CITY OF SOMERVILLE PLANNING BOARD APPLCATION

REVISION TO OSE DOCUMENTS PREVIOUSLY FILED ON JUNE 12, 2023

APPLICANT: SGL Development, Inc.

SUBJECT PROPERTY: 32-40-44 White Street, Somerville, Massachusetts

CASE NUMBER: P&Z 22-054

The Applicant is replacing the previously submitted file entitled “White St 32-44-OSE Documents-2023-6-12” with this new file entitled “White St 32-44-OSE Documents-2023-6-23” to make the following changes:

- Revise the Cover Sheet and Pages 5 and 10 of the LEED and Sustainability Report Sheets in response to PSUF comments to increase the size of the bioswale, and revise the green roof.

FORM: CRM (August 2022)
Discontinue Prior Editions

CITY OF SOMERVILLE

Inspectional Services • Planning Board • Zoning Board of Appeals

CERTIFICATION OF REQUIRED MATERIALS
BY CITY OF SOMERVILLE DEPARTMENT OF SUSTAINABILITY & ENVIRONMENT

Development Site Address:	32-44 White Street, Somerville, MA (P&Z 22-054) Stage 1
Applicant Name:	Adam Siegel, SGL Development

As required by the City of Somerville's Development Review Submittal Requirements, I certify that I have received and approved the following development review materials for the development proposal identified above:

☒ Sustainable & Resilient Building Questionnaire

☒ Low Load Buildings Energy Input Form

☐ Net-Zero Ready Building: PHIUS+
- Building Resilience & Sustainability Narrative
- Copy of signed PHIUS+ Certification Contract
- Copy of signed PHIUS+ Certification Fee Receipt

☐ Net-Zero Ready Building: Zero Carbon
- Building Resilience & Sustainability Narrative
- Evidence of ILFI Premium Membership
- Evidence of ILFI New Zero Carbon Project Registration

☒ LEED Certifiability
- LEED Gold or Platinum checklist
- LEED Narrative
- Signed affidavit by LEED accredited professional

Signature: Elyse Belarge Digitally signed by Elyse Belarge DN: cn=Elyse Belarge, o=City of Somerville, ou=Office of Environment and Sustainability, email=ebelarge@somervillema.gov, c=US Date: 2023.04.18 14:58:58 -04'00' Date: 04/18/2023

Sustainability & Environment Representative

Sustainable and Resilient Buildings Questionnaire

INTRODUCTION

This document outlines long-term environmental sustainability and climate resilience considerations and requirements for buildings in Somerville. Please refer to the Development Review Sustainability Submittal Requirements to determine whether your project requires a Sustainable and Resilient Buildings Questionnaire. It is strongly recommended that applicants meet with staff from the Office of Sustainability and Environment (OSE) prior to submitting a Development Review Application.

The purpose of this Questionnaire is to minimize the adverse environmental impacts in the design, construction, and occupancy of buildings in Somerville and to ensure that the impacts of future climate conditions are carefully evaluated.

Please review the following documents before completing the Questionnaire:

- Submittal Requirements and other sustainability documents available at www.somervillezoning.com/developmentreview
- Somerville Climate Change Vulnerability Assessment
- Carbon Neutrality Pathway Assessment
- Somerville Climate Forward
- Urban Flood Atlas

PROCEDURE:

A completed Sustainable & Resilient Buildings Questionnaire is required for:

- All buildings permitted through Site Plan Approval
- All by-right buildings seeking residential density bonus by meeting Net Zero Ready standards
- All by-right new construction and major renovations over 25,000 square feet

Updated Questionnaires must be submitted prior to the issuance of a Building Permit and prior to the issuance of a Certificate of Occupancy to identify any design changes and provide new information determined as the development process unfolded.

BACKGROUND: CARBON NEUTRALITY

Somerville set a goal to become carbon neutral by the year 2050 due to the global imperative to reduce greenhouse gas emissions in order to prevent extreme changes to the climate. Carbon

neutrality is defined as the net-zero release of carbon dioxide and other greenhouse gases (GHG) within Somerville's municipal boundary. Reducing greenhouse gas emissions is critical to avoiding the worst impacts of climate change and to protecting the health, safety, and welfare of current and future generations. In 2017, the Somerville Board of Aldermen passed a resolution reaffirming the city's carbon neutrality goal. And In 2018, Somerville released its first community-wide climate action plan, Somerville Climate Forward.

To achieve carbon neutrality by 2050 and to minimize adverse environmental impacts, Somerville will need to drastically reduce greenhouse gas emissions from electricity, buildings, transportation, and waste disposal. To meet these goals, all buildings within the city will need to pursue net zero emissions. New development should be designed to maximize envelope performance and energy efficiency, produce or procure renewable energy, and phase out fossil fuel use through electrification of building systems. The City of Somerville recognizes that as technology advances, incorporating design elements to mitigate carbon emissions and increase resilience may become more feasible. Applicants are asked to devise strategies that permit building systems to adapt and evolve over time to further reduce GHG emissions and to avoid reliance on fossil fuels.

BACKGROUND: CLIMATE CHANGE VULNERABILITY

Despite efforts to minimize greenhouse gas emissions, climate change is already impacting Somerville and changes to the climate will continue to intensify. The City of Somerville's Climate Change Vulnerability Assessment analyses vulnerabilities associated with Somerville's key climate stressors: increased precipitation, sea level rise and storm surge, and higher temperatures. The analysis recommends that new development consider these climate impacts and take appropriate measures to address the projected climatic conditions described in the assessment.

Several areas of Somerville are already prone to flooding from intense precipitation. With climate change, precipitation events will become more intense —meaning that a greater volume of rain will fall in a shorter period of time. Somerville is projected to experience more than a 30% increase in rainfall during a 100-year 24-hour event. This increase in precipitation will increase the risk of flooding in areas where the drainage system does not have sufficient capacity.

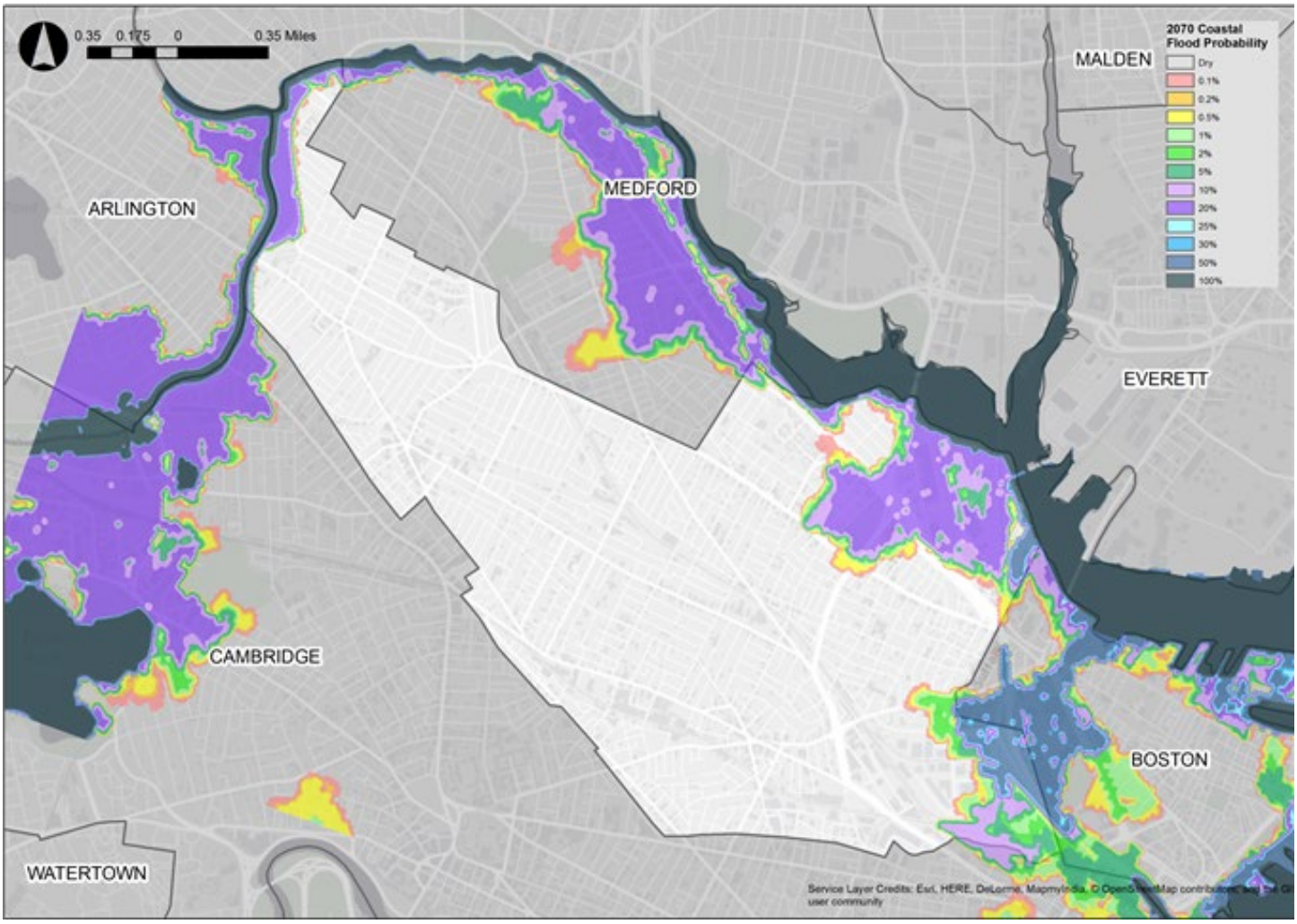
In addition to flooding from precipitation, sea level rise and storm surge are already potential concerns for areas of East Somerville. By 2035-2040, the Amelia Earhart Dam could be regularly flanked by storms, resulting in flooding for areas of Assembly Square, Ten Hills, and Winter Hill.

As the climate continues to change, average seasonal temperatures are also expected to increase and the number of days above 90 degrees Fahrenheit (historically about 10 a year) could rise to 40 days by

2030, a third of the summer, and 90 days by 2070, nearly the entire summer. In 2018 there were 23 days over 90 degrees.
As temperatures increase, Somerville will become more susceptible to the urban heat island effect. Urban heat island effect causes hotter temperatures due to paved surfaces and waste heat generated by energy use when compared to less developed areas. Increasing average temperatures can have wide-ranging impacts on human life, the built environment, and natural ecosystems. Rising temperatures and more intense heat waves present significant public health concerns and can contribute toward kidney, lung, and heart problems. Vulnerable populations are particularly susceptible to heat-induced illness and mortality. There will also be increasing demand for indoor cooling.

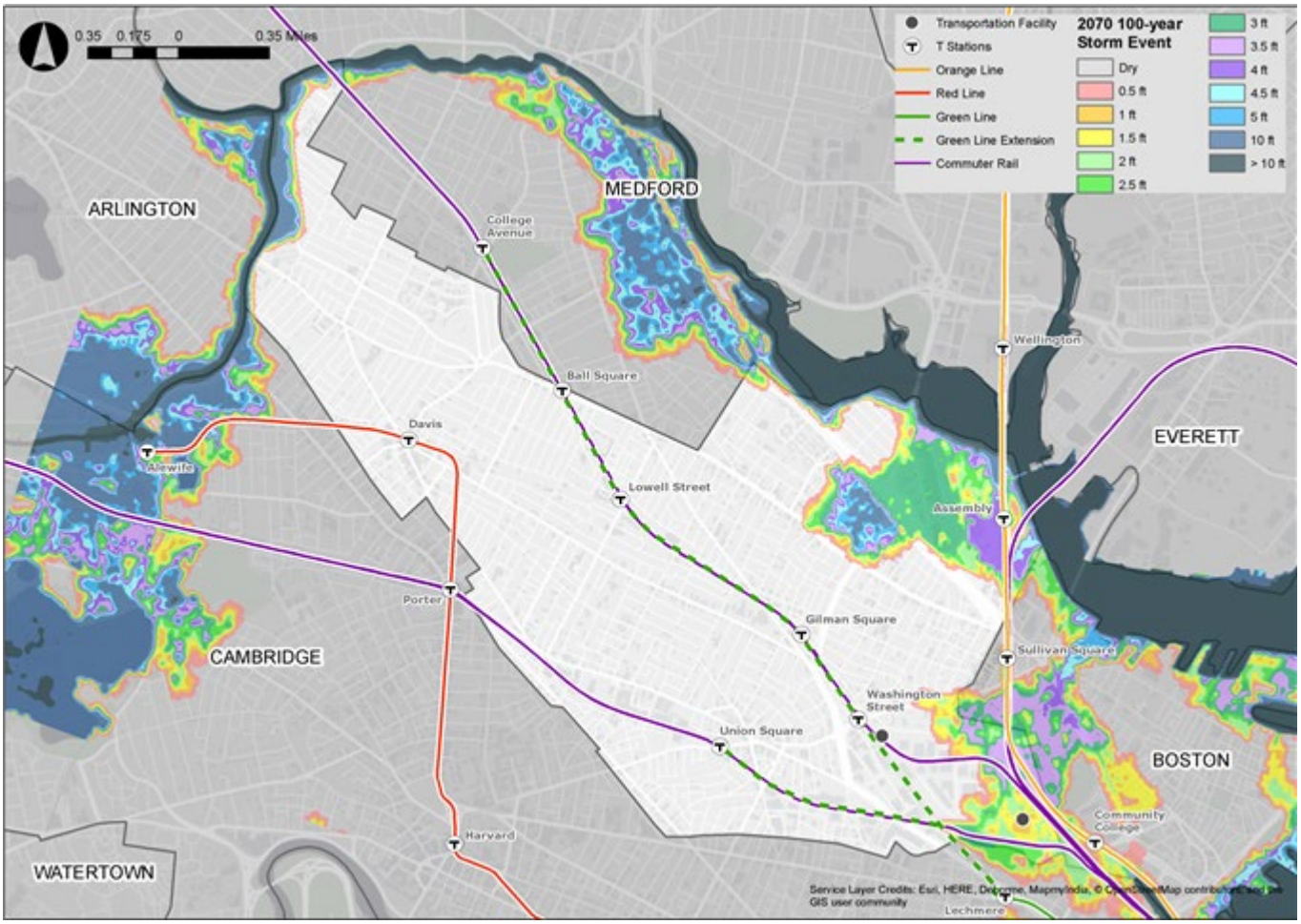
The following maps and figures provide an overview of projected climate exposure. Please review the Climate Change Vulnerability Assessment for more detailed analysis on Somerville's exposure, vulnerability, and risk to climate change. **For high resolution maps and GIS files, please click the link to view the Urban Flood Atlas available at www.somervillezoning.com/developmentreview .**

2070 Coastal Flood Probability



This map shows the annual chance of flooding from coastal storm events and sea level rise in 2070. A 100% chance of flooding means that there is a nearly certain chance that the area will flood at least once in a given year, while a 50% chance means that there is an equal chance that it may or may not flood in a given year. A 1% chance of flooding corresponds with a 100-year event. A 0.1% chance corresponds with a 1000-year event. This map does not account for drainage infrastructure (Somerville Climate Change Vulnerability Assessment, 2017).

2070 Coastal Flood Depth from 2070 100 -year Storm Event

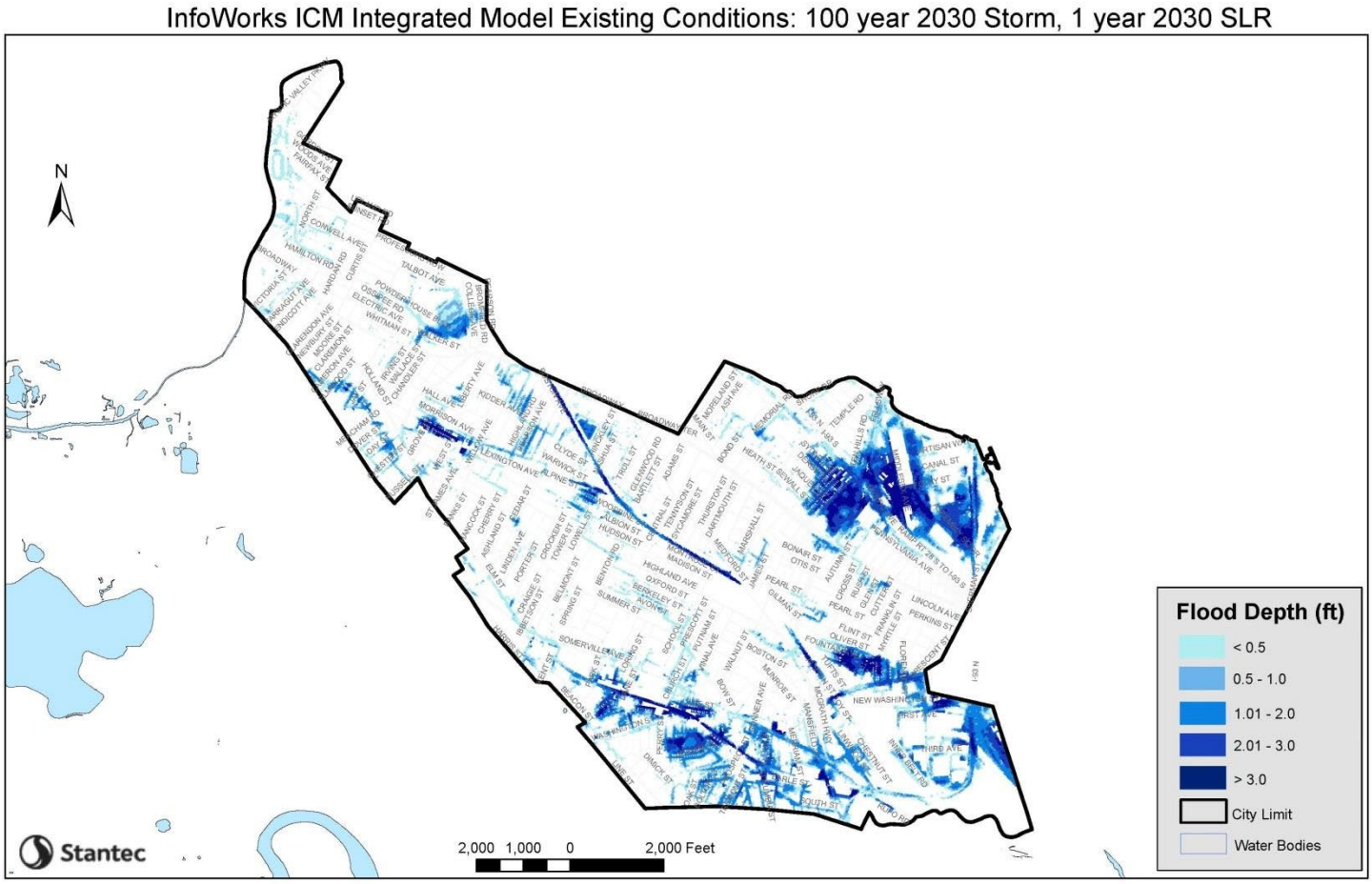


This map shows the projected flood depths of a 100-year coastal storm event in 2070, along with public transportation infrastructure assets. This map does not account for drainage infrastructure (Somerville Climate Change Vulnerability Assessment, 2017).

Precipitation Projections

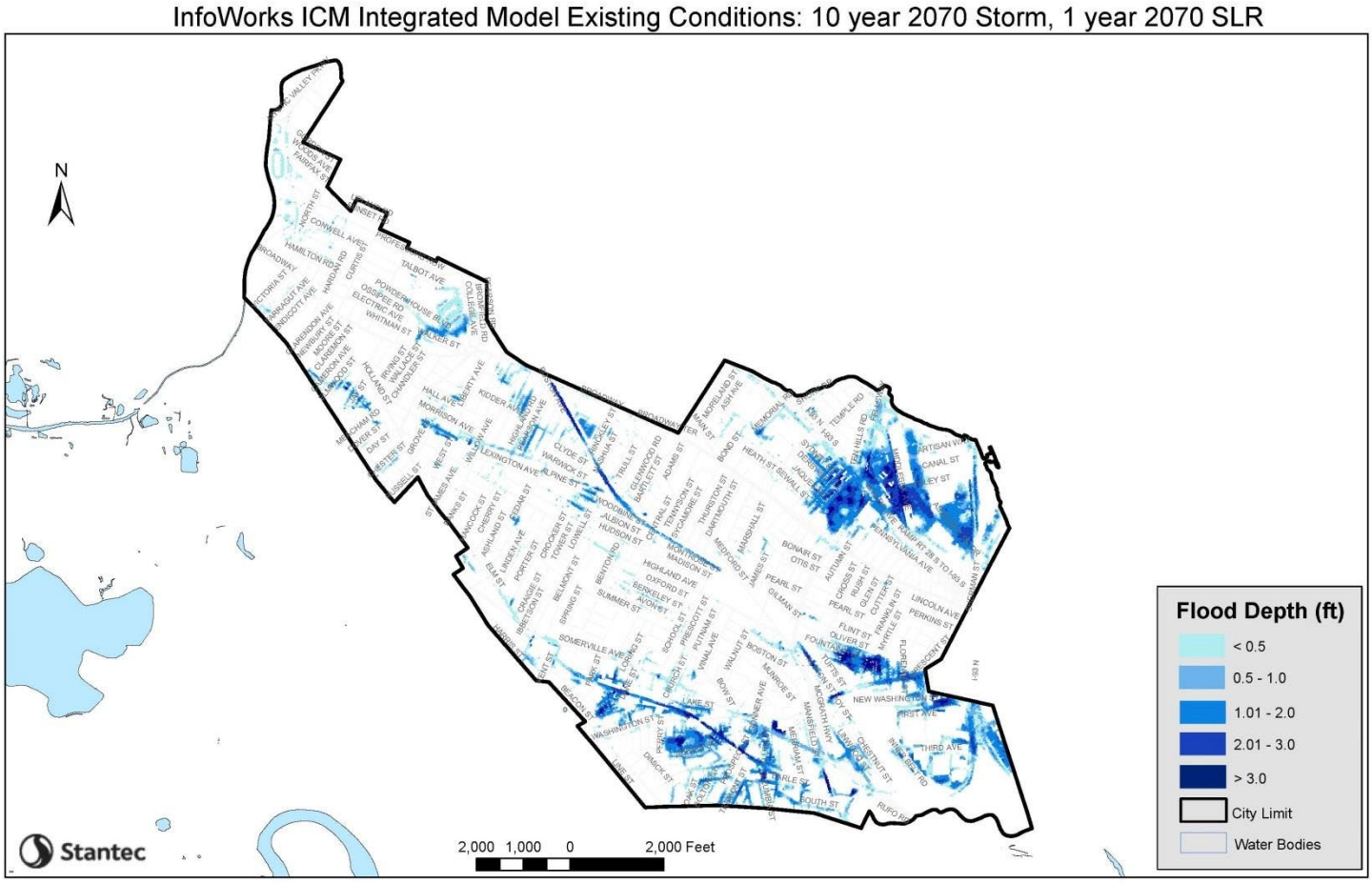
Precipitation-based flooding is projected to increase in Somerville and is currently a more immediate and widespread threat than sea level rise and storm surge. The intensification of both the frequency and intensity of rainfall events is likely to cause increased risk of flooding during rain events.

Storm Type	Present-day Rainfall	2030 Rainfall	2070 Rainfall
10-year (10% annual chance), 24-hour	4.9 in	5.6 in	6.4 in
100-year (1% annual chance), 24-hour	8.9 in	10.2 in	11.7 in



This map shows the impact of precipitation-based flooding, sea level rise, and storm surge. This map shows the modeled flood depths of a 100-year, 24-hour design storm with 1-year storm surge and sea level rise projections in 2030. Unlike the maps above, this includes modeling of the drainage system,

which takes into account how water will be conveyed out of the city. The model is based on how the system is designed to function, so actual areas of flooding and depth of flooding could vary (Stantec, 2019).



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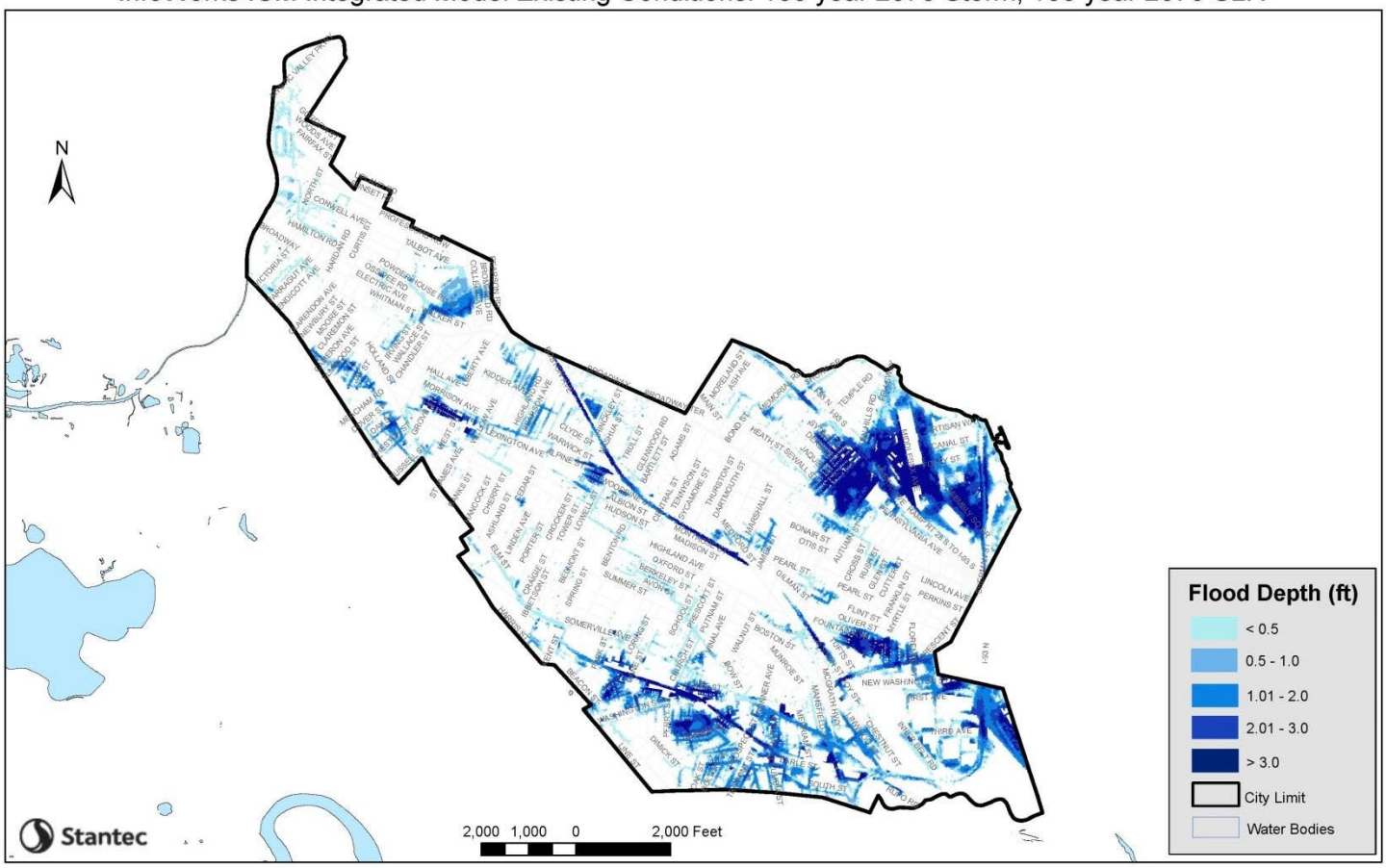
InfoWorks ICM Integrated Model Existing Conditions: 100 year 2070 Storm, 100 year 2070 SLR



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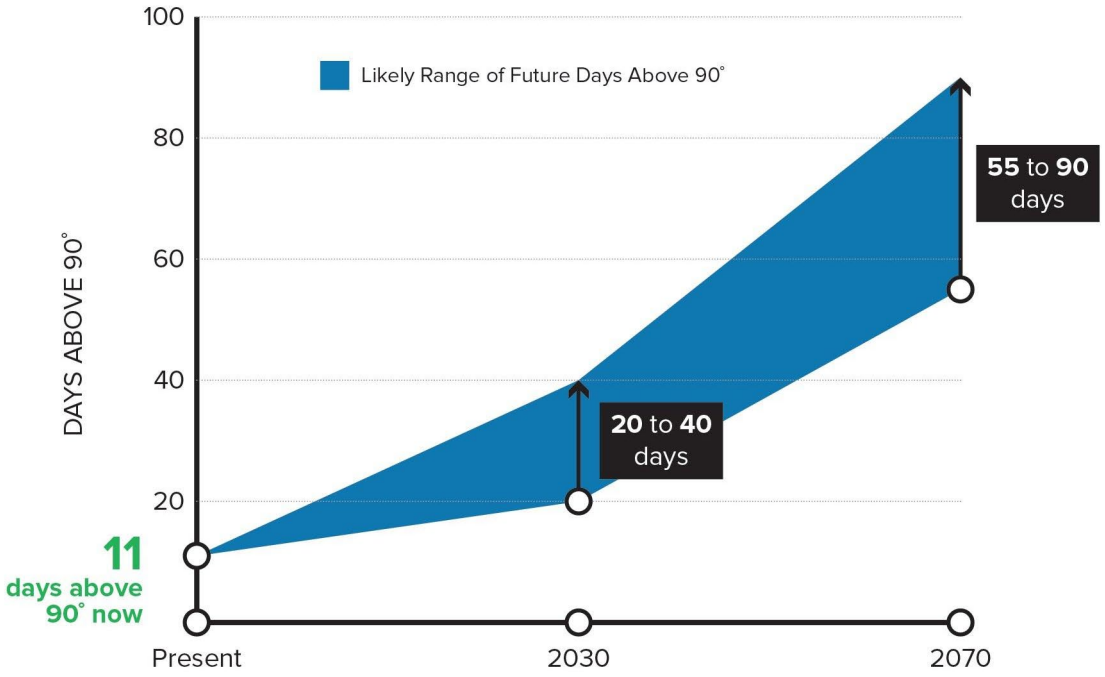
Temperature Projections



The graph above and table below provide historic and projected extreme heat conditions in Somerville (Somerville Climate Change Vulnerability Assessment, 2017).

Temperature	1971-2000 (average)	2030 (low)	2030 Avg.	2030 (high)	2070 (low)	2070 Avg.	2070 (high)
Annual	50.0° F	53.3° F		53.5° F	55.8° F		58.7° F
Summer	70.6° F	74.5° F		74.8° F	77.4° F		80.6° F
Winter	29.8° F	32.2° F		33.0° F	34.6° F		38.0° F

RESOURCES:

For information on net-zero and resilient building and site design, please review the following resources:

- Passive House Principles
- Architecture 2030 Palette (Net -zero design tools)
- Zero Energy Buildings in Massachusetts: Saving Money from the Start

- Enhancing Resilience in Boston
- Enterprise Community Partners' Strategies for Multifamily Building Resilience

SUSTAINABLE & RESILIENT BUILDINGS QUESTIONNAIRE

Section 1: Proposal Information

Proposal Name	Porter SQRD
Address	32-44 White Street, Somerville, MA
Developer	SGL Development
Business Address	810 Memorial Drive, Suite 105
Designated Contact	Adam Siegel
Telephone Number	(978) 3147075
Contact's Email Address	adam@sgldevelopment.com
Date Submitted	04.14.2023
Filing Type (Development review application, Building Permit, etc.)	Development review application
Is this a revised Questionnaire?	Yes
Is MEPA Approval Required?	No; The project is <50,000 SF.

Section 2: Building & Site Details

2.1 Building Information

Building Uses	Office & Laboratory
Gross Floor Area	42,089
Expected Life of Building	60+ years
Please describe the following	
Building heating plant and distribution System	The heating plant will feature both air-to-water heat pumps and natural gas fired condensing boilers to generate low temperature (120 degree F) hot water. Air source heat pumps will act as the primary heating source, and gas fired boilers will operate during extreme temperature conditions. The hot water pumping system will feature variable primary and variable secondary pumps.

Building cooling plant and distribution system	The cooling plant is based upon high efficiency air cooled chillers with primary and secondary pumping. A sensible-only cooling loop (57 degree F) and dedicated pumps shall be provided for terminal cooling devices in offices and high-heat gain spaces.
Ventilation system	The ventilation system will feature two (2) variable volume makeup air handling units with cooling, heating, and filtration. A run-around coil energy recovery will be provided to recapture energy from the lab exhaust air streams to pre-heat and pre-cool incoming outside air.
Domestic hot water system	The domestic hot water system will feature gas-fired condensing water heaters to provide tempered (85 degree F) water for emergency fixtures and hot water (120 degree F) to sinks.

Continue onto next page.

2.2 Green Building	
Green Building Professional(s): Name(s) and contact information	Samira Ahmadi; samira.ahmadi@envien-studio.com; 617-446-3114
Professional Credentials: Green Building Program Certification(s)	BEMP | LEED AP BD+C, ID+C, Homes | WELL AP
Building LEED Rating	Gold. LEED v4 Building Design and Construction: Core and Shell
Building LEED Point Score	66
Will you pursue LEED certification through the USGBC?	Yes
Are any other green building certifications being pursued? (Passive House, Enterprise Green Communities, etc.). Please describe.	No

2.3 Electric Vehicle Parking

The number of electric vehicles (EVs) in Somerville is expected to increase significantly over the next decade with more electric vehicles coming to market. Conservative estimates based on historical trends alone suggest 20% of personal vehicles in Somerville will be electric by 2040. Installing capacity for EV supply equipment (EVSE) has been shown to be more feasible and cost-effective during construction than when retrofitting parking areas to support the installation of EVSE in the future[1]. Providing EVSE can increase property value, become a future revenue source, and provide an amenity that more tenants and commuters will be looking for. It is recommended that parking facilities be designed to allow for the most flexibility to adapt to future needs of electric vehicles and changing mobility needs. **The City of Somerville recommends 25% of spaces have installed charging access and up to 100% of spaces be "EV Ready"** (everything but the station installed). Eversource currently has a program to pay the associated infrastructure costs of EV charging, including infrastructure needed to be "EV ready." Please consult with Eversource to determine if any installation costs could be covered through their Make Ready Program.

[1] http://evchargingpros.com/wp-content/uploads/2017/04/City-of-SF-PEV-Infrastructure-Cost-Effectiveness-Report-2016.pdf; https://www.richmond.ca/__shared/assets/Residential_EV_Charging_Local_Government_Guide51732.pdf

Total # of Parking Spaces	0
EVSE Plugs (number and voltage/ level of plugs)	0
EV Ready Spaces (everything but station is installed)	0
Please share any other information on your EV strategy. Have you spoken with Eversource? Are you talking with EVSE providers? Have you considered EVSE needs in conjunction with your parking and mobility management plans?	

2.4 Energy Input Form

Required for projects over 25,000 SF, optional for all other projects.

Download a copy of the Somerville Low Load Building Energy Input Form and follow the instructions included in the spreadsheet.

Pre-Submittal Phase

- Complete the 'PRE-SUBMITTAL INFO' tab of the Energy Input Form and submit to the Office of Sustainability and Environment (ose@somervillema.gov) at least two weeks prior to your pre-submittal meeting with OSE.

Development Review Phase

- Complete the 'DEVELOPMENT REVIEW INFO' tab of the Energy Input Form and submit to the Office of Sustainability and Environment (ose@somervillema.gov) at least four weeks prior to your application submittal for Board review.
- Projects pursuing Passive House certification from PHIUS or PHI do not have to complete the Development Review Info tab.

Continue onto next page.

Section 3: Net Zero Building Compliance

3.1 Will the building be a net-zero carbon building? The City of Somerville encourages projects to eliminate fossil fuels in their building operations. A net-zero carbon building is a highly energy efficient building that does not burn fossil fuels and either produces or procures enough carbon-free electricity to meet the building's total energy demand. If the building will not be a net-zero carbon building, provide a technical description of how the building's systems will be transitioned over time to achieve net-zero carbon emissions, including how and when systems can be transitioned in the future to carbon-free alternatives (provide timeline including 2030, 2040, and 2050 targets). Description must include whether any remaining emissions will be offset with on-site or off-site renewables and at what quantity. Changes could include, but are not limited to, addition of on-site renewable energy generation, energy storage, additional energy efficiency measures, building electrification, or other measures that would further reduce greenhouse gas emissions.

Carbon neutrality will involve the participation of numerous stakeholders, including the State, electric generators such as utilities, design teams, property owners, and tenants. Although a clear timeline for grid decarbonization has not been developed by electrical generators and the State, the design team and property owner are committing to many electric based systems where possible with the exception of the heating system which has high instantaneous demand. Additional consideration will be given to electrification of space heating and low carbon domestic hot water production when that technology exists in large scale for colder climates– it is possible that this equipment be re-evaluated at the end of the proposed equipment's life cycle pending any space limitations. Renewables and RECs will also be considered as a stop gap pending local generation emissions reductions.

The building's heating system utilizes air-to-water heat pumps as primary heat and high-efficiency natural gas fired condensing boilers for peak demand. The hot water system is designed for 120degF low temperature hot water for future integration of additional air-to-water heat pumps. Future electrification measures include additional air-to-water heat pumps to provide electric based heating. The gas-fired equipment shall be maintained for backup heat only. The building decarbonization timeline may look like the following:

- 2030: Heating plant is 25% electrified via air-to-water heat pumps
- 2040: As air-cooled chillers become due for replacement (15-20 years), the cooling only equipment shall be replaced with air-to-water heat pumps that will electrify 66% of the total heating plant demand.
- 2050: Additional air-to-water heat pumps shall be provided to meet peak heating demand based upon building trending data. The gas fired boilers shall remain as an emergency backup heat source.

3.2 Please explain the proposed building's electric heating system capacity.
If completing the Somerville Low Load Building Energy Input Form, confirm it is consistent with Row 24 in 'Energy Input Form – Pre-submittal Dashboard Tab' or Row 28 if the project is a laboratory building. If the project intends to incorporate fossil fuels, please provide a rationale below and explain provisions that your project is taking to electrify base building systems in the future.

25% of the building's peak heating demand will be provided by air-to-water heat pumps as compliant with 225 CMR 23: MA Commercial Stretch Energy Code 2023. The remaining 75% of peak heating demand will be satisfied by high-efficiency gas condensing boilers. The building will be configured for future conversion to 100% electric heating systems as cooling only equipment becomes due for replacement; and is then replaced with air-to-water heat pumps.

3.3 How is the building currently designed to reduce energy usage? Please describe the key design features of the building including:

A) Building envelope performance (including roof, foundation, walls, and window assemblies).
B) How the design team has integrated energy performance into the building and site design and engineering (orientation, massing, mechanical systems, envelope, etc.).
C) Efficiency of heating and cooling systems. Will these systems be electric? Provide reasoning for selection of heating and cooling systems.

Building envelope exceeds the IECC 2018 calculated UA by 19% and it will be further improved as design progresses to meet the upcoming energy code requirements. Building heating plant will consist of high-efficiency air-to-water heat pump systems with gas-fired boilers for peak heating only. High-efficiency air-cooled chillers will provide CHW for space cooling.

3.4 Evaluate feasibility of on -site renewable generation. Please describe your analysis and findings. Analysis should consider incentives available. Will any renewable energy generation be incorporated into the project? If so, please describe (system type and capacity). If no, could it be added in the future? And will any off-site renewable energy be purchased?

At this time renewable energy generation systems are not anticipated for the project since most of the roof area is allocated to mechanical equipment requirements required for the lab program. The high energy use of the building and limited roof area not dedicated to mechanical equipment requirements result in extremely limited opportunity for significant PV. Although the roof is expected to be covered with mechanical equipment throughout the life of the building, the project might incorporate solar panels in the future. No off-site renewable energy is expected to be purchased.

3.5 Describe any and all incentives, rebates, grants provided by utilities, government organizations, and other organizations being pursued to maximize building efficiency and to reduce emissions. Description must include any incentives that were considered but are not being pursued, including reasoning for each decision.

Project will participate in Mass Save Path 2: Whole Building Energy Use Intensity (EUI) Reduction Approach.

3.6 For buildings with more than four units or a gross floor area greater than 7,000 square feet including parking:

Per Eversource Information and Requirements for Electric Service, single phase services greater than 400amps or any 3-phase service requires private property transformation. Additionally, any building with more than four units requires Eversource review to determine the need for private property transformation.

If your building is within these thresholds:

1. Reach out to Eversource at 888-633-3797 to discuss your electrical service needs.
2. Request via email from Eversource confirmation if private property transformation will be required.
3. Once you receive a reply, forward the email thread to your assigned planner and ose@somervillema.gov with the subject line: Property Address, P&Z# Eversource electric load determination. (If you do not know your assigned planner or tracking number, contact the Planning Department or ose@somervillema.gov.)

Below, include the date when the email was sent and the email address it was forwarded from and the outcome.

DATE (MM/DD/YYYY): 04/05/2023 EMAIL: stan@sgldevelopment.com . ADDITIONAL CAPACITY NEEDED (YES OR NO): Yes.

Continue onto next page.

Section 4: Climate Change Risk and Vulnerability

4.1 Climate Vulnerability Exposure (check all that apply)	1. Sea Level Rise & Storm Surge 2. Precipitation Induced Flooding 3. Heat 4. Other(s):

4.2 How is your site vulnerable to projected climate change impacts?

Our site is vulnerable to the generalized increased risk of extreme weather events like climate exchange and is within Medium Indoor Heat Exposure. The site location is a minimum of two feet above the 2070 (100 yr) flood elevation, so we do not anticipateany problems as it relates to Climate Vulnerability.

The next two sections ask specific questions about how the project is designed to manage climate related risks from heat, coastal, and precipitation induced flooding.

Section 5: Managing Heat Risks

5.1 Describe all building features that will keep building occupants safe and comfortable during extreme heat, including mechanical systems and non-mechanical design elements to cool building (orientation, envelope, operable windows, etc.).

High performance building envelope will reduce summer peak cooling loads and heat loss in the winter. Low lighting power density and energy efficient receptacle equipment will help reduce tenant loads. A natural gas backup generator will be used to keep essential functions going during interruptions of electrical utilities.

5.2 How has increased demand for indoor cooling been factored into the building design and energy management strategy?

A high temperature (57 degree F) chilled water cooling loop will be provided to labs and offices for supplemental cooling devices (fan coils) to minimize outside air demand and the associated dehumidification cooling load.

5.3 List any indoor spaces without cooling and their uses.

The loading dock and trash area will not have cooling.

Continued onto next page.

5.4 What design features will be implemented on site to minimize the site's contribution to the urban heat island effect? Please describe any and all design elements. Strategies could include, but are not limited to, the following:

- High albedo pavement or roof materials
- Passive cooling or increased ventilation capacity
- Green roofs or walls
- Heat resistant trees and plants
- Additional landscaped areas

The proposed lab building will cover approximately 73% of the lot (8,230 GSF/11,220 SF of Lot). Of the 8,230 SF of rooftop area, 45% (3,750 SF) will be covered with a green roof. Another 25% (2,100 SF) of the rooftop area will be investigated for the addtion of solar panels in the future. The green roof will reduce the albedo value of the roof. The remaining 27% of the lot will either be paved with permeable paving or gravel path of a middle range albedo value, paved with cement concrete paving for public sidewalks, or landscaped with vegetation and trees suitable to the micro climate and soil conditions available for survival.

Section 6: Managing Flood Risks

6.1 Is the site susceptible to flooding from sea level rise and storm surge and/or rain events now or during the building's expected lifetime? Please refer to the Somerville Climate Change Vulnerability Assessment and the updated stormwater flooding maps provided in the Background section of this Questionnaire. **High resolution GIS maps are available through the Urban Flood Atlas at** www.somervillezoning.com/developmentreview .

Yes.

If you answered YES to the previous question, please complete the remainder of Section 6.
Otherwise, you have completed the Questionnaire. Thank you.

6.2 Flooding Design Considerations

Proposed Site Elevation - Low	43.5(ft)	Proposed Site Elevation - High	45.5(ft)
Lowest elevation of life-safety systems	33.5(ft)	Proposed First Floor Elevation	43.6(ft)

Nearest flood depth for the 2070 10-year storm	41.4	Nearest flood depth for the 2070 100-year storm	41.6

6.3 What are the first-floor uses of the building? Are there any below ground stories of the building? If so, what uses are located below ground?

First floor consists of main entry/lobby, tenant space, loading area, trash & recycle, electrical room MEP space.

6.4 Are there any flood-sensitive assets, utilities, mechanical equipment, or life-safety systems located in areas of the building that are at risk of flooding? What measures will protect building systems during a flood or severe storm? These might include, but may not be limited to, the following:

- Elevation of utilities and mechanical systems
- Water tight utility conduits
- Wastewater back flow prevention
- Stormwater back flow prevention
- Systems located above the ground floor
- Securing objects at risk of becoming dislodged

No, the building elevation is two feet above the 2070 100 yr flood elevation event.

6.5. Residential and commercial buildings should be designed to maintain regular operations during a 10-year storm in 2070. **Describe how the site and building have been designed to maintain regular operations -- meaning all systems will remain operational and all occupied spaces are protected from flooding -- during the 2070 10-year storm.** Please refer to both the 2070 coastal flood probability map and the 2070 10-year storm and 1-year sea level rise scenario(pages 3 and 6). Resilience measures might include,but may not be limited to, the following:

- Elevation of the site
- Structural elevation of the building
- Non-structural elevation of the ground floor
- Energy storage and backup generation

- Wet flood-proofing (allowing water to flow through building envelope)
- Dry flood-proofing (preventing water from entering building)

The building elevation is two feet above the 2070 100 yr flood elevation event.

6.6 Residential buildings should be designed to allow occupants to shelter in place during a catastrophic storm (100-year event) today and in the future, this means all life-safety systems should be above the 2070 100-year flood elevation. **How will your site and building be impacted by the 2070 100-year, 24-hour storm and how will your site and building be designed to protect against those impacts?** Please evaluate impact based on both the 2070 coastal flood depth model for the 100-year storm and the 2070 100-year, 100-year sea level rise model (pages 4 and 7). Summarize anticipated pre- and post-event policies, strategies, and actions necessary to facilitate post-flood recovery.

The building elevation is two feet above the 2070 100 yr flood elevation event.

6.7 Will hazardous or toxic material be stored on site? Where will it be stored? How will you protect hazardous or toxic material from flooding?

Yes, they will be stored on site. The entire site is two feet above the 2070 100 yr flood elevation event. The below grade level is 45.6, which is four feet above the water table. We will comply with the regulations on what levels hazardous materials are allowed to be stored.

6.8 Will the site be accessible by a typical vehicle during a 10 -year event (up to 6 inches of water) and by emergency vehicles (up to 12 inches of water) during a 100 -year event?

The adjacent street elevations are all above the 2070 100 year event elevation and thus we do not anticipate any issues with accessibility.

Somerville Low Load Buildings Energy Input Form

Updated 12/6/2021

Context:

Somerville Climate Forward, Somerville's Community Climate Action Plan, identifies the need for new devleopment to meet net zero emissions standards to support the citywide goal of a New buildings and extensive renovations should ideally be designed to achieve operational carbon neutrality and to minimize embodied carbon in construction materials.
Reducing heating loads is the single-most important step towards designing a cost-effective, zero-carbon building in Somerville.
This calculator provides an easy way to assess and reduce your building's loads.

The purpose of the Low Load Building Energy Input Form is to:

- Quantify the heating loads of the Proposed building and compare them to: 1) a low load scenario and 2) the MA minimum code requirements.
- Support consistency and transparency in the development and review of a project's approach to cost effective zero-carbon design.

Encourage practical and cost effective design decisions that enable the efficient electrification of commercial buildings

The Calculator compares four building scenarios:

- **Proposed Building:** The building as-designed.
- **ASHRAE 2013:** A code compliant equivalent to the as-designed building
- **Low Load Building:** The building with low heating load components, targeting cost-effective Zero Net Carbon (ZNC).

How to use this workbook:

- The table below outlines the primary steps.

All inputs required by the user are highlighted in blue cells.

Step	Tab	Inputs	Outputs	Opportunities
1	**PRE-SUBMITTAL INFO**	Enter Proposed Building Parameters	Review Envelope Outputs and Heating load of	If the Proposed Heating Load is equal to or less than the
2	**DEVELOPMENT REVIEW INFO**	Enter Energy Model Results	Review the outputs in the Development	

PRE-SUBMITTAL LOAD ASSESSMENT

Reducing heating loads is the single-most important step towards designing a cost-effective zero-carbon building in Somerville.
This calculator provides an easy way to assess and reduce your building's loads.

Instructions:

1 Fill in the blue cells with your project information: All user inputs in blue are required.
2 Review Pre-Submittal Dashboard tab.
3 Compare the Proposed heating load to the heating load of a MA Code Minimum design, and to a Low Load design.
4 For more details, review the 'Detailed Loads' tab. It provides a summary of the assumptions in the MA Code and Low Load options.
5 Consider strategies to cost-effectively reduce the heating load and heating capacity of the Proposed design.

Project Name	32-44 White	
Project Address	32-44 White Street, Somerville MA 02144	
Submission date	4/14/2023	
Filing	P&Z 22-054	
Individual responsible of submission	SGL Development	
Firm responsible for submission		
Project team		
Owner	SGL Development	
Architect	Peter Quinn Architects	
MEP Consultant	Building Engineering Resources, Inc	
Energy Performance Consultant	enviENERGY Studio LLC	*if applicable*
Envelope Consultant	3iVE LLC	*if applicable*
Summary of submission	Sustainability is an important design and construction priority for the Project and the Project team will evaluate and implement measures to reduce energy and water consumption, to improve the efficiency and useful life of building systems and infrastructure, and to reduce the burdens imposed by buildings on city services, the environment, and the public health. Consistent with the Zoning requiremtns, the Project will use the Leadership in Energy and Environmental Design (LEED) v4 for Core and Shell to track the Project's approach to sustainability and its LEED Gold level certification target.	*Outline key project goals, progress to date and major takeaways from this submission.*

General Project Inputs			User Comments	Instructions
Number of Stories Above Grade	4			Do not include mechanical penthouse or unconditioned rooftop amenity spaces as a story.
Total Building Gross Floor Area	42,089	GSF		Automatically calculated, based on sum of individual building types input below. Confirm that the value correctly aligns with the total building value.
Total Building Net Occupiable Floor Area	38,410	NSF		Automatically calculated, based on sum of individual building types input below.
Total Building Vertical Façade Area	25,780	SF		Automatically calculated, based on sum of individual building types input below.
Roof Area	8,352	SF		Include total roof area as seen from above. Includes mechanical penthouse roofs and spaces throughout the building where ambient air is located outside of the ceiling plane (even if not on top of building).

Primary Building Type			User Comments	Instructions
Primary Building Type	Office or Laboratory Building (5000 to 50,000 ft2)			NOTE: if a single development includes multiple separate buildings, project teams are encouraged to use a separate CNBA calculator for each building. Otherwise, the daylight area and code-reference window area
Gross Square Feet	42,089	GSF		not fall under Secondary and Tertiary categories below.
Vertical Façade Area	25,780	SF		the exterior. Exclude other areas, such as: screen walls, parapets, mechanical louvers, and areas that separate non-conditioned space from the exterior. If there are more than 3 building use types, input the total value that
Window Area (SF)	6,223	SF		more than 3 building use types, input the total value that does not fall under Secondary and Tertiary categories below.

Secondary Building Type			User Comments	Instructions
Secondary Building Type				Secondary building type is the use type representing the second greatest % of total building floor area.
Gross Square Feet		GSF		Provide inputs for the Secondary Building Type, similar to the process used for the Primary Building Type, defined above.
Vertical Façade Area		SF		Provide inputs for the Secondary Building Type, similar to the process used for the Primary Building Type, defined above.
Window Area (SF)		SF		Provide inputs for the Secondary Building Type, similar to the process used for the Primary Building Type, defined above.

Tertiary Building Type			User Comments	Instructions
Tertiary Building Type				Tertiary building type is the use type representing the third greatest % of total building floor area.
Gross Square Feet		GSF		Provide inputs for the Tertiary Building Type, similar to the process used for the Primary Building Type, defined above.
Vertical Façade Area		SF		Provide inputs for the Tertiary Building Type, similar to the process used for the Primary Building Type, defined above.
Window Area (SF)		SF		Provide inputs for the Tertiary Building Type, similar to the process used for the Primary Building Type, defined above.

Envelope Parameters			User Comments	Instructions
Window Assembly U-value	0.29	Btu/h-F-sf		U-value times Area (UxA) weighted average for all windows. [(U-value window type 1) x (Area window type 1) + (U-value window type 2) x (Area window type 2) ….] / [Total window area]
Wall Assembly U-value	0.055	Btu/h-F-sf		UxA weighted average for all walls. [(U-value wall type 1) x (Area wall type 1) + (U-value wall type 2) x (Area wall type 2) ….] / [Total wall area]. For assembly U-values see ASHRAE 90.1-2016 Normative Appendix A
Roof Assembly U-value	0.025	Btu/h-F-sf		UxA weighted average for all roofs. [(U-value roof type 1) x (Area roof type 1) + (U-value roof type 2) x (Area roof type 2) ….] / [Total roof area] For assembly U-values see ASHRAE 90.1-2016 Normative Appendix A
Infiltration - Maximum at Blower Door Test	0.1	cfm/sf at 75pa		IECC 2018 requires 0.25 cfm/sf @ 75 Pa

HVAC Parameters			User Comments	Instructions
Minimum Outdoor Airflow + Make-Up Rate	21,700	CFM		air-change rates (such as laboratories) or make-up is required due to a dedicated exhaust system (such as fume hoods, kitchen exhaust, etc.).
Proposed Outdoor Airflow + Make-Up Rate	24,250	CFM		Input the as-designed outdoor airflow quantity.
IF LAB OR HEATHCARE Class 3 and 4 Exhaust (CFM)	24,250	CFM	Proposed design features headered general and hazardous exhaust with glycol energy recovery coils	Class 3 and 4 Exhaust is defined as exhaust meeting the definition of Class 3 and 4 air in ASHRAE/ASHE Standard 62.1-2019, including laboratory fume hood exhaust, laboratory general exhaust when combined with laboratory fume hood exhaust, exhaust where energy recovery is not allowed by ASHRAE/ASHE Standard 170 for use in energy recovery systems with leakage potential, and systems exhausting toxic, flammable, paint or corrosive fumes or dust. The Class 3 and 4 Exhaust system must be capable of reducing exhaust and makeup airflow rates to 50% of the zone design values or the minimum required to maintain pressurization relationship requirements. Excludes Exempt Exhaust. Excludes Class 2 Exhaust. Exludes Class 1 Exhaust: for example, exludes office exhaust, even when the Proposed design has a combined office and laboratory exhaust system.
INCLUDED Exempt Exhaust (CFM)		CFM		grease vapors and smoke. It also includes radioactive isotope exhaust. If exhaust heat recovery is included in the proposed design, the exhaust should not be classified as Exempt.
IF MECHANICALLY HUMIDIFIED Humidification Load		MBH	humidification will not be	If the building, or a portion of the building is humidified, input the humidification load here. This value is carried consistently across all options.
IF APPLICABLE Process Heating Load		MBH		process loads supplied by systems other than the building heating plant. This value is carried consistently across all options.
Ventilation Heating Sensible Recovery Effectiveness	55%	%		exhaust air dry-bulb temperatures, at 0˚F winter design condition, expressed as a percentage. For buildings with multiple types of exhaust heat recovery, this value shall be the cfm-weighted average value.
Ventilation Cooling Total Enthalpy Recovery Effectiveness	0%	%		enthalpy, at summer design condition, expressed as a percentage. For buildings with multiple types of exhaust heat recovery, this value shall be the cfm-weighted average value.
Class 3 and 4 Exhaust Sensible Recovery Effectiveness	55%	%		Sensible Energy Recovery Effectiveness is defined above. For buildings with multiple types of exhaust heat recovery, this value shall be the cfm-weighted average value.
(at 35°F ambient)	855	MBH		EXCLUDE the capacity of redundant equipment that is intended to operate only when heating equipment fails (commonly referred to as an N+1 configuration). Also EXCLUDE the capacity of redundant equipment that is
Non-Electric Space Heating Plant Capacity	2,400	MBH		to operate only when heating equipment fails (commonly referred to as an N+1 configuration). Also EXCLUDE the capacity of redundant equipment that is intended to operate when ventilation heat recovery devices fail.

Total (Non-Redundant) Space Heating Plant Capacity	2,400	MBH		to as an N+1 configuration). If there is redundancy between electric + non-electric heating systems, EXCLUDE redundant capacity. For example, if the non-electric heating plant is designed to handle the entire heating load,
Will the building's heating system be 100% electric?	No			This does not align with the City of Somerville's goals for carbon neutral ready buildings
Will the building's DHW be 100% electric?	No			This does not align with the City of Somerville's goals for carbon neutral ready buildings
Cooling Plant Capacity	200	Tons		Input the proposed cooling system capacity. This may include capacity for all uses such as: space cooling, dehumidification, process cooling loads, etc.

Envelope Outputs			User Comments	Instructions
Window-to-wall ratio	24%			some envelope components, such as foundations and exposed floor areas.
Average Envelope U-value (UxA / A) - Design	0.091	Btu/h-F-sf		some envelope components, such as foundations and exposed floor areas.
Average Envelope U-value (UxA / A) - Maximum per Code	0.114	Btu/h-F-sf		components, such as foundations and exposed floor areas.
Average Envelope U-value (UxA / A) - Aligns with Code?	Yes	Btu/h-F-sf		does not account for some envelope components, such as foundations and exposed floor areas. Therefore, it is not proof or equivalence of the envelope backstop code compliance.

Heating Capacity			User Comments	Instructions
Low Load Building - Heating Plant Capacity	31.9	Btu/h-sf		Automatically calculated value. Indicates a Low-Load target value, intended to optimize cost-effective electrification and procurement of renewable energy to achieve Zero Net Carbon (ZNC).
Proposed Building - Heating Plant Capacity	57.0	Btu/h-sf		Automatically calculated value. Indicates the Proposed Design value, per the inputs above. Design teams should pursue low-load, cost-effective solutions to meet the City of Somerville's Climate Action goals.
MA Code Minimum Building - Heating Plant Capacity	64.7	Btu/h-sf		Automatically calculated value. Indicates the value for a building that meets the MA Code Minimum envelope and exhaust heat recovery performance.

Heating Loads		
Low Load Building	25.5	Btu/h-sf
Proposed Building	25.4	Btu/h-sf
MA Code Minimum Building	51.7	Btu/h-sf

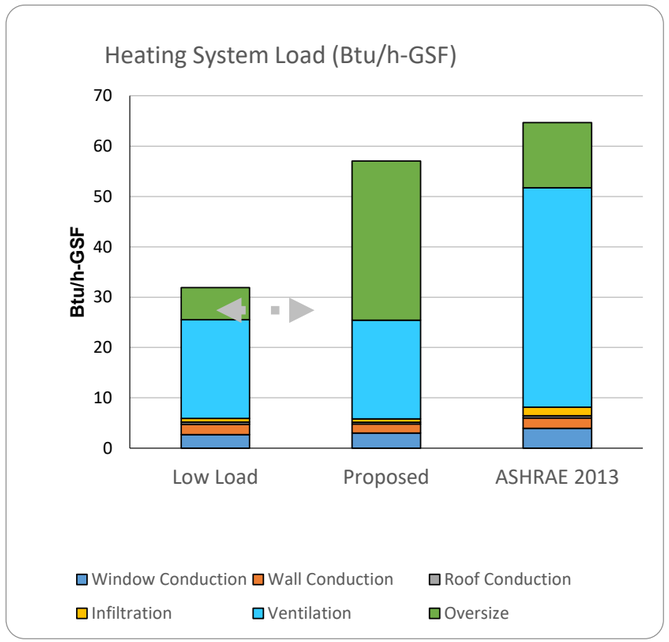
[JWK] LET'S DELETE THIS CHART

PRE-SUBMITTAL DASHBOARD

*If the **Proposed Heating Load** is equal to or less than the **Low Load Target** AND the **Proposed design is all electric**, then **you are done!** If not, then complete the Development Review section.*

For labs and healthcare only:
*If the **Proposed Heating Load** is equal to or less than the **Low Load Target** AND the **Proposed Electric Heat Pump Heating Capacity** is equal to or greater than the **35°F Ambient Suggested Minimum Heat Pump Heating Capacity**, then **you are done!** If not, then complete the Development Review section.*

HEATING SYSTEM PROPOSED TO USE FOSSIL FUELS
DHW SYSTEM PROPOSED TO USE FOSSIL FUELS



LOAD EVALUATION

	Low Load	Proposed	ASHRAE 2013
Window-to-Wall Ratio (%)	24%	24%	24%
Window Assembly U-Value (Btu/h-F-sf)	0.26	0.29	0.38
Opaque Wall U-Value (Btu/h-F-sf)	0.06	0.06	0.06
Infiltration (cfm/sf at 75pa)	0.10	0.10	0.25
Roof Assembly R-Value (Btu/h-F-sf)	0.03	0.03	0.03
Ventilation Sensible Recovery (%)	55%	55%	0%
Building Heating Load (Btu/h-GSF)	26	25	52
Primary System Oversize (%)	25%	124%	25%

HEATING CAPACITY TO BE ELECTRIFIED

	Low Load	Proposed	ASHRAE 2013
Heating Load (Btu/h-GSF) to be Electrified	25.5	25.4	51.7
		PASS	

LABS AND HEALTHCARE ONLY	Minimum	Proposed	
Electric Heat Pump Heating Capacity (Btu/h-GSF)	12.7	20.3	
Electric Heat Pump Heating Capacity (MBH)	535	855	PASS
Electric Heat Pump % of Total Proposed Heating Load	22%	36%	
Overall Pass/Fail for Labs and Healthcare (must pass both criteria)			PASS

**The City of Somerville understands that it may not be practical to electrify 100% of the heating plant for high-ventilation facilities such as life sciences or healthcare buildings. Efficient systems and electrifying a portion of the heating plant equivalent to the load at 35 °F will reduce fossil fuel consumption by upwards of 90%. The addition of heat pumps to satisfy this load will largely decarbonize high-ventilation load facilities in operation while allowing for combustion-based fuel sources to address peak heating conditions.*

DEVELOPMENT REVIEW INFO

New buildings and extensive renovations should ideally be designed to achieve operational carbon neutrality and to minimize embodied carbon in construction materials.
This calculator provides an easy way to assess the operational emissions of your proposed design.

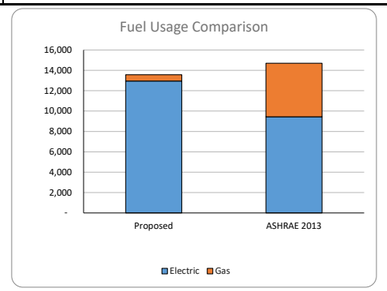
Instructions:
1 Fill in the blue cells with the required information: All user inputs in blue are required.
2 Review the Development Review Dashboard tab.
3 Compare the Proposed design to that of the MA Code Minimum design, and the 'Low Load' design.
4 Consider strategies to cost-effectively reduce the loads of the Proposed design to bring it closer in line to the Low Load building.

Energy Use Inputs	Site Annual Energy Consumption (MMBtu/yr)			Energy Use Intensity (kBtu/sf/yr)						
End Use Breakdown	Zero Carbon	Proposed	ASHRAE 2013	Low Load	Proposed	ASHRAE 2013	Fuel Type (drop-down menu)	Instructions	User Comments	Somerville Comments
Lighting		347	517		8.2	12.3	Electric			
Plug Loads		736	736		17.5	17.5	Electric			
Fans		1,848	1,205		43.9	28.6	Electric			
Pumps		243	108		5.8	2.6	Electric			
Cooling		287	384		6.8	9.1	Electric			
Heating - Non-Electric 1		374	4,653		8.9	110.6	Gas			
Heating - Non-Electric 2					-	-				
Heating - Electric		606	-		14.4	-	Electric			
DHW - Non-Electric 1		217	347		5.2	8.3	Gas			
DHW - Non-Electric 2	not required			not required	-	-				
DHW - Electric					-	-				
Process 1		58	58		1.4	1.4	Electric	Process loads may include: pool heating, sterilization, humidification, etc.		
Process 2					-	-				
Process 3					-	-				
Process 4					-	-				
On-site Renewables (negative)					-					
Off-Site Renewables (negative)					-			purchase agreements for new renewable energy systems (installed within last 3 years)		
TOTAL without Renewable Energy		4,716	8,008		112.0	190.3				
TOTAL with Renewable Energy		4,716	8,008		112.0	190.3				

(if cogen is part of the proposed design, charge fuel consumption to Heating and credit electricity generation proportionally to all electric end uses)

Emissions Outputs	Energy Consumption by Fuel (MMBtu/yr)			Current Carbon Emissions (metric tons CO2e/yr)			2035 Carbon Emissions (metric tons CO2e/yr)		
Fuel Type	Low Load	Proposed	ASHRAE 2013	Zero Carbon	Proposed	ASHRAE 2013	Zero Carbon	Proposed	ASHRAE 2013
Renewable Electric Credit		-	-		-	-			
Electric		12,950	9,444		289	211		215	157
Gas		621	5,250		31	265		31	265
Oil		-	-		-	-			
Propane	not required	-	-	not required	-	-	not required		
Other District Heating		-	-		-	-			
District Cooling		-	-		-	-			
Other Fuel 1		-	-		-	-			
Other Fuel 2		-	-		-	-			
TOTAL without Renewable Energy	-	13,571	14,695	0	321	476	0	246	422
TOTAL with Renewable Energy	-	13,571	14,695	0	321	476	0	246	422
Energy Use Intensity (kBtu/sf/yr)		322.4	349.1						

Emissions Intensity Outputs	Carbon Emissions Intensity (lbCO2e/yr-sf)		
	Low Load	Proposed	ASHRAE 2013
TOTAL Without Renewable Ener	not required	16.8	24.9
Renewable Energy Credit		-	-
TOTAL with Renewable Energy	-	16.8	24.9



Carbon Emissions Factors for City of Somerville		
Fuel Type	lbCO2e/MMBtu	Value is based on:
Renewable Electric Credit	155	
Electric	155	*Portfolio Manager Region Emissions Inensity. Note: this value will not match MEPA/DOER submissions, but it is used for LEED points.*
Electric 2035	115	
Gas	117	*US EIA value*
Oil	161	*US EIA value*
Propane	139	*US EIA value*
Other District Heating		*User to calculate and input custom value.*
District Cooling		*User to calculate and input custom value, based on the specific district chilled water system.*
Other Fuel 1		*User to calculate and input value for Other fuel type.*
Other Fuel 2		*User to calculate and input value for Other fuel type.*
		User to input description of Other Fuel type.

Footnotes:
1. Based on the latest ISO-NE Emissions Report. Should be updated as more recent ISO-NE Emissions Reports are available.

Graphic

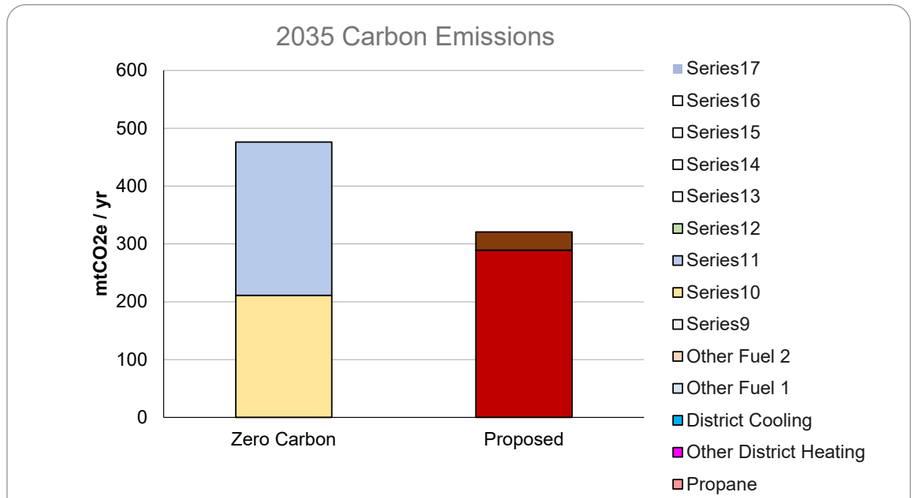
	ASHRAE 2013 E	As-Designed EUI
Lighting	12.3	8.2
Plug Loads	17.5	17.5
Fans	28.6	43.9
Pumps	2.6	5.8
Cooling	9.1	6.8
Heating - Non-Electric 1	110.6	8.9
Heating - Electric	-	14.4
DWH	8.3	5.2
Process 1	1.4	1.4
On-site Renewables (negative)	-	-
Off-Site Renewables (negative)	-	-
TOTAL without Renewable Energy	190.3	112.0
TOTAL with Renewable Energy	190.3	112.0

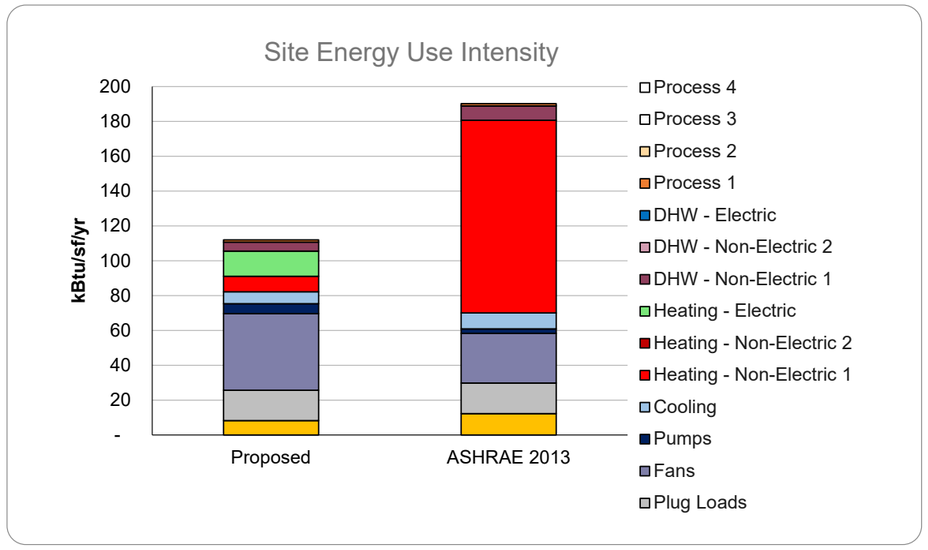
DEVELOPMENT REVIEW DASHBOARD

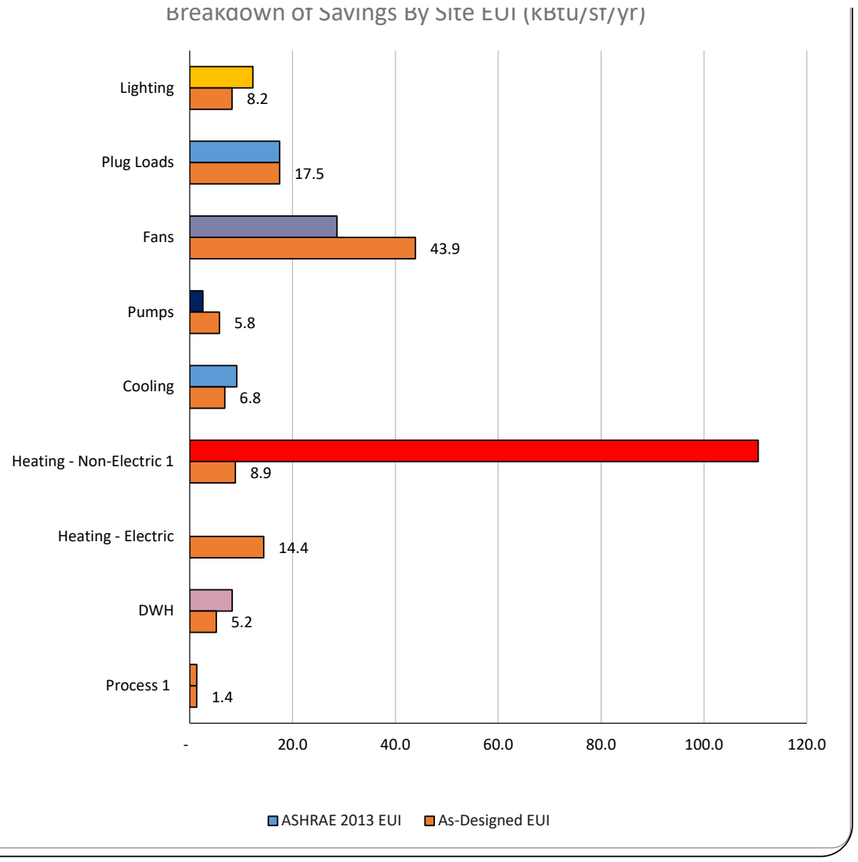
	Proposed	ASHRAE 2013	% Savings
Current Carbon Emissions Intensity (lbCO2e/yr-sf)	16.8	24.9	32.7%
Site Energy Use (kBtu/sf/yr)	112.0	190.3	41.1%
Source Energy Use (kBtu/sf/yr)	322.4	349.1	7.6%
Annual Carbon Offsets to achieve ZNC (metric tons CO2e/yr)	321	476	
2035 Carbon Emissions Intensity (lbCO2e/yr-sf)*	246	422	41.7%

LEED EAc1 Optimize Energy Performance Point Calculator**

Please Select Rating system	LEED NC CS	
Please Select Building Type	900%	
Points earned	10	Min 10 pts***



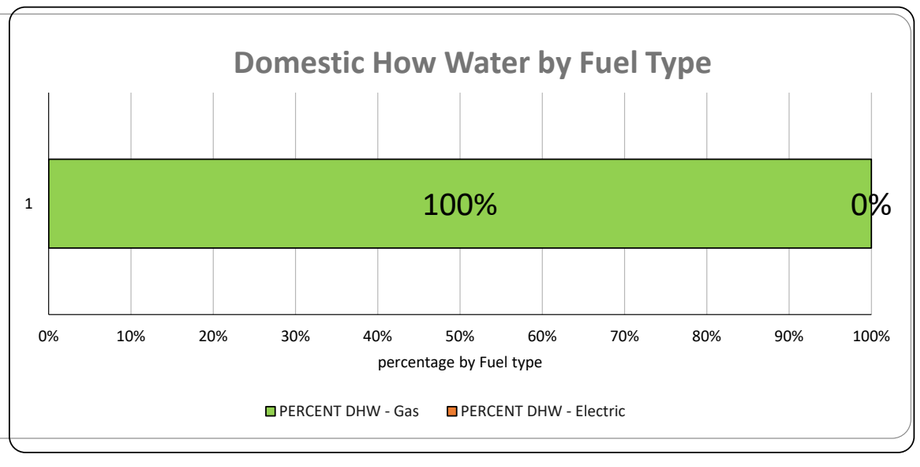


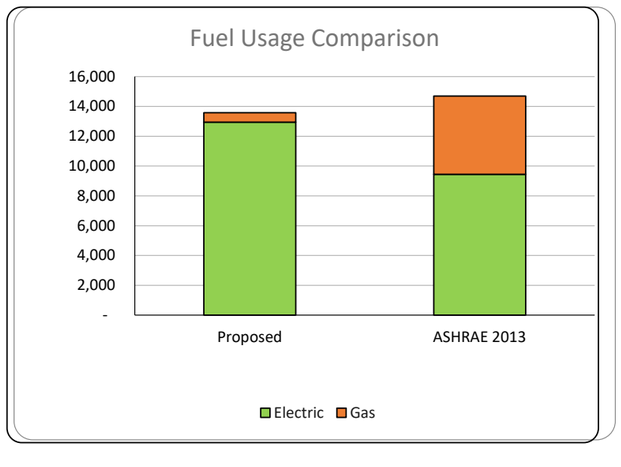


** A 40% savings CO2e emissions target (using 2035 emissions factors) has been established based on the findings of Built Environment Plus' "Massachusetts is Ready for Net Zero 2021 Report." The report surveyed over 7 Million GSF of Net-Zero buildings spanning a range of building types including K-12, Higher Education, Healthcare, Laboratory, Office, and Multifamily buildings in Massachusetts. The report findings indicate that a 40% savings in CO2e emissions, based on 2035 ISO-NE emissions rates, is a readily acheivable benchmark for high-performance buildings within the Greater Boston Area. The target represents the building-level operational carbon emissions reductions expected by the City of Somerville prior to the purchase of onsite or offsite renewable energy, or carbon offsets.*

***The City of Somerville requires projects to use the Alterntative Energy Performance Metric Pilot Credit EApc95 (https://www.usgbc.org/credits/eapc95v4). This compliance path allows projects to document performance improvements using Option 1 Whole Building Simulation and leverage an average of source energy and carbon emissions as an indicator of performance. The City prefers this compliance path as the considerations for CO2e emissions aligns with the City's Net Zero Performance goals.*

**** An EAc1 earning of at least 10 points is best poised to align with the City's CO2e and energy performance goas.*





Per ASHRAE 90.1-2019 Appendix G with MA Amendments (780 CMR revised 9th edition, mandatory as of January 2021)

Building Area Types Baseline Building Gross Above-Grade	% Glazing
Grocery store	7%
Healthcare (outpatient)	21%
Hospital	27%
Hotel/motel (≤75 rooms)	24%
Hotel/motel (>75 rooms)	34%
Office or Laboratory Building (≤5000 ft2)	19%
Office or Laboratory Building (5000 to 50,000 ft2)	31%
Office or Laboratory Building (>50,000 ft2)	40%
Restaurant (quick service)	34%
Restaurant (full service)	24%
Retail (stand alone)	11%
Retail (strip mall)	20%
School (primary)	22%
School (secondary and university)	22%
Warehouse (non-refrigerated)	6%
Multifamily	24%

LEED NC CS	new construction
LEED NC BD+C	6%
LEED NC Healthcare	8%
LEED NC Schools	10%
	12%
	14%
	16%
	18%
	20%
	22%
	24%
	26%
	29%
	32%
	35%
	38%
	42%
	46%
	50%

Approximate value, based on technology available in 2020.

Heat Pump Electrical Infrastructure Design Demand Conversion Factor	COP
VRF	2.0
Air to Water	1.7
Exhaust-Source	1.9

CS	BD+C	Healthcare	School
3%	1	3	1
5%	2	4	2
7%	3	5	3
9%	4	6	4
11%	5	7	5
13%	6	8	6
15%	7	9	7
17%	8	10	8
19%	9	11	9
21%	10	12	10
23%	11	13	11
26%	12	14	12
29%	13	15	13
32%	14	16	14
35%	15	17	15
39%	16	18	16
43%	17	19	
47%	18	20	

LEED NC BD+C	Add Points
Office	5%
Retail (except restaurant/grocery)	5%
School	6%
Healthcare	3%
Restaurant/Grocery	3%
Hospitality	5%
Warehouse	1%
Multifamily	3%
All Other	2%

LEED NC CS	Add Points
Office	3%
Retail (except restaurant/grocery)	3%
School	6%
Healthcare	1%
Restaurant/Grocery	2%
Hospitality	3%
Warehouse	0%
Multifamily	1%
All Other	1%

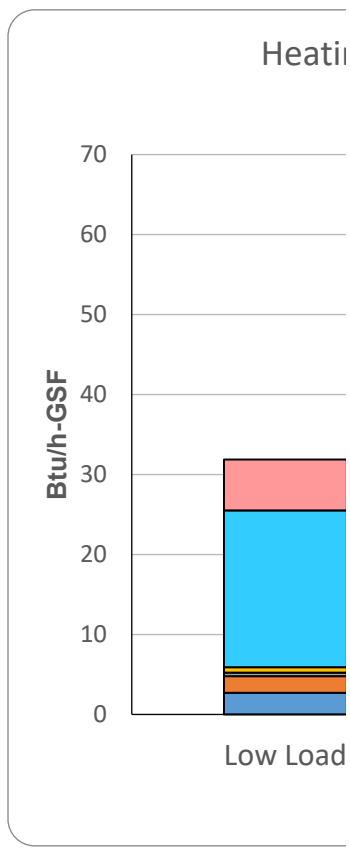
	Renewable Electric Credit
Yes	Electric
No	Gas
	Oil
	Propane
	Other District Heating
	District Cooling
	Other Fuel 1
	Other Fuel 2

LOAD CALCULATIONS

This tab automatically creates the 'ZNC' and 'MA Code' options.
It then calculates the heating load associated with each option.
It also calculates the ventilation cooling load credit for the ZNC option.

Instructions:

1 This tab must remain locked for submission to the City of Somerville



Heating Load Outputs (Btu/h-GSF)	Low Load
Window Conduction	2.7
Wall Conduction	2.1
Roof Conduction	0.4
Infiltration	0.7
Ventilation	19.6
Oversize	6.4
Total Space Heating System Load	**31.9**
TOTAL Conduction	5.2
TOTAL Envelope	5.9
NON-Space-Heating Plant Load	7.9

Summary of Automatic Changes to Proposed Design	Low Load
Total Building - Window to Wall Ratio	24%
Window Average Assembly U-value (Btu/h-ΔT-sf)	0.26
Wall Average Assembly U-value (Btu/h-ΔT-sf)	0.064
Roof Average Assembly U-value (Btu/h-ΔT-sf)	0.032
Infiltration - Maximum at Blower Door Test (cfm/sf at 75pa)	0.10
Proposed Outdoor Airflow Rate (CFM)	24,250
Ventilation Heating Sensible Recovery Efficiency	80%
Class 3 and 4 Exhaust Sensible Recovery Efficiency	55%
Electric Heating System Capacity (Btu/h-gsf)	0.0
Oversize Factor: Heating System Capacity / Heating Load (%)	125%

General Information	Low Load
Number of Stories Above Grade	4
Total Building Gross Floor Area	42,089
Total Building Net Occupiable Floor Area	38,410
Daylight Area (per IECC 2018)	-
Total Building Vertical Façade Area	25,780
Roof Area	8,352

Primary Building Type	Low Load
Primary Building Type	fice or Laboratory Building (5000 to 50,000 ft2)
Gross Square Feet	42,089
Vertical Façade Area	25,780
Window Area	n/a

Secondary Building Type	Low Load
Secondary Building Type	-
Gross Square Feet	-
Vertical Façade Area	-
Window Area	n/a

Tertiary Building Type	Low Load
Tertiary Building Type	-
Gross Square Feet	-
Vertical Façade Area	-
Window Area	n/a

Daylight Area	Low Load
% Daylight Area	0%
Daylight Area >25%? (or >50% if building is <3 stories above grade)	No

Envelope	Low Load

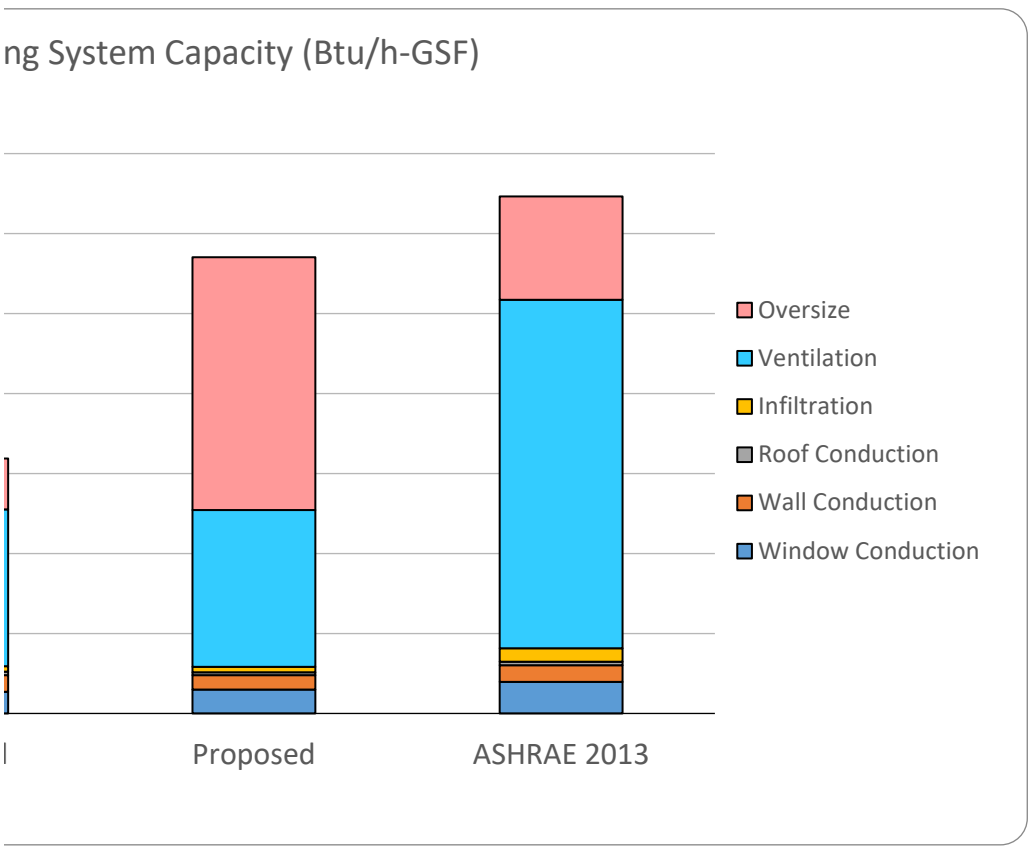
Total Vertical Façade Area	25,780
Primary Building - Window to Wall Ratio	24%
Secondary Building - Window to Wall Ratio	0%
Tertiary Building - Window to Wall Ratio	0%
Total Building - Window to Wall Ratio	24%
Total Window Area	6,223
Window Average Assembly U-value (Btu/h-ΔT-sf)	0.26
Wall Area (SF)	19,557
Wall Average Assembly U-value (Btu/h-ΔT-sf)	0.064
Roof Area (SF)	8,352
Roof Average Assembly U-value (Btu/h-ΔT-sf)	0.032
Infiltration - Maximum at Blower Door Test (cfm/sf at 75pa)	0.1
Infiltration - Maximum at Blower Door Test (cfm at 75pa)	3,400
Infiltration - Design (cfm)	380
Average UxA Value[2]	0.092

Ventilation	Low Load
Minimum Outdoor Airflow Rate (CFM)	24,250
Minimum Outdoor Airflow Rate (CFM/Net SF)	0.63
Proposed Outdoor Airflow Rate (CFM)	24,250
Proposed Outdoor Airflow Rate (CFM/Net SF)	n/a
Exhaust/Relief Air (not including Class 3 and 4 and Exempt Exhaust)	-
Ventilation Heating Sensible Recovery Efficiency	80%
Class 3 and 4 Exhaust (CFM)	24,250
Class 3 and 4 Exhaust Sensible Recovery Efficiency	55%
Exempt Exhaust (CFM)	-
Exempt Exhaust Heat Recovery Efficiency	0%
Average Exhaust Heat Recovery Efficiency	55%

Heating Load	Low Load
Delta-T (˚F Outdoor - ˚F Indoor)	70
Window Conduction Heating Load (MBH)	113
Wall Conduction Heating Load (MBH)	88
Roof Conduction Heating Load (MBH)	19
Envelope Infiltration Heating Load (MBH)	29
Ventilation Heating Load (MBH)	825
Safety Factor (MBH)	268
TOTAL Space Heating System Load (MBH)	1,342
Total Envelope Conduction Heating Load (MBH)	220
Maximum Electric Heating System Capacity (Btu/h-gsf)	n/a
Electric Heating System Capacity (Btu/h-gsf)	-
Electric Heating System Capacity (MBH)	-
Other Heating System Capacity (MBH)	1,342
TOTAL Heating System Capacity (MBH)	n/a
Oversize Factor: Heating System Capacity / Heating Load (%)	125%
NON-Space-Heating Plant Capacity (MBH)	333

Ventilation Cooling Load	Low Load
Outdoor Air - Temperature (F)	91
Outdoor Air - Wet Bulb (F)	73
Outdoor Air - Enthalpy (Btu/lb)	36.48
Indoor Air - Temperature (F)	75
Indoor Air - Relative Humidity (%)	55%
Indoor Air - Enthalpy (Btu/lb)	29.13
Ventilation Cooling Enthalpy Recovery Efficiency (%)	78%
Ventilation Air after Energy Recovery - Enthalpy (Btu/lb)	30.78
Ventilation Discharge Air Enthalpy (Btu/lb)	22.13
Ventilation Delta H (Btu/cfm)	8.65
Ventilation Cooling Load (Btu/cfm)	39
Ventilation Cooling Load (Tons)	-
Class 3 and 4 Exhaust Sensible Heat Recovery Efficiency (%)	55%
Class 3 and 4 Exhaust Make Up - Temperature after Energy Recovery (F)	82
Class 3 and 4 Exhaust Make-Up Load Reduction (Tons)	17.78333333
Total Load Reduction (Tons)	18

DHW Loads	Low Load
DHW - Non-Electric 1 - (MMBtu/yr)	
DHW - Non-Electric 2 (MMBtu/yr)	
DHW - Electric (MMBtu/yr)	
TOTAL DHW Heating System Capacity (MMBtu/yr)	
PERCENT DHW - Gas	
PERCENT DHW - Electric	



Proposed	ASHRAE 2013
3.0	3.9
1.8	2.1
0.3	0.4
0.7	1.7
19.6	43.6
31.6	12.9
57.0	**64.7**
5.1	6.5
5.8	8.2
7.9	7.9

Proposed	ASHRAE 2013
24%	24%
0.29	0.38
0.055	0.064
0.025	0.032
0.10	0.25
24,250	24,250
55%	50%
55%	0%
20.3	0.0
224%	125%

Proposed	ASHRAE 2013
4	4
42,089	42,089
38,410	38,410
-	-
25,780	25,780
8,352	8,352

Proposed	ASHRAE 2013
fice or Laboratory Building (5000 to 50,000 ft2)	fice or Laboratory Building (5000 to 50,000 ft2)
42,089	42,089
25,780	25,780
6,223	n/a

Proposed	ASHRAE 2013
-	-
-	-
-	-
-	n/a

Proposed	ASHRAE 2013
-	-
-	-
-	-
-	n/a

Proposed	ASHRAE 2013
0%	0%
No	No

Proposed	ASHRAE 2013

25,780	25,780
24%	n/a
0%	n/a
0%	n/a
24%	24%
6,223	6,223
0.29	0.38
19,557	19,557
0.055	0.064
8,352	8,352
0.025	0.032
0.1	0.25
3,400	8,500
380	950
0.091	0.114

Proposed	ASHRAE 2013
24,250	24,250
0.63	0.63
24,250	24,250
0.63	n/a
-	-
55%	50%
24,250	24,250
55%	0%
-	-
0%	0%
55%	0%

Proposed	ASHRAE 2013
70	70
126	166
75	88
15	19
29	72
825	1,833
1,330	544
2,400	2,721
216	272
n/a	n/a
20.3	-
855	n/a
2,400	2,721
2,400	n/a
224%	125%
333	333

Proposed	ASHRAE 2013
91	91
73	73
36.48	36.48
75	75
55%	55%
29.13	29.13
0%	50%
36.48	32.81
22.13	22.13
14.35	10.68
65	48
-	-
55%	0%
82	91
17.78333333	0
18	-

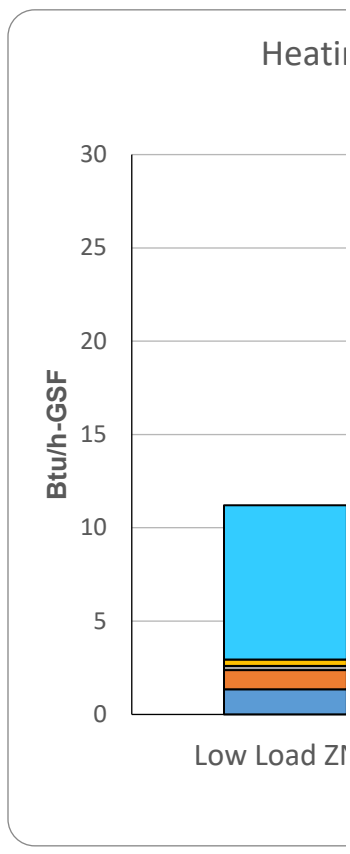
Proposed	ASHRAE 2013
217	347
-	-
-	-
217	347
100%	100%
0%	0%

LOAD CALCULATIONS

This tab automatically creates the 'ZNC' and 'MA Code' options.
It then calculates the heating load associated with each option.
It also calculates the ventilation cooling load credit for the ZNC option.

Instructions:

1 This tab must remain locked for submission to the City of Somerville



Heating Load Outputs (Btu/h-GSF)	Low Load ZNC
Window Conduction	1.3
Wall Conduction	1.0
Roof Conduction	0.2
Infiltration	0.3
Ventilation	8.3
Oversize	0.0
Total Space Heating System Capacity	**11.2**
TOTAL Conduction	2.6
TOTAL Envelope	2.9
NON-Space-Heating Plant Capacity	7.9

Summary of Automatic Changes to Proposed Design	Low Load ZNC
Total Building - Window to Wall Ratio	24%
Window Average Assembly U-value (Btu/h-ΔT-sf)	0.26
Wall Average Assembly U-value (Btu/h-ΔT-sf)	0.064
Roof Average Assembly U-value (Btu/h-ΔT-sf)	0.032
Infiltration - Maximum at Blower Door Test (cfm/sf at 75pa)	0.10
Proposed Outdoor Airflow Rate (CFM)	21,700
Ventilation Heating Sensible Recovery Efficiency	80%
Class 4 Exhaust Sensible Recovery Efficiency	60%
Electric Heating System Capacity (Btu/h-gsf)	9.0
Oversize Factor: Heating System Capacity / Heating Load (%)	125%

General Information	Low Load ZNC
Number of Stories Above Grade	4
Total Building Gross Floor Area	42,089
Total Building Net Occupiable Floor Area	38,410
Daylight Area (per IECC 2018)	-
Total Building Vertical Façade Area	25,780
Roof Area	8,352

Primary Building Type	Low Load ZNC
Primary Building Type	fice or Laboratory Building (5000 to 50,000 ft2)
Gross Square Feet	42,089
Vertical Façade Area	25,780
Window Area	n/a

Secondary Building Type	Low Load ZNC
Secondary Building Type	-
Gross Square Feet	-
Vertical Façade Area	-
Window Area	n/a

Tertiary Building Type	Low Load ZNC
Tertiary Building Type	-
Gross Square Feet	-
Vertical Façade Area	-
Window Area	n/a

Daylight Area	Low Load ZNC
% Daylight Area	0%
Daylight Area >25%? (or >50% if building is <3 stories above grade)	No

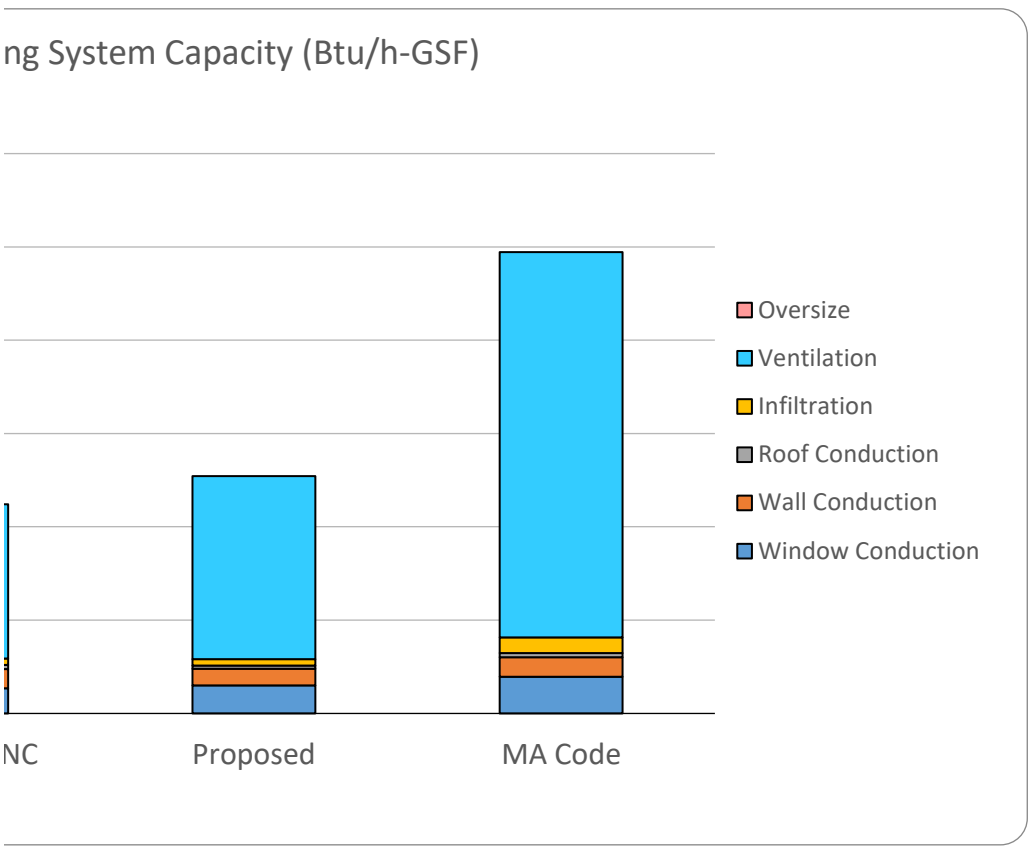
Envelope	Low Load ZNC

Total Vertical Façade Area	25,780
Primary Building - Window to Wall Ratio	24%
Secondary Building - Window to Wall Ratio	0%
Tertiary Building - Window to Wall Ratio	0%
Total Building - Window to Wall Ratio	24%
Total Window Area	6,223
Window Average Assembly U-value (Btu/h-ΔT-sf)	0.26
Wall Area (SF)	19,557
Wall Average Assembly U-value (Btu/h-ΔT-sf)	0.064
Roof Area (SF)	8,352
Roof Average Assembly U-value (Btu/h-ΔT-sf)	0.032
Infiltration - Maximum at Blower Door Test (cfm/sf at 75pa)	0.1
Infiltration - Maximum at Blower Door Test (cfm at 75pa)	3,400
Infiltration - Design (cfm)	380
Average UxA Value[2]	0.092

Ventilation	Low Load ZNC
Minimum Outdoor Airflow Rate (CFM)	21,700
Minimum Outdoor Airflow Rate (CFM/Net SF)	0.56
Proposed Outdoor Airflow Rate (CFM)	21,700
Proposed Outdoor Airflow Rate (CFM/Net SF)	n/a
Exhaust/Relief Air (not including Class 4 and Exempt Exhaust)	(2,550)
Ventilation Heating Sensible Recovery Efficiency	80%
Class 4 Exhaust (CFM)	24,250
Class 4 Exhaust Sensible Recovery Efficiency	60%
Exempt Exhaust (CFM)	-
Exempt Exhaust Heat Recovery Efficiency	0%
Average Exhaust Heat Recovery Efficiency	58%

Heating Load	Low Load ZNC
Delta-T (˚F Outdoor - ˚F Indoor)	35
Window Conduction Heating Load (MBH)	57
Wall Conduction Heating Load (MBH)	44
Roof Conduction Heating Load (MBH)	9
Envelope Infiltration Heating Load (MBH)	14
Ventilation Heating Load (MBH)	347
Safety Factor (MBH)	-
TOTAL Space Heating System Capacity (MBH)	472
Total Envelope Conduction Heating Load (MBH)	110
Maximum Electric Heating System Capacity (Btu/h-gsf)	10
Electric Heating System Capacity (Btu/h-gsf)	9.0
Electric Heating System Capacity (MBH)	377
Other Heating System Capacity (MBH)	94
TOTAL Heating System Capacity (MBH)	n/a
Oversize Factor: Heating System Capacity / Heating Load (%)	125%
NON-Space-Heating Plant Capacity (MBH)	333

Ventilation Cooling Load	Low Load ZNC
Outdoor Air - Temperature (F)	91
Outdoor Air - Wet Bulb (F)	73
Outdoor Air - Enthalpy (Btu/lb)	36.48
Indoor Air - Temperature (F)	75
Indoor Air - Relative Humidity (%)	55%
Indoor Air - Enthalpy (Btu/lb)	29.13
Ventilation Cooling Enthalpy Recovery Efficiency (%)	78%
Ventilation Air after Energy Recovery - Enthalpy (Btu/lb)	30.78
Ventilation Discharge Air Enthalpy (Btu/lb)	22.13
Ventilation Delta H (Btu/cfm)	8.65
Ventilation Cooling Load (Btu/cfm)	39
Ventilation Cooling Load (Tons)	(37)
Class 4 Exhaust Sensible Heat Recovery Efficiency (%)	60%
Class 4 Exhaust Make Up - Temperature after Energy Recovery (F)	81
Class 4 Exhaust Make-Up Load Reduction (Tons)	19.4
Total Load Reduction (Tons)	57



Proposed	MA Code
1.5	2.0
0.9	1.0
0.2	0.2
0.3	0.9
9.8	20.6
0.0	0.0
12.7	**24.7**
2.6	3.2
2.9	4.1
7.9	7.9

Proposed	MA Code
24%	24%
0.29	0.38
0.055	0.064
0.025	0.032
0.10	0.25
24,250	21,700
55%	50%
55%	0%
0.6	0.0
125%	125%

Proposed	MA Code
4	4
42,089	42,089
38,410	38,410
-	-
25,780	25,780
8,352	8,352

Proposed	MA Code
fice or Laboratory Building (5000 to 50,000 ft2)	fice or Laboratory Building (5000 to 50,000 ft2)
42,089	42,089
25,780	25,780
6,223	n/a

Proposed	MA Code
-	-
-	-
-	-
-	n/a

Proposed	MA Code
-	-
-	-
-	-
-	n/a

Proposed	MA Code
0%	0%
No	No

Proposed	MA Code

25,780	25,780
24%	n/a
0%	n/a
0%	n/a
24%	24%
6,223	6,223
0.29	0.38
19,557	19,557
0.055	0.064
8,352	8,352
0.025	0.032
0.1	0.25
3,400	8,500
380	950
0.091	0.114

Proposed	MA Code
21,700	21,700
0.56	0.56
24,250	21,700
0.63	n/a
-	(2,550)
55%	50%
24,250	24,250
55%	0%
-	-
0%	0%
55%	-6%

Proposed	MA Code
35	35
63	83
38	44
7	9
14	36
412	868
-	-
535	1,040
108	136
n/a	n/a
1	-
855	n/a
2,400	1,040
2,400	n/a
125%	125%
333	333

Proposed	MA Code
91	91
73	73
36.48	36.48
75	75
55%	55%
29.13	29.13
0%	50%
36.48	32.81
22.13	22.13
14.35	10.68
65	48
-	(46)
55%	0%
82	91
17.78333333	0
18	46

Electricity CO2e Emissions Comparison

Source	Listed Units	Listing
Portfolio Manager	kg/Mbtu*	70.13
ISO-NE 2019	lbs/MWh	633
ISO-NE 2035 (projected per city of Boston proposed Zero Carbon Zoning)	kg/MMBtu	52

Table 1-1
2018 and 2019 ISO New England System Emissions (ktons) and Emission Rates (lbs/MWh)

Annual System[(a)] Emissions						
	2018 Emissions (ktons)	2019 Emissions (ktons)	Change in Emissions (%)	2018 Emission Rate (lbs/MWh)	2019 Emission Rate (lbs/MWh)	Change in Emission Rate (%)
NO_X	15.61	12.87	-17.6	0.30	0.26	-13.3
SO_2	4.96	2.34	-52. 8	0.10	0.05	-50.0
CO_2	34,096	30,997	-9.1	658	633	-3.8

(a) The term "system" refers to native generation here and throughout the report.

[4] Net energy for load (NEL) is calculated by summing the metered output of native generation, price-responsive demand, and net interchange (imports minus exports). It excludes the electric energy required to fill/refill pumped storage plants.

[5] In this report, "generation" refers to energy production and not capacity.

lb/MMBtu
155
186
115

ENERGY STAR® Portfolio Manager® Technical R

Figure 5 – Indirect Greenhouse Gas Emission Factors for Electricity in the

eGRID Regional Description	eGRID Acronym	$CO2_{eq}$ Emissions (kg/MBtu)
South/Central Alaska	AKGD	138.92
Most of Alaska	AKMS	70.05
Southwest US	AZNM	136.60
Southwest Coast	CAMX	66.29
Most of TX	ERCT	124.44
Most of Florida	FRCC	124.45
HI excluding Oahu	HIMS	148.76
Oahu Island	HIOA	223.68
Eastern WI	MROE	224.61
Upper Midwest	MROW	166.06
New England	NEWE	70.13
Northwest US	NWPP	85.53
New York City	NYCW	79.46
Long Island, NY	NYLI	158.60
Upstate NY	NYUP	33.75
Mid Atlantic	RFCE	95.71
Most of Michigan	RFCM	175.63
Ohio Valley	RFCW	156.07
CO-Eastern WY	RMPA	170.41
KS-Western MO	SPNO	155.75
TX Panhandle-OK	SPSO	155.90
Lower Mississippi	SRMV	114.11
Middle Mississippi	SRMW	222.90
SE US, Gulf Coast	SRSO	137.38
Tennessee Valley	SRTV	138.00
Virginia/Carolina	SRVC	99.37
National Average		**126.67**

2.2 CARBON EMISSION FACTORS

It is recommended that both Carbon Emission Intensity and Carbon Emission reductions shall be calcu using both "occupancy year one" and 2035 electricity emission factors to more accurately represent th emissions from buildings built in the near future, at a point where the ISO-NE grid electricty carbon emis to be approximately equal to those of natural gas (2035 represents the 12.5-year mid-point of typical MEP lifespan (25-years) for a building built in 2022/2023).

Note: The working group considers that choosing 2035 as a target date is a conservative approximation of a gree credit to utility-scale improvements in addition building-level efficiency measures.

It is recommended that the emission factors listed in Table 2 are used for all other emissions factors, to ali program.

Table 2: BERDO-Aligned Carbon Emission Factors

Fuel type	Emission factor (kg CO_2e/MMBtu)
Natural Gas	53.11
Fuel Oil (No. 1)	73.50
Fuel Oil (No. 2)	74.21
Fuel Oil (No. 4)	75.29
Diesel Oil	74.21
District Steam	66.40
District Hot Water	66.40
Electric Driven Chiller	52.70
Absorption Chiller using Natural Gas	73.89
Engine-Driven Chiller Natural Gas	49.31

Note:

1. For service in Boston, DOER has recently calculated the District Steam Emission Factor to be 87.54 kg CC
2. For Grid Electricity, the 2035 Emission Factor is 52 kg CO2e/MMBtu

Phasing

These carbon emission factors should be updated every 5 years (e.g. in 2025, it would be updated to th value for 2040), in alignment with the 5-year periods within the BERDO program.

ılated and reported
ıe lifespan average
sions are predicted
system equipment

ening grid that offers

gn with the BERDO

)2e/MMBtu

e ISO-NE projected

32-44 White Street

Somerville, MA

LEED and Sustainability Report

April 14, 2023
June 22, 2023 revised first-floor image on page 5.

Prepared for: SGL Development

Prepared by: enviENERGY Studio

Contents

Introduction

The 32-44 White St project is being designed to be a first-class research and development facility in Somerville, Massachusetts. The building design by Peter Quinn Architects is a 4-story core and shell building, approximately 42,000 SF. Sustainability is an important design and construction priority for SGL Development and the project team, and therefore, the team evaluated and implemented strategies to improve the health and wellbeing of occupants and to maximize the resource efficiency of the building while enhancing experience by focusing on the resiliency and efficiency measures.

The design team has weighed these strategies with their relationship to LEED certification standard. Through concerted and coordinated quantitative and qualitative metric tracking, the team implemented measure to reduce operational and embodied carbon and water consumption, to improve the useful life of building systems and infrastructure, and to reduce the burdens imposed by the building on city services, the environment, and the public health.

The Project team includes several LEED Accredited Professionals, and the sustainability efforts will be overseen by Samira Ahmadi, BEMP, CPHC, LEED AP, WELL AP. The project team participated in a sustainable design charrette early in the design process to identify the environmental design goals and discussed the LEED program impact on the design and build consensus.

A LEED checklist is provided at the end of this section to identify credits that are going to be pursued for this project, highlights of which are included below. The project is notably targeting 66 LEED Points for LEEDv4 Core and Shell Gold Certification, which is a goal established through the commitment of the design team to incorporate enhanced sustainability features.

A LEED summary is provided below to identify credits that are going to be pursued for this project, highlights of which in the subsequent, sections. The proponent is evaluating the feasibility of pursuing a formal LEED certification and this project may be registered with USGBC and will follow the requirements of LEEDv4 for Core and Shell program during the design and construction. The project team is currently targeting a minimum of LEED Gold certification with a total of 66 out of a possible 110 points in the LEED BD+C rating system. An additional 11 points are undergoing study to determine the feasibility of attainment.

LEED checklist summary:

Integrative Process	1 Point	
Location and Transportation	17 Points	1 Possible Point
Sustainable Site	4 Points	4 Possible Points
Water Efficiency	5 Points	2 Possible Points
Energy and Atmosphere	18 Points	3 Possible Points
Materials and Resources	6 Points	
Indoor Environmental Quality	7 Points	
Innovation and Design Process	6 Points	
Regional Priority	2 Points	1 Possible Point
Total Points	**66 Points**	**11 Possible Points**

Affidavit

As the lead Sustainability Consultant overseeing the planning, design and construction of the 32-44 White St project, I, Samira Ahmadi, certify that I am knowledgeable of the project's green building strategies, designs, plans and details and to the best of my knowledge this project has been planned and designed so as to meet the LEED prerequisites and earn the credits necessary to achieve Gold level (minimum for Gold level is 60 points) using the LEED BD+C for Core and Shell v4 Rating System. The referenced project has been designed to meet the Sustainability Submittal requirements of the Somerville Zoning Code.

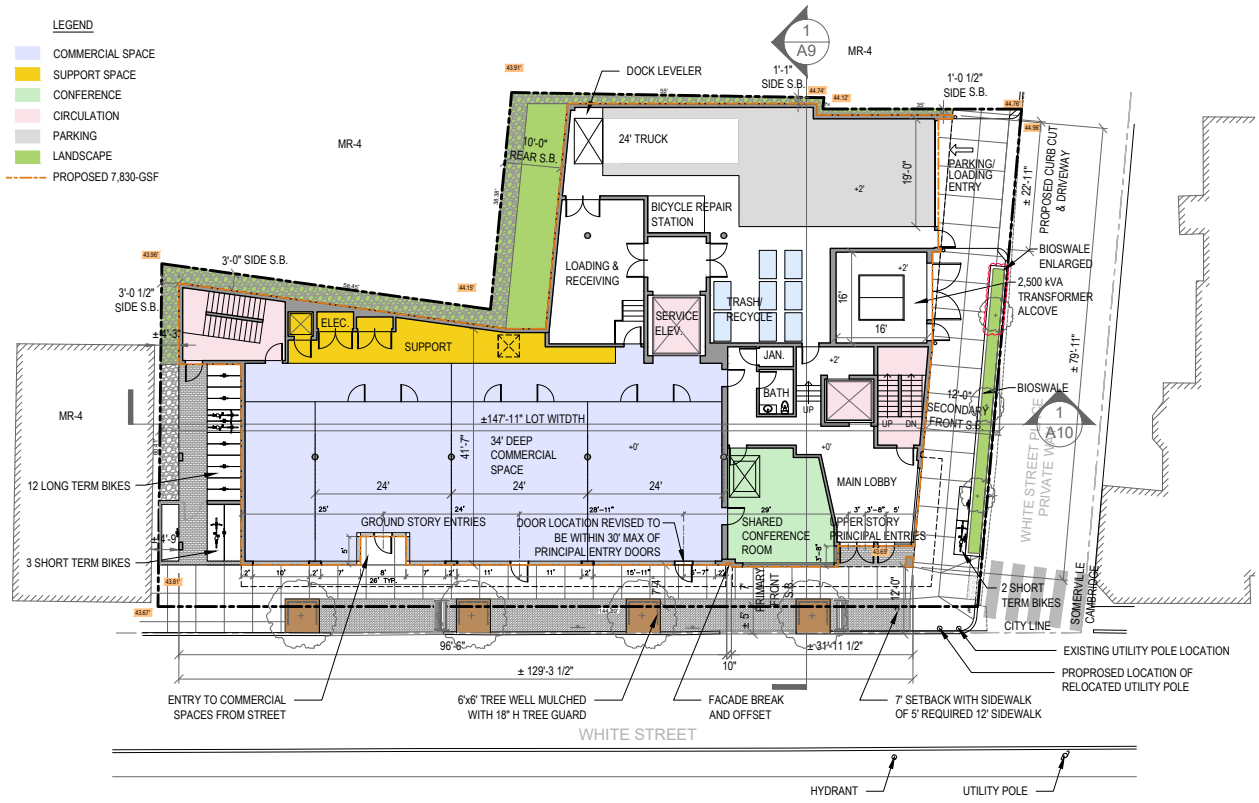
Samira Ahmadi, BEMP, LEED AP BD+C, ID+C, Homes, CPHC, WELL AP
LEED Administrator and Sustainability Consultant

LEED Project Scope and Strategy

General Project Information

Building Area	42,089 GSF 38,410 NSF
Occupancy - FTE (LEED v4 C&S Default Occupancy)	60% Laboratory + 40% Office 130 (Office: 250 SF/person, Lab: 400 SF/person)
Parking Spaces	Zero parking spaces
Long-Term Bike Storage	12 LT
Short-Term Bike Storage	4 ST
Public Transportation	Access to Red Line, Fitchburg commuter rail, and Bus Routes 77, 96, 87 and 83

Preliminary LEED Boundary



Integrative Process

The project team includes several LEED Accredited Professionals, who will lead the sustainability efforts and initiatives throughout the design and construction process. Sustainable design and energy efficiency goals were established early, and strategies associated with the building envelope attributes, lighting design, thermal comfort ranges, plug and process loads, and operational parameters and their impact on the building energy performance will be explored and discussed throughout the design process. An early design energy model was developed and used as an interactive and dynamic platform to evaluate systems synergies and the various pathways for achieving the targeted energy savings and required performance improvements in the most cost-effective manner.

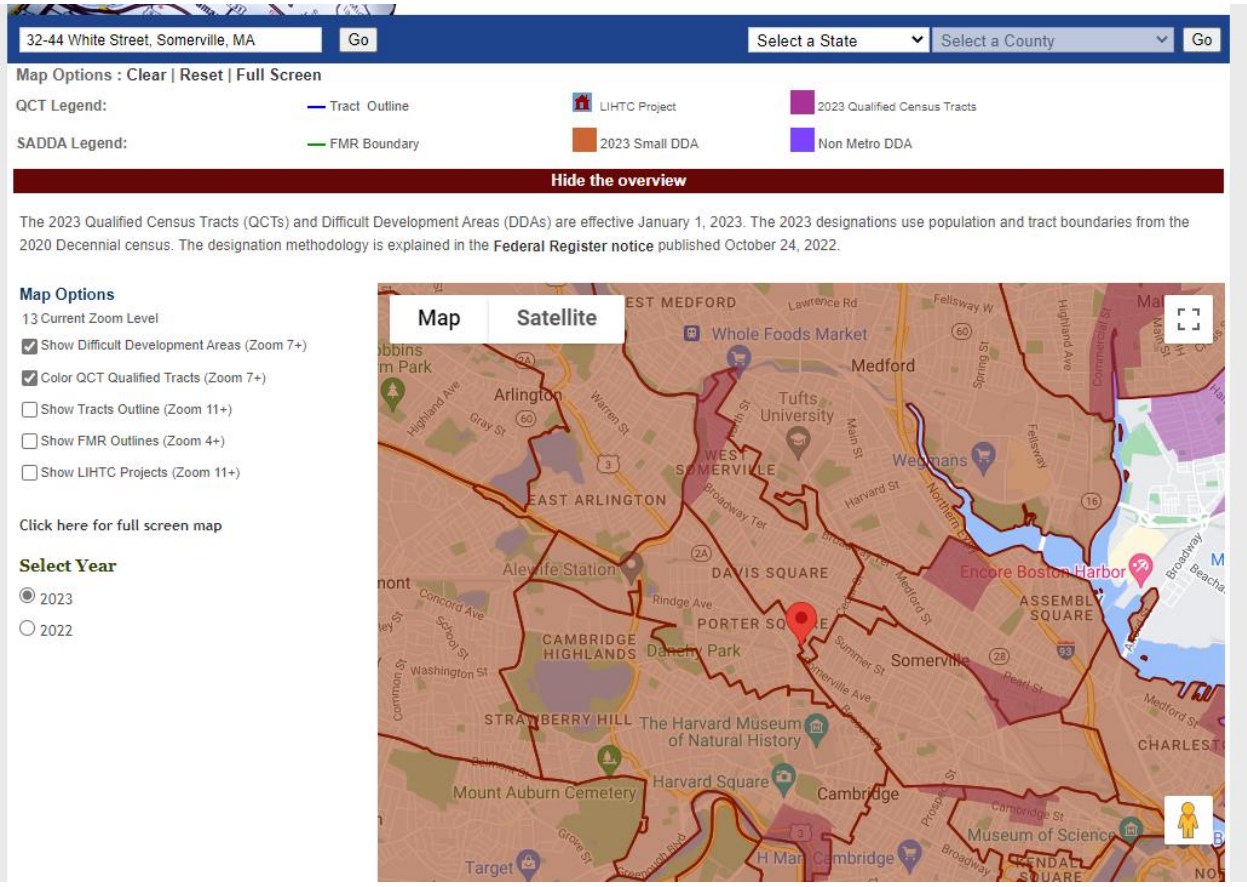
Location and Transportation

Credit 1 – Sensitive Land Protection: ***2 Yes Points***

The Project Site has been previously developed and is located in an urban area of filled land.

Credit 2 – High Priority Site: ***2 Yes Points***

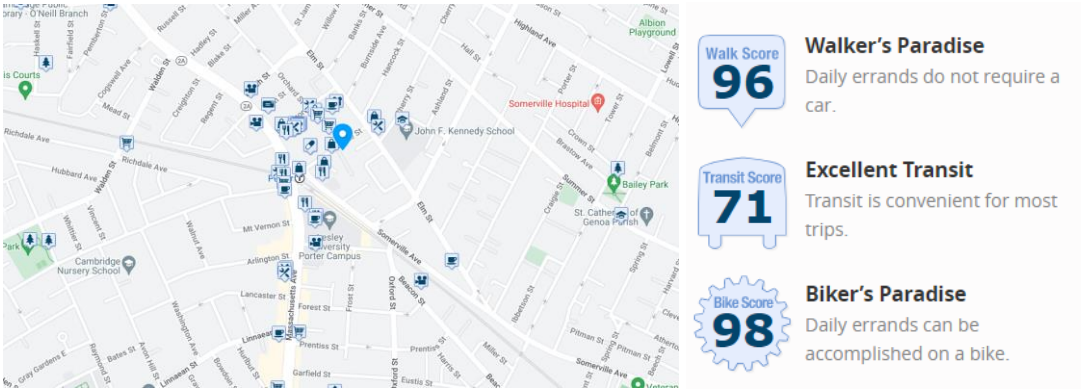
The project site is not a brownfield but it is located in the US Department of Housing and Urban Development's 2023 Difficult Development Areas (DDAs) which is the federally recognized high-priority sites.



The 2023 Difficult Development Areas (DDAs) is effective January 1, 2022.

Credit 3: Surrounding Density and Diverse Uses (v4.1): ***5 Yes Points***

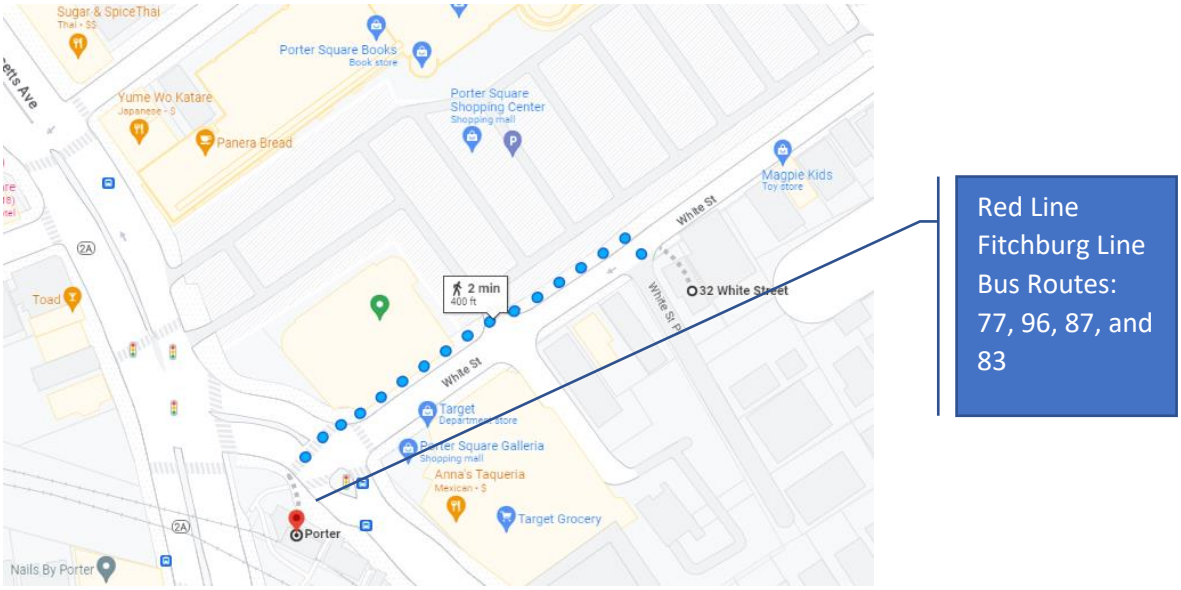
This project is utilizing LEED v4.1, Option 3. Walkable Location, for this credit. The site has a Walk Score of 96, and therefore, it will achieve 5 points.



Credit 4– Access to Quality Transit (v4.1): ***6 Yes Points***

The project location provides access to quality transit and encourages alternative transportation. The occupants of 32-44 White Street will have access to several nearby MBTA T, Commuter Rail, and bus routes, including Red Line, Fitchburg Line, and bus routes 77, 96, 87, and 83, which gives them the opportunity to travel through Somerville and nearby towns, such as Cambridge, and Boston. These transit services provide 374 "weekday" and 325 "weekend" trips, which surpass the 6-point threshold of 360 "weekday" and 216 "weekend" trips.

Routes/ Lines	77	96	87	83	Red Line	Fitchburg Line	TOTAL
Weekday	90	32	52	41	142	17	**374**
Saturday	78	23	41	33	142	8	**325**

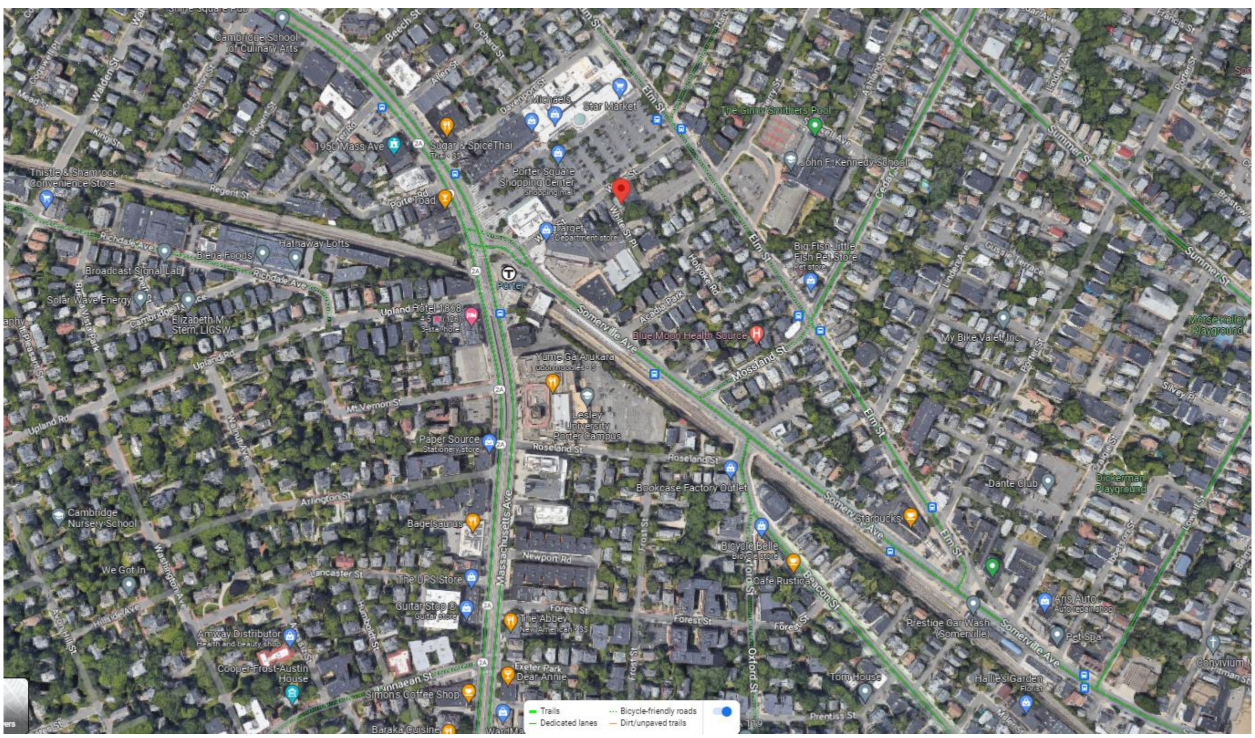


Access to Quality Transit Maps

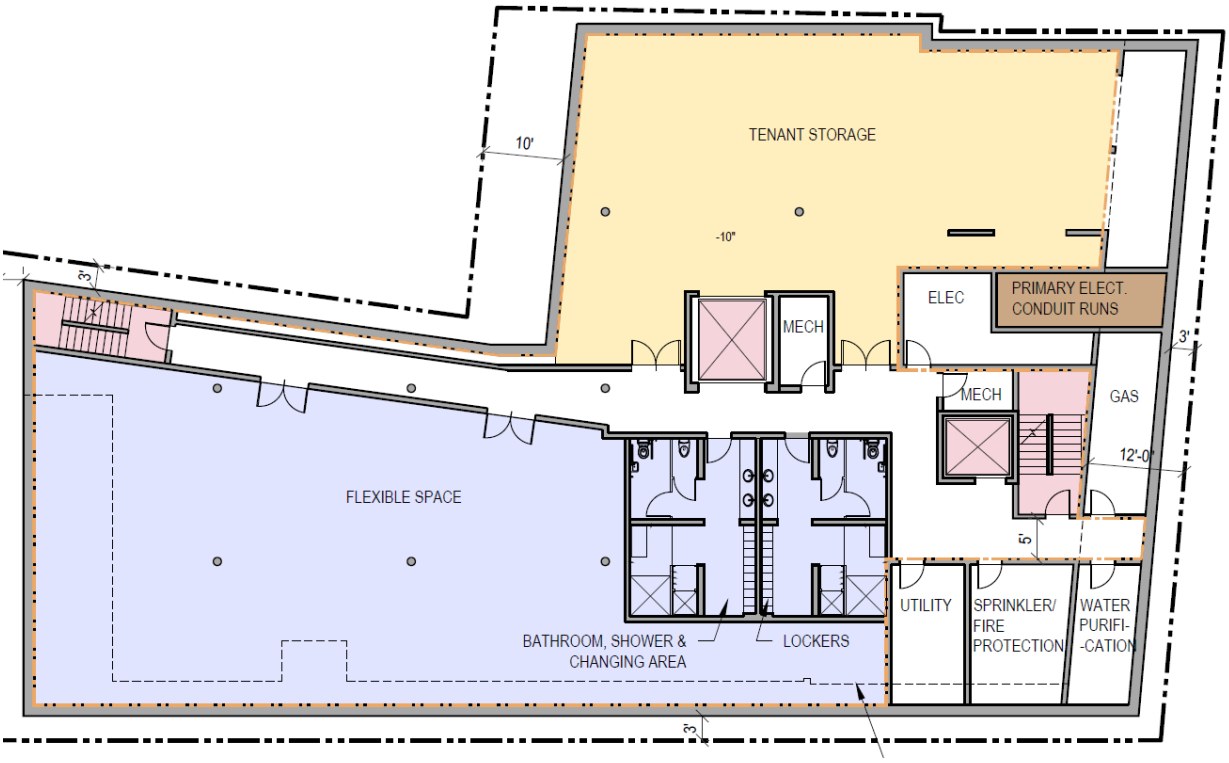
Credit 5 – Bicycle Facilities (v4.1): ***1 Yes Point***

The bicycle storages and racks will be provided at the project site; 12 long-term bike storage, 4 short-term bike storage, and 2 showers-changing rooms. with a Bike Score of 99, the immediate neighborhood provides a direct connection between the project site and a variety of basic services.

Category	Use Type	Business Name and Distance	
Food Retail	Supermarket	Target – 312 ft	1
Community Service Retail	Pharmacy	CVS – 377 ft	2
	Other Retail	Mudflat Gallery – 380 ft	3
Services	Bank	Santander Bank – 450 ft	4
	Gym	Healthworks Cambridge – 400 ft	5
	Restaurant	Yume Wo Katare – 0.1 mile	6
	Hair Care	Salon Luna – 0.2 mile	7
Civic and Community Facilities	Post Office	USPS – 0.2 mile	8
	Library	John & Carol Moriarty Library – 0.6 mile	9
	Place of Worship	Christian Fellowship of Boston – 0.6 mile	10



Credit Requirements	LEED v4.1 Requirements	Facilities in 32-44 White St
Long-term Bike Storage	5% FTE = 7	12 Long Term
Short-term Bike Storage	At least 4	4 Short Term
Shower and Changing Rooms	2	2 Showers



Basement locker room with two shower and changing rooms

Credit 6 -Reduced Parking Footprint (4.1): ***1 Yes Point***

Project does not provide any parking spaces.

Sustainable Sites

Prerequisite 1 – Construction Activity Pollution Prevention:

A management plan will enforce measures to protect adjacent areas from pollution from wind and water-borne soil and sedimentation. The civil design team will prepare an erosion and sedimentation plan that meets the local codes and the EPA Construction General Permit of the National Pollution Discharge Elimination System (NPDES) program. The construction team will implement the erosion and sedimentation measures and will follow the requirements of stormwater pollution prevention plan during the construction.

Credit 1 – Site Assessment: ***1 Yes Point***

The project team will conduct a comprehensive site assessment and will study topography, hydrology, climate, vegetation, soils, human use, and human health effects specific to this project. The Site Assessment worksheet will be completed by the design team after the completion of the survey.

Credit 4 – Rainwater Management (LEED v4.1): ***3 Maybe Point***

The project will implement a stormwater management plan with a goal of decreasing the volume of stormwater runoff. As design progresses, the project team will investigate feasibility for infiltration or collection at site. The feasibility of these points is being investigated.

Credit 5 – Heat Island Reduction: ***2 Yes Points***

The roof will be white TPO plus green roof and the hardscape area consists of open-grid pavement system and paving materials with a three-year aged solar reflectance (SR) value of at least 0.28.

Credit 6 – Light Pollution Reduction: ***1 Maybe Point***

The project is located in MLO lighting zone 3 (LZ3). To reduce the trespass from the project site to the sky and surrounding areas, the design is being evaluated to confirm if it is not exceeding the maximum uplight ratings and meeting the maximum backlight and glare ratings. Additionally, the internally illuminated exterior signages will not exceed a luminance of 200 cd/m2 during nighttime hours and 2000 cd/m2 during daytime hours.

Credit 7 – Tenant Design and Construction Guidelines: ***1 Yes Point***

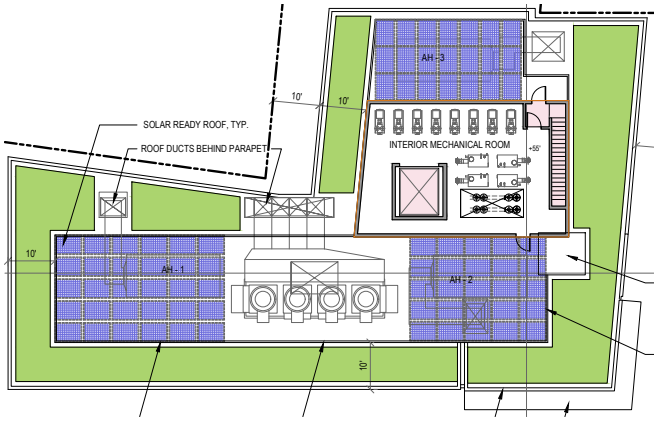
The proponent and the design team are in the process of developing a Tenant Design and Construction Guidelines for this C&S development. The document explains the sustainable aspects of the Core and Shell building design and construction, and also explains what steps are needed for tenants to achieve LEED CI Certification for their space fit-out design and construction, if desired.

LEED-CI is a decision for individual tenants in the building. Tenants are encouraged to have their interior space constructed in an environmentally friendly manner. The rating system is designed to help guide and measure green strategies under the control of the tenants. These strategies can range from the selection of non-toxic paint to Energy Star Computers and office equipment. It is important to understand that the tenant is encouraged to play an active role in the fitting out of their new space.

Water Efficiency

Prerequisite 1 and Credit 1 – Outdoor Water Use Reduction (v4.1): ***1 Yes Point and 1 Maybe Points***

Landscape plantings will be selected to be climate appropriate, native and adapted and the irrigation system will be designed to target at least a 50% reduction in the potable water use. Project will utilize LEED v4.1 for this credit which makes the project eligible for an additional 1 point if a 75% reduction in the outdoor water use is achieved.



Prerequisite 2 and Credit 4 - Indoor Water Use Reduction: ***3 Yes Point***

The project team anticipates reducing the use of potable water inside the building by at least 39% by installing low-flow and low-flush plumbing fixtures in core restrooms.

Fixture Information			Flush Rate		
Fixture ID	Fixture Family	Fixture Type	Baseline Flush Rate (gpf)	Design Flush Rate (gpf)	Percent of Occupants (%)
	Toilet (male)	Dual-Flush Water Closet	1.60	1.19	100
	Toilet (female)	Dual-Flush Water Closet	1.60	1.19	100
	Urinal	Low-Flow Urinal	1.00	0.125	100
Baseline case annual flush volume (gallons/year)					136,500.00
Design case annual flush volume (gallons/year)					81,412.50

Fixture Information		Duration		Flow Rate		
Fixture ID	Fixture Type	Default (sec)	Non-default (sec) (Optional)	Baseline Flow Rate (gpm)	Design Flow Rate (gpm)	Percent of Occupants (%)
	Showerhead	300		2.50	1.5	100
	Public lavatory (restroom) faucet	30		0.50	0.35	100
Baseline case annual flow volume (gallons/year)						65,000.00
Design case annual flow volume (gallons/year)						41,437.50

Group Name	Baseline Case (gallons/year)			Design Case (gallons/year)		
	Annual Flush Volume	Annual Flow Volume	Annual Consumption	Annual Flush Volume	Annual Flow Volume	Annual Consumption
32-44 White	136,500.00	65,000.00	201,500.00	81,412.50	41,437.50	122,850.00

Annual baseline water consumption (gallons/year)	201,500.00
Annual design water consumption (gallons/year)	122,850.00
Percent water use reduction (%)	**39.03%**

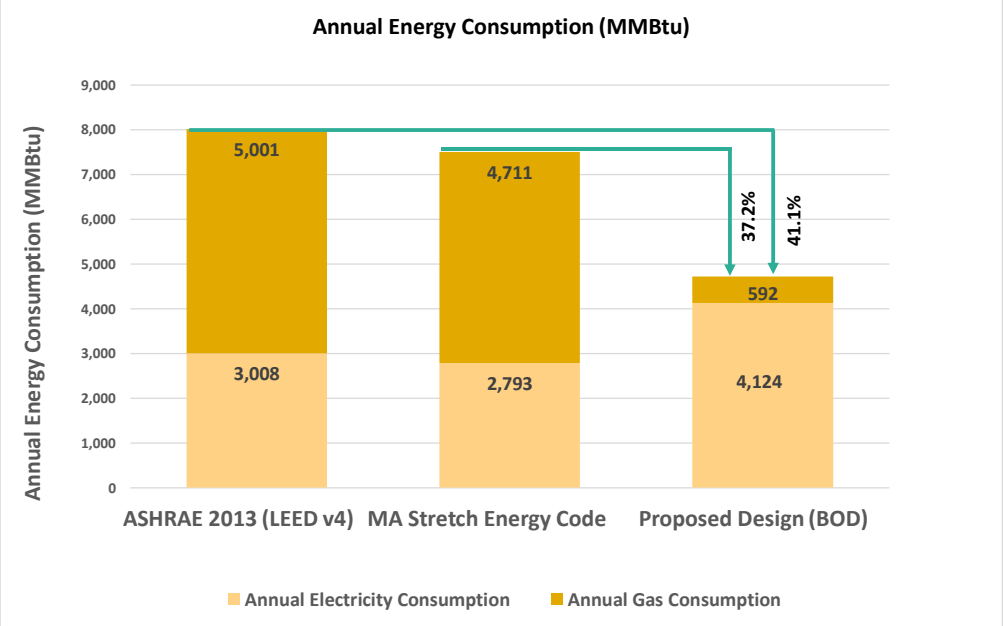
Prerequisite 3 and Credit 6– Building-level Water Metering and Water Metering: ***1 Yes Point***

The building will be equipped with a main water meter and the project team is planning to install additional water meters for at least two water subsystems: irrigation and DHW.

Energy and Atmosphere

Prerequisite 1 – Fundamental Commissioning and Verification
Commissioning of the Mechanical and Electric building systems is under contract and will be performed. The base building Core and Shell HVAC systems will be commissioned by a third-party commissioning agent to ensure correct operation. Commissioning activities include verification of system and equipment installation in accordance with the construction documents and manufacturer's instructions, and confirmation that equipment start, test and check also meet manufacturer's requirements.

Prerequisite 2 and Credit 2 – Minimum and Optimize Energy Performance: 11 Yes & 3 Maybe Points
The project will be designed to comply with the Massachusetts Building Energy Code and to exceed the energy performance requirements of the Massachusetts Stretch Energy Code. Building energy models have been developed and used to evaluate various pathways for achieving the targeted energy savings and required performance improvements. The preliminary energy analysis shows that the project as designed – utilizing conceptual drawings and specifications – is anticipated to result in an annual site energy savings of 41.1%, source energy savings of 12%, and GHG emissions savings of 34% compared to the ASHRAE 90.1-2013 baseline. Following LEED v4 Alternative Compliance Path, which looks at the annual site energy and GHG savings, the preliminary energy model shows a performance savings of approximately 23% relative to the LEED baseline, which results in 11 LEED points.



Prerequisite 3 – Building-level Energy Metering:
The project will be equipped with permanent electricity and gas utility meters.

Credit 1 – Enhanced Commissioning: 5 Yes Points
Project will pursue commissioning in line with LEED v4 Fundamental and Enhanced Commissioning requirements. The commissioning agent will perform the scope of work required to comply with the prerequisite in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC & R systems. Enhanced MEP and envelope systems commissioning scope will include reviewing the owner's

project requirements, and the basis of design, creating, distributing and implementing a commissioning plan, performing a design review of the project documents, witnessing on-site installations and testing and performing commissioning of installed HVAC, lighting, lighting controls and domestic hot water systems. The proponent will pursue the monitoring based commissioning.

Prerequisite 4 and Credit 6 – Fundamental and Enhanced Refrigerant Management: ***1 Yes Point***

No CFC-based refrigerants will be utilized for the Project. The selected equipment will use only refrigerant that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change.

Advanced Energy Metering: ***1 Yes Point***

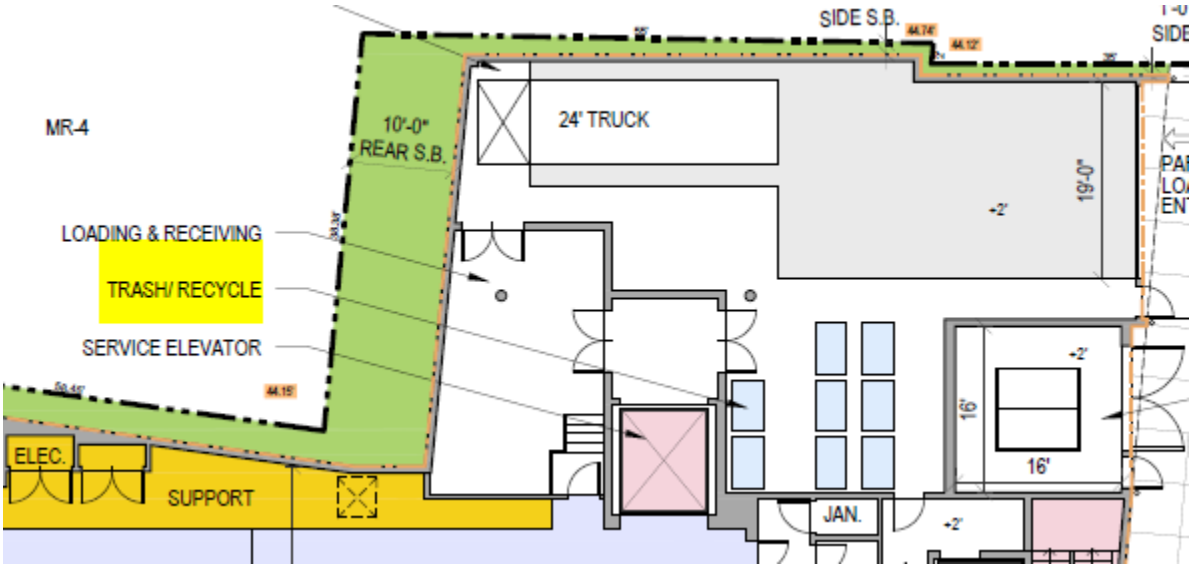
Project will include a submeter per energy source per floor and will meet the requirements of Advanced Energy Metering credit.

Material and Resources

The materials selected for the building will be evaluated using a variety of criteria including a preference for materials extracted, processed and manufactured locally. This reduces the energy consumption and emissions associated with transportation and helps local economies.

Prerequisite 1 – Storage and Collection of Recyclables

A central area for sorting and collection of recyclables before removal from the site will be provided by the loading dock. Recyclable materials collected will include mixed paper, corrugated cardboard, glass, plastics, and metals, and the disposal of batteries and electronic waste.



Prerequisite 2 – Construction and Demolition Waste Management Planning
The project will have a Construction and Demolition Waste Management plan and will meet the requirements of this prerequisite by establishing waste diversion goals and identifying at least five material streams to be diverted.

Credit 2, 3, and 4 – Building Product Disclosure and Optimization (v4.1): ***5 Yes Points***
The project team, including the construction manager and their sub-contractors, will target the specification and use of at least 20 different permanently installed products and materials that have lower environmental impacts and comply with Environmental Product Declaration (EDP), and that conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930. The project team is also targeting the Material Ingredients credit and will specify materials and products with known chemical make-up. Documentation for at least 10 different permanently installed products will be provided, confirming the applicable certification which may be the Health Product Declaration (HPD), Cradle-to-Cradle or Declare.

Credit 5 – Construction and Demolition Waste Management (v4.1): ***1 Yes Points***
The waste generated by the construction and demolition process will be recycled, rather than land-filled, and the ultimate goal is for more than 50% (by weight) of the construction waste to be recycled. The project team will most likely use the ReEnergy facility, which is the only certified comingling facility in Massachusetts and has an annual average diversion rate of 54%.

Indoor Environmental Quality

Prerequisite 1 – Minimum Indoor Air Quality Performance
The mechanical systems are designed to comply with the ASHRAE 55-2010, the indoor temperature, and humidity conditions standard, and to provide superior ventilation throughout the building, following the requirements of ASHRAE 62.1-2010 sections 4 through 7. The future lab spaces will be served by 100% OA air-handling units, which will provide OA to office fan coil unit systems. The current design meets and exceeds the minimum requirements of ASHRAE 62.1-2010.

Prerequisite 2 – Environmental Tobacco Smoke Control
The building will have a no-smoking policy to comply with the Massachusetts Workplace Smoking law, and smoking will be prohibited outside within 25 feet of doors and outside air intakes.

Credit 1 – Enhanced Indoor Air Quality Strategies: ***2 Yes Points***
Building main entrances will be provided with walk-off mats to remove dirt and debris from the shoes of people entering the building and will be cleaned and maintained by house-keeping weekly while space is vacant. High-efficiency MERV 13 or 14 filters will be provided in the main outside air handling unit for superior air particulate filtration. All spaces where hazardous gases or chemicals may be present or used, i.e. housekeeping closets, will be designed with full height walls, exhaust ventilation and door closer. The project is targeting carbon dioxide monitoring as an additional enhanced indoor air quality strategy.

Credit 2 – Low-emitting Materials (v4.1): ***3 Yes Points***
The project will target low-emitting materials for 4 categories - adhesives and sealants, paints and coatings, flooring, and composite wood - used inside the building, to be low-VOC (Volatile Organic

Compound) products and will meet the emission testing requirements; specified wood products will have no added urea-formaldehyde.

Credit 3 – Construction Indoor Air Quality Management Plan: ***1 Yes Point***

The base building will be constructed in accordance with the SMACNA Indoor Air Quality for Buildings under Construction Guideline. This guideline defines procedures for maintaining good indoor air quality inside the building during construction and also addresses construction practices to allow the best possible indoor environment after occupancy. These practices include cleaning during construction, interrupting paths of odor and dust travel within the building, segregating odor and dust producing activities from absorbent materials, and scheduling similar odor or duct producing activities to occur at the same time.

Credit 5 – Quality View: ***1 Yes Point***

At least 75% of the regularly occupied area will have a direct line of sight and quality views to the outdoors, which includes landscaped area, sky, pedestrian walkways and bike lanes, and streetscape. The project team will use the tenant test fit drawings to demonstrate compliance with this credit.

Innovation and Design LEED Strategy

The project team will evaluate and implement measures and strategies in the design and construction of 32-44 White Street to exceed the performance criteria of some of the base credits and will introduce innovative building features, technologies, and policies that are not addressed by existing prerequisites and credits in the BD+C rating system. The innovative strategies include the followings:

- Innovation: Green Building Education: Either a comprehensive signage program will be implemented to educate occupants and visitors about sustainable features of the building or an educational tour will be planned. A case study will be prepared to educate other designers about design processes and solutions that can inform the design of other buildings.
- Innovation: Purchasing Lamps – SGL Development will implement a Purchasing Policy for lamp so that no mercury containing lamps are purchased and installed.
- Innovation: O+M Starter Kit - SGL Development will develop and implement a green cleaning and past management policy.
- Innovation: Walkable Site - The current design meets 7 features of this credit and the design team is evaluating the feasibility of achieving “Feature 9 - Trees” for meeting 8 features required for this innovation credit.
- Exemplary Performance: BPDO- Environmental Product Declarations – Project will exceed the requirements of the base credit - Environmental Product Declarations- by specifying and installing at least 20 permanently installed products that have the EPD certification. The base credit requires 10 products and by targeting 20 products, this project will achieve the exemplary point.
- LEED Accredited Professional: The project team includes numerous LEED Accredited Professionals.

Regional Priority

Regional Priority credits were established with a focus on environmental issues and priorities at a local level. There are six (6) possibilities specific to the project location and the project team has targeted 3 points related to the following strategies: High-Priority Site, Rainwater Management (Maybe), and Optimize Energy Performance.

LEED Checklist

LEED v4 for BD+C: Core and Shell
Project Checklist

Project Name: 32-44 White
Date: April 14, 2023

Y	?+	?-	N			
1				Credit	Integrative Process	1

Y	?+	?-	N			
17	1	0	2		**Location and Transportation**	**20**
				Credit	LEED for Neighborhood Development Location	20
2				Credit	Sensitive Land Protection	2
2			1	Credit	High Priority Site	3
5	1			Credit	Surrounding Density and Diverse Uses	6
6				Credit	Access to Quality Transit (LEED v4.1)	6
1				Credit	Bicycle Facilities (LEED v4.1)	1
1				Credit	Reduced Parking Footprint	1
			1	Credit	Electric Vehicles (LEED v4.1)	1

Y	?+	?-	N			
4	3	1	3		**Sustainable Sites**	**11**
Y				Prereq	Construction Activity Pollution Prevention	Required
1				Credit	Site Assessment	1
			2	Credit	Site Development - Protect or Restore Habitat (LEED v4.1)	2
			1	Credit	Open Space (LEED v4.1)	1
	2	1		Credit	Rainwater Management (LEED v4.1)	3
2				Credit	Heat Island Reduction	2
	1			Credit	Light Pollution Reduction	1
1				Credit	Tenant Design and Construction Guidelines	1

Y	?+	?-	N			
5	1	1	4		**Water Efficiency**	**11**
Y				Prereq	Outdoor Water Use Reduction	Required
Y				Prereq	Indoor Water Use Reduction	Required
Y				Prereq	Building-Level Water Metering	Required
1	1		1	Credit	Outdoor Water Use Reduction (LEED v4.1)	3
3		1		Credit	Indoor Water Use Reduction (LEED v4.1)	4
			3	Credit	Cooling Tower Water Use (LEED v4.1)	3
1				Credit	Water Metering	1

Y	?+	?-	N			
18	2	1	12		**Energy and Atmosphere**	**33**
Y				Prereq	Fundamental Commissioning and Verification	Required
Y				Prereq	Minimum Energy Performance	Required
Y				Prereq	Building-Level Energy Metering	Required
Y				Prereq	Fundamental Refrigerant Management	Required
5			1	Credit	Enhanced Commissioning	6
11	2	1	4	Credit	Optimize Energy Performance	18
1				Credit	Advanced Energy Metering	1
			2	Credit	Demand Response	2
			3	Credit	Renewable Energy Production	3
1				Credit	Enhanced Refrigerant Management	1
			2	Credit	Green Power and Carbon Offsets	2

Y	?+	?-	N			
6	0	0	8		**Materials and Resources**	**14**
Y				Prereq	Storage and Collection of Recyclables	Required
Y				Prereq	Construction and Demolition Waste Management Planning	Required
			6	Credit	Building Life-Cycle Impact Reduction (LEED v4.1)	6
2				Credit	Environmental Product Declarations (LEED v4.1)	2
1			1	Credit	Sourcing of Raw Materials (LEED v4.1)	2
2				Credit	Material Ingredients (LEED v4.1)	2
1			1	Credit	Construction and Demolition Waste Management	2

Y	?+	?-	N			
7	0	0	3		**Indoor Environmental Quality**	**10**
Y				Prereq	Minimum Indoor Air Quality Performance	Required
Y				Prereq	Environmental Tobacco Smoke Control	Required
2				Credit	Enhanced Indoor Air Quality Strategies	2
3				Credit	Low-Emitting Materials	3
1				Credit	Construction Indoor Air Quality Management Plan	1
			3	Credit	Daylight	3
1				Credit	Quality Views	1

Y	?+	?-	N			
6	0	0	0		**Innovation**	**6**
1				Credit	Innovation: Green Building Education	1
1				Credit	Innovations: Walkable Site	1
1				Credit	Exemplary Performance: EPDs	1
1				Credit	Innovations: O+M Starter Kit	1
1				Credit	Innovation: WELL Features; Purchasing - Lamps	1
1				Credit	LEED Accredited Professional	1

Y	?+	?-	N			
2	1	0	1		**Regional Priority**	**4**
1				Credit	Regional Priority: High Priority Site/ Indoor Water Use Reduction	1
	1			Credit	Regional Priority: Rainwater Management	1
1				Credit	Regional Priority: Optimize Energy performance/ Renewable Energy Productior	1
			1	Credit	Regional Priority: Building Life-Cycle impact reduction	1

66	8	3	33	**TOTALS**	Possible Points: **110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110