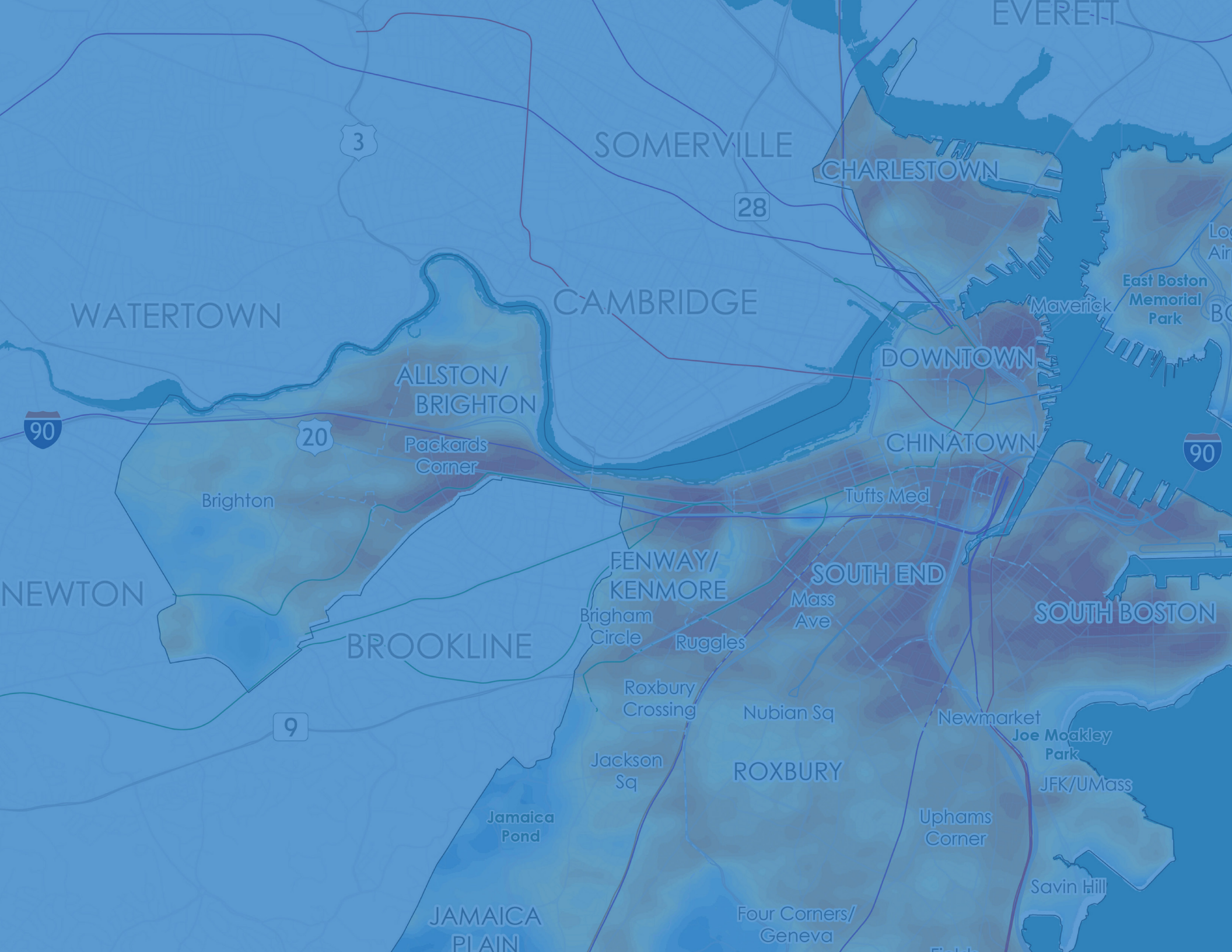
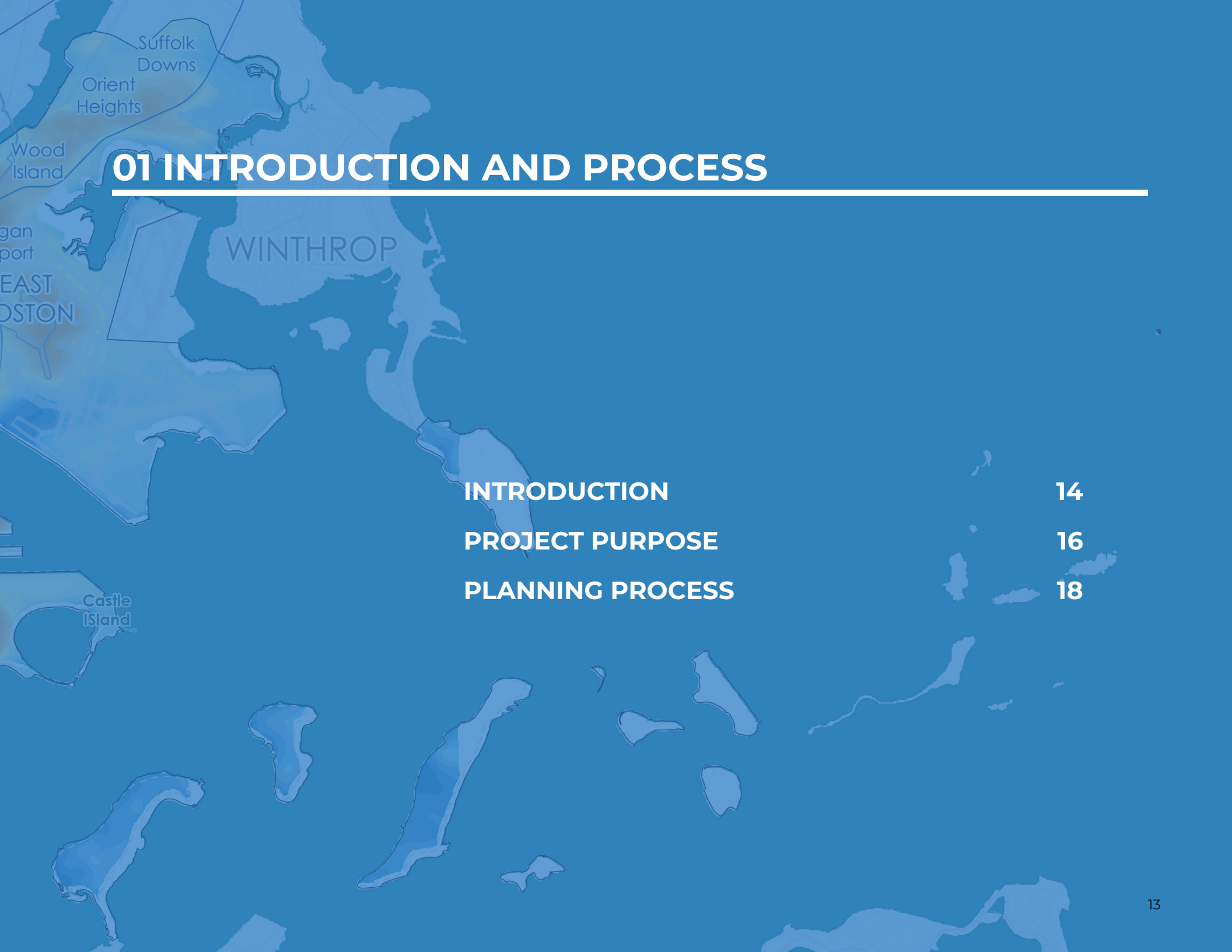

EVERETT
SOMERVILLE
CHARLESTOWN
3
28
CAMBRIDGE
WATERTOWN
East Boston Memorial Park
Maverick
DOWNTOWN
ALLSTON/ BRIGHTON
90
20
Packards Corner
CHINATOWN
90
Brighton
Tufts Med
FENWAY/ KENMORE
SOUTH END
NEWTON
Mass Ave
SOUTH BOSTON
Brigham Circle
Ruggles
BROOKLINE
Roxbury Crossing
Nubian Sq
Newmarket
Joe Moakley Park
9
Jackson Sq
ROXBURY
JFK/UMass
Jamaica Pond
Uphams Corner
Savin Hill
JAMAICA PLAIN
Four Corners/ Geneva




# 01 INTRODUCTION AND PROCESS

# INTRODUCTION

*The effects of climate change are not new to Bostonians. Boston is already experiencing the effects of increasing storm intensity, rising seas, heavier downpours, and hotter summers. These effects are projected to grow over the coming decades. The City of Boston is committed to equitably protecting residents from the climate impacts that we are experiencing and that we are projecting in the future.*

While the challenges of climate change are complex, Boston can take bold and creative action to prepare our residents, our neighborhoods, and our city as a whole for our changing climate, while advancing environmental justice and equity. *Heat Resilience Solutions for Boston* (the *Heat Plan*) presents the City's action plan to prepare for the near-term and long-term impacts of extreme heat in a changing climate. As a product of the Climate Ready Boston initiative, the City's ongoing program to prepare Boston for the effects of climate change, this plan provides an in-depth analysis of extreme summer temperatures during a recent heat wave and an all-of-government framework for strategies to reduce the risks of extreme heat. The plan helps accelerate Boston's progress toward increased climate resilience, charting our course for protecting residents from the effects of extreme heat.

While all of Boston experiences extreme heat, there are temperature hotspots throughout the city. Some residents and communities experience greater risk to the impacts of extreme heat due to environmental factors, the legacy of past investment decisions, health factors, and age. Residents and communities who may experience disproportionate risk include older adults, children, communities of color, people with lower English proficiency, people with lower incomes, people who are unhoused, and people with medical illnesses or disabilities.

The neighborhood focus areas in this study included Chinatown, Dorchester, East Boston, Mattapan, and Roxbury. By ensuring that heat resilience solutions developed in this plan are appropriate both for environmental justice communities in Boston who face elevated risks and the city as a whole, we can ensure that our heat resilience investments can also help us build a better, more resilient Boston with justice and equity at the center. Delivering on strategies that respond to the needs of our most overburdened residents will help us build toward a more climate-ready Boston. This plan creates a framework to take critical action to address the ways that we must adapt to the impacts of climate change while putting Boston on a path to become a Green New Deal city.

The project was funded by a Municipal Vulnerability Preparedness Action Grant through the Massachusetts Executive Office of Energy and Environmental Affairs. The project was also supported through additional funding from the Barr Foundation for the Climate Ready Boston program. This plan links existing efforts with new and planned initiatives that collectively will help prepare Boston for the immediate and future impacts of extreme heat.

## WHAT DOES HEAT RESILIENCE MEAN IN BOSTON?

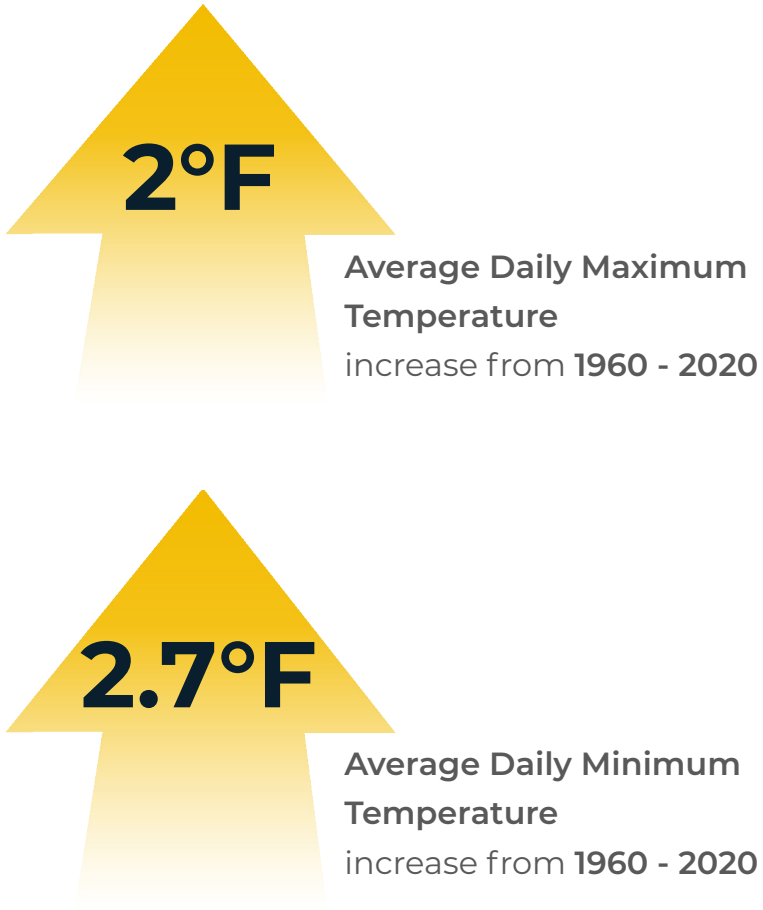
Heat resilience means preparing people, buildings, infrastructure, and the public realm to withstand extreme heat events. For Boston, this means ensuring that all residents and other stakeholders have the resources they need to stay cool and safe in hot summer months. It also means reducing temperatures in hotspots throughout the city to address the disproportionate impact of heat waves in Boston—and to ensure that indoor and outdoor spaces help preserve the health and comfort of residents in an

equitable way. To build resilience to heat, Boston must address three factors of heat risk: *exposure* to extreme heat, the *adaptive capacity* to access cooling, and the *sensitivity* to changes in temperature due to underlying factors like health or age that may influence vulnerability to heat. This report presents a comprehensive framework of strategies to address these core factors of heat risk—and to prepare Boston for extreme heat, both today and under future climate conditions.

Extreme heat is the number one cause of weather-related deaths in the United States, more than tornadoes, hurricanes, flooding, and cold winter weather combined.[1] [2] In Boston, extreme heat is a growing concern with more hot days, longer heat waves, and higher summer temperatures due to climate change. How much temperatures continue to increase will depend on how quickly and by how much global greenhouse gas emissions can be reduced. Since 1960, Boston's average summer temperature has increased (see figure to the right). Additionally, between 2010 and 2020, Boston experienced more hot days than any decade in the previous 50 years. This trend is projected to continue. If emission trends continue as they are, it's predicted that there will be up to 25 to 42 days above 90°F, including up to 1 to 6 days above 100°F by the 2050s.[3] [i] For communities who are already overburdened, increasing extreme heat risks can cause disproportionate impacts.

i These ranges present 17-83% confidence interval projections for RCP 8.5.

**On average, summer days and nights are getting warmer.**




*Source: NOAA National Centers for Environmental Information; data pulled for 1960-2020 Logan International Airport weather station average maximum and minimum temperatures based on May to September data.*

# PROJECT PURPOSE

## *We can build a more just, equitable, and resilient Boston.*

We are preparing Boston for extreme heat and its impacts, both today and in the coming decades. The *Heat Plan*, provides a citywide framework for heat resilience. Out work focuses on overburdened communities that will be most impacted by rising temperatures in Boston

This plan presents the City of Boston's vision for a comprehensive approach to address heat resilience. The *Heat Plan* provides an in-depth analysis of where temperatures are highest across the city during a heat wave—and the environmental factors that contribute to differences in those extreme heat conditions. The plan also presents community experiences of extreme heat impacts and offers a comprehensive framework of strategies to increase access to cooling, improve social resilience, and address conditions that contribute to hotter neighborhoods. This plan complements and builds upon emergency preparedness policies and procedures developed by the Boston Office of Emergency Management (OEM) and the Boston Public Health Commission (BPHC). It recommends longer-term planning for resilience to extreme heat alongside near-term actions that complement ongoing emergency preparedness efforts.

This plan presents new methodologies, updated future temperature projections, new extreme temperature models, heat risk and vulnerability profiles for five environmental justice focus areas, the City's heat resilience strategies, and next step actions to advance heat resilience across Boston. Inputs to the plan included existing plans and programs for climate resilience in Boston and the broader region, as well as detailed heat modeling and stakeholder and community discussions.

*Summer 2021 Egleston Square Library Cool Spot*

# PLANNING PROCESS

## THREE PHASE PROCESS

The project team developed the *Heat Plan* over a 14-month period in three phases that brought together community and stakeholder perspectives with heat modeling and analysis.

### PHASE 1: ANALYSIS AND EXISTING INFORMATION REVIEW

The first phase included data gathering, review of previous and ongoing planning efforts, and developing a citywide heat analysis. This phase included two stages of extreme heat analysis: citywide and neighborhood-level patterns. The neighborhood-level analysis focused on Chinatown, Dorchester, East Boston, Mattapan, and Roxbury. The purpose of the neighborhood-level analysis was to evaluate how current day heat impacts vary across the city, identify temperature hot spots within environmental justice neighborhoods, and assess how racism, inequality, historic urban planning decisions, and other policies have influenced existing heat exposure and vulnerability. This phase also included the first community open house and the formation of the Community Advisory Board (CAB) to guide the planning process.

### PHASE 2: HEAT RESILIENCE STRATEGIES

The second phase included drafting guiding principles for heat resilience based on community feedback from the first phase. The primary focus of the second phase was developing a series of draft strategies for heat resilience informed by findings from the citywide heat analysis and stakeholder and community perspectives. This phase explored considerations for heat resilience citywide and neighborhood-specific applications of strategies within the five neighborhood focus areas.

### PHASE 3: IMPLEMENTATION ROADMAP AND FINAL REPORT

The final phase of the project focused on refining the strategies, developing a benefit-cost analysis (BCA) for cooling homes, schools, and streets; creating a neighborhood-scale heat simulation to model the effectiveness of the physical heat reduction strategies; and developing an implementation roadmap.

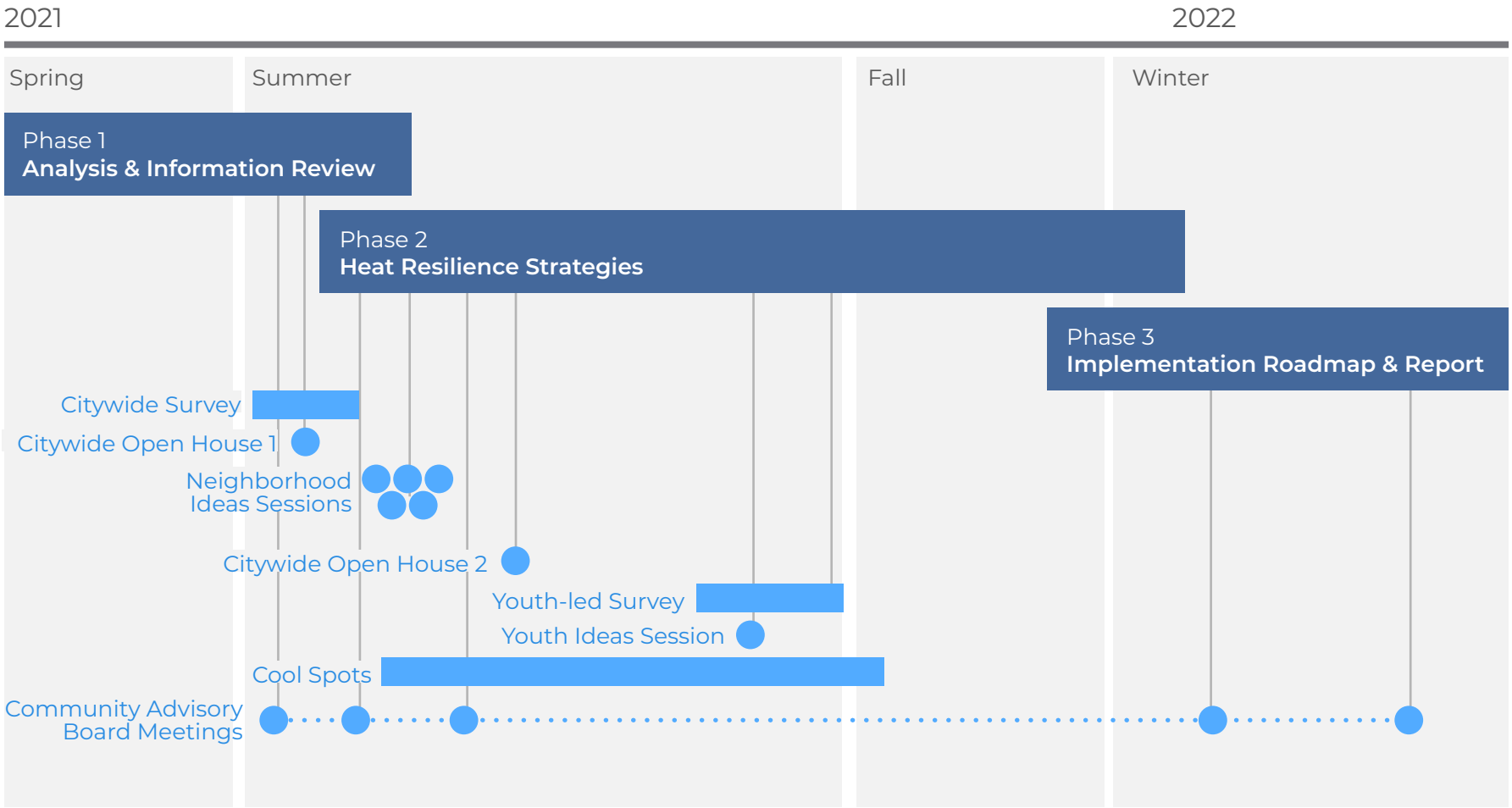
## STAKEHOLDER ENGAGEMENT

The strategies in this document reflect significant input and support from Boston residents and other stakeholders. Participants in the process shared perspectives from their lived experience in Boston with heat and access to cooling. Community feedback directly shaped the heat resilience strategies included in this plan.

### PLANNING IN THE CONTEXT OF COVID-19

Due to the COVID-19 pandemic, the project team designed engagement activities to comply with public health guidelines and to provide flexible methods and times for participation. Based on these objectives, the City's approach to community engagement included a range of ways for residents to engage. The project included virtual meetings to engage discussion and collaborative strategy development. These virtual sessions included two open houses, five neighborhood ideas sessions, and a forum specifically for youth. These sessions were recorded and made available on the project website to provide more opportunities for ongoing feedback in response to the same questions discussed in the live event. During virtual meetings, the City also shared information about existing local resources related to cooling and utilities and rental assistance.

## Project Schedule



Other engagement activities included a citywide survey and a web-based comic builder with social media integration. Two engagement activities took place in-person: a youth-led survey solicited information from residents, and two Boston Public Library Cool Spot installations in East Boston and Egleston Square provided heat risk and resilience information to visitors over the course of summer 2021, which are described in more detail below.

## STEERING COMMITTEE

The Steering Committee included representatives from City departments, agencies, and commissions. The Steering Committee convened five times virtually to define core goals and priorities, review and provide feedback on the resilience strategies, and provide guidance on implementation actions. This all-of-government committee acted as a technical sounding board to ensure feasibility and integration with ongoing and future policy, planning, and capital improvement initiatives.

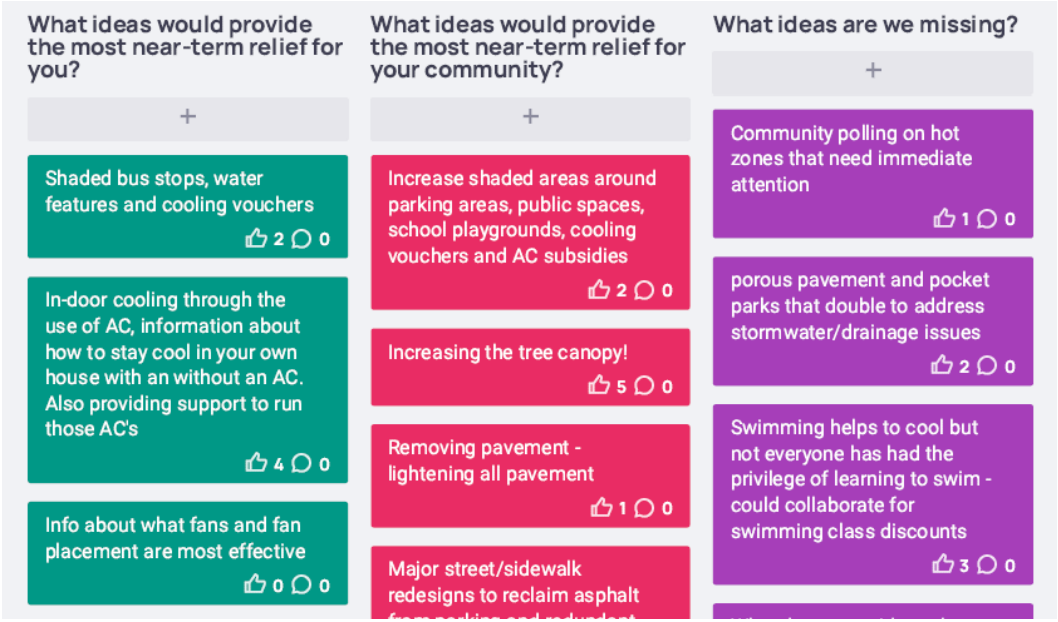
## COMMUNITY ADVISORY BOARD (CAB)

The Community Advisory Board (CAB) formed early in the planning process. The CAB included residents of Boston who provided a range of perspectives that highlighted cross-sectional considerations with heat resilience. Over the course of the plan, the CAB convened virtually five times. The CAB served as a key partner in shaping an inclusive community engagement process, ensuring that community priorities were reflected throughout the resilience strategies and goals, while also promoting the study to friends, neighbors, and colleagues.


*The virtual community meetings included a gathering screen*

## COMMUNITY OPEN HOUSES

The project team hosted two virtual community open houses to share the findings of the citywide heat analysis and gather community perspectives on extreme heat impacts and effective resilience strategies. These open houses focused on reaching a broad range of Boston residents and other stakeholders. The sessions also shared information about existing City resources and programs to access cooling, utility assistance, and tree planting. Translation was provided in Spanish, Mandarin, Cantonese, Vietnamese, and Haitian Creole. In total, more than 100 people participated across the two sessions.




*Virtual self-reflection time during the second open house*

## HEAT RESILIENCE STORY COMIC BUILDER

The Heat Resilience Story Comic Builder is a web-based community engagement tool developed for the plan to cultivate empathy through storytelling. Using the Comic Builder, participants can build a personal avatar and design three scenes that reflect their heat experience. The Comic Builder was used live during the first community open house and was also made available on the project website. Heat stories were compiled into a virtual flip book for participants to read each other's stories and see the variety of heat experiences. In all, more than 40 stories were shared.


*The Heat Stories Comic Builder Tool*

## CITYWIDE SURVEY

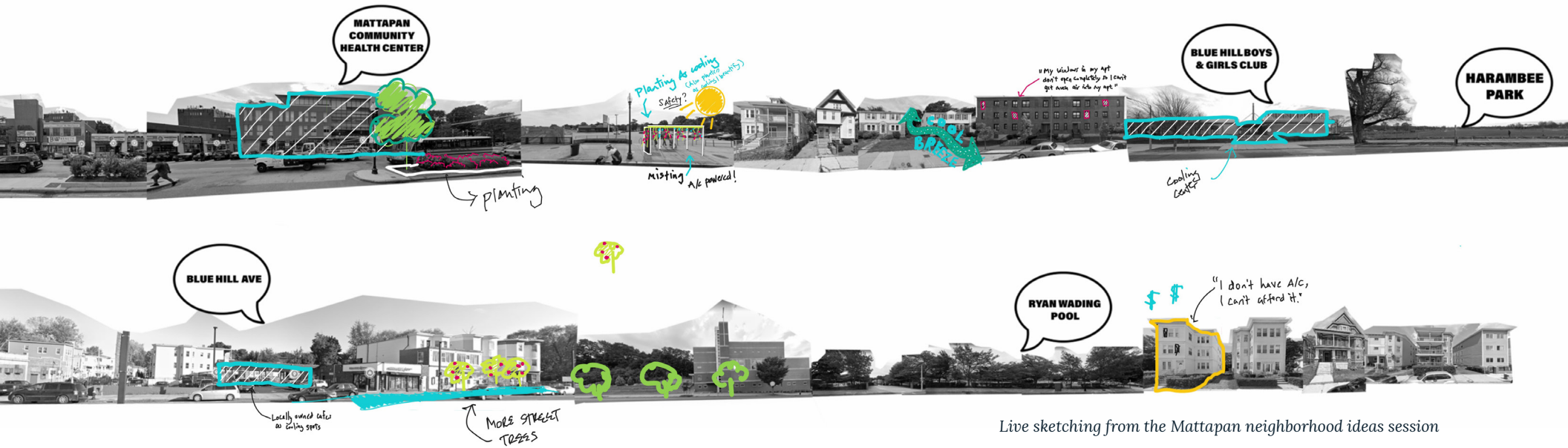
A survey gathered citywide perspectives about existing heat experiences, barriers to staying cool, and ideas for heat resilience. The survey included two sections: a written section and a map-based section to pinpoint where in Boston participants stay cool and where they feel hot. The project compared results from the mapping survey with the modeled results of the citywide heat analysis to understand how the model's findings compared to real-life experiences of survey respondents. In total, over 80 people participated in the survey.

## YOUTH-LED SURVEY

Boston youth also spearheaded deployment of the citywide survey, gathering an additional 151 responses including 64 from Dorchester and 30 from Roxbury. The project aggregated results from this survey with responses from the citywide survey for analysis. In addition to gathering additional survey responses, the youth-led survey respondents included 19 young people, providing the project team with valuable information about how they experience heat in Boston. Youth conducted in-person survey collection using tablets at the No Books, No Ball basketball tournament series on Saturdays at Ramsay/Durbee Park located along the South End/Roxbury line, the Boston Prep Charter School Vaccination Clinic conducted by the Black Boston COVID-19 Coalition, and Downtown Crossing. They received training on pandemic safety, as well as masks, hand sanitizer, and gloves.

## NEIGHBORHOOD IDEAS SESSIONS

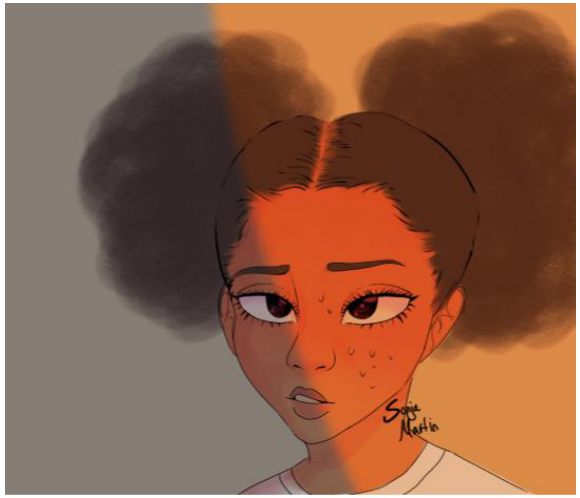
A series of five virtual neighborhood ideas sessions gathered localized ideas for heat resilience strategies. One ideas session took place for each of the five focus neighborhoods: Chinatown, Dorchester, East Boston, Mattapan, and Roxbury. Translation was available for each meeting, based on common languages in each neighborhood. The same content and feedback questions from the sessions were also available in an online survey format for stakeholders to share input and learn about neighborhood-specific heat findings. Overall, over 50 people participated in the sessions or shared their feedback through the ideas sessions.




*Live sketching from the Mattapan neighborhood ideas session*

## YOUTH IDEAS SESSION

Another ideas session invited young people to share their experiences with heat and their ideas for staying cool. Featuring original art and poetry, the sessions highlighted the creativity of Boston's youth and helped the project team understand the nuances of how heat affects youth and some of the unique barriers they face in accessing cool spaces. This session had 14 youth participants.




*Heat-related art by Sonja Martin capturing her youth experience, shared during the youth ideas session*

*Cool Spot at East Boston Public Library in summer 2021*

*"In Boston...most people don't have enough money to go and buy a cool drink,*

*And most of us kids, especially Black ones, aren't allowed at the community pools, or ponds, or lakes,*

*Because we cause problems and disturbances,*

*Or really just because we look intimidating and too much like gangsters.*

*If most people can't afford to buy a cool drink,*

*They definitely can't afford to buy an AC or a fan,*

*It's just too expensive to keep yourself cold,*

*And there aren't a lot of options, and there aren't a lot of places to go to cool down."*

*-Boston's heat problem, poetry by Joshua Alves, shared during the youth ideas session*

## COOL SPOTS

In summer 2021, the project team partnered with the Boston Public Library (BPL) and the Mayor's Office of New Urban Mechanics (MONUM) to pilot two of the six outdoor WiFi Cool Spots at BPL branches across Boston. Cool Spots at the Egleston Branch in Roxbury and the East Boston Branch served as pop-up outdoor community spaces that provided 24-hour daily internet access. These sites expanded access to WiFi and provided safe, socially distanced outdoor gathering spaces during the COVID pandemic. The designs included a range of cooling features, including shaded seating and misting. Each Cool Spot contained a series of temperature sensors that provided real-time reporting of weather conditions at various points across the sites, allowing Cool Spot visitors to see how shade and vegetation influence air temperatures and how experiences can vary significantly even across a small area. The Cool Spots served as community resilience hubs where the City provided information about heat relief, including materials on how to access free fans and air conditioner units, utility assistance, and other support through City of Boston and partner programs such as food assistance and rental relief.