

# Boston University Warren Towers

700 Commonwealth Avenue, Boston, MA 02215

## Permit Filing

Article 37: 'Green Buildings'

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### Attachments:

Attachment A: Building Energy Analysis Report

Attachment B: BPDA, Climate Resiliency Checklist

Attachment C: Transit Schedules

## *Warren Towers - Design Affidavit*

27, September 2024

James Arthur Jemison, Director  
Boston Planning & Development Agency  
One City Hall Square  
Boston, MA 02201-1007

Director Jemison:

As the architect of record overseeing the planning and design of BU Warren Towers Renovation Project, I, James Loftus, certify that I am knowledgeable of the project's green building strategies, designs, plans and details and to the best of my knowledge this project has been planned and designed so as to meet the prerequisites and earn the credits necessary to achieve Gold certification (64 points) using the LEED for New Construction, version 4 rating system.

Accompanying this affidavit is the Design Green Building Filing for the project documenting our point score and approach to achieving the prerequisites and selected credits. A single PDF of these documents, including this affidavit, has been transmitted to the BPDA. We will be seeking USGBC LEED Certification for this project.

We understand it is our responsibility to notify the BPDA of any changes in our green building strategies and LEED point score. Additionally, we understand we are required to provide a Construction Filing including an updated Green Building Report, LEED Checklist, and Construction Affidavit upon completion construction and prior to application to ISD for building Certificate of Occupancy.

Sincerely,



James Loftus  
Miller Dyer Spears Inc.  
40 Broad Street Boston, MA  
Massachusetts Architect License #: 31805

CC: John Dalzell  
Tyler Ross

# Boston University Warren Towers

700 Commonwealth Avenue  
Boston, MA 02215

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## Permit Filing

### Article 37 Green Building Report



Submitted for review: September 27, 2024

## I. Introduction

Trustees of Boston University (the “Proponent”) is pleased to present this Permit Filing Submission for Boston University (“BU”) Warren Towers to the City of Boston Interagency Green Building Committee. The following information is being provided as per the Article 37 submission requirements for Permit Filing. Specifically, Article 37 requires the following materials be provided during the Permit Filing process:

- Affidavit of Design Compliance
- Draft Green Building Report
- Building Energy Analysis Report
- Climate Resiliency Checklist (latest update also submitted online)
- LEED Scorecard

## II. Project Overview

BU Warren Towers includes the construction of an approximately 380,200 GSF mixed-use and residential building at 700 Commonwealth Avenue in Boston, MA. The project scope within the LEED boundary consists of one (1) story of a podium and three fourteen (14) story towers, which will house student dorm rooms, staff apartments, lounge spaces, a dining hall, offices, meeting rooms, and conference rooms.

## III. Project Data

LEED Project Area:	380,200 sf
Parking Quantity:	441
Residential:	1804 student beds, 6 staff apartments
Unit Count	857 student units, 6 staff units
Office Employees (FTE):	45
Dining Hall Employees (FTE):	60
Visitors:	470

## IV. LEED v4 Project Scorecard

The Project was reviewed for compliance with Article 37 ‘Green Buildings’ using the USGBC’s LEED for New Construction, version 4 rating system. The Project is targeting 64 out of a possible 110 credit points with an additional 7 credit points still undergoing evaluation to determine feasibility of achievement. By targeting 64 credit points, the Project anticipates achieving the City of Boston requirements of being LEED Gold certifiable. In addition, the Project has been registered under the LEED-NC v4 rating system and will be pursuing formal GBCI certification.

The USGBC recently released the beta version of the LEEDv4.1 rating system which is intended to serve as an update to (and improvement upon) LEEDv4. Where applicable, LEEDv4.1 credits have been substituted for LEEDv4 credits. A note ([LEEDv4.1](#)) has been added below next to the credit name where that occurs.

The LEED-NC v4 Project Scorecard for BU Warren Towers and associated credit-by-credit narrative is provided below. The scorecard details the Project’s ability to comply with the LEED certifiable requirement of Article 37 ‘Green Buildings’ of the City of Boston’s Zoning Code. It should be noted that the scorecard may change as the Project advances through the design and construction phases.



## LEEDv4 BD+C: New Construction (LEEDv4 NC) Project Scorecard - A37 Report

Project: **BU Warren Towers**

Address: **700 Commonwealth Ave, Boston, MA 02215**

Date: **September 2024**

Yes	M	No		
1	0	0	<b>INTEGRATIVE PROCESS</b>	<b>1</b>
1			IPc1 Integrative Process	1
Yes	M	No		
13	1	2	<b>LOCATION &amp; TRANSPORTATION</b>	<b>16</b>
		N	LTc1 LEED for Neighborhood Development Location	15
1			LTc2 Sensitive Land Protection	1
1		1	LTc3 <u>High Priority Site</u>	1-2
5			LTc4 <u>Surrounding Density and Diverse Uses v4.1</u>	1-5
5			LTc5 Access to Quality Transit v4.1	1-5
	1		LTc6 Bicycle Facilities v4.1	1
1			LTc7 Reduced Parking Footprint v4.1	1
		1	LTc8 Green Vehicles v4.1	1
Yes	M	No		
4	0	6	<b>SUSTAINABLE SITES</b>	<b>10</b>
Y			SSpr1 Construction Activity Pollution Prevention	Req'd
1			SSc1 Site Assessment	1
		2	SSc2 Site Development - Protect or Restore Habitat	1-2
		1	SSc3 Open Space	1
		3	SSc4 Rainwater Management v4.1	2-3
2			SSc5 Heat Island Reduction	1-2
1			SSc6 Light Pollution Reduction	1
Yes	M	No		
5	0	6	<b>WATER EFFICIENCY</b>	<b>11</b>
Y			WEpr1 Outdoor Water Use Reduction	Req'd
Y			WEpr2 Indoor Water Use Reduction	Req'd
Y			WEpr3 Building-level Water Metering	Req'd
2			WEc1 <u>Outdoor Water Use Reduction</u>	1-2
2		4	WEc2 Indoor Water Use Reduction	1-6
		2	WEc3 Cooling Tower Water Use	1-2
1			WEc4 Water Metering	1

Yes M No

19	2	12	ENERGY & ATMOSPHERE		33
Y			EApr1	Fundamental Commissioning and Verification	Req'd
Y			EApr2	Minimum Energy Performance	Req'd
Y			EApr3	Building-level Energy Metering	Req'd
Y			EApr4	Fundamental Refrigerant Management	Req'd
6			EAc1	Enhanced Commissioning	2-6
11		7	EAc2	Optimize Energy Performance	1-18
		1	EAc3	Advanced Energy Metering	1
	2		EAc4	Demand Response	1-2
		3	EAc5	Renewable Energy	1-3
		1	EAc6	Enhanced Refrigerant Management	1
2			EAc7	Green Power and Carbon Offsets	1-2

Yes M No

7	3	3	MATERIALS & RESOURCES		13
Y			MRpr1	Storage & Collection of Recyclables	Req'd
Y			MRpr2	Construction and Demolition Waste Management Plan	Req'd
4		1	MRc1	Building Life-Cycle Impact Reduction v4.1	2-5
1	1		MRc2	Building Product Disclosure & Optimization-EPD's v4.1	1-2
	1	1	MRc3	Building Product Disclosure & Optimization-Raw Materials v4.1	1-2
1	1		MRc4	Building Product Disclosure & Optimization-Material Ingredients v4.1	1-2
1		1	MRc5	Construction and Demolition Waste Management v4.1	1-2

Yes M No

7	1	8	INDOOR ENVIRONMENTAL QUALITY		16
Y			EQpr1	Minimum IAQ Performance	Req'd
Y			EQpr2	Environmental Tobacco Smoke (ETS) Control v4.1	Req'd
2			EQc1	Enhanced IAQ Strategies	1-2
2	1		EQc2	Low-Emitting Materials v4.1	1-3
1			EQc3	Construction IAQ Management Plan	1
		2	EQc4	IAQ Assessment	1-2
1			EQc5	Thermal Comfort	1
		2	EQc6	Interior Lighting	1-2
		3	EQc7	Daylight	1-3
1			EQc8	Quality Views	1
		1	EQc9	Acoustic Performance v4.1	1

Yes M No

6	0	0	INNOVATION		6
1			INc1.1	Innovation: EP for Heat Island Reduction	1
1			INc1.2	Innovation: Purchasing - Lamps	1
1			INc1.3	Innovation: O&M Starter Kit	1
1			INc1.4	Innovation: EP for Environmental Product Declarations	1
1			INc1.5	Pilot Credit: Integrative Analysis of Building Materials.	1

1			INc2	LEED Accredited Professional	1
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Yes M No

2	0	2	<b>REGIONAL PRIORITY: 02215</b>		4
1			RPc1	Building Life-Cycle Impact Reduction (RP@2)	1
1			RPc2	Optimize Energy Performance (RP@8)	1
		1	RPc3	Indoor Water Use Reduction (RP@4)	1
		1	RPc4	Rainwater Management (RP@2)	1
		X	RPcX	High Priority Site (RP@2)	1
		X	RPcX	Renewable Energy Production (RP@2)	1

Yes M No

64	7	39	<b>PROJECT TOTALS (Certification Estimates)</b>		110
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Certified: 40-49 points Silver: 50-59 points Gold: 60-79 points Platinum: 80+ points

## **V. Credit by Credit Narrative**

The credit-by-credit narrative herein demonstrates the Proponent's intent and approach to be certified LEED Gold, using the LEED for New Construction, version 4 rating system. The Project is currently tracking 64 'Yes', 24 'Maybe' and, 22 'No' credit points. By targeting greater than 60 credit points, the Project is pursuing sufficient points to meet LEED-NC v4 Gold and satisfy the City of Boston requirements of Article 37 to be LEED v4 'Certifiable'.

### **A. Integrative Process**

The Project team meets regularly to ensure team members from the various disciplines involved are all known to each other and collectively communicate. Sustainable design-focused workshops were held early in the design process to assist the team in establishing shared sustainable design and energy efficiency goals for the Project. This includes evaluations of both energy and water-related systems, load reduction strategies, potential system downsizing opportunities, opportunities for non-potable water use, and any influenced adjustments to the Proponent's Project Requirements and/or the Basis of Design for the Project. Additionally, the project team has engaged the utility company, enrolled in the available incentive programs, and reviewed potential Energy Conservation Measures for the Project.

#### **IPc1 Integrative Process**

**1 point**

The Project has met the intent of this credit through identification of cross discipline opportunities to design a sustainable building project. Sustainable design focused meetings have been ongoing throughout the design process to assist the team in establishing shared sustainable design and energy efficiency goals for the Project. Early design phase energy modeling has been conducted to review systems synergies and assess areas where energy loads may be significantly reduced. A water use analysis has been conducted to aid in establishing water use reduction targets.



## B. Location and Transportation

The Project is located on a previously developed, urban site in Boston. The Project is situated within the Fenway/Kenmore neighborhood, an area that has ample access to public transportation, including the MBTA Green Line via the B, C, and D branches at the Kenmore station, MBTA Bus Route 57, and the MBTA Commuter Rail via the Framingham/Worcester Line at Lansdowne Station. The local neighborhood provides a variety of services with pedestrian and cyclist access.

### Sensitive Land Protection

1 point

The Project complies with Option 1: Previously Developed Land:

*Locate the development footprint on land that has been previously developed.*

The Project is a renovation of an existing building, and therefore is located entirely on previously developed land within BU's Charles River Campus.

### High Priority Site

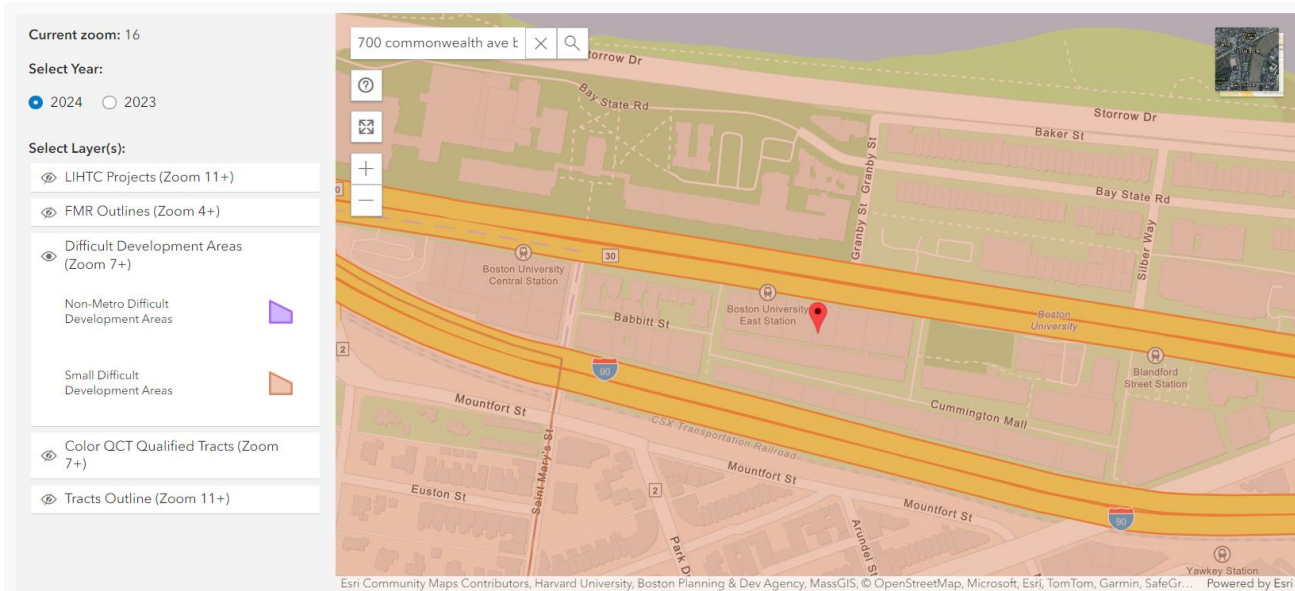
1 point

The Project is achieving this credit via Option 2: Priority Designation:

*Locate the project on one of the following:*

- A site listed by the EPA National Priorities List
- Federal Empowerment Zone site
- Federal Enterprise Community site
- Federal Renewal Community site
- Department of the Treasury Community Development Financial Institutions Fund Qualified Low-Income Community (a subset of the New Markets Tax Credit Program)
- A site in a U.S. Department of Housing and Urban Development's Qualified Census Tract (QCT) or Difficult Development Area (DDA)

The Project is located in a HUD-classified Urban Development's Qualified Census Tract ("QCT"). A QCT is an area in which 50 percent of households have incomes below 60 percent of the Area Median Gross Income and/or there is a poverty rate of 25 percent or more. It is also located in a Difficult Development Area ("DDA"), which has high land, construction, and utility costs relative to the area median income.



### Surrounding Density and Diverse Uses

**5 points**

**LEED v4.1:** The Project is achieving this credit via Option 3: Walkable Location:

*Locate on a site with a Walk Score® or equivalent third-party walkability assessment for the following thresholds, as listed below.*

Walk Score	Points
90-100	5
80-89	4
70-79	3
60-69	2
50-59	1
>50	-

The Project has a WalkScore of 93, earning 5 total points.

[Get Scores](#)
[My Favorites](#)
[Add to Your Site](#)

## 700 Commonwealth Avenue

Fenway - Kenmore - Audubon Circle - Longwood, Boston, 02215

[Add scores to your site](#)

Commute to **Downtown Cambridge**

8 min
 28 min
 12 min
 45 min
 [View Routes](#)

Looking for a home for sale in Boston?

**Walk Score**

**93**

**Walker's Paradise**  
Daily errands do not require a car.

**Transit Score**

**79**

**Excellent Transit**  
Transit is convenient for most trips.

**Bike Score**

**95**

**Biker's Paradise**  
Daily errands can be accomplished on a bike.

[About your score](#)

### Access to Quality Transit

**5 points**

**LEEDv4.1:** The project is achieving this credit via Path 1: Access to Public Transit Service:

*Locate any functional entry of the project within a ¼-mile (400-meter) walking distance of existing or planned bus, streetcar, or informal transit stops, or within a ½-mile (800-meter) walking distance of existing or planned bus rapid transit stops, passenger rail stations (i.e. light, heavy, or commuter rail) or commuter ferry terminals. Points are awarded according to the table below.*

<i>Weekday Trips</i>	<i>Weekend Trips</i>	<i>Points</i>
72	30	1
100	70	2
144	108	3
250	160	4
360	216	5

The Project is adjacent to the Green Line Boston University East stop on the B Line, located within one-half mile walking distance to the Green Line Kenmore Station (B, C, and D) and the Lansdowne Commuter Rail Station, which provides access to the MBTA Framingham/Worcester Line. It is also within one-quarter mile to MBTA Bus Route #57. In total, the building occupants at BU Warren Towers will have access to 580 weekday rides and 469 weekend transit rides, achieving a total of 5 points for the credit. See Attachment C: Transit Schedules.

<b>Route Name</b>	<b>Transit Type <sup>1</sup></b>	<b>Walking Distance to Closest Stop <sup>2</sup> (mi)</b>	<b>Daily Weekday Trips <sup>2</sup></b>	<b>Daily Weekend Trips <sup>2 3</sup></b>
Bus #57	Bus	0.1	102	93
Green Line- B Line	Light rail	0.01	143	121
Green Line- C Line	Light rail	0.5	143	120
Green Line- D Line	Light rail	0.5	165	125
Framingham Commuter R	Commuter rail	0.5	27	10
Total weekday trips				580
Total weekend trips				469



## Reduced Parking Footprint

1 point

**LEED v4.1:** The Project is achieving this credit via Option 1: No Parking or Reduce Parking:

*Provide parking capacity that is a 30% reduction below the base ratios for parking spaces, by building type, found in LEED Appendix 4 Table 1: Base Ratios for Parking. Do not exceed the minimum local code requirements for parking capacity. Projects with no off-street parking meet the requirements.*

According to the LEED Appendix 4 Table 1, the recommended base-ratio for a mixed use project is 1256 spaces. See the table below for the equation used to calculate the base ratio and percent reduction for these use types. The project is providing 441 parking spaces, which is a 64.89% reduction from the base case and qualifies the project for the credit point.

LTc Reduced Parking Footprint v4.1 - NC & CS			
Project Type: "Rental Apartments" in university district + Dining Area + Office Space			
	1256	spaces total	Base Ratio
	879	spaces total	30% Reduction
	502	spaces total	60% Reduction (EP)
	441	Total Spaces Provided	
	64.89%	Percent Reduction from Base Ratio	

### C. Sustainable Sites

The Project has a limited exterior scope as a renovation of an existing building. As only the towers and fourth floor are being renovated, there is no sitework included as part of this project scope. Therefore, the Project's ability to earn points in this category is limited. The Project is committed to reducing the heat island effect through light colored surfaces and maintaining the existing parking area that sits below the towers. With no exterior lighting within scope, the Project is not contributing to the negative effects of light pollution.

#### Construction Activity Pollution Prevention

**Required**

The Project complies with the below requirements for this prerequisite:

*Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent.*

An Erosion and Sedimentation Control (ESC) Plan is required to be developed and implemented on the Project, for the duration of construction. The ESC Plan addresses management and containment of dust and particulate matter generated by site demolition and construction activities. The ESC plan has been developed and included within the project's Construction Documents and will be followed during Construction Administration.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

#### Site Assessment

**1 point**

The design team has completed and documented a site assessment of the Project Site which demonstrates compliance with the below requirements:

*Complete and document a site survey or assessment that includes the following information:*

- **Topography.** Contour mapping, unique topographic features, slope stability risks.
- **Hydrology.** Flood hazard areas, delineated wetlands, lakes, streams, shorelines, rainwater collection and reuse opportunities, TR-55 initial water storage capacity of the site (or local equivalent for projects outside the U.S.).
- **Climate.** Solar exposure, heat island effect potential, seasonal sun angles, prevailing winds, monthly precipitation, and temperature ranges.
- **Vegetation.** Primary vegetation types, greenfield area, significant tree mapping, threatened or endangered species, unique habitat, invasive plant species.
- **Soils.** Natural Resources Conservation Service soils delineation, U.S. Department of Agriculture prime farmland, healthy soils, previous development, disturbed soils (local equivalent standards may be used for projects outside the U.S.).
- **Human use.** Views, adjacent transportation infrastructure, adjacent properties, construction materials with existing recycle or reuse potential.
- **Human health effects.** Proximity of vulnerable populations, adjacent physical activity opportunities, proximity to major sources of air pollution.

A comprehensive site assessment was completed for the Project Site. The site assessment included topography, hydrology, climate, vegetation, soils, human use, and human health effects, and was used to inform the design.

#### Heat Island Reduction

**2 points**

The Project is achieving 2 points by demonstrating compliance with Option 1: Nonroof and Roof and Option 2: Parking Under Cover:

*Option 1 - Nonroof and Roof:*

*Meet the following criterion:*



$$\frac{\text{Area of Nonroof Measures}}{0.5} + \frac{\text{Area of High Reflectance Roof}}{0.75} + \frac{\text{Area of Vegetated Roof}}{0.75} \geq \frac{\text{Total Site Paving Area}}{1} + \frac{\text{Total Roof Area}}{1}$$

*Alternatively, an SRI and SR weighted average approach may be used to calculate compliance.*

*Use any combination of the following strategies:*

**Nonroof Measures**

- *Use the existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Install vegetated planters. Plants must be in place at the time of occupancy permit and cannot include artificial turf.*
- *Provide shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.*
- *Provide shade with architectural devices or structures. If the device or structure is a roof, it shall have an aged solar reflectance (SR) value of at least 0.28 as measured in accordance with ANSI/CRRS S100. If the device or structure is not a roof, or if aged solar reflectance information is not available, it shall have at installation an initial SR of at least 0.33 as measured in accordance with ANSI/CRRS S100.*
- *Provide shade with vegetated structures.*
- *Use paving materials with an initial solar reflectance (SR) value of at least 0.33.*
- *Use an open-grid pavement system (at least 50% unbound).*

**High-Reflectance Roof**

*Use roofing materials that have an aged SRI equal to or greater than the values in Table 1. If aged SRI is not available, the roofing material shall have an initial SRI equal to or greater than the values in Table 1.*

**Vegetated Roof**

*Install a vegetated roof using native or adapted plant species.*

**Option 2 - Parking Under Cover:**

*Place a minimum of 75% of parking spaces under cover. Any roof used to shade or cover parking must (1) have a three-year aged SRI of at least 32 (if three-year aged value information is not available, use materials with an initial SRI of at least 39 at installation), (2) be a vegetated roof, or (3) be covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.*

The Project's roofing materials have been selected with compliant solar reflectance index ("SRI") values in order to lower the Project's impact on the heat island effect. All parking for the project is undercover in a parking lot. The project will also achieve an Exemplary Performance Point by achieving both Options 1 and 2.

	Total Weighted Area (sq ft)	Total Standard Area (sq ft)
Contributing nonroof measures	0	0
Contributing high-reflectance roof	35,988.64	31,461.6
Vegetated roof		
Weighted sum of nonroof and roof measures (sq ft)	47,984.85	41,948.8
Total project paving area (sq ft)		0
Total project roof area (sq ft)		31,461.6
Sum of project paving and roof area (sq ft)		31,461.6

### Light Pollution Reduction

**1 point**

The Project is achieving 1 point by demonstrating compliance with Option 2: Calculation Method:

*Uplight:*

*Do not exceed the following percentages of total lumens emitted above horizontal [Table 2].*

*Trespass:*

*Do not exceed the following vertical illuminances at the lighting boundary [Table 4].*

MLO lighting zone	Maximum allowed percentage of total luminaire lumens emitted above horizontal
LZ0	0%
LZ1	0%
LZ2	1.5%
LZ3	3%
LZ4	6%

MLO lighting zone	Vertical illuminance
LZ0	0.05 FC (0.5 LUX)
LZ1	0.05 FC (0.5 LUX)
LZ2	0.10 FC (1 LUX)
LZ3	0.20 FC (2 LUX)
LZ4	0.60 FC (6 LUX)

FC = footcandle

As there is no exterior lighting associated with the scope of this Project, the Project will comply with the intent of the credit and earn a point.

## D. Water Efficiency

To improve on-site water efficiency and reduce the burden on municipal water supply and wastewater systems, the Project reduces potable water use for domestic use and eliminates irrigation needs. Both whole-building and selective end-use water metering will be installed in the Project, and low flow and high efficiency plumbing fixtures will be used to reduce the amount of potable water used throughout the building.

The Project earns points for Outdoor Water Use Reduction, Indoor Water Use Reduction, and Water Metering.

### Outdoor Water Use Reduction

### Required

The Project has been designed to comply with this prerequisite through Option 1: No Irrigation

Required:

*Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period.*

The Project will comply as there is no landscaping that requires permanent irrigation.

### Indoor Water Use Reduction

### Required

The Project is achieving the prerequisite requirements for Building Water Use and Appliance and Process Water Use:

*For the fixtures and fittings listed below, reduce aggregate water consumption by 20% from the baseline. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled.*

Commercial Fixtures, Fittings, and Appliances	Current Baseline (IP Units)	Current Baseline (SI units)
Water closets (toilets)*	1.6 gallons per flush (gpf)	6 liters per flush (lpf)
Urinal*	1.0 (gpf)	3.8 lpf
Public lavatory (restroom) faucet	0.5 gpm at 60 psi all others except private applications	1.9 lpm at 415 kPa, all others except private applications
Private lavatory faucet*	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Kitchen faucet (excluding faucets used exclusively for filling operations)	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Showerhead*	2.5 gpm at 80 psi per shower stall	9.5 lpm at 550 kPa per shower stall
* WaterSense label available for this product type gpf = gallons per flush gpm = gallons per minute psi = pounds per square inch lpf = liters per flush lpm = liters per minute kPa = kilopascals		



*Install appliances, equipment, and processes within the project scope that meet the requirements listed in the tables below.*

Appliance	Requirement
Residential clothes washers	ENERGY STAR or performance equivalent
Commercial clothes washers	CEE Tier 3A
Residential dishwashers (standard and compact)	ENERGY STAR or performance equivalent
Prerinse spray valves	≤ 1.3 gpm (4.9 lpm)
Ice machine	ENERGY STAR or performance equivalent and use either air-cooled or closed-loop cooling, such as chilled or condenser water system

Through the specification of low flow and high efficiency plumbing fixtures, the Project shall implement water use reduction strategies that use, at a minimum, 20 percent less potable water than the water use baseline calculated for the building after meeting Energy Policy Act of 1992 fixture performance requirements.

As a part of the Indoor Water Use Reduction Prerequisite, the project team has specified low flow toilets, faucets, and showers as part of the overall effort to increase indoor water efficiency within the building and reduce the burden on municipal water supply and wastewater systems.

#### **Building-Level Water Metering**

**Required**

The Project complies with the following prerequisite requirements:

*Install permanent water meters that measure the total potable water use for the building and associated grounds. Meter data must be compiled into monthly and annual summaries; meter readings can be manual or automated. Commit to sharing with USGBC the resulting whole-project water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first.*

Permanent whole building water use meters will be installed on the Project to measure potable water use within the building. Water use data will be shared on an annual basis with the City of Boston as required under the Building Emissions Reduction and Disclosure Ordinance (BERDO).

#### **Outdoor Water Use Reduction**

**2 points**

The Project has been designed to comply with this credit through Option 1, No Irrigation Required:

*Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period.*

The Project complies as the design does not require permanent irrigation, earning two points.

#### **Indoor Water Use Reduction**

**2 points**

The Project is achieving 2 points by complying with the following requirements:

*Further reduce fixture and fitting water use from the calculated baseline in WE Prerequisite Indoor Water Use Reduction. Additional potable water savings can be earned above the prerequisite level using alternative water sources.*

The Project is currently targeting an overall potable water use savings of 33.76 percent from the calculated baseline use. This reduction percentage comes from 1.28 gpf WC, 0.125 gpf urinals, 0.35 gpm public lavatories, 1.5 gpm private lavatories, 1.5 gpm kitchen faucets, 1.8 gpm residential kitchen faucets, and 1.5 gpm residential showerheads.

As a part of the Indoor Water Use Reduction Credit, the project team has specified low flow toilets, faucets, and showers as part of the overall effort to increase indoor water efficiency within the building and reduce the burden on municipal water supply and wastewater systems.

Flush Fixture Type	Baseline GPF	Design GPF	Uses/Day
Male Water Closets	1.60 gpf	1.28 gpf	6.1
Female Water Closets	1.60 gpf	1.28 gpf	8
Urinals	1.00 gpf	0.125 gpf	1.9
Flow Fixture Type	Baseline GPM	Design GPM	Uses/Day
Public Lavatory	0.50 gpm	0.35 gpm	6
Private Lavatory	2.20 gpm	1.5 gpm	5
Kitchen Faucet	2.20 gpm	1.5 gpm	1
Residential Showerhead	2.50 gpm	1.5 gpm	1
Residential Kitchen Faucet	2.20 gpm	1.8 gpm	4

## Summary for Design and Construction Rating Systems

Note: All information on this tab is READ-ONLY. To edit, see the previous tab(s).

Refresh Groups

Group Name	Baseline Case (gallons/year)			Design Case (gallons/year)		
	Annual Flush Volume	Annual Flow Volume	Annual Consumption	Annual Flush Volume	Annual Flow Volume	Annual Consumption
Residential	5,302,720.00	14,569,223.20	19,871,943.20	4,242,176.00	8,928,454.80	13,170,630.80
4th Floor	278,560.70	71,266.25	349,826.95	174,879.35	49,504.95	224,384.30
Annual baseline water consumption (gallons/year)						20,221,770.15
Annual design water consumption (gallons/year)						13,395,015.10
Percent water use reduction (%)						<b>33.76%</b>

**Water Metering****1 point**

The project complies with the following requirements:

*Install permanent water meters for two or more of the following water subsystems, as applicable to the project:*

- *Irrigation*
- *Indoor plumbing fixtures and fittings*
- *Domestic hot water*
- *Boiler with aggregate projected annual water use of 100,000 gallons or more, or boiler of more than 500,000 BtuH (150 kW). A single makeup meter may record flows for multiple boilers.*
- *Reclaimed water. Meter reclaimed water, regardless of rate. A reclaimed water system with a makeup water connection must also be metered so that the true reclaimed water component can be determined.*
- *Other process water. Meter at least 80% of expected daily water consumption for process end uses, such as humidification systems, dishwashers, clothes washers, pools, and other subsystems using process water.*

The Project includes a significant amount of submetering to capture the following uses:

1. Hot water plant Towers A, B, and C
2. Kitchen hot water
3. Kitchen cold water
4. Laundry Towers A, B, and C

## E. Energy and Atmosphere

The building systems have been designed to optimize energy performance and reduce energy consumption through high efficiency building systems. The Project team has engaged a building commissioning agent to ensure the proper installation and operation of systems. No chlorofluorocarbon ("CFC") based refrigerants have been used in order to avoid ozone depletion in the atmosphere. The heating, ventilating, air conditioning and refrigeration ("HVAC&R") system description is provided below.

The Proponent engaged a Commissioning Agent ("CxA") during the design phase to review the proposed design and ultimately confirm the building systems are installed and function as intended and desired.

The Project will earn points for Enhanced Commissioning and Optimize Energy Performance.

### Fundamental Commissioning and Verification

**Required**

The Project will engage a Commissioning Agent to meet the following requirements:

*Complete the required commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability. Requirements for exterior enclosures are limited to inclusion in the owner's project requirements (OPR) and basis of design (BOD), as well as the review of the OPR, BOD and project design. NIBS Guideline 3-2012 for Exterior Enclosures provides additional guidance.*

- Develop the OPR.
- Develop a BOD

A CxA has been engaged by the Proponent for the purpose of providing full commissioning services for the building energy related systems including building envelope, HVAC and Refrigeration ("HVAC&R"), lighting, and Domestic Hot Water ("DHW") systems. The CxA will verify that the building systems are installed, calibrated, and perform to the Project requirements and basis of design. Additionally, the CxA will perform Commissioning activities for MEP systems.

Final documentation confirming compliance with this prerequisite will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

### Minimum Energy Performance

**Required**

The project will pursue Option 1: Whole Building Energy Simulation:

*Demonstrate an improvement of 5% for new construction, 3% for major renovations, or 2% for core and shell projects in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1-2010, Appendix G, with errata (or a USGBC-approved equivalent standard for projects outside the U.S.), using a simulation model.*

For EAc2, project teams may use a pilot alternative compliance path ("ACP") (EApc161) for documenting savings under the EA Optimize Energy Performance Credit. This ACP provides consistent, predictable results that will not be subject to unpredictable fluctuations that are likely when applying the cost, source energy, or GHG emissions metrics. Project's are awarded points based on the reduction of peak electricity demand compared to the baseline and emission reduction estimated over a 30-year period for each grid region, based on an assumption of 95% grid decarbonization by 2050. The ACP requires project teams to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline using metrics of Demand Adjusted Energy and Greenhouse Gas ("GHG") emissions.

This LEED prerequisite requires that projects achieve a minimum energy cost savings of 5% over an ASHRAE Standard 90.1-2010 baseline. The project will meet this minimum annual energy cost savings.

**Building-Level Energy Metering****Required**

The Project will comply with the following prerequisite requirements:

*Install new or use existing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc). Utility-owned meters capable of aggregating building-level resource use are acceptable. Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first.*

The building has a utility primary metered electrical service. A customer owned electrical metering system will be installed to monitor the building usage at substations. The data from the whole-building metering will be shared with the USGBC for a minimum of five years.

**Fundamental Refrigerant Management****Required**

The Project has been designed to meet the prerequisite refrigerant requirements:

*Do not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. When reusing existing HVAC&R equipment, complete a comprehensive CFC phase-out conversion before project completion.*

No CFC refrigerants are used in any of the project's air conditioning systems. The AWHF will use R-454b which has a low global warming potential rating. Split systems for telecommunications data rooms and other spaces will use a refrigerant that will not contribute to ozone depletion.

**Enhanced Commissioning****6 points**

The Project is pursuing 6 points for Option 1: Enhanced Systems Commissioning and Option 2:

Envelope Commissioning:

*Option 1: Enhanced Systems Commissioning*

*Complete the required commissioning process (CxP) activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC&R systems, as they relate to energy, water, indoor environmental quality, and durability.*

**AND**

*Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems.*

*Option 2: Envelope Commissioning*

*Complete the required commissioning process (CxP) activities for the building's thermal envelope in accordance with ASHRAE Guideline 0-2005 and the National Institute of Building Sciences (NIBS) Guideline 3-2012, Exterior Enclosure Technical Requirements for the Commissioning Process, as they relate to energy, water, indoor environmental quality, and durability.*

A CxA has been engaged by the Proponent for the purpose of providing full commissioning services for the building energy related systems including building envelope, HVAC&R, lighting, and DHW systems. The CxA will verify that the building systems are installed, calibrated, and perform to the Project requirements and basis of design. Additionally, the CxA will perform Commissioning activities for MEP. Ongoing monitoring-based commissioning will also be performed to assess the performance of energy- and water-consuming systems.

A project specific commissioning plan will be developed and followed throughout the commissioning process. Activities shall include design reviews, submittal reviews, site inspections, project-specific commissioning schedule, commissioning meetings, functional testing, seasonal testing, a 10-month warranty inspection, and all other LEED Fundamental and Enhanced commissioning activities.

Per LEED guidance, the Commissioning team will meet the requirements for all commissioning services as a third party independent Cx agent.

The following systems are included in the Commissioning scope of work:

- HVAC&R systems
- HVAC controls
- Lighting controls
- Electrical systems
- Domestic hot water systems
- Plumbing and pumps
- Building Management System
- Fire Alarm system

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

### **Optimize Energy Performance**

**11 points**

The project will pursue Option 1: Whole Building Energy Simulation:

*Demonstrate an improvement of 5% for new construction, 3% for major renovations, or 2% for core and shell projects in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata (or a USGBC-approved equivalent standard for projects outside the U.S.), using a simulation model.*

For EAc2, project teams may use a pilot alternative compliance path (“ACP”) (EApc161) for documenting savings under the EA Optimize Energy Performance Credit. This ACP provides consistent, predictable results that will not be subject to unpredictable fluctuations that are likely when applying the cost, source energy, or GHG emissions metrics. Project’s are awarded points based on the reduction of peak electricity demand compared to the baseline and emission reduction estimated over a 30-year period for each grid region, based on an assumption of 95% grid decarbonization by 2050. The ACP requires project teams to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline using metrics of Demand Adjusted Energy and Greenhouse Gas (“GHG”) emissions.

Based on the energy analysis, the Project results in a **19.2% improvement** in Demand-Adjusted Energy, which equates to 4 LEED points, and a **41.7% reduction** in GHG emissions, which equates to 7 LEED points. In total, the design case is expected to achieve a total of **11 points** under the energy performance credit. The Project is also achieving a Regional Priority point for this credit, as it exceeds the 8-point RP threshold.

### HVAC System Description

Specific HVAC technologies and systems employed to achieve overall building sustainability and efficiency are listed below.

1. Highly efficient AWHPs provide all electric cooling and electric heating down to 7°F outdoor temperature. Below this temperature electric boilers will provide the heating. No fossil fuels will be used by the HVAC system. One AWHP shall be provided for each tower, while two AWHPs shall condition the fourth floor.

2. Valance Units for Student Rooms– this hydronic based system for heating and cooling requires no fan motors or filters at the terminal units, to reduce operating and maintenance costs.

3. Dedicated Outside Air Systems (“DOAS”) with Energy Recovery – 100% outside air processing air handlers will be utilized to heat, cool, and dehumidify the building fresh air before it is supplied to the toilet cores and student rooms. The DOAS units also ensure accurate outside air volumes are delivered. Systems capture waste heat and cooling from building exhaust systems by incorporating



energy recovery wheels. The DOAS units will have service corridors for ease of maintenance as well as multiple fans for redundancy.

4. Variable volume AHUs will provide conditioning and kitchen hood make up for the fourth floor. Most of the units shall have air side economizers and enthalpy energy recovery wheels. One AHU will deliver air directly to the kitchen hoods while another shall provide make up air to the main laundry. These units do not have energy recovery wheels. Bathroom exhaust goes through toilet exhaust fans as the units serving areas where the bathrooms are located are not 100% outdoor air. Other than the laundry and hood make up AHUs service corridors will be provided for ease of maintenance and multiple fans for redundancy.

5. Variable Speed Drives will be provided for all major equipment.

6. Premium efficiency motors premium efficiency motors will be specified for HVAC pumps and fans.

7. All major HVAC components shall interface with the campus Building Automation System through BACnet IP.

Plumbing Description:

1. The DHW system will be served by AWHPs that generate energy for a process loop to a heat exchanger that generates DHW stored in tanks for peak demand periods. The AWHPs recover the stored water during low demand periods. The AWHP system is sized for 100% of the DHW demand with electric resistance coils for hot water circulation temperature maintenance.

Please refer to the Energy Model Report provided in [Attachment A](#) for further energy analysis details.

**Green Power and Carbon Offsets**

**2 points**

The Project will earn 2 points by complying with the following requirements:

*Engage in a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract must specify the provision of at least 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs).*

*Green power and RECs must be Green-e Energy certified or the equivalent. RECs can only be used to mitigate the effects of Scope 2, electricity use.*

BU receives and retires renewable energy certificates (RECs) for 100% of the campus' electricity use through a Power Purchase Agreement (PPA) with ENGIE North America for a wind farm in South Dakota, Triple H Wind Project, LLC.

The PPA covers 100% of all electricity used by the BU Campuses for a period of 20 years, surpassing the requirements for this credit. Additionally, the contract ensures that all RECs purchased as part of this agreement will be Green-e Certified, as required by LEED.

Therefore, the Project will achieve 2 points for 100% of electricity use covered with Green-e RECs.



## F. Materials and Resources

The Project has specified materials and products that are environmentally responsible and are transparent regarding the harvest and extraction of raw materials and the manufacturing processes. The design team has specified materials and products with environmental and health product declarations to help support a reduced impact of the development on the environment. Waste management will be addressed during demolition, construction, and post occupancy.

### Storage and Collection of Recyclables

**Required**

The Project has been designed to meet the following prerequisite requirements:

*Provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.*

The Project will comply with this prerequisite by providing a dedicated collection and storage area for recyclable materials for the entire building that is accessible to waste haulers and building occupants.

The storage of collected recyclables shall be accommodated within the Project design, including options for hazardous material disposal (i.e. batteries and electronic waste). Occupants shall have dedicated areas located on each floor to bring their recyclables for storage and collection. BU's contracted waste management company shall collect recyclables on a regular basis.

### Construction and Demolition Waste Management Planning

**Required**

The Project will prepare a Construction and Demolition Waste Management Plan that meets the following requirements:

*Develop and implement a construction and demolition waste management plan:*

- *Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion. Approximate a percentage of the overall project waste that these materials represent.*
- *Specify whether materials will be separated or commingled and describe the diversion strategies planned for the project. Describe where the materials will be taken and how the recycling facility will process the material.*

The specification shall require that prior to the start of construction, the Construction Management team shall prepare and submit a Construction Waste Management plan that shall be implemented on the Project Site. The Project Construction Manager shall endeavor to divert as much demolition debris and construction waste from area landfills as possible with a goal to achieve at minimum 50 percent diversion of three waste streams.

Final documentation confirming compliance with this prerequisite will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

### Building Life-Cycle Impact Reduction

**4 points**

**LEED v4.1:** The Project is pursuing this credit via Option 1: Building and Material Reuse, Path 1:

*Maintain the existing building structure (including floor and roof decking) and envelope (the exterior skin and framing, excluding window assemblies and nonstructural roofing materials). Calculate reuse of the existing project area according to Table 1.*



Table 1. Path 1 Points for reuse of existing building structural elements.

Percent of existing walls, floors and roof reuse by project area	Points BD+C
15%	1
30%	2
45%	3
60%	4
75%	5

The Project is currently tracking 60% reuse of existing structural elements and 50% reuse of interior non-structural elements with preliminary calculations. Final calculations need to be performed to confirm these estimates. The Project is also achieving a Regional Priority point for this credit, as it exceeds the 2-point RP threshold.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

#### **Building Product Disclosure and Optimization: EPDs**

**1 point**

**LEED v4.1:** The Project will achieve this credit via Option 1: Environmental Product Declaration (EPDs):

*Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the disclose criteria below:*

- *Life-cycle assessment and environmental product declarations,*
- *Environmental Product Declarations which conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope,*
- *USGBC approved program. Other USGBC approved programs meeting the material ingredient reporting criteria.*

The Architect will work with the specifications writer and the construction manager to specify 20 products from five manufacturers with compliant Environmental Product Declarations.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

#### **Building Product Disclosure and Optimization: Material Ingredients**

**1 point**

**LEED v4.1:** The Project will achieve this credit via Option 1: Material Ingredient Reporting:

*Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the project to at least 0.1% (1000 ppm):*

- *Manufacturer Inventory. The manufacturer has published complete content inventory for the product following these guidelines:*
- *A publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN)*
- *Materials defined as trade secret or intellectual property may withhold the name and/or CASRN but must disclose ingredient/chemical role, amount and hazard score/class using either GreenScreen List Translator score and/or full GreenScreen benchmark; or The Globally Harmonized System of Classification and Labeling of Chemicals rev.6 (2015).*
- *Health Product Declaration. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration Open Standard.*
- *Cradle to Cradle. Product has Material Health Certificate or is Cradle to Cradle Certified under standard version 3 or later with a Material Health achievement level at the Bronze level or higher.*



- *Declare. The Declare product label must meet the following requirements:*
  - *Declare labels designated as Red List Free or Declared.*
  - *Declare labels designated as LBC Compliant that demonstrate content inventory to 0.1% (1000 ppm).*
- *Living Product Challenge. The included Declare product label must demonstrate content inventory to 0.1% (1000 ppm)*
- *USGBC approved program. Other USGBC approved programs meeting the material ingredient reporting criteria.*

The Architect will work with the specifications writer and the construction manager to specify 20 products from five manufacturers with compliant Health Product Declarations or similar.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

## **Construction and Demolition Waste Management**

**1 point**

**LEED v4.1:** The Project is targeting Option 1, Path 1: Divert 50% and Three Material Streams:

*Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.*

The Project will track construction and demolition waste throughout the construction process to divert at least 50% of waste from landfill.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

## G. Indoor Environmental Quality

The comfort and well-being of the building occupants will be paramount in regard to indoor air quality, access to light, and thermal comfort. An indoor air quality management plan will be implemented during construction to enhance the well-being of construction workers and to promote a better indoor environment for building occupants. Low-emitting materials will be employed throughout the building to reduce the quantity of indoor air contaminants and promote the comfort and well-being of installers and building occupants.

The Project will earn points for Enhanced Indoor Air Quality Strategies, Low Emitting Materials, Construction Indoor Air Quality Management Plan, Thermal Comfort, and Interior Lighting.

During construction, the Construction Manager will develop and implement a compliant Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the Project.

### Minimum Indoor Air Quality Performance

**Required**

The Project will comply with this prerequisite via Option 1: ASHRAE Standard 62.1-2010:

*For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), determine the minimum outdoor air intake flow for mechanical ventilation systems using the ventilation rate procedure from ASHRAE 62.1-2010 or a local equivalent, whichever is more stringent.*

*Meet the minimum requirements of ASHRAE Standard 62.1-2010, Sections 4-7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent.*

This prerequisite establishes a baseline for providing a minimum amount of outdoor air to buildings to maintain good indoor air quality and keep occupants comfortable and healthy. Overall, the intent is to establish minimum indoor air quality (IAQ) performance to enhance indoor environmental quality in buildings, thus contributing to the comfort and well-being of the occupants. The toilet cores and student rooms will be ventilated by a dedicated, 100% DOAS with energy recovery in accordance with the flow rates prescribed by ASHRAE 62.1-2016. The DOAS unit will be constant volume with its airflow rate set during balancing. Current transducers on the fans will confirm airflow to the BMS.

The air handlers serving the fourth floor will have their outdoor air volumes set to the greater of the requirements of ASHRAE 62.1-2016 or that are required for kitchen exhaust make up. Air flow measuring stations on the fans, which are required for variable volume systems, will confirm airflow to the BMS.

### Environmental Tobacco Smoke Control

**Required**

**LEED v4.1:** The Project will meet the prerequisite requirements:

*Prohibit smoking inside the building. Prohibit smoking outside the building except in designated smoking areas located at least 25 feet (7.5 meters) from all entries, outdoor air intakes, and operable windows. Signage must be posted within 10 feet (3 meters) of all building entrances indicating the no-smoking policy.*

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

### Enhanced IAQ Strategies

**2 points**

The Project will pursue points under both Option 1 and Option 2:

**Option 1: Enhanced IAQ Strategies (1 point)**

*Comply with the following requirements, as applicable [for] Mechanically ventilated spaces:*

- entryway systems;
- interior cross-contamination prevention; and
- filtration.

**Option 2: Additional Enhanced IAQ Strategies (1 point)**

*Comply with the following requirements, as applicable [for] Mechanically ventilated spaces (select one):*

- exterior contamination prevention;
- increased ventilation;
- carbon dioxide monitoring; or
- additional source control and monitoring.

The following requirements have been met: Entryway Systems (exempt), Interior Cross-Contamination Prevention, and Filtration. Carbon Dioxide ("CO<sub>2</sub>") Monitors will be installed in each densely occupied space to comply with the second option for the credit.

The HVAC system meets the requirements for Option 1 of this credit. Janitor's closets are kept under negative pressure by being exhausted at a rate greater than 0.50 cfm/ft<sup>2</sup> of floor area while not being directly supplied. The DOAS units and fourth floor air handlers described above have MERV 14 final filters, which is greater than the credit requirement of MERV 13. CO<sub>2</sub> monitors with audible and visual alarms will be installed in each student lounge and each densely occupied area on the fourth floor.

### Low Emitting Materials

**2 points**

**LEED v4.1:** The Project will meet the threshold level for emissions and content standards for three of the product compliance categories:

*Use materials on the building interior (everything within the waterproofing membrane) that meet the low-emitting criteria [provided within the LEED Reference Guide]. Points are awarded according to Table 1:*

Table 1. Points for low-emitting materials	
2 product categories	1 point
3 product categories	2 points
4 product categories	3 points
5 product categories	3 points + exemplary performance
Reach 90% threshold in at least three product categories	Exemplary performance or 1 additional point if only 1 or 2 points achieved above.

The specifications shall include requirements for at least three of the following categories to meet low emitting and VOC criteria: adhesives and sealants, paints and coatings, flooring, composite wood, ceilings, wall panels, insulation, and furniture. The Project Construction Manager will be required to track all products used to ensure compliance.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

### Construction Indoor Air Quality Management Plan

**1 point**

The specifications shall require the Project Construction Manager to develop an Indoor Air Quality Management Plan for the construction and pre-occupancy phases.

The Project will be pursuing this credit during the Construction Phase application. The Construction Manager will be responsible for compliance with the following requirements:

*Develop and implement an Indoor Air Quality Management Plan for the construction and preoccupancy phases of the building. The plan must address the following:*

- During construction, meet or exceed all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3.
- Protect absorptive materials stored on-site and installed from moisture damage.
- Do not operate permanently installed air-handling equipment during construction unless filtration media with a minimum efficiency reporting value (MERV) of 8, as determined by ASHRAE 52.2–2007, with errata (or equivalent filtration media class of F5 or higher, as defined by CEN Standard EN 779–2002, Particulate Air Filters for General Ventilation, Determination of the Filtration Performance...), are installed at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media. Immediately before occupancy, replace all filtration media with the final design filtration media, installed in accordance with the manufacturer's recommendations.

- *Prohibit the use of tobacco products inside the building and within 25 feet (8 meters) of the building entrance during construction.*

The Construction Manager of the project will meet and exceed the recommended Control Measures of the SMACNA IAQ Guidelines for Occupied buildings Under Construction 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3). The permanently installed air handlers will not be operated during construction, and tobacco products will be prohibited within the building as well as within 25 feet of the building entrance.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

**Thermal Comfort****1 point**

The Project will comply with this credit via Option 1: ASHRAE Standard 55-2017:

*Thermal Comfort Design:*

*Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55–2010, Thermal Comfort Conditions for Human Occupancy, with errata or a local equivalent.*

*Thermal Comfort Control*

*Provide individual thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multi-occupant spaces.*

All occupied spaces within the Project will be mechanically heated and air conditioned. The requirements of ASHRAE Standard 55-2017 will be met. At least 50% of all individual occupant spaces will have thermal comfort controls. All multi-occupant spaces shall have group thermal comfort controls (i.e.thermostats).

**Quality Views****1 point**

The Project will comply with the below requirements:

*Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area.*

*Additionally, 75% of all regularly occupied floor area must have at least two of the following four kinds of views:*

- *Multiple lines of sight to vision glazing in different directions at least 90 degrees apart;*
- *Views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet (7.5 meters) from the exterior of the glazing;*
- *Unobstructed views located within the distance of three times the head height of the vision glazing; and*
- *Views with a view factor of 3 or greater, as defined in "Windows and Offices; A Study of Office Worker Performance and the Indoor Environment."*

The Project will comply by providing a direct line of sight to the outdoors via vision glazing for over 75% of regularly occupied spaces. Occupants will have views of the sky and objects over 25 feet away.

**H. Innovation**

The Project is pursuing all six Innovation points as follows: two Exemplary Performance Points – Heat Island Reduction and Environmental Product Declarations, one Pilot Credit - Integrative Analysis of Building Materials, two Innovation Credits - Purchasing Lamps and O&M Starter Kit, and LEED Accredited Professional. Please see the Heat Island Reduction and Environmental Product Declarations credit descriptions for information on how the project team plans to achieve Exemplary Performance.

**Exemplary Performance: Heat Island Reduction****1 point**

The Project will achieve both Options 1 and 2 by installing a high reflectance roof and locating all parking under cover.

**Exemplary Performance: Environmental Product Declarations****1 point**

The Architect will work with the specifications writer and the Construction Manager to specify at least 40 products from five manufacturers with compliant Environmental Product Declarations

**Innovation: Purchasing - Lamps****1 point**

The Project shall design the lighting to reduce the average mercury content of purchased lamps below 35 picograms per lumen hour or eliminate the use of mercury-containing lamps altogether. The credit requires that the Project demonstrate a reduction of mercury content in mercury-containing lamps to 35 picograms per lumen hour or less.

**Innovation: O&M Starter Kit****1 point**

The Proponent shall implement the BU campus standard Green Cleaning Policy that covers green cleaning procedures, materials, and services that are within the building and site management's control and includes the organization responsible for cleaning the building and building site. Additionally, the Proponent will institute the BU campus-wide Integrated Pest Management Program that includes measures for investigation, evaluation, and low-risk, alternative methods for pest management before moving to consider higher risk methods. In the event that high-risk methods of pest control are necessary, the Program will ensure notification of all building occupants prior to utilization.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

**Pilot Credit: Integrative Analysis of Building Materials****1 point**

The Project shall specify and install at least three permanently installed products within the building that have a documented qualitative analysis of the potential health, safety, and environmental impacts of the product in five stages of the product's life cycle. Qualitative analysis will meet the requirements of this Pilot Credit.

Final documentation confirming compliance with this credit will be included as part of the Certificate of Occupancy Filing of the Green Building Report.

**LEED Accredited Professional****1 point**

Multiple LEED AP's are on the Project Team and shall continue to provide administrative services to oversee the LEED credit documentation process.

## **I. Regional Priority Credits**

Regional Priority Credits (“RPC”) are established LEED credits designated by the USGBC to have priority for a particular area of the country. When a project team achieves one of the designated RPCs, an additional credit is awarded to the project for up to four total points. RPCs applicable to the Project’s location include: LTc3 High Priority Site (2-point threshold), SSc4 Rainwater Management (2-point threshold), WEc2 Indoor Water Use Reduction (4-point threshold), EAc2 Optimize Energy Performance (8-point threshold), EAc5 Renewable Energy Production (2-point threshold), and MRc1 Building Life Cycle Impact Reduction (2-point threshold). This Project currently holds two RPCs as “Yes,” as described in the sections above:

- MR Credit 1: Building Life-Cycle Impact Reduction (RP @ 2 pts)
- EA Credit 2: Optimize Energy Performance (RP @ 8 pts)

## Attachment A: Building Energy Analysis Report

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# BU WARREN TOWERS BOSTON, MA

## BUILDING ASSESSMENT

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## Executive Summary

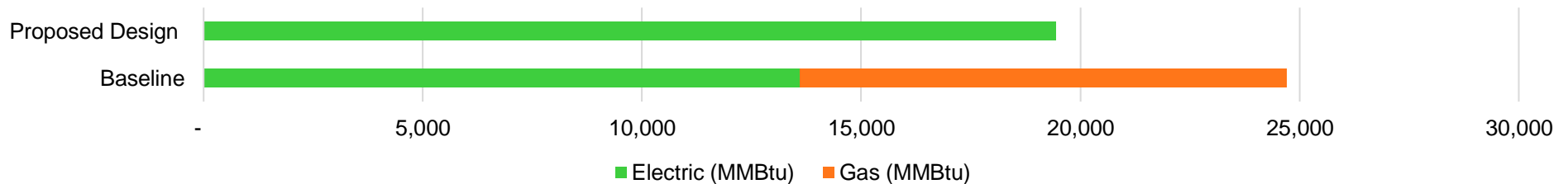
This report contains the Building Energy Assessment for the BU Warren Towers Renovation project, an existing high-rise dormitory. The project is in the construction documentation phase. The Warren Towers Complex was constructed in 1965 and accommodates approximately 1,800 students with living, dining, and support spaces. The three residential Towers (A, B, & C) are supported by a four-story podium, including three parking levels and ground-floor retail. The scope of the energy analysis is only the three towers and the podium level. The project intends to pursue LEED Gold certification for the Article 37 process under the LEED for New Construction / Major Renovation (LEED-NC) v4 rating system.

The Green Engineer (TGE) performed a building energy analysis comparing a baseline to the proposed design case. The baseline references ASHRAE 90.1-2013, Appendix G. Figure 1 illustrates **site energy use savings of 21.3%** when comparing the baseline to the proposed design case. Figure 2 illustrates a comparison of carbon emissions intensity (CEI) between the baseline and design.

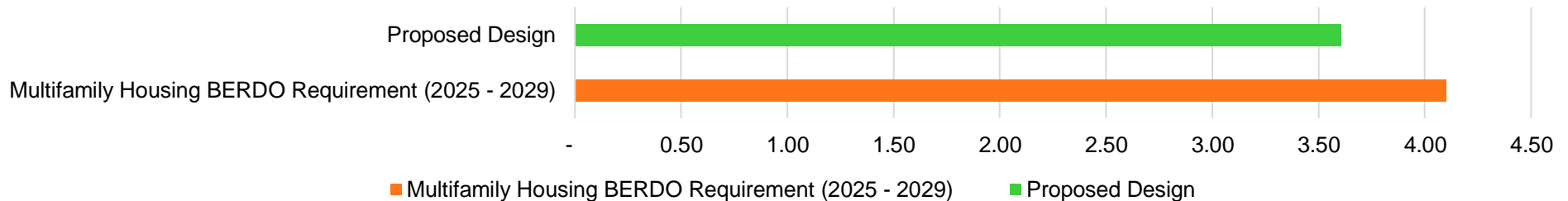
This report includes several important updates to the baseline and the proposed design case that impacts simulated energy use. The revised updates include:

- Revised occupancy schedules for the dormitory towers and the podium level
- Increased equipment process loads in the kitchen and dining room areas
- Updated heating and cooling setback temperatures
- Updated baseline HVAC systems, HVAC sizing parameters for ventilation and heating

**Figure 1: Comparison of Site Energy Use by Fuel Type**



**Figure 2: Comparison of Carbon Emissions Intensity (CEI)**



## 1. Description of Comparison

LEED Baseline Case: The baseline case model is a LEED Baseline equivalent representation of the building, assuming minimum compliance with ASHRAE standard 90.1-2013, Appendix G. Model input parameters are taken from the standard rather than design documents.

Proposed Design Case: Proposed Design Case model inputs are based on the 75% Construction Documentation drawings and specifications and supplemental information provided by the design team. Individual design elements may be better or worse than code requirements in all instances so long as aggregate building energy performance exceeds baseline case energy performance. Every effort has been made to use reasonable assumptions for building components and systems where details were unavailable.

Please refer to Appendix A for model inputs.

## 2. Energy Savings Analysis

The following are the simulation results obtained from the energy model proposed case. The proposed design's annual energy use and cost savings are based on energy efficiency strategies incorporated into the design to reduce the building's energy consumption. The following tables summarize site and source energy use, energy cost, and GHG emissions for the Baseline and Proposed Design. Refer to Appendix A for details of energy model inputs and assumptions.

### 2.1. Energy Performance

The most significant energy conservation measures, starting with the most impactful, include:

- Electrification of the heating, cooling & ventilation system via an air-to-water heat pump plant
- Improved envelope assemblies and fenestration
- Reduced interior lighting power through the use of high-efficiency LED fixtures and occupancy sensors
- High-efficiency heat pump domestic water heaters and low-flow plumbing fixtures
- Demand control ventilation on the Podium level AHUs

These measures yield reduced energy use and, thus, reduced greenhouse gas emissions, as shown in Table 1. Figure 3 converts energy used by different fuel sources (e.g., gas vs. electric) into a standard metric (MMBtu) and sorts it by energy enduses category.

**Table 1: Summary of Performance Data**

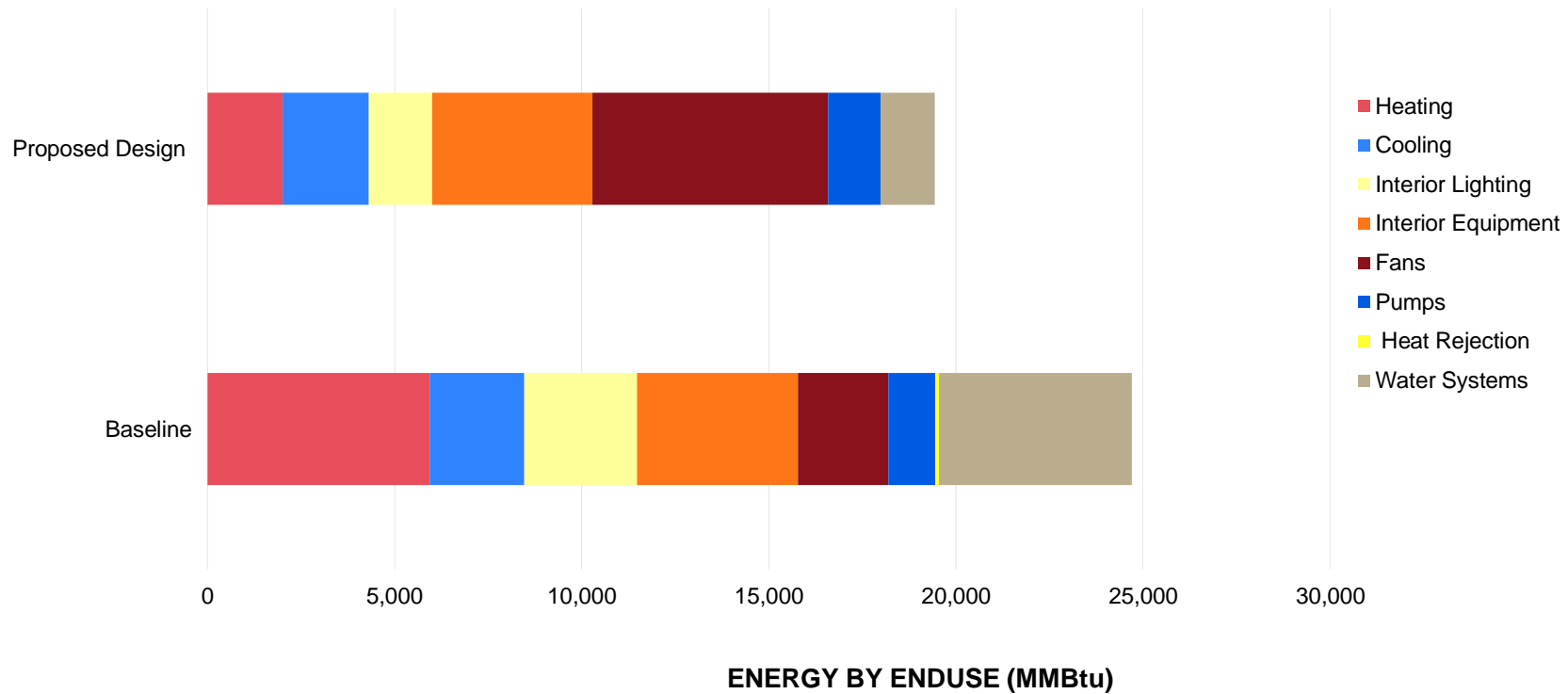
<b>Annual Site Energy Summary</b>		<b>Baseline</b>	<b>Proposed Design</b>
Electricity	kWh	3,988,727	5,695,915
Natural Gas	Therm	110,919	-
Total Site Energy use	MMBtu	24,699	19,435
<b>Site Energy Savings (%)</b>			<b>21.3%</b>
<b>Annual Energy Cost</b>			
Electricity	\$/year	\$749,083	\$1,069,693
Natural Gas	\$/year	\$173,034	\$0
Total Energy Cost	\$/year	\$922,117	\$1,069,693
<b>Energy Cost Savings (%)</b>			<b>-16.0%</b>
<b>Annual Source Energy Reduction</b>			
Total Source Energy use	MMBtu	49,752	54,419
<b>Source Energy Savings (%)</b>			<b>-9.4%</b>
<b>Green House Gas (GHG) Reduction</b>			
Total GHG Emissions	kg CO2e	1,482,457	1,275,885
<b>GHG Reduction(%)</b>			<b>13.9%</b>
<b>LEEDv4 161 ACP</b>			
<b>EApC161: Alternative Energy Performance Metric</b>			
<i>Demand Adjusted Energy % Improvement</i>			<b>19.2%</b>
<i>GHG Emissions % Improvement</i>			<b>41.7%</b>
<b>LEED Points</b>			
<i>Demand Adjusted Energy</i>			<b>4</b>
<i>GHG Emissions</i>			<b>7</b>
<b>Total LEED Points</b>			<b>11</b>

Table 1 compares the proposed design against the LEED baseline. Projects that use all-electric systems paired with peak load reduction strategies typically perform best using the LEED Alternative Energy Performance Metric (EApC161). EApC161 provides consistent, predictable results that will not be subject to unpredictable fluctuations that are likely when applying the cost, source energy, or GHG emissions metrics. EApC161 awards points based on the reduction of peak electricity demand compared to the baseline and emission reduction estimated over a 30-year period for each grid region, based on an assumption of 95% electric grid decarbonization by 2050. For more information on the EApC161 metric, a complete description and point calculation methodology are described online<sup>1</sup>.

The project results in a **19.2%** improvement in Demand-Adjusted Energy, which is good for 4 LEED points, and a **41.7%** reduction in GHG emissions, which is good for 7 LEED points. The design case is sufficient for a **total of 11** points under the energy performance credit.

<sup>1</sup> [U.S. Green Building Council, 2024](#)

**Figure 3: Site Energy by End-use Comparison**



**Table 2: Site Energy by End-use**

Description	Heating	Cooling	Interior Lighting	Interior Equipment	Fans	Pumps	Heat Rejection	Water Systems	Total End Use (Mbtu)	EUI
Baseline	5,937	2,529	3,021	4,289	2,425	1,267	80	5,153	24,699	69.8
Proposed Design	2,015	2,290	1,694	4,289	6,306	1,388	0	1,453	19,435	55.0

## 2.2. Carbon Emissions Intensity

Under the Building Emissions Reduction and Disclosure Ordinance (BERDO) and the Building Performance Standard, the city of Boston will begin regulating the carbon emissions intensity (CEI) attributed to building energy use beginning in 2025<sup>2</sup>. The emissions targets will be incrementally reduced every five years until they reach net zero by 2050. The CEI metric is in terms of kilograms of CO<sub>2</sub>e (carbon dioxide equivalent) per square foot per year, and the performance requirement varies by building type. Multifamily housing buildings currently have an allowance set at **4.1** kG-CO<sub>2</sub>e/[SF-Yr] starting in 2025. Under current policy guidelines, properties that do not comply with the prescribed CEI target will have to remit annual Alternative Compliance Payments (ACPs) to the city commensurate with carbon emissions that exceed the allowance.

Figure 2 of the executive summary illustrates that the proposed design would emit **3.61** kG-CO<sub>2</sub>e/[SF-Yr], which easily meets the initial CEI target starting in 2025. However, the CEI standard for Multifamily housing buildings is projected to be reduced to 2.4 kG-CO<sub>2</sub>e/[SF-Yr] beginning in 2035, at which point the property would be liable for alternative compliance payments unless improvements are made to reduce emissions further.

## 3. Discussion of Results

### Key Performance Advantages

- All electric heat pump systems remove the need for fossil fuel use in the building and help drive down carbon emissions
- Upgraded fenestration and envelope assemblies reduce associated heating and cooling loads
- Low flow fixtures and the CO<sub>2</sub> heat pump water heaters reduce the water use and heating loads
- Demand control ventilation for AHUs on the podium level
- High-efficiency heat recovery systems on AHUs help reduce associated heating loads
- Upgraded podium fenestration
- Reduction of tower DOAS sizes helps lower overall fan power and ventilation loads

### Recommended Next Steps

- TGE recommends completing the ASHRAE 62.1 Ventilation calculations to include in the final model update

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<sup>2</sup> [Building Emissions Reduction and Disclosure Ordinance](#)



## Appendix A: Modeling Methodology

The energy analysis was conducted using DesignBuilder v7.3, which serves as a graphical user interface for Energy Plus v9.4, a simulation engine developed and supported continuously by the US Department of Energy. DesignBuilder estimates annual energy consumption by simulating a year of building operations based on a typical weather year and user-defined design specifications. This phase of analysis reflects design input provided by the project team in the form of design documents, specifications, conference call discussions, and email correspondence. The geometry of the building is based on the architectural floor plans, except that window configurations are simplified based on a percentage of glazing in each zone and exposure.

The prescribed methodology requires a baseline building model that conforms to the minimum code requirements as defined by ASHRAE 90.1-2013 Appendix G, plus Massachusetts amendments as applicable. Once the baseline model has been created according to code requirements, a proposed case model is built reflecting the latest design documents. An abbreviated list of energy modeling inputs has been provided at the end of this report.

It is important to keep in mind the limitations of energy models when reviewing this information. Energy consumption is highly dependent on weather conditions, equipment operations & maintenance, and the actual operating schedule of the building. The numbers generated will not necessarily be an accurate projection of actual energy costs but can serve as an accurate comparison between alternatives.

The software used for this analysis exceeds ASHRAE 90.1-2013 Section G.2.2.1 requirements of the referenced energy code states which mandates the following capabilities at a minimum:

1. 8760 hours per year
2. Hourly variations in occupancy and equipment schedules
3. Thermal mass effects
4. Ten or more thermal zones
5. Part-load performance curves for mechanical equipment
6. Capacity and efficiency correction curves for mechanical heating and cooling equipment
7. Airside economizers with integrated control
8. Baseline building design characteristics specified in Section G3

The following 2022 EIA State Average Utility Rates for electricity and natural gas have been used for estimating annual energy cost savings for the project:

Electricity - \$0.1878 / kWh  
Natural Gas - \$1.567 / Therm



## Appendix B: Energy Model Input Tables

Parameter Description	Baseline	Proposed Design
<b>Gross Building Area (SF)</b>	353,653	
<b>Roof Assembly</b>	Code Minimum: Insulation Entirely above Deck: R-30 c.i. Assembly U-Value: <b>0.032</b>	
<b>Wall Assembly</b>	Code Minimum: Steel-Framed, R-13 +R-10 c.i. Assembly U-Value: <b>0.055</b>	<b>Podium Level:</b> Overall weighted Assembly U-Value: <b>0.161</b>  <b>Dormitory Towers:</b> Overall U-derated (from SGH): Assembly U-Value: <b>0.158</b>
<b>Window-to-Wall Ratio</b>		Podium Level: <b>14%</b> Dormitory Towers: <b>27%</b>
<b>Fenestration</b>	Code minimum: Non-Res, Vertical, Metal Framing, Fixed U-Value: <b>0.42</b>  Non-Res, Vertical, Metal Framing, Operable U-Value: <b>0.50</b>	<b>Podium Level:</b> 1 3/4" Triple Glazed IGU W/ Laminated Glass Weighted Window Assembly: U-Value: <b>0.16</b> VLT: <b>0.47</b> SHGC: <b>0.21</b>  <b>Dormitory Towers:</b> 1 3/4" Triple Glazed IGU, Tempered Weighted Window Assembly: U-Value: <b>0.267</b> VLT: <b>0.56</b> SHGC: <b>0.24</b>
<b>Infiltration (Pa<sub>50</sub>)</b>	0.4 cfm/sf	
<b>HVAC System</b>	<b>Podium Level and tower core:</b> VAV with Reheat  <b>Dorms:</b> PTAC (Packaged terminal air-conditioned)  <b>Tel/Data closets:</b> PSZ-AC (Packaged Single Zone Air Conditioner)	<b>Podium Level:</b> Dining spaces – AHUs with Energy Recovery, FPB, and VAV Reheat coils Kitchen – MAU Office spaces – VAV AHU with Energy Recovery Laundry space – Dryer MAU  <b>Dormitory Towers:</b> Hydronic Valance Units <b>Other Spaces:</b> Corridor and Bathrooms - DOAS system, CAV no reheat Tel/Data closets - VRF system

Parameter Description	Baseline	Proposed Design
<b>T-Stat Setpoints</b>		Cooling: 75°F Heating: 72°F Unoccupied Heating: 70°F Unoccupied Cooling: 77°F
<b>Ventilation CFM</b>	Towers A,B,C: 17,290 (each) Podium: 23,350	DOAS System Towers A,B,C: 17,290 Podium AHU-1: 3,650 Podium AHU-2: 4,000 Podium AHU-3: 5,000 Podium AHU-4: 2,000 Podium AHU-5: 2,700 Podium AHU-6: 6,000
<b>Energy Recovery</b>	Not required for Dorm PTAC system  Corridors and Podium – 50% Effectiveness	DOAS System Towers – 81.3% Podium AHU-1: 84.9% Podium AHU-2: 81.4% Podium AHU-3: None Podium AHU-4: 83.7% Podium AHU-5: 92.4% Podium AHU-6: None
<b>Demand Control Ventilation</b>	Kitchen Zone only	AHU-1, AHU-2, AHU-3, and AHU-5
<b>Heating/Cooling Efficiency</b>	PTAC – EER 9.5-11.9 PSZ-AC – EER 13.0 Chiller– EER 18.7 Boiler – 82%	AWHPs: Heating COP – 1.72 (at 0°F OAT) Cooling COP – 3.01 (assuming full load at ambient temperature of 95°F)
<b>Fan Power (kW/CFM)</b>	Dorms (PTAC) – 0.0003 Tel/Data Closets (PSZ-AC) – 0.00085 Podium and Corridor (VAVs) – 0.001066 – 0.00152	DOAS System Towers A,B,C: 0.00137 VRF Towers A,B,C: 0.00027 Podium AHU-1: 0.001484 Podium AHU-2: 0.001442 Podium AHU-3: 0.001062 Podium AHU-4: 0.001315 Podium AHU-5: 0.001353 Podium AHU-6: 0.000621
<b>Lighting Power Density (W/SF)</b>	Total kW: 175 Food Prep – 1.21 Dining area – 0.65 Stairwells – 0.69 Storage <50 ft <sup>2</sup> – 1.24 Storage <1000 ft <sup>2</sup> – 0.63 Corridors – 0.66 Meeting/Multipurpose Room – 1.23 Breakroom – 0.73 Office Enclosed – 1.11	Total kW: 290 Food Prep – 1.09 Dining area – 0.4 Stairwells – 0.49 Storage <50 ft <sup>2</sup> – 0.38 Storage <1000 ft <sup>2</sup> – 0.38 Corridors – 0.41 Meeting/Multipurpose Room – 0.97 Breakroom – 0.59 Office Enclosed – 0.74

Parameter Description	Baseline	Proposed Design
	Office Open plan – 0.98	Office Open plan – 0.61
	Mech/Elec Room – 0.42	Mech/Elec Room – 0.42
	Locker Room – 0.75	Locker Room – 0.52
	Dorm Room – 0.38	Dorm Room – 0.38
	Source: ASHRAE 90.1 – 2013	Source: IECC 2021
<b>Lighting Controls</b>	Code Minimum	
	Kitchen and Dining Spaces – 15.0	
	Data Closets – 3.0	
<b>Process Loads (W/SF)</b>	Dorms and All Other Spaces – 1.0	
<b>Domestic Hot Water</b>	Gas Storage Water Heater - 80% Efficiency	Heat Pump with Storage Tanks COP – 3.5

- END OF REPORT -

## Attachment B: BPDA, Climate Resiliency Checklist

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# Response Summary

Assigned To	Erika Frazier
Target Record	CHA-000119
Status	Completed
Progress	94.30%
Response End Time	2024-12-02T18:53:18.000Z

# Response Detail

Information

Question	Response	Comment
Building Name		
Warren Towers Renovation		
Related Project		
Boston University - Warren Towers Renovation		
Building Street Number	700	
Building Street Name	Commonwealth	
Building Street Suffix	Avenue	
Select the type of filing	Design	
Filing Contact Name		
Erika Frazier		
Filing Contact Email		
efrazier@fpa-inc.com		

Team

Enter the names of the companies/organizations on the project team.

Question	Response	Comment
Owner/Developer		
Boston University Charles River Campus		
Architect	Miller Dyer Spears	
Landscape Architect	Copley Wolff	
Mechanical Engineer	R.W. Sullivan	
Sustainability / LEED	The Green Engineer	
Performance Modeler	The Green Engineer	
Civil Engineer	Nitsch Engineering	
Permitting	Fort Point Associates, Inc.	
Construction Management	Shawmut Design and Construction	
Transportation Consultant	AECOM	
Consultant for Advanced Energy Feasibility Assessment	N/A	

## Building Description and Design Conditions

Question	Response	Comment
Date COBUCS Report was submitted	12/20/2023	
Site Area (SF)	121640	
Length of sidewalk to be reconstructed (LF)	1534.00	
What are the building's First Floor Building Uses?	Parking Garage, Warehouse & Storage, Retail & Services	
Please specify the building's below grade uses.	Parking Garage, Warehouse & Storage	
Building Gross Square Feet		
380641		
Project Gross Square Feet		
380641		



Question	Response	Comment
Building Gross Floor Area		
380200		
Building Height (Ft)		
Building Height (Stories)	18	

## Description and Design Conditions - Building Envelope

When reporting U values, report total assembly U value including supports and structural elements.

**Note:** for any data (number) requests that are not applicable to this project, please enter a value of 0.

Question	Response	Comment
Roof Area (SF)	62800	
Roof U Value	0.032	
Foundation Wall Area (SF)	0	
Foundation Wall U Value	0.000	
Exposed Floor Area (SF)	0	
Exposed Floor U Value	0.000	
Slab on Grade Area (SF)	0	
Slab on Grade U Value	0.000	

## Description and Design Conditions - Vertical Above-Grade Assemblies

When reporting U value, report total assembly U value including supports and structural elements.

For any data (number) requests that are not applicable, please enter a value of 0.

Question	Response	Comment
Building Infiltration Rate (AHC @ 50 Pa)	0.40	
Window to Wall Ratio (%)	0%	
Opaque Curtain Wall / Spandrel Area (SF)	4340	
Opaque Curtain Wall / Spandrel U Value	0.049	
Opaque Framed Wall Area (SF)	11940	
Opaque Framed Wall U Value	0.041	

Question	Response	Comment
Vision Glazing/Window Type 1 Area (SF)	12130	
Vision Glazing/Window Type 2 Area (SF)	0	
Vision Glazing/Window Type 1 U Value	0.190	
Vision Glazing/Window Type 2 U Value	0.000	
Vision Glazing/Window Type 1 SHGC	0.19	
Vision Glazing/Window Type 2 SHGC	0.00	
Doors - Area (SF)	390	
Doors - U Value	0.600	
Total Wall Area (SF)	28800	
Vertical U Average	0.112	
Whole Building U Average	0.057	

## Article 37 Green Building

Question	Response	Comment
LEED Certified	Yes	
LEED Version	v4	
LEED Rating System	New Construction/Major Renovation	
Proposed LEED Rating	Gold	
Proposed LEED point score	64.0	
LEED Zero Certification		

## Building 2035 Predictive Carbon Emissions Intensity (pCEI) Targets and Performance

Using predictive modeling and 2035 Emission Factors, report the modeled performance for Primary, Secondary, and Tertiary Building Uses and the Whole Building including Energy Source Amount(s) and pCEI(s). If multiple uses share common systems or are not individually modeled, use a common pCEI. Otherwise provide use specific performance data.

**Note:** For any data (number) requests that are not applicable, please enter a value of 0.

Question	Response	Comment
2035 Emissions Factor Electric (kg CO2e/MBtu)		
52.1		
2035 Emissions Factor Gas (kg CO2e/MBtu)		
53.11		

## Building 2035 pCEI Targets and Performance - Primary Use

In the next sections, we ask for information about up to three building uses. Using predictive modeling and 2035 Emission Factors, report the modeled performance for Primary Building Uses including Energy Source Amount(s) and pCEI(s). If multiple uses share common systems or are not individually modeled, use a common pCEI. Otherwise provide use specific performance data.

**Note:** For any data (number) requests that are not applicable, please enter a value of 0.

Question	Response	Comment
Please indicate the building's primary use type	Dormitory	
Square footage of the building's primary use floor area including related uses	353653	
Primary Use Annual Electric (MBtu/yr)	18951	
Primary Use Annual Electric pCEI (kg CO2e/sf/yr)	2.79	
Primary Use Annual Gas/Other (MBtu/yr)	0	
Primary Use Annual Gas/Other pCEI (kg CO2e/sf-yr)	0.00	
Primary Use Energy Amount Totals (MBtu/yr)	18951	
Primary Use pCEI totals (kg CO2e/sf-yr)	2.79	
Does the building have a secondary use that you would like to record pCEI performance for?	No	

## Building 2035 pCEI Targets and Performance - Whole Building

Using predictive modeling and 2035 Emission Factors, report the modeled performance for Whole Building Uses including Energy Source Amount(s) and pCEI(s). If multiple uses share common systems or are not individually modeled, use a common pCEI. Otherwise provide use specific performance data.

**Note:** for any data / number requests that are not applicable, please enter a value of 0.

Question	Response	Comment
Whole Building pCEI (kg CO2e/sf-yr)		
Total Annual Energy (Mbtu/yr)		
Energy Use Intensity (kBtu/sf-yr)	54	
Annual Heating (kBtu/sf-yr)	7	
Peak Heating Load (Btu/hr-sf)	17	
Annual Cooling (kBtu/sf-yr)	7	
Peak Cooling Load (Btu/hr-sf)	27	
Energy Code Compliance Path	Prescriptive	
Energy Use Below Code (%)		

## Building Performance Assistance (Utility, State and Federal)

Question	Response	Comment
Has the project team met with utility representative for project assistance?	No	
Have the local utilities reviewed the predictive performance model?	No	
Will the project receive assistance?	No	
How much funding assistance?	0	TBD based on Mass Save assessment

## Carbon Emission Mitigation - On-site Renewable Energy Generation

Question	Response	Comment
System 1 - select the type	No	
System 1 Ownership	N/A	
System 1 - indicate it's size in kW	0	

Question	Response	Comment
System 1 Annual Output (kWh)	0	
System 2 - select the type	No	
Total Systems (kW)		
Total Annual Output (kWh)		

## Carbon Emission Mitigation - On-site Renewable Energy Storage

Question	Response	Comment
Select the Energy Storage System Type	No	
Describe the ownership	N/A	
Storage System Size (kW)	0	
Storage System Capacity (MBtu)	0	

## Building Carbon Emission Mitigation – Off-site measures - Procurement Renewable Electricity

Question	Response	Comment
Describe the type of Renewable Electricity procurement	N/A	
Describe the source of renewable electricity	N/A	
Annual Quantity of renewable electricity (kWh)	0	
Renewable electricity procurement - % of total Annual Electricity Usage	0%	

## Building Carbon Emission Mitigation – Off-site measures - Procurement RECs, Power Purchase Agreements, and other Mechanism

Question	Response	Comment
Describe the type of RECs, Power Purchase Agreements, and other Mechanism	Large-Scale Power Purchase Agreement	
Source of RECs, Power Purchase Agreements, and other Mechanism	Triple H Wind Project	
Annual Quantity of RECs, Power Purchase Agreements, and other Mechanism (tons of CO2e)	985	
Percent of total Annual Carbon Emissions - RECs, Power Purchase Agreements, and other Mechanism	100%	

## Payments for Non-electricity Carbon Emissions

Question	Response	Comment
Describe the type of non-electricity carbon emissions	N/A	
Source of non-electricity carbon emissions	N/A	
Annual Quantity (tons of CO2e)	0	
Non-electricity carbon emissions - % of annual carbon emissions	0%	

## Extreme Heat Mitigation - Site (Existing and Proposed)

Annual average temperature in Boston increased by about 2°F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

Note: please enter a value of 0 for any data/number requests that do not apply to your project.

Question	Response	Comment
Existing Hardscape - Percent of Site	85%	
Proposed Hardscape - Percent of Site	78%	
Existing Softscape - Percent of Site	18%	

Question	Response	Comment
Proposed Softscape - Percent of Site	22%	

## Extreme Heat Mitigation - Urban Heat Island Reduction – Proposed Site and Building

Question	Response	Comment
Non-roof Landscape Area (SF)	23390	
Non-roof Landscape Percent of Site (%)	20%	
Non-roof Landscape - Area Meeting LEED Criteria (SF)	0	
Non-roof Landscape - SRI Value	0	
Non-roof Hardscape - Area (SF)	20690	
Non-roof Hardscape Percent of Site (%)	17%	
Non-roof Hardscape - Area Meeting LEED Criteria (SF)	835	
Non-roof Hardscape - SRI Value	0	
Roof Surface Area (SF)	92050	
Roof Surface Percent of Site (%)	76%	
Roof Surface Area Meeting LEED Criteria (SF)	92050	
Roof Surface SRI Value	89	
Roof Vegetated Area (SF)	0	
Roof Vegetated Percent of Site (%)	0%	
Roof Vegetated Area Meeting LEED Criteria (SF)	0	
Roof Vegetated SRI Value	0	
Total Area (SF)	136130	
TOTAL Area Meeting LEED Criteria (SF)	92885	
Total SRI Value (weighted average)	88	



Question	Response	Comment
Vertical Cool Wall Area (SF)		
Vertical Cool Wall Area Meeting LEED Criteria (SF)		
Vertical Cool Wall - Percent Meeting LEED Criteria		

## Extreme Precipitation Mitigation - Storm Water Management - Site and Building

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25". There is a significant probability that this will increase to at least 6" by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

Question	Response	Comment
Are any parcels across the entire project located in a Groundwater Conservation Overlay District (GCOD)?	Yes	
Permeable Site Surfaces - Area (SF)	2680	
Permeable Site Surfaces - % of Site	2%	
Impermeable Site Surfaces - Area (SF)	23730	
Impermeable Site Surfaces % of Site (SF)	20%	
Imp. Surfaces Water fr 1" of Rain (CF)	1978	
Imp. Surfaces Water fr 1.25" Rain (CF)	1978	
Roofs - Area (SF)	92780	
Roofs - Percent of Site (SF)	76%	
Roofs - Water from 1" of Rain (CF)	7732	
Roofs - Water from 1.25" of Rain (CF)	9665	
Total Area Precipitation Mitigation (SF)	119190	
TOTAL - Water from 1" of Rain (CF)	9710	
TOTAL - Water from 1.25" of Rain (CF)	11643	
Rain Water Reuse - Type	None	

Question	Response	Comment
Rain Water Reuse - Amount (CF)	0	
Storm Water Reuse - Type	None	
Storm Water Reuse - Amount (CF)	0	
Green Infrastructure - Type	Infiltration tank/wells	
Green Infrastructure - Amount (CF)	11642	
Storm Water Retention - Type	Infiltration tank/wells	
Storm Water Retention - Amount (CF)	0	
TOTAL Retention - Amount (CF)	11642	

## Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, sea levels in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Question	Response	Comment
Is any portion of the site in a FEMA SFHA zone?	No	
Is any portion of the site in the BPDA Coastal Flood Resilience Overlay District? Use the online <a href="http://maps.bostonredevelopmentauthority.org/zoningviewer/">BPDA Zoning Viewer</a> ( <a href="http://maps.bostonredevelopmentauthority.org/zoningviewer/">http://maps.bostonredevelopmentauthority.org/zoningviewer/</a> ) to assess the susceptibility of the project site.	No	

## Attachment C: Transit Schedules

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## SILVER LINE

### Weekday

Departs	First	Last	Every...
<b>SL1</b> Logan Airport	5:39 AM	1:20 AM **	10-17 min
South Station	5:35 AM	1:02 AM *	
<b>SL2</b> Drydock	5:52 AM	12:27 AM	7-16 min
South Station	5:34 AM	12:40 AM	
<b>SL3</b> Chelsea Station	4:55 AM	12:55 AM **	9-20 min
South Station	4:20 AM	12:43 AM *	
<b>SL4</b> Nubian Station	5:17 AM	12:16 AM	12-21 min
South Station	5:40 AM	12:34 AM	
<b>SL5</b> Nubian Station	5:15 AM	12:44 AM	6-20 min
Downtown Crossing	5:32 AM	1:07 AM *	

### Saturday

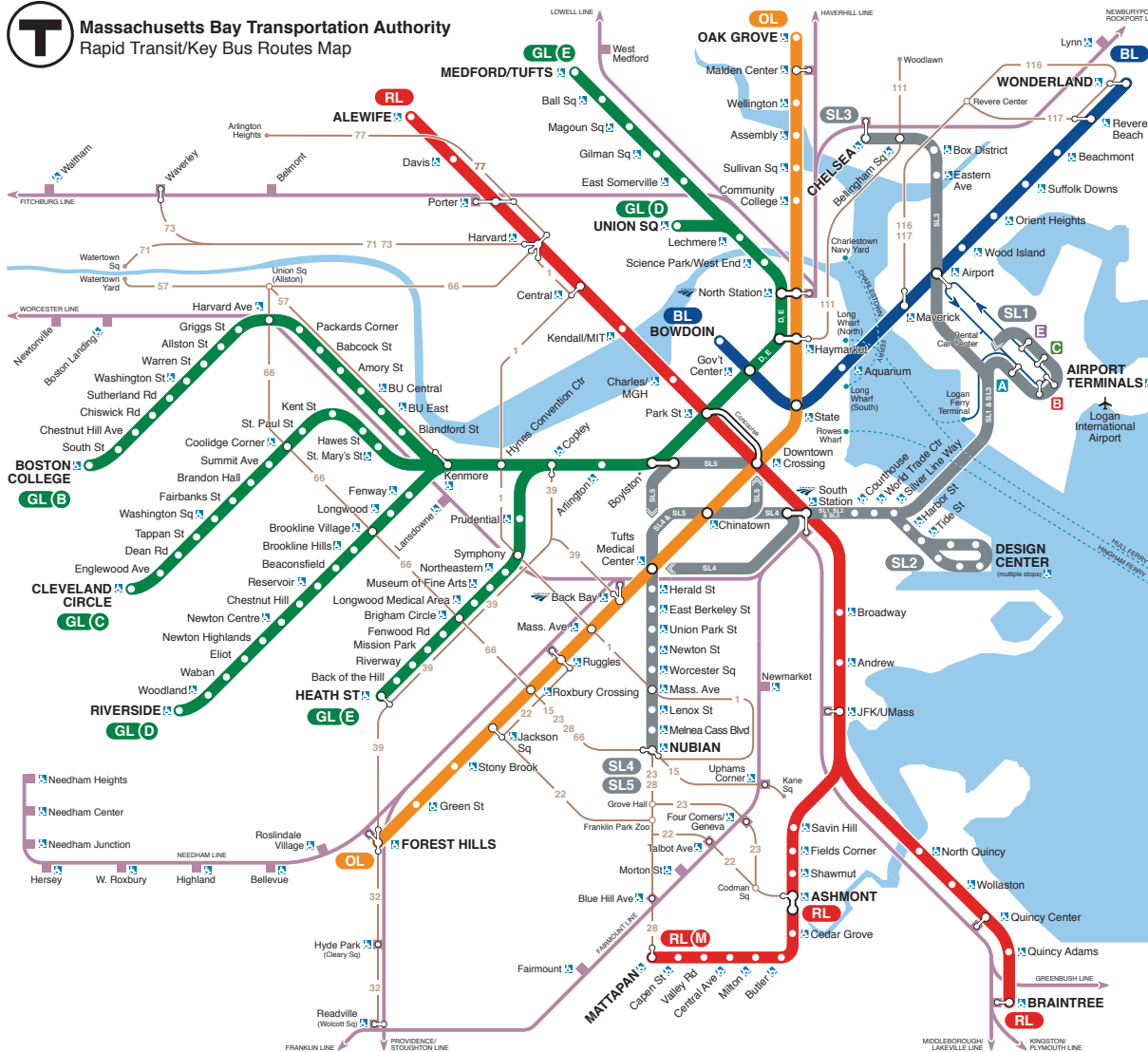
Departs	First	Last	Every...
<b>SL1</b> Logan Airport	5:48 AM	1:12 AM **	10-14 min
South Station	5:45 AM	12:59 AM *	
<b>SL2</b> Drydock	6:06 AM	12:33 AM	14-17 min
South Station	5:47 AM	12:45 AM	
<b>SL3</b> Chelsea Station	5:27 AM	1:17 AM **	9-16 min
South Station	4:55 AM	12:47 AM *	
<b>SL4</b> Nubian Station	5:23 AM	12:20 AM	13-20 min
South Station	5:40 AM	12:40 AM	
<b>SL5</b> Nubian Station	5:19 AM	12:43 AM	6-11 min
Downtown Crossing	5:34 AM	1:00 AM *	

### Sunday

Departs	First	Last	Every...
<b>SL1</b> Logan Airport	5:50 AM	1:06 AM **	10-14 min
South Station	6:18 AM	1:00 AM *	
<b>SL2</b> Drydock	6:51 AM	12:51 AM	12-18 min
South Station	6:35 AM	12:39 AM	
<b>SL3</b> Chelsea Station	6:28 AM	1:19 AM **	11-17 min
South Station	5:52 AM	12:47 AM *	
<b>SL4</b> Nubian Station	6:02 AM	12:20 AM	15-20 min
South Station	6:20 AM	12:40 AM	
<b>SL5</b> Nubian Station	6:00 AM	12:25 AM	9-12 min
Downtown Crossing	6:16 AM	12:47 AM *	



## Massachusetts Bay Transportation Authority Rapid Transit/Key Bus Routes Map



Effective June 16, 2024

Replaces April 2024

RED LINE

ORANGE LINE

GREEN LINE

BLUE LINE

SILVER LINE

mbta.com  
@mbta  
617-222-3200  
617-222-5146 (TTY)



Massachusetts Bay  
Transportation Authority

RED LINE M

**Weekday**  
trains every 6-10 min within trunk, every 12-20 min on branches.  
Mattapan peak trains every 6-7 min, off-peak every 8-12 min.

Departs	First	Last
Alewife	5:15 AM	12:30 AM *
Ashmont	5:15 AM	12:30 AM *
Alewife	5:25 AM	12:22 AM
Braintree	5:05 AM	12:05 AM
<span>M</span> Ashmont	5:14 AM	1:35 AM *
Mattapan	5:02 AM	1:18 AM

Trips with (\*) wait at transfer stations for subway connections.

**Saturday**  
trains every 9-11 min within trunk, every 18-21 min on branches.  
Mattapan trains every 12-13 min

Departs	First	Last
Alewife	5:15 AM	12:30 AM *
Ashmont	5:15 AM	12:30 AM *
Alewife	5:24 AM	12:20 AM
Braintree	5:06 AM	12:02 AM
<span>M</span> Ashmont	5:12 AM	1:35 AM *
Mattapan	5:02 AM	1:18 AM

Trips with (\*) wait at transfer stations for subway connections.

**Sunday**  
trains every 9-10 min within trunk, every 19-20 min on branches.  
Mattapan trains every 12-13 min

Departs	First	Last
Alewife	6:00 AM	12:30 AM *
Ashmont	6:00 AM	12:30 AM *
Alewife	6:09 AM	12:20 AM
Braintree	5:50 AM	12:02 AM
<span>M</span> Ashmont	6:00 AM	1:35 AM *
Mattapan	5:48 AM	1:18 AM

Trips with (\*) wait at transfer stations for subway connections.

ORANGE LINE

**Weekday**  
trains every 7-10 min

Departs	First	Last
Oak Grove	5:15 AM	12:30 AM *
Forest Hills	5:15 AM	12:30 AM *

Trips with (\*) wait at transfer stations for subway connections.

**Saturday**  
trains every 10-11 min

Departs	First	Last
Oak Grove	5:15 AM	12:30 AM *
Forest Hills	5:15 AM	12:30 AM *

Trips with (\*) wait at transfer stations for subway connections.

**Sunday**  
trains every 13-15 min

Departs	First	Last
Oak Grove	6:00 AM	12:30 AM *
Forest Hills	6:00 AM	12:30 AM *

Trips with (\*) wait at transfer stations for subway connections.

	CharlieCard	Cash on board	Reduced fare
Subway	\$2.40	\$2.40	\$1.10
Subway + Bus	\$2.40	\$4.10	\$1.10
Complete fare/pass rules and free/reduced fare eligibility: <a href="https://www.mbta.com/fares">mbta.com/fares</a> or call 617-222-3200			
● Transfer to bus/subway available on CharlieCard—good for 2 hours, pay fare difference.			
● Children 11 & under ride free.			
All MBTA buses are accessible to people with disabilities.			

GREEN LINE B C D E

**Weekday**  
peak trains every 6-8 min, off peak trains every 7-12 min

Departs	First	Last
<span>B</span> Boston College	5:01 AM	12:16 AM
Government Center	5:47 AM	1:01 AM *
<span>C</span> Cleveland Circle	5:00 AM	12:19 AM
Government Center	5:37 AM	12:52 AM *
<span>D</span> Riverside	4:45 AM	12:16 AM *
Union Square	4:50 AM	12:50 AM ^
<span>E</span> Heath Street	5:42 AM	12:55 AM ^
Medford/Tufts	5:01 AM	12:19 AM *

Trips with (\*) wait at transfer stations for subway connections.

Trips with (^) don't provide guaranteed connections.

**Saturday**  
trains every 8-12 min

Departs	First	Last
<span>B</span> Boston College	4:45 AM	12:09 AM
Government Center	5:29 AM	12:53 AM *
<span>C</span> Cleveland Circle	4:50 AM	12:19 AM
Government Center	5:26 AM	12:54 AM *
Riverside	5:00 AM	12:15 AM *
<span>D</span> Union Square	4:55 AM	12:38 AM *
<span>E</span> Heath Street	5:41 AM	12:55 AM ^
Medford/Tufts	5:02 AM	12:25 AM *

Trips with (\*) wait at transfer stations for subway connections.

Trips with (^) don't provide guaranteed connections.

**Sunday**  
trains every 9-13 min

Departs	First	Last
<span>B</span> Boston College	5:20 AM	12:14 AM
Government Center	6:04 AM	12:57 AM *
<span>C</span> Cleveland Circle	5:30 AM	12:17 AM
Government Center	6:06 AM	12:52 AM *
<span>D</span> Riverside	5:25 AM	12:15 AM *
Union Square	5:34 AM	12:39 AM *
<span>E</span> Heath Street	6:08 AM	12:50 AM ^
Medford/Tufts	5:15 AM	12:28 AM *

Trips with (\*) wait at transfer stations for subway connections.

Trips with (^) don't provide guaranteed connections.

BLUE LINE

**Weekday**  
peak trains every 5-6 min, off peak trains every 7-13 min

Departs	First	Last
Wonderland	5:12 AM	12:28 AM *
Bowdoin	5:33 AM	12:54 AM *

Trips with (\*) wait at transfer stations for subway connections.

**Saturday**  
trains every 10-11 min

Departs	First	Last
Wonderland	5:24 AM	12:24 AM *
Bowdoin	5:37 AM	12:52 AM *

Trips with (\*) wait at transfer stations for subway connections.

**Sunday**  
trains every 10-11 min

Departs	First	Last
Wonderland	6:00 AM	12:24 AM *
Bowdoin	6:27 AM	12:52 AM *

Trips with (\*) wait at transfer stations for subway connections.

Service Notes
Third <span>D</span> leaves Riverside to Medford/Tufts on weekdays.
First <span>D</span> leaves North Station at 5:00 AM on weekdays.
First eastbound <span>E</span> serves East Somerville at 4:49 AM.
Some early morning westbound <span>E</span> operate Union Square–Heath Street
<span>SL1</span> & <span>SL3</span> trips with ** stop only at Silver Line Way, World Trade Center and South Station via Summer Street.

## Holidays

<b>SUN</b>	New Year's Day	<b>SUN</b>	Labor Day
<b>SAT</b>	MLK Jr. Day	<b>SAT</b>	Columbus/Indigenous Peoples Day
<b>SAT</b>	Presidents Day		
<b>SAT</b>	Patriots' Day	<b>SUN</b>	Thanksgiving
<b>SUN</b>	Memorial Day	<b>SUN</b>	Christmas Day
<b>SAT</b>	Independence Day	<b>SUN</b>	New Year's Eve

FRAMINGHAM / WORCESTER LINE

SPRING/SUMMER SCHEDULE  
Effective May 20, 2024

Monday to Friday

Inbound to Boston

AM

PM

ZONE	STATION	TRAIN #	500	502	504	582	506	584	508	552	586	510	512	514	516	518	520	522	524	526	592	528	594	530	598	532	534	536	538
	Bikes Allowed																												
8	Worcester	↳	4:15	5:00	5:45	-	6:30	-	7:07	7:40	-	8:13	9:05	10:00	11:00	12:00	1:05	2:00	3:00	3:47	-	4:30	-	5:45	-	6:35	7:55	8:55	10:50
8	Grafton	↳	4:28	5:13	5:58	-	6:43	-	7:20	-	-	8:26	9:18	10:13	11:13	12:13	1:18	2:13	3:13	4:00	-	4:43	-	5:58	-	6:48	8:08	9:08	11:03
7	Westborough	↳	4:32	5:17	6:02	-	6:47	-	7:24	-	-	8:30	9:22	10:17	11:17	12:17	1:22	2:17	3:17	4:04	-	4:47	-	6:02	-	6:52	8:12	9:12	11:07
6	Southborough	↳	4:41	5:26	6:11	-	6:56	-	7:33	-	-	8:39	9:31	10:26	11:26	12:26	1:31	2:26	3:26	4:13	-	4:56	-	6:11	-	7:01	8:21	9:21	11:16
6	Ashland	↳	4:45	5:30	6:16	-	7:01	-	7:38	-	-	8:43	9:35	10:30	11:30	12:30	1:35	2:30	3:30	4:17	-	5:00	-	6:15	-	7:05	8:25	9:25	11:20
5	Framingham	↳	4:55	5:40	6:26	6:35	7:11	7:25	7:48	8:06	8:15	8:53	9:45	10:40	11:40	12:40	1:45	2:40	3:40	4:27	4:40	5:10	5:20	6:25	6:55	7:15	8:35	9:35	11:30
4	West Natick	↳	5:00	5:45	6:32	6:40	7:17	7:30	7:54	-	8:20	8:58	9:50	10:45	11:45	12:45	1:50	2:45	3:45	-	4:45	-	5:25	6:30	7:00	7:20	8:40	9:40	11:35
4	Natick Center		5:05	5:50	-	6:45	-	7:35	-	-	8:25	9:03	9:55	10:50	11:50	12:50	1:55	2:50	3:50	-	4:50	-	5:30	6:35	7:05	7:25	8:45	9:45	11:40
3	Wellesley Square		5:09	5:54	-	6:50	-	7:40	-	-	8:29	9:07	10:00	10:55	11:55	12:55	2:00	2:55	3:55	-	4:54	-	5:34	6:39	7:09	7:29	8:49	9:49	11:44
3	Wellesley Hills		5:13	5:58	-	6:54	-	7:44	-	-	8:33	9:11	10:03	10:58	11:58	12:58	2:03	2:58	3:58	-	4:57	-	5:37	6:42	7:12	7:32	8:52	9:52	11:47
3	Wellesley Farms		5:16	6:01	-	6:57	-	7:47	-	-	8:36	9:14	10:06	11:01	12:01	1:01	2:06	3:01	4:01	-	5:00	-	5:40	6:45	7:15	7:35	8:55	9:55	11:50
2	Auburndale		5:21	6:06	-	7:02	-	7:52	-	-	8:41	9:19	10:11	11:06	-	1:06	-	-	4:06	-	-	-	5:45	-	7:20	-	9:00	10:00	-
2	West Newton		5:24	6:09	-	7:05	-	7:55	-	-	8:44	9:22	10:14	11:09	-	1:09	-	-	4:09	-	-	-	5:48	-	7:23	-	9:03	10:03	-
1	Newtonville		5:27	6:13	-	7:09	-	7:59	-	-	8:48	9:26	10:17	11:12	-	1:12	-	-	4:12	-	-	-	5:51	-	7:26	-	9:06	10:06	-
1A	Boston Landing	↳	5:32	6:18	6:45	7:14	7:35	8:04	8:12	-	8:53	9:31	10:22	11:17	12:12	1:17	2:17	3:12	4:11	4:44	5:11	5:27	5:56	6:55	7:31	7:45	9:11	10:11	11:59
1A	Lansdowne	↳	5:37	6:23	6:54	7:19	7:40	8:09	8:17	8:30	8:58	9:36	10:27	11:22	12:17	1:22	2:22	3:17	4:22	4:49	5:16	5:32	6:01	7:00	7:36	7:50	9:16	10:16	12:04
1A	Back Bay	↳	L 5:44	L 6:30	L 7:04	L 7:27	L 7:50	L 8:17	L 8:27	L 8:39	L 9:05	L 9:43	L 10:37	L 11:32	L 12:27	L 1:32	L 2:32	L 3:27	L 4:38	L 5:01	L 5:23	L 5:45	L 6:07	L 7:07	L 7:42	L 7:57	L 9:25	L 10:25	L 12:12
1A	South Station	↳	5:50	6:36	7:10	7:33	7:56	8:23	8:33	8:45	9:11	9:49	10:43	11:38	12:33	1:38	2:38	3:33	4:39	5:07	5:29	5:50	6:13	7:13	7:48	8:03	9:30	10:30	12:18

Monday to Friday

Outbound from Boston

AM

PM

ZONE	STATION	TRAIN #	501	503	505	583	549	585	507	509	511	513	515	517	519	521	523	591	525	593	527	595	529	597	531	533	535	537	539	541
	Bikes Allowed																													
1A	South Station	↳	4:45	5:25	6:02	6:15	6:52	7:10	7:30	7:55	8:55	9:50	10:50	11:45	12:55	1:45	2:40	3:25	4:00	4:10	4:45	4:55	5:30	5:45	6:15	6:35	7:35	9:00	10:00	11:45
1A	Back Bay	↳	4:51	5:31	6:08	6:21	6:58	7:16	7:36	8:01	9:01	9:56	10:56	11:51	1:01	1:51	2:46	3:31	4:06	4:16	4:51	5:01	5:36	5:51	6:21	6:41	7:41	9:06	10:06	11:51
1A	Lansdowne	↳	4:56	5:36	6:13	6:26	7:03	7:21	7:41	8:06	9:06	10:01	11:01	11:56	1:06	1:56	2:51	3:36	4:11	4:21	4:56	5:06	5:41	5:56	6:26	6:46	7:46	9:11	10:11	11:56
1A	Boston Landing	↳	5:01	5:41	6:18	6:31	-	7:26	7:46	8:11	9:12	10:07	11:07	12:02	1:12	2:02	2:56	3:41	4:16	4:26	5:01	5:11	5:46	6:01	6:31	6:51	7:51	9:16	10:16	12:01
1	Newtonville		-	-	-	6:35	-	-	-	8:16	-	-	-	12:07	-	2:07	3:01	3:46	-	4:31	-	5:17	-	6:06	-	6:56	7:56	9:21	10:21	12:06
2	West Newton		-	-	-	6:38	-	-	-	8:19	-	-	-	12:10	-	2:10	3:04	3:50	-	4:35	-	5:21	-	6:10	-	7:00	7:59	9:24	10:24	12:09
2	Auburndale		-	-	-	6:41	-	-	-	8:22	-	-	-	12:13	-	2:13	3:07	3:53	-	4:38	-	5:24	-	6:13	-	7:03	8:02	9:27	10:27	12:12
3	Wellesley Farms		5:11	5:51	-	6:46	-	7:36	-	8:27	9:22	10:17	11:17	12:17	1:22	2:17	3:11	3:57	-	4:42	-	5:29	-	6:17	-	7:06	8:06	9:31	10:31	12:16
3	Wellesley Hills		5:13	5:53	-	6:48	-	7:38	-	8:29	9:24	10:19	11:19	12:19	1:24	2:19	3:13	4:00	-	4:45	-	5:32	-	6:20	-	7:08	8:08	9:33	10:33	12:18
3	Wellesley Square		5:16	5:56	6:31	6:51	-	7:41	-	8:32	9:27	10:22	11:22	12:22	1:27	2:22	3:16	4:03	-	4:48	-	5:36	-	6:23	-	7:11	8:11	9:36	10:36	12:21
4	Natick Center		5:20	6:00	-	6:55	-	7:45	-	8:37	9:32	10:27	11:27	12:27	1:32	2:27	3:20	4:07	-	4:52	-	5:41	-	6:27	-	7:15	8:15	9:40	10:40	12:25
4	West Natick	↳	5:25	6:05	-	7:00	-	7:50	-	8:42	9:37	10:32	11:32	12:32	1:37	2:32	3:25	4:12	4:33	4:57	5:18	5:46	6:03	6:32	6:48	7:20	8:20	9:45	10:45	12:30
5	Framingham	↳	5:30	6:10	6:43	7:07	7:26	7:57	8:07	8:47	9:42	10:37	11:37	12:37	1:42	2:37	3:30	4:19	4:38	5:04	5:23	5:54	6:08	6:40	6:53	7:25	8:25	9:50	10:50	12:35
6	Ashland	↳	5:36	6:16	6:49	-	-	-	8:13	8:53	9:48	10:43	11:43	12:43	1:48	2:43	3:36	-	4:44	-	5:29	-	6:14	-	6:59	7:31	8:31	9:56	10:56	12:41
6	Southborough	↳	5:41	6:21	6:54	-	-	-	8:18	8:58	9:53	10:48	11:48	12:48	1:53	2:48	3:41	-	4:49	-	5:34	-	6:19	-	7:04	7:36	8:36	10:01	11:01	12:46
7	Westborough	↳	5:50	6:30	7:03	-	-	-	8:27	9:07	10:02	10:57	11:57	12:57	2:02	2:57	3:50	-	4:58	-	5:43	-	6:28	-	7:13	7:45	8:45	10:10	11:10	12:55
8	Grafton	↳	5:55	6:35	7:08	-	-	-	8:32	9:12	10:07	11:02	12:02	1:02	2:07	3:02	3:55	-	5:04	-	5:49	-	6:34	-	7:19	7:50	8:50	10:15	11:15	1:00
8	Worcester	↳	6:11	6:52	7:25	-	7:58	-	8:49	9:31	10:26	11:21	12:21	1:21	2:26	3:21	4:14	-	5:24	-	6:10	-	6:55	-	7:39	8:10	9:09	10:34	11:34	1:19

Weekend

Inbound to Boston

AM

PM

ZONE	SATURDAY TRAIN #	1500	1502	1504	1506	1508	1510	1512	1514	1516	1518
	SUNDAY TRAIN #	2500	2502	2504	2506	2508	2510	2512	2514	2516	2518
	Bikes Allowed										
8 Worcester	↳	5:10	7:10	9:10	11:10	1:10	3:10	5:10	6:55	9:10	11:25
8 Grafton	↳	5:23	7:23	9:23	11:23	1:23	3:23	5:23	7:08	9:23	11:38
7 Westborough	↳	5:27	7:27	9:27	11:27	1:27	3:27	5:27	7:12	9:27	11:42
6 Southborough	↳	5:36	7:36	9:36	11:36	1:36	3:36	5:36	7:21	9:36	11:51
6 Ashland	↳	5:40	7:40	9:40	11:40	1:40	3:40	5:40	7:25	9:40	11:55
5 Framingham	↳	5:50	7:50	9:50	11:50	1:50	3:50	5:50	7:35	9:50	12:05
4 West Natick	↳	5:55	7:55	9:55	11:55	1:55	3:55	5:55	7:40	9:55	12:10
4 Natick Center		6:00	8:00	10:00	12:00	2:00	4:00	6:00	7:45	10:00	12:15
3 Wellesley Square		6:04	8:04	10:04	12:04	2:04	4:04	6:04	7:49	10:04	12:19
3 Wellesley Hills		6:07	8:07	10:07	12:07	2:07	4:07	6:07	7:52	10:07	12:22
3 Wellesley Farms		6:10	8:10	10:10	12:10	2:10	4:10	6:10	7:55	10:10	12:25
2 Auburndale		6:15	8:15	10:15	12:15	2:15	4:15	6:15	8:00	10:15	12:30
2 West Newton		6:18	8:18	10:18	12:18	2:18	4:18	6:18	8:03	10:18	12:33
1 Newtonville		6:21	8:21	10:21	12:21	2:21	4:21	6:21	8:06	10:21	12:36
1A Boston Landing	↳	6:26	8:26	10:26	12:26	2:26	4:26	6:26	8:11	10:26	12:41
1A Lansdowne	↳	6:31	8:31	10:31	12:31	2:31	4:31	6:31	8:16	10:31	12:46
1A Back Bay	↳	6:40	8:40	10:40	12:40	2:40	4:40	6:40	8:25	10:40	12:55
1A South Station	↳	6:45	8:45	10:45	12:45	2:45	4:45	6:45	8:30	10:45	1:00

Weekday schedule

04:45 AM	<div>57</div>	Haymarket via Kenmore	▼
05:19 AM	<div>57</div>	Kenmore	▼
05:37 AM	<div>57</div>	Kenmore	▼
05:55 AM	<div>57</div>	Kenmore	▼
06:09 AM	<div>57</div>	Kenmore	▼
06:21 AM	<div>57</div>	Kenmore	▼
06:33 AM	<div>57</div>	Kenmore	▼
06:43 AM	<div>57</div>	Kenmore	▼
06:53 AM	<div>57</div>	Kenmore	▼
07:01 AM	<div>57</div>	Kenmore	▼
07:13 AM	<div>57</div>	Kenmore	▼
07:25 AM	<div>57</div>	Kenmore	▼
07:38 AM	<div>57</div>	Kenmore	▼
07:48 AM	<div>57</div>	Kenmore	▼
08:00 AM	<div>57</div>	Kenmore	▼
08:10 AM	<div>57</div>	Kenmore	▼
08:20 AM	<div>57</div>	Kenmore	▼
08:30 AM	<div>57</div>	Kenmore	▼
08:40 AM	<div>57</div>	Kenmore	▼
08:50 AM	<div>57</div>	Kenmore	▼
09:00 AM	<div>57</div>	Kenmore	▼
09:10 AM	<div>57</div>	Kenmore	▼
09:17 AM	<div>57</div>	Kenmore	▼
09:24 AM	<div>57</div>	Kenmore	▼
09:31 AM	<div>57</div>	Kenmore	▼
09:39 AM	<div>57</div>	Kenmore	▼
09:47 AM	<div>57</div>	Kenmore	▼
09:56 AM	<div>57</div>	Kenmore	▼
10:05 AM	<div>57</div>	Kenmore	▼
10:14 AM	<div>57</div>	Kenmore	▼
10:24 AM	<div>57</div>	Kenmore	▼
10:34 AM	<div>57</div>	Kenmore	▼
10:44 AM	<div>57</div>	Kenmore	▼
10:54 AM	<div>57</div>	Kenmore	▼
11:04 AM	<div>57</div>	Kenmore	▼
11:15 AM	<div>57</div>	Kenmore	▼
11:26 AM	<div>57</div>	Kenmore	▼
11:37 AM	<div>57</div>	Kenmore	▼
11:49 AM	<div>57</div>	Kenmore	▼
12:01 PM	<div>57</div>	Kenmore	▼

12:13 PM	<div>57</div>	Kenmore	▼
12:24 PM	<div>57</div>	Kenmore	▼
12:36 PM	<div>57</div>	Kenmore	▼
12:48 PM	<div>57</div>	Kenmore	▼
12:59 PM	<div>57</div>	Kenmore	▼
01:10 PM	<div>57</div>	Kenmore	▼
01:21 PM	<div>57</div>	Kenmore	▼
01:32 PM	<div>57</div>	Kenmore	▼
01:43 PM	<div>57</div>	Kenmore	▼
01:54 PM	<div>57</div>	Kenmore	▼
02:05 PM	<div>57</div>	Kenmore	▼
02:16 PM	<div>57</div>	Kenmore	▼
02:27 PM	<div>57</div>	Kenmore	▼
02:39 PM	<div>57</div>	Kenmore	▼
02:50 PM	<div>57</div>	Kenmore	▼
03:04 PM	<div>57</div>	Kenmore	▼
03:18 PM	<div>57</div>	Kenmore	▼
03:30 PM	<div>57</div>	Kenmore	▼
03:42 PM	<div>57</div>	Kenmore	▼
03:53 PM	<div>57</div>	Kenmore	▼
04:04 PM	<div>57</div>	Kenmore	▼
04:15 PM	<div>57</div>	Kenmore	▼
04:27 PM	<div>57</div>	Kenmore	▼
04:39 PM	<div>57</div>	Kenmore	▼
04:49 PM	<div>57</div>	Kenmore	▼
04:59 PM	<div>57</div>	Kenmore	▼
05:11 PM	<div>57</div>	Kenmore	▼
05:22 PM	<div>57</div>	Kenmore	▼
05:33 PM	<div>57</div>	Kenmore	▼
05:42 PM	<div>57</div>	Kenmore	▼
05:51 PM	<div>57</div>	Kenmore	▼
06:00 PM	<div>57</div>	Kenmore	▼
06:09 PM	<div>57</div>	Kenmore	▼
06:18 PM	<div>57</div>	Kenmore	▼
06:27 PM	<div>57</div>	Kenmore	▼
06:35 PM	<div>57</div>	Kenmore	▼
06:43 PM	<div>57</div>	Kenmore	▼
06:51 PM	<div>57</div>	Kenmore	▼
07:02 PM	<div>57</div>	Kenmore	▼
07:15 PM	<div>57</div>	Kenmore	▼

07:28 PM	<div>57</div>	Kenmore	▼
07:41 PM	<div>57</div>	Kenmore	▼
07:54 PM	<div>57</div>	Kenmore	▼
08:04 PM	<div>57</div>	Kenmore	▼
08:16 PM	<div>57</div>	Kenmore	▼
08:30 PM	<div>57</div>	Kenmore	▼
08:44 PM	<div>57</div>	Kenmore	▼
08:58 PM	<div>57</div>	Kenmore	▼
09:12 PM	<div>57</div>	Kenmore	▼
09:26 PM	<div>57</div>	Kenmore	▼
09:39 PM	<div>57</div>	Kenmore	▼
09:52 PM	<div>57</div>	Kenmore	▼
10:06 PM	<div>57</div>	Kenmore	▼
10:21 PM	<div>57</div>	Kenmore	▼
10:35 PM	<div>57</div>	Kenmore	▼
10:48 PM	<div>57</div>	Kenmore	▼
11:08 PM	<div>57</div>	Kenmore	▼
11:28 PM	<div>57</div>	Kenmore	▼
11:48 PM	<div>57</div>	Kenmore	▼
12:08 AM	<div>57</div>	Kenmore	▼
12:28 AM	<div>57</div>	Kenmore	▼
12:48 AM	<div>57</div>	Kenmore	▼

Bus #57: 102 weekday trips,  
93 weekend trips



Weekend schedule

Departs	Destination	Trip Details
04:48 AM	<div><div></div>57 Haymarket via Kenmore</div>	▼
05:20 AM	<div><div></div>57 Kenmore</div>	▼
05:35 AM	<div><div></div>57 Kenmore</div>	▼
05:50 AM	<div><div></div>57 Kenmore</div>	▼
06:06 AM	<div><div></div>57 Kenmore</div>	▼
06:23 AM	<div><div></div>57 Kenmore</div>	▼
06:38 AM	<div><div></div>57 Kenmore</div>	▼
06:51 AM	<div><div></div>57 Kenmore</div>	▼
07:04 AM	<div><div></div>57 Kenmore</div>	▼
07:19 AM	<div><div></div>57 Kenmore</div>	▼
07:33 AM	<div><div></div>57 Kenmore</div>	▼
07:47 AM	<div><div></div>57 Kenmore</div>	▼
08:00 AM	<div><div></div>57 Kenmore</div>	▼
08:14 AM	<div><div></div>57 Kenmore</div>	▼
08:28 AM	<div><div></div>57 Kenmore</div>	▼
08:42 AM	<div><div></div>57 Kenmore</div>	▼
09:00 AM	<div><div></div>57 Kenmore</div>	▼
09:15 AM	<div><div></div>57 Kenmore</div>	▼
09:30 AM	<div><div></div>57 Kenmore</div>	▼
09:44 AM	<div><div></div>57 Kenmore</div>	▼
09:58 AM	<div><div></div>57 Kenmore</div>	▼
10:10 AM	<div><div></div>57 Kenmore</div>	▼
10:22 AM	<div><div></div>57 Kenmore</div>	▼
10:34 AM	<div><div></div>57 Kenmore</div>	▼
10:46 AM	<div><div></div>57 Kenmore</div>	▼
10:58 AM	<div><div></div>57 Kenmore</div>	▼
11:09 AM	<div><div></div>57 Kenmore</div>	▼
11:20 AM	<div><div></div>57 Kenmore</div>	▼
11:31 AM	<div><div></div>57 Kenmore</div>	▼
11:43 AM	<div><div></div>57 Kenmore</div>	▼
11:58 AM	<div><div></div>57 Kenmore</div>	▼
12:10 PM	<div><div></div>57 Kenmore</div>	▼
12:22 PM	<div><div></div>57 Kenmore</div>	▼
12:34 PM	<div><div></div>57 Kenmore</div>	▼
12:46 PM	<div><div></div>57 Kenmore</div>	▼
12:58 PM	<div><div></div>57 Kenmore</div>	▼
01:10 PM	<div><div></div>57 Kenmore</div>	▼
01:22 PM	<div><div></div>57 Kenmore</div>	▼
01:34 PM	<div><div></div>57 Kenmore</div>	▼

01:46 PM	<div><div></div>57 Kenmore</div>	▼
01:56 PM	<div><div></div>57 Kenmore</div>	▼
02:06 PM	<div><div></div>57 Kenmore</div>	▼
02:18 PM	<div><div></div>57 Kenmore</div>	▼
02:30 PM	<div><div></div>57 Kenmore</div>	▼
02:41 PM	<div><div></div>57 Kenmore</div>	▼
02:53 PM	<div><div></div>57 Kenmore</div>	▼
03:05 PM	<div><div></div>57 Kenmore</div>	▼
03:16 PM	<div><div></div>57 Kenmore</div>	▼
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03:40 PM	<div><div></div>57 Kenmore</div>	▼
03:51 PM	<div><div></div>57 Kenmore</div>	▼
04:03 PM	<div><div></div>57 Kenmore</div>	▼
04:15 PM	<div><div></div>57 Kenmore</div>	▼
04:26 PM	<div><div></div>57 Kenmore</div>	▼
04:38 PM	<div><div></div>57 Kenmore</div>	▼
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09:04 PM	<div><div></div>57 Kenmore</div>	▼
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09:28 PM	<div><div></div>57 Kenmore</div>	▼
09:37 PM	<div><div></div>57 Kenmore</div>	▼
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10:02 PM	<div><div></div>57 Kenmore</div>	▼
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10:29 PM	<div><div></div>57 Kenmore</div>	▼
10:44 PM	<div><div></div>57 Kenmore</div>	▼
11:01 PM	<div><div></div>57 Kenmore</div>	▼
11:18 PM	<div><div></div>57 Kenmore</div>	▼
11:34 PM	<div><div></div>57 Kenmore</div>	▼
11:51 PM	<div><div></div>57 Kenmore</div>	▼
12:08 AM	<div><div></div>57 Kenmore</div>	▼
12:25 AM	<div><div></div>57 Kenmore</div>	▼
12:42 AM	<div><div></div>57 Kenmore</div>	▼
01:00 AM	<div><div></div>57 Kenmore</div>	▼