Three Case Studies in Mitigating **Bringing Down the Red Lines** Disparate Impacts of Urban Heat in UVA SCHOOL OF ARCHITECTURE **Historically Redlined Communities** Maggie Ayers, Charlie Cross, Mary Claire Erskine, Miranda Lao

Urban Heat & Redlining Across the country, the increased frequency, intensity, and duration of extreme heat waves in urban environments are the deadliest and most widely experienced consequence of climate change. The severity of extreme urban heat is not evenly distributed across a local environment: concentrated heat output intensified by urban surroundings is known as the urban heat island effect. Many of the areas experiencing the most severe heat island effects also coincide with the areas in which predominantly Black communities reside. Histories of racist zoning policies, including the practice of redlining, have led to underinvestment and lack of crucial heat mitigating infrastructures, including street trees, green spaces, and public parks; instead locating these communities near industrial zones and heavily asphalted transportation infrastructure, such as parking lots and highways. A 2020 study of 108 urban areas in the US by Hoffman et. al explicitly links these historical housing policies to the disparate impact of heat on residents in these urban areas, finding that "94% of studied areas display consistent city-scale patterns of elevated land surface temperatures in formerly redlined neighbors by as much as 7°C." Here, we compare three case studies in urban heat island mitigation.

Average Temperature in Formerly Redlined Areas	West Side & South Side	South Bronx	Northside, East End, & Southside
A-Graded Areas B-Graded Areas C-Graded Areas D-Graded Areas "Best" "Still Desirable" "Declining" "Hazardous"	Chicago, Illinois	New York, New York	Richmond, Virginia
Chicago, IL -4.6°F -14°F +0.7°F +1.3°F	Mount Prospect	Clifton Passarc	Tuckahoe 250 B D B D



Black centerlines represent average temperatures for each city

The chart above shows how average temperatures today compare to the city average across areas that were given different HOLC ratings from the 1930s redlining maps in each of the three cities from the case study. This table uses data from a NYT published data visualization. "D-graded areas" correspond to redlined areas.

Three Social Justice Planning Frameworks:

Just Transition is a future focused planning framework that originally developed out of the labor movement. This framework works to ensure that the transition to a low-carbon economy happens equitably that no one is left behind and that workers in precarious and vulnerable positions in the current energy economy are placed at the forefront of considerations in the transition to a new energy economy.





Reparative Planning is a framework that addresses the planning discipline's historic and present entanglements with white supremacy and racial capitalism, which have created inequitable, racialized spaces within cities. Reparative planning looks at the lasting impacts of such planning practices and seeks to acknowledge, actively address, and repair the harm that has been done.

Emergent Strategy arises "unplanned", outside of the traditional administrative and professional planning process. In our analysis, we look at grassroots projects that were initiated by community members in response to a need, which were later incorporated into official city plans as a result of their proven local success.

Wha	nt did	we	learn?

	Impacted Residents	Proposed Interventions to address extreme heat	Population Demographics	Were the interventions carried out?	Budget	How is the community engaged?	Is this case study scaleable or replicable?	How resilient is the intervention to political or administrative change?	What did we learn: Historic redlining and racial zoning practices have had an enduring legacy, observable in the urban heat island effect. We chose to analyze city plans that
st Transition The South Side The West Side Chicago, IL	Many victims of the 1995 heat wave were Black elderly residents in the South and West Side neighborhoods. Today, these areas still experience hotter temperatures than other parts of the city.	 Plant over 75,000 trees Minimize hard pavement Maximize green space in specifically vulnerable neighborhoods, such as those in the South and West Side neighborhoods. 	 Population: about 76,000 residents. Approximately 98% of residents are people of color more than 65% are unemployed or not in the labor market. 	The CCAP was published in April of 2022, and has since not provided any metrics or progress on implementation of the proposed plan.	45% (\$53.1M) of the \$118M climate iniative budget for FY2022 to "equitable development of a clean-energy future", the category which extreme heat falls under.	Chicago residents were involved in the creation of the 2022 CCAP through "interactive virtual town halls, two online surveys, facilitated conversations with community partners, and comments on the draft plan." (CCAP 2022)	This intervention requires large mutual stakeholder partnerships, an adundance of top-down governmental resources, and a large amount of funding resources	The 2022 CCAP is relatively vulnerable to political change, evident from the failures of the original 2008 CCAP. That plan was unable to be successfully implemented largely because of the dismantling of Chicago's Department of the Environment in 2011.	model three social justice planning frameworks in their attempts to address this problem. The reparative planning case study rightfully centered histories of injustice, but did not include a commitment to implementation. The just transition case study charted out paths toward a vision of the future, but lacked a foundation of action and energy form the community in the present. These two case studies together highlight the importance of having implementation strategies built into the plan. Emergent strategies are rooted in and built upon community efforts, strengths, and perspectives. Borne of collective histories, these actions mobilize towards a collective future. Although emergent strategies are generally smaller in scale than an entire city plan, their incorporation into city planning can be an effective means of ensuring implementation of equity goals while also supporting ongoing and extant community-led projects. We
mergent Strategy South Bronx New York, NY	~350 heat-related deaths per year occur in New York City. Low-income residents are unable to afford air conditioning, putting them at greater risk of fatal heat stroke. Temperatures in these areas climb up to 8°F higher than other parts of the city.	 The NYC Cool Roofs program is one of three main strategies Other strategies include targeted tree plantings, understanding cool pavements, AC unit distribution, and increasing green infrastructure. 	 Population approximately 372,600 residents. 64% of residents are Hispanic, and 31% are Black. 32% of residents are foreign-born. 	The 2024 heat-related mortality report showed a relatively steady number of heat-related deaths in recent years, even as temperatures have climbed. When the NYC Cool Roofs program was first implemented in 2009, the city had a goal of installing one million square feet of cool roofs per year. They have painted 10 million square feet of rooftops.	The adopted budget for FY2025 has a \$6.505M apportionment of city funds for the construction, reconstruction, or improvements to roofs citywide. Likely, the NYC CoolRoofs money would come from this apportionment.	Residents are the backbone of the program: they are responsible for creating and painting these cool roofs. The community benefits from the cool roofs and from the job training programs, paid planning, management, and construction jobs	Yes, there are organizations like the HOPE program in many cities. It is scaleable because there are poeple looking for training in all areas of the country, and others who live in urban areas experiencing extreme heat that would benefit from the roofing improvements.	The NYC CoolRoofs program is particularly resilient to political or administrative change because of the program's focus on job training and skill development	
eparative Planning Richmond, VA	"Today, Richmond's formerly redlined neighborhoods are, on average, 5 degrees hotter on a summer day than greenlined neighborhoods Some of the hottest areas, like the Gilpin neighborhood [in Northside], can see temperatures 15°F higher than wealthier, whiter parts of town." (NYT)	 Increasing tree canopy Expanding parks and green space Reducing energy burden of vulnerable communities Creating resilience/cooling hubs Developing a cool surfaces and depaving program and regulating impervious surfaces of new construction. 	 Population: approximately 227,000 residents 40% of residents are Black, 42% of residents are white, and 10% of residents are Hispanic or Latinx. White residents primarily reside in the West End. 	The RVAgreen 2050 plan was published in 2022, and was partially successful in its goal of engaging marginalized community members. Now it is in the beginning of implementation, and has recieved a large grant for reparative urban forestry.	The RVAgreen 2050 plan sets aside \$50K per year for equity planning process, and \$6M grant for reparative urban forestry.	The plan was advised by representative community membership on the Racial Equity and Environmental Justice Roundtable. This was only partially successful. The demographics of the committee did not fully match the communities they were seeking to represent.	The mission to center marginalized communities in the planning proces could be replicated, and lessons could be learned about community engagement process.	Inclusive processes require political leaders that value having diverse voices at the table. When there is administrative change, there is no guarantee that marginalized communities will have the same relationships or trust towards the new local leaders.	

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concluded that there is untapped potential in equitycentered city plans that blend these three frameworks.