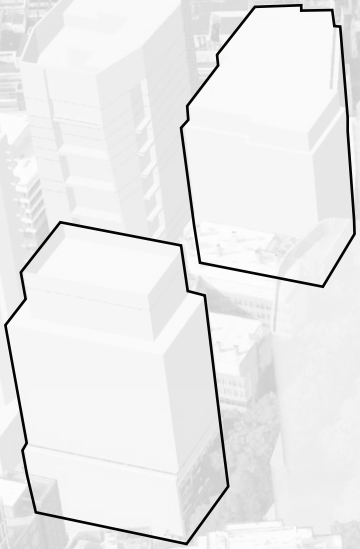


MXD

CAMBRIDGE, MA

INFILL DEVELOPMENT CONCEPT PLAN

AMENDMENT 3 CONFORMING DOCUMENT

VOLUME III APPENDICES

FEB 2025

APPENDIX

Description

Appendix A – Tree Study

Appendix B – Transportation Impact Statement Technical Memorandum

Appendix C – Pedestrian Wind Study

Appendix D – Noise Study Technical Memorandum

APPENDIX A

TREE STUDY

July 17, 2024

BXP
800 Boylston St, Suite 1900
Boston, MA 02199

Tree Report at 105 Broadway, Cambridge, MA

To Whom It May Concern:

You contacted Arborist Representative Andrew Balon about an updated conditional survey of select trees on the 105 Broadway site. Th original inventory was completed in February 2022.

Seventeen trees were observed during the site visit on July 10. One tree (#1001) was a small newly planted tree that is dead. Tree #105 was a red oak in poor condition exhibiting poor vigor. Additionally a zelkova tree (#113) is not as healthy as the trees nearby. No recent damage or changes were observed that would have caused these trees to be in poor condition.

If you have any questions about my observations or recommendations, please contact me.

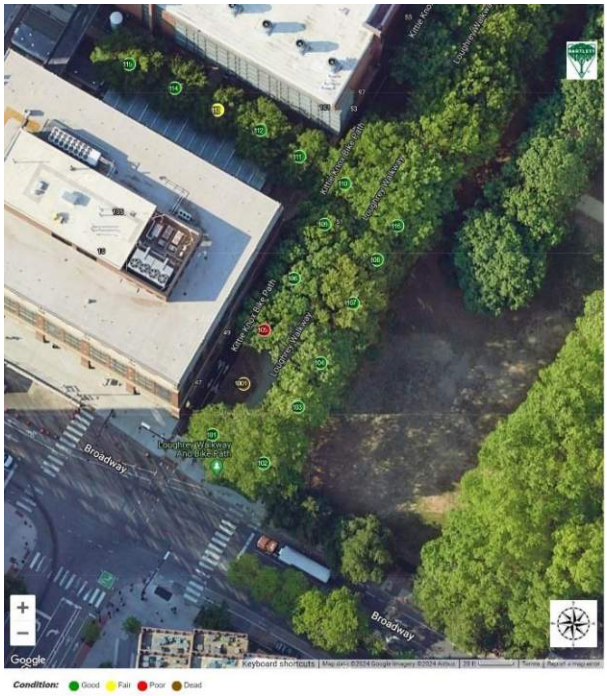


Image 1: Map of updated trees by condition.

Tim Armstrong
ASCA Registered Consulting Arborist #790
ISA Board Certified Master Arborist #NE-7132B
ISA Tree Risk Assessment Qualified
Tim.armstrong@bartlett.com

Site images enclosed:

Limits of the Assignment

The tree assessment was performed from the ground for visual conditions. This tree inventory was not a tree risk assessment. As such, no trees were assessed for risk in accordance with industry standards, nor are there any tree risk ratings or risk mitigation recommendations provided within this report.

Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

Illustrations, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

Information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection. There is no warranty or guarantee, expressed or implied, that problems of deficiencies of the plans or property in question may not arise in the future.

There is no guarantee for the preservation of the trees contained in this report, however, the preservation plan is made with the best interest intended for the trees being preserved.

Site Images

Image 2: Dead young tree (#1001)

Image 3: Alleyway containing trees #111-115. The small grey birch trees were not included in the initial inventory.

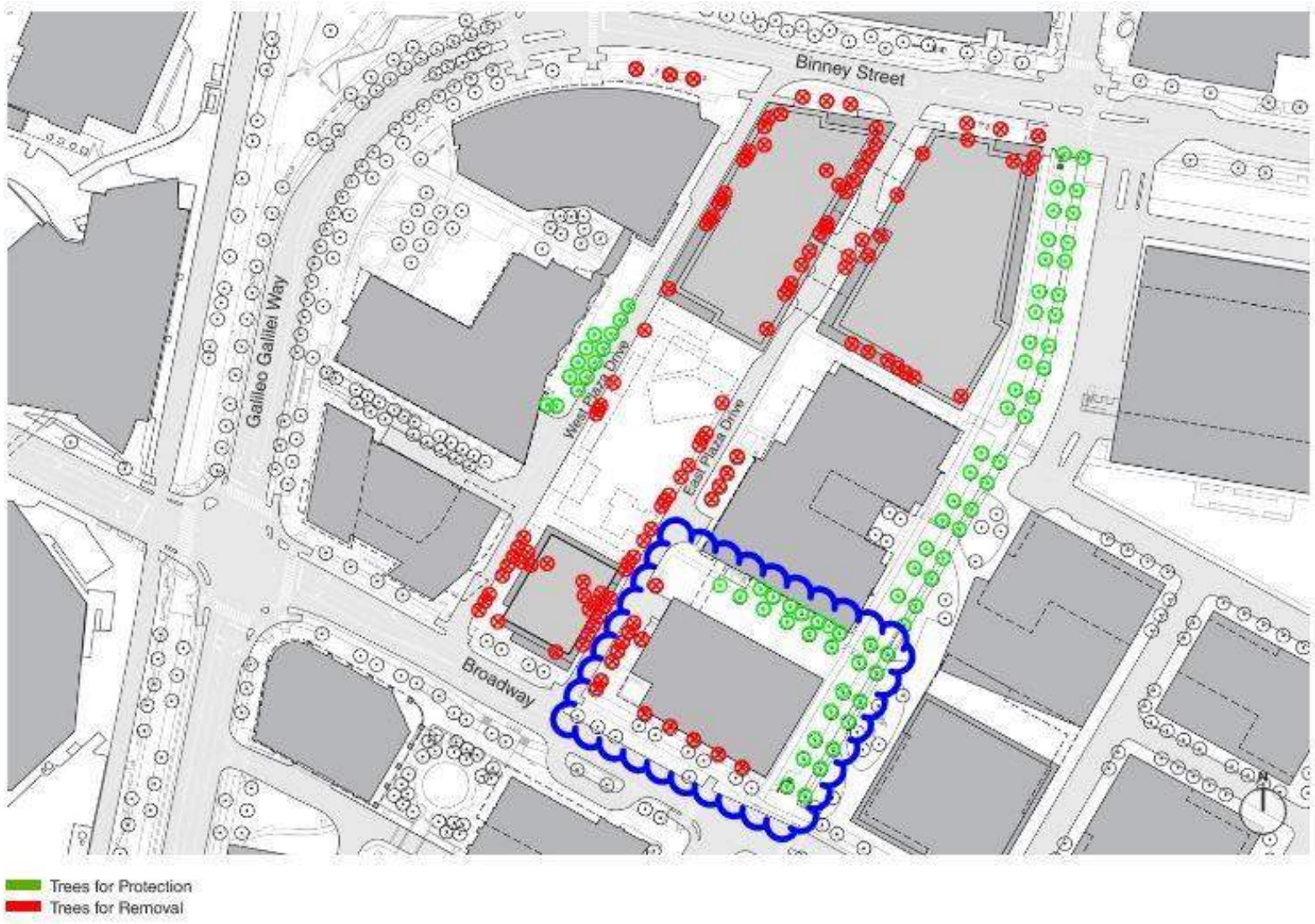


Image of requested tree condition update (blue cloud).

APPENDIX B

TRANSPORTATION IMPACT STATEMENT TECHNICAL MEMORANDUM

Memorandum

To: Brooke McKenna,
Transportation Commissioner
Adam Shulman,
Transportation Planner

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

Date: November 7, 2024

Project #: 12959.17

From: Sean Manning, P.E.
Chelsea Sadler

Re: KSURP Infill Development Concept Plan
105 Broadway – TIS Update Memorandum

KSURP Infill Development Concept Plan Background

Boston Properties Limited Partnership (BXP) has retained VHB to prepare a Transportation Impact Study (TIS) Update memorandum for the proposed 105 Broadway development in Kendall Square in Cambridge, Massachusetts. The original TIS (for the Kendall Square Urban Redevelopment Plan (KSURP) Infill Development Concept Plan) was submitted to the Cambridge Traffic, Parking, and Transportation (TP&T) Department on June 23, 2016 and certified on July 14, 2016. The Proponent submitted a Special Permit application (PB#315) to the Planning Board, under Article 14, in September 2016 and received Planning Board approval in March 2017. In January 2017, VHB submitted an update to the transportation analysis that reflected changes in the proposed development program, which were documented by TP&T in a memorandum to the Planning Board dated January 11, 2017, in support of the Board's approval of the Special Permit for the KSURP Project.

In September 2018, VHB submitted another update to the transportation analysis for Amendment #1. This memorandum focused on the updated trip generation and parking analysis changes due to an increase in the residential program and the relocation of a building within the development. The overall development gross square footage did not change from the previous update. TP&T documented the changes with recommendations for Amendment #1 in a memorandum to the Planning Board on November 27, 2018. The Amendment #1 (Major) was approved by the Planning Board on December 4, 2018. The Amendment #2 TIS (for the Kendall Square Urban Redevelopment Plan (KSURP) Infill Development Concept Plan) was submitted to the Cambridge Traffic, Parking, and Transportation (TP&T) Department on August 4, 2021 and certified on August 6, 2021. Amendment #2 accounted for an additional 800,000 SF of commercial Utility Project GFA located at 290 Binney and 250 Binney, enabled by the relocation of an Eversource electrical substation to the MXD. It also consolidated approved residential GFA at 121 Broadway, relocated above-grade parking (Blue Garage) below grade, and allowed for a significant addition to the public open space, Center Plaza. The Project team was recently coordinating with TP&T on revisions to a TIS Update memorandum for the MXD - 290 Binney - Two-way traffic pattern re: East Service Drive. A draft of the TIS update memo for this effort was shared on July 23, 2024, and it was recently approved by TP&T on July 29, 2024.

The Client is now proposing to shift previously approved office/lab GFA from 250 Binney Street to a new site at 105 Broadway. No additional GFA is being proposed beyond what was previously approved. Details of the proposed changes are outlined in the following sections.

Key Findings

The Currently Proposed Project has the following key attributes:

- Zero net-increase of GFA when compared to the currently-approved project;
- Shift of approximately 145,000 square feet (sf) of allowable commercial space from the previously reviewed and approved 250 Binney Street development to 105 Broadway; The commercial building located at 105 Broadway would be newly constructed with 302,400 sf of GFA, including approximately 2,550 sf of retail/active use. Of the 302,400 sf, 157,100 sf would be existing GFA to be demolished and replaced, and 145,300 sf would be net new GFA.
- Zero net-increase in approved parking supply;
- Redistribution between garage access points including: (1) 457 parking spaces in the 105 Broadway Garage, (2) 529 in the 290 Binney Garage, (3) 598 in the 250 Binney Garage;
- The East Service Drive will continue to operate as described in the TIS Update Memo dated 7/23/24[1].
- A loading dock is provided just south of the parking ramp which will provide three loading bays and a trash compactor.
- The Proposed Project results does not change the net-new vehicle trips entering or exiting on Binney Street or Broadway (the shift in vehicle trips is associated with which driveway they are using – internal to East Service Drive)

Proposed Project Overview

The proposed development includes a shift of approximately 145,000 square feet (sf) of allowable commercial space from the previously reviewed and approved 250 Binney Street development to 105 Broadway. The proposed development also includes minor GFA adjustments for Commercial Building B, Residential Building South, and Commercial Building C given refinements to these buildings' design through the City design review process. The commercial building located at 105 Broadway would be 302,400 sf of GFA including approximately 2,550 sf of retail/active use.

The Proposed Project program is detailed below in **Table 1** and compares this proposed development program to the previously approved development program[2]. A complete development program table is provided in the Appendix of this memo for reference (Table A). Comparing to the previously approved program to the currently proposed project, **there is zero net-increase of GFA.** A context map is provided in **Figure 1. Figures 2 and 3** depict the program and parking summaries graphically.

---

[1] TIS Update memo for the MXD - 290 Binney - Two-way traffic pattern re: East Service Drive dated 7/23/24

[2] sp315_decision_20220315.pdf (cambridgema.gov)

Memorandum

Table 1 Proposed Development Program VS Previously Approved Program[1]

Project Component	2021 Approved Net Program	2024 Proposed Net Program	Difference (2024 Proposed Net Program less 2021 Approved Net Program)
Building A - 145 Broadway	362,978 sf	362,978 sf	-0 sf
(Commercial) [3]	354,278 sf	354,278 sf	-0 sf
(Retail/Active Use)[4]	8,700 sf	8,700 sf	-0 sf
Building B - 325 Main St	268,221 sf	266,277 sf	(- 1,944) sf
(Commercial) [3]	268,221 sf	266,277 sf	(- 1,944) sf
(Retail/Active Use)[4]	0 sf	0 sf	0 sf
Residential – 121 Broadway *(fka 135 Broadway)*	420,700 sf	421,550sf	850 sf
(Residential)	420,000 sf (465 units)	420,000 sf (465 units)	0 sf (+0 units)
(Retail/Active Use)[4]	700 sf	1,550 sf	850 sf
Building C – 290 Binney St	412,000 sf	425,333 sf	13,333 sf
(Commercial)	409,500 sf	420,607 sf	11,107 sf
(Retail/Active Use)[4,5]	2,500 sf	4,726 sf	2,226 sf
Building D – 250 Binney St	388,000 sf	229,761 sf	(- 158,239) sf
(Commercial)	382,200 sf	229,761 sf	(- 152,439) sf
(Retail/Active Use)[4,5,6]	5,800 sf	0 sf	(- 5,800) sf
75 Ames St / Broad Institute[2]	14,000 sf	14,000 sf	0 sf
(Commercial)	14,000 sf	14,000 sf	0 sf
Building E - 105 Broadway	0 sf	145,300 sf	145,300 sf
(Commercial)	0 sf	142,750 sf	142,750 sf
(Retail/Active Use)[4,6]	0 sf	2,550 sf	2,550 sf
TOTAL	**1,865,899 sf**	**1,865,199 sf**	**(- 700) sf[7]**
(Commercial)	**1,428,199 sf**	**1,427,673 sf**	**(- 526) sf**
(Retail/Active Use)	**17,700 sf**	**17,526 sf**	**(- 174) sf**
(Residential)	**420,000 sf (465 units)**	**420,000 sf (465 units)**	**0 sf (+0 units)**

1. GFA as defined in Article 2.0 of the Cambridge Zoning Ordinance.
2. Represents the conversion of existing mechanical space to be re-purposed/fit-out into leasable commercial/laboratory office space at the Broad Institute's 75 Ames Street location. The Applicant is not responsible for the execution of this component of the Project.
3. Incorporated within the Commercial GFA Figures is the Innovation Space tied to Commercial Building A and Commercial Building B.
4. Active Ground Floor Uses can include retail uses and active public gathering space (whether open or enclosed) where that ground floor fronts Main Street, Broadway or Ames Street, per Article 14.38 of the Zoning Ordinance.
5. The Applicant plans to distribute up to approximately 11,700 SF of ground floor active use or retail GFA between Commercial Building C and Commercial Building D so as to activate the northeast edge of the proposed Center Plaza open space. Commercial Building C retail space will house a temporary bike valet to meet City of Cambridge requirements serving Commercial Building C and Residential South. Once Commercial Building D is complete, the bike valet will transfer to Commercial Building D.

6. Exempt active uses are excluded from this table including bike rooms and bike valet.
7. Previously 700 sf of space was considered as exempt retail GFA under Section 14.32.6 (4) of the Zoning Code. Under the current program, that 700 sf is no longer treated as exempt which leads to a net-reduction of 700 SF. For purposes of the traffic analysis, this is assumed to be zero.

In addition, the following summarizes how the Project will maintain previously approved 3,750 total parking spaces by proposing to shift 457 parking spaces to the Proposed 105 Broadway Garage:

- 3,750 masterplan approved total parking spaces (no change)
- 1,584 total parking spaces in 250 Binney and 290 Binney (2021 approval)
- 1,584 total parking spaces in 250 Binney, 290 Binney, and the new 105 Broadway (no change in total space count, only slight redistribution between garage access points)
    - 457 in the 105 Broadway Garage
    - 529 in the 290 Binney Garage
    - 598 in the 250 Binney Garage

    Totaling 1,584 parking spaces among these three garages

Previously Approved Volumes and Circulation[3]

Based on the traffic analysis and peak period traffic volumes summarized in the Traffic Impact Study (TIS) update memo dated 7/23/24 that was approved on 7/29/24[3], the East Service Drive will operate as a predominately one-way southbound road with a two-way section north of the 290 Binney Garage driveway. The two-way section serves both the 250 Binney Garage and the 290 Binney Garage however, northbound traffic in the two-way section is limited to garage traffic only (trucks exiting the loading docks would be required to head southbound to exit on Broadway). Further, the two-way section would prohibit left turns exiting onto Binney Street.

Currently Proposed Volumes and Circulation

The East Service Drive will continue to operate as described in the TIS Update Memo dated 7/23/24[4].

However, the Proponent is committed to identifying the best access solution for the project and the neighborhood. The Proponent is in favor of proposing modifying the southern portion of the East Service Drive to become two-way in front of the 105 Broadway building. In this configuration, vehicle trips arriving at the site would arrive both northbound from Broadway (right turn only) and southbound on East Service Drive, and exiting vehicle trips will only take a left turn out of the site (onto East Service Drive), heading southbound toward Broadway. The proponent would like to re-engage in this access and circulation discussion later as part of future design review for the Project.

As previously discussed, there is **zero net-increase of GFA and zero net-increase in parking supply.** However, there is a shift of approximately 145,000 square feet (sf) of allowable commercial space from the previously reviewed and approved 250 Binney Street development to 105 Broadway. **The change in traffic volumes anticipated will not impact study area intersections and is internal to East Service Drive and the building driveways.**

[3] sp315_designupdate_20240807.pdf (cambridgema.gov)

[4] TIS Update memo for the MXD - 290 Binney - Two-way traffic pattern re: East Service Drive dated 7/23/24

105 Broadway Site Plan

The Proposed 105 Building will have the following elements as illustrated in **Figure 4**.

Vehicle Parking + Service/Loading

Access to the parking garage (access and egress) will be provided by the parking ramp off of East Service Drive. The curb cut is provided on the far north end of the west edge of the building (that fronts East Service Drive). In addition, a loading dock is provided just south of the parking ramp which provides three loading bays and a trash compactor. Truck turning templates for the proposed loading and service are provided in the Appendix.

Vehicle Parking Supply

As previously indicated, the project will provide 457 parking spaces below the 302,400 sf 105 Broadway building within the below grade parking garage. The Project will maintain the previously approved 3,750 total parking spaces and parking supply which were previously approved per the 2021 Approved Program.

Site Access (Pedestrians and Bicycles)

Primary access/egress to the building lobby is provided on the corner of Broadway at East Service Drive (retail) and the corner of Broadway at "Kittie Knox" Bicycle Path (lobby). Access to the bicycle room is provided in the northeast corner of the site.

Proposed Bicycle Parking

The Proposed Project will provide 68 long-term bicycle parking spaces within an enclosed bicycle room on the ground floor of the site (for employees) and 21 short-term bicycle parking spaces (for visitors), as required by zoning and City of Cambridge Bicycle Parking Guidelines. Figures depicting the proposed bike parking is provided in **Figures 5a and 5b.**

Transportation Demand Management

The Proponent is committed to maintaining their proactive and comprehensive array of Transportation Demand Management (TDM) measures and Mitigation Plan previously committed to in the original 2016 TIS. The proposed TDM measures aim to reduce drive-alone trips, or single occupancy vehicles (SOVs), by encouraging employees, residents and visitors to use alternative modes of transportation. Overall, the goal of the proposed TDM Plan is to reduce the use of SOVs by encouraging carpooling and vanpooling, bicycle commuting and walking, and increased use of the Kendall Square public transportation system by employees and residents.

The following important transportation mitigation and improvements actions have been completed since the 2016 TIS was certified in 2019:

- Provided the initial $6 million payment for the KSTEP Fund.
- Developed 100% Design Plans for reconstruction of Binney Street and Galileo Galilei Way between Sixth Street and Broadway, including improvements at the intersection of Galileo Galilei Way/Broadway and respective approaches of Galileo Galilei Way.
- Developed 100% Design Plans for reconstruction of Broadway between Ames Street and Galileo Galilei Way.
- Improved the Sixth Street Connector Pathway by providing separated pedestrian and bicycle facilities while maintaining the mature trees along the existing pathway.
- Installed wayfinding and real-time transit screens in the Commercial Building A lobby and the Marriott plaza.

- Constructed $400,000 in improvements to the MBTA Red Line Outbound Station on the north side of Main Street.
- Funded one large (i.e., 23-dock) Bluebikes system to further support the public bicycle sharing system in Kendall Square and mitigate the impacts of additional development at 325 Main Street.
- Implemented a real-time parking availability system within the Applicant's commercial parking facilities, in coordination and as approved by TP&T, the CDD and the CRA.
- Implemented a parking management practice or plan that permits parkers to pay by the day, instead of monthly, to encourage commuters not to drive every day, and shall offer this or a comparable program to tenants of the MXD.
- Provided real-time transit screens in the Commercial Building B lobby.

The following measures are ongoing, and will be completed prior to the issuance of a certificate for future Project components:

- Finance the purchase and installation of Bluebikes Stations:
    - Two (2) 19 dock Bluebikes stations; or
    - One (1) 27 dock Bluebikes and expand the existing Binney Street station to a 27-dock station.
    - The City and the Applicant shall identify mutually acceptable location(s) for the Bluebikes Station(s).
- Pay ongoing annual operations and maintenance fees to the City for the Bluebikes Station(s).
- Provide real-time transit screens in the in lobbies of Residential Building South and Commercial Buildings C and D.
- The Permittee shall commit to a transportation monitoring program and mitigation measures whose effectiveness is commensurate with the triggers established in the Recommended Transportation Monitoring Program.

TDM ongoing measures specific to the residential component are identified below:

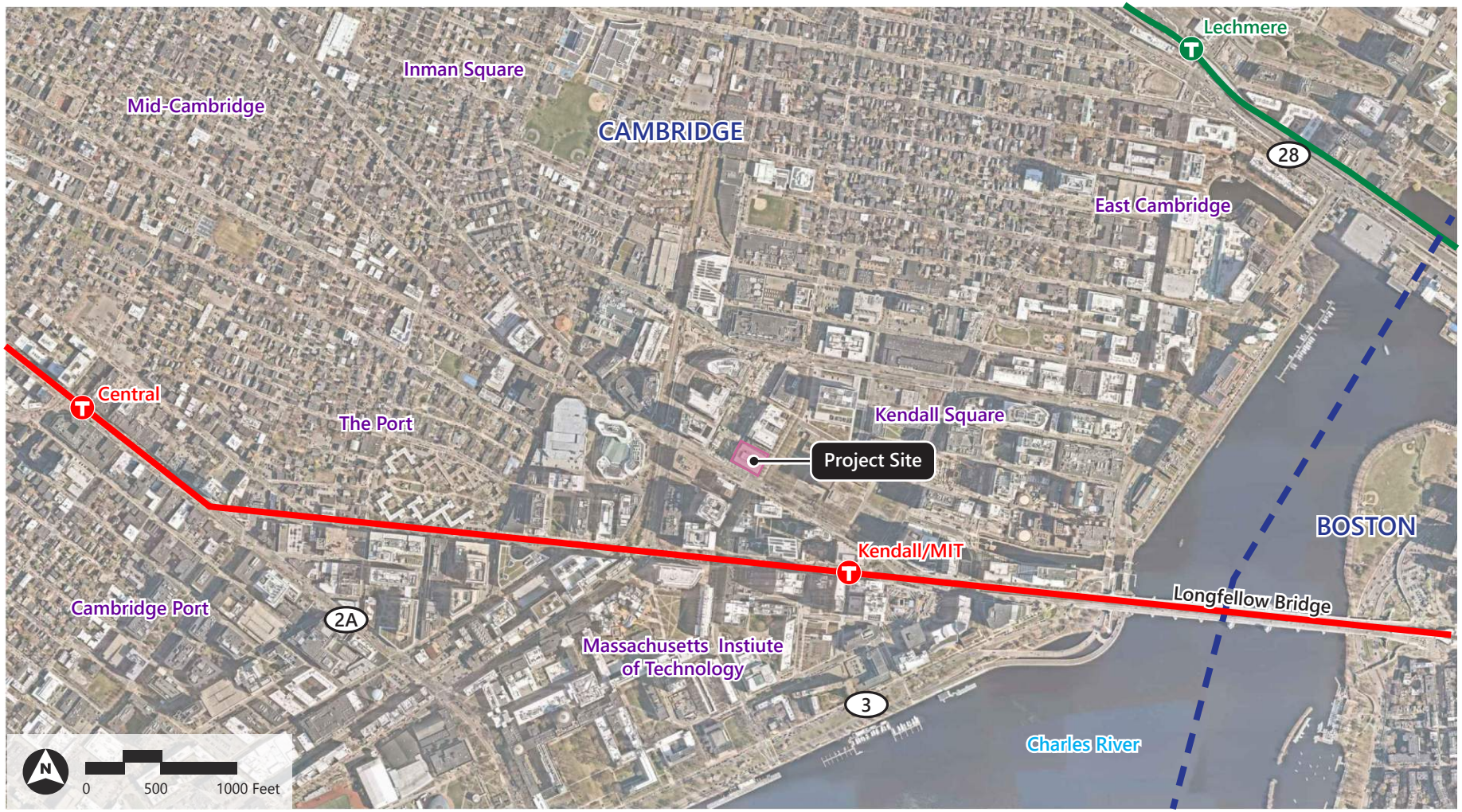
- Make available a minimum of 10 car-sharing parking spaces for a vehicle-sharing company. As demand dictates additional car-sharing vehicles will be added over time. Provide additional designated car-sharing parking spaces within and/or nearby by KSURP parking garages, if deemed feasible. (These are designated and priority spaces for car-sharing users arriving for short-periods of time which is different than car-sharing spaces that "live" in the parking garages.
- Provide electric vehicle (EV) charging stations (1 EV space per 100 auto parking spaces) and preferential parking to alternative fuel vehicles, as dictated by the market.
- Offer each adult member of each household (up to 2) upon move-in a Charlie Card valued at the cost of a 50 percent bus/subway pass (subject to fare increases) for three consecutive months. This benefit will end after 3 months for the household and begins anew upon unit turnover.
- Offer each adult member of each household (up to 2) upon move-in a 1- year Gold-Level Bluebikes membership. This benefit will end after one year for the household and begins anew upon unit turnover.
- Provide air pumps and other bike tools in the bicycle storage room.
- Join the Charles River Transportation Management Association (TMA)

- Provide free EZRide Shuttle sticker for each adult member of each household each year.
- Charge parking (market rate) separately from the residential rent, in order to remind tenants how much they pay for parking. The Permittee shall provide the summary of on-site parking fees to the TP&T.
- Either install a real-time multimodal transportation display screen to help people decide which mode to choose for each trip (transit, carsharing vehicle, Bluebikes bike share, etc.), or establish a transportation information center located in an area that is central, visible, convenient, and equally accessible to all residents and visitors. The center will feature information on:
    - Available pedestrian and bicycle facilities in the vicinity of the site
    - MBTA maps, schedules, and fares
    - Area shuttle map and schedule, if one exists
    - "Getting Around in Cambridge" map and other CitySmart materials (available at the Cambridge Community Development office)
    - Location of bicycle parking
    - Bluebikes regional bikeshare system
    - Carsharing
    - Ride-matching
    - Other pertinent transportation information
- Designate a Transportation Coordinator (TC) for the residential building or the site to manage the TDM program. The TC will also oversee the marketing and promotion of transportation options to all residents at the site in a variety of ways:
- Post information in a prominent location in the building and on the Project's website, social media, and property newsletters.
- Respond to individual requests for information in person and via phone and email.
- Perform annual transportation surveys.
- Require the TC to compile and distribute up-to-date information explaining all transportation options to all new residents as part of their New Resident Packet. The packets will contain information on both the range of options available to any building manager programs to support the use of these options and will include:
    - Available pedestrian and bicycle facilities in the vicinity of the site
    - MBTA maps, schedules, and fares
    - Area shuttle map and schedule, if one exists
    - "Getting Around in Cambridge" map and other CitySmart materials
    - Location of bicycle parking
    - Bluebikes regional bikeshare system
    - Carsharing
    - Ride-matching
    - Other pertinent transportation information
- Require that the TC will be on-site during a minimum of two (2) hours per week and will be available during other times to residents via email and telephone. Email and phone information for the TC will be posted in the transportation information center.

Figure 1: Project Area Context

105 Broadway | Cambridge, MA

10/14/2024



Legend:

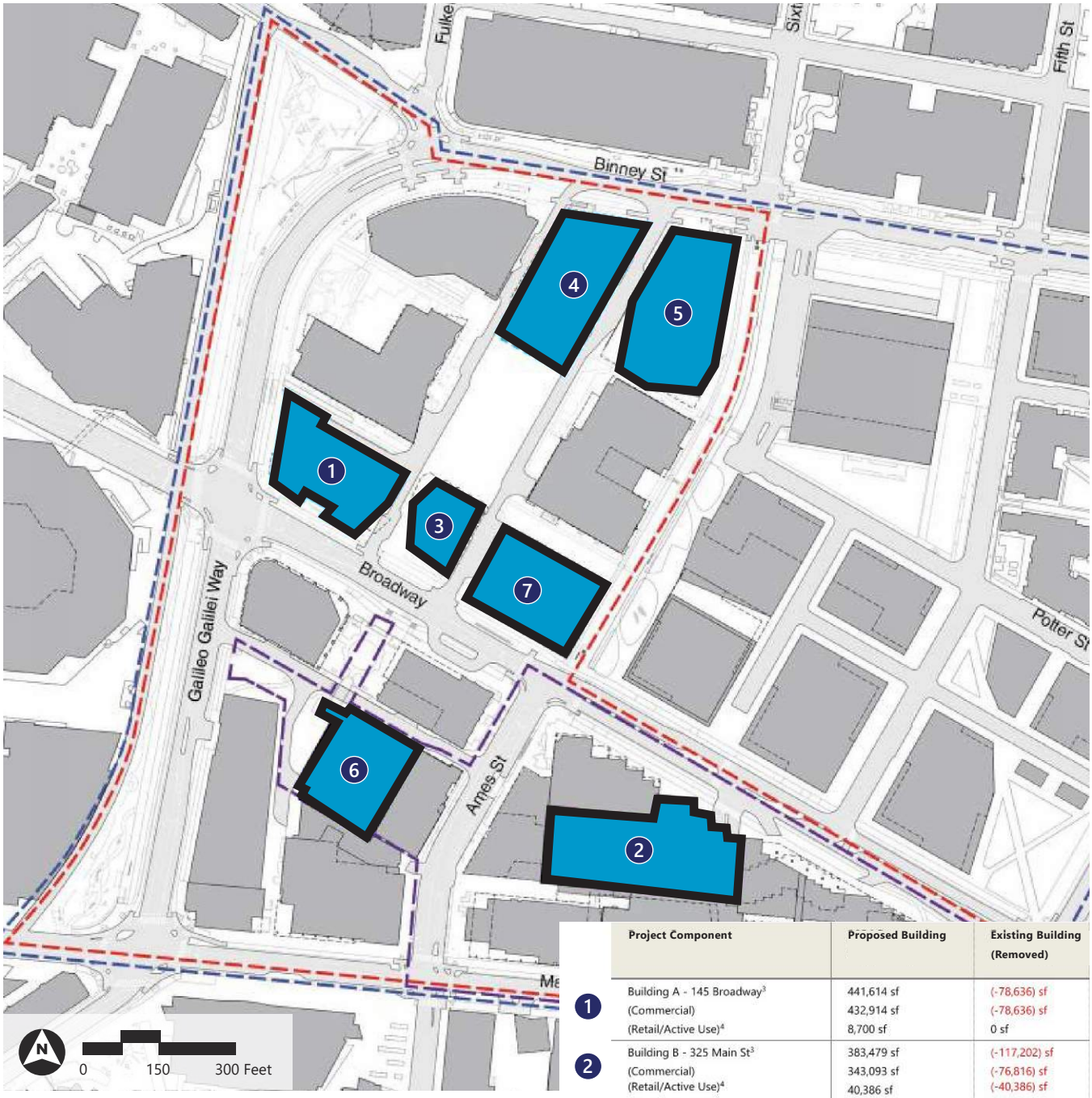
- Project Site
- Red Line Station
- Green Line Station
- State Route (X)
- City Line

Source: Nearmaps April 2024, Google Maps.

Figure 2: Program Summary

105 Broadway St | Cambridge, MA

10/14/2024



Legend:

KSURP Infill Development Site

X Building Number

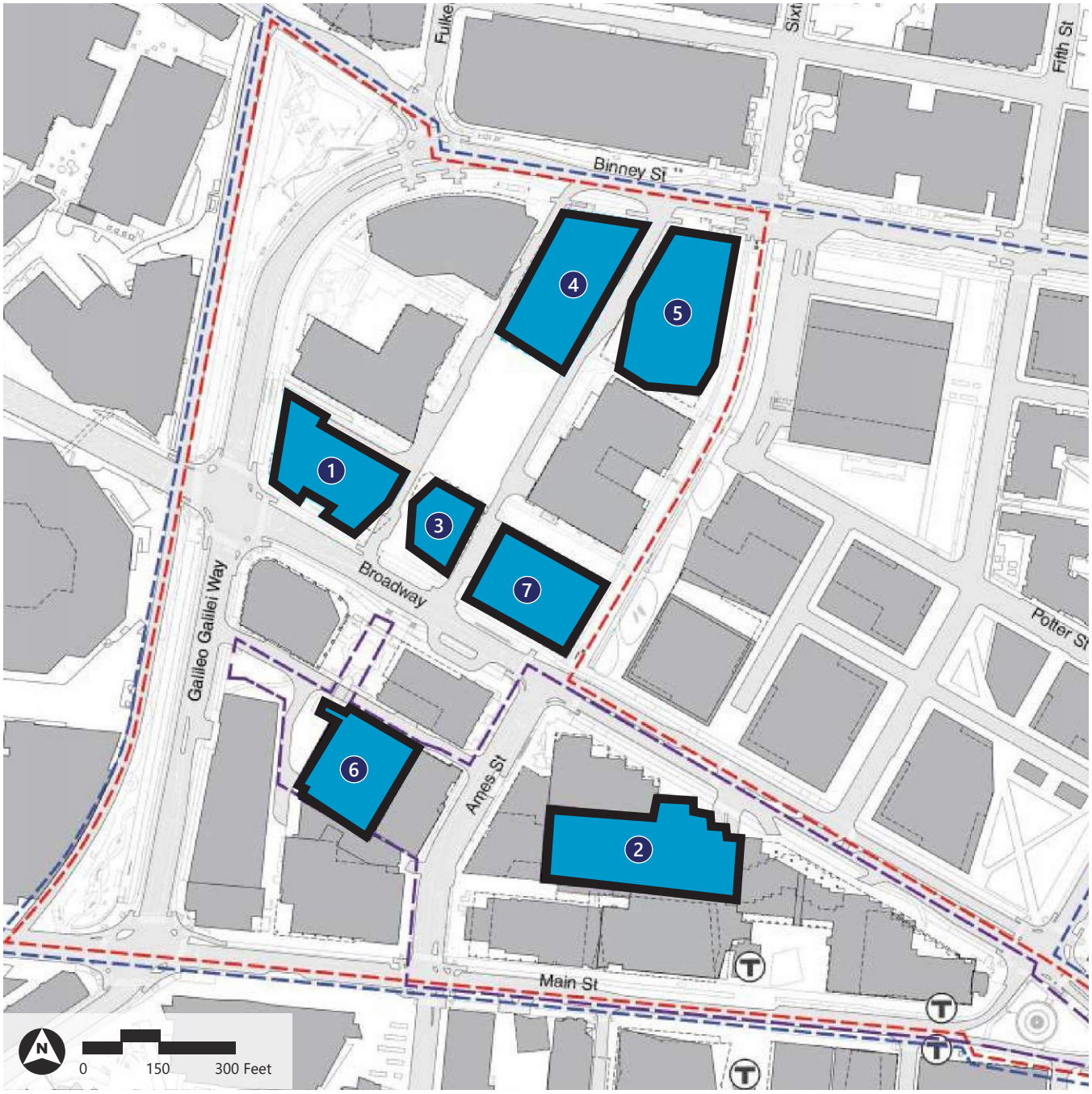
	Project Component	Proposed Building	Existing Building (Removed)
1	Building A - 145 Broadway[3]	441,614 sf	(-78,636) sf
	(Commercial)	432,914 sf	(-78,636) sf
	(Retail/Active Use)[4]	8,700 sf	0 sf
2	Building B - 325 Main St[3]	383,479 sf	(-117,202) sf
	(Commercial)	343,093 sf	(-76,816) sf
	(Retail/Active Use)[4]	40,386 sf	(-40,386) sf
3	Residential – 121 Broadway *(fka 135 Broadway)*	421,550sf	0 sf
	(Residential)	420,000 sf (465 units)	0 sf
	(Retail/Active Use)[4]	1,550 sf	0 sf
4	Building C – 290 Binney St	425,333 sf	0 sf
	(Commercial)	420,607 sf	0 sf
	(Retail/Active Use)[4,5]	4,726 sf	0 sf
5	Building D – 250 Binney St	292,337 sf	(-62,576) sf
	(Commercial)	292,337 sf	(-62,576) sf
	(Retail/Active Use)[4,5,6]	-0 sf	0 sf
6	75 Ames St / Broad Institute[2]	14,000 sf	0 sf
	(Commercial)	14,000 sf	0 sf
7	Building E - 105 Broadway	302,400 sf	(-157,100) sf
	(Commercial)	299,850 sf	(-157,100) sf
	(Retail/Active Use)[4,6]	2,550 sf	0 sf
	TOTAL	**2,280,713 sf**	**(-415,514) sf**
	(Commercial)	**1,802,801 sf**	**(-375,128) sf**
	(Retail/Active Use)	**57,912 sf**	**(-40,386) sf**

Source: Sasaki

Figure 3: Parking Summary

105 Broadway St | Cambridge, MA

10/14/2024



Legend:

KSURP Infill Development Site

X Building Number

	Building Name	Existing Parking	Future Parking
1	145 Broadway	457	457
2	Green Garage	824	824
3	121 Broadway	-	-
4	290 Binney St	-	598
5	250 Binney St	-	529
6	Yellow Garage	885	885
7	105 Broadway	-	457
	Total:	**2,166**	**3,750**

Source: Sasaki

Figure 4: Proposed Site Plan

105 Broadway St | Cambridge, MA

10/14/2024

Legend:

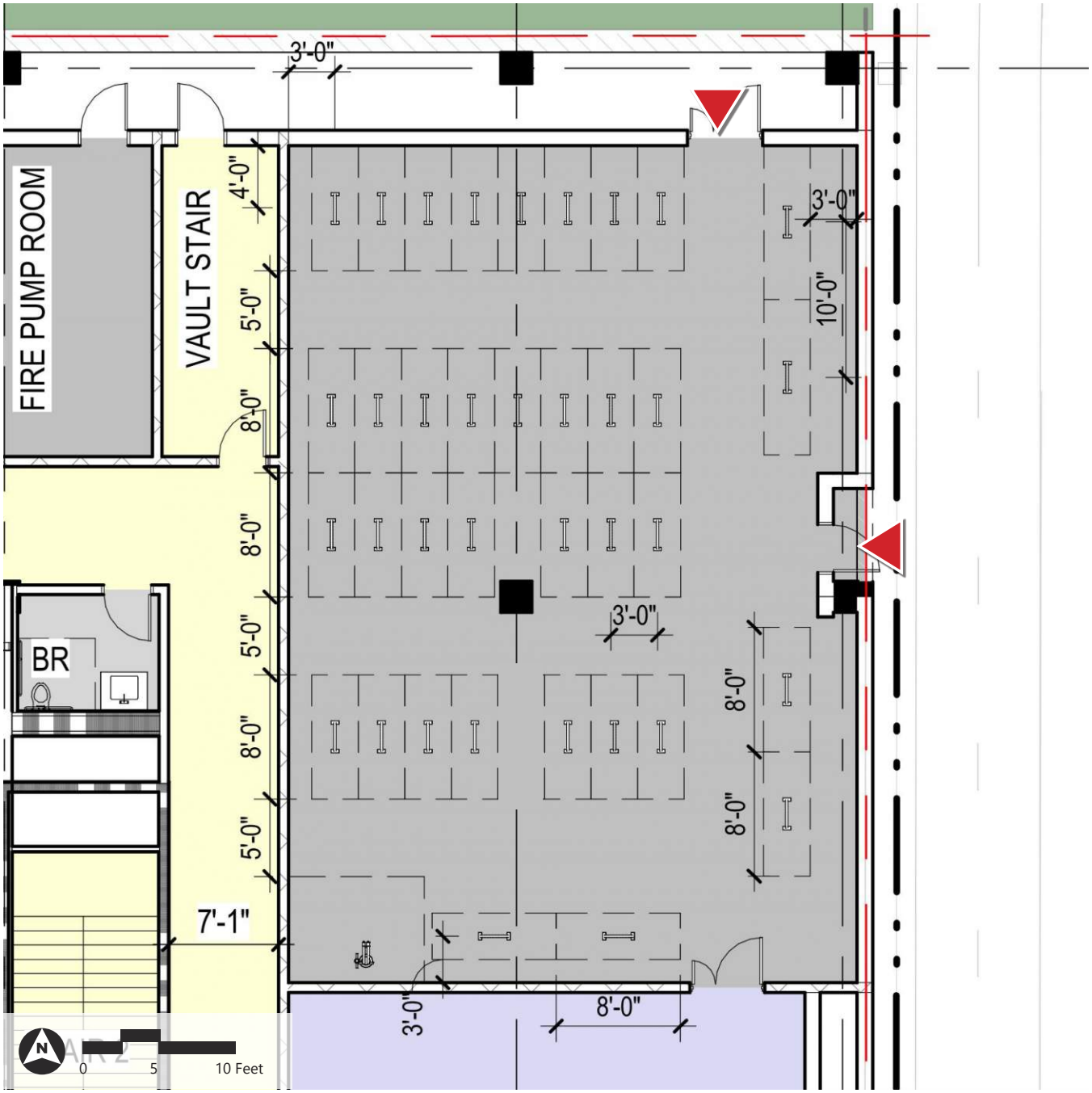
- Pedestrian Access/Egress
- Garage Parking Access/Egress
- Bike Access/Egress
- Loading Access/Egress

Source: Stantec and Lemon Brooke

Figure 5a: Proposed Long-Term Bike Parking

105 Broadway St | Cambridge, MA

10/14/2024



Legend:

Bike Access/Egress

Bike Room Capacity:

68 Standard Spaces

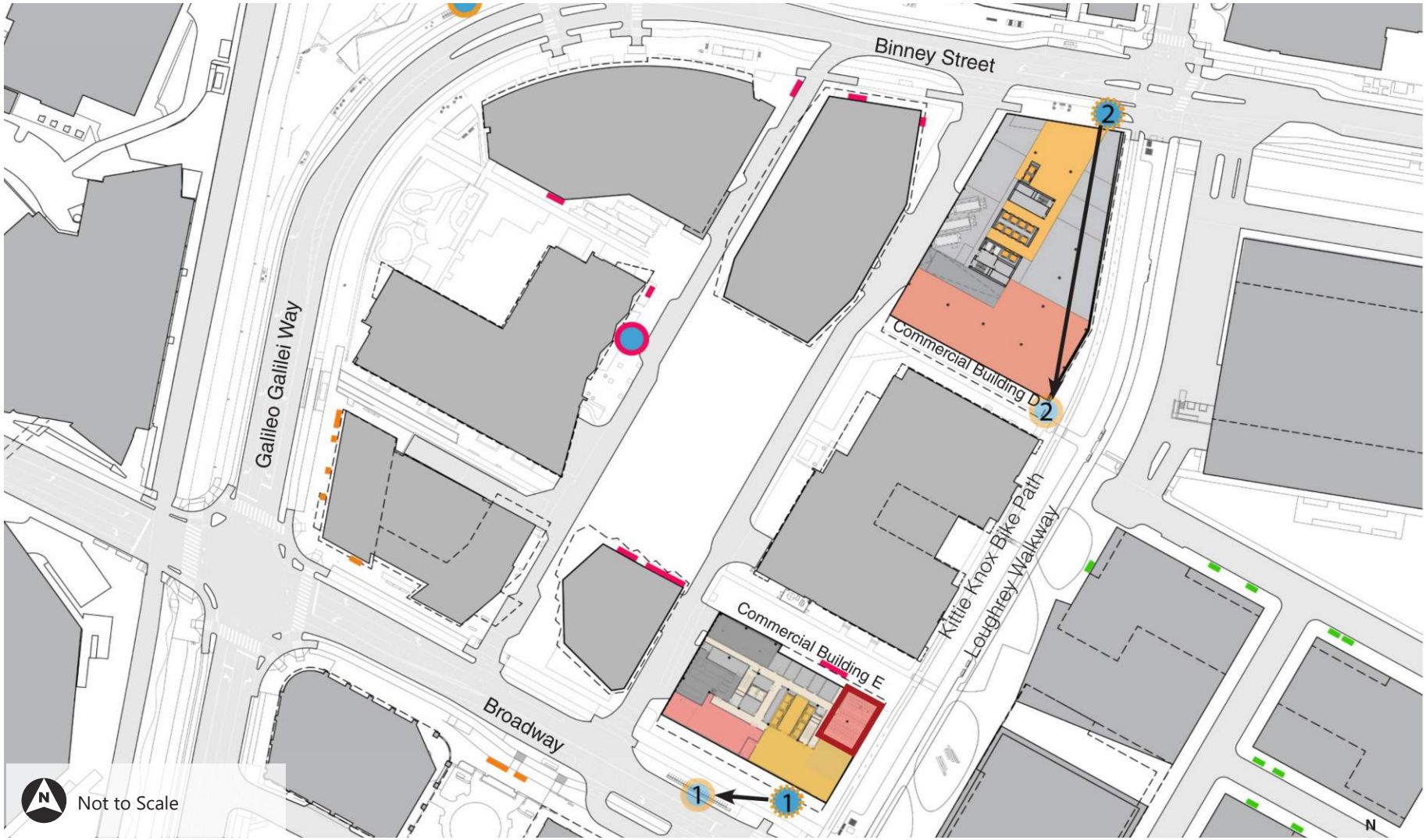
4 Tandem + Trailers Spaces

Source: Stantec and Lemon Brooke

Figure 5b: Proposed Short-Term Bike Parking

105 Broadway | Cambridge, MA

10/14/2024



Legend:

- Existing Short Term Bike Parking
- Proposed Short Term Bike Parking
- Proposed Short Term Bike Parking by others
- Existing Bluebikes Location to Remain
- Existing Bluebikes Relocation
- Proposed Bluebikes Location

Source: Sasaki.

Memorandum

Appendix

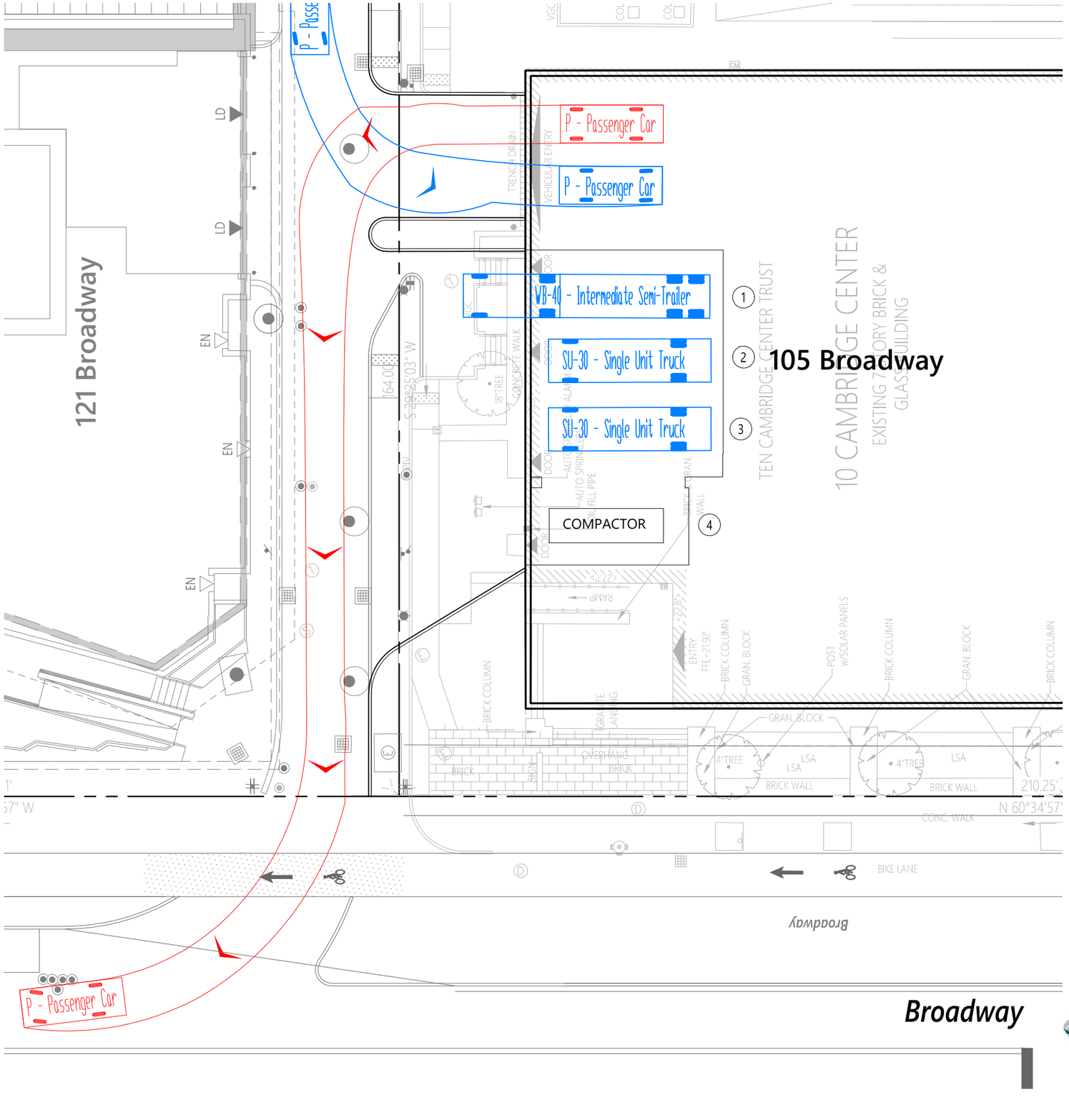
A. PROPOSED 2024 DEVELOPMENT PROGRAM TABLE

B. TRUCK TURNING TEMPLATES

Table A Proposed 2024 Development Program[1]

Project Component	2024 Proposed Project Program	Existing (Removed)	2024 Proposed Net Program
Building A - 145 Broadway[3]	441,614 sf	(-78,636) sf	362,978 sf
(Commercial)	432,914 sf	(-78,636) sf	354,278 sf
(Retail/Active Use)[4]	8,700 sf	0 sf	8,700 sf
Building B - 325 Main St[3]	383,479 sf	(-117,202) sf	266,277 sf
(Commercial)	343,093 sf	(-76,816) sf	266,277 sf
(Retail/Active Use)[4]	40,386 sf	(-40,386) sf	0 sf
Residential – 121 Broadway *(fka 135 Broadway)*	421,550sf	0 sf	421,550sf
(Residential)	420,000 sf (465 units)	0 sf	420,000 sf (465 units)
(Retail/Active Use)[4]	1,550 sf	0 sf	1,550 sf
Building C – 290 Binney St	425,333 sf	0 sf	425,333 sf
(Commercial)	420,607 sf	0 sf	420,607 sf
(Retail/Active Use)[4,5]	4,726 sf	0 sf	4,726 sf
Building D – 250 Binney St	292,337 sf	(-62,576) sf	229,761 sf
(Commercial)	292,337 sf	(-62,576) sf	229,761 sf
(Retail/Active Use)[4,5,6]	-0 sf	0 sf	-0 sf
75 Ames St / Broad Institute[2]	14,000 sf	0 sf	14,000 sf
(Commercial)	14,000 sf	0 sf	14,000 sf
Building E - 105 Broadway	302,400 sf	(-157,100) sf	145,300 sf
(Commercial)	299,850 sf	(-157,100) sf	142,750 sf
(Retail/Active Use)[4,6]	2,550 sf	0 sf	2,550 sf
TOTAL	**2,280,713 sf**	**(-415,514) sf**	**1,865,199 sf**
(Commercial)	**1,802,801 sf**	**(-375,128) sf**	**1,427,673 sf**
(Retail/Active Use)	**57,912 sf**	**(-40,386) sf**	**17,526 sf**
(Residential)	**420,000 sf (465 units)**	**0 sf**	**420,000 sf (465 units)**

1. GFA as defined in Article 2.0 of the Cambridge Zoning Ordinance.
2. Represents the conversion of existing mechanical space to be re-purposed/fit-out into leasable commercial/laboratory office space at the Broad Institute's 75 Ames Street location. The Applicant is not responsible for the execution of this component of the Project.
3. Incorporated within the Commercial GFA Figures is the Innovation Space tied to Commercial Building A and Commercial Building B.
4. Active Ground Floor Uses can include retail uses and active public gathering space (whether open or enclosed) where that ground floor fronts Main Street, Broadway or Ames Street, per Article 14.38 of the Zoning Ordinance.
5. The Applicant plans to distribute up to approximately 11,700 SF of ground floor active use or retail GFA between Commercial Building C and Commercial Building D so as to activate the northeast edge of the proposed Center Plaza open space. Commercial Building C retail space will house a temporary bike valet to meet City of Cambridge requirements serving Commercial Building C and Residential South. Once Commercial Building D is complete, the bike valet will transfer to Commercial Building D.
6. Exempt active uses are excluded from this table including bike rooms and bike valet.

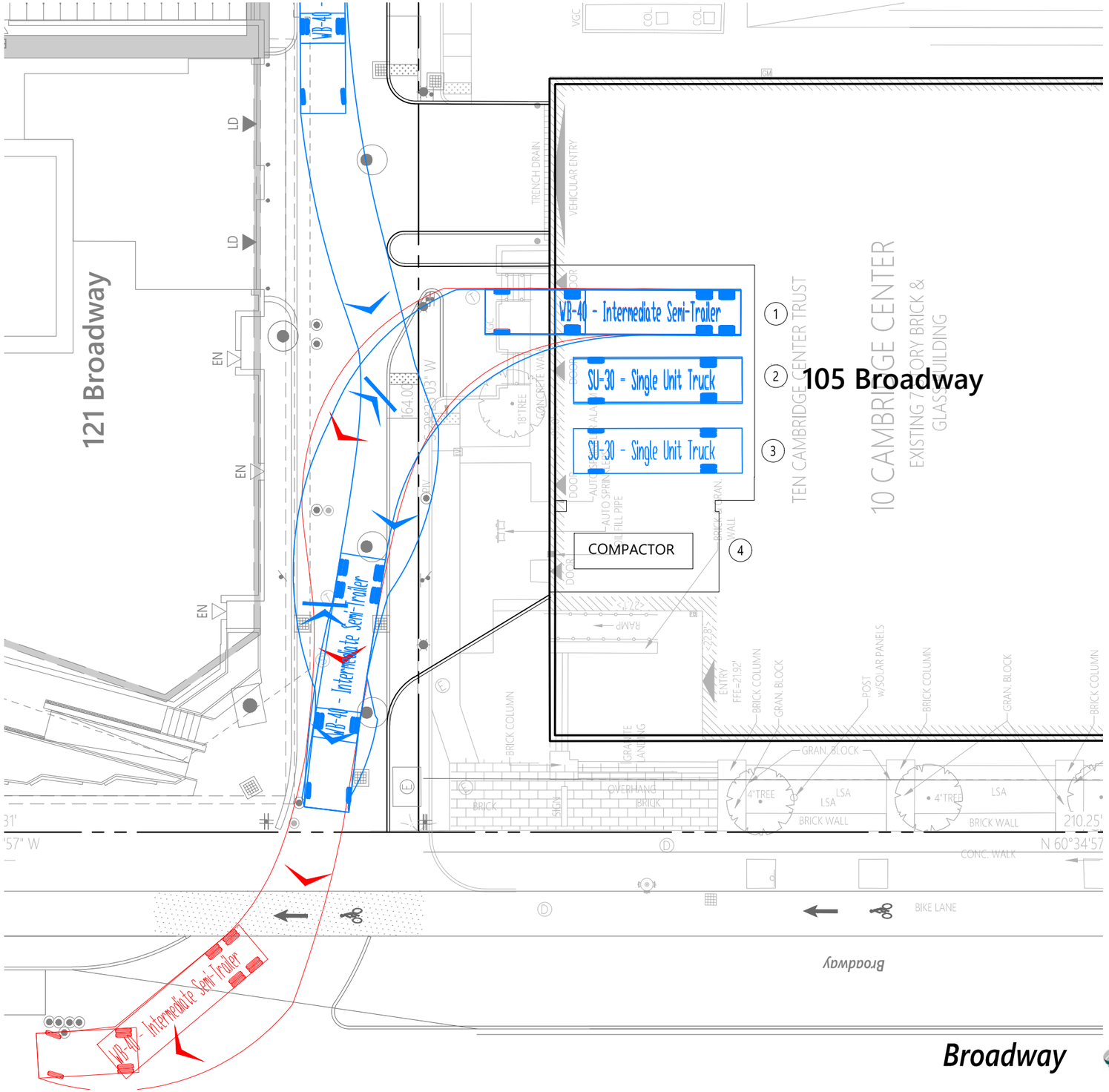


0 10 20 Feet

105 Broadway
Vehicular Loading
Passenger Car

Figure A.1: Garage

November 2024

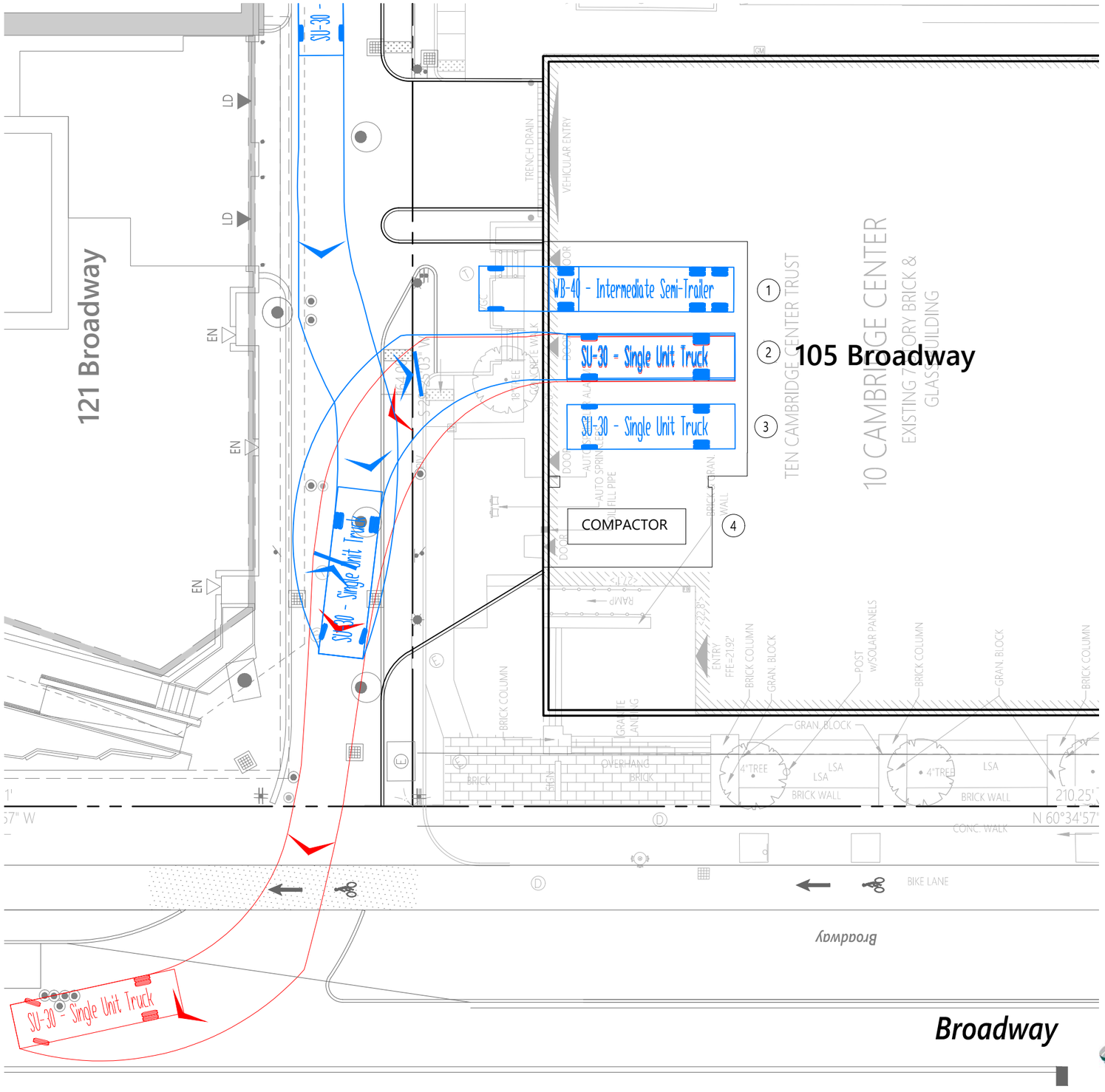


0 10 20 Feet

105 Broadway
Vehicular Loading
WB-40

Figure A.2: Bay 1

November 2024

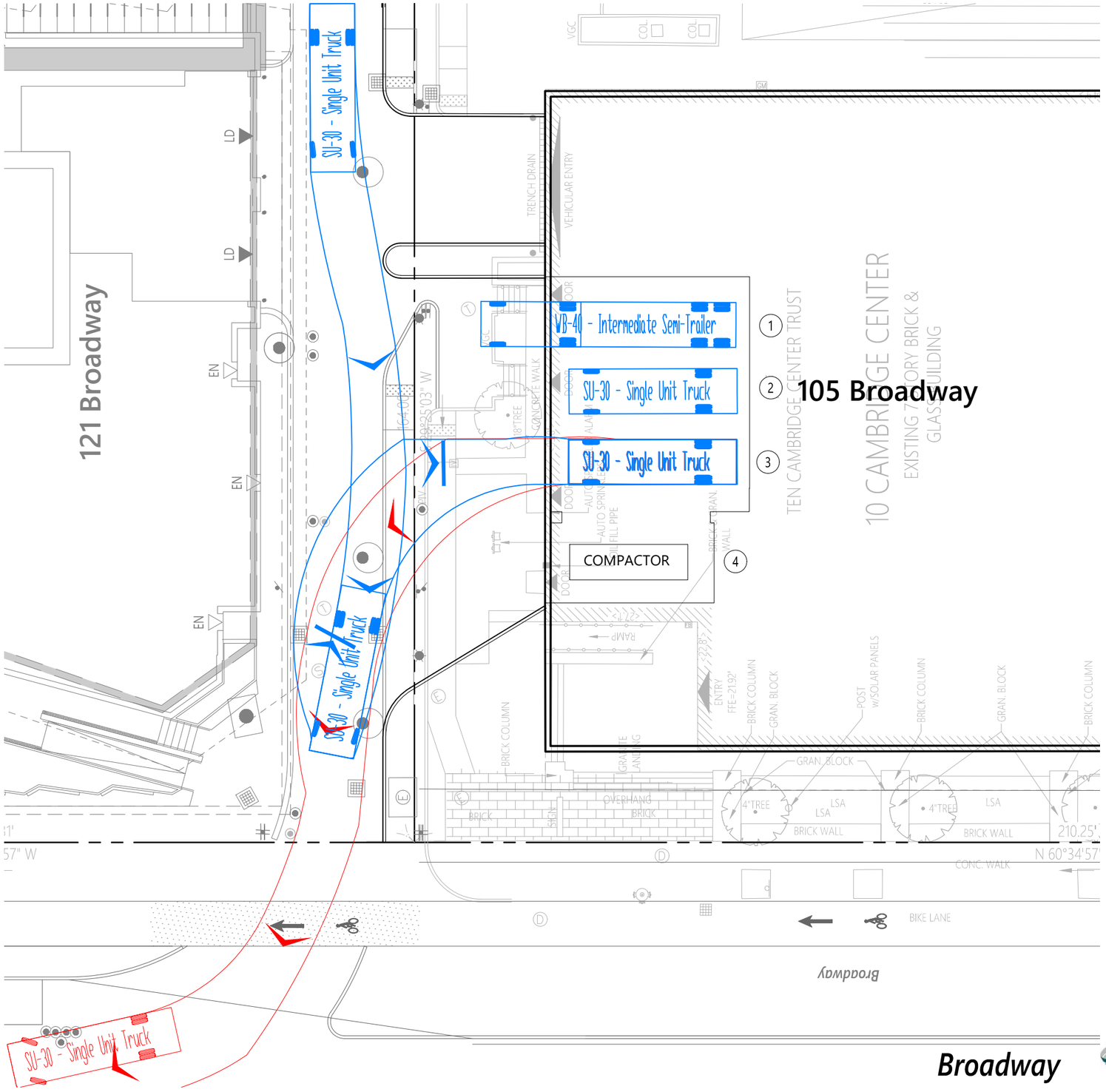


0 10 20 Feet

105 Broadway
Vehicular Loading
SU-30

Figure A.3: Bay 2

November 2024

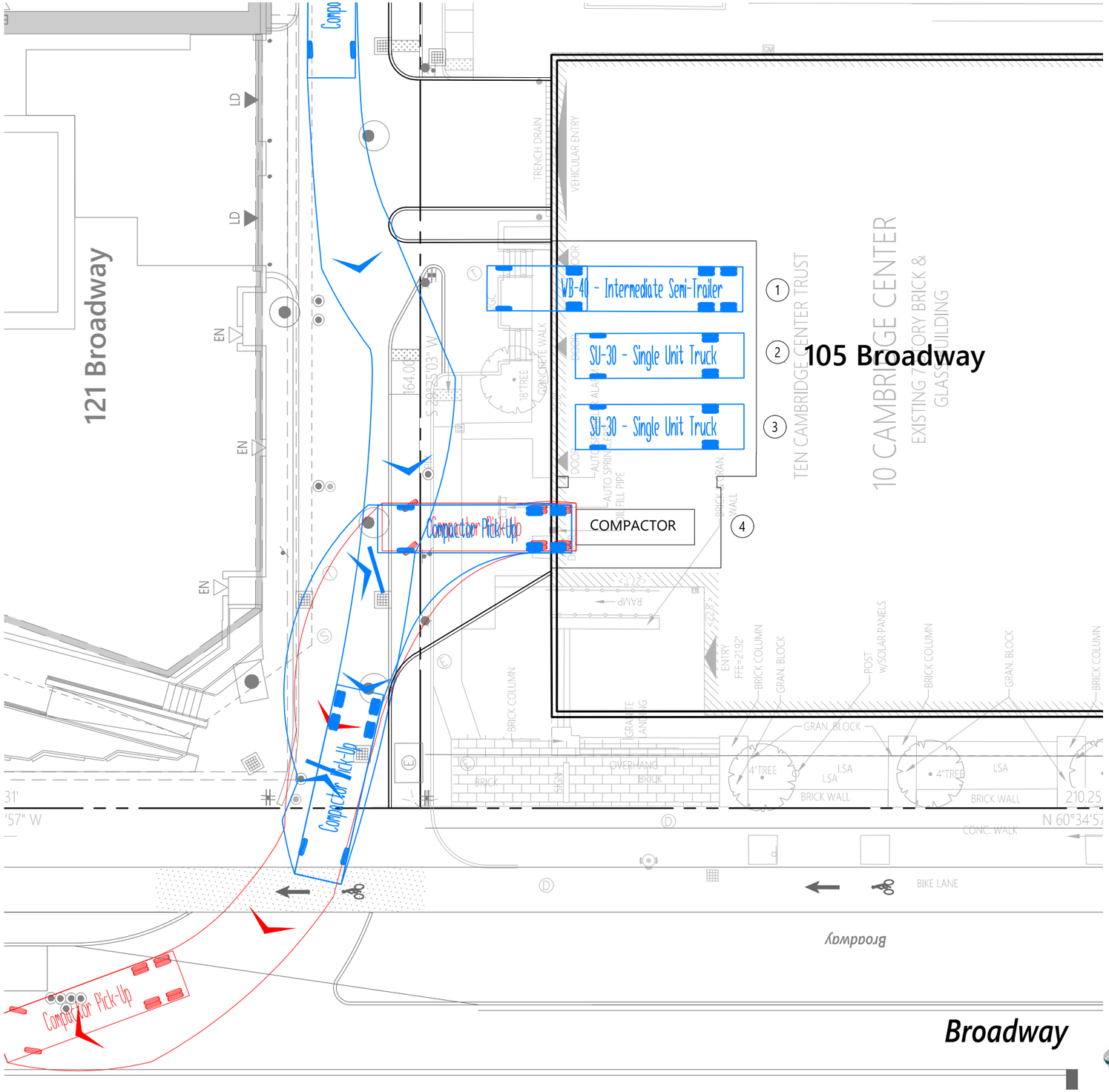


0 10 20 Feet

105 Broadway
Vehicular Loading
SU-30

Figure A.4: Bay 3

November 2024



0 10 20 Feet

105 Broadway
Vehicular Loading
Compactor

Figure A.5: Bay 4

November 2024

APPENDIX C

PEDESTRIAN WIND STUDY

FINAL REPORT

105 BROADWAY STREET

CAMBRIDGE, MA

PEDESTRIAN WIND STUDY
RWDI # 2405303
August 16, 2024

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed 105 Broadway Street (the Project) in Cambridge, MA. The assessment was based on the wind-tunnel testing conducted for the proposed development site under the No Build, Build, and Full Build configurations of the site and surroundings. The results were analysed using the regional wind climate records and evaluated against the RWDI Pedestrian Wind Criteria for pedestrian comfort (pertaining to common wind speeds conducive to different levels of human activity) and pedestrian safety (pertaining to infrequent but strong gusts that could affect a person's footing). The criteria description is appended to this report to assist with the interpretation of the results. The predicted wind conditions are presented in Figures 1A through 3C, and Table 1, and are summarized as follows:

Wind Safety:

- In the No Build configuration, wind speeds are expected to meet the safety criteria at all but one location (at the north corner of 290 Binney Street), in the No Build configuration.
- In the Build and Full Build configurations, wind speeds are predicted to meet the safety criterion on an annual basis at all assessed locations.

Mean Speed

- Wind conditions around the project site are comfortable for sitting, standing, strolling, or walking in the No Build configuration.
- Wind comfort conditions along streets in the surrounding neighborhood are predicted to remain similar to those in the No Build configuration after the proposed Project is added (Build and Full Build configurations). Moreover, the proposed Project is expected to slightly improve wind conditions in some areas to the north and west of the Project.

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LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed 105 Broadway Street development in Cambridge, MA. This report presents the project objectives, approach, and the main results from RWDI's assessment and provides conceptual wind control measures, where necessary. Our Statement of Limitations as it pertains to this study can be found in Section 4 of this report.

1.1 Project Description

The proposed development site is a 16-storey tower with a height of 310 ft, located on the northeast side of Cambridge Center and Broadway Street (Image 1).

1.2 Objectives

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

Image 1: Aerial View of Site and Surroundings (Photo Credit: Google™ Earth)

2 BACKGROUND AND APPROACH

2.1 Wind Tunnel Study Model

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

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

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

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

The wind tunnel model included all relevant surrounding buildings and topography within an approximate 1200 ft radius around the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 185 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately 5 ft above local grade in pedestrian areas throughout the study site. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site and was reviewed by Boston Properties. Wind speeds were measured for 36 directions in 10-degree increments. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model.

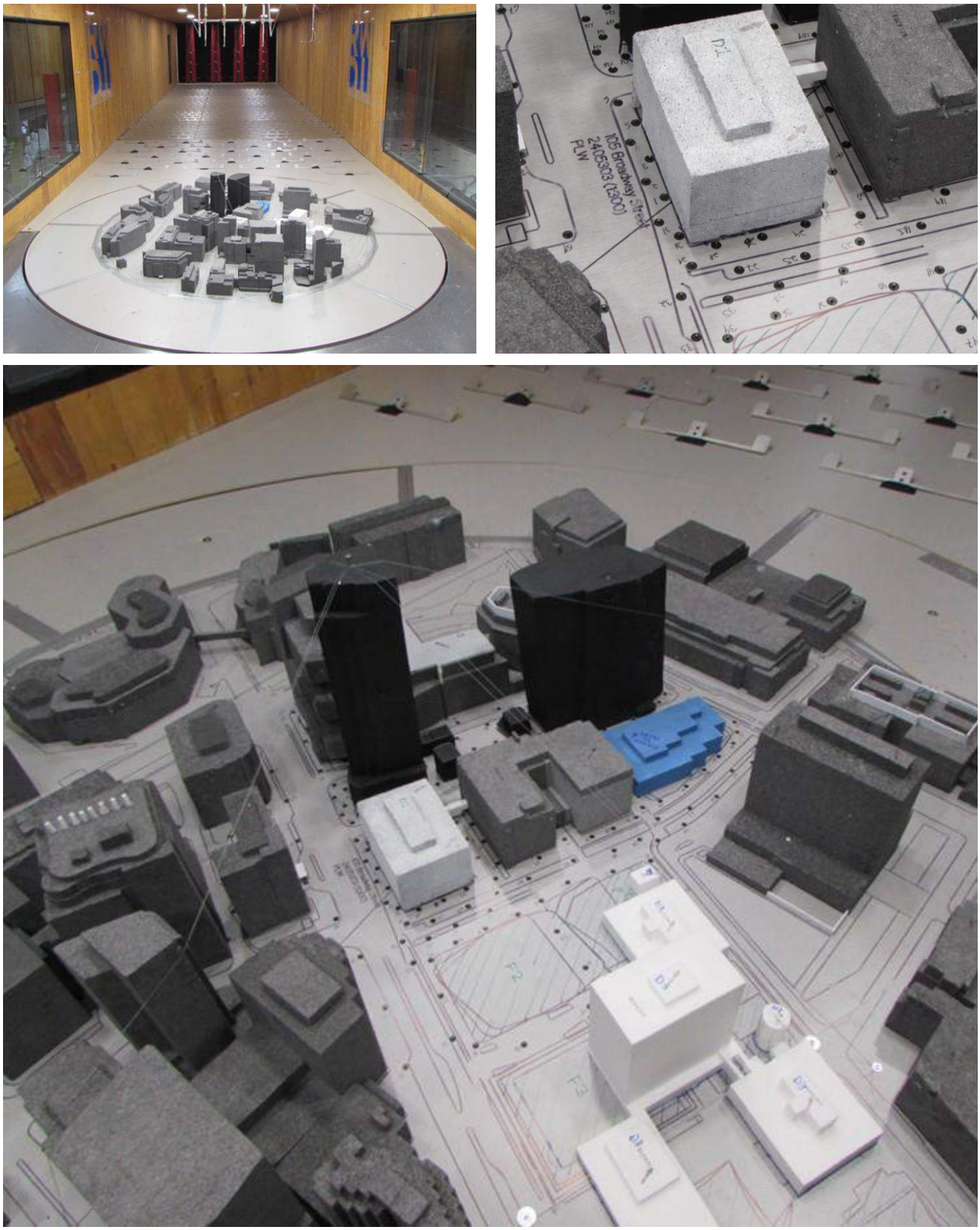
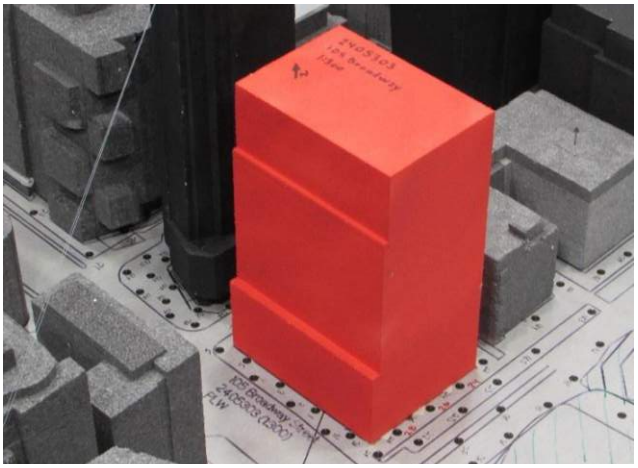


Image 2A: Wind Tunnel Study Model – No Build Configuration



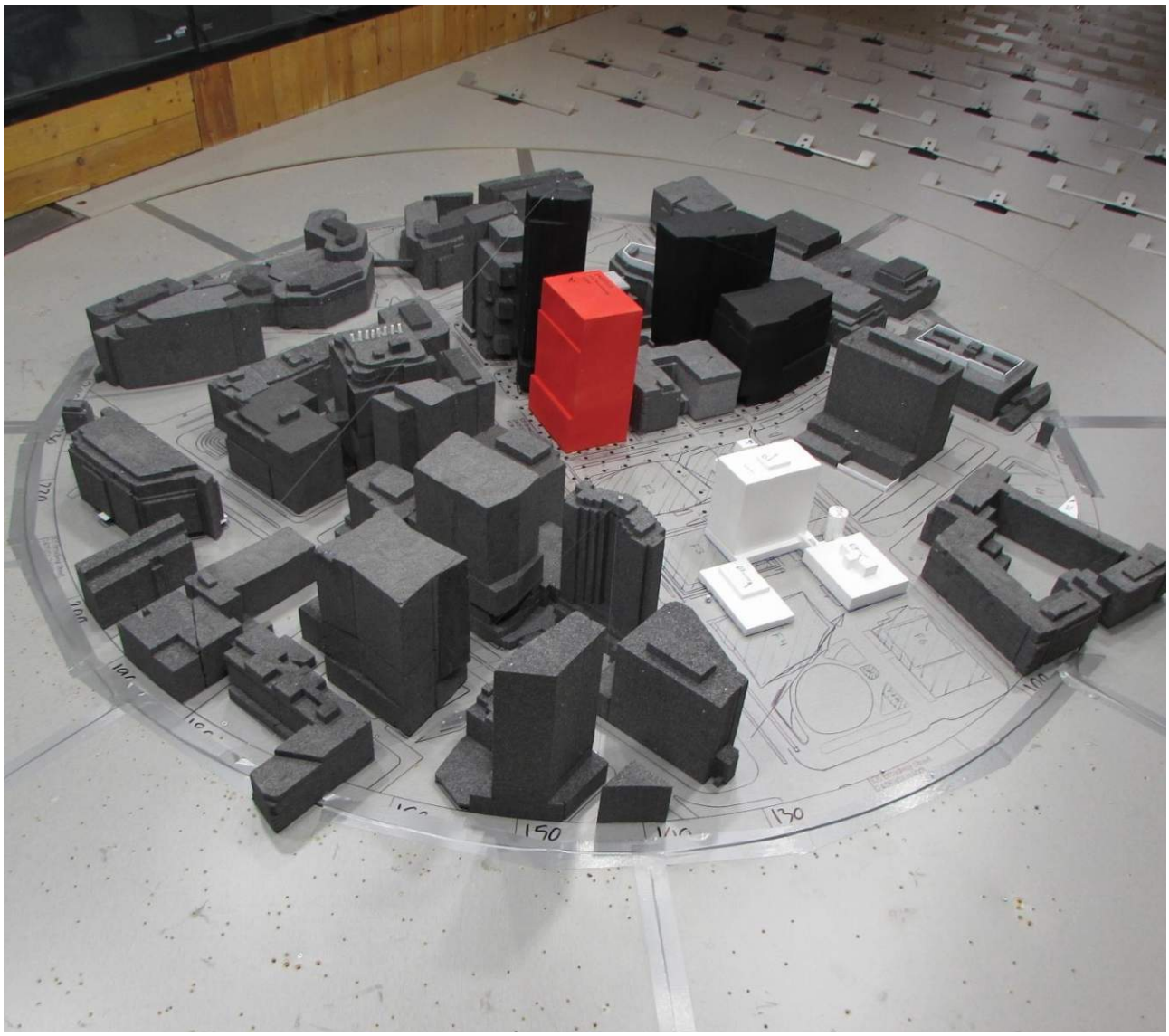
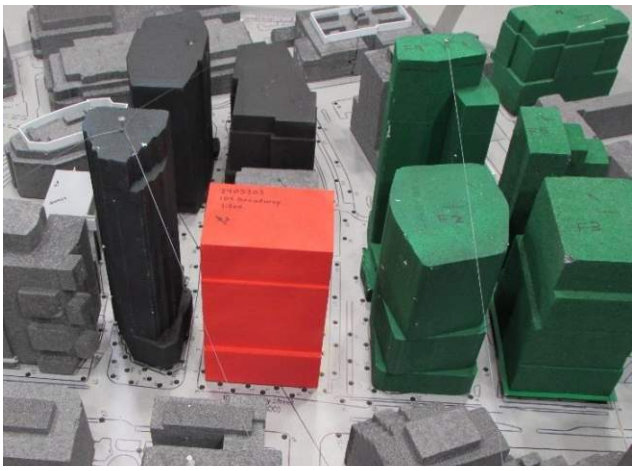


Image 2B: Wind Tunnel Study Model – Build Configuration



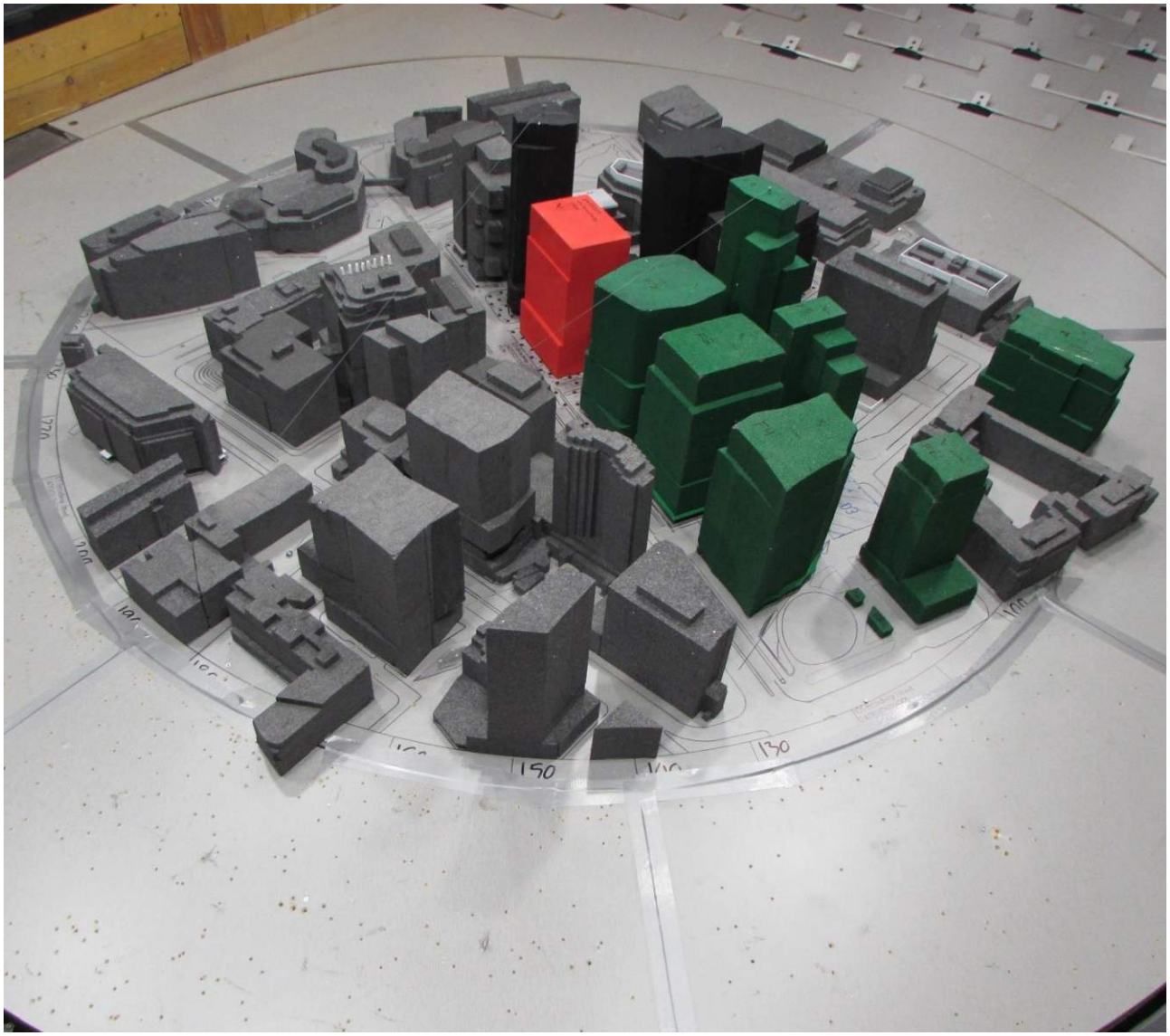
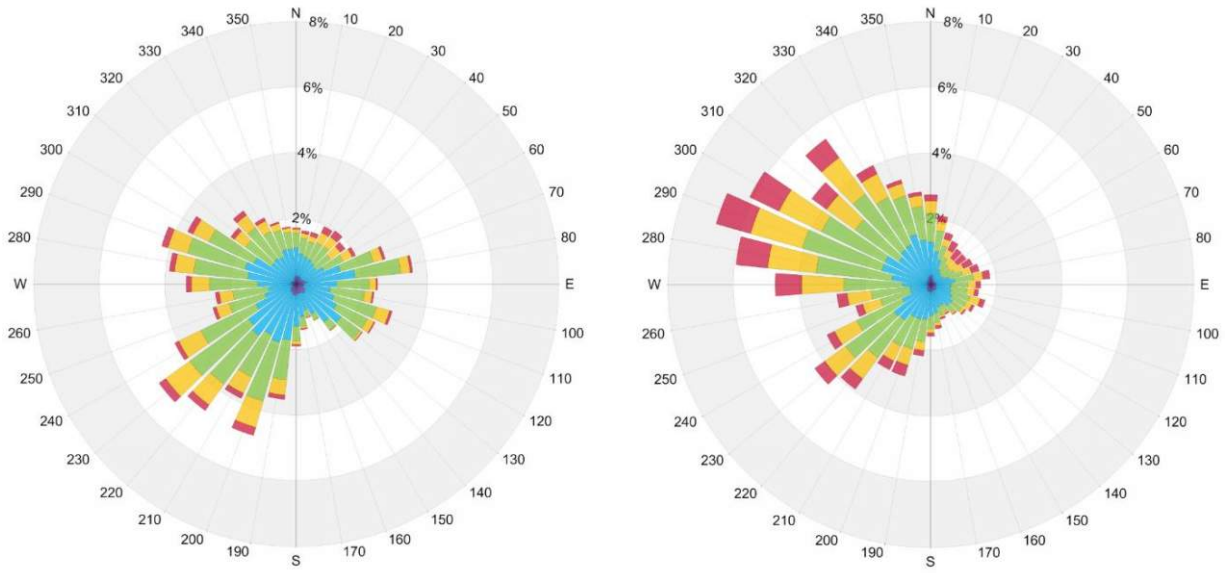


Image 2C: Wind Tunnel Study Model – Full Build Configuration

2.2 Wind Climate Data

Wind statistics recorded at Boston Logan International Airport between 1990 and 2019, inclusively, were analyzed for the Summer (May through October) and Winter (November through April) seasons. Image 5 graphically depicts the directional distributions of wind frequencies and speeds for these two seasons. The most common wind directions are those between south-southwest and north-northwest. Winds from the east-northeast to the east-southeast are also strong but less frequent. In the case of strong winds, west-northwest, northwest, west and northeast are the dominant wind directions. Strong winds of a mean speed greater than 20 mph measured at the airport (at an anemometer height of 30 ft) occur for 3.9% and 11% of the time during the summer and winter seasons, respectively, and they are primarily from the southwest through northeast directions.

Wind statistics were combined with the wind tunnel data to predict the frequency of occurrence of full-scale wind speeds. The full-scale wind predictions were then compared with the wind criteria for pedestrian comfort and safety.



Wind Speed (mph)	Probability (%) Summer	Winter
Calm	2.7	2.3
1-5	8.3	6.1
6-10	36.1	27.7
11-15	36.2	34.2
16-20	12.8	18.7
>20	3.9	11.0

Image 3: Directional Distribution of Winds Approaching Boston Logan International Airport between 1990 and 2019

2.3 RWDI Pedestrian Wind Criteria

The RWDI pedestrian wind criteria, which have been developed by RWDI through research and consulting practice since 1974, are used in the current study. These criteria have been widely accepted by municipal authorities as well as by the building design and city planning community. Regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. can affect a person's perception of the wind climate. Therefore, comparisons of wind speeds for the existing and proposed building configurations are the most objective way in assessing local pedestrian wind conditions. In general, the combined effect of mean and gust speeds on pedestrian comfort can be quantified by a Gust Equivalent Mean (GEM).

Comfort Category	GEM Speed (mph)	Description
Sitting	≤ 6	Calm or light breezes desired for outdoor restaurants and seating areas where one can read a paper without having it blown away
Standing	≤ 8	Gentle breezes suitable for main building entrances, bus stops, and other places where pedestrians may linger
Strolling	≤ 10	Moderate winds that would be appropriate for window shopping and strolling along a downtown street, plaza or park
Walking	≤ 12	Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering
Uncomfortable	> 12	Strong winds of this magnitude are considered a nuisance for all pedestrian activities, and wind mitigation is typically recommended

Notes:
(1) GEM Speed = max (Mean Speed, Gust Speed/1.85) and *Gust Speed = Mean Speed + 3*RMS Speed*.
(2) A wind comfort category is applicable if the predicted GEM speeds are within the respective threshold for at least 80% of the time in the season assessed.
(3) The comfort assessment was conducted for two seasonal periods, summer (May to October) and winter (November to April), because in a cold climate such as that found in Cambridge, there are distinct differences in pedestrian outdoor behaviors between these two-time periods.
(4) The assessment considers winds occurring between 6 AM and midnight. Limited usage of outdoor spaces is anticipated in the excluded period.

Safety Criterion	Gust Speed (mph)	Description
Exceeded	> 56	Excessive gust speeds that can adversely affect a pedestrian's balance and footing. Wind mitigation is typically required.

Notes:
(1) Based on an annual exceedance of 9 hours or 0.1% of the time for 24 hours a day; and,
(2) Only gust speeds need to be considered in the wind safety criterion. These are usually rare events but deserve special attention in city planning and building design due to their potential safety impact on pedestrians.

3 RESULTS AND DISCUSSION

The predicted wind conditions are shown on site plans in Figures 1A through 3C located in the "Figures" section of this report and the associated wind speeds are presented in Table 1, located in the "Tables" section of this report.

Wind conditions comfortable for walking or strolling are appropriate for sidewalks and walkways as pedestrians will be active and less likely to remain in one area for prolonged periods of time. Lower wind speeds conducive to standing are preferred at main entrances where pedestrians are apt to linger. Wind speeds comfortable for sitting are preferred for areas intended for passive activities, such as seating areas (if any such uses are planned). The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest.

3.1 Wind Safety

For the No Build configuration, wind speeds are expected to exceed the safety criteria at one location at the north corner of 290 Binney Street (Location 88 in Figure 3A). **Wind speeds are expected to meet the safety criterion at all locations around the proposed Project site for the Build and Full Build configurations (Figures 3B and 3C)**.

3.2 Wind Comfort

3.2.1 No Build Configuration

Wind speeds at all areas around the site are expected to be comfortable for walking or better in the No Build configuration throughout the year (Figures 1A and 2A). Accelerated winds with uncomfortable conditions exist during the winter at areas further away from the site, around 121 Broadway and 290 Binney Street (Figure 2A).

3.2.2 Build Configuration

In the Build configuration, wind comfort conditions at most areas around the site are expected to be suitable for sitting or standing, during the summer, and sitting, standing, strolling or walking during the winter (Figures 1B and 2B). These conditions are appropriate for sidewalks and walkways, however, we recommend keeping main building entrances away from areas where strolling or walking conditions are predicted.

Positively, wind conditions are expected to improve in the areas further away from the site, where uncomfortable conditions were predicted in No Build configurations.

3.2.3 Full Build Configuration

The addition of the future buildings to the east of the site is expected to slightly improve the wind comfort conditions at most areas around the project site, throughout the year (Figures 1C and 2C). Slightly increased wind speeds are expected at the area to the east of the proposed building, as a result of winds channeling between the project and the future building to the east. Wind conditions at this area are still considered appropriate.

4 STATEMENT OF LIMITATIONS

Limitations

This report entitled "105 Broadway Street Pedestrian Wind Study", dated August 16, 2024, was prepared by Rowan Williams Davies & Irwin, Inc. ("RWDI") for Boston Properties ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

Design Assumptions

RWDI confirms that the pedestrian wind assessment (the "**Assessment**") discussed herein was performed by RWDI in accordance with generally accepted professional standards at the time when the Assessment was performed and in the location of the Project. No other representations, warranties, or guarantees are made with respect to the accuracy or completeness of the information, findings, recommendations, or conclusions contained in this Report. This report is not a legal opinion regarding compliance with applicable laws.

The findings and recommendations set out in this report are based on the following information disclosed to RWDI. Information listed below were received from Pickard Chilton and used to construct the scale model of the proposed 105 Broadway Street **("Project Data**").

File Name	File Type	Date Received (dd/mm/yyyy)
240805_250Binney_105Broadway_SimplifiedMassing.3dm	Rhino	05/08/2024

The recommendations and conclusions are based on the assumption that the Project Data and Climate Data are accurate and complete. RWDI assumes no responsibility for any inaccuracy or deficiency in information it has received from others. In addition, the recommendations and conclusions in this report are partially based on historical data and can be affected by a number of external factors, including but not limited to Project design,

quality of materials and construction, site conditions, meteorological events, and climate change. As such, the conclusions and recommendations contained in this report do not list every possible outcome.

The opinions in this report can only be relied upon to the extent that the Project Data and Project Specific Conditions have not changed. Any change in the Project Data or Project Specific Conditions not reflected in this report can impact and/or alter the recommendations and conclusions in this report. Therefore, it is incumbent upon the Client and/or any other third party reviewing the recommendations and conclusions in this report to contact RWDI in the event of any change in the Project Data and Project Specific Conditions in order to determine whether any such change(s) may impact the assumptions upon which the recommendations and conclusions were made.

5 REFERENCES

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

2. Williams, C.J., Hunter, M.A. and Waechter, W.F. (1990). "Criteria for Assessing the Pedestrian Wind Environment," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.36, pp.811-815.

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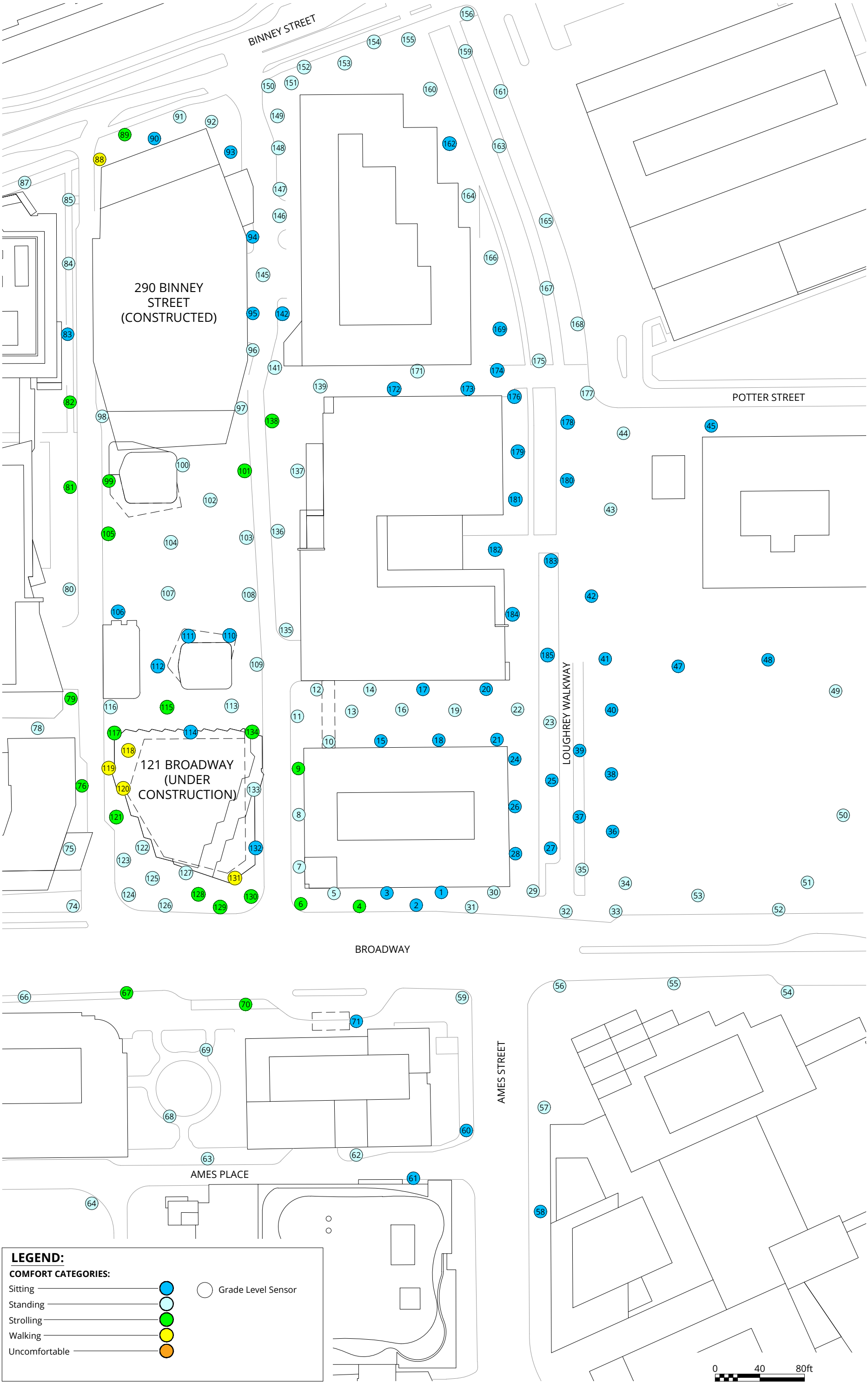
10. Wu, H., Williams, C.J., Baker, H.A. and Waechter, W.F. (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", *ASCE Structure Congress 2004,* Nashville, Tennessee.

FIGURES



Pedestrian Wind Comfort Conditions
No Build
Summer (May to October)

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 1A
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024

BINNEY STREET

290 BINNEY STREET (CONSTRUCTED)

250 BINNEY STREET (PROPOSED)

121 BROADWAY (UNDER CONSTRUCTION)

105 BROADWAY STREET (PROPOSED)

POTTER STREET

LOUGHREY WALKWAY

BROADWAY

AMES PLACE

AMES STREET

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

Grade Level Sensor

Building Above Removed for Clarity

0 40 80ft

Pedestrian Wind Comfort Conditions

Build

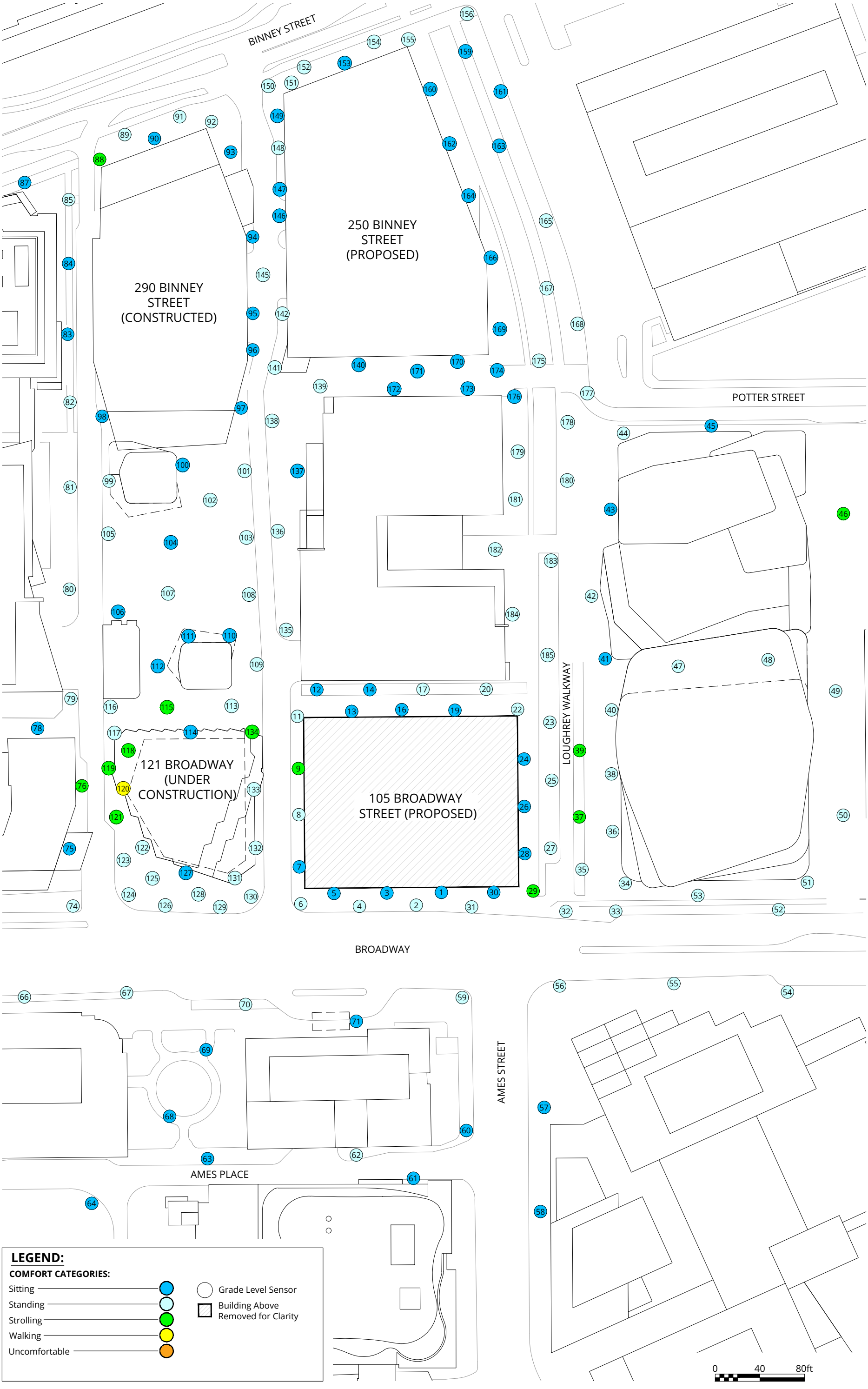
Summer (May to October)

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 1B
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024



Pedestrian Wind Comfort Conditions
Full Build
Summer (May to October)

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 1C
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024

BINNEY STREET

290 BINNEY STREET (CONSTRUCTED)

121 BROADWAY (UNDER CONSTRUCTION)

POTTER STREET

LOUGHREY WALKWAY

BROADWAY

AMES PLACE

AMES STREET

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

Grade Level Sensor

0 40 80ft

Pedestrian Wind Comfort Conditions

No Build

Winter (November to April)

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 2A
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024

BINNEY STREET

290 BINNEY STREET (CONSTRUCTED)

250 BINNEY STREET (PROPOSED)

121 BROADWAY (UNDER CONSTRUCTION)

105 BROADWAY STREET (PROPOSED)

POTTER STREET

LOUGHREY WALKWAY

BROADWAY

AMES PLACE

AMES STREET

0 40 80ft

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

Grade Level Sensor

Building Above Removed for Clarity

Pedestrian Wind Comfort Conditions

Build

Winter (November to April)

105 Broadway Street - Cambridge, MA

Project #2405303

True North

Drawn by: SAER	Figure: 2B
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024

BINNEY STREET

290 BINNEY STREET (CONSTRUCTED)

250 BINNEY STREET (PROPOSED)

POTTER STREET

121 BROADWAY (UNDER CONSTRUCTION)

105 BROADWAY STREET (PROPOSED)

LOUGHREY WALKWAY

BROADWAY

AMES PLACE

AMES STREET

LEGEND:

COMFORT CATEGORIES:

- Sitting
- Standing
- Strolling
- Walking
- Uncomfortable

Grade Level Sensor

Building Above Removed for Clarity

0 40 80ft

Pedestrian Wind Comfort Conditions

Full Build

Winter (November to April)

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 2C
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024

BINNEY STREET

290 BINNEY STREET (CONSTRUCTED)

121 BROADWAY (UNDER CONSTRUCTION)

POTTER STREET

LOUGHREY WALKWAY

BROADWAY

AMES PLACE

AMES STREET

LEGEND:

SAFETY CATEGORIES:

Pass

Exceeded

Grade Level Sensor

0 40 80ft

Pedestrian Wind Safety Conditions
No Build
Annual

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 3A
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024

BINNEY STREET

290 BINNEY STREET (CONSTRUCTED)

250 BINNEY STREET (PROPOSED)

121 BROADWAY (UNDER CONSTRUCTION)

105 BROADWAY STREET (PROPOSED)

POTTER STREET

LOUGHREY WALKWAY

BROADWAY

AMES PLACE

AMES STREET

LEGEND:

SAFETY CATEGORIES:

Pass

Exceeded

Grade Level Sensor

Building Above Removed for Clarity

0 40 80ft

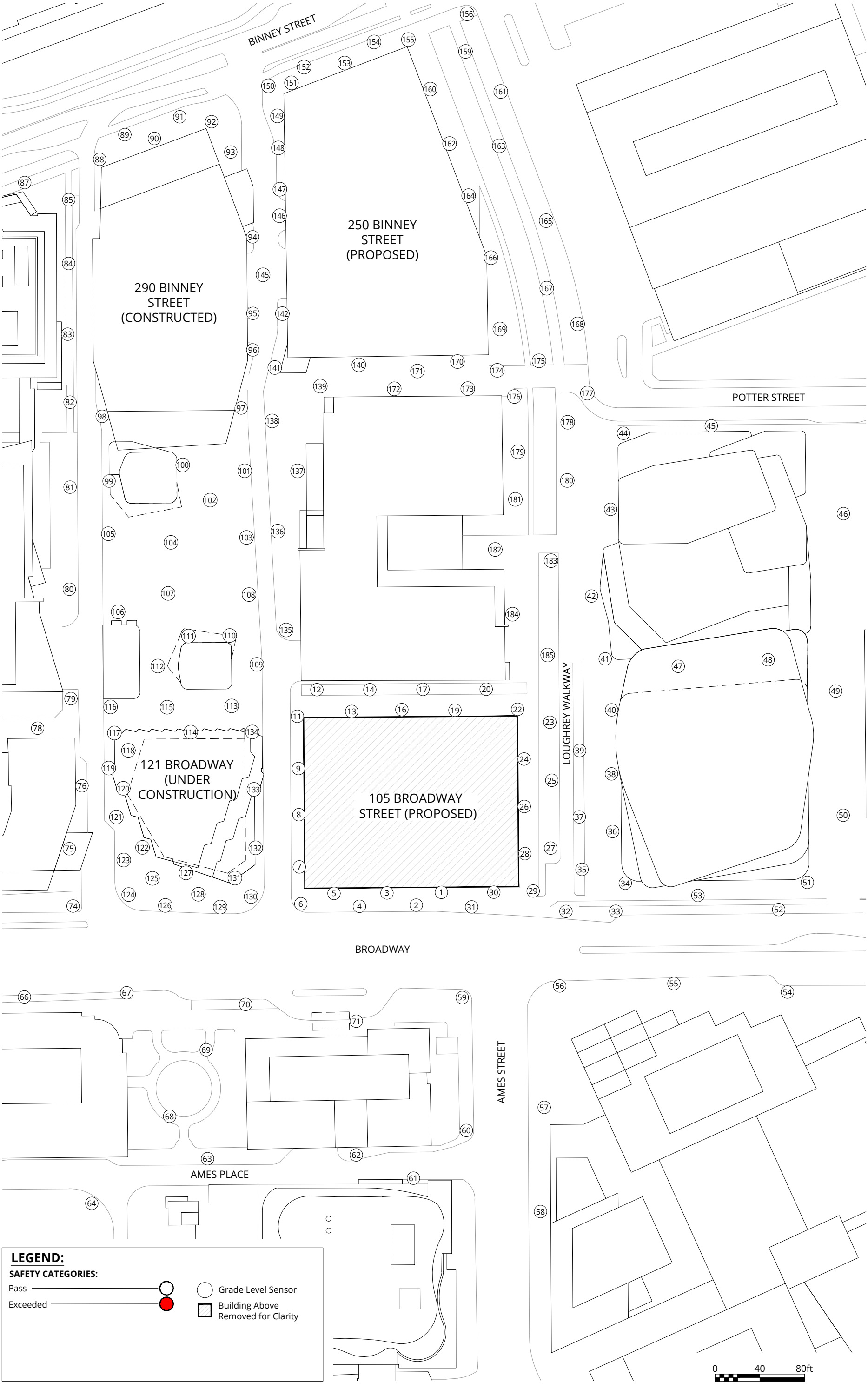
Pedestrian Wind Safety Conditions
Build
Annual

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 3B
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024



Pedestrian Wind Safety Conditions
Full Build
Annual

105 Broadway Street - Cambridge, MA

True North

Project #2405303

Drawn by: SAER	Figure: 3C
Approx. Scale:	1"=80'
Date Revised:	Aug. 16, 2024

TABLES

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
1	No Build	6	Sitting	7	Standing	28	Pass
	Build	6	Sitting	8	Standing	32	Pass
	Full Build	6	Sitting	7	Standing	30	Pass
2	No Build	6	Sitting	8	Standing	35	Pass
	Build	7	Standing	8	Standing	34	Pass
	Full Build	7	Standing	8	Standing	33	Pass
3	No Build	4	Sitting	6	Sitting	27	Pass
	Build	6	Sitting	7	Standing	32	Pass
	Full Build	6	Sitting	7	Standing	30	Pass
4	No Build	9	Strolling	11	Walking	44	Pass
	Build	7	Standing	9	Strolling	36	Pass
	Full Build	7	Standing	9	Strolling	35	Pass
5	No Build	7	Standing	8	Standing	36	Pass
	Build	6	Sitting	7	Standing	31	Pass
	Full Build	6	Sitting	7	Standing	31	Pass
6	No Build	10	Strolling	11	Walking	45	Pass
	Build	9	Strolling	11	Walking	41	Pass
	Full Build	8	Standing	10	Strolling	40	Pass
7	No Build	7	Standing	8	Standing	35	Pass
	Build	7	Standing	8	Standing	34	Pass
	Full Build	6	Sitting	8	Standing	33	Pass
8	No Build	8	Standing	10	Strolling	45	Pass
	Build	8	Standing	10	Strolling	40	Pass
	Full Build	8	Standing	10	Strolling	40	Pass
9	No Build	10	Strolling	12	Walking	47	Pass
	Build	9	Strolling	12	Walking	43	Pass
	Full Build	9	Strolling	11	Walking	45	Pass
10	No Build	7	Standing	9	Strolling	37	Pass
	Build	-	-	-	-	-	-
	Full Build	-	-	-	-	-	-

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
11	No Build	8	Standing	11	Walking	42	Pass
	Build	10	Strolling	12	Walking	45	Pass
	Full Build	8	Standing	10	Strolling	42	Pass
12	No Build	7	Standing	8	Standing	33	Pass
	Build	8	Standing	10	Strolling	39	Pass
	Full Build	6	Sitting	8	Standing	37	Pass
13	No Build	8	Standing	11	Walking	45	Pass
	Build	6	Sitting	8	Standing	37	Pass
	Full Build	6	Sitting	8	Standing	34	Pass
14	No Build	7	Standing	9	Strolling	47	Pass
	Build	7	Standing	10	Strolling	48	Pass
	Full Build	6	Sitting	8	Standing	47	Pass
15	No Build	6	Sitting	8	Standing	33	Pass
	Build	-	-	-	-	-	-
	Full Build	-	-	-	-	-	-
16	No Build	7	Standing	8	Standing	32	Pass
	Build	6	Sitting	8	Standing	31	Pass
	Full Build	5	Sitting	7	Standing	28	Pass
17	No Build	6	Sitting	7	Standing	33	Pass
	Build	7	Standing	8	Standing	39	Pass
	Full Build	7	Standing	8	Standing	37	Pass
18	No Build	6	Sitting	6	Sitting	29	Pass
	Build	-	-	-	-	-	-
	Full Build	-	-	-	-	-	-
19	No Build	7	Standing	7	Standing	34	Pass
	Build	6	Sitting	7	Standing	32	Pass
	Full Build	6	Sitting	7	Standing	28	Pass
20	No Build	6	Sitting	6	Sitting	27	Pass
	Build	6	Sitting	8	Standing	35	Pass
	Full Build	7	Standing	8	Standing	39	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
21	No Build	6	Sitting	7	Standing	30	Pass
	Build	-	-	-	-	-	-
	Full Build	-	-	-	-	-	-
22	No Build	7	Standing	8	Standing	35	Pass
	Build	7	Standing	8	Standing	41	Pass
	Full Build	8	Standing	8	Standing	38	Pass
23	No Build	7	Standing	8	Standing	35	Pass
	Build	7	Standing	8	Standing	42	Pass
	Full Build	8	Standing	10	Strolling	41	Pass
24	No Build	5	Sitting	5	Sitting	26	Pass
	Build	5	Sitting	6	Sitting	31	Pass
	Full Build	6	Sitting	7	Standing	31	Pass
25	No Build	6	Sitting	7	Standing	30	Pass
	Build	6	Sitting	7	Standing	39	Pass
	Full Build	8	Standing	10	Strolling	45	Pass
26	No Build	4	Sitting	5	Sitting	27	Pass
	Build	5	Sitting	6	Sitting	28	Pass
	Full Build	6	Sitting	7	Standing	35	Pass
27	No Build	6	Sitting	6	Sitting	30	Pass
	Build	7	Standing	7	Standing	33	Pass
	Full Build	8	Standing	10	Strolling	47	Pass
28	No Build	5	Sitting	5	Sitting	28	Pass
	Build	5	Sitting	5	Sitting	30	Pass
	Full Build	6	Sitting	7	Standing	37	Pass
29	No Build	8	Standing	9	Strolling	37	Pass
	Build	10	Strolling	12	Walking	43	Pass
	Full Build	9	Strolling	10	Strolling	43	Pass
30	No Build	7	Standing	8	Standing	33	Pass
	Build	7	Standing	8	Standing	34	Pass
	Full Build	6	Sitting	7	Standing	34	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
31	No Build	7	Standing	8	Standing	35	Pass
	Build	7	Standing	9	Strolling	35	Pass
	Full Build	7	Standing	8	Standing	34	Pass
32	No Build	7	Standing	9	Strolling	37	Pass
	Build	9	Strolling	11	Walking	40	Pass
	Full Build	8	Standing	10	Strolling	37	Pass
33	No Build	7	Standing	9	Strolling	39	Pass
	Build	9	Strolling	11	Walking	40	Pass
	Full Build	8	Standing	10	Strolling	39	Pass
34	No Build	7	Standing	9	Strolling	38	Pass
	Build	8	Standing	11	Walking	43	Pass
	Full Build	7	Standing	9	Strolling	37	Pass
35	No Build	7	Standing	8	Standing	32	Pass
	Build	8	Standing	10	Strolling	42	Pass
	Full Build	8	Standing	10	Strolling	39	Pass
36	No Build	6	Sitting	6	Sitting	27	Pass
	Build	8	Standing	8	Standing	40	Pass
	Full Build	8	Standing	11	Walking	46	Pass
37	No Build	6	Sitting	6	Sitting	26	Pass
	Build	7	Standing	7	Standing	34	Pass
	Full Build	9	Strolling	11	Walking	52	Pass
38	No Build	6	Sitting	7	Standing	28	Pass
	Build	7	Standing	8	Standing	36	Pass
	Full Build	8	Standing	11	Walking	45	Pass
39	No Build	6	Sitting	7	Standing	29	Pass
	Build	7	Standing	8	Standing	35	Pass
	Full Build	10	Strolling	12	Walking	47	Pass
40	No Build	6	Sitting	7	Standing	29	Pass
	Build	7	Standing	7	Standing	37	Pass
	Full Build	7	Standing	8	Standing	38	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
41	No Build	6	Sitting	8	Standing	30	Pass
	Build	6	Sitting	7	Standing	32	Pass
	Full Build	6	Sitting	8	Standing	34	Pass
42	No Build	6	Sitting	8	Standing	33	Pass
	Build	6	Sitting	7	Standing	32	Pass
	Full Build	8	Standing	10	Strolling	40	Pass
43	No Build	7	Standing	8	Standing	40	Pass
	Build	6	Sitting	7	Standing	35	Pass
	Full Build	6	Sitting	7	Standing	29	Pass
44	No Build	7	Standing	8	Standing	40	Pass
	Build	6	Sitting	8	Standing	35	Pass
	Full Build	7	Standing	8	Standing	39	Pass
45	No Build	6	Sitting	8	Standing	38	Pass
	Build	6	Sitting	6	Sitting	33	Pass
	Full Build	6	Sitting	6	Sitting	33	Pass
46	No Build	-	-	-	-	-	-
	Build	-	-	-	-	-	-
	Full Build	9	Strolling	11	Walking	43	Pass
47	No Build	6	Sitting	8	Standing	33	Pass
	Build	6	Sitting	7	Standing	30	Pass
	Full Build	7	Standing	8	Standing	35	Pass
48	No Build	6	Sitting	8	Standing	35	Pass
	Build	6	Sitting	8	Standing	32	Pass
	Full Build	7	Standing	8	Standing	37	Pass
49	No Build	7	Standing	9	Strolling	37	Pass
	Build	6	Sitting	8	Standing	34	Pass
	Full Build	8	Standing	10	Strolling	45	Pass
50	No Build	7	Standing	10	Strolling	38	Pass
	Build	8	Standing	10	Strolling	39	Pass
	Full Build	7	Standing	8	Standing	38	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
51	No Build	7	Standing	8	Standing	37	Pass
	Build	8	Standing	10	Strolling	40	Pass
	Full Build	8	Standing	10	Strolling	43	Pass
52	No Build	7	Standing	8	Standing	37	Pass
	Build	8	Standing	10	Strolling	41	Pass
	Full Build	7	Standing	10	Strolling	40	Pass
53	No Build	7	Standing	8	Standing	38	Pass
	Build	8	Standing	10	Strolling	42	Pass
	Full Build	7	Standing	10	Strolling	41	Pass
54	No Build	7	Standing	8	Standing	35	Pass
	Build	8	Standing	9	Strolling	37	Pass
	Full Build	7	Standing	9	Strolling	34	Pass
55	No Build	7	Standing	8	Standing	35	Pass
	Build	8	Standing	10	Strolling	39	Pass
	Full Build	7	Standing	10	Strolling	37	Pass
56	No Build	8	Standing	9	Strolling	35	Pass
	Build	8	Standing	10	Strolling	37	Pass
	Full Build	7	Standing	8	Standing	32	Pass
57	No Build	7	Standing	8	Standing	32	Pass
	Build	7	Standing	8	Standing	30	Pass
	Full Build	6	Sitting	7	Standing	30	Pass
58	No Build	6	Sitting	7	Standing	30	Pass
	Build	6	Sitting	7	Standing	29	Pass
	Full Build	6	Sitting	7	Standing	29	Pass
59	No Build	7	Standing	9	Strolling	36	Pass
	Build	8	Standing	10	Strolling	37	Pass
	Full Build	7	Standing	9	Strolling	35	Pass
60	No Build	6	Sitting	7	Standing	29	Pass
	Build	6	Sitting	7	Standing	27	Pass
	Full Build	6	Sitting	7	Standing	25	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
61	No Build	6	Sitting	7	Standing	29	Pass
	Build	6	Sitting	7	Standing	29	Pass
	Full Build	5	Sitting	7	Standing	25	Pass
62	No Build	8	Standing	10	Strolling	41	Pass
	Build	7	Standing	10	Strolling	40	Pass
	Full Build	7	Standing	9	Strolling	38	Pass
63	No Build	7	Standing	8	Standing	35	Pass
	Build	6	Sitting	7	Standing	30	Pass
	Full Build	6	Sitting	7	Standing	29	Pass
64	No Build	7	Standing	8	Standing	37	Pass
	Build	6	Sitting	7	Standing	29	Pass
	Full Build	6	Sitting	7	Standing	29	Pass
65	No Build	8	Standing	9	Strolling	39	Pass
	Build	7	Standing	8	Standing	37	Pass
	Full Build	7	Standing	8	Standing	37	Pass
66	No Build	8	Standing	10	Strolling	42	Pass
	Build	7	Standing	9	Strolling	37	Pass
	Full Build	7	Standing	8	Standing	38	Pass
67	No Build	10	Strolling	12	Walking	46	Pass
	Build	9	Strolling	11	Walking	41	Pass
	Full Build	8	Standing	10	Strolling	41	Pass
68	No Build	7	Standing	7	Standing	33	Pass
	Build	6	Sitting	7	Standing	26	Pass
	Full Build	5	Sitting	6	Sitting	25	Pass
69	No Build	7	Standing	8	Standing	35	Pass
	Build	7	Standing	8	Standing	31	Pass
	Full Build	6	Sitting	7	Standing	29	Pass
70	No Build	10	Strolling	12	Walking	41	Pass
	Build	8	Standing	10	Strolling	38	Pass
	Full Build	7	Standing	10	Strolling	36	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
71	No Build	6	Sitting	8	Standing	30	Pass
	Build	7	Standing	8	Standing	31	Pass
	Full Build	6	Sitting	7	Standing	29	Pass
72	No Build	8	Standing	10	Strolling	45	Pass
	Build	8	Standing	10	Strolling	43	Pass
	Full Build	8	Standing	10	Strolling	43	Pass
73	No Build	7	Standing	8	Standing	34	Pass
	Build	6	Sitting	8	Standing	31	Pass
	Full Build	6	Sitting	7	Standing	31	Pass
74	No Build	8	Standing	10	Strolling	40	Pass
	Build	8	Standing	9	Strolling	38	Pass
	Full Build	7	Standing	9	Strolling	37	Pass
75	No Build	7	Standing	8	Standing	39	Pass
	Build	7	Standing	7	Standing	36	Pass
	Full Build	6	Sitting	7	Standing	35	Pass
76	No Build	10	Strolling	11	Walking	51	Pass
	Build	10	Strolling	10	Strolling	49	Pass
	Full Build	10	Strolling	11	Walking	49	Pass
77	No Build	8	Standing	11	Walking	55	Pass
	Build	7	Standing	10	Strolling	52	Pass
	Full Build	7	Standing	10	Strolling	51	Pass
78	No Build	7	Standing	10	Strolling	49	Pass
	Build	7	Standing	9	Strolling	45	Pass
	Full Build	6	Sitting	9	Strolling	45	Pass
79	No Build	9	Strolling	11	Walking	43	Pass
	Build	9	Strolling	10	Strolling	41	Pass
	Full Build	8	Standing	10	Strolling	40	Pass
80	No Build	8	Standing	12	Walking	47	Pass
	Build	8	Standing	10	Strolling	40	Pass
	Full Build	7	Standing	10	Strolling	39	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
81	No Build	10	Strolling	16	Uncomfortable	54	Pass
	Build	8	Standing	13	Uncomfortable	48	Pass
	Full Build	8	Standing	12	Walking	48	Pass
82	No Build	9	Strolling	14	Uncomfortable	50	Pass
	Build	8	Standing	12	Walking	45	Pass
	Full Build	7	Standing	11	Walking	44	Pass
83	No Build	6	Sitting	7	Standing	34	Pass
	Build	5	Sitting	7	Standing	30	Pass
	Full Build	5	Sitting	7	Standing	30	Pass
84	No Build	7	Standing	8	Standing	39	Pass
	Build	6	Sitting	8	Standing	37	Pass
	Full Build	6	Sitting	8	Standing	37	Pass
85	No Build	8	Standing	11	Walking	46	Pass
	Build	7	Standing	10	Strolling	42	Pass
	Full Build	7	Standing	10	Strolling	42	Pass
86	No Build	7	Standing	8	Standing	37	Pass
	Build	6	Sitting	8	Standing	35	Pass
	Full Build	6	Sitting	8	Standing	36	Pass
87	No Build	7	Standing	9	Strolling	37	Pass
	Build	6	Sitting	8	Standing	34	Pass
	Full Build	6	Sitting	8	Standing	34	Pass
88	No Build	11	Walking	16	Uncomfortable	58	Exceeded
	Build	10	Strolling	15	Uncomfortable	53	Pass
	Full Build	9	Strolling	14	Uncomfortable	52	Pass
89	No Build	9	Strolling	13	Uncomfortable	52	Pass
	Build	8	Standing	11	Walking	48	Pass
	Full Build	8	Standing	11	Walking	47	Pass
90	No Build	6	Sitting	7	Standing	30	Pass
	Build	6	Sitting	7	Standing	27	Pass
	Full Build	6	Sitting	7	Standing	27	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
91	No Build	8	Standing	11	Walking	45	Pass
	Build	7	Standing	10	Strolling	40	Pass
	Full Build	7	Standing	9	Strolling	39	Pass
92	No Build	8	Standing	12	Walking	47	Pass
	Build	8	Standing	11	Walking	46	Pass
	Full Build	7	Standing	10	Strolling	43	Pass
93	No Build	4	Sitting	6	Sitting	37	Pass
	Build	6	Sitting	8	Standing	41	Pass
	Full Build	6	Sitting	7	Standing	38	Pass
94	No Build	4	Sitting	4	Sitting	19	Pass
	Build	4	Sitting	5	Sitting	21	Pass
	Full Build	4	Sitting	4	Sitting	21	Pass
95	No Build	6	Sitting	9	Strolling	39	Pass
	Build	6	Sitting	7	Standing	31	Pass
	Full Build	6	Sitting	8	Standing	30	Pass
96	No Build	7	Standing	9	Strolling	38	Pass
	Build	6	Sitting	7	Standing	35	Pass
	Full Build	6	Sitting	8	Standing	34	Pass
97	No Build	7	Standing	9	Strolling	38	Pass
	Build	6	Sitting	7	Standing	34	Pass
	Full Build	6	Sitting	7	Standing	33	Pass
98	No Build	8	Standing	13	Uncomfortable	51	Pass
	Build	7	Standing	10	Strolling	44	Pass
	Full Build	6	Sitting	10	Strolling	43	Pass
99	No Build	10	Strolling	16	Uncomfortable	55	Pass
	Build	8	Standing	12	Walking	48	Pass
	Full Build	8	Standing	12	Walking	47	Pass
100	No Build	7	Standing	8	Standing	37	Pass
	Build	6	Sitting	6	Sitting	32	Pass
	Full Build	6	Sitting	7	Standing	35	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
101	No Build	9	Strolling	11	Walking	43	Pass
	Build	8	Standing	10	Strolling	40	Pass
	Full Build	7	Standing	9	Strolling	39	Pass
102	No Build	8	Standing	10	Strolling	41	Pass
	Build	7	Standing	8	Standing	33	Pass
	Full Build	7	Standing	8	Standing	34	Pass
103	No Build	7	Standing	9	Strolling	36	Pass
	Build	7	Standing	8	Standing	36	Pass
	Full Build	7	Standing	8	Standing	36	Pass
104	No Build	7	Standing	9	Strolling	37	Pass
	Build	6	Sitting	8	Standing	33	Pass
	Full Build	6	Sitting	7	Standing	32	Pass
105	No Build	9	Strolling	14	Uncomfortable	52	Pass
	Build	8	Standing	12	Walking	46	Pass
	Full Build	7	Standing	11	Walking	45	Pass
106	No Build	6	Sitting	7	Standing	29	Pass
	Build	5	Sitting	7	Standing	26	Pass
	Full Build	5	Sitting	6	Sitting	25	Pass
107	No Build	7	Standing	11	Walking	45	Pass
	Build	7	Standing	9	Strolling	39	Pass
	Full Build	7	Standing	9	Strolling	38	Pass
108	No Build	7	Standing	9	Strolling	37	Pass
	Build	7	Standing	8	Standing	35	Pass
	Full Build	7	Standing	8	Standing	35	Pass
109	No Build	8	Standing	10	Strolling	39	Pass
	Build	8	Standing	9	Strolling	36	Pass
	Full Build	8	Standing	9	Strolling	36	Pass
110	No Build	6	Sitting	8	Standing	30	Pass
	Build	6	Sitting	7	Standing	30	Pass
	Full Build	6	Sitting	7	Standing	27	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
111	No Build	5	Sitting	7	Standing	29	Pass
	Build	5	Sitting	6	Sitting	24	Pass
	Full Build	5	Sitting	6	Sitting	25	Pass
112	No Build	6	Sitting	8	Standing	30	Pass
	Build	6	Sitting	7	Standing	27	Pass
	Full Build	6	Sitting	7	Standing	27	Pass
113	No Build	7	Standing	9	Strolling	38	Pass
	Build	7	Standing	8	Standing	35	Pass
	Full Build	7	Standing	8	Standing	34	Pass
114	No Build	6	Sitting	8	Standing	32	Pass
	Build	6	Sitting	7	Standing	30	Pass
	Full Build	6	Sitting	7	Standing	28	Pass
115	No Build	10	Strolling	12	Walking	47	Pass
	Build	10	Strolling	11	Walking	43	Pass
	Full Build	9	Strolling	11	Walking	43	Pass
116	No Build	7	Standing	10	Strolling	42	Pass
	Build	7	Standing	9	Strolling	43	Pass
	Full Build	7	Standing	9	Strolling	43	Pass
117	No Build	10	Strolling	11	Walking	42	Pass
	Build	9	Strolling	10	Strolling	42	Pass
	Full Build	8	Standing	10	Strolling	41	Pass
118	No Build	11	Walking	12	Walking	50	Pass
	Build	10	Strolling	11	Walking	46	Pass
	Full Build	10	Strolling	11	Walking	44	Pass
119	No Build	11	Walking	12	Walking	46	Pass
	Build	10	Strolling	11	Walking	44	Pass
	Full Build	10	Strolling	11	Walking	43	Pass
120	No Build	12	Walking	14	Uncomfortable	53	Pass
	Build	12	Walking	13	Uncomfortable	51	Pass
	Full Build	12	Walking	13	Uncomfortable	51	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
121	No Build	10	Strolling	12	Walking	45	Pass
	Build	10	Strolling	12	Walking	43	Pass
	Full Build	10	Strolling	12	Walking	44	Pass
122	No Build	8	Standing	10	Strolling	42	Pass
	Build	7	Standing	9	Strolling	40	Pass
	Full Build	7	Standing	9	Strolling	41	Pass
123	No Build	8	Standing	9	Strolling	39	Pass
	Build	7	Standing	9	Strolling	38	Pass
	Full Build	7	Standing	8	Standing	39	Pass
124	No Build	7	Standing	9	Strolling	39	Pass
	Build	7	Standing	8	Standing	37	Pass
	Full Build	7	Standing	8	Standing	37	Pass
125	No Build	7	Standing	10	Strolling	39	Pass
	Build	7	Standing	8	Standing	36	Pass
	Full Build	7	Standing	8	Standing	36	Pass
126	No Build	8	Standing	10	Strolling	40	Pass
	Build	7	Standing	9	Strolling	35	Pass
	Full Build	7	Standing	9	Strolling	35	Pass
127	No Build	7	Standing	10	Strolling	40	Pass
	Build	6	Sitting	8	Standing	33	Pass
	Full Build	6	Sitting	8	Standing	32	Pass
128	No Build	9	Strolling	11	Walking	41	Pass
	Build	7	Standing	9	Strolling	35	Pass
	Full Build	7	Standing	8	Standing	34	Pass
129	No Build	10	Strolling	12	Walking	43	Pass
	Build	8	Standing	10	Strolling	37	Pass
	Full Build	8	Standing	10	Strolling	36	Pass
130	No Build	10	Strolling	12	Walking	42	Pass
	Build	8	Standing	10	Strolling	37	Pass
	Full Build	7	Standing	9	Strolling	35	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
131	No Build	12	Walking	13	Uncomfortable	48	Pass
	Build	8	Standing	10	Strolling	42	Pass
	Full Build	8	Standing	9	Strolling	42	Pass
132	No Build	6	Sitting	7	Standing	29	Pass
	Build	7	Standing	8	Standing	38	Pass
	Full Build	7	Standing	7	Standing	35	Pass
133	No Build	7	Standing	8	Standing	31	Pass
	Build	8	Standing	8	Standing	42	Pass
	Full Build	7	Standing	7	Standing	35	Pass
134	No Build	10	Strolling	12	Walking	44	Pass
	Build	9	Strolling	11	Walking	42	Pass
	Full Build	9	Strolling	11	Walking	42	Pass
135	No Build	7	Standing	10	Strolling	40	Pass
	Build	7	Standing	10	Strolling	37	Pass
	Full Build	7	Standing	9	Strolling	35	Pass
136	No Build	7	Standing	9	Strolling	35	Pass
	Build	8	Standing	9	Strolling	37	Pass
	Full Build	7	Standing	8	Standing	37	Pass
137	No Build	7	Standing	8	Standing	35	Pass
	Build	7	Standing	8	Standing	32	Pass
	Full Build	6	Sitting	7	Standing	32	Pass
138	No Build	10	Strolling	14	Uncomfortable	51	Pass
	Build	8	Standing	11	Walking	43	Pass
	Full Build	8	Standing	11	Walking	43	Pass
139	No Build	8	Standing	12	Walking	42	Pass
	Build	7	Standing	10	Strolling	42	Pass
	Full Build	7	Standing	9	Strolling	39	Pass
140	No Build	-	-	-	-	-	-
	Build	7	Standing	10	Strolling	37	Pass
	Full Build	6	Sitting	8	Standing	34	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
141	No Build	8	Standing	13	Uncomfortable	51	Pass
	Build	8	Standing	11	Walking	43	Pass
	Full Build	8	Standing	11	Walking	41	Pass
142	No Build	6	Sitting	8	Standing	35	Pass
	Build	7	Standing	9	Strolling	37	Pass
	Full Build	7	Standing	8	Standing	35	Pass
143	No Build	-	-	-	-	-	-
	Build	-	-	-	-	-	-
	Full Build	-	-	-	-	-	-
144	No Build	-	-	-	-	-	-
	Build	-	-	-	-	-	-
	Full Build	-	-	-	-	-	-
145	No Build	7	Standing	8	Standing	35	Pass
	Build	7	Standing	10	Strolling	39	Pass
	Full Build	7	Standing	10	Strolling	39	Pass
146	No Build	7	Standing	10	Strolling	48	Pass
	Build	7	Standing	10	Strolling	43	Pass
	Full Build	6	Sitting	9	Strolling	40	Pass
147	No Build	7	Standing	11	Walking	51	Pass
	Build	6	Sitting	9	Strolling	42	Pass
	Full Build	6	Sitting	8	Standing	40	Pass
148	No Build	8	Standing	10	Strolling	44	Pass
	Build	7	Standing	10	Strolling	39	Pass
	Full Build	7	Standing	9	Strolling	38	Pass
149	No Build	7	Standing	9	Strolling	37	Pass
	Build	7	Standing	8	Standing	34	Pass
	Full Build	6	Sitting	8	Standing	32	Pass
150	No Build	8	Standing	11	Walking	43	Pass
	Build	7	Standing	9	Strolling	37	Pass
	Full Build	7	Standing	9	Strolling	36	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
151	No Build	8	Standing	11	Walking	42	Pass
	Build	7	Standing	9	Strolling	35	Pass
	Full Build	7	Standing	9	Strolling	35	Pass
152	No Build	8	Standing	12	Walking	46	Pass
	Build	7	Standing	9	Strolling	36	Pass
	Full Build	7	Standing	9	Strolling	36	Pass
153	No Build	8	Standing	11	Walking	43	Pass
	Build	6	Sitting	8	Standing	32	Pass
	Full Build	6	Sitting	7	Standing	30	Pass
154	No Build	8	Standing	11	Walking	44	Pass
	Build	7	Standing	10	Strolling	37	Pass
	Full Build	7	Standing	9	Strolling	35	Pass
155	No Build	7	Standing	10	Strolling	45	Pass
	Build	8	Standing	11	Walking	44	Pass
	Full Build	7	Standing	10	Strolling	41	Pass
156	No Build	8	Standing	10	Strolling	47	Pass
	Build	8	Standing	10	Strolling	42	Pass
	Full Build	7	Standing	9	Strolling	39	Pass
157	No Build	8	Standing	10	Strolling	42	Pass
	Build	7	Standing	9	Strolling	40	Pass
	Full Build	7	Standing	9	Strolling	37	Pass
158	No Build	8	Standing	10	Strolling	47	Pass
	Build	7	Standing	9	Strolling	41	Pass
	Full Build	7	Standing	8	Standing	38	Pass
159	No Build	8	Standing	10	Strolling	46	Pass
	Build	7	Standing	8	Standing	40	Pass
	Full Build	6	Sitting	7	Standing	37	Pass
160	No Build	7	Standing	10	Strolling	42	Pass
	Build	4	Sitting	5	Sitting	28	Pass
	Full Build	4	Sitting	4	Sitting	24	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
161	No Build	8	Standing	10	Strolling	43	Pass
	Build	7	Standing	8	Standing	41	Pass
	Full Build	6	Sitting	7	Standing	35	Pass
162	No Build	6	Sitting	8	Standing	40	Pass
	Build	5	Sitting	5	Sitting	28	Pass
	Full Build	4	Sitting	4	Sitting	25	Pass
163	No Build	8	Standing	10	Strolling	44	Pass
	Build	8	Standing	8	Standing	42	Pass
	Full Build	6	Sitting	7	Standing	36	Pass
164	No Build	7	Standing	9	Strolling	45	Pass
	Build	6	Sitting	6	Sitting	35	Pass
	Full Build	5	Sitting	5	Sitting	32	Pass
165	No Build	8	Standing	10	Strolling	50	Pass
	Build	8	Standing	9	Strolling	48	Pass
	Full Build	7	Standing	8	Standing	43	Pass
166	No Build	7	Standing	9	Strolling	51	Pass
	Build	7	Standing	6	Sitting	50	Pass
	Full Build	6	Sitting	6	Sitting	46	Pass
167	No Build	7	Standing	10	Strolling	50	Pass
	Build	7	Standing	8	Standing	47	Pass
	Full Build	7	Standing	8	Standing	42	Pass
168	No Build	7	Standing	10	Strolling	49	Pass
	Build	7	Standing	8	Standing	46	Pass
	Full Build	7	Standing	8	Standing	40	Pass
169	No Build	6	Sitting	8	Standing	44	Pass
	Build	6	Sitting	5	Sitting	40	Pass
	Full Build	5	Sitting	6	Sitting	37	Pass
170	No Build	-	-	-	-	-	-
	Build	6	Sitting	7	Standing	30	Pass
	Full Build	6	Sitting	7	Standing	28	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
171	No Build	7	Standing	10	Strolling	42	Pass
	Build	6	Sitting	7	Standing	29	Pass
	Full Build	6	Sitting	7	Standing	29	Pass
172	No Build	5	Sitting	7	Standing	29	Pass
	Build	5	Sitting	6	Sitting	25	Pass
	Full Build	5	Sitting	6	Sitting	35	Pass
173	No Build	5	Sitting	6	Sitting	28	Pass
	Build	7	Standing	7	Standing	32	Pass
	Full Build	6	Sitting	7	Standing	37	Pass
174	No Build	6	Sitting	8	Standing	39	Pass
	Build	7	Standing	7	Standing	37	Pass
	Full Build	6	Sitting	7	Standing	35	Pass
175	No Build	7	Standing	8	Standing	45	Pass
	Build	7	Standing	7	Standing	43	Pass
	Full Build	7	Standing	8	Standing	39	Pass
176	No Build	6	Sitting	7	Standing	41	Pass
	Build	7	Standing	8	Standing	42	Pass
	Full Build	6	Sitting	7	Standing	37	Pass
177	No Build	7	Standing	9	Strolling	44	Pass
	Build	7	Standing	8	Standing	42	Pass
	Full Build	7	Standing	8	Standing	37	Pass
178	No Build	6	Sitting	8	Standing	42	Pass
	Build	7	Standing	8	Standing	40	Pass
	Full Build	7	Standing	9	Strolling	38	Pass
179	No Build	6	Sitting	7	Standing	34	Pass
	Build	6	Sitting	6	Sitting	37	Pass
	Full Build	7	Standing	8	Standing	37	Pass
180	No Build	6	Sitting	8	Standing	39	Pass
	Build	7	Standing	7	Standing	37	Pass
	Full Build	8	Standing	10	Strolling	39	Pass

Table 1: Pedestrian Wind Comfort and Safety Conditions

Location	Configuration	Wind Comfort				Wind Safety	
		Summer		Winter		Annual	
		Speed (mph)	Rating	Speed (mph)	Rating	Speed (mph)	Rating
181	No Build	5	Sitting	6	Sitting	27	Pass
	Build	6	Sitting	6	Sitting	33	Pass
	Full Build	8	Standing	8	Standing	38	Pass
182	No Build	5	Sitting	6	Sitting	26	Pass
	Build	6	Sitting	6	Sitting	29	Pass
	Full Build	8	Standing	8	Standing	38	Pass
183	No Build	6	Sitting	7	Standing	30	Pass
	Build	6	Sitting	6	Sitting	33	Pass
	Full Build	8	Standing	10	Strolling	40	Pass
184	No Build	5	Sitting	6	Sitting	24	Pass
	Build	5	Sitting	5	Sitting	27	Pass
	Full Build	7	Standing	7	Standing	34	Pass
185	No Build	6	Sitting	7	Standing	31	Pass
	Build	6	Sitting	6	Sitting	30	Pass
	Full Build	7	Standing	8	Standing	39	Pass

Season	Months	Hours
Summer	May - October	6:00 - 23:00 for comfort
Winter	November - April	6:00 - 23:00 for comfort
Annual	January - December	0:00 - 23:00 for safety

Configurations

No Build: Existing site and surroundings
Build: Project with existing surroundings
Full Build: Project with future surroundings

Comfort Speed (mph)	
(20% Seasonal Exceedance)	
≤ 6	Sitting
7 - 8	Standing
9 - 10	Strolling
11 - 12	Walking
> 12	Uncomfortable

Safety Speed (mph)	
(0.1% Annual Exceedance)	
≤ 56	Pass
> 56	Exceeded

APPENDIX D

NOISE STUDY TECHNICAL MEMORANDUM

Memorandum

To: BXP

Date: 7/24/24

Project #: 12959.17

From: VHB

Re: IDCP 105 Broadway Noise Study

This noise technical memorandum provides background information on the fundamentals of noise, describes the noise impact criteria and methodology, and discusses the potential noise impacts associated with the Phase 4 Alternative's operations, including mechanical equipment and loading activities. Noise monitoring was conducted to determine existing ambient sound levels.

Phase 4 Alternative includes shifting approximately 145,300 GFA of commercial lab/office space from the previously approved Commercial Building D development to the new Commercial Building E (the 'Project'), which is located at 105 Broadway, Cambridge MA (the 'Project Site'). Noise associated with Commercial Building D, located at 250 Binney Street, was previously studied as part of Concept Plan Amendment #2.

Fundamentals of Noise

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, communication, work, or recreation. How people perceive sound depends on several measurable physical characteristics, which include the following:

- Intensity - Sound intensity is often equated to loudness.
- Frequency - Sounds are comprised of acoustic energy distributed over a variety of frequencies. Acoustic frequencies, commonly referred to as tone or pitch, are typically measured in Hertz. Pure tones have all their energy concentrated in a narrow frequency range.

Sound levels are most often measured on a logarithmic scale of decibels (dB). The decibel scale compresses the audible acoustic pressure levels which can vary from the threshold of hearing (zero dB) to the threshold of pain (120 dB). Because sound levels are measured in dB, the addition of two sound levels is not linear. Adding two equal sound levels creates a 3 dB increase in the overall level. Research indicates the following general relationships between sound level and human perception:

- A 3 dB increase is a doubling of acoustic energy and is the threshold of perceptibility to the average person.
- A 10 dB increase is a tenfold increase in acoustic energy but is perceived as a doubling in loudness to the average person.

The human ear does not perceive sound levels from each frequency as equally loud. To compensate for this phenomenon in perception, a frequency filter known as A weighted (dBA) is used to evaluate environmental noise levels. **Table 1** below presents a list of common outdoor and indoor sound levels.

Table 1 Common Outdoor and Indoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)*		Sound Level dBA**	Indoor Sound Levels
	6,324,555	-	110	Rock Band at 5 m
Jet Over Flight at 300 m		-	105	
	2,000,000	-	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		-	95	
	632,456	-	90	Food Blender at 1 m
Diesel Truck at 15 m		-	85	
Noisy Urban Area—Daytime	200,000	-	80	Garbage Disposal at 1 m
		-	75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	-	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		-	65	Normal Speech at 1 m
	20,000	-	60	
Quiet Urban Area—Daytime		-	55	Quiet Conversation at 1 m
	6,325	-	50	Dishwasher Next Room
Quiet Urban Area—Nighttime		-	45	
	2,000	-	40	Empty Theater or Library
Quiet Suburb—Nighttime		-	35	
	632	-	30	Quiet Bedroom at Night
Quiet Rural Area—Nighttime		-	25	Empty Concert Hall
Rustling Leaves	200	-	20	
		-	15	Broadcast and Recording Studios
	63	-	10	
		-	5	
Reference Pressure Level	20	-	0	Threshold of Hearing

Source: Highway Noise Fundamentals. Federal Highway Administration, September 1980.
* μPA – MicroPascals, which describe pressure. The pressure level is what sound level monitors measure.
** dBA – A-weighted decibels, which describe pressure logarithmically with respect to 20 μPa (the reference pressure level).

A variety of sound level indicators can be used for environmental noise analysis. These indicators describe the variations in intensity and temporal pattern of the sound levels. The following is a list of common sound level descriptors used for environmental noise analyses:

› L90 is the sound level which is exceeded for 90 percent of the time during the time period. The L90 is generally considered to be the ambient or background sound level.

Methodology

Potential noise impacts were evaluated for the proposed mechanical equipment and loading/service activities associated with Commercial Building E. The evaluation included measurements of existing ambient background sound levels and a qualitative evaluation of potential noise impacts associated with the proposed mechanical equipment (e.g., energy recovery units, cooling towers, etc.) and loading/service activities. Sensitive receptor in the vicinity of the Project were identified and noise readings were taken at nearby locations to set the baseline noise levels. The site layout and building design, as it relates to the rooftop mechanical systems, and service and loading area, as well as the time and frequency of anticipated deliveries at the site were considered. The evaluation also considered potential sound attenuation due to distance, proposed building design, and obstructions from surrounding structures.

City of Cambridge Noise Impact Standards

The City of Cambridge has developed noise standards that establish noise thresholds deemed to result in adverse impacts. The noise analysis for the Project used these standards to evaluate whether the proposed development will generate sound levels that result in potential adverse impacts.

The noise standards are provided under Chapter 8.16 of the City of Cambridge Municipal Code (Noise Ordinance). These standards establish maximum allowable sound levels based upon the land use affected by the proposed development. **Table 2** below summarizes the maximum allowable sound levels that should not be exceeded. While the surrounding area is a mixed-use zoning district, residential and residential in industrial zoning districts were used as comparisons to provide a conservative assessment for potential impacts. For a residential or residential in industrial zoning district, the maximum noise level affecting residential uses shall not exceed the Residential or Residential in Industrial Noise Standards, respectively. The single number equivalent noise standard for a residential use is 60 dBA for daytime periods (7:00 AM to 6:00 PM) and 50 dBA during other times of the day. For residential in industrial uses, the single number equivalent noise standard is 65 dBA for daytime periods and 55 dBA during other times of the day.

The City of Cambridge noise ordinance considers construction sound levels to be an impact to residential land uses if the L10 sound level is in excess of 75 dBA or the Lmax sound level is in excess of 86 dBA measured at the lot of the affected property.

Table 2 City of Cambridge Noise Standards by Zoning District, dB

Octave Band Center Frequency (Hz)	Residential		Residential in Industrial		Commercial	Industrial
	Daytime	Other Times	Daytime	Other Times	Anytime	Anytime
31.5	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	69	69	69	69	69
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1,000	50	40	56	45	56	61
2,000	45	33	51	39	51	57
4,000	40	28	47	34	47	53
8,000	38	26	44	32	44	50
Single Number Equivalent, dBA	60	50	65	55	65	70

Source: City of Cambridge Municipal Code, Chapter 8.16, Table 8.16.060E.

Receptor Locations

The noise analysis included an evaluation of the study area to identify nearby sensitive receptor locations, which typically include areas of sleep and areas of outdoor activities that may be sensitive to noise. The noise analysis identified six nearby sensitive receptor locations in the vicinity of the Project:

- R1 – Residence Inn Boston Cambridge (Residential);
- R2 – 90 Broadway (Commercial);
- R3 – 303 Third Street (Residential);
- R4 – Sixth Street Connector and Bike Path (Park);
- R5 – Residential Building South; and
- R6 – Danny Lewin Park (Park).

These receptor locations, selected based on land use considerations, represent the most sensitive locations in the vicinity of the Project Site.

Existing Noise Conditions

Existing sound level measurements were conducted using Type 1 sound analyzers (Larson Davis 831) to establish existing ambient conditions. Measurements were conducted during the weekday daytime period (approximately 12:15 PM to 1:30 PM) and late-night period (2:00 AM to 4:00 AM) in the vicinity of the Project Site on July 2, 2024. The monitoring program consists of three short-term monitoring locations, as shown in **Figure 1**. During the daytime period, the measured sound levels under existing conditions were composed of noise from vehicles on local roadways such as Binney Street and Broadway, pedestrian activity, and nearby construction activities. The nighttime period sound levels were generally associated with mechanical equipment from nearby buildings. The existing measured sound level data are presented in **Table 3** below. The measured L90 sound levels range from approximately 57 dBA to

65 dBA during the daytime period and from 54 dBA to 56 dBA during the nighttime period. The result of the noise monitoring program indicates that the daytime sound levels within the study area are currently exceeding the City of Cambridge's residential daytime standard of 60 dBA along Broadway but are below the City's standard at other locations. The existing sound levels during the nighttime period exceed the City's residential nighttime standard of 50 dBA for residential use at all evaluated locations. Existing sound levels meet the City's residential in industrial standard of 65 dBA along Broadway but are below the City's standard at other locations. The existing sound levels during the nighttime period meet or exceed the City's residential in industrial standard of 55 dBA in proximity of Broadway but are below it in other locations.

Table 3 Existing Ambient Sound Levels, dBA

	Measured L90 Sound Levels[2]	
Measurement Location[1]	**Daytime**	**Nighttime**
M1 – Residence Inn Boston Cambridge	65[3]	56
M2 – Sixth Street Connecter and Bike Path	58	55
M3 – 303 Third Street	57	54

[1]See Figure 1 for measurement locations.
[2]Measured L90 sound levels presented include exclusions due to atypical sound events.
[3]Construction activities were audible during this measurement.

Future Noise Conditions

The noise analysis evaluated the potential noise impacts associated with the Project's proposed mechanical equipment and loading activities. The analysis qualitatively evaluated the potential sound level impacts at the nearby sensitive receptor locations.

Mechanical Equipment

Since the Project is in the early stages of the design process, the specific details related to the final selection of mechanical equipment are unknown at the time of this noise assessment. Based on preliminary design plans, the anticipated mechanical equipment associated with the Project are expected to include the following:

- Emergency generators;
- Air handling units;
- Exhaust fans;
- Chillers;
- Energy Recovery Units, and
- Air source heat pumps.

The mechanical systems will be strategically located on the building's rooftop, utilizing the proposed building height in providing noise attenuation. Rooftop equipment will also be surrounded by screen walls on all sides. Attenuation measures such as ductwork and louvers, enclosures, and vibration isolating springs are all being considered for rooftop equipment. Equipment is also proposed to be located in mechanical rooms on the interior of the proposed building. As such, the sound levels associated with the Project's mechanical equipment are expected to be minimal and comply with the City of Cambridge's noise standards at the surrounding receptor locations.

The Project components will require an emergency generator for life safety purposes such as emergency exit lighting. The determination of specific generator parameters, such as the sizes and locations will be made during the building design process. The Project will be required to adhere to Massachusetts Department of Environmental Protection's (MassDEP's) regulations that require such equipment to be certified and registered. As part of the air permitting/certification process, the Project will be required to meet additional noise requirements described in MassDEP regulations under the Codes of Massachusetts Regulations (310 CMR 7.00). When the details of the emergency generator are developed, the Applicant will submit the appropriate permit/certification application to MassDEP, which would include noise mitigation measures (such as acoustic enclosures and exhaust silencers) that are necessary to meet MassDEP's noise criteria.

Service and Loading Activities

Off-street designated loading areas will be provided for loading and service activities associated with the Project. The loading areas will be located at the ground level, on the west side of the proposed building, facing East Service Drive. The loading dock activities will be managed so that service and loading operations do not impact traffic circulation on the adjacent local roadways. Since loading and service activities will be enclosed within the proposed building and operations will be managed, noise impacts to nearby sensitive receptor locations are expected to be negligible.

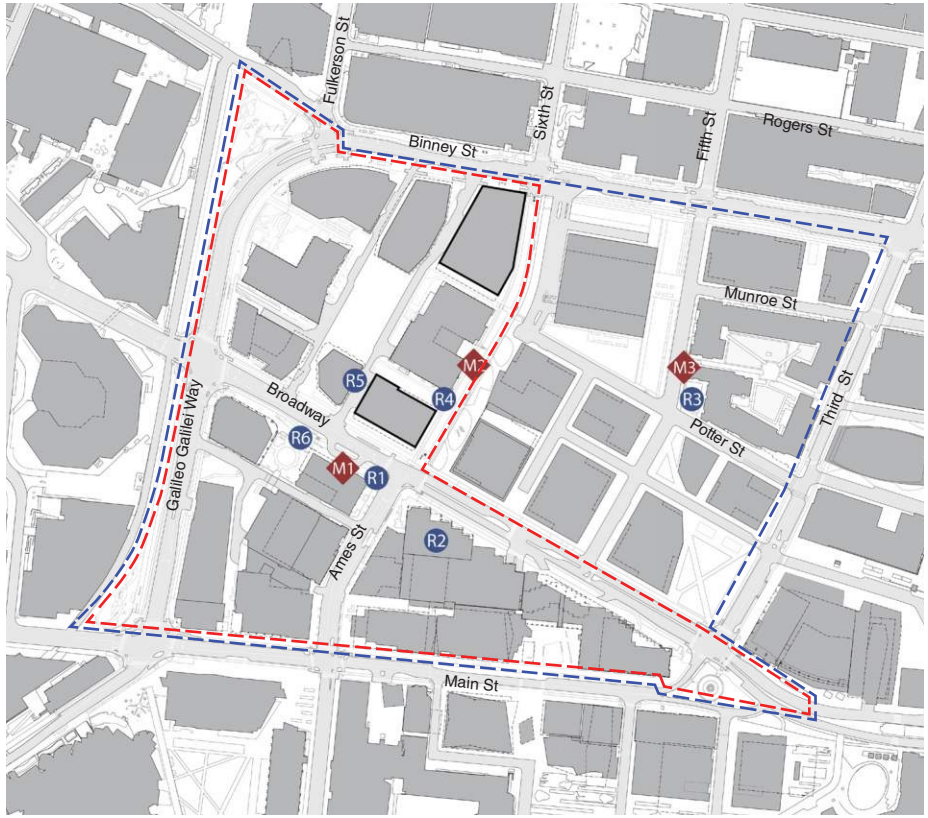
Temporary Construction Activities

The construction activity associated with the Project may temporarily increase nearby sound levels due to the use of heavy machinery. Heavy machinery is expected to be used intermittently throughout the Project's construction phases, typically during daytime periods. The construction activities that will generate the highest sound levels may include demolition, site excavation and grading, and construction of the foundation for the proposed building. A construction management program will be developed with the City for each phase of the Project to ensure that the applicable noise regulation is met.

The Project will implement mitigation measures to reduce or minimize noise from construction activities. Construction vehicles and equipment would be required to maintain their original engine noise control equipment specific mitigation measures may include the following:

- Construction equipment would be required to have installed and properly operating appropriate noise muffler systems.
- Appropriate traffic management techniques would be implemented during the construction period to mitigate roadway traffic noise impact.
- Proper operation and maintenance, and prohibition of excessive idling of construction equipment engines, would be required.

Therefore, construction noise levels are proposed to be mitigated to the greatest extent possible.


Fulkerson St
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Third St
Potter St
Broadway
Galileo Galilei Way
Ames St
Main St
M1
M2
M3
R1
R2
R3
R4
R5
R6
Project Components
MXD Boundary
KSURP Boundary
R# Receptors
M# Monitors
N