350 MASSACHUSETTS AVENUE PROJECT

CHANGE OF USE SPECIAL PERMIT APPLICATION: VOLUME 3 - APPENDICES

LOCATION: 350 MASSACHUSETTS AVE, CAMBRIDGE, MA

CRDD DISTRICT

ISSUE DATE:

MAR.20.2025

OWNER: BRE-BMR 350 Massachusetts LLC

OWNER PROJECT MANAGER: REDGATE

PREPARED BY: DIMELLA SHAFFER

COLLABORATING CONSULTANTS:

STRUCTURAL ENGINEER: McNAMARA · SALVIA

MEP ENGINEER: GENESIS

CIVIL ENGINEER: VHB

ENVELOP CONSULTANT: BET

SUSTAINABILITY: enviENERGY

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Transportation Impact Study (TIS) and TP + T certification / Parking Analysis

BioMed Realty REDGATE DIMELLA SHAFFER

CITY OF CAMBRIDGE
TRAFFIC, PARKING, + TRANSPORTATION

Brooke McKenna
Transportation Commissioner
344 Broadway, Suite 202
Cambridge, MA 02139

March 3, 2025

Selma Mandzo-Preldzic
VHB
99 High Street, 13th Floor
Boston, MA 02110

RE: 350 Massachusetts Avenue

Dear Selma,

The Cambridge Traffic, Parking, and Transportation (TP+T) Department received your Transportation Assessment dated February 2025 for a proposed change in use at 350 Massachusetts Avenue by BRE-BMR 350 Massachusetts LLC. Based on the scope of work requested by TP+T, we certify the Traffic Assessment as accurate and complete.

The proposed Project would convert 103,315 Gross Floor Area (GFA) of existing Office use to 108,720 GFA Lab/Technical Office use. It will reduce Retail use from 14,950 GFA to 3,880 GFA. The overall net change will be negative 5,665 GFA at the building.

Thank you for working with us on the Traffic Assessment and please contact Adam Shulman of my staff at 617-349-4745 if you have any questions or to set up a meeting.

Very truly yours,

Brooke McKenna, Transportation Commissioner

cc: Jeff Parenti, Assistant Commissioner for Street Management/Director of Traffic and Parking.
Adam Shulman, Transportation Planner.

TRANSPORTATION ASSESSMENT

350 Massachusetts Ave

Cambridge, Massachusetts

SUBMITTED TO

City of Cambridge
Traffic, Parking and Transportation Department
344 Broadway
Cambridge, MA 02139

SUBMITTED BY

BRE-BMR 350 Massachusetts LLC
4570 Executive Drive, Suite 400
San Diego, CA 92121

PREPARED BY

99 High Street
13th Floor
Boston, MA 02110

FEBRUARY 2025

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Introduction

On behalf of BRE-BMR 350 Massachusetts LLC (the Proponent) VHB has conducted a Transportation Assessment for the proposed development on Massachusetts Avenue in Central Square's University Park in Cambridge, Massachusetts.

The proposed project includes a change in use at the **350 Massachusetts Avenue** Parcel to include 108,720 square feet of lab use with 3,880 square feet of ground floor retail/restaurant.

The Proponent is seeking a Special Permit as required by the change in use. The Transportation Assessment that follows is in response to the study scope received from Traffic, Parking, and Transportation (TP&T) Department on August 16th, 2024. A copy of the City's scope request is included in the Appendix.

This document comprises three components, as follows:

1. Summary of Findings
2. Project Overview and Development Program
3. Trip Generation Assessment
4. Response to TP&T Scope
    - Part I – Compliance with Traffic Mitigation Agreement from 1988
    - Part II – Transportation Circulation Plan and Narrative

Supplementary data and analysis worksheets are provided in a technical appendix.

Summary of Findings

- The Proposed Project will reduce the overall development by (5,665) square feet.
- The Proposed Project is expected to have a net-reduction in vehicle trips (-50 during the morning peak hour and -46 during the evening peak hour).
- University Park continues to be in compliance with the 1988 Traffic Mitigation conditions and subsequent conditions, as the project remains under the 1,700 PM peak hour trip generation cap. The projection of 1,098 district evening trips is well below the threshold of 1,700 trips established by the Traffic Mitigation conditions and subsequent conditions.
- The Proposed Project will provide 30 bicycle parking spaces in a bike room with direct access from Sidney St.
- The Proposed Project proposes a comprehensive TDM plan to promote alternative modes of transportation and reduce reliance on single-occupancy vehicles.

Development Program

BRE-BMR 350 Massachusetts LLC is seeking to change the use of existing 350 Massachusetts Ave building from office to Lab/technical office use.

Table 1 summarizes the program changes that are being proposed.

Table 1 Proposed Development Program

Program	Existing Program GFA	Proposed Program GFA	Difference (Net-New GFA)
Office	103,315	0	(- 103,315)
Lab/Technical Office	0	108,720	108,720
Retail	14,950	3,880	(- 11,070)
Total	**118,265**	**112,600**	**(-5,665)**

The development will remove all office use, and instead include a lab/technical office use on site with a much smaller ground floor retail component. The project changes will reduce the overall development by (5,665) square feet.

The following sections will evaluate impact to vehicle trip generation from this change in use.

Trip Generation Assessment

The rate at which any development generates traffic is dependent upon several factors such as size, location, use, parking, transportation options, and density of surrounding developments. The number of vehicle trips to be generated by the proposed project—prior to adjusting for mode share—was estimated based on trip generation rates provided in the most recent edition of the *Trip Generation Manual*, 11th edition, published by the Institute of Transportation Engineers (ITE).[1]

Unadjusted ITE Vehicle Trips

The unadjusted number of vehicle-trips to be generated by the proposed project was estimated based on trip generation rates provided in the *Trip Generation Manual*. The ITE *Trip Generation Manual* categorizes trip rates by land uses and provides daily, morning, and evening peak hour vehicle trip generation estimates. The trip generation estimates for the proposed project were calculated using the following Land Use Codes: LUC 760, (Research & Development) and LUC 820 (Shopping Center). In addition, trip generation estimates for the existing site square footage that will be removed were calculated using the following Land Use Codes: LUC 710 (General Office) and LUC 820 (Shopping Center).

The *unadjusted* vehicle trip estimates for the project are the starting input to the *adjusted* estimate of project trips, which reflect local area mode shares. Trip generation worksheets are included in the Appendix.

Adjusted Trip Generation

Unadjusted trip generation estimates do not include any adjustments to reflect public transit use, walking, or bicycling that are characteristic of an urban area such as this site's location. This mode share adjustment is critical to the evaluation of overall project-related traffic impacts, recognizing that there will be a mix of automobile travel, public transit, and walk and bike trips to the project site.

Vehicle Occupancy Rates ("VOR") were applied to the ITE trip generation to convert the ITE estimated unadjusted vehicle trips to person trips. The VORs were based on the 2022 National Household Travel Survey[2]. Further national Vehicle Occupancy Rates ("VOR") were applied again to the ITE trip generation to convert the person trips to trips by mode.

Mode shares are based on the K2C2 Central Square Final Report 2013 Enhanced TDM Mode Split for Office/R&D and Retail. The mode share splits for the trip generation estimate are provided in Table 2.

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1 *Trip Generation Manual (11th edition),* Institute of Transportation Engineers, Washington DC, 2021.

2 National Household Travel Survey (ornl.gov); nhts.ornl.gov

Table 2 Mode Shares

	Office/ Technical Office (Lab)	Retail
Vehicle	41%	23%
Transit	42%	31%
Walk/Bike/Other	17%	46%
Total	**100%**	**100%**

Source: K2C2 Central Square Final Report 2013 Enhanced TDM Mode Split for Office/R&D and Retail

Based on the process described above, the resulting net-new project trip generation is summarized in Table 3. The project is expected to have a net-reduction in vehicle trips (-50 during the morning peak hour and -46 during the evening peak hour). Detailed Trip generation calculation tables and assumptions are provided in the **Appendix** for reference.

Table 3 Estimated Project Vehicle Trip Generation, Weekday Peak Hours

	Vehicle Trips
Weekday AM Peak	
Enter	(- 39)
Exit	(- 11)
Total	**(- 50)**
Weekday PM Peak	
Enter	(- 16)
Exit	(- 30)
Total	**(- 46)**

Trip rate source: *Trip Generation Manual*, 11th Edition, Institute of Transportation Engineers.

- LUC 760 – Research & Development; regression (peak hour of adjacent street)
- LUC 710 – General Office; regression (peak hour of adjacent street)
- LUC 820 – Shopping Center; regression (peak hour of adjacent street)

Mode shares: K2C2 Central Square Final Report 2013 Enhanced TDM Mode Split for Office/R&D and Retail

As retail components of a project tend to be a higher trip generator, removal of significant retail square footage results in a reduction in vehicle trips. Similarly, a lab/technical office use is considered a lower trip generator than a general office use, thereby further contributing to the reduction in vehicle trips expected as a result of the land use change at 350 Massachusetts Avenue.

Traffic Assessment (per TP&T Scope dated August 16th, 2024)

As identified by TP&T in the transportation scope received on August 16th, 2024, the primary aim of the study is to confirm that the new proposed uses will not exceed the trip generation thresholds established for the University Park campus in 1988. **(PART I)**

The assessment should also include an access and transportation circulation plan. **(PART II)**

Part I. "Update the May 20, 2013, Traffic Mitigation Agreement Compliance Report considering the 350 Mass Ave project being fully occupied R&D building."

Per TP&T scoping request, the following specific components are presented in the below sections:

A. Update on current conditions at University Park

B. Update of the 85th percentile traffic level from parking garages

C. Update of parking utilization data and peak parking University Park's parking garages.

D. Update on peak PM driveway counts at the three garages.

E. Demonstrate that the district is not generating more than 1,700 PM peak hour trips.

2024 Update – Traffic Mitigation Compliance

A. Update on Current Conditions at University Park

City requested for documentation and an update of current conditions at University Park, utilizing previously developed Tables in the May 20, 2013, University Traffic Agreement Compliance memo (provided in the Appendix).

Specifically, 2013 Tables 1A, 1B, and 2 have been updated with 2024 information. Table 1A (new Table 4) presents the commercial development and Table 1B (new Table 5) presents the residential portion of the Project. Table 2 (new Table 6) shows updated parking supply information for University Park.

Findings:

Most program components are consistent to the last update from 2013, except for Star Market (retail use) located at 20 Sidney that has since been converted to office space.

On the residential front the units continue to be almost fully occupied, with a vacancy rate of 5% in October 2024.

To encourage commuters to utilize transit and other alternatives to single occupancy vehicles, the parking supply at University park has been constrained. There are 2,687 vehicle parking spaces currently provided in the three University Park garages and 105 surface parking spaces set aside for the Auburn Court residents.

Table 4 University Park Commercial Development as of October 2024 (Table 1A in 2013 analysis)

Building Information	Current Use	Zoning[1]	Gross[2]	Percent Occupied
26 Landsdowne Street	Office/R&D	102,718	102,700	100%
38 Sidney St	Office/R&D	117,965	125,000	56%
64 Sidney St	Office/R&D	122,658	130,000	100%
20 Sidney St	Hotel	159,133	166,190	100%
	Office	43,482	61,000	0%
45 Sidney St	Office/R&D	130,804	144,588	100%
75 Sidney St	Office/R&D	133,769	145,088	100%
35 Landsdowne St	R&D	187,125	221,561	100%
40 Landsdowne St	R&D	199,520	228,184	100%
65 Landsdowne St	R&D	116,393	129,454	100%
88 Sidney St	R&D	136,615	154,978	100%
300 Mass Ave	R&D	212,500	245,937	100%
	Retail	15,000	14,485	100%
Form 350 Mass Ave	Office	80,315	101,222	0%
(Before Special Permit)	Retail	38,325	17,720	60%
Total		**1,796,322**	**1,894,185**	-

1 Gross floor area as defined by the City of Cambridge Zoning Ordinance

2 Total gross square footage of building per the Institute of Transportation Engineers' methodology

Table 5 University Park Residential Development as of October 2024[1] (Table 1B in 2013 analysis)

Building Information	Use	Zoning[1]	Gross[2]	Total Units	Occupied Units
129 Franklin St	Residential	137,846	137,846	142	133
23 Sidney St	Residential	51,844	51,844	51	50
91 Sidney St	Residential	156,539	156,539	135	126
100 Landsdowne	Residential	215,379	215,379	203	195
Total		**561,608**	**561,608**	**531**	

TOTAL BUILDING	(Residential and Commercial)	**2,357,930**	**2,455,793**

1 Gross floor area as defined by the City of Cambridge Zoning Ordinance

2 Total gross square footage of building per the Institute of Transportation Engineers' methodology

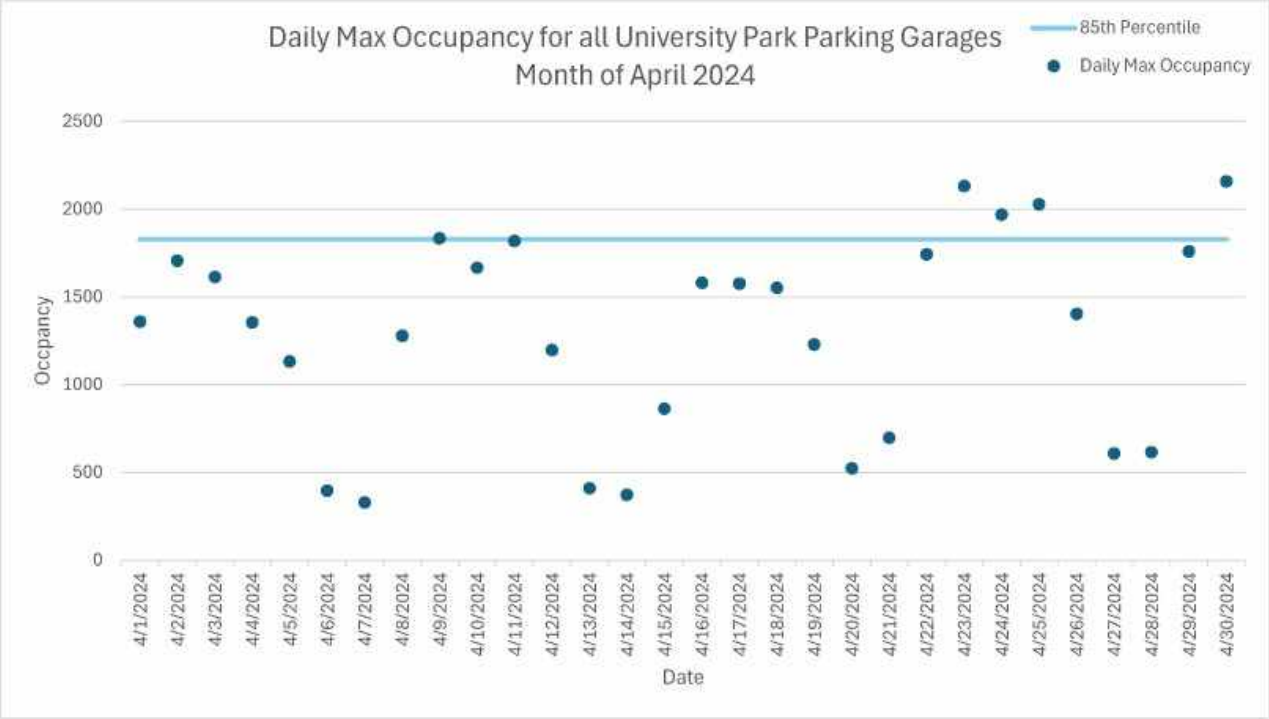
Table 6 University Park Parking Supply as of September 2024 (Table 2 in 2013 analysis)

Location	Garage Parking Spaces	Surface Parking Spaces	Total Parking Spaces
55 Franklin Garage	985	-	985
80 Landsdowne Street Garage	1,120	-	1,120
30 Pilgrim Garage	582	-	582
Auburn Court Surface Parking	0	105	105
Total	**2,687**	**105**	**2,791**

B. Update of the 85th Percentile Traffic Level from Parking Garages

City requested for documentation and an update to the 85th percentile traffic level from parking garages. Specifically, the request asked for an April 2024 update, for a consistent review and comparison to the April 2013 conditions.

The Traffic Mitigation Agreement requires that traffic be measured at a time that is representative of the 85th percentile level of traffic activity throughout the year. This means that the evening peak hour volume measured is higher than 85 percent of all the peak hour volumes over the course of a year. Data from the three garages was reviewed for the entire month of April 2024. Based on this information, Tuesday, April 9th, 2024, represents a day that is higher than the 85th percentile day, and therefore the counts for that day did not need to be adjusted. Graph below illustrated April 9th and 85th day.



C. Update of Parking Utilization Data and Peak Parking at University Park's Parking Garages

City requested for documentation and an update on parking utilization data, peak parking, etc. for University Park's off street parking garages. Complete parking hour-by-hour utilization data representative of the 85th percentile day is provided below.

4/9/2024	Lansdowne Garage					Pilgrim Garage					Franklin Garage					Total				
Time	Hourly Occupancy	Hourly Entering	Hourly Exiting	Totals (Ins + Outs)	Percentage Occupanied	Hourly Occupancy	Hourly Entering	Hourly Exiting	Totals (Ins + Outs)	Percentage Occupanied	Hourly Occupancy	Hourly Entering	Hourly Exiting	Totals (Ins + Outs)	Percentage Occupanied	Hourly Occupancy	Hourly Entering	Hourly Exiting	Totals (Ins + Outs)	Percentage Occupanied
12 to 1 AM	105	3	0	3	9.38%	78	1	1	2	13.40%	137	10	3	13	13.91%	320	14	0	18	11.91%
1 to 2 AM	104	1	2	3	9.29%	78	1	1	2	13.40%	141	7	3	10	14.31%	323	9	6	15	12.02%
2 to 3 AM	104	1	1	2	9.29%	79	2	1	3	13.57%	155	16	2	18	15.74%	338	19	4	23	12.58%
3 to 4 AM	105	1	0	1	9.38%	80	1	0	1	13.75%	158	5	2	7	16.04%	343	7	2	9	12.77%
4 to 5 AM	113	9	1	10	10.09%	81	2	1	3	13.92%	163	6	1	7	16.55%	357	17	3	20	13.29%
5 to 6 AM	159	47	1	48	14.20%	84	4	1	5	14.43%	178	15	0	15	18.07%	421	66	2	68	15.67%
6 to 7 AM	252	96	3	99	22.50%	108	27	3	30	18.56%	214	41	5	46	21.73%	574	164	11	175	21.36%
7 to 8 AM	372	127	7	134	33.21%	162	58	4	62	27.84%	303	97	8	105	30.76%	837	282	19	301	31.15%
8 to 9 AM	538	175	9	184	48.04%	245	88	5	93	42.10%	423	130	10	140	42.94%	1206	393	24	417	44.88%
9 to 10 AM	714	187	11	198	63.75%	327	87	5	92	56.19%	561	151	13	164	56.95%	1602	425	29	454	59.62%
10 to 11 AM	788	85	11	96	70.36%	356	35	6	41	61.17%	623	75	13	88	63.25%	1767	195	30	225	65.76%
11 to 12 PM	827	56	17	73	73.84%	366	18	8	26	62.89%	624	36	35	71	63.35%	1817	110	60	170	67.62%
12 to 1 PM	836	37	28	65	74.64%	369	12	9	21	63.40%	629	32	27	59	63.86%	1834	81	64	145	68.25%
1 to 2 PM	803	27	60	87	71.70%	365	8	12	20	62.71%	623	22	28	50	63.25%	1791	57	100	157	66.65%
2 to 3 PM	712	8	99	107	63.67%	341	6	30	36	58.59%	572	14	65	79	58.07%	1625	28	194	222	60.48%
3 to 4 PM	584	18	146	164	52.14%	298	2	45	47	51.20%	486	22	108	130	49.34%	1388	42	299	341	50.91%
4 to 5 PM	383	13	214	227	34.20%	215	10	93	103	36.94%	372	15	129	144	37.77%	970	38	436	474	38.10%
5 to 6 PM	241	9	151	160	21.52%	138	6	83	89	23.71%	305	20	87	107	30.96%	684	35	321	356	28.46%
6 to 7 PM	170	7	78	85	15.18%	105	3	36	39	18.04%	260	3	48	51	26.40%	535	13	162	175	19.91%
7 to 8 PM	142	6	34	40	12.68%	96	5	14	19	16.49%	247	6	19	25	25.08%	485	17	67	84	18.05%
8 to 9 PM	124	6	24	30	11.07%	93	2	5	7	15.98%	230	8	25	33	23.35%	447	16	54	70	16.64%
9 to 10 PM	114	4	14	18	10.18%	85	4	12	16	14.60%	218	4	16	20	22.13%	417	12	42	54	15.52%
10 to 11 PM	111	4	7	11	9.91%	88	4	1	5	15.12%	216	2	4	6	21.93%	415	10	12	22	15.44%
11 to 12 AM	110	3	5	8	9.82%	84	0	2	2	14.43%	213	9	5	14	21.62%	407	5	13	24	15.15%
Maximum				227					103					144					474	
Hour of Maximum				4 to 5 PM					4 to 5 PM					4 to 5 PM					4 to 5 PM	

D. Update on Peak PM Driveway Counts At The Three Garages

City requested for an updated peak PM driveway count at the three garages, and comparison to Table 3 in the May 20, 2013, University Traffic Agreement Compliance memo.

Findings show that trips at the three garages have decreased by 28%, between 2013 and 2024. Higher decreased was seen at 55 Franklin Garage with a reduction in evening trips of almost 40%.

Table 7 University Park Evening Peak Hour - Inbound/Outbound Garage Vehicle Trips (Table 3 in 2013 analysis)

	30 Pilgrim Garage	55 Franklin Garage	80 Landsdowne Garage	Total All Garages
2013 Compliance Memo (PM Peak Hour)	126	231	303	660
2024 Existing Conditions (PM Peak Hour)	103	144	227	474
Difference	*-23*	*-87*	*-76*	*-186*
	(-18%)	*(-38%)*	*(-25%)*	*(-28%)*

E. Demonstrate - Trip Generation is below 1,700 Evening Trips Threshold

Per the 1988 permitting documents, a cap of 1,700 vehicle trips during the evening peak hour was established for University Park development parcels. This study will confirm and document that the proposed 350 Massachusetts Ave Project will not be exceeding the historical trip cap.

In 2002, Forest City (then owner of University Park) provided an analysis to demonstrate that the first phase of the build out of University Park generated less than 1,500 evening peak hour vehicle trips. Since this threshold of 1,500 evening peak hour trips was not exceeded, the remainder of University Park was then approved to proceed with the Full Build out. Accordingly, the threshold was increased to 1,700 evening peak hour vehicle trips.

In 2013, the 300 Massachusetts Ave Project was added to the University Park campus and another analysis related to the trip threshold was provided. The results of the update indicated that the University Park active developments in 2013 and the proposed uses at 300 Massachusetts Ave would result in 1,148 total vehicle trips in the evening peak hour. This number is well below the 1,700-vehicle threshold set for the full development of University Park.

The current 2024 update for the 350 Massachusetts Ave Project, similar to previous updates, shows that the total evening trip number will not exceed the limit of 1,700 vehicle trips during the evening peak hour. Specifically, the result of the analysis indicates that the proposed change in use at 350 Massachusetts Ave is projected to generate a net-reduction of -50 evening peak hour inbound and outbound vehicle trips. Trip generation methodology presented in section below. With the current University Park generating 1,148 vehicle trips during peak hour (as established in 2013 update), a reduction of 50 trips for 350 Massachusetts Ave Project results in a **new total trip level of 1,098 evening vehicle trips** for the full development of University Park.

This number of 1,098 trips falls well below the threshold of 1,700 evening peak hour vehicle trips established by the City of Cambridge in Section 15.325.v of the Traffic Mitigation Agreement.

Part II. "Provide a transportation circulation plan focused on the following elements of the proposed changes to the 350 Massachusetts Avenue building."

A. Loading Plan

City: Loading plan and delivery plan for the building to accommodate a R&D use, including delivery of air gas and flammable materials commonly used for R&D buildings.

Response: Truck turning diagrams are provided in the Appendix.

B. Access Plan

City: Access plan for pedestrians, bikes, and transit riders, including bike parking plan for employees.

Response: Figure 1 provides a Proposed Site plan for 350 Massachusetts Ave.

Included are the following elements:

- Primary pedestrian access at the corner of Mass Ave at Sidney St.
- Bike room with parking for employees for 30 spaces with direct access off Sidney St.
- Loading and service access/egress off Blanche St (entering via Green St and exiting via Mass Ave).
- Nearby MBTA bus routes which stop in front of the site on Mass Ave.
- Nearby MBTA Red Line at Central Square station stop located 3 tenths of a mile from the site.
- Nearby Bluebikes bikeshare station located on Sidney Street

C. Site Plan

City: Site Plan: Provide an engineering site plan of site including existing frontages of Sidney and Mass. Ave. Show property lines, street trees, poles, signs, MBTA bus stops, and any items on the sidewalk.

Response: Figure 2 provides an existing survey plan and Figure 3 is a Civil Engineer plan showing proposed conditions for 350 Massachusetts Ave. Included are all property lines, street trees, poles, signs, MBTA bus stops, and any items on the sidewalk.

- How will the project support and not preclude changes to the Mass. Ave frontage as documented in the Bike network vision and CSO (e.g., consider a floating bus stop, raised and protected bike lanes).

  Response: The project will not preclude changes to the Massachusetts Avenue frontage as documented in the Bike network vision and CSO.

- How will the project support bike, pedestrian and transit conditions for site employees and visitors.

  Response: The project will support bike, pedestrian and transit conditions for site employees and visitors in the following ways through its site plan:

  - Bike room with parking for employees for 30 spaces with direct access off Sidney St

In addition, the project proposes a comprehensive TDM plan to promote alternative modes and reduce reliance on single-occupancy vehicles. The TDM plan is documented under Section (e), below.

- How will the Project activate Blanche St as had been previously proposed.

  Response: The Project proposes flexible seating on Blanche Street. Blanche Street seating will be managed so as not to impact loading and service at either 300 or 350 Mass Ave. 20ft clear will be maintained for Cambridge Fire access to the site.

D. Parking Plan

City: Determine the parking need for the 350 Mass. Avenue building and demonstrate that University Park can accommodate the demand at the proposed parking location (55 Franklin Street Garage). This may include ways to minimize parking demand by encouraging walking, biking, and transit over driving to work.

Response: Existing motorists of the 350 Massachusetts Ave building park at 55 Franklin Street garage. Motorists of the proposed project are also expected to park at this location. As previously stated, the project is expected to have a net-reduction in vehicle trips (-50 during the morning peak hour and -46 during the evening peak hour). With this, the 55 Franklin Garage may experience a reduction in use with the project in place, and no additional parking spaces are expected to be utilized as a result of the project.

E. TDM Plan

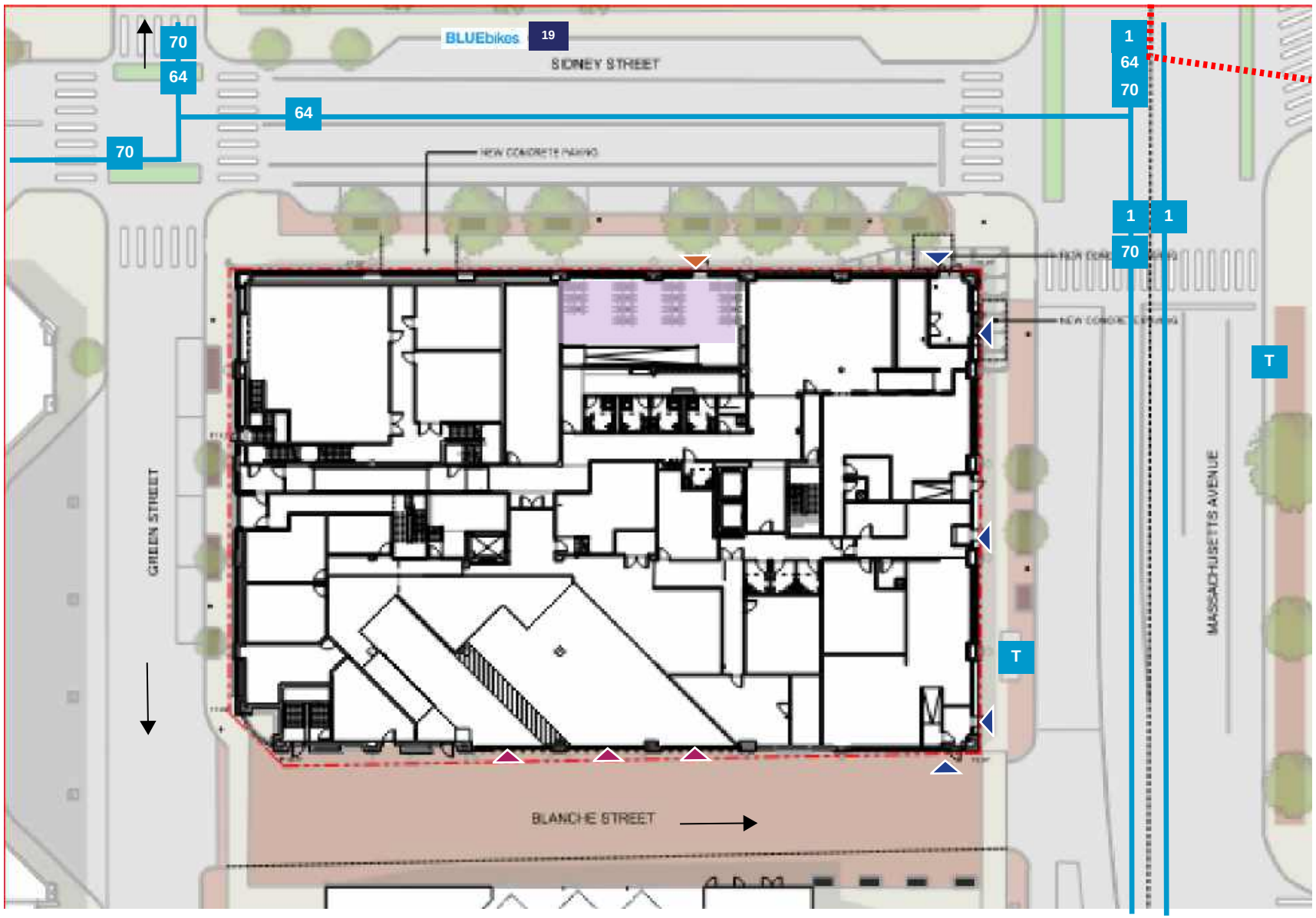
City: Document the current and proposed transportation mitigation for University Park – including what TDM measures will be provided for the 350 Mass. Ave building. For buildings covered by a PTDM Plan or Special Permit TDM requirements, only a summary of the requirements and their source is necessary. If different for different buildings or user groups explain why.

Response: The 350 Mass Ave building, is expected to be subject to the following TDM measures, similar to **Buildings under Phase IV of the University Park, per their** PTDM Ordinance Final Decision (F-10) dated August 26th, 1999:

- Designate an Employee Transportation Coordinator (ETC) to assist with marketing and promotion of sustainable transportation modes. Publish a quarterly newsletter/bulletin to provide employees with information about alternative modes.
- The ETC will compile and provide to tenants up-to-date transportation packets explaining all commute options for distribution to all existing and new employees as part of their orientation package.
- Require each new tenant to charge market rate parking, offer transit subsidies, and provide incentives for all non-SOV commuters.

Figure 1: Project Site

350 Massachusetts Avenue | Cambridge, MA



Source: VHB Survey 9/9/2024, Dimella Shaffer Site Plan, MBTA System Map.

Sewer and Water Infrastructure

Infrastructure

The following narrative describes the existing and proposed infrastructure systems within and surrounding the Project Site and discusses utility requirements for the Project and potential impacts to the infrastructure.

The project will connect to existing City of Cambridge and private utility company systems in the adjacent public streets. As design progresses, the project will coordinate with the proper agency to ensure that the final design meets all the applicable protocols and design standards to service the building.

The systems described herein include those owned and managed by City of Cambridge Department of Public Works (DPW), Cambridge Water Department (CWD), Eversource Electric, Eversource Gas & private telecommunications systems. Existing infrastructure systems will be reviewed with the proper agencies to ensure that they are adequately sized to accept any increase in demand associated with the Project.

Sewer and Water Infrastructure

Sanitary Sewer Infrastructure

The Project Site currently consists of a 5-story office building with a first-floor restaurant and retail uses. The Project design will renovate the interior existing building structure from office to lab use with some retail/restaurant use remaining on the first floor.

The existing building sanitary sewer is connected to the DPW sanitary sewer system via an existing 4-inch and existing 6-inch sanitary service into the 8-inch vitrified clay sewer main in Blanche Street, abutting the Project site. The existing sanitary services will be maintained in the redeveloped building. Two new 4-inch PVC sanitary services are proposed from the building to the existing 8-inch sanitary main in Blanche Street to serve the new office and restaurant.

The Project's sanitary sewer generation has been estimated using design sewage flow rates obtained from 310 CMR 15,00: Septic Systems ("Title 5"). The following flow criteria has been evaluated for existing and proposed anticipated gallons per day (GPD) of sanitary sewer usage:

- 75 GPD per 1,000 SF for Office
- 200 GPD per 1,000 SF of Wet Lab
- 75 GPD per 1,000 SF for Back-of-House
- 35 GPD per one (1) Seat of Restaurant
- 50 GPD per 1,000 SF of Retail

The Project, as designed, will generate approximately 19,370 GPD of sanitary sewer compared to 15,322 GPD in the existing conditions. This is a net increase of approximately 4,048 sanitary sewer generation and is summarized in Table 1, below.

The sanitary sewer generation threshold for local Cambridge DPW Inflow/Infiltration (I/I) mitigation is 15,000 GPD of net new sanitary flow. Based on the calculations, the project does not anticipate I/I mitigation.

Table 1 Preliminary Sanitary Sewer Generation

Program Type	Unit/ Area	DEP Category	Generation Rate*	Total Generation *(GPD)*
Existing Program				
Retail	9,288 SF	Retail Use	50 GPD / KSF	464
Office	93,230 SF	Office Building	75 GPD / KSF	6,992
Lobby/BOH	16,670 SF	Office Building	75 GPD / KSF	1,250
Restaurant	189 Seats	Restaurant***	35 GPD / Seat	6,615
			Existing Total	**15,322**
Proposed Program				
Retail	1,293 SF	Retail Use	50 GPD / KSF	65
Office	34,980	Office Building	75 GPD / KSF	2,624
Wet Lab	52,470 SF	Lab**	200 GPD / KSF	10,494
Restaurant	86 Seats	Restaurant***	35 GPD / Person	3,018
Lobby/BOH	42,270 SF	Office Building	75 GPD / KSF	3,170
			Proposed Total	**19,370**
			Net New Sewer Flow	**4,048**
			Net New Water Demand	**4,453**

* 314 CMR7.00 Sewer System Extension and Connection Permit Program.
** Assumed lab use rate.
*** Restaurant seating capacity assumes 30 SF per 1 occupant

Water Service Infrastructure

The domestic water estimate for the Project is based on the projected approximate daily wastewater flow for the project. As shown in Table 1 above, the approximate net new demand for water is 4,453 GPD.

The existing building domestic water and fire protection services are located off Blanche Street and connect to the CWD 20-inch cement lined ductile iron (CLDI) municipal water main. Record drawings from the City of Cambridge show two water services to the building off Massachusetts Avenue. These water lines existence will be verified during

construction and cut and capped. The Project site has a City of Cambridge fire hydrant in proximity to the loading dock that will remain in the proposed condition. The Project will maintain the existing fire service and provide a new 6-inch domestic water service off Blanche Street.

The Project will coordinate with Cambridge Water Department as the design progresses and will submit plot plans to Cambridge Water Department prior to building permit for the Project. The new 6-inch water service will provide a new tee at the CWD water main. The existing domestic service connection to be discontinued will cut out the existing anchor tee at the water main and replace with new water pipe, following CWD standards.

Stormwater Management

Under existing conditions, the Project Site is previously developed and consists mostly of impervious roof area as a zero-lot line building. The existing building connects directly to the DPW storm drain system via a 15-inch reinforced concrete pipe at the corner of Green Street and Sidney Street and has no stormwater management system or water quality treatment prior to discharge.

The proposed stormwater management system will be designed to fully comply with the MA DEP Stormwater Management Policy and to comply with the City of Cambridge standards to the maximum extent practicable. Based on a meeting held with DPW on October 10, 2024, the Applicant intends to apply for a Stormwater Peak Rate and Volume waiver specific to the DPW “25 to 2” design standard, from the Land Disturbance Bylaw due to the limited site area, existing column footings, and structural capacity of the existing columns and roof load limiting the ability of the project to fully meet the City standards.

The proposed stormwater management design will install a below slab infiltration system sized to infiltrate the one-inch storm event. It is anticipated that the entire roof area will flow through this infiltration system to provide phosphorous removal and water quality improvement prior to discharge to the municipal system. The overflow from this system will tie into the existing 24-inch reinforced concrete pipe (RCP) in Sidney Street to the Massachusetts Avenue drainage system. This system will reduce peak rate of runoff and volume of stormwater in all events and will reduce the volume of water in the Sidney/Green Street drainage system by connecting to the Massachusetts Avenue system per DPW request.

The Project will include measures and specifications regarding erosion and sediment controls and barriers in the construction documents. Construction dewatering discharges will be appropriately controlled and discharged in accordance with National Pollutant Discharge Elimination System (NPDES) and state and local dewatering standards.

The Project anticipates detailed design review with DPW throughout the design process. The detailed stormwater management design is described in the Land Disturbance waiver request, submitted to DPW under separate cover.

Cambridge 2070 Resiliency

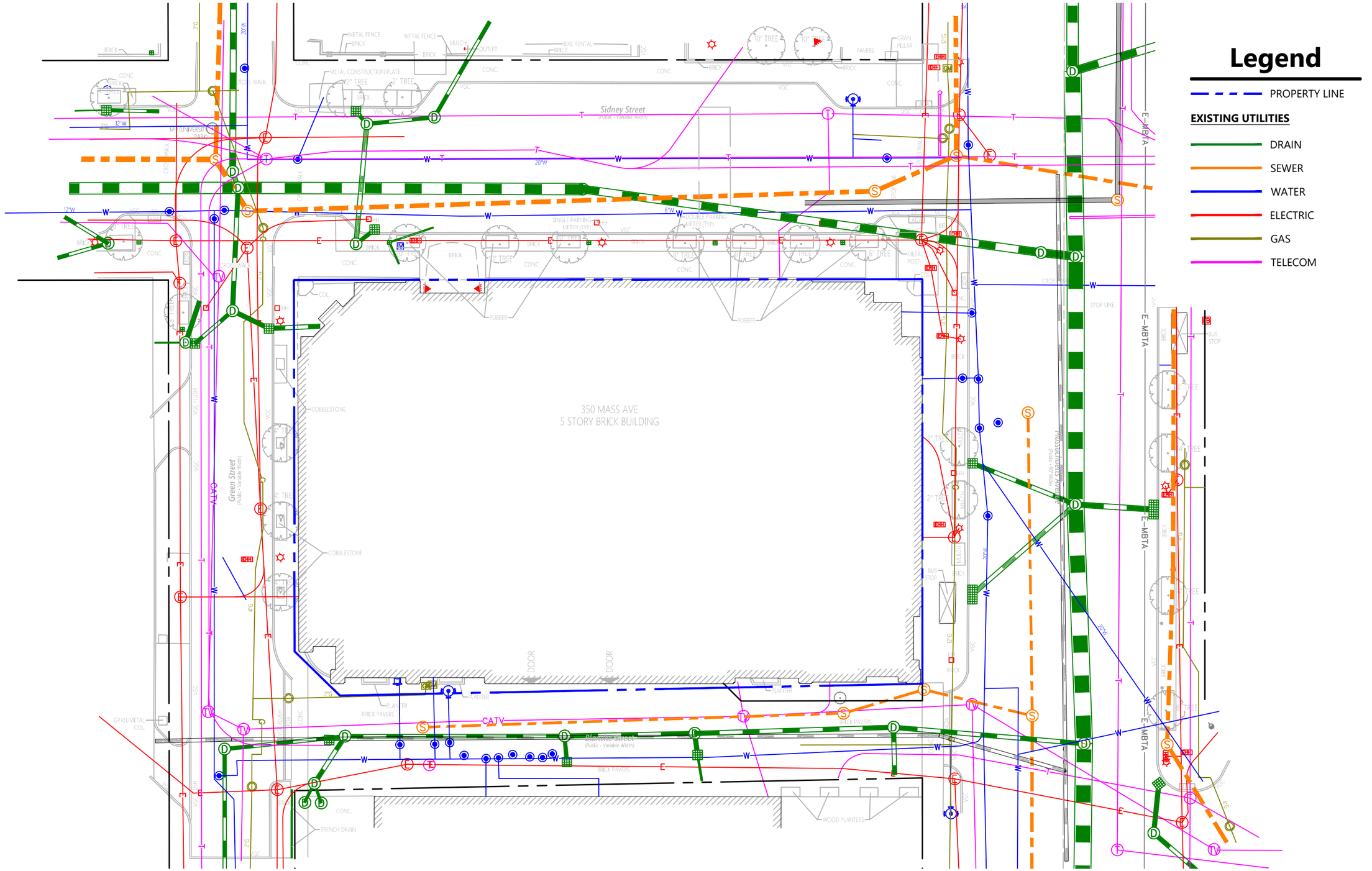
The City of Cambridge has developed the Climate Change Preparedness & Resiliency Plan (CCPR) which was incorporated into Zoning in February 2023. The Project team reviewed the 2070 Long Term Flood Elevations (LTFE's) with the current Cambridge Flood Viewer for both Precipitation and Sea Level Rise / Storm Survey (SLR/SS). In review of the existing Project Site, the current 2070 10-year LTFE is equal to elevation 20.40 CCB and the 2070 100-year LTFE is equal to elevation 23.3 CCB.

As a zero-lot line condition, the Project is limited by the existing street elevations which are below the flood elevations. To comply with Cambridge resiliency standards, the Project has proposed lobbies that will be set at the existing street elevation and ramp up interior to the building to elevation 20.50, above the 10-year LTFE. Around the building, the sill will be set above the 2070 10-year LTFE to protect the first-floor area from flooding. All critical equipment will be protected from the 100-year LTFE. The final design of this protection is being coordinated with DPW and will be submitted in a resiliency memorandum, under separate cover.

Other Utilities

In addition to water service and stormwater management infrastructure, the proposed renovation will also require natural gas, electrical, and telecommunication services, which are available via connections to the existing 350 Massachusetts Avenue. The project is proposing a new Eversource vault room at the corner of Sidney and Green Street. The Green Street Garage and Le Meridien Hotel are currently serviced by the existing vault room. The project will work with Eversource and DPW to separate these services, if required by Eversource Electric, and coordinate the electrical service for these buildings.

The existing natural gas meter will be replaced and upgraded by Eversource Gas in the same approximate location as the current location off Blanche Street.



Legend

- PROPERTY LINE

EXISTING UTILITIES

- DRAIN
- SEWER
- WATER
- ELECTRIC
- GAS
- TELECOM

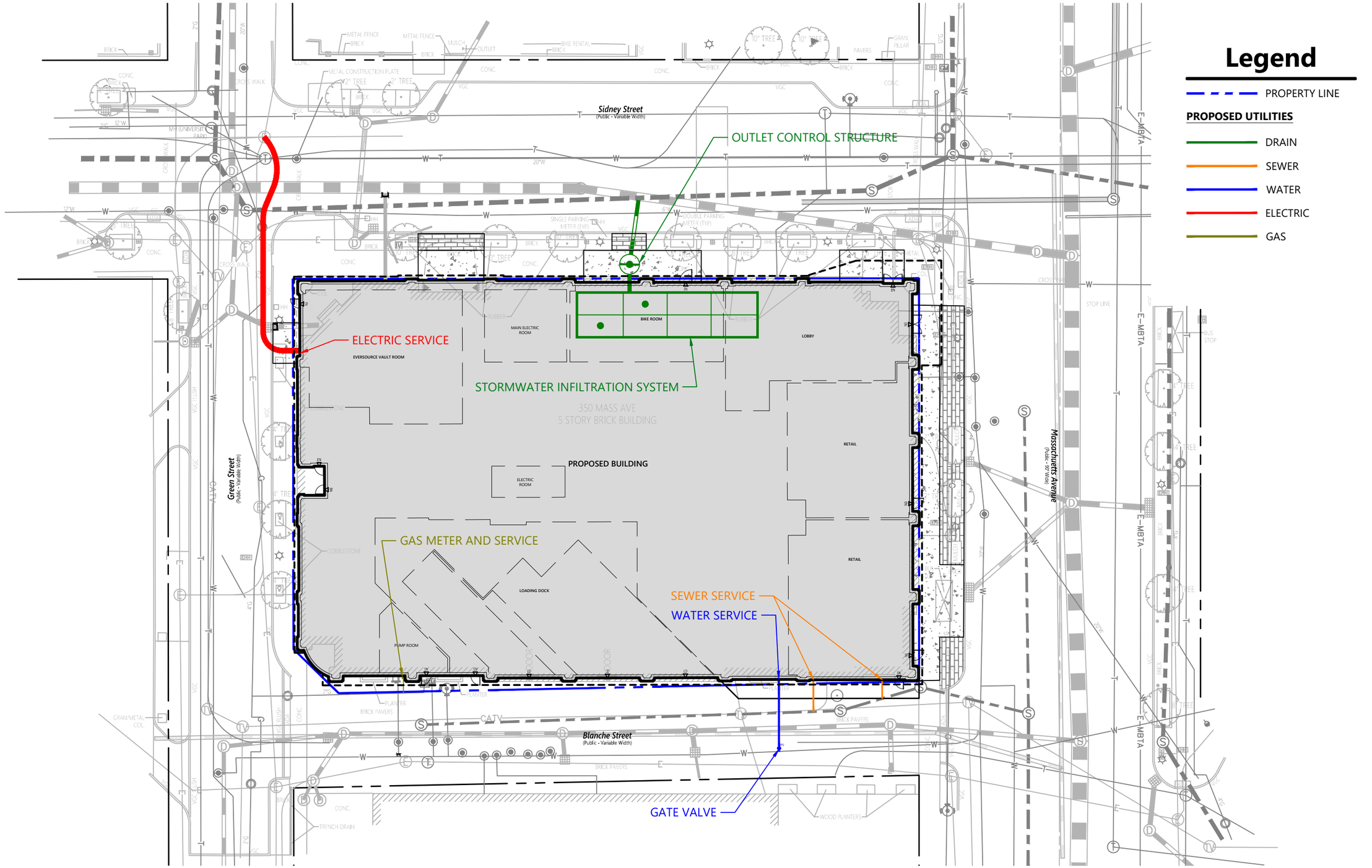
0 15 30 Feet

vhb

350 Massachusetts Avenue
Cambridge, Massachusetts

Existing Utilities

December 2024



Legend

PROPERTY LINE

PROPOSED UTILITIES

DRAIN

SEWER

WATER

ELECTRIC

GAS

0 15 30 Feet

350 Massachusetts Avenue
Cambridge, Massachusetts

Proposed Utilities

December 2024

Noise Mitigation Narrative

BioMed Realty REDGATE DIMELLA SHAFFER

October 18, 2024

Mr. David Godfroy
DiMella Shaffer
24 Farnsworth Street
Boston, MA 02210

SUBJECT: 350 Massachusetts Avenue, Cambridge, MA
Environmental Sound Study

Dear Mr. Godfroy,

Cavanaugh Tocci Associates has evaluated the environmental sound impact associated with the proposed renovation project at 350 Massachusetts Avenue in Cambridge, MA. The building is being renovated from an office building to a shell & core mixed-use lab/office building with retail/food service space on the first floor and a new mechanical penthouse. New mechanical equipment will be located both in the penthouse and on the rooftop of the building. The objectives of this evaluation were:

- To define acoustic design goals based on applicable noise regulations, and the results of a baseline sound survey.
- To estimate and evaluate the acoustic impact of the proposed project in the surrounding community.

This review is based on progress DD drawings dated 9/11/2024 and preliminary HVAC equipment selections, with available sound data provided by the mechanical engineer. Results of the evaluation are summarized herein. Appendix A provides a glossary of acoustic terminology used in this report.

Background Sound Level

Sound is a feature of all environments. Sound is only objectionable when it is inconsistent with its environment; by being either too loud or by being distinctive in character (i.e. tonally or temporally varying). The goal of acoustical design is to render facility noise consistent with the level and character of other sounds in the environment. To this end, the following environmental noise analysis evaluates sound produced by the proposed Project in light of existing environmental sound levels.

In order to document typical background sound levels in the project area, we performed continuous sound monitoring at two locations at the Project site for a weeklong period (September 20 through September 26, 2024). Figure 1 is an aerial photograph indicating the Project area and the location of the sound monitors on the roof of the existing building; SM1 along Massachusetts Avenue and SM2 along Sidney Street. The results of the survey allow both quantitative and qualitative analyses of the acoustic environment surrounding the Project.

Figures 2 and 3 present the results of the continuous monitoring. The acoustic environment in this area is dominated by traffic noise on local roads. Measured background sound levels ($L_{A90\ 1\text{-}hour}$) range between 55 dBA and 62 dBA at the SM1 and between 52 dBA and 64 dBA at SM2. Higher levels occurred during daytime hours due to existing mechanical equipment on the roof near the monitors, particularly

at SM2. The lowest levels occur during late night and early morning hours when mechanical equipment is off and traffic is at a minimum.

Applicable Noise Regulations and Zoning

City of Cambridge Noise Control Ordinance

Chapter 8.16 –of the City of Cambridge Code[1] is a noise control ordinance. Section 8.16.060 applies to this Project and defines maximum A-weighted and octave band sound level limits for four receptor land use categories. These limits are presented below in Table 1 and apply at all adjacent receptor lot lines.

Table 1: City of Cambridge Zoning District Noise Standards

Octave Band	Residential Area		Residential in Industrial Area		Commercial Area	Industrial Area
Center Frequency (Hz)	Daytime	Other Times	Daytime	Other Times	Anytime	Anytime
31.5	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1000	50	40	56	45	56	61
2000	45	33	51	39	51	57
4000	40	28	47	34	47	53
8000	38	26	44	32	44	50
A-weight (dBA)	**60**	**50**	**65**	**55**	**65**	**70**
"Daytime" means the period between the hours of 7:00 a.m. to 6:00 p.m. daily except Sunday						

Zoning

The project site is located in and surrounded on three sides by the Cambridgeport Revitalization Development District (CRDD). The area across Massachusetts Avenue is zoned Business B (BB). The nearest residential buildings are located north across Massachusetts Avenue and west of the site at the corner of Sidney and Green Streets. The Le Meridien hotel is located south of the site across Green Street. Image 1 is an excerpt from the MIT Campus map showing the City of Cambridge Zoning.

[1] https://library.municode.com/ma/cambridge/codes/code_of_ordinances?nodeId=TIT8HESA_CH8.16NOCO

Project Acoustic Design Goals

City of Cambridge Noise Control Ordinance

"Residential Area" limits apply at the nearest residential receptors (residential buildings and hotel) around the Project. Since the proposed rooftop mechanical equipment is expected to operate at any time of day, this implies an A-weighted sound level limit at residential receptors of 60 dBA during daytime and 50 dBA during nighttime and all day Sunday.

All other receptors surrounding the site are subject to the "Commercial Area" limit of 65 dBA at any time.

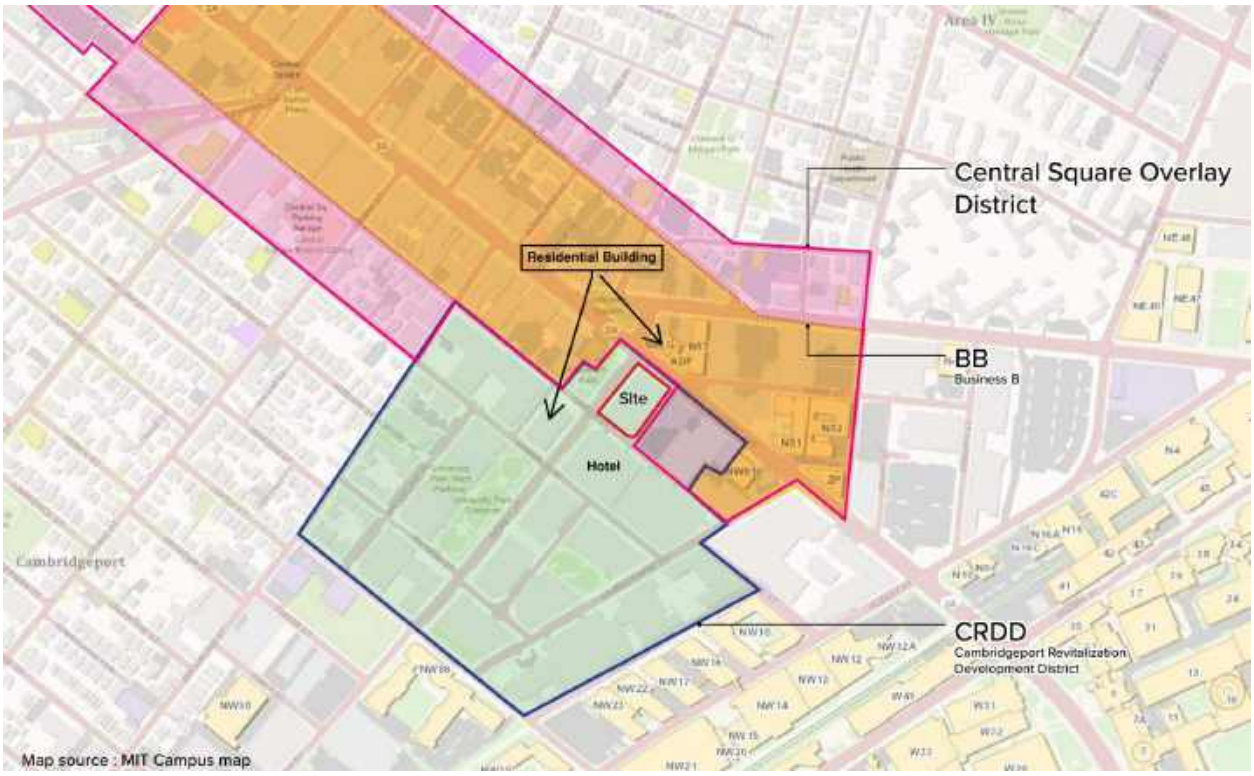


Image 1. Cambridge Zoning – 350 Massachusetts Avenue

Project Sound Analysis

Project-related sound impacts that are associated with the emergency generator have been calculated using CadnaA environmental sound modeling software (Version 2024 MR1 DataKustic GmbH). The CadnaA sound modeling software uses algorithms and procedures described in International Standard ISO 9613-2:1996 "Acoustics- Attenuation of sound during propagation outdoors – Part 2: General method of calculation". This standard and its associated methodology are the most universally accepted approach for environmental sound modeling of industrial and transit sound sources. The methodology described in this standard provides estimates of A-weighted sound levels for meteorological conditions that are favorable for the propagation of sound (downwind with a wind speed of 1-5 meters/sec). This

methodology is also valid for sound propagation under well-developed moderate ground-based temperature profile inversions, which commonly occur on clear calm nights.

Using sound data provided by the project mechanical engineer, we created sound sources for all exterior mechanical equipment. Examples of exterior sound sources can include unit-radiated sound and exhaust/intake unit openings. All equipment was modeled operating at full capacity, with no reductions for nighttime/weekend operation. Sound data is attached in Appendix B. In our model we included the following exterior mechanical equipment:

- Ten (10) Heat Pumps – HP-1 through HP-10 based on Flow Environmental Systems selections
- One (1) exhaust air handling unit with four (4) exhaust fans – EAHU-1 and EF-1 through EF-4 (N+1 configuration), based on MK Plastics selections. The exhaust fans include discharge stack silencers.
- Four (4) Kitchen Exhaust Fans – KEF-1 through KEF-4, based on Captiveaire selections

Penthouse Equipment: Air handling units serving the building are located in the penthouse with a large plenum and louvers along Blanche Street for air intake and exhaust discharge. Sound data for equipment located in the penthouse is not currently available. Once available, these units will be reviewed to ensure compliance with the Cambridge Noise Control Ordinance.

- Two Air Handling Units – AHU-1 and AHU-2
- One Dedicated Outdoor Air Unit – DOAS-1

Figure 4 presents the results of acoustic modeling for the exterior rooftop mechanical equipment listed above. The analysis includes a 14-foot high screen along the Green Street roof edge and the southern portion of the Blanche Street roof edge as shown in Figure 5. A louvered screen will be installed along the Sidney Street roof edge to allow for air intake to the heat pumps. This screen was not included in our analysis but is expected to result in lower sound levels at receptors along Sidney Street.

Table 2 below provides a summary of our estimates of rooftop mechanical equipment A-weighted sound levels at relevant receptors. The data indicates that with the exhaust fan discharge stack silencers and rooftop screen the Project will comply with the A-weighted sound level limits of the Cambridge Noise Ordinance.

Estimated HVAC equipment sound levels at nearest receptors are lower than the measured existing background sound levels in the vicinity of the project, which were 52-55 dBA.

TABLE 2
Estimate of Rooftop Equipment Sound Levels at Surrounding Receptors (dBA)

Receptor	Description	Estimated Sound Level	Cambridge Limit
R1	Residential – 355 Massachusetts Avenue	45	**Day – 60 dBA Night – 50 dBA**
R2	Residential – 23 Sidney Street	38	
R3	Residential (Hotel) – 20 Sidney St	46	
C1	Commercial (Office/Lab) – 294-310 Massachusetts Avenue	47	**65 dBA**
C2	Commercial (Office) – 408 Massachusetts Avenue	36	
C3	Commercial (Fire Station) – 380 Massachusetts Avenue	38	
C4	Commercial – 323 Massachusetts Avenue	34	

Emergency Generator

A 1300 kW generator is proposed for the building and will be located north of the EAHU along the Blanche Street side of the roof. The generator will be specified with an acoustical enclosure that will result in compliance with the Cambridge Noise Control Ordinance at all surrounding receptors.

Conclusion

Cavanaugh Tocci has determined that sound produced by proposed exterior mechanical equipment at the 350 Massachusetts Avenue renovation project in Cambridge, MA, based on preliminary HVAC equipment selections and available sound data, is expected to comply with the limits set forth in the Cambridge Noise Control Ordinance at nearest receptor locations.

As design progresses and equipment is substituted/modified, we will update our analysis and noise control recommendations, as needed, to account for these changes and ensure compliance with the Cambridge Noise Control Ordinance.

We appreciate the opportunity to work with you on this project. Please do not hesitate to contact us with any questions.

Sincerely,
CAVANAUGH TOCCI

Aaron M. Farbo, *Principal Consultant*
afarbo@cavtocci.com
24181/350 Massachusetts Avenue Cambridge Environmental Sound Study Report 1a.docx

FIGURES

Figure 1

CAVANAUGHTOCCI

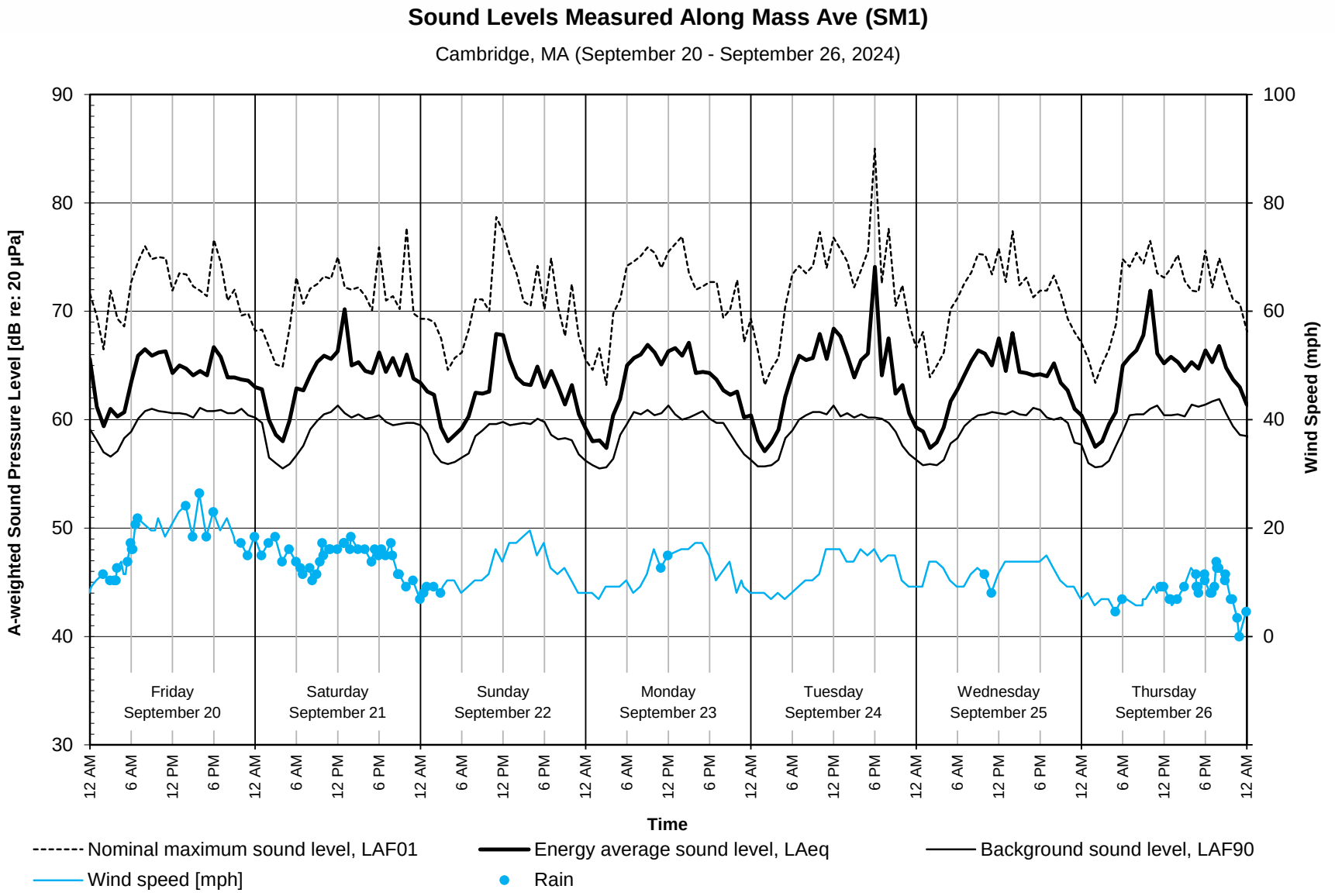

Sound Levels Measured Along Mass Ave (SM1)
Cambridge, MA (September 20 - September 26, 2024)
A-weighted Sound Pressure Level [dB re: 20 µPa]
Wind Speed (mph)
90
80
70
60
50
40
30
100
80
60
40
20
0
Friday September 20
Saturday September 21
Sunday September 22
Monday September 23
Tuesday September 24
Wednesday September 25
Thursday September 26
12 AM
6 AM
12 PM
6 PM
Time
Nominal maximum sound level, LAF01
Energy average sound level, LAeq
Background sound level, LAF90
Wind speed [mph]
Rain

Figure 2

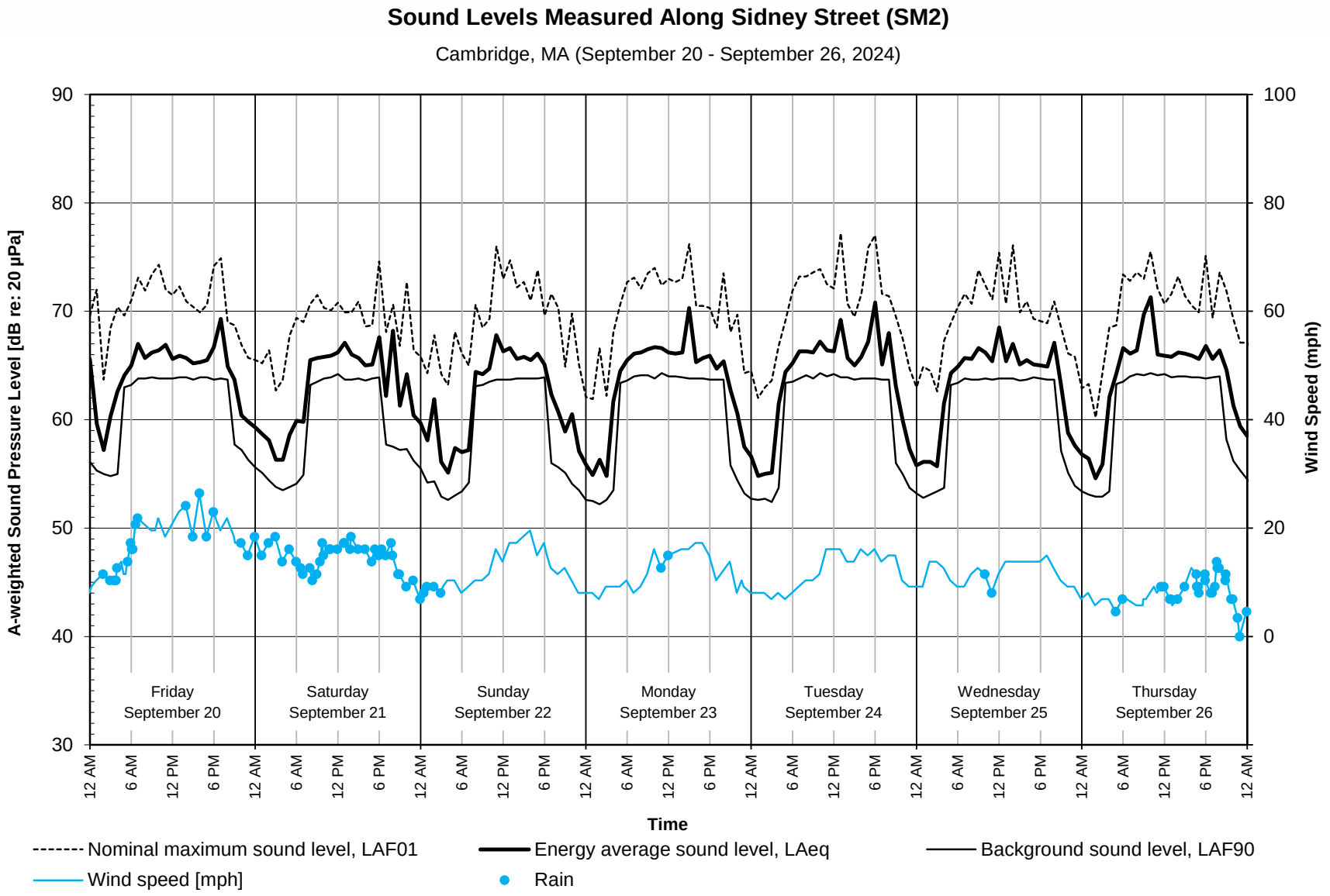

Sound Levels Measured Along Sidney Street (SM2)
Cambridge, MA (September 20 - September 26, 2024)
A-weighted Sound Pressure Level [dB re: 20 µPa]
Wind Speed (mph)
90
80
70
60
50
40
30
100
80
60
40
20
0
Friday September 20
Saturday September 21
Sunday September 22
Monday September 23
Tuesday September 24
Wednesday September 25
Thursday September 26
12 AM
6 AM
12 PM
6 PM
Time
Nominal maximum sound level, LAF01
Energy average sound level, LAeq
Background sound level, LAF90
Wind speed [mph]
Rain

Figure 3

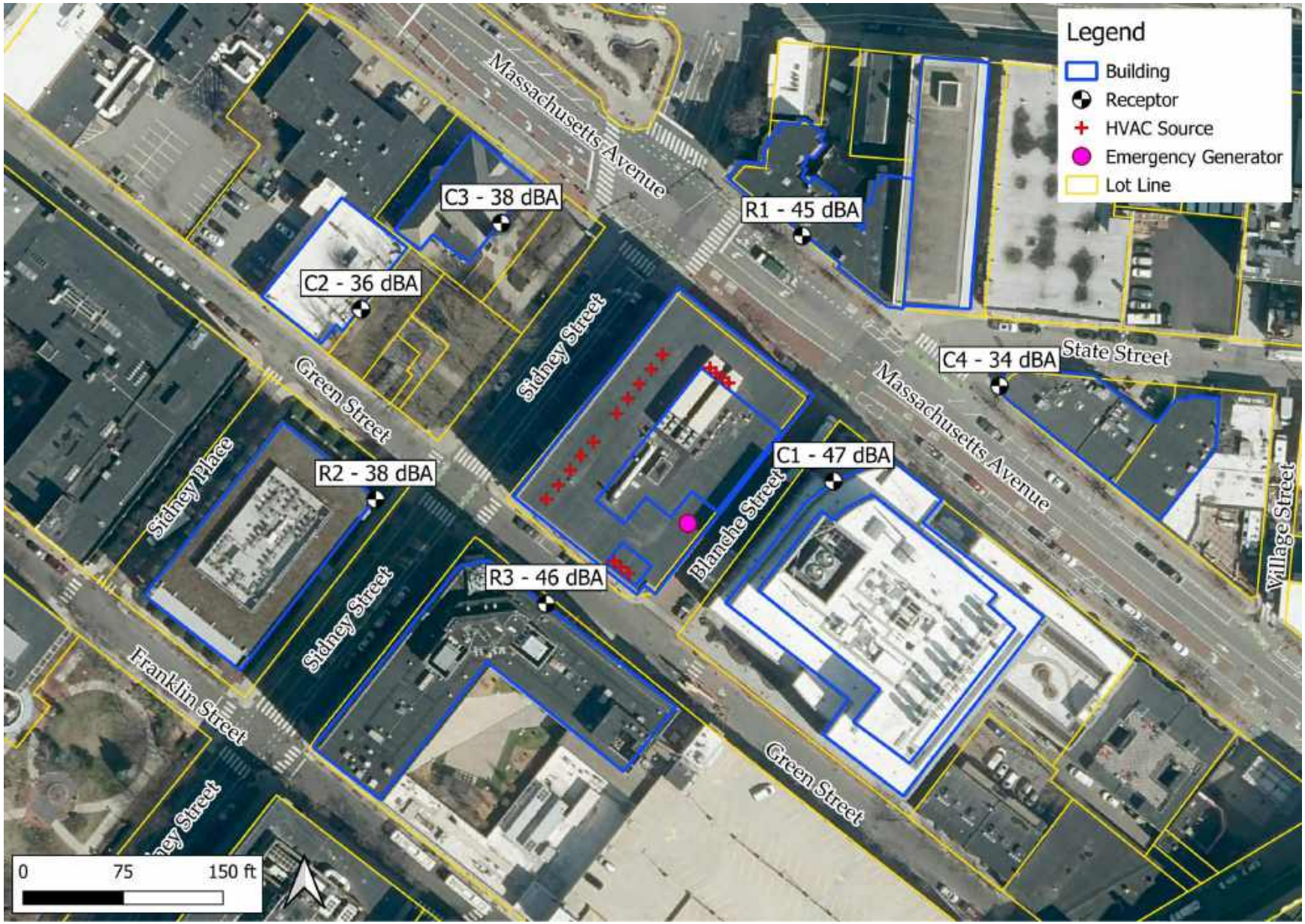

Legend
Building
Receptor
HVAC Source
Emergency Generator
Lot Line
C3 - 38 dBA
C2 - 36 dBA
R1 - 45 dBA
C4 - 34 dBA
R2 - 38 dBA
C1 - 47 dBA
R3 - 46 dBA
Massachusetts Avenue
Green Street
Sidney Street
State Street
Sidney Place
Blanche Street
Village Street
Franklin Street
0
75
150 ft

Figure 4

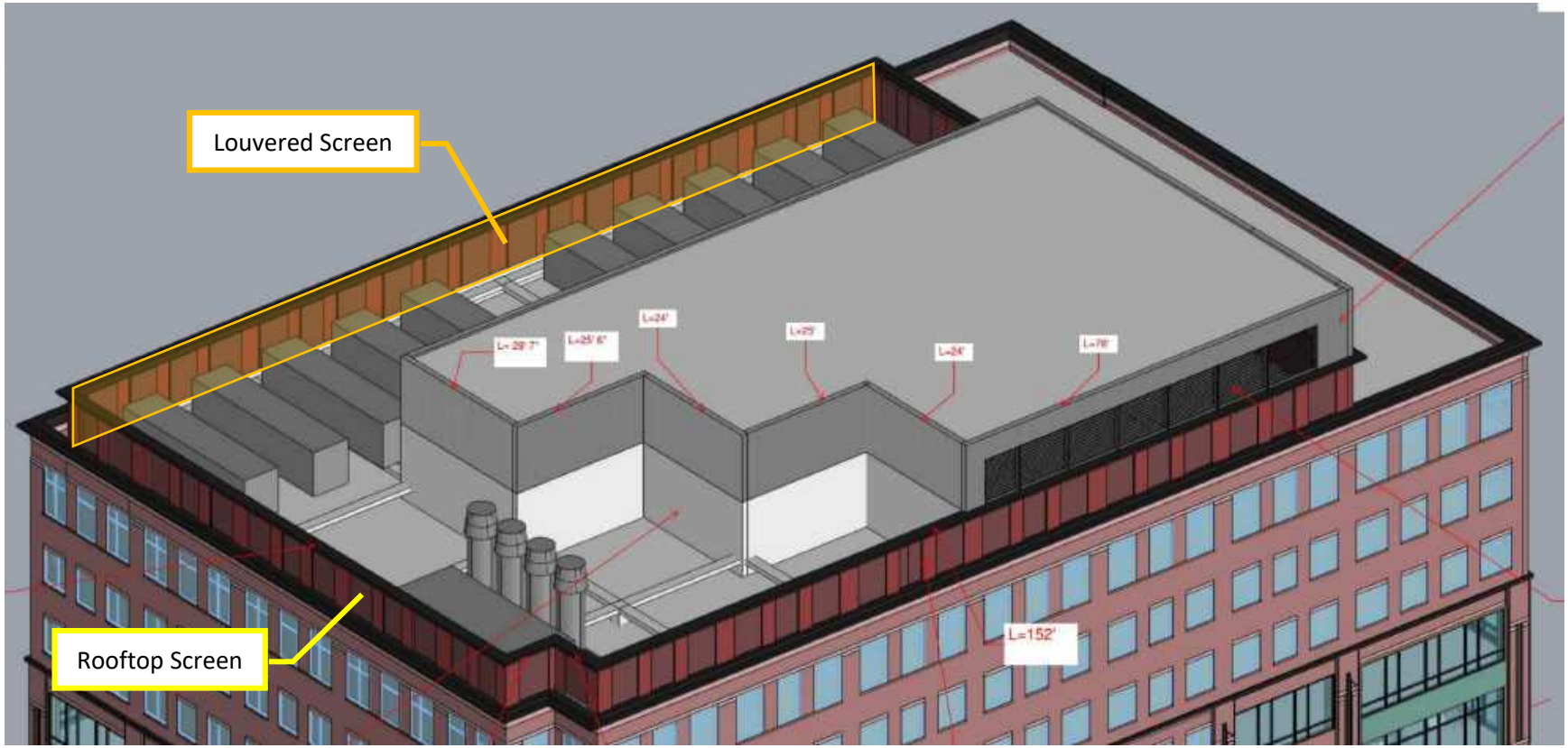


Figure 5

APPENDIX A

Sound Measurement Terminology

SOUND MEASUREMENT TERMINOLOGY

In order to quantify the amplitude, frequency, and temporal characteristics of sound, various acoustical descriptors are used. The following is an introduction to acoustic terminology that is used in this report.

Sound Level

Sound levels are typically quantified using a logarithmic decibel (dB) scale. The use of a logarithmic scale helps to compress the wide range of human sensitivity to sound amplitude into a scale that ranges from approximately 0 to 180 dB. Note however, that the use of the logarithmic scale prevents simple arithmetic operations when combining the cumulative impact of sources. For example, two sources of equal sound level operated simultaneously results in a combined sound level that is only 3 dB higher than if only one source was operated alone. An important feature of the human perception of continuous sound is that an increase or decrease in sound pressure level by 3 dB or less is barely perceptible, and an increase or decrease by 10 dB is perceived as a doubling or halving of noise level.

A-weighting

Generally, the sensitivity of human hearing is restricted to the frequency range of 20 Hz to 20,000 Hz. However, the human ear is most sensitive to sound in the 500 Hz to 5,000 Hz frequency range. Above and below this range, the ear becomes progressively less sensitive. To account for this feature of human hearing, sound level meters incorporate filtering of acoustic signals that corresponds to the varying sensitivity of the human ear to sound at different frequencies. This filtering is called A-weighting. Sound level measurements that are obtained using this filtering are referred to as A-weighted sound levels and are signified by the identifier, dBA. A-weighted sound levels are widely used for evaluating human exposure to environmental sounds. To help place A-weighted sound levels in perspective, Figure A-1 contains a scale showing typical sound levels for common interior and environmental sound sources.

Spectral Characteristics – Octave and 1/3 Octave Band Sound Levels

To characterize a sound, it is often necessary to evaluate the frequency distribution of the sound energy. As mentioned before, the frequencies of most interest where human exposure is concerned range between 20 Hz and 20,000 Hz. This frequency range is commonly divided into octave bands, where an octave band is a range of frequencies. Each octave band is referred to by its center frequency and has a bandwidth of one octave (a doubling of frequency). To cover the full range of human hearing, it is necessary to measure sound in 10 separate octave bands. Typically, the lowest frequency band measured has a center frequency of 31.5 Hz. The next frequency band has a center frequency of 63 Hz. This geometric series continues to the highest frequency band that has a center frequency of 16,000 Hz. A set of octave band sound levels to describe a particular sound is called an octave band spectrum. Covering the full range of hearing, an octave band spectrum would have 10 values, one for each band. Under certain circumstances, more frequency resolution in acoustical data is needed to identify the presence of tonal sounds. A 1/3 octave band spectrum uses filters that divide each octave band into 3 separate frequency bands. Note that octave band and 1/3 octave band sound levels are not usually A-weighted, with their units being dB.

Environmental Noise Descriptors

Sound levels in the environment are continuously fluctuating and it is difficult to quantify these time-varying levels with single number descriptors. Statistical approaches, which use *percentile sound levels* and *equivalent sound levels*, are often used to quantify the temporal characteristics of environmental sound.

Percentile sound levels (L_n) are the A-weighted sound levels that are exceeded for specific percentages of time within a noise measurement interval. For example, if a measurement interval is one hour long, the 50th percentile sound level (L_{50}) is the A-weighted sound level that is exceeded for 30 minutes of that interval.

- L_{90} is the sound level in dBA exceeded 90 percent of the time during the measurement period. The 90th percentile sound level represents the nominally lowest level reached during the monitoring interval and is typically influenced by sound of relatively low level, but nearly constant duration, such as distant traffic or continuously operating industrial equipment. The L_{90} is often used in standards to quantify the existing background or residual sound level.
- L_{50} is the median sound level: the sound level in dBA exceeded 50 percent of the time during the measurement period.
- L_{10} is the sound level exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The L_{10} is sometimes called the intrusive sound level because it is caused by occasional louder noises like those from passing motor vehicles or aircraft.

By using percentile sound levels, it is possible to characterize the sound environment in terms of the steady-state background sound (L_{90}) and occasional transient sound (L_{10}).

The equivalent sound level (L_{eq}) is the energy average of the A weighted sound level for the measurement interval. Sounds of low level and long duration, as well as sounds of high level and short duration influence this sound level descriptor.

Noise levels at night generally produce greater annoyance than do the same levels which occur during the day. It is generally agreed that a given level of environmental noise during the day would appear to be 10 dBA louder at night – at least in terms of potential for causing community concern. The day night average sound level (Ldn) is a 24 hour average A-weighted sound level where a 10 dB "penalty" is applied to sound occurring between the hours of 10:00 p.m. and 7:00 a.m. The 10 dB penalty accounts for the heightened sensitivity of a community to noise occurring at night.

When a steady continuous sound is measured, the L_{10}, L_{50}, L_{90} and L_{eq} are all equal. For a constant sound level, such as from a power plant operating continuously for a 24-hour period, the L_{dn} is approximately 6 dBA higher than the directly measured sound level.

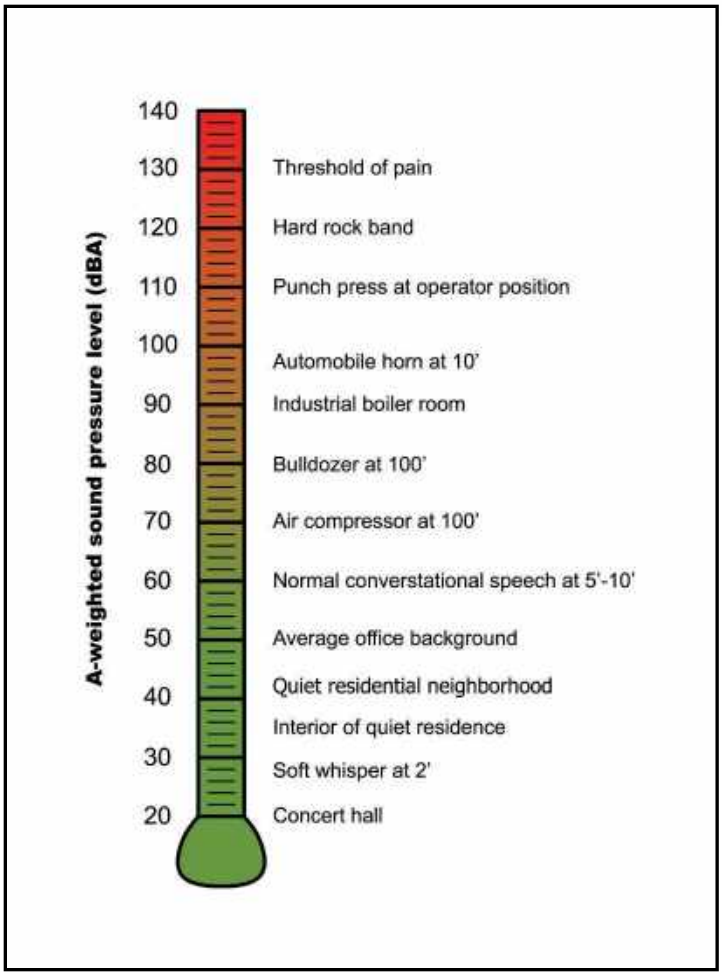


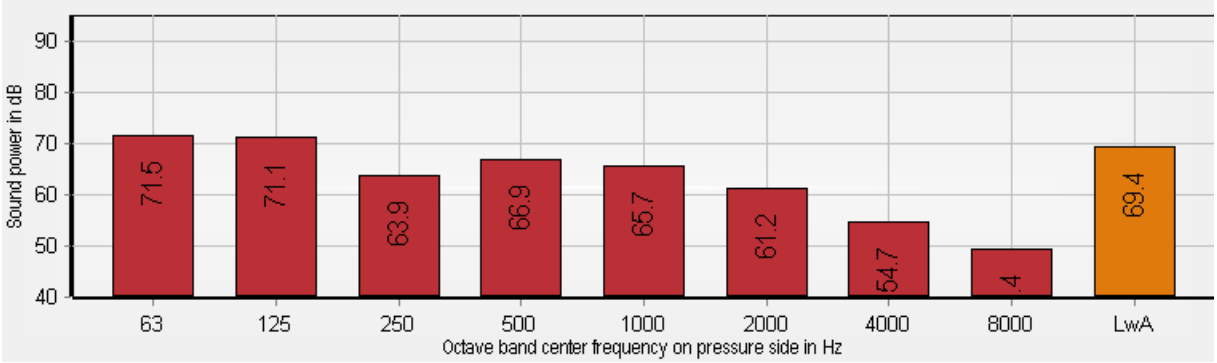
Figure A-1
Typical Sound Levels for Common Interior and Environmental Source

APPENDIX B

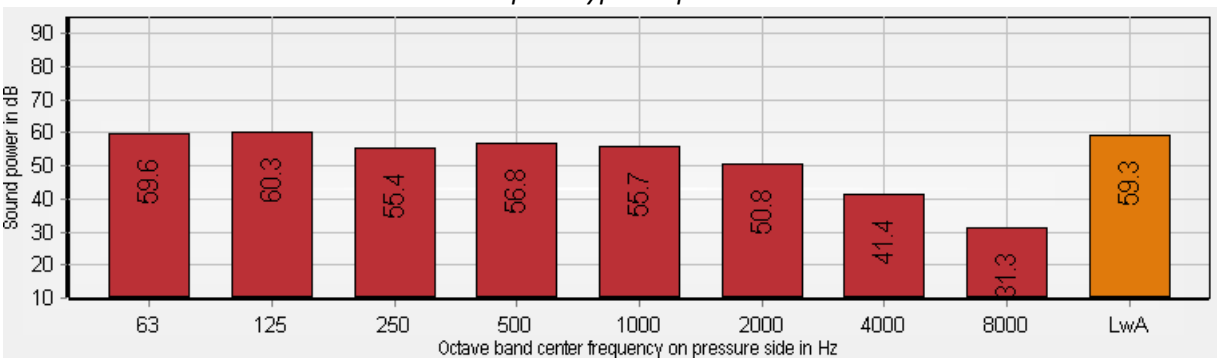
Equipment Sound Data

Heat Pumps

Full Load



50% speed typical operation



Compressors are just sound power but muted significantly by the cabinet. With the doors closed we experience about 58dbA sound pressure level at 1 m at rating conditions.

Sound Measurement	
Sound power level (-10°C / 90bar)	72dB(A) @ 60Hz
Sound pressure level @ 1m (-10°C / 90bar)	64 dB(A) @ 60Hz

EXHAUST FAN INFORMATION – JOB#7023460

FAN UNIT NO	TAG	QTY	FAN UNIT MODEL #	MANUFACTURER	CFM	ESP	RPM	MOTOR ENCL	HP	BHP	PHASE	VOLT	FLA	DISCHARGE VELOCITY	WEIGHT (LBS)	SONES
1	KEF-1	1	USB1240D-RM	CAPTIVEAIRE	5000	2.500	1197	DDP,PREMIUM	5.000	4.0050	3	460	6.9	1657 FPM	808	28.9
2	KEF-2	1	USB1240D-RM	CAPTIVEAIRE	5000	2.500	1197	TEFC,PREMIUM	5.000	4.0050	3	460	7.0	1657 FPM	800	28.9
3	KEF-3	1	USB1330D-RM	CAPTIVEAIRE	1000	1.500	1621	DDP,PREMIUM	1.000	0.5810	3	460	1.4	875 FPM	252	14.4
4	KEF-4	1	USB1330D-RM	CAPTIVEAIRE	1000	1.500	1621	DDP,PREMIUM	1.000	0.5810	3	460	1.4	875 FPM	252	14.4

MK PLASTICS CORPORATION
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SWITZERLAND Tel./ Fax 4133 654 9763
URL www.mkplastics.com

AXIJET-S 3650

US Patent No.5439349
CANADA Patent No.2,140,163
EUROPE Patent No.EP0713011
M.K. 2021 Version 15.3

Customer	.
Project	BMR - 350 MASS AVENUE, CAMBRIDGE
Engineer	GENESIS - NATE BOLTON
P.O. #	. **JOB #** .

Representative: DYNAMIC AIR

Date 08/22/24

Sys. No. EAHU-1 & 2 [EF 1-4 & 5-8]

Drawing . A

Revision .

FEI_T Based on
Default Motor Efficiencies ☑
Regulated Motor Efficiencies ☐

Model	AXIJET
Fan Size	3650
Dia.[in]	36.50
CFM	17947
SP	4.5
BHP	19.92
RPM	1146

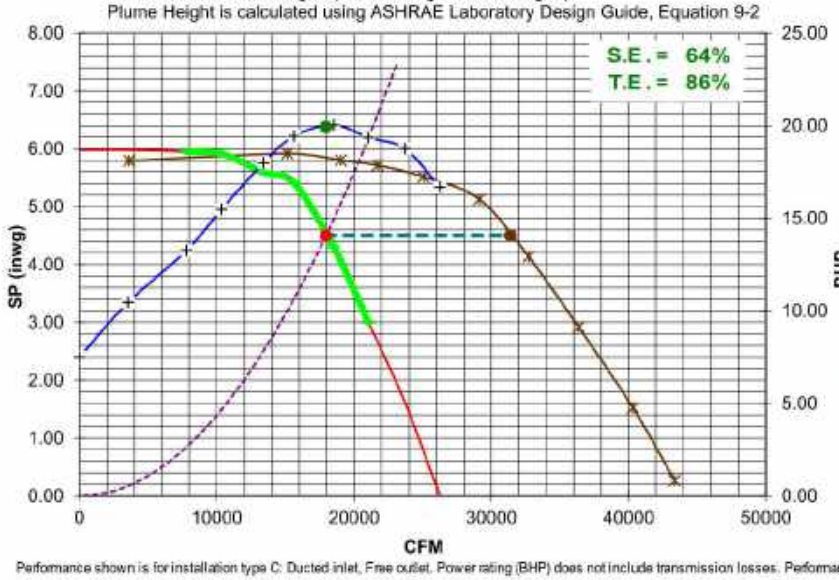
	10	[mph]
EH =	46.1	[feet]
PH =	32.9	[feet]
NV =	4971	[fpm]
WV =	2334	[fpm]
TF =	31395	[cfm]
TS =	10951	[fpm]
T =	70	[°F]
ALT =	0	[feet]

CLASS II WHEEL

Air performance

FEI_T = 1.39

TF=Total Flow; NV=Nozzle Velocity; WV=Windband Velocity; TS=Tip Speed
EH: Effective Plume Height. (Plume Height + Fan Height)
Plume Height is calculated using ASHRAE Laboratory Design Guide, Equation 9-2



Density : 0.075 lb/ft³

CFM-SP
System Curve
CFM-BHP
Total Flow-SP
15% Peak T.E.

FEG90

M.K. Plastics Corporation certifies that the models shown here in are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and 311 and comply with the requirements of the AMCA Certified Ratings Program.

Performance shown is for installation type C: Ducted inlet, Free outlet. Power rating (BHP) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). Performance ratings do not include the effects of crosswinds. FEI values are calculated in accordance with AMCA 208 and are based on default motor efficiencies. FEI values for fans with specific motors will vary slightly from those shown.

Sound power level

The sound power level ratings shown are in decibels, referred to 10^{-12} Watts calculated per AMCA standard 301. Values shown are for (outlet Lwo and LwoA) sound power levels for installation type C: Ducted inlet, Free outlet. Ratings do not include the effects of duct end correction. The A-weighted sound ratings have been calculated per AMCA Standard 301.

RPM	Hz								LwA
	63	125	250	500	1000	2000	4000	8000	
1146	94	93	88	84	84	84	78	68	90

Sound pressure level variation

Values shown are calculated based on a free-field over reflecting plane conditions. (ASHRAE Fundamentals Handbook). dBA levels are not licensed by AMCA international.

Feet	1	3	5	10	15	50	100	150
dB(A)	92	83	78	72	69	58	52	49

Comments : **PERFORMANCE BASED ON FAN RUNNING AT 58 Hz (VFD), 25 HP, 6-POLE MOTOR**
[4 x fans N+1, total flow per EAHU = 53,840 cfm]

CAVANAUGHTOCCI

MK PLASTICS CORPORATION
CANADA Tel. 514 871 9999 / Fax 514 871 1753
USA Tel. 888 278 9988
SWITZERLAND Tel./ Fax 4133 654 9763
URL www.mkplastics.com

AXIJET-S 3650

Sound Calculation

M.K. 2021 Version 15.3

Customer	.
Project	BMR - 350 MASS AVENUE, CAMBRIDGE
Engineer	GENESIS - NATE BOLTON
P.O. #	.
JOB #	.

Representative
DYNAMIC AIR
.

Date 08/22/24

Sys. No. EAHU-1 & 2
[EF 1-4 & 5-8]
.

Model	**AXIJET**
Fan Size	**3650**
Dia.[in]	**36.50**
CFM	**17947**
SP	**4.5**
BHP	**19.92**
RPM	**1146**

Attenuator Information	
Material:	Coated steel
Length:	41"
S.P. drop:	0.08"
Weight:	719 lbs

Sound power level
Without attenuator

The sound power level ratings shown are in decibels, referred to 10^{-12} Watts calculated per AMCA standard 301. Values shown are for (outlet Lwo and LwoA) sound power levels for installation type C :Ducted inlet, Free outlet. Ratings do not include the effects of duct end correction. The A-weighted sound ratings have been calculated per AMCA Standard 301. dBA levels are not licensed by AMCA International.

RPM	Hz								LwA
	63	125	250	500	1000	2000	4000	8000	
1146	94	93	88	84	84	84	78	68	90

Sound pressure level variation
Without attenuator

Values shown are calculated based on a free-field over reflecting plane conditions. (ASHRAE Fundamentals Handbook)

Feet	1	3	5	10	15	50	100	150
dB(A)	92	83	78	72	69	58	52	49

Sound power level
Add insertion loss of attenuator

	Hz								
	63	125	250	500	1000	2000	4000	8000	
Insertion loss	5	9	13	17	21	16	11	6	
RPM									LwA
1146	89	84	75	67	63	68	67	62	75

Sound pressure level variation
With attenuator

3 x fans running = 49 dB(A)

Feet	1	3	5	10	15	50	100	150
dB(A)	78	68	64	58	54	44	38	34

Comments : MODEL: 41 CSA-57V70

Sound data sheet

C1300N6 60 Hz spark-ignited generator set (GenSet)

Sound pressure levels (SPLs) with radiator cooling package

A-weighted SPLs in dB(A) @ 7 meters

GenSet configuration	Applied standby load	Microphone position*								8 position average SPL
		1	2	3	4	5	6	7	8	
Unhoused with infinite exhaust	No load	87.8	93.1	92.6	95.8	93.1	93.8	94.3	93.3	93.4
	50% load	88.2	93.4	93.0	95.9	93.0	93.9	94.5	93.5	93.6
	75% load	88.8	93.9	93.5	96.1	92.9	94.1	94.9	93.9	93.9
	Full load	89.9	94.8	94.4	96.4	92.7	94.6	95.4	94.2	94.4
Housed with level II sound-attenuated enclosure and muffler	No load	84.4	85.9	81.9	83.3	82.6	81.6	78.4	85.0	83.4
	50% load	84.1	85.8	82.1	83.1	82.2	80.9	78.5	84.4	83.1
	75% load	84.0	85.7	82.4	83.2	82.3	80.9	78.8	84.3	83.1
	Full load	84.5	86.1	83.2	83.8	82.8	81.5	79.8	84.7	83.7

*Position 1 faces the GenSet front. The positions proceed around the GenSet in a counter-clockwise direction in 45° increments. All positions are approximately 7 m (23 ft.) from the surface of the GenSet and approximately 1.2 m (48 in) from floor level.

Average A-weighted SPLs in dB(A)@ 1 meter

measured from a reference parallelepiped creating a hemisphere around the GenSet

GenSet configuration	Applied standby load	Octave band center frequency, Hz											Total SPL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Unhoused with infinite exhaust	No load	N/A	51.3	71.1	91.5	93.5	95.2	94.6	92.2	88.1	81.7	68.6	100.9
	50% load	N/A	51.6	71.2	91.6	93.6	95.3	94.7	92.7	88.5	83.4	69.8	101.1
	75% load	N/A	51.6	71.3	91.6	93.6	95.3	94.9	93.5	89.0	86.4	71.7	101.4
	Full load	N/A	51.8	71.4	91.8	93.7	95.4	95.5	94.6	89.9	89.4	73.3	101.9
Housed with level II sound-attenuated enclosure and muffler	No load	N/A	49.3	65.2	88.2	86.2	84.3	79.9	79.1	73.2	67.0	53.0	91.9
	50% load	N/A	49.4	65.5	87.8	86.4	84.5	80.3	80.0	74.4	68.1	56.5	92.0
	75% load	N/A	51.6	65.5	87.5	86.4	85.0	81.3	81.0	76.1	70.9	63.0	92.2
	Full load	N/A	53.9	66.8	87.5	86.9	86.8	84.1	82.9	78.2	73.4	65.0	93.2

A-weighted SPLs in dB(A)@ the operator location

measured at 1 meter from the GenSet control panel at 1.5 meter height

GenSet configuration	Applied standby load	Octave band center frequency, Hz											Total SPL
		16	32	63	125	250	500	1000	2000	4000	8000	16000	
Unhoused with infinite exhaust	75% load	N/A	52.0	72.6	86.4	91.8	96.6	97.4	96.4	89.5	86.8	73.4	102.5
	Full load	N/A	52.1	72.5	86.6	92.1	96.9	97.9	97.7	90.6	89.9	75.9	103.2
Housed with level II encl and muffler	75% load	N/A	46.9	66.7	87.4	81.4	80.0	74.0	76.7	67.7	69.3	62.3	89.4
	Full load	N/A	47.0	67.2	87.1	81.7	80.2	75.0	78.9	69.2	72.4	64.3	89.6

Shadow Study

March 21 (Spring Equinox)

MAR 21 _ 9AM

MAR 21 _ 12PM

MAR 21 _ 3PM

MAR 21 _ 6PM

September 23 (Autumnal Equinox)

SEP 21 _ 9AM

SEP 21 _ 12PM

SEP 21 _ 3PM

EXISTING SHADOW

NET NEW SHADOW

BioMed Realty

REDGATE
The Right Return on Real Estate

DIMELLA SHAFFER

SHADOW STUDY

BIOMED 350 MASS AVE CAMBRIDGE

June 21 (Summer Solstice)

JUNE 21 _ 9AM

JUNE 21 _ 12PM

JUNE 21 _ 3PM

JUNE 21 _ 6PM

December 21 (Winter Solstice)

SEP 21 _ 9AM

SEP 21 _ 12PM

SEP 21 _ 3PM

EXISTING SHADOW

NET NEW SHADOW

BioMed Realty

REDGATE The Right Return on Real Estate

DIMELLA SHAFFER

SHADOW STUDY

BIOMED 350 MASS AVE CAMBRIDGE

Green Building Report &
Green Factor Document

BioMed Realty REDGATE DIMELLA SHAFFER

CDD Determination for Special Permit submission

The Community Development Department (CDD) received the Green Factor (GF) documentation for the Special Permit stage. Pursuant to Section 22.96 of the Zoning Ordinance, CDD staff have reviewed the project's GF documentation and provide the following Determination and Summary of Compliance.

CDD Determination: The documentation provided by the Applicant is adequate and demonstrates compliance with the Green Factor Standard applicable to the Special Permit stage.

Summary of Compliance:

- Solar Reflectance Index of Roof – N/A
- Solar Reflectance Index of Paving – N/A
- Cool Score – .10

Green Building Project Checklist

Green Building
Project Location: 350 Massachusetts Ave, Cambridge, MA 02139

Applicant

Name: BRE-BMR 350 Massachusetts LLC
Address: 4570 Executive Dr, Suite 400, San Diego CA 92121
Contact Information
Email Address: ashley.myslinski@biomedrealty.com
Telephone #: 858-524-9153

Project Information (select all that apply):

- ☐ New Construction – GFA: _____
- ☐ Addition – GFA of Addition: _____
- ☒ Rehabilitation of Existing Building – GFA of Rehabilitated Area: 112,600 sf
  - ☒ Existing Use(s) of Rehabilitated Area: Office
  - ☒ Proposed Use(s) of Rehabilitated Area: 108,720 sf 60% Lab / 40% Office; 3,880 sf Retail
- ☐ Requires Planning Board Special Permit approval
- ☐ Subject to Section 19.50 Building and Site Plan Requirements
- ☐ Site was previously subject to Green Building Requirements

Green Building Rating Program/System:

- ☒ Leadership in Energy and Environmental Design (LEED) – Version: 4
  - ☒ Building Design + Construction (BD+C) – Subcategory: Core and Shell
  - ☐ Residential BD+C – Subcategory: _____
  - ☐ Interior Design + Construction (ID+C) – Subcategory: _____
  - ☐ Other: _____
- ☐ Passive House – Version: _____
  - ☐ PHIUS+
  - ☐ Passivhaus Institut (PHI)
  - ☐ Other: _____
- ☐ Enterprise Green Communities – Version: _____

Project Phase

☒ **SPECIAL PERMIT**

Before applying for a building permit, submit this documentation to CDD for review and approval.

Required Submissions

All rating programs:

- ☒ Rating system checklist
- ☒ Rating system narrative
- ☒ Net zero narrative (see example template for guidance)
- ☒ Affidavit signed by Green Building Professional with attached credentials – use City form provided (Special Permit)

Project Phase

☐ **BUILDING PERMIT**

Before applying for a building permit, submit this documentation to CDD for review and approval.

Required Submissions

All rating programs:

- ☐ Rating system checklist – updated from any prior version
- ☐ Rating system narrative – updated from any prior version with additional supporting information from construction documents
- ☐ Net zero narrative – updated from any prior version (see example template for guidance)
- ☐ Energy Simulation Tool results demonstrating compliance with selected rating system. *[Note: For Passive House rating program, must use WUFI Passive, Passive House Planning Package (PHPP), or comparable software tool authorized by Passive House.]*
- ☐ Credentials of Green Commissioning Authority (or copy of contract between developer and Commissioning Authority if an independent consultant or subcontractor), including documentation of Green Commissioning process experience on at least two building projects with a scope of work similar to the proposed project extending from early design phase through at least ten (10) months of occupancy
- ☐ Affidavit signed by Green Building Professional with attached credentials – use City form provided (Building Permit)

Passive House rating program only:

- ☐ Letter of intent from Passive House rater/verifier hired for on-site verification, with credentials of rater/verifier
- ☐ Credentials of Certified Passive House Consultant who has provided design, planning, or consulting services (if different from the Green Building Professional for the project)
- ☐ Construction drawings and specifications

Project Phase

☐ **CERTIFICATE OF OCCUPANCY**

Before applying for a certificate of occupancy, submit this documentation to CDD for review and approval.

Required Submissions

All rating programs:

- ☐ Rating system checklist – updated from any prior version
- ☐ Rating system narrative – updated from any prior version with additional supporting information from as-built conditions
- ☐ Net zero narrative – updated from any prior version (see example template for guidance)
- ☐ Energy Simulation Tool results demonstrating compliance with selected rating system, updated to as-built conditions. *[Note: For Passive House rating program, must use WUFI Passive, Passive House Planning Package (PHPP), or comparable software tool authorized by Passive House.]*
- ☐ Affidavit with schedule of commissioning requirements signed by Green Commissioning Authority, with attached credentials – use City form provided (Certificate of Occupancy)
- ☐ Affidavit signed by Green Building Professional with attached credentials – use City form provided (Certificate of Occupancy)

Passive House rating program only:

- ☐ Pressure Test Verification
- ☐ Ventilation Commissioning
- ☐ Quality Assurance Workbook
- ☐ Final testing and verification report from rater/verifier

Affidavit Form for Green Building Professional
Special Permit

Green Building
Project Location: 350 Massachusetts Ave, Cambridge, MA 02139

Green Building Professional

Name: Lauren M. Gunther, AIA, LEED AP, CPHC

☒ Architect

☐ Engineer

License Number: MA# 50273

Company: DiMella Shaffer

Address: 24 Farnsworth St, Flr 4, Boston, MA 02210

Contact Information

Email Address: lgunther@dimellashaffer.com

Telephone Number: (617) 778-0173

I, Lauren M. Gunther , as the Green Building Professional for this Green Building Project, have reviewed all relevant documents for this project and confirm to the best of my knowledge that those documents indicate that the project is being designed to achieve the requirements of Section 22.24 under Article 22.20 of the Cambridge Zoning Ordinance.

(Signature) 03/17/2025 *(Date)*

Attach either:

☒ Credential from the applicable Green Building Rating Program indicating advanced knowledge and experience in environmentally sustainable development in general as well as the applicable Green Building Rating System for this Green Building Project.

☐ If the Green Building Rating Program does not offer such a credential, evidence of experience as a project architect or engineer, or as a consultant providing third-party review, on at least three (3) projects that have been certified using the applicable Green Building Rating Program.

https://www.usgbc.org/people/lauren-gunther/0010275456

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Attend Greenbuild 2024 in Philadelphia from Nov. 12-15. Register

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Lauren Gunther

Director of Sustainability & Associate

DiMella Shaffer

Boston, Massachusetts

LEED AP

Member Employee

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Attend Greenbuild 2024 in Philadelphia from Nov. 12-15. Register

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LEED credentials & designations

Hi, Lauren!

GBCI#: 0010275456

LEED AP

My credentials

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Status	Active

GBCI

GREEN BUILDING CERTIFICATION INSTITUTE

HEREBY CERTIFIES THAT

Lauren Drojarski

HAS ACHIEVED THE DESIGNATION OF

LEED® ACCREDITED PROFESSIONAL

BY DEMONSTRATING THE KNOWLEDGE OF GREEN BUILDING PRACTICE REQUIRED FOR SUCCESSFUL IMPLEMENTATION OF THE LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED®) GREEN BUILDING RATING SYSTEM™.

LEED AP

Robert L. Flora
Chairman

September 4, 2008
Date Issued

S. Richard Fedrizzi, President and CEO

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Article 22 Green Building Report

SPECIAL PERMIT

350 Massachusetts Ave

Cambridge, MA

March 17th, 2025

Prepared for: BRE-BMR 350 Massachusetts LLC

Prepared by: enviENERGY Studio

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Introduction

The 350 Mass Ave project is being designed to be a first-class research and development facility in Cambridge, Massachusetts. The design by DiMella Shaffer will reuse the existing 5-story building core and shell building, approximately 112,600 GFA (133,600 GSF including an added mechanical penthouse). Sustainability is an important design and construction priority for BMR-BRE and the project team. The team is evaluating and implementing strategies to improve the health and wellbeing of occupants and maximize the resource efficiency of the building, while enhancing experience by focusing on the resiliency and efficiency measures.

The design team is weighing in on strategies and their relationship to LEED certification standard. Through concerted and coordinated quantitative and qualitative metric tracking, the team plans to implement measures 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 Elizabeth Venuti, LEED AP, CPHC. 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 67 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, which will be highlighted in the subsequent sections. The proponent plans to pursue a formal LEED certification. The project will be registered with USGBC and follow the requirements of LEED BD+C v4 Core and Shell program during the design and construction. The project team is targeting a minimum of LEED Gold certification with a total of 67 out of a possible 110 points in the LEED BD+C rating system.

LEED Checklist Summary:

Integrative Process	1 Point
Location and Transportation	17 Points
Sustainable Sites	6 Points
Water Efficiency	5 Points
Energy and Atmosphere	15 Points
Materials and Resources	7 Points
Indoor Environmental Quality	7 Points
Innovation and Design Process	5 Points
Regional Priority	4 Point
Total Points	**67 Points**

Energy Code Compliance

The project will demonstrate energy code compliance by adhering to the 2021 International Energy Conservation Code (IECC 2021) with Massachusetts State amendments from the 225 CMR 23 *Stretch Code* and Appendix CC *Municipal Opt-in Specialized Code.* The baseline building is modeled to adhere to the methodology described by ASHRAE 90.1-2019 Appendix G, with amendments as outlined in C401.2.1.3 for Relative Performance Compliance. The model considers current design assumptions about occupancy, hours of operation, internal loads, envelope criteria, and mechanical system design. Tenant areas were modeled assuming a 40/60 distribution of office and lab areas with generic space layouts, consistent with the building design criteria.

In addition, to comply with Section C406.1 of IECC 2021 with Massachusetts State amendments, the project team is targeting the following C406 measures to achieve at least 15 credits:

- C406.2.2: 5% Cooling Efficiency Improvement (2 credits)
- C406.3: Reduced Lighting Power (7 credits)
- C406.6: Dedicated Outdoor Air (5 credits)
- C406.10: Energy Monitoring (2 credits)
- C406.11: Fault Detection and Diagnostics Systems (1 credit)

Building Type	Life Science (60% Lab/ 40% Office)	
*GSF**	133,600	
GSF Excluding MPH (used in CEI and EUI calculations)*	125,300	
Baseline Case	**ASHRAE 90.1-2019 App. G**	**2023 Stretch Code (1)**
Annual Electricity (kWh)	3,371,914	2,444,379
Annual Gas (Therms)	182,054	92,848
Annual Site Energy (MMBTU)	29,714	17,627
Site pEUI (kBTU/Sf.yr)	237	141
*PEIt**	**0.59**	
Proposed Design		
Annual Electricity (kWh)		4,324,097
Annual Gas (Therms)		6,616
Annual Site Energy (MMBTU)		15,420
pEUI (kBTU/Sf.yr)		**123**
*Performance Energy Index (PEI)***		**0.52**
*Vertical Envelope AU****		**0.1345**
C505.1 Change of Occupancy, Exception 1		*< 0.1414 UA Threshold*

*GSF (Gross Square Feet) is measured from the exterior faces of the exterior walls and is used for the pEUI and pCEI calculations.

**PEIt is the Performance Energy Index for the ASHRAE 90.1-2019 baseline case and PEI= Proposed Building Performance/ Baseline Building Performance

*** Whole building Average U-value (AU) is the average area-weighted U value for all above-grade wall area. Value subject to change as design progresses.

(1)2023 Stretch Code case includes a 49% (1-0.51) reduction in regulated energy use (gas and electricity) from the ASHRAE 2019 baseline.

Envelope Backstop Performance

As an existing building, the design team will need to overcome thermal bridging from existing elements. Per C505.1, the proposed UA shall not be greater than 110% of the target UA. As the design progress, the team will strive to achieve a vertical UA under U-0.1414 (*1.1 * 0.1285*). The results of initial backstop calculations are shown below; however, this value is subject to change due to the early stage of design and inherent complexity with mitigating thermal bridging from existing elements.

C402.1.5 Component Performance Alternative Requirements	
Low Glazed Wall System	U-0.1285 max
Vision glass in glazed wall system	U-0.25 max
Vision glass in punched window	U-0.30 max
C505.1 Change of Occupancy or Use - Exception 1: For change of occupancy or use, where the component performance alternative in Section C402.1.5 is used to comply with this section, the proposed UA shall not be greater than 110 percent of the target UA	
Target U value	U-0.1414 max

Total area	55,386				
Total AxU				7449.3262	
Whole building total area weighed U value		U- 0.13449836		PASS	

Affidavit

As the lead Sustainability Consultant overseeing the planning, design and construction of the 350 Massachusetts Ave project, I, Elizabeth Venuti, 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 Green Building requirements under Article 22 Green Building Requirements of the Cambridge Zoning Code.

Elizabeth Venuti, LEED AP BD+C, CPHC
LEED Administrator and Sustainability Consultant

Article 22.20 – Green Building Requirements

LEED Project Scope and Strategy

General Project Information

Building Area Summary	133,600 GSF* (with MPH); 8,300 SF MPH 108,720 SF for Office/ Lab 3,880 SF for Retail
Occupancy - FTE (LEED v4 C&S Default Occupancy)	409 FTE (*Office: 250 SF/person, Lab: 400 SF/person, Retail: 550 SF/person*)
Parking Spaces	130 parking spaces (allocated from existing garage)
Long-Term Bike Storage	30 LT
Short-Term Bike Storage	Nearby publicly available parking spots
Public Transportation	Access to Red Line and Bus Routes 1, 47, 64, 70

*GSF (or *GFA* for LEED) is the sum of the floor areas of the spaces within the building, including basements, mezzanine and intermediate-floored tiers, and penthouses with headroom height of ≥7.5 ft, taken from the exterior faces of exterior walls OR from the centerline of walls separating buildings.[1]

Preliminary LEED Boundary

350 Mass Ave will be considered a **Zero Lot Line (ZLL)** project, which is described as "a project whose building footprint, exclusive of any required setbacks or easements, rest directly on, or nearly aligns with, the LEED project boundary on multiple sides and covers at least 90% of the total size area."[2] The LEED project boundary is outlined in red below.

[1] https://usgbc.org/glossary#gross-floor-area-gfa
[2] 100002306 ZLL definition for SSc Rainwater Management | U.S. Green Building Council (usgbc.org)

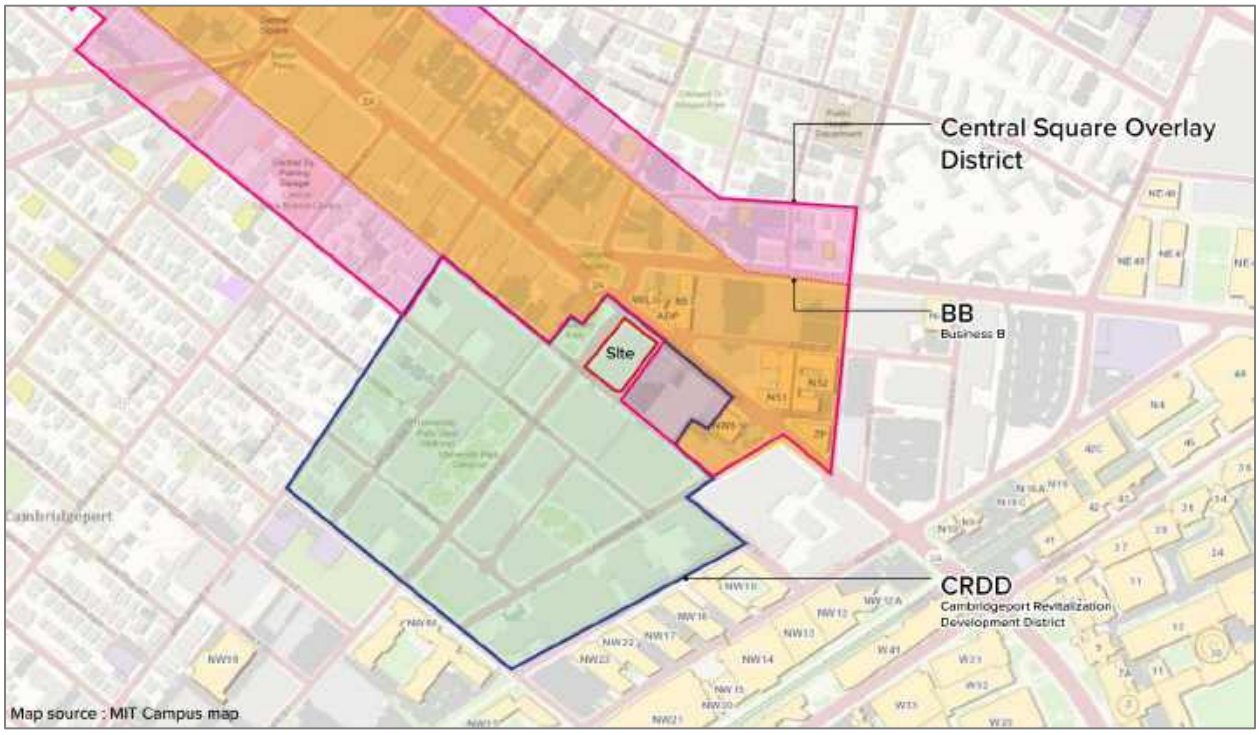
Integrative Process

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 have been 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***

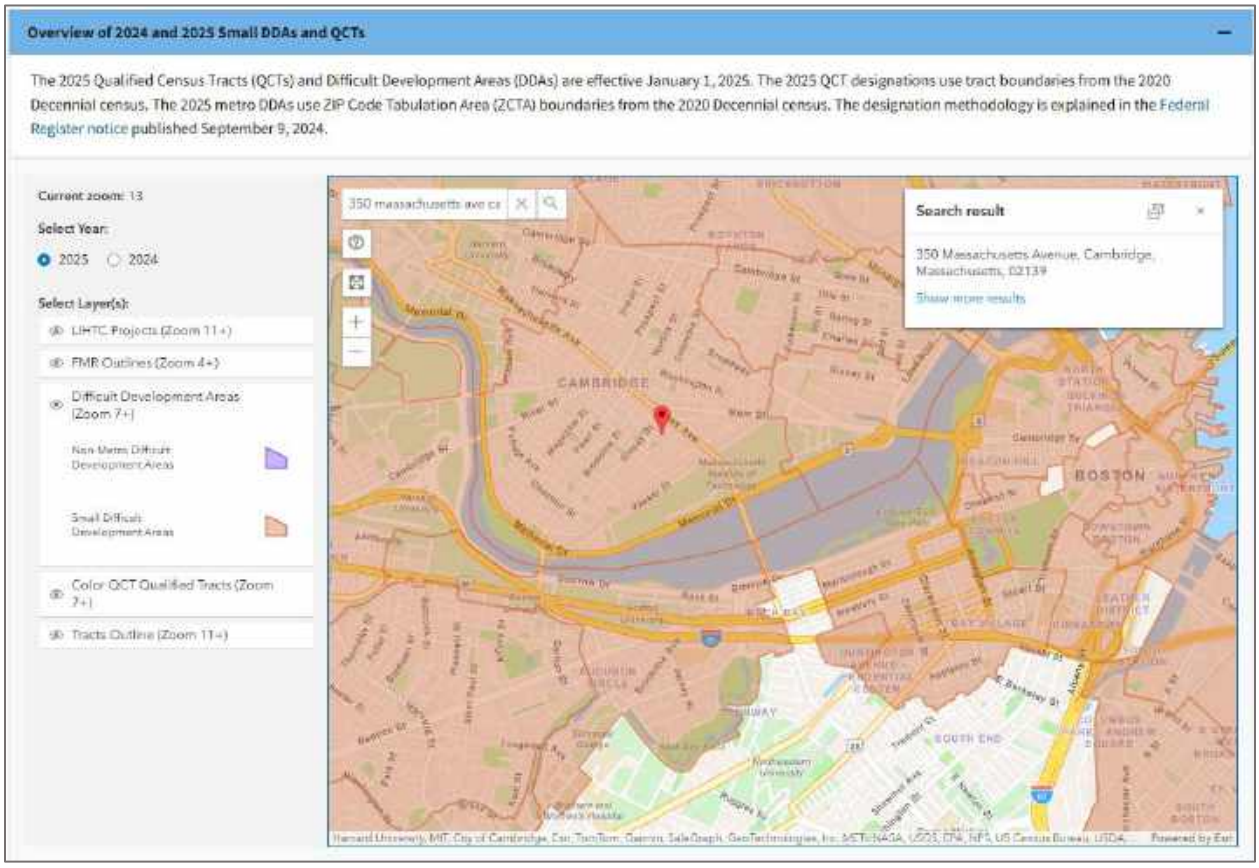
The Project Site has been previously developed and is in an urban area of filled land.



Zoning Boundary

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

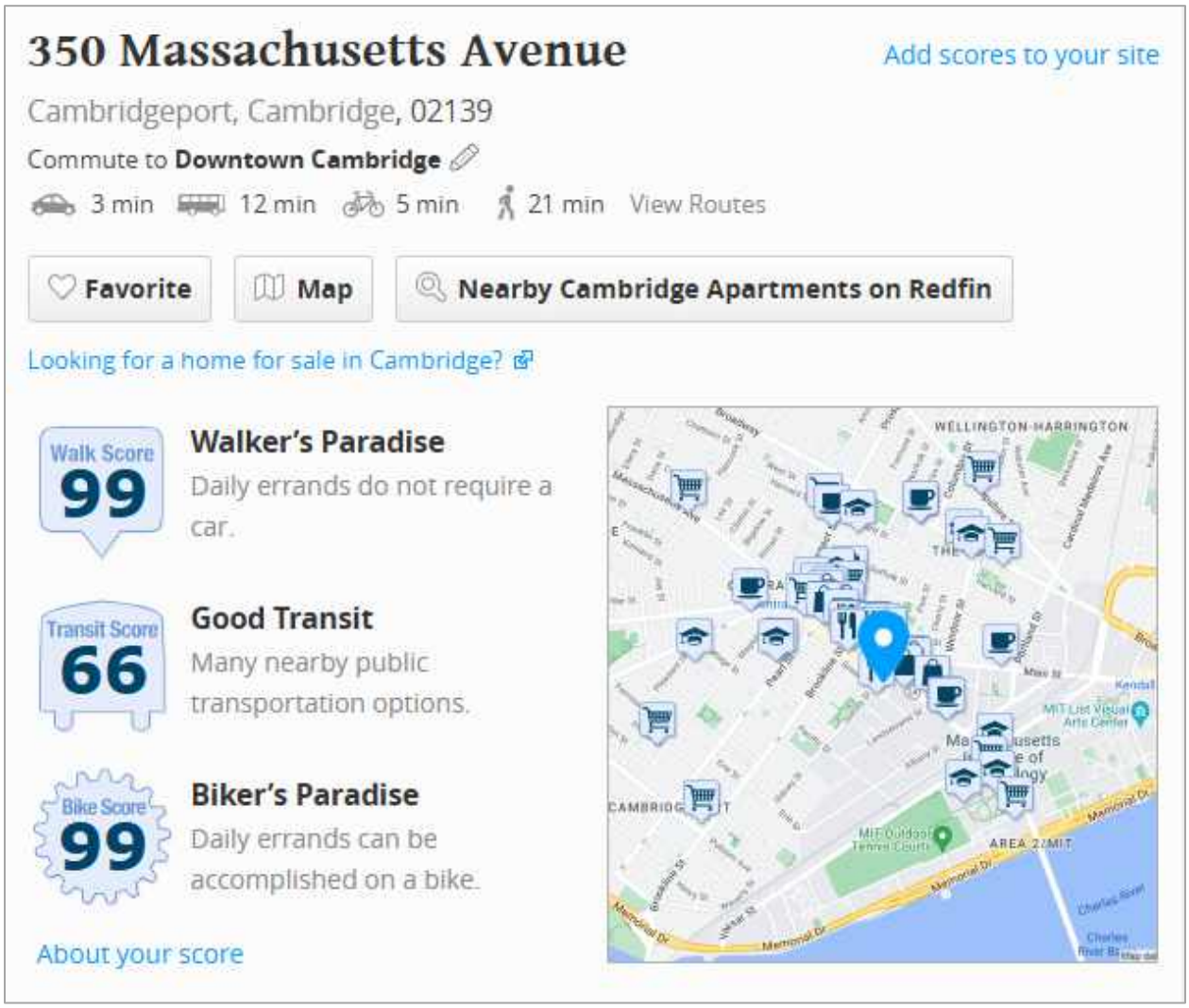
The project site is not a brownfield, but it is in the US Department of Housing and Urban Development's 2025 Difficult Development Areas (DDAs) which are the federally recognized high-priority sites.



[2024 and 2025 Small DDAs and QCTs | HUD USER](#).

Credit 3 – Surrounding Density and Diverse Uses (v4.1): ***6 Yes Points***

The project is utilizing LEED V4.1, Option 3. Walkable Location, for this credit. The site has a Walk Score of 99 and therefore will achieve 6 points.



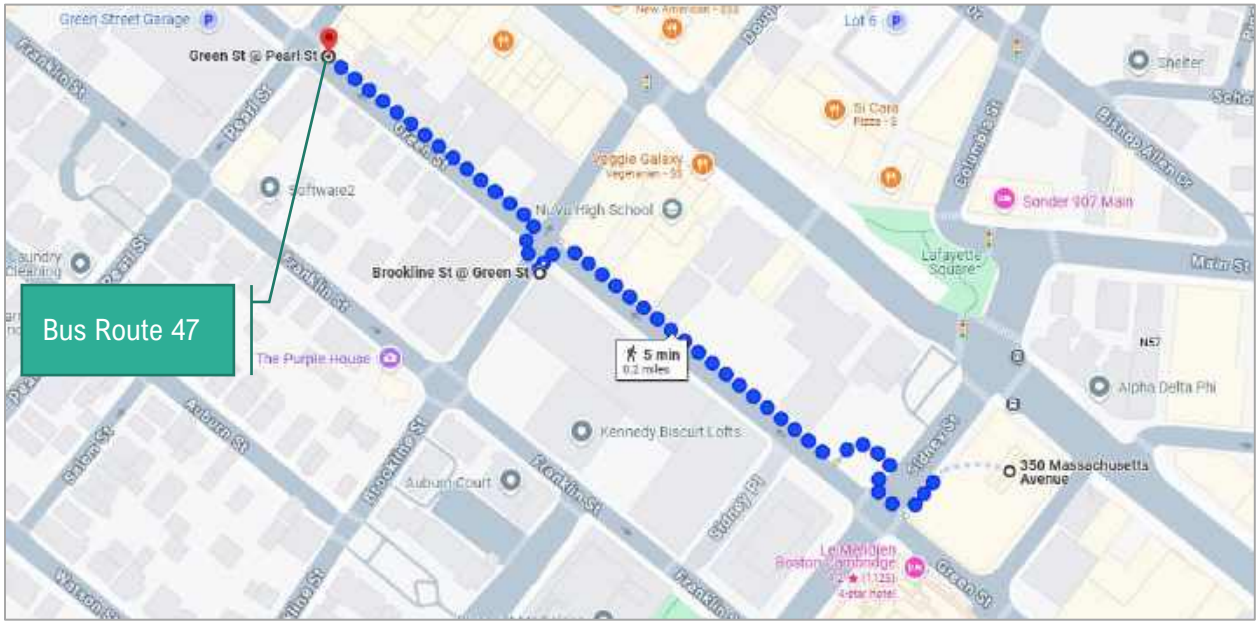
[350 Massachusetts Avenue, Cambridge MA - Walk Score]

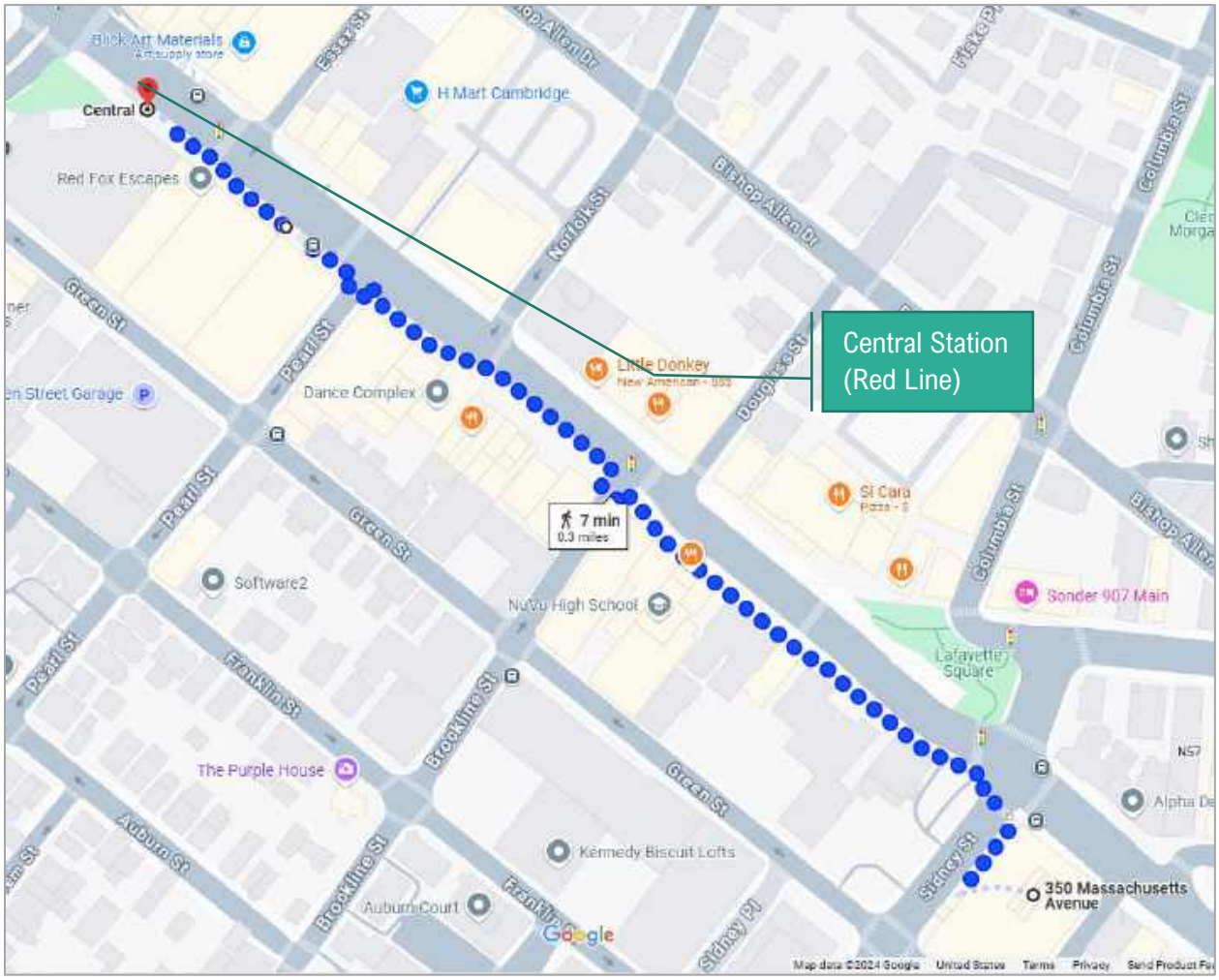
Credit 4 – Access to Quality Transit (v4.1): ***6 Yes Points***

The project location provides access to quality transit and encourages alternative transportation. The occupants of 350 Mass Ave will have access to several nearby bus routes, including 1, 47, 64 & 70, which gives them the opportunity to travel to and from other parts of Cambridge and neighboring cities such as Boston, Watertown, and Waltham. Similarly, the project is located near the MBTA Red Line, with the Central station only a 7-minute walk away. These transit services provide 369 "weekday" and 329 "weekend" trips, which surpass the 6-point threshold of 360 "weekday" and 216 "weekend" trips.

Transit Service	Weekday Trips	Weekend Trips
Red Line Subway*	125	125
1 Bus	85	88
47 Bus	53	36
64 Bus	30	18
70 Bus	76	62
Totals	**369**	**329**

**125 trips are counted assuming there is a red line train every 9 minutes (MBTA website indicates between 8-11 min)*


Green Street Garage
Green St @ Pearl St
Bus Route 47
Brookline St @ Green St
5 min
0.2 miles
The Purple House
Kennedy Biscuit Lofts
Auburn Court
Software2
NuVu High School
Lafayette Square
Sonder 907 Main
Alpha Delta Phi
350 Massachusetts Avenue
Shelter
Si Cara
Veggie Galaxy
Franklin St
Pearl St
Auburn St
Brookline St
Sidney Pl
Green St
Columbia St
Bishop Allen Dr
Main St

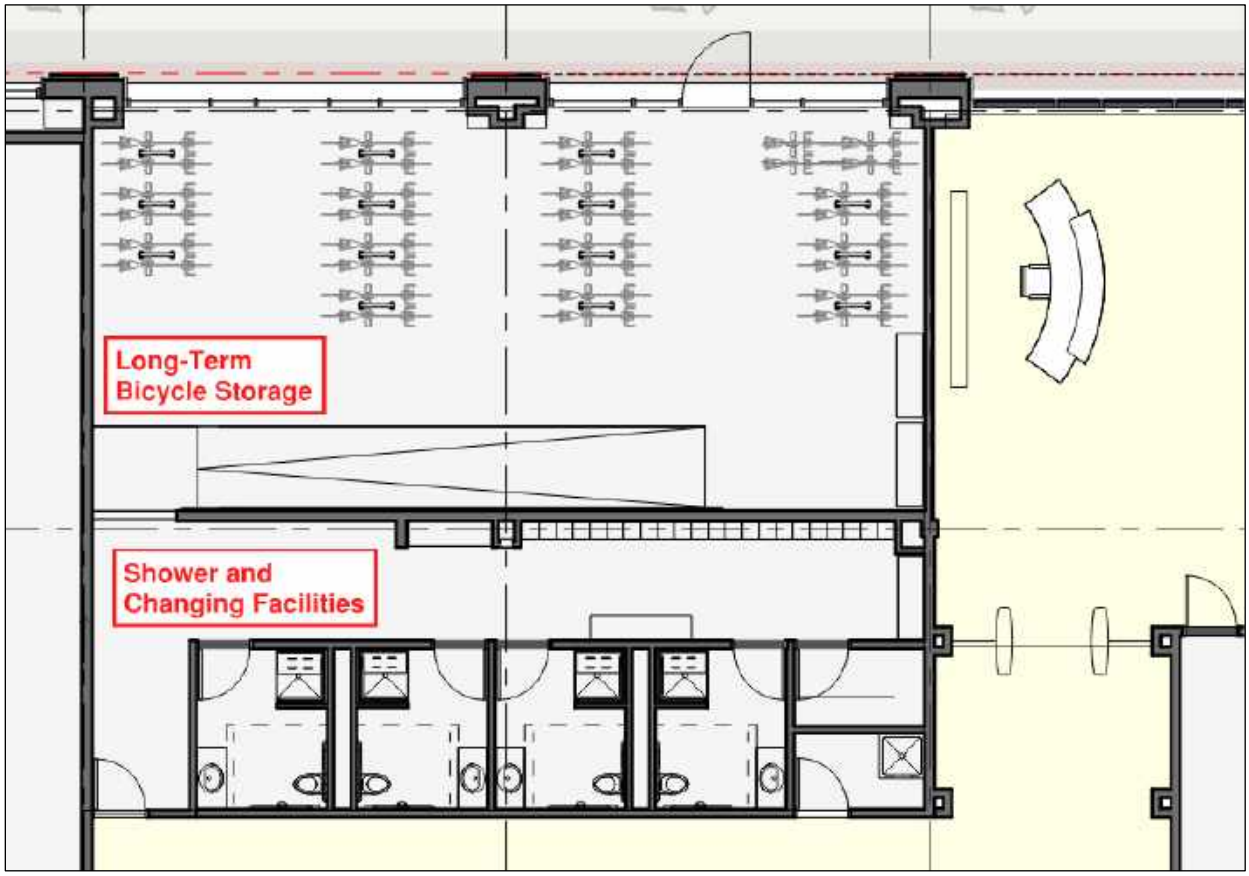

Central
Central Station
(Red Line)
7 min
0.3 miles
H Mart Cambridge
Red Fox Escapes
Dance Complex
Little Donkey
Si Cara
Software2
NuVu High School
Sonder 907 Main
Lafayette Square
The Purple House
Kennedy Biscuit Lofts
Auburn Court
350 Massachusetts Avenue
Norfolk St
Douglass St
Pearl St
Green St
Franklin St
Brookline St
Auburn St
Sidney Pl
Columbia St
Bishop Allen Dr
Google

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

Bicycle facilities will be provided on the first floor of the building, which will include 30 spots for long-term bike storage and 4 shower-changing rooms. Long-term bicycle storage will be located along Sidney Street, with immediate access to the bicycle network that runs along this street. With a Bike Score of 99, the immediate neighborhood provides a direct connection between the project site and a variety of basic services. Both Sidney Street and Mass Ave have dedicated bike lanes that meet the LEED v4/4.1 requirements for a Bicycle Network.

As a Zero Lot Line project, the proponent is unable to provide short-term bike parking in the public right-of-way. LEED allows publicly available bicycling parking to count towards short-term requirements, if they are within 200 feet walking distance of any main entrance. Five publicly available spots have been identified for the purpose of achieving this credit.

Bicycle Facilities	**LEED v4.1 Requirements**	**350 Mass Ave**
Long-term Bike Storage	5% FTE (21)	30 Long Term
Short-term Bike Storage	2.5% peak visitors, no fewer than 4	5 Nearby Public Spots
Shower and Changing Rooms	1+(FTE-100)/150 = 3.1	4 Showers/Changing Rooms



Credit 6 – Reduced Parking Footprint (v4.1): ***1 Yes Point***

No on-site parking spaces will be added as part of this project's design. However, the proponent plans to allocate approximately 130 off-site spaces (*1 per 1,000 square feet*) from the 55 Franklin St Garage for the building occupants of 350 Mass Ave. This capacity will fall below the LEED v4.1 threshold of 30% below the base ratio for office buildings between 100,000 and 500,000 square feet. The base ratio is 447 spaces; a 30% reduction of which would be 313 spaces. The anticipated number of off-site allocated spaces is a 58% reduction from the base ratio.

$$\left[3.4 - \left[0.6 * \left(\frac{133{,}370 - 100{,}000}{400{,}000}\right)\right]\right] * \frac{133{,}370}{1{,}000} = 447\ Parking\ Spaces$$

$$447 - (0.3 * 447) = \mathbf{313}\ Parking\ Spaces$$

$$\mathbf{130} < 313$$

Per LEED v4.1 BD+C guide, Appendix 4. Base Ratios for Parking Capacity, Table 1. Base ratios for parking spaces, by building type (p. 295).

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 has conducted a comprehensive site assessment and studied topography, hydrology, climate, vegetation, soils, human use, and human health effects specific to the 350 Mass Ave project.

Credit 4 – Rainwater Management (LEED v4.1): ***2 Yes Points, 1 Maybe Point***

The project will implement a stormwater management plan with a goal of decreasing the volume of stormwater runoff and will retain the site runoff from at least the 75th percentile of local rainfall events. The current proposed system should achieve a minimum of 2 points for Zero Lot Line (ZLL) projects.

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

The 350 Mass Ave project will achieve 2 points by following Option 1. Nonroof and Roof. Because this is a ZLL project, the roof will be the focus of reducing the heat island effect. The roofing membrane replacement will have a high reflectance with a minimum initial SRI of 85. The design team is also investigating potential for Green Roof Areas.

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

The proponent and the design team are in the process of developing 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 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: ***2 Yes Points***

There is currently no irrigation system for 350 Mass Ave, and none is planned for this project. If landscape plantings are added, they will be climate appropriate, native, and adapted without the need to irrigation. With no irrigation, the percent reduction from baseline will be 100%, awarding this project 2 points.

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

The project team anticipates reducing the use of potable water inside the building by at least 30% by installing low-flow and low-flush plumbing fixtures in core restrooms.

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
Retail	13,570.70	2,445.50	16,016.20	8,516.00	2,445.50	10,961.50
Lab	438,984.00	209,040.00	648,024.00	280,636.20	156,780.00	437,416.20

Annual baseline water consumption (gallons/year)	664,040.20
Annual design water consumption (gallons/year)	448,377.70
Percent water use reduction (%)	**32.48%**

Fixture Information			**Flush Rate**		Percent of Occupants (%)
Fixture ID	Fixture Family	Fixture Type	Baseline Flush Rate (gpf)	Design Flush Rate (gpf)	
	Toilet (male)	Low-Flow Water Closet	1.60	1.28	100
	Toilet (female)	Low-Flow Water Closet	1.60	1.28	100
	Urinal	Non-Water Urinal	1.00	0.125	100
Baseline case annual flush volume (gallons/year)					438,984.00
Design case annual flush volume (gallons/year)					280,636.20

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 (%)
	Public lavatory (restroom) faucet	30		0.50	0.5	100
	Showerhead	300		2.50	1.5	100
Baseline case annual flow volume (gallons/year)						209,040.00
Design case annual flow volume (gallons/year)						156,780.00

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: Domestic Hot Water and Boilers.

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: 10 Yes 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 Progress DD drawings and specifications – is anticipated to result in an annual energy savings of 13% compared to the Massachusetts Stretch Code baseline. Following LEED v4.1 Electrification ACP: Energy Simulation Performance Path (EApc161), which rewards projects based on efficient electrification, peak loads reductions and grid harmonization, the preliminary energy model shows a performance savings of approximately 9.4% (2 points) in Demand Adjusted Energy and 43% (8 points) in GHG emissions (based on 30-year average) relative to the LEED baseline. The points awarded for Demand Adjusted Energy and GHG emissions are combined.

Prerequisite 3 – Building-level Energy Metering:

The project will be equipped with permanent electric and gas utility meters.

Credit 1 – Enhanced Commissioning: 4 Yes Points

Project will pursue commissioning in line with LEED v4 Enhanced Commissioning, *Path 2: Enhanced and monitoring-based 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 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 monitoring-based commissioning.

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

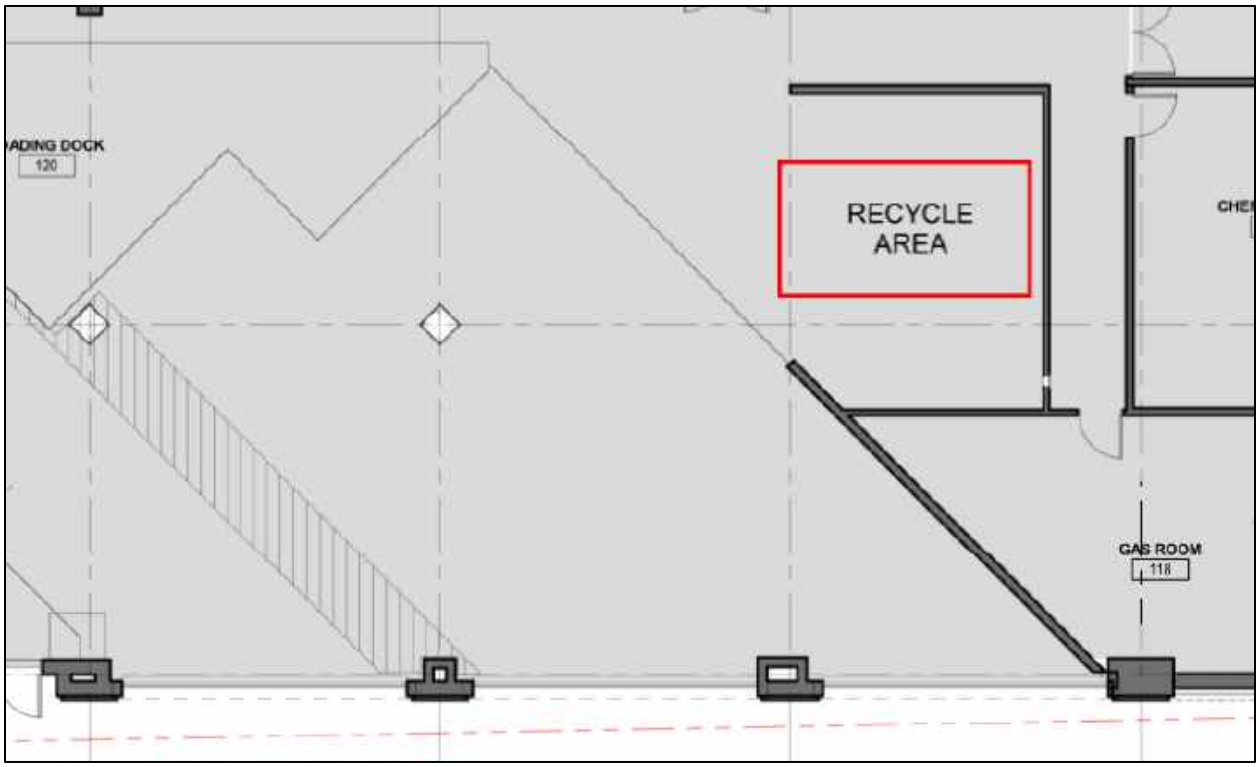
No CFC-based refrigerants will be utilized for the Project. The selected equipment will use only refrigerant that minimizes or eliminates the emission of compounds that contribute to ozone depletion and climate change.

Materials and Resources

As an existing building, many of the emissions associated with demolition and construction processes will be avoided. Any added materials selected for the building will be evaluated using a variety of criteria including a preference for materials extracted, processed, and manufactured locally. This approach 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 1 – Building Life-Cycle Impact Reduction (v4.1): 3 Yes Points

The project team intends to pursue *Option 1. Building and Materials Reuse* and maintain as much of the existing building structure and envelope while also meeting the envelope requirements of the Massachusetts Stretch Code. It is anticipated that at least 45% of the structural elements will be maintained to achieve a minimum of 3 points. A Whole-Building Life-Cycle Analysis will also be performed alongside these calculations.

Credit 2, 3, and 4 – Building Product Disclosure and Optimization (v4.1): 3 Yes Points

The project team, including the construction manager and their sub-contractors, will target the specification and use of at least 10 different permanently installed products and materials that have lower environmental impacts and comply with Environmental Product Declaration (EPD), 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 Point

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 will be 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, and separate air handling units 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 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 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 30% increased ventilation and carbon dioxide monitoring as additional enhanced indoor air quality strategies.

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 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 Views: 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 renovation of 350 Mass Ave 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
- Innovation: LEED O+M Starter Kit or Walkable Site
- Pilot: Informing Design Using Triple Bottom
- Innovation: Purchasing – Lamps
- Exemplary Performance: BPDO - Environmental Product Declarations (at least 20 products will have EPDs)
- LEED Accredited Professional

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 4 points related to the following strategies: High-Priority Site, Rainwater Management, Optimize Energy Performance and Building Life-Cycle Impact Reduction.

LEED Checklist

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

Project Name: 350 Mass Ave
Date: 2/25/2025

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
6				Credit	Surrounding Density and Diverse Uses	6
6				Credit	Access to Quality Transit (v4.1)	6
	1			Credit	Bicycle Facilities (v4.1)	1
1				Credit	Reduced Parking Footprint	1
			1	Credit	Electric Vehicles (v4.1)	1

Y	?+	?-	N			
6	1	0	4	**Sustainable Sites**		11
Y				Prereq	Construction Activity Pollution Prevention	Required
1				Credit	Site Assessment	1
			2	Credit	Site Development - Protect or Restore Habitat	2
			1	Credit	Open Space (v4.1)	1
2	1			Credit	Rainwater Management (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	0	0	6	**Water Efficiency**		11
Y				Prereq	Outdoor Water Use Reduction	Required
Y				Prereq	Indoor Water Use Reduction	Required
Y				Prereq	Building-Level Water Metering	Required
2				Credit	Outdoor Water Use Reduction	2
2			4	Credit	Indoor Water Use Reduction	6
			2	Credit	Cooling Tower Water Use	2
1				Credit	Water Metering	1

Y	?+	?-	N			
15	0	0	18	**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
4			2	Credit	Enhanced Commissioning	6
10			8	Credit	Optimize Energy Performance	18
			1	Credit	Advanced Energy Metering	1
			2	Credit	Demand Response	2
			5	Credit	Renewable Energy (v4.1)	5
1				Credit	Enhanced Refrigerant Management	1
				Credit	Green Power and Carbon Offsets	

Y	?+	?-	N			
7	0	0	7	**Materials and Resources**		14
Y				Prereq	Storage and Collection of Recyclables	Required
Y				Prereq	Construction and Demolition Waste Management Planning	Required
3			3	Credit	Building Life-Cycle Impact Reduction (v4.1)	6
1			1	Credit	Environmental Product Declarations (v4.1)	2
			2	Credit	Sourcing of Raw Materials (v4.1)	2
2				Credit	Material Ingredients (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 (v4.1)	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			
5	1	0	0	**Innovation**		6
	1			Credit	Exemplary Performance: HPD or Heat Island Reduction	1
1				Credit	Innovation: Purchasing - Lamps	1
1				Credit	Exemplary Performance: EPDs	1
1				Credit	Innovation: LEED O+M Starter Kit or Walkable Site	1
1				Credit	Innovation: Green Building Education	1
1				Credit	LEED Accredited Professional	1

Y	?+	?-	N			
4	0	0	0	**Regional Priority**		4
1				Credit	Regional Priority: High priority Site	1
1				Credit	Regional Priority: Rainwater Management	1
1				Credit	Regional Priority: Optimize Energy performance/ Renewable En	1
1				Credit	Regional Priority: Building LCA	1

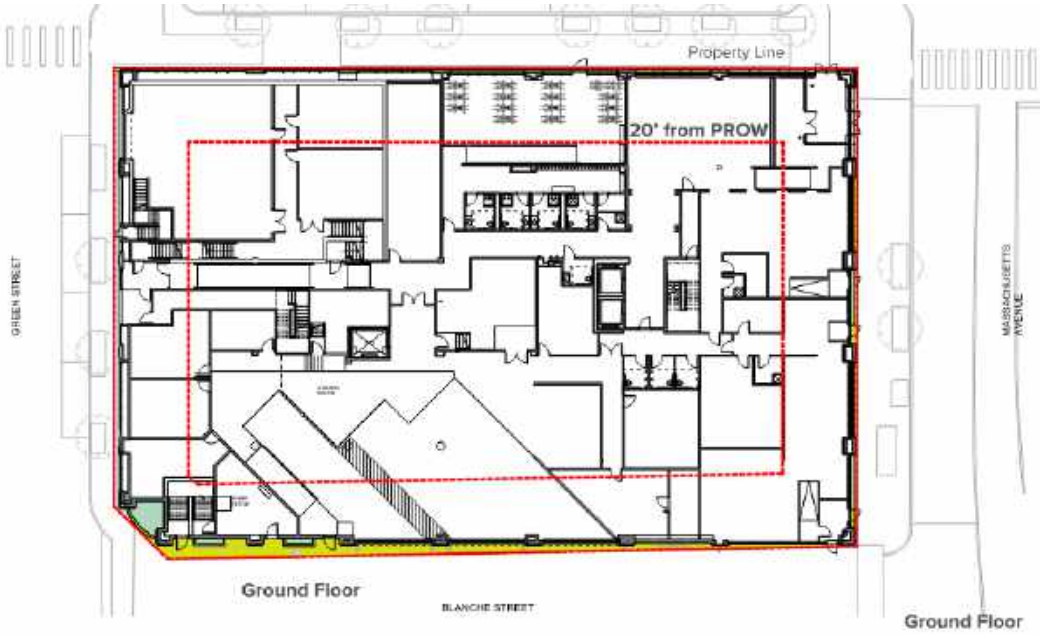
67	3	0	40	**TOTALS**	Possible Points: 110

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

Article 22.30 – Green Roofs

Note that per Section 22.35.1, the Green Roofs Requirement is only applicable to a new building or structure of 25,000 square feet or more. The only added square footage will be from the 8,300 square foot mechanical penthouse, which is less than 25,000 square feet. However, the team is evaluating areas where green roof can be added. Featured below are the current proposed roof and site plans. It is estimated that approximately 1,500 square feet of roof space can be allocated to green roof.

Roof Plan



Ground Floor

Green Roofs & Legend

Type	Color	Description	QTY / Area out side 20' of street	QTY / Area within 20' of street	SRI
N/A		Potential green roof	0 sf	Apx 1,500sf	N/A
D1		High SRI Membrane	Apx 14,000sf	Apx 7,500sf	85

Paving, Plantings Legend

Type	Color	Description	QTY / Area out side 20' of street	QTY / Area within 20' of street	SRI
N/A		Brick Paving	0 sf	741 sf	TBD
N/A		Concrete Paving	0 sf	253 sf	TBD
B2		Low Planting Area	0 sf	110 sf	N/A

Total Lot Area:
26,075sf
CAMBRIDGEPORT REVITAILIZATION DEVELOPMENT DISTRICT (CRDD)

* All Roof area is low roof condition

Project Address	Special Permit Number	Total Lot Area (SF)	
350 Massachusetts Avenue	PB- XXX	26075	
Applicant Name	Phone Number	Open Space Requirement (%)	
BRE-BMR 350 Massachusetts LLC	858-524-9153	20%	
Applicant Contact / Address	Email Address	Includes High SRI Roof	SRI Value
4570 Executive Dr, Suite 400, San Diego CA 92121	ashley.myslinski@biomedrealty.com	☑ Yes TRUE	85
Project Description		Result	
Existing Cool Score: Rehabilitation of existing building with zero lot line		**N/A**	

			Outside 20' of PROW	Value Factor		Within 20' of PROW	Value Factor	Contributing Area
Trees Enter the number of trees in each category. Count each tree only once on this form.		**Preserved Existing Trees**						
	A1	Understory tree currently <10' canopy spread	0	0.80	+	0	1.60	-
	A2	Understory tree currently >10' canopy spread	0	1.00	+	0	2.00	-
	A3	Canopy tree currently <15' canopy spread	0	0.80	+	0	1.60	-
	A4	Canopy tree currently between 15' and 25' canopy spread	0	1.00	+	0	2.00	-
	A5	Canopy tree currently >25' canopy spread	0	1.20	+	0	2.40	-
		New or Transplanted Trees						
	A6	Understory tree	0	0.60	+	0	1.20	-
	A7	Canopy tree	0	0.70	+	0	1.40	-
Planting Areas Enter area in square feet of each component in the box provided	B1	Lawn	0	0.30	+	0	0.60	-
	B2	Low Planting	0	0.40	+	90	0.80	72
	B3	Planting	0	0.50	+	0	1.00	-
Green Roofs & Facades For definitions, see reference document.	C1	Green Façade	0	0.10	+	0	0.20	-
	C2	Living Wall	0	0.30	+	0	0.60	-
	C3	Green Roof	0	0.30	+	0	0.60	-
	C4	Short Intensive Green Roof	0	0.50	+	0	1.00	-
	C5	Intensive Green Roof	0	0.60	+	0	1.20	-
Paving & Structures	D1	High-SRI Roof	Required	N/A				
	D2	High-SRI Paving	0	0.1				-
	D3	High-SRI Shade Structure	0	0.2	+	0	0.40	-

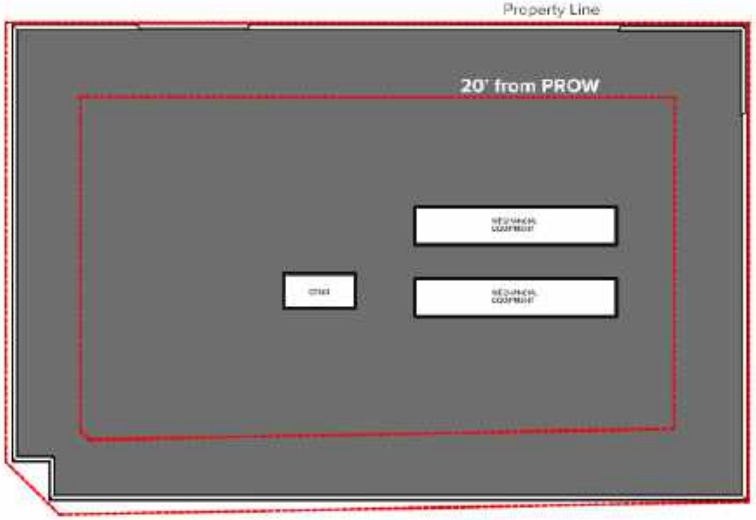
Project Summary		
Portion of lot area utilizing green strategies 0%	**Total Contributing Area**	**72**
Portion of score from green strategies 100%	**Total Area Goal**	**5,215**
Portion of score from trees 0%	**COOL FACTOR SCORE**	**0.01**
Portion of score contributing to public realm cooling 100%		

Article 22.90 – Green Factor Standard

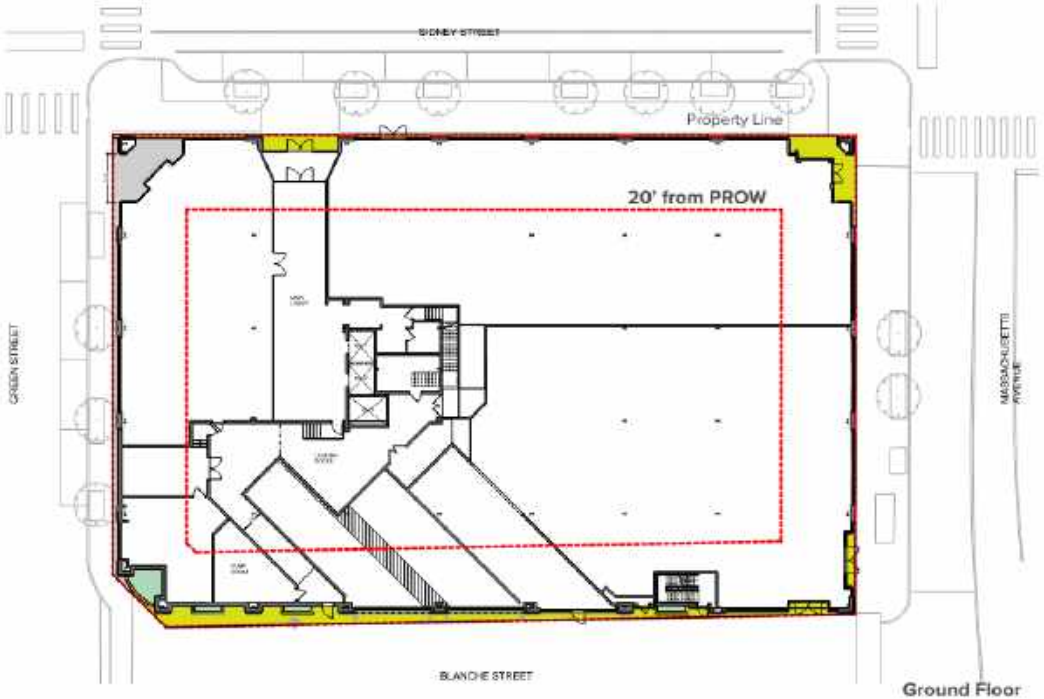
Existing Cool Factor Score

In accordance with Section 22.93.1, any roof membrane that added or replaced will have an initial SRI of at least 85. The design team is evaluating the feasibility of Green Roof Area. Due to roof space allocated to electrification equipment, however, there will be limited roof space available. 350 Mass Ave is a Zero Lot Line project and involves the rehabilitation of a pre-existing building that will not result in the enlargement of the building footprint. Therefore, per Section 22.94.3 (b), a "Cool Score of less than 1.0 shall be considered to meet the Green Factor standard if it is equal to or greater than the Cool Score attributable to the existing conditions on the site." The project team will protect and maintain any existing trees during the construction process. The current Cool Factor Score of 0.01 will be the minimum factor achieved at this site.

Existing Roof and Site Plan



Roof Plan



Ground Floor

Green Roofs & Legend

Type	Color	Description	QTY / Area out side 20' of street	QTY / Area within 20' of street	SRI
N/A		Dark Membrane	Apx 13,200sf	Apx 9,800sf	UNKNOWN

Paving, Plantings Legend

Type	Color	Description	QTY / Area out side 20' of street	QTY / Area within 20' of street	SRI
N/A		Brick Paving	0 sf	936 sf	TBD
N/A		Concrete Paving	0 sf	364 sf	TBD
B2		Low Planting Area	0 sf	90 sf	N/A

Total Lot Area:
26,075sf
CAMBRIDGEPORT REVITAILIZATION DEVELOPMENT DISTRICT (CRDD)

* All Roof area is low roof condition

Proposed Cool Factor Score

Based on the proposed roof and site plans, the cool factor could increase from 0.01 to 0.10 with modifications made with this renovation.

			Outside 20' of PROW	Value Factor		Within 20' of PROW	Value Factor	Contributing Area
Trees Enter the number of trees in each category. Count each tree only once on this form.		**Preserved Existing Trees**						
	A1	Understory tree currently <10' canopy spread	0	0.80	+	0	1.60	-
	A2	Understory tree currently >10' canopy spread	0	1.00	+	0	2.00	-
	A3	Canopy tree currently <15' canopy spread	0	0.80	+	0	1.60	-
	A4	Canopy tree currently between 15' and 25' canopy spread	0	1.00	+	0	2.00	-
	A5	Canopy tree currently >25' canopy spread	0	1.20	+	0	2.40	-
		New or Transplanted Trees						
	A6	Understory tree	0	0.60	+	0	1.20	-
	A7	Canopy tree	0	0.70	+	0	1.40	-
Planting Areas Enter area in square feet of each component in the box provided	B1	Lawn	0	0.30	+	0	0.60	-
	B2	Low Planting	0	0.40	+	110	0.80	88
	B3	Planting	0	0.50	+	0	1.00	-
Green Roofs & Facades For definitions, see reference document.	C1	Green Façade	0	0.10	+	0	0.20	-
	C2	Living Wall	0	0.30	+	0	0.60	-
	C3	Green Roof	1500	0.30	+	0	0.60	450
	C4	Short Intensive Green Roof	0	0.50	+	0	1.00	-
	C5	Intensive Green Roof	0	0.60	+	0	1.20	-
Paving & Structures	D1	High-SRI Roof	Required	N/A				
	D2	High-SRI Paving	0	0.1				-
	D3	High-SRI Shade Structure	0	0.2	+	0	0.40	-

Project Summary

Portion of lot area utilizing green strategies 2%	
Portion of score from green strategies 100%	
Portion of score from trees 0%	
Portion of score contributing to public realm cooling 16%	
Total Contributing Area	**538**
Total Area Goal	**5,215**
COOL FACTOR SCORE	**0.10**

Green Factor Certification Form

This is for projects that are subject to the Green Factor Standard in Section 22.90 of the Cambridge Zoning Ordinance, which requires site and landscape design features that reduce urban heat.

Review Section 22.90 of the Cambridge Zoning Ordinance and the Cambridge Cool Score Information and Guidelines before completing this form. When submitting a completed form, attach the supporting materials listed in the Green Factor Checklist.

Project Address/Location: 350 Massachusetts Ave, Cambridge, MA 02139

Planning Board (PB) and/or Board of Zoning Appeal (BZA) case number (if applicable): _____

Developer Name and Contact Information

Name: BRE-BMR 350 Massachusetts LLC

Mailing Address: 4570 Executive Dr, Suite 400, San Diego CA 92121

Email Address: ashley.myslinski@biomedrealty.com

Telephone #: 858-524-9153

Applicability: Section 22.92 & Section 5.22.5

Is this project subject to Green Building Requirements (Section 22.20)?	☒ Yes ☐ No
Does this project involve the construction of a new building?	☐ Yes ☒ No
Does this project enlarge an existing building's footprint by at least 50%?	☐ Yes ☒ No
Does this project involve the creation of new surface parking area?	☐ Yes ☒ No

Answer the questions below if the answer is "Yes" to any of the above

Requirements

Cool Roof Requirement

Does this project involve the construction of a new building roof or replacement of more than 50% of an existing roof?	☒ Yes ☐ No
Has this project received a Certificate of Appropriateness from the Cambridge Historical Commission or a Neighborhood Conservation District Commission, or a determination of adverse effect by the Executive Director of the Cambridge Historical Commission? [if "Yes," attach the document to your submission]	☐ Yes ☐ No ☒ N/A

Last Updated: March 2024

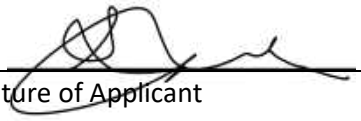
How much of the new or replaced roof area (in sq. ft.) has a slope (rise:run) of less than 2:12? [Cool Roof Requirement is not applicable to roof area with a 2:12 or steeper slope]	25,130 ft2
What is the initial Solar Reflectance Index (SRI) of the proposed roof surface material for the area described above, excluding any solar energy systems or green roof area? [Minimum is 82]	85

Cool Score – Base information on the attached Cool Score Sheet and Site/Roof Plan

What is the Cool Score of the proposed site design? [Minimum is 1.0 except per below]	0.10
What is the Cool Score of the existing site? [Only answer if the project does not involve a new building or enlargement of a building footprint. The proposed Cool Score must not be less than the Cool Score of the existing site]	0.01

Modifications to Requirements

Has the project received, or will the project seek, a special permit from the Planning Board to modify the Green Factor Standard for this proposal?	□ Received SP (date: _____) □ Seeking SP ☒ No modification



Signature of Applicant

2/5/25

Date

Green Factor Checklist

Project Phase	Required Submissions
☒ **Special Permit/Design Review (if applicable)**	☒ Green Factor Certification Form ☒ Cool Score Sheet ☒ Site and Roof Plans
☐ **Building Permit**	☐ Green Factor Certification Form (updated from prior version) ☐ Cool Score Sheet (updated from prior version) ☐ Site and Roof Plans (updated from prior version) ☐ Catalog of plant species including height and canopy spread of trees and height and soil depth of high and low planting areas ☐ Specifications of roof surface material including initial Solar Reflectivity Index (SRI) ☐ Specifications of paving material including SRI (if applicable) ☐ Specifications of green roof installation with operations and maintenance plan (if applicable)
☐ **Certificate of Occupancy**	***All materials updated based on as-built conditions:*** ☐ Green Factor Certification Form (updated from prior version) ☐ Cool Score Sheet (based on as-built conditions) ☐ Site and Roof Plans (based on as-built conditions) ☐ Catalog of plant species including height and canopy spread of trees and height and soil depth of high and low planting areas ☐ Specifications of roof surface material including initial Solar Reflectivity Index (SRI) ☐ Specifications of paving material including SRI (if applicable) ☐ Specifications of green roof installation with operations and maintenance plan (if applicable)

Last Updated: March 2024

Article 22 – Net Zero Narrative

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Project Profile

Development Characteristics

Lot Area (sq.ft.):	26,075 SF
Existing Land Use(s) and Gross Floor Area (sq.ft.), by Use:	118,265 SF – Office
Proposed Land Use(s) and Gross Floor Area (sq.ft.), by Use:	112,600 SF 3,880 SF – Retail 108,720 SF – 60% Lab & 40 % Office
Proposed Building Height(s) (ft. and stories):	97' (69.5' five-story office/lab + 27.5' mechanical penthouse); Existing structure to be reused
Proposed Dwelling Units:	None
Proposed Open Space (sq.ft.):	N/A (Zero Lot Line)
Proposed Parking Spaces:	None
Proposed Bicycle Parking Spaces (Long-Term and Short-Term):	30 Long-Term and Contribution to Public Bicycle Parking Fund for Short-Term Parking

Green Building Rating System

Choose the Rating System selected for this project:

LEED-Leadership in Energy & Environmental Design (U.S. Green Building Council)			
Rating System & Version:	LEED BD+C: Core and Shell v4	***Seeking Certification? ****	Yes
Rating Level:	Gold	***# of Points:***	67

Enterprise Green Communities			
Rating System & Version:	N/A	***Seeking Certification? ****	No
Rating Level:	N/A	***# of Points:***	N/A

Passive House Institute US (PHIUS) or Passivhaus Institut (PHI)			
Rating System & Version:	N/A	***Seeking Certification? ****	No

**NOTE: Certification is not required through the Green Building Requirements. However, you may choose to indicate if the Project Team intends to pursue formal certification through these Green Building Rating Programs (or their affiliates).*

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Proposed Project Design Characteristics

Building Envelope

Assembly Descriptions:

Roof:	*Existing roof replacement:* *Single ply roof membrane* *Cover board* *Tapered polyisocyanurate insulation* *7" polyisocyanurate insulation* *Vapor barrier* *Metal deck* *New mechanical penthouse roof:* *Single ply roof membrane* *Cover board* *Tapered polyisocyanurate insulation* *7" polyisocyanurate insulation* *Vapor barrier* *Moisture resistance gypsum board* *Metal deck*
Foundation:	*Concrete foundation wall* 2" XPS down to footing Team is evaluating 6" Glavel or 2" XPS for below slab horizontal part, vertical part is 1" XPS
Exterior Walls:	*Typical brick veneer wall:* *Brick veneer* *Air gap* *Air barrier* *Exterior gypsum sheathing* *4" HFO-blown closed cell spray foam in 6" metal stud* *2" Polyisocyanurate insulation c.i.* *Vapor barrier* *2 ½" Metal stud* *GWB* *Penthouse wall (Roof membrane system):* *4" Polyisocyanurate insulation* *6" Metal stud* *Penthouse wall (Rainscreen system):* *Corrugated metal classing* *5" Mineral wool* *6" Metal stud*

	Aluminum composite metal panel: *ACM* *Air gap* *6" mineral wool insulation with thermally broken girt system* *AVB* *Exterior gypsum sheathing* *6" Metal stud* *GWB*
Windows:	*Punched windows:* *Kawneer storefront system with 1" IGU (existing windows)* *Winsert Plus secondary window inserts (gas filled, super insulated fiberglass frame)* *Curtainwall:* *Kawneer 1600 system thermally broken system with triple glazing*
Window-to-Wall Ratio:	28%
Other Components:	

Envelope Performance:

Provide estimates of the thermal transmittance (U-value) for the building envelope compared to "Baseline" standards required by the Massachusetts Stretch Energy Code, latest adopted edition.

	Proposed		***Baseline***	
	Area (sf)	*U-value*	*Area (sf)*	*U-Value*
Punched window	9,295	0.19	9,295	0.30
Curtainwall	5,890	0.21	5,890	0.25
Folding Door	346	0.31	346	0.63
Brick wall	24,746	0.12	24,746	0.055
M.P (MEMBRANE)	5,572	0.05	5,572	0.055
M.P(METAL)	4,556	0.05	4,556	0.055
ACM WALL	2,338	0.08	2,338	0.055
Overhead Door	1,155	0.31	1,155	0.31
Curtain Wall with a wall behind	1,488	0.05	1,488	0.055
Roof	25,130	0.032	25,130	0.032

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Envelope Commissioning Process:

The Applicant intends to meet the requirements of Path 2 of LEED BD+C v4 Enhanced Commissioning:

Enhanced and Monitoring-Based Commissioning.

Building Mechanical Systems Descriptions:

Space Heating:	25% of the building's peak heating load will be electric, air-to-water heat pumps. HW heating coils for office/lab AHUs and tenant zonal systems will be supplied by air-to-water heat pumps and high-efficiency, natural gas condensing boilers as backup for coldest conditions.
Space Cooling:	Air-to-water heat pumps to supply chilled water coils for office/lab AHUs and tenant zonal systems.
Heat Rejection:	Air-cooled via air-to-water heat pumps
Pumps & Auxiliary:	All pumps with Variable Frequency Drives
Ventilation:	100% OA with Konvekta heat recovery and VFD's to lab spaces and separate ventilation to office spaces with enthalpy wheel for energy recovery.
Domestic Hot Water:	Local electric resistance
Interior Lighting:	LED fixtures in core spaces
Exterior Lighting:	Existing exterior light fixtures to remain and existing bulbs to be replaced with LEDs.
Other Equipment:	Office: 0.9-1.1 W/SF process load associated with office equipment Lab: 6 W/SF associated with laboratory equipment

Systems Commissioning Process:

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. The commissioning process will meet the requirements of LEED BD+C v4 Fundamental and Enhanced Commissioning, Path 2 (Enhanced and Monitoring-Based Commissioning) in accordance with ASHRAE Guideline 0–2013 and ASHRAE Guideline 1.1–2007 for HVAC&R systems for mechanical, electrical, plumbing, and renewable energy systems and assemblies, as applicable.

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Building Energy Performance Measures

Overview

Broadly describe the ways in which building energy performance has been integrated into the following aspects of the project's planning, design, engineering, and commissioning. More detail on specific measures can be provided in appendices.

Land Uses:	The site has been previously developed and it is classified as a Difficult Development Area by the US Department of Housing and Urban Development. The selected site will provide access to public transportation, bicycle network and facilities.
Building Orientation and Massing:	As an existing structure, the building orientation will remain unchanged. The envelope and fenestration area will be optimized to minimize thermal losses and to bring in sufficient daylight into the spaces.
Envelope Systems:	The existing envelope will be upgraded to meet the MA 2023 Stretch Energy Code C505.1 exception 1 component performance alternative requirement for low glazed wall systems. The renovated envelope includes new interior cavity and continuous insulation at the walls, new continuous insulation at the roofs, high-performance glazing, and decreased infiltration.
Mechanical Systems:	Lab: Variable Volume 100% OA Air-Handling Units with combination HW, CHW and Konvekta heat recovery coils; Office: Variable Volume Air-Handling Units with combination HW, CHW and coils and enthalpy wheel energy recovery; High-efficiency Air-to-water source heat pumps and condensing gas-fired boilers; Circulation pumps with VFD's
Renewable Energy Systems:	The roof area is allocated to the electrification equipment of the base building and future tenant equipment.
District-Wide Energy Systems:	*N/A*
Other Systems:	*N/A*

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Integrative Design Process

Describe how different parties in the development process (owners, developers, architects, engineers, contractors, commissioning agents) have collaborated in the design. Include the Basis of Design and Owner's Project Requirements and describe how they have been informed by planning activities such as meetings or design charettes. Describe how continuing collaborative processes will inform Schematic/Design and Construction Documents.

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 will be evaluated in each phase as the project develops. 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.

Green Building Incentive Program Assistance

Describe any programs applicable to this project that would support improved energy performance or reduced greenhouse gas emissions, and which of those programs have been contacted and may be pursued. Programs may be offered by utility companies, government agencies, and other organizations, and might include rebates, grants, financing, technical assistance, and other incentives.

The Project Team had an introductory meeting with MassSave and is taking incentive opportunities into consideration for decarbonization efforts of this existing building. This project may be eligible for EUI reduction and heat pump incentives, and applicability will continue to be evaluated as the design progresses.

The Project Team is also discussing potential applicable Inflation Reduction Act incentives, and these incentives will be explored further.

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Net Zero Scenario Transition

Describe the technical framework by which the project can be transitioned to net zero greenhouse gas emissions prior to 2050, acknowledging that such a transition might not be economically feasible at first. This description should explain the future condition and the process of transitioning from the proposed design to the future condition.

	Net Zero Condition:	***Transition Process:***
Building Envelope:	The existing building envelope will be brought up to meet current 2023 Stretch Energy Code standards, which will significantly decrease thermal loss, providing the opportunity to size smaller equipment.	*N/A*
HVAC Systems:	The existing equipment is designed to supply 25% of the building's peak space and ventilation heating load, which will cover most of the annual energy consumption associated with heating.	The project will be designed to support 100% electrification for the future, including the sizing of the transformer. Additional infrastructure and equipment will not be provided on day one.
Domestic Hot Water:	The domestic hot water system will be all electric. Low-flow fixtures will be installed to reduce electric usage associated with DHW heating.	*N/A*
Lighting:	All LED light fixtures with advanced lighting control systems	The base building will utilize LED fixtures. At the end of life of fixtures, with potential new technologies, lighting upgrades may result in additional savings.
Renewable Energy Systems:	Due to the limited roof area, an on-site renewable system is not feasible for this project.	*N/A*
Other Strategies:	Plug loads and other process equipment in a laboratory building represent a significant percentage of a laboratory building's annual energy consumption. The team is studying the implementation of high-efficiency equipment and implementing advanced control strategies to reduce these loads will have a significant impact on the building overall energy performance and environmental footprint.	As new technologies emerge, the office and lab equipment may be replaced with new and low-energy ones and the plug-load control strategies may improve. Additionally, implementing control strategies for the lab fume hoods (i.e., controlled by occupancy or Indoor Air Quality sensors) will help the project with achieving NZE goals.

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Energy Systems Comparison

Overview

This section should describe the results of an analysis comparing the technical and financial feasibility to meet the projected HVAC and domestic hot water demands of the building using energy systems that do not consume carbon-based fuels on-site compared to code-compliant energy systems that consume carbon-based fuels on-site.

The project team is currently evaluating the technical and financial feasibility of reducing the use of carbon-based fuels on-site. Although not subject to the decarbonization requirements of New Construction, the proponent intends to design for a minimum of 25% electrification of the peak heating demand and the electrification of domestic hot water, which will reduce the GHG emissions associated with on-site natural gas consumption by 87% as compared to an all-gas scenario. The 25% electrification scenario is also anticipated to use 17% less overall energy as compared to the code-compliant gas scenario.

Assumptions

Describe what building energy systems were included and excluded in your analysis and why.

	Included in analysis?		***Describe the systems for which this was analyzed or explain why it was not included in the analysis:***
	Yes	***No***	
Solar Photovoltaics:		*x*	All the roof area will be covered by mechanical equipment and therefore, no area will be available to study solar PV.
Solar Hot Water:		x	Solar Hot Water is not feasible for this building type and size.
Ground-Source Heat Pumps (Geothermal):		x	Due to challenges with site-related logistics and feasibility, geothermal analysis will not be pursued.
Water-Source Heat Pumps:	x		Water-source heat pumps have been evaluated and ruled out due to concerns with financial and logistical feasibility.
Air-Source Heat Pumps:	x		Air-to-water source heat pumps are included in the BOD
Non-Carbon-Fuel District Energy:		x	
Other Non-Carbon-Fuel Systems:		x	

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Non-Carbon-Fuel Scenario

The non-carbon fuel scenario would be an all-electric option without the need for backup gas boilers and to rely solely on the air-to-water source heat pumps. The Net Zero Energy (NZE) scenario would include the purchase of Class I RECs to offset indirect emissions and Verified Carbon Credits to offset on-site natural gas consumption.

Solar-Ready Roof Assessment

The purpose of this assessment is to determine the technical feasibility of solar energy system installation, either as part of the proposed project or in the future. It is helpful to supplement this narrative with a plan depicting the information provided.

Total Roof Area (sq. ft.):	25,130 sf (roof replacement area 16,830 sf / New Mechanical Roof area 8,300 sf)
Unshaded Roof Area (sq. ft.):	There is no availability of roof area due to electrification efforts.
Structural Support:	*N/A*
Electrical Infrastructure:	*N/A*
Other Roof Appurtenances:	*N/A*
Solar-Ready Roof Area (sq. ft.):	*N/A*
Capacity of Solar Array:	*N/A*
Financial Incentives:	*N/A*
Cost Feasibility:	*N/A*

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Results

Briefly summarize the results of the analysis and how it has informed the design of the project. Also include figures for the "Non-Carbon-Fuel Scenario" in the concluding Summary Table at the end of the Net Zero Narrative. Attachments can be provided with more specific figures and metrics regarding installation, maintenance, and upkeep costs (exclusive *of operating fuel expenses), but a full report is not necessary.*

TBD	***Proposed Design***		***Non-Carbon-Fuel Scenario***	
	Installation Cost	*Maintenance Cost*	*Installation Cost*	*Maintenance Cost*
Space Heating				
Space Cooling				
Heat Rejection				
Pumps & Aux.				
Ventilation				
Domestic Hot Water				
(Financial Incentives)				
Total Building Energy System Cost				

The project team utilized energy benchmarking tools and databases such as Cambridge Building Energy Use Disclosure Ordinance (BEUDO) to establish an energy performance benchmark and a predicted Energy Use Intensity (pEUI) for the commercial building. After narrowing down the building parameters in the BEUDO data to reflect the current design, the outcomes are sixteen peer buildings with an average source EUI of 411 kBtu/SF. This comparison shows that the current design with a predicted source EUI of approximately 339 kBtu/SF is low when compared to the benchmarking data. The site pEUI for the 350 Mass Ave laboratory is estimated at 124.2 kBtu/SF which is significantly lower than the BEUDO average EUI of 227.4 kBtu/SF.

This energy analysis shows that this building will have better energy performance as compared to the MA Stretch Energy Code baseline case. Throughout the design process, the design team will use three performance metrics in their decision making around energy use in the design process: site energy use, source energy use, and greenhouse gas emissions.

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Anticipated Energy Loads and Greenhouse Gas Emissions

Assumptions

Describe the assumptions and methodology used to conduct preliminary energy modeling and set energy targets for the project. Specifically describe what components of the building were included and excluded.

Energy models were developed for 350 Mass Ave project to investigate its compliance with the Massachusetts Stretch Energy Code and to evaluate the impact of several energy conservation measures on the building overall energy use, cost, and GHG emissions in the early stage of design.

350 Mass Ave will be a new Core and Shell, Laboratory/ Office building, in Cambridge, MA. The building program includes 60% laboratory and 40% office spaces. Using the guidelines outlined in Appendix G of ASHRAE 90.1-2019 and Massachusetts Amendments, the Stretch Energy Code baseline and proposed building design were modeled following Tables G3.1 in terms of the space use classification, schedules, building envelope, lighting, thermal blocks, HVAC systems, service hot water system, and receptacle and other loads.

The building geometry is based on the conditions of the existing building in conjunction with the preliminary modifications design. The vertical elements of the envelope primarily consist of a curtainwall system on the first and second levels with punch windows on the remaining third – fifth levels. The overall window area is estimated at 28% of the building exterior wall area. High performance insulated glazing is expected to be installed throughout.

The building is anticipated to be occupied during extended office hours throughout the year, with some partial occupancy during weekends. The peak occupancy density is estimated to be 250 GSF/person in the office and 400 GSF/person in Lab spaces. The HVAC system will operate 24/7.

The interior lighting power densities in both the baseline and proposed case models follow the space-by-space-method approach. End uses such as computers, receptacles, and lab equipment are included as equipment gains. These are inputs to reflect the design team's understanding of the anticipated equipment usage and are identical between the baseline and the proposed models.

Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Annual Projected Energy Consumption and Greenhouse Gas (GHG) Emissions

The preliminary energy modeling results should be shown in a concluding table format similar to what is shown on the next page. It should compare the "baseline building" (Massachusetts Stretch Energy Code) to the proposed design, as well as the "net zero" scenario projected by 2050 and described later in this narrative.

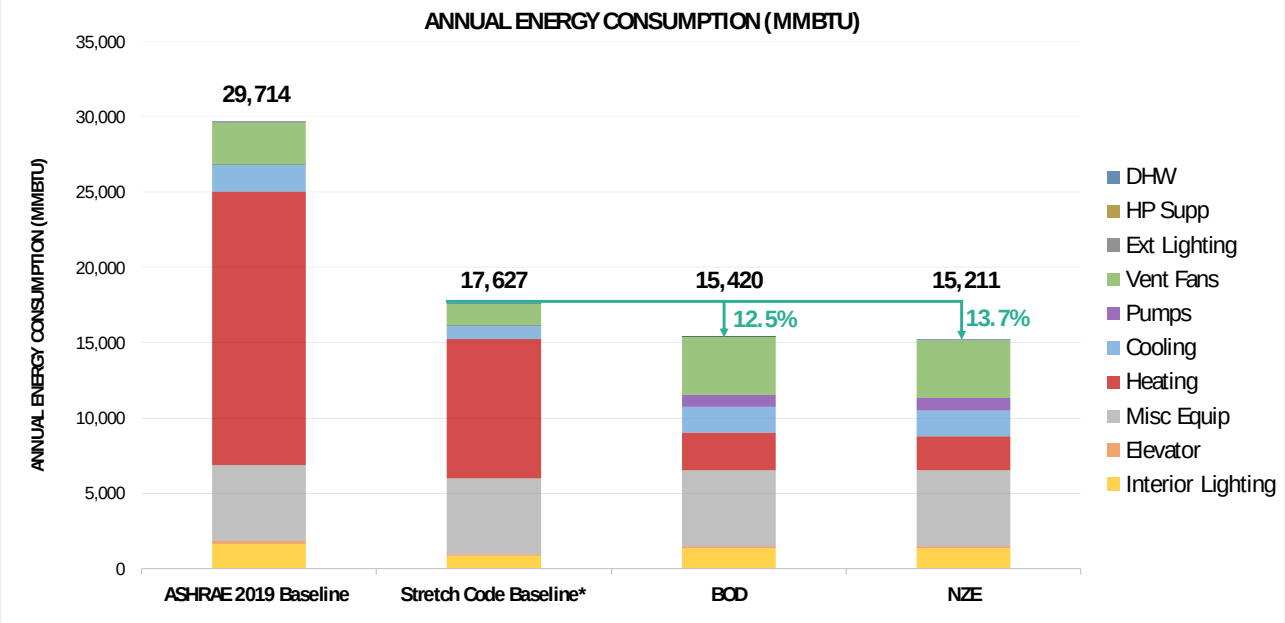
	Baseline Building		***Proposed Design***		***Future Net Zero Scenario***		***Non-Carbon-Fuel Scenario***	
	kWh or Therms	*% of Total*	*kWh or Therms*	*% of Total*	*kWh or Therms*	*% of Total*	*kWh or Therms*	*% of Total*
Space Heating	*92,848 Therms*	*53%*	*535,665 kWh/ 6,616 Therms*	*16%*	*656,406 kWh*	*15%*		
Space Cooling	*260,633 kWh*	*5%*	*496,870 kWh*	*11%*	*509,018 kWh*	*11%*		
Heat Rejection	*0*	*0%*	*0*	*0%*	*0*	*0%*		
Pumps & Aux.	*1,689 kWh*	*0.03%*	*241,153 kWh*	*5%*	*241,004 kWh*	*5%*		
Ventilation	*424,083 kWh*	*8%*	*1,125,398 kWh*	*25%*	*1,125,396 kWh*	*25%*		
Domestic Hot Water	*7,106 kWh*	*0.1%*	*9,511 kWh*	*0.2%*	*9,511 kWh*	*0.2%*		
Interior Lighting	*244,264 kWh*	*5%*	*382,272 kWh*	*8%*	*382,272 kWh*	*9%*		
Exterior Lighting	*1,626 kWh*	*0.03%*	*3,189 kWh*	*0.1%*	*3,189 kWh*	*0.1%*		
Misc. Equipment	*1,478,985 kWh*	*29%*	*1,478,985 kWh*	*33%*	*1,478,985 kWh*	*33%*		
	$US, kBTU, kBTU/SF		*$US, kBTU, kBTU/SF*	*% Reduction from Baseline*	*$US, kBTU, kBTU/SF*	*% Reduction from Baseline*	*$US, kBTU, kBTU/SF*	*% Reduction from Baseline*
Site EUI	*140.7 kBTU/SF*		*123.1 kBTU/SF*	*12.5%*	*121.4 kBTU/SF*	*13.7%*		
Source EUI	*267 kBTU/SF*		*339 kBTU/SF*	*-26.9%*	*343 kBTU/SF*	*-28.6%*		
Total Energy Use	*17,627,432 kBTU*		*15,419,750 kBTU*	*12.5%*	*15,211,188 kBTU*	*13.7%*		
Total Energy Cost	*$660,056.54*		*$872,867.22*	*-32.2%*				
	kWh or Therms	*% Total Energy*	*kWh or Therms*	*% Total Energy*	*kWh or Therms*	*% Total Energy*	*kWh or Therms*	*% Total Energy*
On-Site Renewable Energy Generation								
Off-Site Renewable Energy Generation								
	Tons CO_2 [/SF]		*Tons CO_2 [/SF]*	*% Reduction from Baseline*				
GHG Emissions	*1,096 MTCO2e*		*0.0088*	*-0.54%*				
GHG Emissions per SF	*1,102 MTCO2e*		*0.0089*	*-0.54%*				

It may be helpful to present this information in a chart or graph. The following page provides examples.

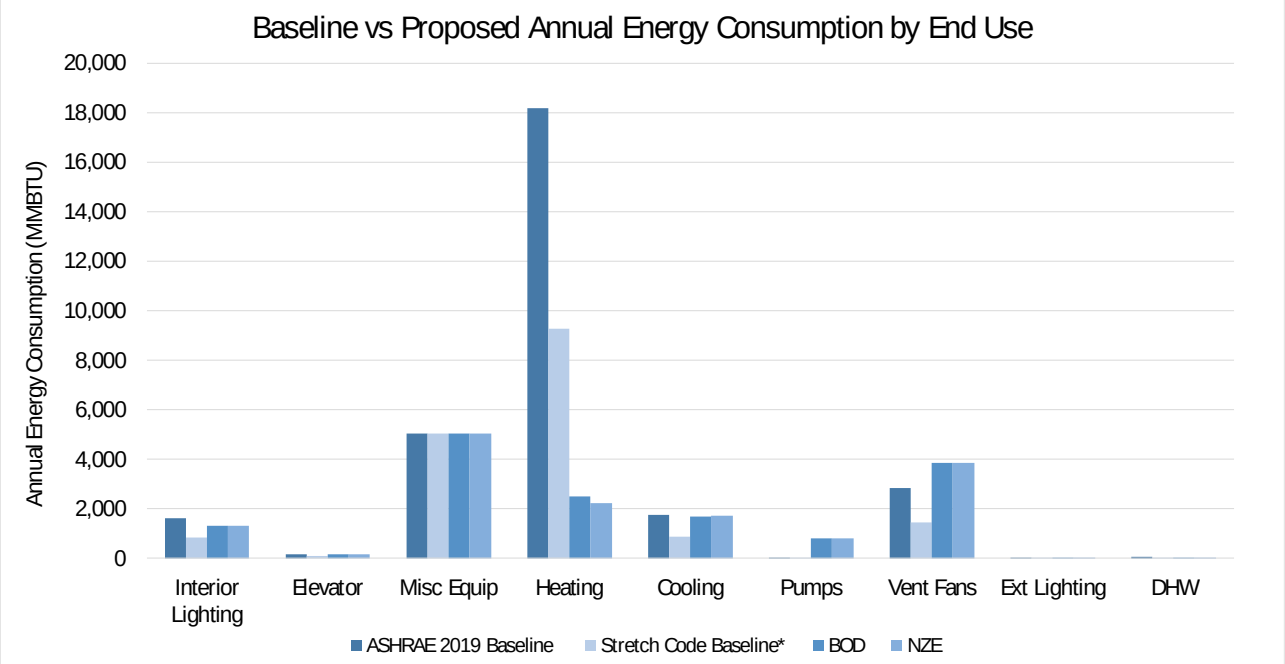
Net Zero Narrative – 350 Mass Ave

350 Massachusetts Ave, Cambridge, MA 02139
Submitted By: BRE-BMR 350 Massachusetts LLC

Example Chart 1:



Example Chart 2:



CITY OF CAMBRIDGE EMBODIED CARBON REPORTING TEMPLATE

City of Cambridge Zoning Ordinance Amendment to Section 22.25.1(c) of Article 22, entitled Sustainable Design and Development (Ordinance No. 2022-20), Section 7. Embodied Emissions:

"A whole building lifecycle analysis of the estimated emissions generated by the construction of the Green Building Project. The Assistant City Manager for Community Development shall promulgate regulations for how these estimated emissions are to be reported.

Such regulations shall include at minimum the required reporting of estimated lifecycle emissions generated by the use of major building materials, including but not limited to wood, concrete, steel, aluminum and glass, using embodied emissions modeling software and industry standards acceptable to CDD staff. This paragraph will become effective on the date of final promulgation of the regulations for Green Building Projects that have not yet completed the initial stage of administrative review by such date, and shall not impose a requirement on any building project that does not meet the standard threshold for project review special permit of 50,000 square feet or includes housing units."

Applicability: For Projects after date of final promulgation of regulations (01/01/2024)

Is this project subject to Green Building Requirements (Section 22.20)?	Yes
Does this project meet the threshold for Project Review special permit (Section 19.23)?	Yes
Is the gross floor area of this project 50,000 square feet or more?	Yes
Does this project exclude dwelling units?	Yes

Complete this reporting template if the answer is "Yes" to ALL of the above.

EMBODIED CARBON REPORTING SUBMISSION PROCESS

Submission 1 – Special Permit Stage:

1. Submit all of the Required Narratives noted below and any of the applicable Optional Narratives.
2. A life cycle analysis (LCA) is not required at this submission stage.

Submission 2 - Building Permit Stage:

1. Submit revised Required Narratives and any applicable Optional Narratives to reflect the updated building design.
2. Complete a life cycle analysis (LCA) and complete all LCA-related fields included in this reporting template including:
    - Life Cycle Analysis Inputs
    - Life Cycle Analysis Results

Submission 3 – Certificate of Occupancy Stage:

1. No additional submission is required at this stage.

PROJECT INFORMATION INPUTS -

Current Project Design Phase (% Complete SD/DD/CD/CA)	50% DD
# Stories Above Grade	5 occupied levels; 1 mechanical penthouse that does not exceed one-third of the area of the supporting deck.
# Stories Below Grade	0
Definitions: • Story. 'That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.' • Story Above Grade. 'A Story whose highest point is more than 4 feet above the Grade.' • Story Below Grade. 'Any Story that is lower than the Ground Story of a building.'	

NARRATIVES -

Required Narratives:

☐ Narrative description of the project structural system chosen, and any alternative systems studied related to embodied carbon:

The existing building structure is a composite structural steel framed building with concrete slab-on-metal deck floors, steel columns, and concrete shallow spread footing foundation. The lateral system is a combination steel moment frame and braced frame system in either direction. The project is adding new structural steel framing levels at the top of the building to connect on top of the existing columns and re-utilize the existing columns and foundations to support the new levels. The floor framing and lateral resisting system members for the new added levels will be similar to the existing structure material and type. The Project Team plans to study options to lower the embodied carbon of structural materials, such as steel and concrete, added to the project.

☐ Narrative description of the project enclosure system and materials chosen and any alternative systems/materials studied related to embodied carbon:

To reduce Global Warming Potential (GWP), the focus will be on selecting low-impact insulation materials for the exterior components.

- The exterior walls will feature closed-cell spray foam insulation within the stud cavity. This insulation will be HFO-based, with a low GWP. Additionally, continuous polyisocyanurate insulation will be applied to further enhance the wall's U-value and meet the 2023 Stretch Code requirements. The Project Team will evaluate polyisocyanurate products which use a hydrocarbon-based blowing agent with negligible GWP.

- The existing cold-formed metal framing (CFMF) will remain in place on the exterior walls, but new CFMF will be needed for the installation of interior finishes. The Project Team will evaluate low embodied carbon CFMF products.

- Where the existing slab-on-grade is to be removed and replaced, the Project Team is studying the application of foam glass gravel for under-slab insulation instead of XPS. Made from recycled glass and a foaming agent, foam glass gravel offers a significantly lower GWP than XPS.

- The roof insulation will also utilize polyisocyanurate insulation which, as previously mentioned, will be studied.

- The Project Team is also evaluating the application of a high-performance storm window at the interior of the existing punched windows. The product is comprised of thin glass and an insulated fiberglass frame.

☐ Does the project include the adaptive reuse of an existing building (either all or a portion of a building)? Did the project include any reused or reclaimed materials? If yes to either, please describe:

The project is changing its use from office to lab/office use. The design intent is to maintain most of the existing structural elements, with some adjustments as needed, and the exterior façade brick façade and back-up stud wall be reused and restored. The building enclosure system will be updated to meet the 2023 Stretch Energy Code requirements for change of use and cumulative additions of less than 20,000 sf. The embodied carbon of insulation materials will be considered. The Project Team is evaluating restoration of the existing punched windows with new high-performance interior storm windows versus replacement of the existing punched windows.

☐ Please describe your intended approach to performing an LCA for the second submission stage including the LCA tool to be used, materials and systems to be included, specific EPD's to be requested, etc.:

OneClick LCA and EC3 will be used to evaluate the amount of embodied carbon avoided through reuse of existing building components, as well as the impact of new materials installed. Close coordination will be conducted with the structural and building enclosure teams to evaluate potential reduction strategies, and the necessary information needed to report accurately.

Optional Narratives if Applicable:

Include any graphics that illustrate the LCA results.

☐ Did the project set an embodied carbon reduction target? If so, please describe the benchmark data used and the reduction target set:

Between 40% and 60% of the existing building envelope and structure are existing to remain which will result in significant savings in the embodied carbon. The project team will create a scenario in which a brand-new building would be constructed to calculate the avoided embodied carbon. We are evaluating for at least a 30% reduction and will be studied as the design progresses.

☐ Did the project perform a whole building life cycle assessment (WBLCA) early in the design process to identify the largest opportunities ("hot spots") for embodied emissions reductions? If yes, please describe the results and decision-making process for materials choices:

The project is starting the embodied carbon calculations based on the schematic design package.

☐ Did the project include in its specifications requests for Environmental Product Declarations (EPD's) and for what materials? Did the specifications include specific product or materials embodied carbon (GWP) targets? If yes, please describe:

The team will explore specifying the collection of Environmental Product Declaration (EPD) documentation. The Project Team is beginning this process in design development and exploring potential products with EPD documentation.

LIFE CYCLE ANALYSIS (LCA) INPUTS -

Phase of project design during which LCA was performed:	Choose from Options:	Answer = X
	Conceptual Design	
	Schematic Design	
	Design Development	
	Construction Documents	
	During Construction	
	Post-occupancy	

LCA tool/software used:	Choose from Options:	Answer = X
	Athena Impact Estimator	
	BEAM Tool	
	CARE Tool	
	Cove Tool	
	EC3	
	EPiC	
	Kaleidoscope	
	OneClick LCA	
	PH Ribbon	
	Tally	
	TallyCat beta	
	Other:	

Source of material quantities used in the LCA:	Choose from Options:	Answer = X
	BIM (ie: Revit)	
	Material take-offs or quantities from drawings	
	Rules of thumb estimates	
	Other:	

Based on the LCA tool chosen, please select the stages included in the analysis. Refer to the Cambridge Embodied Carbon Educational Toolkit for additional information on LCA stages.

Life cycle stages that are included in LCA tool used:		Answer = X
Product Stage (A1-A3) -	Product Stage (A1-A3) = Cradle to Gate	

• A1 Raw Materials Supply/Extraction		
• A2 Transport (to factory)		
• A3 Manufacturing		
Construction Stage (A4-A5) -	A1-A5	
• A4 Transport (to site)		
• A5 Construction and Installation Process		
Use Stage (B1-B5) -	A1-B5	
• B1 Use		
• B2 Maintenance		
• B3 Repair		
• B4 Replacement		
• B5 Refurbishment		
End of Life Stage (C1-C4) -	A1-C4 Cradle to Grave	
• C1 Demolition/Deconstruction	*LCA stages A1-A5, B2-B5, and C1-C4 = from Cradle to Grave – Recommended *Cradle to Grave Tools include Athena, OneClick LCA, Tally	
• C2 Transport (to disposal)		
• C3 Waste Processing		
• C4 Disposal		
Beyond the Life Cycle (D)- Reuse, Recycling, Energy Recovery	A1-D	
	* Module D is used for any applicable biogenic carbon storage	

Physical scope of materials and systems included in LCA:		**Yes or No**
*At a minimum, embodied carbon calculations should be performed for building structure and building envelope. *Envelope components should include all materials from the exterior material to the interior finish surface.	**Structure (above grade)**	**Required**
	Structure (below grade)	**Required**
	Enclosure (outside surface to interior drywall)	**Required**
	Fireproofing	
	Interiors (partitions, ceilings, doors)	
	Finish materials (floors, walls, ceilings)	
	Mechanical, electrical and plumbing systems	
	Furniture	
	Parking structure included or excluded?	
	Other	

Reference study period, ie: Expected life of the building:	**Answer = X**

	*Building service life (or expected life of the building) should be a **minimum** of 60 years for this analysis. If your LCA uses a period other than 60 years, please specify that below.	
	LEED LCA Credit period = 60 years	
	Other =	

Refer to the Cambridge Embodied Carbon Educational Toolkit for additional information on types of EPD's-

Source of material carbon data:		**Answer = X**
	Product-specific EPD's	
	Industry-average EPD's	
	Combination of Product-specific and industry-average EPD's	
	Manufacturers data other than EPD's	

Carbon Sequestration/Biogenic Carbon data (for wood):		**Answer = X**
	Included in LCA	
	Not included in LCA	

LIFE CYCLE ANALYSIS (LCA) RESULTS-

EMBODIED CARBON FOR TOTAL BUILDING	**in kg CO2eq.**
Global Warming Potential (GWP) of **Total Project:**	
Global Warming Potential (GWP) of **Structural Components Only:**	
Global Warming Potential (GWP) of **Enclosure Components Only:**	
Global Warming Potential (GWP) of **Division 03: Concrete Only:**	
Global Warming Potential (GWP) of **Division 05: Metals (Steel, Aluminum) Only:**	
Global Warming Potential (GWP) of **Division 06: Wood, Plastics & Composites Only:**	
Global Warming Potential (GWP) of **Division 07: Thermal & Moisture Protection Only:**	

Global Warming Potential (GWP) of **Division 08: Openings & Glazing Only:**	

EMBODIED CARBON (EMISSIONS) PER UNIT OF FLOOR AREA	**Emissions Intensity**
	in kg CO2eq/SF
Global Warming Potential (GWP) per Square Foot of Total Project: *GWP per square foot is used by LEED	
	in kg CO2eq/m2
Global Warming Potential (GWP) per Square Meter of Total Project: *GWP per square meter, rather than square foot, is used by AIA 2030 and ILFI	

Flood Resilience Documentation

BioMed Realty REDGATE DIMELLA SHAFFER

CITY OF CAMBRIDGE
DEPARTMENT OF PUBLIC WORKS

147 Hampshire Street, Cambridge, MA 02139

Phone (617) 349-4800

Flood Resilience Compliance Confirmation

Confirmation Number: 1155627
Date Issued: March 20, 2025

Project Address/ Location: 350 Massachusetts Ave
Map/Lot: 69-159
Project Stage: Special Permit

Applicant:

Name: Annie Gleichauf
Mailing Address: 99 High Street 13th Floor Boston, Boston, MA 02110
Email Address: araftery@vhb.com
Telephone #: 2038852781

Applicability:

Is this project subject to Green Building Requirements (Section 22.20)?	Yes
Does this project involve the construction of a new building?	No
Does this project enlarge an existing building's footprint by at least 50%?	No
Does Any development in Stories Below Grades seeking exemption under Section 5.25.2?	No

LTFE:

	SLR/SS	Precip	LTFE*
2070 1%	23.3	22.1	23.3
2070 10%	20.1	20.4	20.4

All Elevations in Cambridge City Base

**As defined by Zoning, whichever is higher of 1% and 10% events.*

Meeting of Development Standards

Describe compliance with Section 22.84.1 (a): All occupiable spaces shall be protected from 10 % LTFE:

350 Massachusetts Avenue is a zero-lot line building with abutting streets and sidewalks at elevations lower than the 10% LTFE. The design utilizes the following strategies to protect all occupiable spaces while allowing easy pedestrian access from the street.

The building design elevates the first floor of the building to 20.50 CCB, above the 10% LTFE. The building design includes lobbies at retail entrances and the main entrance that will ramp up inside the building to 20.50 from the existing sidewalk elevations at the street.

The loading dock truck wells and bike room have been designed to allow flooding as the unoccupiable spaces with the first floor of the building. The higher loading dock area has been designed to meet the first floor elevation of 20.50.

Describe compliance with Section 22.84.1 (b and c): Habitable spaces and critical building equipment shall be protected from the 1% LTFE:

The PH room and normal electrical room have been elevated to 23.3 to protect from the 1% LTFE.

The Eversource transformer vault has been designed to provide a concrete ring wall and stairs to elevation 23.3 to protect this equipment from flooding. All 3 personal entrances will be accessed via a stair up to elevation 23.3 and then down to the floor elevation. The equipment door is designed to accommodate an installed flood barrier, which will be in place 24/7. The barrier will only be removed at Eversource request, if equipment needs to be replaced in the future and will be immediately reinstalled after the equipment replacement is completed. An operation and maintenance plan for how this barrier will be removed and reinstalled on these rare occasions will be submitted to DPW at the time of building permit application.

The MPOED/DATA and main electric room are also set at a floor elevation of 17.50 and are located within the concrete ring wall.

The pump room, located adjacent to the loading dock, utilizes a similar block wall and stair protection to provide passive protection from the 1% LTFE.

Elevator machine rooms have been placed in the penthouse, above LTFE elevations, to ensure elevator functionality during extreme flood events.

Describe compliance with Section 22.84.2, how spaces below the 10% LTFE will recover from flood event.

The bike room, with a first floor elevation of 18.0, will have concrete, masonry and water-resistant materials where the room is below the 10% LTFE elevation. All outlets and other MEP devices will be located above the flood elevation. The building lobbies also have impervious surfaces where they are below the LTFE elevation. The loading dock truck wells are designed to be flooded, and the higher loading dock is designed at elevation 20.50, above the 10% LTFE elevation.

Notes/Conditions:

This Document Confirms that the above mentioned project is in Conformance with the Flood Resilience Standards.

Confirmation #: **1155627** Date: **March 20, 2025**

Resiliency Narrative

Project Overview

The City of Cambridge has taken comprehensive steps to address the growing threats posed by climate change, particularly in the areas of flooding, rising sea levels, and extreme weather patterns. To better understand these risks, the City has conducted an independent Climate Change Vulnerability Assessment and developed the Climate Change Preparedness & Resilience Plan (CCPR). This plan outlines specific actions to mitigate the effects of climate change, including the use of advanced tools like the City FloodViewer 2022 (Version 3.0). This tool offers site-specific projections of flood elevations, which must be integrated into the design of all new development projects.

As part of these efforts, the Department of Public Works (DPW) has assessed the risks associated with climate change impacts, including increasing temperatures, heavy precipitation, storm surges, and rising sea levels. The findings from these studies have influenced the City's building and zoning requirements, particularly through the updated Zoning Article 22.80, which mandates climate-resilient design standards for new and redeveloped buildings.

Design Compliance with Cambridge's Climate Resilience Standards

The Proposed project is an existing zero lot line building with significant grade change between Mass Ave and Green Street (approximately 2'). Therefore, meeting resiliency standards, in some cases, is challenging. However, through conversations with DPW and after design revisions, we were able to meet the requirements as follows:

To ensure the project meets Cambridges climate resilience standards the project has been designed to comply with Article 22.80 of the zoning code, specifically focusing on the flood protection and resiliency criteria outlined for 2070 storm event projections. The projections include the following specific elevations:

- **2070 10-year storm event**: Elevation 20.4 feet (Cambridge City Base Datum)
- **2070 100-year storm event**: Elevation 23.3 feet (Cambridge City Base Datum)

As per **Article 22.80**, the project is required to meet the following design guidelines:

- **2070 10-year storm event**: The site must be designed to meet or exceed the higher elevation of the two potential 10-year storm event scenarios, including adjustments to the finished floor elevation (FFE) and critical infrastructure like mechanical and electrical equipment.

- **2070 100-year storm event**: A **Site Action Plan** must be created, detailing resilient measures to respond to the higher flood elevations, including passive flood protection features that do not require manual operation.

The design adheres to the specific requirements outlined in Sections **22.841** and **22.84.2** regarding flood protection, recovery, and resilience:

- All occupiable spaces within the building must be protected to the 10%-LTFE standard, with exceptions for small areas like entryways that meet flood recovery standards.
- Critical building equipment—such as HVAC systems, backup generators, and electrical panels—must be protected to the 1%-LTFE standard.
- The project must include flood recovery measures to ensure the building can return to normal functionality after a flood event without significant damage.

Design Features to Address Vulnerability to Flooding and Storm Surge

First Floor and Occupiable Spaces:

- The bike room is located at grade 18.0 feet, which is below the 2070 10-year flood elevation but it has been designed to be recoverable, allowing for easy repairs if flooded. The portions of the rooms below the flood elevation will be concrete, masonry or other water-resistant products. All outlets and other MEP devices will be located above the flood elevation. The decision to have the bike room at sidewalk grade below the 2070 10 -year flood elevation, was to allow easy access and street presence along Sidney Street therefore complying with the University Park design guidelines to activate Sidney St.
- The retail spaces along Massachusetts Avenue are set at 20.5 feet, exceeding the 2070 10-year flood elevation of 20.4 feet. This ensures flood resilience while maintaining seamless pedestrian access from the sidewalk. The entrances to the retail spaces match the sidewalk elevation and are designed with impervious recoverable surfaces and allow flood water up to the ramp.
- The main lobby vestibule is set at grade 19.3 feet, aligning with the adjacent sidewalk for easy pedestrian access, while the interior of the lobby is elevated to 20.5 feet to ensure protection against flooding. Interior areas subject to flooding have been designed with impervious materials and will be recoverable.

Loading Dock Area:

- The lower portion (truck wells) of the loading dock is at elevation 18.65 feet to match the exterior grade. This portion of the loading dock may flood during extreme events and is designed to be recoverable. The higher dock height of the

loading area is set at 20.5 feet, ensuring flood resilience for the 10-year storm event.

Critical Equipment Protection:

- The PH room and normal electrical room will be elevated to 23.3 feet to comply with the requirement for all critical equipment to meet the 2070 100-year flood elevation.
- The new transformer vault room floor cannot be elevated above the 2070 100-year flood elevation level due to structural limitations, such as the existing floor-to-floor height. Instead, and as previously discussed with DPW, a concrete ring wall (or concrete "tub") will be erected around the equipment to protect the vault room. This concrete barrier will extend up to 23.3 feet. All 3 personal entrances into the area protected by the concrete wall are passively protected by stairs that rise above the rim and back down to the adjacent grade. The equipment door entrance is passively protected by a permanently installed flood barrier. That barrier can be removed and reinstalled in the event equipment replacement is required to meet the requirements of Eversource.
- The MPOED/DATA and main electric room are also set at elevation 17.5' and will be located within the concrete ring wall.
- The pump room is also surrounded and protected by block walls and is also passively protected by a set of stairs that rise above the rim and back down to the pump room grade.
- Elevator machine rooms have been placed in the penthouse, above flood-risk elevations, to ensure elevator functionality during extreme flood events.

Flood Barriers:

- Staircases were created to act as barriers protecting the interior doors within the concrete ring wall from flooding.
- The vault room exterior coiling door will have a passive flood barrier on the inside of the vault. The Flood Barrier will be permanently installed and deployed at the location and will only be removed on rare occasions, such as when the transformer vault requires replacement.

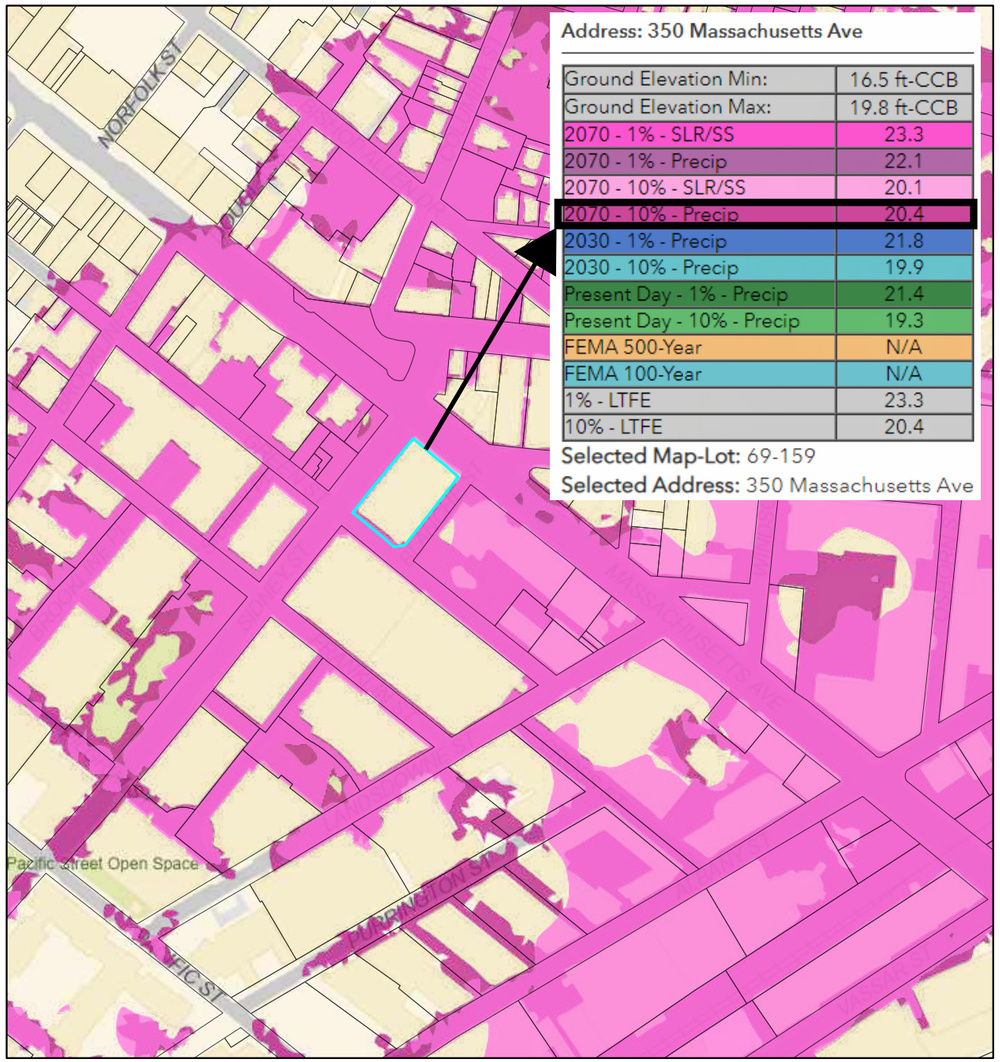
Conclusion

This project is an adaptive reuse of an existing building that would otherwise be vulnerable to flooding and other climate risks and has been carefully redesigned to ensure compliance with the City of Cambridge's Zoning Article 22.80 and the Climate Change Preparedness & Resilience Plan (CCPR) moving forward.

By integrating adaptive flood protection measures, elevating critical infrastructure, and implementing passive flood barriers, the building will remain resilient to the projected 2070 10-year and 100-year storm events. The design not only ensures protection against flooding and storm surge but also supports the City's broader commitment to sustainability, climate preparedness, and the long-term safeguarding of its infrastructure and inhabitants.

These proactive measures will help ensure that the building remains functional and resilient for decades, contributing to the City's efforts in creating a safer, more sustainable urban environment in the face of an evolving climate.

350 Mass Ave - 2070 10-Year Flood Elevations



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2070 - 10% - SLR/SS Flooding Extent

2070 - 10% - Extent of Flooding

Parcels With Flood Data

1:4,514

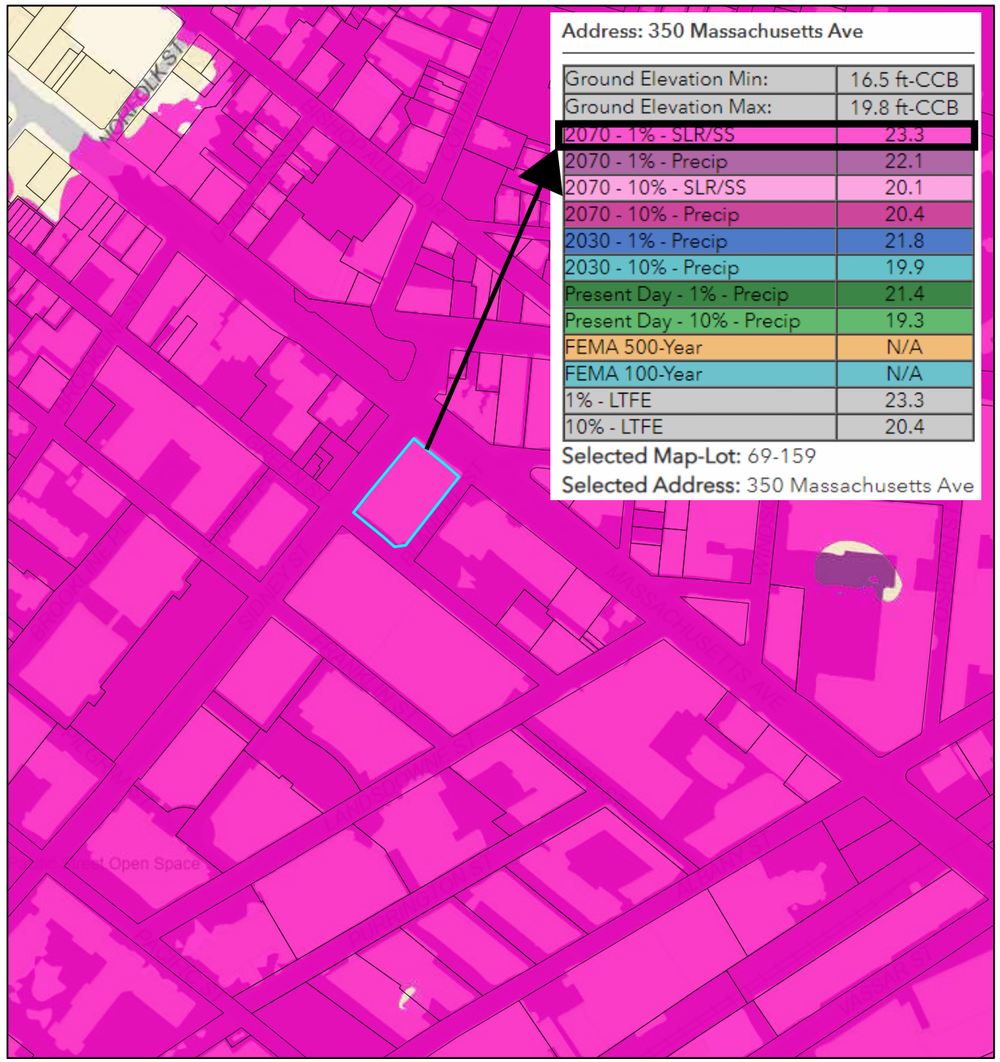
0 0.03 0.06 0.11 mi

0 0.04 0.09 0.18 km

City of Cambridge GIS, Harvard University, City of Boston, City of Cambridge, MassGIS, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA

City of Cambridge, MA
Visit CambridgeMA.gov/FloodViewer for additional information.

350 Mass Ave - 2070 100-Year Flood Elevations



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2070 - 1% - SLR/SS Flooding Extent

2070 - 1% - Extent of Flooding

Parcels With Flood Data

1:4,514

0 0.03 0.06 0.11 mi

0 0.04 0.09 0.18 km

City of Cambridge GIS, Harvard University, City of Boston, City of Cambridge, MassGIS, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA

City of Cambridge, MA
Visit CambridgeMA.gov/FloodViewer for additional information.

2070 - 10% PRECIPITATION
+20.4

SIDNEY ST

GREEN ST

MASSACHUSETTS AVE

BLANCHE ST

+17.38

+19.30

+18.50

+19.75

194' - 8"

10' - 0" | 24' - 8" | 25' - 0" | 25' - 0" | 25' - 0" | 25' - 0" | 25' - 0" | 35' - 0"

J H G F E D C B A

1 2 3 4 5 6

24' - 8" | 25' - 0" | 25' - 0" | 25' - 0" | 124' - 8"

+17.5
TRANSFORMER VAULT ROOM

MPOE/DATA

MAIN ELEC

+23.3

+17.5

+23.3

VESTIBULE

8 % SLOPE

ELEC
+23.3

PH ROOM
+23.3

+16.0
BIKE ROOM

LOCKER ROOM

LOBBY
1,500SF
+20.5

VESTIBULE
200SF
+19.3

8 % SLOPE

RETAIL

+20.5

CHEMICAL STORAGE

CHEMICAL STORAGE

CHEMICAL STORAGE

+20.5

RECYCLE AREA

CHEMICAL STORAGE

RETAIL

18.65

8 % SLOPE

+23.3
PUMP

GAS ROOM

PASSIVE FLOOD BARRIER

FLOOD DOOR

BioMed Realty

REDGATE
The Right Return on Real Estate

DIMELLA SHAFFER

FLOOD RESILIENCY PLAN - 10% PRECIPITATION

BIOMED 350 MASS AVE CAMBRIDGE

2070 - 1% PRECIPITATION
+23.3

SIDNEY ST

+17.38

+19.30

MPOE/DATA

+17.5
TRANSFORMER VAULT ROOM

MAIN ELEC

+23.3

+17.5

+23.3

+23.3

VESTIBULE

8 % SLOPE

ELEC
+23.3

PH ROOM
+23.3

BIKE ROOM +19.0

LOCKER ROOM

LOBBY
1,500SF +20.5

VESTIBULE
200SF
+19.3

8 % SLOPE

RETAIL

+20.5

CHEMICAL STORAGE

CHEMICAL STORAGE

CHEMICAL STORAGE

+20.5

RECYCLE AREA

CHEMICAL STORAGE

RETAIL

8 % SLOPE

+23.3
PUMP

18.65

GAS ROOM

+18.50

+19.75

GREEN ST

MASSACHUSETTS AVE

BLANCHE ST

PASSIVE FLOOD BARRIER

FLOOD DOOR

BioMed Realty

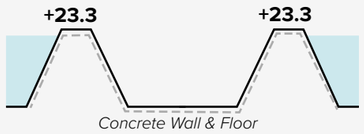
REDGATE
The Right Return on Real Estate

DIMELLA SHAFFER

FLOOD RESILIENCY PLAN - 1% PRECIPITATION

BIOMED 350 MASS AVE CAMBRIDGE

‘Concrete ring wall Idea’



SIDNEY ST

+17.20

+17.04

MPOE/DATA
+17.5

MAIN ELEC ROOM
+17.5

+23.3

TRANSFORMER VAULT ROOM
+17.5

Flood barrier

Roll up door

+23.3

+23.3

PH ROOM
+23.3

NORMAL ELEC ROOM
+23.3

+17.5

GREEN ST

FIRE PUMP ROOM
+18.65

+23.3

BLANCHE ST

PASSIVE FLOOD BARRIER
UP TO +23.3 (Behind roll up door)

* Barrier will be installed inside the vault room

+23.3
Concrete Wall

+23.3
Platform

Concrete
Wall & Floor

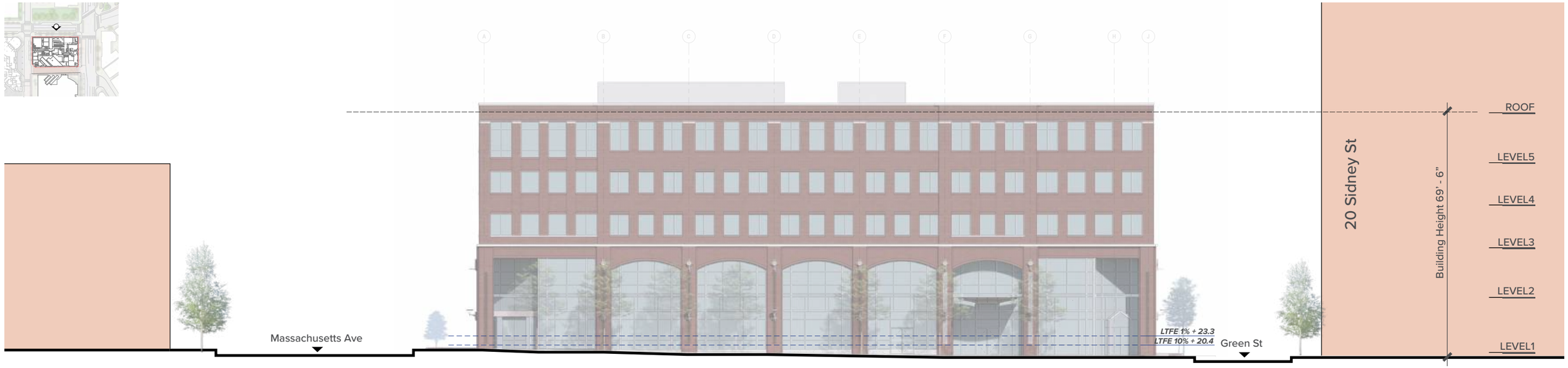
BioMed Realty

REDGATE
The Right Return on Real Estate

DIMELLA SHAFFER

CRITICAL EQUIPMENT PROTECTION DIAGRAM

BIOMED 350 MASS AVE CAMBRIDGE



EXISTING ELEVATION _ SIDNEY ST

PROPOSED ELEVATION _ SIDNEY ST

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REDGATE
The Right Return on Real Estate

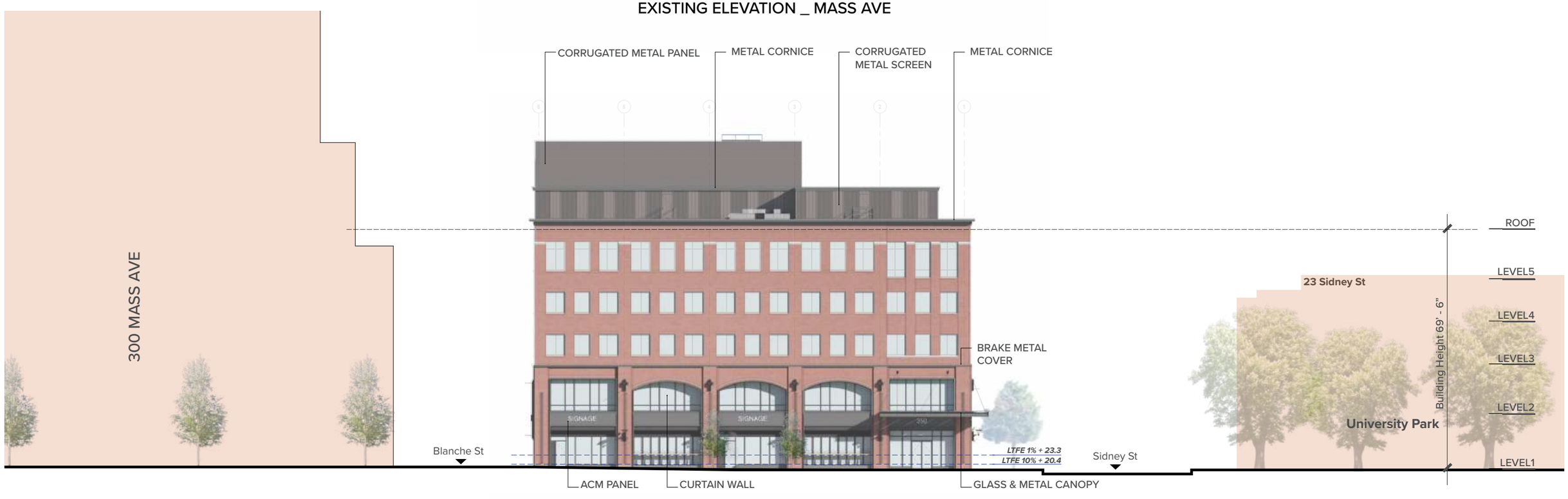
DIMELLA
SHAFFER

0' 10' 20' 30' 50'

EXISTING & PROPOSED ELEVATIONS-1

BIOMED 350 MASS AVE CAMBRIDGE

EXISTING ELEVATION _ MASS AVE



PROPOSED ELEVATION _ MASS AVE

BioMed Realty

REDGATE
The Right Return on Real Estate

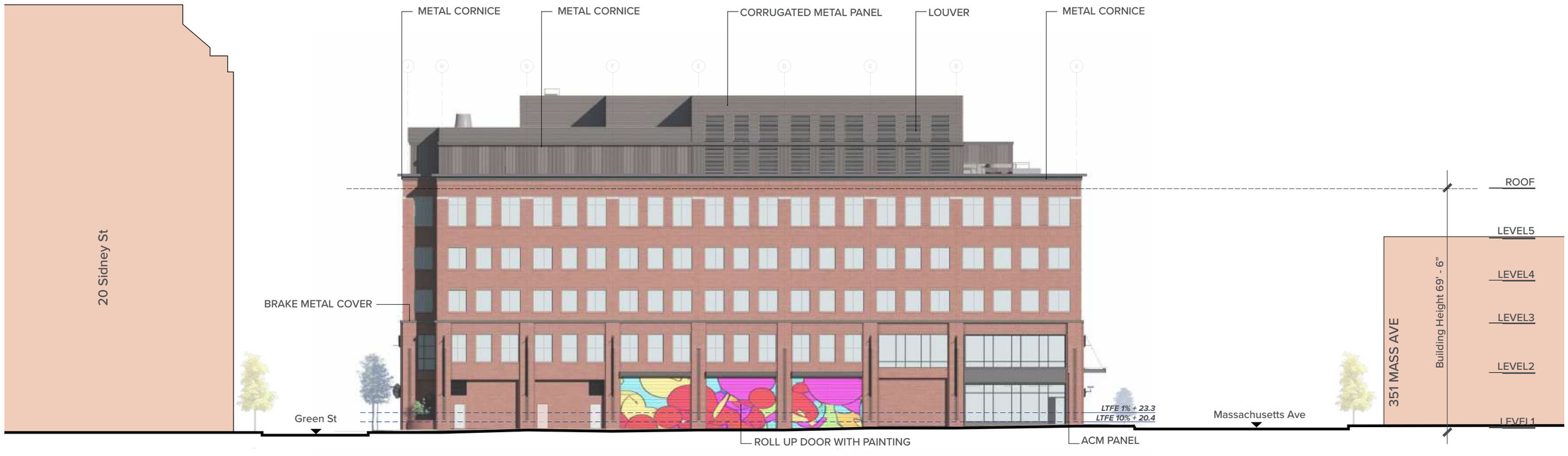
DIMELLA SHAFFER

0' 10' 20' 30' 50'

EXISTING & PROPOSED ELEVATIONS-2

BIOMED 350 MASS AVE CAMBRIDGE

EXISTING ELEVATION _ BLANCHE ST



PROPOSED ELEVATION _ BLANCHE ST

BioMed Realty

REDGATE
The Right Return on Real Estate

DIMELLA SHAFFER

0' 10' 20' 30' 50'

EXISTING & PROPOSED ELEVATIONS-3

BIOMED 350 MASS AVE CAMBRIDGE

EXISTING ELEVATION _ GREEN ST

PROPOSED ELEVATION _ GREEN ST

BioMed Realty

REDGATE
The Right Return on Real Estate

DIMELLA SHAFFER

0' 10' 20' 30' 50'

EXISTING & PROPOSED ELEVATIONS-4

BIOMED 350 MASS AVE CAMBRIDGE

Retail Narrative

Retail Narrative

The proposed project at 350 Massachusetts Avenue ("Mass. Ave.") involves the adaptive reuse of an existing building, transitioning it from office space to laboratory use, while enhancing its ground-floor retail spaces. The design balances urban resilience with street activation, contributing to the vitality of both the University Park and Central Square districts.

The current retail configuration has been difficult to lease in its current configuration. With retail along Blanche Street, Mass. Ave. and Sidney Street, the ground floor is not effectively utilized. As part of this renovation, the retail spaces will be "right-sized" and reconfigured to ensure vitality along this important stretch of Mass. Ave. As shown, there will be two separate retail locations that, together, meet the Cambridgeport Revitalization Development District (CRDD) zoning requirement (Sec. 15.24) of having at least 75% of the linear ground floor frontage along Mass. Ave. at a minimum 40' depth. The design of these spaces is flexible; they can each accommodate a range of retail and active uses ranging from casual food and beverage (F&B) to local neighborhood retail or services. Provisions have been made to allow for outdoor seating at the corner of Blanche Street, which would help activate the streetscape and draw people toward Central Square as approaching from the east. This type of activation will further enhance the pedestrian experience along Mass. Ave.

To improve access and enhance the pedestrian experience, the building's main entrance has been relocated to the corner of Mass. Ave. and Sidney Street, providing a more prominent presence. At the suggestion of CDD staff, the design has intentionally been kept flexible and could include a movable wall between the lobby and adjacent retail space – similar to the "Shy Bird" model at One Broadway should the retail tenant(s) desire this configuration. This will allow the building lobby to be used as spillover for large events and local gatherings, thereby creating a more active and inviting space along the entirety of the Mass. Ave. frontage.

The University Park Design Guidelines from 1988 advocate for having retail along Sidney Street. After careful consideration with both CDD and DPW staff, retail has been precluded along Sidney Street due to resiliency concerns. The primary challenge is that the building has a significant (>2-feet) grade change between Mass. Ave. and Green Street. The building's design had to be adapted to meet the City's new resiliency standards, which took effect after the 1988 University Park Design Guidelines were adopted. Given the grade change, the space along Sidney Street is more likely to be prone to flooding. These spaces cannot be sufficiently elevated to accommodate retail within the existing floor height. As such, retail spaces are not planned for this façade. Instead, the bike room and back-of-house (BOH) spaces are positioned along Sidney Street to ensure that these areas are better protected from potential flooding events.

However, the design of this façade incorporates glazed art boxes bringing lively artwork to the Sidney Street façade and enriching the streetscape, whilst also limiting the visibility of building infrastructure.

As noted above, resilience has been a key consideration in the design. The retail along Mass. Ave. is set at an elevation of 20.5 feet, which exceeds the 2070 10-year flood elevation of 20.4 feet, ensuring that the retail spaces remain flood-resistant while still maintaining pedestrian access at sidewalk level. Additionally, the entrances are designed to be recoverable in the event of flooding, ensuring the long-term sustainability of the retail spaces.

Architecturally, the design incorporates a slight setback of the ground-floor curtain wall, particularly within the arches along Massachusetts Avenue. This feature highlights the retail function, creating a more inviting streetscape while improving the visual connection between indoor and outdoor spaces. The setback adds depth and texture to the architecture, enhancing the character of the street and increasing sidewalk space for better activation.

Overall, this project aims to revitalize the ground-floor spaces and foster a more dynamic and engaging streetscape. By creating flexible retail opportunities and improving pedestrian and bicycle connectivity, the project will play an important role in the revitalization of both University Park and Central Square. The enhanced design ensures that the building's relationship with the surrounding streets is strengthened, contributing to a vibrant and active urban environment.

Retail Marketing Plan

As shown on the ground floor plan, the renovation of 350 Mass. Ave. will result in two newly configured retail spaces along Mass. Ave. Per Section 15.24.1 of the Cambridge Zoning Code, below is the Retail Marketing Plan for these spaces:

1. Target Uses and Users.

   The Project team conducted robust outreach for this project prior to this filing. During both community meetings and individual stakeholder meetings, residents and local employees expressed interest in having at least one vibrant food and beverage (F&B) use where The Asgaard was formerly located.. Others expressed interest in having a space that could accommodate live music or other forms of entertainment – a continuation of the Central Square cultural corridor. The retail has been designed flexibly to support either of these potential uses.

   A proprietary retail study conducted by *Graffito SP* in September 2024 confirmed

that having two retail uses along Mass. Ave. would be viable, including the potential for a full-service, sit-down restaurant.

While the Project envisions having one F&B use in either of these two retail spaces, the second retail space could foreseeably accommodate a range of other neighborhood retailers and/or service providers including but not limited to: a boutique clothing/thrift store, specialty food store, pet supply store, bookstore, salon or barber shop, bike repair shop, coworking space, wellness studio, art gallery, dessert shop, local bistro, and more.

Marketing for the space will not begin until approvals for the building renovation are in place. The eventual tenant(s) will largely be determined by local demand and market conditions at the time of actual building renovation.

That said, the team intends to target local, independently owned businesses whenever possible and will abide by any local regulations pertaining to the restriction of formula businesses.

2. Project Designee for Implementing Retail Marketing Plan.

   Ashley Myslinski, Senior Project Manager for Development at BioMed Realty, will be the Project's Designee for implementing this plan and will serve as a point of contact with the Community Development Department through its Economic Development Division (EDD), consulting periodically with EDD staff on the implementation of same.

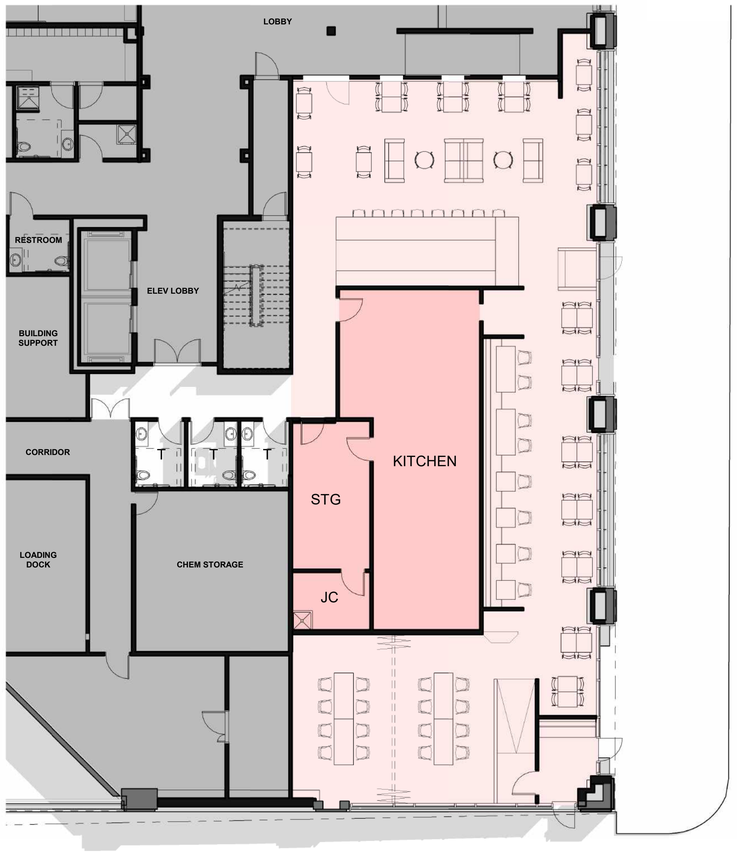
3. Economic Incentives and Tenant Attraction Strategies.

   As BioMed Realty has done elsewhere in Cambridge, the 350 Mass. Ave. Project team will prioritize deals with small, local, independent businesses. Specifically, the team will embrace the following in its tenant recruitment strategy for the Project:

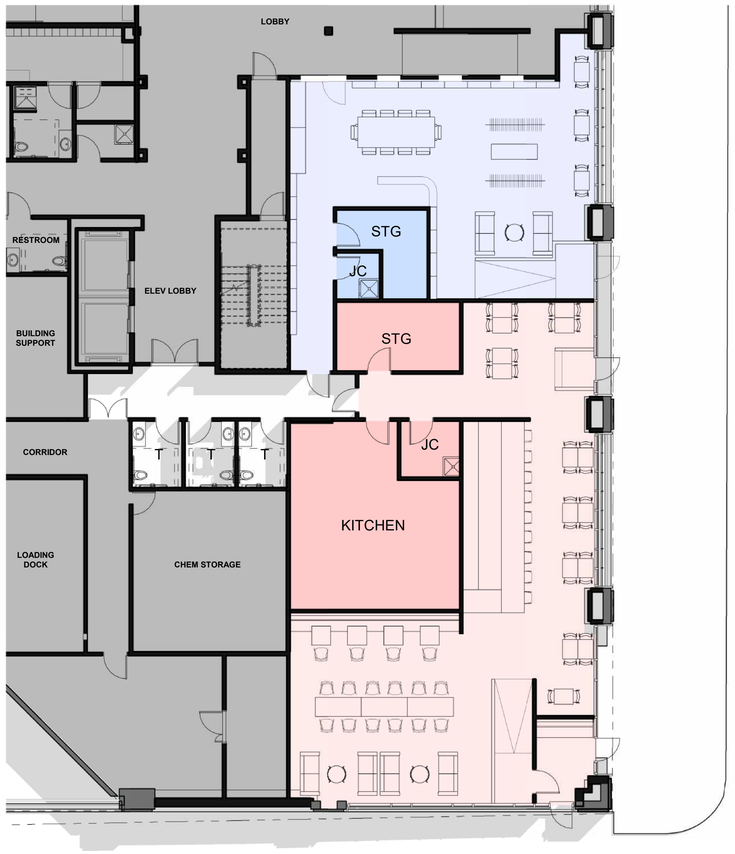
   - In keeping with BioMed Realty's commitment to supporting a racially and culturally diverse neighborhood, the team will recruit and prioritize deals with female-, minority-, and veteran-owned businesses;
   - Aggressively pursue retail tenants for the Project that offer services/uses that have been identified as missing from the neighborhood through the prior – and ongoing – public engagement process for both this Project and for the adjacent Central Square neighborhood more broadly;

- Deliver rentable premises along Mass. Ave. of varying shapes and sizes in an effort to foster maximum flexibility in tenant recruitment;
- Incorporating planning and tenant programming feedback from local cultural partners and collaborators; and
- Willingness to explore flexible lease terms and structures that lower the barriers of entry for local and/or start-up retailers (e.g., shorter lease terms, more landlord investment into tenant improvements, smaller security deposits).

By deploying strategies and tactics such as these, the Project team is confident that it will transform and underutilized, dark and mostly vacant stretch of Mass. Ave. into one that is vibrant, engaging, and attractive to residents, building employees, and the casual passersby. The team is similarly confident that the retail approach for the renovation of 350 Mass. Ave. embraces thoughtful urban design that will allow for flexibility and adaptation over time as consumer preferences change and evolve.



2 RETAIL PLAN - SINGLE TENANT OPTION a
1/8" = 1'-0"



1 RETAIL PLAN - 30/70 OPTION b
1/8" = 1'-0"

RETAIL _ RESTAURANT

RETAIL _ MAKER SHOP

DIMELLA SHAFFER

0' 8' 16' 24' 40'

RETAIL OPTIONS

350 MASS AVE / 01/13/25

From: Putnam, Andrew <aputnam@cambridgema.gov>
Sent: Friday, February 28, 2025 9:09 AM
To: Joseph, Swaathi
Cc: Dikla Mileguir; Amanda Keefe; Messplay, Daniel
Subject: 350 Mass. Ave. - Tree Survey

Categories: Filed in TonicDM, 2023058.000 BioMed – 350 Mass Ave

External email
First time sender

> You don't often get email from aputnam@cambridgema.gov. Learn why this is important

Hi Swaathi,

The are no significant trees on the parcel at 350 Mass Ave. No Tree Study is necessary and the developer is in compliance with TPO.
Please let me know if you have any questions.

Thanks,

Andrew Putnam
Superintendent of Urban Forestry & Landscapes
MCA | TRAQ | NOFA Accredited Organic Land Care Professional
City of Cambridge
(617)-349-6722

From: Amanda Keefe <amanda.keefe@redgate-re.com>
Sent: Thursday, February 27, 2025 2:10 PM
To: Putnam, Andrew <aputnam@cambridgema.gov>
Cc: Dikla Mileguir <DMileguir@dimellashaffer.com>
Subject: RE: 350 Mass. Ave. - Tree Survey

Hi Andrew, just putting this top of inbox for your review. We're expecting the City's comments on our draft for completeness next week. I anticipate we'll spend a week or two responding to those comments and then we're preparing to file our special permit application. As you know, a Tree Study is generally a part of that application but in our case, with our zero-lot-line building, we have no trees on site. Just building. CDD was looking for you to confirm that no tree study was necessary in this instance.

Happy to chat further, send the plans again, or even walk the site with you if it's helpful. Let me know what you think is best.

Thank you!
-Amanda

Amanda M. Keefe
Vice President

Redgate
265 Franklin Street, 6th Floor | Boston, MA 02110
C 603.234.9903
www.redgate-re.com

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From: Amanda Keefe
Sent: Thursday, February 13, 2025 11:20 AM
To: Putnam, Andrew <aputnam@cambridgema.gov>
Subject: FW: 350 Mass. Ave. - Special Permit Draft for Completeness

Hi Andrew,

See below. We've just submitted our special permit draft for completeness for 350 Mass Ave. As you may recall, this is a zero-lot-line building with no trees or landscape – just building on all sides, right to the property line. Therefore, there is no tree survey to be done. Are you able to provide the CDD with that clarification, that we are therefore in compliance with the TPO?

Thank you!
-Amanda

Amanda M. Keefe
Vice President

Redgate
265 Franklin Street, 6th Floor | Boston, MA 02110
C 603.234.9903
www.redgate-re.com

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From: Joseph, Swaathi <sjoseph@cambridgema.gov>
Sent: Wednesday, February 12, 2025 5:20 PM
To: Amanda Keefe <amanda.keefe@redgate-re.com>; Spetrini, Evan <espetrini@cambridgema.gov>
Cc: Ashley Myslinski <Ashley.Myslinski@biomedrealty.com>
Subject: RE: 350 Mass. Ave. - Special Permit Draft for Completeness

Amanda,

We usually get an email (example attached) from the city arborist team to confirm compliance with Tree Protection Ordinance.

Sincerely,
Swaathi Joseph
Zoning Project Planner, Zoning and Development
sjoseph@cambridgema.gov | 617-349-4668
Pronouns: she, her

In office: Tue/Fri
Telework: Mon/Wed/Thu

City of Cambridge | Community Development Department
344 Broadway, Third Floor
Cambridge, MA 02139
www.cambridgema.gov/cdd
Mon: 8:30 A. M. to 8:00 P. M.
T/W/Th: 8:30 A. M. to 5:00 P. M.
Fri: 8:30 A. M. to Noon

From: Amanda Keefe <amanda.keefe@redgate-re.com>
Sent: Wednesday, February 12, 2025 5:01 PM
To: Joseph, Swaathi <sjoseph@cambridgema.gov>; Spetrini, Evan <espetrini@cambridgema.gov>
Cc: Ashley Myslinski <Ashley.Myslinski@biomedrealty.com>
Subject: Re: 350 Mass. Ave. - Special Permit Draft for Completeness

Thanks for the quick response. Will find a way to reduce the individual file sizes and will then resend.

We did speak with the arborist previously and were told that we did not have to submit anything given that there are no trees or landscape. We are happy to confirm that with them again.

Stay tuned for documents - coming your way shortly!

Thanks,
Amanda

From: Joseph, Swaathi <sjoseph@cambridgema.gov>
Sent: Wednesday, February 12, 2025 4:55:12 PM
To: Amanda Keefe <amanda.keefe@redgate-re.com>; Spetrini, Evan <espetrini@cambridgema.gov>
Cc: Ashley Myslinski <Ashley.Myslinski@biomedrealty.com>
Subject: RE: 350 Mass. Ave. - Special Permit Draft for Completeness

Hi Amanda,

The zip file is not allowing the files to be extracted. Please resend them as separate attachments.

Please email the city arborist about this project as City Arborist Certification is a requirement for Project Review special permit.

Sincerely,
Swaathi Joseph
Zoning Project Planner, Zoning and Development
sjoseph@cambridgema.gov | 617-349-4668
Pronouns: she, her

In office: Tue/Fri
Telework: Mon/Wed/Thu

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Fri: 8:30 A. M. to Noon

From: Amanda Keefe <amanda.keefe@redgate-re.com>
Sent: Wednesday, February 12, 2025 2:32 PM
To: Joseph, Swaathi <sjoseph@cambridgema.gov>; Spetrini, Evan <espetrini@cambridgema.gov>
Cc: Ashley Myslinski <Ashley.Myslinski@biomedrealty.com>
Subject: 350 Mass. Ave. - Special Permit Draft for Completeness

Swaathi, Evan –

Attached please find BioMed Realty's application for a change of use Special Permit for 350 Mass. Ave. Note, this is a **draft for completeness** and therefore not all signatures are present. We are also awaiting approval on our Art. 22, TIS, and Resiliency/Flood certifications. Also, as previously discussed, we did not include a landscaping plan or tree study as this is a zero-lot-line building with no landscaping or trees.

Please let me know if you have any questions. We look forward to your feedback.

Warmly,

Amanda

Amanda M. Keefe
Vice President

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C 603.234.9903
www.redgate-re.com

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