8. APPENDIX

i. Green Building Report
ii. Green Building Report Certification
iii. Traffic Impact Study (TIS) Certification
iv. Tree Study – Final submitted 8/10/21 and deemed approved
v. Wind Study

Green Building Project Checklist

Green Building
Project Location: 585 Third Street

Applicant

Name: BMR - Third LLC
Address: 101 Main St, 16th Floor; Cambridge, MA 02142
Contact Information
Email Address:
Telephone #: 978.771.8134

Project Information (select all that apply):

- ■ New Construction – GFA: 535,000 GFA
- ☐ Addition – GFA of Addition: _____
- ☐ Rehabilitation of Existing Building – GFA of Rehabilitated Area: _____
  - ☐ Existing Use(s) of Rehabilitated Area: _____
  - ☐ Proposed Use(s) of Rehabilitated Area: _____
- ■ 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: LEEDv4 + v4.1 BETA
  - ☐ Building Design + Construction (BD+C) – Subcategory: Core + 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)

585 Third Street

Cambridge, MA

Article 22 Green Building Submission

v01

June 02, 2021

Prepared for: BioMed Realty

Prepared by: enviENERGY Studio

Buro Happold

Contents

Introduction

The 585 Third Street project is being designed to be a first-class research and development facility in Cambridge, Massachusetts. The building design by CBT Architects is a 16-story core and shell building, approximately 648,500 GSF including a mechanical penthouse and basement. Sustainability is an important design and construction priority for BioMed Realty and the project team, and therefore, the team will evaluate a variety of measures that impact a variety of metrics. Two sustainability workshops; one in concept, one in schematic, have been held with the team to outline the greater objects for the project. The framework that has been identified for the project is as follows.

Three core sustainability objectives were identified based on the outputs of Workshop One.

1. **Experience & Comfort**: Design spaces and places where people are healthier, happier, and more productive.
2. **Resiliency & Efficiency**: Maximize the resource efficiency of the building while enhancing experience. The project is pursing measures to reduce water and energy consumption
3. **Community & Arts**: Develop a community around where science meets art.

The design team has weighed these objectives with their relationship to LEED and other certification standards. Through these defined objectives, the project will evaluate design decisions against the impact to energy efficiency and resiliency, occupant experience and comfort, and the relationship to the community. Through concerted and coordinated quantitative and qualitative metric tracking, the team will measure the efforts to reduce operational and embodied carbon, water consumption, the useful life of building systems and infrastructure, and the burdens imposed by the building on city services, the environment, and the public health.

The project is notably targeting 66 LEED Points for LEEDv4 Core & Shell Gold Certification, which is a goal established through the commitment of the design team to incorporate enhanced sustainability features. For example, the project will be able to quantitatively measure the embodied carbon impact of the materials selections through a life cycle assessment (LCA) to achieve points under the LEED Materials and Resources Credit Life Cycle Impact Reduction. Through the evaluation of the foundation, structural, and enclosure elements of design, the LCA will determine feasible optimizations and design recommendations to reduce the project's embodied carbon footprint.

The design team is also evaluating a rainwater capture and reuse system, which will be sized to collect rainwater from at least the 80th percentile storm. Rainwater will likely be reused on site for cooling tower make-up water to reduce potable water consumption.

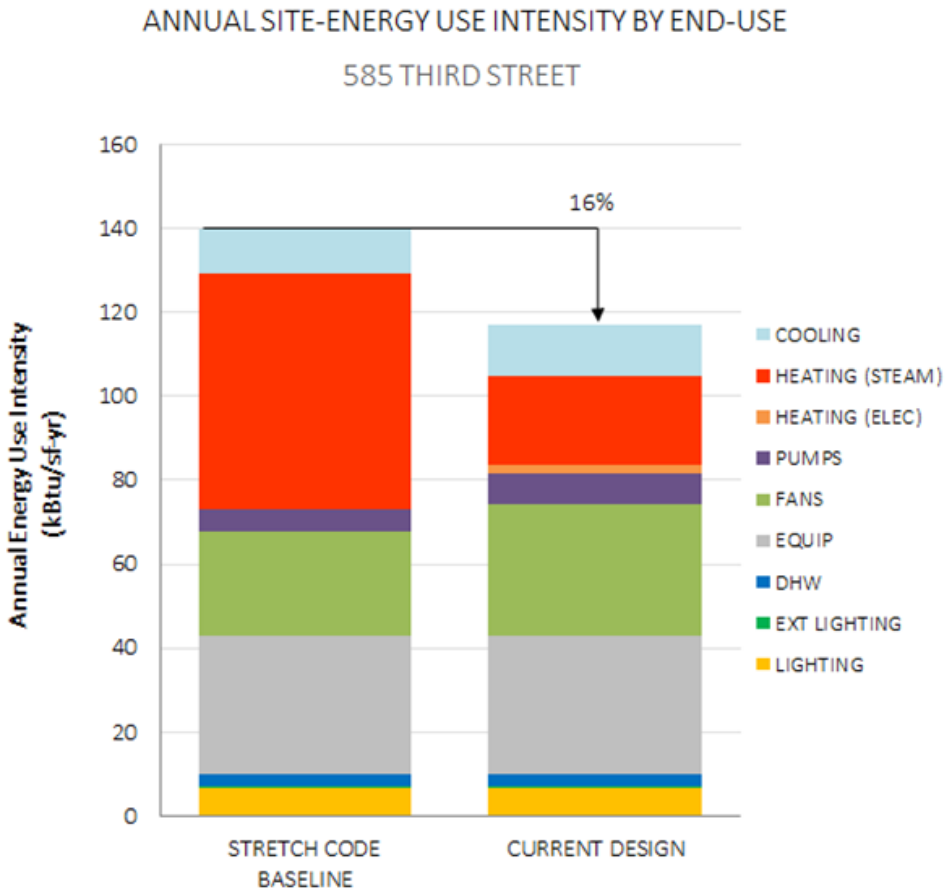
Energy Code Compliance

The project will demonstrate energy code compliance by adhering to the 9th Edition – Revised of the Massachusetts Building Code - 780 CMR, Chapter 13.00 - Energy Efficiency, including Appendix AA (MA Stretch Code). The baseline building is modeled to adhere to the methodology described by ASHRAE 90.1-2013 Appendix G, with MA Amendments. 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 50/50 distribution of office and lab areas with generic space layouts, consistent with the building design criteria.

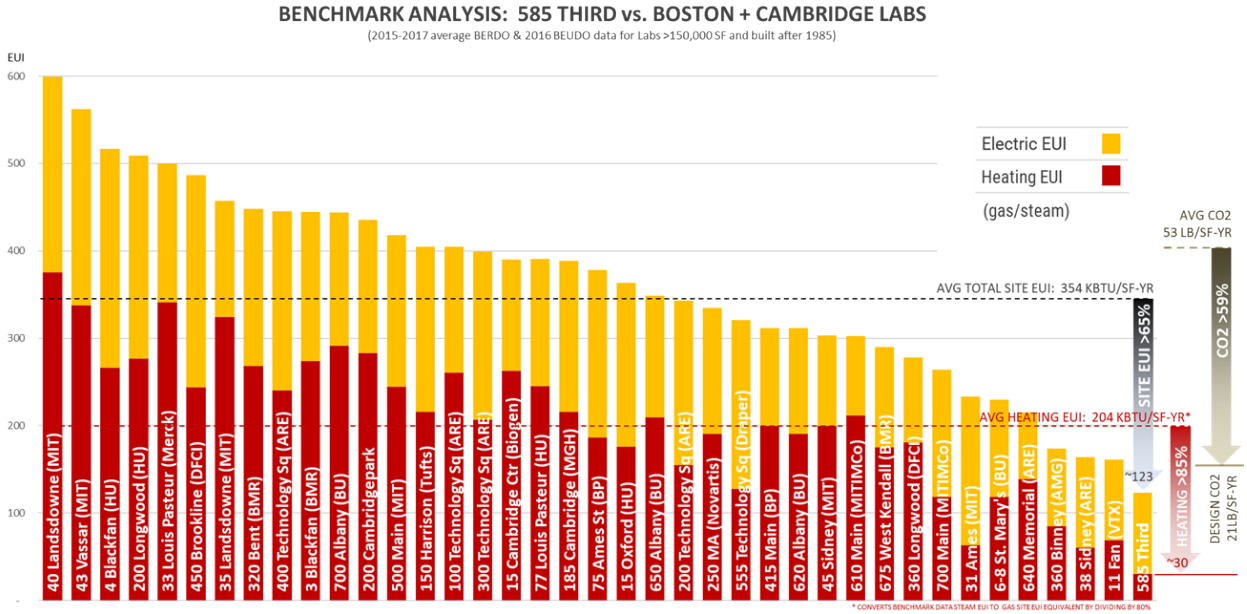
In addition, to comply with Section C406 of MA Energy Code, the baseline and proposed buildings capture the energy use reductions associated with the following three C406 measures:

- C406.2: More efficient HVAC performance
- C406.3: Reduced Lighting Power Density
- C406.9: Reduced Air-Infiltration

Energy Model Performance Results



In addition to comparing the estimated energy consumption to the current Stretch Code baseline, the design team has compared the predicted energy use for the project to existing lab buildings in Boston and Cambridge. Based on the current energy analysis. 585 Third St is expected to consume 65% less energy and 85% less fossil fuels than the benchmark average.



Envelope Backstop Performance

	Proposed		*Baseline*	
	Area (sf)	*U-value*	*Area (sf)*	*U-Value*
Window	80,707 SF	0.24	30% (60,530 SF)	U-0.38
Wall	121,060 SF	0.100	70% (141,237 SF)	U-0.064
Roof	41,853 SF	U-0.032	41,853 SF	U-0.032
U*A (BTU/hr-°F]	-	32,815		33,380

Article 22 LEED Compliance

The Project team includes several LEED Accredited Professionals, and the sustainability efforts will be overseen by Buro Happold and enviENERGY Studio.

A LEED checklist is provided below to identify credits that are going to be pursued for this project, highlights of which in the subsequent, sections. The 585 Third Street project will be registered with USGBC and will follow the requirements of LEEDv4 for Core and Shell program during the design and construction. The project team is currently targeting a minimum of LEED Gold certification with a total of 66 out of a possible 110 points in the LEED BD+C rating system. An additional 19 points are undergoing study to determine the feasibility of attainment.

LEED checklist summary:

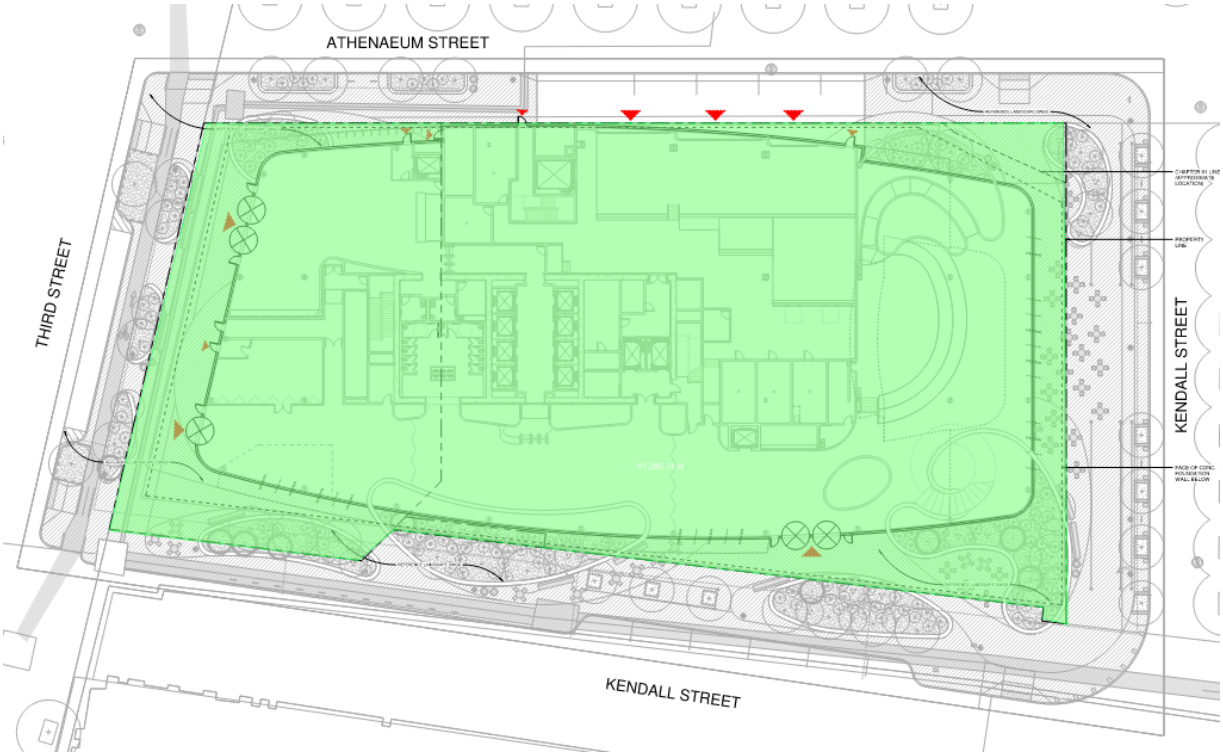
Integrative Process	1 Point	
Location and Transportation	14 Points	
Sustainable Sites	6 Points	4 Potential Points
Water Efficiency	6 Points	5 Potential Points
Energy and Atmosphere	17 Points	5 Potential Points
Materials and Resources	6 Points	2 Potential Points
Indoor Environmental Quality	7 Points	3 Potential Points
Innovation and Design Process	6 Points	
Regional Priority	3 Point	1 Potential Point
Total Points	**66 Points**	**20 Potential Points**

LEED Project Scope and Strategy

General Project Information

Building Area	535,000 GFA Lab/Office/Public Ground Floor – 500,000 GFA Arts/Cultural Facility – 35,000 GFA
Occupancy - FTE (LEED v4 C&S Default Occupancy)	50% Laboratory + 50% Office 1,640 (Office: 250 SF/person, Lab: 400 SF/person) 500 Peak Visitors to Building
Parking Spaces	No parking
Site Area	50,000 SF
Open Space	12,000 SF
Long-Term Bike Storage	114 LT
Short-Term Bike Storage	61 ST
Public Transportation	Access to Kendall/MIT Station and Bus Routes 64 and 85

Preliminary LEED Boundary



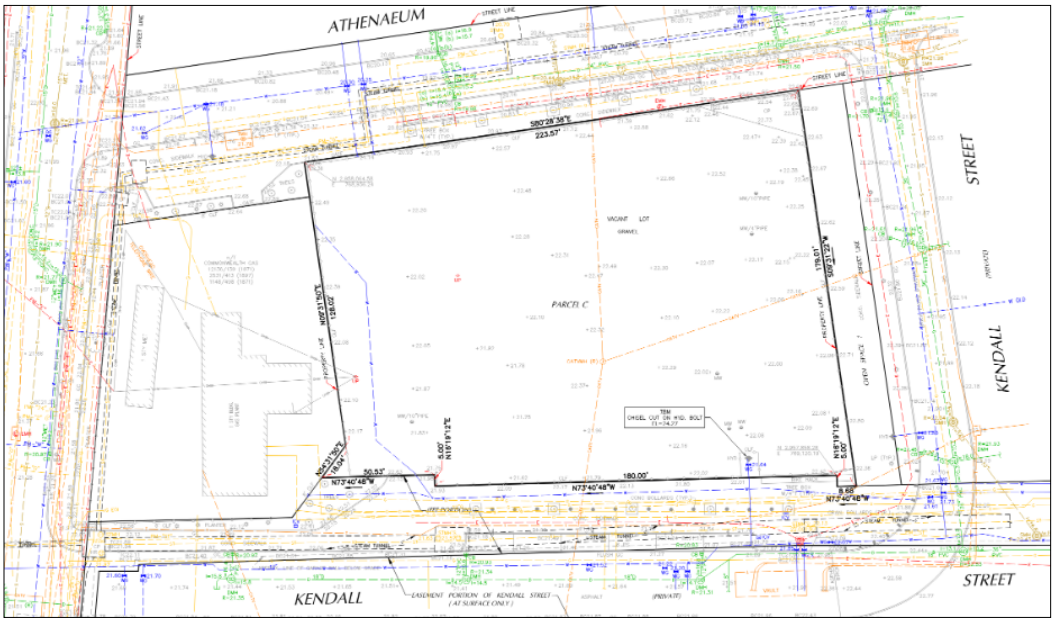
Integrative Process

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

Location and Transportation

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

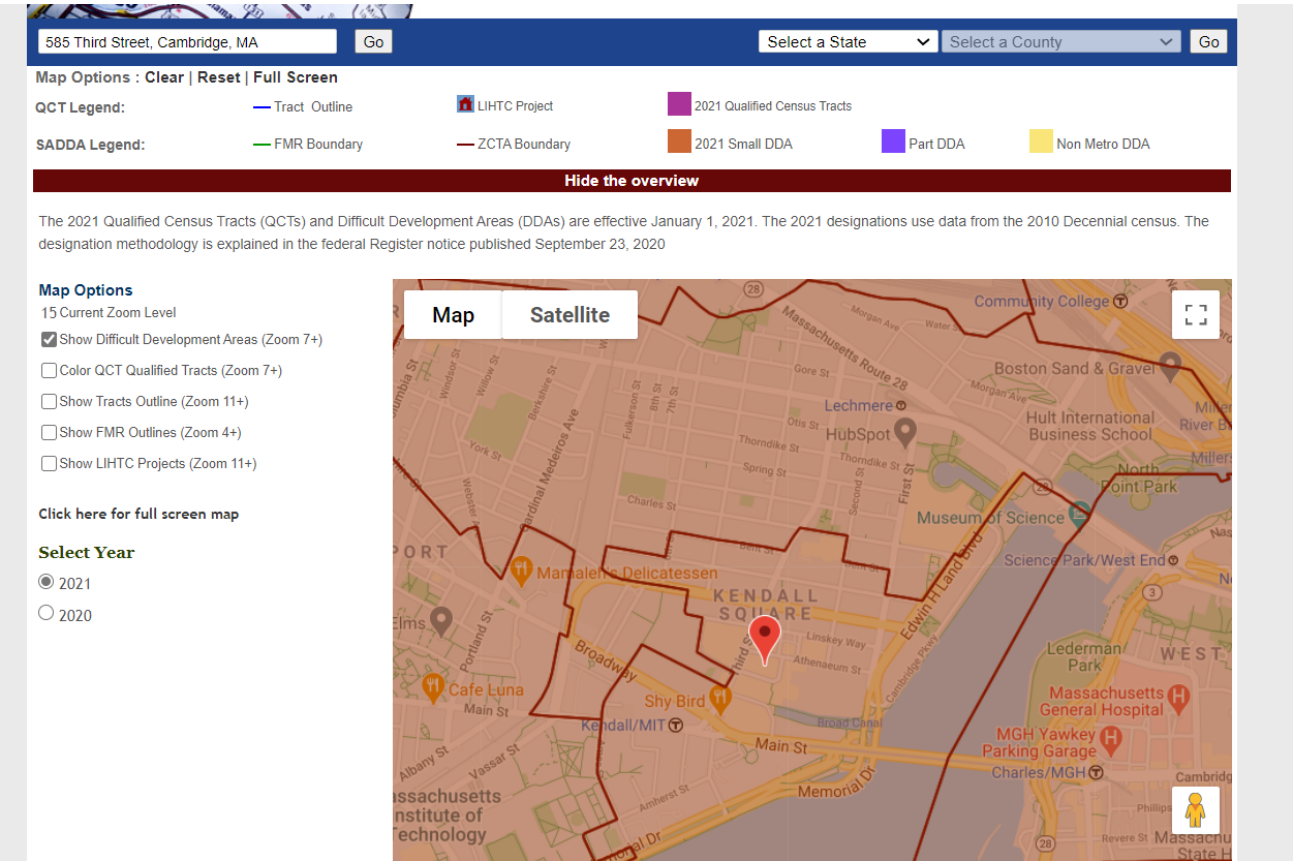
The Project Site has been previously developed and is located in an urban area of filled land.



Site Survey

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

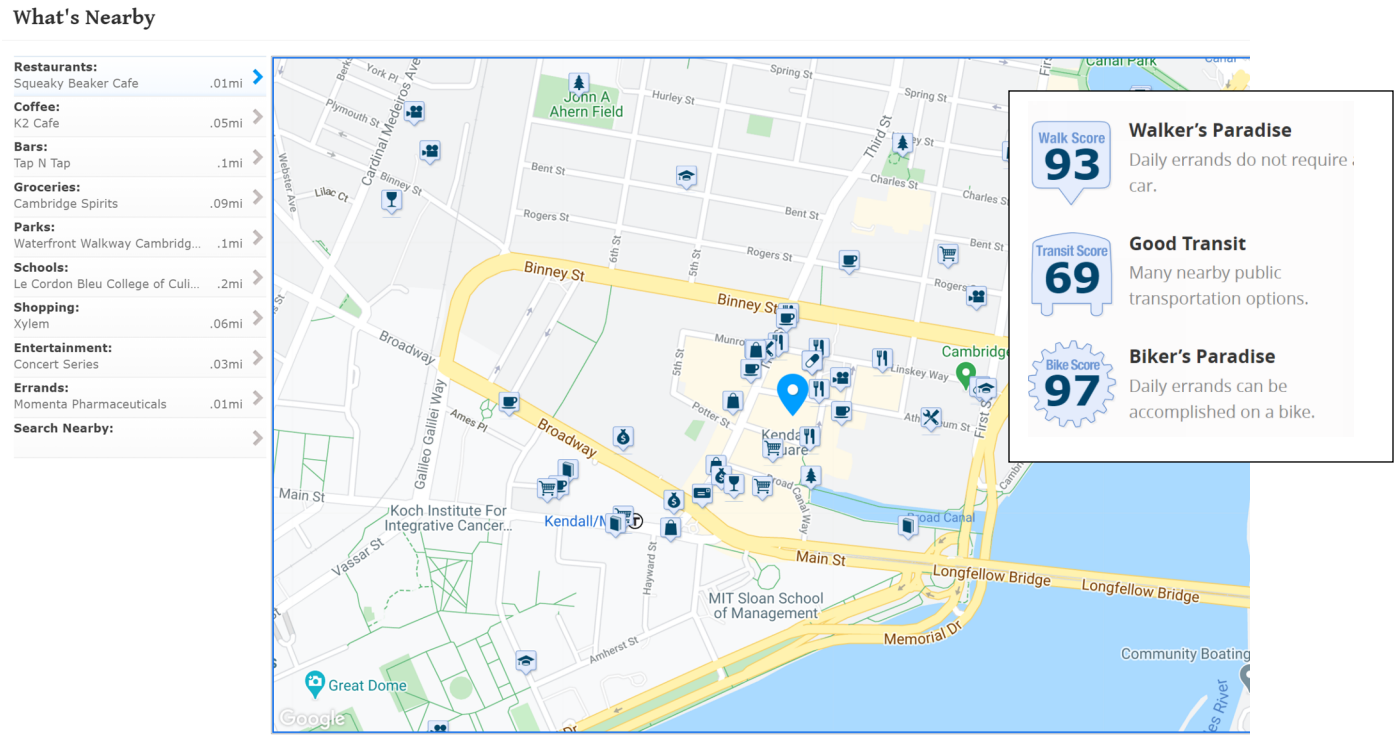
The project site is not a brownfield but it is located in the US Department of Housing and Urban Development's 2021 Difficult Development Areas (DDAs) which is the federally recognized high-priority sites.



The 2021 Difficult Development Areas (DDAs) is effective January 1, 2021.

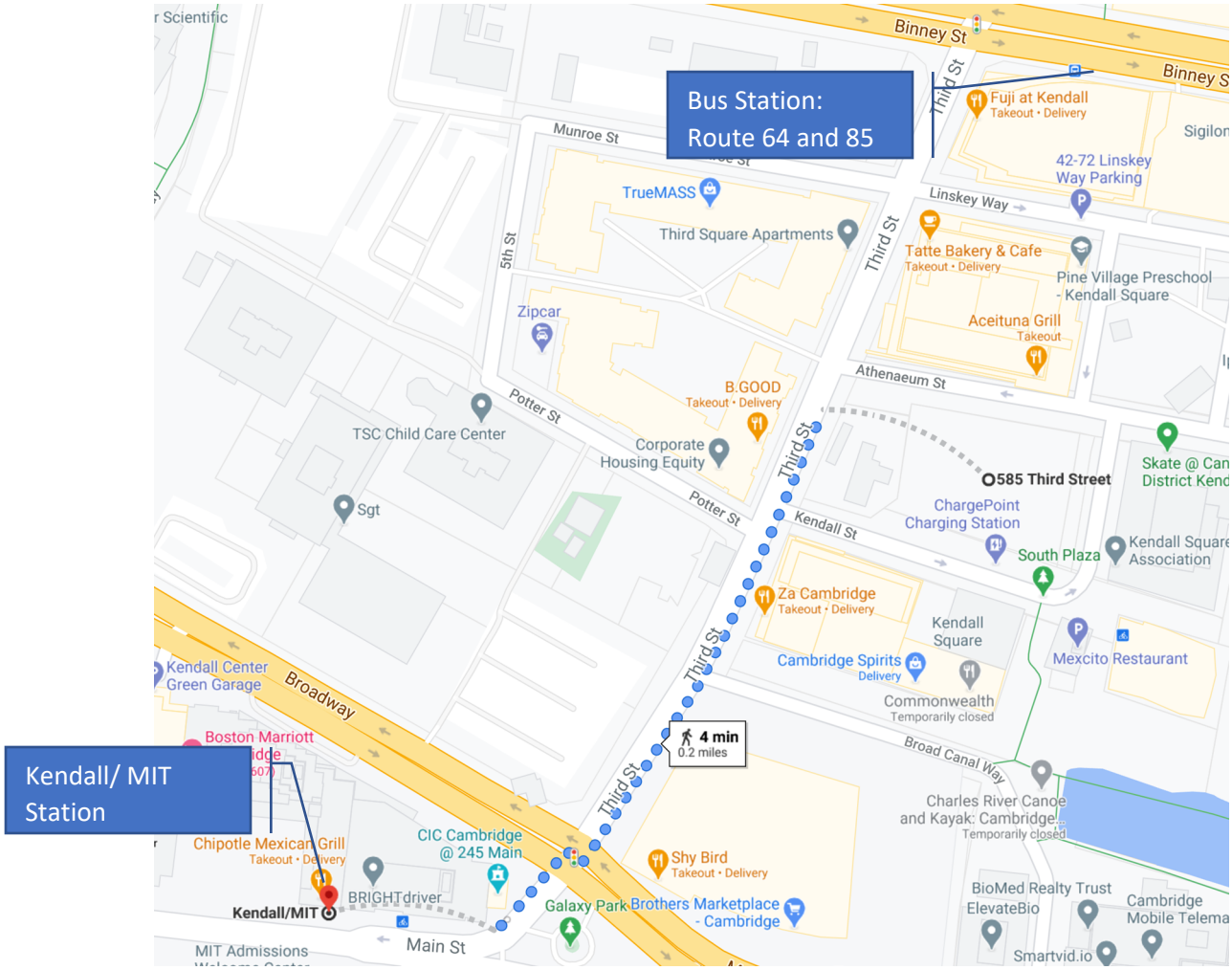
Credit 3: Surrounding Density and Diverse Uses (v4.1): ***6 Yes Points***

Project is utilizing LEED v4.1, Option 3. Walkable Location, for this credit. The site has a Walk Score of 93, and therefore, it will achieve the maximum number of points.



Credit 4– Access to Quality Transit (v4.1): ***2 Yes Points***

The project location provides access to quality transit and encourages alternative transportation. The occupants of 585 Third Street will have access to several nearby transit lines, including Kendall/MIT Station and bus routes 64 and 85, which gives them the opportunity to travel through Cambridge, Boston, and close-by towns. These transit services provide more than 136 "weekday" and over 80 "weekend" trips.



Access to Quality Transit Map

Credit 5 – Bicycle Facilities: ***1 Yes Point***

The bicycle storages and racks will be provided throughout the project and the development site; 115 long-term bike storage, 80 short-term bike storage, and 9 showers-changing rooms. with a Bike Score of 97, the immediate neighborhood provides a direct connection between the project site and a variety of basic services.

Credit Requirements	LEED v4 Requirements	Facilities in 585 Third Street
Long-term Bike Storage	5% FTE = 82	114 LT for Cambridge
Short-term Bike Storage	At least 12.5	61 ST for Cambridge
Shower and Changing Rooms	9	9 Showers

Credit 6 -Reduced Parking Footprint: ***1 Yes Point***

The project will not provide any off-street parking spaces.

Sustainable Sites

Prerequisite 1 – Construction Activity Pollution Prevention:
A management plan will enforce measures to protect adjacent areas from pollution from wind and water-borne soil and sedimentation. The civil design team prepared an erosion and sedimentation plan that meats the local codes and the EPA Construction General Permit of the National Pollution Discharge Elimination System (NPDES) program. The construction team will implement the erosion and sedimentation measures and will follow the requirements of stormwater pollution prevention plan during the construction.

Credit 1 – Site Assessment: ***1 Yes Point***
The project team will conduct a comprehensive site assessment and will study topography, hydrology, climate, vegetation, soils, human use, and human health effects specific to 585 Third Street project.

Credit 4 – Rainwater Management (v4.1): 1 ***Yes Point and 2 Maybe Points***
The project will implement a stormwater management plan with a goal of decreasing the stormwater rates and runoff volume into the BMR-served 36-inch storm drain within Kendall Street and ultimately the Broad Canal. The project will reuse the collect rainwater for at least the 80th percentile storm. Rainwater will be reused for cooling tower makeup to meet the LEED v4.1 requirement.

Credit 5 – Heat Island Reduction: ***2 Yes Points***
The roof will be white TPO and the hardscape area will consist of open-grid pavement system and paving materials with a three-year aged solar reflectance (SR) value of at least 0.28.

Credit 6 – Light Pollution Reduction: ***1 Yes Point***
To reduce the trespass from the project site to the sky and surrounding areas, the design will not exceed the maximum uplight ratings and will meet the maximum backlight and glare ratings. Additionally, the internally illuminated exterior signages will not exceed a luminance of 200 cd/m2 during nighttime hours and 2000 cd/m2 during daytime hours.

Credit 7 – Tenant Design and Construction Guidelines: ***1 Yes Point***
The proponent and the design team are in the process of developing a Tenant Design and Construction Guidelines for this C&S development. The document explains the sustainable aspects of the Core and Shell building design and construction, and also explains what steps are needed for tenants to achieve LEED CI Certification for their space fit-out design and construction, if desired.

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

Water Efficiency

Prerequisite 1 and Credit 1 – Outdoor Water Use Reduction: ***1 Yes Point and 2 Maybe Points***

Landscape plantings will be selected to be climate appropriate, native and adapted and the irrigation system will be designed to target at least a 50% reduction in the potable water use. Project will utilize LEED v4.1 for this credit which makes the project eligible for an additional 1 point if a 75% reduction in the outdoor water use is achieved. The design team will investigate the feasibility of using the collected rainwater for the irrigation purposes to offset 100% of the usage and to achieve an additional LEED point.

Prerequisite 2 and Credit 4 - Indoor Water Use Reduction: ***3 Yes Points and 1 Maybe Point***

The project team anticipates reducing the use of potable water inside the building by at least 35% by installing low-flow and low-flush plumbing fixtures in core restrooms.

Flush Fixture Family	**Baseline Flush Rate (GPF)**	**Design Flush Rate (GPF)**	**Baseline Annual Water Use (gal)**	**Design Annual Water Use (gal)**	**% Reduction**
Water Closet	1.6	1.1	1,115,920	767,195	
Urinal	1.0	0.125	354,200	44,275	
Annual Flush Volume (gallons/ yr)			1,470,120	811,470	44.8%
Flow Fixture Family	**Baseline Flow Rate (GPM)**	**Design Flow Rate (GPM)**	**Baseline Annual Water Use (gal)**	**Design Annual Water Use (gal)**	**% Reduction**
Public Lavatory	0.5	0.35	262,912.5	184,038.8	
Showerhead	2.5	1.5	415,375	249,225	
Kitchen Faucet	2.2	2.2	182,765	182,765	
Annual Flow Volume (gallons/ yr)			861,052.5	616,028.8	28.4%
Total Annual Water Use and Savings			**2,331,172.5**	**1,427,498.8**	**38.76%**

Indoor Water Use Calculations

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

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

Credit 5 – Optimize Process Water Use (v4.1): ***1 Yes Point and 2 Maybe Points***

The design team will obtain the local water quality reports and will design the heat rejection system so that the maximum number of cycles can be achieved without exceeding any maximum concentration levels. Additionally, the feasibility of reusing the collected rainwater to offset at least 30% of the cooling tower water needs will be investigated.

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: 9 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 conceptual design drawings and specifications – is anticipated to result in an annual energy savings of 16% compared to the Massachusetts baseline. Following LEED v4 Alternative Compliance Path, which looks at the annual site energy and GHG savings, the preliminary energy model shows a performance savings of approximately 19% relative to the LEED baseline.

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

Credit 1 – Enhanced Commissioning: 5 Yes Points and 1 Maybe Point
Project will pursue commissioning in line with LEED v4 Fundamental and Enhanced Commissioning requirements. The commissioning agent will perform the scope of work required to comply with the prerequisite in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC & R systems. Enhanced MEP and envelope systems commissioning scope will include reviewing the owner's project requirements, and the basis of design, creating, distributing and implementing a commissioning plan, performing a design review of the project documents, witnessing on-site installations and testing and performing commissioning of installed HVAC, lighting, lighting controls and domestic hot water systems. The proponent may pursue the monitoring based commissioning.

Prerequisite 4 and Credit 6 – Fundamental and Enhanced Refrigerant Management: 1 Maybe Point
No CFC-based refrigerants will be utilized for the Project. The selected equipment will use only refrigerant that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change

Credit 7 – Green Power and Carbon Offset: ***2 Yes Points***

Utilizing the preliminary energy modeling results, it is estimated that approximately 15% of the building annual energy consumption is associated with the core and shell scope of work. The owner will purchase carbon offset through a 5-year contract to offset 100% of the core and shell building's energy use with renewable sources.

Material and Resources

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

Prerequisite 1 – Storage and Collection of Recyclables

A central area for sorting and collection of recyclables before removal from the site will be provided. 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): ***2 Yes Points and 1 Maybe Point***

The project team is planning to conduct a whole-building life-cycle assessment of the building structure and enclosure. The target is at least a 5% reduction in the global warming potential, acidification of land and water sources, and depletion of nonrenewable energy sources when compared with a baseline building.

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 20 different permanently installed products and materials that have lower environmental impacts and comply with Environmental Product Declaration (EDP), and that conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930. The project team is also targeting the Material Ingredients credit and will specify materials and products with known chemical make-up. Documentation for at least 10 different permanently installed products will be provided, confirming the applicable certification which may be the Health Product Declaration (HPD), Cradle-to-Cradle or Declare.

Credit 5 – Construction and Demolition Waste Management (v4.1): ***1 Yes Points***

The waste generated by the construction and demolition process will be recycled, rather than land-filled, and the ultimate goal is for more than 50% (by weight) of the construction waste to be recycled. The project team will most likely use the ReEnergy facility, which is the only certified comingling facility in Massachusetts and has an annual average diversion rate of 54%.

Indoor Environmental Quality

Prerequisite 1 – Minimum Indoor Air Quality Performance
The mechanical systems 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, which will provide OA to office fan coil unit systems. The current design meets and exceeds the minimum requirements of ASHRAE 62.1-2010.

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

Credit 1 – Enhanced Indoor Air Quality Strategies: ***2 Yes Points***
Building 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 carbon dioxide monitoring as an additional enhanced indoor air quality strategy.

Credit 2 – Low-emitting Materials (v4.1): ***3 Yes Points***
The project will target low-emitting materials for 4 categories - adhesives and sealants, paints and coatings, flooring, and composite wood - used inside the building, to be low-VOC (Volatile Organic Compound) products and will meet the emission testing requirements; specified wood products will have no added urea-formaldehyde.

Credit 3 – Construction Indoor Air Quality Management Plan: ***1 Yes Point***
The base building will be constructed in accordance with the SMACNA Indoor Air Quality for Buildings under Construction Guideline. This guideline defines procedures for maintaining good indoor air quality inside the building during construction and also addresses construction practices to allow the best possible indoor environment after occupancy. These practices include cleaning during construction, interrupting paths of odor and dust travel within the building, segregating odor and dust producing activities from absorbent materials, and scheduling similar odor or duct producing activities to occur at the same time.

Credit 5 – Quality 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 construction of 585 Third Street to exceed the performance criteria of some of the base credits and will introduce innovative building features, technologies, and policies that are not addressed by existing prerequisites and credits in the BD+C rating system. The innovative strategies include the followings:

- Innovation: Green Building Education
- Innovation: LEED O+M Starter Kit or Walkable Site
- Pilot: Informing Design Using Triple Bottom
- Innovation: WELL Features or Purchasing Lamps
- Exemplary Performance: BPDO- Environmental Product Declarations (at least 40 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 3 points related to the following strategies: High-Priority Site, Optimize Energy Performance, and Life Cycle Impact Reduction.

LEED Checklist

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

Project Name: 585 Third Street
Date: 6/1/2021

Y	?+	?-	N			
1				Credit	Integrative Process	1

Y	?+	?-	N		Location and Transportation	20	Phase
				Credit	LEED for Neighborhood Development Location	20	
2				Credit	Sensitive Land Protection	2	D
2			1	Credit	High Priority Site	3	D
6				Credit	Surrounding Density and Diverse Uses	6	D
2			4	Credit	Access to Quality Transit (LEED v4.1)	6	D
1				Credit	Bicycle Facilities (LEED v4.1)	1	D
1				Credit	Reduced Parking Footprint	1	D
			1	Credit	Electric Vehicles (LEED v4.1)	1	D

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

Y	?+	?-	N		Water Efficiency	11	Phase
Y				Prereq	Outdoor Water Use Reduction	Required	D
Y				Prereq	Indoor Water Use Reduction	Required	D
Y				Prereq	Building-Level Water Metering	Required	D
1		2		Credit	Outdoor Water Use Reduction (LEED v4.1)	2	D
3		1		Credit	Indoor Water Use Reduction (LEED v4.1)	6	D
1		2		Credit	Cooling Tower Water Use (LEED v4.1)	2	D
1				Credit	Water Metering	1	D

Y	?+	?-	N		Energy and Atmosphere	33	Phase
Y				Prereq	Fundamental Commissioning and Verification	Required	C
Y				Prereq	Minimum Energy Performance	Required	D
Y				Prereq	Building-Level Energy Metering	Required	D
Y				Prereq	Fundamental Refrigerant Management	Required	D
5		1		Credit	Enhanced Commissioning	6	C
9	2	2	5	Credit	Optimize Energy Performance	18	D
			1	Credit	Advanced Energy Metering	1	D
			2	Credit	Demand Response	2	D
			3	Credit	Renewable Energy Production	3	D
1				Credit	Enhanced Refrigerant Management	1	D
2				Credit	Green Power and Carbon Offsets	2	C

Y	?+	?-	N		Materials and Resources	14	Phase
Y				Prereq	Storage and Collection of Recyclables	Required	D
Y				Prereq	Construction and Demolition Waste Management Planning	Required	C
2	1		3	Credit	Building Life-Cycle Impact Reduction (LEED v4.1)	6	D
1			1	Credit	Environmental Product Declarations (LEED v4.1)	2	C
1		1		Credit	Sourcing of Raw Materials (LEED v4.1)	2	C
1			1	Credit	Material Ingredients (LEED v4.1)	2	C
1			1	Credit	Construction and Demolition Waste Management	2	C

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

Y	?+	?-	N		Innovation	6	Phase
1				Credit	Innovation: Green Building Education	5	C/D
1				Credit	Pilot: Informing Design Using Triple Bottom Line Analysis		C/D
1				Credit	Exemplary Performance: EPDs		C/D
1				Credit	Innovation: LEED O+M Starter Kit or Walkable Site		C/D
1				Credit	Innovation: WELL Features; Purchasing - Lamps		C/D
1				Credit	LEED Accredited Professional	1	C/D

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

Y	?+	?-	N			
66	6	14	24	TOTALS	Possible Points:	110

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

Green Building Requirements
Net Zero Narrative

Last Updated – 2/23/2021

Introduction

The "Net Zero Narrative" is required for projects subject to Green Building Requirements, Section 22.20 of the Cambridge Zoning Ordinance. The requirement is based on the recommendations of the City's Net Zero Action Plan (adopted in 2015), which seeks to neutralize greenhouse gas emissions in Cambridge by 2050. This plan sets a timeframe of 2025 for most new construction to be designed to a "net zero" standard, meaning that on an annual basis, all greenhouse gas emissions resulting from building operations are offset by carbon-free energy production. In the meantime, the goal is to reduce greenhouse gas emissions to the maximum extent possible, and to design and develop buildings to adapt to net zero emissions in the future.

This Net Zero Narrative is provided for advisory review only. It is intended to inform City staff and officials on how the Net Zero Action Plan has influenced the design of the project, and to begin a dialogue so that all parties can better understand what building improvements are possible and what the major barriers are to achieving net zero emissions. As research, design, and development of the project continues to unfold, this narrative must be updated and included in the submission for the Building Permit and Certificate of Occupancy.

Example Narrative Template

This document provides an example format for the Net Zero Narrative as a guide for developers and designers. Variations are appropriate to account for the unique conditions of a case. However, any Net Zero Narrative must include the components set forth in Paragraph (c), Section 22.25.1 of the Zoning Ordinance:

(1) anticipated building envelope performance, including roof, foundation, walls and window assemblies, and window-to-wall ratio;

(2) anticipated energy loads, baseline energy simulation tool assumptions, and proposed energy targets, expressed in terms of site energy use intensity ("EUI"), source EUI, and total greenhouse gas emissions;

(3) description of ways in which building energy performance has been integrated into aspects of the Green Building Project 's planning, design, and engineering, including building use(s), orientation, massing, envelope systems, building mechanical systems, on-site and off-site renewable energy systems, and district- wide energy systems;

(4) description of the technical framework by which the Green Building Project can be transitioned to net zero emissions in the future (acknowledging that such a transition might not be economically feasible at first), including future net zero emissions options for building envelope, HVAC systems, domestic hot water, interior lighting, and on- and off-site renewable energy sources;

(5) description of programs provided by local utility companies, government agencies, and other organizations that provide technical assistance, rebates, grants, and incentives that can assist in achieving higher levels of building performance, summarizing which entities have been contacted and which programs could be utilized in the Green Building Project; and

(6) assessment of the technical and financial feasibility to meet the projected HVAC and domestic hot water demands of the building as noted above in (2) 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, which shall include the cost of installation, maintenance and upkeep of the energy system and its components (incorporating programs and incentives as noted above in (5).

Project Profile

Development Characteristics

Lot Area (sq.ft.):	50,000 SF
Existing Land Use(s) and Gross Floor Area (sq.ft.), by Use:	Vacant Lot
Proposed Land Use(s) and Gross Floor Area (sq.ft.), by Use:	Ground Plane Open Space Area: 12,000 SF Building Footprint: 38,000 SF Building Area: 535,000 GFA including: Arts/Cultural Facility: 35,000 GFA Office/Lab Space: 500,000 GFA
Proposed Building Height(s) (ft. and stories):	250' 16 stories
Proposed Dwelling Units:	No Dwelling Units
Proposed Open Space (sq.ft.):	12,000 SF
Proposed Parking Spaces:	No Parking
Proposed Bicycle Parking Spaces (Long-Term and Short-Term):	114 Long-Term Bikes, 61 Short-Term Bikes

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:	LEEDv4 BD+C CS	***Seeking Certification?****	☒Yes ☐No ☐TBD
Rating Level:	Gold	***# of Points:***	66

Enterprise Green Communities			
Rating System & Version:		***Seeking Certification?****	☐Yes ☒No ☐TBD
Rating Level:		***# of Points:***	

Passive House Institute US (PHIUS) or Passivhaus Institut (PHI)			
Rating System & Version:		***Seeking Certification?****	☐Yes ☒No ☐TBD

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

Proposed Project Design Characteristics

Building Envelope

Assembly Descriptions:

Roof:	Conventional low-sloped roof assembly with roofing membrane over cover board over tapered rigid insulation over structural deck. At roofs with vegetation, a protected membrane assembly with fluid-applied membrane applied directly to the structural deck and insulation and overburden materials installed on top of the membrane.
Foundation:	Concrete reinforced mat slab supported by piles or other deep foundation element and cast-in-place reinforced concrete foundation walls. Below-grade slab and walls will be protected by a waterproofing membrane. Insulation over waterproofing membrane on foundation walls at conditioned space and on walls above frost line at unconditioned space.
Exterior Walls:	Unitized curtain wall unit incorporates triple pane insulating glass unit or opaque facing material on the exterior and backpan with minimum 6” of insulation on the interior.
Windows:	Unitized curtain wall unit consists of triple pane insulating glass unit structurally glazed into thermally broken aluminum frame. At storefront on terrace and ground floor, system consists of triple pane insulating glass units structurally glazed on to thermally broken custom aluminum mullion.
Window-to-Wall Ratio:	40%
Other Components:	N/A

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.

The values provided below are the values shown to demonstrate compliance with the envelope backstop calculation (2018 IECC UxA).

	Proposed		***Baseline***	
	Area (sf)	*U-value*	*Area (sf)*	*U-Value*
Window	80,707 SF	0.24	30% (60,530 SF)	U-0.38
Wall	121,060 SF	0.100	70% (141,237 SF)	U-0.064
Roof	41,853 SF	U-0.032	41,853 SF	U-0.032
U*A (BTU/hr-°F]	-	32,815	-	33,380

Envelope Commissioning Process:

BMR will pursue envelope commissioning in line with LEED v4 Enhanced Commissioning Option 2: Envelope Commissioning.

Building Mechanical Systems

Systems Descriptions:

Space Heating:	Heating hot water will be generated by steam-to-water heat exchangers (Vicinity district steam) and a heat recovery chiller. The heat recovery chiller will provide all summer heating loads without fossil fuels, and offset winter heating loads when coincident cooling loads exist. Hot water vertical risers will be provided with valved and capped connections for future tenant heating. Zone-level heating system varies by space type: • Labs up to level 9: VAV with hot water reheat • Labs on level 10 and above: DOAS + 4-pipe fan coil units • Offices: DOAS + 4-pipe fan coil units Façade will be designed to minimize or eliminate the need for perimeter radiation systems.
Space Cooling:	The chilled water system will consist of high-efficiency electric centrifugal chillers with VFDs and a heat recovery chiller located in the penthouse. The chilled water system will serve all AHU cooling coils, miscellaneous fan coils for base building mechanical/electrical rooms, and tenant office and lab fan coil units. A third-party chiller optimization controller will be provided to minimize overall plant electricity consumption. Chilled water vertical risers will be provided with valved and capped connections for future tenant fan coil units. Zone-level cooling system varies by space type: • Labs up to level 9: VAV (all air) • Labs on level 10 and above: DOAS + 4-pipe fan coil units • Offices: DOAS + 4-pipe fan coil units
Heat Rejection:	The heat rejection system will consist of multiple cross-flow cooling towers on the roof with VFD fans.
Pumps & Auxiliary:	All pumps will be equipped with variable frequency drives (VFDs) for variable volume operation.
Ventilation:	AHUs will be 100% outside air units in the penthouse consisting of VFD fan arrays, flow measuring stations, cooling coils, glycol heat recovery coils, filters, and controls. Medium pressure supply air will be distributed vertically in shafts and horizontally to each floor for future tenant connection. Exhaust will be provided via exhaust EAHUs located on the roof or upper penthouse. EAHUs will include pre-filters, glycol heat recovery coils, and pad-mounted exhaust fans with stainless steel stacks and integral sound attenuators extending through the roof. Medium pressure exhaust air will be distributed vertically in shafts and

	horizontally distributed to each floor for future tenant connection. The AHUs and EAHUs will utilize an intelligent, high-efficiency glycol runaround heat recovery system by Konvekta or equal. Ventilation and exhaust allocation varies by space type: • Labs up to level 9: 2.0 cfm/sf • Labs on level 10 and above: 1.5 cfm/sf • Offices: 0.25 cfm/sf
Domestic Hot Water:	Toilet rooms: point-of-use electric water heaters Tempered loop: steam-fired water heater
Interior Lighting:	All-LED lighting system meeting at least 10% LPD reduction compared to MA amended values
Exterior Lighting:	All-LED exterior lighting system
Other Equipment:	Base building and tenant standby generators

Systems Commissioning Process:

BMR will contract a consultant to perform MEP commissioning to comply with LEED V4 requirements for Enhanced Commissioning. Systems will be commissioned to ensure functionality and execution of intended sequence of operations.

The Applicant will pursue commissioning in line with LEED v4 Fundamental and Enhanced Commissioning requirements. The commissioning agent will perform the scope of work required to comply with the prerequisite in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC & R systems. Enhanced 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.

Building Energy Performance Measures

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 measurescan 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 the public transportation, bicycle network and facilities.
Building Orientation and Massing:	The building massing is developed and optimized based on the orientation that is dictated by the existing site and will provide access to view and daylight for majority of the future occupied spaces.
Envelope Systems:	High performing envelope which meets and exceeds the 2018 IECC U*A backstop requirements. It includes continuous insulation on walls and roofs, high performing glazing assemblies with insulated opaque spandrel areas and decreased infiltration rates.
Mechanical Systems:	High-efficiency cooling plant Heat recovery chiller for partial electrification of space heating District steam heating from Vicinity combined heat and power (CHP / "cogen") facility
Renewable Energy Systems:	Due to the nature of the Project, part of the roof will be occupied by large mechanical systems. On areas of the roof free of mechanical systems and with good solar availability, the potential of installing photovoltaic panels is under evaluation. Integration of photovoltaics is being studied, taking into account available roof area, building orientation, and shading from adjacent buildings.
District-Wide Energy Systems:	The project will be connected to the Vicinity district combined heat and power (CHP / "cogen") system
Other Systems:	High-efficiency lighting

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'sProject 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 is pursuing the LEED Integrative Process credit for this project, and therefore, energy models were developed during the conceptual design phase. The project team for the overall master site development, including the ownership group, architects, Civil and MEP engineers, as well as the sustainability consultants and energy modelers met several times in the early stages of planning and design to discuss the project overall energy, sustainability, and environmental goals.
The preliminary and conceptual energy models were developed early on to investigate the project's compliance with the LEED v4 Minimum and Optimize Energy Performance criteria and the Massachusetts Stretch Energy Code requirements and to estimate the project site and source energy use and cost as well as the GHG emissions. As a result of these analyses, the design team proposed and evaluated additional energy conservation measures to improve the building overall performance and decided to improve the overall performance of the building envelope.

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 has had multiple engagements with local utility representatives and is planning to participate in all relevant energy-efficiency incentive programs. An initial MassSave kickoff/energy charrette will be conducted in Spring 2021. The project will be participating in the Mass Save Path II for Large Buildings.

The project will review other incentives for Renewable Energy Systems such as:

- DOER's SMART program
- Commercial Investment Tax Credit (ITC) for PV Systems
- Modified Accelerated Cost Recovery System (MACRS) for Renewable Energy Systems
- Clean Renewable Energy Bonds (CREBs)

Net Zero Scenario Transition

Describe the technical framework by which the project can be transitioned to net zero greenhouse gas emissions in the future, 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:	By virtue of complying with IECC 2018 UxA Backstop, the envelope as designed will support a Net Zero condition	n/a - no change required
HVAC Systems:	Current design has summer reheat load and base winter cooling load is provided by a heat recovery chiller. Supplemental and heating loads are provided by Vicinity steam. Vicinity expected to transition to zero carbon emissions through use of biofuels, electrification, and other technological innovations.	Vicinity transitions to carbon neutral steam through use of biofuels, electrification, and other technological innovations as described in 2050 Zero Carbon Emissions commitment https://www.vicinityenergy.us/press-releases/vicinity-energy-commits-to-reaching-net-zero-carbon-emissions-for-all-operations-by-2050
Domestic Hot Water:	Point-of-use domestic hot water loads continue to use electric resistance. Steam-fired tempered water loop transitions to carbon neutral Vicinity Steam.	Vicinity carbon neutral transition (see above)
Lighting:	Lighting design to meet LPDs defined in MA Stretch Energy Code with 10% LPD reduction in compliance with C406.3. No additional measure to achieve net zero condition.	n/a – no change required
Renewable Energy Systems:	Optimize installation of solar PV on roof and terraces.	n/a – no change required
Other Strategies:	n/a	n/a

Energy Systems Comparison

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 mechanical systems as-currently designed are aligned with the strategy for meeting the zero-carbon future. Analysis is omitted, as the zero-carbon scenario will not require building retrofit or capital cost expenditure. However, strategies for on-site renewables and non-carbon district energy are described below.

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		Refer to Solar Ready Roof Assessment. There is limited capacity for on-site solar PV, however a small installation(s) may be studied in the future. The majority of the renewable energy for the future Net Zero / Zero Carbon condition would need to be procured from off-site until the regional electric grid transitions to net zero emissions. Team may also consider the feasibility of off-site renewable energy certificates, in line with the LEED Green Power and Carbon Offset Credit.
Solar Hot Water:	N/A	N/A	N/A
Ground-Source Heat Pumps (Geothermal):	N/A	N/A	N/A
Water-Source Heat Pumps:	N/A	N/A	N/A
Air-Source Heat Pumps:	N/A	N/A	N/A
Non-Carbon-Fuel District Energy:	X		The building will utilize district steam from the Vicinity combined heat and power (CHP) plant, which will transition to renewable fuel sources.
Other Non-Carbon-Fuel Systems:	N/A	N/A	N/A

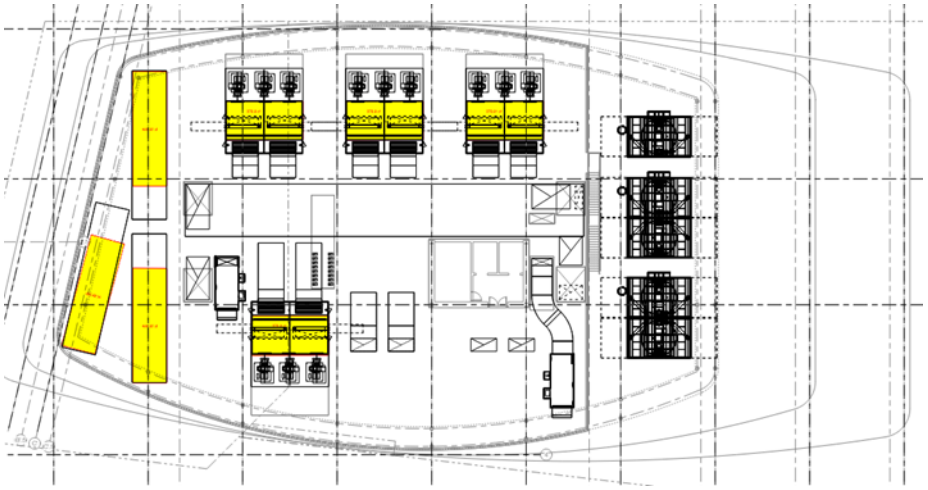
Non-Carbon-Fuel Scenario

The mechanical systems as-currently designed are aligned with the strategy for meeting the zero-carbon future. As Vicinity Steam and the electrical grid transitions to a net zero carbon future, the building is positioned to also be a zero-carbon building.

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 plandepicting the information provided.

The design team explored the potential to incorporate rooftop photovoltaic arrays at 585 Third St. The study considered available roof areas, including the penthouse roof and mid-level terraces, relative to their open area and shade characteristics. The team determined that the rooftop terraces would not support PV due to shading from two tall buildings directly adjacent and due south of the project site. Because the penthouse roof is densely crowded with base building and future tenant mechanical equipment, and surrounded by a screened enclosure, it cannot support a PV at the roof deck height. However, the team has evaluated the potential to affix PV arrays above the (4) exhaust air handling units (EAHUs) and (3) emergency generators, as they would be sufficiently high to minimize shading from the screen wall. The approximate locations of these arrays are highlighted in the preliminary roof plan below.



<table>
<tr><td>Total Roof Area (sq. ft.):</td><td>Approx. 29,000 SF</td></tr>
<tr><td>Unshaded Roof Area (sq. ft.):</td><td>n/a (see below)</td></tr>
<tr><td>Structural Support:</td><td>The roof deck itself is shaded by a screen wall. Unshaded areas consist of mechanical equipment with flat upper surfaces, including EAHUs and generators. PV could be supported directly by these mechanical enclosures, with support engineered by equipment manufacturers.</td></tr>
<tr><td>Electrical Infrastructure:</td><td>PV system, if installed, would connect to gear in the penthouse electrical room.</td></tr>
<tr><td>Other Roof Appurtenances:</td><td>Virtually the entire roof area is covered by mechanical equipment and access/clearance areas, both base building and reserved for future tenants. As noted above, roof surface is entirely shaded by screen wall. PV could only be installed above select pieces of mechanical equipment.</td></tr>
<tr><td>Solar-Ready Roof Area (sq. ft.):</td><td>2,290 SF
<table>
<tr><th>Location</th><th>Area (each)</th><th>Quantity</th><th>Total</th></tr>
<tr><td>Exhaust EAHUs</td><td>370 sf</td><td>4</td><td>1,480 sf</td></tr>
<tr><td>Generators</td><td>480 sf</td><td>3</td><td>1,440 sf</td></tr>
<tr><td></td><td></td><td></td><td>2,290 sf</td></tr>
</table></td></tr>
<tr><td>Capacity of Solar Array:</td><td>Nominal PV installed density: 18 W/sf
Total PV system size: 52.5 kW
Estimated annual production: 63,000 kWh
Estimated installation cost: $210,000 ($4.00/W)

Based on this preliminary layout, equipment-mounted PV arrays could total approximately 52.5 kW and produce about 63,000 kWh of electricity on site annually. This would constitute less than 0.4% of the building’s annual electricity consumption. Because of the low energy impact relative to the cost and complexity required to attach PV to mechanical equipment, the team has decided not to pursue rooftop PV at this time. However, because it may be pursued as costs improve, the impact of this on-site PV has been carried in the “Future Net Zero” and “Non-Carbon Fuel” scenarios in the Net Zero Narrative.</td></tr>
<tr><td>Financial Incentives:</td><td>Due to complexity of installation condition, it is unclear at this time if a PPA would be viable. Most likely condition would be direct ownership. MA SMART incentives and/or federal tax credits could offset partial costs.</td></tr>
<tr><td>Cost Feasibility:</td><td>Because of the low energy impact (less than 0.4% of annual electricity) relative to the cost and complexity of installing PV above mechanical equipment (estimated at $210,000), PV array was determined not to be feasible at this time.</td></tr>
</table>

Results

Briefly summarize the results of the analysis and how it has informed the design of the project. Also includefigures 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.*

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

Because the future non-carbon fuel scenario does not rely on any changes to mechanical systems or maintenance procedures within the building, cost analysis has been excluded from the study.

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.

The project will demonstrate energy code compliance by adhering to the 9th Edition – Revised of the Massachusetts Building Code - 780 CMR, Chapter 13.00 - Energy Efficiency, including Appendix AA (MA Stretch Code). The baseline building is modeled to adhere to the methodology described by ASHRAE 90.1-2013 Appendix G, with MA Amendments. 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 50/50 distribution of office and lab areas with generic space layouts, consistent with the building design criteria.

In addition, to comply with Section C406 of MA Energy Code, the baseline and proposed buildings capture the energy use reductions associated with the following three C406 measures:

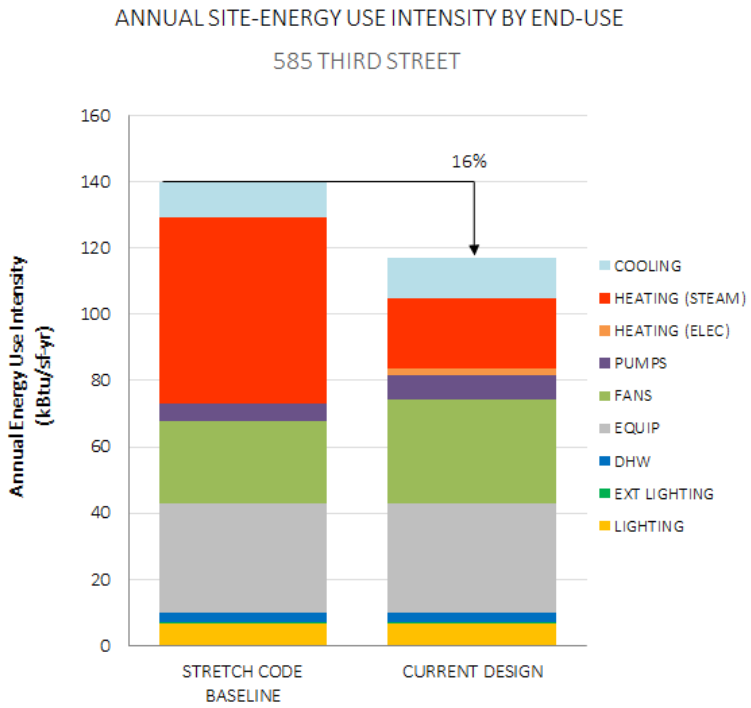
- C406.2: More efficient HVAC performance
- C406.3: Reduced Lighting Power Density
- C406.9: Reduced Air-Infiltration

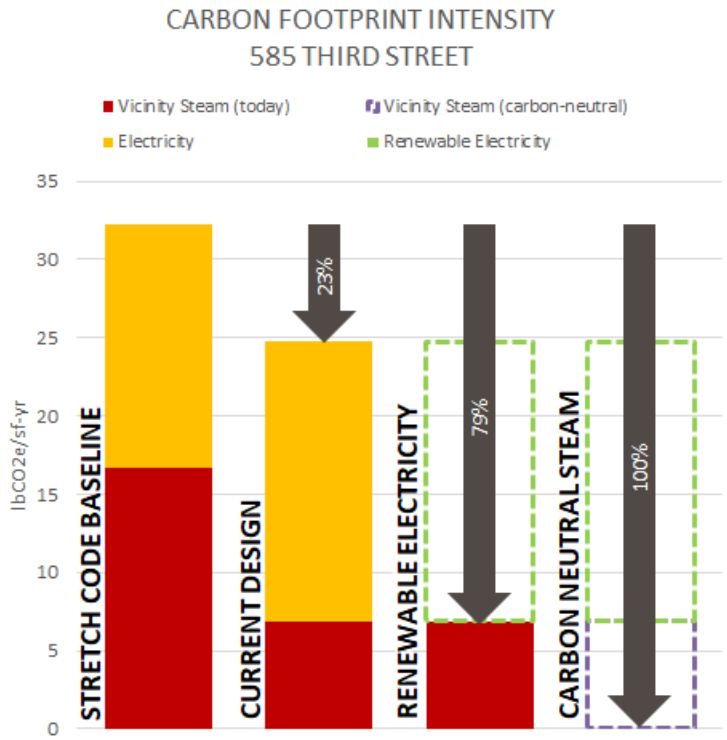
Annual Projected Energy Consumption and Greenhouse Gas (GHG) Emissions

The preliminary energy modeling results should be shown in a concluding table format similar to what is shown at the end of this document. It should compare the "baseline building" (Massachusetts Stretch EnergyCode) to the proposed design, as well as the future "net zero" scenario described later in this narrative.

The energy model indicates that the design achieves a 16% site energy reduction and 23% greenhouse gas emissions reduction relative to the Stretch Code baseline. Purchasing 100% renewable electricity would result in a 79% GHG reduction and transitioning to zero-carbon steam would result in a net zero carbon building.

	Baseline Building		Proposed Design		Future Net Zero Scenario		Non-Carbon Fuel Scenario	
Energy By End-Use (MMBtu/yr)	*MMBtu*	*% of Total*	*MMBtu*	*% of Total*	*MMBtu*	*% of Total*	*MMBtu*	*% of Total*
Space Heating - Steam	36,510	40%	13,865	18%	13,865	18%	13,865	18%
Space Heating - Electric		0%	1,161	2%	1,161	2%	1,161	2%
Space Cooling	6,950	8%	7,838	10%	7,838	10%	7,838	10%
Heat Rejection	240	0%	317	0%	317	0%	317	0%
Pumps & Aux.	3,270	4%	4,929	6%	4,929	6%	4,929	6%
Ventilation	16,140	18%	20,219	27%	20,219	27%	20,219	27%
Domestic Hot Water	1,900	2%	1,899	2%	1,899	2%	1,899	2%
Interior Lighting	4,420	5%	4,416	6%	4,416	6%	4,416	6%
Exterior Lighting	150	0%	149	0%	149	0%	149	0%
Misc. Equipment	21,370	23%	21,372	28%	21,372	28%	21,372	28%
	Baseline		*Proposed*	*% Reduction*	*Net Zero*	*% Reduction*	*Non-Carbon*	*% Reduction*
Site EUI (kBtu/sf-yr)	140		117	16%	117	16%	117	16%
Source EUI (kBtu/sf-yr)	274		279	-2%	112	59%	93	66%
Total Energy Use (MMBtu)	90,950		76,166	16%	76,166	16%	76,166	16%
Total Energy Cost (USD)	$ 3,355,164		$3,289,344	2%				
	kWh	% of Total	kWh	% of Total	kWh	% of Total	kWh	% of Total
On-Site Renewable Energy Generation	n/a		0	n/a	63,000	0.4%	63,000	0.4%
Off-Site Renewable Energy Generation	n/a		0	n/a	17,547,557			
	Tons CO2		Tons CO2	% Reduction				
GHG Emissions	10,459		8,016	23%				
GHG Emissions per SF	32.3		24.7					


ANNUAL SITE-ENERGY USE INTENSITY BY END-USE
585 THIRD STREET
Annual Energy Use Intensity (kBtu/sf-yr)
160
140
120
100
80
60
40
20
0
16%
COOLING
HEATING (STEAM)
HEATING (ELEC)
PUMPS
FANS
EQUIP
DHW
EXT LIGHTING
LIGHTING
STRETCH CODE BASELINE
CURRENT DESIGN


CARBON FOOTPRINT INTENSITY
585 THIRD STREET
Vicinity Steam (today)
Vicinity Steam (carbon-neutral)
Electricity
Renewable Electricity
lbCO2e/sf-yr
35
30
25
20
15
10
5
0
STRETCH CODE BASELINE
CURRENT DESIGN
23%
RENEWABLE ELECTRICITY
79%
CARBON NEUTRAL STEAM
100%

BURO HAPPOLD

To	City of Cambridge Community Development Department (CDD)	Date	June 02, 2021
From	Buro Happold	Job no	0049156
Copied to	Redgate, BioMed Realty		
Subject	Affidavit Form for Green Building Professional		

Green Building Project Location: 585 Third Street

Green Building Professional

Name: John Swift, PE, CEM, LEED AP BD+C

☐ Architect

☒ Engineer

MA License Number 36840

Company Buro Happold

Address: 11 Beacon Street, Suite 400
Boston, MA 02108

Contact Information

Email Address john.swift@burohappold.com

Phone Number 617-419-2284

I, John Swift, PE, CEM, LEED AP BD+C, 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) 06/02/2021 *(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 Projection

☐ 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.

LEED AP BD+C

GREEN BUSINESS CERTIFICATION INC. CERTIFIES THAT

John Swift

HAS ATTAINED THE DESIGNATION OF

LEED AP® Building Design + Construction

by demonstrating the knowledge and understanding of green building practices and principles needed to support the use of the LEED® green building program.

88977-AP-BD+C

CREDENTIAL ID

23 DEC 2009

ISSUED

20 DEC 2021

VALID THROUGH

Mahesh Ramanujam

MAHESH RAMANUJAM
PRESIDENT & CEO, U.S. GREEN BUILDING COUNCIL
PRESIDENT & CEO, GREEN BUSINESS CERTIFICATION INC.

Green Building Requirements

585 Third Street Green Building Report – Comments on Special Permit Stage

Status: Pursuant to Section 22.25.1 of the Zoning Ordinance, the Community Development Department (CDD) received the Green Building Report (GBR) for the Special Permit stage of this on 6/24/2021. CDD staff have reviewed the project's GBR and offer the following Determination, Summary of Compliance and Advisory Comments on the project's sustainability.

CDD Determination: The GBR documentation provided by the Applicant sufficiently demonstrates compliance with the Green Building Requirements of Section 22.24 at the special permit stage of review. A revised submission with additional documentation will be required at the building permit stage.

LEED Project Summary: This project is subject to the City's Green Building Requirements (Section 22.20, Zoning Ordinance). The project is currently meeting the minimum requirement with 66 credit points, targeting LEED Gold, under LEED v4 BD+C: Core and Shell and is pursuing LEED certification. An additional 6 points have been designated as possible points. The Green Building Report for this project is complete and meets Article 22 requirements.

Rating System: LEED v4 BD+C: Core and Shell

Summary of Compliance

Green Building Professional Certification

- John Swift of Buro Happold has been identified as the Green Building Professional for the project. The affidavit states that this professional has reviewed all relevant documents for this project and confirmed to the best of his/her 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.
- A copy of the professional's credential from Green Building Rating Program has been provided.

Rating System Checklist and Narrative

- The project is pursuing Integrative Process credit.
- The project is pursuing Enhanced Commissioning credit, which includes monitoring-based commissioning process for various building systems and assemblies as well as commissioning for the building's thermal envelope.
- The project is pursuing Optimize Energy Performance credit by targeting a 23% improvement in energy cost savings over LEED baseline. The project is also pursuing domestic water use reduction of approximately 39% below LEED baseline.
- The project is seeking all six Innovation credits.
- LEED points summary:
    - Integrative Process – 1 point
    - Location and Transportation – 14 points
    - Sustainable Sites – 6 point
    - Water Efficiency – 6 points
    - Energy and Atmosphere – 17 points

- Materials and Resources – 6 points
- Indoor Environmental Quality – 7 points
- Innovation – 6 points
- Regional Priority – 3 points

Net Zero Narrative Highlights

The project will be connected to the Vicinity district combined heat & power (CHP) co-gen system. This will be a positive feature of the project in its goal to reach net-zero. Other features include triple glazing and enhanced commissioning for the building envelope. Below are additional highlights:

- The proposed site energy use intensity (EUI) is approximately 117 kBtu/sf-yr.
- The energy use reduction is approximately 16% relative to ASHRAE 90.1-2013 baseline.
- Proposed GHG emissions will be 23% reduction from baseline.
- Window to Wall Ratio at 40%.
- Window U-Value =.24

Advisory Comments:

The City's goal is to promote environmentally sustainable and energy-efficient design and development practices in new construction and the renovation of existing buildings. Strategies that are relevant for this project include reduction in energy use in construction and daily operations, reuse of materials, conservation of natural resources and reduction of toxins in building materials and construction methods. To support the City's goal in sustainability, staff recommend the following strategies as we move forward with the next phases:

- Consider pursuing the less tentative points.
- Continue assessment information on embodied carbon.
- Provide installation and maintenance cost of proposed design even if no changes are anticipated for non-carbon fuel scenario for next phase of review.

Staff appreciate the Project team in providing the requested information and would encourage continuing to pursue the highest level of sustainable and energy-efficient design possible as the project moves through design development. Pursuing additional credit points in impactful LEED categories including Energy & Atmosphere and Material Resources, Water Efficiency, and Indoor Environmental Quality is highly recommended.

The project will be subject to green building review prior to receiving Building Permit and Certificate of Occupancy. CDD Staff is available to work with the Applicant through continuing design review and looks forward to receiving updates including projected building performance, Annual Projected Energy Consumption, Greenhouse Gas (GHG) Emissions and information on building materials and resources.

CITY OF CAMBRIDGE
TRAFFIC, PARKING, + TRANSPORTATION

Joseph E. Barr, Director
344 Broadway, Suite 202
Cambridge, MA 02139

August 4, 2021

Sean Manning, VHB Inc.
99 High Street, 10 Floor
Boston, MA 02110

Sal Zinno, BioMed Realty Trust
101 Main Street
Cambridge, MA 02142

RE: 585 Third Street Development Transportation Impact Study (TIS)

Dear Sean and Sal,

The Cambridge Traffic, Parking, and Transportation Department (TP+T) received a Transportation Impact Study (TIS) for the proposed 585 Third Street Project by BMR-Third LLC on June 24, 2021. Based on staff review, a few corrections and clarifications were needed. We received the updated TIS on July 23, 2021 and based on our review we certify the TIS as accurate and complete.

Thank you for working with us on the TIS and we look forward to continuing to work with you on this Project as it moves through the Development Review process, including developing a final transportation mitigation program to adequately mitigate the Project's transportation impacts.

Please call Adam Shulman of my staff at 617-349-4745 to set up a meeting or if you have any questions.

Very truly yours,

Joseph E. Barr, Director

cc: Adam Shulman, Patrick Baxter, TP&T

Tyler Morandi

From: Jesse Nicholson <jnicholson@mvvainc.com>
Sent: Tuesday, August 10, 2021 4:00 PM
To: Putnam, Andrew
Cc: Tyler Morandi; Emily Mueller De Celis; Lefcourt, David; Robin Fitzgerald-Green (fitzgeraldgreen@cbtarchitects.com); Soo ran Shin
Subject: RE: Article 19 Tree Mitigation Plan 585 Third Street Cambridge, MA.
Attachments: 2021.08.09_585 Third Street Article 19 Tree Protection and Removal Plan.pdf

Andrew,

Here are the updated sheets addressing the comments that were discussed regarding the proposed soils and trees. Please review and let me know if you have any further questions. Thank you.

Sincerely,

Jesse Nicholson
Associate Principal
he, him, his

Michael Van Valkenburgh Associates, Inc., Landscape Architects
231 Concord Avenue
Cambridge, MA 02138
Phone: 617.864.2076
Direct: 617.250.7939

From: Jesse Nicholson
Sent: Friday, July 2, 2021 2:01 PM
To: 'Putnam, Andrew' <aputnam@cambridgema.gov>
Cc: 'Tyler Morandi' <tyler.morandi@redgate-re.com>; Emily Mueller De Celis <emuellerdecelis@mvvainc.com>; 'Lefcourt, David' <dlefcourt@cambridgema.gov>; 'Robin Fitzgerald-Green (fitzgeraldgreen@cbtarchitects.com)' <fitzgeraldgreen@cbtarchitects.com>; Soo ran Shin <sshin@mvvainc.com>
Subject: RE: Article 19 Tree Mitigation Plan 585 Third Street Cambridge, MA.

Andrew,

There were some adjustments to the ground plane that came out of a CDD meeting and we wanted to capture that in the plan. Here is an updated attachment. Please review and let me know if you have any questions.

Sincerely,

Jesse Nicholson
Senior Associate

Michael Van Valkenburgh Associates, Inc., Landscape Architects
231 Concord Avenue
Cambridge, MA 02138
Phone: 617.864.2076
Direct: 617.250.7939

From: Jesse Nicholson
Sent: Thursday, June 24, 2021 4:25 PM
To: Putnam, Andrew <aputnam@cambridgema.gov>
Cc: Tyler Morandi <tyler.morandi@redgate-re.com>; Emily Mueller De Celis <emuellerdecelis@mvvainc.com>; Lefcourt, David <dlefcourt@cambridgema.gov>; Robin Fitzgerald-Green (fitzgeraldgreen@cbtarchitects.com) <fitzgeraldgreen@cbtarchitects.com>; Soo ran Shin <sshin@mvvainc.com>
Subject: RE: Article 19 Tree Mitigation Plan 585 Third Street Cambridge, MA.

Andrew,

Here are the updated plans for 585 Third street reflecting the change from 8" DBH to 6" DBH for significant trees. Please review and let me know if you have any questions or comments. Thank you.

Sincerely,

Jesse Nicholson
Senior Associate

Michael Van Valkenburgh Associates, Inc., Landscape Architects
231 Concord Avenue
Cambridge, MA 02138
Phone: 617.864.2076
Direct: 617.250.7939

From: Putnam, Andrew <aputnam@cambridgema.gov>
Sent: Tuesday, June 22, 2021 1:10 PM
To: Jesse Nicholson <jnicholson@mvvainc.com>
Cc: Tyler Morandi <tyler.morandi@redgate-re.com>; Emily Mueller De Celis <emuellerdecelis@mvvainc.com>; Lefcourt, David <dlefcourt@cambridgema.gov>; Robin Fitzgerald-Green (fitzgeraldgreen@cbtarchitects.com) <fitzgeraldgreen@cbtarchitects.com>; Soo ran Shin <sshin@mvvainc.com>
Subject: RE: Article 19 Tree Mitigation Plan 585 Third Street Cambridge, MA.

Hi Jesse,

DBH was not reviewed/discussed further by the Councilors. It is safe to assume when the amendment is ordained next Monday DBH will be 6".

Thanks,
Andrew

From: Jesse Nicholson <jnicholson@mvvainc.com>
Sent: Tuesday, June 22, 2021 1:08 PM
To: Putnam, Andrew <aputnam@cambridgema.gov>
Cc: Tyler Morandi <tyler.morandi@redgate-re.com>; Emily Mueller De Celis <emuellerdecelis@mvvainc.com>; Lefcourt, David <dlefcourt@cambridgema.gov>; Robin Fitzgerald-Green (fitzgeraldgreen@cbtarchitects.com) <fitzgeraldgreen@cbtarchitects.com>; Soo ran Shin <sshin@mvvainc.com>
Subject: RE: Article 19 Tree Mitigation Plan 585 Third Street Cambridge, MA.

Andrew,

Thank you for the follow-up call yesterday, I wanted to check in on the meeting last night regarding the caliper of a significant tree in Cambridge. Was it changed from 8” to 6”, if so MVVA will update the plans and resend. Thank you .

Sincerely,

Jesse Nicholson
Senior Associate

Michael Van Valkenburgh Associates, Inc., Landscape Architects
231 Concord Avenue
Cambridge, MA 02138
Phone: 617.864.2076
Direct: 617.250.7939

From: Jesse Nicholson
Sent: Monday, June 21, 2021 9:31 AM
To: Lefcourt, David <dlefcourt@cambridgema.gov>
Cc: Tyler Morandi <tyler.morandi@redgate-re.com>; Emily Mueller De Celis (emuellerdecelis@mvvainc.com) <emuellerdecelis@mvvainc.com>; Robin Fitzgerald-Green (fitzgeraldgreen@cbtarchitects.com) <fitzgeraldgreen@cbtarchitects.com>; Soo ran Shin <sshin@mvvainc.com>
Subject: RE: Article 19 Tree Mitigation Plan 585 Third Street Cambridge, MA.

David,

I left you a voicemail last week and wanted to follow-up on the email below. Please let me know if you have any follow-up questions or comments. Thank you.

Sincerely,

Jesse Nicholson
Senior Associate

Michael Van Valkenburgh Associates, Inc., Landscape Architects
231 Concord Avenue
Cambridge, MA 02138
Phone: 617.864.2076
Direct: 617.250.7939

From: Jesse Nicholson
Sent: Tuesday, June 8, 2021 3:56 PM
To: 'Lefcourt, David' <dlefcourt@cambridgema.gov>
Cc: 'Tyler Morandi' <tyler.morandi@redgate-re.com>; Emily Mueller De Celis <emuellerdecelis@mvvainc.com>; Robin Fitzgerald-Green (fitzgeraldgreen@cbtarchitects.com) <fitzgeraldgreen@cbtarchitects.com>; Soo ran Shin <sshin@mvvainc.com>
Subject: Article 19 Tree Mitigation Plan 585 Third Street Cambridge, MA.

Dear David,

Attached are the tree mitigation plans included to be certified by you before we submit our special permit application for 585 Third Street in Cambridge, MA. The attachment contains an Existing conditions survey, protection/removal plan, and a proposed planting plan which shows the calculation showing DBH to mitigate and the DBH being proposed. Please review and let me know if you have any questions or comments. Thank you for your time.

Sincerely,

Jesse Nicholson
Senior Associate

Michael Van Valkenburgh Associates, Inc., Landscape Architects
231 Concord Avenue
Cambridge, MA 02138
Phone: 617.864.2076
Direct: 617.250.7939

J.M.KING
Arboriculture & Landscaping

Jesse Nicholson

Senior Associate

Michael Van Valkenburgh Associates, Inc.

231 Concord Avenue

Cambridge, Ma 02138

3/11/2021

585 Third Street Cambridge, Ma Tree Inventory and Report

(The following report is based on a site visit and visual observations made on 3/4/2021. Athenaeum Street was closed for a construction project, so all observations of trees #5-14 were made from a distance on Third Street and Kendall Street.)

The subject trees in this report are in the periphery of a proposed construction project. The predicted extent of this project's impact on all of the tree's was not presented at the time of this report. It was indicate that the project may come very close to trees #1-4.

Many of the trees appear to be newly planted, and some have been on site and established for a longer period of time. Many of the trees are in good condition and may warrant preservation efforts. Some of the trees have various ailments and physical conditions that make them poorly suited to the site and may reduce their ability to survive the impacts of change in their environment. Such trees may not warrant preservation efforts.

Some trees have current insect infestations that may require the use of Pesticides for control of future infestations. This may not be an acceptable practice on public streets in Cambridge.

The opportunity exists to replace these trees with new trees carefully selected to be better suited to the sites and less susceptible to insects and disease. This can increase the long-term success of trees on the site. These benefits may outweigh efforts and costs to preserve compromised trees.

Specific Observations

-Trees # 1-6 6 Sophora japonica trees

4 of these trees (#2,3,5 and 6) appear to be in good condition. 2 of these trees (#1 and 4) are in poor condition, both with large trunk injuries extending down the side(s) of the trees into the root base. These injuries reduce the overall health and vigor of the trees. This condition may also lead to root and/or trunk rot, which could compromise their structural integrity, causing tree failure.

Tree # 5, although in good condition, had lost it's top at some point and is very disfigured.

The proposed proximity of construction to these trees may have a severe impact on health and longevity. They may be considered as candidates for replacement.

-Trees # 7-9, 20-24 8 Catalpa speciosa trees

Trees #20,21,23 and 24 appear to be in good condition. Trees 7 and 8 appear to be in fair condition. Tree #9 is in poor condition and is much smaller than surrounding trees, possible stressed and/or stunted. Tree # 22 has a lower trunk injury, which may lead to root and/or trunk rot, which could compromise its structural integrity, leading to tree failure.

All of the Catalpa trees have signs of heavy Aphid infestation. This infestation could impact the health of the trees and may require the use of Pesticide applications for control.

Catalpa trees have a very wide, spreading branch growth habit that may outreach their site, requiring frequent pruning to manage their size. Additionally, Aphid residue, leaf drop and large seed pods make Catalpas a very “messy” tree, usually not suited for Urban/sidewalk locations.

-Trees # 10-14 5 Zelkova serrata

All of these trees appear to be newly planted, in good condition and are well suited for the site.

-Trees # 15-19 5 Ginkgo biloba trees

All of these trees appear to be either newly planted (#16-17) or planted recently within 5 years (+/-). Trees 15-18 are in good condition and are well suited for their site. Tree #19 has a large, recent wound on its trunk and may be compromised.

-Trees 25-27 3 Serviceberry Trees

All of these trees are in fair condition with signs of Aphid infestation and some tip dieback. Serviceberry trees are not tolerant of drought conditions, high heat and deicing salts, Making them very poor candidates for the site. Consider replacement with more suited Species.

Report Submitted by

Joseph Camilliere

Member, American Society of Consulting Arborists

Massachusetts Certified Arborist

International Society of Arborists Certified Arborist

Tree Risk Assessment Qualified

TREE #	SPECIES	COMMON NAME	DBH	PUBLIC OR PRIVATE	SIGNIFICANT PRIVATE	STATUS	CONDITION NOTE
1	*Sophora Japonica*	Japanese Pagoda Tree	12.5"	Public	N	Protect	Trunk Injury
2	*Sophora Japonica*	Japanese Pagoda Tree	13.5"	Public	N	Protect	
3	*Sophora Japonica*	Japanese Pagoda Tree	12.5"	Public	N	Protect	
4	*Sophora Japonica*	Japanese Pagoda Tree	12"	Public	N	Protect	Trunk Injury
5	*Sophora Japonica*	Japanese Pagoda Tree	10"	Private	Y	Remove	
6	*Sophora Japonica*	Japanese Pagoda Tree	6"	Private	Y	Remove	
7	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Signs of Aphid Infection
8	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Signs of Aphid Infection
9	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Signs of Aphid Infection
10-14	*Zelkova Serrata*	Japanese Zelkova	3"	Private	N	Remove	
15	*Ginkgo Biloba*	Ginkgo	4"	Private	N	Remove	

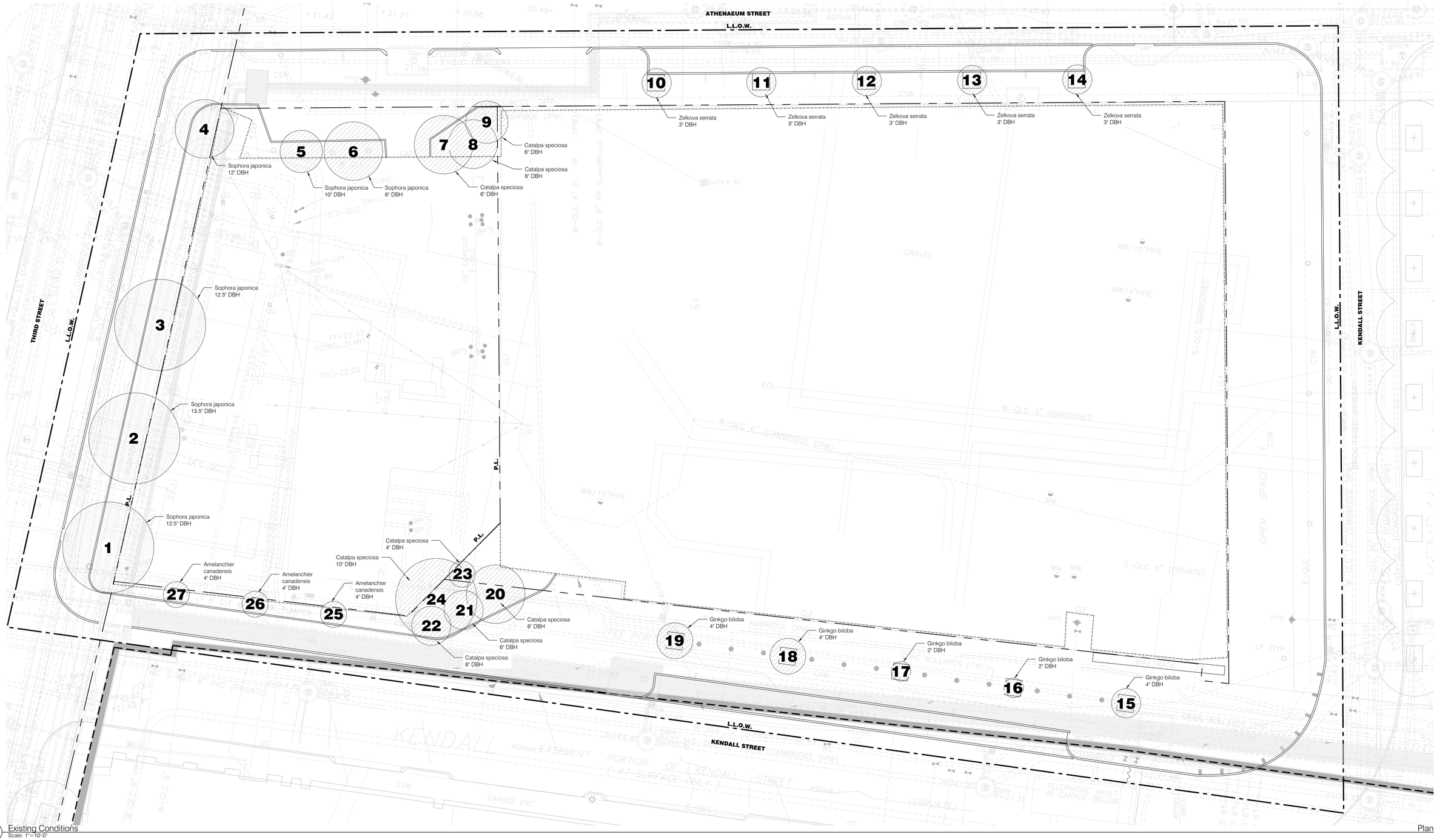
TREE #	SPECIES	COMMON NAME	DBH	PUBLIC OR PRIVATE	SIGNIFCANT PRIVATE	STATUS	CONDITION NOTE
16	*Ginkgo Biloba*	Ginkgo	2"	Private	N	Remove	
17	*Ginkgo Biloba*	Ginkgo	2"	Private	N	Remove	
18	*Ginkgo Biloba*	Ginkgo	4"	Private	N	Remove	
19	*Ginkgo Biloba*	Ginkgo	4"	Private	N	Remove	Trunk Damaged
20	*Catalpa Speciosa*	Catalpa	8"	Private	Y	Remove	Aphids
21	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Aphids
22	*Catalpa Speciosa*	Catalpa	8"	Private	Y	Remove	Basal Trunk Injury, Aphids
23	*Catalpa Speciosa*	Catalpa	4"	Private	N	Remove	Aphids
24	*Catalpa Speciosa*	Catalpa	10"	Private	Y	Remove	Aphids
25-27	*Amelanchier Canadensis*	Serviceberry	4"/Multi	Private	N	Remove	Aphids
					Total DBH of Significant Private Trees:		**66"**

LANDSCAPE ARCHITECTURAL LEGEND 585 THIRD ST

- P.L. — Property Line
- L.L.O.W. — Landscape Limit of Work

TREE PROTECTION AND REMOVAL LEGEND

- Existing Public Tree to Remain and be Protected
- Existing Private Tree



1 Existing Conditions
Scale: 1"=10'-0"

Plan

REVISIONS

#	DATE	DESCRIPTION

BioMed Realty
585 THIRD STREET
CAMBRIDGE, MA

KEY PLAN

N

cbt 617 262 4354 cbtarchitects.com
110 canal street boston, ma 02114

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Michael Van Valkenburgh Associates, Inc.
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Cambridge, MA 02138
Tel: 617.864.2076
Fax: 617.492.3128

IRRIGATION
Irrigation Consulting, Inc.
4 Hotel Place
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Fax: 978.433.2788

SOIL SCIENTIST
Pine & Swallow Environmental
867 Boston Road
Groton, MA 01450
Tel: 978.448.9511
Fax: 978.448.6645

TITLE
SCHEMATIC DESIGN

EXISTING CONDITIONS

SCALE	PROJECT #	DATE ISSUED
	207079.00	08.10.2021

4/21/2021 9:37:54 AM

TREE #	SPECIES	COMMON NAME	DBH	PUBLIC OR PRIVATE	SIGNIFICANT PRIVATE	STATUS	CONDITION NOTE
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3	*Sophora Japonica*	Japanese Pagoda Tree	12.5"	Public	N	Protect	
4	*Sophora Japonica*	Japanese Pagoda Tree	12"	Public	N	Protect	Trunk Injury
5	*Sophora Japonica*	Japanese Pagoda Tree	10"	Private	Y	Remove	
6	*Sophora Japonica*	Japanese Pagoda Tree	6"	Private	Y	Remove	
7	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Signs of Aphid Infection
8	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Signs of Aphid Infection
9	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Signs of Aphid Infection
10-14	*Zelkova Serrata*	Japanese Zelkova	3"	Private	N	Remove	
15	*Ginkgo Biloba*	Ginkgo	4"	Private	N	Remove	
16	*Ginkgo Biloba*	Ginkgo	2"	Private	N	Remove	
17	*Ginkgo Biloba*	Ginkgo	2"	Private	N	Remove	
18	*Ginkgo Biloba*	Ginkgo	4"	Private	N	Remove	
19	*Ginkgo Biloba*	Ginkgo	4"	Private	N	Remove	Trunk Damaged
20	*Catalpa Speciosa*	Catalpa	8"	Private	Y	Remove	Aphids
21	*Catalpa Speciosa*	Catalpa	6"	Private	Y	Remove	Aphids
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25-27	*Amelanchier Canadensis*	Serviceberry	4"/Multi	Private	N	Remove	Aphids

Total DBH of Significant Private Trees: 66"

Total DBH of Significant Private Trees Saved: 0"

DBH to Mitigate: 66"

LANDSCAPE ARCHITECTURAL LEGEND 585 THIRD ST

P.L. Property Line

L.L.O.W. Landscape Limit of Work

TREE PROTECTION AND REMOVAL LEGEND

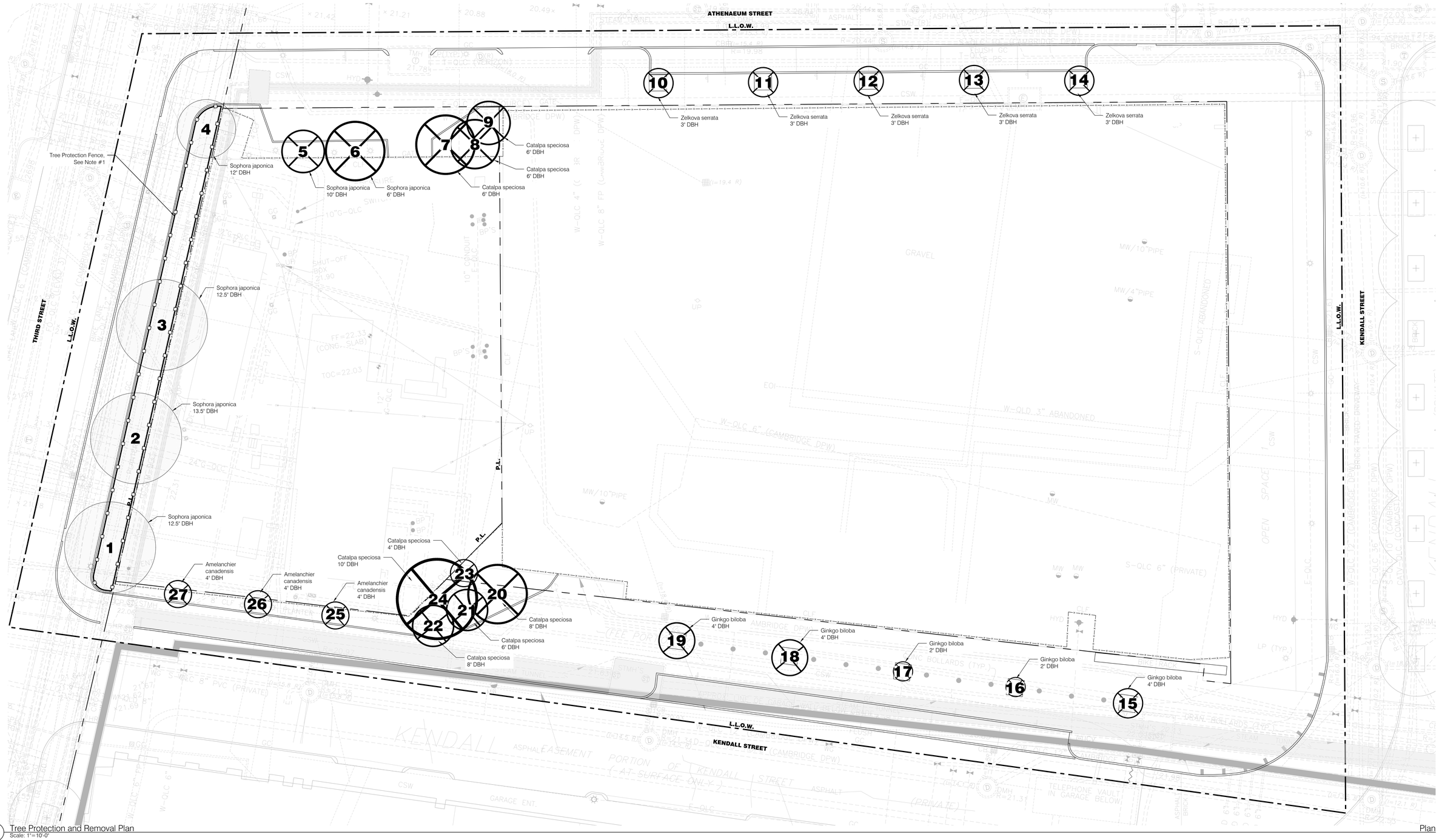
Existing Public Tree to Remain and be Protected

Existing Tree to be Removed

Tree Protection Fence

TREE PROTECTION AND REMOVAL NOTES

1. TREE PROTECTION FENCE: Contractor Shall Install Tree Protection Fence Immediately Following Demo/Removals and Prior to Pavement Preparation and Installation. No Work, Equipment, Tools, Materials, or Laborers Shall be Within the Tree Protection Fence. Driven Metal Chainlink to be maintained for the duration of construction. Soil to be protected, erosion waddle at the base of the fence wrapped in silt fence to prevent sediment from entering the protected soil zone. Canopy is to be reduced by a certified arborist prior to the start of construction and the surrounding soils to be air spaded and amended with composted at the end of the construction process.
2. AIR SPADING: Contractor Shall Air Spade Tree Roots on Protected Trees to Identify and Avoid Conflict with Any Major Tree Roots During Construction.



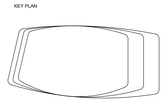
1 Tree Protection and Removal Plan
Scale: 1"=10'-0"

Plan

REVISIONS
DATE DESCRIPTION

BioMed Realty
585 THIRD STREET
CAMBRIDGE, MA

KEY PLAN



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SOIL SCIENTIST
Pine & Swallow Environmental
867 Boston Road
Groton, MA 01450
Tel: 978.448.9511
Fax: 978.448.6645

TITLE
SCHEMATIC DESIGN

TREE PROTECTION AND REMOVAL PLAN

SCALE	PROJECT #	DATE ISSUED
	207079.00	08.10.2021

4/21/2021 9:37:54 AM

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Total DBH of Significant Private Trees: 66"

Total DBH of Significant Private Trees Saved: 0

DBH to Mitigate: 66"

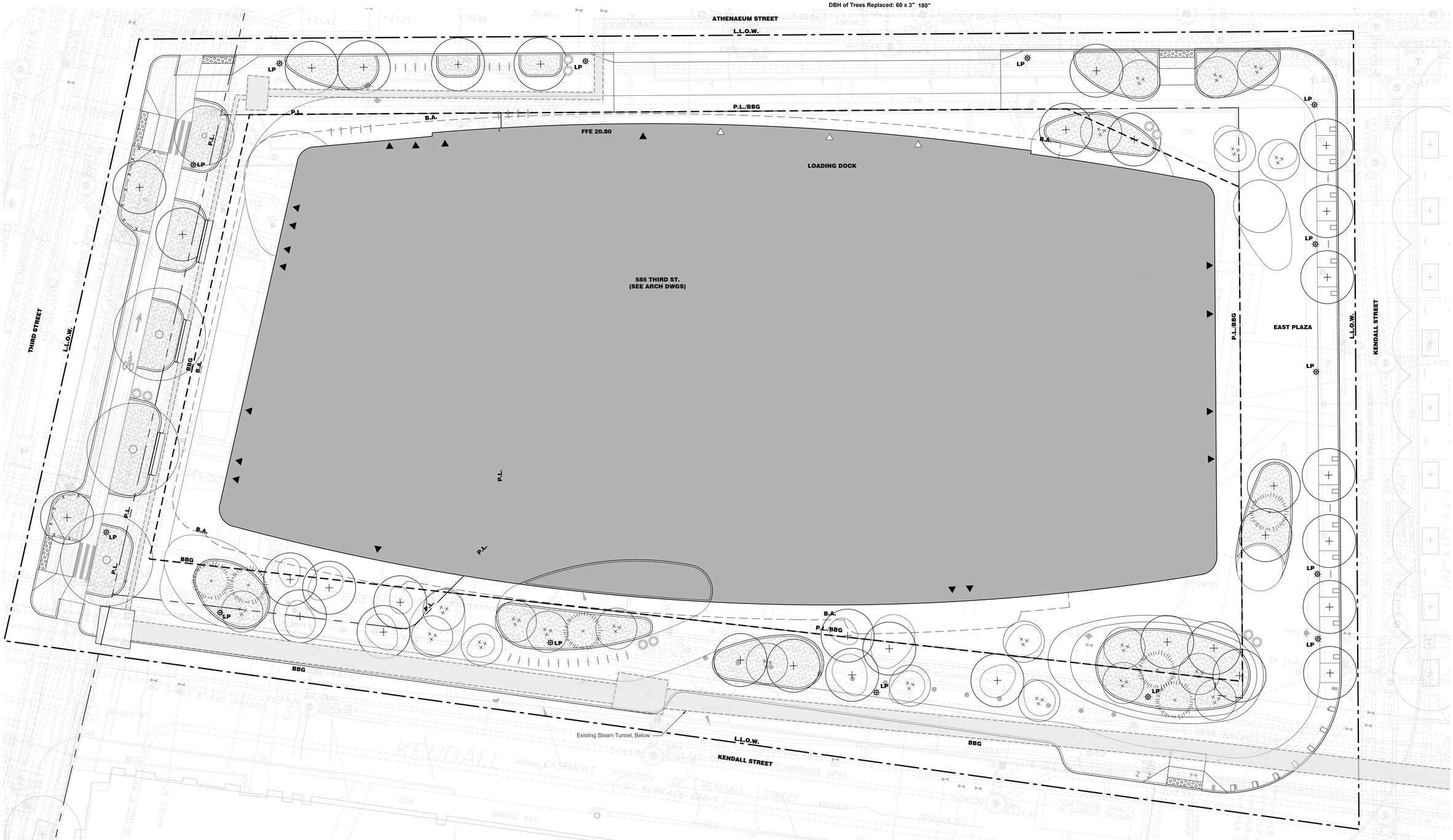
DBH of Trees Replaced: 60 x 3" 180"

LANDSCAPE ARCHITECTURAL LEGEND 585 THIRD ST

- P.L. — Property Line
- L.L.O.W. — Landscape Limit of Work
- B.A. — Building Above
- BBG — Building Below Grade
- Building Entrance
- Parking Lot / Loading Dock Entrance

TREE PROTECTION AND REMOVAL LEGEND

- Existing Public Tree to Remain and be Protected
- Proposed Tree - Deciduous
- Proposed Tree - Deciduous Multi-Stem
- Proposed Tree - Evergreen



1 Proposed Tree Plan
Scale: 1"=10'-0"

Plan

REVISIONS

#	DATE	DESCRIPTION

BioMed Realty
585 THIRD STREET
CAMBRIDGE, MA

cbt 617 262 4354 cbtarchitects.com
110 canal street boston, ma 02114

KEY PLAN

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867 Boston Road
Groton, MA 01450
Tel: 978.448.9511
Fax: 978.448.6645

TITLE
SCHEMATIC DESIGN

PROPOSED TREE PLAN

SCALE	PROJECT #	DATE ISSUED
	207079.00	08.10.2021

K:\21\2021.9.3\T.M.MR

LANDSCAPE ARCHITECTURAL LEGEND 585 THIRD ST

- P.L. — Property Line
- L.L.O.W. — Landscape Limit of Work
- B.A. — Building Above
- BBG — Building Below Grade
- Building Entrance
- Parking Lot / Loading Dock Entrance

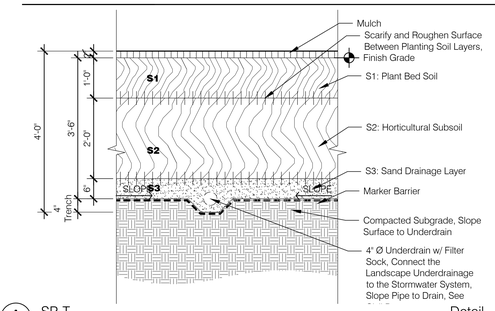
TREE PROTECTION AND REMOVAL LEGEND

- Existing Public Tree to Remain and be Protected
- Proposed Tree - Deciduous
- Proposed Tree - Deciduous Multi-Stem
- Proposed Tree - Evergreen

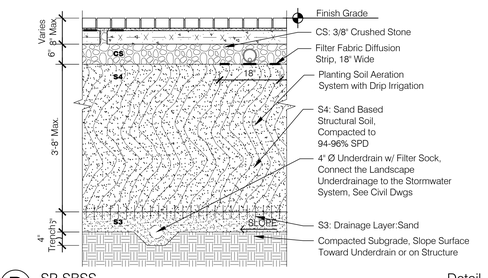
PLANTING SOIL PROFILE LEGEND

- SP-T — Tree Planting Soil (A)
- SP-SBSS — Sand Based Structural Soil (B)

PLANTING SOIL PROFILE



A SP-T Detail
Scale: 1/2" = 1'-0"

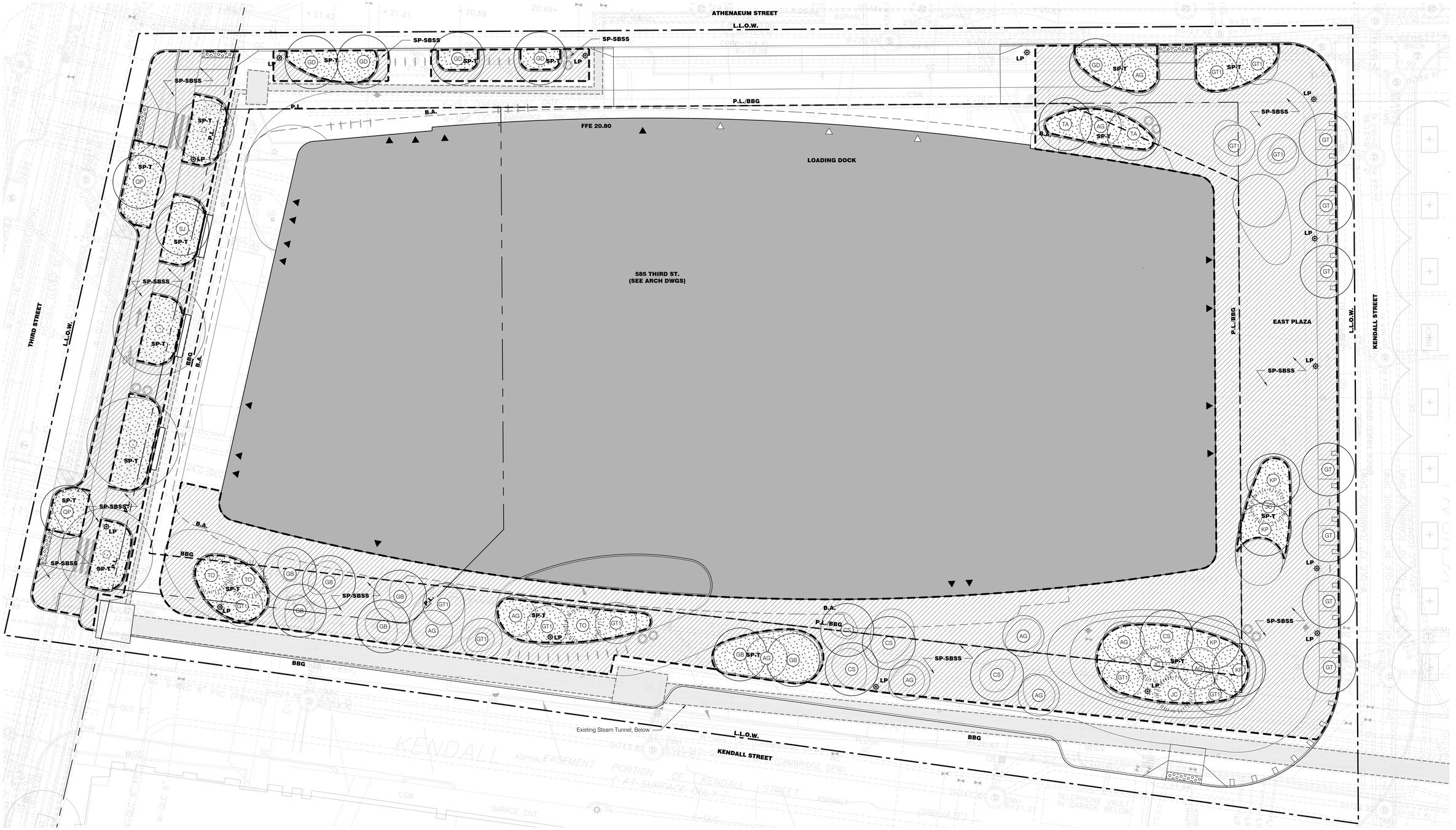


B SP-SBSS Detail
Scale: 1/2" = 1'-0"

PLANTING SCHEDULE - 585 THIRD ST - GROUND FLOOR EXTERIOR

TREES

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	ROOT	RB DIA.	NOTES
AG	*Amelanchier × grandiflora 'Autumn Brilliance'*	Apple Serviceberry	10	12' HT	B&B	38" MIN	Multi-Stem Form, 3-5 Stems w/ No Cross Branching
CS	*Catalpa speciosa*	Northern Catalpa	5	3" cal.	B&B	38" MIN	
GB	*Ginkgo biloba 'Princeton Sentry'*	Princeton Sentry Ginkgo	7	3" cal.	B&B	38" MIN	
GD	*Gymnocladus dioicus*	Kentucky coffeetree	5	3" cal.	B&B	38" MIN	
GT	Gleditsia triancanthos var. inermis 'Skyline	Skyline Honeylocust	4	3" cal.	B&B	38" MIN	
GT1	Gleditsia triancanthos var. inermis 'Skyline	Skyline Honeylocust	14	12' HT	B&B	38" MIN	Multi-Stem Form, 3-5 Stems w/ No Cross Branching
JC	*Juniperus chinensis 'Torulosa'*	Hollywood Juniper	3	12' HT	B&B	38" MIN	
KP	*Koelreuteria paniculata*	Golden Raintree	4	3" cal.	B&B	38" MIN	
QP	*Quercus palustris*	Pin oak	2	3" cal.	B&B	38" MIN	
SJ	*Styphnolobium japonicum*	Japanese pagoda tree	1	3" cal.	B&B	38" MIN	
TA	*Tilia americana 'McKSentry'*	American Sentry Linden	2	3" cal.	B&B	38" MIN	
TO	*Thuja accidentalis 'Hetz Wintergreen'*	American Arbovitae	3	12' HT	B&B	38" MIN	
		TOTAL TREES:	**60**				



1 Proposed Planting and Planting Soils Plan
Scale: 1" = 10'-0"

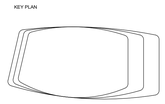
Plan

REVISIONS
DATE DESCRIPTION

BioMed Realty
585 THIRD STREET
CAMBRIDGE, MA

cbt 617 262 4354 cbtarchitects.com
110 canal street boston, ma 02114

KEY PLAN



N

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TITLE SCHEMATIC DESIGN

PROPOSED PLANTING AND PLANTING SOILS PLAN

SCALE

PROJECT # 207079.00

DATE ISSUED 08.10.2021

REPORT

585 THIRD STREET

CAMBRIDGE, MA

PEDESTRIAN WIND STUDY
RWDI # 2102562
July 13, 2021

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed 585 Third Street project in Cambridge, MA (Image 1). The potential wind conditions have been assessed based on wind tunnel testing of the project under the No Build, Build and Full Build configurations (Images 2A through 2C) and the local wind records (Image 3), and compared to the Mean Speed and Effective Gust criteria adopted by the Boston Planning and Development Agency (BPDA). The results of the assessment are shown on site plans in Figures 1A through 2C, and the associated wind speeds are listed in Tables 1 and 2. The key findings are summarized as follows:

Effective Gust

- Wind speeds that meet the effective gust criterion of 31 mph are predated at all pedestrian areas assessed for the No Build, Build and Full Build configurations, both annually and seasonally.

Mean Speed

- The annual mean wind speeds on the existing site (No Build configuration) are generally comfortable for the intended pedestrian use. Wind speeds that are uncomfortable for walking occur at the southwest corner of the project site. There are no areas with dangerous wind conditions on either an annual or seasonal basis.

- With the addition of the project to the site in the Build configuration, the annual mean wind speeds in the extended surroundings are expected to remain similar to those in the No Build configuration. Appropriate wind conditions are predicted along the project perimeter and nearby pedestrian areas, including entrances and walkways. Higher-than-desired wind speeds are expected at the two entrances near the southwest corner of the proposed building and the southeast and east seating areas on an annual basis. No dangerous wind conditions are expected on either an annual or seasonal basis.

- The addition of the future developments to the west and north of the project, in the Full Build configuration, is expected to provide sheltering from the predominant local winds and generally reduce wind speeds at most areas on and around the project in comparison to the Build configuration. Suitable wind conditions are predicted for all entrances on an annual basis.

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LIST OF TABLES

1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed 585 Third Street project in Cambridge, MA. This report presents the project objectives, background, RWDI's approach, and discusses of the results. It also provides conceptual wind control measures, where necessary.

1.1 Project Description

The project (site shown in Image 1) is located on the east side of Third Street between Kendall Street to the south and Athenaeum Street to the north. The proposed project consists of an 18-story office/lab building at an approximate height of 290 ft, with stepped façades on the east and west sides.

1.2 Objectives

The objectives of the study were to assess the effect of the proposed development on local wind conditions in pedestrian areas on and around the study site and provide recommendations for minimizing adverse effects, if needed. This quantitative assessment was based on wind speed measurements on a scale model of the project and its surroundings in one of RWDI's boundary-layer wind tunnels. These measurements were combined with the local wind records and compared to the BPDA criteria for gauging wind comfort and safety in pedestrian areas. The assessment focused on critical pedestrian areas, including building entrances, public sidewalks, and grade-level outdoor seating spaces.

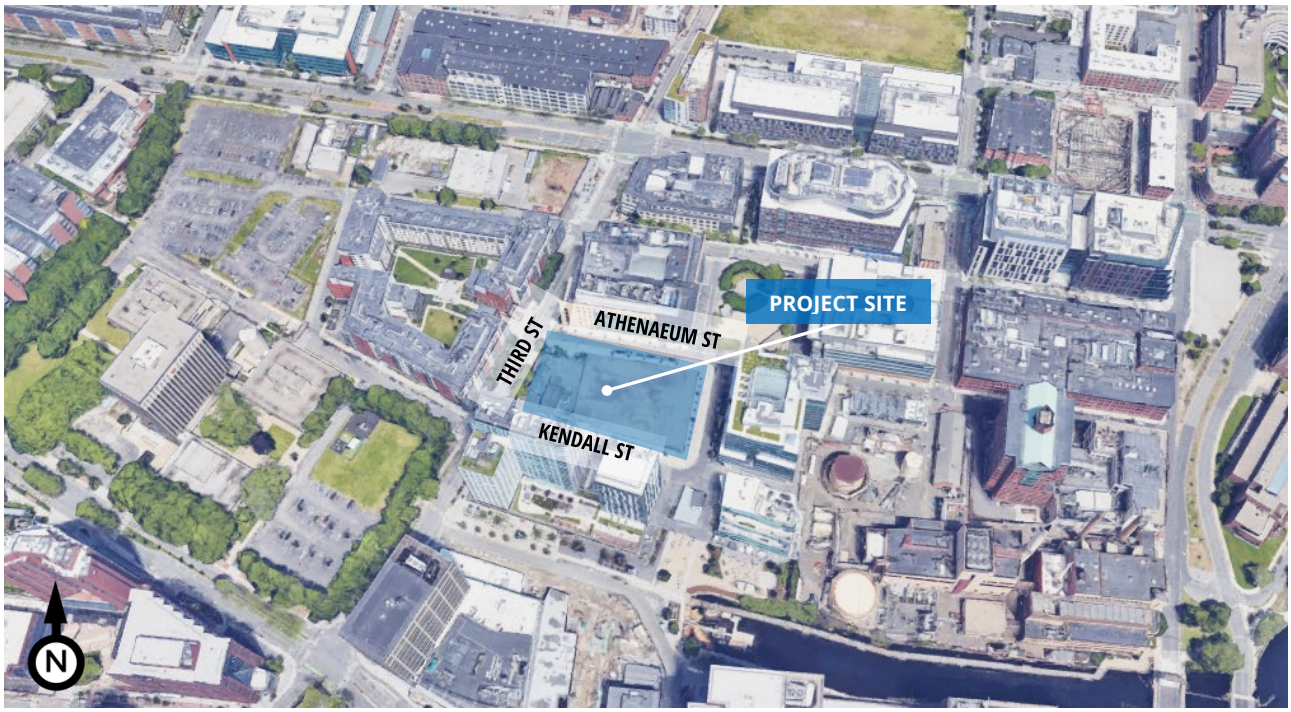


Image 1: Aerial View of the Project Site and Surroundings (Photo Courtesy of Google™ Earth)

2 BACKGROUND AND APPROACH

2.1 Wind Tunnel Study Model

To assess the wind environment around the proposed project, a 1:300 scale model of the project site and its surroundings was constructed for the wind tunnel tests of the following configurations:

A – No Build: Existing site with existing surroundings (Image 2A),

B - Build: Proposed project with existing surroundings (Image 2B), and,

C – Full Build: Proposed project with existing and future surroundings (Image 2C).

The wind tunnel model included all relevant surrounding buildings and topography within an approximately 1200 ft radius of the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modeled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 84 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately 5 ft above local grade in pedestrian areas throughout the study site. Wind speeds were measured for 36 directions in a 10-degree increment. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site and was reviewed by the project team.

Image 2A: Wind Tunnel Study Model – No Build Configuration

Image 2B: Wind Tunnel Study Model – Build Configuration

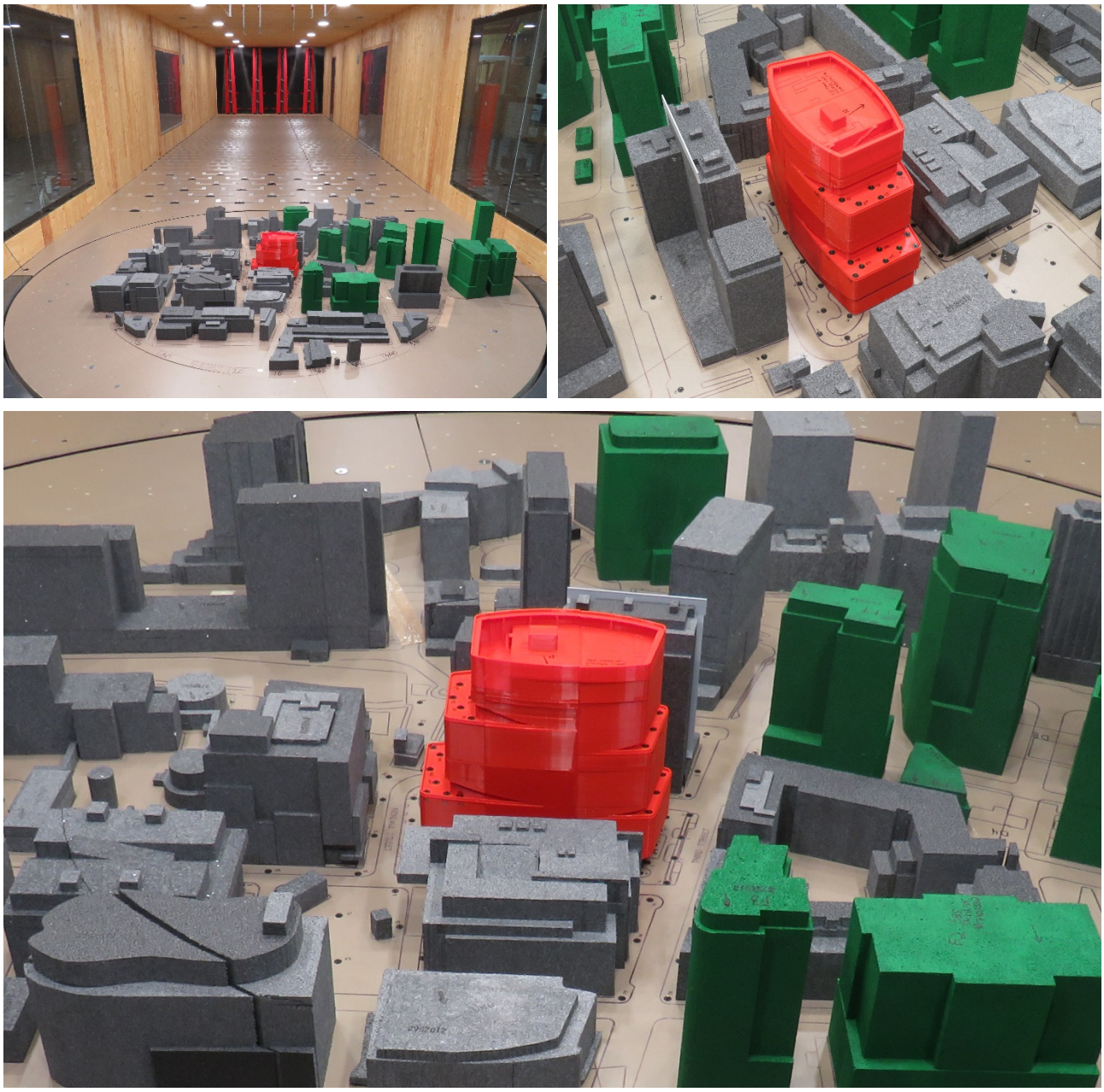
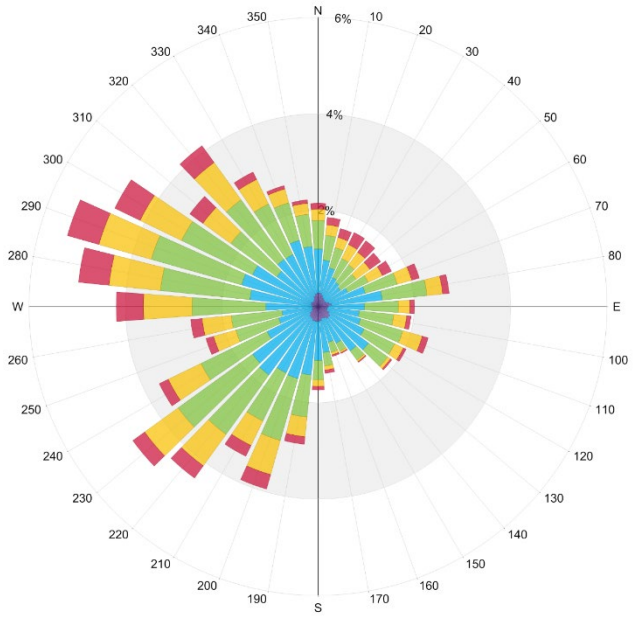


Image 2C: Wind Tunnel Study Model – Full Build Configuration

2.2 Meteorological Data

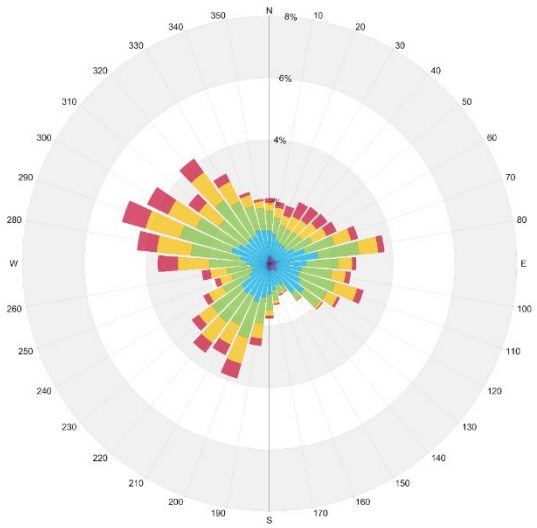
The results from wind tunnel tests were combined with long-term meteorological data, recorded during the years 1995 through 2018 at Boston Logan International Airport, to predict full scale wind conditions for the entire year and for each of the four seasons. Image 3 presents the annual wind rose, summarizing the directional distribution of wind frequencies and speeds. Similarly, seasonal wind climate for spring (March to May), summer (June to August), fall (September to November) and winter (December to February) seasons are summarized in the wind roses of Image 4.

On an annual basis, the most common wind directions are those between south-southwest and northwest. Winds from the east-northeast to the east-southeast are also relatively common. In the case of strong winds, southwest, west through northwest and northeast are the dominant wind directions.

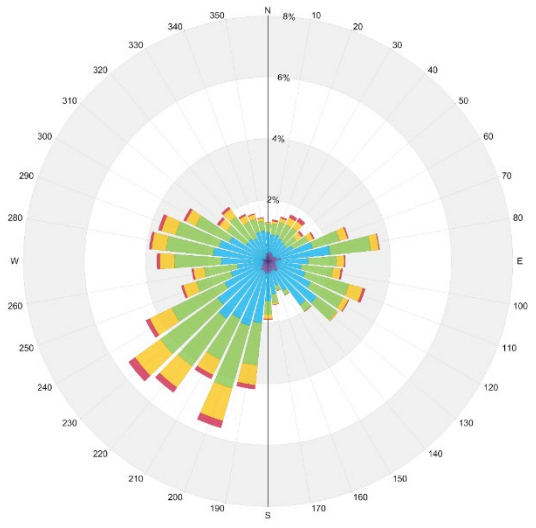


Wind Speed (mph)	Probability (%) Annual
Calm	3.0
1-5	7.9
6-10	32.5
11-15	32.4
16-20	16.3
>20	7.9

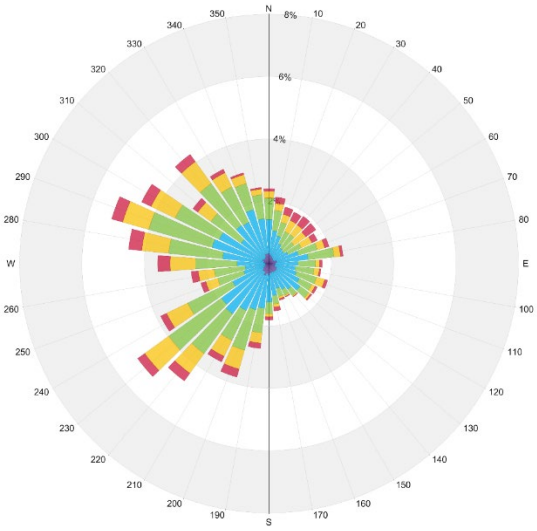
Image 3: Annual Directional distribution of winds approaching Boston Logan International Airport from 1995 through 2018



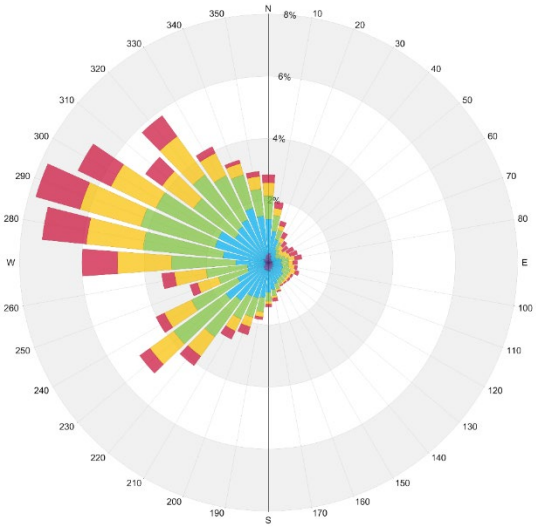
Spring (March – May)



Summer (June – August)



Fall (September – November)



Winter (December – February)

Wind Speed (mph)	Probability (%) Spring	Summer	Fall	Winter
Calm	2.8	3.0	3.4	2.6
1-5	6.8	9.4	8.7	6.5
6-10	28.9	38.8	34.6	27.9
11-15	32.3	34.4	32.0	30.9
16-20	19.2	11.8	14.5	19.7
>20	10.1	2.6	6.8	12.4

Image 4: Seasonal Directional Distribution of Winds Approaching Boston Logan International Airport from 1995 through 2018

2.3 BPDA Wind Criteria

The Boston Planning and Development Agency (BPDA) has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BPDA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than 1% of the time.

The second set of criteria used by the BPDA to determine the acceptability of specific locations is based on the work of Melbourne. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing, or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time.

Wind Acceptability	Effective Gust Speed (mph)
Acceptable	≤ 31
Unacceptable	> 31
Comfort Category	Mean Wind Speed (mph)
Comfortable for Sitting	≤ 12
Comfortable for Standing	≤ 15
Comfortable for Walking	≤ 19
Uncomfortable for Walking	> 19
Dangerous	> 27

**Effective gust and mean wind speeds are based on a 1% exceedance or 99 percentile wind speeds.

The consideration of wind in planning outdoor activity areas is important since high winds in an area tend to deter pedestrian use. For example, winds should be light or relatively light in areas where people would be sitting, such as outdoor cafes or playgrounds. For bus stops and other locations where people would be standing, somewhat higher winds can be tolerated. For frequently used sidewalks, where people are primarily walking, stronger winds are acceptable. For infrequently used areas, the wind comfort criteria can be relaxed even further. The actual effects of wind can range from pedestrian inconvenience, due to the blowing of dust and other loose material in a moderate breeze to severe difficulty with walking due to the wind forces on the pedestrian.

The wind climate found in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BPDA effective gust velocity criterion of 31 mph. However, without any mitigation measures, this wind climate is likely to be frequently uncomfortable for more passive activities.

This study involved state-of-the-art measurement and analysis techniques to predict wind conditions. Nevertheless, some uncertainty remains in predicting wind comfort, and this must be taken into account. For example, the sensation of comfort among individuals can be quite variable, as variations in age, health, clothing, and other human factors can change a particular response of an individual. The comfort limits used in this report represent an average for the total population. Also, unforeseen changes in the project area, such as the construction or removal of buildings, can affect the conditions experienced at the site. Finally, the prediction of wind speeds is necessarily a statistical procedure, meaning that the wind speeds reported are for the frequency of occurrence stated (1% of the time) and higher wind speeds will occur but on a less frequent basis.

3 RESULTS AND DISCUSSION

The predicted wind conditions in terms of mean and effective gust speeds pertaining to the tested configurations are graphically depicted on site plans in Figures 1A through 2C located in the "Figures" section of this report. These conditions and the associated wind speeds are presented in Tables 1 and 2 in the "Tables" section. The following is a detailed discussion of the suitability of the predicted wind comfort conditions for the anticipated pedestrian use of each area of interest on an annual base. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds.

In general, wind conditions comfortable for walking are appropriate for sidewalks and walkways as pedestrians will be active and less likely to remain in one area for prolonged periods of time. Lower wind speeds conducive to standing are preferred at main entrances where pedestrians are apt to linger. Wind speeds comfortable for sitting are ideal for areas intended for passive activities, such as plaza spaces or outdoor seating areas, during the warmer months of the year.

Wind speeds that meet the effective gust criterion of 31 mph are predated at all pedestrian areas assessed for the No Build, Build and Full Build configurations, both annually and seasonally (Figures 2A to 2C and Tables 1 and 2).

3.1 No Build Configuration

Mean wind speeds on and around the existing project site and along the sidewalks of the nearby streets are comfortable for walking, standing or sitting (Figure 1A). Wind speeds higher than those comfortable for walking occur at the southwest corner of the project site (Location 6 in Figure 1A). There are no areas with mean wind speeds categorized as dangerous either annually or seasonally (Figure 1A and Tables 1 and 2).

3.2 Build Configuration

The proposed building is of similar height to the existing surroundings on the east and south sides and taller than the surrounding to the north and west. As a result, it is expected to intercept the predominant local winds at higher elevations and redirect them to the ground level, causing increased wind activity, especially near the exposed building corners. The increased wind speeds are considered appropriate for the intended use of various pedestrian areas, including the adjacent sidewalks and main building entrances near Locations 1, 14 and 20 (Figure 1B). Note that the existing uncomfortable conditions at the southwest corner of the site are expected to be alleviated in the Build configuration (Location 6 in Figure 1B). Wind speeds that are higher than those comfortable for standing are expected at the two entrances near the southwest corner of the proposed building (Locations 5 and 8 in Figure 1B). At the southeast and east seating areas, wind speeds are predicted to be higher than those comfortable for sitting (Locations 15, 19, 21 and 22 in Figure 1B).

Mean wind speeds in the extended surrounding areas are predicted to remain generally unchanged, compared to those in the No Build configuration (Figure 1B). These wind conditions are considered suitable for the intended pedestrian use of the tested areas. No areas with mean wind speeds categorized as dangerous are predicted on and around the site either annually or seasonally (Figure 1B and Tables 1 and 2).

To reduce the wind speeds near the main entrances at the southwest corner, it is recommended to relocate the entrance away from the corner, recess the entrances to create sheltered doorways or introduce vertical wind mitigation features in the form of coniferous/marcescent landscaping or porous screens on both sides of the entrances and adjacent to the façade. for these features to be effective, a minimum height of 6-8 ft and 20-30% screen porosity are recommended. For the seating spaces to the southeast and east, we recommend the extensive use of landscaping/hardscaping elements such as screens, planters and trellises to provide sheltered zones for the anticipated passive use of the area. Examples of these wind control measures are shown in Image 5.

Image 5: Examples of Wind Control Measures for Entrances and Outdoor Seating Areas

3.3 Full Build Configuration

The addition of the future developments to the west and north of the project is expected to provide sheltering from the predominant winds and generally reduce wind speeds at most areas on and around the project in comparison to the Building configuration. The higher-than-desired wind speeds at the two entrances near the southwest corner of the proposed building are predicted to be reduced and become suitable for the intended use (Locations 5 and 8 in Figure 1C). Note that wind speeds at the southeast seating area are expected to slightly increase in the Full Build configuration (Location 15 in in Figure 1C).

4 APPLICABILITY OF RESULTS

The wind conditions presented in this report pertain to the model of the 585 Third Street project constructed using the drawings and information listed below. Should there be any design changes that deviate from this list of drawings, the wind condition predictions presented may be affected. Therefore, for any changes in the design, it is recommended that RWDI be contacted and requested to review their potential impact on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
cbt_207079_585ThirdSt_CENTRAL_2019	Revit	20/05/2021

5 REFERENCES

1. ASCE Task Committee on Outdoor Human Comfort (2004). *Outdoor Human Comfort and Its Assessment*, 68 pages, American Society of Civil Engineers, Reston, Virginia, USA.

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FIGURES

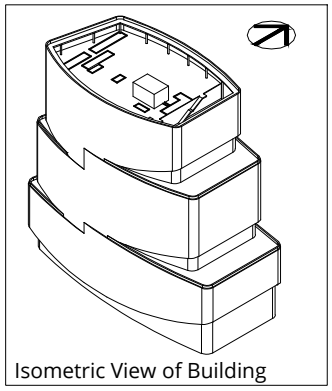
Pedestrian Wind Conditions - Mean Speed
No Build
Annual

585 Third Street - Cambridge, MA

True North

Project #2102562

Drawn by: DF	Figure: 1A
Approx. Scale:	1"=120'
Date Revised:	Jul. 6, 2021



LEGEND:

MEAN SPEED CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable
- Dangerous

SENSOR LOCATION:
- Grade Level
- Main Entrance Location

Pedestrian Wind Conditions - Mean Speed

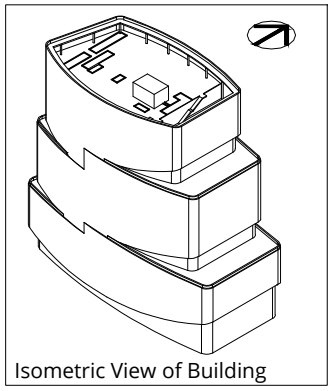
Build
Annual

585 Third Street - Cambridge, MA

True North

Project #2102562

Drawn by: DF	Figure: 1B
Approx. Scale:	1"=120'
Date Revised:	Jul. 6, 2021



LEGEND:

MEAN SPEED CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable
- Dangerous

SENSOR LOCATION:
- Grade Level
- Main Entrance Location

Pedestrian Wind Conditions - Mean Speed

Full Build
Annual

585 Third Street - Cambridge, MA

True North

Project #2102562

Drawn by: DF	Figure: 1C
Approx. Scale:	1"=120'
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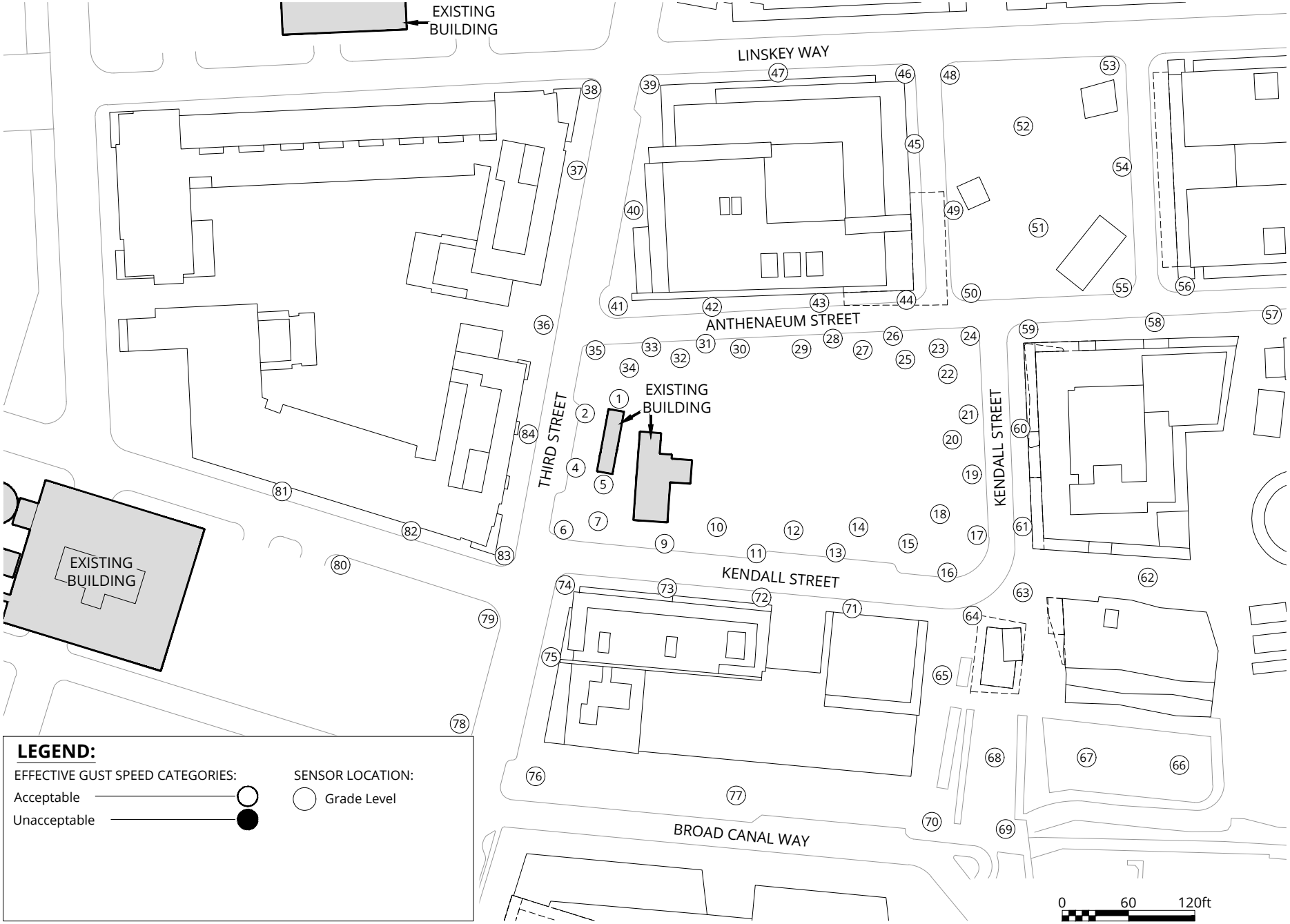


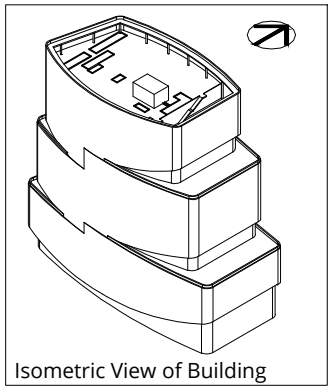
Pedestrian Wind Conditions - Effective Gust Speed
No Build
Annual

585 Third Street - Cambridge, MA

True North

Project #2102562

Drawn by: DF	Figure: 2A
Approx. Scale:	1"=120'
Date Revised:	Jul. 6, 2021



LEGEND:

EFFECTIVE GUST SPEED CATEGORIES:
- Acceptable
- Unacceptable

SENSOR LOCATION:
- Grade Level
- Main Entrance Location

Pedestrian Wind Conditions - Effective Gust Speed

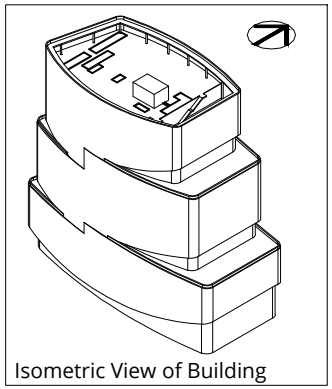
Build
Annual

585 Third Street - Cambridge, MA

True North

Project #2102562

Drawn by: DF	Figure: 2B
Approx. Scale:	1"=120'
Date Revised:	Jul. 6, 2021



LEGEND:

EFFECTIVE GUST SPEED CATEGORIES:
- Acceptable
- Unacceptable

SENSOR LOCATION:
- Grade Level
- Main Entrance Location

Pedestrian Wind Conditions - Effective Gust Speed

Full Build
Annual

585 Third Street - Cambridge, MA

True North

Project #2102562

Drawn by: DF	Figure: 2C
Approx. Scale:	1"=120'
Date Revised:	Jul. 6, 2021

TABLES

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
1	A	Annual	9		Sitting	14		Acceptable
	B	Annual	14	56%	Standing	19	36%	Acceptable
	C	Annual	13	44%	Standing	17	21%	Acceptable
2	A	Annual	12		Sitting	19		Acceptable
	B	Annual	14	17%	Standing	21	11%	Acceptable
	C	Annual	10	-17%	Sitting	16	-16%	Acceptable
3	A	-	-		-	-		-
	B	Annual	13		Standing	20		Acceptable
	C	Annual	14		Standing	18		Acceptable
4	A	Annual	16		Walking	25		Acceptable
	B	Annual	13	-19%	Standing	20	-20%	Acceptable
	C	Annual	10	-38%	Sitting	15	-40%	Acceptable
5	A	Annual	13		Standing	20		Acceptable
	B	Annual	17	31%	Walking	24	20%	Acceptable
	C	Annual	13		Standing	18		Acceptable
6	A	Annual	21		Uncomfortable	29		Acceptable
	B	Annual	15	-29%	Standing	25	-14%	Acceptable
	C	Annual	11	-48%	Sitting	17	-41%	Acceptable
7	A	Annual	19		Walking	27		Acceptable
	B	Annual	16	-16%	Walking	22	-19%	Acceptable
	C	Annual	13	-32%	Standing	19	-30%	Acceptable
8	A	-	-		-	-		-
	B	Annual	16		Walking	23		Acceptable
	C	Annual	11		Sitting	16		Acceptable
9	A	Annual	15		Standing	23		Acceptable
	B	Annual	19	27%	Walking	27	17%	Acceptable
	C	Annual	13	-13%	Standing	21		Acceptable
10	A	Annual	15		Standing	23		Acceptable
	B	Annual	13	-13%	Standing	19	-17%	Acceptable
	C	Annual	12	-20%	Sitting	18	-22%	Acceptable
11	A	Annual	15		Standing	23		Acceptable
	B	Annual	16		Walking	24		Acceptable
	C	Annual	14		Standing	20	-13%	Acceptable
12	A	Annual	15		Standing	23		Acceptable
	B	Annual	13	-13%	Standing	18	-22%	Acceptable
	C	Annual	11	-27%	Sitting	14	-39%	Acceptable
13	A	Annual	13		Standing	21		Acceptable
	B	Annual	13		Standing	19		Acceptable
	C	Annual	11	-15%	Sitting	18	-14%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
14	A	Annual	15		Standing	23		Acceptable
	B	Annual	14		Standing	18	-22%	Acceptable
	C	Annual	13	-13%	Standing	18	-22%	Acceptable
15	A	Annual	15		Standing	22		Acceptable
	B	Annual	14		Standing	22		Acceptable
	C	Annual	17	13%	Walking	23		Acceptable
16	A	Annual	14		Standing	21		Acceptable
	B	Annual	12	-14%	Sitting	20		Acceptable
	C	Annual	11	-21%	Sitting	17	-19%	Acceptable
17	A	Annual	16		Walking	24		Acceptable
	B	Annual	14	-12%	Standing	22		Acceptable
	C	Annual	13	-19%	Standing	21	-12%	Acceptable
18	A	Annual	15		Standing	22		Acceptable
	B	Annual	15		Standing	22		Acceptable
	C	Annual	17	13%	Walking	24		Acceptable
19	A	Annual	13		Standing	21		Acceptable
	B	Annual	14		Standing	21		Acceptable
	C	Annual	12		Sitting	17	-19%	Acceptable
20	A	Annual	13		Standing	21		Acceptable
	B	Annual	10	-23%	Sitting	16	-24%	Acceptable
	C	Annual	10	-23%	Sitting	16	-24%	Acceptable
21	A	Annual	11		Sitting	18		Acceptable
	B	Annual	16	45%	Walking	23	28%	Acceptable
	C	Annual	14	27%	Standing	20	11%	Acceptable
22	A	Annual	12		Sitting	20		Acceptable
	B	Annual	17	42%	Walking	24	20%	Acceptable
	C	Annual	16	33%	Walking	22		Acceptable
23	A	Annual	11		Sitting	19		Acceptable
	B	Annual	15	36%	Standing	22	16%	Acceptable
	C	Annual	13	18%	Standing	18		Acceptable
24	A	Annual	12		Sitting	20		Acceptable
	B	Annual	16	33%	Walking	24	20%	Acceptable
	C	Annual	14	17%	Standing	21		Acceptable
25	A	Annual	11		Sitting	19		Acceptable
	B	Annual	13	18%	Standing	19		Acceptable
	C	Annual	11		Sitting	15	-21%	Acceptable
26	A	Annual	11		Sitting	18		Acceptable
	B	Annual	16	45%	Walking	22	22%	Acceptable
	C	Annual	12		Sitting	17		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
27	A	Annual	11		Sitting	18		Acceptable
	B	Annual	15	36%	Standing	21	17%	Acceptable
	C	Annual	10		Sitting	16	-11%	Acceptable
28	A	Annual	11		Sitting	18		Acceptable
	B	Annual	16	45%	Walking	22	22%	Acceptable
	C	Annual	10		Sitting	15	-17%	Acceptable
29	A	Annual	11		Sitting	18		Acceptable
	B	Annual	14	27%	Standing	20	11%	Acceptable
	C	Annual	9	-18%	Sitting	14	-22%	Acceptable
30	A	Annual	11		Sitting	18		Acceptable
	B	Annual	17	55%	Walking	20	11%	Acceptable
	C	Annual	16	45%	Walking	19		Acceptable
31	A	Annual	10		Sitting	16		Acceptable
	B	Annual	14	40%	Standing	18	12%	Acceptable
	C	Annual	10		Sitting	15		Acceptable
32	A	Annual	10		Sitting	16		Acceptable
	B	Annual	14	40%	Standing	18	12%	Acceptable
	C	Annual	13	30%	Standing	16		Acceptable
33	A	Annual	10		Sitting	16		Acceptable
	B	Annual	13	30%	Standing	20	25%	Acceptable
	C	Annual	10		Sitting	16		Acceptable
34	A	Annual	11		Sitting	17		Acceptable
	B	Annual	18	64%	Walking	24	41%	Acceptable
	C	Annual	14	27%	Standing	20	18%	Acceptable
35	A	Annual	12		Sitting	18		Acceptable
	B	Annual	18	50%	Walking	26	44%	Acceptable
	C	Annual	16	33%	Walking	23	28%	Acceptable
36	A	Annual	11		Sitting	17		Acceptable
	B	Annual	13	18%	Standing	19	12%	Acceptable
	C	Annual	11		Sitting	17		Acceptable
37	A	Annual	9		Sitting	15		Acceptable
	B	Annual	8	-11%	Sitting	13	-13%	Acceptable
	C	Annual	7	-22%	Sitting	11	-27%	Acceptable
38	A	Annual	14		Standing	20		Acceptable
	B	Annual	12	-14%	Sitting	17	-15%	Acceptable
	C	Annual	15		Standing	21		Acceptable
39	A	Annual	10		Sitting	16		Acceptable
	B	Annual	10		Sitting	15		Acceptable
	C	Annual	12	20%	Sitting	19	19%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
40	A	Annual	10		Sitting	15		Acceptable
	B	Annual	10		Sitting	16		Acceptable
	C	Annual	7	-30%	Sitting	11	-27%	Acceptable
41	A	Annual	12		Sitting	18		Acceptable
	B	Annual	15	25%	Standing	22	22%	Acceptable
	C	Annual	13		Standing	19		Acceptable
42	A	Annual	8		Sitting	14		Acceptable
	B	Annual	17	112%	Walking	24	71%	Acceptable
	C	Annual	9	12%	Sitting	13		Acceptable
43	A	Annual	9		Sitting	16		Acceptable
	B	Annual	15	67%	Standing	21	31%	Acceptable
	C	Annual	11	22%	Sitting	16		Acceptable
44	A	Annual	10		Sitting	18		Acceptable
	B	Annual	16	60%	Walking	22	22%	Acceptable
	C	Annual	14	40%	Standing	19		Acceptable
45	A	Annual	7		Sitting	12		Acceptable
	B	Annual	8	14%	Sitting	13		Acceptable
	C	Annual	8	14%	Sitting	14	17%	Acceptable
46	A	Annual	14		Standing	20		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	10	-29%	Sitting	15	-25%	Acceptable
47	A	Annual	17		Walking	23		Acceptable
	B	Annual	17		Walking	22		Acceptable
	C	Annual	9	-47%	Sitting	14	-39%	Acceptable
48	A	Annual	14		Standing	20		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	17	21%	Walking	26	30%	Acceptable
49	A	Annual	9		Sitting	14		Acceptable
	B	Annual	8	-11%	Sitting	12	-14%	Acceptable
	C	Annual	7	-22%	Sitting	11	-21%	Acceptable
50	A	Annual	12		Sitting	19		Acceptable
	B	Annual	17	42%	Walking	25	32%	Acceptable
	C	Annual	15	25%	Standing	21	11%	Acceptable
51	A	Annual	9		Sitting	16		Acceptable
	B	Annual	9		Sitting	15		Acceptable
	C	Annual	8	-11%	Sitting	14	-12%	Acceptable
52	A	Annual	13		Standing	19		Acceptable
	B	Annual	13		Standing	19		Acceptable
	C	Annual	12		Sitting	19		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
53	A	Annual	10		Sitting	16		Acceptable
	B	Annual	11		Sitting	17		Acceptable
	C	Annual	12	20%	Sitting	18	12%	Acceptable
54	A	Annual	10		Sitting	16		Acceptable
	B	Annual	11		Sitting	17		Acceptable
	C	Annual	10		Sitting	16		Acceptable
55	A	Annual	10		Sitting	16		Acceptable
	B	Annual	10		Sitting	16		Acceptable
	C	Annual	10		Sitting	16		Acceptable
56	A	Annual	12		Sitting	19		Acceptable
	B	Annual	13		Standing	19		Acceptable
	C	Annual	12		Sitting	18		Acceptable
57	A	Annual	12		Sitting	18		Acceptable
	B	Annual	13		Standing	19		Acceptable
	C	Annual	13		Standing	19		Acceptable
58	A	Annual	10		Sitting	15		Acceptable
	B	Annual	11		Sitting	17	13%	Acceptable
	C	Annual	9		Sitting	14		Acceptable
59	A	Annual	12		Sitting	19		Acceptable
	B	Annual	12		Sitting	20		Acceptable
	C	Annual	10	-17%	Sitting	16	-16%	Acceptable
60	A	Annual	9		Sitting	14		Acceptable
	B	Annual	15	67%	Standing	22	57%	Acceptable
	C	Annual	13	44%	Standing	20	43%	Acceptable
61	A	Annual	13		Standing	20		Acceptable
	B	Annual	18	38%	Walking	24	20%	Acceptable
	C	Annual	12		Sitting	18		Acceptable
62	A	Annual	15		Standing	22		Acceptable
	B	Annual	12	-20%	Sitting	18	-18%	Acceptable
	C	Annual	11	-27%	Sitting	17	-23%	Acceptable
63	A	Annual	16		Walking	23		Acceptable
	B	Annual	14	-12%	Standing	21		Acceptable
	C	Annual	11	-31%	Sitting	16	-30%	Acceptable
64	A	Annual	16		Walking	23		Acceptable
	B	Annual	15		Standing	22		Acceptable
	C	Annual	12	-25%	Sitting	18	-22%	Acceptable
65	A	Annual	12		Sitting	20		Acceptable
	B	Annual	13		Standing	20		Acceptable
	C	Annual	10	-17%	Sitting	17	-15%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
66	A	Annual	12		Sitting	18		Acceptable
	B	Annual	12		Sitting	18		Acceptable
	C	Annual	12		Sitting	18		Acceptable
67	A	Annual	13		Standing	21		Acceptable
	B	Annual	12		Sitting	19		Acceptable
	C	Annual	12		Sitting	18	-14%	Acceptable
68	A	Annual	13		Standing	21		Acceptable
	B	Annual	11	-15%	Sitting	18	-14%	Acceptable
	C	Annual	11	-15%	Sitting	17	-19%	Acceptable
69	A	Annual	12		Sitting	20		Acceptable
	B	Annual	12		Sitting	20		Acceptable
	C	Annual	12		Sitting	18		Acceptable
70	A	Annual	14		Standing	23		Acceptable
	B	Annual	14		Standing	22		Acceptable
	C	Annual	15		Standing	22		Acceptable
71	A	Annual	10		Sitting	17		Acceptable
	B	Annual	11		Sitting	17		Acceptable
	C	Annual	10		Sitting	15	-12%	Acceptable
72	A	Annual	11		Sitting	18		Acceptable
	B	Annual	15	36%	Standing	22	22%	Acceptable
	C	Annual	12		Sitting	18		Acceptable
73	A	Annual	9		Sitting	16		Acceptable
	B	Annual	15	67%	Standing	22	38%	Acceptable
	C	Annual	13	44%	Standing	18	12%	Acceptable
74	A	Annual	18		Walking	27		Acceptable
	B	Annual	17		Walking	25		Acceptable
	C	Annual	11	-39%	Sitting	17	-37%	Acceptable
75	A	Annual	12		Sitting	19		Acceptable
	B	Annual	11		Sitting	18		Acceptable
	C	Annual	11		Sitting	17	-11%	Acceptable
76	A	Annual	18		Walking	27		Acceptable
	B	Annual	18		Walking	27		Acceptable
	C	Annual	13	-28%	Standing	21	-22%	Acceptable
77	A	Annual	19		Walking	27		Acceptable
	B	Annual	19		Walking	27		Acceptable
	C	Annual	12	-37%	Sitting	17	-37%	Acceptable
78	A	Annual	12		Sitting	21		Acceptable
	B	Annual	11		Sitting	19		Acceptable
	C	Annual	12		Sitting	18	-14%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
79	A	Annual	16		Walking	24		Acceptable
	B	Annual	14	-12%	Standing	21	-12%	Acceptable
	C	Annual	15		Standing	20	-17%	Acceptable
80	A	Annual	9		Sitting	15		Acceptable
	B	Annual	9		Sitting	15		Acceptable
	C	Annual	8	-11%	Sitting	14		Acceptable
81	A	Annual	8		Sitting	14		Acceptable
	B	Annual	8		Sitting	13		Acceptable
	C	Annual	10	25%	Sitting	15		Acceptable
82	A	Annual	8		Sitting	14		Acceptable
	B	Annual	7	-12%	Sitting	13		Acceptable
	C	Annual	15	88%	Standing	21	50%	Acceptable
83	A	Annual	17		Walking	25		Acceptable
	B	Annual	14	-18%	Standing	22	-12%	Acceptable
	C	Annual	12	-29%	Sitting	18	-28%	Acceptable
84	A	Annual	10		Sitting	16		Acceptable
	B	Annual	14	40%	Standing	20	25%	Acceptable
	C	Annual	12	20%	Sitting	18	12%	Acceptable

Configurations	Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)	
(A) No Build	≤ 12	Comfortable for Sitting	≤ 31	Acceptable
Existing site and surroundings	13 - 15	Comfortable for Standing	> 31	Unacceptable
(B) Build	16 - 19	Comfortable for Walking		
Project with existing surroundings	20 - 27	Uncomfortable for Walking		
(C) Full Build	> 27	Dangerous Conditions		
Project with future surroundings				

Notes

1) Wind Speeds are for a 1% probability of exceedance

2) % Change is based on comparison with Configuration A

3) % changes less than 10% are excluded

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1	A	9	7	9	10	14	11	14	15
	B	14	11	14	15	20	15	19	21
	C	13	10	13	14	17	13	17	18
2	A	12	9	11	13	20	15	18	21
	B	14	11	13	15	21	16	20	22
	C	11	8	10	11	17	12	16	16
3	A	-	-	-	-	-	-	-	-
	B	14	11	13	14	20	16	19	21
	C	14	12	13	15	18	15	17	19
4	A	16	12	15	17	26	19	24	27
	B	13	11	13	14	21	16	20	22
	C	11	8	10	11	16	12	15	16
5	A	13	10	13	14	20	15	19	21
	B	18	13	16	19	25	19	22	27
	C	14	10	13	14	19	14	17	19
6	A	21	16	20	22	30	23	28	31
	B	16	12	15	17	25	20	24	27
	C	11	8	10	12	18	14	16	18
7	A	20	15	18	21	29	21	27	30
	B	16	12	15	17	23	18	21	24
	C	14	11	13	14	19	16	18	20
8	A	-	-	-	-	-	-	-	-
	B	16	12	15	18	24	18	22	26
	C	11	10	11	11	16	15	16	18
9	A	15	11	14	16	24	18	22	26
	B	20	15	19	21	28	22	26	30
	C	14	12	14	14	21	19	21	22
10	A	16	11	15	16	25	18	23	24
	B	14	11	13	15	19	16	18	20
	C	12	11	12	13	18	17	18	19
11	A	16	11	15	15	24	18	23	24
	B	17	13	16	18	24	19	23	26
	C	14	12	14	15	21	19	21	22
12	A	16	12	15	16	25	19	23	25
	B	13	10	12	14	18	14	17	19
	C	11	9	10	12	15	12	14	15
13	A	14	11	13	14	22	17	21	22
	B	13	10	12	13	19	16	19	20
	C	12	10	11	12	18	16	18	19

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
14	A	16	12	15	16	24	18	23	24
	B	14	12	14	15	18	15	18	19
	C	14	12	13	15	18	16	18	19
15	A	16	12	16	16	23	17	22	24
	B	14	13	14	15	22	20	22	23
	C	17	16	16	18	24	22	23	25
16	A	14	11	14	15	22	16	21	24
	B	13	10	12	13	21	16	19	21
	C	11	9	10	11	18	14	17	18
17	A	16	12	15	17	24	18	23	26
	B	15	12	14	15	22	18	21	23
	C	14	12	13	14	21	19	20	22
18	A	16	12	15	16	23	17	22	24
	B	15	14	15	16	23	20	22	24
	C	17	16	17	18	25	22	24	26
19	A	14	11	13	15	22	16	20	23
	B	15	11	14	15	21	16	20	22
	C	12	10	12	12	18	14	18	18
20	A	14	10	13	14	21	15	20	22
	B	11	8	10	11	17	13	16	18
	C	10	8	10	11	17	12	16	17
21	A	12	9	11	12	19	14	18	20
	B	17	12	16	17	24	18	22	25
	C	15	11	14	15	22	15	20	22
22	A	13	9	12	13	21	15	19	22
	B	18	14	17	18	25	19	24	26
	C	17	12	16	16	23	16	22	23
23	A	12	9	11	12	20	15	18	21
	B	16	12	15	17	23	17	21	24
	C	14	10	13	14	20	14	19	20
24	A	13	9	12	14	20	15	19	22
	B	17	13	15	17	25	18	23	25
	C	16	11	15	15	23	16	21	22
25	A	12	9	11	12	19	15	18	20
	B	14	10	13	14	20	15	18	20
	C	12	8	11	11	17	12	15	16
26	A	11	9	11	12	18	14	17	19
	B	17	12	15	18	23	17	21	24
	C	12	9	12	12	19	14	17	18

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
27	A	12	9	11	12	19	15	18	20
	B	16	12	14	16	22	17	20	23
	C	11	7	10	10	17	12	16	16
28	A	11	9	10	11	18	15	17	19
	B	17	12	15	18	23	17	20	24
	C	10	8	9	11	16	12	15	17
29	A	12	9	11	12	19	14	18	20
	B	15	11	13	16	21	15	19	22
	C	10	7	9	10	15	11	14	15
30	A	12	9	11	12	18	14	18	19
	B	17	13	16	18	20	16	20	22
	C	16	14	16	17	19	16	18	20
31	A	11	8	10	11	17	13	16	17
	B	14	11	13	15	19	14	17	20
	C	11	9	10	11	16	12	15	16
32	A	11	8	11	11	17	13	16	17
	B	15	11	14	16	19	14	17	20
	C	13	10	12	14	16	12	15	17
33	A	11	9	10	11	17	13	16	17
	B	14	10	13	14	21	15	19	21
	C	11	8	10	11	17	12	16	17
34	A	11	9	11	12	17	13	16	18
	B	18	14	17	19	25	18	23	26
	C	16	11	14	15	22	16	20	21
35	A	12	9	11	13	19	15	18	20
	B	19	13	17	19	27	19	25	27
	C	18	13	17	17	26	17	23	23
36	A	12	9	11	12	18	13	16	18
	B	13	9	12	13	20	15	19	21
	C	12	9	12	12	19	13	17	18
37	A	10	8	9	10	16	12	14	16
	B	9	7	8	9	14	11	13	14
	C	7	6	7	7	12	9	11	12
38	A	15	11	14	15	21	16	19	22
	B	12	9	11	13	18	14	17	18
	C	16	12	15	16	23	16	21	22
39	A	10	8	10	10	16	13	15	17
	B	10	8	9	10	16	12	15	17
	C	13	10	12	13	19	15	18	20

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
40	A	10	8	9	11	16	12	14	16
	B	10	8	10	11	17	13	15	18
	C	7	5	6	8	12	9	11	12
41	A	12	10	11	13	19	15	17	19
	B	16	11	15	16	23	17	22	24
	C	15	10	13	14	21	15	20	20
42	A	8	7	8	8	14	12	14	15
	B	17	14	17	19	24	19	23	26
	C	9	7	9	9	14	11	14	14
43	A	9	8	9	10	17	13	16	18
	B	15	11	14	16	21	16	20	22
	C	11	9	11	11	16	13	16	16
44	A	10	9	10	11	18	15	17	19
	B	17	12	16	17	23	17	21	23
	C	16	11	14	14	21	15	19	20
45	A	8	6	7	8	13	10	12	13
	B	8	7	8	9	14	11	13	14
	C	9	7	8	9	15	11	14	16
46	A	15	11	14	16	21	16	19	22
	B	16	12	15	17	22	16	20	22
	C	11	9	11	11	16	13	16	16
47	A	17	13	16	18	23	18	21	24
	B	17	13	16	18	23	18	21	24
	C	10	8	8	9	15	11	13	15
48	A	14	11	13	15	20	16	19	21
	B	15	11	14	16	21	16	20	22
	C	18	13	16	20	27	19	24	29
49	A	9	7	8	10	14	10	13	15
	B	8	6	7	8	13	10	12	13
	C	7	6	6	7	11	9	11	12
50	A	12	10	12	13	19	15	18	21
	B	18	13	17	19	26	19	24	26
	C	16	11	15	15	23	16	21	22
51	A	10	7	9	10	16	12	15	17
	B	10	7	9	10	16	12	15	16
	C	9	7	8	9	15	11	14	15
52	A	13	10	12	14	20	15	18	21
	B	13	10	12	14	19	15	18	20
	C	13	10	11	13	20	15	18	21

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
53	A	11	8	10	11	17	13	15	17
	B	11	9	10	12	17	14	16	18
	C	12	9	11	13	19	14	17	20
54	A	10	8	9	11	17	13	15	18
	B	11	9	10	12	18	13	16	19
	C	10	8	9	10	16	13	15	17
55	A	10	8	9	11	16	12	15	17
	B	10	8	10	11	17	13	16	18
	C	11	8	10	11	17	13	16	18
56	A	12	9	12	13	19	14	18	21
	B	14	10	13	14	20	15	19	21
	C	12	10	12	13	18	14	17	19
57	A	12	10	11	13	18	15	17	19
	B	14	11	13	14	20	16	19	21
	C	13	11	12	14	19	16	18	20
58	A	10	8	10	11	16	12	15	17
	B	11	8	10	12	17	13	16	19
	C	9	8	9	10	14	12	14	15
59	A	13	10	12	14	20	15	19	21
	B	13	10	12	13	21	15	19	21
	C	10	8	9	10	17	13	16	17
60	A	9	7	9	9	15	11	14	15
	B	16	12	14	17	22	18	21	24
	C	14	12	13	14	21	18	20	21
61	A	13	10	12	14	21	16	19	23
	B	19	13	16	20	26	19	22	27
	C	12	9	11	13	19	14	17	20
62	A	15	11	14	16	23	17	21	23
	B	13	10	12	13	20	15	19	19
	C	12	9	11	12	18	14	17	18
63	A	16	12	15	17	24	17	22	25
	B	15	11	14	16	22	16	20	23
	C	11	8	10	11	17	13	16	18
64	A	16	13	15	17	23	18	22	24
	B	15	13	14	16	22	18	21	23
	C	13	11	12	12	19	15	17	19
65	A	12	9	12	13	21	16	20	22
	B	14	10	13	14	20	16	19	22
	C	11	8	10	11	17	13	17	18

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
66	A	12	11	12	13	19	16	18	19
	B	12	11	12	13	19	16	18	19
	C	12	10	11	12	18	15	18	19
67	A	14	11	13	14	22	18	20	23
	B	13	11	12	13	19	17	19	20
	C	13	12	12	13	19	17	18	20
68	A	13	11	13	14	21	17	20	22
	B	12	10	11	12	18	15	18	19
	C	12	10	11	12	17	15	17	18
69	A	13	10	12	13	20	16	19	21
	B	13	11	12	13	20	16	19	21
	C	12	11	12	13	19	16	18	19
70	A	14	12	14	16	23	19	22	25
	B	14	12	14	15	23	19	22	24
	C	15	14	14	15	22	20	21	23
71	A	11	8	10	11	18	13	17	18
	B	11	9	11	12	18	14	17	18
	C	10	8	9	10	16	12	15	16
72	A	12	9	11	12	19	14	18	20
	B	16	12	15	17	22	17	21	23
	C	13	10	13	13	18	14	18	19
73	A	9	7	9	10	16	12	15	17
	B	16	12	15	17	22	17	21	24
	C	14	11	13	14	19	14	18	19
74	A	19	14	18	20	28	20	26	29
	B	17	13	16	19	26	20	24	28
	C	12	9	10	12	18	14	16	18
75	A	12	9	12	13	20	15	19	21
	B	11	8	10	12	18	14	17	20
	C	12	9	11	12	18	14	17	18
76	A	18	14	17	20	27	21	26	29
	B	18	14	17	20	27	21	25	29
	C	14	11	13	14	21	17	20	22
77	A	19	14	17	21	27	20	25	30
	B	20	15	18	22	28	21	26	31
	C	13	9	12	13	18	14	17	19
78	A	13	10	12	13	22	17	21	22
	B	12	10	11	12	20	17	19	21
	C	13	11	12	13	19	16	18	19

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
79	A	17	13	15	17	26	19	24	26
	B	14	11	13	15	22	17	21	23
	C	16	12	15	16	21	17	20	22
80	A	9	7	8	9	16	12	15	16
	B	9	7	8	9	15	13	15	16
	C	8	7	8	9	14	11	13	15
81	A	8	6	8	9	14	11	13	15
	B	8	6	7	8	14	11	13	14
	C	10	8	9	10	16	13	15	16
82	A	8	6	8	8	14	11	13	15
	B	7	6	7	8	13	10	13	14
	C	16	14	15	16	22	19	21	23
83	A	18	13	17	19	25	19	24	27
	B	15	12	14	16	22	18	21	24
	C	12	10	12	13	19	15	18	20
84	A	10	8	10	10	17	13	16	17
	B	15	12	13	15	21	16	19	21
	C	13	10	12	13	19	15	18	19

Seasons	Months	Mean Wind Criteria Speed (mph)	
Spring	March - May	≤ 12	Comfortable for Sitting
Summer	June - August	13 - 15	Comfortable for Standing
Fall	September - November	16 - 19	Comfortable for Walking
Winter	December - February	20 - 27	Uncomfortable for Walking
Annual	January - December	> 27	Dangerous Conditions

Effective Gust Criteria (mph)	
≤ 31	Acceptable
> 31	Unacceptable

Configurations	
(A) No Build	Existing site and surroundings
(B) Build	Project with existing surroundings
(C) Full Build	Project with future surroundings

Notes