



**City of Cambridge
Community Development Department**

Climate Resilience Zoning – Draft Text

**Planning Board / Task Force Discussion
November 15, 2022**





CRZTF Purpose

Recommend **development standards** for climate resilience to incorporate into the Cambridge Zoning Ordinance

Specific Climate Change Impacts to Discuss:

- Impacts of flooding from sea level rise, storm surge, and precipitation
- Rise in temperatures exacerbated by the urban heat island effect

Scope of Zoning Recommendations:

- Major new development subject to project review procedures
- Smaller-scale new development subject to as-of-right zoning
- Additions/alterations to existing buildings and uses



20 CRZTF Members

Residents

- Doug Brown – co-chair
- Ted Cohen (*Planning Board*)
- Conrad Crawford (*CRA Board*)
- Mike Nakagawa

Union/Trades Representative

- Louis Bacci, Jr. (*Laborers Local 151, Planning Board*)

Institutional/Non-Profit Representatives

- Brian Goldberg (*MIT*)
- Tom Lucey (*Harvard*)
- Margaret Moran (*Cambridge Housing Authority*)
- Craig Nicholson (*Just-a-Start*)

Business Representatives/Property Owners

- Jason Alves (*East Cambridge Business Association*)
- Nancy Donohue (*Cambridge Chamber of Commerce*)
- Mark Johnson/Tom Sullivan (*Divco West*)
- Joe Maguire/Rick Malmstrom (*Alexandria*)
- Mike Owu (*MITIMCo*)

Subject Matter Experts

- Tom Chase (*New Ecology*)
- Lauren Miller (*CDM Smith*)
- Jim Newman (*Linnaean Solutions*)

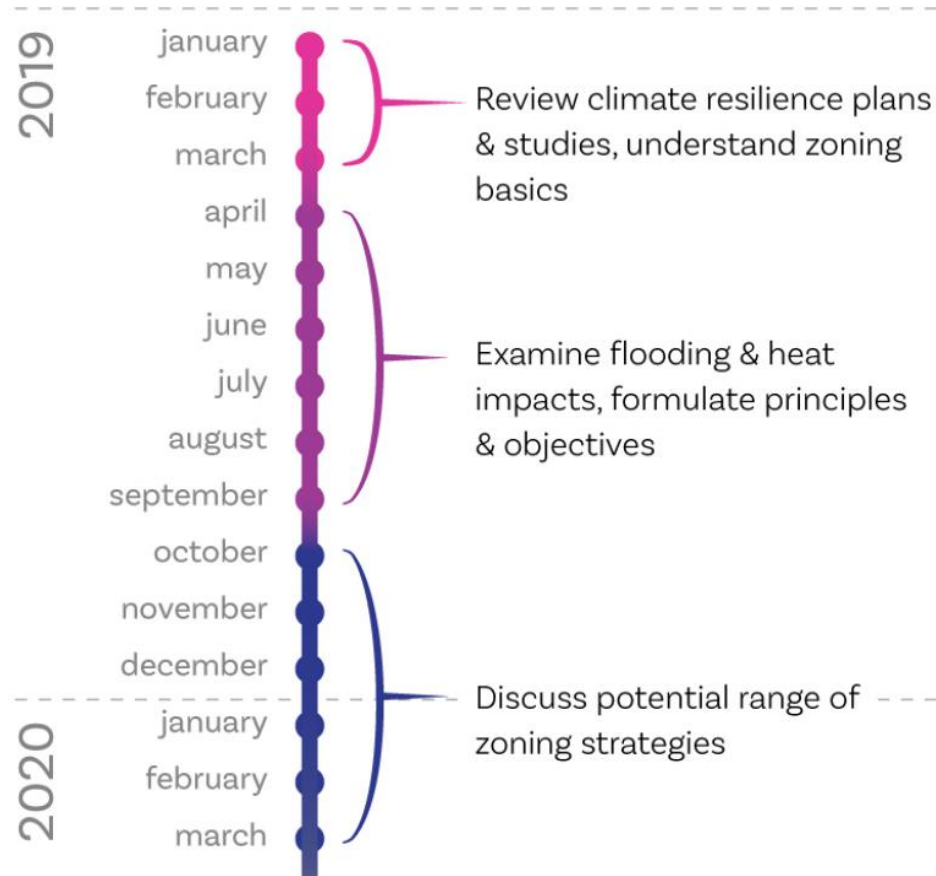
City Staff

- John Bolduc, Environmental Planner (emeritus)
- Iram Farooq – co-chair
- Kathy Watkins, City Engineer

Consultants

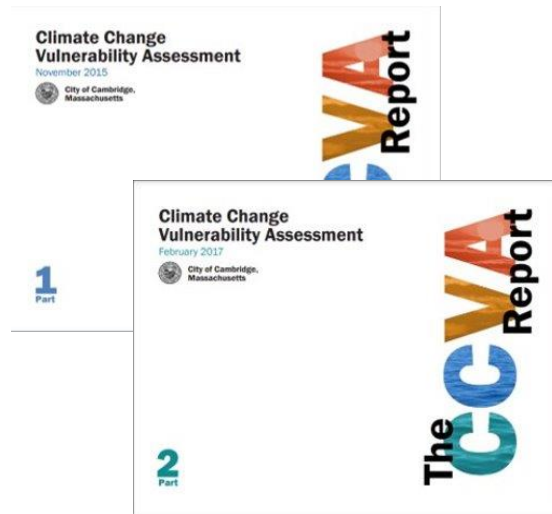
- Kleinfelder, Weston & Sampson (engineering)
- Reed-Hilderbrand (landscape architecture)

Two-Year Process

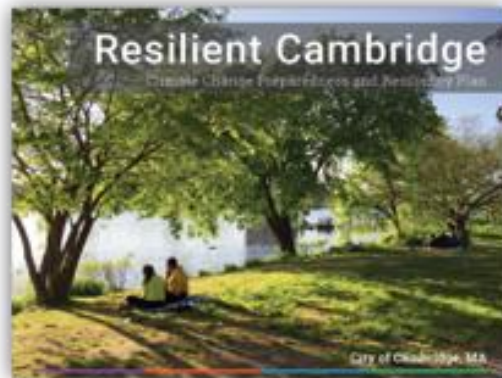


Contributing Work

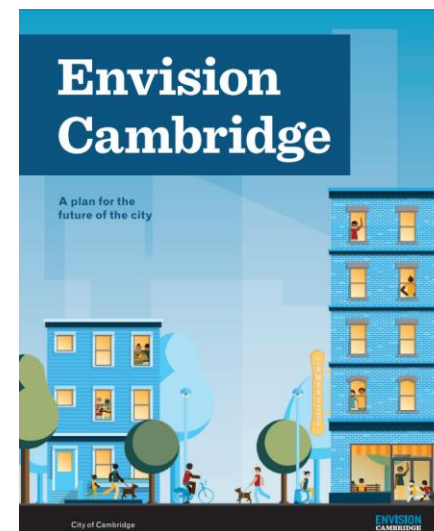
Climate
Change
Vulnerability
Assessment



Resilient
Cambridge
Plan



Urban Forest
Master Plan



Envision
Cambridge

Guiding Ideas

Overarching goal: provide flexibility and choice to property owners while advancing the City's climate resilience adaptation and mitigation goals





Principles to Guide Zoning Strategies

1. Focus on **people, communities, & equity**
2. Account for **differentiation & choice**
3. Balance strategies to address **new construction & existing development**
4. Use **performance-based standards** as well as **prescriptive standards**
5. **Allow flexibility** in changing circumstances
6. Support actions with **co-benefits**
7. Seek **effectiveness**
8. Make decisions based on **best available data & science**



Land Use & Development Objectives

- 1. Elevate & floodproof
- 2. Design to recover

- 3. Use green infrastructure
- 4. Preserve vegetation
- 5. Create vegetation
- 6. Limit paved areas
- 7. Provide shading

- 8. Use reflective surfaces
- 9. Promote passive resilience
- 10. Shelter in emergencies
- 11. Create emergency plans

- 12. Implement area-wide strategies
- 13. Produce co-benefits

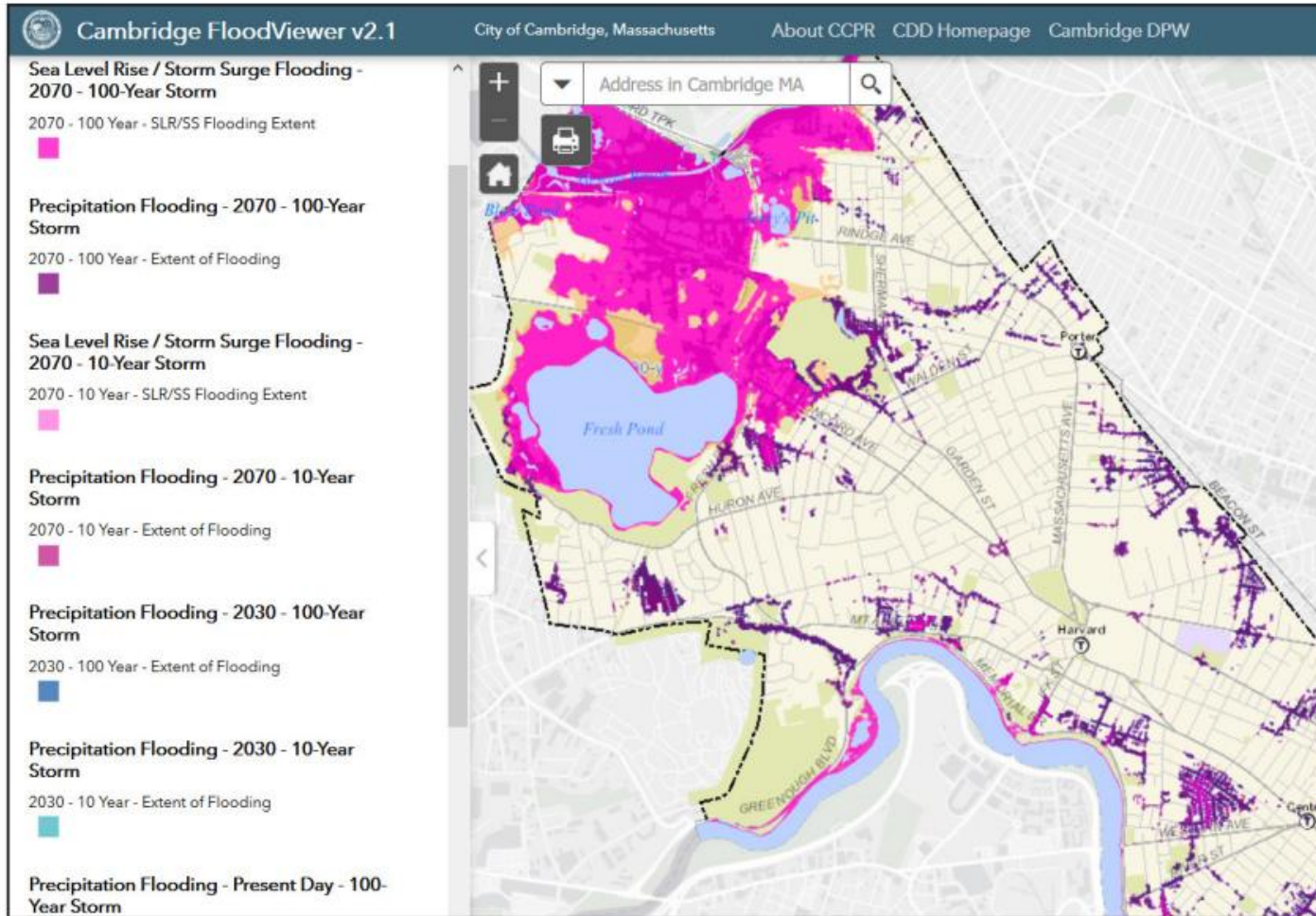


Draft Climate Resilience Zoning

Four main parts:

- New Flood Resilience Standards (22.80)
- New Heat Resilience Standards (22.90)
- Remove Impediments in Current Zoning (Articles 2.000, 5.000, 22.000)
- Incorporate Resilience into Development Review (Article 19.000)

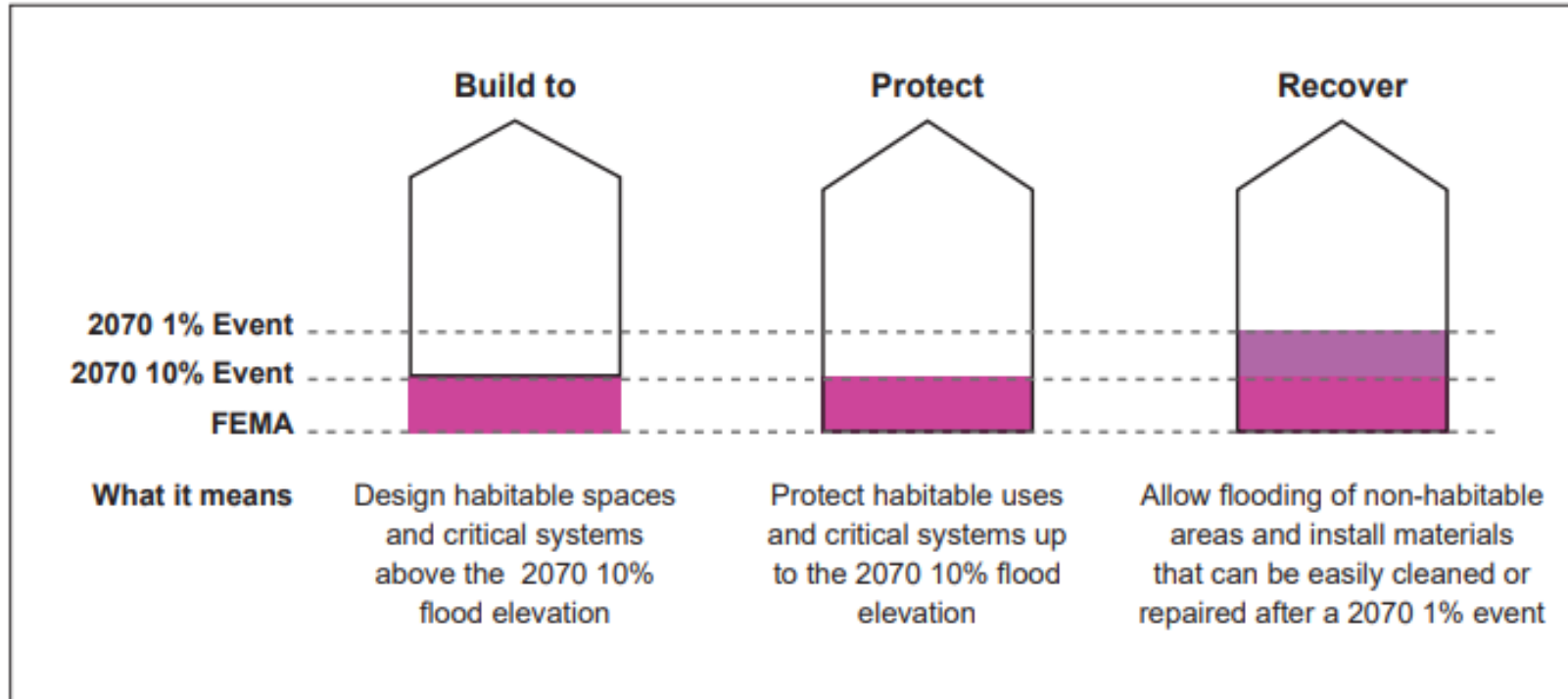
22.80 Flood Resilience Standards



Flood Elevations:

- DPW promulgates Long-Term Flood Elevations (LTFEs)
- 50-year horizon
- 10% and 1% flood probability levels
- FloodViewer shows LTFEs by site
- Revised based on climate projections

22.80 Flood Resilience Standards

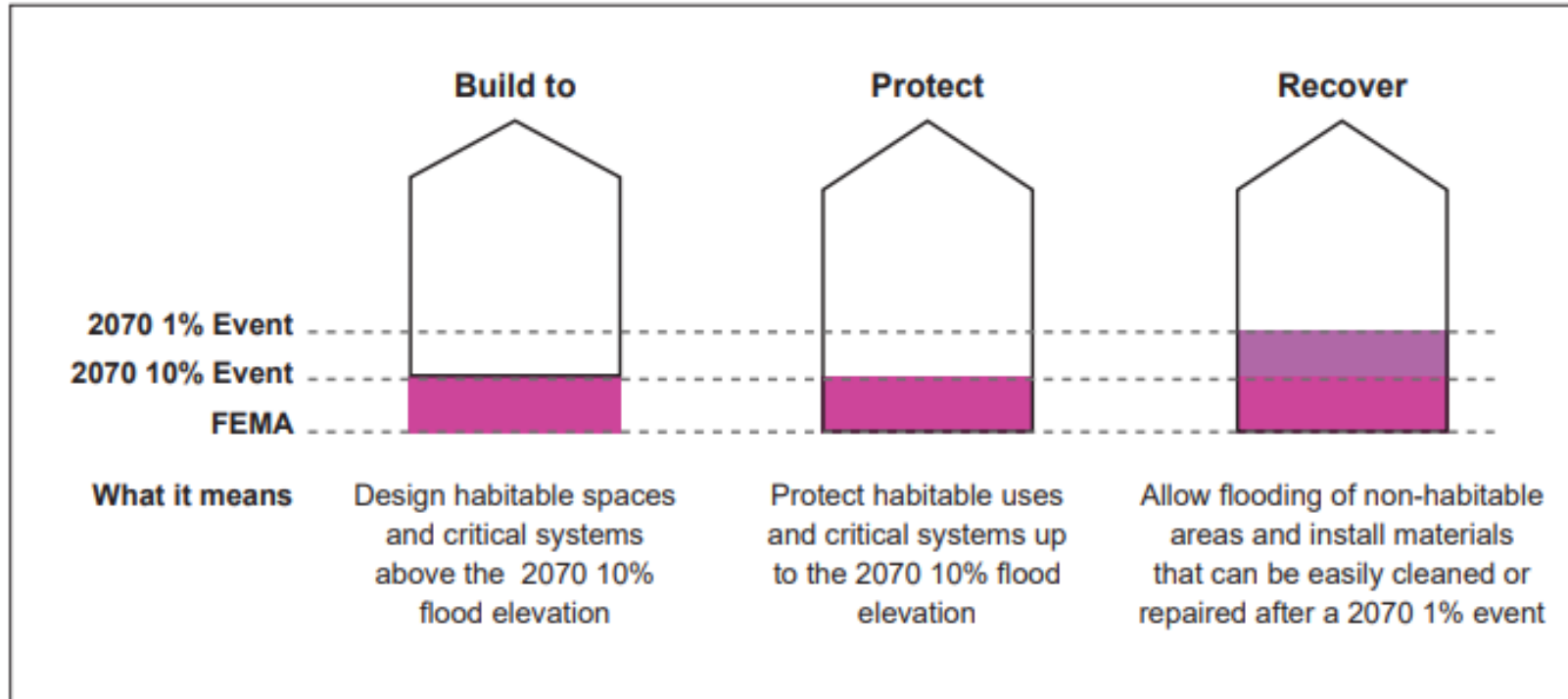


“Protect” means either put the space above the flood elevation, or use permanent/movable flood barriers

Development Standards:

- Protect occupiable spaces to 10%-LTFE
- Protect habitable (residential) space and critical eqpt. to 1%-LTFE
- Design spaces below 1%-LTFE to recover
- Modifications by special permit

22.80 Flood Resilience Standards




Applicability:

- Development subject to Green Building Review (25,000+ SF)
- All new buildings or additions on a new foundation, if the footprint is more than 50% of existing


22.80 Flood Resilience Standards

Address: 197 Vassal Ln
Map-Lot: 260-80

 **FloodViewer**
 City of Cambridge, MA

(Elevations in ft-CCB¹) **Flood Elevation Data**

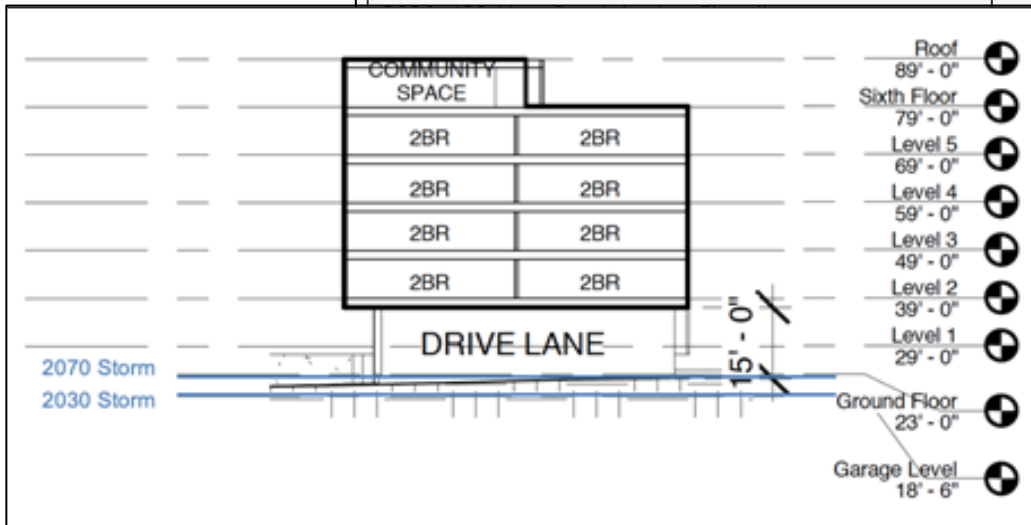
Minimum Ground Elevation:	16.9
Maximum Ground Elevation:	28.6
2070 100-Year SLR/SS Flooding:	22.5
2070 100-Year Precipitation Flooding:	24.1
2070 10-Year SLR/SS Flooding:	22.1
2070 10-Year Precipitation Flooding:	22.6



The Flood Viewer has been developed as an informational tool for the Cambridge community to assess climate change threats from flooding and to prepare for it by implementing specific strategies.

Use this tool to help understand the risk of flooding to your property and how to protect against it.

Learn more at:
CambridgeMA.gov/FloodViewer



Procedures:

- Submit LTFEs, plans and elevations
- DPW reviews plan at first review stage (special permit, advisory, building permit)
- Updated submissions at building permit, certificate of occupancy

22.90 Green Factor (Heat Resilience)



Cool Score:

- Weighted score based on area of:
 - Tree canopy preservation
 - Tree canopy planting
 - Green roofs
 - Shrubs and lawns
 - Shaded area
 - Cool paving

Factor Comparison

STRATEGIES	Somerville Green Score	Seattle Green Factor	Brown, et al. Green Factor	Proposed Green Factor
Landscaped area	✓	✓	✓	✓
Vegetation	✓	✓	✓	✓
New trees	✓	✓	✓	✓
Preserved trees	✓	✓	✓	✓
Green roofs	✓	✓	✓	✓
Rain gardens & bioswales	✓	✗	✓	✓
Bioretention facilities	✗	✓	✓	✓
Water features	✗	✓	✗	✗
Vegetated walls	✓	✓	✓	✓
Turfgrass & mulch	✓	✓	✓	✓
Pervious paving	✓	✓	✓	✗
Structural soil systems	✓	✓	✓	✓
High-SRI paving	✗	✗	✗	✓
High-SRI shade structure	✗	✗	✗	✓

22.90 Green Factor (Heat Resilience)



Development Standard:

- Cool Score of “1.0”: weighted “Cool Area” \geq required open space (min. 20%)
- For preservation or rehab, Cool Score not less than existing condition
- Modifications by special permit

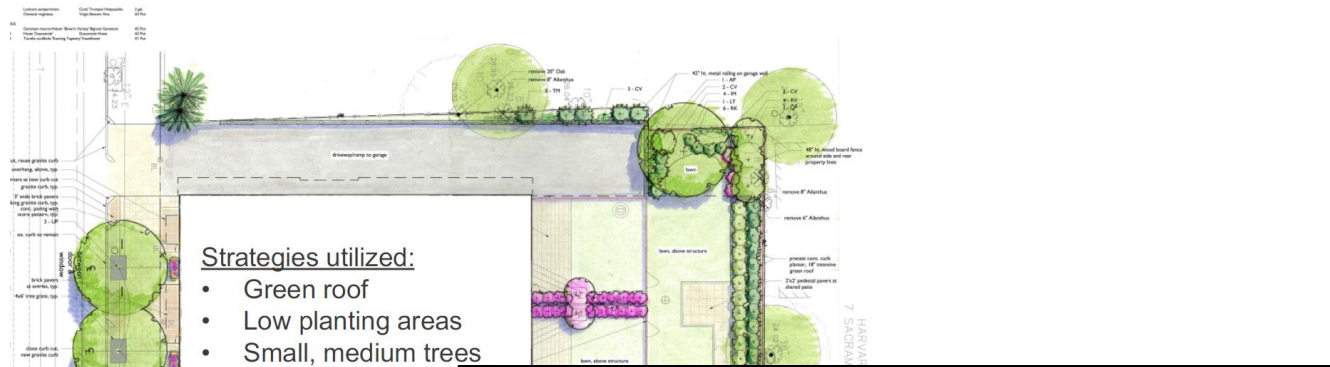
22.90 Green Factor (Heat Resilience)



Applicability:

- Development subject to Green Building Review (25,000+ SF)
- All new buildings or additions on a new foundation, if the footprint is more than 50% of existing

22.90 Green Factor (Heat Resilience)



Strategies utilized:

- Green roof
- Low planting areas
- Small, medium trees

		Outside 20' of PROW	Value Factor		Within 20' of PROW	Value Factor	Contributing Area								
Trees	Preserved Existing Trees														
	A1 Understory tree currently <10' canopy spread	1	0.80	+	1	1.60	360								
	A2 Understory tree currently >10' canopy spread	1	1.00	+	1	2.00	450								
	A3 Canopy tree currently <15' canopy spread	1	0.80	+	1	1.60	1,680								
	A4 Canopy tree currently between 15' and 25' canopy spread	1	1.00	+	1	2.00	2,100								
	A5 Canopy tree currently >25' canopy spread	1	1.20	+	1	2.40	2,520								
	New or Transplanted Trees														
A6 Understory tree	1	0.60	+	1	1.20	270									
A7 Canopy tree	1	0.70	+	1	1.40	1,470									
Planting Areas	B1 Lawn	100	0.30	+	100	0.60	90								
	B2 Low Planting	100	0.40	+	100	0.80	120								
	B3 Planting	100	0.50	+	100	1.00	150								
Green Roofs & Facades	C1 Green Façade	100	0.10	+	100	0.20	30								
	C2 Living Wall	100	0.30	+	100	0.60	90								
	C3 Green Roof	100	0.30	+	100	0.60	90								
	C4 Short Intensive Green Roof	100	0.50	+	100	1.00	150								
	C5 Intensive Green Roof	100	0.60	+	100	1.20	180								
Paving & Structures	D1 High-SRI Roof	Required	N/A												
	D2 High-SRI Paving	100	0.1				18								
	D3 High-SRI Shade Structure	100	0.2	+	100	0.40	68								
Project Summary	<table border="1"> <tr> <td>Portion of lot area utilizing green strategies</td> <td>24%</td> </tr> <tr> <td>Portion of score from green strategies</td> <td>98%</td> </tr> <tr> <td>Portion of score from trees</td> <td>86%</td> </tr> <tr> <td>Portion of score contributing to public realm cooling</td> <td>67%</td> </tr> </table>						Portion of lot area utilizing green strategies	24%	Portion of score from green strategies	98%	Portion of score from trees	86%	Portion of score contributing to public realm cooling	67%	
	Portion of lot area utilizing green strategies	24%													
	Portion of score from green strategies	98%													
	Portion of score from trees	86%													
Portion of score contributing to public realm cooling	67%														
Total Contributing Area						9,820									
Total Area Goal						8,000									
COOL FACTOR SCORE						1.23									

Procedures:

- Submit plan and calculation worksheet
- CDD reviews plan at first review stage (special permit, advisory, building permit)
- Updated submissions at building permit, certificate of occupancy

Removing Impediments in Current Zoning



Shade Canopies:

- Defined as coverings with a **high-SRI or solar** top surface
- Exempt from setbacks and height
- Area underneath exempt from GFA
- Allowed to cover no more than 50% of required open space



Iggy's Bread (photo: energysage.com)

Removing Impediments in Current Zoning



Stairs and Ramps:

- Exempt from setbacks and GFA up to 4 feet or 1%-LTFE

Building Height:

- May be increased to compensate for elevating ground story above 1%-LTFE (no more than 4 feet)



Removing Impediments in Current Zoning



Green Roofs:

- Exempt from GFA, including surrounding deck area equal to Green Roof Area
- Access headhouses exempt from GFA and height
- *Currently:* Usable green roof requires special permit for exemption
- *Proposed:* No special permit; maintenance plan required

Removing Impediments in Current Zoning



Usable Basements:

- *Currently:* Exempt from GFA if in single-family or two-family, otherwise by special permit
- *Proposed:* Exempt from GFA for any use if it meets Flood Resilience Standard (i.e., protected up to 10%-LTFE or to 1%-LTFE if habitable space)

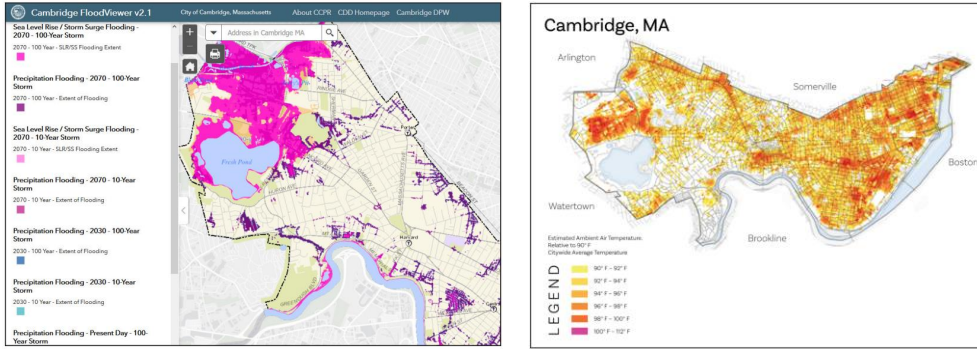


Current Zoning “Cleanup”

Similar dimensional standards moved to Article 5.000 for clarity:

- GFA exemptions
- Height exceptions
- Yard exceptions
- Open space dimensions

Article 19.000 Project Review



- 19.20 Project Review Special Permit: Require “Resilience Narrative” assessing future flood and heat impacts and describing mitigation
- 19.30 Urban Design Objectives: Include resilience objective and indicators with other objectives
- 19.40 Advisory Review Procedure: Provide Flood Resilience and Green Factor information for staff review

SOLAR-READY ROOF

- Over 14,000 sq feet of solar-ready space on building roof.
- Conduit infrastructure installed in advance.

GREEN BUILDING DESIGN

- Investment in training Construction and Operations Teams in green building practices.
- Building anticipates meeting LEED Gold standards.

REDUCE URBAN HEAT ISLAND EFFECT

- Energy efficient white roofing materials to be used.
- Permeable paving materials to be used at street level.

LANDSCAPE FEATURES

- Increase tree canopy through inclusion of 51 new street shade trees.
- Planting along streetscape and pedestrian amenities (street furniture, lighting, bicycle racks, etc.)

RESILIENT DESIGN MEASURES

- Increase on-site food storage (under building).
- Increase stormwater infiltration/ground-water recharge (220 stormwater chambers).
- Site Action Plan, including flood protection measures, to prepare for a changing climate.

ALTERNATIVE TRANSPORTATION

- Provide new bicycle racks and “Blue Bikes” in public realm.
- Construct new bicycle lanes in Triangle neighborhood.
- Provide TDM benefits to encourage use of MBTA public transit (across from Alewife T Station).

SOCIAL COHESION

- Build a community through engaging public spaces and neighborhood businesses.
- Social programming for residents and visitors.
- Educate through “Triangle Neighborhood Initiative” for a climate-ready community.

SUSTAINABLE AND RESILIENT DESIGN MEASURES AT 50 CAMBRIDGE PARK DRIVE



Why These Recommendations?

Ensure that new buildings are resilient throughout their lifetime

- Set flood resilience standards that are based on the future, not the past
- Promote high-impact cooling strategies that provide co-benefits
- Remove small zoning obstacles so property owners can make their properties more resilient
- Encourage developers to think holistically about resilience
- Adapt and change zoning, as needed



Other Regulations

Existing Zoning:

- Green Building Requirements
- Permeable open space requirements
- Green Roof requirement

Sewer/Stormwater (www.cambridgema.gov/stormwater):

- “25:2 Requirement.” Based on 2070 projections. Stormwater stored or recharged on site.
- Post-development peak discharge rates cannot exceed pre-development peak discharge rates.
- Water quality improvements – TSS and phosphorus.
- Sewer Holding tanks in Kendall Square and Alewife areas; 8-hour volume.
- Sewer inflow/infiltration (I/I) reduction requirements



Continuing Study

- **Regular updates** to flood and heat projections based on climate models
- Incorporate climate resilience principles when updating **urban design guidelines**
- **Periodic evaluation** of the effectiveness of these zoning standards and **recommended revisions** where they can be improved



Next Steps

- **Discuss** Draft Zoning Text
- Transmit zoning text to City Council for referral as a **Zoning Petition**
- Public hearings at **Planning Board and City Council (Ordinance Committee)**
- Consider **adoption into the Zoning Ordinance**



Tonight's Discussion

- **Questions** on how the proposed zoning works
- **Comments** on ways to clarify/improve
- **Guidance** on moving forward