

MODEL ACTION TO SET A CITY ON THE PATH TO SUMMER COOLING, PROTECTING WORKERS, STRENGTHENING THE ECONOMY, AND IMPROVING QUALITY OF LIFE OF ALL CITIZENS AND VISITORS

Smart Surfaces provide a cost-effective way to increase cities' resilience by mitigating extreme heat and stormwater flooding. Smart Surfaces include green infrastructure (trees, rain gardens, urban meadows, green roofs), reflective (cool) roofs, walls, and pavements, porous and permeable pavements, solar PV, and combinations of these surfaces.

The case for deploying Smart Surfaces widely and in an integrated way city-wide is overwhelmingly clear. Extreme heat endangers the health of city residents and tourists and hurts the economy. Extreme heat events increase healthcare costs and can overwhelm emergency responders. Especially for vulnerable populations (elderly, children, student athletes, health-compromised), extreme heat can be a matter of life and death. Outdoor workers are more stressed and less productive when temperatures soar, and their error rates increase.¹ Tourism suffers when visitors avoid traveling to cities because of concerns about heat discomfort and risk.² Failing to respond to credit rating agencies' warnings to undertake adaptation and resilience measures could damage a city's credit rating, increasing the city's cost of borrowing.³

This model provides a pathway for cities to reduce or avoid these economic, health, and quality of life risks by taking executive action to implement effective and cost-saving Smart Surfaces on city properties.⁴ It may be used as either a mayor's order, a council resolution, or another form of city policymaking as appropriate in a given jurisdiction.

The set of actions described in this model is designed to offer a menu of options to capitalize on Smart Surfaces. Some will need customization to suit the unique opportunities and challenges of a particular jurisdiction. Anyone working from this model should consider whether the items included should be tuned to their particular location, whether some of these actions are already taking place and could be supported or expanded on, and whether there are other steps not described here that could be added.

Because cities define the scope of their mayors' and legislative bodies' authority differently, anyone using this model should adjust its provisions to be consistent with applicable law and regulation. This model is an academic resource provided for informational purposes only and does not constitute legal advice. No party should act or rely on any information contained in this paper without first seeking the advice of an attorney.

¹ Barrack Alahmad et al., *A modeling study of cool surfaces and outdoor workers productivity at San Francisco International Airport*, 4 PNAS Nexus 593 (2025), <https://academic.oup.com/pnasnexus/article/4/1/pgae593/7941987>.

² Greg Kats & Rob Jarrell, *Cooling Cities, Slowing Climate Change and Enhancing Equity: Costs and Benefits of Smart Surfaces Adoption for Baltimore* 18–22 (2022), <https://perma.cc/VQ4N-NNW8>.

³ Greg Kats, Stephen Bushnell, Will Wynn & Rob Jarrell, *Here's How Cities Can Reduce Climate Change Risk*, Risk & Insurance Magazine (2019), <https://riskandinsurance.com/smart-surface-strategy-increases-city-resiliency/>.

⁴ Hashem Akbari, *A Simplified Method to Calculate Atmospheric CO₂ Equivalency for Changing Surface Albedo*, 65 Urban Climate 102795 (2026), <https://www.sciencedirect.com/science/article/pii/S221209552600026X?dgcid=author>.

For more information and resources on Smart Surfaces, or to request no-cost help to maximize the benefits of Smart Surfaces in a particular setting, visit smartsurfacescoalition.org or reach out through our City Policy [Help Desk](#).

["An Order" or "A Resolution"] Directing All City Departments to Maximize the Use of Smart Surfaces to Increase the City's Resilience, Health, and Livability

WHEREAS, there is a range of cost-effective, demonstrated urban surface solutions that cool cities, cut energy bills, protect health, and reduce the risk of flooding and mold;

WHEREAS, these solutions, collectively known as Smart Surfaces, are available, proven, cost-effective, and broadly beneficial to the City's economy, livability, and quality of life;

WHEREAS, Smart Surfaces address extreme heat that poses an imminent and significant threat to public health and welfare by increasing emergency room visits, hospitalizations, and even premature death, endangering student athletes, and impacting sectors of the economy that benefit from summer tourism;

WHEREAS, extreme heat negatively affects learning outcomes for children leading to loss of future income and increases the cost of cooling schools;⁵

WHEREAS, many Smart Surfaces also address extreme rainfall events that strain the City's capacity to comply with state and federal regulatory requirements for clean water, that make it difficult and costly to manage stormwater, that risk overwhelming the City's water treatment capacity, and that create dangerous flooding conditions throughout the City;

WHEREAS, the costs of responding to the effects of extreme weather events expose the City to significant financial risk and can impair the City's rate of economic growth;

WHEREAS, these challenges are projected to become worse as climate change increases the frequency and severity of extreme weather events and raises peak summer temperatures in the City;

WHEREAS, Smart Surfaces—including highly reflective roofs and walls, porous and reflective pavements, solar photovoltaics, rooftop solar, solar canopies, rain gardens and bioswales, green roofs, urban meadows, and trees—are proven, cost-effective strategies that help cities manage extreme heat and stormwater events, greatly reducing costs and risks of excess heat, smog, and flooding, and making cities more livable, comfortable, and safe;

WHEREAS, by reducing those costs and risks, Smart Surfaces will help protect the City's credit rating, increase outdoor workers' productivity while reducing error rates, lessen the health impacts of extreme heat, and reduce emergency room admissions during heat events; and

⁵ U.S. Environmental Protection Agency, Climate Change and Children's Health and Well-Being in the United States (April 2023), https://www.epa.gov/system/files/documents/2023-04/CLiME_Final%20Report.pdf.

WHEREAS, pursuing an integrated and comprehensive set of Smart Surfaces will serve the health and welfare of the City's residents and visitors, create high-quality jobs, address the needs of vulnerable populations, and help deliver on the goals of the City's climate action plan.

Accordingly, under the authority of [Section Number] of the City's Charter, it is hereby ordered that every relevant City cabinet, department, agency, and office to take all necessary steps to implement the sections that follow, including through the allocation of funding and other resources to the maximum extent feasible and consistent with applicable law. In the sections that follow, references to the City shall be construed as referring to each City cabinet, department, agency, and office with authority to undertake the activities described in each section.

1. Use Smart Surfaces to Reduce Extreme Heat & Flooding and Protect Citizens' Health

- a. The City shall ensure that roof coverings on all new City buildings and any roof replacements on existing City buildings and on projects that receive funding from the City shall meet the following standards:
 - i. Roof coverings on steep-slope roofs (roof slope $> 2:12$) shall be constructed of materials that achieve, when tested in accordance with the ANSI/CRRC S100 (CRRC S100) standard the following ratings:
 - (a) for asphalt shingle roofing, either a minimum 3-year aged solar reflectance of 0.25 and a minimum 3-year aged thermal emittance of 0.75, or a minimum 3-year aged solar reflectance index of 23.
 - (b) for roofing of any other material, either a minimum 3-year aged solar reflectance of 0.40 and a minimum 3-year aged thermal emittance of 0.75, or a minimum 3-year aged solar reflectance index of 43.
 - ii. Roof coverings on low-slope roofs (roof slope $\leq 2:12$) shall be constructed of materials that achieve, when tested in accordance with the ANSI/CRRC S100 (CRRC S100) standard:
 - (a) a minimum 3-year aged solar reflectance of 0.70 and a minimum 3-year aged thermal emittance of 0.75; or
 - (b) a minimum solar reflectance index not less than 82.
- b. On new and renovated City buildings and on projects funded by the City, the above-ground walls facing east, south, and west shall meet the following standards:
 - i. An initial solar reflectance of 0.30 (when tested either in accordance with CRRC S100, ASTM C1549 with AM1.5GV output, ASTM E903 with the AM1.5GV output, or determined in accordance with generally accepted engineering standards), a minimum thermal emittance of 0.75 (when tested in accordance with CRRC S100, ASTM C835, C1371, E408, or determined in accordance with

generally accepted engineering standards), and for the portion of the opaque wall that is glass spandrel area, a minimum solar reflectance of 0.29 (determined in accordance with NFRC 300 or ISO 9050).

- c. All tree planting in the City shall be targeted to maximize trees' capacity to reduce heat gain in an equitable way, including by prioritizing planting new trees in low-canopy areas within the City and by placing those trees on the south, east, and west side of buildings wherever feasible.
- d. Schoolyards at every City school shall be designed to maximize student health and minimize dark and impervious surfaces and schoolyards' contribution to urban heat island, including by maximizing vegetated features such as rain gardens and bioswales and the planting of shade trees in all feasible locations, and using reflective and permeable paving surfaces that reduce heat absorption in locations where green infrastructure is not possible and where paving is required.
- e. New and renovated City buildings, as well as projects funded by the City, shall comply with Addendum "o" to ANSI/ASHRAE/USGBCE/IES Standard 189.1-2009 or a comparable standard promulgated by a nationally recognized organization for bird-friendly glazing design in buildings.
- f. Within ninety days of this Order, the City will initiate a study examining options for using photocatalytic and other cool pavement treatments for City roads, including studying those treatments' costs and benefits over their whole lifecycle, studying the extent to which the City may undertake those treatments without assistance or permission from the State, and studying the health and economic benefits available from expected reductions in air pollution.
 - i. Where cool pavement treatments are available at the same or lower initial cost than traditional asphalt sealant technologies, the City shall use the cool pavement alternative.
 - ii. Where the lifecycle cost assessment of a cool pavement treatment indicates that it will be more cost-effective than a traditional asphalt sealant technology for the same project, the City shall implement the cool pavement option even if the initial cost is higher than that of a traditional treatment product.

2. Use Smart Surfaces to Increase the City's Competitiveness

- a. To the extent permissible under applicable law, all City agencies will assess the cost of new infrastructure projects on a whole lifecycle basis and, when selecting between alternative approaches, choose the option with the lowest lifecycle cost.
- b. All concrete in City-funded projects shall be below the 50th percentile of carbon intensity among locally available products, as measured by the CarbonStar CO₂e methodology.

3. Use Smart Surfaces to Enhance the City's Resilience

- a. All City-funded projects shall be designed to minimize dark and impervious surfaces to the greatest extent possible, including:
 - i. Where the City is considering installing pavers for sidewalks and streets, except where historic district requirements require specific styles of pavers, installing permeable pavers if there is both sufficient depth for the subsurface layers required and a lifecycle cost assessment reveals a positive benefit cost ratio for the permeable paving option.
 - ii. Adopting a policy of assessing green stormwater infrastructure options that can replace impervious surfaces whenever the City undertakes projects that propose to disturb a land area of two thousand five hundred square feet (2,500 ft²) or greater.
- b. In every instance in which the City is already coating bus lanes, bike lanes, or other relevant markings on asphalt surfaces, cool pavement treatments shall be used provided that they are cost-competitive on a first cost or lifecycle cost basis.
- c. Within ninety days of this Order, the City will commence a study of where and how it can convert vacant lands and underutilized mowed grass areas to create urban meadows, including identifying specific areas that may be appropriate for urban meadows and calculating the aggregate total of such areas within the city, determining which native plants should be selected, assessing what signage is appropriate to effectively communicate meadows' purpose and effect, and estimating the benefits and costs of urban meadows in the City.

The foregoing provisions are severable. If any provision or portion hereof should be held to be invalid or otherwise unenforceable by any court of competent jurisdiction the remaining provisions shall remain in full effect.

This [Order or Resolution] takes effect immediately.