City of Cambridge
Community Development Department

Climate Resilience Zoning Task Force Meeting

October 22, 2020

Agenda

- Re-Introductions
- Getting Up To Speed
- Survey Results
- Cool Factor Analysis
- Discussion
- Public Comment
- Next Steps

Re-Introductions

Tell Us Your...

Name

Affiliation

Interest in participating in the Task Force

Getting Up To Speed

CRZTF Purpose

Recommend **development standards** to incorporate into the Cambridge Zoning Ordinance in the **near term**

Focus Areas

- Flooding from sea level rise, storm surge, precipitation
- Temperature & urban heat island effect

Contributing Work

- Climate Change Vulnerability Assessment (CCVA)
- Climate Change Preparedness & Resilience (CCPR) plans
- Urban Forest Master Plan (UFMP)

Process So Far

January – March 2019	• Climate resilience plans & studies • Zoning basics
April – September 2019	• Flooding & heat impacts • Task Force principles & objectives
October 2019 – March 2020	• Potential zoning strategies
October 2020 – January 2021	• Consensus recommendations

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. 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

Potential Zoning Approaches

1. Define Standards for **Flood & Heat Resilience**
2. Incentivize Improvement by **Reducing Impediments** in Current Zoning
3. Apply Standards through **Project Review Special Permit**
4. Apply Standards through **Building & Site Plan Requirements**
5. Apply Standards through **Base Zoning**

Survey Results

About the Survey

Input on **preferences for potential range of zoning recommendations**

Level of support on a scale of 1 to 5:

- 1 = **very strong reservations**/highly unlikely to support
- 3 = **some reservations** and/or need for minor modifications or clarification before supporting
- 5 = **very few to no reservations**/highly likely to support

Open-ended comments on outstanding issues/concerns

Survey Results

16 out of 20 Task Force members responded to the survey

Revealed **strong support** for a majority of the 17 potential approaches:

- Very few to no reservations = **10 recommendations**
- Some reservations = **7 recommendations**
- Very strong reservations = **0 recommendations!**

Category 1: Define Standards for Flood & Heat Resilience

1A: **Flood Elevation Definitions**

1B: **Flood Resilient Definition**

1C: **Heat Resilient Definition**

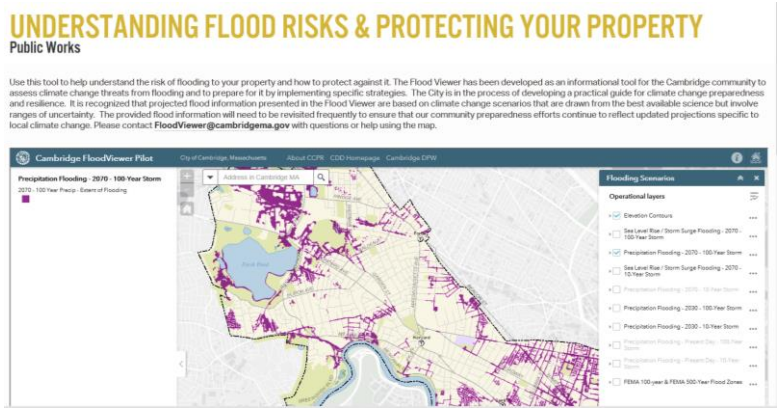
Defining Flood Elevations

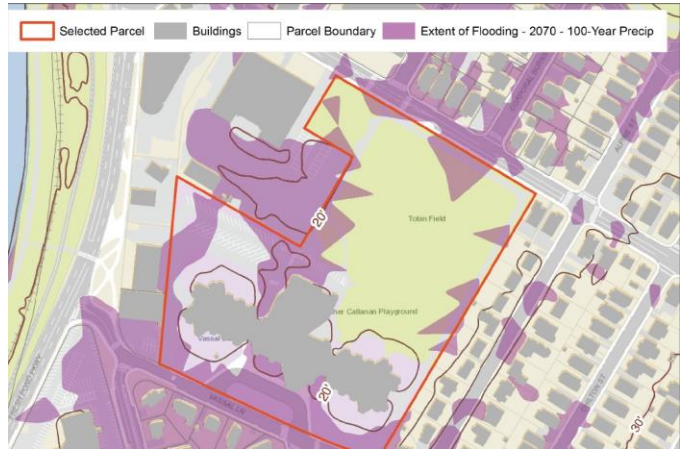
50-year (2070) climate projections

Probabilities: **10% (10-year) & 1% (100-year)**

Elevations by parcel: Not only based on map area

Updated periodically based on new modeling





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

FloodViewer
City of Cambridge, MA

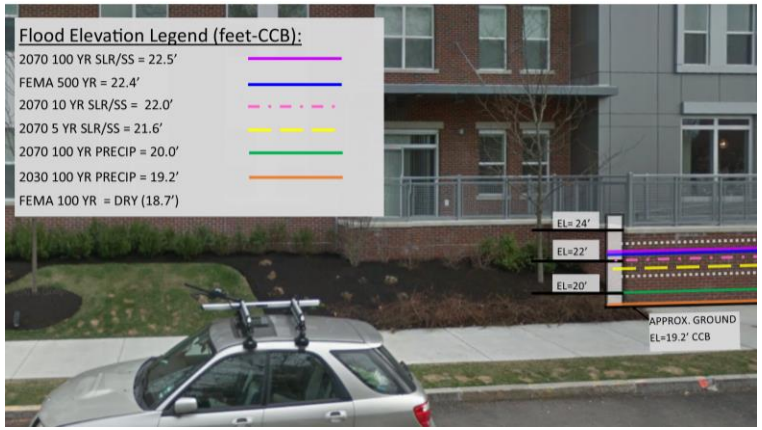
(Elevations in ft-CCB[1]) **Flood Elevation Data**

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
2030 100-Year Precipitation Flooding:	23.9
2030 10-Year Precipitation Flooding:	22.2
Present Day 100-Year Precipitation Flooding:	23.5
Present Day 10-Year Precipitation Flooding:	21.9
FEMA 100-year Flood Elevation:	N/A
FEMA 500-year Flood Elevation:	22.4

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



Defining Flood Resilience

Build to 2070 10% long-term flood elevation → **Elevate buildings or grade** above 2070 10%-LTFE & vulnerable uses above 1%-LTFE

Protect to 2070 10% long-term flood elevation → **Dry-floodproof most usable spaces** below 10%-LTFE & vulnerable uses between 10%- & 1%-LTFE

Recover from 2070 1% long-term flood elevation → **Wet-floodproof most usable spaces** between 10% & 1%-LTFE

ENVISION PROTOTYPES

RESIDENTIAL

Residential

HOUSING MUST BE ELEVATED

GARAGE LEVELS CAN BE FLOODPROOFED OR FLOODABLE

ELEVATE OR PROTECT UTILITIES AND MAJOR EQUIPMENT

Mixed-Use Residential

HOUSING MUST BE ELEVATED

COMMERCIAL OR RETAIL USES CAN BE FLOODPROOFED

ELEVATE OR PROTECT UTILITIES AND MAJOR EQUIPMENT

NON-RESIDENTIAL

Mixed-Use Commercial

OFFICE USES CAN FLOODPROOFED

COMMERCIAL OR RETAIL USES CAN BE FLOODPROOFED

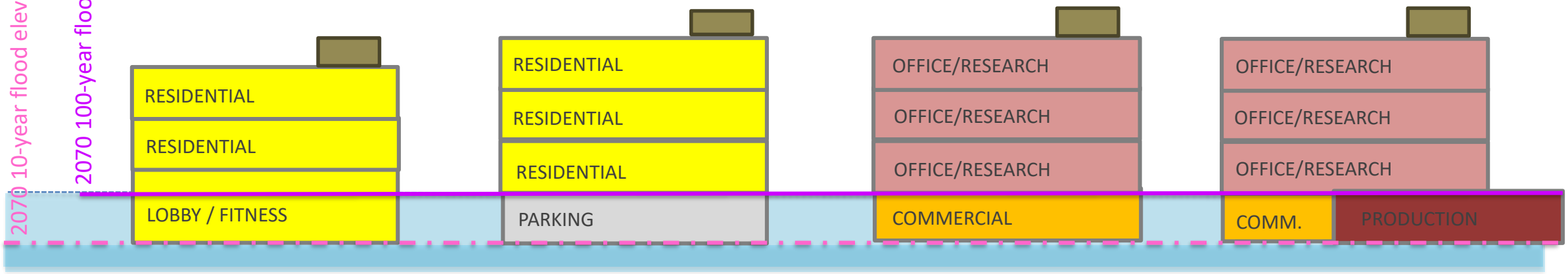
ELEVATE OR PROTECT UTILTIES AND CHEMICAL STORAGE

Mixed-Use Industrial

OFFICE USES CAN FLOODPROOFED

COMMERCIAL, INDUSTRIAL OR RETAIL USES CAN BE FLOODPROOFED

ELEVATE OR PROTECT UTILTIES AND MAJOR EQUIPMENT AND CHEMICAL STORAGE



Why This Approach?

- Standards based on **latest science**
- **Different standards** for different levels of risk (e.g., residential, critical systems, commercial)
- **Choice & flexibility** in how to “protect” or “recover”
- Could be applied to **new construction or conversions** of existing built space

1A: Flood Elevation Definitions

Likes:

- Based on **best-available data** & regularly-updated **future projections**;
- Sets **site-specific standards**, rather than imposing a citywide requirement.

Reservations:

- Should **update FloodViewer regularly** to reflect changes in infrastructure;
- Need to **educate property owners** on how to use FloodViewer & what its implications are;
- Terms like **"x%-LTFE"** could be improved upon & better defined;
- Need to understand impact on flood insurance rates;
- Projections should be for 50 years in the future, **not tied to 2070** specifically;
- Critical facilities may need greater protection.

1B: Flood Resilient Definition

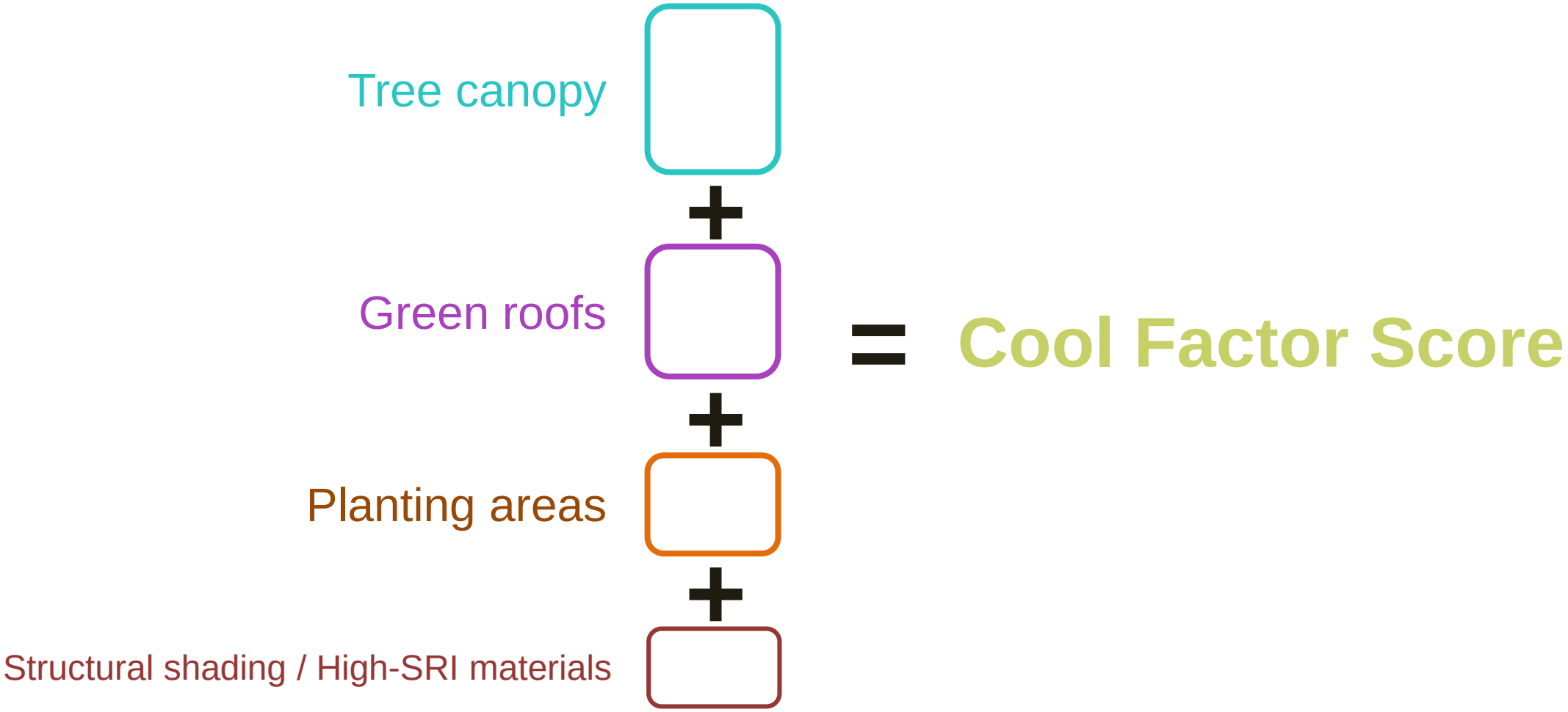
Likes:

- Addresses the safety of **the most critical areas of a building**, especially residential areas;
- **Defines new terms** in a straightforward way.

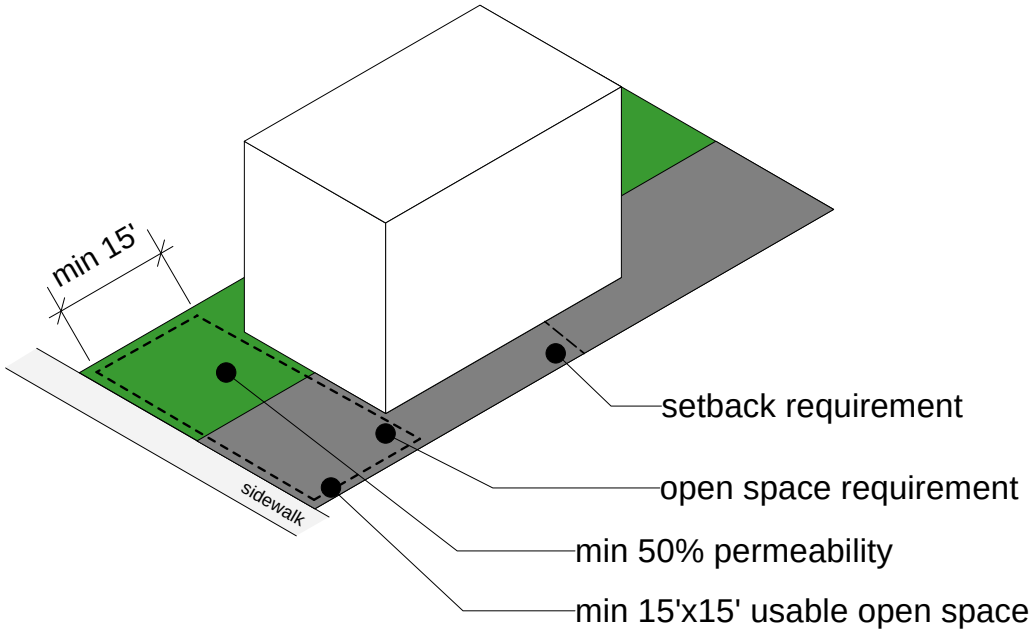
Reservations:

- Need to **clarify the differences between "flood proof" and "flood resilient;"**
- More appropriate for the **State Building Code** than zoning regulations;
- Need to specify **which requirements apply to which parts of a building**;
- **Lobbies** & other places that provide emergency access in & out of buildings **should be built above the 1%-LTFE**;
- Should **only apply to residential uses**, not all buildings;
- Clarify if this will apply only to **new construction** or whether all **existing buildings** (including historical buildings) will be evaluated by these standards.

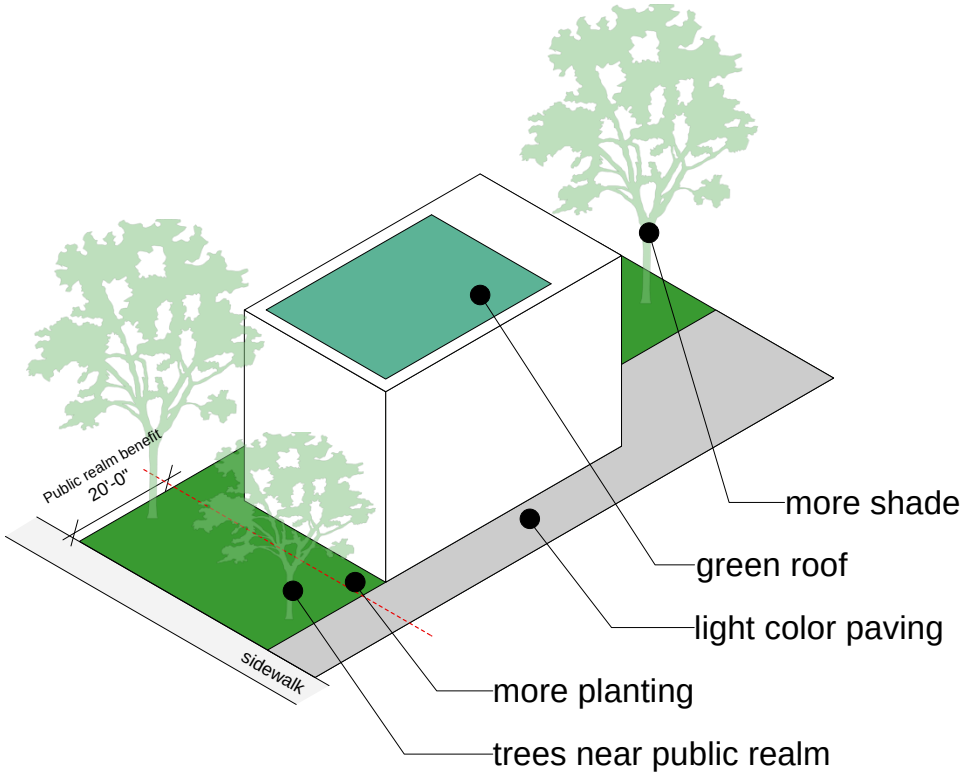
Defining Heat Resilience



Traditional Zoning



Cool Factor



OPEN SPACE | PERMEABILITY | + | SHADE | COOL SURFACES | PLANTING

Why This Approach?

- **Qualitative metrics** for cooling dovetail with current quantitative zoning standards (e.g., setbacks, open space)
- Menu of design interventions provide **flexibility & adaptability** to different types of sites
- Improvements benefit **the site & the surrounding area**

1C: Heat Resilient Definition (i.e. Cool Factor)

Likes:

- **Flexibility in strategies** that can be used (performance-based standard);
- Potential to **increase cooling of ambient air temperature** compared to current zoning;
- Requirement for **white roofs**.

Reservations:

- Questions remain about **how the Cool Target will be achieved**:
  - Should it vary by zoning district &/or land use type?
  - Should it focus on heat islands?
  - Should there be exemptions for certain types of development?
- There are **not enough options** to make this a true performance standard;
- Preference for a **Green Factor approach**, alone or in combination with the Cool Factor;
- Need to **regularly evaluate the Cool Factor's effectiveness**.

Category 2: Incentivize Improvement by Reducing Impediments in Current Zoning

2A: Exclude **open areas covered by shade canopy** from Gross Floor Area, yard (setback), and height limitations

2B: **Allow stairs/ramps** in front setbacks as-of-right for Flood Resilient buildings

2C: Exclude **Functional Green Roof Area** from Gross Floor Area and height limitations as-of-right in all cases

2D: Exclude **headhouses for accessing usable roof space** from height limitations

2E: Allow **basement exclusion** from Gross Floor Area limitations if the building is certified to be Flood Resilient

2F: Allow a **compensating building height increase** where the ground floor of the building is raised to meet Flood Resilience standards

Why This Approach?

- Allowing improvements as-of-right **reduces cost & uncertainty** for property owners
- Can apply to both **new & existing development**
- Incentive approach gives **flexibility & choice**
- Prescriptive standards **work in tandem** with performance-based standards (e.g. Cool Factor)

2A: Exclude shaded open areas from dimensional limitations

Likes:

- **Incentivizes shade canopy** while addressing realities of density in the City;
- **Adds more usable space** to constrained sites;
- Support for **Alternative A** (exclude height) &/or **B** (require high-SRI or PV surface).

Reservations:

- Concerns about **increasing height and decreasing setbacks**;
- Alternative B could create an **additional regulatory barrier** that conflicts with the performance-based approach of the Cool Factor;
- A **cost-benefit analysis is necessary** to determine where the added GFA would be most beneficial to the City.

2B: Allow stairs/ramps in front setbacks as-of-right for Flood Resilient buildings

Likes:

- **Reduces regulatory barrier** to addressing elevation differences;
- **Offers flexibility**, including addressing accessibility;
- **Provides more usable space**, especially on small lots.

Reservations:

- Does not **discourage building** in flood-prone areas;
- Does not allow for **design review**;
- Should also apply to **window wells** and **side setbacks**.

2C: Exclude Functional Green Roof Area from GFA & height limitations as-of-right in all cases

Likes:

- **Reduces regulatory and cost barriers** to green roofs;
- Encourages a positive, productive use of roofs with many co-benefits.

Reservations:

- The ability to convert a roof into a green roof **is not accessible to all**;
- Green roofs should not result in **reduced open space at ground level**;
- Add an additional incentive for **public access** to rooftop "parks;"
- There will be a need for an **administrative review** of all green roofs' planting & maintenance plans.

2D: Exclude headhouses for accessing usable roof space from height limitations

Likes:

- **Encourages green roofs** and **creates more usable space;**
- **Removes a regulatory barrier** to providing an element of sustainable design.

Reservations:

- Should **only be for green roofs**;
- Must **show headhouses in plans** submitted to the BZA and Planning Board;
- Concern about **negative impacts on neighbors**, especially noise;
- Should have **some type of height limit**.

2E: Allow basement exclusion from GFA limitations if building is Flood Resilient

Likes:

- This is a good incentive for both **residential and non-residential** buildings;
- **Removes GFA limits** on good-faith efforts to protect building occupants.

Reservations:

- **Unclear** meaning and applicability;
- Concern with **cost-burdening property owners**;
- Potential to enable the **development of less-than-suitable parcels**;
- Buildings should have to meet the Flood Resilient standard **without incentives**;
- **Contradicts the goals of the 2016 Basement Zoning changes** by discouraging maximum use of building space to increase housing supply.

2F: Allow building height increase when building is raised to be Flood Resilient

Likes:

- Encourages the building of **flood-resilient buildings** using an appropriate incentive;
- Allows **flexibility** based on site conditions;
- Offers a **relatively simple and inexpensive option** for property owners.

Reservations:

- Will result in **non-uniformity within a district**;
- Might **increase construction costs** by having developers turn to using steel framing;
- Should **only apply to existing buildings**, not to new construction or significant renovations;
- Potential to enable the **development of less-than-suitable parcels**;
- May be **contradictory to urban design, historic preservation, & accessibility** goals.

Category 3: Apply Standards through Project Review Special Permit

3A: Require **Resilience Narrative** in Section 19.20 Project Review Special Permit Requirements

3B: Include **Resilience Objectives** in Section 19.30 Citywide Urban Design Objectives

Resilience Narrative

Analysis of **long-term flood & heat projections**

Detailed **description of mitigating measures**, including flood-protective design features, passive survivability, shading & other design features to reduce heat inside & outside of the building (including on public realm), recovery plans, emergency management plans

Cool Factor calculations & qualitative description of what approaches were used

Resilience Objective

“Buildings and sites are designed to be resilient to increased risks from flooding and heat.”

Incorporated into **Planning Board review & findings**

Potential indicators:

- Meeting “Flood Resilient” standard;
- Meeting “Heat Resilient” standard;
- Passive survivability;
- Recovery & emergency management plans.

Why This Approach?

- **Qualitative, holistic review process** (but limited number of cases)
- More thorough **consideration of context & site-specific factors**, allowing for different approaches
- Considers **design & programmatic approaches** (e.g., recovery planning, emergency response)
- Opportunity to **weigh co-benefits & tradeoffs** of development decisions

3A: Require Resilience Narrative for Project Review Special Permits

Likes:

- Requires that climate is accounted for in the **planning & design of new buildings**;
- Gives Planning Board & City staff **more information** with which to analyze proposals.

Reservations:

- Could **burden small & mid-sized property owners**, as well as **affordable housing developers**;
- **Cannot replace prescriptive standards**, especially for large projects;
- Reviewing these narratives could **increase the administrative burden of City staff**;
- The **evaluation of these narratives is unclear** & there are no requirements beside the Cool Factor accompanying this.

3B: Include Resilience Objectives in Citywide Urban Design Objectives

Likes:

- **Provides guidance** to developers & designers as well as the Planning Board;
- Clear standards highlight the **importance of resilient design**.

Reservations:

- Needs to be **implemented after Resilience Narrative** is implemented;
- Could add **time, cost, & risk** to projects that might have unintentional **negative impacts on small projects & housing development**;
- Could **conflict with other objectives** (e.g., 19.31(2), 19.32(1));
- Terms are vague and allow too much **room for interpretation** from reviewers.

Category 4: Apply Standards through Building & Site Plan Requirements

4A: Include **Flood Resilience Performance Requirement** (Section 19.50)

4B: Include **Heat Resilience Performance Requirement** (Section 19.50)

4C: Include **Prescriptive Heat Resilience Requirements** (various options)

Building & Site Plan Requirements

Applicable to new projects of **25,000 SF+** (like Green Building Review)

Conformance based on **performance metrics**

Administrative review & certification process

Existing buildings cannot be altered to make them less conforming (or could be required to improve)

Planning Board may approve **modifications by special permit**

Performance vs. Prescriptive

Performance Approaches

- “Protect/Recover” approach to Flood Resilience
- “Cool Factor” approach to Heat Resilience
- Different options to arrive at results

Prescriptive Approaches

- Minimum tree planting to front yard landscaping requirements (Section 19.55)
- Minimum vegetation standards in open space requirements (Section 19.59)
- Required shading of paved areas &/or high-SRI materials.

Why This Approach?

- Parallels other performance standards (Green Building Review)
- Allows for **administrative review of mid-sized projects**
- Focuses on limited number of cases but covers a significant amount of development
- **Performance-based approach** can account for site-by-site differentiation and choice
- Provides **multiple co-benefits** (e.g., open space, urban design, stormwater management)

4A: Include Flood Resilience Performance Requirement in Section 19.50

Likes:

- **Flexibility** of performance-based standards;
- Allowing exceptions or modifications by **Planning Board special permit**;
- **Could be tied into commissioning** required for certain sustainability rating systems to eliminate the need for additional administrative review.

Reservations:

- Would only work if **enforcement, standards, & criteria for compliance** are very clear;
- Could add **additional cost & hurdles** to development;
- Concern with **allowing the Planning Board to waive requirements**.

4B: Include Heat Resilience Performance Requirement in Section 19.50

Likes:

- Allowing certain projects to show **"Cool Score Improvement"** rather than meet the Cool Target;
- Performance-based standards **increase design choices** for developers;
- **Could be tied into commissioning** required for certain sustainability rating systems to eliminate the need for additional administrative review.

Reservations:

- Ability to meet the requirement **across multiple lots** would be helpful but difficult to track;
- Monitoring performance-based standards could **increase compliance costs**;
- Concern that **mid-sized projects could slip through** the requirements.

4C: Include Prescriptive Heat Resilience Requirements

Likes:

- Allows the Planning Board to **approve modifications by special permit**;
- Provides **uniform and clear best practices** while still allowing flexibility.

Reservations:

- City should **set a minimum vegetation coverage**;
- **Requirements should be differentiated** by location;
- Requiring specific practices **conflicts with the Cool Factor**;
- Should **prioritize shading** over reflective surfaces;
- Need to create incentives for **garage parking** rather than surface parking.

Category 5: Apply Standards through Base Zoning

5A: Add **Flood Resilience Requirement** to Base Zoning (Article 5.000)

5B: Incorporate **Heat Resilience Performance Standards** (Cool Factor) in Base Zoning

5C: Incorporate **Heat Resilience Prescriptive Standards** in Base Zoning

“Baseline” Development Standards

Applies to all new development – small & large, including additions & alterations

Interacts with other baseline standards (e.g., open space, setbacks, parking)

Existing sites could remain “non-conforming,” alterations could require special permits (if authorized) or variances

Could be in **base district standards or an overlay district** with specific boundaries (e.g., Flood Plain Overlay)

“Baseline” Development Standards

Possibilities:

- Expanded overlay district with prescriptive flood standards
- Incorporate Cool Factor into minimum Open Space standards (Section 5.22) &/or parking lot landscaping (Section 6.48.1)
- Include more prescriptive standards for vegetation in Open Space, shading &/or high-SRI materials in parking areas

Why This Approach?

- Covers **all new development & significant alterations** to existing buildings – broadest impact
- Creates a **citywide, prescriptive-based standard** that could be tailored by land use or geography
- If included in base zoning, **can be tailored to requirements by district**

5A: Add Flood Resilience Requirement to Base Zoning (Article 5.000)

Likes:

- Ensures that **every building contributes** to making Cambridge more resilient;
- Allows the City to **provide guidance & set expectations**;
- Establishing an **overlay district** like the Flood Plain Overlay District is the best approach;
- Allows **modifications by special permit**.

Reservations:

- Could put a **disproportionate burden** on owners of smaller properties;
- **Create an overlay district** using FloodViewer instead;
- An **overlay district will not work** given the dynamic character of flood elevations;
- Properties that are not at risk of flooding **should not have to be certified**.

5B: Incorporate Heat Resilience Performance Standards (Cool Factor) in Base Zoning

Likes:

- Application to **parking lots**;
- **Citywide standards** in base zoning ensure that everyone contributes to resilience;
- Allows **modifications by special permit**.

Reservations:

- Should create **an overlay district** to target heat islands;
- Ensure that these requirements are **not too onerous on owners of smaller properties**,;
- May need **differentiation among land use types**;
- Concern with **integration with Cool Factor**;
- Potential for **burdensome costs** that would impact housing production.

5C: Incorporate Heat Resilience Prescriptive Standards in Base Zoning

Likes:

- Using science-based best practices to set a baseline standard;
- Potential **prescriptive standards for parking lots**.

Reservations:

- **Limited impact** of prescriptive standards due to insufficient monitoring & enforcement;
- Concern with **integration with Cool Factor**;
- Should allow **modifications by special permit**;
- Preference for a **performance-based approach**.

Next Steps

Today:

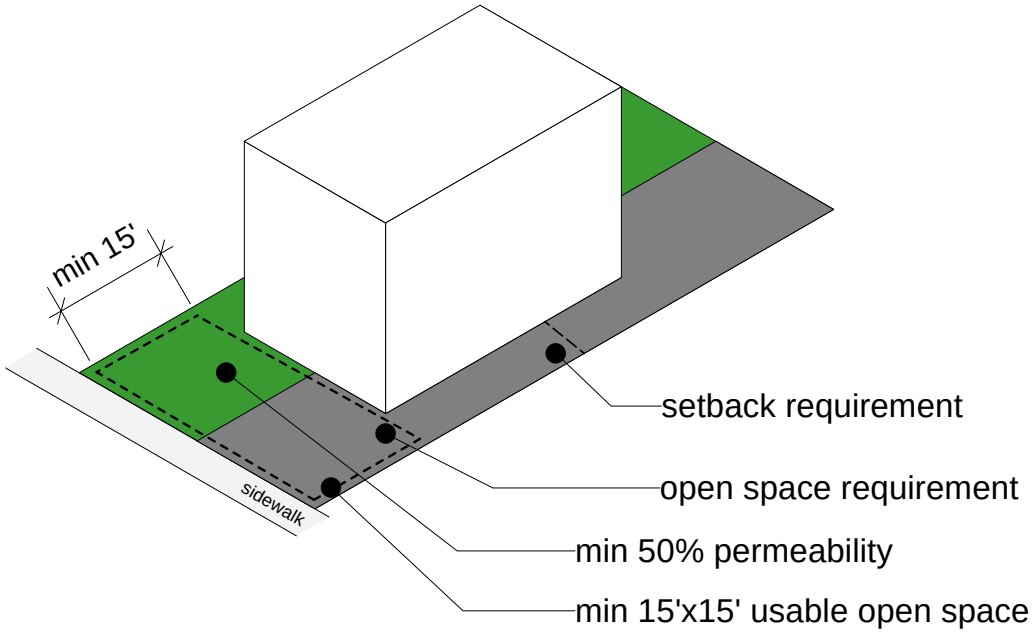
- Review additional Cool Factor analysis
- Discuss general support for Cool Factor approach, additional thoughts

Later Meetings:

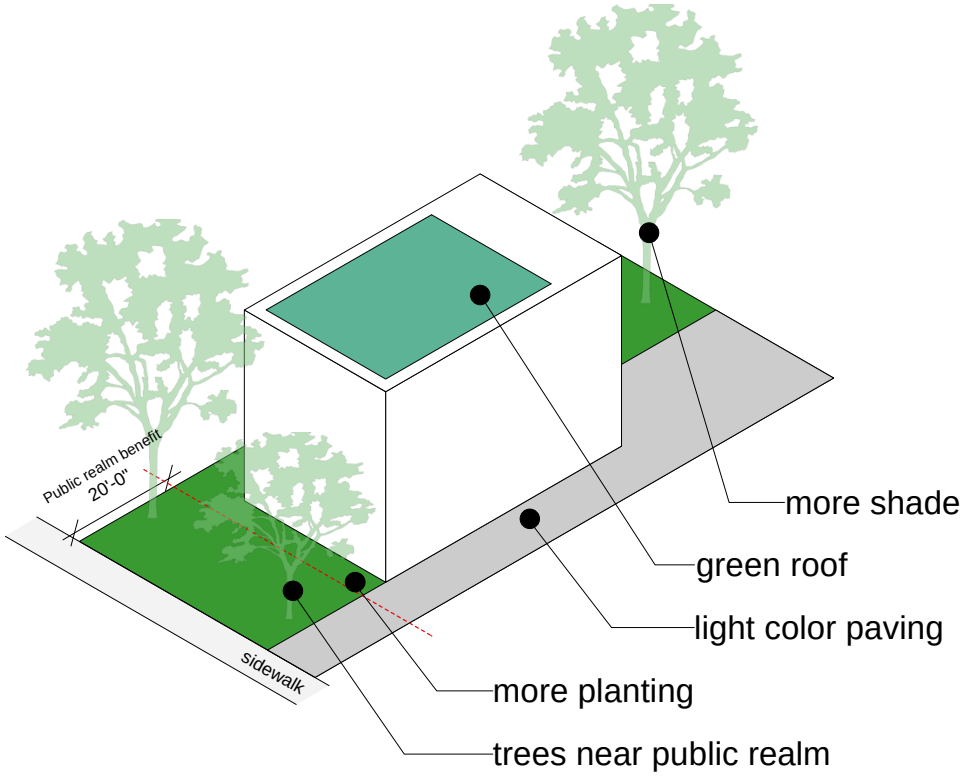
- Update/refine full set of recommendations based on feedback
- Discuss general support for recommendations as a whole

Cool Factor Analysis

Traditional Zoning

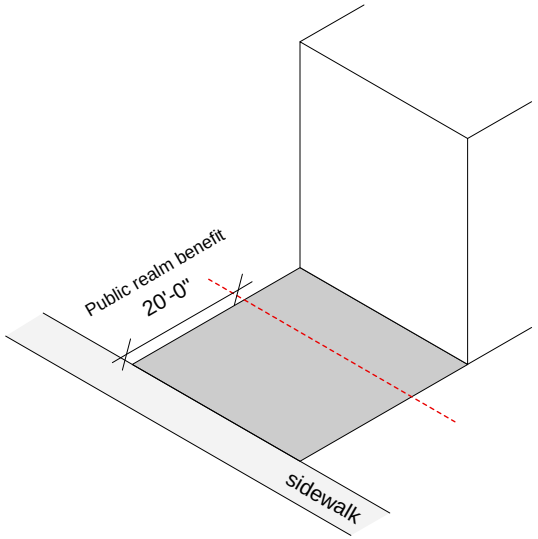


Cool Factor



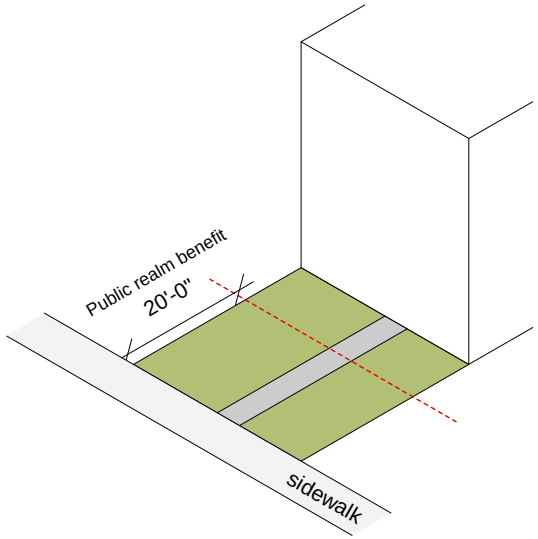
OPEN SPACE | PERMEABILITY | + | SHADE | COOL SURFACES | PLANTING

Layering of Strategies Allows for Flexibility



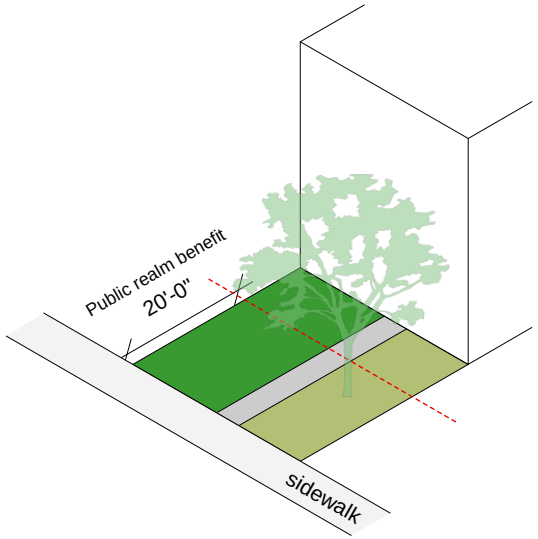
high-SRI paving

0.15



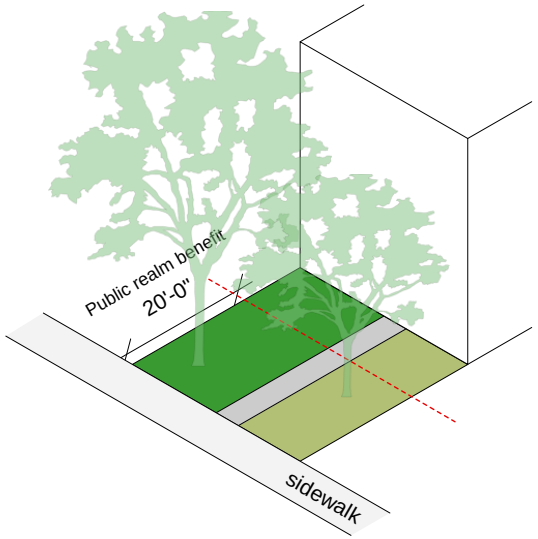
high-SRI paving + turf

0.28



high-SRI paving + turf + planting area + medium tree

0.57



high-SRI paving + turf + planting area + medium tree + large tree

1.02

Cool Factor Score

Why “Cool” Factor, Not “Green” Factor?

- There is **no one “Green Factor” approach** – precedents are tailored to community needs
- Cool Factor includes most elements of Green Factor precedents, but strategies & weighting are based on **scientifically-proven cooling benefits**
- Some Green Factor strategies are duplicative of existing stormwater standards – keeping them could **lead to less overall site cooling**

Comparison: Planting Strategies

Strategies	Somerville Green Score	Seattle Green Factor	Proposed Cambridge Cool Factor	Notes on Cool Factor
Landscaped area	✓	✓	✓	"Low planting area," min. 18" soil depth & plants ≤ 2' tall at maturity
Vegetation	✓	✓	✓	"Planting area," min. 24" soil depth & plants > 2' tall at maturity
New trees	✓	✓	✓	Score weighted by size of tree
Preserved trees	✓	✓	✓	Weighted higher than new trees

Comparison: Green Infrastructure

Strategies	Somerville Green Score	Seattle Green Factor	Proposed Cambridge Cool Factor	Notes on Cool Factor
Green roofs	✓	✓	✓	Weighted by soil depth & planting height at maturity
Rain gardens, bioswales	✓	✗	✓	Valued under “planting area”
Bioretention facilities	✗	✓	✓	Valued under “planting area”
Water features	✗	✓	✗	No substantial cooling benefit
Vegetated walls	✓	✓	✓	= “green facades” & “living walls”

Comparison: Non-Planting Strategies

Strategies	Somerville Green Score	Seattle Green Factor	Proposed Cambridge Cool Factor	Notes on Cool Factor
Turfgrass, mulch	✓	✓	✓	Turf valued under "lawn or turf area," min. 8" soil depth
Pervious paving	✓	✓	✗	No substantial cooling benefit
Structural soil systems	✓	✓	✓	Included in soil requirements
High-SRI paving	✗	✗	✓	Aligns with LEED
High-SRI shade structure	✗	✗	✓	Aligns with LEED

Main Outstanding Issues

- Setting the minimum Cool Target
- Testing feasibility of Cool Factor on complex sites
- Rethinking public realm multiplier
- Valuing green façades & living walls

Setting the Cool Target

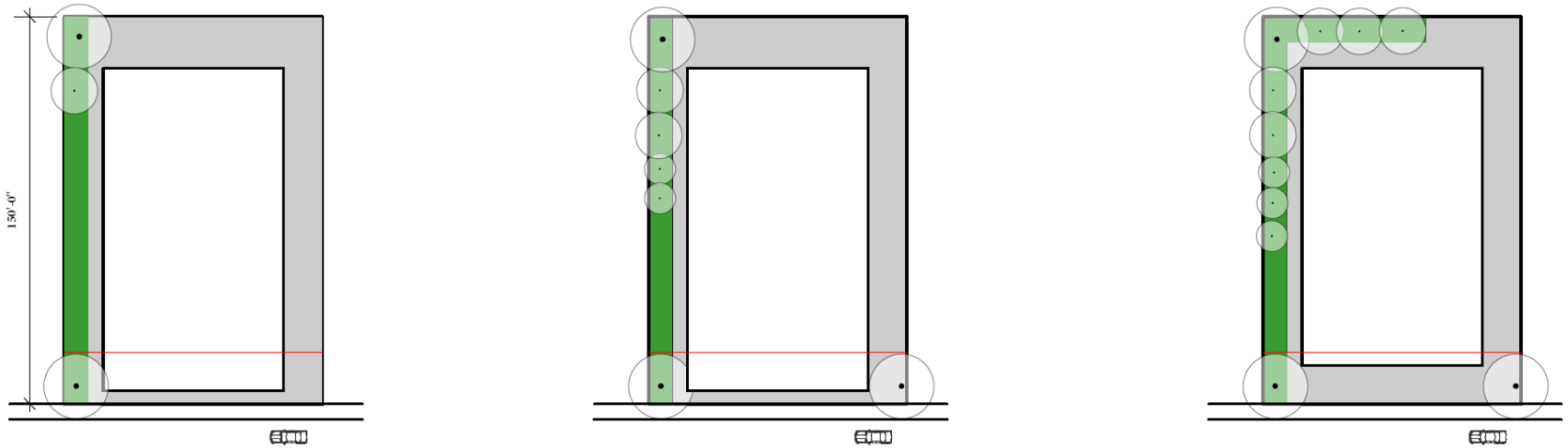
- Greater of open space requirement or “baseline minimum”
- 15% was proposed as the “baseline minimum” for all sites
- Tested 15%, 20%, 25% as possible minimum
- Reviewed feasibility in different zoning districts/contexts

Cool Factor Feasibility in Residence C-3

3 POSSIBLE COOLING TARGETS

15%	20%	25%

HYPOTHETICAL PLANS



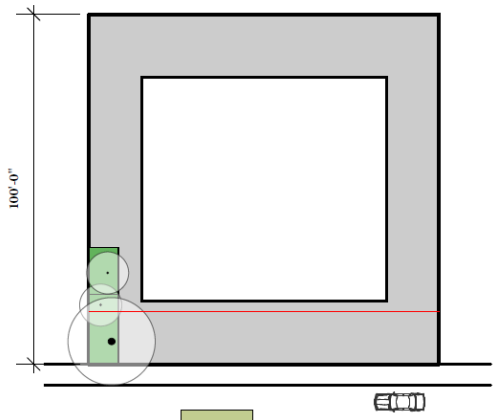
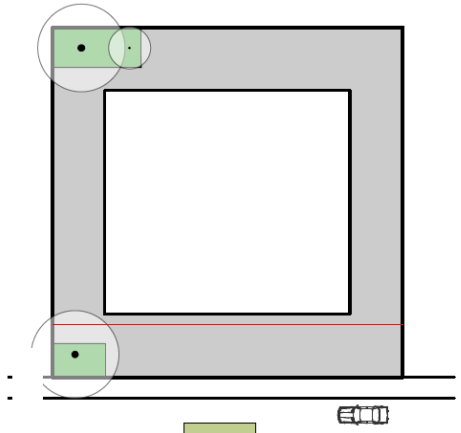
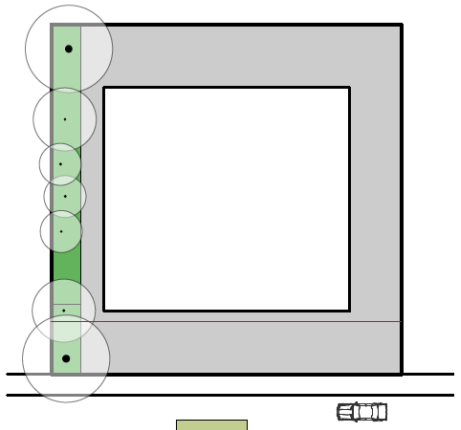
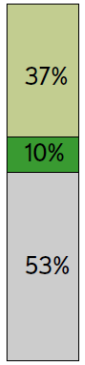
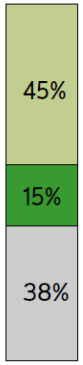
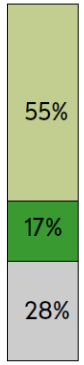
PERCENTAGE OF COOL SCORE

Cool Factor Feasibility in Office

3 POSSIBLE COOLING TARGETS

HYPOTHETICAL PLANS

PERCENTAGE OF COOL SCORE

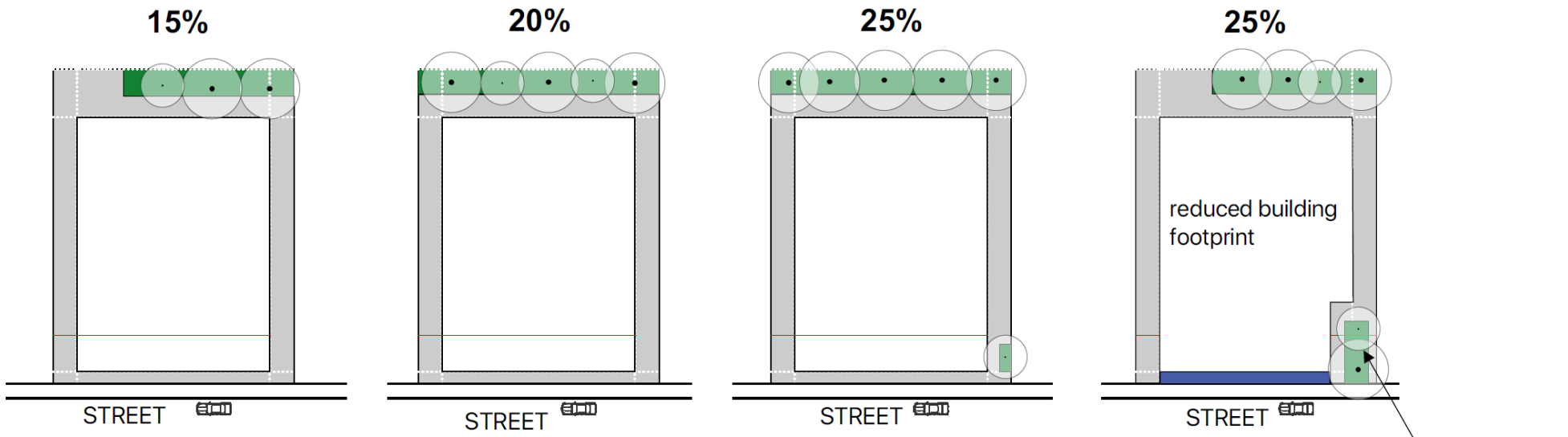
15%	20%	25%
		
		
37%	45%	55%
10%	15%	17%
53%	38%	28%

TREES
PLANTING AREA
HIGH SRI PAVING

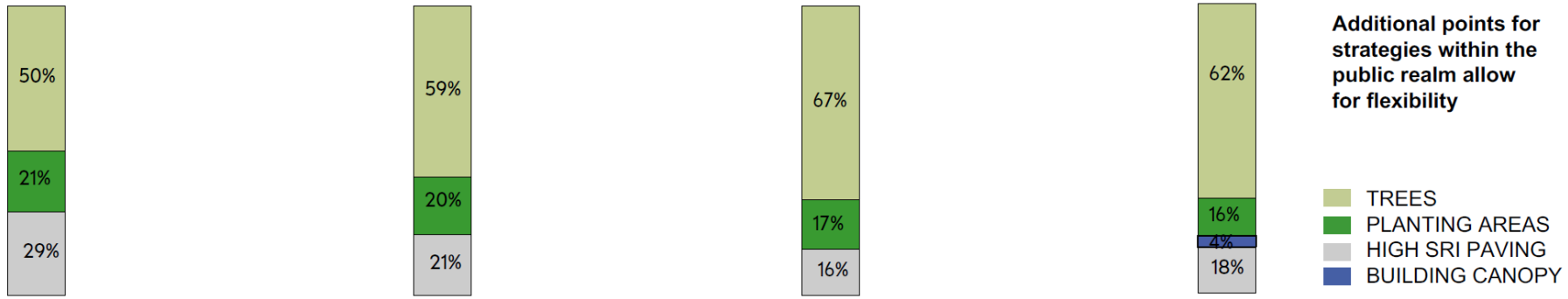
Cool Factor Feasibility in Business A-2

3 POSSIBLE COOLING TARGETS

HYPOTHETICAL PLANS



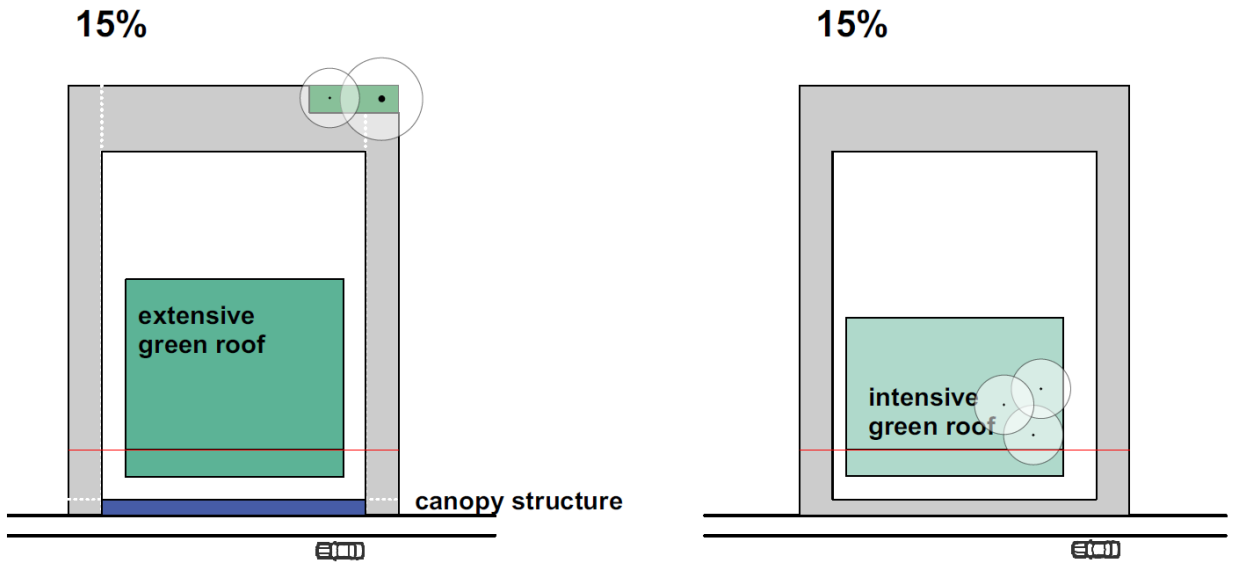
PERCENTAGE OF COOL SCORE



Cool Factor Feasibility in Business A-2 (alt.)

COOLING TARGETS

HYPOTHETICAL PLANS



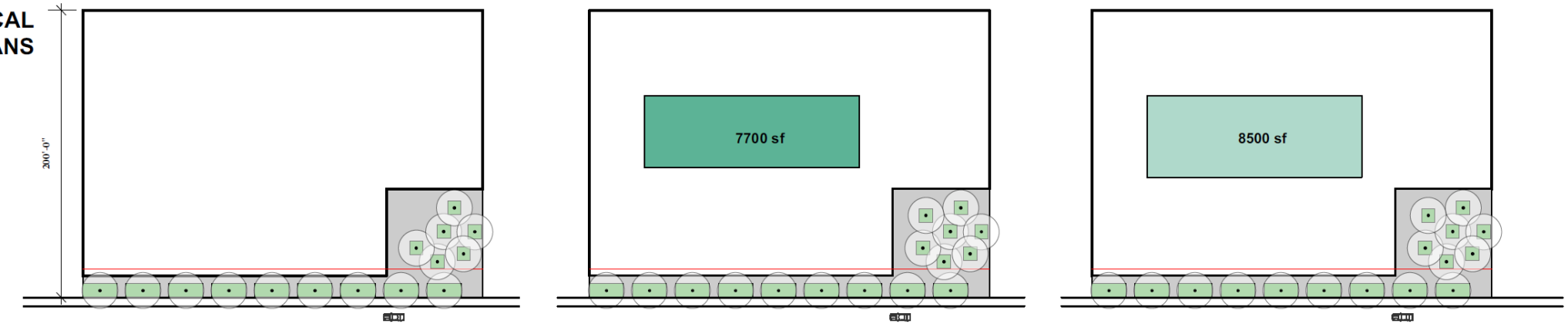
PERCENTAGE OF COOL SCORE

Cool Factor Feasibility in Industry B

3 POSSIBLE COOLING TARGETS

15% **20%** **25%**

HYPOTHETICAL PLANS



PERCENTAGE OF COOL SCORE

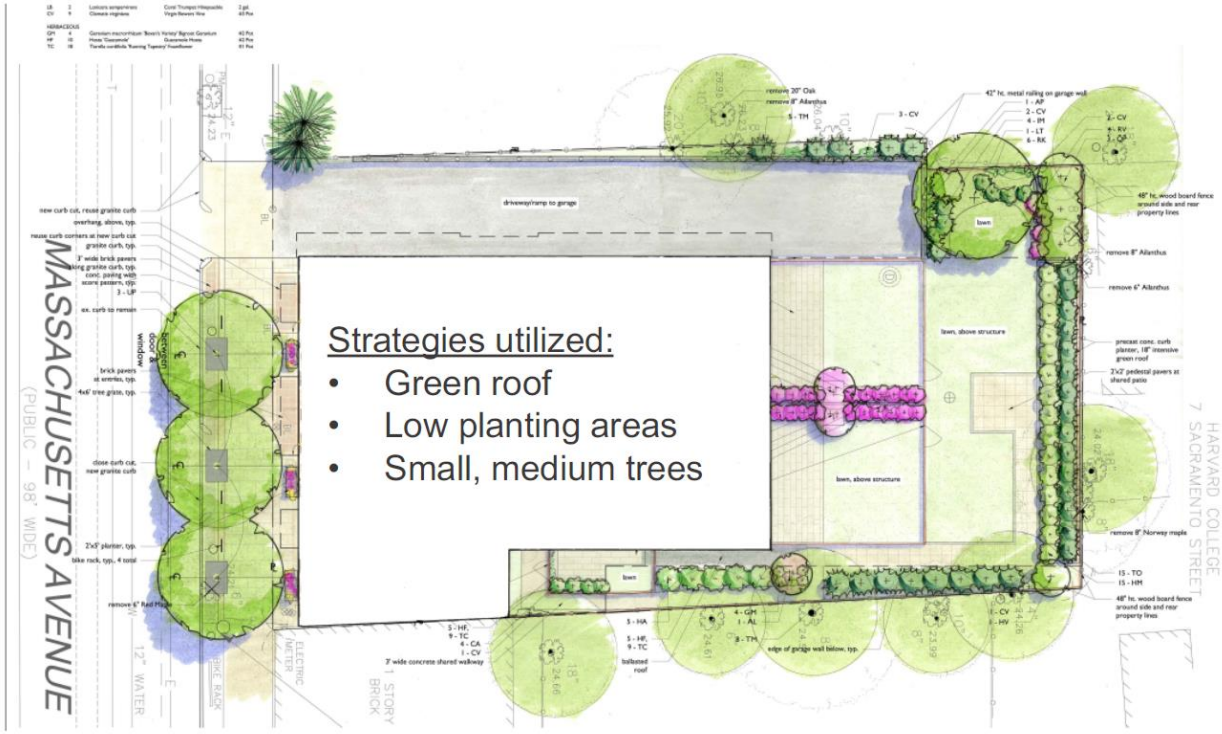
Findings

Most new construction on lots that conform to zoning
could meet a 20% Cool Target
but it would be challenging to meet a 25% target

Testing Different Site Conditions

- Reviewed examples based on **recent development projects**
  - Residential renovation
  - Historic rehabilitation
  - New construction on constrained site
- Intent — to identify **conditions that make compliance more challenging**

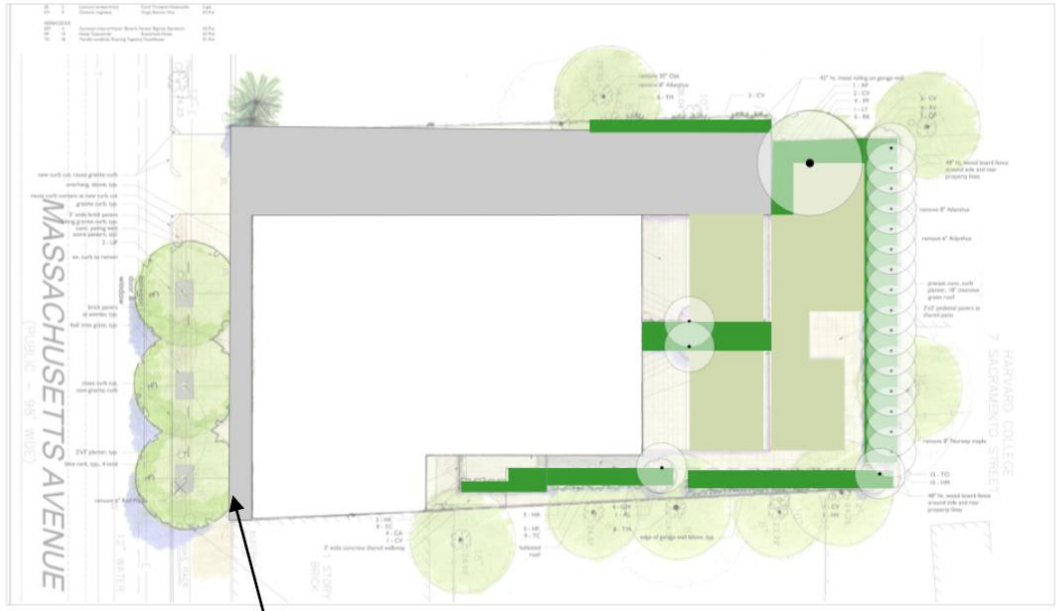
Business A-2 Case Study



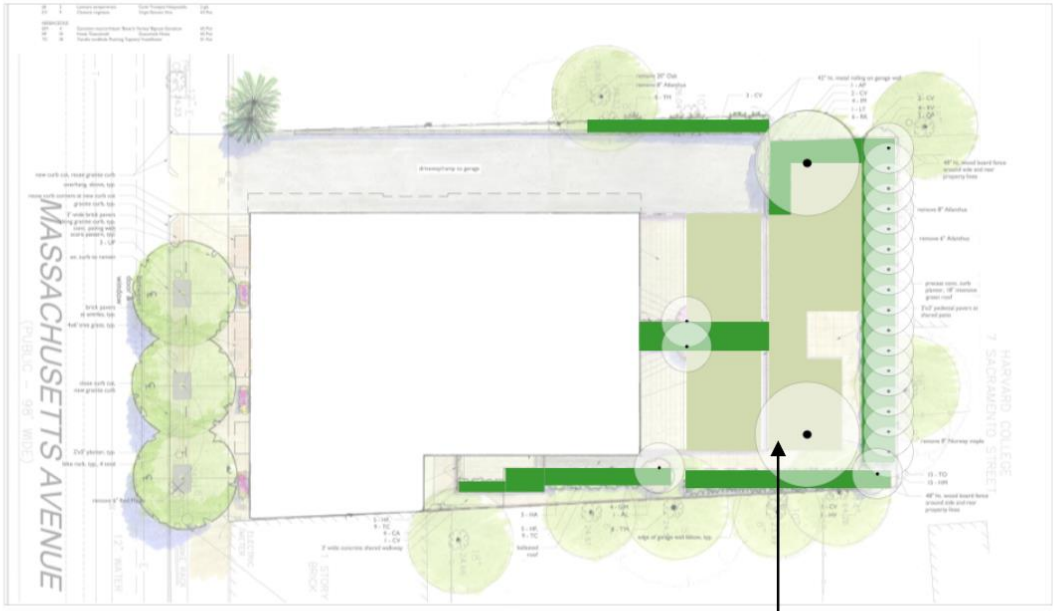
COOLING TARGETS	15%	20%	25%
CURRENT COOL FACTOR SCORE	1.44	1.08	0.87

Business A-2 Case Study

If the Cool Target was **25%**, what strategies could be used for the site to meet the minimum Cool Score?



High SRI paving



Large canopy tree

Residence C-1 Case Study

Property Description:

- Existing single-family, residential building
- Dimensionally nonconforming
- 1,402 sq. ft. parcel

Development Description:

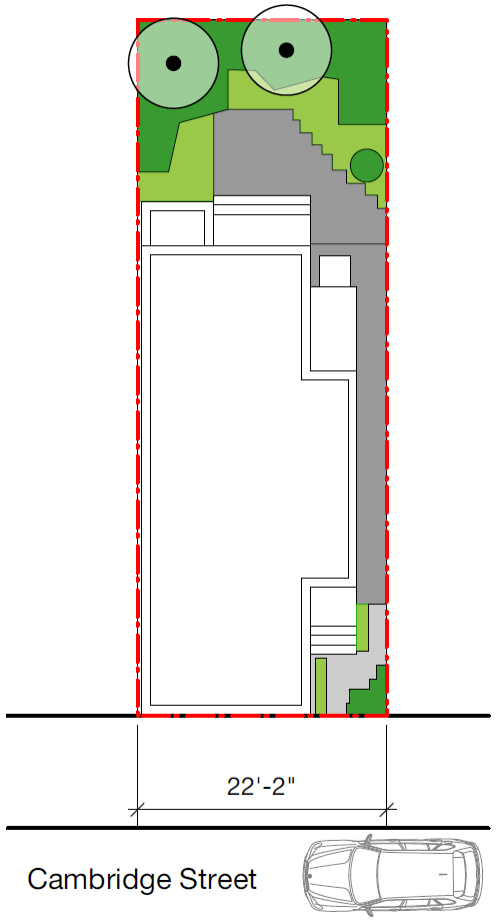
- Full gut renovation & small addition to the worker's cottage, extension of existing side porch

Residence C-1 Case Study – Permitted

AS PERMITTED COOL FACTOR SCORE

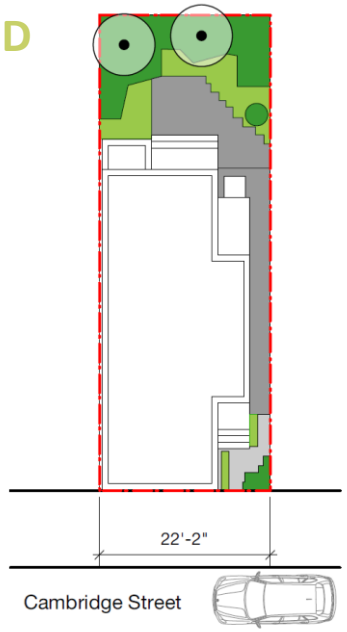
0.8

(With target cooling area of 30%)



Residence C-1 Case Study – Alternatives

PERMITTED



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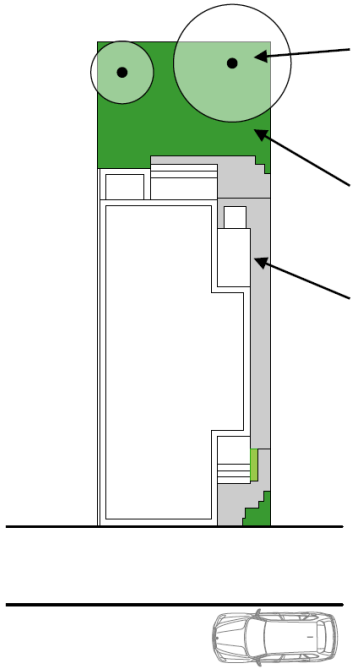

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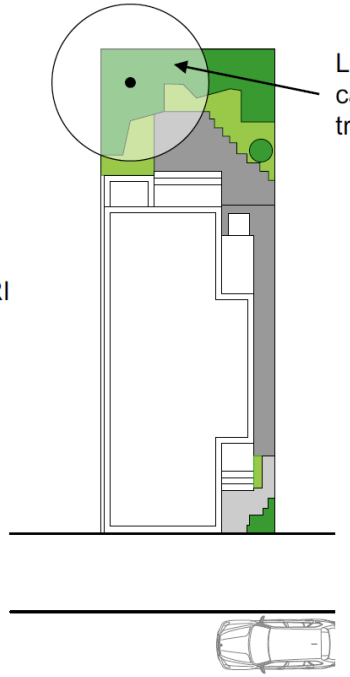
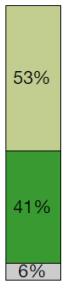
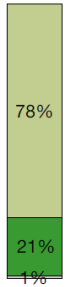


PERCENTAGE OF COOL SCORE

1.0





TREES
PLANTING AREAS
HIGH SRI PAVING

Business B Case Study

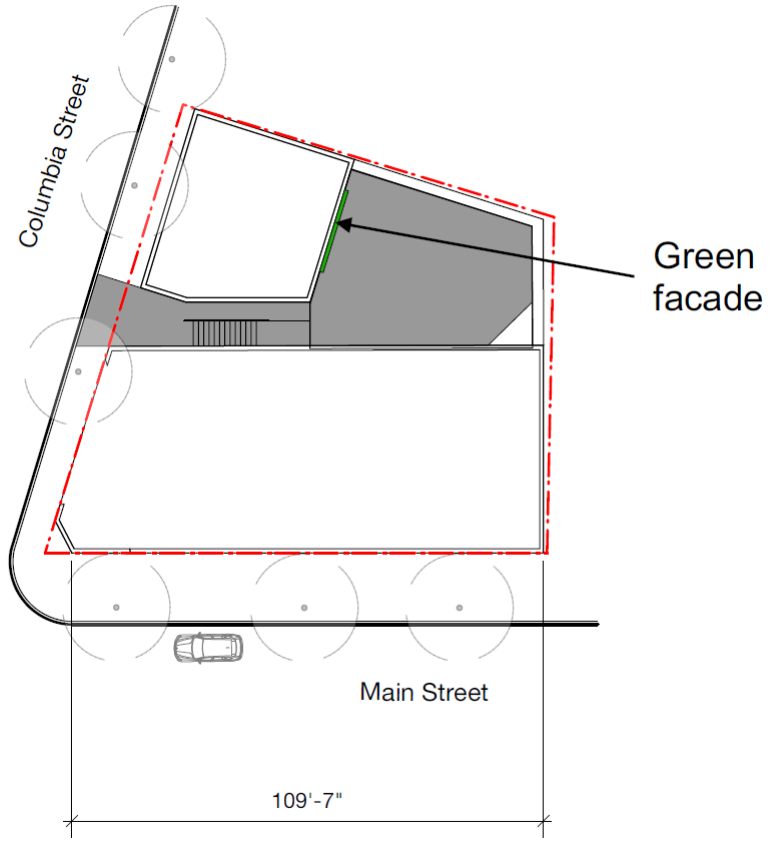
Property Description:

- 9,436 lot area (sq. ft.)
- Also in Central Square Overlay District

Development Description:

- Conversion of existing building to hotel use
- No requirements for front, rear, or side yard setbacks

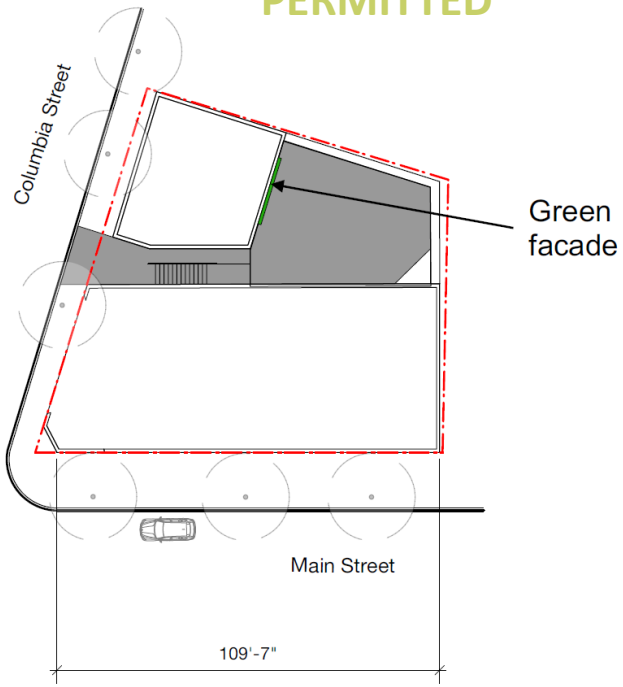
Business B Case Study – Permitted



AS PERMITTED COOL FACTOR SCORE .03

Business B Case Study – Alternatives (15%)

PERMITTED



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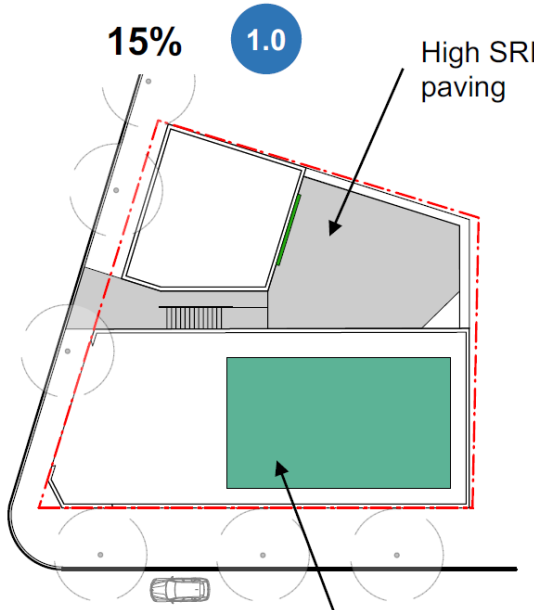

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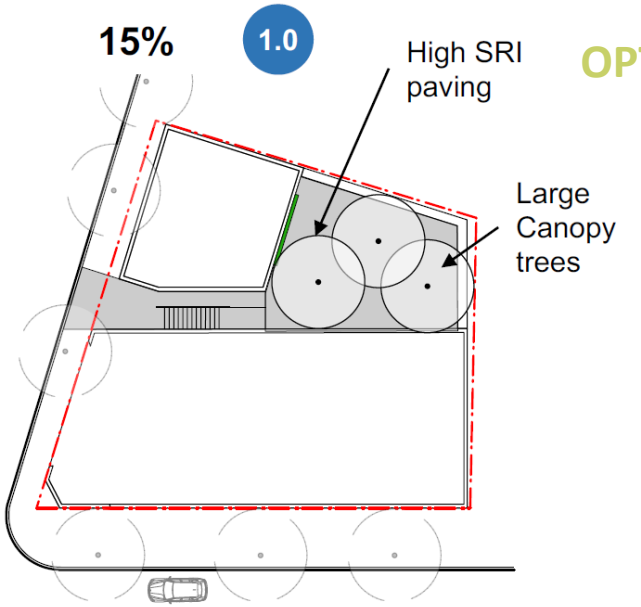
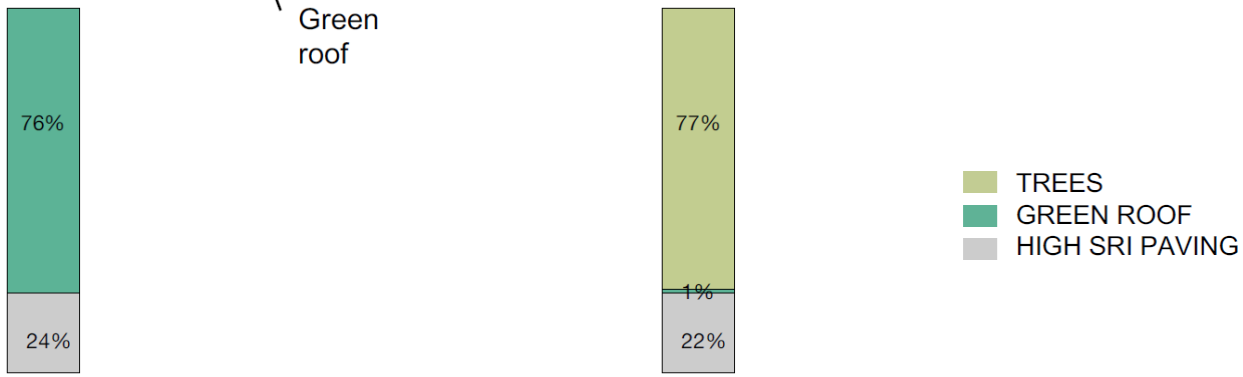
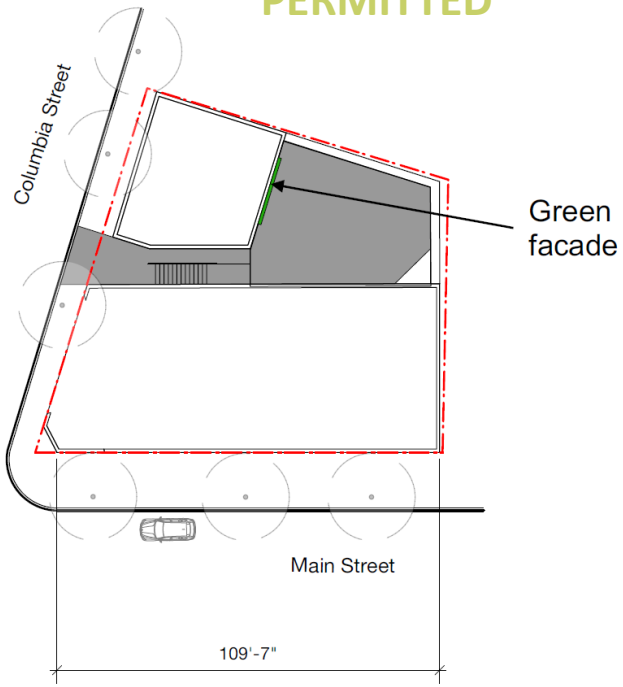


PERCENTAGE OF COOL SCORE

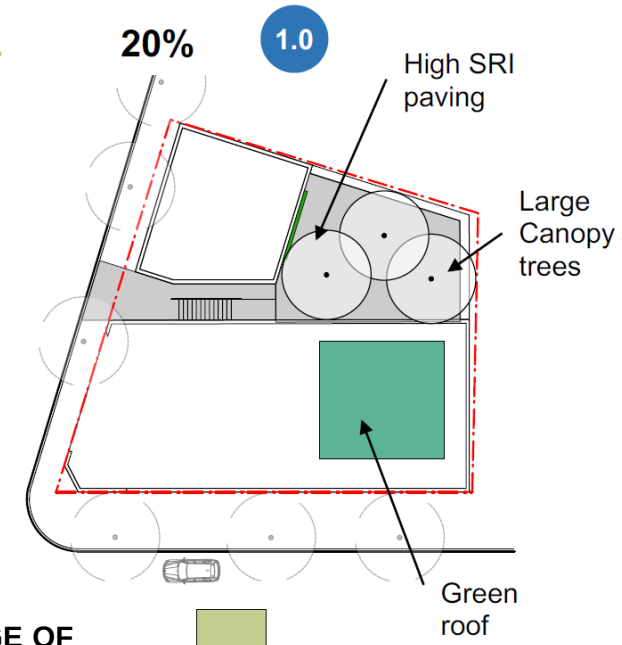


Business B Case Study – Alternatives (20%)

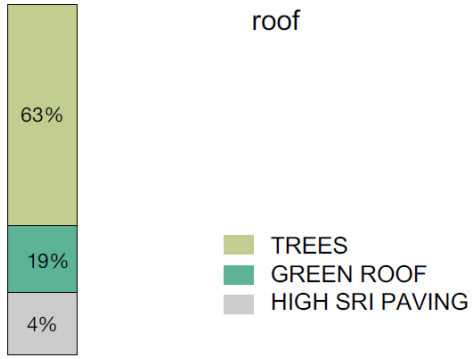
PERMITTED



OPTION 1



PERCENTAGE OF COOL SCORE



Note: Improvements may not be technically feasible given existing building & site constraints

Business A Case Study

Property Description:

- 7,727 lot area (sq. ft.)

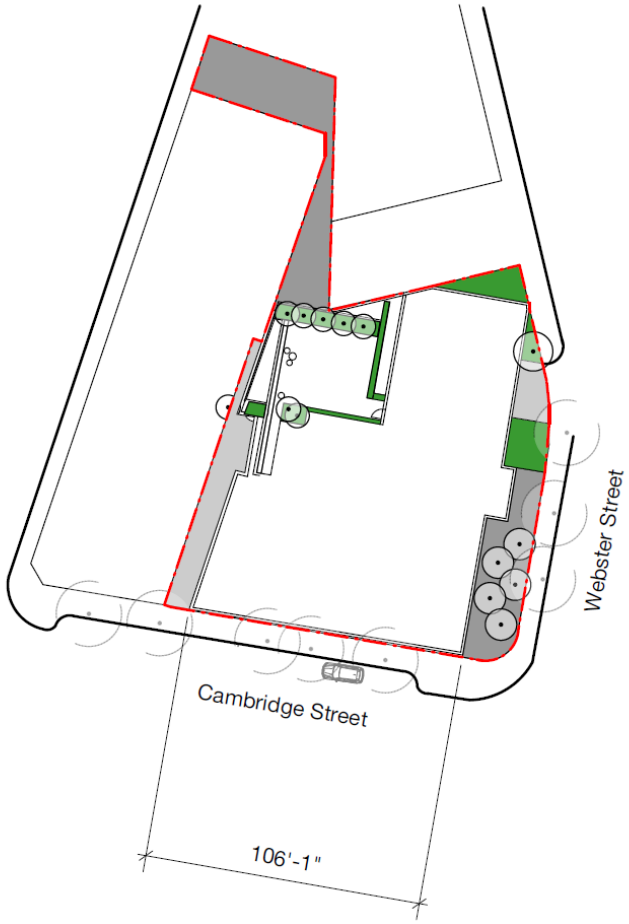
Development Description:

- Demolition & new construction of 4-story, mixed-use building
- Ground level patio & second story common outdoor area

Business A Case Study – Permitted

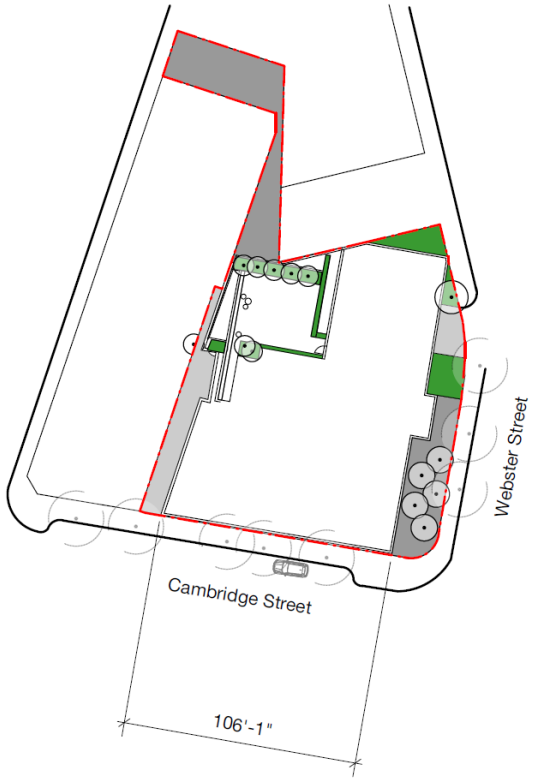
AS PERMITTED
COOL FACTOR SCORE

.65



Business A Case Study – Alternatives (15%)

PERMITTED



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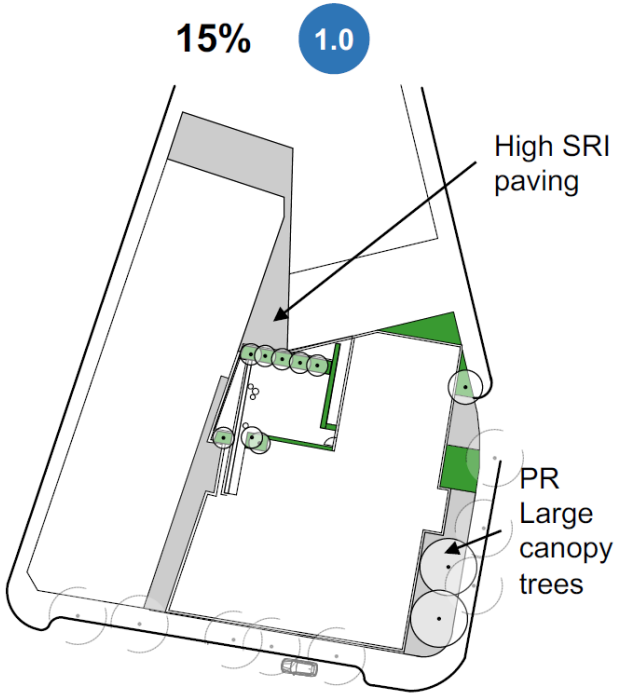

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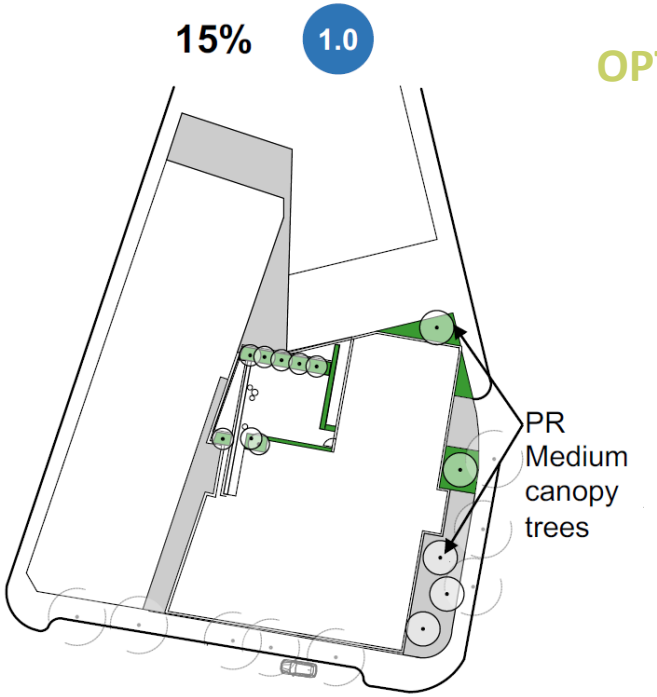
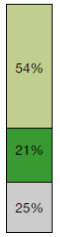


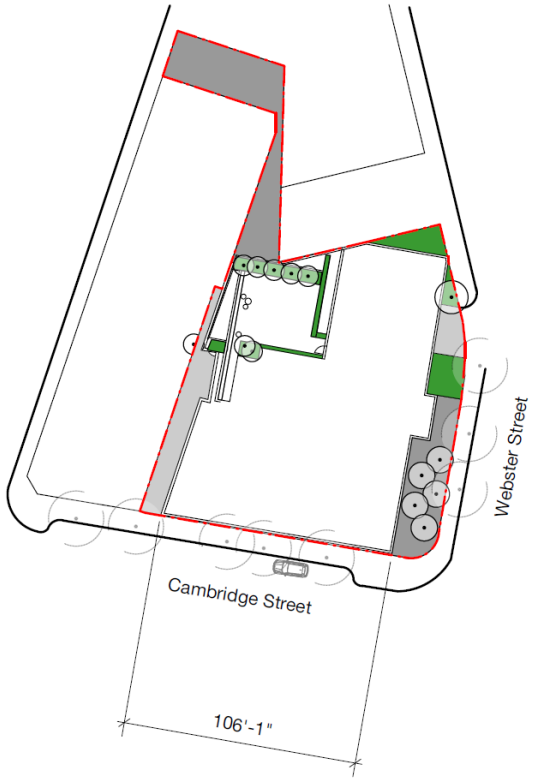
PERCENTAGE OF COOL SCORE



TREES
GREEN ROOF
HIGH SRI PAVING

Business A Case Study – Alternatives (20%)

PERMITTED



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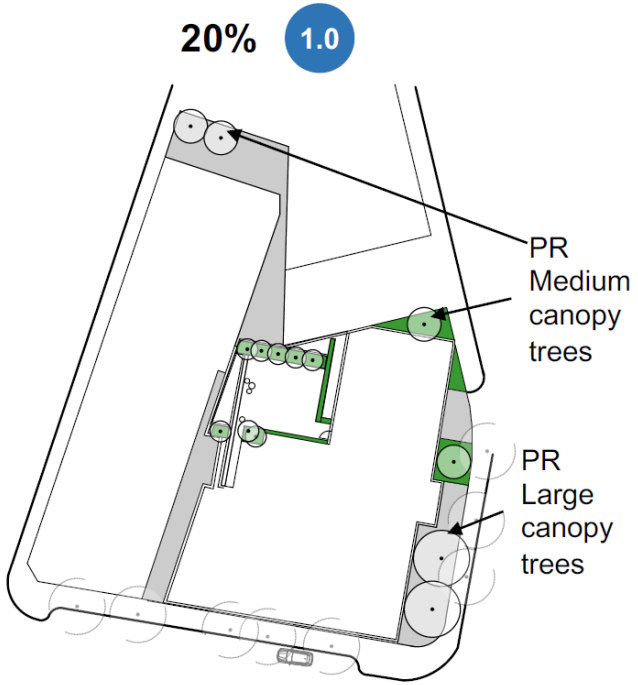


PERCENTAGE OF COOL SCORE

Findings

15% Cooling Target

- Generally easy to meet for most new construction
- Feasible for some constrained sites, but not all

20% Cooling Target

- Feasible for most new construction
- Promotes more greening strategies, especially larger tree canopies
- Also promotes siting strategies within the PROW
- Too challenging for more constrained sites

25% Cooling Target

- Significantly harder to achieve for all sites & may limit site functionality and/or increase costs

Applicability — A Range of Approaches

Development Subject to Building & Site Plan Requirements:

- Standard for new construction on larger sites
- Cool Target set by zoning district (20% minimum)
- Flexible strategies for changes to existing buildings, could include meeting Cool Target to “Maximum Extent Practicable” &/or demonstration of no reduction in site cooling

Other Sites:

- Include minimum Cool Factor in base zoning Open Space requirement (applies to all property & development types)
- Consider impacts through Tree Protection Ordinance (non-zoning)

Revisiting the Public Realm Multiplier

How to incentivize cooling the public realm?

Current multiplier = 1.15, i.e. **15% increase**

Same multiplier for all strategies

Public Realm Multiplier: Approach A

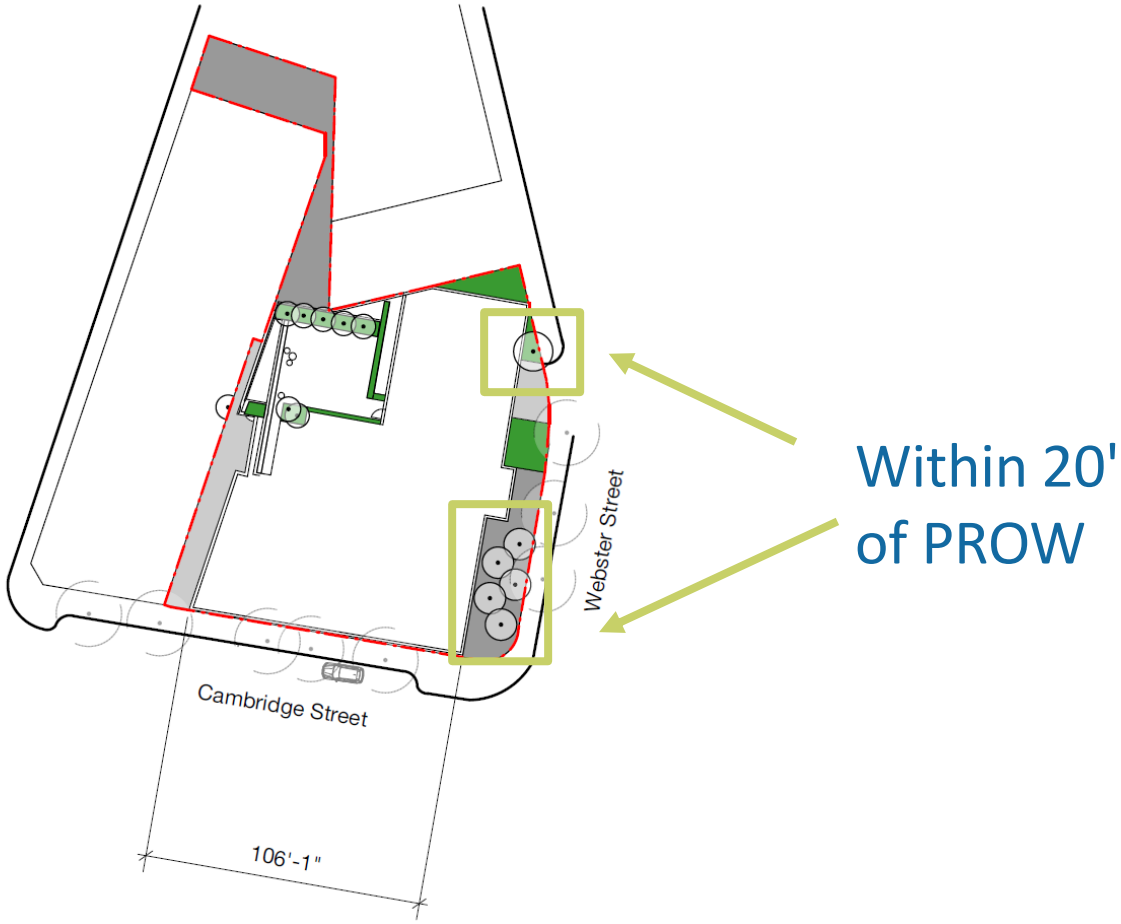
Differentiate between strategies based on cooling impact

	Strategy	Factor	PRM
A: Tree Canopy	Preserve Existing Trees	0.80-1.40	**2.00**
	Plant Small Trees	0.60	**1.75**
	Plant Medium Trees	0.70	**1.75**
	Plant Large Trees	0.80	**2.00**
B: Planting Areas	Lawn/Turf Area	0.30	**1.25**
	Low Planting Area	0.40	**1.50**
	Planting Area	0.50	**1.50**

	Strategy	Factor	PRM
C: Green Roofs & Facades	Green Façade	0.10	**1.25**
	Living Wall	0.30	**1.25**
	Green Roof	0.30	**1.25**
	Short Intensive Green Roof	0.50	**1.50**
	Intensive Green Roof	0.60	**1.50**
D: Hardscape	High-SRI Paving	0.10	**1.25**
	High-SRI Shade Structure	0.30	**1.50**

Business A Case Study – Permitted

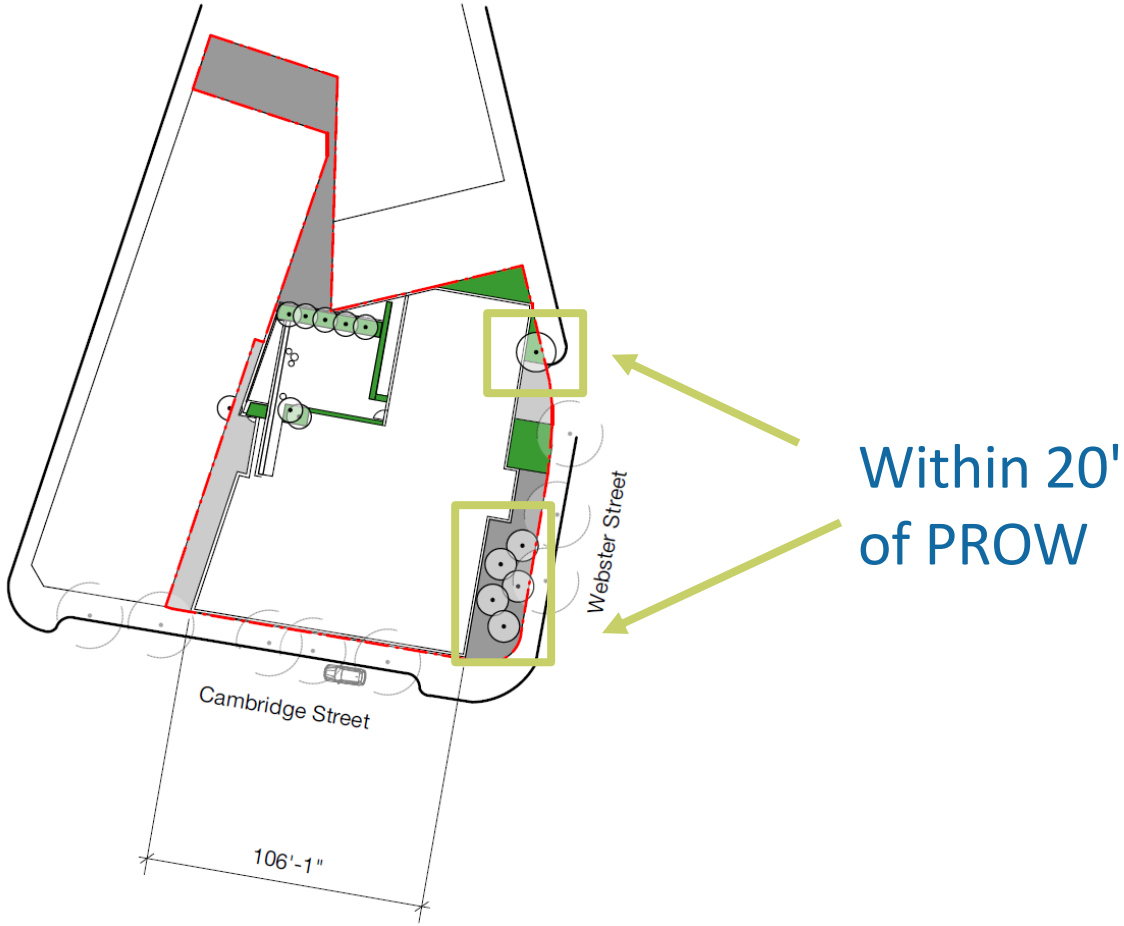
AS PERMITTED
COOL FACTOR SCORE .65



Revised PROW Multiplier – Approach A

INCREASED PROW MULTIPLIER
COOL FACTOR SCORE

.80



Public Realm Multiplier: Approach B

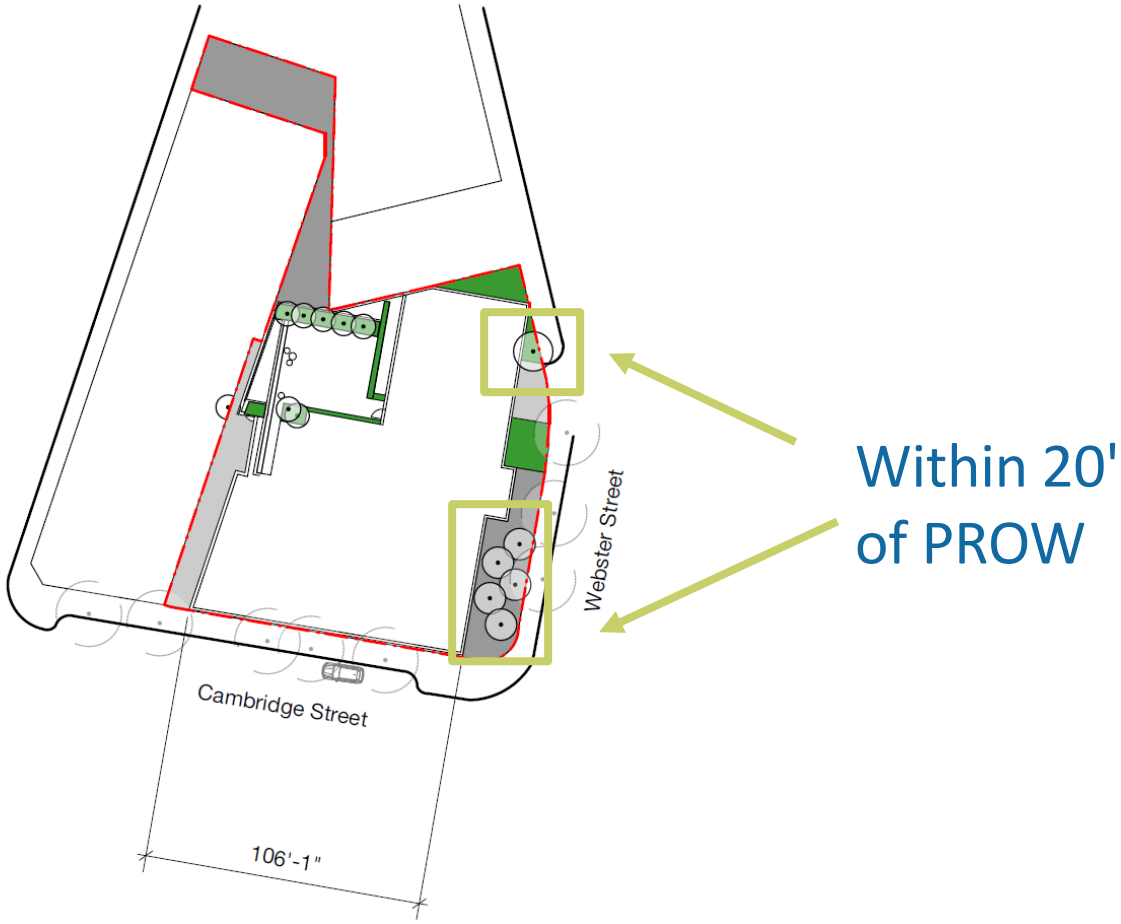
Increase multiplier for all strategies from 1.15 to 2.00

	Strategy	Factor	PRM
A: Tree Canopy	Preserve Existing Trees	0.80-1.40	**2.00**
	Plant Small Trees	0.60	**2.00**
	Plant Medium Trees	0.70	**2.00**
	Plant Large Trees	0.80	**2.00**
B: Planting Areas	Lawn/Turf Area	0.30	**2.00**
	Low Planting Area	0.40	**2.00**
	Planting Area	0.50	**2.00**

	Strategy	Factor	PRM
C: Green Roofs & Facades	Green Façade	0.10	**2.00**
	Living Wall	0.30	**2.00**
	Green Roof	0.30	**2.00**
	Short Intensive Green Roof	0.50	**2.00**
	Intensive Green Roof	0.60	**2.00**
D: Hardscape	High-SRI Paving	0.10	**2.00**
	High-SRI Shade Structure	0.30	**2.00**

Business A Case Study – Permitted

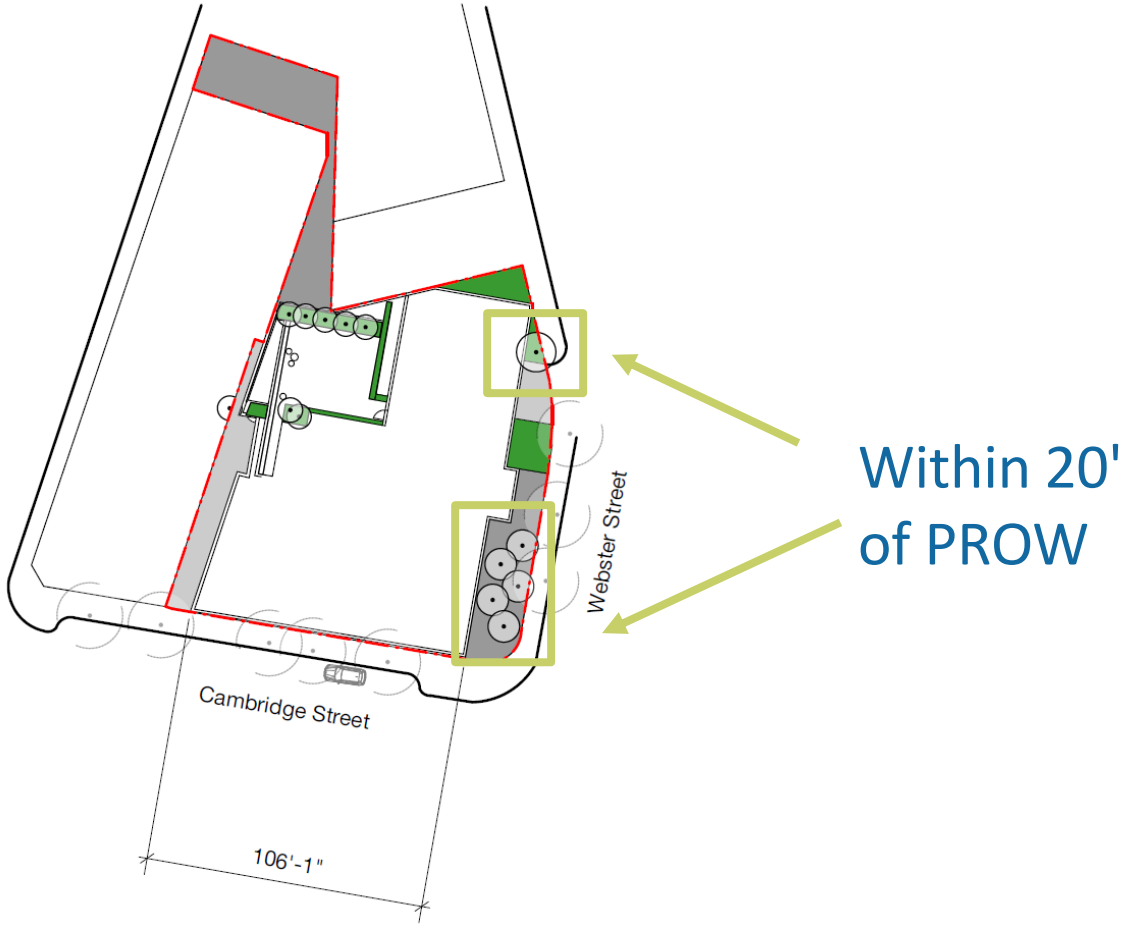
AS PERMITTED
COOL FACTOR SCORE .65



Revised PROW Multiplier – Approach B

INCREASED PROW MULTIPLIER
COOL FACTOR SCORE

.90



Comparing Green Façades and Living Walls

Source: "Green facade, Rue Belliard" by sampos is licensed under CC BY-NC-ND 2.0

Green Façades

- Typically vines or other climbing plant species that grow from the ground up & attach to a lattice, cable, mesh, or existing wall
- Some species need vertical support structures while others do not

Source: "A Living Wall" by gcraig3si is licensed under CC BY-NC-ND 2.0

Living Walls

- Plants that are potted in a planting medium (i.e. soil) that is suspended on a wall

Green Façades Recommendation

Multiplication Factor: 0.10

Minimum requirements to receive credit:

- For vines that do need a support system, provide a minimum 15’ wide & 10’ tall structure
- For vines that do not need a support system, plant species based on their recommended spacing to cover at least 15’ wide wall segment
- Maximum credit is equivalent to the expected coverage over a 5- to 10-year period or the area of the support structure, whichever is smaller
- Minimum 6 cubic feet of soil per plant, if soil is needed

Living Walls Recommendation

Multiplication Factor: 0.30

Minimum requirements to receive credit:

- Since these systems require special structures to hold the soil volume, all that is required is an adequate an irrigation system to support the living wall

Discussion

Discussion Questions

- Do these refinements improve the Cool Factor approach?
- What additional questions/concerns remain?
- Consensus: Will this be among the Task Force's recommendations?

"Consensus in this context is defined as
the concurrence of all or almost all
of the participating members that they can
at least 'accept' or 'live with'
the group's recommendation,
even if it is not their preferred outcome."

Public Comment

Next Steps

Workplan

Meeting #15 – October 22nd	Present work-to-date, share updates since March 4th meeting
Meeting #16 – November 19th	Discuss potential recommendations
Meeting #17 – December 9th	Come to consensus on final recommendations
Early 2020	*Review and comment on final report*

Between Meetings

Task Force member feedback

Staff office hours:

- Tuesday, October 27 – 12:30-1 p.m.
- Friday, October 30 – 11 a.m.-12 p.m.
- Monday, Nocember 2 – 5:30-6:30 p.m.

Thank You!