SUSTAINABLE & RESILIENT BUILDINGS QUESTIONNAIRE

Section 1: Proposal Information

Proposal Name	45 Mystic
Address	45 Mystic Ave, Somerville, MA 02145
Developer	Boston Pinnacle Properties
Business Address	599 E Broadway, South Boston, MA 02127
Designated Contact	John Beatty
Telephone Number	857 496 7187
Contact's Email Address	john@burnsrealtyboston.com
Date Submitted	
Filing Type (Development review application, Building Permit, or CoA)	Development Review Application
Is this a revised Questionnaire?	No.
Is MEPA Approval Required?	Yes/**No**; Why?

Section 2: Building & Site Details

2.1 Building Information

Building Uses	Core & Shell Lab/Office
Gross Floor Area	52,185 GSF
Expected Life of Building	50 years
Expected Life of Building Systems: HVAC, electrical, boilers, plumbing, telecom, lighting, energy management.	According to ASHRAE, the HVAC system shall have a 20-25 year operating life expectancy
Type of Heating System(s)	Heating shall be provided through an electric heat pump and hot water heating.
Type of Cooling System(s)	Cooling shall be provided through an electric heat pump and chill water cooling,

2.2. Green Building

Green Building Professional(s): Name(s) and contact information	Colleen Ryan Soden

Professional Credentials: Green Building Program Certification(s)	LEED AP BD+C, ID+C
Building LEED Rating	Certifiable/Silver/Gold/**Platinum**
Building LEED Point Score	80
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.	Not currently.

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 than ever before. 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 the 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.

Total # of Parking Spaces	#0
EVSE Plugs (number and voltage/ level of plugs)	#0

[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

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 Key Building Efficiency Metrics
The following should be provided for each building type (office, retail, multifamily, hotel, restaurant, etc.).

Vertical Envelope Performance

Vertical Envelope	**ASHRAE Reference Building**			**Proposed Building**		
	Percent of Vertical Area	**R value** *(see note 1)*	**U value** *(see note 2)*	**Percent of Vertical Area**	**R value** *(see note 1)*	**U value** *(note 2)*
Framed, insulated Wall	70%	R-13+R-10c.i.	U-0.055	70%	R-13+R-10c.i	U-0.055
Opaque glass, curtain wall, shadowbox, spandrel	NA – ASHRAE reference building has no spandrel			0%	R+Rc.i	R+Rc.i.
Vision glass	30%	R-2.38	U-0.42	30%	R-3.13	U-0.32
	100%		***Aggregate U :0.1645***	***100%***		***Aggregate U: 0.1345***
			6.08 Aggregate R			***7.43 Aggregate R***

Notes:
1. Show in format of R+R c.i. where first R is amount of discontinuous insulation and second R is amount of continuous insulation.

2. U values shall be based on indicated R+R c.i. and shall conform to Appendix A of ASHRAE 90.1 2013.

3. U value includes frame, per NRFC standard methods.

4. Aggregate U is calculated as: ($U_1\%_1 + U_2\%_2 + U_3\%_3$) where U is the respective thermal transmittance values and $\%_1$ is the percent area of framed insulated wall; $\%_2$ is the percent area of opaque glass, curtain, or shadowbox; and $\%_3$ is the percent area of vision glass. Only areas adjacent to conditioned space are counted, areas adjacent to unconditioned spaces (e.g. parking garages, mechanical penthouses) are not counted. Aggregate R is the inverse of aggregate U. For percent areas for ASHRAE reference building, see Table G3.1.1-1 in ASHRAE 90.1 2013.

<u>Other Performance Metrics</u>

	ASHRAE Reference Building	Proposed Building
Air Infiltration (ACH 50)	0.40 cfm/ft^2 @75Pa	0.40 cfm/ft^2 @ 75Pa
Aggregate Vertical Envelope R	6.08	7.43
Roof R	30	30
Lowest level conditioned floor above unconditioned space (if any) R	30	30
Cooling End Use (kBtu/sf-yr)	17.8	11.8
Heating End Use (kBtu/sf-yr)	133.3	7.9
Peak Heating (kBtu/hr-sf)	0.08	0.043
Peak Cooling (kBtu/hr-sf)	0.07	0.051
Site EUI (kBtu/hr-sf)	328.9	133.8

Section 3. Planning for Net Zero Emissions and Energy Resilience

3.1. 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 has the design team 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.

HVAC systems shall be all electric. Energy usage reduction is through high efficiency heat pump operation, heat recovery chillers for simultaneous loads, variable speed pumping, ventilation energy recovery, demand control ventilation, DDC controls, reduced watts/square foot lighting and lighting controls.

3.2 Will the building be a net zero carbon building? 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.

The new building will be provided with a generator that will utilize fossil fuels. All other MEP systems shall be electric.

3.3 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.

Mass Save provides incentives and rebates for all electric high efficiency systems.

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?

PV hasn't been included since the roof space is limited.

3.5. Are any on-site energy storage systems planned? Please describe.

None

3.6 Does the electric utility's infrastructure have enough capacity to support the addition of your building's energy load? Please provide confirmation from utility.

The electric infrastructure will be new and able to support the new MEP systems.

3.7 Will the building's roof include any sustainability features? These may include, but are not limited to, high albedo roof materials, solar panels, or vegetation. Please describe what features could be added in the future (i.e. roof will be designed to support solar or green roof installation of X size).

The roof system will be constructed of high-albedo materials.

Section 4: Climate Change Risk and Vulnerability

4.1 Climate Vulnerability Exposure (check all that apply)	• Sea Level Rise & Storm Surge • Precipitation Induced Flooding X Heat • Other(s):

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

According to Somerville's Climate Change Vulnerability Assessment, our site, 45 Mystic Ave., is located in a "High Outdoor Heat Exposure" zone. The city of Somerville has identified that, "Temperature is a ubiquitous threat throughout the city and will be relatively more intense in some areas based on a combination of surface types, lack of vegetation and level of emissions." Due to the significant square footage of hardscape and lack of vegetation surrounding our site, we are especially prone to the heat island effect and accompanying high temperatures.

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

The building will be provided for full cooling during extreme heat days of the year with high efficiency all electric heat pump systems.

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

The building will be provided for full cooling during extreme heat days of the year with high efficiency all electric heat pump systems. A new DDC building management system shall be utilized to operate and monitor the spaces and equipment.

5.3 List any indoor spaces without cooling and their uses.

Cooling shall not be provided in stairwells, mechanical room and storage areas.

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 be 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 team has designed the site to include ample shading from vegetation and overhangs, generous amounts of greenspace, and pervious, light-colored paving with minimal amounts of asphalt.

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. Additional maps and data are available by request (email hpayne@somervillema.gov)

No.

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: (ft)

Proposed Site Elevation - High: (ft)

Lowest elevation of life-safety systems	(ft)	Proposed First Floor Elevation	(ft)
Nearest flood elevation for the 2070 10-year storm		Nearest flood elevation for the 2070 100-year storm	

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?

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
- Waste water back flow prevention
- Storm water back flow prevention
- Systems located above the ground floor
- Securing objects at risk of becoming dislodged

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)

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.

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?

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?