

ABSTRACT

Thesis Title: THE INVISIBLE NEIGHBORHOOD: DESIGNING FOR
INTERSECTIONALITY

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This thesis explores a resilient neighborhood and school for Black and Brown disabled communities displaced by climate change in New York City, New York. Marginalized communities around the world are constantly displaced due to climate disasters. But the people most affected are those at the intersection of those groups. These communities typically live in lower-status neighborhoods incapable of withstanding a climate disaster, which is becoming more frequent as climate change becomes a more persistent issue. Black and brown disabled communities are at the heart of the groups, often overlooked during a climate crisis and often displaced from their support groups and at a higher risk for mortality during an event. Exploring the design of a resilient neighborhood that prioritizes these communities would set the framework for future development and prevention of disproportionate impact on them.

THE INVISIBLE NEIGHBORHOOD
DESIGNING FOR INTERSECTIONALITY

BY

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Thank you to everyone who helped me push through this journey. To my parents and friends who stayed up late nights listening to my rants and cries and still encouraged me to keep going. My parents are supportive no matter what I do and always tell me they are proud. And every teacher who encouraged me to change, adapt, grow, and, most importantly, learn from the past. My history is what shapes my future.

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Chapter 1: Communities in Danger

Black and brown communities are at a far greater risk than other ethnicities, particularly in the U.S., to have a disability and to be exposed to a climate disaster. Black and Indigenous people are more likely than any other ethnicity in the U.S. to have a disability (Figure 1), and this is due to the systemic racism and forced displacement that has happened to both groups over centuries.

Figure 1 Adults with Disabilities: Ethnicity & Race¹



Systemic Racism and Displacement

Black people in the U.S. have similar issues as their ancestors were forcibly removed from their homes and brought to the U.S. as enslaved people. Throughout the centuries since being brought here, the descendants have continuously endured systemic racism, displacement, and terrorism. Black Americans have the second highest rate of disability in the country, only behind

¹ CDC, "Disability and Health Overview | CDC," Centers for Disease Control and Prevention, September 15, 2020, <https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html>.

indigenous populations. Due to redlining and several other systemic pressures, they are among the most at risk for health problems and displacement due to climate change.

Between the 1930s and late 1960s, redlining became highly utilized in the United States to segregate and disenfranchise different ethnic groups. It most notably affected black people, who were forced into undesirable areas. It came into effect during the great depression when many people needed loans to buy homes, and the government backed these loans. Homeowner's Loan Cooperation (HOLC) maps were created to determine the loan risk of neighborhoods within a city.² Insurers wanted the lowest risk areas within these maps to insure. Maps were color-coded: green- the best, blue- still desirable, yellow- declining, and red- hazardous.³

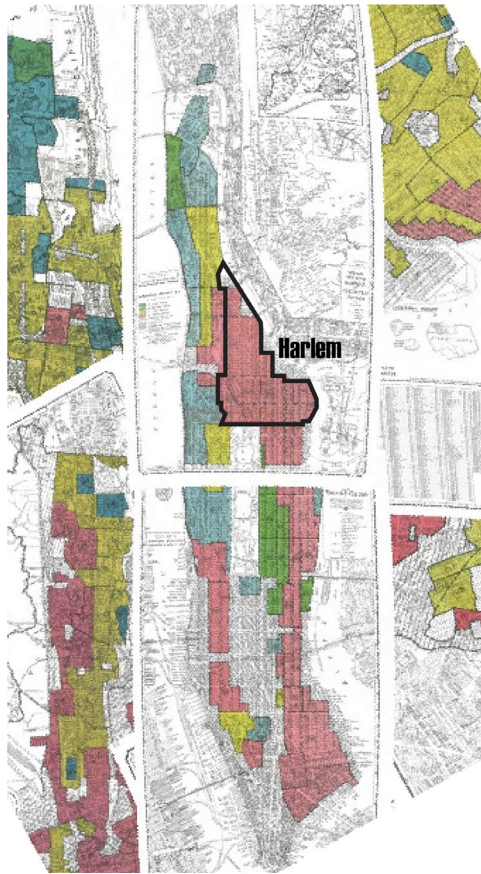
Many redlined areas had a majority or all black and brown populations. Without the ability to receive loans from insurers, black people were limited to certain city regions, and it removed the ability to grow generational wealth through property, as most black Americans were forced to rent.

Famous neighborhoods in New York City were redlined early on and are still facing the consequences of it (Figure 2). These communities were and continue to be heavily policed compared to their non-redlined counterparts. While these discriminatory practices may have been made illegal in the late 1960s, many still feel its effect today.

² "Redlining," LII / Legal Information Institute, accessed March 17, 2023, <https://www.law.cornell.edu/wex/redlining>.

³ "Mapping Inequality," accessed May 21, 2023, <https://dsl.richmond.edu/panorama/redlining/>.

Figure 2 Manhattan Redline Map⁴



Today, many black Americans live primarily in neighborhoods deemed undesirable and unworthy of investment. This results in poorer areas due to a high number of rented properties. When no one owns homes in a neighborhood, the property taxes are low, allowing very little investment into the community. It also virtually leaves those who live there in a constant cycle of needing resources, but we don't have them, and the only way to get them is to invest in the neighborhood with those same resources.

Black neighborhoods within a city are also more likely to feel the effect of climate change. Many of these neighborhoods lack adequate tree coverage, making the redlined neighborhood as

⁴ "Mapping Inequality."

much as 5 degrees warmer than a non-redlined neighborhood.⁵ Climate Change also brings more heatwaves for extended periods, making people in these neighborhoods more likely to have heat stroke, amongst other heat-related issues.⁶ This also comes with a mental health toll as well. As more intense hurricanes sweep the East Coast, many minority neighborhoods experience excessive flooding and less resilient infrastructure than their white counterparts.⁷ This leads to a higher risk for depression, anxiety, and PTSD. For example, black survivors of Hurricane Katrina had a much higher risk of having depression and PTSD than white survivors.⁸

Black and brown individuals are also far more likely to live in proximity to significant polluters, causing them to have bad air quality. Cancer Alley in Louisiana is an excellent example of this problem. Cancer Alley is a strip of the Mississippi River between Baton Rouge and New Orleans, consisting of more than 320 toxic chemical plants. (Figure 3) Most of the towns and cities that border the river are black communities that settled their post-civil war. The toxins are known to give people various forms of cancer, asthma, kidney failure, etc.⁹ Some people on this strip of the river have 30 plants within a 10-mile radius of their homes. This area has the worst air quality in the U.S. and is home to some of the largest congregations of Black Americans.

⁵ “Past Racist ‘Redlining’ Practices Increased Climate Burden on Minority Neighborhoods - Scientific American,” accessed March 17, 2023, <https://www.scientificamerican.com/article/past-racist-redlining-practices-increased-climate-burden-on-minority-neighborhoods/>.

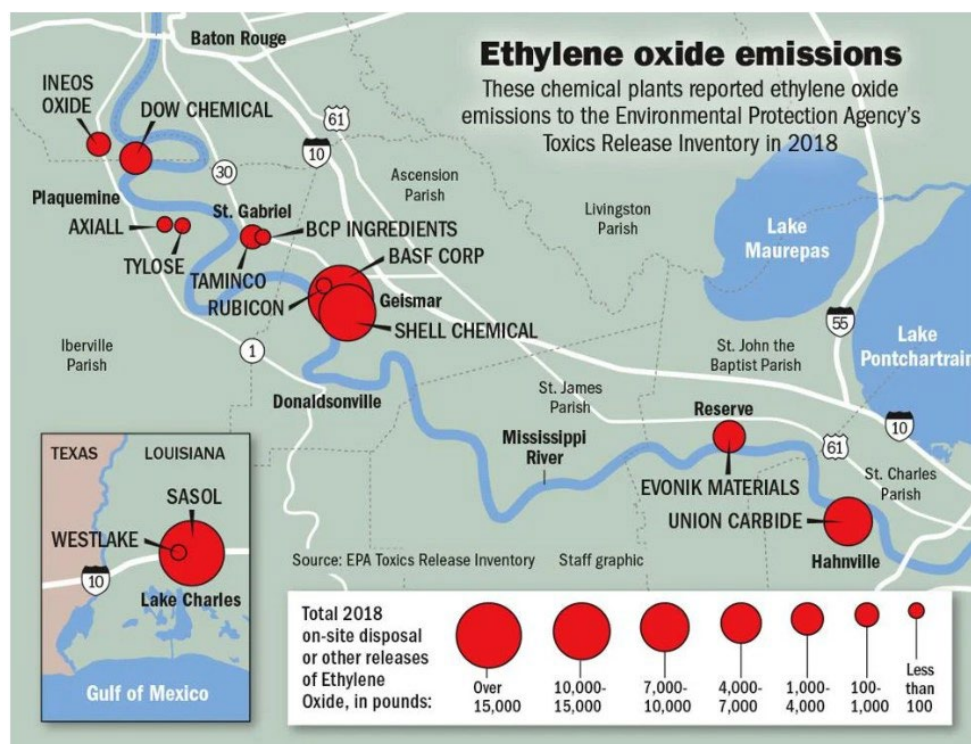
⁶ “Past Racist ‘Redlining’ Practices Increased Climate Burden on Minority Neighborhoods - Scientific American.”

⁷ Alique G. Berberian, David J. X. Gonzalez, and Lara J. Cushing, “Racial Disparities in Climate Change-Related Health Effects in the United States,” *Current Environmental Health Reports* 9, no. 3 (2022): 451–64, <https://doi.org/10.1007/s40572-022-00360-w>.

⁸ Berberian, Gonzalez, and Cushing.

⁹ Polluter’s Paradise, “Welcome to ‘Cancer Alley,’ Where Toxic Air Is About to Get Worse,” ProPublica, October 30, 2019, <https://www.propublica.org/article/welcome-to-cancer-alley-where-toxic-air-is-about-to-get-worse>.

Figure 3 Cancer Alley Louisiana¹⁰



Black and brown disabled individuals are the intersection of issues facing both sides. As those with disabilities often live in lower-income neighborhoods adjacent to potentially toxic environments. They are also at more risk of having fewer economic outlets as there are higher rates of unemployed and disabled people.¹¹ Coupled with an increased risk of unemployment for black and brown people, many at the intersection find themselves with very little income beyond government assistance, which is very scarce for most disabled people.

¹⁰ HALLE PARKER and GORDON RUSSELL | Staff writers, "Louisiana Chemical Corridor Is the Country's Largest Hot Spot for Toxic Air, Cancer Risk," NOLA.com, November 5, 2021, https://www.nola.com/news/environment/louisiana-chemical-corridor-is-the-countrys-largest-hot-spot-for-toxic-air-cancer-risk/article_852d98d0-3d81-11ec-a61f-0bf8e82339a8.html.

¹¹ Alyssa Gutnik and Maria Roth, "Disability and Climate Change: How Climate-Related Hazards Increase Vulnerabilities among the Most at Risk Populations and the Necessary Convergence of Inclusive Disaster Risk Reduction and Climate Change Adaptation," *Humanity & Inclusion / Operations Division*, n.d., 62.

Inaccess to Information

Countries and states have emergency response plans for when an emergency occurs. However, a lot of these plans are not readily accessible to communities. And they are particularly not accessible. A 2004 study showed that emergency managers only had 16% of their preparedness materials in an accessible format.¹² When the information and the spaces where you would get more info are inaccessible, people tend only to receive it if they are present. Even in cases where plans might be more readily available, there is minimal discussion within those plans on what to do as a disabled person during a crisis.

Conversations surrounding emergency preparedness don't take place often in lower-income neighborhoods. Black and Brown disabled people are often within devalued areas that are typically less accessible and may have low public preparedness plans when considering the flexibility of people in valued neighborhoods with more wealth who have the time to engage with neighbors regarding emergency plans.

Exclusion from Solutions

Access to information is needed to ensure how solutions are made as well. Many black, indigenous, and disabled populations are often left out of the conversation about how we solve the climate change problem. The communities most affected by the issues not being involved in the solution doesn't make sense. It is solving a theoretical concern at that point because the answers aren't tangible to people who can use them. For example, one of the many ways people are trying to reduce pollution is by using biodegradable paper straws. However, this solution is inaccessible as the straw melts, making it hard for anyone, especially if you need it to eat or drink. Including

¹² "Impact | Volume 20, Number 1 | Including People with Disabilities in Emergency Planning: How Are We Doing?," accessed March 17, 2023, <https://publications.ici.umn.edu/impact/20-1/including-people-with-disabilities-in-emergency-planning-how-are-we-doing>.

communities at the intersection of minority groups increases the odds that the solution created is accessible and works towards solving the issue.

Chapter 2: What is Disability?

How is disability defined? Disability has various definitions across many boards. It has a legal definition, but that may not encompass all the pieces of what it means to be disabled. This goes into the medical model vs. the social model of Disability. The medical model treats disabled people and their disability as only a medical issue.

In contrast, the social model considers the social ideals and systematic interventions that influence disabled people. Both models, however, sometimes need more insight into the other; in most cases, the medical model severely needs to influence the social model. The medical model doesn't consider the built environment, societal impact, and limitations/inaccessibility. (Figure 4) This changes how disability is defined in the public eye. Disability can be defined in numerous ways, but it must be determined by those who identify as having a disability, as they are the ones who understand the full extent of disability.

Figure 4 Social vs. Medical Model



Medical Model Definition

The Medical model of Disability states that people are only considered disabled by their impairments or differences. This model also implies that disability is an issue to be fixed and cured.¹³ The idea is construed in the way society discusses disability and how it is defined universally. Through this lens, society often treats disabled people as if their disability is a personal issue, similar to a common cold, a problem to be fixed. However, having it is not a result of general public limiting factors.

The Americans with Disabilities Act (ADA) defines disability as “a person who has a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such an impairment, or a person who is perceived by others as having such an impairment.” The definition addresses some of the limitations that a disabled person might have but not the concept that they are limited by the inaccessible world designed around them. This definition also implies that the general public has to define someone as having a disability, i.e., being able to see a disability physically or being diagnosed. This doesn’t include those who may have invisible disabilities or cannot access a doctor for a diagnosis. Defining disability through this model furthers the “disability needs to be a fixed” concept because you go to the doctor when there is a problem and want a solution. However, there is no solution to a disability; it isn’t something that needs to be fixed; it is an aspect of life.

Social Model Definition

The Social Model of Disability states that people are defined as disabled by how society is organized and the barriers created by that organization. It aims at removing those barriers from

¹³ “Social Model vs Medical Model of Disability,” *Disabilitynottinghamshire.Org.Uk* (blog), accessed March 11, 2023, <https://www.disabilitynottinghamshire.org.uk/index.php/about/social-model-vs-medical-model-of-disability/>.

everyday life.¹⁴ Hennekam presents the scenario of imagining you wake up one day and everyone can breathe underwater except for you. They can still live on land, and they have the additional ability to breathe underwater as well. This is fine, at first, because all significant life functions still occur on land where everyone can access them. Until they begin to move all these functions solely underwater. You are now considered disabled because the location of operations limits you. In this scenario, you could never breathe underwater, but when the rest of the world was fully accessible, it wasn't a problem.¹⁵ It only became a problem when the world changed; the way they were living made it inaccessible. Now, adaptations must be made for only you and solve problems that could have been avoided (Figure 5).

¹⁴ "Social Model vs Medical Model of Disability."

¹⁵ *Am I Disabled?*, TikTok, 2021, <https://www.tiktok.com/t/ZTR7ynjAg/>.

Figure 5 Social Model of Disability¹⁶



This concept in our context is a bit more complex, but the principles still hold that the limiting notions of society define disability. This also implies that the definition of disability is changing within society. Early Indigenous communities also recognized the social model. In many histories regarding North American indigenous people, the concept of disability, in the way today's society may define it, didn't exist because someone was only considered disabled if they were not an active part of their community.¹⁷ You could be an active part of the community by participating, meaning there was space for those with disabilities to grow within their communities. This exposed various communication techniques and skills to everyone within that community.

¹⁶ "Figure 2. Social Model of Disability (Diagram Adapted From...," ResearchGate, accessed April 19, 2023, https://www.researchgate.net/figure/Social-Model-of-Disability-diagram-adapted-from-wwwsalto-youthnet_fig1_320700392.

¹⁷ Kim E. Nielsen, *A Disability History of the United States*, Paperback edition, Revisioning American History (Boston: Beacon Press, 2012), 3.

The social model allows the world to fully encompass the broad spectrum of disabilities that exist while still acknowledging the background of why they are considered disabled in this world. The fact is that people will be disabled whether they are labeled disabled or not. However, whether the willingness of society to acknowledge that someone is disabled or not determines how they will interact and be treated.

Comprehensive Definition

Disability is ever-growing and adapting based on the way society is organized. Disabled people will exist regardless of whether they are described as disabled or not because it is an ever-changing label.¹⁸ It is based on the existing societal barriers and not solely on what capabilities one person may not have. However, much of the data collected by the general public does not define disability in this way; instead, they use the medical model to define disability as an impairment, making certain activities difficult for a person.¹⁹

For this thesis, the best definition of Disability is:

Ability and Disability may be in part about the physical state of the body. Still, they are also produced by the relative flexibility or rigidity of the built world, its capacity to bend or adapt in a dance with bodies in a range of states and stages. Disability, in part, results when the shape of the world-building and streets but also institutions, cultural organizations, and centers of power- operates rigidly, with a brittle and scripted sense of what the body does or does not do, how it moves and organizes its world²⁰

¹⁸ Alice Wong, ed., *Disability Visibility: First Person Stories from the Twenty-First Century* (Vintage Books, 2020).

¹⁹ CDC, "Disability and Health Overview | CDC."

²⁰ Sara Hendren, *What Can a Body Do? How We Meet the Built World*, First hardcover (New York: Riverhead Books, 2020), 14.

This definition considers the limiting factors of the modern world that may affect our perception of disability. It acknowledges that it may have some components of the physical state of bodies. It addresses how people may identify themselves as disabled based on their own experiences with society.

It is also important to acknowledge the definition of disability regarding the intersection of race and disability. At the same time, it is noted that disability is defined by societal limitations both by the built environment and context of society. We must address the idea that this is true when looking at race. The organization is designed to exclude and disenfranchise certain races and people from living fully in society. Putting them more at risk if they are at the intersection of race and disability to be judged and deemed a certain way by society in at least two manners, if not more. If one is already deemed a threat or unwanted by society in both of these retrospects, one may be considered a deviant in the eyes of society.

Chapter 3: Biggest Crisis Attacking These Communities

Black populations are even more disenfranchised when you look at the intersection between race and disability. Disability is defined as the societal barriers making the world inaccessible, but some of those barriers impact black and brown communities. The proximity to being in devalued neighborhoods makes one susceptible to climate-related consequences and disasters. They are already exposed to more significant health issues, but climate disasters might exasperate these issues by not being accessible or putting people at further risk by being in toxic locations.

Heatwaves

Heatwaves are becoming increasingly more of a crisis in recent years due to climate change. Many older cities must prepare for heat waves that rage across the city during those peak summer months. In 2019, two heat waves that hit France killed nearly 1,500 people.²¹ In Paris, temperatures reached up to 108.7°F. France has many older homes and buildings, especially in major cities like Paris. With the lack of air conditioning and circulation, more people will likely experience heat-exacerbated deaths.

Heatwaves tend to affect black and brown communities located in cities more than other communities based on the location of those neighborhoods. Most low-income neighborhoods tend to have less tree coverage, no sidewalks, and are less likely to have working air conditioning. Black people are 40% more likely to live in areas with the highest projected increase in temperature. While Hispanic people are 43% more likely to live in areas with the highest projected increase in temperature.²² In addition to that, Hispanic people are more involved in heat/weather-exposed industries.²³ Most of these neighborhoods comprise black and brown communities. Black and brown communities are more at risk of cardiovascular issues, asthma, and kidney failure. This puts them at higher risk for death during a heat wave. Many of these communities may also work multiple jobs with long hours within their neighborhoods. So, the heat conditions continue to affect them at their place of business as well.

²¹ “Summer Heat Killed Nearly 1,500 in France, Officials Say,” *BBC News*, September 8, 2019, sec. Europe, <https://www.bbc.com/news/world-europe-49628275>.

²² OA US EPA, “EPA Report Shows Disproportionate Impacts of Climate Change on Socially Vulnerable Populations in the United States,” News Release, September 2, 2021, <https://www.epa.gov/newsreleases/epa-report-shows-disproportionate-impacts-climate-change-socially-vulnerable>.

²³ US EPA.

Heatwaves affect these communities more because of the general location of black and Hispanic people within a city. Many major cities are still segregated due to redlining, as discussed before. This leads to drastic heat disparities within the city. Many redlined neighborhoods were grounds for less green spaces and more paved areas. Many planners saw the redlined spaces as cheap places to put large warehouses, highways, and public housing.²⁴ All of these lead to more paved areas, specifically asphalt, which absorbs heat. This is compared to the white, non-redlined neighborhoods with abundant green spaces and parks as public amenities. This is seen best in cities like New York City, where neighborhoods near Central Park can range in temperatures from 80°F to 82°F but Lower Bronx and Upper Manhattan range from 88°F to 89°F at the same time.²⁵ (Figure 6) The drastic difference that also causes heat disparities is the amount of tree coverage in various neighborhoods within the city. East Harlem has 2,401 trees, while its directly south counterpart neighborhood, the Upper East Side, has 4,103 trees.²⁶ (Figure 7)

²⁴ Brad Plumer, Nadja Popovich, and Brian Palmer, “How Decades of Racist Housing Policy Left Neighborhoods Sweltering,” *The New York Times*, August 24, 2020, sec. Climate, <https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html>.

²⁵ “NYC Heat Mapping Study Finds Higher Temps in Lower-Income Neighborhoods | Environmental Justice & Climate Just Cities Network,” accessed May 21, 2023, <https://justicenetwork.climate.columbia.edu/news/nyc-heat-mapping-study-finds-higher-temps-lower-income-neighborhoods>.

²⁶ “NYC Tree Map,” NYC Parks, accessed May 10, 2023, <https://tree-map.nycgovparks.org/>.

Figure 6 Heat Disparities

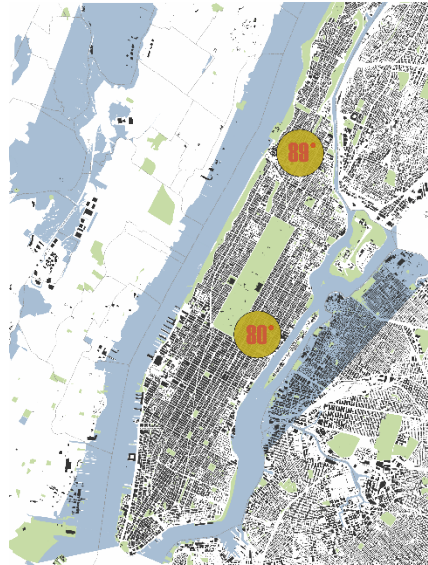
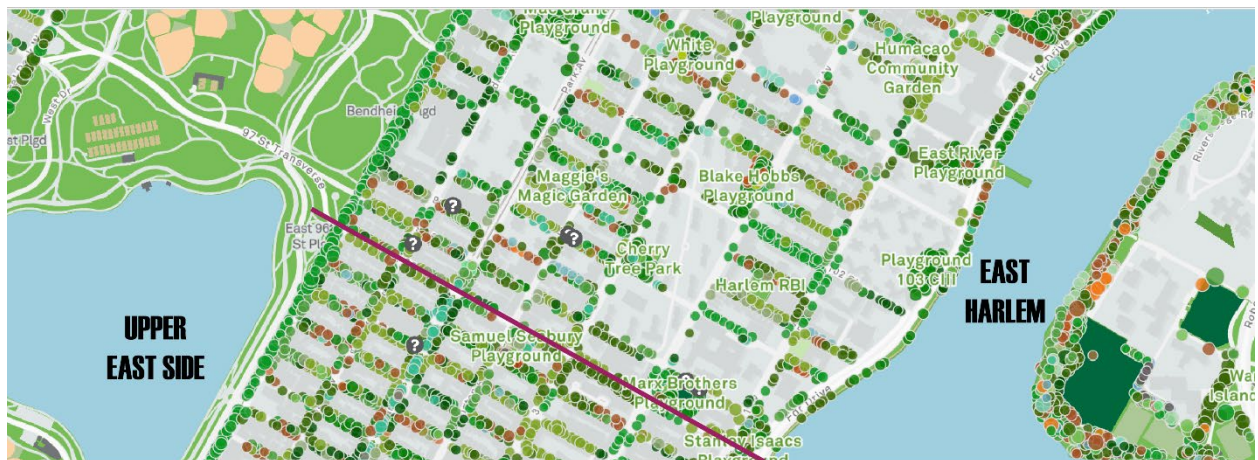


Figure 7 Tree Coverage²⁷



Major heat wave events disproportionately affecting black and brown communities are not accurately recorded. When there is a national heat wave, it is talked about regionally rather than displaying the direct communities being attacked. In 2021, during the June heat wave that spread across most of the west coast, many agricultural workers fought for better working conditions.

²⁷ "NYC Tree Map."

They worked long hours, exposed to higher temperatures, for longer than most. While also being expected to perform strenuous physical activity and creating more of the health concerns discussed previously.

In addition to health concerns (cardiovascular, etc.), heat exposure can bring anxiety, depression, and increased stress. It can also be triggering for some people as they may not have immediate healthcare access. Black and brown disabled individuals are already at risk based on their location in low-income neighborhoods. Their mortality rate also increases because they lack proximity to formal hospitals with the adequate amount of care one might need.

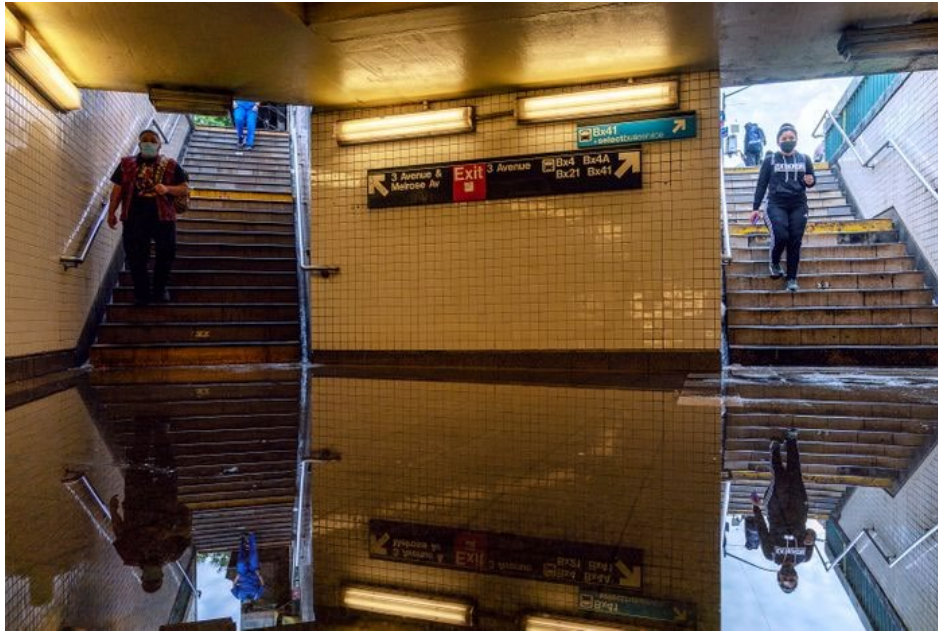
Flooding

Flooding from increased heavy rainfall and hurricanes on the East Coast heavily impact black and brown communities. Typically, the response is slow and not fully equipped during these events. Many emergency precautions and plans don't consider disabled individuals and the resources they may need. The neighborhoods many black and brown people have congregated in seem to get hit the most by the catastrophe. Similar to the issue with heatwaves, many black and brown neighborhoods consist of non-porous materials making them more susceptible to flooding in their neighborhoods. As hurricanes are more likely to occur in the future, it is essential to watch these communities. New York City is one coastal city most at risk in the future to suffer the consequences of rising hurricanes. If a category four hurricane were to hit NYC, surge level could reach up to 21ft at the LaGuardia airport and 31 ft at the Lincoln Tunnel.²⁸ While this is an infrequent occurrence today, it is becoming more of a reality as the city is unprepared for the surge levels that might follow that hurricane level. Last summer Hurricane Ida left heavy rainfall in the

²⁸ Jessica Romeo, "New York City, Underwater," JSTOR Daily, October 6, 2021, <https://daily.jstor.org/new-york-city-underwater/>.

city, flooding many subway stations and streets, especially in coastal and lower-income neighborhoods like Washington Heights.²⁹ (Figure 8)

Figure 8 Flooded Subway Station³⁰



Hurricane Katrina- New Orleans

Hurricane Katrina took place in the late summer of 2005. The storm started as a tropical depression in the Bahamas on August 23rd, 2005, with around 85 mph winds. Over the next six days, the storm gained traction and became a Category 5 Hurricane with more than 170 mph winds.³¹ Throughout this time, it traveled on the Southeast coast of the United States and crossed the Mississippi River. The initial impact of the Hurricane on August 29th missed New Orleans, Louisiana; however, the results of the rain gravely impacted the city.

²⁹ Clio Chang, “We’ve Surrendered the Subway to the Flood,” Curbed, July 19, 2022, <https://www.curbed.com/2022/07/new-york-city-subway-floods-again.html>.

³⁰ Chang.

³¹ “Hurricane Katrina | Deaths, Damage, & Facts | Britannica,” March 27, 2023, <https://www.britannica.com/event/Hurricane-Katrina>.

New Orleans is a predominantly black city between two water sources, the Mississippi River and Lake Pontchartrain, with an emergency canal surrounding it. The river and lake are supported by levees which were 23ft and 17 ft (Figure 9). Much of the city is below sea level as a result.³² When the hurricane reached the New Orleans area, it directly impacted the Plaquemines Parish, which is 45 miles outside of the city. However, the rain from the storm overwhelmed the two levees, and they broke, pulling in all the water from the lake and river as well as the storm. As a result, 80% of New Orleans was underwater.

Figure 9 New Orleans Levees



Although many 1.2 million people evacuated the city the day before, hundreds of thousands did not. Their homes were fully flooded, resulting in people being rescued from roofs and attics. Many waded through the water to seek shelter in large community areas, including the Louisiana Superdome. Much of the damage was due to poor infrastructure and flood area determination. The

³² *Memorable TV Moments: Hurricane Katrina*, 2012, <https://www.youtube.com/watch?v=RD0-dvQfARK>.

levees were not tall enough in some areas, and some floodgates didn't close in time to prevent the water from rushing into the city. FEMA had not determined some areas as flood zones even though they frequently flooded. Many did not get flood insurance for their homes, leading to higher damage costs.³³

Emergency Planning was also a significant issue when looking at Hurricane Katrina. Especially looking at those with disabilities. It is estimated that 155,000 disabled people over 5 were in the major cities hit by Hurricane Katrina. The national council of Disability, which studied the effects of Katrina on the disabled communities, defined disability as:

Compounded by chronic health conditions and functional impairments... [which includes] people who are blind, people who are deaf, people who use wheelchairs, canes, walkers, crutches, people with service animals, and people with mental health needs³⁴

Much of the emergency broadcast for evacuation and information regarding the storm's severity was done via TV. With no interpreters or other modes of communication, many had access to emergency plans. Even those who had dealt with this in the past and attempted to rely on cellphone information were left out because the wind knocked out most cellphone towers. Many neighborhoods were also low-income neighborhoods with poor infrastructure, and in 2005 many had limited tv and internet access.

Post-recovery efforts sparsely covered the damage done to the city. The impacts of people losing their homes and jobs were rarely covered. Many students with disabilities and systems in place were moved to other schools that may not have the resources to support them. Or in some

³³ "Hurricane Katrina | Deaths, Damage, & Facts | Britannica."

³⁴ "The Impact of Hurricanes Katrina and Rita on People with Disabilities: A Look Back and Remaining Challenges," April 14, 2015, <https://ncd.gov/>.

cases, they have been denied their accommodations because they didn't have paperwork, which they may have abandoned during their evacuation. The loss of paperwork also impacted medical needs. Post-hurricane, many with access to Medicaid did not have their paperwork and lost that access. Many shelters lacked medical supplies and adequate care. Many shelters were understaffed and/or had professionals unsure if they could provide care due to HIPAA.

Hurricane Katrina also had a significant impact on the mental health of the residents of New Orleans. Many residents reported having higher anxiety, depression, and substance abuse due to losing their city's social and built support network. The loss of their healthcare and access to education changed the environment people lived in. Many also had reports of Post Traumatic Stress Disorder; most people were unprepared for flooding and overwhelmed.³⁵ Hurricane Katrina gained national attention and some relief, but inadequate emergency preparedness and the lack of post-hurricane support impacted New Orleans residents for decades.

Hurricanes Maria and Irma

In September 2017, Puerto Rico and the Virgin Islands were hit back to back with Category 5 and 4 Hurricanes Irma and Maria, respectively. The aftermath of the hurricanes lasted for months and left many questioning the federal government's assistance. Puerto Rico is a U.S. territory, not a state. Therefore it lacks some of the essential functions of state infrastructure and supplies. Puerto Rico's poverty rate is higher than any state in the U.S.; 58% of Puerto Rican children live in poverty.³⁶ The island has a poor infrastructure with older cellphone towers, broken down bridges, broken roads, and reliant entirely on a fossil fuel energy system.

³⁵ "One Year after Katrina, More Is Known about Its Mental Health Effects," <https://www.apa.org>, accessed April 21, 2023, <https://www.apa.org/news/press/releases/2006/08/katrina>.

³⁶ "Hurricane Maria Exposed the U.S.'s Long Neglect of Puerto Rico | ACLU," *American Civil Liberties Union* (blog), December 8, 2017, <https://www.aclu.org/news/human-rights/hurricane-maria-exposed-uss-long-neglect-puerto-rico>.

The Hurricanes exasperated the problem Puerto Rico already had significantly. On September 7th, 2017, Hurricane Irma passed incredibly close to the island. The Category 5 storm winds caused power disruptions and water damage.³⁷ While trying to recover, they were hit directly by Category 4 Hurricane Maria. Due to it being almost immediately after Hurricane Irma and the island's already poor infrastructure, the storm caused an influx in wind tunnels, rain, and flash flooding.³⁸ The result is the power grid being wholly demolished, 43% of wastewater treatment plants inoperable, 40,000 landslides, 95% of cellular sites gone, and 97% of roads impassable.³⁹ (Figure 10) More than half of the emergency response plans in Puerto Rico didn't address support for children, older people, and those with disabilities. And with health centers already damaged, they could not properly care for those groups of people.

Figure 10 Damage from Hurricanes Irma and Maria⁴⁰



³⁷ 1776 Main Street Santa Monica and California 90401-3208, "Hurricanes Irma and Maria: Impact and Aftermath," accessed April 23, 2023, <https://www.rand.org/hsrd/hsoac/projects/puerto-rico-recovery/hurricanes-irma-and-maria.html>.

³⁸ Monica and California 90401-3208.

³⁹ Monica and California 90401-3208.

⁴⁰ A. B. C. News, "US Virgin Islands in Ruins from Hurricane Maria," ABC News, accessed April 23, 2023, <https://abcnews.go.com/International/us-virgin-islands-ruins-hurricane-maria/story?id=50178300>.

The immediate response from the federal government seemed to be great as it offered a massive expense to the island and its relief. However, poor organization and neglect of the island quickly led Puerto Ricans to feel invalidated by the U.S. government and the people of the U.S. While FEMA was tasked with providing relief for the island, they were also charged with providing relief for the central U.S. land as they were hit by Hurricane Harvey a few weeks before Hurricane Irma. While the rest of the U.S. recovered, two months after Irma and Maria came, Puerto Ricans felt like the hurricane had just hit the day before. The island had deployed FEMA workers but not the right supplies to support the broken infrastructure to access hurricane victims. They had also deployed millions of water bottles, but only a fraction made it to the victims. While many government officials, including the president at the time, called the response to the hurricanes a success, the death toll during and in the six months after rose to 3,000. The issue that occurred 12 years earlier during Katrina happened again in Puerto Rico. Government response and dedication to the catastrophic event were horrendous, leading to many deaths and leaving an island still recovering today.

Chapter 4: Climate Prevention and Protection Around the World

With the growing number of climatic issues, many cities address the issue in several ways. This chapter will discuss the different climate prevention and protection techniques applied at the city, neighborhood, and block levels. There are multiple ways to address vulnerable communities' concerns about the growing world around them.

City Level: New Orleans

As discussed in the previous chapter, Hurricane Katrina caused significant damage to New Orleans, Louisiana. The damage was from failed infrastructure, communication systems, and evacuation routes. Looking at the present day, it is essential to see how the city addressed these

issues so they don't have this enormous catastrophe again. Katrina caused more than \$100 billion in damages. Some of the problems have been addressed, but some are still failing.

The city's biggest concern was fixing the failed levee system that was the root of the flooding in 2005. The city spent \$14 billion to fortify its levee and floodgate system.⁴¹ Since Hurricane Katrina, there has not been a forceful hurricane to test the levee system until Hurricane Ida in 2021. The system seemed to stand up well for New Orleans, but much of the water that didn't go to the city went into neighboring towns, heavily flooding them. So while the system may have technically worked better for the citizens of New Orleans, it inadvertently damaged and had the same effect on a suburb of New Orleans called Laplace. They had been requesting a levee system for years from the city and were hit by Ida during its construction.

The other major issue with New Orleans during Katrina was the communication and evacuation failures. The city took the time to revamp its communication and evacuation procedures. However, during Hurricane Ida, those were still very prevalent issues. Cellphone towers were still knocked out, which no one could control but didn't seem to be any backup mode of communication. The city also took the time to replan the evacuation routes to get the most vulnerable out in a reasonable amount of time. It includes evacuation locations with buses for people to load on during an emergency. However, the sites weren't set up during Hurricane Ida, and the highway wasn't shut down to evacuate people swiftly. The city says they did not have enough time and did not want to set it up if people weren't going to come, as it would waste time.

While many of their systems are still being fixed, New Orleans is an excellent example of changing infrastructure in the looming threat of climate disasters. Infrastructure at the city level is

⁴¹ A. B. C. News, "How New Orleans Handled Hurricane Ida after Post-Katrina Changes," ABC News, accessed April 23, 2023, <https://abcnews.go.com/US/orleans-handled-hurricane-ida-post-katrina/story?id=79743061>.

essential because it influences how neighborhoods and community centers respond to emergencies. It changes how information is spread.

Neighborhood Level: Kampung Admiralty

Singapore is one country at the most risk of facing the repercussions of climate change—specifically, hurricanes and Tsunamis because it is an island. Much of the architecture being built in Singapore addresses the growing concern over flooding in the future and how we protect those communities most vulnerable. Kampung admiralty is an excellent example of design for future risk and for a specific community.

Kampung Admiralty is not a sprawled-out neighborhood but a stacked neighborhood designed primarily for aging adults. In Malay, Kampung means village, which this project comprises. The building encompasses commercial, medical, education, housing, and care facilities in one design. The first two floors of the building are all commercial spaces. It includes shops, food stalls, a staging area, and access to the local train station through a pathway. The first floor also consists of the building's Eco Pond, which increases biodiversity but can serve as a bio-retention pond. The first and second floors only take up about half the floor square footage of the other floors, allowing the rest to be used as public amenity open space and lifting the rest of the building in case of emergency flooding. The third and fourth-floor floors comprise the building hospital. It includes medical offices and smaller clinics that may be useful to those living within the building to have immediate access. It is also helpful in an emergency as medical supplies are all centrally located within the same building so people can take shelter in their homes and still have access to care.

The fifth and sixth floors consist of the building's childcare center and anti-aging hub, a daily care facility for older adults who may need more assistance. Floors five and six also only

take up about half the floor in building space. The rest of the floors are dedicated to green terracing and farming. Roof farming allows those who live here to have another source of food within the neighborhood that they grew. They have a direct source and can also use it in an emergency. Floors 7-11 are the housing units. They are studio apartments with eight units on each floor, and there are two buildings. The entrances for the homes are in smaller corridors to promote relationships between neighborhoods and foster a sense of community.

Through designing for a specific population, Kampung Admiralty promotes the health and well-being of many Singapore citizens. Because it is a one-stop shop, many people who don't live in the building can also benefit from its resources. Someone who may work in the building can drop their child off, get the grocery shopping done and have doctor's appointments all in the same place. And in the case of a catastrophic event, they still have access to all the essential resources.

Figure 11 Kampung Admiralty



Block Level: Ko’Olauloa Community Center and Resilience Hub and FH Faunteroy

The Ko’Olauloa and FH Faunteroy Community centers are considered resilience hubs. They were identified by the Urban Sustainability Directors Network (USDN) as resilience hubs based on their criteria. The USDN describes Resilience Hubs as “Resilience Hubs are community-serving facilities augmented to support residents, coordinate communication, distribute resources, and reduce carbon pollution while enhancing the quality of life”⁴² These reliance hubs are spread out all over the country as an attempt to integrate community planning/design and climate resilience. USDN describes that they work in three parts: disruption and recovery daily.

The Ko’Olauloa Community Center and Resilience Hub will be in Oahu, Hawaii. The Community Center focuses on resilience from Tsunamis and Typhoons that might sweep onto the island damaging and putting at risk many people within the island. Many native Hawaiians are already at risk because they are often displaced by mainland Americans entering their islands and destroying and taking their homes. Many could not afford to live in their native land, let alone withstand a sudden natural disruption. The center is different from the other Case studies mentioned as its creation and design directly worked with the residents in Ko’Olauloa. They were fully involved in the design process and worked with architects, +Lab.⁴³ The Center is comprised of about three floors dispersed between two buildings. Surrounding the building are many forested areas with a stream to allow water flow during a tsunami to filter through biophilia. The site itself also has a bioretention pond located on it to assist with any runoff.

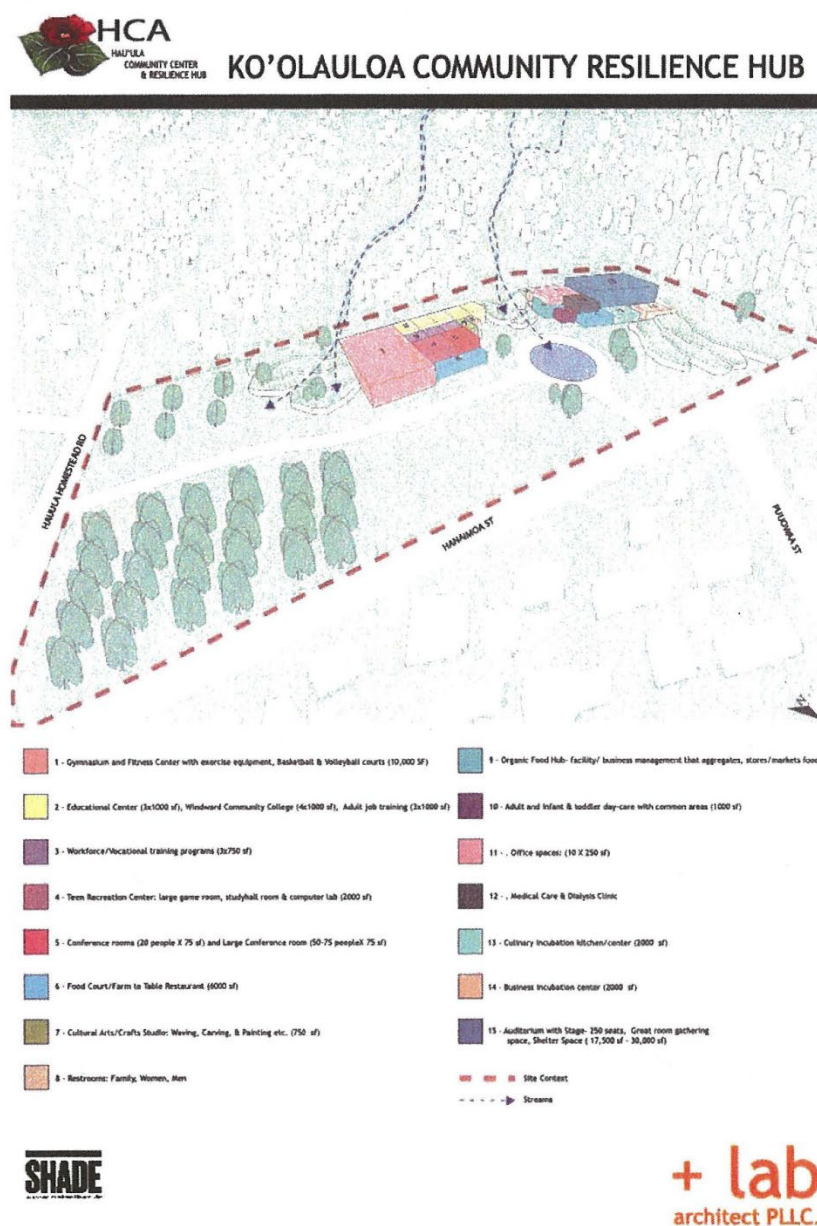
⁴² “What Are Hubs?,” *Resilience Hubs* (blog), July 5, 2019, <http://resilience-hub.org/what-are-hubs/>.

⁴³ “General 1,” +LAB architect, 1, accessed May 22, 2023, <https://www.pluslabglobal.com/wisdom>.

Every day of this community center, it has several different functions and abilities for the surrounding community. The center is around 87,285 sf within the two buildings; the building is about average. The center has several commercial, childcare/adult care, educational, and medical facilities. The medical center serves daily as a care clinic and dialysis center, making up about 2,000 sf. During a disruption, these spaces would be used to care for people hurt or needing medical assistance. The childcare/ adult care facilities are 1,000 sf. The center also has several educational spaces, including a community college and workforce development center comprising about 10,000 sf. Finally, the Ko'Olauloa community center has several commercial spaces making up the bulk of the square footage within the space, taking up 62,750 sf.⁴⁴ It includes an auditorium that transforms into a shelter space, recreational spaces, and arts areas. (Figure 12)

⁴⁴ Hui Hau'ula, "Land Design Form Ko'Olaulo Community Center and Resilience Hub," October 23, 2020.

Figure 12 Ko'Olauloa Community Center Program⁴⁵

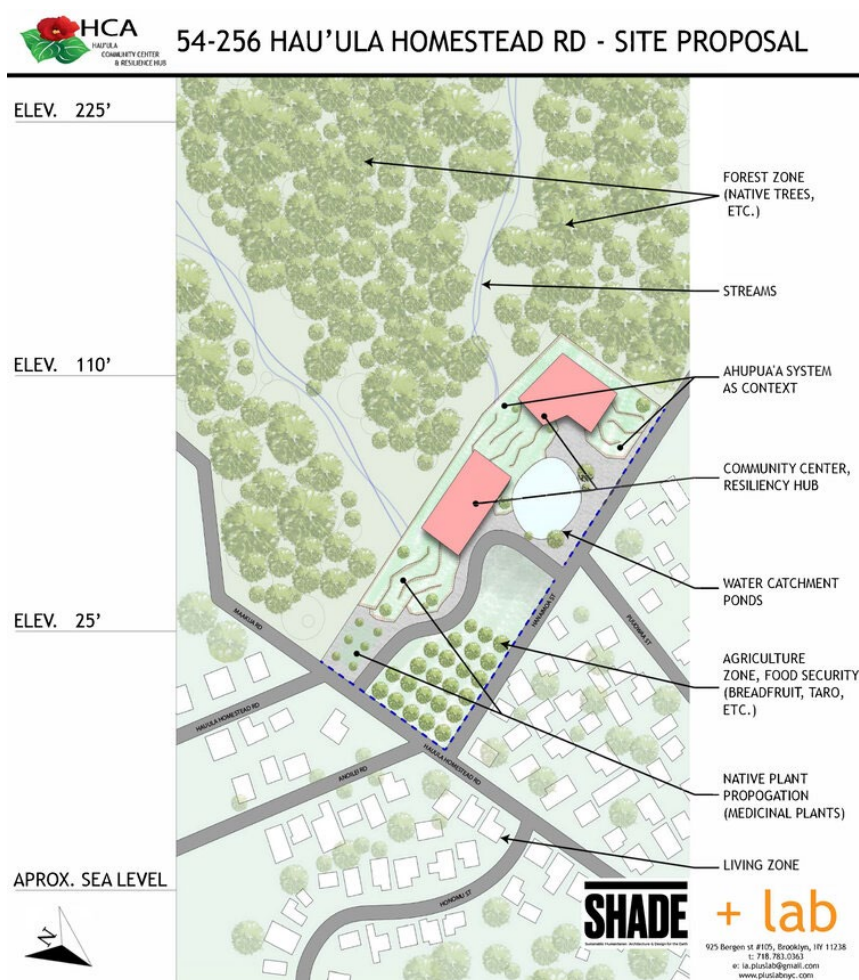


The site spoke to what the community needed and wanted. The site plan reveals the influence many native Hawaiians had on the design and ensuring their resiliency (Figure 13). The center on the exterior aimed not to remove any currently forested areas but rather to use them to

⁴⁵ Hau'ula.

aid the resilient nature of the space. They also implemented an agricultural zone to promote food security. One of the unique things about the site plan is the implementation of a space to grow medicinal plants that could support people on the island during a disruption, given that more of their medicine and food is imported.

Figure 13 Ka'Olauloa Site Plan⁴⁶



FH Faunteroy is a small community center in Washington, DC, specifically in the Deanwood neighborhood. Although this project is small, it is a major community center in the

⁴⁶ "SHADE-Ko'olauloa Community Resilience Hub," SHADE, accessed May 22, 2023, <http://www.shadegroup.org/koolauloa-community-resilience-hub-1>.

area. It is a small community center and cooling center/resilience hub during a heat wave or other disruptions. While FH Faunteroy says Community Center, Torti Gallas designed it as an adult enrichment center. (Figure 14) The center sits on the ground level of an apartment building called The Nannie Helen at 4800. It is 100% affordable housing with some commercial space and green on the lower level. While the community center may be the resilience hub, it is influenced by the building and supports its intended functionality.

Figure 14 FH Faunteroy Site Plan⁴⁷



The center is around 1,900 sf consisting of all commercial spaces. The commercial spaces include a broadcast studio, interview room, and kitchen. While the FH Faunteroy is very small, its spaces can also transform during a disruption center aims to become a cooling center in the city to assist in the summer with frequent heat waves. Their gathering spaces could be used as shelter and reduce exposure to the heat.

⁴⁷ A. Wash and Associates, "NHB_Hearing_100923," n.d.

Chapter 6: Site Selection and Analysis

Choosing a site for this project was a difficult task as there are many moving aspects, making the site location dependent on the type of climatic disaster as the focus. The ability for the project to be modular also aided as the project wanted to represent the best combination of the characteristics. An urban environment was crucial for this project as it represented the greatest number of black and brown populations most at risk. New York City was a great choice as it has a very public and pressing problem in heat-exacerbated deaths. The NYC mayor has addressed how racism and redlining played a role in creating the urban heat island effect within the city.

Scale of Reach

In addition to being climate resilient, this project encompasses resiliency in general, and the disinvestment and racism led to them being nonresilient today. The site analysis of this project covers several categories to select the most beneficial site. Those categories included the concentration of demographics, Income, Heat vulnerability index/ tree coverage, flood risk, and neighborhood involvement and assessment.

The Concentration of Demographics

When choosing between urban locations, looking at first, race and ethnicity demographics was essential. Black and brown populations are the focus of this project as they are the ones most at risk based on the decades of discriminatory practices discussed previously that contribute to their risk for higher heat-related deaths. When looking at this data within NYC, looking for neighborhoods with somewhere between a 50-50 or 40-60 split of black and Hispanic populations was the initial baseline of where to look within the city. It gave way to where these populations might gather and how they might overlap with other aspects, such as the redlining

maps of the 1930s. This led to concentrations within upper Manhattan, the Bronx, and lower Brooklyn.

Income

Income became crucial after finding the concentrations of the race and ethnicity demographics within the city. Many of the communities most at risk are those that are also low-income and black or Hispanic. Many current residents are multi-generational New Yorkers whose grandparents and great-grandparents bore the wrath of redlining, reducing their ability to create generational wealth. Often this leads to being caught in this neighborhood loop where your or your children have no way out due to being in the low-income bracket. So when income overlaps with the demographics, the sites narrow down with some narrowing leading to lower Bronx and upper Manhattan. Many places, such as Brooklyn, have gained wealth in recent years and, while still being affected by the heat, are less likely to die due to the heat disparities across the city. In NYC, low-income people are considered to have an annual income lower than \$58,000. This brings those neighborhoods with higher populations of black and brown people back into context.

Heat Vulnerability and Flood Risk

The primary climate disruption being looked at within this project is heat and heat waves that continue to rage across the U.S. The city of New York began to analyze the heat vulnerability of each neighborhood in 2018. (Figure 15) The map shows that many neighborhoods identified for their concentration of black and brown people and considered low-income the neighborhoods most at risk. The index uses a scale of 1 to 5 to determine vulnerability. One is the least amount of vulnerable, while five is the highest. In addition to the heat vulnerability index, tree coverage was also looked at. Green spaces and trees can drastically help reduce the neighborhood's heat-related

deaths. NYC has an interactive tree map that tracks every tree within the city and encourages people to report new trees being planted. The map includes the tree-specific type and its size. They helped narrow down to sites even further. When looking at tree coverage, the stark difference in neighborhoods is primarily a difference of 1000 or more. The communities with smaller tree coverage were Washington Heights, East Harlem, and Polo Grounds. And Mount Hope in the Bronx. In addition to the heat risk NYC is at risk of high-surge waters and flooding in the future. When considering the future, one must consider the present and how future applications might change it. There was also some consideration regarding flooding that went into site analysis. While flooding may not be the most significant risk regarding climate change consequences, it is something to be prepared for as the floodplains and hurricanes grow stronger. Many of these communities at risk for heat-related deaths are also at risk for flooding due to the same conditions as asphalt within their neighborhoods isn't very porous.

Figure 15 Heat Vulnerability Index Map⁴⁸

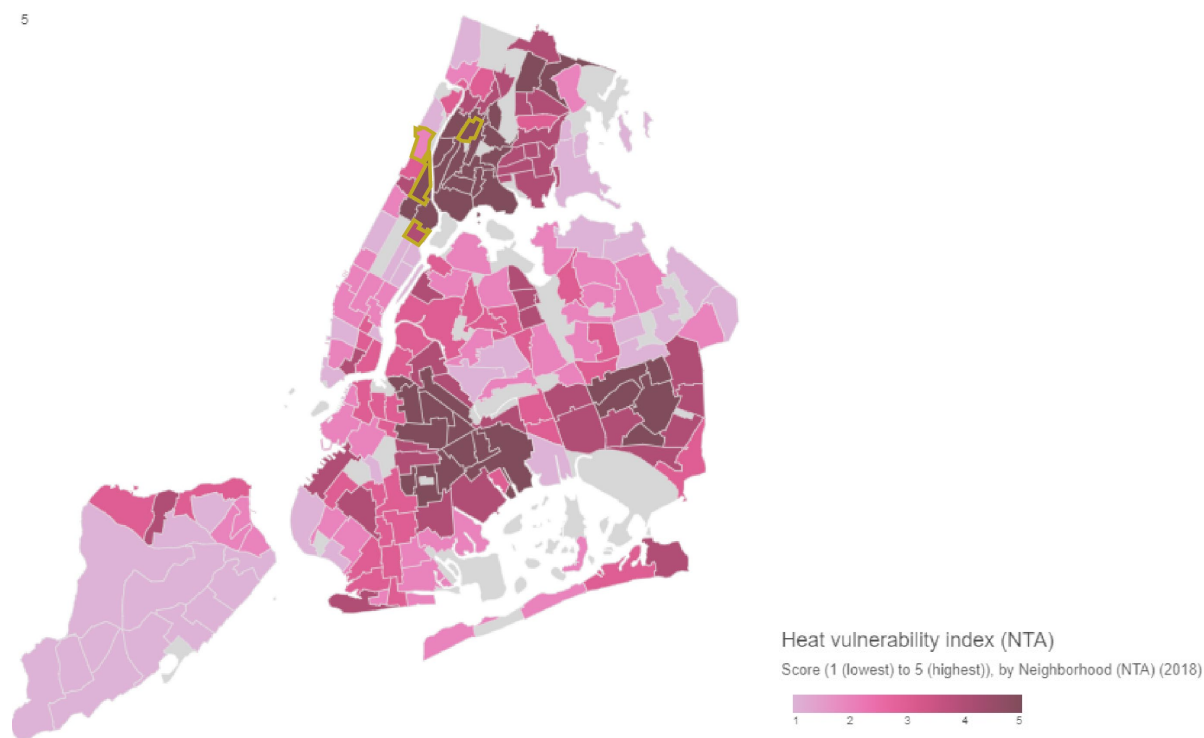


Figure 16 Tree Coverage Disparities⁴⁹



⁴⁸ “Interactive Heat Vulnerability Index.” Environment & Health Data Portal, accessed May 23, 2023, <https://a816-dohbsp.nyc.gov/IndicatorPublic/beta/key-topics/climatehealth/hvi/>.

⁴⁹ “NYC Tree Map.”

Site Analysis

After looking at the initial criteria, this narrowed the site locations to four areas—two in Northern Manhattan and two in the Bronx. The sites in Manhattan were in the East Harlem South and Central Harlem North/ Polo Grounds neighborhoods. These neighborhoods previously made up the historically black Harlem neighborhood in NYC. The Mount Hope/ Claremont- Bathgate and the Morrisiana neighborhoods were within the Bronx. The Morrisiana neighborhood is also a traditionally black neighborhood within the Bronx.

East Harlem

The East Harlem site is on Dr. Martin Luther King Jr. Blvd & 3rd Ave. The site is about 200 ft by 420 ft, around 84,000 SF. The East Harlem neighborhood's racial and ethnic makeup is 29% Black and 43% Hispanic. The Average annual income is \$41,341.⁵⁰ They have a heat vulnerability index of 4, the second-highest vulnerability.⁵¹ The neighborhood has a total of 4,179 trees, while the specific site has about 17 trees on site.⁵² While the site doesn't have much flood risk, it is located not too far from the Harlem River and could experience some of the surge flooding that could happen in the future.

The site is an empty lot within a heavy commercial district with some housing above the commercial area. Many areas within East Harlem have been rapidly gentrifying since the early 2000s.⁵³ This questions whether placing this project in this location will benefit long-term or newly moved residents. East Harlem has often been known as a prominent Latino area, which

⁵⁰ "Census Profile: NYC-Manhattan Community District 11--East Harlem PUMA, NY," Census Reporter, accessed May 23, 2023, <http://censusreporter.org/profiles/79500US3603804-nyc-manhattan-community-district-11-east-harlem-puma-ny/>.

⁵¹ "Interactive Heat Vulnerability Index."

⁵² "NYC Tree Map."

⁵³ Yesenia Barrios, "Gentrification in East Harlem Forcing Latino Community Out," *Latino Rebels* (blog), November 30, 2022, <https://www.latinorebels.com/2022/11/30/eastharlemgentrification/>.

has changed as they have been removed from their neighborhoods. Previously on this empty lot were a Pathmark grocery store and Rainbow Clothing Store. The subway runs directly across the street from the site running the 4, 5, and 6 lines with local and express stops at the station. The specialized medical clinic is located two blocks north from the site. And a housing complex called Wagner Houses is located two blocks southwest of the site. Spaces that you gain gather within the neighborhood are spare. There are no community centers or large banquet spaces. One school and several churches could be used to gather within the community. There is, however, a small playground/park located two blocks south. (Figure 18)

Figure 17 East Harlem Site



Figure 18 East Harlem Site Analysis



Central Harlem North/Polo Grounds

The Central Harlem North site is on W 147 St and Malcolm X Blvd. The site measures 200 ft by 640 ft, about 128,000 SF. Currently located in the proposed site location is the MTA Bus Depot. The neighborhood's racial and ethnic makeup is 44% Black and 27% Hispanic. The Average annual income is \$45,230.⁵⁴ They have a heat vulnerability index of 5 which is the highest vulnerability.⁵⁵ The neighborhood has a total of 4,196 trees, while the specific site has

⁵⁴ "Census Profile."

⁵⁵ "Interactive Heat Vulnerability Index."

about 29 trees on site.⁵⁶ The site has the highest flood risk out of all the proposed sites, located one block from the Harlem River. The flood risk is about 5ft.⁵⁷

Surrounding the site is mostly housing. There is a commercial corridor closest to the river; however, it is very slim. There are no local grocery stores within a 5 min walk. Most churches are within walking distance. The site has a metro station that serves the 3 train and is the last stop on the trains line and a local-only stop. One school near the site is the PS 200 James McCune Smith School. There is some smaller green space. The Frederick Johnson Recreational spaces include a tennis court and playground. These spaces are the only spaces for this primarily residential community to gather. This puts them at much risk during a heat wave as many of these buildings seem to be older and very tall apartment buildings making them harder to travel through during the summer. (Figure 20)

⁵⁶ “NYC Tree Map.”

⁵⁷ “Find Your Property’s Climate Risks - Homepage,” Risk Factor, accessed May 23, 2023, <https://riskfactor.com>.

Figure 19 Central Harlem North/ Polo Grounds Site



Figure 20 Central Harlem North/Polo Grounds Site Analysis



Mount Hope

The Mount Hope site is on E 175th & Webster Ave. (). The site measures 110 ft by 420 ft, about 46,299 SF. Currently located in the proposed site is primarily a parking area in an undeveloped commercial area. The site has a White Castle Restaurant and a Shell Gas Station. The neighborhood's racial and ethnic makeup is 26% Black and 67% Hispanic. The Average annual income is \$34,894.⁵⁸ They have a heat vulnerability index of 5.⁵⁹ The neighborhood has a total of 2,526 trees, while the specific site has about ten trees on site.⁶⁰ The site doesn't have a

⁵⁸ "Census Profile."

⁵⁹ "Interactive Heat Vulnerability Index."

⁶⁰ "NYC Tree Map."

flood risk, but part of the possible adjacent neighborhood being served does have a flood risk of about 3ft.

The surrounding area is primarily a commercial core. The site is split by the train tracks and the Cross Bronx Expressway that separate this area from some residential areas. There are some crossways. There is a large residential area to the west of the site. However, it sits on top of a large hill. All of the gathering spaces within a 5 min walk of the site are located on the other side of the train tracks. They include PS 058 School, a banquet hall, a library, and a community garden. There is a hospital located about a 3 min walk from the site. (Figure 22)

Figure 21 Mount Hope Site



Figure 22 Mount Hope Site Analysis



Site Selection

The leading candidate for site location is the Central Harlem North/Polo Grounds. While this area has a higher income, it is still well below the low-income line. A high quantity of residential buildings in the area needs to be served by spaces to gather in truly. With the lack of green spaces, this site is vulnerable during the summer. This currently provides the best area to address resiliency currently and in the future.

Figure 23 Key for Site Matrix

Key to Scoring		
Category	Most possible points	Notes
Race and Ethnicity	10	Black % makes up 5 of the point, Hispanic % makes up the other 5. The higher the number the higher the percentage.
Income	5	The higher the score the lower the income which is the criteria I am looking for
Heat Index	5	Each number relates to the heat index score because it is also out of 5. higher the score higher the vulnerability index.
Tree Coverage	4	The neighborhood's overalls number of trees receives 2 and the number of trees actually on the site receives 2. The lower amount of tree coverage the higher the score.
Flood risk	3	Based on possible feet of flooding on the site.
Possible Community gathering	5	The number of spaces within a 5 min walking radius to gather. The lower amount of spaces receive a higher score
Health Care Proximity	4	Walking distance to the nearest health care facility. The closer the walking distance the lower the score.
Total	36	

Figure 24 Site Matrix

Neighborhood	Race/ Ethnicity- 10		Income (Low Income for NYC \$58,000)- 5	Heat Index # - 5	Tree Coverage- 4		Flood Risk (100 year Flood risk) - 3	Possible Community Gathering Spaces- 5	Health Care Proximity- 4	Notes	Total
	Black Percentage	Hispanic Percentage			Neighborhood	Site					
East Harlem North	29%	43%	\$41,341	4	4,179	17	0 ft	5	3 min	Health care facility is not a general clinic	23
Central Harlem North/ Polo Grounds	3	4	3	4	1	1	0	5	2		
Mount Hope	44%	27%	\$45,230	5	4,196	29	5 ft	6	N/A	neighborhood being service is 3ft for flood	27.5
	4	3	2	5	1	0.5	3	4	5		
Mount Hope	26%	67%	\$34,894	5	2,526	10	0 ft	8	4 min	neighborhood being service is 3ft for flood	25
	3	5	4	5	2	2	1	2	1		

Chapter 5: Program

The Program for the invisible neighborhood was derived from a combination of precedent case studies as well as what the community the leading site candidate was missing. The priority when looking at the program was to also create the basics of the resiliency hub that could fit into the neighborhood while meeting those criteria. Which includes everyday disruption and recovery.

This project also has some macro scale pieces of replanning some of the surrounding area to get people to the site as best possible or allowing them to shelter in place with assistance from the center also contributed into program. The current program consists of 39,850 gross square footage.

Everyday Use

The everyday use of this center would include a general health care center. The health care clinic would be around 8,000 sf and service the neighborhood's lack of hospital or nay health care facility. Reducing their travel for basic everyday health needs. Ideally the center would also have a childcare facility of around 1,200 sf which serves about 1,200 preschool children. While there was a daycare not to far from the site it seemed to be fairly small so this would help serve the high number of young adults within the area. One thing that was in all of the case studies was an education component within the center. Specifically, this center would include a vocational training facility and some artist teaching studios.

The bulk of the center's use would come from its commercial use. This would make up for around 26,000 sf within the center. Included within could be an indoor gym, auditorium, meeting rooms, kitchen, and broadcast studio. Additionally, the center could have some outdoor recreational space including harvesting area for food and recreational gathering space. With this program the goal is to get people to want to come into the building with the various activities and amenity spaces to the neighborhood so during a disruption they see it as a safe space to come with many of their neighbors.

Figure 25 Program Diagram

INVISIBLE NEIGHBORHOOD					
NEW YORK CITY					
45,827					
Description		Quantity	SF per Unit	GSF	Notes
MEDICAL					
	CLINIC	1	8,000	8,000	
	TOTAL			8,000	
CHILDCARE & ADULT CARE					
	CHILD CARE FACILITY	1	1,200	1,200	
	TOTAL			1,200	
EDUCATION	WORKFORCE/VOCATIONAL TRAINING	2	1,500	3,000	
	ARTIST STUDIOS	2	800	1,600	
	TOTAL			4,600	
COMMERCIAL	GYM	1	7,050	7,050	
	MEETING ROOMS	10	300	3,000	
	BROADCAST STUDIO	4	1,000	4,000	
	KITCHEN	1	3,000	3,000	
	ADMIN SPACE	1	2,000	2,000	
	AUDITORIUM/ SHELTER SPACE	1	7,000	7,000	
	TOTAL			26,050	
TOTAL GSF				39,850	
NET SF				45,827	
CORE FACTOR				1.150	
OUTDOOR SPACE	STAGE/FLEXIBLE AREA	900			
	HARVESTING GARDEN	800			
	TOTAL	1,700			

During a Climate Disruption

During climate disruption many of these spaces will transform to support the community. The clinic can now support and prioritize those with heat-related issues or injuries due to flooding. They can also focus on getting medical supplies to those with predisposed medical concerns or disabilities. The broadcast studio is a source of information for the community as it can send

updates and proper warning systems. The auditorium and gym now serve as cooling centers and shelter spaces for those lacking air conditioners or central air systems allowing them also to be closer to the health care clinic if they need assistance. The meeting rooms and admin spaces can now become communications centers and charging stations. And with the industrial kitchen and harvesting garden, you can serve those who may not have access to food.

Chapter 7: Design Proposal

Final Site Selection and Analysis

When determining final site selection, doing more in-depth site analysis throughout the summer break was essential. This site analysis looked directly at the block character of each proposed site. This included looking at several block tops (Figure 26) within the area to determine which site was most vulnerable. It also included looking at building use (Figure 27) surrounding the area and the proximity of community centers and health centers near the site. Sites with more community centers may not need another one as they are already being serviced. Communities with hospitals or clinics in high quantities are not at high risk as they have emergency services that can assist in their needs during an emergency.

Figure 26 North Central Harlem Black Tops

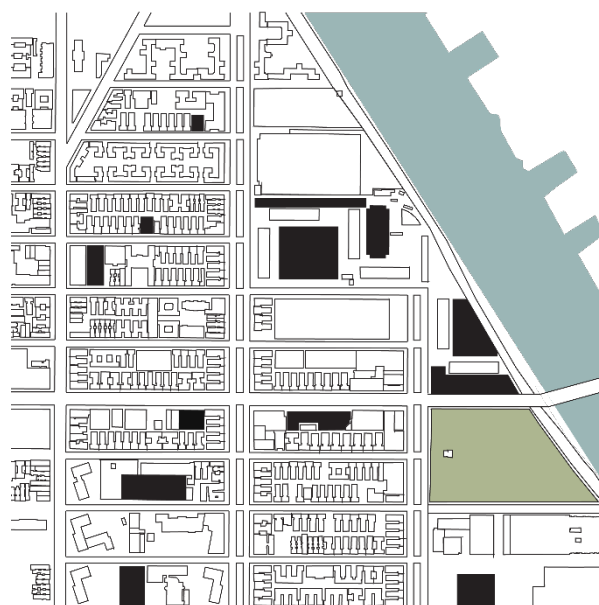
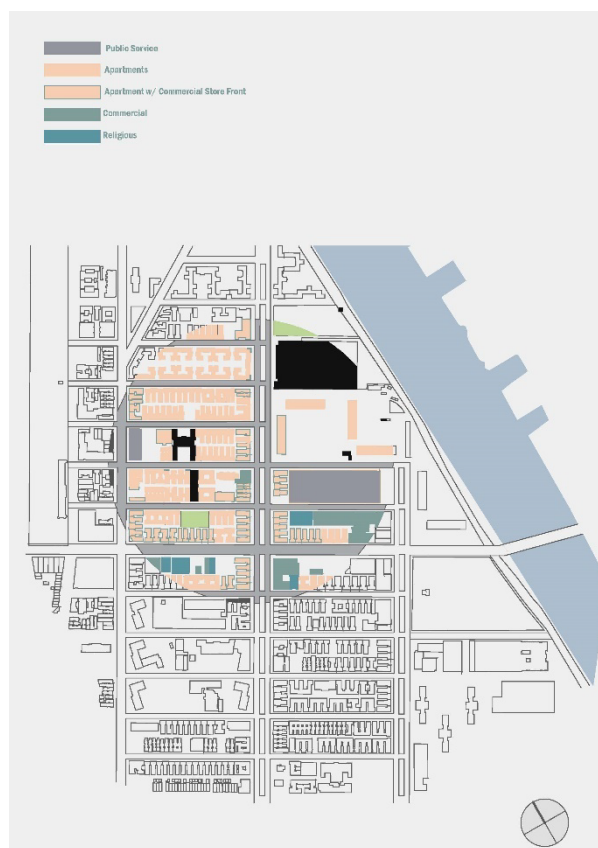


Figure 27 Central Harlem North Building Use



This led to the ultimate site decision of the North Central Harlem Site. The site is comprised of only one clinic in the neighborhood. Showing an apparent lack of healthcare options within the neighborhood. The only other hospital was closed over 15 years ago. The area also has a significant amount of housing surrounding it, allowing the center to prioritize the community's needs and become a living entity. While several community centers are within the area, they are smaller spaces dedicated to a specific task, such as sports. The area also has a commercial corridor (Figure 28) with a park nearby, allowing direct access to the site in an emergency. The neighborhood has many older apartments and buildings, most built before 1935 (Figure 29). It shows a lack of central air conditioning units, and after visiting the site, there is also a significant lack of in-window AC units. This area is highly vulnerable with the rising temperatures predicted before and the Harlem River located near the site.

Figure 28 Cultural and Commercial Corridor

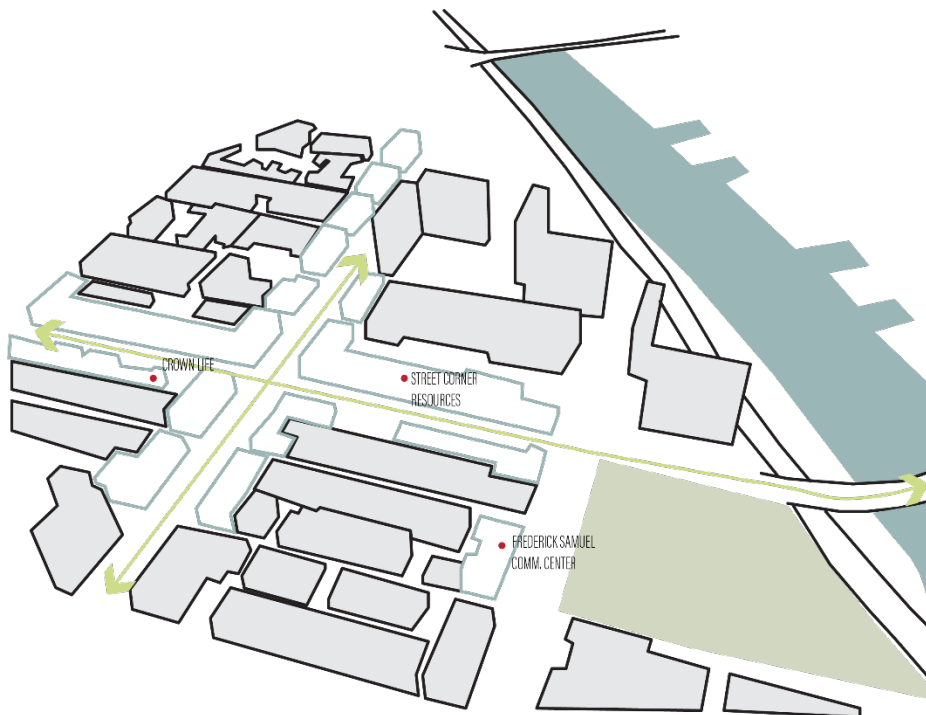
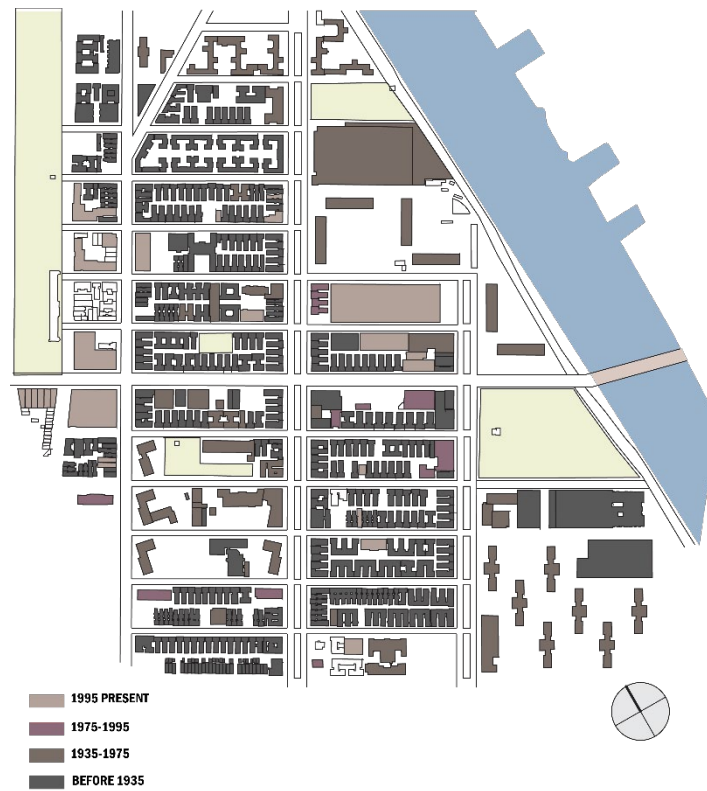
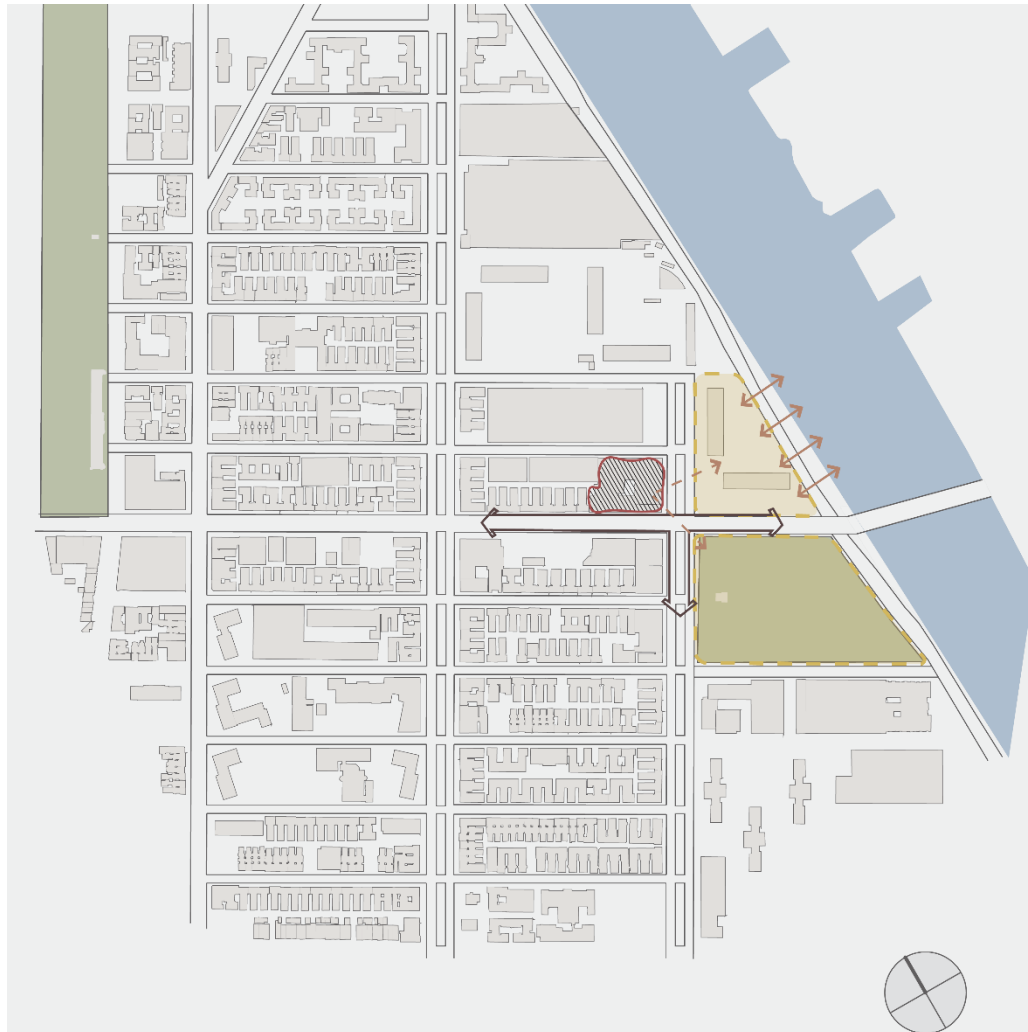


Figure 29 North Central Harlem Building Age



After determining which site to use, fitting the program to the site seemed appropriate as a starting design point. Some basic massing strategies showed that the initial site chosen was significant for the program. The bus depot held an almost 130,000 sq ft base lot coverage for an initial 45,000 sq ft program. This was seemingly unreasonable and needed to be adjusted. The best solution was to move the proposed project to one street south of the original site on the corner of W 145th Street and Malcolm X Blvd. This would give more direct access to the commercial corridor and link directly over the W 145th Street bridge connecting Manhattan to the Bronx. The site provided direct access to the baseball park and the metro stop across the street (Figure 30).

Figure 30 Site Strategy



Design Process

When looking at the newly proposed site, it was essential to start with new goals that reflected the research and history of the project. These goals were to Inform, Plan, Prioritize, and Respond. Inform is being able to inform the public on what to do during a crisis. Plan: Create a community plan involving the whole site and the center. Prioritize: putting the needs and concerns of a community already at risk first. Respond: provide a reliable space that provides during and after a crisis. These goals drove the overall design process.

The process started with two design schematics. The first scheme is called “The branch”. The scheme took advantage of the cultural corridor while directly connecting to the river (Figure 31). The shape aimed to gather residents from all directions of the community while still creating a public face. This also allowed some retail on the public side but a more private neighborhood towards the north. The plan prioritized the large public areas and administration on the first level. At the same time, smaller community spaces worked their way up the building, with housing taking up the additional upper levels (Figure 32).

Figure 31 The Branch Conceptual Drawing

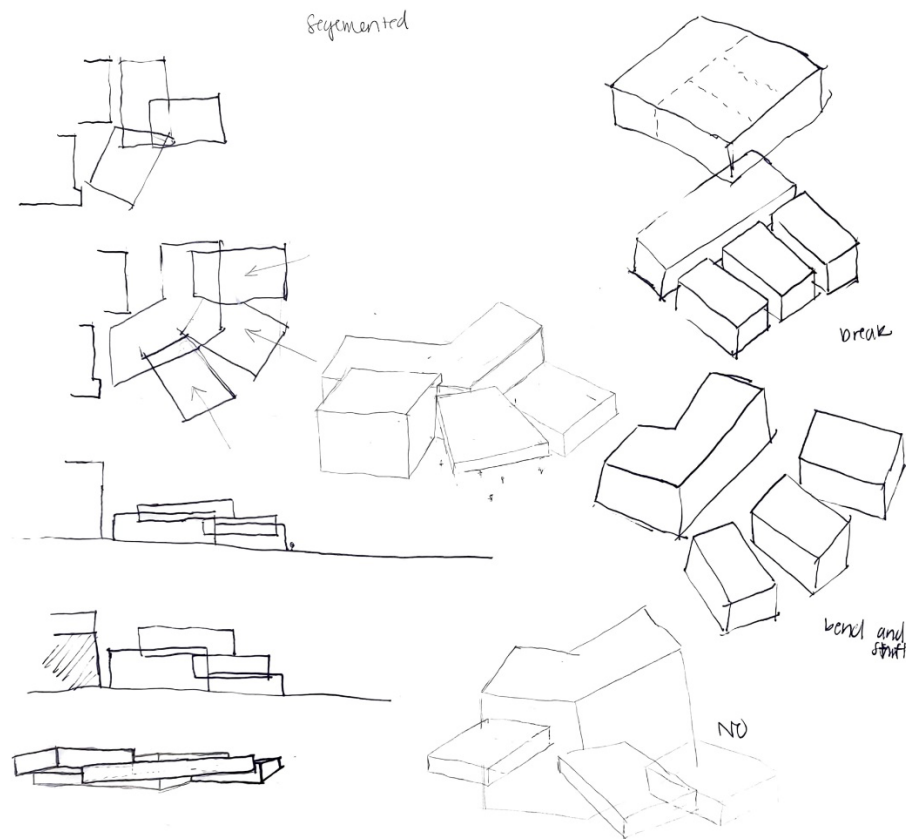
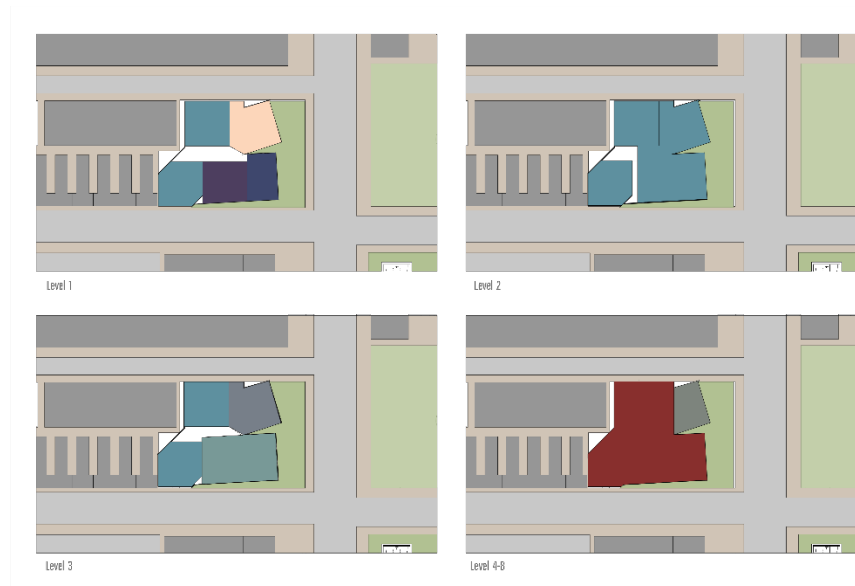


Figure 32 The Branch Initial Blocking Plans



The second scheme was called “The Junction”. This scheme looked at matching the height and density of the site while also bridging down to the water. It creates a more private interior courtyard. The scheme stemmed from two conceptual ideas: tiering and filling on the street lines. The plans of this once again left administration and the large community spaces like the gym and auditorium on the lower level. In contrast, the community spaces and clinic pressed upward, creating more private spaces as the building rose.

Figure 33 The Junction Axon

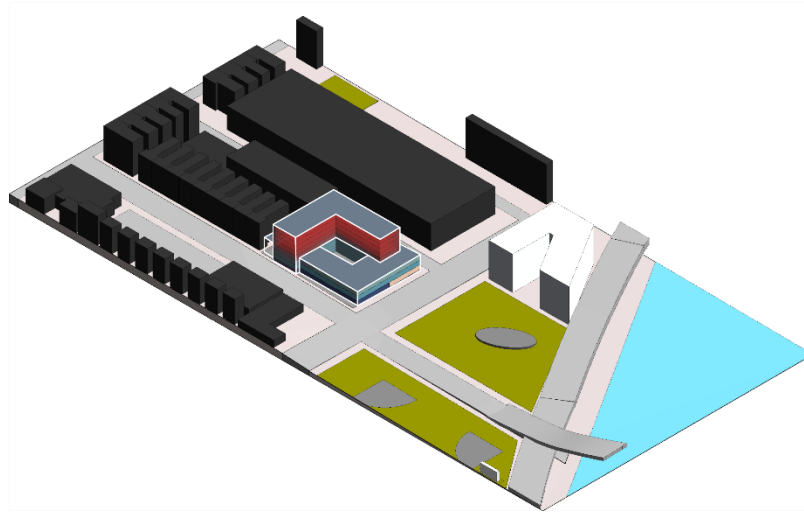
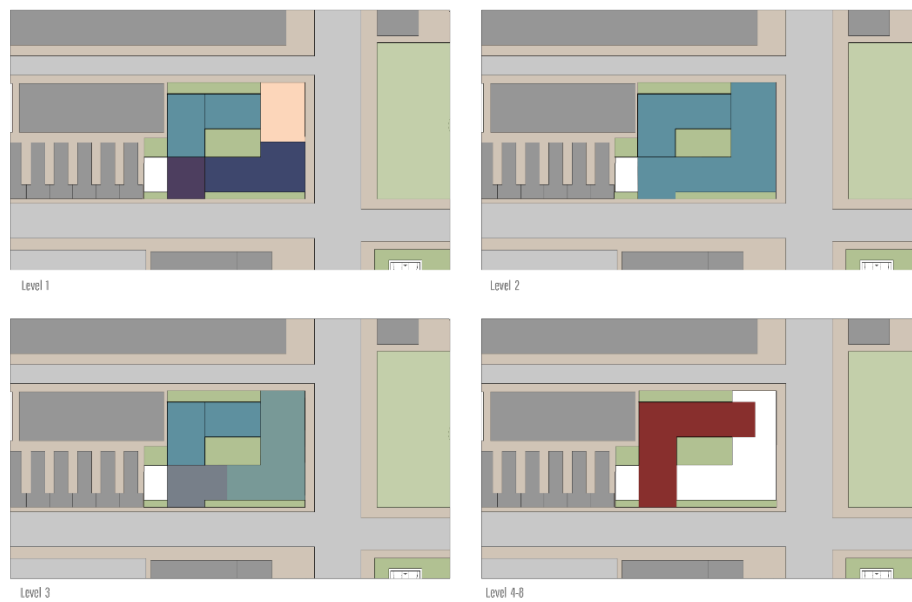


Figure 34 The Junction Initial Blocking plans



The First scheme the Branch was the scheme chosen to move forward with. The scheme aligned directly with the site strategy. As well as allowed the most versatility in design. The form could be expressed in several ways explored throughout the design process. This included the introduction of courtyards and height differentials. Throughout this process, the program of the

building changed considerably. This reflected the community's needs and the need for a resiliency hub (Figure 35). This included a crisis education center, health education center, library, and market area.

Figure 35 Updated Program

INVISIBLE NEIGHBORHOOD NEW YORK CITY 284,895 SF			
SOCIAL SERVICES			
Description	Quantity	SF per unit	NSF
Clinic	1	6,000	6,000
Health Education	1	650	650
Total			6,650
CHILD DEVELOPMENT			
Description	Quantity	SF per unit	NSF
Child Care Facility	1	7,000	7,000
Total			7,000
COLLABRATIVE ART & TRAINING			
Description	Quantity	SF per unit	NSF
Workforce / Vocational Training	2	2,000	2,000
Artist Studios	4	800	3,200
Total			7,000
COMMUNITY GATHERING			
Description	Quantity	SF per unit	NSF
Gym	1	7,900	7,900
Small Meeting Rooms	12	250	3,000
Large Meeting Rooms	6	400	2,400
Broadcast Studio	4	1,000	4,000
Kitchen	1	4,000	4,000
Auditorium	1	6,800	6,800
Crisis Education	1	2,200	2,200
Total			42,300
MARKET			
Description	Quantity	SF per unit	NSF
Retail	3	800	2,400
Market	1	10,000	10,000
Total			13,000
SUPPORT			
Description	Quantity	SF per unit	NSF
Storage	5	200	1,000
Mechanical	1	1,300	1,300
Restrooms	8	600	4,800
Lobby	1	3,000	3,000
Administration	1	4,000	4,000
Total			14,100
HOUSING			
Description	Quantity	SF per unit	NSF
Apartments	6	7,200	43,200
Community Room	1	2,400	2,400
Laundry Room	1	1,600	1,600
Bike Room	1	1,000	1,000
Mail Room	1	600	600
Fitness Room	1	1,900	1,900
Total			129,300
OUTDOOR SPACE			
Description	Quantity	SF per unit	NSF
Stage/ Flexible			1,000
Harvesting Garden			1,000
Open Green Area			8,000
Total			10,000

Design Proposal

The final design proposal reflects the goals established at the beginning of the thesis. Prioritizing the needs of the community efficiently. It integrates the site's previously obsolete site boundaries into a benefit for the neighborhood that helps mitigate risk to the community (Figure 36). The new site proposal introduced two new residential buildings across from the resiliency hub location. This would match New York City's goals to revitalize its coast to mitigate flood risk. During a flooding emergency, the site and the first floor of the resiliency hub can be flooded over (Figure 37).

Figure 36 Site Use Diagram

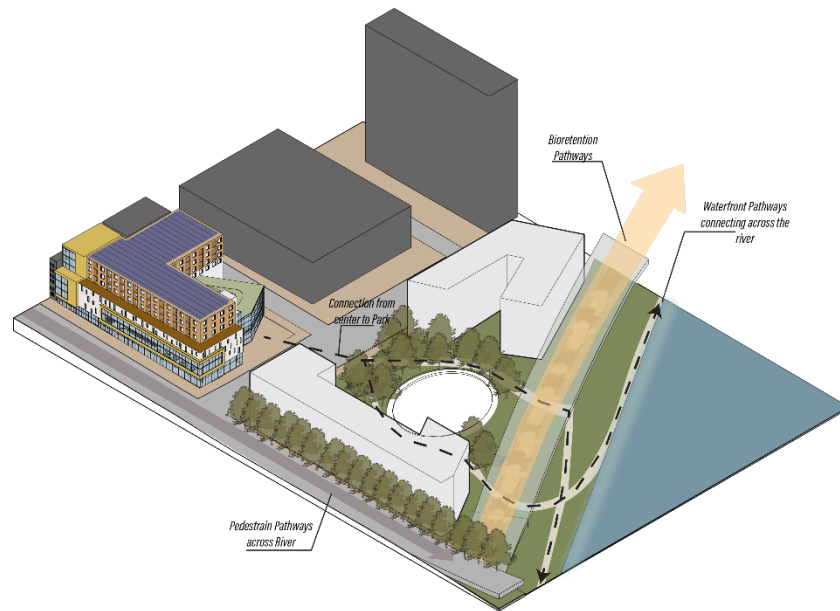
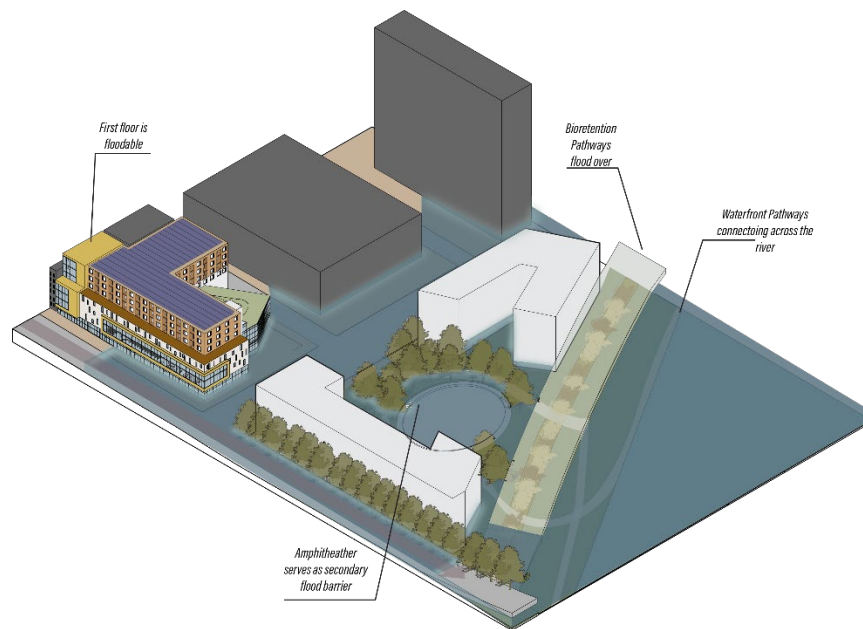


Figure 37 Emergency Flooding Diagram



Looking specifically at the North Central Harlem Resiliency Hub. The building integrates large community spaces that interact with support spaces. It goes back to the original concept of keeping more public spaces on lower levels and getting more private as one works one's way

through the building. Level 1 of the building focuses primarily on resident services, retail, and market. This floor also included the childcare facility as it has easy access for parents; however, the stairs are located directly next to the childcare facility for emergency evacuation (Figure 38). While the whole building serves the community, the residents of this building would primarily be black and brown disabled individuals, and it is essential to provide amenities to the space that are simply for them.

Figure 38 Ground Floor Plan



Moving up to Level 2, the introduction of main community spaces. This level consists of a gym, flexible community room, and library (Figure 39). Using a grand staircase to move one from the lobby into the upper levels, you can begin to see the connection between each floor and

its spaces (Figure 40). This floor also houses the administration and main mechanical room, so all the necessities are located on one level during an emergency. The Community Room on this level is a flexible event room/auditorium (Figure 41). Allowing the community to have an ample, dedicated space.

Figure 39 Level 2 Floor Plan

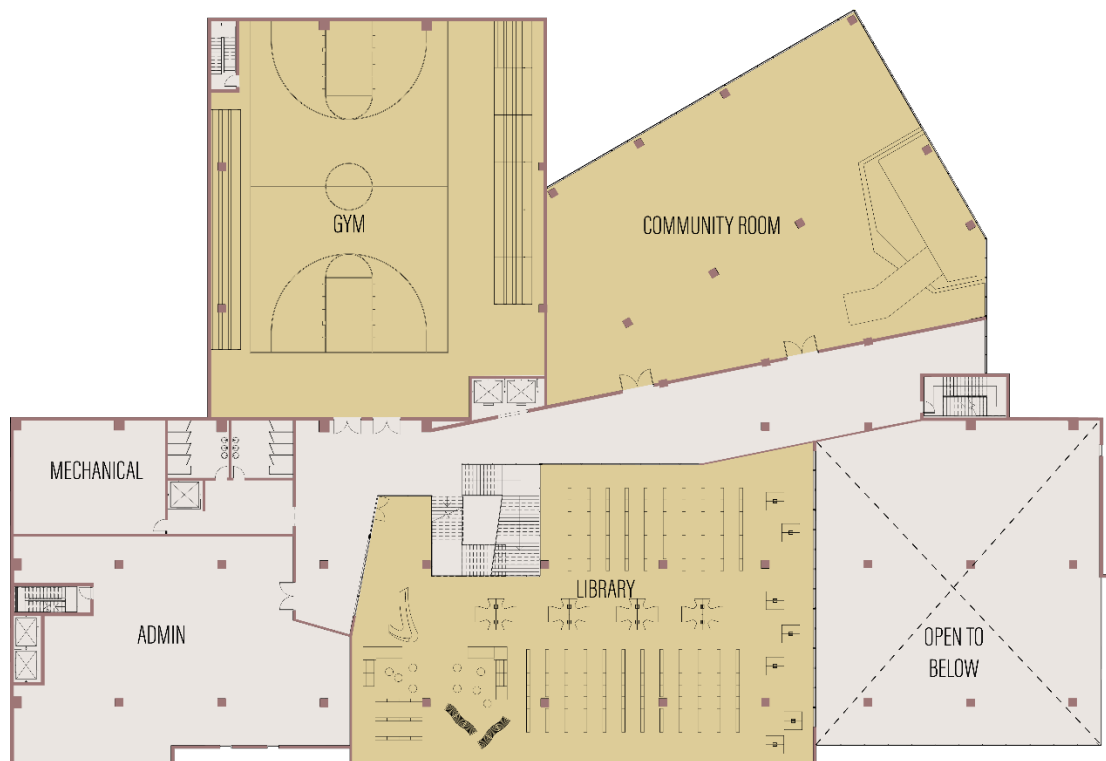


Figure 40 Library and Grand Staircase



Figure 41 Community Room Perspective



Level 3 of the North Central Harlem Resiliency Hub is considered the care floor. This floor consists of the clinic and broadcast studios (Figure 42). These spaces serve the community year-round and are critical for information and health care during an emergency. This floor also has many meeting rooms that investigate and serve the library, creating a quieter level of space. The last level of the community-centered program is the fourth level. This level is considered to

be the education level (Figure 43). It houses the vocational and workforce development centers and some broadcast teaching facilities. This level also has several artist studios encouraging those in this vibrant community to express themselves. However, the main spaces on this level are the kitchen, crisis education center, and harvest terrace. The kitchen serves as both a teaching kitchen and a food pantry throughout the year. The food used in this kitchen can be directly pulled from the harvest terrace, which provides immediate green space access and food accessibility not only to the community center but to the residents of the building as they have direct access (Figure 44). Levels 5-7 of this building are residential levels. They consist mainly of one and two-bedroom apartments to reflect the community's single population (Figure 45).

Figure 42 Level 3 Floor Plan



Figure 43 Level 4 Floor Plan



Figure 44 Kitchen and Harvest Terrace

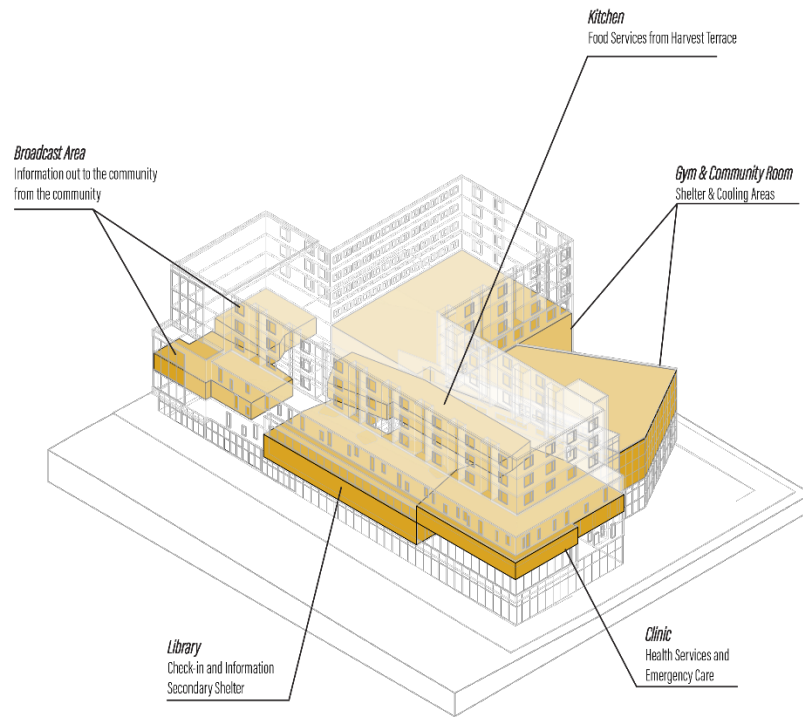


Figure 45 Levels 5-7 Floor Plan



During an emergency, the building transforms into a crisis center. The large community floor is now a check-in and shelter floor. The library is a source of information, check-in, and a secondary shelter. The primary shelters on this floor are the gym and flexible community room. They can hold large gatherings and easily access the information center for updates. The broadcast rooms are getting information to the public and directing those within their neighborhoods. Reminding people of their resiliency plans and providing clear, accessible information in multiple formats. Meanwhile, the clinic supports those needing additional care during a crisis. The Kitchen on the 4th level can be transformed into one large kitchen ready to serve the shelters below (Figure 46).

Figure 46 Public Space Adaptation



Chapter 8: Conclusion

Overall, the Central North Harlem Resiliency Hub creates a space where black and brown disabled people are the heart of the design. Climate crises are happening more often, and these communities are becoming more and more invisible in the solution. Their needs and communities must be prioritized, or we will continue to see nationwide damage. Resiliency hubs are a step in the right direction, and this proposal is a template that can be applied to cities nationwide.

Figure 47 Exterior View Approaching



Figure 48 Exterior View From Park



Figure 49 Aerial



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