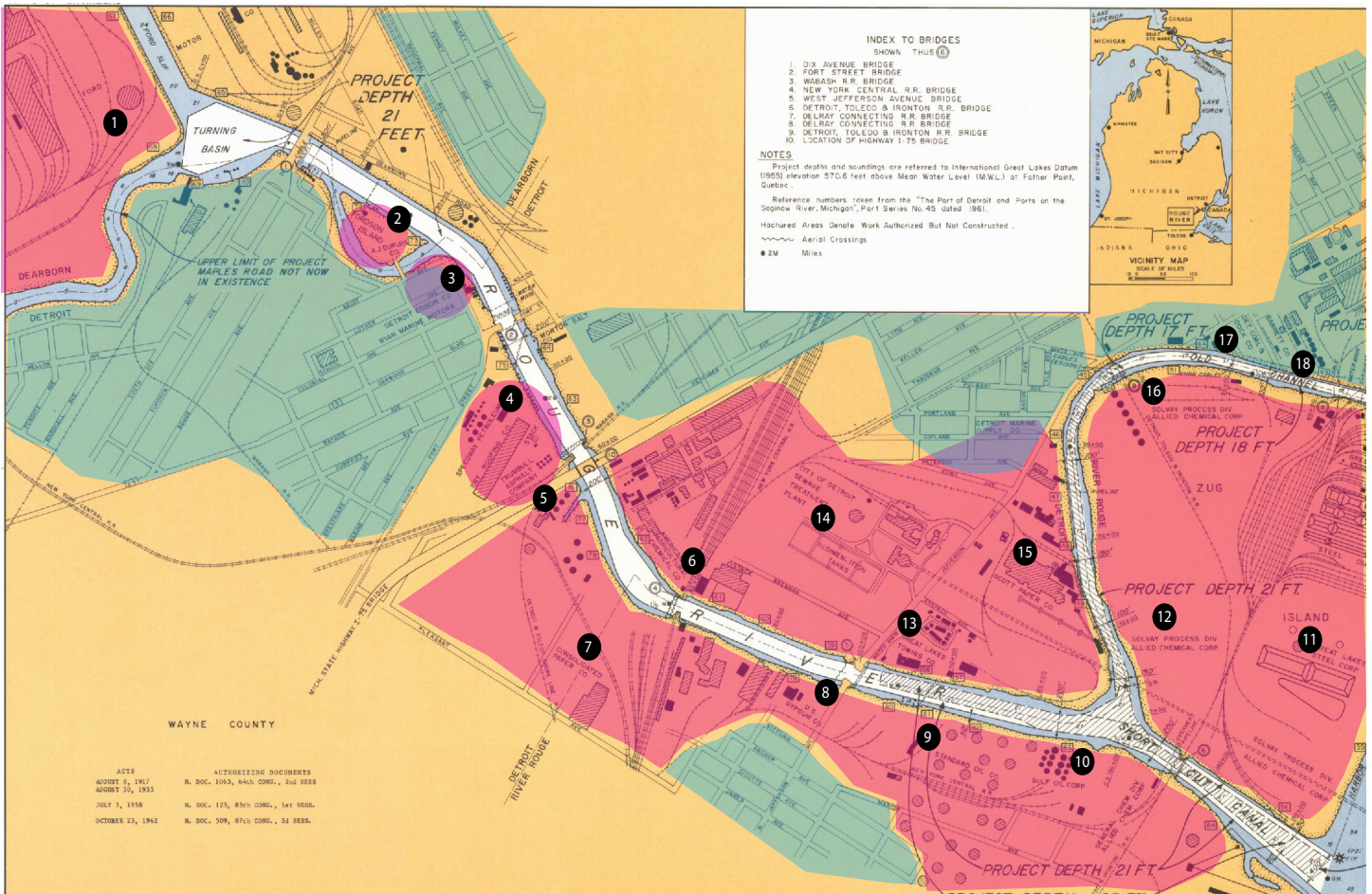


Figure 7: An overview of the Rouge River as it goes from the Detroit River through River Rouge, Detroit and ending in Dearborn in the top left. The purpose of this diagram is to show a complete view of amount of industry that was on the Rouge River and represent the zoning of the industrial (red) and residential (green) areas.

TRI-CITY FACTORIES - 1986

1. FORD ROUGE COMPLEX
2. AJ DUPUIS CO.
3. DETROIT EDISON CO.
4. SPEEDWAY PETROLEUM
5. TRUMBULL ASPHALT CO.
6. AMERICAN AGRICULTURAL
7. CONSOLIDATED PAPER CO.
8. U.S GYPSUM CO.
9. STANDARD OIL CO.
10. GULF OIL CORP.
11. GREAT LAKES STEEL CORP.
12. SOLVAY PROCESS DIV ALLIED CHEMICAL CORP.
13. GREAT LAKES TOWING CO.
14. CITY OF DETROIT SEWAGE TREATMENT PLANT
15. SCOTT PAPER CO.
17. DET COAL & DOCK CO.
18. BARRETT CO.

Inside the Tri-City, you can find many polluters such as AK Steel, Great Lakes Water Authority waste treatment plant, DTE Energy plants, EDW Levy Co. Plant, Magni Industries, Air Products and Chemicals Inc., and St. Marys Cement. All of these different factories are releasing toxic emissions on a vast scale. These different factories are releasing toxic emissions on a vast scale. The 48217 is the most polluted zip code in MI and a part of the Boynton neighborhood in Detroit.²³ The main polluter is the Marathon Petroleum Oil Refinery located at 1001 Oakwood, Detroit, MI 48217 sprawling 250 acres. The sands oil refinery produces up to 140,000 barrels of oil a day while releasing 29 different poisons into the atmosphere such as nitrous dioxide, sulfur dioxide, and carbon monoxide.²⁴ It also emits eight different types of carcinogens, including benzene and dioxin.²⁵

These emissions have completely disrupted the lives of the community members and they can't leave the area because the factories have completely lowered home values. Homes in Ecorse are valued at a median of \$38,000. According to researchers "Nelson, Genereux, and Genereux (1992) found that property values were lower within a two-mile radius of a landfill and that there was a property gradient of 6.2% per mile."²⁶ The Environmental Protection Agency has also found other toxic chemicals such as hydrogen cyanide. Hydrogen cyanide is highly toxic and was used by Nazis to kill prisoners in concentration camps. Living so close has not only property values and the air but also soil quality. The community has been completely ruined and residents have reported not being able to grow vegetables or trees. The soil contained such high levels of arsenic and lead that no plants could grow in the conditions. All of these issues that have been affecting the neighborhood have made it so that they can't afford to move because of low income and declining property values. It's hard to find a buyer willing to live in a home and be a part of a community that is being destroyed by toxic air and soil. These discoveries by the Environmental Protection Agency are what made the official deem the area a non-attainment.

Capitalism has been cruel to Detroit, especially this community and it demonstrates how corporations put profit over Black lives. Marathon wants to create a buffer between residential and industrial areas by purchasing occupied and vacant homes. They started this process but many focused on the white neighborhood of Oakwood Heights located in northern 48217 by offering above market price so they could expand the factory. This would then continue the spread of the factories' toxic emissions then putting more Detroiters at risk. The reason the oil refinery is located in southwest Detroit is not for the betterment of the community and to bring more jobs to the area but to take advantage of low regulatory laws. "Marathon has a history of noncompliance and excessive emissions. The refinery failed three EPA inspections since 2016 and received nine environmental violations from the state in 2018. In 2019, the Michigan Department of Environment, Great Lakes and Energy (EGLE) issued at least nine violations to Marathon for noxious odors and exceeding legal limits on toxic emissions."²⁷

The neighboring towns of Allen Park, Lincoln Park, Melvindale and Dearborn are also heavily affected by the toxic emissions from the factories. River Rouge, MI held many factories including the Henry Ford Complex but the industrial success affected the community's health. Many residents suffer from similar diseases as Detroit and Ecorse residents such as asthma, cancer, and heart disease. There has been a connection between the emissions from steel plants, car factories, power plants, and a refinery to the effects on the community. In 2012 the Michigan Department of Environmental Quality did a study and they discovered that the air surrounding River Rouge contained high levels of sulfur dioxide.²⁸ Sulfur dioxide was an emission from the many power plants that were released from burning fossil fuels. Sulfur dioxide has been a recurring toxin throughout the cities causing health and land problems. During this same study residents and officials noticed that there was a difference in plant life and studies proved that sulfur dioxide was in the soil just like Ecorse.²⁹ Sulfur dioxide in the soil contaminates any vegetables that people may be growing at home and kills trees that help provide clean air.

THE POLLUTION FLOW OF THE ROUGE RIVER

The factories in the downriver area were mostly confined to the Tri-City area but that didn't stop the pollution from affecting the surrounding cities such as Dearborn, Melvindale, and Lincoln Park. In Figure 7 you can see the vast amount of factories that have been located Downriver along the Rouge River. The Rouge River is one of the most polluted waterways in the Great Lakes. Rouge River is 48 miles long and is the watershed for the cities of River Rouge, Melvindale, and Dearborn. The Rouge River ends by flowing into the Detroit River. Rouge River is located in a highly populated and industrialized area of southeast Detroit. The river has always been an asset in the industrialization of southeast Michigan because it allowed transportation by water. The river was originally dammed by Henry Ford so that it could be utilized as a power supply for his Fairlane Mansion in Dearborn and to supply power to smaller Ford plants.³⁰ Later in 1915, Henry Ford purchases the plot of land that would become his Rouge Complex and it sat along the lower Rouge River. Then in 1918, the lower Rouge River was dredged about 20 feet to allow the passage of freighters to the factories.³¹ This was specifically important to Henry Ford because a lot of the freighters transported raw materials that went to the Rouge Plant for manufacturing.

The Detroit and Rouge River was used as a dumping ground from 1946 to 1948 and for those 2 years, 5.9 million gallons of oil and petroleum products were dumped into the water system. Those large quantities of oil pollution in the water affected the natural life greatly by killing 11,000 ducks and geese in 1948. In 1969 there was so much oil inside the river it caught on fire. There were about 3,000 gallons of oil in the river that was dumped by the Shell Oil Company refinery and when a construction worker accidentally dropped his torch into the water the fire ignited. The River Rouge watershed is 467 square miles servicing 1.3 million people and by 1980 it was found 168 sewer overflow points along the Rouge River were releasing untreated sewage into the river during heavy rainfall. This began affecting the residents of Melvindale and Dearborn as they started to complain of an awful smell coming from the river. Once an investigation was conducted it was found that the river was so polluted that it contained no oxygen due to the decomposition of the raw sewage in the water. The lack of oxygen killed all of the fish and without oxygen the creation of hydrogen sulfide started and that is what was causing the awful smells. Even with all the complaints and investigations no action was taken by the government and a great tragedy occurred. In 1985 a 23-year-old man fell into the Rouge River, swallowed water, and later died due to infection. The infection was due to a rare parasitic that was Leptospirosis, also known as rat fever which is a waterborne disease. The young man became a martyr because his death could not be ignored and the health of the river needed to be addressed.

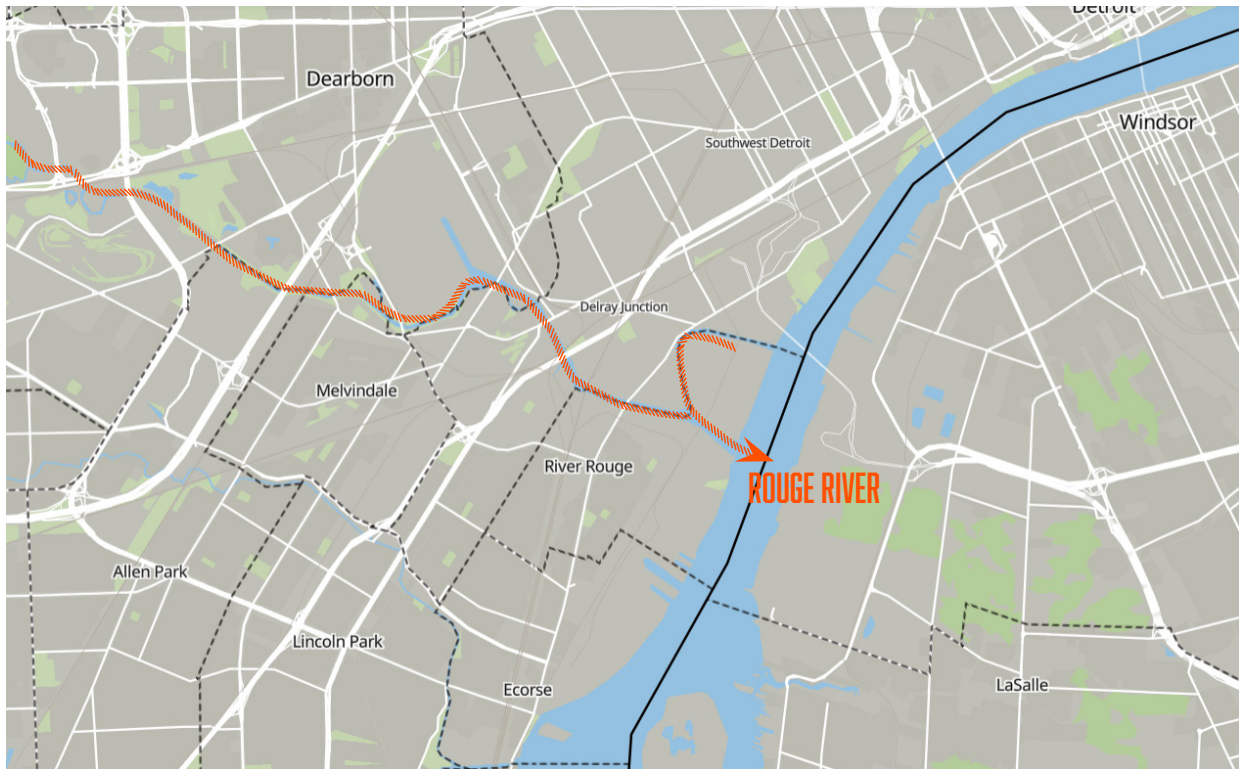
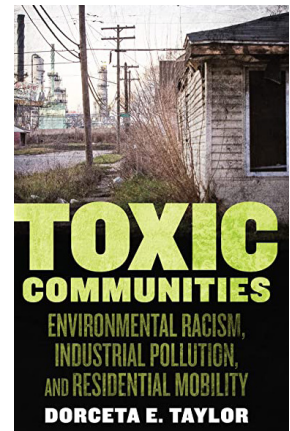


Figure 8: Map showing all the downriver cities. Allen Park, MelvinDale, Lincoln Park, Ecorse, River Rouge, Dearborn and Detroit

The pollution wasn't confined to the border of the Tri-cities; the air and water would spread these toxic emissions throughout Downriver and southeast Detroit affecting many other communities. The cause of the pollution starts downriver but the emissions have spread to Hamtramck, Highland Park, Lincoln Park, Melvindale, Dearborn, and Allen Park. The cities of Dearborn, Melvindale, and Lincoln Park are neighbors to the Tri-Cities and have been affected because of the proximity. The Environmental Protection Agency (EPA) conducted its air quality report and it was found that counties in Michigan have the highest levels of air pollution.³² In February 2020 the EPA ranked the U.S. metropolitan areas and Dearborn-Detroit-Warren received 13th place for worst air pollution.³³ With the Henry Ford Rouge Complex sitting on the edge of Dearborn it has caused them an issue with fugitive dust. The dust is airborne particles that are being released from industrial sites and trucks transporting industrial materials. Fugitive dust can affect you in many different ways by causing your airway to become inflamed, coughing, problems breathing, and asthma. As the CDC conducted their 500 Cities Project it was discovered that residents that live near the Ford Rouge Complex had higher rates of asthma, chronic obstructive pulmonary disease, and chronic kidney disease.³⁴ It was found that almost every 1 in 6 Detroiters suffers from asthma.³⁵ This rise in health issues is due to the toxins of nitrogen dioxide, particle matter, and ozone exposure just as it was found in the Tri-city area. The exposures have a direct connection to the industrial industry and emissions that are being released into the atmosphere. The toxic particles travel by air meaning they can find their way inside residences leaving residents completely defenseless and not safe inside or outside.

Detroit isn't the only city that has suffered from deindustrialization and suburban sprawl. Boyton (48217) and the Tri-City area would be considered the cancer alley of Detroit. Toxic communities spanned across the United States and were found in Louisiana and New Jersey. The Washington Post highlighted a large industrial industry corridor in New Jersey and referred to it as a cancer alley. The surrounding area is heavily polluted due to the heavy industrial industry and the air smog is causing residents to have cancer. Later in New Orleans the stretch of the Mississippi River to Baton Rouge was so heavily polluted from 135 petrochemical factories.³⁶ Louisiana holds the second place ranking for the highest male cancer rate.³⁷ Living in these toxic communities residents find themselves surrounded by noxious facilities. These living conditions were a cause for White flight and left many mixed communities over time. Environmental injustices are also found in Chester, another city that is very similar to Detroit. While reading *From the ground up* environmental racism and the rise of the environmental justice movement I realized that Chester and Detroit went through the same cycle of industrialization, un-industrialization, and racism.³⁸ Chester was once a city on the rise with many factories that employed a lot of residents with many of them being Black. Once Chester's un-industrialization began and factory jobs disappeared, so did the White residents. The city was left to the same fate as Detroit. Chester's economy and job market crashed leaving many of the Black residents unemployed.



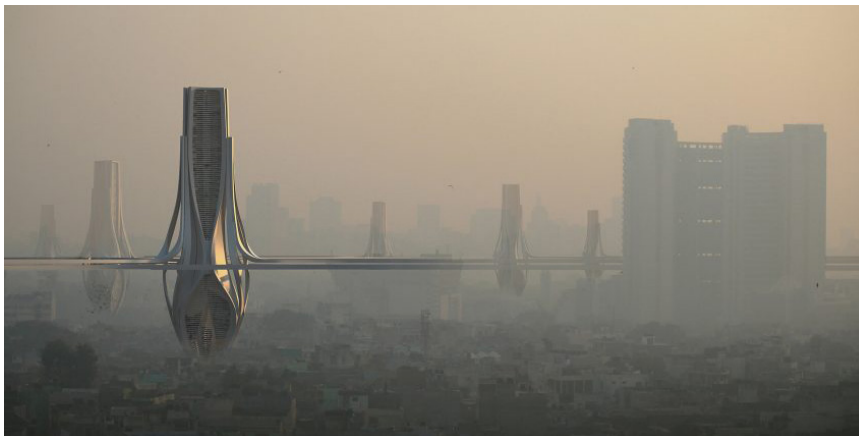
PRECEDENTS



THE CITY TREE - 2018 LOCATION: LONDON, ENGLAND

DESIGNER: GREEN CITY SOLUTIONS

Designed by German startup Green City Solutions, the CityTree is billed by the company as the world's first intelligent biological air filter. This air filter and public seat absorbs smog and releases oxygen back to the community. The entire design takes up a fraction of the space required to provide the same air-purifying outcomes as 275 genuine trees. I have thought of two different ways for this strategy to be in my thesis, first as a stationary object that would be thought the community helping with air pollution or taking these design precedents and inputting them into a building form.



THE SMOG PROJECT - PROPOSED CONCEPT

DESIGNER: ZNERA LOCATION: DEHLI

The studio Znera developed The Smog Project, the proposal envisions a grid of towers that could absorb pollution from the atmosphere, with each building creating a 1.2 mile radius of semi-clean air. The towers act as clean air vacuums fighting to clean the heavily polluted air and this could be applied to my thesis. Even though my site and area is not as polluted as Delhi this same concept can be utilized. Through the use of stationary building forms the emissions that are being released could be absorbed and released back as oxygen. This could happen as the facade of buildings or happen as one form.



OLALEKAM JEYIFOUS

Jeyifous is a Nigerian Visual artist. Jeyifous received recognition for his speculative and dystopian vision of Lagos called “Shanty Megastructures. He is imagining a future New York through the use of implausible architecture. This is a theory that he has thought of and explains as a creative excitement of an alternative story line. He is now doing this work in the Crown Heights area of New York. With the use of Afrofuturism, eco-futurism, and agro-futurism he depicts a community that is full of greenery and technology. All types of plants to help the ecosystem and tech such as rainwater harvesting, biofuels, aeroponics, aquaponics, cooperative farms.



THEASTER GATES

Theaster Gates who is a land developer, sculptor, and performer who focuses on the possibility of the “life within things.” He founded the Rebuild Foundation which is a platform for art, cultural development, and neighborhood transformation. They focus on supporting artists and strengthening communities by providing free arts programming, creating new cultural amenities, and developing affordable housing, studio, and live-work space.



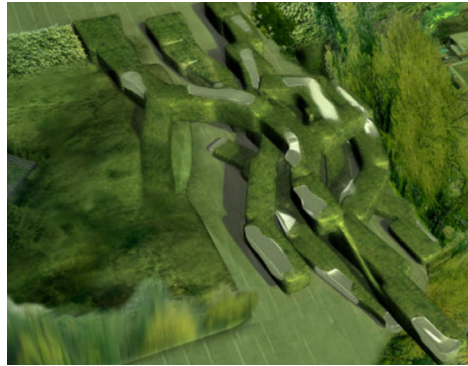
BLACK QUANTUM FUTURISM CAMAE AYEWA AND RASHEEDAH PHILLIPS

Black Quantum Futurism is the outcome of Camae Ayewa and Rasheedah Phillips' collaborative efforts. Using writing, music, film, visual art, socially engaged art, and creative research, they explore personal, cultural, familial, and communal cycles of experience. Their goal is to discover solutions that can shift oppressive linear timelines into empowering alternatives. The duo primarily focuses on recovering, gathering, and preserving communal memories, histories, and potential futures. harvesting, biofuels, aeroponics, aquaponics, cooperative farms.



CULTUUR PARK WESTERGASFABRIEK (WESTERN GAS FACTORY) GUSTAFSON PORTER + BOWMAN

Cultuurpark Westergasfabriek is a significant project for Gustafson Porter + Bowman. It's a good example of turning an old industrial area into a park in a busy city. The project involves a lot of different people with different interests. The design finds a good balance between dealing with pollution and making the place easy to get to. It also encourages creativity and different ways of looking at things, while also taking care of the old structures.



NMBA, BY R&SIE(N) ARCHITECTS, LUSANNE SWITZERLAND, 2005 LUSANNE CITY MUSEUM AMSTERDAM, THE NETHERLANDS

“They design a building as formal analog to the weeds biological desire to invade and spread. More a landscape than a urbanism; more a forest than architecture. A project that plays with its nature. “Weeds” that become local woods that are then populated with animals...”



RETURN TO NATURE – DECOLONIZING ARCHITECTURE ART RESIDENCY

Decolonizing architecture is a group of architects managing a residency program located in Beit Sahour, Palestine. The former Israeli military base Oush Grab underwent a transformation into a decolonized architecture art space. This initiative is known as “Return to Nature,” aiming to both seamlessly blend the buildings into the landscape and provide shelter for migrating birds.

The goal of my thesis is to reclaim, remediate, and revitalize the Oakwood Heights neighborhood of Detroit, MI. A neighborhood once filled with working class families. Now a neighborhood filled with vacancy, toxic soil, air, and water. Welcome to 48217, the most polluted zip code in MI. Detroit was a hub during the industrial revolution. Seeing many industrial factories coming to the area. At the same time the great migration is happening with a lot of Black Americans leaving the south for better opportunity. Many such as my grandparents moved to Detroit, MI and found work in the industrial industry. The neighborhood of Oakwood Heights has been subject to redlining, predatory mortgage loans that lead to the foreclosure of 2008, and Marathon home buyouts. The area is surrounded by industrial factories that release numerous different toxins such as benzene, hydrogen cyanide, and chromium. The main polluter is the Marathon Petroleum Oil Refinery located to the left of my site sprawling 250 acres. The sands oil refinery produces up to 140,000 barrels of oil a day while releasing 29 different poisons into the atmosphere such as nitrous dioxide, sulfur dioxide, and carbon monoxide. In 2017 it was found that air pollution represented 7% of deaths in Detroit, more than all the lives lost to homicide.

The design purpose of my thesis is to be a community asset that represents all the history of the site, remediate the environment and be a resource to the community. I am able to bring to the forefront the use of weed, birds, smog and gas into architectural design. Through that I am able to implement sustainable designs that will start to reclaim, remediate and revitalize the Oakwood Heights neighborhood. I will start to reclaim the site by buying a Marathon crude oil tank and turning it into an Art House Silo. An open roof bird and art sanctuary that will allow residents to immerse themselves into a 85 foot high drum. At the same time remediation will be happening through the use of phytoremediation. Utilizing plants such as sunflower, indian mustard, and trees such as Poplar. Revitalizing the site continues with community engagement and growth. To allow access to healthier food, and job opportunities a hydroponics farm was the route to go. It allows the site to blend in with the surrounding industry but with a twist. Instead this is a green industry showing people how to grow food without the use of soil. As I talked with community members I learned that they want more areas to play basketball but specifically indoor. The Oakwood Heights Community Center will allow residents a place to gather, play and eat. Designed to resemble the Ford plant fenestration pattern. This building will be implemented with green facades and roofs that will help with biodiversity, insects and air pollution.

This is where my intervention stops and stewardship steps in. I am being imaginative about the continuation of this site because it is up to the community to say how they want to utilize the space. This site and my thesis allow residents to recognize the history and see the future!

SITE ANALYSIS



The site is located next to the Marathon Petroleum Oil Refinery and is in the residential neighborhood. The site is currently open fields but has single family homes. Due to the toxic air and soil quality many of the homes were demolished. The pros of this site is that there are open fields that can be built on but the cons are these lots are empty for a reason so would it be beneficial to come and build on this land? The air and soil is toxic so if I want to build on this area I would need to solve that problem. The approach that I would take with this site would be creating a walkable city for the residential area. I could create a possible “downtown” area that would hold the different programs that are missing in the community.

MY FIRST VISIT:

I first visited the site with my younger brother in the summer of 2023. I walked around and took the pictures that you see on 20,21 and 22. The area smelled awful. The air had a strong smell and just from me being there for 30 minutes I began to get a headache and my brother wouldnt get out of the car. The trees in the area were all dead and had no leaves. The only sound you could hear was cars and machines.





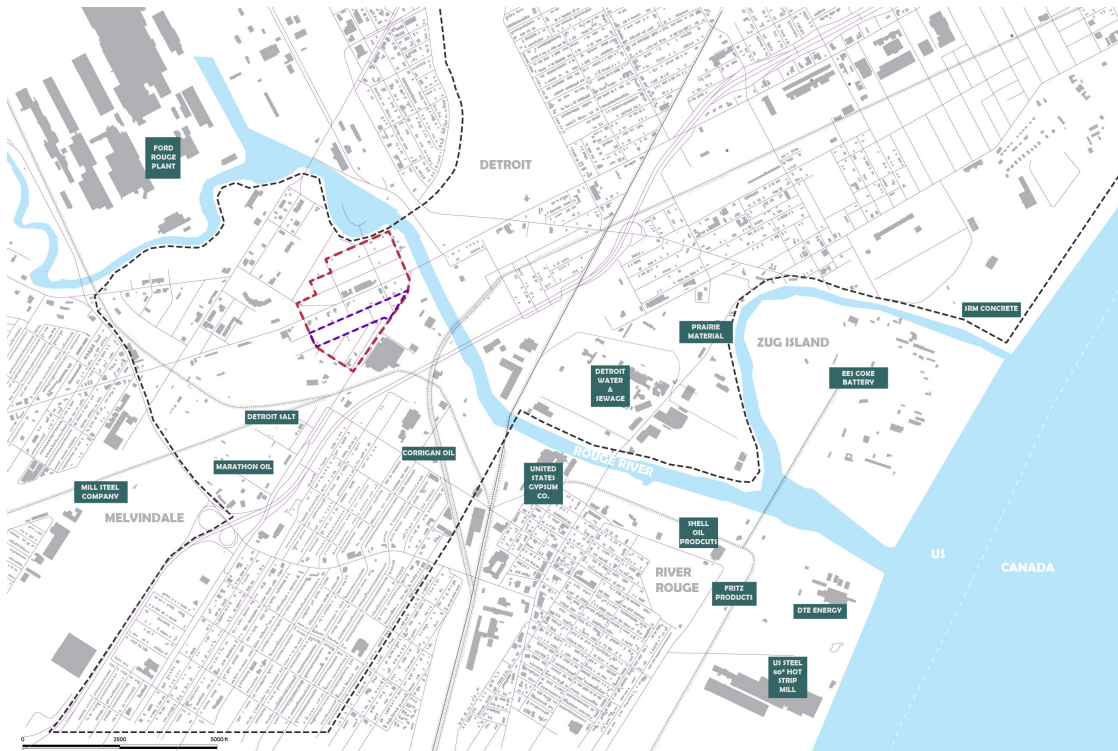
Empty block Oakwood Heights street that was once filled with residential homes.



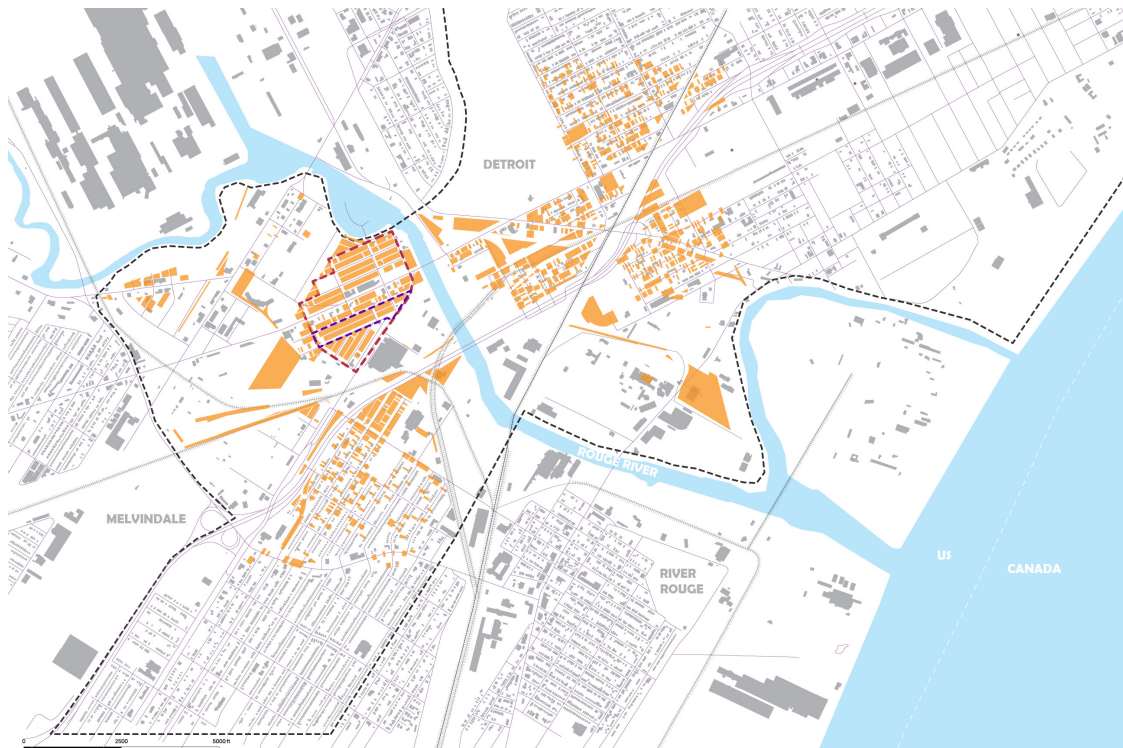
PENZ PLAYLOT- A empty park that sits infront of the Marathon Oil Refinery



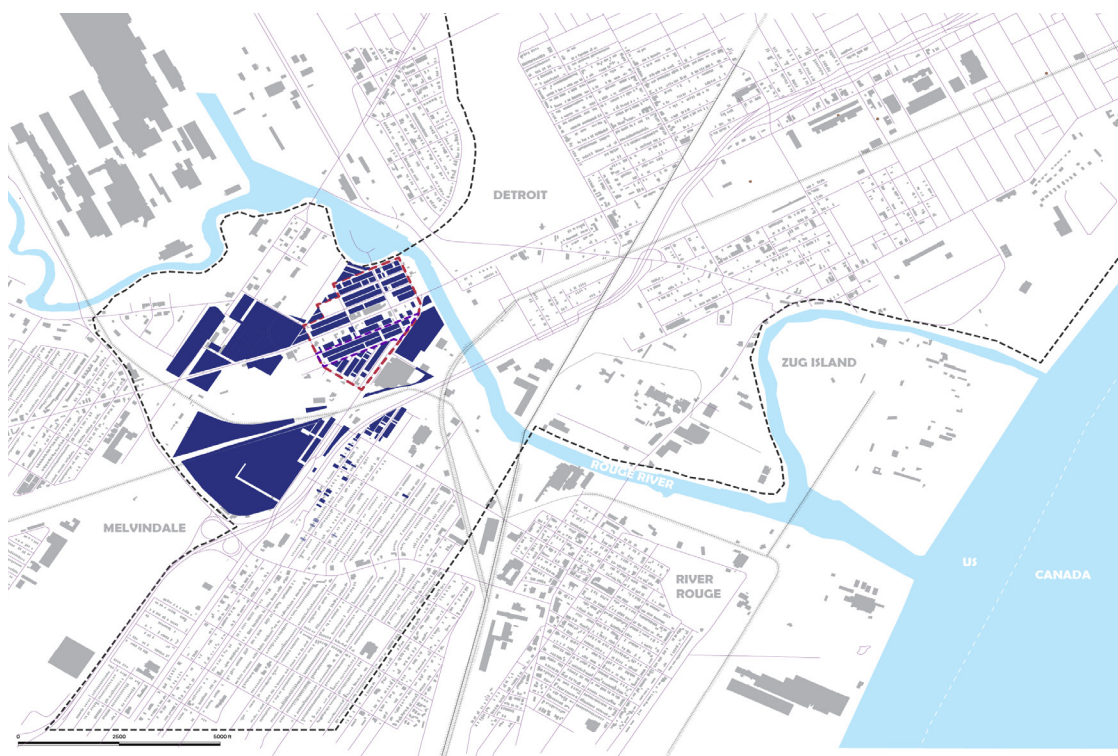
Marathon bought the empty lots of Oakwoods Heights and attempted to create a wildlife habitat. They have a butterfly garden with no butterflies and dead plants that have not been tended to.



INDUSTRY DIAGRAM- In this overview of the surrounding area shows the amounts of factories surrounding Oakwood Heights. All of these factories affect the air, soil and water quality.



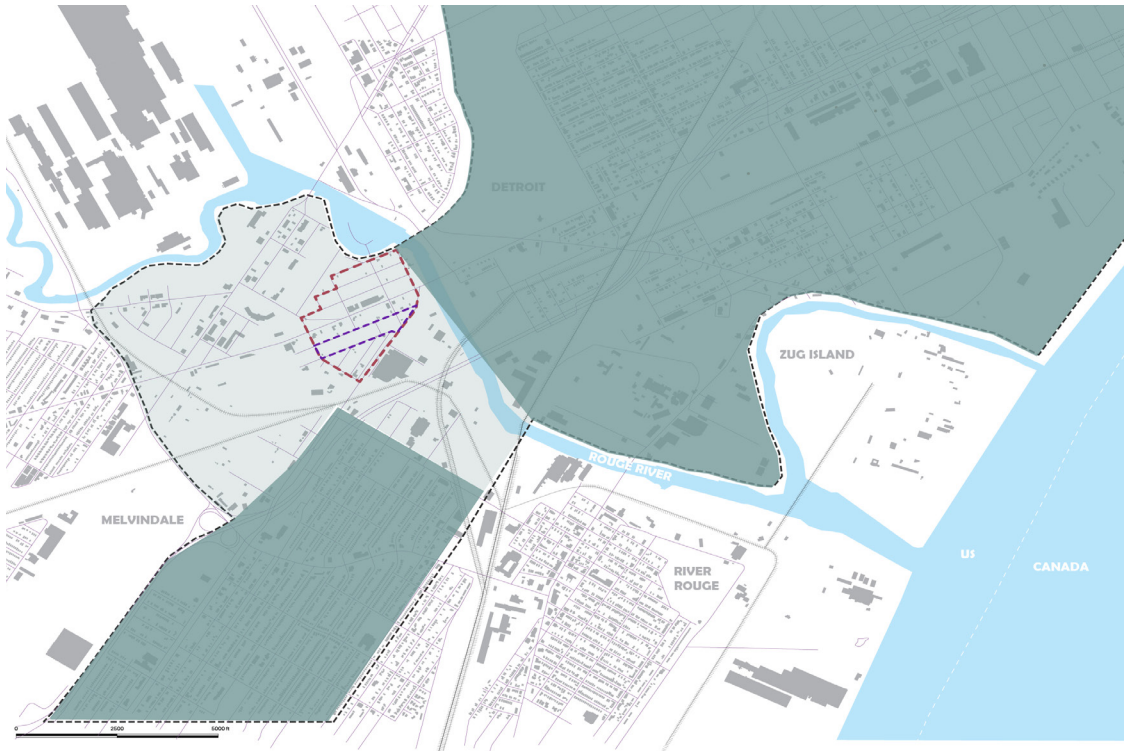
VACANCY DIAGRAM- Highlighted in orange are all the vacant lots that spread throughout the Oakwood Heights neighborhood and surrounding areas. Many of the vacant lots were once single or two family households.



MARATHON OWNED DIAGRAM - Highlighted in dark purple are all the vacant lots that have been purchased by Marathon Oil Refinery. The entire neighborhood of Oakwood Heights has been purchased. In efforts to create a “green buffer” Marathon offered homeowners buyouts for less than the value of their homes.



POLLUTION DIAGRAM- Highlighted in green are the toxins that are being released into the air, soil, and water. The Oakwood Heights neighborhood is highly affected by all the pollution with factories surrounding the area.



FOOD DESERT DIAGRAM- Highlighted in dark and light blue are the areas surrounding the site that are suffering from a food desert.

DEMOGRAPHICS

AIR TOXINS AFFECTS ON PEOPLE

	RESPIRATORY, ASTHMA, COPD	CARDIO-VASCULAR RISK	CENTRAL NERVOUS SYSTEM	Prenatal Development/ Birth Outcomes	DEATH
PARTICULATE MATTER PM2.5	●	●			●
SULFUR DIOXIDE SO2	●				
CARBON MONOXIDE CO	●	●	●	●	●
NITROGEN OXIDE NOX	●				
OZONE O3	●			●	

The different toxins of air pollution can harm us in many different ways. Carbon monoxide is a big threat to our health causing issues such as asthma and even death.

AIR TOXINS AFFECTS ON DIFFERENT DEMOGRAPHICS

	PEOPLE WITH ASTHMA, COPD	CARDIO-VASCULAR DISEASE	INFANTS	YOUNG CHILDREN	ELDERS
PARTICULATE MATTER PM2.5	●	●		●	●
SULFUR DIOXIDE SO2	●			●	
CARBON MONOXIDE CO	●	●	●	●	●
NITROGEN OXIDE NOX	●			●	●
OZONE O3	●		●	●	

The toxins affect all demographics of people, from infants to the elderly. Air pollution effects on our health can include stroke, heart disease, pulmonary disease, and even lung cancer.

2017 STUDY BY COMMUNITY ACTION TO PROMOTE HEALTHY ENVIRONMENTS
 SPONSORED BY THE UNIVERSITY OF MICHIGAN SCHOOL OF PUBLIC HEALTH

AIR POLLUTION CAUSED

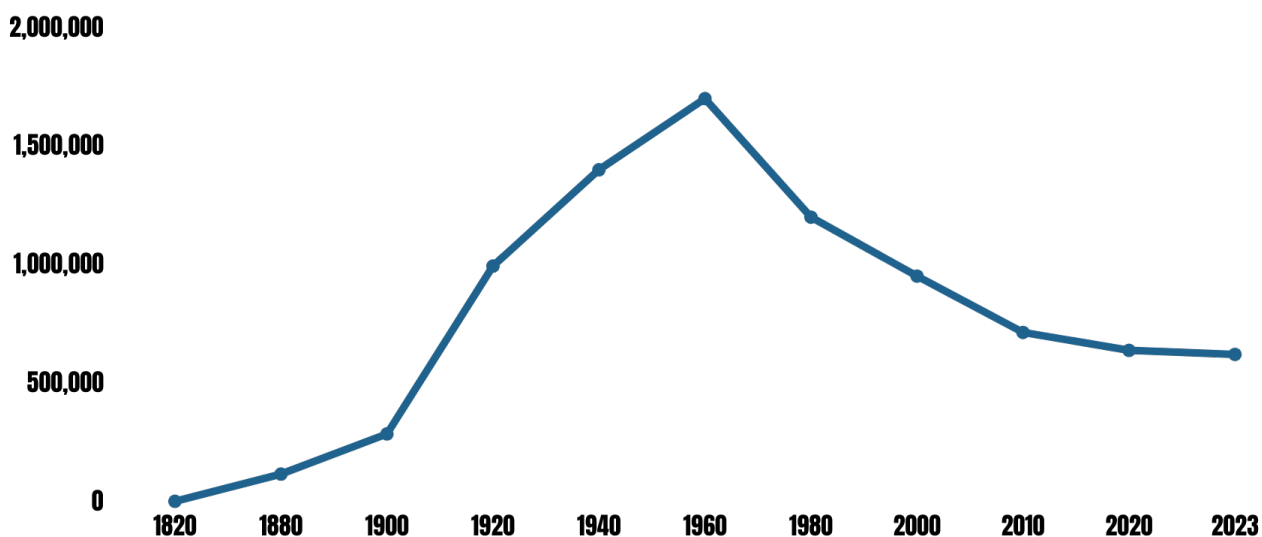
690 EXCESS DEATHS

1,800 HOSPITALIZATIONS

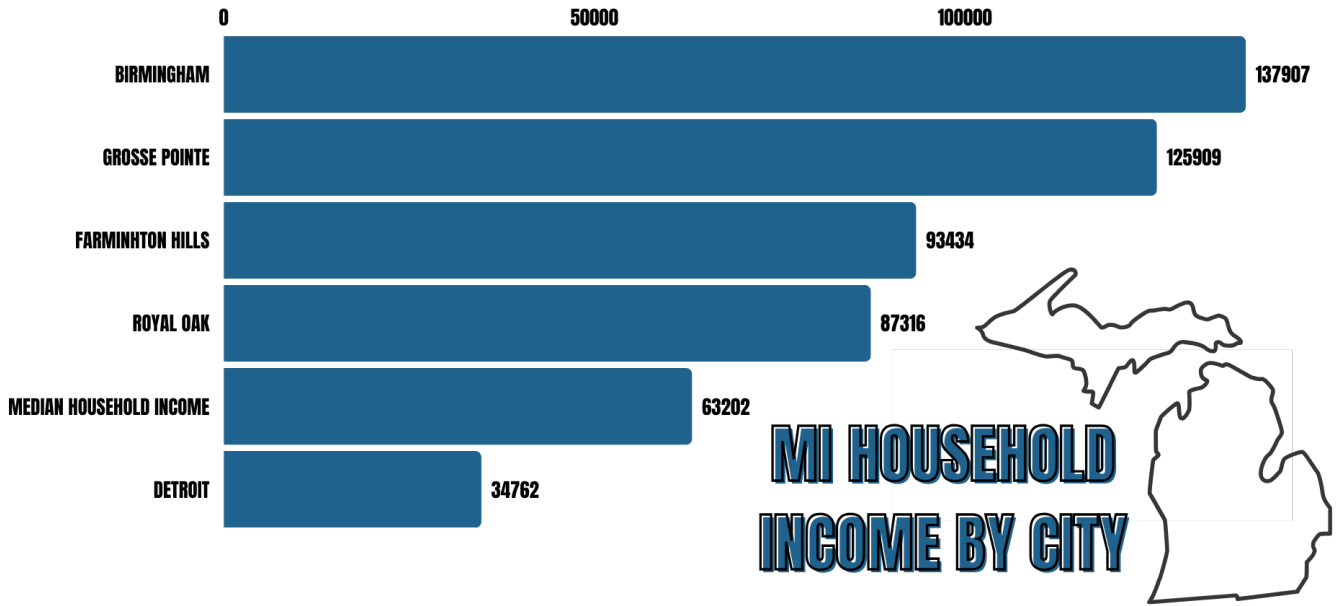
3,400 ASTHMA-RELATED DOCTOR VISITS

"AMBIENT AIR POLLUTION REPRESENTS 7% OF DEATHS IN THE CITY, MORE THAN ALL THE LIVES LOST TO HOMICIDE.

DETROIT POPULATION

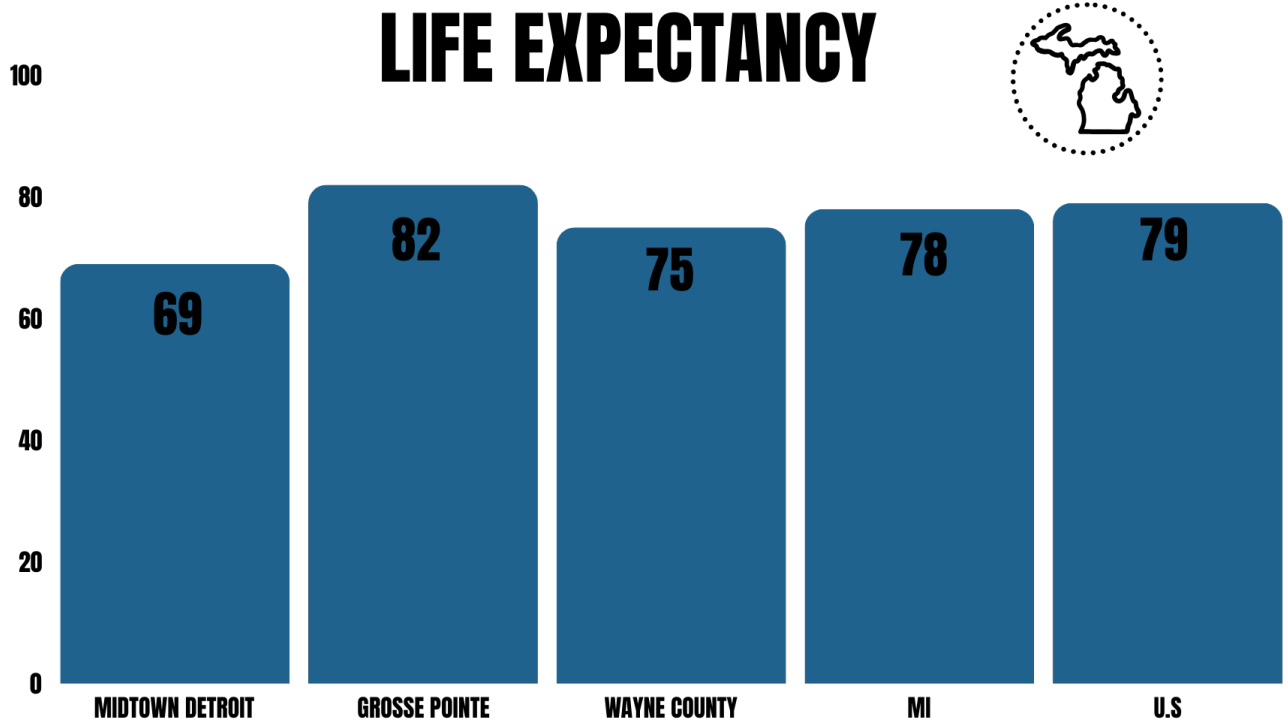


The Detroit population grew during the industrial revolution with many Americans finding work in the industrial industry. At the same time many Black Americans are leaving the south and moving north for better work. The decline happens after the Detroit riots with many residents leaving for the suburbs.



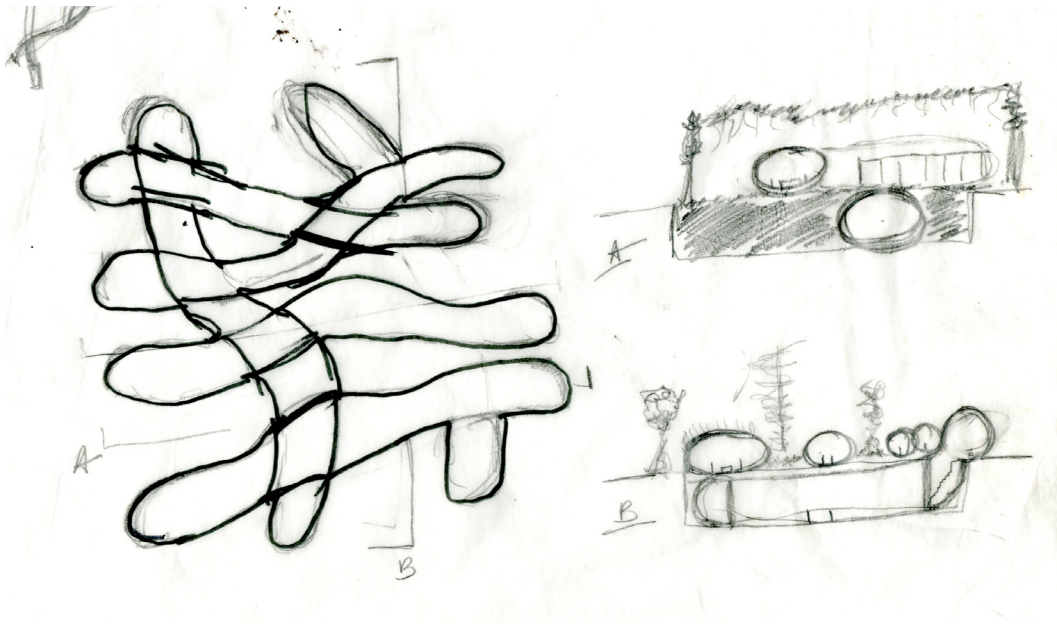
“The households impacted by industrial air pollution often have a median income of about \$24,000, making it challenging for them to move to less polluted areas.”

The suburbs of Michigan hold the highest household income, with the average in Detroit being below the state median at \$34,762.

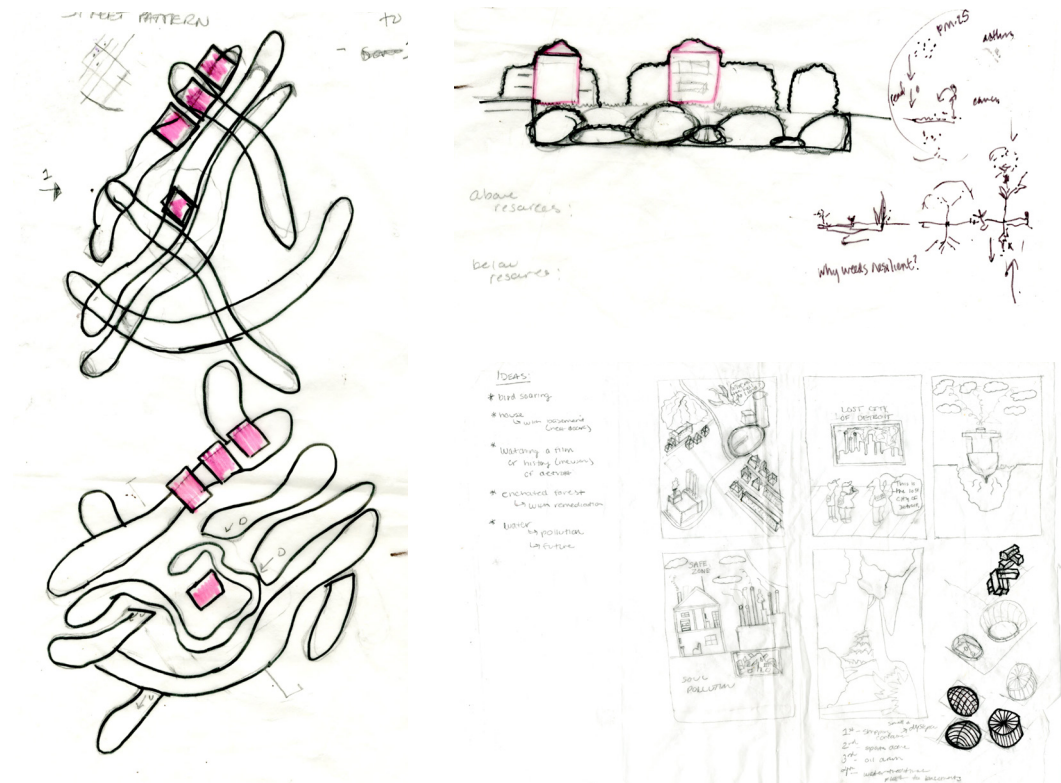


The life expectancy in Midtown Detroit is 13 years less than the suburb of Grosse Pointe that is a 20 minute drive away.

DESIGN DEVELOPMENT



During the beginning phases of my design I wanted to focus on creating a structure that was subnatural and followed the form of weed. The form of the building would weave in and out of each other. As shown in the section the form would also weave from under and above ground.

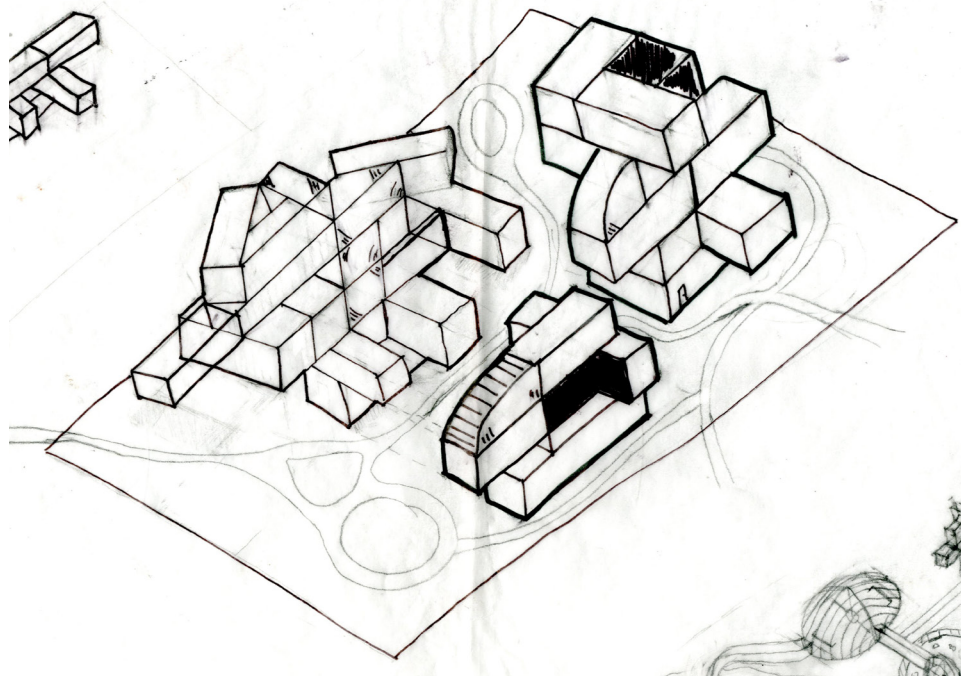


I continued to push the form of the structure but I started to think about the few homes that remain in Oakwood Heights. Highlighted in pink are the existing homes and I started to think about how the subnatural structure could incorporate the existing homes. Some homes become surrounded by the structure while others become a part of the structure.

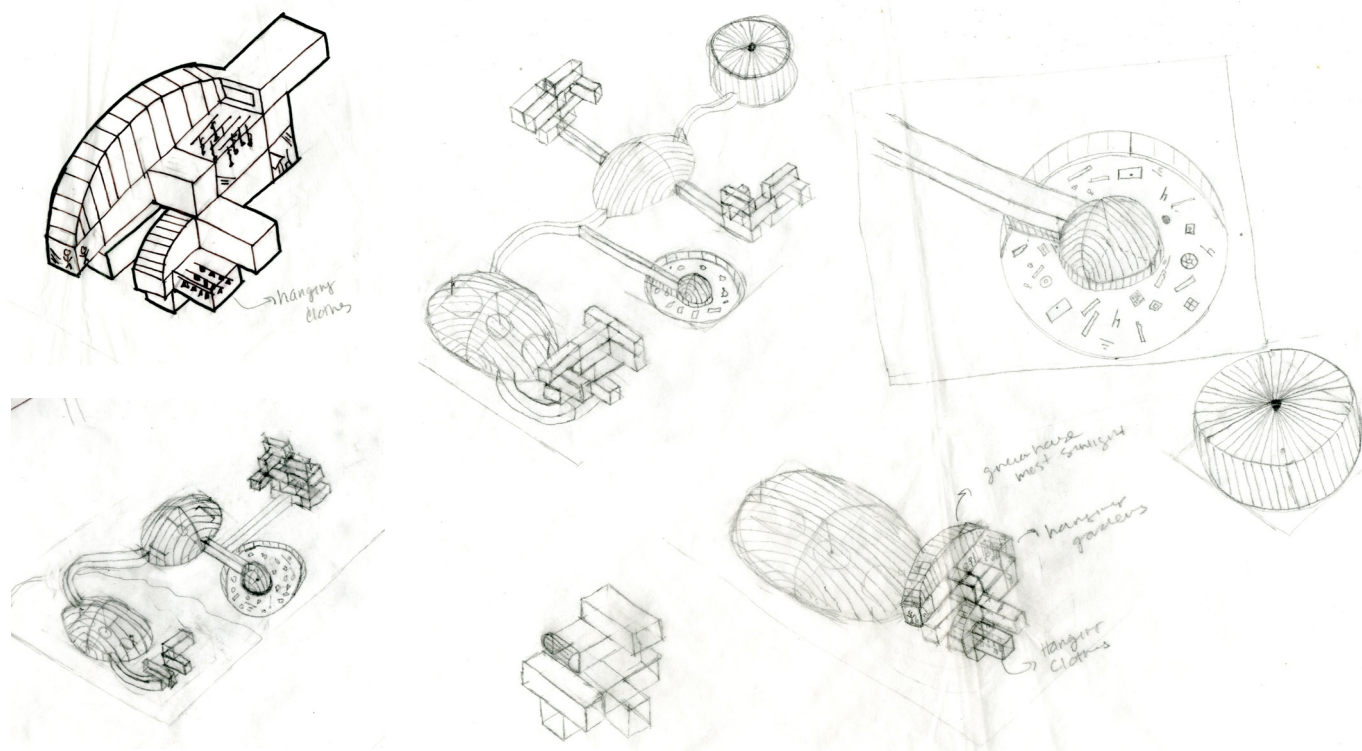
FORM PRECEDENT:



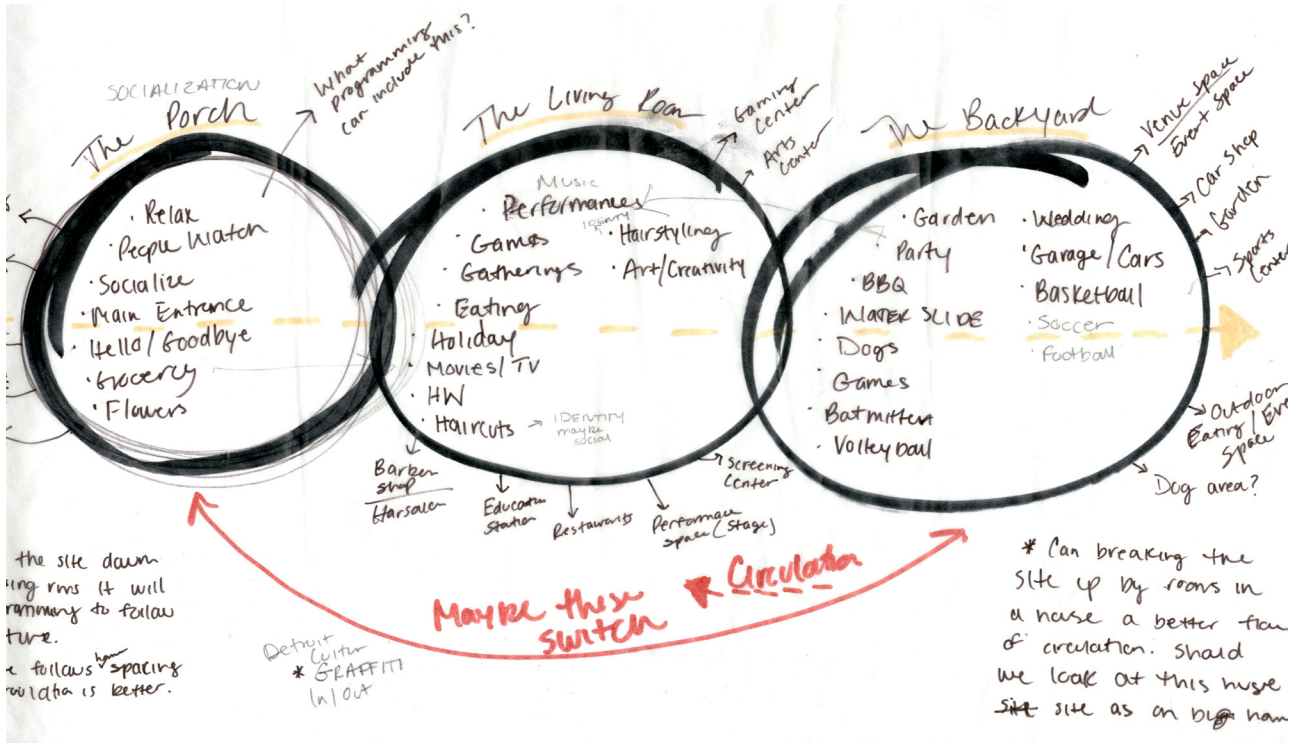
MOVIE: READY PLAYER ONE
ARCH DAILY



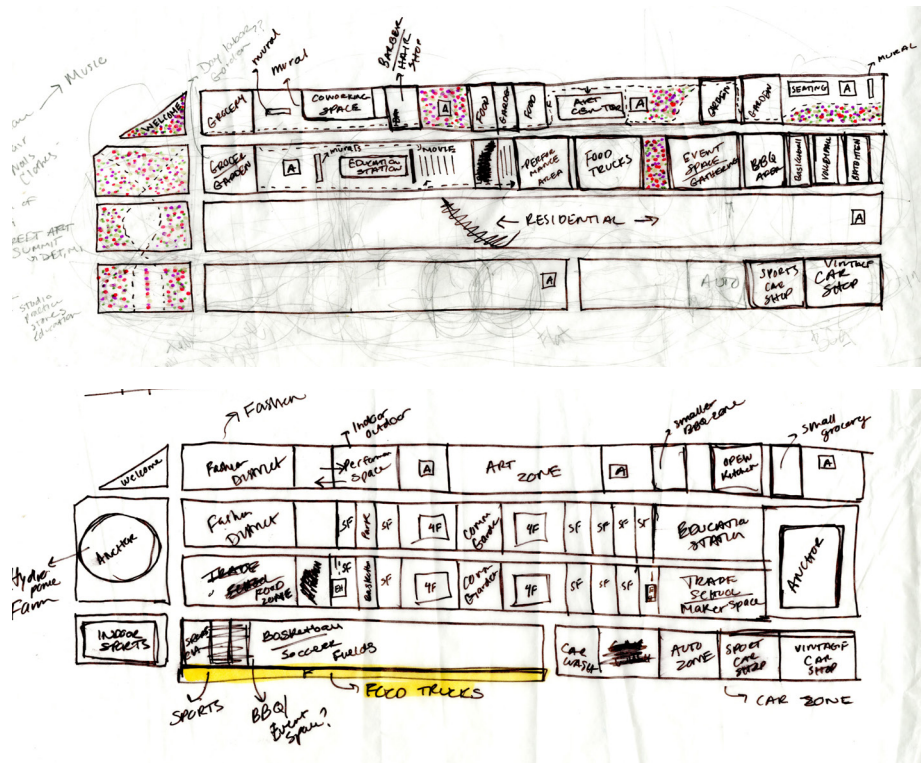
As I continued my design I started to think about my sight as a representation of the future. I wanted architecture to represent the lengths that we would have to go to live if pollution continues to rise. These structures would contain our entire lives and we would not have to go outside to live our daily lives.



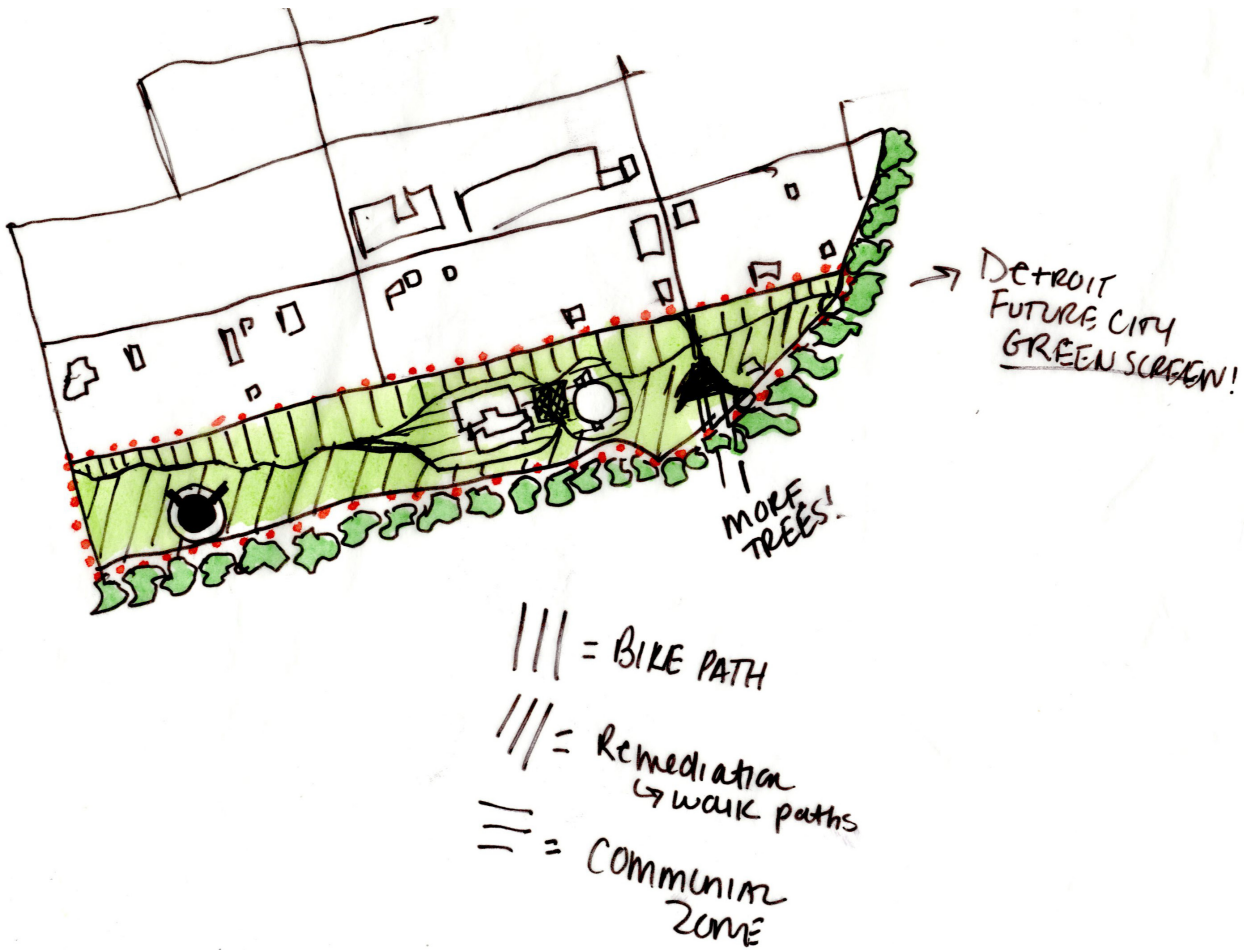
I furthered this design by adding more activities for people to do in our daily lives but still be all indoors. I sketched multiple different forms including an indoor sports field.



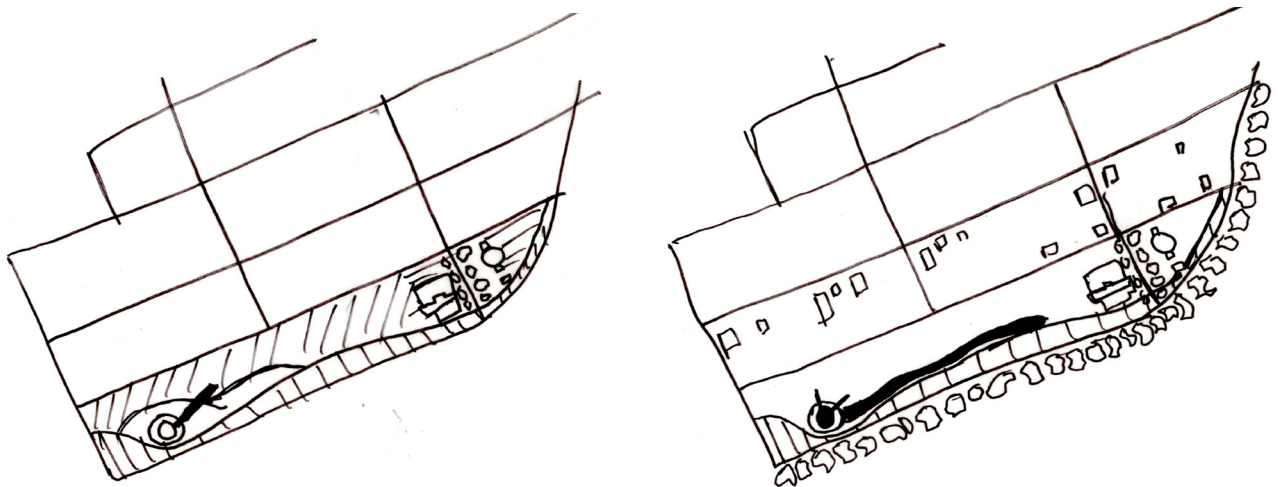
I was working with a large site inside of Oakwood Heights and it was difficult to look at different programming fully on the site. Since at one point homes filled the Oakwood Heights neighborhood I decided to break the site apart as the most important areas of the home. Those areas being the porch, living room, and backyard.



As I continued to further this design I began to plug in programming into the site. Starting with anchors of the site which are the Hydroponics Farm and the Art House Silo.



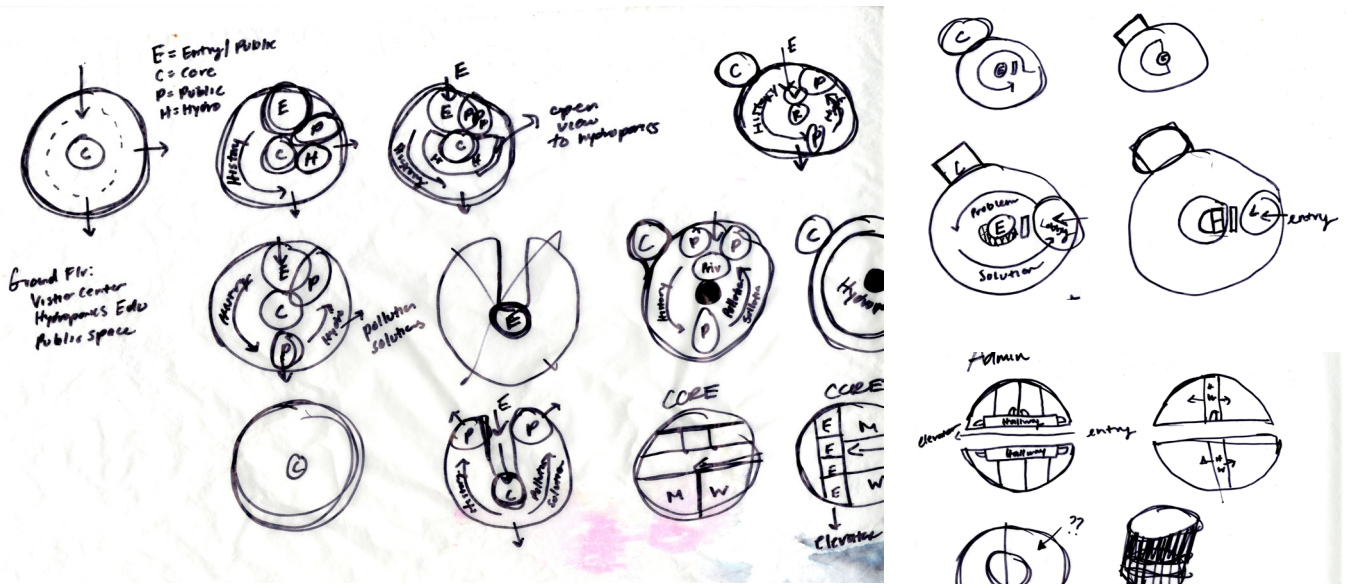
Once I decided on the anchors of my site I started to think about the landscaping of the site and how that could start to incorporate biodiversity and starting phytoremediation. I started to look at the site in zones, so I could break up the programming.



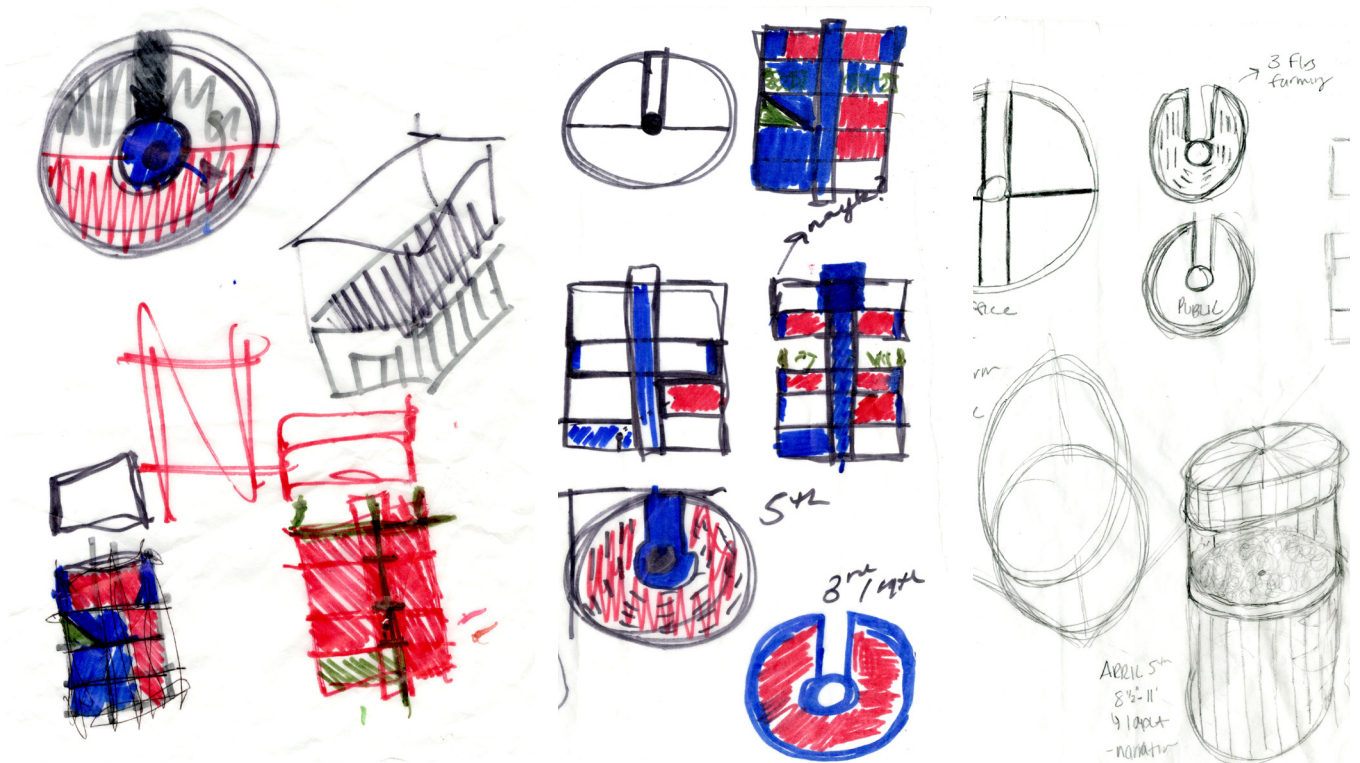
I was sketching out ideas of incorporating a pond that would increase bird interaction. Along with incorporating trees that would help with soil and air pollution.



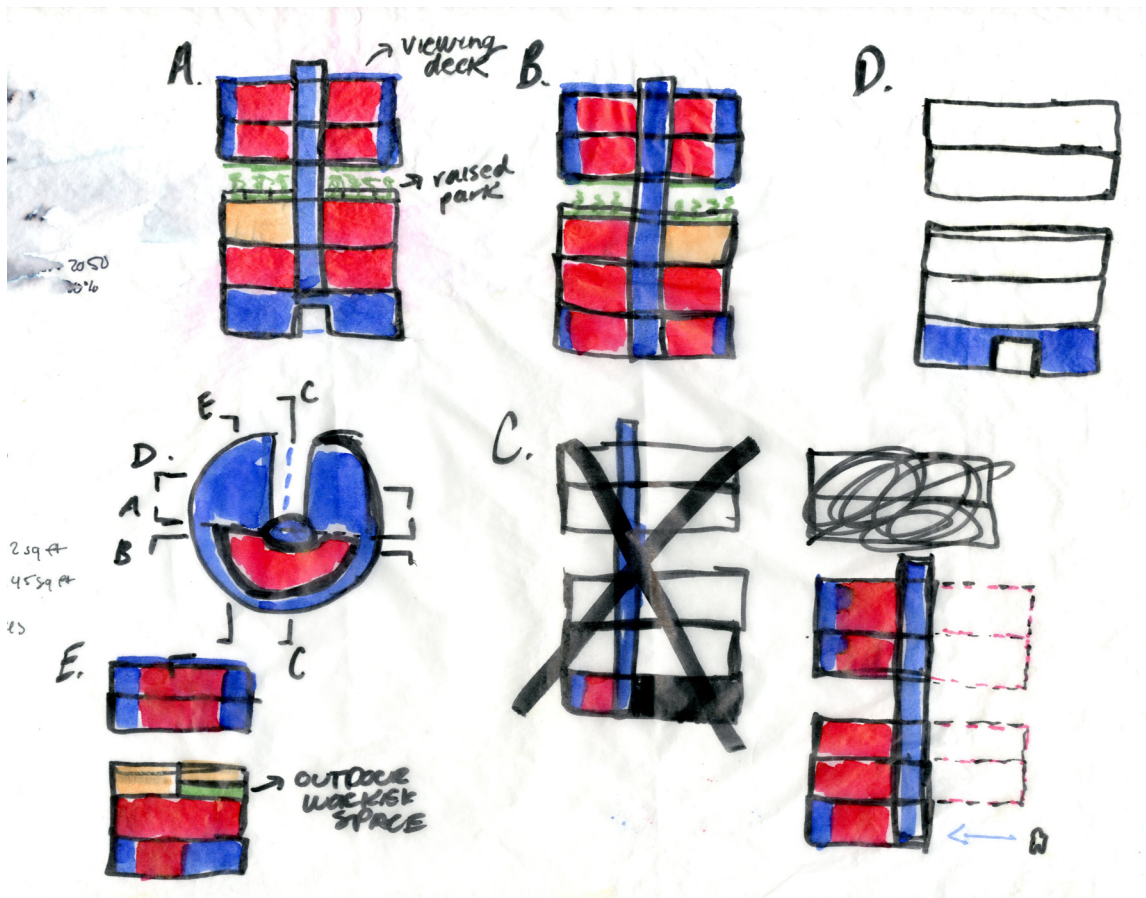
In this sketch I have laid out the complete programming of my site. I have the trails in purple, remediation in green, water in blue, and communal space in yellow.



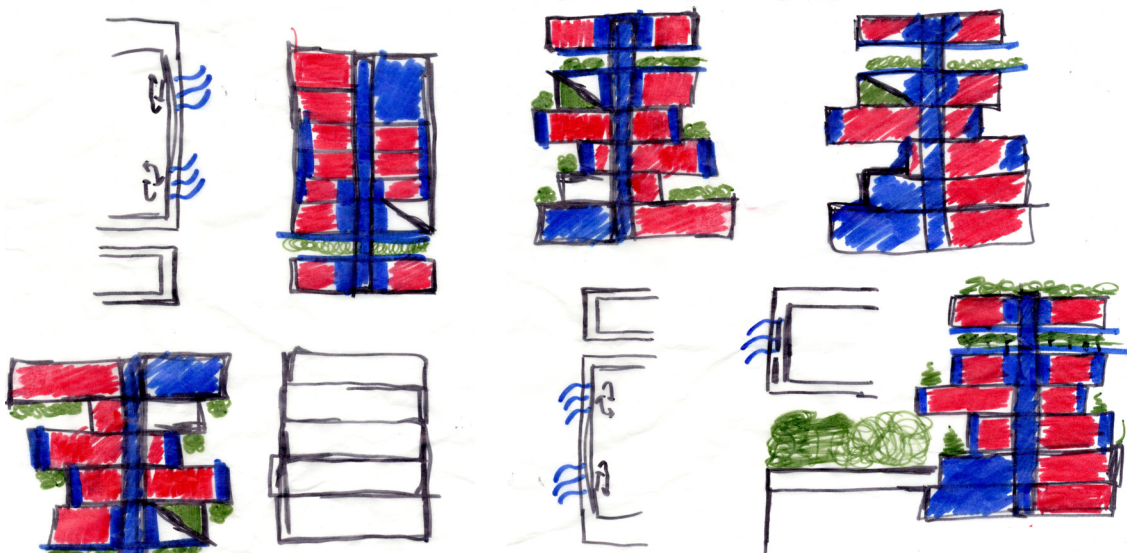
I began to sketch out ideas of the Hydroponics Farm with the ground floor being a Visitor Center that represents the history of the site.



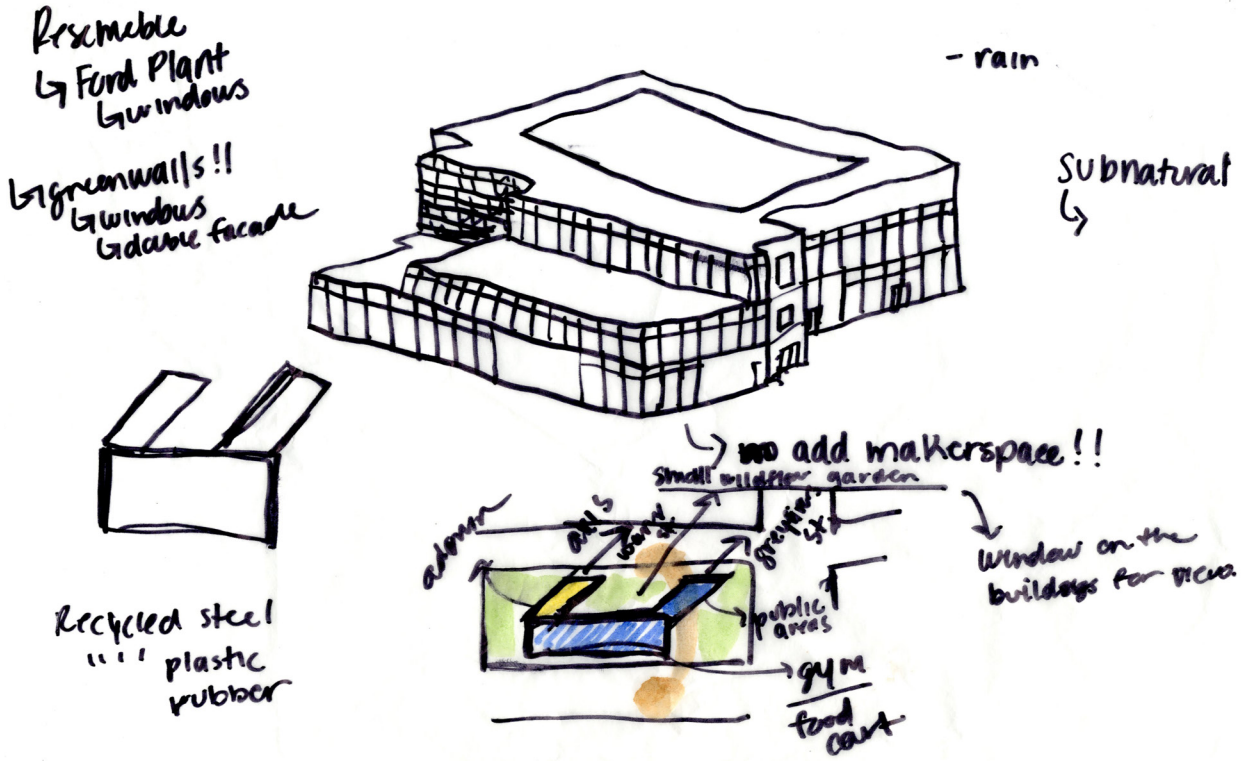
I continued to think about the form of the Hydroponics Farm and thinking about the integration of public (blue) and private (red) spaces.



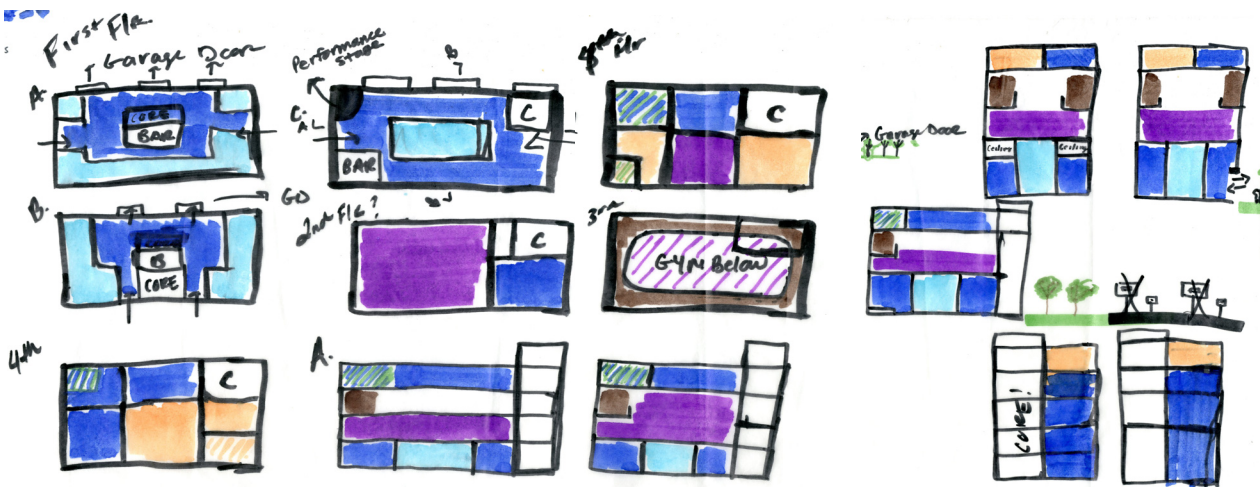
I began to look at the Hydroponics Farm section and started to implement employee spaces (orange) inside of the private spaces. I also started to include green spaces throughout the building. This would help with public and environmental health.



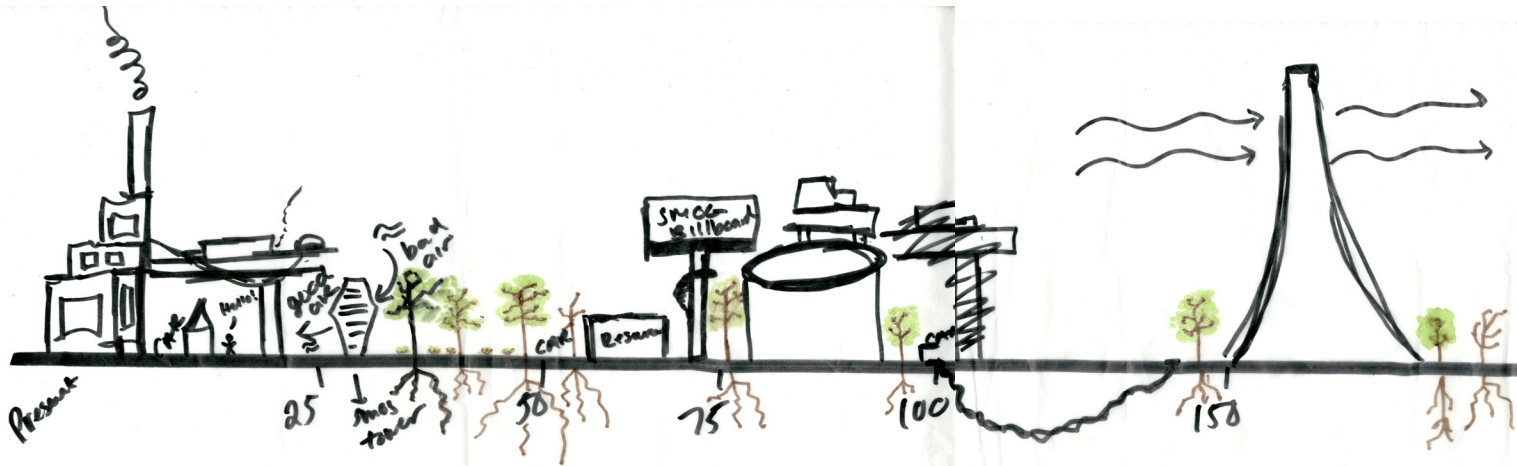
I started to think about a change in form and started to shift each floor of the hydroponics farm. I also started to think about the facade of the building as a tool to clean the air.



In this sketch I get to designing the facade of the community and form of the Oakwood Heights Community Center. I designed the community center fenestration system after the Ford Rouge Plant and its hierarchical structure from the Packard Plant.

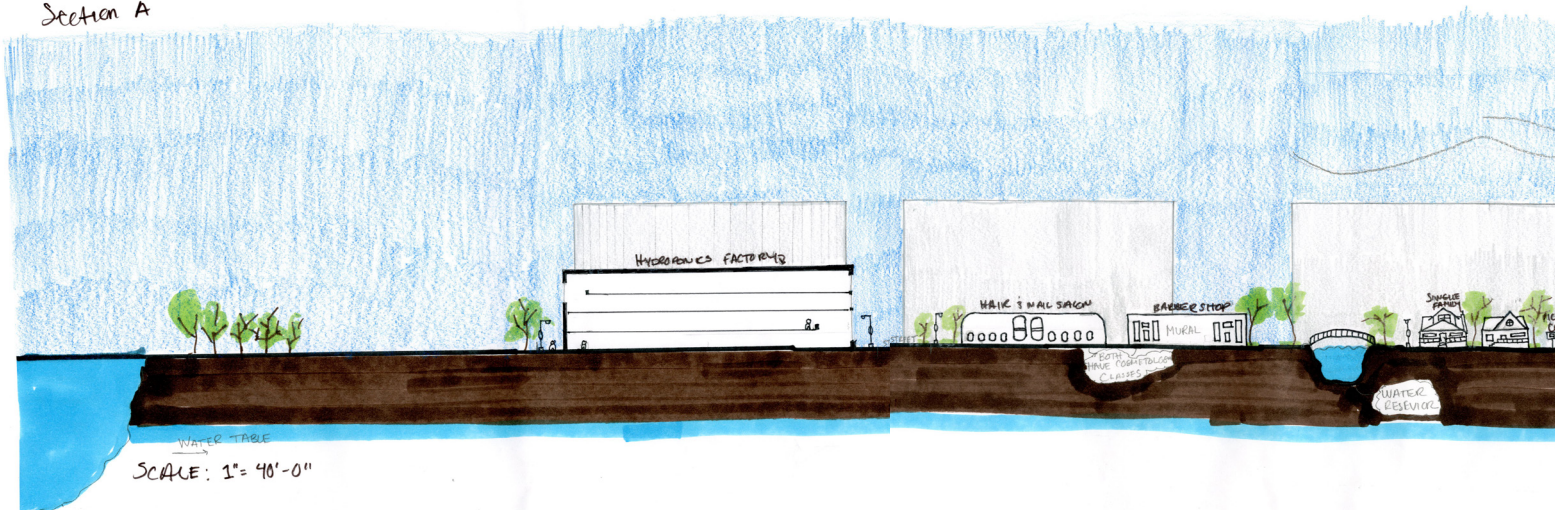


I look at the community center in plan and section view and break the space down by programming. The programming of spaces are public(dark blue), food (light blue), gym (purple), track (brown) and private(yellow).



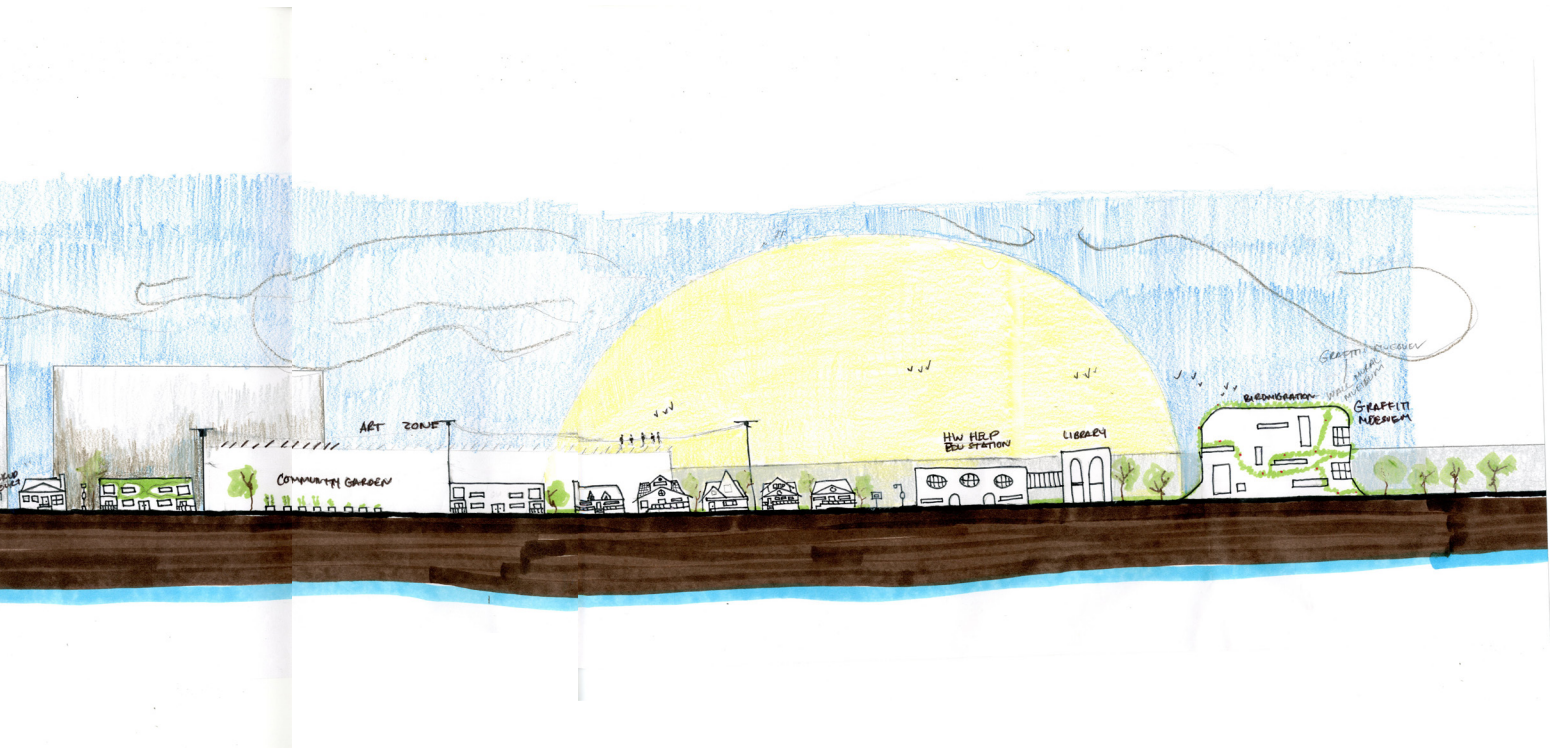
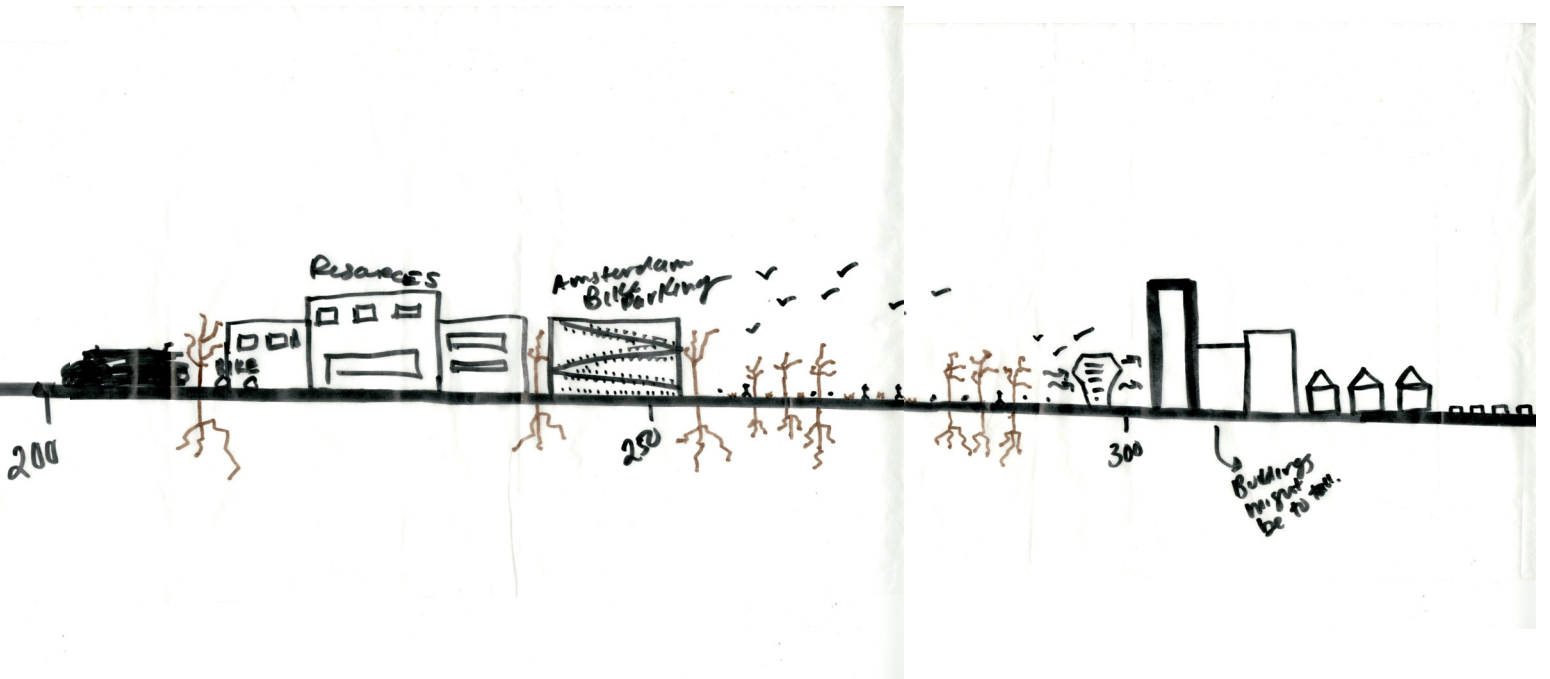
I thought about my site over time and through this timeline sketch I was able to create an idea of what I wanted to happen to my site over time. Started with remediation and ending with revitalization with the implementation of environmental solutions.

Section A



- How do ppl interact with the

I sketched a sketch cut of my site and began to look at how my anchors connect with the surrounding area and my future implementations. I began to think about green facades, and a water reservoir.



DESIGN DEVELOPMENT COLLAGES

THE GREAT MIGRATION - 1920



REDLINING & HOUSING DISCRIMINATION - 2008

Blackstone No. 6

THE SUPER SUBDIVISION WITH THE BIG FUTURE
GUARDED - - - CLOSE IN - - - LOW PRICED

This 300-acre subdivision has the restrictions that being demanded for home sites. Surrounded by other high-grade properties, it is guarded from inferior types of buildings.

Meyers Road, only direct route to the River Rouge industries, runs through the property. Eight-Mile, Monnier, State Park, Wyoming (super-highway), Seven-Mile (super-highway), Outer Drive and Northwestern are all about Blackstone No. 6.

Blackstone No. 6 is priced lower than properties in the same class were when placed on the market nine years ago. It is closer to than many properties that are selling for more today.



BIRWOOD WALL
DETROIT, MI

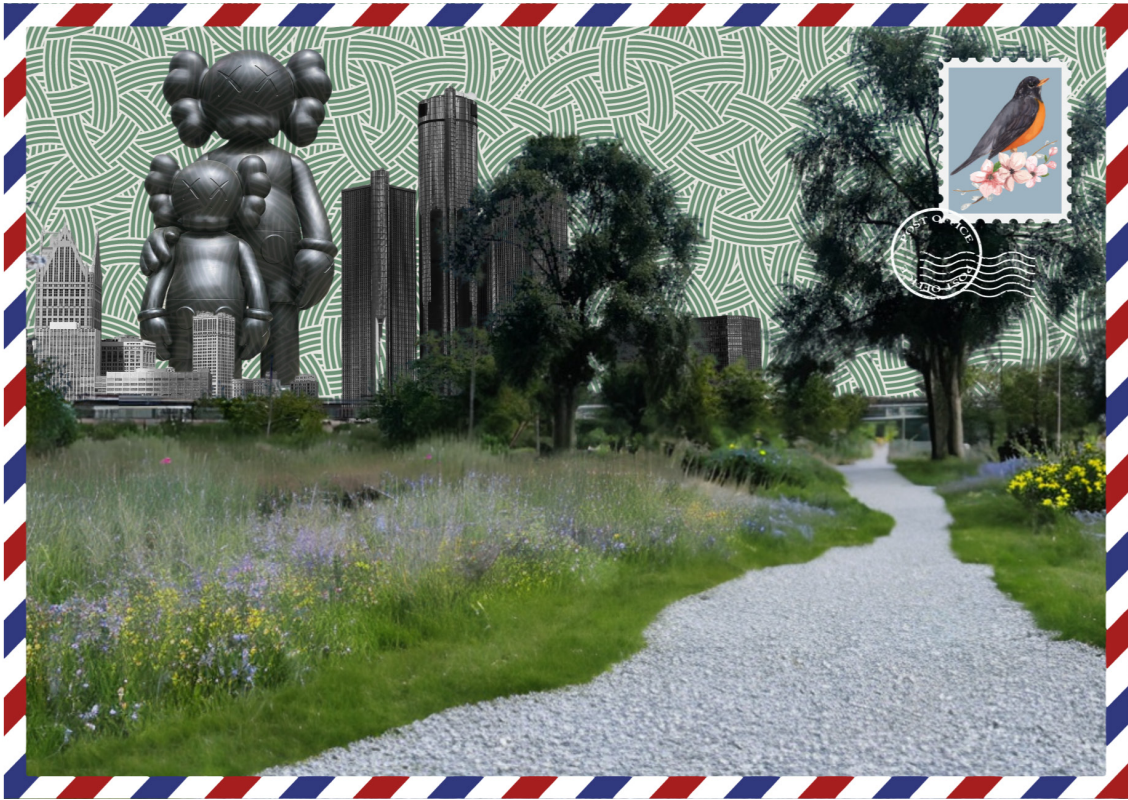
WE WANT WHITE
TENANTS IN OUR
WHITE COMMUNITY

COLLAGE CREATED BY AUTHOR

FORECLOSURE CRISIS - 2008



COLLAGE CREATED BY AUTHOR



POSTCARD SITE COLLAGE - I thought about bringing trails and wildflower to the site.



POSTCARD SITE COLLAGE - Through collage I continued to think about bio-diversity on the site.



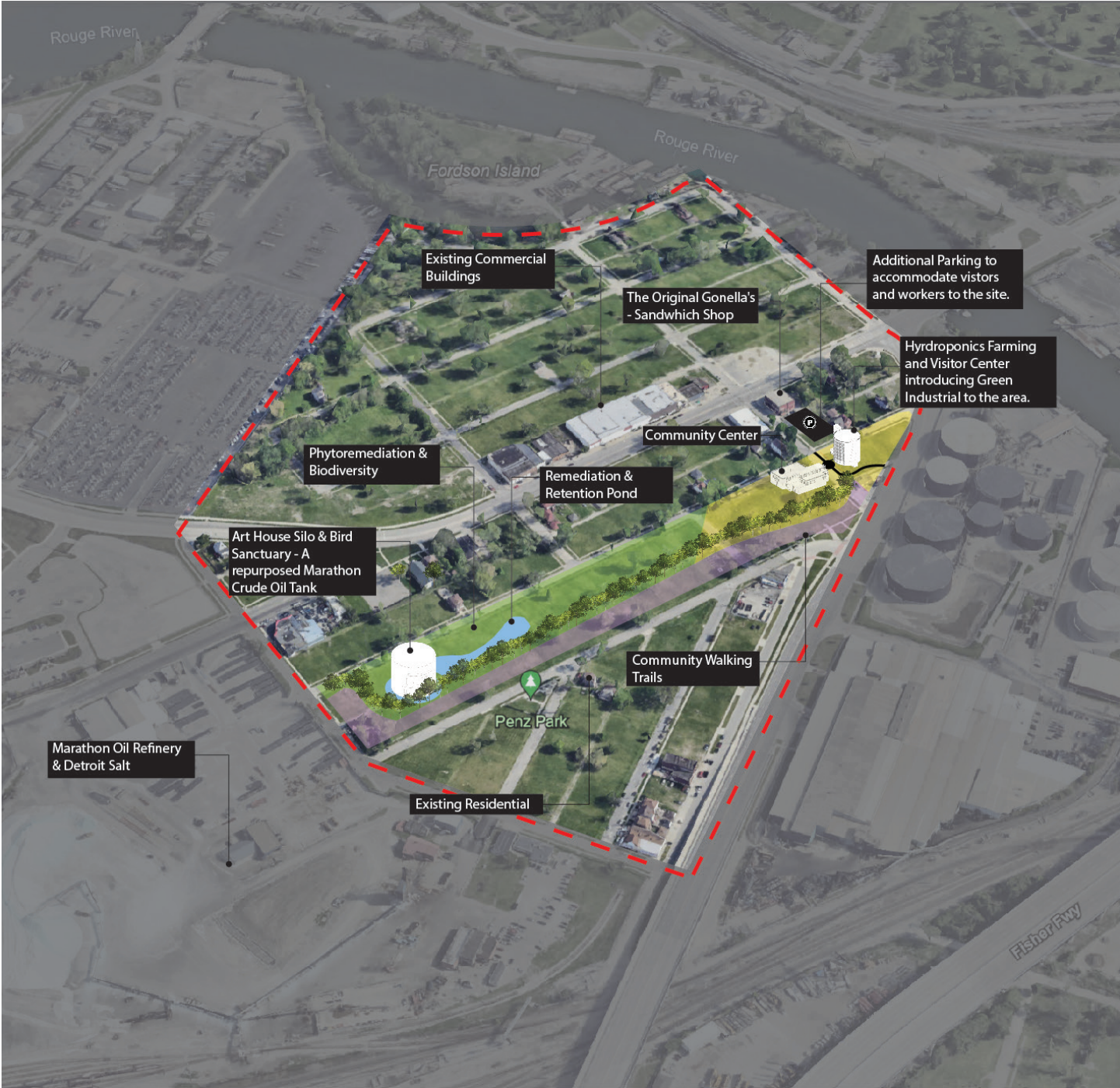
POSTCARD SITE COLLAGE -In this collage I thought about the removal of toxic soil and creating a new space for the community to use and nature to come back.



POSTCARD SITE COLLAGE - In this last collage I looked at the site as a complete park with water and greenery.

DESIGN PROCESS

NEIGHBORHOOD OVERVIEW



PROGRAM

To better the quality of life for community members in the Boynton neighborhood there has to be some sort of buffer that separates the residential from the industrial. Marathon Petroleum Corp. is working on an offer and is to spend up to \$5 million buying homes in the Boynton neighborhood in 48217 to create a buffer between the industrial and residential communities. Marathon is working with the city of Detroit Land Bank Authority with the plan to buy or lease 38 abandoned homes, and 140 vacant lots. The issue with this buffer is that nothing is separating the two such as smog-absorbing plants. The goal is to have more lots that open the gap between residential and industrial. Community members have been devastated by their living conditions and with increased health issues they have an increased need for medical attention. In the 48217 neighborhood, 4 medical centers seem to be a 15 min drive that would turn into a 2-hour walk for residents without a personal vehicle. As time went on hospitals in Detroit have disappeared starting with 42 in 1960 and only 7 today. In this thesis, I want to address these issues through the use of subnatural architecture. Based on my precedents the issue can be addressed in many different ways. After conducting my research I thought a way to bring attention through reclaiming, remediating, and revitalizing the site.

ART HOUSE SILO/BIRD SANCTUARY

A place for residents and artists to start activating the site. There are many artists throughout the city of Detroit and this would be a great opportunity to highlight the talent. This structure will also be home to birds as a stop on their migration path.

HYDROPONICS FARM & VISITOR CENTER

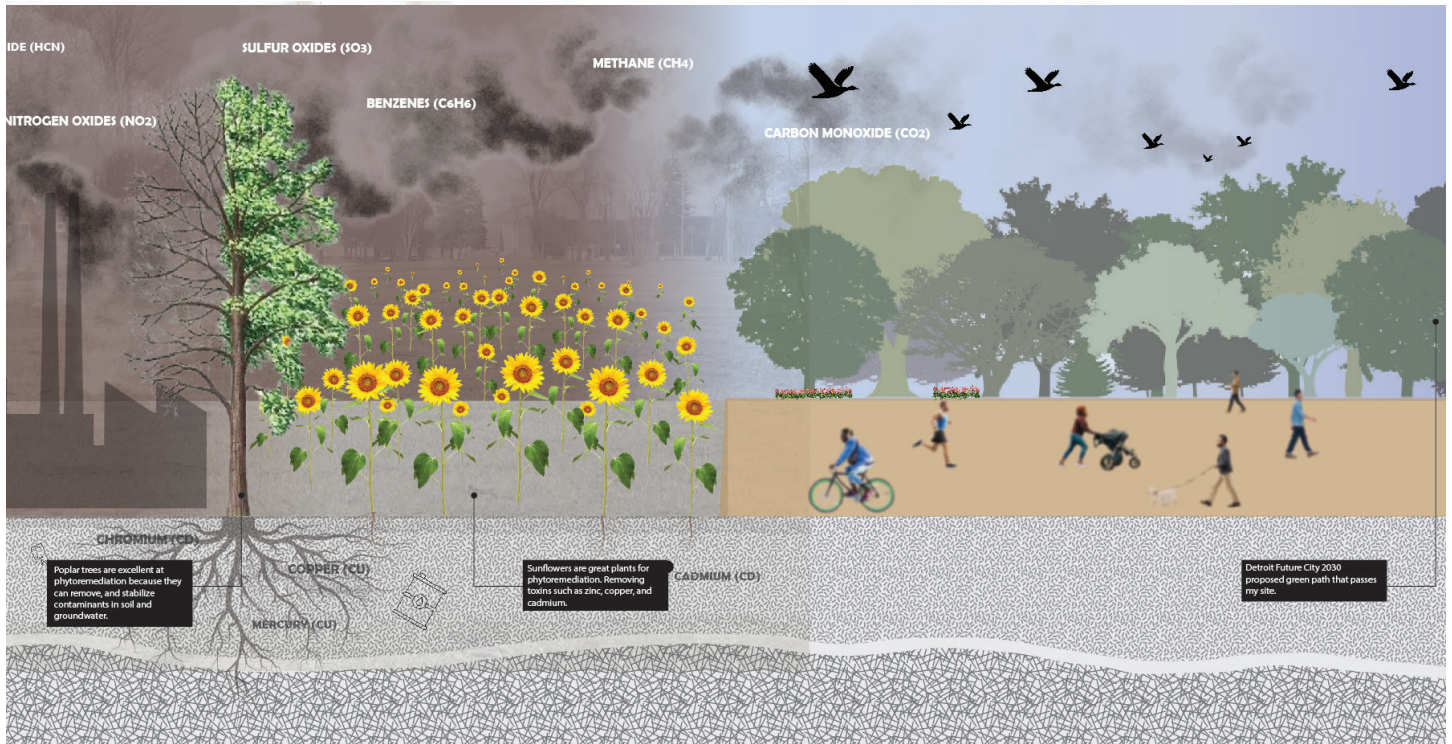
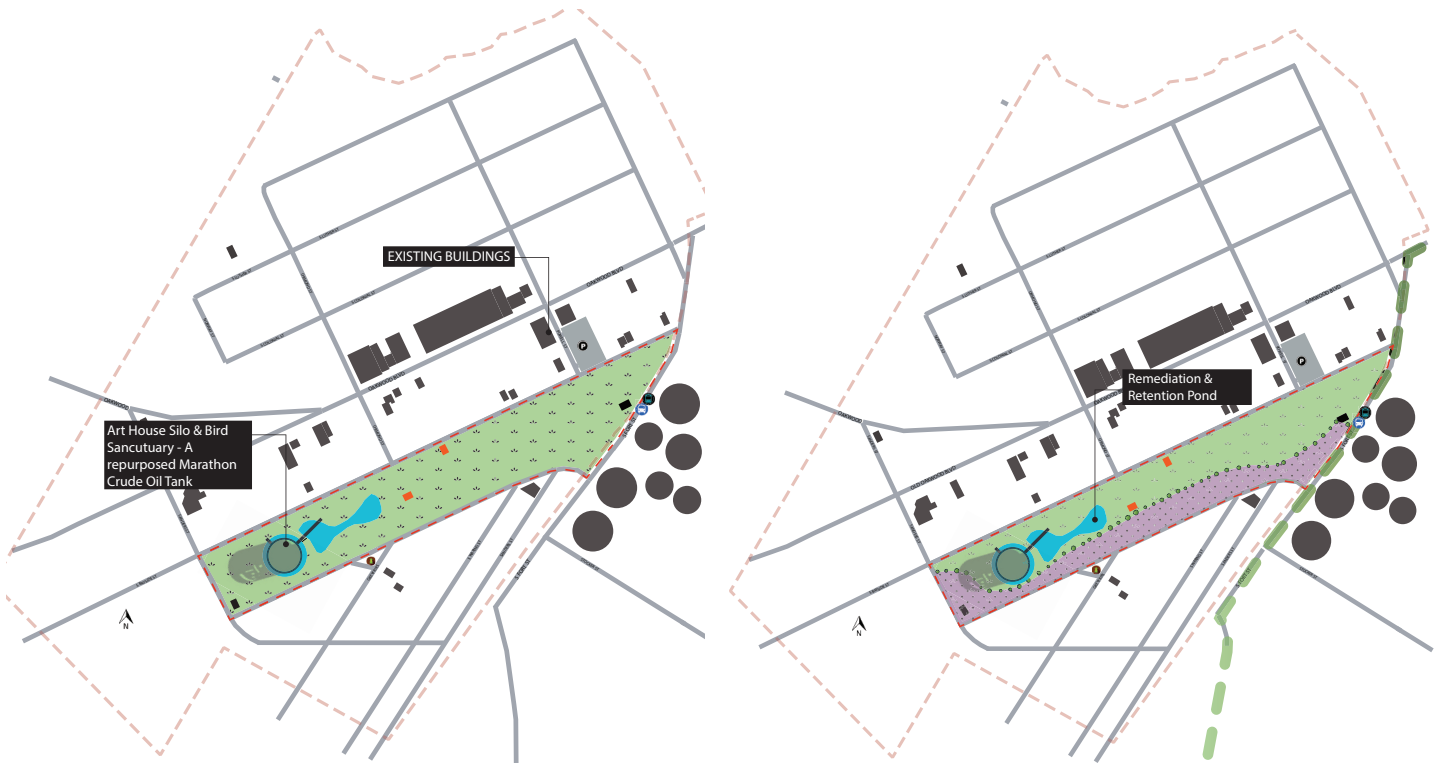
This hydroponics farm will close the gap for the food desert allowing residents a way to eat healthier food and learn how to grow it themselves. The hydroponics farm will show that residents can grow food without the use of toxic soil that is around the site. This will also allow more job opportunities in the area.

OAKWOOD HEIGHTS COMMUNITY CENTER

The community center will be a place for residents to use it for all events. This will be a place for all age groups to come together and have a good time. The center will also have workzone rooms that will allow students and workers a space to do their work. The community center will have a green facade and green roof that will allow the residents to be with greenery. This greenery will also be a great way to solve air pollution and help with biodiversity.

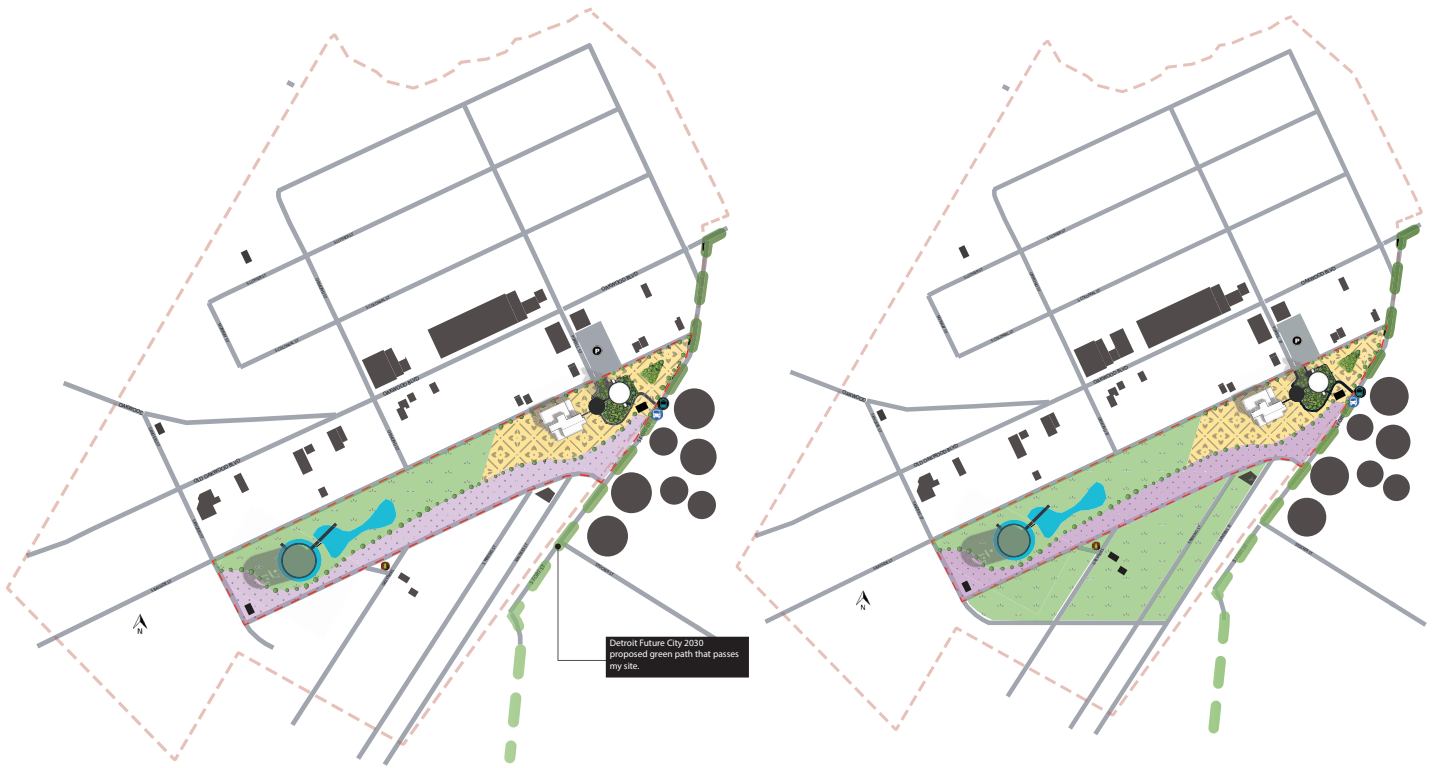
RECLAIM, REMEDIATE

The first step in my thesis is to reclaim the site. By taking a crude oil tank and turning it into an Art House/Bird Sanctuary. The site will also be going through remediation by phytoremediation. Walking paths will also be implemented into the site to continue public activation.



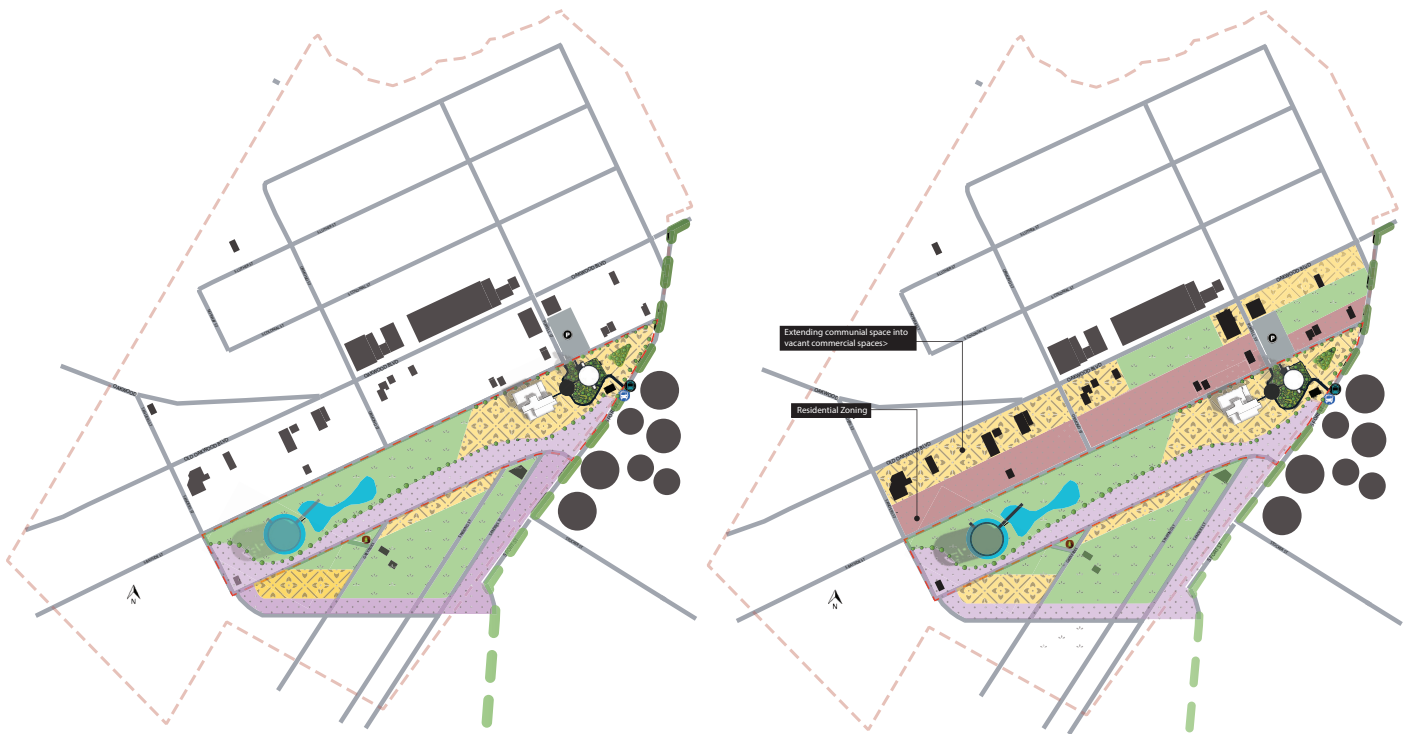
REVITALIZE

Revitalizing the site continues with community engagement and growth. This will start with the Art Silo House and continue with the Hydroponics Farm. The farm would allow jobs and food to the community. Later the Oakwood Heights Community Center will be built. The center will be a space for residents to gather, eat, and play.



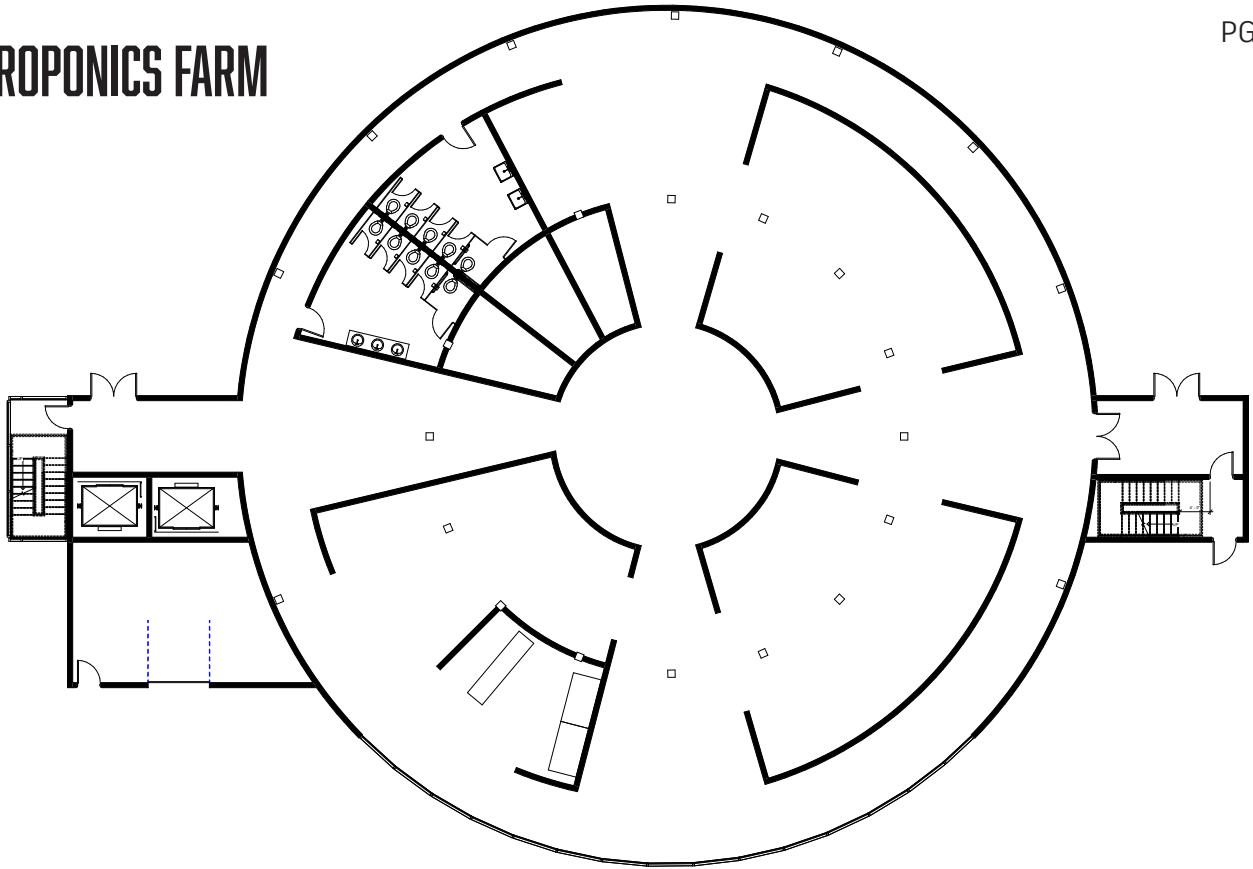
RESTORE

As the site continues to be revitalized it will eventually become restored. This will be a new community that has healthy residents and businesses. The site will allow residents to recognize and reflect on the history of the site but know we are moving towards a better future.

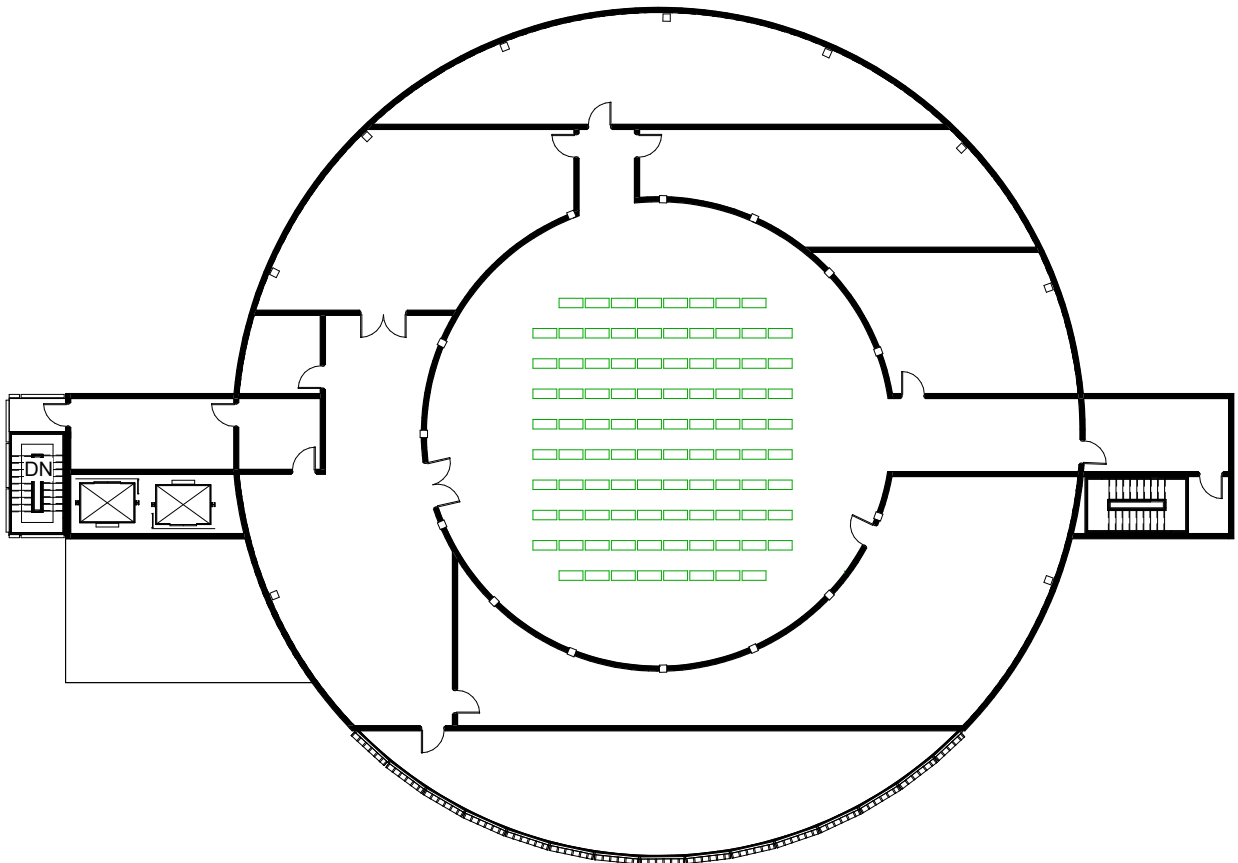


FLOOR PLANS

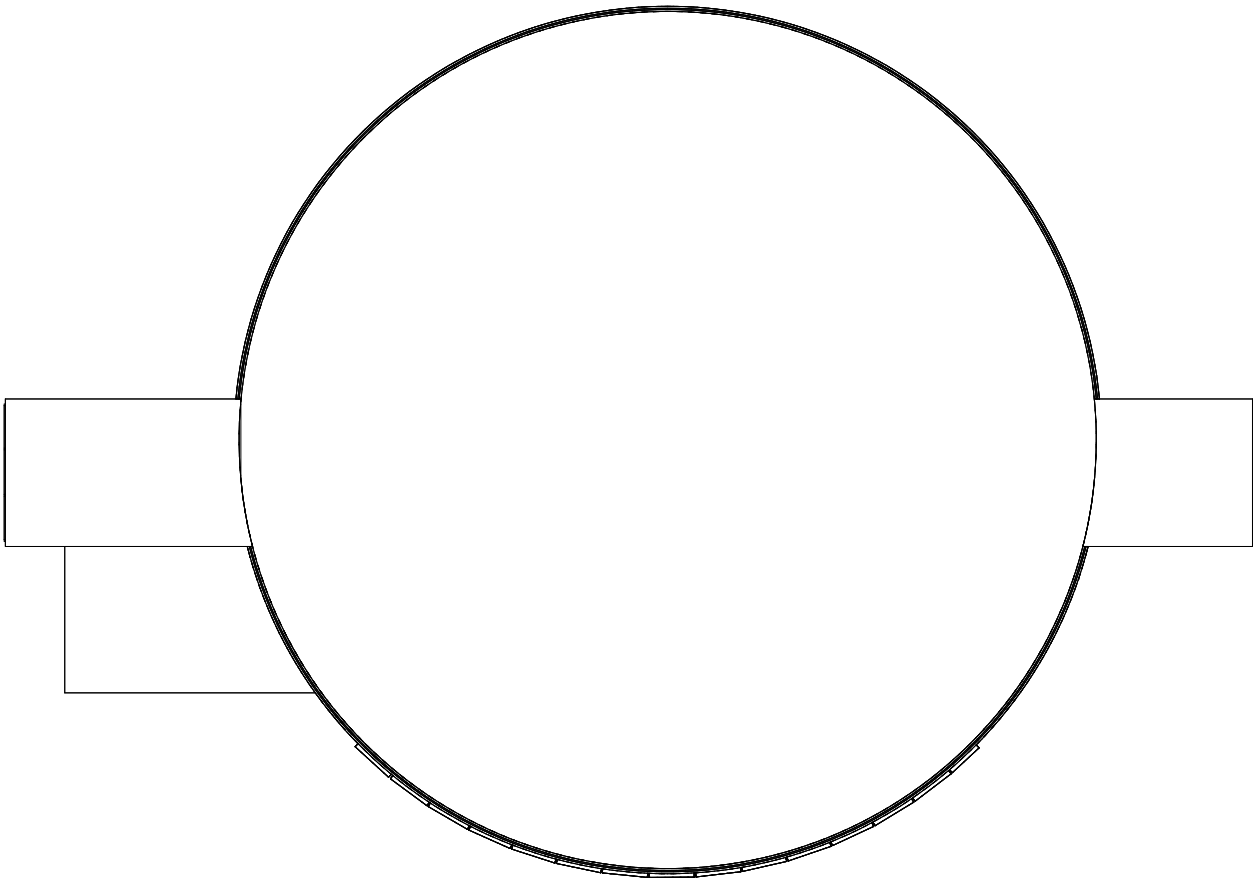
HYDROPONICS FARM



GROUND FLOOR PLAN: VISITOR CENTER

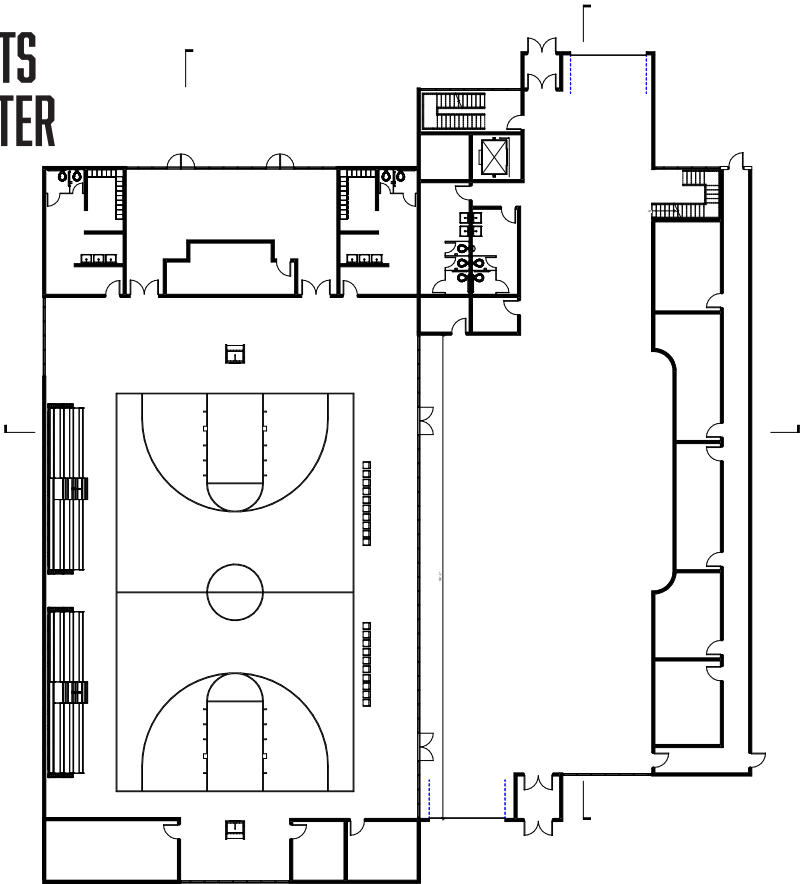


2ND - 7TH FLOOR PLANS: HYDROPONICS FARM

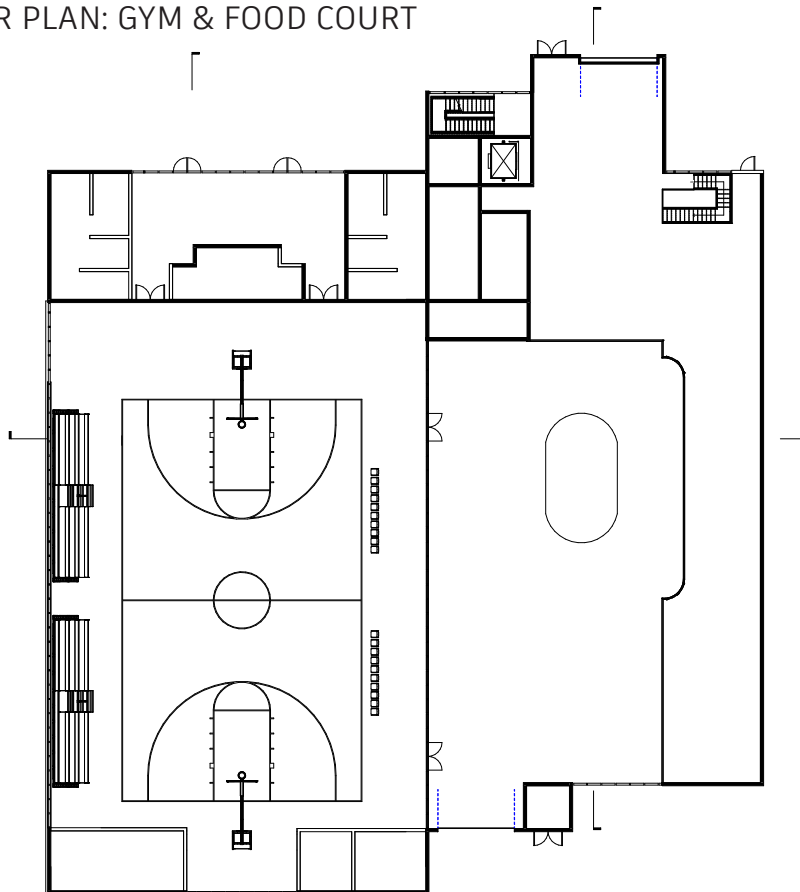


ROOF PLAN

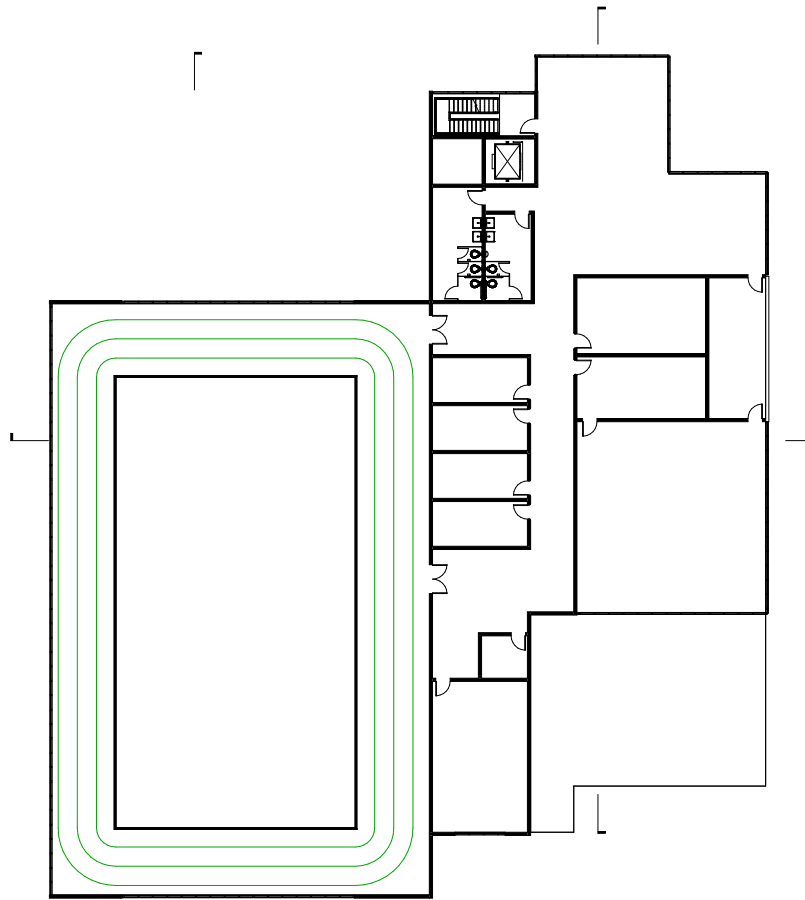
OAKWOOD HEIGHTS COMMUNITY CENTER



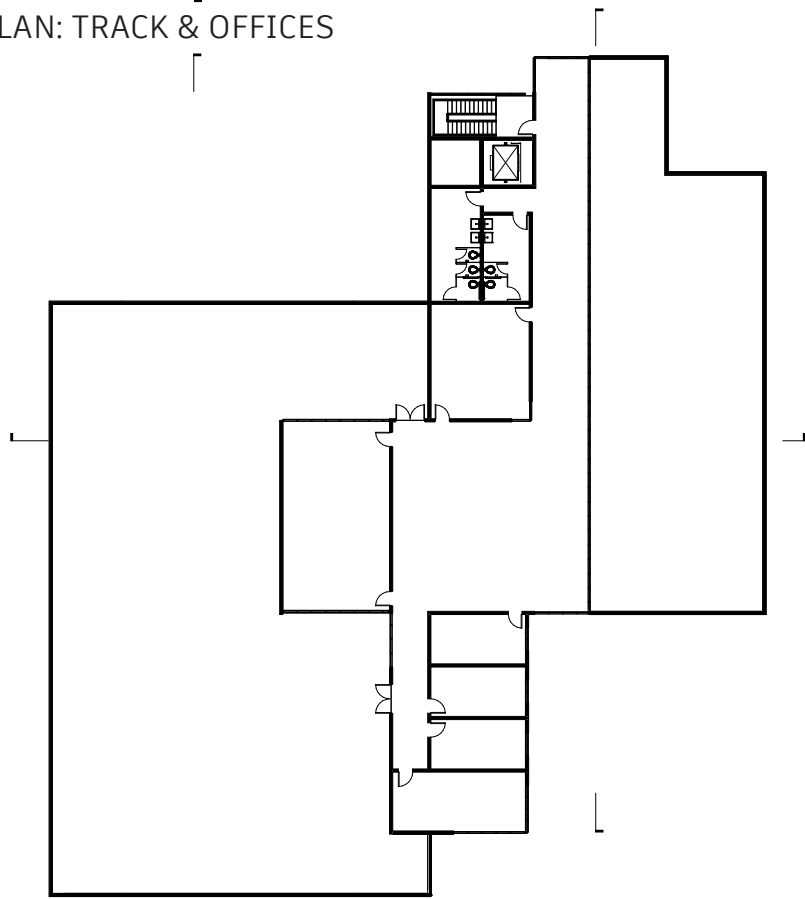
GROUND FLOOR PLAN: GYM & FOOD COURT



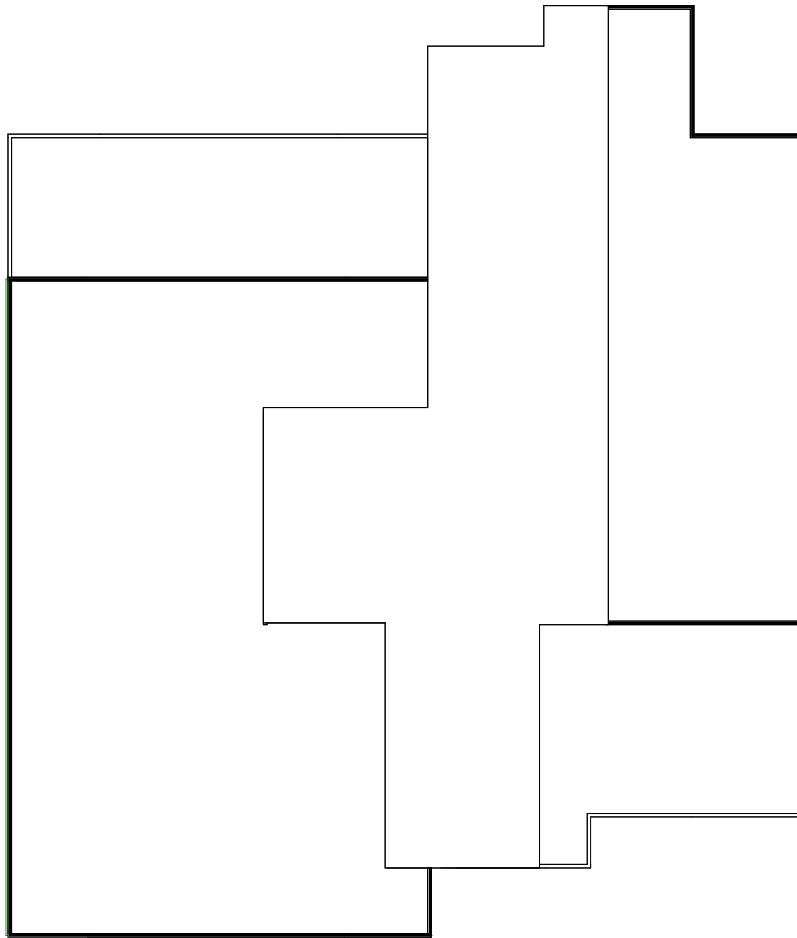
MEZZANE FLOOR PLAN



2ND FLOOR PLAN: TRACK & OFFICES



3RD FLOOR PLAN: STUDY ROOM & GREEN ROOF



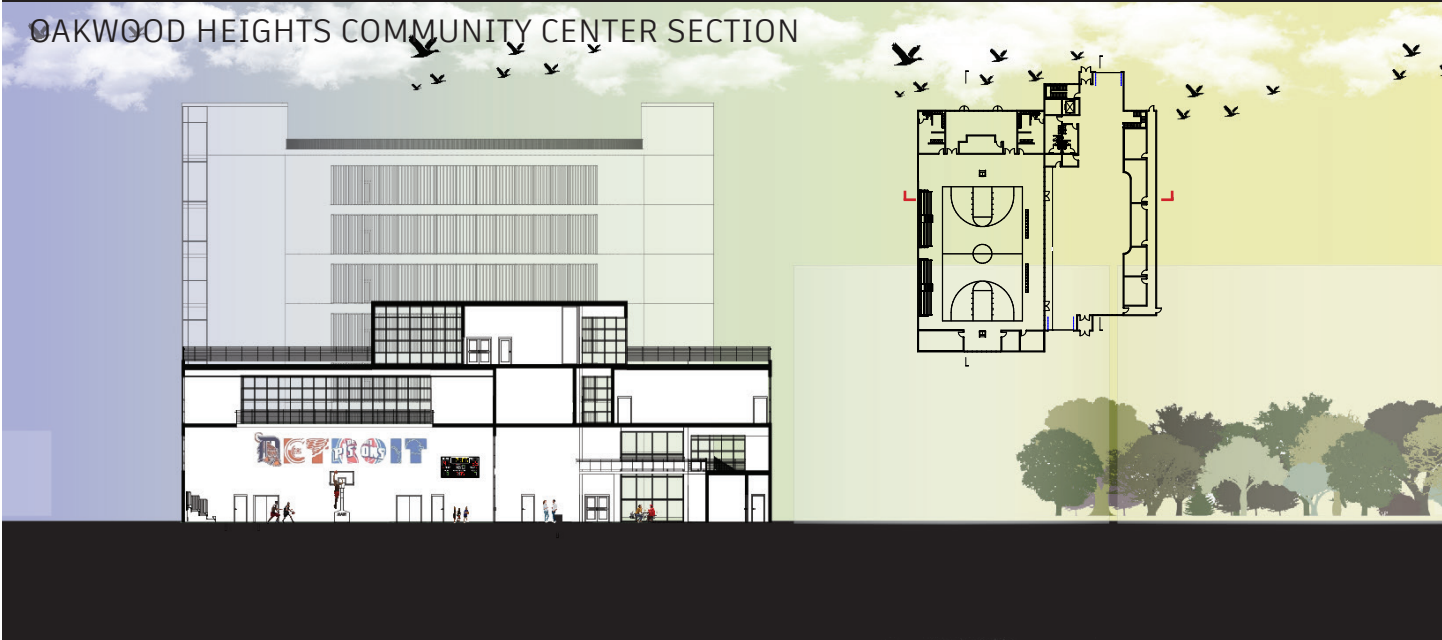
ROOF PLAN

SECTIONS

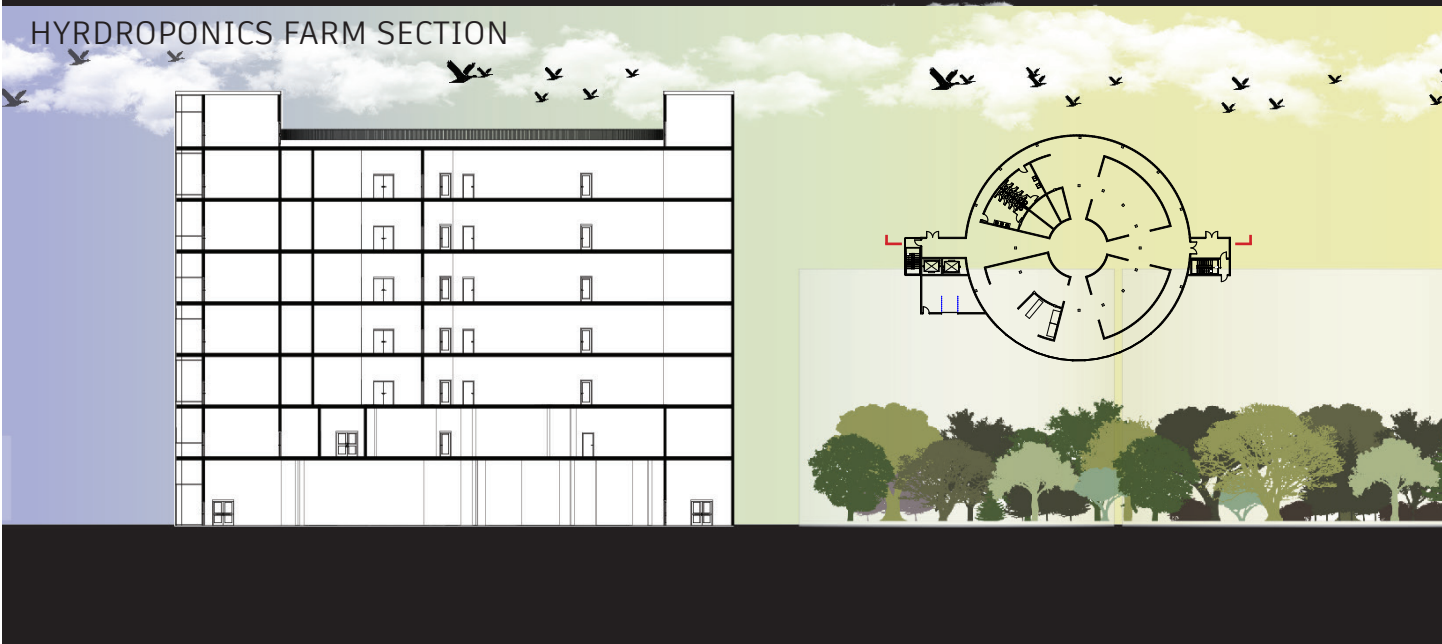
ART HOUSE SILO SECTION



OAKWOOD HEIGHTS COMMUNITY CENTER SECTION



HYDRONONICS FARM SECTION



HYDROPONICS FARM SECTION





COLLAGES

COLLAGE INSIDE 2030 DFC PROPOSED LIGHT RAIL





ART HOUSE SILO SECTION COLLAGE



BASKETBALL GYM SECTION COLLAGE



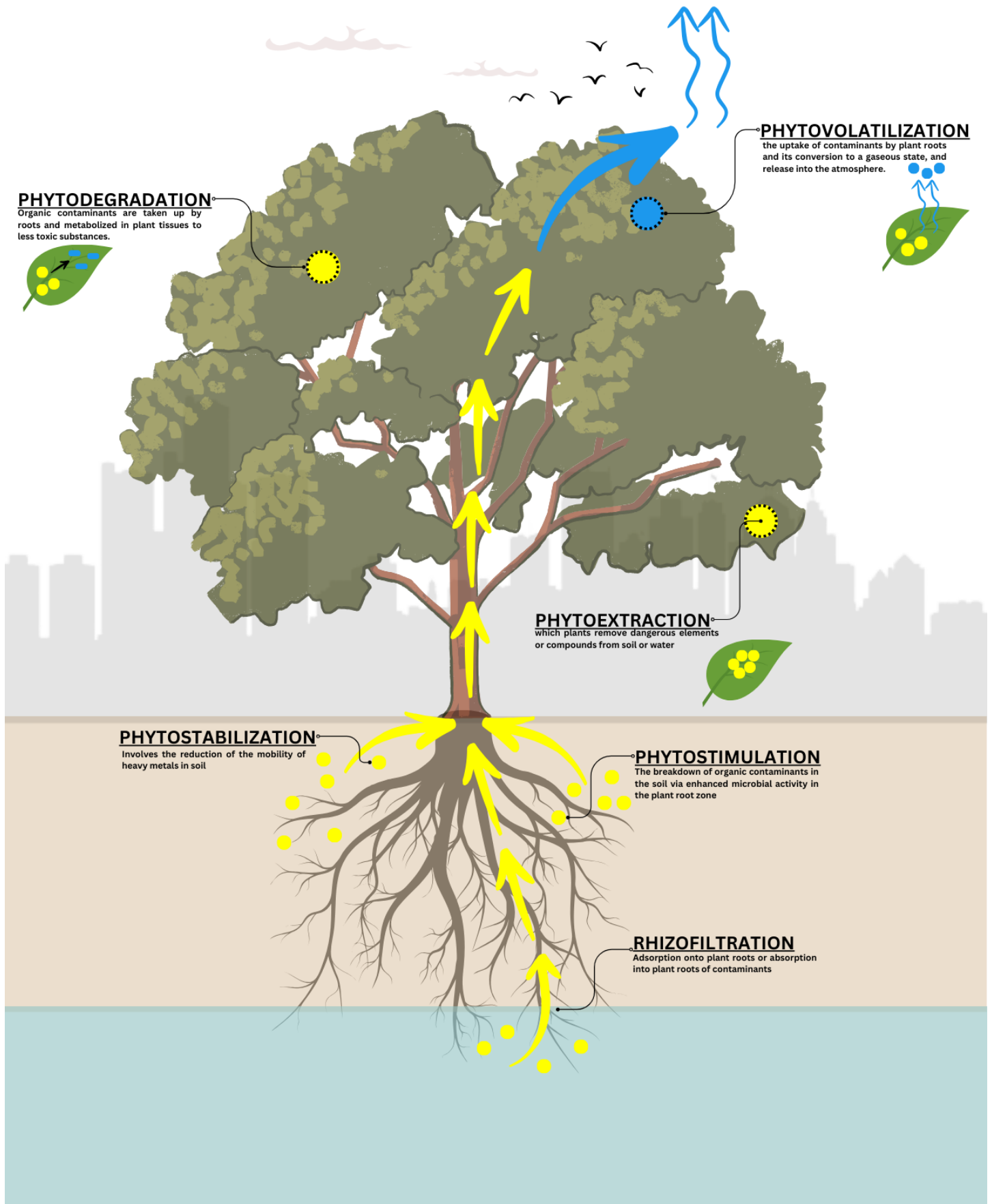
RESTORED COMMUNITY BARBER SHOP COLLAGE



RESTORED COMMUNITY BEAUTY SHOP COLLAGE

DIAGRAMS

PHYTOREMEDIATION DIAGRAM



REMEDICATION PLANTS



INDIAN
MUSTARD



SUNFLOWER



INDIAN
GRASS



GRAMINEAE



ALFALFA



CORN



POPLAR TREE



LADY FERN



ROYAL FERN



MAIDENHAIR
FERN



OSTRICH
FERN



WOOD FERN



SENSITIVE
FERN



CHRISTMAS
FERN



EBONY
SPLEENWORT
FERN



BROAD BEECH
FERN

MICHIGAN BIRDS

MIGRATE FROM MI TO WARMER CLIMATES



CHICKADEES



NUTHATCHES



CARDINALS



BLUE JAYS

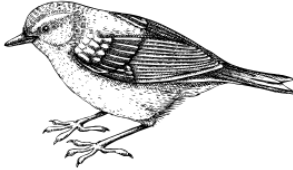
ALL YEAR ROUND



ROBIN



SPARROW



WARBLER

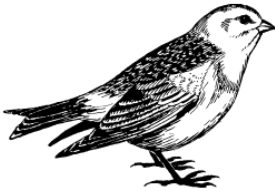


HUMMINGBIRD

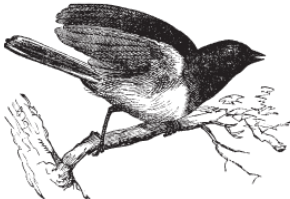
MIGRATE TO MICHIGAN FROM NORTHERN ENVIRONMENTS



PINE SISKINS



DARK-EYED JUNCOS

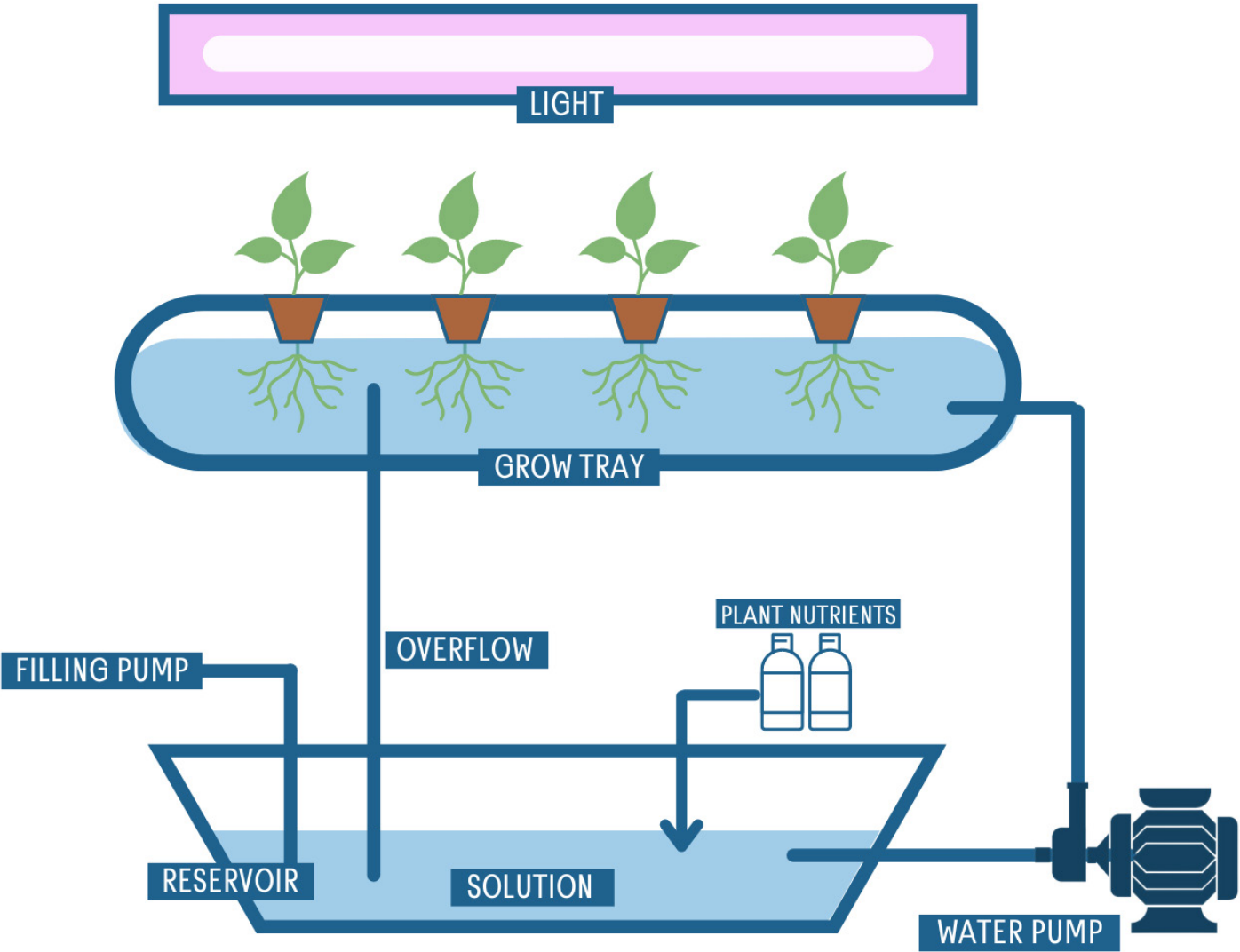


SNOW BUNTINGS



CROSSBILLS

HYDROPONICS FARMING SYSTEM DIAGRAM



The downriver and Tri-city area has a long history of being filled with opportunity, community, barriers, and despair but that hasn't stopped the perseverance of its residents. All of this creates the community that is there today and the architectural design of this thesis should be a direct representation. The next steps in continuing my research will be going back and further researching into the remediation of the site. I could start to use other forms of remediation that include the Rouge River. I will begin to further research into different laws and regulations that would protect my site. This thesis has to allow protection of the community that remains and the people that will return. The goal is to keep developers and gentrifiers out of the area in the hopes that the Oakwood Heights neighborhood will return to a restored state. I also want to further look at the forms of my building. I want the forms to be statement pieces for the community but also be a reflection of the past. I think connecting the design with the history strengthens the work and will further answer my thesis question. I want to further my understanding of landscape architecture so that I can better design the walking paths. The paths should have biodiversity and include biking and walking lanes. With the strengthening and continuation of my thesis I believe that "Reclaim, Remediate, & Revitalize" can be a plan that can be used as a guide in multiple cities that have been affected by industrialization.

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