

# Reducing Outdoor Vulnerability to Extreme Heat in Los Angeles:

## Law and Policy Recommendations for Street-Scale Shade Interventions

Cara Horowitz, Elizabeth Kent, Heather Dadashi, Brennon Mendez

Fall 2025



# Authors and Acknowledgments

Cara Horowitz is the Executive Director of the Emmett Institute on Climate Change and the Environment at UCLA School of Law. Brennon Mendez is a current fellow at the Emmett Institute. Heather Dadashi and Elizabeth Kent are former fellows at the Emmett Institute.

The views in this paper are those of the authors, not the institutions with which they are affiliated. We are grateful for support from the UCLA Sustainable LA Grand Challenge and the California Office of Emergency Services/Federal Emergency Management Agency (HMGP DR-4610-744-056, Integration of Fine-Scale Extreme Heat Mitigation into Sustainability Planning, PI: Travis Longcore), as well as for advice and input from colleagues and reviewers including Colleen Callahan, Monica Dean, Sahar Derakhshan, David Eisenman, Ali Frazzini, Edith de Guzman, Travis Longcore, Juan Matute, Kristen Torres Pawling, Aaswath Raman, Kirsten Schwarz, V. Kelly Turner, and Walker Wells. All errors are our own.

For questions or comments about this report, please contact Cara Horowitz at the Emmett Institute on Climate Change and the Environment, UCLA School of Law, at [horowitz@law.ucla.edu](mailto:horowitz@law.ucla.edu).

Design and Layout: Scott Gruber

Editing: Brennon Mendez

Cover Photo: Drewdlecam via Flickr

## TABLE OF CONTENTS

Authors and Acknowledgments .....	2
Introduction .....	4
The Worsening Problem of Urban Extreme Heat in Los Angeles.....	7
Existing Goals and Actions in Los Angeles Relevant to Reducing Vulnerability to Outdoor Extreme Heat.....	10
L.A. County.....	10
City of L.A. ....	12
Shade Structures and Other Street-Level Built-Environment Interventions Can Be an Important Part of the Solution to Mitigating Extreme Heat.....	15
Case Study: The Legal and Regulatory Context for Street-Level Shade Structures in L.A. City.....	21
Significant legal uncertainty about how to treat shade structures under Los Angeles’s Municipal Code may pose a barrier to installations .....	21
L.A.’s anti-loitering policies may interfere with efforts to create more street-level shade structures .	24
L.A.’s pedestrian-friendly policies support efforts to build more street-level shade structures .....	25
Considerations Relevant to L.A. County .....	27
Recommendations .....	30
Adopt and Strengthen Permitting and Land Use Policies to Support the Deployment of Streetscape Heat Resilience Interventions .....	30
Leverage Existing Programs in New Ways to Expand Shade in Targeted Outdoor Spaces .....	33
Invest Public Dollars in Heat Interventions .....	40
Conduct Further Research Related to Extreme Heat.....	44
Conclusion .....	46
Appendix – Key Recommendations.....	47
1. Clarify Permitting Requirements and Strengthen Land Use Policies .....	47
2. Leverage Existing Programs in New Ways .....	48
3. Grow and Invest Public Dollars.....	49

# Introduction

Climate change is making life in cities across the globe hotter and more dangerous, but cities—and the land use policies that shape them—have not yet adequately responded. L.A. is no exception. In L.A., the frequency and severity of extreme heat days are increasing, creating dangerous and sometimes deadly conditions for communities.<sup>1</sup> By the end of the century, researchers predict that even under an aggressive emissions reduction scenario, L.A. will see an additional 20–40 extremely hot days per year.<sup>2</sup> The risk and incidence of heat-related illnesses, such as heat rash, heat cramps, fainting, heat exhaustion, and heat stroke, will increase apace if measures are not taken to reduce their severity and likelihood.<sup>3</sup>

These risks fall disproportionately on low-income communities of color. L.A. County’s Climate Vulnerability Assessment reported “children, older adults and older adults living alone, people with cardiovascular disease, people with asthma, and outdoor workers” who live “in highly exposed communities will be especially vulnerable to rising temperatures[.]”<sup>4</sup> The California Healthy Places Index: Extreme Heat Edition, which maps heat impacts and vulnerability across the State,<sup>5</sup> shows that transit-dependent communities that lack green space and economic opportunities will be hit hardest by increasing temperatures. The County’s report notes that outdoor exposure to extreme heat temperatures is an especially difficult and important problem to address, one that affects the most vulnerable segments of the population.<sup>6</sup>

To prepare for a much hotter future and protect residents from these risks, cities like L.A. have opportunities to change the built environment in fundamental ways, such as by increasing outdoor shade and green space, decreasing urban hardscapes, and requiring or incentivizing the use of cool roofs and cool surfaces. But addressing the problem of extreme heat through measures like these is challenging because the relevant regulatory frameworks

- 1 The Centers for Disease Control and Prevention (CDC) define extreme heat as “summertime temperatures that are much hotter and/or humid than average.” Nat’l Ctr. for Healthy Housing, *Extreme Heat* (Aug. 21, 2022), <https://nchh.org/information-and-evidence/learn-about-healthy-housing/emergencies/extreme-heat/>. “It is acknowledged that because average temperatures differ between locations, what qualifies as extreme heat in one place may not hold true for all locations.” *Id.*
- 2 Fengpeng Sun, et al., *A Hybrid Dynamical-Statistical Downscaling Technique Part II: End-of-Century Warming Projections Predict a New Climate State in the Los Angeles Region*, 28 J. OF CLIMATE 4618, 4632 (2015), <https://journals.ametsoc.org/view/journals/clim/28/12/jcli-d-14-00197.1.xml>.
- 3 Ctrs. for Disease Control & Prevention, *Heat Stress and Workers*, <https://www.cdc.gov/niosh/topics/heatstress/default.html> (July 11, 2024); see also L.A. County, *L.A. County Climate Vulnerability Assessment*, at 40 (Oct. 2021), <https://preview-assets-us-01.kc-usercontent.com/0234f496-d2b7-00b6-17a4-b43e949b70a2/5a0e0a91-02b5-4e90-995f-c47440c73001/LA-County-Climate-Vulnerability-Assessment-1.pdf>.
- 4 *L.A. County Climate Vulnerability Assessment*, *supra* note 3, at 40.
- 5 UCLA Luskin Ctr. for Innovation, *California Healthy Place Index: Extreme Heat Edition* (last visited Oct. 6, 2025), <https://innovation.luskin.ucla.edu/climate/heat/>.
- 6 *L.A. County Climate Vulnerability Assessment*, *supra* note 3, at 41 (discussing the disproportionate impact of extreme heat on outdoor workers).

are both complex and underdeveloped. Many regulatory and policy regimes do not yet account for the risk of heat in meaningful ways, despite the fact that extreme heat is already the leading weather-related cause of death and will certainly worsen.<sup>7</sup> Even where explicit policies exist to deal with the problem of extreme heat, they are often aspirational or not yet fully implemented. L.A. County and the City of L.A. have done more robust planning for heat than have many other jurisdictions, adopting advisory plans and broad policies promoting heat mitigation and cooling. Both locales have also assessed risks from heat to their residents; developed public information campaigns on heat safety; and begun to develop location-specific interventions. Yet even in L.A., most of these plans and policies lack sufficient funding, deadlines, and enforcement mechanisms, which can hinder implementation.

Given these challenges, this policy brief examines ways for the City and County of L.A. to strengthen their responses to extreme heat, and specifically to reimagine and remake the outdoor urban environment to reduce risks to vulnerable communities. This analysis focuses especially on the problem of exposure to heat in outdoor spaces because that problem is difficult to address, requires significant lead-time to tackle, and has so far received little regulatory attention. It explores opportunities to develop and implement solutions that rely on the built environment, such as street-level shade structures.<sup>8</sup> This analysis focuses on facilitating shade infrastructure because shade is the most effective way to keep people cool outside. Shade can drop the *feels-like* temperature by 35 to 70°F—which not only makes our streets more comfortable and walkable, but also saves lives.

First, we discuss the problem of extreme heat and its disproportionate impact on low-income communities and communities of color. Second, we describe current frameworks for addressing the problem of extreme heat in L.A., especially ones aimed at addressing outdoor exposures and reducing inequitable outcomes. Third, we focus on the benefits of and need for shade structures and other streetscape, built-environment interventions. Fourth, we examine existing land use and zoning regulations that could impact cooling structures and other potential legal barriers that would need to be overcome to install such structures. Lastly, we suggest solutions that could facilitate the installation of street-level shade structures and other built interventions.<sup>9</sup>

- 7 S. Cal. Assoc. of Gov'ts, *Extreme Heat & Public Health Report*, at 6 (Sept. 2020), [https://scag.ca.gov/sites/default/files/old/file-attachments/extremeheatpublichealthreportfinal\\_09302020.pdf](https://scag.ca.gov/sites/default/files/old/file-attachments/extremeheatpublichealthreportfinal_09302020.pdf); Nat'l Weather Serv., Nat'l Oceanic and Atmospheric Admin., *Weather Related Fatality and Injury Statistics*, <https://www.weather.gov/hazstat/> (last visited Oct. 6, 2025) (showing weather fatalities in 2024).
- 8 Though outside the scope of this paper, the problem of indoor heat is of course also critically important and has been the subject of a few regulatory efforts. See Cal. Dep't of Indus. Relations, *Cal/OSHA Heat Illness Prevention Guidance and Resources* (Aug. 2024), <https://www.dir.ca.gov/dosh/heatillnessinfo.html> (“On June 20, 2024, the [OSHA] Board approved California Code of Regulations, Title 8, § 3396, ‘Heat Illness Prevention in Indoor Places of Employment’. This standard applies to most workplaces where the indoor temperature reaches 82°F. It establishes required safety measures for indoor workplaces to prevent worker exposure to risk of heat illness. This standard went into effect on July 23, 2024.”).
- 9 This paper arose out of work by an interdisciplinary team of UCLA faculty and researchers on a collaborative project called “Heat Resilient L.A.,” supported by the UCLA Sustainable LA Grand Challenge as well as by a grant from

These solutions are discussed in the Recommendations section of this report and are summarized in table form in the Appendix. They include:

- Prioritizing and accelerating the creation of shade structures in densely populated, heat-exposed public areas, such as at transit stops and along popular commuting and commercial corridors
- Passing new laws that require or incentivize providing shade and other forms of heat mitigation on public and private property
- Using existing programs in new ways to promote outdoor heat equity, such as by including street-scale shade structures within the framework of the L.A. Municipal Code's overlay design policies, or by explicitly considering the effects of proposed developments on outdoor heat exposures and mitigating those effects as part of CEQA review processes
- Growing the funding for streetscape interventions by harnessing tax increment financing and state general obligation bonds, supporting applications for state funding through the Affordable Housing and Sustainable Communities program, and securing a parametric insurance policy to cover currently uninsured costs that flow from extreme heat events, freeing up public resilience dollars for more forward-looking mitigation projects

Measures like these and others could kickstart the critically important transformation of our urban environment to help shield residents from some of the worst effects of rising temperatures. Finally, we identify additional research needs to make both L.A. and California more heat-resilient.

---

the Federal Emergency Management Agency via the California Office of Emergency Services. See *Heat Resilient L.A.*, UCLA Inst. of the Env't & Sustainability (last visited Oct. 6, 2025), <https://www.ioes.ucla.edu/project/heat-resilient-la/>.

# The Worsening Problem of Urban Extreme Heat in Los Angeles

L.A. is becoming dangerously hot. Average temperatures are steadily increasing across L.A. County due to our changing climate. Moreover, extreme heat events are projected to increase in frequency, severity, and duration. Climate projections predict that average air temperatures will increase by 1.8°F to 7.2°F across the county by the middle of the century, with the greatest surges in average temperatures and high-heat days (> 95°F) occurring in Palmdale, Lancaster, and the San Gabriel Valley.<sup>10</sup> Heat waves can also multiply the impacts of extreme heat.<sup>11</sup> The San Fernando Valley experienced a heat wave in July 2006 that saw 21 consecutive days over 100°F. This was the longest stretch of extreme heat ever recorded since recordkeeping began in the Valley in 1949. “More recently, in September 2020, L.A. County experienced another record-breaking heat wave, with maximum temperatures in the Valley reaching an all-time high of 121°F.”<sup>12</sup> Modeled projections show that the annual average number of heat waves in L.A. County will increase tenfold by mid-century.<sup>13</sup>

Extreme heat threatens the health and safety of the people of L.A. County. “By mid-century, nearly 98 percent of L.A. County’s population will face at least moderate exposure to extreme heat.”<sup>14</sup> Additionally, a total of 2.2 million people are expected to reside in areas of both high exposure and high social sensitivity, an increase of 87.3 percent from baseline conditions.<sup>15</sup> This is a deadly combination. “Extreme heat accounts for more annual deaths than any other single weather-related hazard.”<sup>16</sup> It can trigger heat-related illness, like heat stroke, and exacerbate respiratory, heart, and other medical conditions. Extreme heat also impacts mental health and cognitive function, with an increase in depressive thoughts and insomnia.<sup>17</sup> Total heat stress emergency room visits and hospitalizations have risen, from under 300 emergency room visits in 2005 to approximately 700 visits in 2014, and heat stress has been linked to low birth weight for infants exposed to excessive heat in utero, causing them to be “at greater risk of health problems, from immediate complications at

10 County of L.A., *Our County: The Los Angeles Countywide Sustainability Plan*, at 49 (July 2019) [hereinafter “Our County”], <https://ourcountyla.org/wp-content/uploads/2019/07/OurCounty-Final-Plan.pdf>. High-heat days are the days during which temperatures exceed 95°F. They are projected for future years to assess the threat of extreme temperatures in an area. *Id.* at 211.

11 Heat waves are generally extended periods of extreme temperature. In this context, a heat wave is at least four consecutive days of daily maximum temperature above the 98th percentile for the County, or 94.4°F, under an RCP 8.5 scenario. *L.A. County Climate Vulnerability Assessment*, *supra* note 3, at 26.

12 *Id.*

13 *Id.*

14 *Id.* at 43.

15 *Id.*

16 *Id.* at 40. *see also* S. Cal. Assoc. of Gov’ts, *supra* note 7, at 6.

17 Mare Löhmus, *Possible Biological Mechanisms Linking Mental Health and Heat—A Contemplative Review*, 15 Int’l J. Env’tl. Res. & Pub. Health 1, 3, 13 (2018), <https://www.mdpi.com/1660-4601/15/7/1515>.

birth such as low oxygen levels to long-term challenges, including potential metabolic, cognitive and neurodevelopmental impairments.”<sup>18</sup>

Low-income communities of color are especially vulnerable to the negative health effects of extreme heat. Hispanic and Latino people make up about 70 percent of the population in communities highly vulnerable to extreme heat, compared to less than half of L.A. County’s population as a whole.<sup>19</sup> Extreme heat risks experienced by communities of color today are linked to historical discriminatory housing practices and diverted investment from these communities.<sup>20</sup> In an analysis of 108 urban areas across the United States, researchers revealed that land surface temperatures are approximately 2.6°F warmer in formerly redlined neighborhoods than in non-redlined neighborhoods.<sup>21</sup> The lack of access to green space, lack of tree canopy, and the presence of high-asphalt infrastructure in these areas can make it especially challenging for these neighborhoods to mitigate heat.<sup>22</sup> Households without ready access to public transit or a vehicle have a harder time accessing cooling centers and other shelter from extreme heat.<sup>23</sup> Additionally, low-income households are less likely to be air-conditioned and to be able to afford to run air conditioning during extreme heat events. Many low-income neighborhoods are also overburdened by high levels of environmental pollution and face other risk factors that compound and intensify heat exposure health risks.<sup>24</sup>

The problem of outdoor extreme heat is particularly troublesome. The unhoused, outdoor workers, transit-dependent individuals, and apartment dwellers are all especially vulnerable to outdoor heat.<sup>25</sup> And pedestrians are highly exposed: Research on the use of shade by

- 
- 18 Our County, *supra* note 10, at 200; Stacia Pelletier, *New USC Study Links Wildfire Smoke Exposure and Heat Stress to Adverse Birth Outcomes* (June 18, 2025), <https://keck.usc.edu/news/new-usc-study-links-wildfire-smoke-exposure-and-heat-stress-to-adverse-birth-outcomes/> (“Greater exposure to . . . excessive heat during the month before conception and the first trimester of pregnancy was associated with greater odds of having a small-for-gestational-age (SGA) baby.”).
- 19 *L.A. County Climate Vulnerability Assessment*, *supra* note 3, at 45.
- 20 Anna Novoselov, *As Climate Change Worsens Deadly Heat Waves, Policymakers Begin to Act*, UCLA Inst. of the Env’t and Sustainability (Aug. 30, 2022), <https://www.ioes.ucla.edu/article/as-climate-change-worsens-deadly-heat-waves-policymakers-begin-to-act/>.
- 21 Jeremy S. Hoffman, et al., *The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas*, 8 CLIMATE, no. 1, at 12 (2020), [www.mdpi.com/2225-1154/8/1/12/htm](http://www.mdpi.com/2225-1154/8/1/12/htm).
- 22 *L.A. County Climate Vulnerability Assessment*, *supra* note 3, at 45.
- 23 *Id.* at 47.
- 24 *Id.*; see also Amee Raval et al., *Mapping Resilience: A Blueprint for Thriving in the Face of Climate Disasters*, Asian Pac. Env’t Network (2019), [https://apen4ej.org/wp-content/uploads/2019/10/APEN-Mapping\\_Resilience-Report.pdf](https://apen4ej.org/wp-content/uploads/2019/10/APEN-Mapping_Resilience-Report.pdf); Heather Cooley et al., *Social Vulnerability to Climate Change in California*, CEC-500-2012-013, Pac. Inst., at 4–7 (Sept. 28, 2012), <https://pacinst.org/wp-content/uploads/2014/04/social-vulnerability-climate-change-ca.pdf> (discussing intrinsic and extrinsic factors that can contribute to different levels of risk to heat-related illness or death, including age, medical conditions and use of medications, living conditions, and social isolation).
- 25 C.J. Gabbe et al., *Reducing Heat Risk for People Experiencing Unsheltered Homelessness*, 96 INT’L J. OF DISASTER RISK REDUCTION (2023) (discussing the vulnerability of unhoused people); Kevin Riley et al., *Mortality and Morbidity During Extreme Heat Events and Prevalence of Outdoor Work: An Analysis of Community-Level Data from Los Angeles County, California*, 15 INT’L J. OF ENVTL. RES. & PUB. HEALTH no. 580, at 4 (2018) (discussing the

pedestrians during extreme heat events in a vulnerable neighborhood in L.A. demonstrates that the “location of high heat exposure sites within the neighborhood include areas heavily trafficked by pedestrians,” such as transit stops, schools, and outdoor commercial spaces. Moreover, “despite being active in high heat zones, pedestrians in [the] study area did not seek shade proactively,” suggesting that “individuals do not alter routines or routes due to daily life obligations,” particularly on weekdays.<sup>26</sup> Understanding pedestrian behavioral patterns is therefore an important prerequisite to devising policy solutions to address outdoor heat.

---

vulnerability of outdoor workers); Andrew M. Fraser & Mikhail V. Chester, *Transit System Design and Vulnerability of Riders to Heat*, 4 J. OF TRANSPORT & HEALTH, 216–225 (2017) (discussing the vulnerability of transit riders); C. J. Gabbe et al., *Housing and Urban Heat: Assessing Risk Disparities*, 33 HOUS. POLICY DEBATE, 5, 1078–1099 (2023) (discussing the vulnerability of renters). In a study on the use of shade by pedestrians during extreme heat events in a vulnerable neighborhood in L.A., UCLA researchers found that “outdoor spaces classified as commercial and residential were used more during weekends, which had an increase for commercial and high density residential [areas] during heat event days but slightly decreased in low density residential areas.” Sahar Derakhshan et al., *Space-Time Dynamics in Hazard Exposure Analysis: Smartphone Locations Show Pedestrian Routes Are Inflexible to Extreme Heat Event*, NPJ NAT. HAZARDS no. 2, at 2 (2025). “By overlaying building footprints on users’ resting locations at night, [the researchers] discovered that about 10.5% of the potential resident population were not within buildings and may represent the unhoused population (an underrepresented group vulnerable to extreme heat), from which 10% were continuously in outdoor areas in weekdays (5% in weekends) in Pacoima during daytime as well, without a major difference between control and heat event days (36% of the unhoused residents were in Pacoima’s outdoor areas for at least half of sampled days).” *Id.* Heat events also “disproportionately affect communities with more residents who work in construction, agriculture, or other outdoor occupations.” *L.A. County Climate Vulnerability Assessment*, *supra* note 3, at 41.

26 Derakhshan et al., *supra* note 25, at 7.

# Existing Goals and Actions in Los Angeles Relevant to Reducing Vulnerability to Outdoor Extreme Heat

The problem of extreme heat is relatively new and under-addressed by regulatory bodies and local governments around the world. L.A. County and City have done more than most other jurisdictions on this issue, setting ambitious goals and adopting advisory plans and broad policies promoting heat mitigation and cooling. For example, the County aims to convert significant amounts of pavement in the County to multi-benefit, nature-based solutions like cool or green surfaces, and to reduce by 30% the number of heat-stress emergency department visits by 2045. The City's goals include installing cool pavement material on 250 lane miles of the City's streets. Both locales have assessed risks from heat to their residents, developed public information campaigns on heat safety, and begun to develop location-specific interventions. Some of the main areas of progress related to outdoor heat are summarized here.

## L.A. County

L.A. County has done pioneering work to assess community vulnerability to heat. Most notably, in 2021, the County published its first-ever Climate Vulnerability Assessment, a comprehensive report that examines how climate risks will impact county residents. The Climate Vulnerability Assessment notes that there are spatial differences in L.A. County communities' access to the built environment and natural resources that can help people cope with heat, such as heat refuges, park access, tree canopy, and permeable surfaces. "Even marginal increases in frequency, severity, and/or duration of extreme heat events may cause more serious impacts" in communities with limited access to community scale adaptive capacity.<sup>27</sup> The communities where this limited access coincides with high vulnerability to extreme heat include areas of Baldwin Park, Montebello, and parts of City of Los Angeles (Van Nuys, North Hollywood, and Winnetka).<sup>28</sup> Additionally, "communities with low community level adaptive capacity that are expected to become more vulnerable to extreme heat by mid-century because of increases in exposure" include unincorporated East Los Angeles, South Gate, Huntington Park, Bellflower, and L.A. (Melrose).<sup>29</sup> The

---

<sup>27</sup> L.A. County Climate Vulnerability Assessment, *supra* note 3, at 50.

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

Assessment determines that these areas should be prioritized for adaptation action because they are less equipped to deal with extreme heat risks.<sup>30</sup>

The County has also begun to outline goals and steps to reduce extreme heat vulnerabilities. In its regional Sustainability Plan (titled “*OurCounty*”), L.A. County identifies “integrat[ing] climate resilience and adaptation into planning, buildings, infrastructure, and community development decisions” as a main strategy related to extreme heat (referred to as “Strategy 2A”).<sup>31</sup> The targets associated with Strategy 2A entail replacing 500 acres of L.A. County’s 271,000 total acres of pavement with multi-benefit, nature-based solutions like cool or green surfaces by 2030, replacing 1,600 acres of pavement by 2045, and reducing the number of heat stress emergency department visits by 10% by 2030 and by 30% by 2045.<sup>32</sup> Notably, the County proposes building shade structures as one strategy to accomplish its goals.<sup>33</sup> Other strategies the County identifies include prioritizing cool pavements and roofs as well as pavement reduction and urban greening; and implementing building upgrades, infrastructure improvements, and zoning and code changes.<sup>34</sup> Another one of the County’s advisory documents, *Heat Vulnerability in Los Angeles County: Resource and Methodology Assessment*, suggests an approach that is similar to Strategy 2A in *OurCounty* and also recommends “ensur[ing] a climate-appropriate, healthy urban tree canopy that is equitably distributed.”<sup>35</sup> Moreover, the *L.A. County General Plan* includes the goal of supporting the design of developments that provide substantial tree canopy cover and utilize light-colored paving materials and energy-efficient roofing materials to reduce the urban heat island effect.<sup>36</sup>

L.A. County has begun efforts to reduce vulnerability to extreme heat through its management of heat mitigation information campaigns and research hubs. For example, *Ready L.A. County* serves as a hub for disaster preparedness resources for eight hazards and threats, including “Extreme Heat.”<sup>37</sup> The resource page contains a map of cooling centers as well as other safety tips and links to other local, state, and national organizations, such as the Federal Emergency Management Association. The County Department of Public Health’s *Office of Environmental Justice and Climate Health* (OEJCH) webpage also contains its OEJCH Strategic Plan, which is a comprehensive roadmap that “outlines a path to

---

30 *Id.*

31 County of L.A., *Our County: The Los Angeles Countywide Sustainability Plan, 2025 Update*, at 53 (Nov. 4, 2025), <https://ourcountyla.lacounty.gov/wp-content/uploads/2025/10/Final-2025-OurCounty-Plan.pdf>.

32 *Id.* at 52.

33 *Id.* at 66.

34 *Id.* at 141.

35 Ctr. for Resilient Cities and Landscapes, Columbia Univ., *Heat Vulnerability in Los Angeles: Resource and Methodology Assessment*, at 4 (June 2020), <https://static1.squarespace.com/static/5dba154a6b94a433b56a2b1d/t/6026bad8d2340a771606e2bc/1613150954188/LA+County+Heat+report.pdf>.

36 William Fulton et al., *L.A. County General Plan 2035*, at 89 (last updated Mar. 2023), [https://planning.lacounty.gov/wp-content/uploads/2023/03/gp\\_final-general-plan.pdf](https://planning.lacounty.gov/wp-content/uploads/2023/03/gp_final-general-plan.pdf).

37 County of L.A., *Ready L.A. County* (last visited Oct. 6, 2025), <https://ready.lacounty.gov/heat/>.

protect Los Angeles County residents from the harmful effects of toxic exposure and climate change.”<sup>38</sup>

Although L.A. County has identified ambitious goals to address vulnerability to extreme heat and has begun to take actions in pursuit of these goals, these efforts are still in their nascent stage and are largely unmandated, unenforceable, and un- or underfunded. L.A. County has developed a Climate Ready Communities initiative which involves the promotion of Climate Resilience Districts that empower local governments to adopt climate resilience measures, but this initiative is still in its early stages, with the County recently having “commissioned [a] white paper to investigate the effectiveness of CRDs and possible applications.”<sup>39</sup> Notably, the County has not adopted a specific “shade” target to help drive its efforts to increase shade.

## City of L.A.

Like L.A. County, the City of L.A. has adopted goals to address vulnerability to extreme heat and has begun making progress to fulfill these goals. One of the City’s highest profile initiatives is *L.A.’s Green New Deal (GND)*, the citywide sustainability plan developed in 2015 by the office of then-Mayor Eric Garcetti. It is focused on lowering urban temperatures by implementing cool infrastructure, with a target of reducing the urban/rural temperature differential by at least 1.7 degrees by 2025, and 3 degrees by 2035.<sup>40</sup> The specific interventions that the *GND* recommends include cool pavement, cool neighborhoods, and cool roofs.<sup>41</sup> The plan also calls for annual reporting on the City’s progress toward meeting these goals.<sup>42</sup> *Resilient Los Angeles*, which is an advisory plan developed by the Mayor’s Office in partnership with the Rockefeller Foundation, includes similar strategies as well as the strategy of planting trees for shading and cooling.<sup>43</sup>

38 L.A. County Dep’t of Pub. Health, *Office of Environmental Justice and Climate Health* (last visited Oct. 6, 2025), <http://publichealth.lacounty.gov/eh/about/environmental-justice-climate-health.htm#plan>.

39 See generally L.A. County Pub. Works, *Climate Resilience Districts* (Oct. 2023), <https://file.lacounty.gov/SDSInter/bos/supdocs/179887.pdf#page=23>; L.A. County Bd. of Supervisors, Mot. on Fourth Progress Report on Building Climate Ready Communities and Infrastructure in L.A. County, at 15–16 (Apr. 18, 2025), [https://file.lacounty.gov/SDSInter/bos/bc/1182281\\_BoardMotion4.18.23Item7BuildingClimateReadyCommunitiesandInfrastructures\\_2025.04.18\\_.pdf](https://file.lacounty.gov/SDSInter/bos/bc/1182281_BoardMotion4.18.23Item7BuildingClimateReadyCommunitiesandInfrastructures_2025.04.18_.pdf) (discussing Climate Resilience Districts and citing *id.*).

40 This target is based on a baseline of 5.58°F in 2012. City of L.A., *L.A.’s Green New Deal: Sustainable City pLAn*, at 122 (2019), [https://plan.mayor.lacity.gov/sites/g/files/wph2176/files/2022-12/pLAn\\_2019\\_final.pdf](https://plan.mayor.lacity.gov/sites/g/files/wph2176/files/2022-12/pLAn_2019_final.pdf).

41 *Id.*

42 *Id.* at 18.

43 City of L.A. and Rockefeller Found., *Resilient Los Angeles* (Mar. 2018), [https://resilientcitiesnetwork.org/downloadable\\_resources/Network/Los-Angeles-Resilience-Strategy-English.pdf](https://resilientcitiesnetwork.org/downloadable_resources/Network/Los-Angeles-Resilience-Strategy-English.pdf).

Building on these goals, the City has taken some important steps to help residents adapt to extreme heat. In 2019, former Mayor Garcetti launched the *Cool Streets L.A.* program—“an initiative bringing 200 blocks of cool pavement and nearly 2,000 new trees to eight neighborhoods across L.A.’s hottest residential areas.”<sup>44</sup> The first phase of *Cool Streets L.A.* was designed to advance the goals of the City’s *Green New Deal* by piloting 10 cool streets projects by 2025. The cooling impacts of the program are aimed at enabling the City to meet several goals set forth in the *GND*, such as: achieving the 2025 and 2035 urban/rural temperature differential targets mentioned above; increasing tree canopy in areas of greatest need by at least 50% by 2028; and installing cool pavement material on 250 lane miles of the City’s streets.<sup>45</sup> L.A. County has also adopted an ordinance that requires all new roofs built after 2020 to be cool roofs.<sup>46</sup>

Another landmark heat resilience initiative at the city level has been the City’s appointment of a Chief Heat Officer. The City of L.A. named Marta Segura its first chief heat officer in June 2022.<sup>47</sup> L.A. became the third local government after Miami-Dade County in Florida and Phoenix, Arizona, to have created a city heat officer. This position was designed to oversee the city’s response to increasingly high heat by working with city departments to take immediate action on extreme heat; setting city-specific heat goals; and working with community-based and nonprofit organizations to increase public awareness about severe climate risk.<sup>48</sup> The job necessarily draws on a diverse set of government capacities, from public health and emergency services to transportation, housing, and public works—but it is challenging because these resources are outside the command and authority of the Chief Heat Officer. With Segura’s vision and support, the City launched a web application called Cool Spots LA. The app uses GIS technology to display more than 200 cooling centers and specific types of cool spots, such as hydration stations, recreation centers, public pools, and libraries, near residents.<sup>49</sup> Cool Spots L.A. is “the first of many resources Segura is mandated to create as she develops the city’s Heat Action Plan and Climate

44 Streets L.A., *Cool L.A. Neighborhoods* (last visited Oct. 6, 2025), <https://streetsla.lacity.org/cool-la-neighborhoods>. These neighborhoods include Pico Union, Westlake South, North Hollywood, Canoga Park, Sylmar, Vermont Square, South Central, and Boyle Heights. Alive! Employees Club, *Innovating to Lower LA’s Temperature, One City Neighborhood at a Time* (June 1, 2022), [https://aliveemployeesclub.com/feature\\_street-services-cool-neighborhoods-la\\_202206/](https://aliveemployeesclub.com/feature_street-services-cool-neighborhoods-la_202206/).

45 Alive! Employees Club, *supra* note 44.

46 LOS ANGELES COUNTY, CAL. ORDINANCE No. 2019-0061.

47 Council File: 21-1277: *City of Los Angeles Chief Heat Officer / Extreme Heat / Climate Change / Heat-Related Illness / Heat Action Plan / Establishment* (Oct. 26, 2022), <https://cityclerk.lacity.org/lacityclerkconnect/index.cfm?fa=ccfi.viewrecord&cfnumber=21-1277>.

48 See Sarah Kuta, *Los Angeles Becomes Latest City to Hire ‘Chief Heat Officer,’* Smithsonian Magazine (June 21, 2022), <https://www.smithsonianmag.com/smart-news/los-angeles-becomes-latest-city-to-hire-chief-heat-officer-180980285/>.

49 City of L.A., *CoolSpots L.A.* (last visited Oct. 6, 2025), [https://www.arcgis.com/apps/instant/nearby/index.html?appid=d3bea5218c3b4adca485a32c9e3fabee&center=-118.3519;34.052&level=11&hiddenLayers=LMS\\_Data\\_Public\\_5706;featColl\\_7801;Youthsource\\_centers\\_1444;featColl\\_3296](https://www.arcgis.com/apps/instant/nearby/index.html?appid=d3bea5218c3b4adca485a32c9e3fabee&center=-118.3519;34.052&level=11&hiddenLayers=LMS_Data_Public_5706;featColl_7801;Youthsource_centers_1444;featColl_3296); Patricia Cummins, *LA’s New Chief Heat Officer Expands Cooling Centers Based on Equity Maps*, Esri Blog (Oct. 27, 2022), <https://www.esri.com/about/newsroom/blog/los-angeles-chief-heat-officer-expands-cooling-centers/>.

Vulnerability Assessment, which will prioritize extreme-heat response.”<sup>50</sup> In July 2022, Segura’s team also launched a social media campaign to alert people of oncoming heat waves and increase awareness of the City’s network of cooling centers.<sup>51</sup> Though the Climate Emergency Mobilization Office had recently been proposed for elimination due to city-wide budget shortfalls, a range of commentators and community-based organizations rallied in support of the office and its work, leading the City Council to “scale[] back an array of cuts proposed in Bass’ budget,” including by providing “funds to continue operating the Climate Emergency Mobilization Office” in May 2025.<sup>52</sup> Maintaining a Chief Heat Officer continues to present opportunities for L.A. to adopt some of the strategies other global cities are using to address heat.

Through these and other efforts, the City of L.A. has taken innovative actions to build heat resilience by implementing cooling and heat mitigation strategies and developing capacity to tackle extreme heat. But like the County’s plans to reduce vulnerability to extreme heat, most of the City’s plans are relatively nascent and advisory. More can and should be done to build on this good work. Opportunities remain to push for additional implementation of these programs toward achievement of stated goals, and for the City and County to further align their heat resilience efforts.

---

50 Cummins, *supra* note 49.

51 *New Chief Heat Officer Helps Los Angeles Prepare for More Heat Waves*, YALE CLIMATE CONNECTIONS (Sept. 7, 2022), <https://yaleclimateconnections.org/2022/09/new-chief-heat-officer-helps-los-angeles-prepare-for-more-heat-waves/>.

52 David Zahniser and Rebecca Ellis, *L.A. City Council Approves \$14-Billion Budget, Scaling Back Bass’ Public Safety Plans*, L.A. TIMES (May 22, 2025), <https://www.latimes.com/california/story/2025-05-22/city-council-approves-budget-while-scaling-back-public-safety-plans>; see Sammy Roth, *Climate Change Is Cooking Los Angeles. Does Karen Bass Care?*, L.A. TIMES (May 1, 2025), <https://www.latimes.com/environment/newsletter/2025-05-01/climate-change-is-cooking-los-angeles-does-karen-bass-care>; Corinne Purtill, *Marta Segura: Chilling Voice in an Overheating City*, L.A. TIMES (June 23, 2024), <https://www.latimes.com/la-influential/story/2024-06-23/marta-segura-los-angeles-heat> (“The climate office has six employees and an annual budget of \$1 million—less than what the city spends on street sweeping supplies.”).

# Shade Structures and Other Street-Level Built-Environment Interventions Can Be an Important Part of the Solution to Mitigating Extreme Heat

Shade structures and other street-level built-environment interventions should be deployed in L.A. quickly to reduce harmful health impacts of extreme heat, especially in disadvantaged communities. Urban interventions to address exposure to heat include artificial shade structures, cool roofs and pavements, and green infrastructure such as trees and permeable softscapes that can replace urban pavements and other hardscapes.<sup>53</sup> Of these options, shade structures provide significant advantages. Urban climate science is unambiguous: shade is the most effective way to keep people cool when spending time outdoors.<sup>54</sup> Robust research investigating how shade can reduce surface temperatures and improve thermal comfort during extreme heat events demonstrates significant protections from peak temperatures, in some cases even reducing the surfaces temperatures of buildings by approximately 20–40°F.<sup>55</sup> However, buildings provide little shade in low-rise development zones. And while trees play an important role in providing shade and should be part of any urban heat resilience strategy, trees take years to mature enough to provide shade and won't always win community acceptance.<sup>56</sup> For these reasons, planting trees and installing

- 
- 53 Cools roofs are “designed to reflect more sunlight than a conventional roof, absorbing less solar energy,” and cooling the building temperature as a result. U.S. Dep’t of Energy, *Cool Roofs* (last visited Oct. 6, 2025), <https://www.energy.gov/energysaver/cool-roofs>. Cool pavements refer to “paving materials that reflect more solar energy, enhance water evaporation, or have been otherwise modified to remain cooler than conventional pavements.” Env’t Prot. Agency, *Using Cool Pavements to Reduce Heat Islands* (last visited Oct. 6, 2025), <https://www.epa.gov/heatislands/using-cool-pavements-reduce-heat-islands>.
- 54 V. Kelly Turner et al., *Site Design and Human Heat Burden in Pacoima, California* 4, 6, UCLA LUSKIN CTR. FOR INNOVATION (Apr. 2023), <https://innovation.luskin.ucla.edu/wp-content/uploads/2023/05/luskin-pacoima-extreme-heat-report.pdf>.
- 55 *Id.* at 101–02.
- 56 Stephanie Pincetl et al., *Urban Tree Planting Programs, Function or Fashion? Los Angeles and Urban Tree Planting Campaigns* 78 *GeoJournal* 475, 477, 481, 489, 490 (2013), <https://pages.stolaf.edu/es237-spring2018-19/wp-content/uploads/sites/1295/2020/02/Pincetl2013UrbanTreePlantingEx.LosAngeles.pdf>. Tree planting and maintenance “requires irrigation, which creates a tradeoff between environmental costs” (e.g., water transport from distant watersheds and energy required to do so) and benefits (e.g., cooling and shade). *Id.* at 481. Studies of the L.A. market for single-family detached houses and the multifamily building market also suggest “that while Los Angeles residents may want additional trees, they are unwilling to pay for them.” *Id.* at 483–84; see also Colleen Callahan et al., *Protecting Californians with Heat Resilient Schools* 8, UCLA LUSKIN CTR. FOR INNOVATION (May 2023), <https://innovation.luskin.ucla.edu/wp-content/uploads/2023/05/Protecting-Californians-with-Heat-Resilient-Schools.pdf>. Those looking to read more about urban tree-planting strategies can consult resources developed by the UCLA’s Luskin Center for Innovation and its L.A. Urban Forest Equity Collective. See, e.g., Dana Hellman et al., *Los Angeles Urban Forest Equity: Assessment, Tools, and Recommendations*, URBAN FOREST EQUITY COLLECTIVE (Jan. 2024), <https://escholarship.org/uc/item/1gt5f9x2>; Robin Gilliam et al., *Los Angeles*

cool pavements—though critically important—can and should be paired with additional short- and mid-term strategies for creating shade. This paper focused on built-environment interventions, like shade structures, about which comparatively less has been written.

Shade structures or other built-environment interventions serve as useful heat mitigation strategies because they are likely not as costly to maintain as trees, they are designed specifically for shade provision, they can be installed where needed, and they are immediately effective upon installation. Examples of shade structures include:

- shelters at or near transit stops (like existing bus shelters but more widespread and perhaps larger);
- shaded covers over public and private parking lots;
- shade sails over playgrounds, parks, sidewalks, urban plazas, and school yards;
- colonnades and other forms of shade covers over highly trafficked urban walking routes and commercial spaces; and
- shaded features attached to or adjacent to private buildings, and in publicly accessible courtyards.

A few guiding design principles for shade structures are safety, accessibility, and protection from the sun, wind, and rain.<sup>57</sup> Structures “must be designed in such a way that provides shade during the hottest times of the day for heat relief.”<sup>58</sup> It is important to choose materials that will not absorb and reradiate sunlight, thereby increasing heat in the vicinity of the structure. Areas “that are already shaded by nearby trees or buildings may not require as much investment in shade production as others.”<sup>59</sup> Structures “also need to consider disabled and older adults’ ability to use the structure in a safe and equitable manner.”<sup>60</sup>

---

*Urban Forest Equity Neighborhood Strategy: Central Alameda*, URBAN FORESTRY EQUITY COLLECTIVE (Jan. 2024), <https://escholarship.org/uc/item/12r9n92k>; Pam Gibson et al., *Los Angeles Urban Forest Equity Neighborhood Strategy: Sylmar*, URBAN FORESTRY EQUITY COLLECTIVE (Jan. 2024), <https://escholarship.org/uc/item/5zv7v9zx>; Krystle Yu and Rachel O’Leary, *Los Angeles Urban Forest Equity: Design Guidebook*, URBAN FORESTRY EQUITY COLLECTIVE (Jan. 2024), <https://escholarship.org/uc/item/25h5d5z3>; Urban Forest Equity Collective, *LA Urban Forest Equity Community Action Toolkit* (last visited Oct. 6, 2025), <https://www.cityplants.org/community-action-toolkit/>.

57 Diana Alcocer et al., *Identifying and Addressing Heat Inequities in the City of Los Angeles*, 2023 UCLA Master of Urban and Regional Planning Comprehensive Planning Project, Conducted in Collaboration with the L.A. City Climate Emergency Mobilization Office (CEMO) 115 (2023), <https://innovation.luskin.ucla.edu/wp-content/uploads/2023/06/CEMO-Comprehensive-Project-Report.pdf>. Bus shelters users report feeling safer when the shelter is well-lit, and they have an unobstructed view of their surroundings.

58 *Id.*

59 *Id.*

60 *Id.*

Moreover, the placement of shade infrastructure is critically important. Research by our UCLA colleagues looking at pedestrian movements in a vulnerable neighborhood in L.A. has shown that people who spend time outdoors during extreme heat days do not significantly alter their movement patterns as compared with average temperature days, and individuals' weekday outdoor activities are particularly unresponsive to the location of existing shade.<sup>61</sup> Pedestrian locations were concentrated around transit stops, schools, and parking lots with little difference between control and extreme heat days.<sup>62</sup> For this reason, the most important shade provision strategy is to provide shade exactly where heat-exposed people are, rather than assume that people will adjust their use of urban space to seek shade.<sup>63</sup>

Another consideration is ensuring that shade structures are sited optimally with respect to sun exposure throughout the day and year. For example, in L.A. and the rest of the northern hemisphere, sunlight is stronger from the south, so on sidewalks running east-west, transit shelters on the northern side of the road run the risk of casting shade on the buildings behind the structure rather than in the shelter where people wait for buses. Where possible, the design, construction, and placement of shade structures should take this factor into account, recognizing that some degree of sub-optimal placement will always be necessary because of design and siting constraints.

Advances in materials sciences are expanding opportunities for shade structures even beyond traditional options. UCLA researchers and others are exploring new shade structures as potential solutions that could reduce adverse public health outcomes from outdoor exposure to extreme heat, and that have the potential to reduce inequities across neighborhoods in exposure to extreme heat. A group of materials science and thermal engineers at UCLA have tested a prototype cooling structure during summer conditions that serves as the basis for a structure to be deployed in the field. They constructed their prototype structure with “superwhite” roof coatings, which experienced significantly lower temperatures (> 15°F) under direct sunlight than a bare metallic roof, as well as radiant cooling panels flowing cold water along one of the vertical panels, which block radiative heating sources. Thermal imaging reveals that, even in a hot environment, the radiant panel is able to remain cool relative to the hot radiant environment around it and qualitatively improves thermal comfort in preliminary testing.<sup>64</sup>

61 A group of researchers at UCLA's Institute of the Environment and Sustainability drew this conclusion from an analysis of human behavior during extreme heat events as manifested in smartphone device locations. See generally Sahar Derakhshan & Travis Longcore et al., *Smartphone Locations Reveal Patterns of Cooling Center Use as a Heat Mitigation Strategy*, APPLIED GEOGRAPHY, INST. OF THE ENV'T & SUSTAINABILITY, UCLA (2022).

62 *Id.*

63 *See id.*; Derakhshan et al., *Space-Time Dynamics*, *supra* note 25, at 2, 6.

64 *See* Eric Teitelbaum et al., *Membrane-Assisted Radiant Cooling for Expanding Thermal Comfort Zones Globally Without Air Conditioning*, 117 PROCEEDINGS OF THE NAT'L ACAD. OF SCIENCES 21162, 21164 (Aug. 2020), <https://pubmed.ncbi.nlm.nih.gov/32817481/>; *see also* Erica Moser, *Testing a Novel, Community-Driven Response to Heat Islands in Philadelphia*, PENN TODAY, UNIV. OF PA. (Sept. 9, 2024), <https://penntoday.upenn.edu/news/cooling->

Around the world, cities have begun to explore creative solutions to reduce community exposure to extreme outdoor heat. The following table gives examples of built-environment interventions that have been adopted to protect communities from outdoor exposure to extreme heat:

City	Solutions
Tel Aviv, Israel	Along the sidewalks of Atidim Park—a business and commercial district in northern Tel Aviv—city stakeholders installed a structure resembling something between a satellite dish and a ship’s sail, called LumiWeave. The structure is made of an innovative lightweight fabric designed to provide shade during the day and solar-powered lighting at night. Prior to the launch of LumiWeave, the city developed “shade maps” documenting where shade was, and was not, provided by buildings, trees, colonnades, and pergolas in public spaces. <sup>65</sup>
Singapore	The Singaporean government installed new smart bus stops in 2018 with a cooling system called Airbitat, created by the Singapore-based ST Engineering company, to address the dual problem of urban heat and pollution and keep track of average waiting time. <sup>66</sup> Airbitat “works by pre-cooling the hot return air in the data hall to reduce over 40% of the heat load from the existing chiller system” and “does not generate waste heat into the environment as it does not use compressors [or] refrigerants.” <sup>67</sup> The Airbitat was first installed as a pilot venture in the Plaza Singapore Bus Stop, which became the world’s first sustainably cooled bus stop shelter. “The Airbitat served as a valuable amenity to bus stops to cool the surrounding air temperatures down to 75°F.” <sup>68</sup>
Medellín, Colombia	The city transformed 18 roads and 12 waterways into lush green cycling lanes and walkways, connecting its parks and other frequently visited sites. <sup>69</sup> By 2019, the city had planted over 8,000 trees and more than 350,000 shrubs. <sup>70</sup> The city also collects rainwater to help water the green belts. This initiative, which is called the Green Corridors project, has dropped the city’s average summer temperature by as much as 5.5 degrees Fahrenheit and officials hope that before 2030, it could shave off up to 9 degrees Fahrenheit. <sup>71</sup>

In order to prepare L.A. for a hotter future and protect its residents now and in advance of the 2028 Olympics and Paralympics, shade structures and other built-environment

[shelter-novel-community-driven-response-heat-islands-philadelphia](#) (describing a novel solar-powered wooden bus shelter developed by researchers at the University of Pennsylvania that provides shade, a bench with a conductive cooling surface, and radiant cooling panels in the walls).

65 Peter Yeung, *The City Taking Shade to a Science in Battle with Heat*, Deceleration News (Sept. 2022), <https://deceleration.news/2022/09/02/the-city-taking-shade-to-a-science-in-battle-with-heat/>.

66 Diana Alcocer et al., *supra* note 57, at 124.

67 *Data Centre Cooling System Has Tropical Benefits*, Cooling Post (July 2022), <https://www.coolingpost.com/products/data-centre-cooling-system-has-tropical-benefits/>.

68 Diana Alcocer et al., *supra* note 57, at 125.

69 Angela Dewan, *These Cities Are Better at Enduring Extreme Heat. Here’s What They’re Doing Different*, CNN (Aug. 2022), <https://www.cnn.com/2022/08/04/world/cool-cities-heat-wave-climate-cmd-intl/index.html>.

70 *Id.*

71 *Id.* The Green Corridors project won the 2019 Ashden Award for Cooling by Nature. See Ashden Climate Solutions in Action, *Alcaldía de Medellín/Growing a Cooler City* (last visited Oct. 6, 2025), <https://ashden.org/awards/winners/alcaldia-de-medellin/>.

solutions should be constructed at key, high-use locations and along outdoor movement corridors. Transit stops, for example, are particularly important hubs and should be prioritized given LA’s ambitious goals for transit and active transportation. These transit and transportation goals will be harder to meet if transit stops are so hot as to be unsafe during extreme heat events. In general, transit stops, schools, parking lots, and commercial areas with high foot traffic are high-use nodes even on extreme heat days, and are therefore ripe for intervention.<sup>72</sup> Thus, shade structures should be constructed in and around these sites to improve pedestrian thermal comfort.<sup>73</sup> Because commercial areas are some of the places with the most people exposed to unshaded conditions, incentives and public-private partnerships may be particularly valuable to bring shade and other cooling interventions to L.A. residents.<sup>74</sup>

The urgency of this need is highlighted by the ShadeLA campaign, a new collaboration between UCLA and the University of Southern California, with participation by the City, the County, Metro, and LA28. In its initial public announcement, ShadeLA summarizes its aims in this way: “As we get ready to welcome the world for the World Cup, Super Bowl, and Olympic and Paralympic Games, it’s time to take action. From rethinking how we design streets and schoolyards to adding shade wherever people gather, wait, or walk, Angelenos are stepping up to make our city cooler and more comfortable for everyone.”<sup>75</sup> Among ShadeLA’s early efforts is its launch of an annual “Shade Zones” design competition in which students submit designs for innovative shade structures—with the 2025 prompt seeking designs for “modular, temporary shade that can go up fast around public hot spots like bus stops, event spaces, and parks”—inspired by a similar competition in Tel Aviv that “invited architects and designers to offer shade solutions at selected intersections throughout the city for prizes.”<sup>76</sup>

Although reducing vulnerability to outdoor extreme heat is a nascent effort in L.A. and other jurisdictions, bolstering these efforts will become increasingly important as temperatures

72 In one study of outdoor movements of pedestrians in a vulnerable L.A. neighborhood, commercial spaces were found to have the highest foot traffic and the least available shade and tree cover. Derakhshan et al., *Space-Time Dynamics*, *supra* note 25, at 2.

73 This conclusion is consistent with existing City and County goals and with the findings of other researchers who have examined climate adaptation efforts in L.A. through an equity lens. See Hanqing Chu et al., *Equity-Focused Heat Adaptation Strategies for Los Angeles County*, UCLA LUSKIN CTR. FOR INNOVATION, at 4 (June 2021), <https://innovation.luskin.ucla.edu/wp-content/uploads/2021/06/Equity-Focused-Heat-Adaptation-Strategies-for-LA-County.pdf> (recommending, *inter alia*, that L.A. install more cooling infrastructure, including shade structures and centers).

74 *Id.* at 2, 7.

75 ShadeLA, *We Are ShadeLA* (last visited Oct. 6, 2025), <https://shade-la.com>; see also UCLA, *UCLA Teams Up with USC and Civic Partners to Cool the Los Angeles Region* (July 16, 2025), <https://newsroom.ucla.edu/releases/ucla-usc-civic-partners-shade-los-angeles>.

76 ShadeLA, *Design Competition: Shade Zones* (last visited Oct. 6, 2025), <https://shade-la.com/design-competition/>; Simona Shemer, *Throwing Shade: Tel Aviv Competition Awards Teams For Innovative Shaded Structures*, NOCAMELS (Jan. 9, 2018), <https://nocamels.com/2018/01/tel-aviv-competition-innovative/>.

rise. Creating shade through shade structures and other street-level built interventions is consistent with many of the goals that have been articulated by the City and County and is a significant part of the solution.

# Case Study: The Legal and Regulatory Context for Street-Level Shade Structures in L.A. City

Many existing land use and regulatory regimes do not yet value or promote shade or other heat resilience measures in ways that are consistent with long-term climate adaptation goals. Development of the most equitable and cost-effective interventions to reduce risks from outdoor heat will require using existing authorities in new ways and creating new policies for public and private spaces.

To illustrate this dynamic, this section provides examples of the City of L.A.'s land use and zoning regulations that may be relevant to efforts to install streetscape shade structures, noting where current regimes may be inadequate to support, or are even at cross purposes with, the creation of such structures.

## Significant legal uncertainty about how to treat shade structures under Los Angeles's Municipal Code may pose a barrier to installations

The City of L.A.'s Municipal Code (the Municipal Code) does not directly address how streetscape shade structures would or could be permitted. But there are some useful analogies that shed light on how such structures could be treated in L.A. and the legal requirements that would apply. The way in which shade structures are framed could impact how they are treated under the Municipal Code. For example, shade structures might be treated like benches or canopies, which are subject to relatively stricter permitting requirements. Alternatively, they could be treated like bike racks, which can be installed with less red tape. The fact that the legal status of shade structures is so uncertain is, itself, a barrier to construction and indicative of how much more work could be done to smooth the path to implementation.

If treated like benches or canopies, installation of shade structures could be relatively difficult. Canopy rules don't apply directly to most shade structures, because canopies are defined very narrowly in the Municipal Code to include only certain outdoor fixed struc-

tures associated with an entrance to a building.<sup>77</sup> But analogizing to the code provisions for canopies suggests an onerous permitting pathway. Benches and canopies require individual permits and approval from abutting property owners, which allows residents to challenge the installation of benches and canopies near their properties. These mechanisms would allow people who hold a “not in my backyard” or “NIMBY” attitude to prevent the installation of shade structures.

Both canopies and benches require a type of permit (known as a Revocable Permit or “R” Permit) that grants a conditional encroachment of the public right-of-way by private parties. Municipal Code § 62.61(b) establishes that a permit is required for any such encroachment, establishing the general rule that “no person shall . . . perform work within or on any Public Street or public right-of-way, or obstruct any Public Street or public right-of-way for any reason without first applying for and obtaining the applicable permit from the Bureau of Engineering or the Bureau of Street Services.” “R” permits are discretionary because the Board of Public Works can modify permit recommendations made by the Bureau of Engineering. “R” permits are typically granted with construction and installation permits, such as A, B, and Excavation E Permits.<sup>78</sup> Under the Municipal Code, benches come with additional constraints, too. They may only be permitted at existing bus stops and on commercial streets that are adjacent to a residential area where a “substantial percentage” of residents are over the age of 65.<sup>79</sup> The owner or occupant of the property abutting the potential bench location must give written consent,<sup>80</sup> and if 60 percent of the property owners and/or tenants within 200 feet of the location of the bench protest the bench, the application will be denied.<sup>81</sup> Additionally, in order to receive a permit to install a bench, the applicant must obtain a surety bond or public liability insurance.<sup>82</sup>

Similarly, to erect a canopy, an applicant must obtain an “R” permit and accompanying construction and installation permits from the Board of Public Works, and must show whether the owners of abutting properties approve of the canopy.<sup>83</sup> The installer must also have an

77 LOS ANGELES, CAL. MUN. CODE § 62.133(a)(1) (defining a canopy as “any fixed structure, framework, appendage, appurtenance, shelter or shade, without enclosing walls, covered with canvas, cloth, galvanized iron, aluminum, approved slow-burning plastic or similar material erected, constructed or maintained at or over the entrance way to a building or place of business within a building, and extending over any public street or sidewalk supported by an individual framework from the ground”).

78 *R-Permit Purpose & Definition*, L.A. BUREAU OF ENG’G (revised on July 9, 2025), <https://engpermitmanual.lacity.org/revocable-r-permits/permit-overview/1-r-permit-purpose-definition>; see also “A” *Permit Purpose & Definition*, L.A. BUREAU OF ENG’G (revised on July 7, 2025), <https://permitmanual.engineering.lacity.gov/construction-permits/permit-overview/1-permit-purpose-definition> (explaining that A-Permits are construction permits applicable to minor street construction of “streetscape fixtures” like benches and canopies in the public right-of-way).

79 LOS ANGELES, CAL. MUN. CODE § 68.01(a), (b) (2025).

80 LOS ANGELES, CAL. MUN. CODE § 68.01(b)(3) (2025).

81 LOS ANGELES, CAL. MUN. CODE § 68.04(c), (f) (2025).

82 LOS ANGELES, CAL. MUN. CODE §§ 68.10–11 (2025).

83 LOS ANGELES, CAL. MUN. CODE §§ 62.133(b), (d) (2025); see LOS ANGELES, CAL. MUN. CODE § 62.133(a)(1), *R-Permit Purpose & Definition*, *supra* note 78.

insurance policy that indemnifies the City, and the canopy must meet certain material and construction requirements.<sup>84</sup>

One could, alternatively, analogize the installation of shade structures to the installation of bike racks, which is somewhat more easily accomplished—but which is still not easy. L.A.’s municipal code includes multiple provisions regulating the installation of bicycle parking near buildings and in the public right-of-way. For example, under L.A.’s Bicycle Parking Ordinance, short-term bicycle parking must be located near the main entrance of a newly constructed building and may be located inside or in the parking structure of an existing building.<sup>85</sup> If bicycle infrastructure is to be installed in a public right-of-way, it can only be installed on sidewalks that are within a DOT designated “Bike Infrastructure Zone.”<sup>86</sup> To install a bike rack, an applicant must submit a plan to DOT and if the plan requires modifying a permanent structure on the sidewalk, the applicant must get a permit from the Board of Public Works.<sup>87</sup> As with benches and canopies, an additional permit (known as an “A” permit) may also be required from the Bureau of Engineering, which allows for minor construction in the public right-of-way.<sup>88</sup> Unlike with benches and canopies, bicycle infrastructure permits do not require neighbor consent. Bike infrastructure may be relatively more streamlined to install than other forms of streetscape infrastructure because of a broad push by the City to favor modes of active transportation.<sup>89</sup>

To reduce legal uncertainties and clear a path for easier installation, the City could clarify how it treats street-level shade installations under the Municipal Code, making plain what steps and authorizations are required for shade installations. As with favored bike infrastructure, the City could explicitly consider and promote shade structures to advance climate resilience policy aims. As discussed further below in our section on recommendations, the City might, for example, establish cooling or shade infrastructure zones where shade structures can be more easily built, analogous to DOT’s “bike infrastructure zones.”

The City might clarify that streetscape shade structures fall under the category of “public benefit projects” under Section 14.00 of the City’s Municipal Code. Public benefit projects are allowed in any zone, unless specifically restricted. Uses include density bonuses,

---

84 LOS ANGELES, CAL. MUN. CODE §§ 62.133 (g), (h), (i), (m) (2025). The code section on canopies does not specify the amount of liability insurance necessary, but the Bureau of Engineering requires \$1 million in liability insurance for sidewalk encroachments.

85 LOS ANGELES, CAL. MUN. CODE § 12.21 (2025).

86 LOS ANGELES, CAL. MUN. CODE § 85.04(b)(1) (2025).

87 *R-Permit Purpose & Definition*, *supra* note 78.

88 *Bicycle Racks/Bike Sharing Installation*, CITY OF L.A. BUREAU OF ENG’G, <https://engpermitmanual.lacity.org/construction-permits/technical-procedures/07-bicycle-racks-bike-sharing-installation> (last visited Oct. 6, 2025); *Construction “A” Permits*, CITY OF L.A. BUREAU OF ENG’G, <https://permitmanual.engineering.lacity.gov/construction-permits> (last visited Oct. 6, 2025).

89 Los Angeles, Exec. Directive 25, L.A.’s Green New Deal: Leading By Example (Feb. 10, 2020) (introducing “Activate Streets” directive).

supportive housing, community centers, parks, public service uses, and governmental enterprises. Public benefit projects must adhere to certain performance standards, such as prohibiting outdoor public telephones (related to the purpose of not encouraging loitering, discussed further below).<sup>90</sup> Although shade structures are not currently listed in this category, there's a strong case for considering a shade structure a public service use.

Lastly, the zoning code could be amended to address shade structures explicitly, making clear where and how such structures could be installed.

## L.A.'s anti-loitering policies may interfere with efforts to create more street-level shade structures

One overarching lesson from these surveyed regulations is that they are designed to prevent or discourage loitering. Often, streetscape infrastructure that has the potential to attract loiterers—or, more simply, people who hang around a space for an extended length of time—is treated less favorably than other, similar types of infrastructure. This anti-loitering bias in the law may create significant tension with efforts to deliberately draw people to public spaces for the purpose of sheltering them, like shade structures.

This anti-loitering bias is reflected in the more stringent regulations around installation of public benches than for, say, the installation of bike racks, as discussed above. While benches and bike racks are both similar sized structures installed on public rights-of-ways, bench installation requires approval of the abutting property owner or tenant, and an application to install a bench will be denied if 60 percent of the neighbors object. Bicycle racks are not subject to the same neighbor approval and are generally much easier to get approved.

The Municipal Code also contains language that seems to discourage public gatherings. Municipal Code § 14.00 prohibits outdoor public telephones as part of public benefits projects to further the purpose of discouraging loitering.<sup>91</sup> The design of street-level infrastructure also reflects an intent to prevent loitering. For example, many bus benches throughout the City and County of L.A. feature divided seats, which prevent people from laying down at bus stops. These ideas are also reflected in L.A.'s “sit, sleep, lie” ordinance, which prohibits people from “sitting, lying, or sleeping, or by storing, using, maintaining, or placing personal property, within the public right-of-way in a manner that obstructs or unreasonably interferes with the use of the right-of-way for any activity for which the City

90 LOS ANGELES, CAL. MUN. CODE § 14.00A(5)(b) (2025).

91 LOS ANGELES, CAL. MUN. CODE § 14.00A(5)(b) (2025).

has issued a permit” or “anywhere within the street, bike lane, bike path, or other public right-of-way,” among other places, such as near doorways and fire hydrants.<sup>92</sup>

While there may be legitimate ADA and public safety reasons for these regulations, many of the Municipal Code’s provisions have the effect of preventing transit riders, pedestrians, and unhoused people from finding shade, resting, and congregating in public spaces. L.A. may need to consider how these existing anti-loitering policies could inhibit efforts to create inviting places for pedestrians to seek and enjoy shaded spaces.

## L.A.’s pedestrian-friendly policies support efforts to build more street-level shade structures

In contrast with the anti-loitering language highlighted above, City of L.A. is also embracing more pedestrian-oriented communities and streets.<sup>93</sup> Climate adaptation infrastructure such as shade structures should be an important part of the effort to create pedestrian-friendly streetscapes.

This trend toward creating pedestrian-friendly communities plays out in a few ways in the Municipal Code. The Code allows for the creation of overlay districts, including Community Overlay Districts and Pedestrian Overlay Districts, that are designed to give communities more control over the land use and zoning laws that govern the built environment in their neighborhoods. In particular, Pedestrian Overlay Districts are aimed at promoting more pedestrian-friendly streets and encouraging pedestrians to use sidewalks. Both of these tools can be used to enhance thermal comfort and safety of pedestrians during extreme heat events, in ways discussed in the Recommendations section below.

Another notable effort to promote more pedestrian-friendly streets is the City’s work to expand outdoor dining rules first pioneered during the COVID-19 pandemic. This work also provides a potential model for streamlining legal requirements to achieve desired policy outcomes. The City authorized outdoor dining areas and temporarily suspended certain zoning regulations at the beginning of the COVID-19 pandemic as a part of the L.A. Al Fresco program. “The program created a lifeline for many businesses, and was imple-

---

92 LOS ANGELES, CAL. MUN. CODE § 41.18 (2025).

93 See L.A. County Dep’t of Pub. Health, *Step by Step Los Angeles County* (last visited Oct. 6, 2025), [www.publichealth.lacounty.gov/place/stepbystep/lacounty.htm](http://www.publichealth.lacounty.gov/place/stepbystep/lacounty.htm) (detailing how L.A. County has adopted or is in the process of adopting pedestrian plans for specific unincorporated communities in L.A. County that provide “guidance in developing a network of sidewalks, off-street paths, and trails and facilities (such as lighting, crosswalks and benches) that allow people to walk safely and comfortably to key destinations like parks and schools throughout a community”).

mented with a simple process and minimal cost to participants.”<sup>94</sup> Due to the success of the temporary program, the City Council instructed City departments to establish permanent rules for outdoor dining on private property, sidewalks, and in-street.<sup>95</sup> The City’s ongoing efforts to make this temporary zoning relief permanent suggests that the City is rethinking some of its policies and working to implement more pedestrian-friendly policies.

Efforts to advance outdoor heat resilience infrastructure could draw lessons from each of these examples, as explored further below.

---

94 L.A. City Planning, *Al Fresco Ordinance - Outdoor Dining on Private Property* (last visited Oct. 6, 2025), <https://planning.lacity.org/plans-policies/outdoor-dining>.

95 L.A. City Clerk Connect, Council File 20-1074 (Mar. 14, 2023), <https://cityclerk.lacity.org/lacityclerkconnect/index.cfm?fa=ccfi.viewrecord&cfnumber=20-1074>.

## Considerations Relevant to L.A. County

L.A. County’s land use and zoning regulations are also relevant to efforts to install street-scale shade structures, especially in unincorporated parts of L.A. County. Unincorporated L.A. County encompasses over 65 percent of the County’s 4,000 square miles and contains over one million people who receive municipal services from the County, as opposed to from a city government.<sup>96</sup> The County’s Chief Sustainability Office is currently developing a County Heat Action Plan (CHAP), relevant to both incorporated and unincorporated areas in the County, which “will serve as an all-of-government policy agenda for ensuring our communities and ecosystems can thrive in the face of rising temperatures.” As part of this process, the County conducted workshops and expert convenings with the public and is now “engaging residents in heat-vulnerable areas to identify local heat resilience priorities and potential capital projects.”<sup>97</sup> The County will “synthesize all of the information and ideas generated through the engagement process into a draft plan that [it] will make available for public comment” by Fall 2025.<sup>98</sup> One of the primary goals of the County Heat Action Plan is to cool and protect the outdoors. As part of this work, the County is publishing a Public Engagement Toolkit for Heat Action Planning, which includes an in-depth guide on how to facilitate community discussions of extreme heat and develop “data-informed heat resilience plans that reflect local knowledge, values, and priorities.”<sup>99</sup> While we have not undertaken a complete review of L.A. County’s frameworks and policies related to street-level shade interventions, we have assessed a few key interactions and make the following observations.

First, the County has exempted some shade structures from requirements to obtain building permits, but only if those shade structures are fairly modest in size.<sup>100</sup> L.A. County Building Code § 106.3(1) states that “a building permit shall not be required for . . . shade structures . . . provided the gross floor area does not exceed 120 square feet (11.15 m<sup>2</sup>), the height does not exceed 12 feet (3.69 m), and the maximum roof projection does not exceed 24 inches (610 mm).” The County similarly exempts “canopies and awnings” on private property from building permit requirements per L.A. County Building Code § 106.3(11), which states that “a building permit shall not be required for . . . canopies or awnings,

96 *Unincorporated Los Angeles County*, L.A. COUNTY PLANNING (last visited Oct. 6, 2025), <https://planning.lacounty.gov/unincorporated-los-angeles-county/>.

97 *County Heat Action Plan*, L.A. COUNTY CHIEF SUSTAINABILITY OFFICE (last visited Oct. 6, 2025), <https://cso.lacounty.gov/the-plan/cso-current-initiatives/county-heat-action-plan/>.

98 *Id.*

99 *Public Engagement Toolkit for Heat Action Planning*, L.A. COUNTY CHIEF SUSTAINABILITY OFFICE (last visited Oct. 6, 2025), <https://cso.lacounty.gov/the-plan/cso-current-initiatives/county-heat-action-plan/public-engagement-toolkit-for-heat-action-planning/>; see also *Keeping Our Cool*, L.A. COUNTY CHIEF SUSTAINABILITY OFFICE (last visited Oct. 6, 2025), <https://cso.lacounty.gov/media/blog/keeping-our-cool>.

100 *Permits*, L.A. COUNTY PUB. WORKS (last visited Oct. 6, 2025), <https://dpw.lacounty.gov/building-and-safety/permits/workexempt>.

completely supported by the exterior wall, attached to a Group R-3 [like single-family homes or duplexes] or U Occupancy [like sheds and detached garages], and extending not more than 54 inches (1372 mm) from the exterior wall of the building, and not encroaching into the public right-of-way or any required fire separation distance specified by this Code.” Of course, shade structures, canopies, and awnings benefitting from these exemptions from the County’s building permit requirement still must comply with other important legal and regulatory requirements. These include restrictions on the use of potentially flammable construction materials close to adjacent properties, Fire Department requirements for allowing fire ladder access to upper floors on at least one side of a building, and the prohibition of road encroachments that create line-of-sight problems at intersections or driveways that could increase the risk of collisions.

Thus, even if a shade structure is exempted from obtaining a building permit, it still may need a road encroachment permit and to meet a series of other requirements before being built. L.A. County requires that street-level shade structures built on sidewalks must secure a road encroachment permit.<sup>101</sup> The L.A. County Public Works specifies that “Road Encroachment permits are necessary when you wish to place anything in the road right-of-way temporarily or long term.”<sup>102</sup> L.A. County Code defines “encroachment” as “any obstruction, tower, pole, pole line, pipe, fence, wire, cable, conduit, stand or building, or any structure or object . . . which is placed in, along, under, over or across the highway,” and, in turn, defines “highway” as including sidewalks.<sup>103</sup> In reviewing an application for a road encroachment permit, Public Works will assess how the proposed structure affects visibility and road safety, as well as compliance with the Americans with Disabilities Act. The California Department of Transportation has stated that the ADA generally requires a minimum clear width of “48 inches exclusive of curb width,” and sometimes the ADA requires sidewalks to be “repaired or reconstructed” following the installation of an encroachment to remedy excessive sloping and gaps (i.e., cracks, crumbling).<sup>104</sup>

Though the permitting regime we describe here is fairly clear under County law, the process could be more transparent and the steps to obtain a road encroachment permit clearer for applicants looking to build sidewalk shade structures. For example, the County’s Public Works website does not include shade structures on a list of examples of road encroachments requiring a permit, nor does it provide a webpage outlining the approval

101 *Road Permit Application Package*, L.A. COUNTY PUB. WORKS (revised on Mar. 2017), [https://dpw.lacounty.gov/SPATS/public/spatsfaq/forms/Road\\_Permit\\_Application.pdf](https://dpw.lacounty.gov/SPATS/public/spatsfaq/forms/Road_Permit_Application.pdf).

102 *Road Permit Frequently Asked Questions (FAQ)*, L.A. COUNTY PUB. WORKS (last visited Oct. 6, 2025), <https://pw.lacounty.gov/ldd/lddservices/faqroad.shtml#6>.

103 L.A. County Code §§ 16.04.060, 16.04.100 (2025).

104 *Permanent Pedestrian Facilities ADA Compliance Handbook*, CAL. DEP’T OF TRANSPORTATION (Mar. 2018), <https://dot.ca.gov/-/media/dot-media/programs/civil-rights/documents/permanent-pedestrian-facilities-ada-compliance-handbook-a11y.pdf>; *Permits Manual, 08 - Sidewalk Encroachments*, CITY OF L.A. BUREAU OF ENG’G (revised on Nov. 4, 2024), <https://permitmanual.engineering.lacity.gov/index.php/revocable-r-permits/technical-procedures/08-sidewalk-encroachments>.

process for shade structure permits (as it does for all the examples on the list).<sup>105</sup> As another example, while the County handles line-of-sight issues administratively through the road encroachment permit process operated by Public Works, the County does not offer a publicly-available standard for what constitutes an impermissible obstruction to visibility. The County could provide greater clarity about what encroachments are permissible; could expand some of its permitting exemption categories; and could use Community Standards Districts strategically to pilot shade structures programs. We say more about these and other collected recommendations in our section below.

---

105 *Road Permit*, L.A. COUNTY PUB. WORKS (last visited Oct. 6, 2025), <https://pw.lacounty.gov/ldd/lddservices/roadpermits.shtml>; *see, e.g., Aerial Cable Permit Approval Process*, L.A. COUNTY PUB. WORKS (last visited Oct. 6, 2025), <https://pw.lacounty.gov/ldd/lddservices/roadPermits/aerialCable.shtml>.

# Recommendations

Based on these reviews and observations, we recommend clarifying permitting rules and adopting new policies to support the faster deployment of built-environment interventions; further integrating heat resilience into existing programs; and investing public dollars in heat interventions to support public health, sustainability, equity, and economic goals. We also flag some areas for additional research and data collection. We note below where these recommendations are particularly aimed at L.A. City, L.A. County, or both jurisdictions. The recommendations discussed in this section are summarized in table form in the Appendix to this report.

## Adopt and Strengthen Permitting and Land Use Policies to Support the Deployment of Streetscape Heat Resilience Interventions

A range of potential amendments to existing laws and policies, some big and some modest, could be used to support the faster deployment of outdoor heat resilience interventions that focus on the built environment.

As noted above in the L.A. City case study, the existing barriers to constructing shade shelters suggest areas for potential improvement. To reduce legal uncertainties and clear a path for easier installation of such shelters on public rights of way, the City could clarify how it treats street-level shade installations under the Municipal Code. The City could establish cooling or shade infrastructure zones where shade structures can be more easily built, analogous to DOT’s “bike infrastructure zones.” Alternatively, the City might clarify that streetscape shade structures fall under the category of “public benefit projects” under Section 14.00 of the City’s Municipal Code, which would make their installation easier across the city. Lastly, the zoning code could be amended to address shade structures explicitly, making clear where and how such structures could be installed.

At the County level, the Public Works department website could explicitly address the permitting requirements for shade structures by adding them to the list of examples of road encroachments requiring a permit and providing a webpage outlining the approval process for such permits (as it currently does for all the examples on the list).<sup>106</sup> As a more ambitious step, the County could amend its code to exempt certain non-obstructing canopies from the general requirement that a road encroachment permit must be obtained for any

<sup>106</sup> Road Permit, *supra* note 105; see, e.g., Aerial Cable Permit Approval Process, *supra* note 105.

structure extending onto the public right-of-way (e.g., exempting from the encroachment permit requirement canopies between 10 and 20 feet tall and extending into the sidewalk no more than 5 feet). The County could also expand the scope of the building permit exemption to include larger shade structures and a broader swath of canopies and awnings, or even require shade structures to be built alongside new buildings, substantial building additions, and new or expanded parking lots, akin to the County’s existing tree planting requirements set forth in L.A. County Code § 22.126.030.

It might also be useful for the County to provide more stable, transparent guidance about the conditions under which shade structures may be denied a road encroachment permit. The County is currently less clear than the City about what kinds of structures constitute an impermissible obstruction to visibility. This lack of regulatory clarity could slow the adoption of shade structures and lead to inefficiencies in the encroachment permit application process. As one option to address this, the County could simply clarify that it adopts the standard from the City’s Municipal Code § 62.200 (“Street Intersections – Obstructions to Visibility”), which defines as a public nuisance “any sign, hedge, shrubbery, natural growth or other obstruction” higher than three feet within the “visibility triangle” of any corner of an uncontrolled intersection—defined as the line between the points 45 feet from the intersection on the curbs of the intersecting streets. Alternatively, the County could adopt the less-restrictive visibility standards used by the City in its On-Street Dining Policy (i.e., the L.A. Al Fresco program) which typically only mandates “a 15-foot setback from the nearest intersection” per the City’s Department of Transportation.<sup>107</sup>

Both the City and County could consider changes to the law to incentivize or require helpful actions on private property, too. Privately-owned parcels can play an important role in increasing access to shade and cooling neighborhoods. For example, private buildings could create publicly accessible and shaded spaces within their own footprint (e.g., small courtyards adjacent to streetways). Private properties could also add structures that create shade over public sidewalks or over any surface parking that they create. They could add green infrastructure to their landscaping plans, use light-colored or cool paving materials, and install cool or green roofs. Such measures would help fulfill the goal articulated by L.A. County in its General Plan to reduce the urban heat island.<sup>108</sup> Toward this end, the L.A. County Code already imposes tree planting requirements for new uncovered surface parking lots, requiring trees to be planted of a species “that provide[s] adequate shade” and that create “a minimum of 50 percent shade coverage of the uncovered parking area within 15 years.”<sup>109</sup> The County Code also imposes tree planting requirements for developers, for example in instances in which a lot is subdivided into multiple lots, which triggers a

107 LADOT *On-Street Dining Policy*, CITY OF L.A. DEP’T OF TRANSP. (Jan. 2024), <https://ladot.lacity.gov/sites/default/files/2024-01/al-fresco-final-on-street-dining-policy-2024.pdf>.

108 L.A. County General Plan, *supra* note 36, at 89.

109 L.A. COUNTY CODE § 22.126.030 (2025).

requirement that the subdividing developer adhere to tree planting requirements based on a determination by the County’s Department of Public Works and additional requirements for each newly-created parcel based on that parcel’s street frontage.<sup>110</sup>

New City or County ordinances could require the inclusion of shade structures or other outdoor heat resilience measures on all new construction, on all substantial renovations of at least a certain size, or on a subset of such properties, such as those located near high-use commercial and transit corridors in especially vulnerable communities. Incentive-based programs are also possible. New programs could draw on a range of existing programs as models. For example, City of L.A.’s Ordinance No. 183149, which is based on CALGreen’s cool roof recommendations, requires all roofs to be made of cooling materials meeting a standard set by the City. Additionally, L.A.’s Transit Oriented Communities Program, which was designed to promote the development of affordable housing, provides a range of incentives to residential and mixed-use projects that are located within a half-mile radius of a major transit stop and that meet certain requirements.<sup>111</sup> The City could similarly create programs to promote housing or commercial developments that incorporate street-level shade elements and other outdoor heat resilience measures. Or heat resilience goals could be integrated into the existing Transit Oriented Communities Program by, for example, requiring street-level shade elements be constructed for development projects to be eligible for additional incentives like exemptions from building height limitations. Additional incentives are granted pursuant to review by the City Planning Department (unlike the ministerial or “by-right” incentives provided automatically like “density bonuses” allowing buildings to contain more units than otherwise permitted by existing zoning regulations or reductions in required parking spots).<sup>112</sup> The City Planning Department already incorporates local design guidelines into its review of proposed developments applying for additional incentives, so the Department could consider also taking into account whether heat resilience measures are adopted when choosing to approve or deny applications for additional incentives.<sup>113</sup>

Building shade structures in parking lots could also benefit Angelenos’ health and well-being. Parking lots across L.A. County take up an estimated 101 square miles.<sup>114</sup> Large lots can function as heat islands—they are typically large areas of concentrated concrete with little to no greenery or shade. The larger the parking lot, the longer people may have to walk to

110 L.A. COUNTY CODE §§ 21.32.160, 21.32.195 (2025).

111 Julia E. Stein, *Los Angeles’s Transit-Oriented Communities Program: Challenges and Opportunities*, UCLA Emmett Institute Pritzker Environmental Law and Policy Brief, at 6 (Nov. 2019), [https://law.ucla.edu/sites/default/files/PDFs/Publications/Emmett%20Institute/CEN\\_EMM\\_PUB\\_Los%20Angeles%20Transit-Oriented%20Communities%20Program.pdf](https://law.ucla.edu/sites/default/files/PDFs/Publications/Emmett%20Institute/CEN_EMM_PUB_Los%20Angeles%20Transit-Oriented%20Communities%20Program.pdf).

112 *Transit-Oriented Communities: Los Angeles*, TERNER CTR.FOR HOUSING INNOVATION, UC BERKELEY (Apr. 2019), [https://turnercenter.berkeley.edu/wp-content/uploads/2020/12/TOC\\_Los\\_Angeles.pdf](https://turnercenter.berkeley.edu/wp-content/uploads/2020/12/TOC_Los_Angeles.pdf).

113 *Id.*

114 Elijah Chiland, *In LA, Land Dedicated to Parking is Larger than Manhattan*, L.A. CURBED (Nov. 30, 2018), <https://la.curbed.com/2018/11/30/18119646/los-angeles-parking-lots-total-size-development>.

traverse them unprotected from the heat. Parking lot shade structures also hold significant potential to double as solar generators.<sup>115</sup> Solar shade structures in parking lots present the opportunity to build out large swaths of solar while sidestepping the kind of land disputes that often arise in the context of solar farms on undeveloped land.<sup>116</sup> While some private companies have moved ahead with solar canopies on their own (and to benefit from the resulting solar capacity),<sup>117</sup> state, city, or county incentives could provide encouragement for others to do so. At the state level, California’s SB 49 (2023) creates a tax incentive for companies to build solar canopies in large parking lots. Similar city and county initiatives could contribute as well.

Finally, the City of L.A. could adopt an ordinance creating a development impact fee for heat mitigation. The City’s Quimby Ordinance requires most new residential developments to dedicate land or pay an in-lieu fee for park development. Property owners can set aside a portion of their property for public recreational use, or the City can use the fees to develop or improve public open space near the site. The City could create a similar development impact fee for heat mitigation that requires owners of new constructions or substantial renovations to provide shade on site, likely in the form of awnings, covered patios, other shade structures and possibly trees and cool building materials, or to pay a fee for the City to install shade structures in the surrounding area.

## Leverage Existing Programs in New Ways to Expand Shade in Targeted Outdoor Spaces

Street-level built interventions and green infrastructure can mitigate the urban heat island effect and cool neighborhoods, but many local government programs do not yet explicitly account for extreme heat measures. L.A. has opportunities to use existing programs to help address heat impacts without requiring the creation of new programs or pots of funding.<sup>118</sup> Specifically, the City of L.A. could promote street-scale shade structures within the framework of the L.A. Municipal Code’s overlay design policies that already advance pedestrian-friendly streets, such as within Pedestrian Oriented Districts and Community Design

115 The French government, for example, expects that a recent law requiring owners of large parking lots to shade at least 50% of parking lot area with solar panels will contribute an additional 11 gigawatts of solar capacity to the grid. A Time magazine analysis estimated that if a similar law were enacted in the United States, it could generate around 422 gigawatts of solar on the low end and 3,376 gigawatts on the high end—close to three times existing total power capacity. Ciara Nugent, *The Overlooked Potential of America’s Parking Lots*, TIME (Dec. 8, 2022), <https://time.com/6239651/solar-parking-lots-france-us/>.

116 *Id.*

117 Melissa Repko, *Target Looks to Massive Solar Panels in a California Parking Lot as a Green Model to Power Its Stores*, CNBC (Mar. 17, 2022) <https://www.cnbc.com/2022/03/17/targets-solar-panel-carports-at-california-store-may-be-a-green-model.html>.

118 However, existing programs may need larger budgets or reappropriations to continue funding projects and services.

Overlays. The Strategic Growth Council and the County could also better support applications for state funding through the Affordable Housing and Sustainable Communities program that could be used to construct new shade interventions. And lead agencies conducting CEQA reviews of proposed major development projects could use those reviews more strategically to assess and mitigate the impact of proposed projects on community member exposure to outdoor extreme heat. These policies will be discussed in turn.

## PEDESTRIAN ORIENTED DISTRICTS

The City’s Municipal Code includes a process for establishing Pedestrian Oriented Districts (PODs) with the purpose of creating “new areas where pedestrian activities are common, to encourage people to walk and shop” and to “encourage pedestrian use during evenings and weekends, as well as weekdays.”<sup>119</sup> PODs are districts where communities have adopted, by ordinance, special land use and zoning rules responsive to a community’s particular interests and priorities. They are powerful tools in part because POD rules supersede Municipal Code rules where the two conflict. Currently, there are only three PODs in L.A.,<sup>120</sup> but more could be established in order to encourage the installation of street-scale shade structures or other built interventions designed to keep pedestrians cool on extreme heat days, especially in disadvantaged or shade-poor neighborhoods. Existing PODs could also be amended to advance these goals.

There are several advantages to POD designation in this context. First, because the Pedestrian Oriented District ordinance supersedes the Municipal Code when the two conflict, PODs can reduce existing permitting requirements, anti-loitering barriers, and other barriers to the creation and utilization of shade interventions.<sup>121</sup> Second, an ordinance creating a Pedestrian Oriented District could directly encourage or even require the installation of shade structures in a few ways.

For example, POD ordinances could encourage shade interventions by favoring or requiring particular shade elements in all or certain applications for building permits. New PODs could require, as a condition of issuing building permits, the inclusion of sidewalk shade elements or other heat resilience measures along certain high-use commercial corridors or in parking lots of a certain size. Such provisions could be modeled on and go a step further than current PODs, which already require certain architectural elements in applications for building permits. The existing Westwood – Pico POD ordinance, for instance, requires that building façades include wall treatments that generate visual interest.<sup>122</sup> Such wall treat-

119 LOS ANGELES, CAL. MUN. CODE § 13.07 (2025).

120 L.A. City Planning, *Plan Overlays* (last visited Oct. 6, 2025), <https://planning.lacity.org/plans-policies/overlays>.

121 LOS ANGELES, CAL. MUN. CODE § 13.07 (2025). See also James Brasuell, *Less Parking Required in New Atwater Pedestrian District*, L.A. CURBED (Feb. 3, 2012), <https://la.curbed.com/2012/2/3/10399044/less-parking-required-in-new-atwater-pedestrian-oriented-district>.

122 LOS ANGELES, CAL. ORDINANCE NO. 171,859 (Jan. 24, 1998).

ments could include awnings or other shade interventions. Additionally, both the Westwood – Pico and the Atwater ordinances require second floors to be differentiated from ground floors by architectural details, such as awnings.<sup>123</sup> Awnings or other architectural details could help shade the street below.

PODs can also be used to influence building landscaping and parking in ways that advance community resilience to extreme heat. Before the Planning Department issues a building permit, it must approve a landscaping plan for new projects and parking areas, which could provide an opportunity to encourage heat-reducing greenery and trees.<sup>124</sup> All three existing Pedestrian Oriented District ordinances contain development regulations around parking and landscaping, requiring any surface parking to be screened and separated from the public right-of-way.<sup>125</sup> Requirements for incorporating parking lot shade could be added to existing and new PODs.

Existing POD ordinances should also be examined and perhaps amended to eliminate provisions that could impose constraints on the construction of new shade structures. For example, the Atwater ordinance specifies that façade elements, which could include shade structures, must be “as architecturally integrated as possible.”<sup>126</sup> Such requirements do not preclude shade structures, but they do constrain the range of options developers can construct. The general section of the Municipal Code that prescribes a height limitation of 30-40 feet for buildings in PODs could also potentially limit the kinds of shade interventions possible.<sup>127</sup>

## COMMUNITY DESIGN OVERLAYS

A similar option to a Pedestrian Oriented District is the Community Design Overlay (CDO). A CDO provides “an additional layer of planning control” by requiring properties in a specified geographic area to comply with a unique set of requirements designed to “enhance the visual identity and character of a neighborhood.”<sup>128</sup> CDOs serve as a supplement to broader zoning codes and plans.<sup>129</sup> In light of increasing extreme heat events, reviewing and

123 LOS ANGELES, CAL. ORDINANCE No. 171,859 (Jan. 24, 1998); LOS ANGELES, CAL. ORDINANCE No. 173,676 (Jan. 24, 2019).

124 LOS ANGELES, CAL. MUN. CODE § 13.07 (2025).

125 LOS ANGELES, CAL. ORDINANCE No. 173,676 (Jan. 24, 2019); LOS ANGELES, CAL. ORDINANCE No. 171,859 (Jan. 24, 1998); LOS ANGELES, CAL. ORDINANCE No. 174,260 (Nov. 17, 2001).

126 LOS ANGELES, CAL. ORDINANCE No. 173,676 (Jan. 24, 2019).

127 LOS ANGELES, CAL. MUN. CODE § 13.07 (2025).

128 L.A. City Planning, *Plan Overlays* (last visited Oct. 6, 2025), <https://planning.lacity.gov/plans-policies/overlays>.

129 See LOS ANGELES, CAL. MUN. CODE § 13.08 (2025). The geographic area a CDO applies to can be created or modified by the L.A. City Council, while the CDO’s standards and guidelines are created by City Planning. All planning and zoning provisions set forth in the Municipal Code must be followed in addition to the CDO. *Id.* Once the design standards and guidelines are approved by the Planning Commission, the City Council introduces an Ordinance, which if passed, is incorporated into the Municipal Code. Currently, the City of L.A. has 19 CDO Districts. For example, the Pacoima CDO, which was created in 2003, was intended “to promote design that welcomes pedestrians

updating existing CDOs and creating new CDOs could be a good strategy to meet climate and heat resiliency goals, while maintaining the character and aesthetics of a neighborhood.

Communities within L.A. could be more ambitious about using CDOs to require developers to include pedestrian-friendly and heat resilience infrastructure in new developments. Creating or amending a CDO to incorporate such policies requires stakeholders in an area to work with the Planning Department and potentially City Council offices. As with Pedestrian Oriented Districts, a CDO could help mitigate the effects of policies against loitering and public gathering that are seen within the Municipal Code by establishing community priorities related to shade provision, thermal comfort of pedestrians, and walkability.

## AFFORDABLE HOUSING AND SUSTAINABLE COMMUNITIES PROGRAM

The Affordable Housing and Sustainable Communities (AHSC) Program is a competitive state program that funds projects that advance California’s climate goals. The state and the County could use it more effectively to encourage the construction of new shade structures.

The AHSC Program provides grants and/or loans for land use, housing, transportation, and land preservation projects.<sup>130</sup> It is intended to further achievement of California’s climate goals by investing in “projects that reduce GHG emissions by supporting more compact, infill development patterns, encouraging active transportation and transit usage, and protecting agricultural land from sprawl development.”<sup>131</sup> The AHSC Program is funded by the Greenhouse Gas Reduction Fund, which distributes funds from the Cap-and-Trade auctions and is administered by the California Strategic Growth Council.<sup>132</sup>

To determine which projects to fund, the AHSC Program uses a 100-point scale to score applicants across a range of criteria including climate adaptation and community resiliency (allocated five of the 100 points).<sup>133</sup> The climate adaptation and community resiliency criteria provide points for measures that increase resilience to extreme heat, among other threats. The inclusion of extreme heat adaptation measures among the program’s scoring

---

and helps improve business.” L.A. City Planning, *Pacoima Community Design Overlay (CDO), Design Guidelines & Standards*, at 3 (last visited Oct. 6, 2025), <https://planning.lacity.gov/odocument/e9474ea8-1d9e-4d0d-829d-c29f7e825440/PacoimaCDOGuidelines.pdf>.

130 Cal. Dep’t. Housing & Community Dev., *Affordable Housing and Sustainable Communities Program (AHSC)*, (last visited Oct. 6, 2025), <https://www.hcd.ca.gov/grants-and-funding/programs-active/affordable-housing-and-sustainable-communities>.

131 *Affordable Housing and Sustainable Communities Program Round 9 Program Guidelines*, CAL. STRATEGIC GROWTH COUNCIL, at 4 (Feb. 26, 2025), [https://sgc.ca.gov/grant-programs/ahsc/docs/20250303-5\\_Guidelines\\_Adopted.pdf](https://sgc.ca.gov/grant-programs/ahsc/docs/20250303-5_Guidelines_Adopted.pdf).

132 *Id.*

133 *Id.* at 31.

criteria supports projects seeking to include shade elements in their proposals, but the application process could be clarified and made easier in order to increase effectiveness.

AHSC applicants must complete a “Climate Adaptation Assessment Matrix,”<sup>134</sup> which includes a section dedicated to heat, to demonstrate that their project adequately addresses climate adaptation issues. Applicants must evaluate extreme heat risks in the project area and select from various adaptive measures, which include, for example, the provisioning of shade, either through planting trees or constructing other shade structures. But the full range of shade structures that qualify for points under this scoring system may not be obvious to all applicants. Moreover, in order to receive the full five points for climate adaptation and community resiliency, applicants must address the technical aspects of their adaptive measures in detail and display “understanding of the vulnerabilities from climate impacts.”<sup>135</sup> Many applicants looking to install shade structures may struggle to adequately describe the technical specifications of those structures and how they help to address extreme heat.

A couple of solutions might ease these barriers and help ensure that this program enhances street-level shade interventions. First, the Strategic Growth Council could clarify the types of shade structures that qualify for points under this scoring system, perhaps by providing representative lists of qualifying shade interventions. This would help give applicants confidence that proposing shade structures as part of a project application will help that application be competitive. Second, the Strategic Growth Council or the County could provide sample technical data or write-ups to support applicants’ analyses of the benefits of shade structures and the ways that enhancing street-level shade serves community climate resilience. The County already offers technical assistance to AHSC applicants and may be able to support applicants in completing strong applications for shade-based adaptive measures as part of services already provided.<sup>136</sup>

## CEQA REVIEW

Major urban development projects can have profound effects on the thermal comfort of pedestrians and others enjoying the outdoors, for example by increasing heat-absorbing hardscapes; removing trees or other green infrastructure and permeable softscapes; and changing the existing shade profile of high-use corridors either for better or for worse. Under the California Environmental Quality Act, lead agencies with discretion over the permitting of such projects must consider their environmental effects and can require

134 *AHSC Round 9 Climate Adaptation and Assessment Matrix, AHSC Guidelines*, CAL. STRATEGIC GROWTH COUNCIL (Jan. 18, 2018), <https://sgc.ca.gov/grant-programs/ahsc/resources/guidelines.html>.

135 *AHSC Round 9 Narrative Rubric, AHSC Guidelines*, CAL. STRATEGIC GROWTH COUNCIL (Mar. 25, 2025), [https://sgc.ca.gov/wp-content/uploads/20250325-AHSC\\_Round\\_9\\_Narrative\\_Rubric\\_ADA.pdf](https://sgc.ca.gov/wp-content/uploads/20250325-AHSC_Round_9_Narrative_Rubric_ADA.pdf).

136 County of Los Angeles, *Affordable Housing and Sustainable Communities Program (AHSC)* (last visited Oct. 6, 2025), <https://ceo.lacounty.gov/affordable-housing-and-sustainable-communities-program/>.

mitigation of some of those impacts. The City and County, as well as the other 87 cities within L.A. County, often act as lead agencies with discretion over permitting and thus bear significant legal responsibilities under CEQA for their proposed development projects. Yet many lead agencies fail to look carefully at the effects of a proposed project on the thermal comfort of pedestrians or on a community’s general resilience in the face of extreme heat events, and project proponents generally do not robustly assess the effects of their projects through this lens in CEQA analyses. Rather, climate change impacts are typically evaluated in terms of greenhouse gas emissions.<sup>137</sup> Lead agencies conducting CEQA reviews of proposed major development projects could and should use those reviews more strategically to assess the impact of proposed projects on community exposure to outdoor heat. Where appropriate, those agencies should push for mitigation measures that could help offset a project’s influence on urban heat via, for example, the funding of additional streetscape heat interventions.

## SIDEWALK AND TRANSIT AMENITIES PROGRAM

The City and other jurisdictions in L.A. County should facilitate the construction of shade structures at and around transit stops in low-income districts to provide thermal comfort to transit riders experiencing higher heat exposures. In a study conducted by the UCLA Department of Urban Planning and the Climate Emergency Mobilization Office, researchers found that there are significant disparities in the equitable placement of bus shelters in the City of L.A., particularly in relation to heat exposure and vulnerability.<sup>138</sup> Specifically, there is a lack of basic amenities such as bus shelters, benches, and trees at many bus stops in certain low-income districts (e.g., Council District 14) that are characterized by higher bus stop activity, ridership, and longer wait times than wealthier districts.<sup>139</sup>

The new Sidewalk and Transit Amenities Program (STAP), stemming from StreetsLA’s contract with Tranzito/Vector LLC (Tranzito), provides an opportunity to increase shade access in these underserved areas. The program aims to include heat adaptation in its allocation strategy for bus stop shelter placements and to ensure that 75% of bus riders in each City Council District will have access to a bus shelter.<sup>140</sup> While the program’s implementation has begun, with 150 bus shelters already having been installed as of June 2025 since the program’s launch in 2024, there is still much more progress to be made with “3,000 new shelters or other planned sidewalk amenities” in the works; the City has an opportunity to

---

137 Cal. Governor’s Off. of Land Use & Climate Innovation, *CEQA & Climate Change* (last visited Oct. 6, 2025), <https://lci.ca.gov/ceqa/ceqa-climate-change.html>.

138 Diana Alcocer et al., *supra* note 57, at 151.

139 *Id.*

140 L.A. Bureau of Street Services, *STAP Program Fact Sheet* (last visited Oct. 6, 2025), <https://streetsla.lacity.org/stap-program-fact-sheet>.

leverage this contract in combination with other City goals to prioritize heat equity in bus shelter planning and deploy other streetscape shade interventions.<sup>141</sup>

Other ideas advanced by advocates to speed the construction of new, effective transit shelters include the following:<sup>142</sup>

- Exempt transit structures from the typical City and County permits required for sidewalk/road encroachments (discussed above with regard to the County’s road encroachment permit requirement), either in full or by subjecting them to another permitting process specifically for transit shelters that is more streamlined
- Lessen requirements for other City and County approvals that can delay or stall the permitting process
- Improve public messaging to counter the perceived undesirability of transit shelters and have the City or County either add public art installations by local artists to the sides of transit shelters or require that the companies contracted to build transit shelters feature public art on them when they are installed, which can increase public approval and perception of transit shelters as a benefit rather than a detriment
- Enable the quick construction of transit shelters from a common “kit of parts” that can be arranged modularly to fit different street and sidewalk configurations that require different shelter sizes and shapes to ensure pedestrian safety, access, drainage, and other interests
- Involve manufacturers of transit shelters—ideally ones with nearby production sites—early on in the process of developing City and County policies to fund transit shelters, so that they can give feedback on program design to ensure feasibility and cost-effectiveness
- Direct L.A. County counsel to publish generally-applicable guidance on how to ensure that transit shelters are ADA-compliant, given various sidewalk and road conditions and configurations

More generally, the existing encroachment permit paradigm should be shifted to treat transit shelters as an amenity that serves the public interest rather than as an obstruction. Regulatory approaches should acknowledge that transit shelters are a public good (e.g.,

---

141 *Photos: STAP bus shelter program hits milestone in LA*, THE DAILY BREEZE (June 6, 2025), <https://www.dailybreeze.com/2025/06/06/photos-stap-bus-shelter-program-hits-milestone-in-la/>.

142 We thank our colleague Juan Matute, Deputy Director of the UCLA Institute of Transportation Studies at the Luskin School of Public Affairs, for sharing and exploring many of these ideas with us.

by treating them like the City treats “public benefit projects” as discussed above). There should be public resources and webpages aimed at entities seeking to build transit shelters that explain which departments must be involved (e.g., L.A. City and/or County Planning, Engineering, Public Works) and the processes required by each of them.

## Invest Public Dollars in Heat Interventions

Extreme heat generates substantial costs for government, health care organizations, businesses, the agricultural industry, and the labor sector, among others. By investing early in heat interventions in public spaces, near transit, and in neighborhoods with pedestrian traffic, the City and County can reduce expenditures over time while reducing vulnerability to extreme heat risks and making areas more comfortable and attractive to visit on hot days. Additionally, securing an insurance policy to cover currently uninsured extreme heat costs could help ensure the availability of robust funding for response and resilience measures.

### GENERATING NEW FUNDING FOR STREET-SCALE SHADE INTERVENTIONS

In addition to creating more stringent requirements or better incentives, L.A. and the State should allocate additional funding for street-level heat resilience infrastructure. Several sources of such funding are promising.

One approach to raising funds for the installation of such infrastructure is for the City or County of L.A. to establish an Enhanced Infrastructure Financing District (EIFD). EIFDs are a type of tax increment financing (TIF) district that cities and counties may form to help fund economic development projects. “Tax increment financing works by freezing the property tax revenues that flow from a designated project area to the city, county, and other taxing entities at the ‘base level’ in the current year. Additional tax revenue in future years (the ‘increment’) is diverted into a separate pool of money, which can be used either to pay for improvements directly or to pay back bonds issued against the anticipated TIF revenue.”<sup>143</sup> Senate Bill 852 (2022) authorizes local agencies to create climate resilience districts, which are EIFDs, to address climate change effects and impacts.<sup>144</sup> “The districts

143 S. Cal. Assoc. of Gov’ts, *Enhanced Infrastructure Financing District* (EIFD) (last visited Oct. 6, 2025) <https://scag.ca.gov/post/enhanced-infrastructure-financing-district-eifd>.

144 *See generally* L.A. County Public Works, *Climate Resilience Districts* (Oct. 2023), <https://file.lacounty.gov/SDSInter/bos/supdocs/179887.pdf#page=23>; L.A. County Board of Supervisors, Mot. on Fourth Progress Report on Building Climate Ready Communities and Infrastructure in L.A. County (Apr. 18, 2025), [https://file.lacounty.gov/SDSInter/bos/bc/1182281\\_BoardMotion4.18.23Item7BuildingClimateReadyCommunitiesandInfrastructures\\_2025.04.18\\_.pdf](https://file.lacounty.gov/SDSInter/bos/bc/1182281_BoardMotion4.18.23Item7BuildingClimateReadyCommunitiesandInfrastructures_2025.04.18_.pdf), at 15–16 (discussing Climate Resilience Districts and citing *id.*).

must be formed for the purpose of raising and allocating funding for and the operating expenses of projects designed and implemented to address climate change mitigation, adaptation, or resilience.”<sup>145</sup> The incremental funding raised by such climate resilience districts must be used to fund projects that address certain climate hazards, including extreme heat. The climate resilience districts are required to follow specified priorities and requirements for each project, such as using a skilled and trained workforce. No climate resilience districts have been created, which gives L.A. the opportunity to pioneer how to implement this new authority and source of funding to advance resilience.

At the state level, California could authorize funds in state general obligation bonds for the development of heat-resilient infrastructure, such as parks, transit shelters, and other capital projects. This would help improve heat resiliency throughout the State, and state funding could allow L.A. to focus on projects, programs, and services that cannot be covered by bond funding and that are critically needed to support unhoused people, outdoor workers, and other vulnerable communities.

## ADOPTING A PARAMETRIC INSURANCE POLICY TO COVER EXTREME HEAT COSTS

To help free up funding for street-scale heat resilience interventions, the City or County could consider investing in parametric insurance to manage the financial impacts of extreme heat. Extreme heat events impose significant costs on local governments, which must spend money on additional health services, outreach and education, cooling center staffing, emergency responses, and infrastructure repairs, among other items. Research shows that “communities with strong insurance uptake recover more quickly and more completely after facing catastrophes, helping to preserve economic health and stability.”<sup>146</sup> But the disruptive impacts of heat waves on health, energy systems, local economies, and other sectors are rarely insured, leaving people more exposed to financial costs and less able to recover—with costs often falling to local governments. L.A., and the State as a whole, has a widening gap in insurance coverage between insured and uninsured losses, which can be particularly deleterious for low-income communities and vulnerable populations.<sup>147</sup> Risk transfer tools, like parametric insurance, could reduce the impacts of extreme heat costs and help achieve equitable climate resilience.<sup>148</sup>

145 Liebert Cassidy Whitmore, *SB 852 – Local Agencies Are Authorized to Create Climate Resilience Districts to Address Climate Change Effects and Impacts* (Oct. 18, 2022), <https://www.lcwlegal.com/news/sb-852-local-agencies-are-authorized-to-create-climate-resilience-districts-to-address-climate-change-effects-and-impacts/>.

146 Cal. Dep’t of Ins., Climate Insurance Working Group, *Protecting Communities, Preserving Nature, and Building Resiliency How First-of-Its-Kind Climate Insurance Will Help Combat the Costs of Wildfires, Extreme Heat, and Floods*, at 19 (2021), <https://www.insurance.ca.gov/cci/docs/climate-insurance-report.pdf> (“*Protecting Communities Climate Insurance Report*”).

147 *Id.* (Executive Summary).

148 “Insurance solutions for heat waves exist in part for crops and under the umbrella of health insurance but are insufficient to address other heat-related problems.” *Id.* at 53.

In particular, parametric insurance can be one tool to help local governments manage the costs involved in responding to extreme heat events. This is especially true if local governments are not able or willing to invest in heat resilience interventions in a sustained way over time, and if the effects of particularly extreme heat seasons can be expected to impose significant and concentrated costs. Parametric insurance policies involve the standard premium and payout structure of traditional insurance but establish payouts on the occurrence of pre-determined “trigger” events. “The trigger is typically determined based on an agreed index of weather or natural phenomena, allowing the policyholder (often a government) to protect against the anticipated financial loss of a catastrophic natural event without having to assess and claim actual damage.”<sup>149</sup> “[C]laimants are compensated based on the value of the index, which serves as a proxy for damage.”<sup>150</sup> A parametric insurance policy held by a local government could be beneficial for a variety of reasons. First, payout is swift, and funding is provided immediately because it is determined by the trigger event and a preset formula in the policy. Second, payouts can be used flexibly for various types of community-identified needs, including preparedness, disaster response, business interruption, infrastructure, and investments in long-term solutions like cooling structures or urban forests. Parametric policies can also save administrative costs and enhance resilience by promptly providing liquidity and the opportunity to invest in hazard mitigation measures, such as transportation and cooling infrastructure.<sup>151</sup> Especially in cases where a local government has not invested (or has under-invested) in heat resilience measures in a sustained manner over a long period, parametric insurance can serve a function similar to an enforced “rainy day” fund for extreme heat response costs.

Insurance experts in California have contemplated a parametric insurance concept for extreme heat that could be implemented in L.A. In its 2021 Climate Insurance Report, the California Department of Insurance recommended parametric insurance as a way for local governments, Tribes, and public health agencies to bolster climate disaster funding and improve climate resilience.<sup>152</sup> And in March 2023, members of the Climate and Sustainability Branch of the state Department of Insurance developed a proposal for a community-based parametric insurance policy to protect communities throughout the state

149 Ted Lamm et al., *Insuring Extreme Heat Risks: Scoping the Potential for Insurance Innovation to Support Heat Mitigation and Response* 41, Berkeley Law Ctr. for Law, Energy, & the Env’t Policy Report (Dec. 2020), <https://www.law.berkeley.edu/wp-content/uploads/2020/11/Insuring-Extreme-Heat-Risks-Dec-2020.pdf>.

150 *Id.*

151 Deborah Halberstadt & Rabab Charafeddine, *Climate Insurance Working Group Discussion Concept Paper, Nov. 2, 2022 Draft*, CLIMATE & SUSTAINABILITY BRANCH, CAL. DEP’T OF INS. , at 5, <https://www.insurance.ca.gov/01-consumers/180-climate-change/upload/Draft-Extreme-Heat-Neighborhood-Protection-Concept-November-2-2022.pdf> (“Parametric Insurance Concept Paper”). Parametric insurance also has drawbacks. For example, it raises the potential that a policyholder may incur losses without the trigger event occurring, limiting the value of the policy (and that an insurer will pay out where there is no loss). Parametric policies could also provide little incentive to proactively reduce risk of loss (since payouts are tied solely to the occurrence of the trigger event), suggesting a need to incorporate payout or premium structures that are specifically tied to risk mitigation investments[.]” Ted Lamm et al., *supra* note 149, at 41.

152 Ted Lamm et al., *supra* note 149, at 39, 43, 61.

from acute extreme heat risks.<sup>153</sup> The draft proposal suggests a two-phase trigger criterion and a proof of loss to cover direct or indirect losses. The first trigger would involve a physical measurement (e.g., a particular temperature, or particular temperature plus humidity, or a specific heat wave ranking), and the second would be associated with the severity, duration, or frequency of the heat event.<sup>154</sup> For example, “to address severity, the policy could be limited ... to heat waves that rank category 3 or higher.”<sup>155</sup> To address frequency, “if a local jurisdiction has budgeted for and incurred expenses for three days of extreme heat per year, a fourth day of extreme heat would trigger the policy.”<sup>156</sup> After meeting the physical and severity triggers, the insured would be required to demonstrate a verifiable loss, which is a significantly lower burden than needed for traditional indemnity insurance and would be agreed upon in the negotiated insurance contract. “It could, for example, be the completion of previously agreed upon steps the insured has taken to reduce heat risk” or “a previously agreed upon dollar amount the insured has already spent on heat preparedness and response.”<sup>157</sup>

In the California Department of Insurance’s 2021 Climate Insurance Report, the Department suggested a pilot project approach to launch an insurance-based instrument, which could be developed through consultation between the Insurance Commissioner, members of local Disaster Councils, and the cities’ risk managers.<sup>158</sup> A pilot project could be implemented at either the city or county level in L.A., building off the concepts developed by the California Insurance Department. L.A. City and County risk managers should work with the California Insurance Department to conduct a proof of concept to implement and test risk-mitigation and risk-transfer solutions.

By helping to cover unexpected extreme heat costs, parametric insurance could free up City and County dollars for more forward-looking resilience projects. Additionally, the better the City and County’s infrastructure is at shielding the population from extreme heat, the fewer costs will be incurred on extreme heat days, and the easier it will be for the County and City to cover those costs, using parametric insurance products or otherwise.

---

153 Parametric Insurance Concept Paper, *supra* note 151.

154 *Id.* at 3–4. Insurance Commissioner Lara sponsored legislation in 2022 that was signed by the Governor to create a heat wave ranking system for California. (Assembly Bill 2238, authored by L. Rivas, C. Garcia, and E. Garcia). This ranking system could be used to design the first trigger.

155 *Id.* at 4.

156 To provide liquidity for heat event preparation, public interventions, and lifesaving activities, “payouts could also be shifted to pre-event actions by relying on increasingly accurate forecasting.” *Protecting Communities* Climate Insurance Report, *supra* note 146, at 62. For example, in Vietnam, the Red Cross developed a trigger protocol based on pre-event actions to deliver philanthropic dollars for extreme heat impacts. Although the Red Cross delivers philanthropic—rather than insurance—money, its work shows “the value of funds arriving before the peak of a disaster event for evidence-based preparation measures, such as setting up cooling stations and initiating community outreach programs.” *Id.* at 60, 62.

157 Parametric Insurance Concept Paper, *supra* note 151, at 4.

158 *Protecting Communities* Climate Insurance Report, *supra* note 146, at 57.

## Conduct Further Research Related to Extreme Heat

More fundamental research into key questions about the risks of extreme heat in L.A. is needed in order to best tailor solutions.

First, further research should be conducted into the financial costs and benefits to L.A. City and County of extreme heat risk and response. Such research would help policymakers understand what level of expenditure is warranted to mitigate those risks. For example, it is not clear what L.A. is currently spending to respond to extreme heat risks and harms. Researchers have investigated the health and economic impacts of rising temperatures on a national scale, but there is still a lack of data on the statewide and regional impacts of extreme heat.<sup>159</sup> The L.A. County Climate Vulnerability Assessment does a good job of qualitatively describing extreme heat risks and impacts on vulnerable communities in the County, but the Assessment and other County documents do not examine the financial and health costs of these impacts.

Some work along these lines is already underway. For example, the County of L.A. collaborated with RAND on a study of County data that found a correlation between extreme heat and deaths, particularly in vulnerable populations like the unhoused and elderly people in care facilities; bookings for violent crimes; and emergency room visits, among other negative social outcomes.<sup>160</sup> This study could be complemented by the quantification of public sector costs associated with heat impacts across the County's own facilities and operations. The Department of Insurance has also begun conducting this kind of analysis, as recommended by the Climate Insurance Report.<sup>161</sup> But more is needed. Collecting comprehensive data on the costs of extreme heat events and the benefits of mitigation investments will

- 159 In 2021, the Adrienne Arsht-Rockefeller Foundation Resilience Center published a report on the health and economic impacts of extreme heat. Adrienne Arsht-Rockefeller Foundation Resilience Center & Vivid Economics, *Extreme Heat: the Economic and Social Consequences for the United States* (Aug. 2021), <https://www.atlanticcouncil.org/wp-content/uploads/2021/08/Extreme-Heat-Report-2021.pdf>. The Center found that the current annual economic loss due to heat in the U.S. is \$100 billion (compared to \$60–65 billion from hurricanes in 2020). *Id.* at 2. If nothing changes, this number is projected to rise to \$200 billion by 2030, and \$500 billion by 2050. “The report is a collaboration with Vivid Economics, an economics consultancy group that analyzed a wide range of historic data on climate, employment, and demographics, and forecast it for 2020, 2030, and 2050, based on current socio-economic trends.” Talib Visram, *Extreme Heat is Extremely Bad for the Economy*, *Fast Company* (Sept. 2021), <https://www.fastcompany.com/90673921/extreme-heat-is-extremely-bad-for-the-economy>.
- 160 Roland Sturm, et al., *Health and Social Services During Heat Events: Demand for Services in Los Angeles County*, RAND CORPORATION (Sept. 16, 2024) [https://www.rand.org/pubs/research\\_reports/RRA3406-1.html](https://www.rand.org/pubs/research_reports/RRA3406-1.html); Climate & Sustainability Branch, Cal. Dep’t of Ins., *California Climate Insurance Report: Year 1 Implementation Update*, at 3 (Mar. 2023), <https://www.insurance.ca.gov/01-consumers/180-climate-change/upload/climate-insurance-report-one-year-implementation-update.pdf>.
- 161 *Id.* Assembly Bill 2238 included language that directed the California Department of Insurance to study insured and uninsured costs from past heat waves, including examining protection gaps for vulnerable communities. The Climate Insurance Report specifically recommended the Insurance Commissioner to “convene university researchers, other insurance regulators, insurance companies, and other experts to develop a method for estimating extreme heat costs from past events . . . and apply it in multiple California cities or counties. The analytic method should also include the capability to use [these] findings to forecast future costs from an extreme heat event to allow

allow public and private actors to accurately assess their exposure and determine appropriate responses.<sup>162</sup> It will also inform the needed size of “specific local funds or potential insurance coverages to consider in planning decisions by local and state authorities.”<sup>163</sup>

Second, work should be expanded to better understand which communities in L.A. are most vulnerable to extreme heat events and to understand where people are located on extreme heat days. The work done by our UCLA colleagues on pedestrian movement patterns in a vulnerable community in L.A. on extreme heat days, referenced above, could serve as a model for such research and could be expanded to cover other parts of the city and to compare behaviors and risks across neighborhoods. Transient workers, renters, and unhoused people are especially important to include in such studies.

Third, more should be done to look creatively at law and policy regimes to ensure that they take account of the risks of extreme heat and help to advance responses. For example, heat is a significant environmental and health impact that is not properly accounted for in existing planning processes, nor in environmental impact analyses and mitigation regimes under CEQA. Across regulatory regimes, shade is not yet properly valued as an increasingly vital public good. And legacy policies often complicate efforts to create shade structures in urban environments. More work should be done to explore and propose changes in local planning and land use regimes to ensure that local governments can address this public health threat.

---

decision makers to compare future heat-related costs with the costs of mitigation efforts.” *Protecting Communities Climate Insurance Report*, *supra* note 146, at 54.

162 Ted Lamm et al., *supra* note 149, at 64.

163 *Protecting Communities Climate Insurance Report*, *supra* note 146, at 53.

# Conclusion

Our cities and the land use policies that shape them are not—yet—built for climate change. As extreme heat days increase in frequency and intensity around the globe, heat-related illnesses and deaths will rise if measures are not taken to curb these risks. Deploying shade structures and other street-level built-environment interventions can reduce harmful health impacts of extreme heat, especially in disadvantaged communities.

The City and County of L.A. have done more heat planning and preparation than many other jurisdictions, but much more needs to be done to reimagine and reshape outdoor urban environments to protect the most vulnerable residents from extreme heat. L.A. should begin reworking policies and reconstructing streetscapes now in order to serve and protect communities against extreme heat in the decades to come. Deploying built-environment interventions will require using many of our basic land use and urban planning tools in new ways and creating new approaches.

# Appendix – Key Recommendations

## 1. Clarify Permitting Requirements and Strengthen Land Use Policies

Recommendation	Responsible Actor	Benefit
Clarify what steps and authorizations are required under the Municipal Code to install street-level shade structures, with the goal of minimizing red tape. (Consider, e.g., defining shade structures as “public benefit projects” and clarifying that anti-loitering policies do not restrict shade structures)	L.A. City	Removes legal uncertainty and streamlines approvals to speed shade deployment in the public right-of-way
Adopt a development impact fee for heat mitigation that requires owners of new constructions or substantial renovations to either provide shade on site or pay an in-lieu fee for the City to fund heat resilience measures in the surrounding area	L.A. City	Creates a dedicated funding stream for the City to build shade structures and incentivizes developers to create shade themselves
Integrate heat resilience measures and incentives for shade structures into Transit Oriented Communities (TOC) program	L.A. City	Aligns housing and transit goals with outdoor heat protection; targets shade where foot traffic is highest
Require or incentivize shade structures to be built alongside new buildings, substantial additions, and new/expanded surface parking, akin to existing tree/shade coverage requirements	L.A. City and County	Integrates outdoor heat mitigation into routine development, growing shade coverage over time
Promote parking lot shade structures (including solar canopies) with local incentives, to align with state incentives (e.g., SB 49 (2023))	L.A. City and County (in coordination with the State)	Mitigates large heat island surfaces; adds distributed clean energy and grid benefits
Incentivize or require shade and outdoor heat resilience measures on private property (e.g., shaded courtyards, sidewalk awnings, shade/solar canopies in parking lots; cool/green roofs and surfaces)	L.A. City and County	Expands shade network beyond the public right-of-way
Set clear visibility/line-of-sight standards for shade structures (i.e., define what constitutes an impermissible obstruction to visibility by adopting the City’s definition of “visibility triangle” or the City’s Al Fresco program’s 15ft. setback requirement)	L.A. County	Establishes predictable design standards to improve compliance and reduce permit denials/requests for revisions
Amend County code to exempt certain non-obstructing canopies from road encroachment permit requirement, and expand building permit and road encroachment permit exemptions for modest shade structures	L.A. County	Reduces permitting requirements for low-risk shade structures and thus quickens deployment and lowers costs
Add shade structures to County Public Works’ website as a road encroachment example and publish a clear approval pathway listing all requirements	L.A. County	Publicizes a transparent, predictable permitting process that reduces applicant errors and speeds the permit approval process

## 2. Leverage Existing Programs in New Ways

Recommendation	Responsible Actor	Benefit
Use Pedestrian Oriented Districts (PODs) to encourage/require shade interventions in façades, sidewalks, and parking areas	L.A. City	Targets shade to high-use corridors and leverages the City’s existing overlay power to supersede barriers
Update/create Community Design Overlays (CDOs) with shade/thermal comfort design standards for development projects and parking areas	L.A. City	Uses the City’s overlay power to craft neighborhood-specific standards for context-sensitive, durable shade improvements
Leverage the City’s Sidewalk and Transit Amenities Program (STAP) to prioritize equitable, heat-focused placement of bus shelters, and accelerate their deployment by exempting/streamlining permit requirements and enhancing public support	L.A. City (StreetsLA within the City’s Dep’t of Public Works, in coordination with City Council districts and manufacturers of bus shelters)	Builds better-sited bus shelters where riders face the highest heat, with a faster rollout and more community acceptance
Ease burdens of transit shelter installation process by promoting standardized modular “kit-of-parts” shelters and disseminating ADA guidance on siting and design	L.A. City (StreetsLA within the City’s Dep’t of Public Works, in coordination with manufacturers of bus shelters) and County (County Counsel)	Reduces design/installation time; promotes uniform ADA compliance across variable streetscapes
Use CEQA more strategically to assess and mitigate outdoor heat exposure	L.A. City and County (specifically, the departments serving as CEQA lead agencies)	Helps ensure large projects do not worsen outdoor heat exposure by focusing attention on the issue during environmental review
Reframe encroachment paradigm to treat bus shelters as public amenities, and publish cross-departmental guidance and process maps for bus shelters	L.A. City and County (across multiple departments governing public works, engineering, and planning)	Reduces administrative friction and speeds approvals; educates those seeking to build bus shelters; improves interagency coordination
Maximize Affordable Housing and Sustainable Communities (AHSC) funding for shade, clarify qualifying shade measures, provide model technical justifications, and expand technical assistance for applicants	L.A. County (in coordination with California Strategic Growth Council)	Makes shade projects more competitive for state funds from the Greenhouse Gas Reduction Fund (GGRF); scales investments in vulnerable areas
Develop pilot shade structure-building programs in strategically-chosen Community Standards Districts (CSDs)	L.A. County	Allows for pilot programs to be tested out in high-priority areas using an existing designation (CSDs)

### 3. Grow and Invest Public Dollars

Recommendation	Responsible Actor	Benefit
Establish Climate Resilience Districts as authorized by SB 852 (2022)—a type of Enhanced Infrastructure Financing District (EIFD)—to fund heat resilience projects in high-priority areas	L.A. City and County	Secures long-term, locally-controlled funding via tax increment financing
Pursue State general obligation bond funding dedicated to heat resilience measures (e.g., shade structures, parks, transit shelters)	L.A. City and County	Unlocks large-scale capital for shade/cooling; complements local funds for services and outreach
Explore parametric insurance for extreme heat response costs, and develop a pilot program with the California Department of Insurance and City and County risk managers	L.A. City and County (in collaboration with the California Department of Insurance)	Ensures swift, flexible payouts that reduce fiscal shocks and free local dollars for proactive shade investments

**UCLA**

School of Law

**Emmett Institute on Climate  
Change & the Environment**

## About the Emmett Institute on Climate Change and the Environment

The Emmett Institute on Climate Change and the Environment is a leading law school center focused on climate change and other critical environmental issues. Founded in 2008 with a generous gift from Dan A. Emmett and his family, the Institute works across disciplines to develop and promote research and policy tools useful to decision makers locally, statewide, nationally, and beyond. Our Institute serves as a premier source of environmental legal scholarship, nonpartisan expertise, policy analysis and training.

<https://www.law.ucla.edu/emmett>

