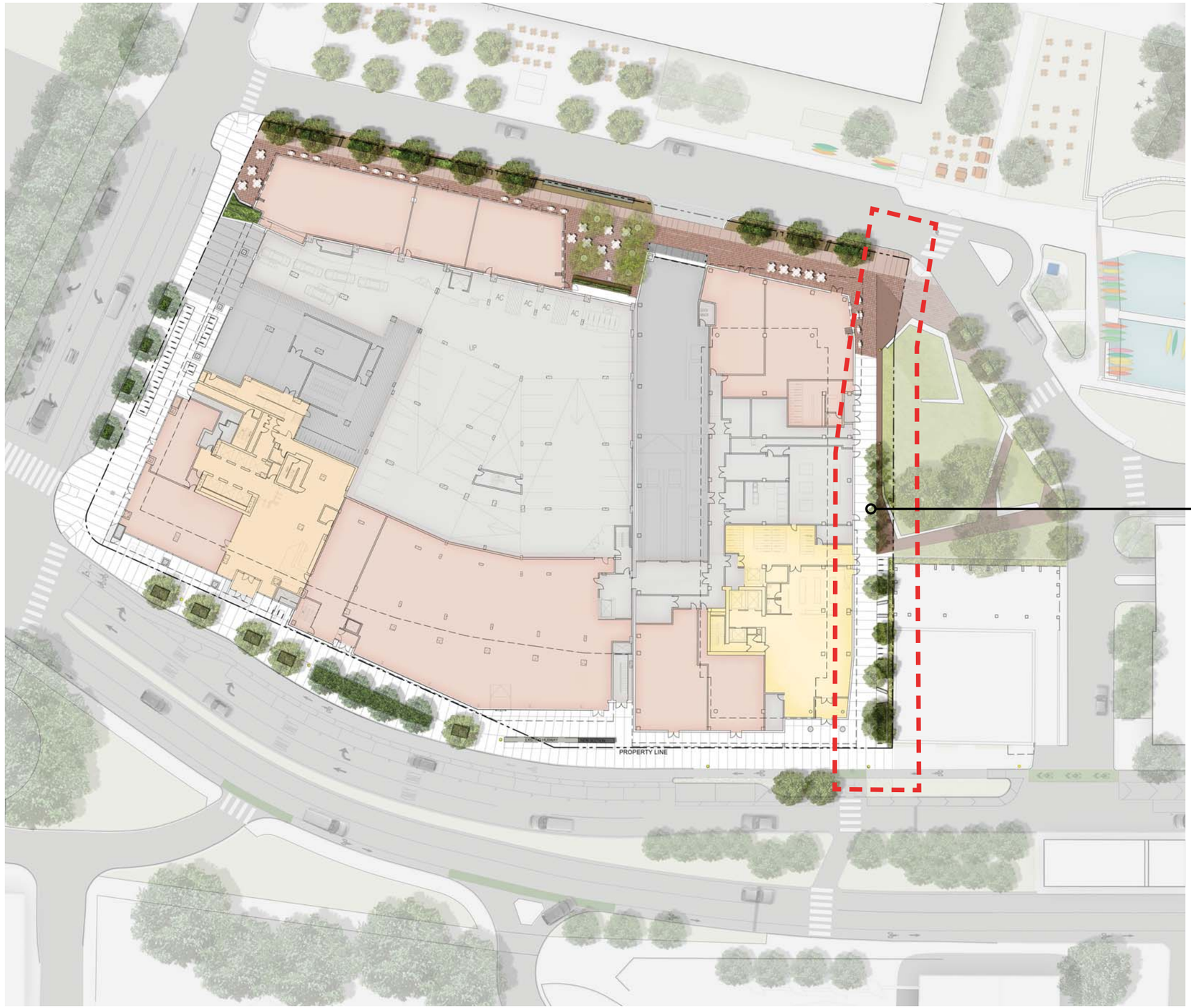

© ELKUS MANFREDI ARCHITECTS

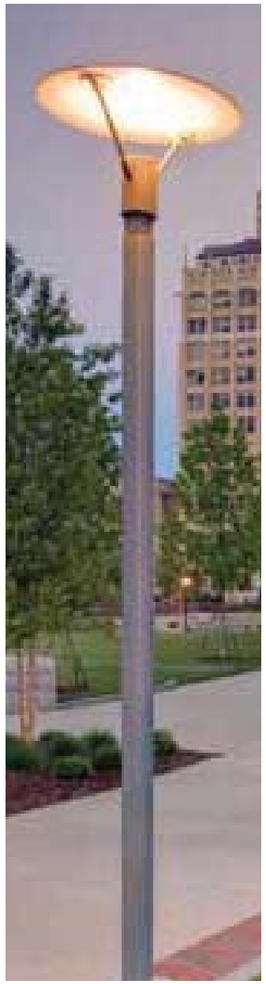


(II) CONNECTOR

SCALE 1"=60'

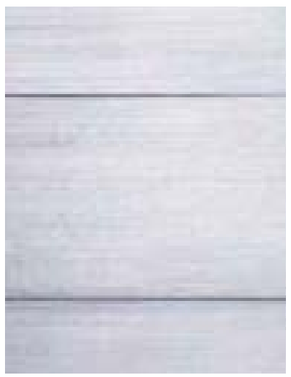
0 60' 120'

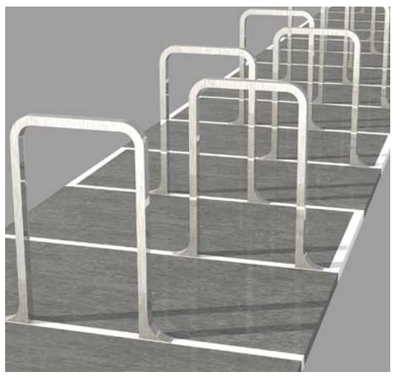
FOLDING PRECAST CONCRETE



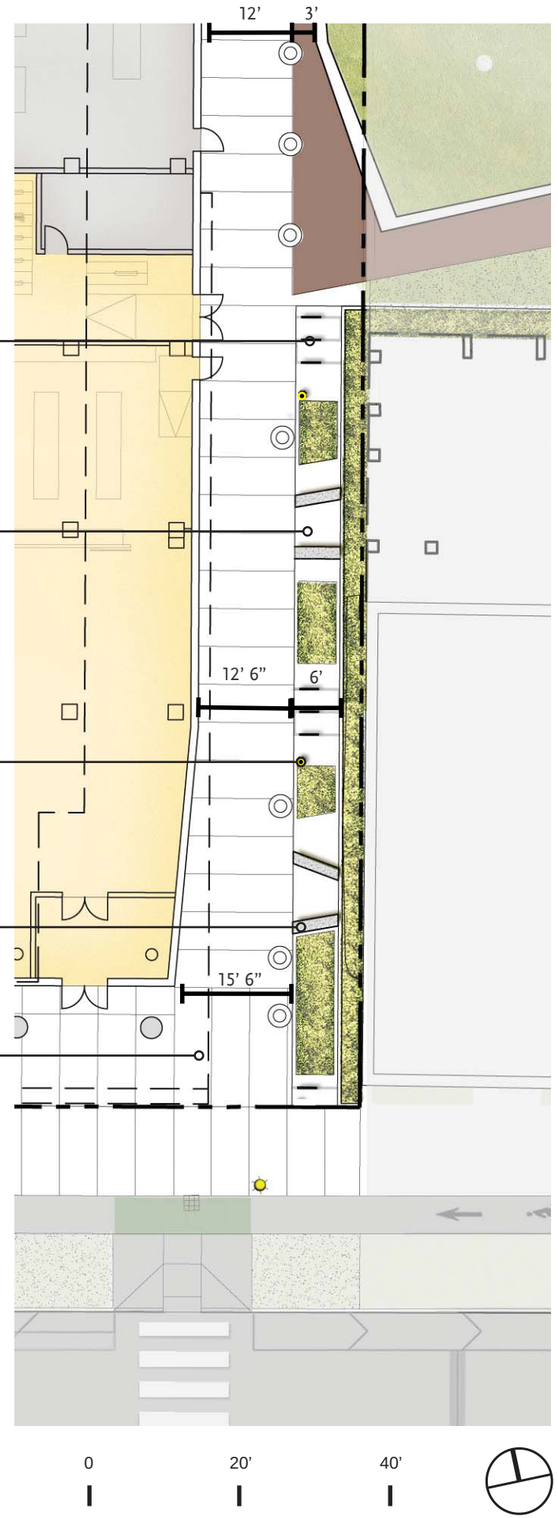
PEDESTRIAN LIGHT

POUR-IN-PLACE CONCRETE





SCULPTURAL BIKE RACKS



HORNBEAM

BLUE FESCUE GRASS

SOFT RUSH

CINNAMON FERN

IRIS

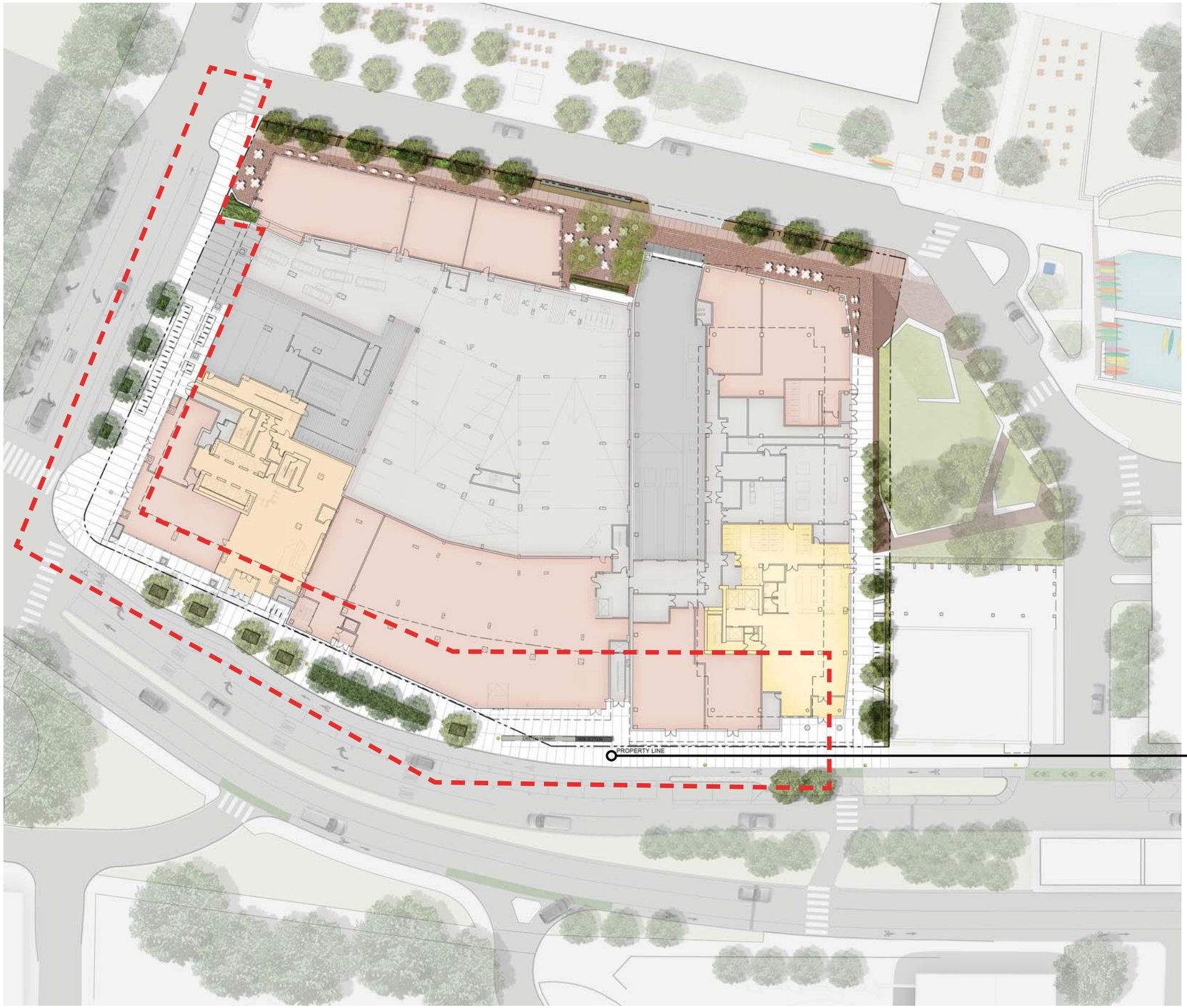
TREE PLANTING
HORNBEAM CORRIDOR
CONTINUED INTO
TRIANGLE PLACE

TREE PLANTING
HORNBEAM CORRIDOR

PLANTING
BLUE FESCUE GRASS
SOFT RUSH
CINNAMON FERN
IRIS

SCALE 1"=20'

0 20' 40'



(III) STREET (MAIN / BROADWAY / THIRD)

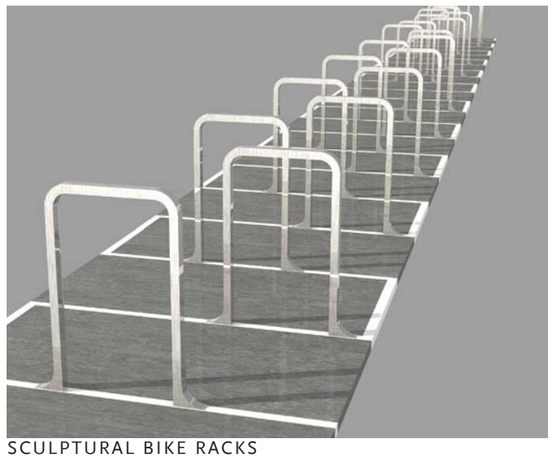
SCALE 1"=60'

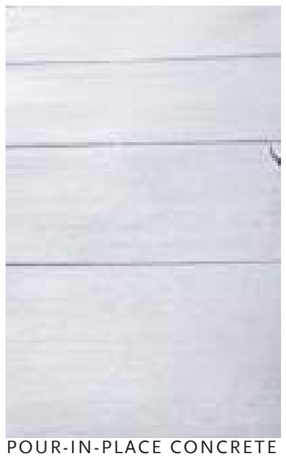
0 60' 120'


HUBWAY BIKE RACK


PLANTER ISLANDS


LONDON PLANE CANOPY TREE


SCULPTURAL BIKE RACKS


POUR-IN-PLACE CONCRETE

SCALE 1"=30'

0 30' 60'

COMMON HORNBEAM
Carpinus betulus 'Festigiata'

HONEY LOCUST
Gleditsia triacanthos

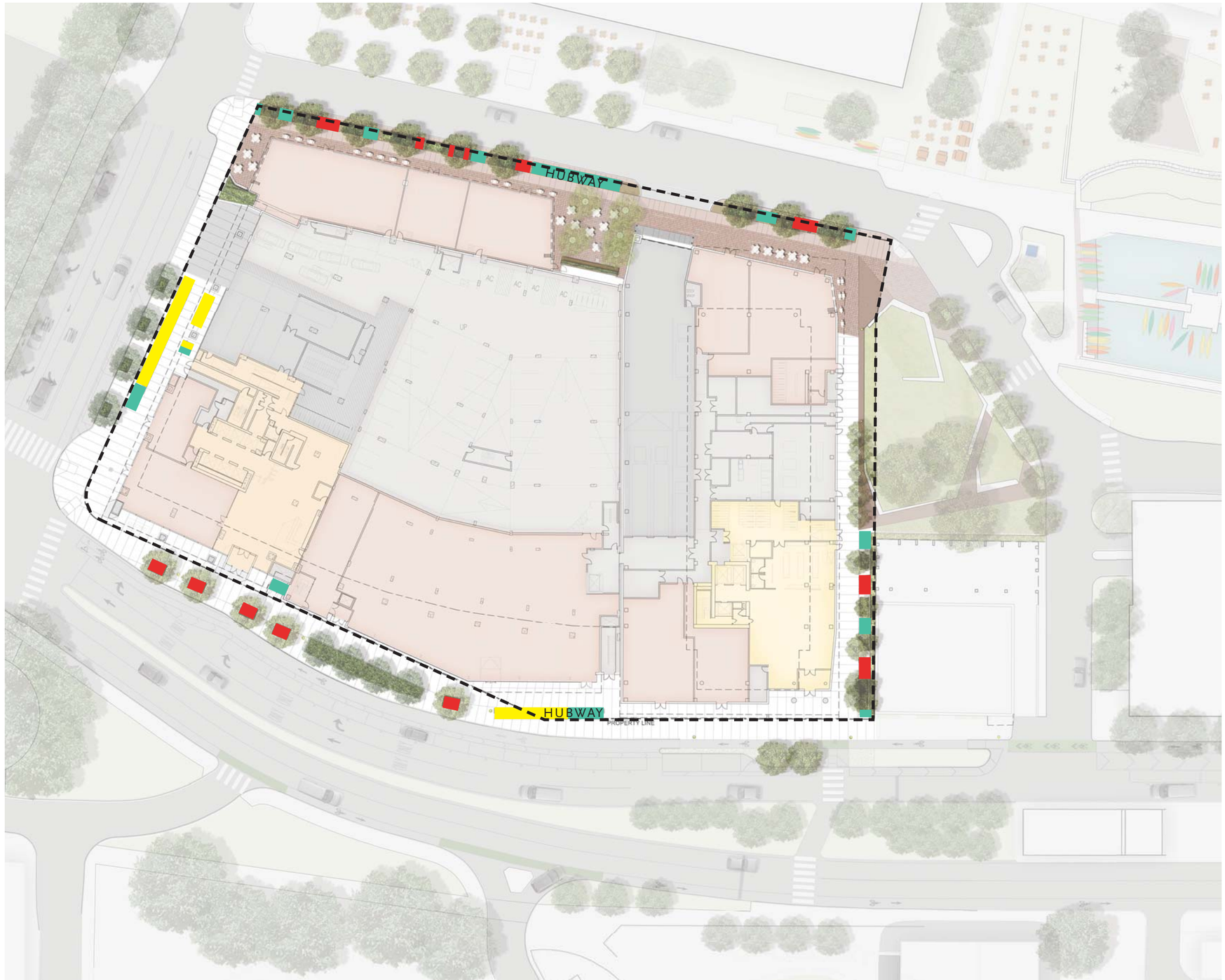
LONDON PLANE
Platanus × acerifolia

SILVER BIRCH
Betula pendula

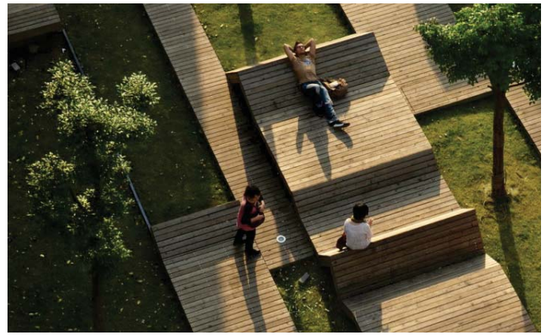
EXISTING TREES

SCALE 1"=60'

0 60' 120'



SEATING- MAIN STREET PLANTERS



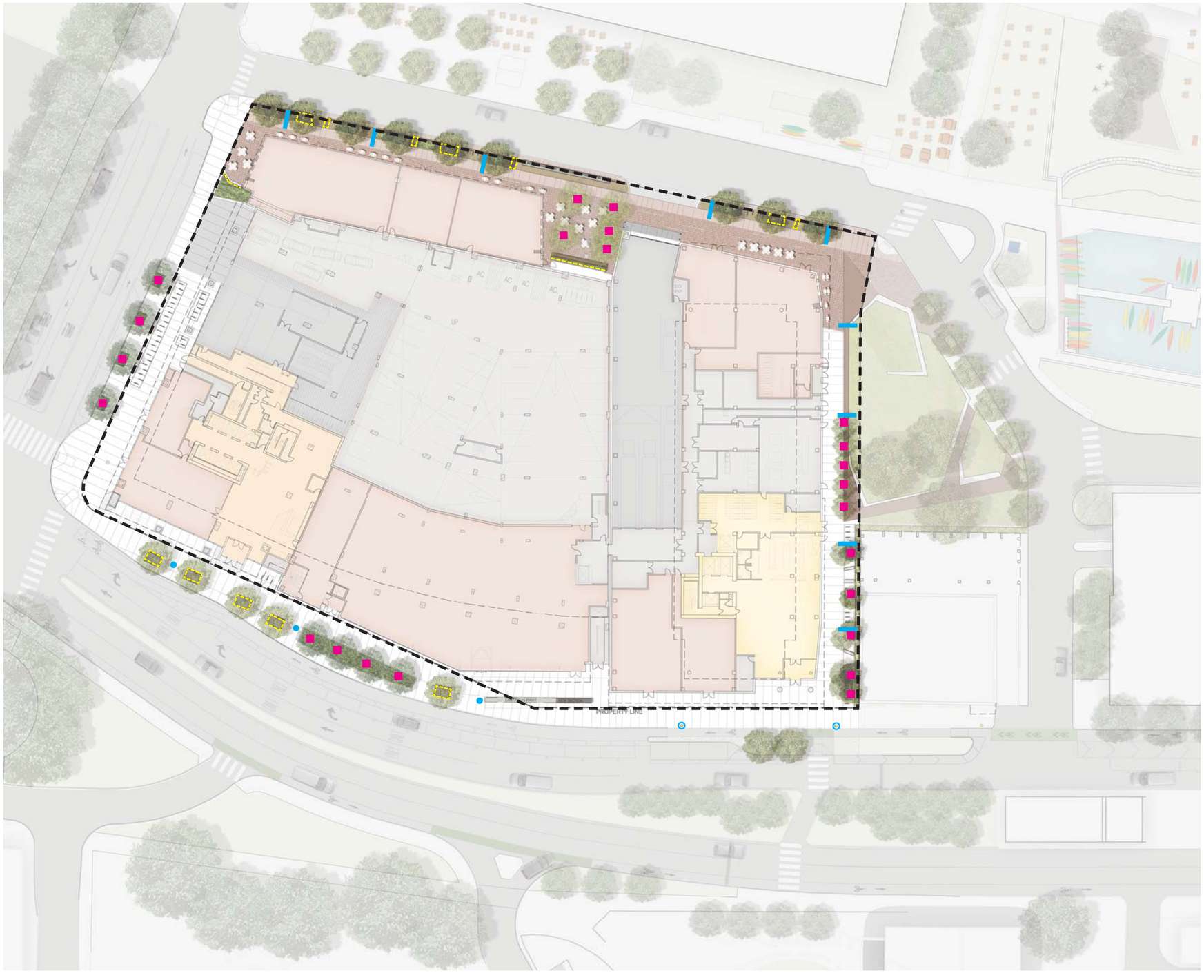
SEATING- BROAD CANAL WAY RIBBON

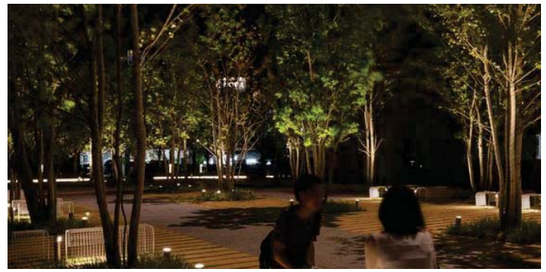
SEATING- CORRIDOR RIBBON

RELOCATED EXISTING BIKE PARKING
+
SEATING
+
BIKE PARKING

SCALE 1"=60'

0 60' 120'





TREE UPLIGHTING

PEDESTRIAN LIGHTS

PLANTER ISLAND /FURNITURE LIGHTING

EXISTING STREET LAMPS

RELOCATED EXISTING STREET LAMPS

TREE UPLIGHTING

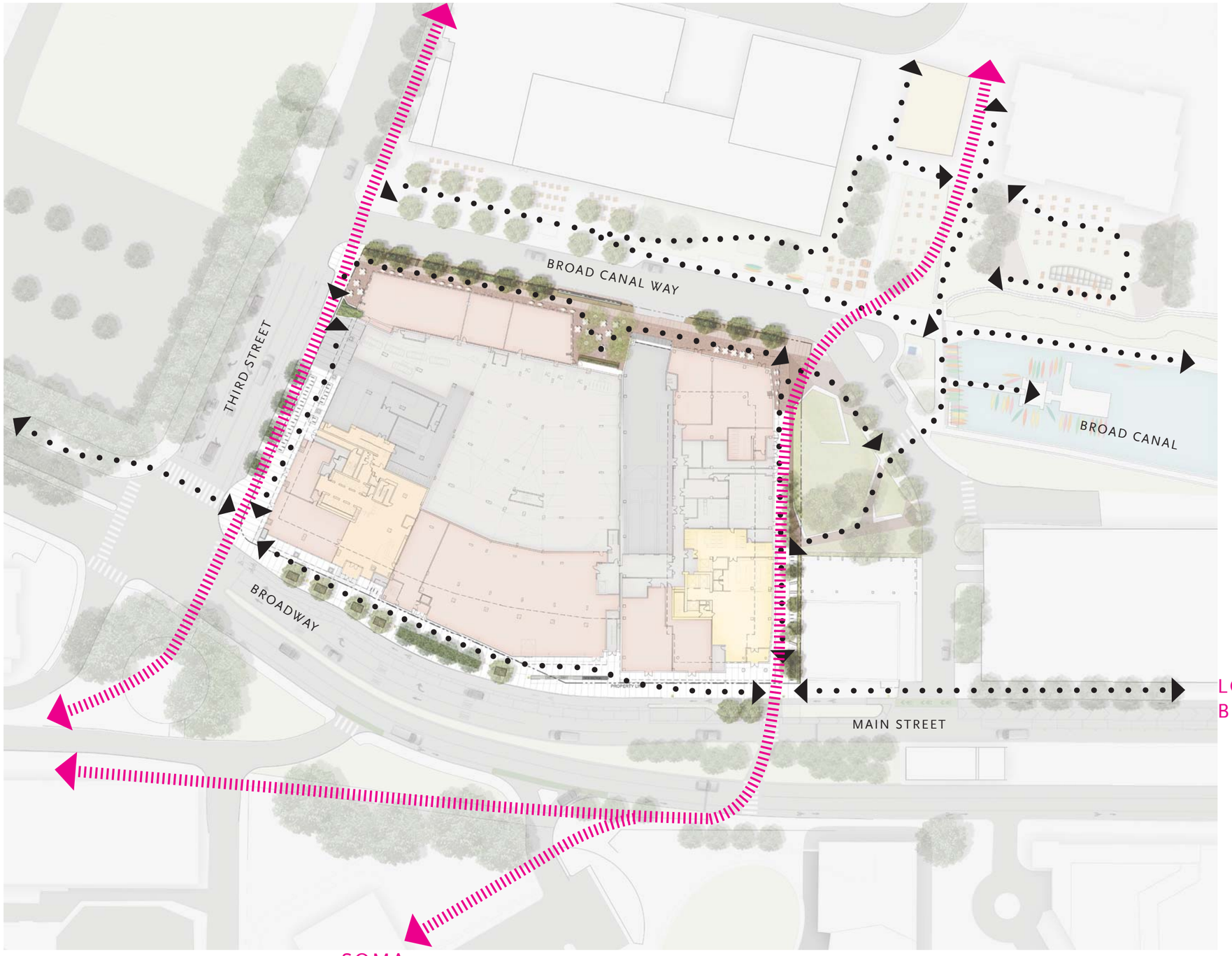
PEDESTRIAN LIGHTS

FURNITURE LIGHTING

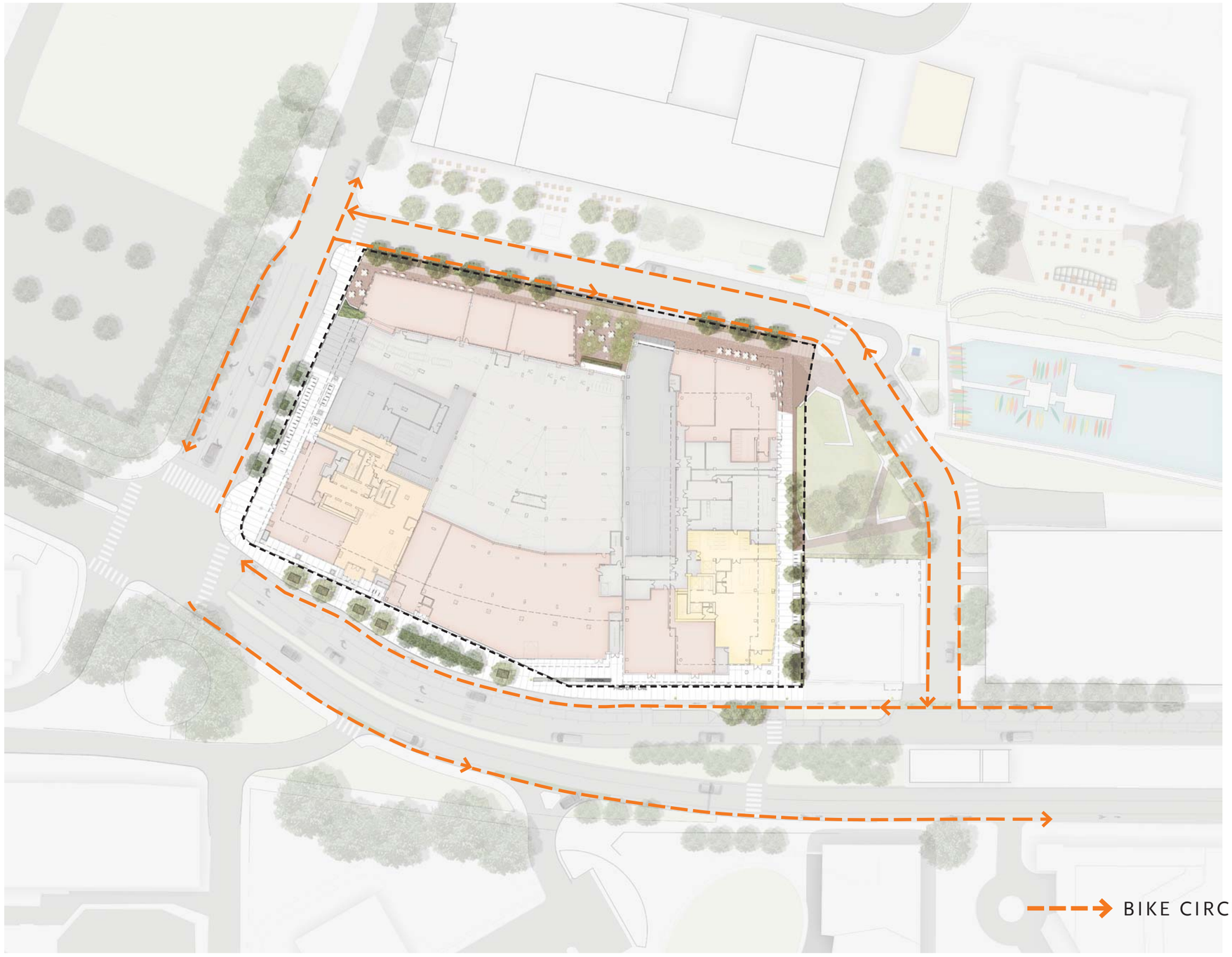
SCALE 1"=60'

0 60' 120'

EAST CAMBRIDGE



NOT TO SCALE



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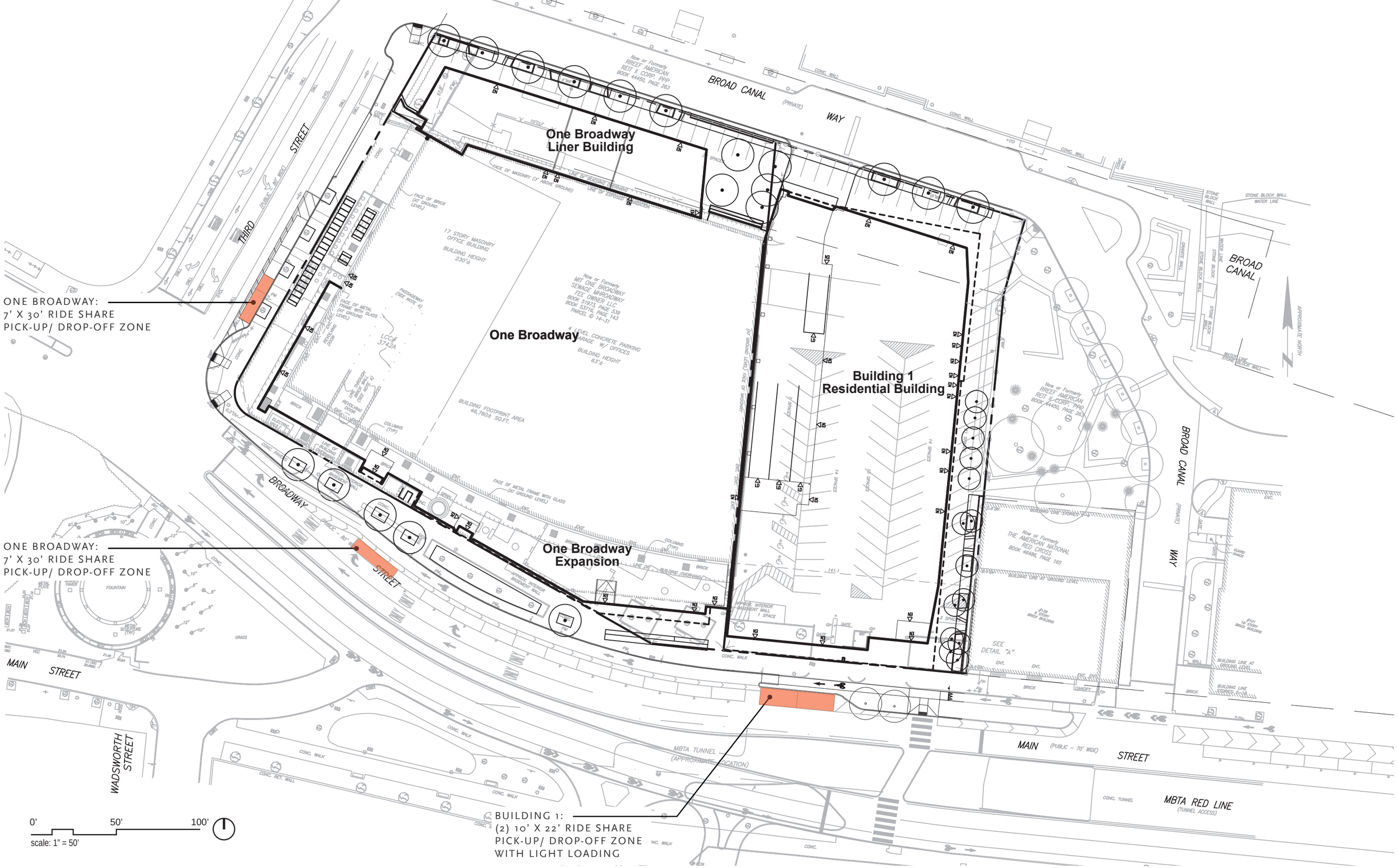
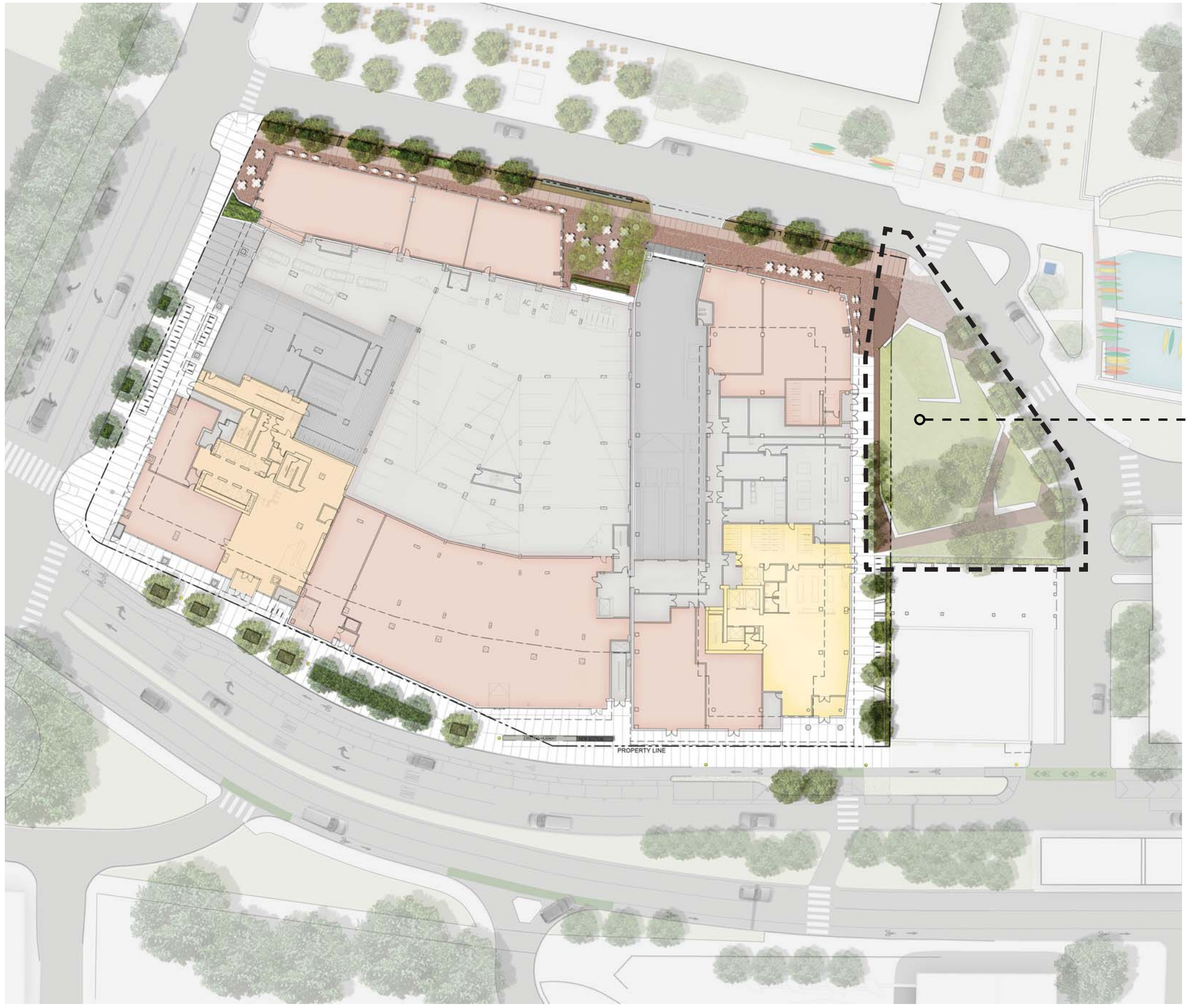
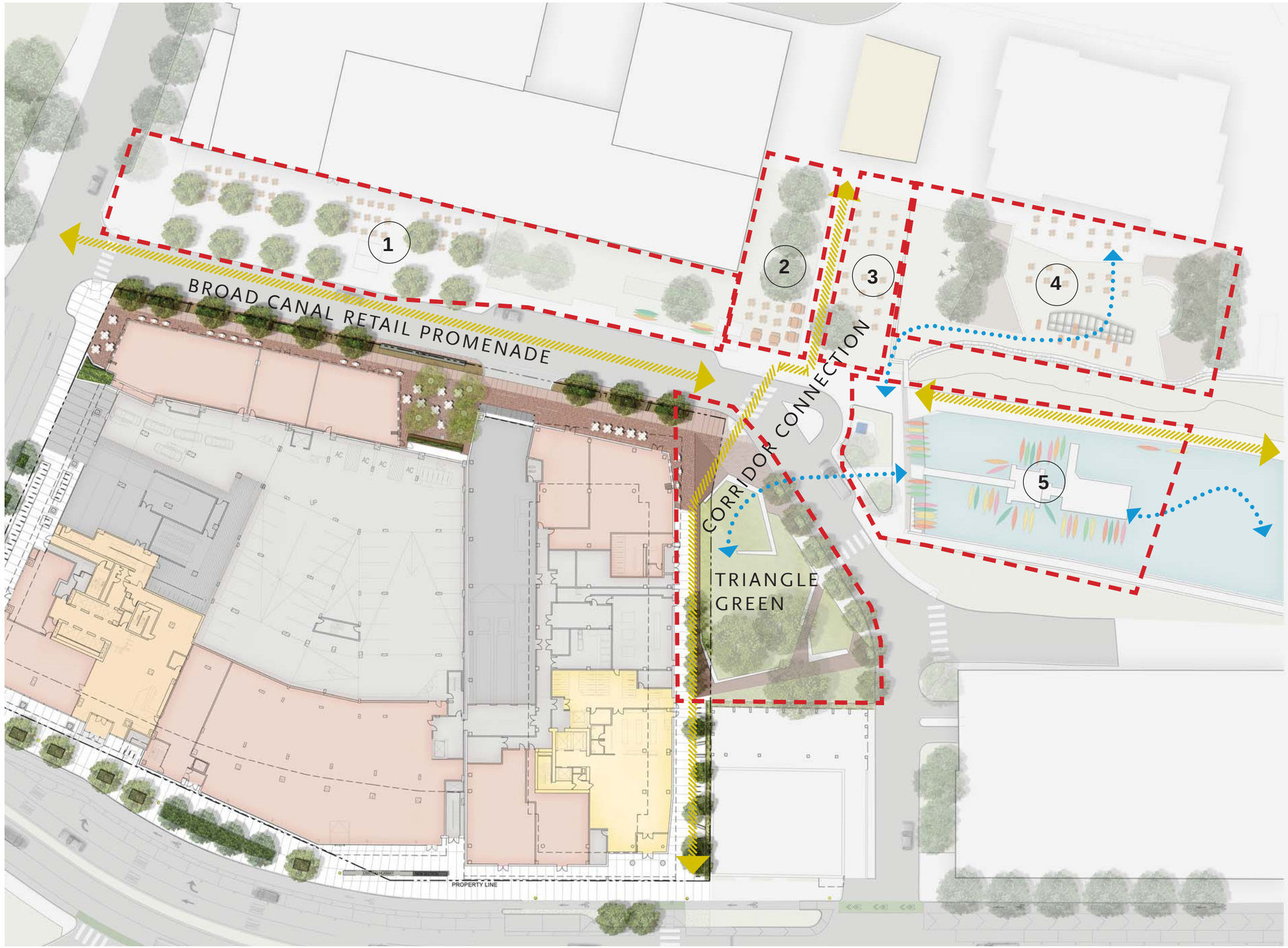

One Broadway
Liner Building
One Broadway
One Broadway
Expansion
Building 1
Residential Building
BROAD CANAL
(PRIVATE) WAY
BROAD CANAL
THIRD STREET
BROADWAY STREET
MAIN STREET
WADSWORTH STREET
MBTA TUNNEL
(APPROXIMATE LOCATION)
MBTA RED LINE
(TUNNEL ACCESS)
17 STORY MASONRY OFFICE BUILDING
BUILDING HEIGHT 230'±
4 LEVEL CONCRETE PARKING GARAGE W/ OFFICES
BUILDING HEIGHT 63'±
BUILDING FOOTPRINT AREA 46,780± SQ.FT.
Now or Formerly
MIT ONE BROADWAY
SEWAGE MHBROADWAY
FEE OWNER, LLC
BOOK 53773, PAGE 339
BOOK 53716, PAGE 143
PARCEL ID 1F-31
Now or Formerly
FREEF AMERICAN
REIT II, CORP. PPP
BOOK 44450, PAGE 263
Now or Formerly
THE AMERICAN NATIONAL
RED CROSS
BOOK 46486, PAGE 185
ONE BROADWAY:
7' X 30' RIDE SHARE
PICK-UP/ DROP-OFF ZONE
ONE BROADWAY:
7' X 30' RIDE SHARE
PICK-UP/ DROP-OFF ZONE
BUILDING 1:
(2) 10' X 22' RIDE SHARE
PICK-UP/ DROP-OFF ZONE
WITH LIGHT LOADING
0'
50'
100'
scale: 1" = 50'



TRIANGLE GREEN

SCALE 1”=60’

0 60’ 120’



EXISTING CONDITIONS

1.

2.

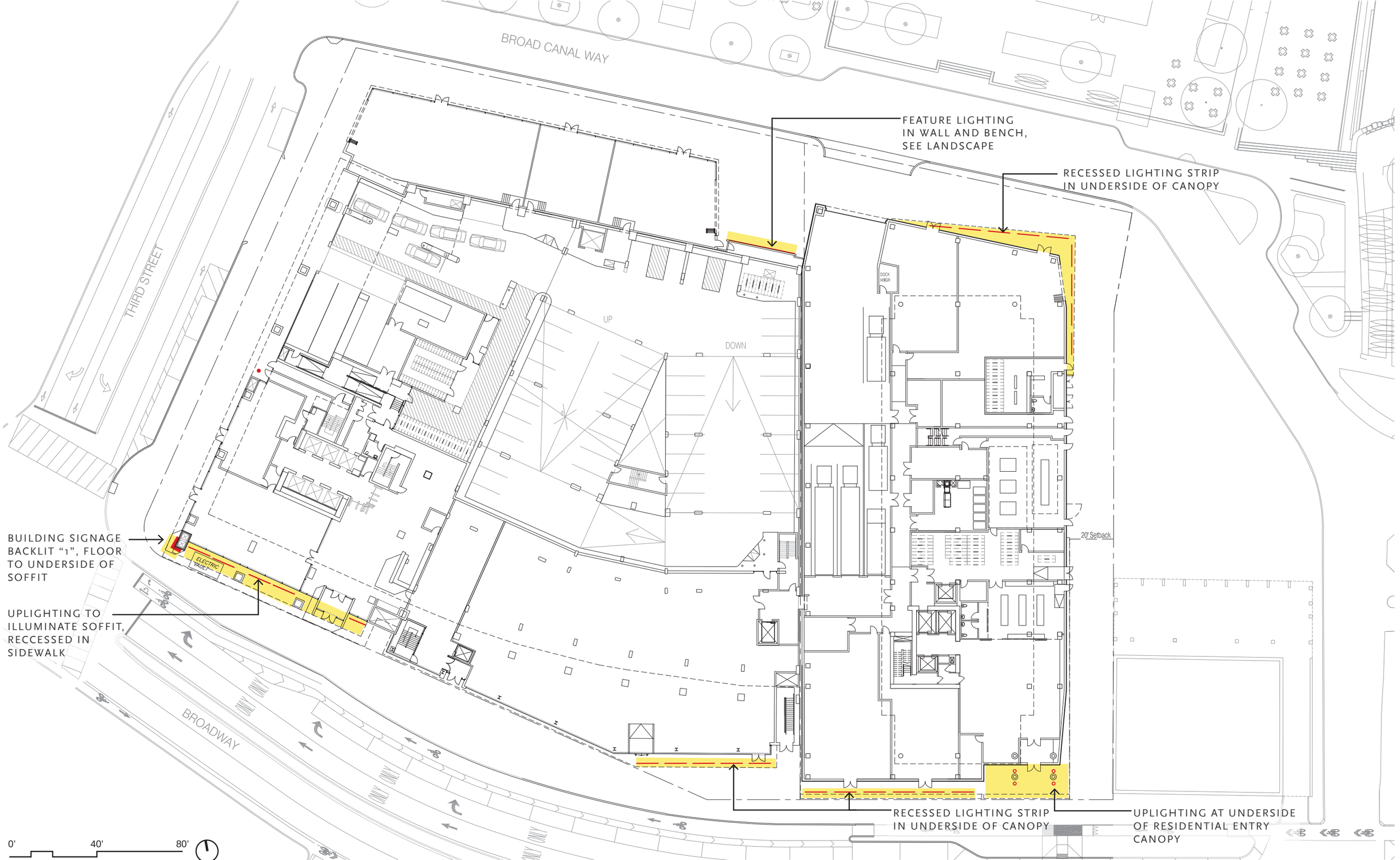
3.

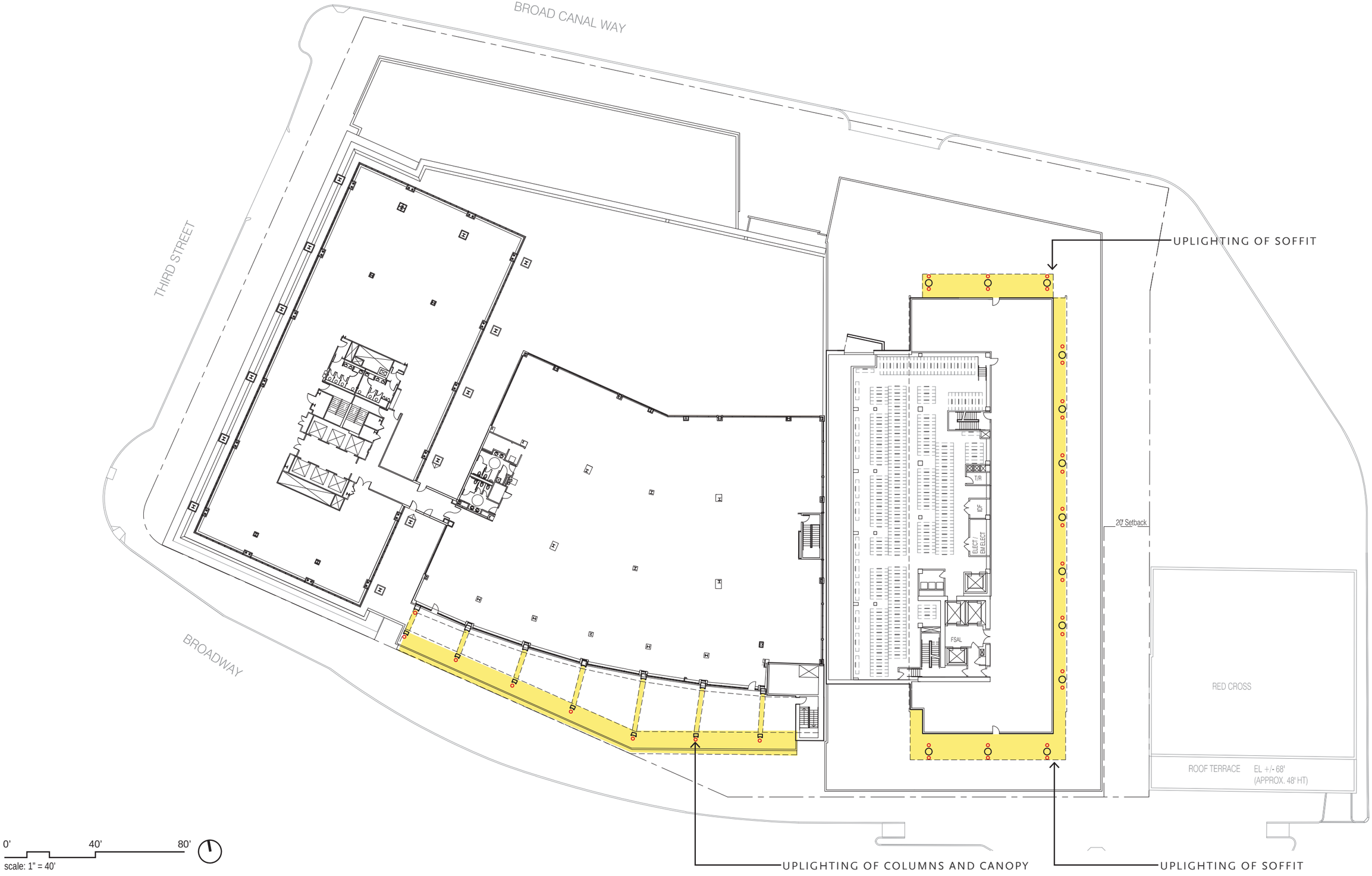
4.

5.

SCALE 1"=60'

0 60' 120'


BROAD CANAL WAY
THIRD STREET
FEATURE LIGHTING IN WALL AND BENCH, SEE LANDSCAPE
RECESSED LIGHTING STRIP IN UNDERSIDE OF CANOPY
BUILDING SIGNAGE BACKLIT "ı", FLOOR TO UNDERSIDE OF SOFFIT
UPLIGHTING TO ILLUMINATE SOFFIT, RECCESSED IN SIDEWALK
UP
DOWN
DOCK MNGR
20' Setback
ELECTRIC VAULT
BROADWAY
RECESSED LIGHTING STRIP IN UNDERSIDE OF CANOPY
UPLIGHTING AT UNDERSIDE OF RESIDENTIAL ENTRY CANOPY
0'
40'
80'
scale: 1" = 40'


BROAD CANAL WAY
THIRD STREET
BROADWAY
UPLIGHTING OF SOFFIT
20' Setback
T/R
DF
ELECT/ EM ELECT
FSAL
RED CROSS
ROOF TERRACE
EL +/- 68'
(APPROX. 48' HT)
UPLIGHTING OF COLUMNS AND CANOPY
UPLIGHTING OF SOFFIT
0'
40'
80'
scale: 1" = 40'

TOTAL SIGN FRONTAGE =
237 LINEAR FEET

237 x 1 =

237 SF MAX. ALLOWED SIGNAGE

TYPES OF SIGNS

FREE STANDING SIGNS
PER LOT: MAX. (2) SIGNS @ 30 SF TOTAL,
15' MAX. HEIGHT

PROJECTING SIGNS
13 SF EACH MAX. AREA

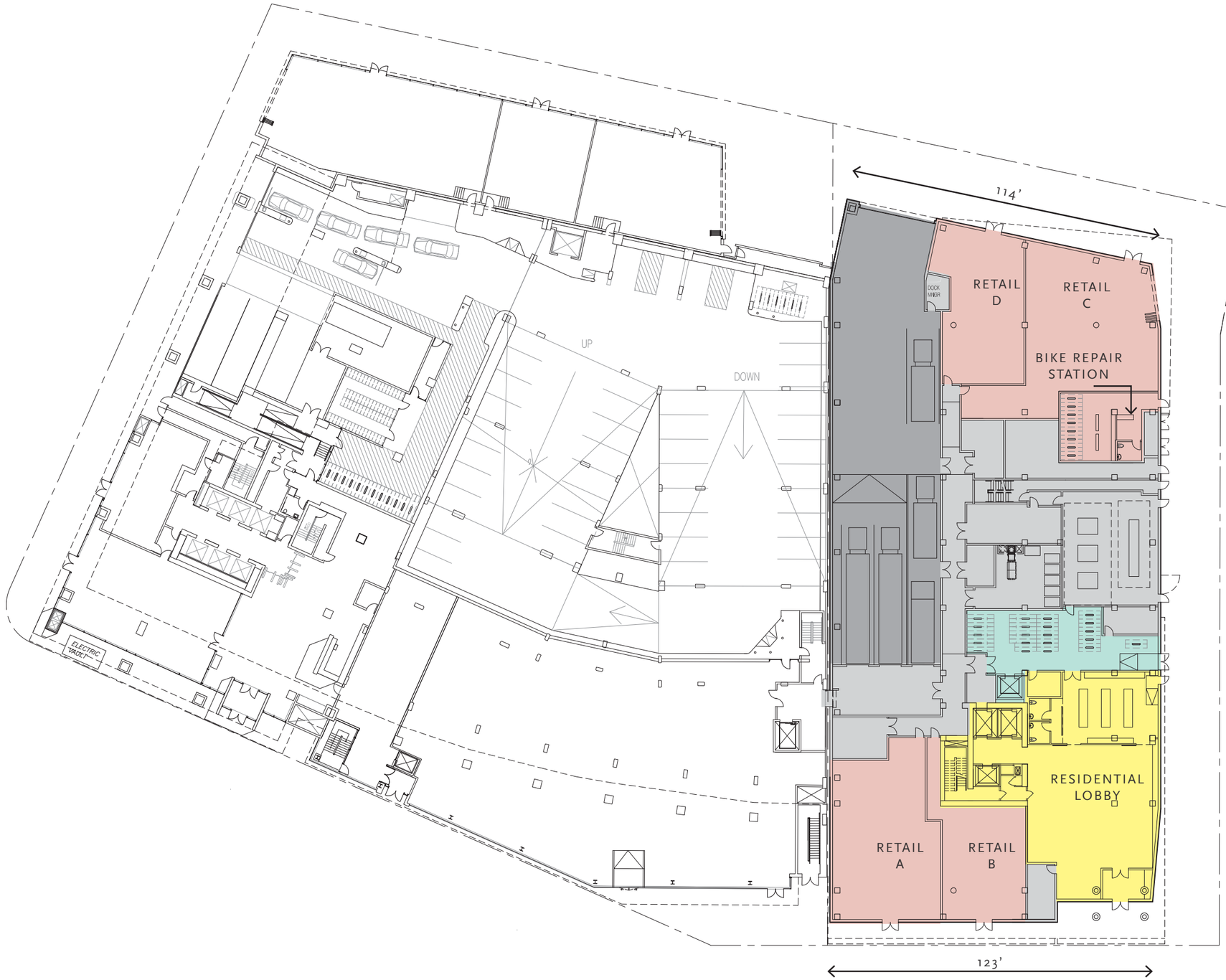
(1) PER GROUND FLOOR ESTABLISHMENT, PLUS
(1) FOR ANY PUBLIC BUILDING ENTRACE NOT
SERVING A GROUND FLOOR ESTABLISHMENT

20' MAX. HEIGHT, PROVIDED IT IS BELOW THE
SILL LINE OF THE SECOND FLOOR WINDOWS

WALL SIGNS
60 SF EACH MAX. AREA (FOR GROUND FLOOR
ESTABLISHMENTS WITH 60' OR LESS FRONTAGE,
MAX AREA OF INDIVIDUAL SIGN MULTIPLIER IS
(1) INSTEAD OF (1.5) x FRONTAGE)

NO LIMIT IN QUANTITY

20' MAX. HEIGHT, PROVIDED IT IS BELOW THE
SILL LINE OF THE SECOND FLOOR WINDOWS



0' 40' 80'
scale: 1" = 40'

TOTAL SIGN FRONTAGE =
742 LINEAR FEET

742 X 1 =

742 SF MAX. ALLOWED SIGNAGE

TYPES OF SIGNS

FREE STANDING SIGNS
PER LOT: MAX. (2) SIGNS @ 30 SF TOTAL,
15' MAX. HEIGHT

PROJECTING SIGNS
13 SF EACH MAX. AREA

(1) PER GROUND FLOOR ESTABLISHMENT, PLUS
(1) FOR ANY PUBLIC BUILDING ENTRACE NOT
SERVING A GROUND FLOOR ESTABLISHMENT

20' MAX. HEIGHT, PROVIDED IT IS BELOW THE
SILL LINE OF THE SECOND FLOOR WINDOWS

WALL SIGNS
60 SF EACH MAX. AREA (FOR GROUND FLOOR
ESTABLISHMENTS WITH 60' OR LESS FRONTAGE,
MAX AREA OF INDIVIDUAL SIGN MULTIPLIER IS
(1) INSTEAD OF (1.5) x FRONTAGE)

NO LIMIT IN QUANTITY

20' MAX. HEIGHT, PROVIDED IT IS BELOW THE
SILL LINE OF THE SECOND FLOOR WINDOWS

0' 40' 80'
scale: 1" = 40'

SIGNAGE KEY:

PROJECTED BLADE SIGN

PROJECTED SIGN — 13 SF MAX.

WALL SIGN EXTERIOR — 60 SF MAX.

WALL SIGN INTERIOR

5' O.B. ID

55' ONE BROADWAY RETAIL 1

34' ONE BROADWAY BUILDING ID

40' ONE BROADWAY RETAIL 3

147' ONE BROADWAY RETAIL 7

309' ONE BROADWAY SOUTH RETAIL

41' BUILDING 1 RETAIL A

32' BUILDING 1 RETAIL B

50' BUILDING 1 BUILDING ID

123' BUILDING 1

0' 20' 40'

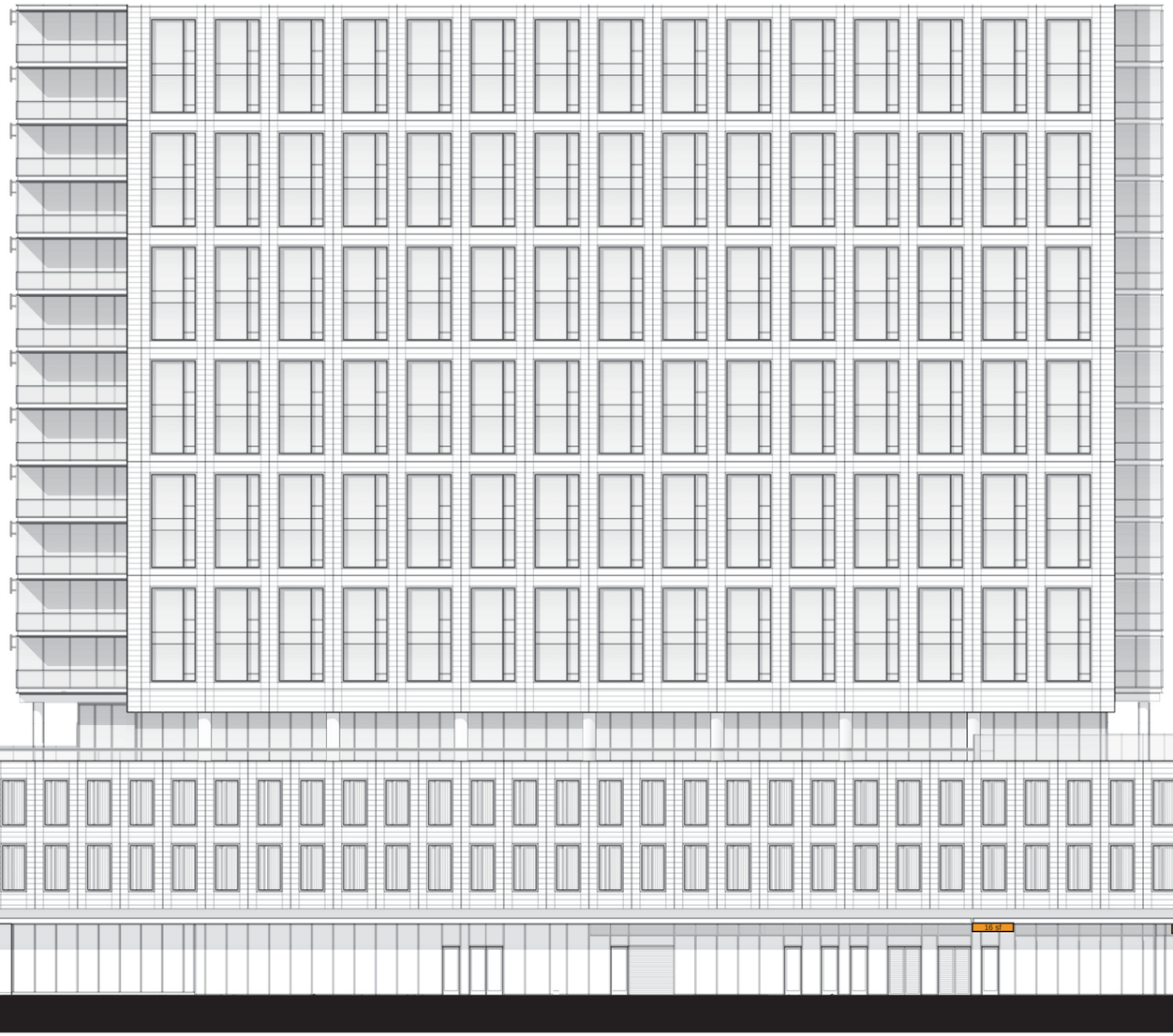
SIGNAGE KEY:

PROJECTED BLADE SIGN

PROJECTED SIGN — 13 SF MAX.

WALL SIGN EXTERIOR — 60 SF MAX.

WALL SIGN INTERIOR



8’ BIKE REPAIR STATION

46’ BUILDING 1 RETAIL C

0’ 20’ 40’

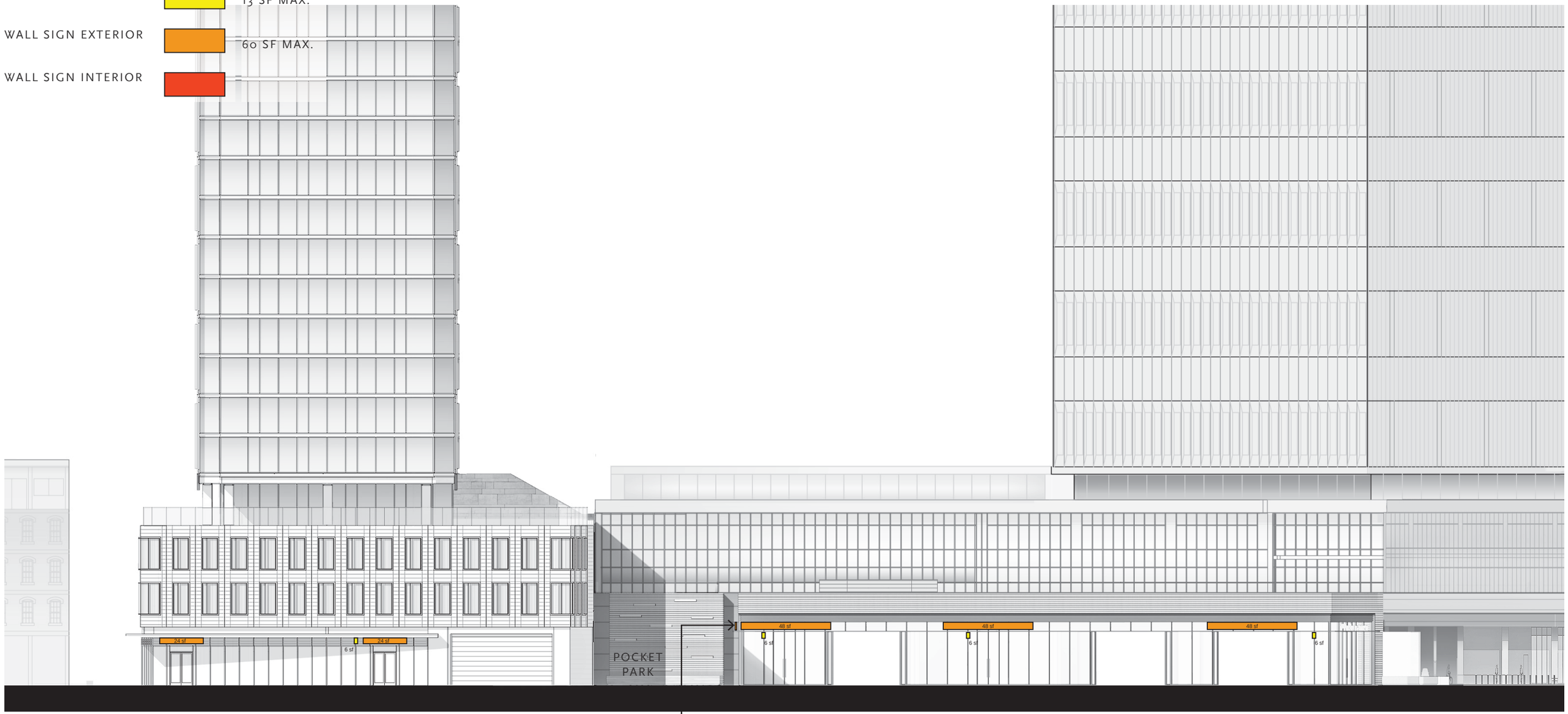
SIGNAGE KEY:

PROJECTED BLADE SIGN

PROJECTED SIGN — 13 SF MAX.

WALL SIGN EXTERIOR — 60 SF MAX.

WALL SIGN INTERIOR



47' BUILDING 1 RETAIL C

33' BUILDING 1 RETAIL D

BUILDING 1 LOADING

114' BUILDING 1

35' LINER EAST FACADE WALL SIGN (24 SF)

48' LINER RETAIL 1

35' LINER RETAIL 2

79' LINER RETAIL 3

203' ONE BROADWAY NORTH RETAIL

0' 20' 40'

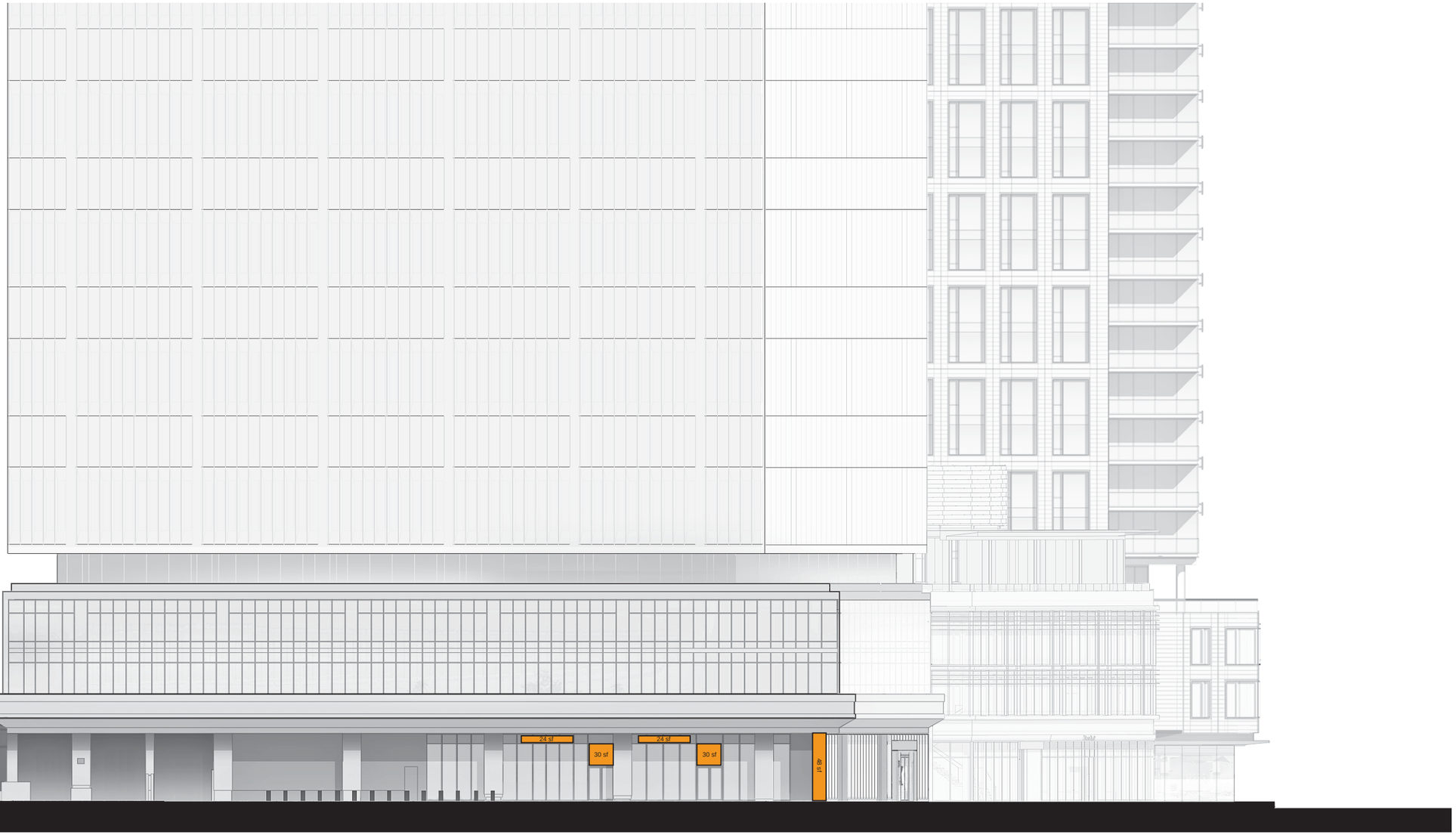
SIGNAGE KEY:

PROJECTED BLADE SIGN

PROJECTED SIGN — 13 SF MAX.

WALL SIGN EXTERIOR — 60 SF MAX.

WALL SIGN INTERIOR



35’ ONE BROADWAY LINER

ONE BROADWAY / BUILDING 1 PARKING ENTRANCE

41’ ONE BROADWAY RETAIL 2

37’ O.B. RETAIL 1

8’ O.B. ID

230’ ONE BROADWAY

0’ 20’ 40’

SUSTAINABILITY NARRATIVE & LEED SCORECARD

MIT KENDALL SQUARE NOMA

BUILDING 1
ONE BROADWAY

MIT Kendall Square Initiative – North of Main (NoMa)
Sustainability Design Review Narrative – Building 1
23 January 2017

Introduction

MIT's Kendall Square Initiative is designed to be a leader in urban sustainability revitalization and renewal. MIT has made sustainability an integral part of the project and Building 1's design process. MIT is committed to developing buildings that are sustainably designed, energy efficient, environmentally conscious and healthy for the occupants and visitors that enhance the community.

The Building 1 project team has embraced an integrated design process and includes technical experts who are actively engaged with the design process of both the site, building, and overall Kendall Square Initiative. This comprehensive view allows the development to incorporate sustainability best practices in design and operation, stormwater capture and reuse, transportation and landscape strategies.

Energy and Performance Strategies

As part of the design process, MIT is exploring the opportunities to improve energy efficiency and reduce greenhouse gas emissions. An integral part of this process is the study of the projected energy demands of the future building and how to best meet them. First and foremost, the design team is focused on reducing the energy demand of the buildings through the integration of high performance facades, efficient building systems, reduced lighting power consumption, advanced controls, efficient equipment, and occupant education programs. The mechanical systems are designed to minimize energy use and maximize flexibility by utilizing high efficiency equipment and a next generation approach to building conditioning.

In tandem with exploring opportunities for building level efficiency improvements for Building 1, the district team performed a comprehensive district energy study that evaluated a wide range of options against multiple criteria, including energy use, emissions, space requirements, regulatory context, market drivers, phasing, and cost. The options evaluated included steam, chilled water, gas, and electricity sourced from on-site district energy plants, MIT's central utility plant, local district steam providers, building by building plants, the local energy utility, and combinations of those different sources. Since Building 1 sits north of Main Street constrained by underground infrastructure from the MBTA Redline, the options considered for district energy opportunities included connection to the nearby Veolia steam system. While the design for many of the Kendall Square Initiative buildings is still ongoing, the current results of the study provide a clear direction for further development. Based on the analysis of all criteria, a local heat exchange and heat recovery strategy on the building scale is the optimal way to reduce greenhouse gas emissions for the project.

As an active and engaged member in City committees and initiatives such as the Net Zero working group, MIT is committed to exceeding local energy standards by incorporating a whole system, integrated approach and to continually revise and reevaluate design strategies to stay at the forefront of technical developments and improve environmental performance. Energy efficiency and resource conservation are at the heart of the sustainability framework developed for Kendall Square, and will remain a focus for the entire team as the project develops.

Sustainability Design Review Overview

This memo provides an overview of the sustainability efforts and decisions related to the Building 1 project.

In working with the City of Cambridge to shape the PUD-5 Zoning Requirements, MIT established a minimum commitment to Leadership in Energy and Environmental Design (LEED) Gold. The project will therefore achieve a LEED Gold Rating under the v4 system. The team's efforts have been in developing buildings that are sustainably designed, energy efficient, environmentally conscious, and healthy for the occupants, visitors, and community and committed to earn the buildings at least 60 credit points under the more stringent LEED v4 system, for LEED Gold ratings. MIT's Kendall Square Initiative will be one of the largest LEED v4 collections of projects on the east coast that incorporates the latest energy standards and new sustainability initiatives such as material content disclosure to encourage healthy buildings and indoor environments.

In addition to achieving the LEED project goals, the Building 1 design team has addressed the City of Cambridge's Sustainability requirements and guidelines throughout the design process, as detailed in the following.

- Chapter 1: Consistency with Zoning Requirements
- Chapter 2: Consistency with Sustainability Guidelines
- Chapter 3: LEED Benchmarking

The Building 1 project incorporates best practices for Energy and Emissions, Urban Site and Landscaping, Healthy Living & Working, Transportation, Promotion of Sustainability Awareness, Cool Roofs, and Monitoring. The team has achieved this through the following integrated design measures to enhance the project's environmental performance.

Energy + Emissions

The Building 1 design team recognizes that an important driver in mitigating climate change caused by building operations is to reduce the buildings energy consumption. The reduction in energy and its associated emissions is critical in effective environmental design.

The team conducted a feasibility study to assess the possible infrastructure connection of Building 1 to Veolia's steam system north of Main Street. Veolia and MIT worked hand in hand for nearly a year to analyze and compare the use of Veolia steam vs. Eversource natural gas as the energy supplier for Building 1. A report of findings is outlined in the team's District Energy Study Phase 2 report dated November 28, 2016. MIT and Veolia collaboratively evaluated the building by building and Veolia options against several sustainability and cost criteria. Building efficiency measures demonstrated the greatest potential for energy reductions and emissions savings.

Site 1 is developing a design with consideration to multiple energy guidelines. The following table quickly outlines what MIT has under review, in terms of this specific project's performance.

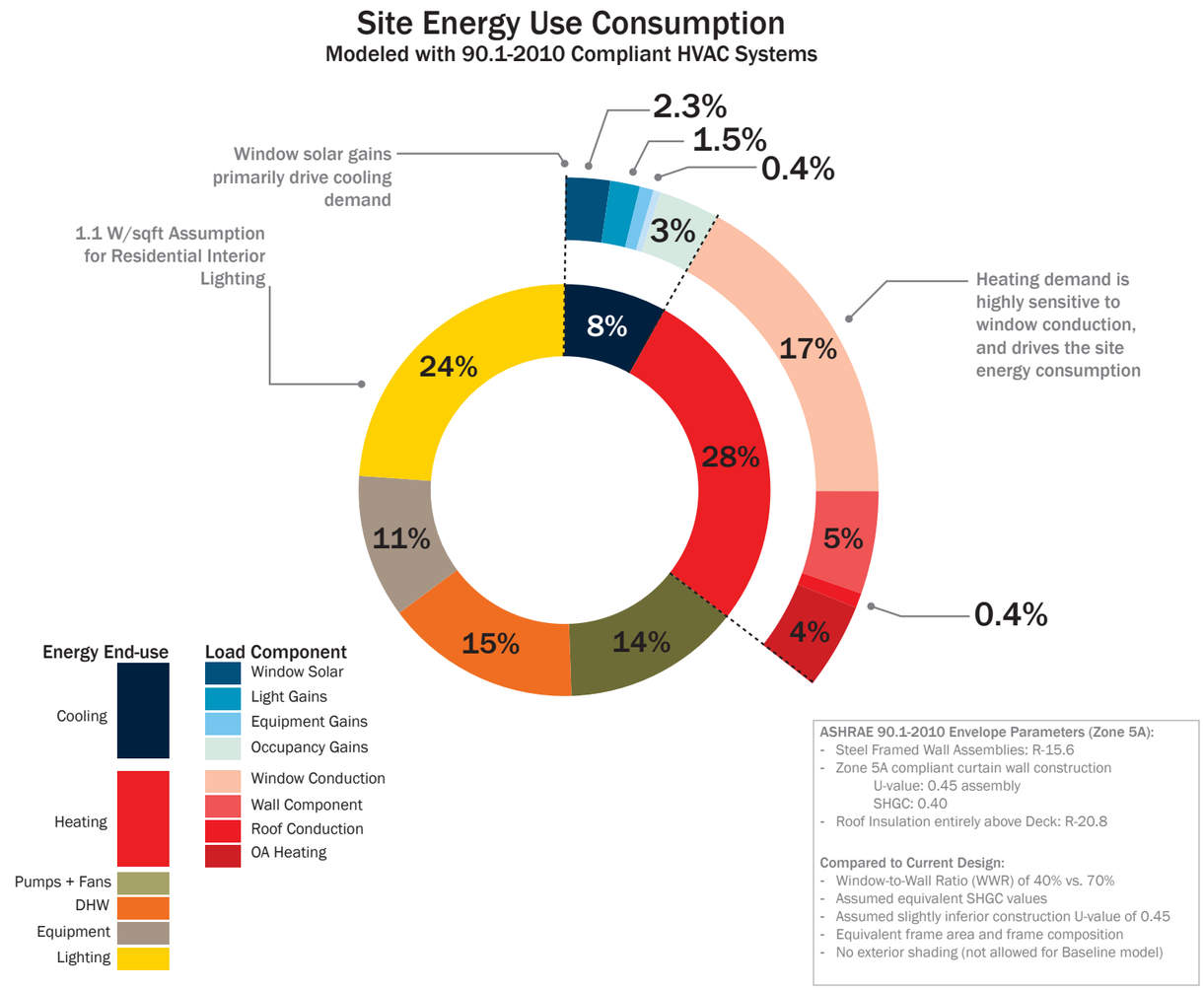
	Code/Applicable baseline in Effect on January 1, 2017	Threshold Savings for New Construction Component
Energy Code	IEEC 2015, ASHRAE 90.1-2013	
Stretch Code	ASHRAE 90.1-2013 Appendix G methodology	10%
LEED v4 Anaylsis	ASHRAE 90.1-2010 Appendix G methodology	5%
Eversource Incentive Program	ASHRAE 90.1-2013	10%

In accordance with LEED v4, the design team has modeled the building based on ASHRAE 90.1-2010 appendix G and the LEED Whole-Building Energy Simulation methodology. The project is tracking to obtain a 10-20% energy cost savings compared to the baseline building. The project is projecting over 10% savings, and the project is currently designed to meet Stretch Code, based on ASHRAE 90.1-2013. The team will update the City as needed.

The current anticipated EUI is between 35 and 55 kBtu/sf per year. These results are draft results based on the current understanding of the schematic design building and will be updated as the design evolves. In addition, the design team has engaged with Eversource and has further developed energy savings strategies specifically aimed to help reduce the site consumption of the building.

By incorporating energy efficiency measures, the goal has been to reduce energy consumption and resulting emissions of the operation of the building. Currently, the proposed design is targeted to reduce emissions by roughly 25-30% from the baseline building. MIT will update this information as the information becomes available.

By modeling the baseline building as shown below, the design team could establish the key performance drivers of this building type.

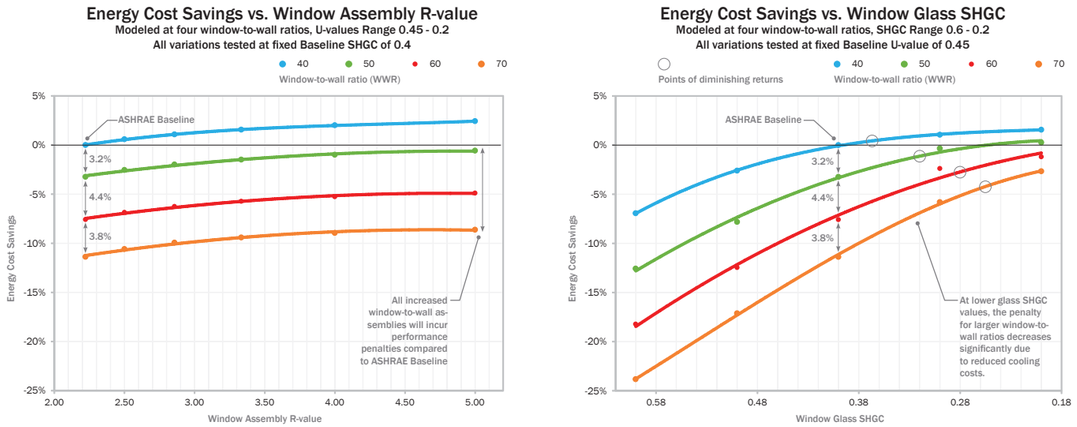


In order to conserve energy and reduce greenhouse gas emissions, the Building 1 team has prioritized systems that benefit occupant comfort and energy efficiency while providing reliability and ease of operations and maintenance. The greatest savings demonstrated in the building energy model currently come from:

- Water source heat pumps in residential spaces
- Heat recovery devices in the dedicated outside air units serving the residences
- Heat exchange in building systems to transfer waste heat to serve building heating demands, that are high in residential
- 60% effective window to wall ratio
- Enhanced lighting power density and lighting controls
- Reduced lighting power density – goal of 30% reduction over ASHRAE90.1-2013 allowance
- EnergyStar equipment and appliances
- Low flow shower heads for residential and non-residential areas. This measure not only reduces the water consumption, but also reduces the demand on the Domestic Hot Water service which will result in energy savings.

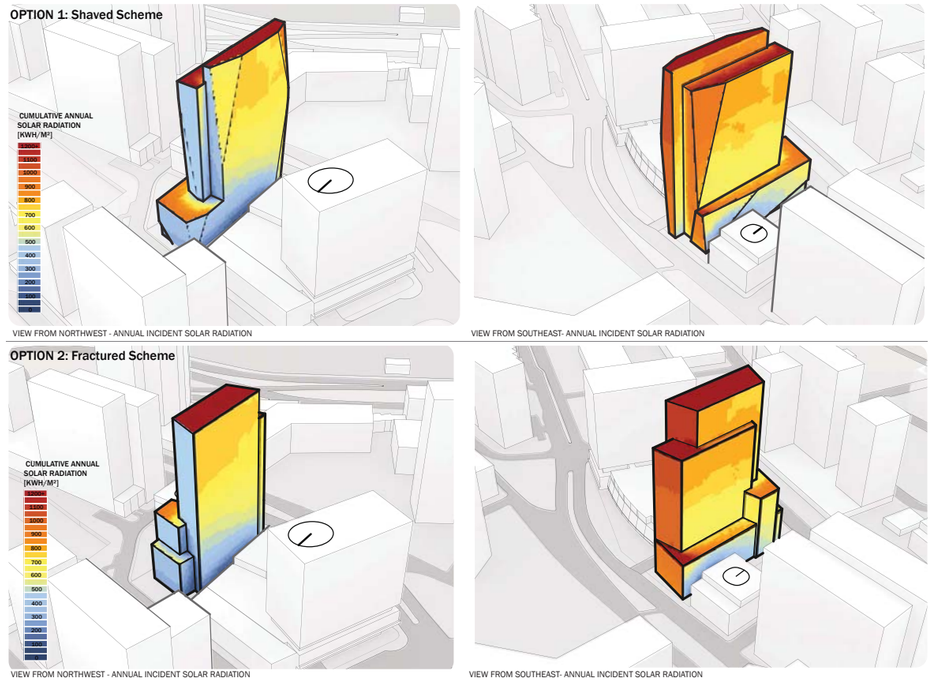
Envelope Performance Analysis

Fenestration Sensitivity Analysis



Schematic Design Window-to-wall Ratio, R-value, and SHGC Envelope Sensitivity Study

Finally, building window to wall ratio has been reduced on east and west facades that show the greatest amount of cumulative incident solar insolation.



Early Schematic Design Solar Radiation Analysis – Elevated East and West Solar Radiation

Urban Site + Landscaping – Water Management

As part of the overall development, the design of Building 1 will achieve sustainability in water management and site landscaping strategies while managing domestic potable water consumption. The current design incorporates potable water use reductions, stormwater capture and connection to pedestrian open space areas.

Building Fixtures

The design team is targeting a minimum reduction of 30-35% for potable water consumption from efficient fixtures alone, and is still considering opportunities for potential reuse for toilet flushing in the building. Retail spaces will be held to tenant guidelines that will set limits on installed fixtures to align with base building potable water conservation goals.

Landscape

The site design improves upon existing paved surface area with a landscape that provides habitat and pedestrian tree canopy cover and active outdoor recreation areas. The current design incorporates potable water use reductions, stormwater management in open space areas, native vegetation, and includes the reuse of stormwater for site irrigation and non-potable demands for building cooling needs.

The landscape design via native vegetation and drip irrigation will achieve at least 50% reduction in potable water for irrigation. The team is considering if the remaining irrigation demand will be met by stormwater reuse.

Stormwater

The existing project site is mostly impervious and the proposed design will not produce significant changes in either the pattern of, or rate of stormwater runoff. The Site 1 stormwater management approach is designed to reach the Cambridge Department of Public Works design criteria of reducing the peak stormwater flow of the post-construction 25-year design storm, to the pre-existing 2-year design storm. In general, the DPW requirement is much greater than LEED, therefore the project should achieve the LEED v4 Rainwater Management credit, as long as the DPW design standard is met. Additionally, the project is designed to reduce total phosphorus to receiving bodies by a minimum of 65%.

The use of infiltration as part of the project's stormwater management system will reduce site peak flows, replenish groundwater and provide quality treatment for building roof runoff as well as site runoff. The onsite infiltration system design complies with the City of Cambridge's Low Impact Development Guidelines. The project will result in a net increase in onsite pervious surfaces, which is inclusive of a portion of the site being dedicated to new public open space containing paved walkways, and public seating. The Project will provide stormwater Best Management Practices (BMPs) in conformance with DEP's Stormwater Management Standards. The current design will meet DPW requirements for the design storms as well as is on target for treatment and management for the 95th Percentile storm for the LEED v4 Rainwater Management credit.

Stormwater falling on the site area will be infiltrated through permeable paved areas, directed to planted areas that include low level native plantings or numerous trees within the open space, or directed to catchment areas that will direct runoff into the stormwater basins.

Roadway surface runoff will be treated via porous pavement and/or infiltration catch basins according to the City of Cambridge's standards.

The Project is reviewing the alternative of stormwater re-use for the purposes of irrigation and/or cooling tower make-up water. Re-use of stormwater is beneficial as it will contribute to the reduction of peak storm flows, and the reduction of potable water use from the City's water system. The feasibility of this alternative is currently being vetted out by the design team.

All water from roof areas will be diverted along with site runoff from the open space areas into the stormwater storage. This collected water will be filtered and stored to be diverted from the already strained regional sewers and instead reused as site irrigation and for cooling tower makeup water on the roof for year-round building heat rejection.

Water Reuse

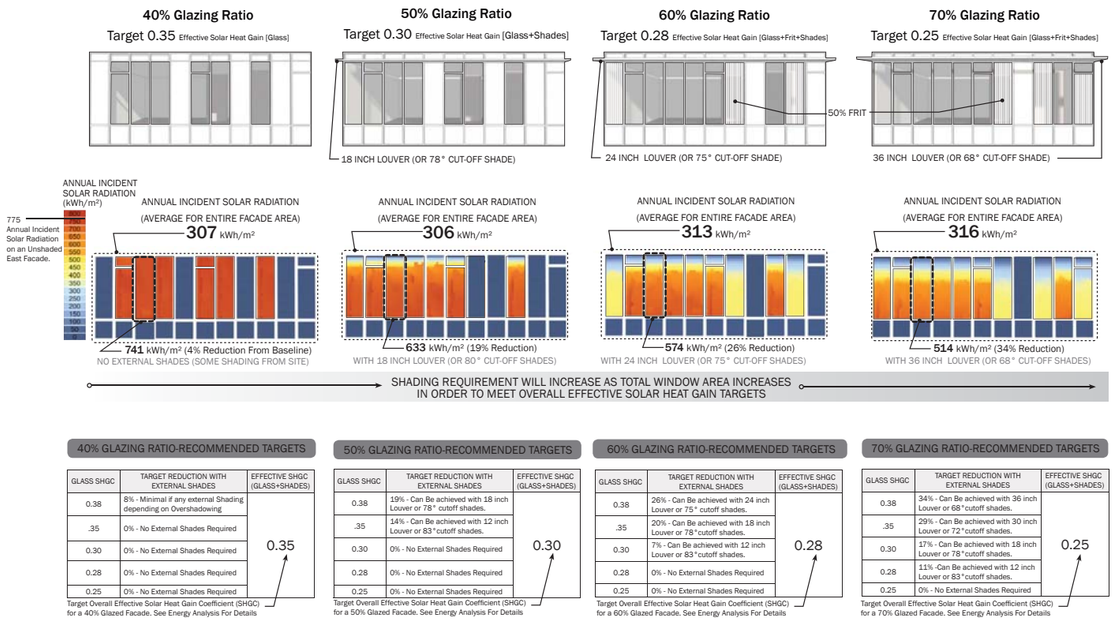
Potable domestic water for showers is a main driver for Building 1's total water consumption but requires potable water. Therefore, the best destination for non-potable water reuse is the cooling towers.

Healthy Living + Working

Providing healthy living and working environments is a further defining factor of high performance buildings. The site area encourages active outdoor activities and community connectivity.

The Building 1 project incorporates envelope design that maximizes access to daylight and views while providing insulated facades that manage occupant thermal comfort and energy use. The team has balanced increasing insulated facade areas with fenestration that provides views and connections to the outdoors for residents.
From all areas of the building, direct views through the glazing provides connection to the outdoors for occupants, including quality views to the site open space, neighboring streetscapes, and the Charles River and Boston beyond.

In contrast, opaque façade areas have been designed to provide self-shading of the glazing, to have limited impact on views while shading the glazing from solar gain and occupants from excessive direct solar glare. In residential spaces, interior shades can further reduce any glare and can be controlled by each residential unit individually.



40% GLAZING RATIO-RECOMMENDED TARGETS

GLASS SHGC	TARGET REDUCTION WITH EXTERNAL SHADES	EFFECTIVE SHGC (GLASS+SHADES)
0.38	8% - Minimal if any external Shading depending on Overshadowing	0.35
.35	0% - No External Shades Required	
0.30	0% - No External Shades Required	
0.28	0% - No External Shades Required	
0.25	0% - No External Shades Required	

Target Overall Effective Solar Heat Gain Coefficient (SHGC) for a 40% Glazed Facade. See Energy Analysis For Details

50% GLAZING RATIO-RECOMMENDED TARGETS

GLASS SHGC	TARGET REDUCTION WITH EXTERNAL SHADES	EFFECTIVE SHGC (GLASS+SHADES)
0.38	19% - Can Be achieved with 18 inch Louver or 78° cutoff shades.	0.30
.35	14% - Can Be achieved with 12 inch Louver or 83°cutoff shades.	
0.30	0% - No External Shades Required	
0.28	0% - No External Shades Required	
0.25	0% - No External Shades Required	

Target Overall Effective Solar Heat Gain Coefficient (SHGC) for a 50% Glazed Facade. See Energy Analysis For Details

60% GLAZING RATIO-RECOMMENDED TARGETS

GLASS SHGC	TARGET REDUCTION WITH EXTERNAL SHADES	EFFECTIVE SHGC (GLASS+SHADES)
0.38	26% - Can Be achieved with 24 inch Louver or 75° cutoff shades.	0.28
.35	20% - Can Be achieved with 18 inch Louver or 78°cutoff shades.	
0.30	7% - Can Be achieved with 12 inch Louver or 83°cutoff shades.	
0.28	0% - No External Shades Required	
0.25	0% - No External Shades Required	

Target Overall Effective Solar Heat Gain Coefficient (SHGC) for a 60% Glazed Facade. See Energy Analysis For Details

70% GLAZING RATIO-RECOMMENDED TARGETS

GLASS SHGC	TARGET REDUCTION WITH EXTERNAL SHADES	EFFECTIVE SHGC (GLASS+SHADES)
0.38	34% - Can Be achieved with 36 inch Louver or 68°cutoff shades.	0.25
.35	29% - Can Be achieved with 30 inch Louver or 72°cutoff shades.	
0.30	17% - Can Be achieved with 18 inch Louver or 78°cutoff shades.	
0.28	11% -Can Be achieved with 12 inch Louver or 83°cutoff shades.	
0.25	0% - No External Shades Required	

Target Overall Effective Solar Heat Gain Coefficient (SHGC) for a 70% Glazed Facade. See Energy Analysis For Details

Transportation

MIT continues to encourage alternative transportation through various commuter initiatives, providing commuting options, reduced fare benefits, and alternative transportation infrastructure. The team has considered the type of users for the building and has provided the most beneficial alternative transportation strategies.

This building will connect into the Kendall bicycle transportation network and include site-level bike racks for visitors and transient occupants while the building will have bike parking on the first floor and amenity floor for secure bike racks dedicated to building full time employees and residents. Moreover, there will be one new Hubway station located near the building to encourage use of the regional bikeshare system.

The team has committed to the City to reserve retail space for a bike repair station, which will be externally operated but house bike storage, lockers, and changing areas.

The team has designed the garage entrance through the existing 1 Broadway garage and minimized the loading and servicing to have minimal impact on the street level amenities and retail to maximize community space and enhance the pedestrian experience. The building is able to provide an open space with vegetation, room for pedestrian activity and community engagement, and quality exterior environments.

Meanwhile, low-emitting and fuel-efficient vehicles will be provided preferred locations in the garage. Charging stations for electric vehicles will be provided in the garage, and the team has designed for flexibility to increase the number of charging stations in the future as demand for electric vehicles rises.

Promotion of Sustainability Awareness

One of the Innovation Credits the project is considering is Green building education. MIT is evaluating: educational building dashboards, an informational website, and signage for sustainable features for residents and visitors.

Initiatives geared at educating new building occupants and users on installed green features is helpful to encourage behaviors and engagement with the environment.

Cool Roofs

All roof areas will include high-albedo materials to reflect heat and reduce urban heat island effects. The Solar Reflective Index of the roof material will be an SRI of at least 78. For areas of the podium for residential outdoor recreation, sedum green roof areas will reduce urban heat island effects and contribute to environmental quality.

Monitoring

Monitoring building energy data and sharing with the City allows for not only accountability in energy performance but consistency internally in building operations and ongoing identification of operational

deficiencies. The project will comply with the City of Cambridge's Building Energy Use Disclosure Ordinance. MIT will commit to sharing building energy data annually under this ordinance that surpasses the Zoning Requirements .

MIT and the design team understand the importance of metering building energy data to evaluate whether the building is being operated as efficiently as designed. Building meters will be installed to measure water and energy consumption in line with the LEED v4 requirements. Additional metering of building performance data is likely for tenant spaces and building systems. Having sufficient meters in place will allow building operation to be continuously evaluated over time, evolving to improve performance, increase efficiency, and reduce emissions.

Chapter 2: Consistency with Sustainability Guidelines

This section outlines the design team's considerations, strategies, and benchmarks with respect to MIT's Kendall Square Initiative Sustainability Guidelines.

The Building 1 design process included integrated design efforts to incorporate proposed strategies from the Net-Zero Action Plan and likely climate conditions as described in the Cambridge Climate Vulnerability Assessment, while considering how such environmental design measures may evolve over time with the changing climate.

A detailed breakdown of the decision making process is outlined below for the primary sustainability guidelines, including how the design investigated and incorporated strategies or where the investigation demonstrated a more efficient or feasible opportunity.

Energy Performance

Building 1 has established a minimum of 10-20% target for reduction in energy cost from the more stringent ASHRAE 90.1-2010/LEED v4 Baseline. The design team will continue to evaluate additional energy efficiency measures as are described in the above section Design Response to Zoning Requirements: Energy + Emissions. Moreover, the team is collaborating with Eversource to determine the numerous possibilities where the design can best maximize energy and emissions reductions.

Energy Supply

To date, the design has considered alternative sources of energy, such as solar renewables, district steam, and geothermal heating and cooling.

The design team performed a test fit for solar renewables to determine if solar energy generation would be viable. The study included assessment of rooftop renewables and building façade integrated renewables. Rooftop renewables were not feasible due to significant shaded area from mechanical equipment and architectural elements leading to limited solar access for roof space. The highest roof will include mechanical equipment and cooling towers, while lower roof areas will be significantly overshadowed by the building itself and are designed to be active tenant amenity spaces. Analysis of rooftop solar, building integrated photovoltaics (BIPV), and PV pavers for potential outdoor amenity areas is included below.

BIPV from Onyx Solar

The analysis shows that if the building was covered in at least 25% opaque BIPV panels, such panels could meet 3-10% of the electricity demand of the project. However, such a design would limit views and daylighting while resulting in a high cost to the project. (Likewise, the product that could potentially generate 16% in the table below was not feasible due to limitations for views, architectural design and costs) The assessment concluded the potential energy generation of renewables in the limited area available was not viable and the resources required for such generation would be better applied elsewhere for more effective energy efficiency measures on the project.

Annual Electricity Consumption					Energy Consumption		Electricity Cost		over All	
		KWh/YEAR GENERATED	Electricity Consumption	Reduction %	Overall Energy consumption	% reduction	Energy cost $	% reduction	Energy cost	% reduction
AMORPHOUS SILICON OPAQUE (5,76 Wp/SQFT)		91,370	2,387,224	4%	2,627,135	3%	$ 365,560	4%	$ 384,518	4%
CRYSTALLINE SILICON OPAQUE (14,86 Wp/SQFT)		258,750	2,219,844	10%	2,459,755	10%	$ 339,929	10%	$ 358,887	10%
AMORPHOUS SILICON OPAQUE (5,76 Wp/SQFT)		160,112	2,318,482	6%	2,558,393	6%	$ 355,034	6%	$ 373,992	6%
CRYSTALLINE SILICON OPAQUE (14,86 Wp/SQFT)		415,180	2,063,414	17%	2,303,325	15%	$ 315,975	17%	$ 334,933	16%
Walkable PV - AMORPHOUS SILICON (6 Wp/SQFT)		9650	2,468,944	0.39%	2,708,855	0.35%	378074.2763	0.39%	$ 397,032	0.37%
Walkable PV -CRYSTALLINE CELL (10.3 Wp/SQFT)		16050	2,462,544	0.65%	2,702,455	0.59%	377094.2316	0.65%	$ 396,052	0.62%

Given the energy demand of the proposed building and limitations on an urban site for locating equipment, photovoltaics or solar thermal panels currently cannot provide sufficient energy reduction for the project. The team recognizes that as the efficiency of solar panels and energy storage improves future installation could provide not only educational opportunities, but could be contributing power generators to the building.

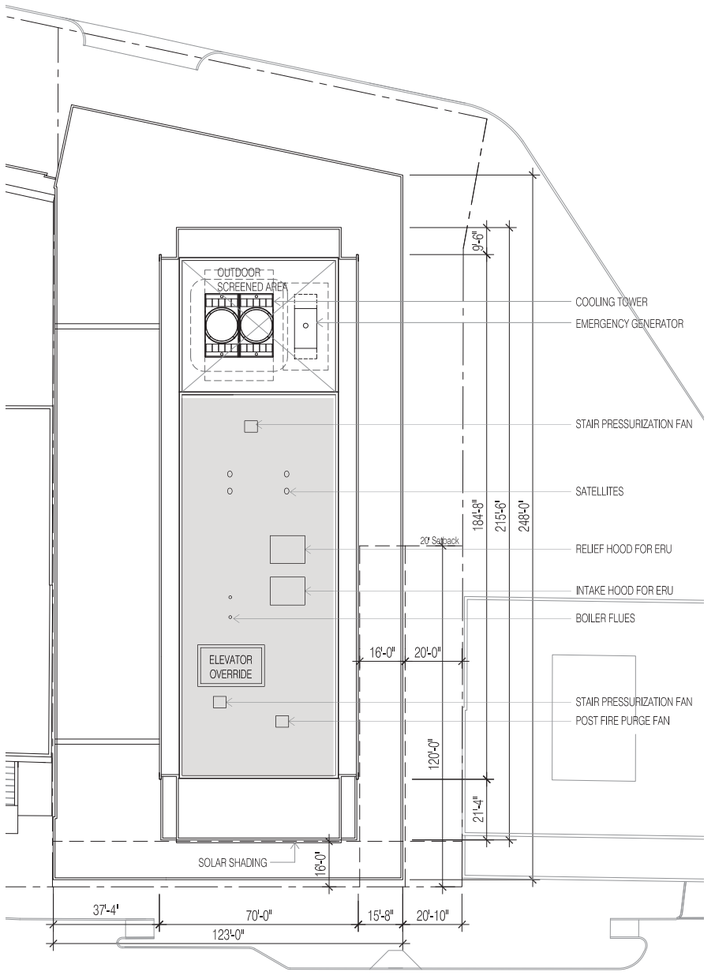


Diagram showing dedicated roof areas with limited access for renewables

The design team also considered wind renewables. Wind renewable energy was determined to be unviable, as it would conflict with other mechanical systems that are located on the roof. If physical space were available, wind renewable energy would generate only a small amount of energy (at most 0.25% of the annual energy consumption with 3 vertical axis turbines). The projected savings for different vertical axis wind turbines can be found in the following table.

Vertical Axis Wind Turbine Specs

Physical dimensions	5.5m tall, 3.1m diameter, 16m^2 swept area
Generator	Direct drive, mechanically integrated, weather sealed permanent magnet generator
Power control	Peak power tracking constantly optimises turbine output for all sites and windspeeds
Power	The projected peak power at 16m/s is: 8.5kW aerodynamic; 7.0kW DC; 6.5kW grid
Annual energy yield	4197 kWh at 5m/s to BWEA standards; Up to 7,500 kWh at 7m/s No reduction in power output at up to 40% turbulence intensity.
Operating wind speeds	Cut in at sustained 5m/s; Cut out sustained 26m/s
Design life	25 years (annual inspections recommended)
Rotor construction	Carbon fibre
Power Regulation and shutdown	Power regulation above 13.5m/s wind speed, auto shutdown in high wind speeds (above 26m/s)
Roof mounting	6m mast
Tower mounting	15m or 18m ground mounted

Environment Energy Centre, Leyland

A minimum distances of 10m between QR5 turbines is recommended to reduce negligible impact from surrounding turbines. It is estimated that approximately 1-3 turbines could be accommodated on the rooftop of Building 1.

		2kW		3kW		5kW								
Wind speed	Annual Wind frequency	Power curve data (retScreen)		Power curve data (retScreen)		Power curve data (retScreen)			Wind speed	Annual Wind frequency from Wind Test (site specific)	Power curve data (Quiet Revolution - QR5)	1, QR5 Turbines	2, QR5 Turbines	3, QR5 Turbines
m/s	Hours/yr.	kW	kWh	kW	kWh	kW	kWh		m/s	Hours/yr.	kW	Energy Generated kWh	Energy Generated kWh	Energy Generated kWh
0		0.0	-	0.0	-	0.0	-	75% of the year the wind speed will be too low to generate electricity.	0	226	0	-	-	-
1		0.0	-	0.0	-	0.0	-		1	430	0	-	-	-
2		0.0	-	0.0	-	0.0	-		2	1,393	0	-	-	-
3		0.2	580	0.3	870	0.4	1,159		3	2,899	0	-	-	-
4		0.4	610	0.5	686	0.6	839		4	1,525	0.2	305	610	915
5		0.5	452	0.6	602	0.8	803		5	1,004	0.5	502	1,004	1,505
6		0.6	370	0.8	493	1.2	740		6	617	0.75	463	925	1,388
7		0.9	393	1.5	655	1.7	742		7	437	1	437	873	1,310
8		1.5	181	1.9	229	2.4	290		8	121	1.75	211	422	633
9		2.0	103	2.7	139	3.4	175		9	52	2.5	129	258	387
10		2.3	63	3.1	86	5.0	139		10	28	3.1	86	173	259
11		2.5	47	3.2	62	5.5	106		11	19	4.5	87	174	261
12		3.0	15	3.2	16	5.5	28		12	5	5.5	28	56	84
13		2.0	6	3.2	9	5.5	16		13	3	7	21	41	62
14		1.5	2	3.2	4	5.5	6		14	1	7.4	9	17	26
15		1.3	1	3.2	2	5.5	3		15	1	7.4	4	8	12
16		1.0	0	3.2	0	5.5	1		16	0	7.4	1	1	2
17		0.8	0	3.2	0	5.5	0		17	0	7.4	0	0	1
18		0.4	0	3.2	0	5.5	0		18	0	7.4	0	0	1
19		0.2	0	0.0	-	0.0	-		19	0	7.4	0	0	1
20		0.1	-	0.0	-	0.0	-		20	-	7.4	-	-	-
21		0.0	-	0.0	-	0.0	-		21	-	7.4	-	-	-
22		0.0	-	0.0	-	0.0	-		22	-	7.4	-	-	-
23		0.0	-	0.0	-	0.0	-		23	-	5	-	-	-
24		0.0	-	0.0	-	0.0	-		24	-	5	-	-	-
25-30		0.0	-	0.0	-	0.0	-		26-30	-	0	-	-	-
			2,822		3,855		5,049					2,282	4,564	6,846
														2,718,505
												0.08%	0.17%	0.25%
												$ 349	$ 699	$ 1,048

The cut-in wind speed for a qr5 Turbine is a sustained wind speed of 4m/s. The turbine will shut down in the event of sustained wind speeds over 26m/s. At Site L, wind speeds will be sufficient for energy generation for ~26% of the year.

Annual Generation Potential (kWh)

Proposed Design Annual

Percentage of Building Energy met with QR5 Vertical Axis Wind Turbine

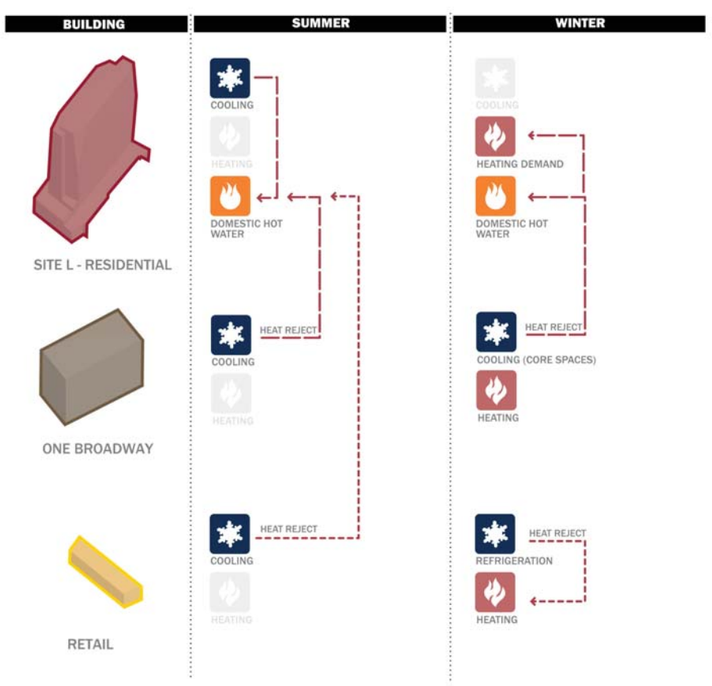
Estimated annual electricity sold to the grid (@ $0.1531 /kWh)

In addition to building-level investigations for renewable energy installations, the team considered district ground source heat pump opportunities.

The team investigated opportunities for geothermal, or ground source heat pumps, during the early concept phases of the project. Ground source heat pumps allow buildings to reject heat to the ground when in cooling and remove heat from the ground for heating during cooler months. Wells are drilled vertically into the ground and require a significant spacing to avoid any interaction between wells underground to maintain efficiency. The site area that would be required to install ground source heat pumps to meet a significant portion of the building's heating and cooling load is greater than the parcel available.

Comparatively, the near zero lot line of the Building 1 project restricts the access to potential wells which would need to be installed through the foundation. Any below grade/foundation ground source heat pumps would limit access to well heads, significantly complicate future maintenance on such a system, and limit future flexibility in use of the ground level.

The team performed a comprehensive analysis of potential district steam connections, as outlined in the above section Consistency with Zoning Requirements: Energy + Emissions. Building 1 will not participate in district steam connections, as greater greenhouse gas reductions can be achieved through building system investments. (See District Energy Study Phase 2 report dated November 28, 2016)



The team also investigated local heat exchange opportunities with adjacent buildings in the early schematic design phase, but found that given the complexity of future connections to these buildings and the significant existing heat exchange opportunities within our own building, the building would not connect to adjacent structures.

Ultimately, the building team determined the best course of action was building system level investments for energy reductions.

Energy Storage

Energy storage is not feasible for the building due to space considerations. As energy storage technologies improve in the future, there may be opportunities in the future as program needs and uses change in buildings or within the site. Ideally, incorporating energy storage could also pair with advancements in solar renewable technologies to generate clean energy to be stored. The team will continue to look for future opportunities for energy storage.

Commissioning

MIT has adopted the Enhanced Commissioning standards as outlined in LEED. Through ongoing operation, MIT will consider opportunities for recommissioning of building systems to maintain performance and ensure maximum energy savings and emissions reductions.

The Building 1 team will engage a commissioning agent during the design development phase. The Building 1 team will continue to coordinate with a commissioning agent to meet the requirements.

Beyond the LEED requirements for commissioning, the team is considering including envelope commissioning for the project which can provide enhanced verification of the façade from an energy, infiltration, and construction quality perspective to ensure energy requirements and thermal comfort aspirations are met.

Transitioning to Net Zero

MIT is committed to reducing its carbon footprint in support of the City of Cambridge's Net Zero Action Plan. Given our current understanding of available technologies, one potential path for Building 1 to achieve net zero would be a de-carbonization of the ISO New England electrical grid and deployment of technologies that can take advantage of grid improvements.

With current technologies, the high density building presents a challenge for achieving net-zero energy on a dense urban site. The proposed design reflects new construction being built to the best of currently available technology and efficiency, and embraces new trends in reducing unit size to maximize density to reduce the urban footprint (allowing for maximum open site area) while increasing provided shared communal spaces for community building. However, the design team has continued to evaluate opportunities to reduce energy consumption and the resulting greenhouse gas emissions. The heating and cooling systems could be equipped to receive thermal energy from a steam or hot water distribution system, minimizing barriers to the building accepting utilities from a de-carbonized or net-zero carbon source.

As a result of the campus energy studies, the team has brainstormed pathways for potential emissions reductions, including speculation about future technologies, future greening of the grid, and what it would take to fully electrify our buildings. The team considered the possibility of a Day-1 all-electric design for the site and district components; however, the current utility mix of the Massachusetts grid electricity would increase our projected emissions.

Additional savings are likely to be seen in advancement of building controls and active personalization of your environment in spaces. New technologies have the opportunity to be tested and incorporated as tenant turnover happens to bring select spaces up to the most current integrated systems. Beyond improvements in the base building equipment, the biggest reduction potential within the building in energy consumption and greenhouse gas emissions for this residential project will likely be in equipment performance and plug load management.

The team discussed where it sees energy supply and decarbonization in the future, particularly with improvements from the grid electricity sources. The team will continue to consider long term strategies to leverage improvements in grid electricity emissions. As the grid and technology evolves and improves over time, the strategies for MIT to reduce building level emissions will evolve and will use the latest available technology, which may not currently be understood, to support making a transition that is economically feasible, reliable, and decarbonized.

Resilience

Building 1's design will locate most critical equipment above the flood elevation, above Cambridge elevation 26 feet.

In addition, the envelope is insulated to reduce heat loss and gain and maintain comfortable temperatures during severe weather events, prolonged extreme temperatures and potential power outages. Likewise, operable windows will allow for ventilation during potential events in cooling seasons. Finally, domestic water systems (faucets, showers, flushing) and emergency lights are designed to be available during a power outage.

Building equipment capacities are being designed to account for possible rising temperatures and increasing average building cooling loads.

To reduce flooding potential, the site's ability to infiltrate stormwater and storage system will assist in reducing strain on sewer systems. The design team is currently evaluating surface flows through the open space to maximize the runoff capture potential for peak rain events seen recently with short, high volume rain events.

Evolving Standards

As the design has progressed, the design team has continued to evaluate the building performance against new guidelines and standards. Mainly, the team has continued to model the building against the LEED v4 ASHRAE 90.1 baseline. This information can be translated to greenhouse gas emissions in addition to energy consumption and cost (as is referenced by LEED) to be in line with any potential future City benchmarks.

MIT and the design team members continue to be engaged with City initiatives and are prepared to respond to new environmental design expectations for the design and operation of the building. MIT and the design teams look forward to continued collaboration with the City and Cambridge Community to develop a sustainable destination in Kendall Square.

Chapter 3: LEED Benchmarking

MIT is committed to LEED Gold projects, suggesting a more stringent benchmark above the City of Cambridge's standard requirement for minimum LEED Silver performance. Reinforcing their commitment, the Kendall Square Initiative projects will achieve LEED Gold. Given the project timeline, the team has decided to pursue LEED version 4 which is more stringent than the previous version of LEED, LEED v3 (2009).

Site 1 will register as a LEED for New Construction project under the version 4 Rating system.

The project will be registered with the USGBC and target several credits which span the nine LEED version 4 categories (Integrative Process, Location & Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation in Design Process and the additional Regional Priority Credits) to enable the project to meet the zoning requirements as outlined in the Appendix.

All points below are being pursued unless noted as a maybe/possible credit, if it is determined that some of the credits under consideration will not be attainable.

All LEED Minimum Program Requirements and Prerequisites will be met.

LEED CREDIT SUMMARY

All LEED credit requirements and commitments will be met within the boundary of the site. 58 points high probability, +19 medium probability points to be studied further for at least 60 points. The current probabilistic weighted projection for total points is 67.

Integrative Process

Integrative Process
The design team is conducting a preliminary energy model and water budget before the completion of SD and both will be documented in the OPR & BOD.

Location & Transportation

The project site is located on a previously developed site in urban Cambridge, close to several public transportation services including a Massachusetts Bay Transportation Authority subway stop, and public bus services. Residents shall have access to bicycle racks and showers, as well as preferred parking for hybrid and/or low-emitting vehicles.

Credit 1 LEED for Neighborhood Development Location NOT POSSIBLE
The site is not part of a LEED for Neighborhood development, so this credit is not possible.

Credit 2 Sensitive Land Protection
The project site is located on a previously developed urban site in Cambridge.

Credit 3 High Priority Site NOT LIKELY
Cleanup work will be required on site before construction to remediate the open site area. A site environmental survey will be required to confirm soil classification. Team to determine if any contamination exists on site, and to remediate if found.

Credit 4 Surrounding Density and Diverse Uses
The project site is the center of Kendall Square in urban Cambridge, Massachusetts. The surrounding community is replete with housing, restaurants, shops, grocery stores, educational and religious institutions, performance venues and other community amenities. In addition, the Kendall Square Initiative itself will add residential, office, lab, retail and services to the community.

Credit 5 Access to Quality Transit
The building is located close to the MBTA Kendall Square T-station. In addition, local bus routes connect the location to other areas of the community and Boston. Finally, campus shuttle services will continue to serve the MIT community in Kendall Square, linking to other regions of MIT's campus and student community, and is a short walk from the building.

Credit 6 Bicycle Facilities NOT LIKELY
Short term and long term bicycle parking will be provided for resident, retail workers, and visitors. Residential buildings will include secure storage as needed. Site and roadway access will be provided to enhance the bicycle network already so prevalent in the city of Cambridge.

Showers are not being provided for FTEs for Retail spaces or included in future Tenant Guidelines; therefore, this credit is not currently anticipated.

Credit 7 Reduced Parking Footprint NOT LIKELY
After zoning for special permit is established, requirements for this credit will be recalculated and included in design.

Credit 8 Green Vehicles
The project will designate 5% of parking spaces for fuel-efficient vehicles and the above grade garage infrastructure will provide charging stations for 2% of all parking spaces.

Sustainable Sites

The team is taking a comprehensive approach to site, landscape, habitat creation, stormwater management, and human use.

Prerequisite 1 Construction Activity Pollution Prevention
The contractor shall follow best practice construction methods and submit and implement an Erosion and Sedimentation Control (ESC) Plan for construction activities related to the construction of the new building specific to this project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit and specific municipal requirements for the City of Cambridge.

Credit 1 Site Assessment
The civil and landscape teams will conduct a comprehensive site survey to study topography, hydrology, climate, vegetation, soils, human use, and human health effects to achieve credit requirements.

Credit 2 Site Development, Protect or Restore Habitat NOT POSSIBLE
The team is investigating opportunities for restoring landscape in what is currently a primarily hardscaped surface site. This credit is not currently anticipated. The design team is evaluating design options that to specify native or adapted vegetation for trees and green roofs to meet credit requirements and limit turf grass.

Credit 3 Open Space MAYBE
This development acts as an urban infill project that will enhance the landscape while providing significant services and thriving community to the sometimes deserted Kendall Square area. Maintaining pedestrian oriented open space that is inviting and engaging is a top priority for this project for the amount of open space that will be provided. Credit compliance to be calculated in later phases.

Credit 4 Rainwater Management
Stormwater will be captured from roof and site area and either reused on site or infiltrated in a

subsurface Stormwater will be captured from roof and site area and either reused on site or infiltrated in a subsurface system. The intent will be to design the system such that the stormwater strategy and landscape design meets the more stringent LEED v4 requirements as well as local watershed requirements. The stormwater treatment strategy will include treatment of a majority of stormwater falling on site, including collection from roof and site/landscape runoff strategies, for 80% reduction in total suspended solids (TSS).

Credit 5 Heat Island Reduction
All roofs will be designed with high-albedo materials to reflect heat and mitigate the urban heat island effects. In addition, all parking on site will be above grade in a shared garage under cover of the tower above. All garage roof areas not under the tower will use high SRI materials. The design will include high SRI and permeable pavers, which would comply with the requirements for this credit. Trees and shading elements are being explored to further reduce heat island effects on hard scape areas.

Credit 6 Light Pollution Reduction
This credit will be pursued under dark-sky lighting strategies. Credit compliance will be fully evaluated in the next phase. Efforts will be made to design the site with night sky friendly fixtures, while maintaining safety and security with the adjacency to the MIT campus.

Credit 7 Tenant Design and Construction Guidelines (For Core and Shell Retail)
Design requirements for tenant fitouts will be utilized for Core and Shell projects to commit future tenants to the principles pursued by the projects as a whole for sustainability.

Water Efficiency

Outdoor and process water use reduction will be a primary driver on the project. The project will specify low-flow and low-flush plumbing fixtures to achieve Water Efficiency. The team shall also consider other water strategies to reduce potable water use.

Prerequisite 1 Outdoor Water Use Reduction, 30% Reduction
Through the use of native and adapted vegetation and efficient irrigation systems, the project will reduce the demand for irrigation by 30%.

Prerequisite 2 Indoor Water Use Reduction, 20% Reduction
Through specifying efficient fixtures and equipment, the project will achieve a 20% reduction in potable water use inside the building.

Prerequisite 3 Building Level Water Metering
New in LEED v4, the project will install meters for building and site grounds to measure and ongoing reevaluate water consumption for each building.

Credit 1 Outdoor Water Use Reduction, 50%/No Potable Water
The project will target a minimum of 50% reduction through efficient irrigation and/or stormwater reuse for irrigation. Full elimination of potable water for irrigation is not anticipated at this point in the design. To meet the credit requirements of 50% or 100% reduction in potable water use for irrigation, potable water use for irrigation will be limited and reuse strategies feasible for irrigation will be explored, including stormwater, reverse osmosis, or other reuse water available for irrigation AND/OR use of native, drought resistant vegetation. Current design includes conservation strategies and no reuse.

Credit 2 Water Use Reduction 25/30/35/40/45/50%
The project will install efficient flow and flush fixtures as well as compliant equipment to reduce building potable water consumption. The building's water reduction target is a minimum 30% reduction from efficient fixtures.

Through the use of low-flow and low-flush plumbing fixtures in the building, as outlined in the project basis of design, the project shall implement water use reduction strategies that use at least 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting Energy Policy Act of 1992 fixture performance requirements.

Credit 3 Cooling Tower Water Use MAYBE
The mechanical engineers will conduct a water analysis to optimize cooling tower cycles, to achieve at least >10 cycles, or 20% non-potable water use to maximize points for this credit.

Credit 4 Water Metering MAYBE
Beyond the whole building and site water metering, the projects will study installing permanent water meters for two or more water subsystems each. This credit is under consideration but not yet anticipated.

Energy and Atmosphere

The building systems shall be designed to optimize energy performance and will not use refrigerants that are harmful to the environment. The owner has engaged a third party Commissioning Agent to confirm the building systems are installed and function as intended and designed.

Prerequisite 1 Fundamental Commissioning and Verification
Building will engage a commissioning agent and develop and perform fundamental commissioning.

Prerequisite 2 Minimum Energy Performance
The current design should meet this prerequisite. The next model will measure energy cost savings against LEED Baseline. Further study and energy modeling in subsequent project phases will confirm compliance.

Prerequisite 3 Building-Level Energy Metering
Meters must be installed to provide data on total energy consumption. This LEED requirement is in line with City of Cambridge energy data reporting guidelines.

Prerequisite 4 Fundamental Refrigerant Management
The specifications for refrigerants used in the building HVAC systems will not use CFC based refrigerants.

Credit 1 Enhanced Commissioning
The Commissioning agent will perform a review of the CD documents and provide any comments to the team for design revision. In addition, the Cx agent will perform post-occupancy reviews and draft a recommissioning manual and develop monitoring procedures for ongoing operations and maintenance. Additional points are awarded for envelope commissioning, but this is not likely to be pursued by the individual projects.

Credit 2 Optimize Energy Performance (6%-50%, up to 18 points
The design is targeting at least a 20% savings through the design of an efficient building envelope, high performance lighting and energy-saving HVAC systems.

Credit 3 Advanced Energy Metering
The projects will install energy metering for whole building energy and individual energy end uses representing 10% or more of total consumption.

Credit 4 Demand Response MAYBE
Credit requires designing building and equipment for participation in demand response programs through load shedding or shifting. This credit is not likely pursued.

Credit 5 Renewable Energy Production (1%, 5%, 10%) MAYBE
Currently, the team is exploring opportunities to incorporate renewables in the projects. The density of the development and potential for renewables may only achieve the 1% threshold if pursued. Credit is not likely.

Credit 6 Enhanced Refrigerant Management
Equipment with refrigerant over 0.5 lbs should be selected for low LCGWP and LCODP.

Credit 7 Green Power and Carbon Offsets MAYBE
A primary strategy for this project will be reduction in energy consumption. The teams will discuss green power purchasing if other LEED credits are necessary to achieve the target certification rating. Green-e certified power contracts would be written into tenant guidelines as required.

Materials and Resources

Throughout the construction phase of the project, the contractor shall endeavor to divert construction and demolition waste from area landfills and procure materials that have recycled content and/or are manufactured locally.

Prerequisite 1 Storage and Collection of Recyclables
Storage of collected recyclables shall be accommodated throughout the buildings. At least 500 square feet has been allocated for recycling storage on individual floors as well as ground level collection, sorting, and bundling for pick-up. A recycling plan will be developed.

Prerequisite 2 Construction and Demolition Waste Management Planning
Projects will follow construction and demolition waste management best practices. The construction manager will draft Construction and Demo Waste Management Plans to maximize waste diverted from landfill.

Credit 1 Building Life-Cycle Impact Reduction MAYBE
Project will conduct a life-cycle assessment that demonstrates a minimum of 10% reduction in at least three of the six impact measures.
- Global warming potential (greenhouse gasses), in CO2e
- Depletion of the stratospheric ozone layer, in kg CFC-11
- Acidification of land and water sources, in moles H+ or kg SO2
- Eutrophication, in kg nitrogen or kg phosphate
- Formation of tropospheric ozone, in kg NO2 or kg ethane
- Depletion of nonrenewable energy resources, in MJ

Credit 2 Building Product Disclosure & Optimization: Enviro. Product Declarations MAYBE
Team will specify 20 products sourced from five different manufacturers that meet the disclosure criteria and use products that exhibit optimized performance on those disclosures for 50% by cost.

Credit 3 Building Product Disclosure & Optimization: Sourcing of Raw Materials MAYBE
Team will use 20 products sourced from five different manufacturers that have publicly released a report from their raw material suppliers and those reports demonstrate products meet responsible extraction criteria (25% material cost).

Credit 4 Building Product Disclosure & Optimization: Material Ingredients MAYBE
Team will use 20 products sourced from five different manufacturers that demonstrate the chemical inventory of the products and document their material ingredient optimization (25% by material cost).

Credit 5 Construction & Demolition Waste Management (50/75%)
The project will pursue optimized waste diversion from landfill to achieve 75% reduction in 4 material streams OR generate less than 2.5 lbs of waste/sf.

Indoor Environmental Quality

The air quality shall be monitored during the construction phase of the project and likely prior to occupancy. Low emitting materials will be used throughout construction to maintain and improve air quality. The building occupants will be able to maintain a comfortable environment through access to thermal and lighting controls.

Prerequisite 1 Minimum IAQ Performance
The building mechanical systems will be designed to meet or exceed the requirements of ASHRAE Standard 62.1-2010 sections 4 through 7 and/or applicable building codes.

Prerequisite 2 Environmental Tobacco Smoke (ETS) Control
Smoking will be prohibited inside the building and within 25 feet of the building, especially any entryways or air intakes.

Credit 1 Enhanced Air Quality Strategies
Project will provide entryway systems to avoid contamination from exterior particulates and prevent interior cross contamination. In addition, MERV 13 filters will be specified. In addition, project will either provide increased ventilation or monitor CO2, depending on the program type for which compliance path is most energy efficient.

Credit 2 Low-Emitting Materials
The team will target achieving threshold level of compliance for VOC content in at least 4 categories. Enhanced performance will target 5 categories.
- Interior paints and coatings
- Interior adhesives and sealants applied on-site (including flooring)
- Flooring
- Composite wood
- Ceilings, walls, thermal, and acoustic insulation
- (Furniture not applicable)

Credit 3 Construction IAQ Management Plan
A Construction IAQ Management Plan will be drafted and implemented on all projects during construction and pre-occupancy according to the SMACNA Guidelines.

Credit 4 Indoor Air Quality Assessment
In addition to managing air quality during construction and pre-occupancy, a building flush-out or air quality testing will be performed before each building is occupied.

Credit 5 Daylight (55%/75%) MAYBE
Project will design for adequate daylighting and visual comfort where possible. Building enclosures will be designed to mitigate heat gains and temper interior daylighting levels. In addition, daylight dimming will be studied for perimeter building zones. This credit will be calculated in later design phases.

Credit 6 Quality Views MAYBE
Direct views will be provided to the outside for 75% of regularly occupied spaces, which meet 2 of 4 LEED criteria.
- Multiple lines of sight to vision glazing in different directions at least 90 degrees apart
- Views that include at least 2 of the following (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet from the exterior of the glazing
- Unobstructed views located within the distance of three times the head height of the vision glazing
- 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"

Innovation & Design Processes

The project team has identified several possible ID credits which are listed below, limited to 5 ID credits total. Throughout the design process these along with other potential innovation and design process credits will be evaluated.

Credit 1.1 Green Building Education – under consideration
Green building education is a recommended best practice. MITIMCO considering educational building dashboards and shall pursue an informational website, building tours, or signage for sustainable features for residents and visitors.

Credit 1.2 Green Housekeeping – under consideration MAYBE
Green housekeeping is a recommended best practice. The team will discuss developing and implementing a plan for occupants.

Credit 1.3 Exemplary Performance, Low Mercury Lighting MAYBE
This innovation credit can be earned by specifying low-mercury lighting which reduces the toxicity of waste streams.

Credit 1.4 Innovation in Design, Organic Landscape Management
Site may choose to pursue organic landscape management, to enhance the quality of the site and reduce chemicals and pesticides used on site areas. This will improve the quality of stormwater runoff and green spaces that occupants and visitors may come in contact with.

Credit 1.5 Innovation in Design, Integrated Pest Management
Team will explore alternative ID credits; however, an integrated pest management approach that meets LEED EBOM standards will help improve indoor air quality for occupants, and can be included as a requirement in the Tenant Guidelines.

Credit 2 LEED Accredited Professional
Atelier Ten, a group of LEED accredited professionals, is overseeing the overall sustainability of the Kendall Square development. They are also serving as the sustainability lead on the Building 1 design team. In addition, many other design team members have LEED accredited professionals working on the project.

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. Up to four RPCs can be achieved on a project. The following RPCs are applicable to the Kendall Square Initiative region in LEED v4:

Credits to be Pursued
Optimize Energy Performance (8 pts required, up to 18 points)
High Priority Site (2 pts required, 2 possible)
Rainwater Management (2 pts required, up to 3 points)
Indoor Water Use Reduction (4 pts required, up to 6 points)

Credits Not Pursued
Renewable Energy Production (5% required, up to 3 points)

LEED v4 for New Construction - Kendall Square Building 1

last updated: January 4, 2017

Achievability			
hi	med	low	NP
58	19	29	4

Certified 40 to 49 points **Silver** 50 to 59 points **Gold** 60 to 79 points **Platinum** 80 or more points
Achievability rating: **Hi** = 90%, **Med** = 60%, **Low** = 10%, **NP** = not possible.

67 Projected Points

				Prerequisites		**Standard**
Y				SS Prereq 1	**Construction Activity Pollution Prevention**	Create and implement erosion control plan that meets the 2003 EPA Construction General Permit.
Y				WE Prereq 1	**Outdoor Water Use Reduction:** 30%	Reduce outdoor water use by 30% over the baseline specified in LEED.
Y				WE Prereq 2	**Indoor Water Use Reduction:** 20%	Reduce indoor water use by 20% over the baseline specified in LEED and meet requirements for process water use.
Y				WE Prereq 3	**Building-Level Water Metering**	Install permanent water meters for building and grounds
Y				EA Prereq 1	**Fundamental Commissioning and Verification**	Engage commissioning agent, and develop and execute a commissioning plan. Prepare O&M plan for current facilities.
Y				EA Prereq 2	**Minimum Energy Performance**	Reduce energy cost by 5%, compared to ASHRAE 90.1-2010, Appendix G; meet mandatory provisions of ASHRAE 90.1-2010.
Y				EA Prereq 3	**Building-Level Energy Metering**	Install meters to provide data on total energy consumption AND commit to share data with the USGBC for 5 years
Y				EA Prereq 4	**Fundamental Refrigerant Management**	Eliminate CFCs in building HVAC&R.
Y				MR Prereq 1	**Storage & Collection of Recyclables**	Provide space for the collection and storage of paper, cardboard, glass, plastic, and metals.
Y				MR Prereq 2	**Construction and Demolition Waste Management Planning**	Develop and implement a construction and demolition waste management plan
Y				IEQ Prereq 1	**Minimum IAQ Performance**	Meet sections 4 through 7 of ASHRAE 62.1-2010.
Y				IEQ Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Prohibit smoking inside building, and locate exterior smoking areas at least 25 feet away from building.

1	0	0	0	**Integrative Process**		**Standard**
1				IP Credit 1	**Integrative Process**	Perform preliminary energy model and water budget before the completion of SD and document in OPR & BOD.

12	0	4	0	**Location & Transportation**		**Standard**
			16	LT Credit 1	**LEED for Neighborhood Development Location**	Locate the project in within a development certified under LEED for Neighborhood Development
1				LT Credit 2	**Sensitive Land Protection**	Locate the development footprint on land that has been previously developed.
		2		LT Credit 3	**High Priority Site**	Locate the project on a site where contaminated soil/groundwater remediation is required or in historic district/building.
5				LT Credit 4	**Surrounding Density and Diverse Uses**	Locate on a site with an existing density of 22,000sf/acre - 35,000 sf/acre and within 1/2 mile of 4-8 basic services.
5				LT Credit 5	**Access to Quality Transit**	Locate project within 1/2 mile of a rail station or ferry terminal or 1/4 mile of bus, streetcar or rideshare.
		1		LT Credit 6	**Bicycle Facilities**	Access to bicycle network. Short term (2.5% peak visitors) and long term (5% all occupants) bike parking and FTE showers
		1		LT Credit 7	**Reduced Parking Footprint**	Preferred parking for carpools for 5% of the total parking spaces
1				LT Credit 8	**Green Vehicles**	Preferred parking for Green Vehicles: 5% of all parking spaces and electric vehicle charging or alternative fuel facility for 2%

6	2	1	1	**Sustainable Sites**		**Standard**
1				SS Credit 1	**Site Assessment**	Complete comprehensive site survey; topography, hydrology, climate, vegetation, soils, human use and human health effects.
		1	1	SS Credit 2	**Site Development:** Protect or Restore Habitat	Protect 40% of greenfield and restore 30% of previously developed site (2pts) or provide $0.40/sf to accredited land trust (1pt).
	1			SS Credit 3	**Open Space**	Provide outdoor space greater than or equal to 30% of the total site area (including building footprint).
3				SS Credit 4	**Rainwater Management**	Manage runoff for the 95th percentile (2pt), 98th percentile (+1pt) with low-impact development (LID) and green infrastructure.
2				SS Credit 5	**Heat Island Reduction**	Meet high albedo requirements for roof and site OR place a minimum of 75% parking under cover (1pt).
	1			SS Credit 6	**Light Pollution Reduction**	Meet uplight and light trespass requirements and do not exceed exterior signage luminance requirements.

6	2	3	0	**Water Efficiency**		**Standard**
1				WE Credit 1	**Outdoor Water Use Reduction:** 50% Reduction	Reduce potable water used for irrigation by 50%.
	1			WE Credit 1	**Outdoor Water Use Reduction:** No Potable Water	No potable water use for irrigation.
2	1			WE Credit 2	**Water Use Reduction:** 25% / 30% / 35%	Reduce building water use over LEED baseline .
		3		WE Credit 2	**Water Use Reduction:** 40% / 45% / 50%	Reduce building water use over LEED baseline .
2				WE Credit 3	**Cooling Tower Water Use**	Conduct a water analysis to optimize cooling tower cycles. Maximizing cycles (1pt), >10 cycled or 20% non-potable water use (2pts).
1				WE Credit 4	**Water Metering**	Install permanent water meters for two or more water subsystems.

11	5	16	1	Energy & Atmosphere		Standard
4		2		EA Credit 1	**Enhanced Commissioning**	CD review, post occupancy review, recommissioning manual (3pts) AND develop monitoring procedures (4pts) AND/OR envelope Cx (2pts)
3				EA Credit 2	**Optimize Energy Performance:** 6% / 8% / 10%	Reduce building energy cost by 6% / 8% / 10% compared to ASHRAE 90.1-2010, Appendix G.
3				EA Credit 2	**Optimize Energy Performance:** 12% / 14% / 16%	Reduce building energy cost by 12% / 14% / 16% compared to ASHRAE 90.1-2010, Appendix G.
	3			EA Credit 2	**Optimize Energy Performance:** 18% / 20% / 22%	Reduce building energy cost by 18%/ 20%/ 22% compared to ASHRAE 90.1-2010, Appendix G.
	1	2		EA Credit 2	**Optimize Energy Performance:** 24% / 26% / 29%	Reduce building energy cost by 24% / 26% / 29% compared to ASHRAE 90.1-2010, Appendix G.
		3		EA Credit 2	**Optimize Energy Performance:** 32% / 35% / 38%	Reduce building energy cost by 32%/ 35%/ 38% compared to ASHRAE 90.1-2010, Appendix G.
		3		EA Credit 2	**Optimize Energy Performance:** 42% / 46% / 50%	Reduce building energy cost by 42%/ 46%/ 50% compared to ASHRAE 90.1-2010, Appendix G.
	1			EA Credit 3	**Advanced Energy Metering**	Install energy metering for whole building energy and individual energy end uses representing 10% of more of total consumption.
		2		EA Credit 4	**Demand Response**	Design building and equipment for participation in demand response programs through load shedding or shifting.
		2	1	EA Credit 5	**Renewable Energy Production:** 1% / 5% / 10%	Produce renewable energy on-site for 1% / 5% / 10% of building energy consumption, calculated by cost.
1				EA Credit 6	**Enhanced Refrigerant Management**	Select refrigerants with low global warming potential and ozone depletion potential.
		2		EA Credit 7	**Green Power and Carbon Offsets**	Engage a 5 year contract for at least 50% or 100% of the project's energy from green power, carbon offsets, or RECs

5	3	3	2	Materials & Resources		Standard
		3	2	MR Credit 1	**Building Life-Cycle Impact Reduction**	Conduct a life-cycle assessment that demonstrates a minimum of 10% reduction in at least three of the six impact measures (3pts). Credit can also be earned for building and material reuse, or renovation of an abandoned building (2-5pts).
1	1			MR Credit 2	**Building Product Disclosure & Optimization:** Environmental Product Declarations	Use 20 products sourced from five different manufacturers that meet disclosure criteria (1pt) AND/OR use products that exhibit optimized performance , 50% by cost (1 pt)
1	1			MR Credit 3	**Building Product Disclosure & Optimization:** Sourcing of Raw Materials	Use 20 products sourced from five different manufacturers that have publicly released a report from their raw material suppliers (1pt) AND/OR products that meet responsible extraction criteria, 25% material cost (1pt)
1	1			MR Credit4	**Building Product Disclosure & Optimization:** Material Ingredients	Use 20 products sourced from five different manufacturers that demonstrate the chemical inventory of the products (1pt) AND/OR use products that document their material ingredient optimization, 25% material cost (1pt)
2				MR Credit 5	**Construction & Demolition Waste Management:** 50% / 75%	Divert 50%, three material streams (1pt) OR 75%, four material streams (2pts), OR generate less than 2.5 lbs waste/sf (2pts)

8	6	2	0	Indoor Environmental Quality		Standard
2				IEQ Credit 1	**Enhanced Air Quality Strategies**	Provide entryway systems, prevent interior cross-contamination, and specify MERV 13 filters (1pt) AND/OR prevent exterior contamination or increase ventilation or monitor CO2 (1pt).
1	1	1		IEQ Credit 2	**Low-Emitting Materials:** 2 / 4 / 5 categories	Achieve the threshold level of compliance with emissions and content standards for 2, 4 or 5 product categories
1				IEQ Credit 3	**Construction IAQ Management Plan**	Develop an IAQ plan for construction and preoccupancy phases that meets SMACNA IAQ Guidelines for Occupied Buildings Under Construction
1	1			IEQ Credit 4	**Indoor Air Quality Assessment**	Perform pre-occupancy building flush out (1pt) or testing (2pts).
1				IEQ Credit 5	**Thermal Comfort**	Meet ASHRAE 55-2010, Thermal Comfort Conditions for Human Occupancy.
2				IEQ Credit 6	**Interior Lighting**	Provide lighting controls for 90% of individuals AND/OR meet four of LEED's lighting quality requirements.
	2	1		IEQ Credit 7	**Daylight:** 55% / 75%	Demonstrate through annual simulations that daylight autonomy300/50% (sDA300/50%) is achieved (2/3pts)
	1			IEQ Credit 8	**Quality Views**	Provide direct views to the outside in 75% of regularly occupied spaces which meets 2 out of 4 LEED view criteria.
	1			IEQ Credit 9	**Acoustic Performance**	Meet requirements for HVAC background noise, sound isolation, reverberation time, & sound reinforcement for all occupied spaces.

6	0	0	0	Innovation in Design		Standard
1				ID Credit 1.1	**Innovation in Design**, Green Education	Pending GBCI review and comment.
1				ID Credit 1.2	**Innovation in Design**, Green Cleaning	Pending GBCI review and comment.
1				ID Credit 1.3	**Innovation in Design**, Low Mercury Lighting	Pending GBCI review and comment.
1				ID Credit 1.4	**Innovation in Design**, Organic Landscape Management	Pending GBCI review and comment.
1				ID Credit 1.5	**Innovation in Design**, Integrated Pest Management	Pending GBCI review and comment.
1				ID Credit 2	**LEED™ Accredited Professional**	LEED Accredited Professional on design team.

3	1	0	0	Regional Priority		Standard
1				RP Credit 1.1	**Regional Priority**, Indoor Water Use Reduction	Pursuant to USGBC determined zone-based regional priority credit (Up to 6 points, required pt threshold = 4)
1				RP Credit 1.2	**Regional Priority**, Optimize Energy Performance	Pursuant to USGBC determined zone-based regional priority credit (Up to 18 points, required pt threshold = 8)
	1			RP Credit 1.3	**Regional Priority**, High Priority Site	Pursuant to USGBC determined zone-based regional priority credit (2 points, required point threshold = 2)
1				RP Credit 1.4	**Regional Priority**, Rainwater Management	Pursuant to USGBC determined zone-based regional priority credit (Up to 3 points, required pt threshold = 2)
				RP Credit	**Regional Priority**, Renewable Energy Production	Pursuant to USGBC determined zone-based regional priority credit (Up to 3 points, required pt threshold = 2)

ACOUSTICAL NARRATIVE

MIT KENDALL SQUARE NOMA

BUILDING 1
ONE BROADWAY

CAVANAUGHTOCCI

This letter presents our noise analysis for outdoor mechanical equipment associated with the proposed residential tower (Building 1) in Cambridge, and new mechanical equipment to be added on the roof of the One Broadway building to serve tenant spaces. We have calculated noise at nearby receptors (occupied buildings) to evaluate compliance with the Cambridge noise regulation.

Noise Sources

The following noise sources were included in the calculations:

Building 1 Tower Roof:
- Cooling Towers
- Emergency Generator
- Energy Recovery Unit

Building 1 North Façade (level 4):
- Discharge louver for parking garage ventilation

One Broadway Podium Roof:
- Air conditioning unit for new office space
- Condenser units (three) for grocery store
- Exhaust fans (two) for grocery store kitchen
- Emergency generator
- Intake and discharge louvers for parking garage ventilation

One Broadway North Podium Facade:
- Louvers for parking garage

One Broadway South Podium Façade:
- Louvers for parking garage

Noise Controls

Emergency Generators

The emergency generators will be in outdoor sound enclosures and fitted with exhaust silencers. Our noise model is based on the sound attenuated enclosures and critical grade exhaust silencers.

Noise Barrier

The architectural drawings show a solid screen at the south edge of the One Broadway roof. This screen is intended as a visual screen but will also provide sound attenuation between the equipment on the One Broadway roof and receptors to the south.

There also a screen on the roof of Building 1, surrounding the mechanical equipment. This screen provides sound attenuation for the Building 1 mechanical equipment.

Building 1 Cooling Towers

These towers have been selected for quiet operation.

Garage Fans

Garage Fans will be equipped with variable speed drives. Our noise model is based on full speed operation, which is not expected on a regular basis. The normal operating speed is 50% or less, with fan speed increasing as needed based on a signal from the CO sensors.

Noise Model Results

Table 1 shows a summary of calculated noise at 16 different receptor points surrounding 1 Broadway. The table has two sets of noise values, the first column shows noise with all equipment running at full load, except the emergency generators. The calculated noise for this operating condition is within the Cambridge residential daytime limit of 60 dBA at all locations.

The second set of noise values represents the night operating mode. In this operating mode, the grocery store equipment is at full load, the parking garage fans are at 50% speed, and the rooftop unit serving the new office space is turned off. The calculated noise for this operating condition meets the Cambridge residential limit of 50 dBA at all locations except the east façade of the One Broadway office tower. The calculated noise at the east façade is 60 dBA, which is within the 65 dBA limit for a commercial building.

The third column in Table 1 adds noise from the emergency generator to the daytime operating mode (all equipment at full speed). With the exception of R 06, all of the predicted noise levels for this operating condition are less than 60 dBA, which we consider acceptable for emergency equipment.

Figure 1 at the end of the report shows an area map with the locations and predicted noise levels for all of the normally operating mechanical equipment. Figure 2 shows predicted noise with all normally operating mechanical equipment plus the emergency generators. Note that the noise levels with generators are not shown in the noise maps (Figures 1 and 2).

Table 1 – Summary of Calculated Noise From Outdoor Mechanical Equipment

Receptor	Description	Height [ft]	Distance [ft]	Base Building, Day[1]	Base Building, Day + Generators[3]	Base Building, Night[3]
R01	Residential (Marriott)	175	435	38	40	33
R02	Residential	240	390	37	44	34
R03	Residential (Watermark)	195	330	45	48	40
R04	Ground Level (Commercial)	20	320	45	53	41
R05	Residential (Watermark)	240	350	42	54	39
R06	New Residential Tower (Bldg 1)	50	50	52	66	50
R07	Commercial (Red Cross)	55	165	33	40	30
R08	Commercial (Office)	245	320	40	44	40
R09	Commercial (MIT)	180	295	40	54	37
R10	Commercial	245	290	43	57	40
R11	Commercial	60	345	40	43	36
R12	Commercial	35	580	34	36	29
R13	Commercial	85	690	32	34	26
R14	Residential (Future Mixed Use)	180	840	31	37	27
R15	Ground Level (Sidewalk North)	5	105	55	55	49
R16	Ground Level (Sidewalk South)	5	180	47	49	42

[1] Includes all normally operating mechanical equipment at 100% capacity, no emergency equipment operating.

[2] Same as condition described above, with addition of emergency generators on Building 1 and 1 Broadway roofs.

[3] Based on 6 dB reduction for all garage supply and exhaust equipment, and the 1 Broadway new RTU turned off at night.

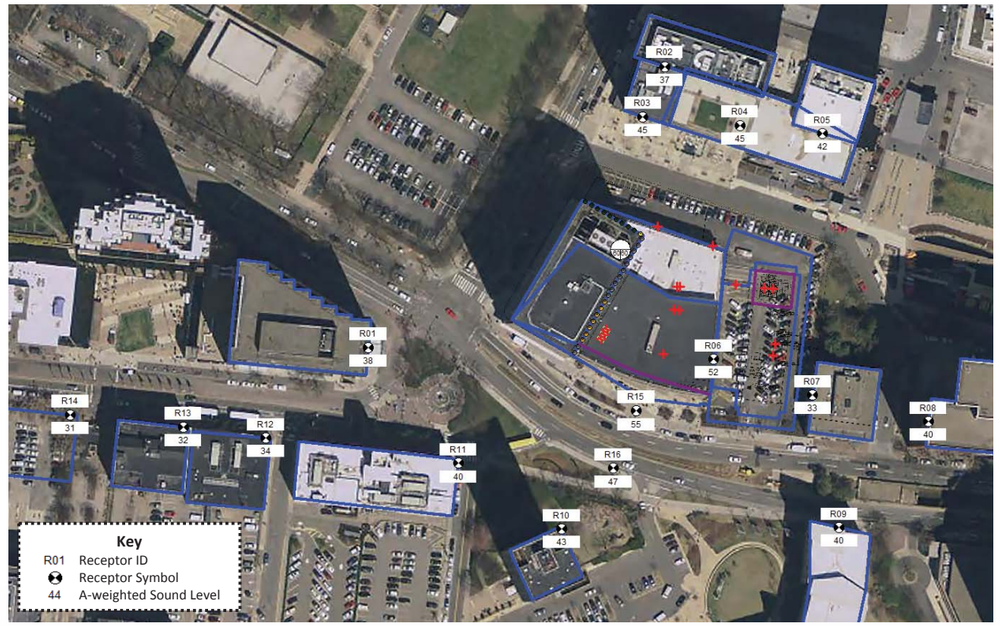
Existing Ambient Noise

Based on studies by Acentech, the existing ambient noise at several locations along Main Street and Broadway was 60-65 dBA during daytime and 55 dBA at the quietest times during the night. The calculated noise in the table above is quieter than the existing ambient except when the emergency generators are running. Operation of these generators will be limited to weekly test runs and power emergencies.

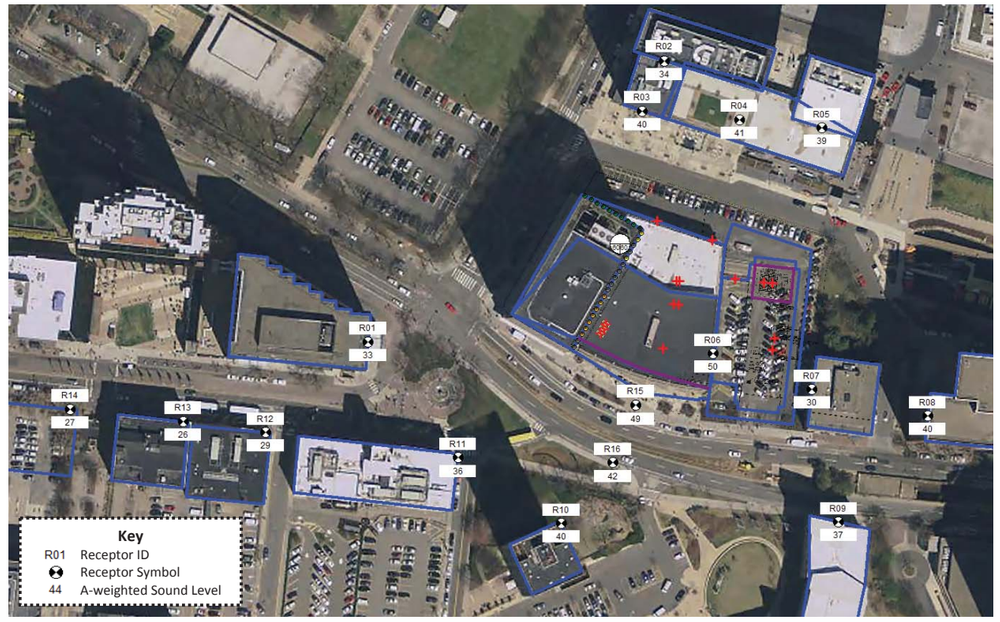
This noise model shows that the current design is expected to comply with the Cambridge noise regulation at all locations under normal operating conditions.

Note:
See pages 17, 20, and 22 for proposed roof plans.

Kendall Square Cambridge – Predicted Daytime Noise from Outdoor Mechanical Equipment at One Broadway



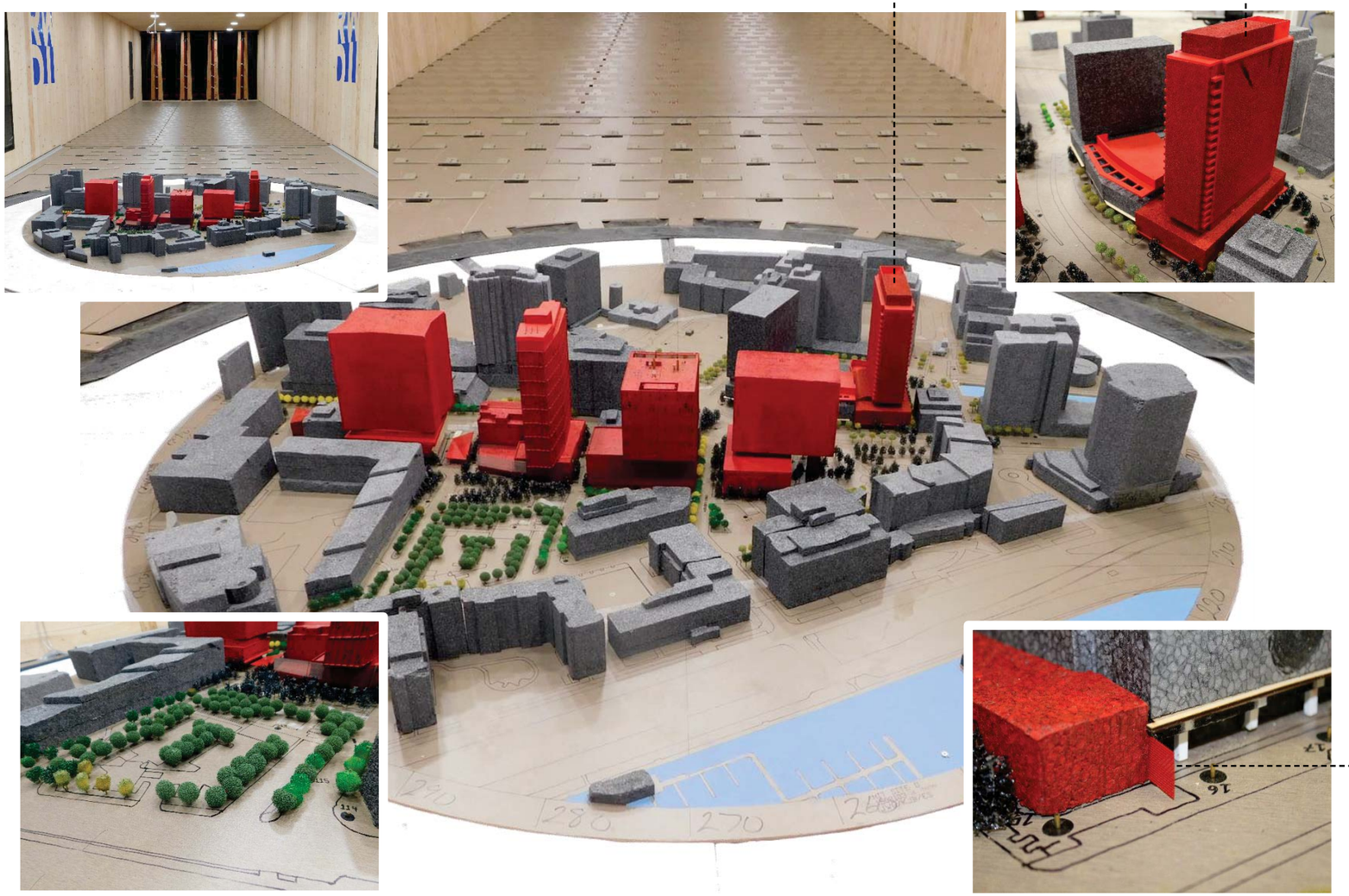
Kendall Square Cambridge – Predicted Nighttime Noise from Outdoor Mechanical Equipment



WIND STUDY

MIT KENDALL SQUARE NOMA

BUILDING 1
ONE BROADWAY



Wind Tunnel Study Model
Full Build (NoMa and SoMa Tree Plans)

MIT Kendall Square Initiative – Cambridge, MA | Project #1502103

Figure No. 1b

Date: October 14, 2016

RWDI