282-308 Bremen Street, East Boston

Mixed-Use Residential /Commercial Development

PROJECT NOTIFICATION FORM — May 8, 2019

Submitted Pursuant to Article 80A & 80B of the Boston Zoning Code

SUBMITTED BY:

282 Bremen Development LLC
c/o Transom Real Estate, LLC
527 Albany Street
Boston, MA 02118

SUBMITTED TO:

boston planning & development agency

Boston Planning and Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201

PREPARED BY:

MLF CONSULTING LLC

Mitchell L. Fischman ("MLF") Consulting LLC
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IN ASSOCIATION WITH:

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28 STATE STREET, SUITE 802
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Boston, MA 02110

May 8, 2019

Mr. Brian Golden, Director
Boston Planning and Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201
Attn: Mr. Raul Duverge, Project Manager

RE: Project Notification Form
Proposed Mixed-Use Multi-Family Residential/Commercial Development
282-308 Bremen Street, East Boston

Dear Director Golden:

On behalf of 282 Bremen Development, LLC (the "Proponent"), as developer of an approximately 0.8 acre (34,160 square feet) site at 282-308 Bremen Street (the "Project Site"), we are pleased to submit this Project Notification Form ("PNF") for the 282-308 Bremen Street mixed-use multi-family residential/commercial development to the Boston Planning and Development Agency ("BPDA") in accordance with the Article 80B-2 Large Project Review requirements of the City of Boston Zoning Code. The Project Site is uniquely situated across from the Bremen Street Community Park and within a short walk to the MBTA's Blue Line Airport Subway Station, which makes it an ideal location for the upgrade and conversion of these non-conforming parcels into much-needed residential housing. The Project Site is bounded to the northwest by the rear property lines of multi-family residential properties along Chelsea Street, to the northeast by multi-family residences along Bremen Street, to the south by Bremen Street, and to the southwest by Brooks Street.

The Proponent seeks to revitalize this non-conforming and outdated industrial project site in a residential section of the East Boston neighborhood, with a vibrant mixed-use development of approximately 125,000 gross square feet. The proposed project will include 165 residential apartment units, 2,000 gsf of live/work space on the first floor of the building to help activate the street and provide artist live/work lofts, and 2,000 gsf of ground floor retail space plus amenity, lobby, circulation, and accompanying storage spaces, served by a garage that can accommodate up to 68 parking spaces utilizing stackers, in a new 5-6 story building along Bremen Street of varying heights with related upgrades in public realm improvements including pedestrian and vehicular access, landscaping and streetscape design (the "Proposed Project").

The Proponent submits that the scope and scale of the Proposed Project's residential program is intended to further the new housing creation goals of Mayor Walsh's 2030 Housing Plan, and consistent with the residential character of the area, the Proposed Project has been carefully designed with certain building and site measures that will help to appropriately transition from residential properties along Chelsea Street at the rear to a more prominent engagement along the Bremen Street frontage.

The surrounding area is a mix of residential, light industrial, wholesale, and office uses. The Project Site is located within the 3F-2000 (three-family residential) Subdistrict of the East Boston Neighborhood District (Article 53). As such, the Proposed Project requires zoning relief as discussed in the PNF from the City of Boston's Zoning Board of Appeal.

In accordance with BPDA requirements, the public notice for the PNF submission appears in the May 8, 2019, edition of the *Boston Herald*.

The Proposed Project will exceed the 50,000 square foot size threshold of Article 80 for a project within a Boston neighborhood, and therefore requires several additional filings pursuant to Large Project Review regulations.

A Letter of Intent to File a Project Notification Form was filed with the BPDA on March 21, 2019 (attached hereto as **Appendix "A"**).

In support of the Article 80 Large Project Review process, the Proponent has conducted, and continues to conduct, community outreach with neighbors and abutters of the site, including meetings and discussions with elected representatives and other officials. The Proponent has also made several presentations to residents of the surrounding neighborhood as well as the Maverick Central Neighborhood Association.

On behalf of the entire project team, we would like to thank you and the BPDA staff assigned to the 282-308 Bremen Street Project, particularly Project Manager, Raul Duverge, and reviewing BPDA Urban Designer, Matthew Martin, for their invaluable assistance to date in helping the development team to shape the Proposed Project and in completing this comprehensive PNF filing.

We look forward to continuing the Large Project Review process and advancing the Proposed Project through public review with the cooperation of the BPDA, other City officials, members of the Impact Advisory Group, and the East Boston community.

In accordance with BPDA requirements, please find attached ten (10) copies of the PNF plus a CD containing the electronic PNF file to be uploaded to the BPDA's online portal for public review.

Very truly yours,

Partner - Joseph P. Hanley, Esq.
McDermott Quilty & Miller, LLP

PUBLIC NOTICE

The Boston Redevelopment Authority d/b/a the Boston Planning & Development Agency ("BPDA"), pursuant to Article 80A and 80B of the Boston Zoning Code ("Code"), hereby gives notice that 282 Bremen Development, LLC (the "Proponent") submitted a Project Notification Form ("PNF") for Large Project Review on May 8, 2019 to the BPDA for a mixed-use development at 282-308 Bremen Street in the East Boston neighborhood of Boston. The proposal consists of the demolition of the existing structures occupying the site and the construction of a 5-6 story, approximately 125,000 square foot, mixed-use building which will include 165 residential apartment units, approximately 2,000 square feet of live/work space, and approximately 2,000 square feet of ground floor retail space, and up to 68 off-street vehicle parking spaces (the "Proposed Project"). The combined project site includes approximately 34,160 square feet (0.8 acres) of land, which is bounded to the northwest by the rear property lines of multi-family residential properties along Chelsea Street, to the northeast by multi-family residences along Bremen Street, to the south by Bremen Street, and to the southwest by Brooks Street (collectively, the "Project Site"). Approvals are requested of the BPDA pursuant to Article 80. In the required Scoping Determination for this PNF, the BPDA may waive further review pursuant to Section 80B-5.3(d), if, after reviewing public comments, the BPDA finds that such PNF adequately describes the Proposed Project's impacts. The PNF may be obtained from the BPDA website- www.bostonplans.org or may be reviewed at the Office of the Secretary of the BPDA, Room 910, Boston City Hall, 1 City Hall Square, Boston, MA 02201, between 9:00 AM and 5:00 PM, Monday through Friday except legal holidays. A copy of the PNF is on reserve and available for review at the East Boston Public Library, 365 Bremen Street, East Boston, MA 02128 during scheduled business hours. Public comments on the PNF, including the comments of public agencies, should be submitted by email to: Raul.Duverge@Boston.gov or in writing to: Mr. Raul Duverge, Senior Project Manager, BPDA, 1 City Hall Square, Boston, MA 02201 by June 10, 2019.

BOSTON REDEVELOPMENT AUTHORITY
d/b/a BOSTON PLANNING & DEVELOPMENT AGENCY
Teresa Polhemus, Executive Director/Secretary
May 8, 2019

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Transom Real Estate, LLC on behalf of its affiliate, 282 Bremen Development, LLC (the "Proponent") developer of the real property situated at 282-308 Bremen Street in East Boston is submitting this Project Notification Form ("PNF"), in accordance with the Article 80 requirements of the Boston Zoning Code ("Code"), for a new residential apartment development of approximately 125,000 gross square feet (gsf) of floor area, containing 165 residential apartment units, three live/work units with 2,000 gsf of space, and 2,000 gsf of ground floor retail space plus amenity, lobby, circulation, and accompanying storage spaces, aserved by 68 garage parking spaces[1] in a new 5-6 story building with varying heights (the "Proposed Project"). The Proposed Project will advance the housing creation goals of Mayor Martin Walsh's 2030 Housing Plan.

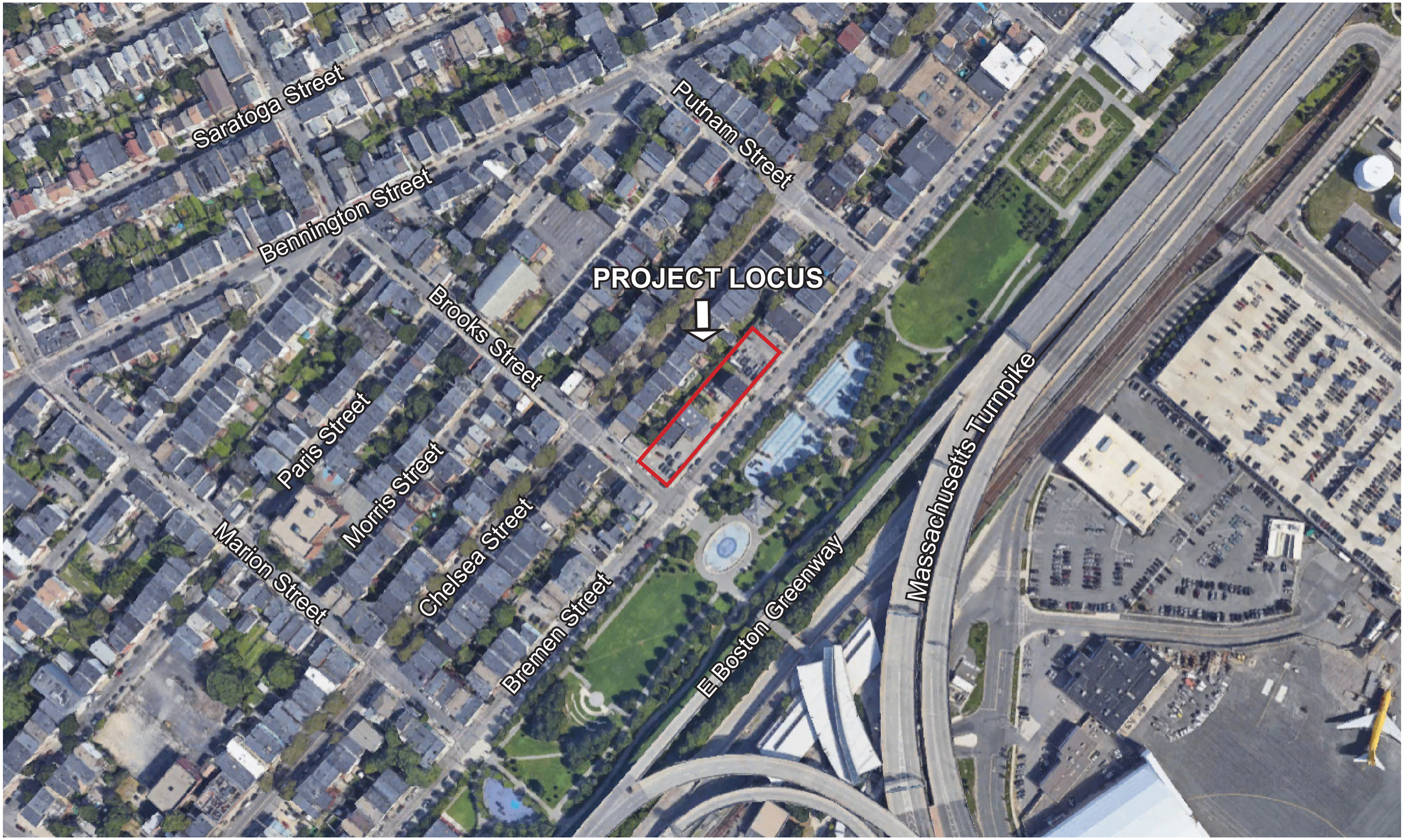
The site comprises 34,160 square feet of land and is bounded to the northwest by the rear property lines of multi-family residential properties along Chelsea Street, to the northeast by multi-family residences along Bremen Street, to the south by Bremen Street, and to the southwest by Brooks Street. The site, shown on **Figure 1-1**, is currently occupied by two automobile repair establishments and a 4-unit multifamily residential structure. Please also see **Figures 1-2** thru **1-6** for the USGS map and photographs of existing onsite uses and properties in the project vicinity.

The surrounding area is a mix of residential, light industrial, wholesale, and office uses. The site is within the 3F-2000 (three-family residential) Subdistrict of the East Boston Neighborhood District (Article 53).

A Letter of Intent (LOI) to File a Project Notification Form was filed with the Boston Planning and Development Agency for the proposed mixed-use building on March 21, 2019 (See **Appendix A**).

The Project is uniquely situated across from the Bremen Street Community Park and to take advantage of the numerous public transportation opportunities in the area including Airport Station, which serves the MBTA's Blue Line subway and No. 3 Silver Line bus route. It is expected that due to the availability of public transportation and the walkability of the surrounding neighborhood, the Project will rely on alternative non-vehicular modes of transportation to access the site.

[1] In response to community feedback, the garage has been redesigned to accommodate stackers for up to 68 vehicles.



282-308 Bremen Street

Figure 1-1. Project Locus
282-308 Bremen Street

Figure 1-2. USGS Map
282-308 Bremen Street

Figure 1-3. Existing Site Photos

Existing Site Building – Auto Body Company

Adjacent Building Along Bremen St

Figure 1-4. Existing Site Photos

Existing Site Building – Braz Motor Repair and Sales

Side of Existing Building Along Bremen St

Figure 1-5. Existing Site Photos

Corner of Chelsea and Brook Streets

Existing Residences Along Chelsea St

Figure 1-6. Existing Site Photos

Massport's Bremen Street Park on the Opposite Side of Bremen St

Nearby East Boston BPL Branch Library on Bremen St

1.3 Detailed Project Description

1.3.1 Existing Conditions Plan

The site comprises 34,160 square feet of land and is bounded to the northwest by the rear property lines of multi-family residential properties along Chelsea Street, to the northeast by multi-family residences along Bremen Street, to the south by Bremen Street, and to the southwest by Brooks Street. The site is currently occupied by two automobile repair establishments and a 4-unit multifamily residential structure, which will be demolished to allow for the new construction to commence. (See **Figure 1-7**. **Existing Conditions Plan.**)

1.3.2 Detailed Project Program

The Project proposes construction of a new residential apartment development of approximately 125,000 gross square feet, containing 165 multi-family apartment units, three live/work units with 2,000 gsf of space, and 2,000 gross square feet of ground floor retail spaces plus amenity, lobby, circulation, BOH space, served by 68 garage parking spaces[2] in a new 5-6 story building approximately 58-68 feet to the top of the roof, with the 5-story portion at 58 feet and the 6-story portion at 68 feet (the "Proposed Project"). The Proposed Project will advance the housing creation goals of Mayor Martin Walsh's 2030 Housing Plan.

The upward limit of 165 residential units currently planned include approximately 25 two-bedroom, 82 one-bedroom, and 58 studio units. See Project Dimensions in **Table 1-1** below:

Table 1-1. Approximate Dimensions of Proposed Project

Lot Area	34,160 sf
Gross Building Area	125,000 Gross Square Feet
F.A.R.	3.65
No. of Floors	5-6 Floors
Height	58-68 Feet
No. of Residential Units	165-Units
Live / Work Space	2,000 GSF in Three Live / Work Units
Amount of Neighborhood Retail Space	2,000 GSF
No. of Garage Parking Spaces	68-Spaces

[2] As indicated, in response to community feedback, the garage has been redesigned to accommodate stackers for up to 68 vehicles.

TITLE INSURANCE COMMITMENT NOTE

I HAVE REVIEWED THE FIRST AMERICAN TITLE INSURANCE COMPANY COMMITMENT NO. NCS-924543-BOS1, WITH AN EFFECTIVE DATE OF SEPTEMBER 18, 2018 AT 5:00 PM AND FIND AS FOLLOWS WITH RESPECT TO THE EXCEPTIONS LISTED IN SCHEDULE B, PART II OF SAID COMMITMENT:

(FOR PLOTTED ITEMS REFER TO THE EXCEPTION NUMBER ON THE PLAN: 9)

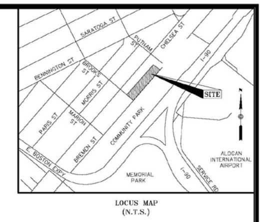
1. ANY FACTS, RIGHTS, INTERESTS, OR CLAIMS THAT ARE NOT SHOWN IN THE PUBLIC RECORDS BUT THAT COULD BE ASCERTAINED BY AN INSPECTION OF THE LAND OR BY MAKING INQUIRY OF PERSONS IN POSSESSION OF THE LAND. (NOT PLOTTABLE)
2. ANY ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATION, OR ADVERSE CIRCUMSTANCE AFFECTING THE TITLE INCLUDING DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, OR ANY OTHER FACTS THAT WOULD BE DISCLOSED BY AN ACCURATE AND COMPLETE LAND SURVEY OF THE LAND, AND THAT ARE NOT SHOWN IN THE PUBLIC RECORDS. (NOT PLOTTABLE)
3. ANY LIEN, OR RIGHT TO A LIEN, FOR SERVICES, LABOR, OR MATERIAL HERETOFORE OR HEREAFTER FURNISHED, IMPOSED BY LAW AND NOT SHOWN BY THE PUBLIC RECORDS. (NOT PLOTTABLE)
4. REAL ESTATE TAXES AND MUNICIPAL CHARGES WHICH MAY CONSTITUTE LIENS. (NOT PLOTTABLE)
5. ANY DEFECT, LIEN, ENCUMBRANCE, ADVERSE CLAIM, OR OTHER MATTER THAT APPEARS FOR THE FIRST TIME IN THE PUBLIC RECORDS OR IS CREATED, ATTACHES, OR IS DISCLOSED BETWEEN THE COMMITMENT DATE AND THE DATE ON WHICH ALL OF THE SCHEDULE B, PART I-REQUIREMENTS ARE MET. (NOT PLOTTABLE)
6. TITLE TO AND RIGHTS OF THE PUBLIC AND OTHERS ENTITLED THERETO IN AND TO THOSE PORTIONS OF THE LAND LYING WITHIN THE BOUNDS OF ADJACENT STREETS, ROADS, AND WAYS. (NOT PLOTTABLE)
7. THE ACREAGE OR SQUARE FOOTAGE BEING OTHER THAN AS STATED IN SCHEDULE A OR THE PLAN(S) THEREIN REFERRED TO. (NOT PLOTTABLE)
8. ANY MATTERS ARISING OUT OF LAND COURT TAX LIEN CASES 32885-TL AND 28894-TL. (NOT PLOTTABLE)
9. TAX TAKING BY THE CITY OF BOSTON, DATED AUGUST 17, 1955, RECORDED WITH SAID DEEDS, BOOK 7084, PAGE 11, AS AFFECTED BY A PETITION TO FORECLOSE SAID TAX TAKING, RECORDED WITH SAID DEEDS, BOOK 7322, PAGE 341, WHICH PETITION IS WITHDRAWN AT BOOK 7351, PAGE 464. (PLOTTED - AFFECTS TRACT I, PARCEL 3)
10. TAX TAKING BY THE CITY OF BOSTON, DATED JUNE 28, 1950, RECORDED WITH SAID DEEDS, BOOK 6633, PAGE 200, AS AFFECTED BY A PETITION TO FORECLOSE, RECORDED WITH SAID DEEDS, BOOK 6847, PAGE 554, WHICH PETITION IS WITHDRAWN AT BOOK 6866, PAGE 443. (PLOTTED - AFFECTS TRACT I, PARCEL 1)

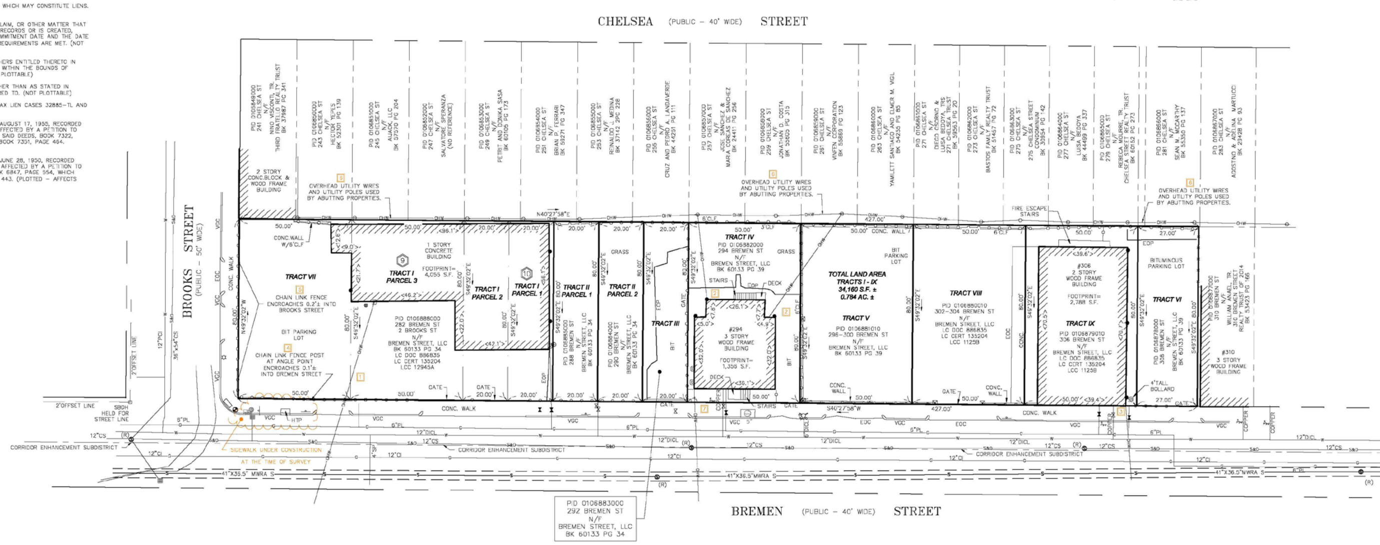
UTILITY STATEMENT

THE LOCATION OF THE UTILITIES AS SHOWN HEREON HAVE BEEN COMPILED FROM VISIBLE STRUCTURES AND INFORMATION OBTAINED FROM VARIOUS SOURCES. THE ACTUAL LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHALL BE CONSIDERED APPROXIMATE AND SHALL BE VERIFIED BY THE OWNER PRIOR TO ANY CONSTRUCTION. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED.

LEGEND

CBDH CONCRETE BOUND WITH DRILL HOLE
SBDH STONE BOUND WITH DRILL HOLE
CATCH BASIN
DRAIN MANHOLE
ELECTRIC BOX
ELECTRIC METER
GAS METER
GAS VALVE
WATER GATE
FIRE HYDRANT
DECIDUOUS TREE
SIGN (SINGLE POSTED)
MONITORING WELL
LIGHT POLE
BOLLARD
ROOF DRAIN
SEWER MANHOLE
EOC EDGE OF CONCRETE
EOP EDGE OF PAVEMENT
VGC VERTICAL GRANITE CURB
CONC CONCRETE
BIT BITUMINOUS
(TYP.) TYPICAL
HTP HANDICAP TRACTION PAD
DICL DUCTILE IRON CEMENT LINED
CS COATED STEEL
(R) LOCATION/VALUE FROM RECORD
RIGHT-OF-WAY LINE
ABUTTERS LOT LINE
PROPERTY LINE
INTERNAL TRACT LINE
ZONING SUBDISTRICT LINE
CHAIN LINK FENCE
WOOD FENCE
METAL/WIRE FENCE
OVERHEAD WIRES
UNDERGROUND ELECTRIC
SEWER LINE
DRAIN LINE
COMBINED SEWER LINE
WATER LINE
GAS LINE





RECORD LEGAL DESCRIPTION

THE LAND IS DESCRIBED AS FOLLOWS: REAL PROPERTY IN THE CITY OF BOSTON, COUNTY OF SUFFOLK, COMMONWEALTH OF MASSACHUSETTS, DESCRIBED AS FOLLOWS:

TRACT I - 282 BREMEN STREET, EAST BOSTON (RECORDED LAND):

PARCEL 1: A CERTAIN PARCEL OF LAND WITH THE BUILDINGS THEREON, SITUATED IN THAT PART OF BOSTON CALLED EAST BOSTON AND BEING PART OF LOT #67 ON PLAN OF SECTION 5 BY R.H. EDDY & E. LINCOLN, ENGINEERS, DATED NOVEMBER 23, 1842 AND RECORDED IN SUFFOLK REGISTRY OF DEEDS AT THE END OF BOOK 492, BOUNDED AND DESCRIBED AS FOLLOWS:
BEGINNING AT A POINT ON BREMEN STREET, DISTANT SIXTY (60) FEET SOUTHWESTERLY FROM LOT #68 ON SAID PLAN; THENCE RUNNING
SOUTHWESTERLY ON SAID BREMEN STREET TWENTY (20) FEET; THENCE RUNNING
NORTHWESTERLY PARALLEL WITH BROOKS STREET EIGHTY (80) FEET, THENCE RUNNING
NORTHEASTERLY ON LOT #29 ON SAID PLAN TWENTY (20) FEET; AND THENCE RUNNING
SOUTHEASTERLY PARALLEL WITH SAID BROOKS STREET, EIGHTY (80) FEET TO THE POINT OF BEGINNING

PARCEL 2: A CERTAIN PARCEL OF LAND WITH THE BUILDINGS THEREON, SITUATED IN THAT PART OF SAID BOSTON CALLED EAST BOSTON, BOUNDED AND DESCRIBED AS FOLLOWS:
BEGINNING IN THE BOUNDARY LINE BETWEEN LOTS NUMBERED 66 AND 67, ON PLAN OF SEC. 5 EAST BOSTON, ON BREMEN STREET, THENCE RUNNING
NORTHEASTERLY ON SAID BREMEN STREET, 20 FEET, THENCE TURNING AT RIGHT ANGLES AND RUNNING
NORTHWESTERLY 80 FEET, THENCE TURNING AT RIGHT ANGLES AND RUNNING
SOUTHWESTERLY, 20 FEET TO SAID LOT NUMBERED 66, THENCE TURNING AT RIGHT ANGLES RUNNING
SOUTHEASTERLY ALONG SAID BOUNDARY LINE, 80 FEET, TO THE POINT OF BEGINNING ON BREMEN STREET.
SAID PREMISES COMPRISE THE SOUTHWESTERLY PORTION OF SAID LOT.

PARCEL 3: A CERTAIN PARCEL OF LAND WITH THE BUILDINGS THEREON SITUATED IN THAT PART OF BOSTON CALLED EAST BOSTON AND BOUNDED AND DESCRIBED AS FOLLOWS:
COMMENCING AT A POINT ON THE WESTERLY SIDE OF BREMEN STREET WHICH IS 50 FEET NORTHEASTERLY FROM THE CORNER OF BROOKS AND BREMEN STREETS, AND RUNNING
NORTHEASTERLY ON SAID BREMEN STREET, 50 FEET, THEN TURNING AND RUNNING
NORTHWESTERLY ON THE DIVISION LINE OF LOTS 66 AND 67 ON R.H. EDDY'S PLAN OF SECTION 5 EAST BOSTON, 80 FEET, THENCE TURNING AND RUNNING
SOUTHWESTERLY ON THE DIVISION LINE OF LOTS 66 & 28 ON SAID PLAN, 50 FEET; THENCE TURNING AND RUNNING
SOUTHEASTERLY 80 FEET TO THE POINT OF BEGINNING.
SAID PARCEL IS THE NORTHEASTERLY HALF OF LOT 66 ON SAID PLAN AND CONTAINS 4000 SQUARE FEET OF LAND.

TRACT II - 288-290 BREMEN STREET, EAST BOSTON (RECORDED LAND):

PARCEL 1: A CERTAIN PARCEL OF LAND WITH THE BUILDINGS THEREON, SITUATED IN THAT PART OF BOSTON CALLED EAST BOSTON AND BEING PART OF LOT 67 ON A PLAN OF SECTION 5 BY EDDY & LINCOLN, DATED NOVEMBER 23, 1842, RECORDED WITH THE SUFFOLK DEEDS AT THE END OF BOOK 492, BOUNDED AND DESCRIBED AS FOLLOWS:
BEGINNING AT A POINT IN THE NORTHWESTERLY LINE OF BREMEN STREET DISTANT FORTY FEET SOUTHWESTERLY FROM THE DIVISION LINE BETWEEN LOTS 67 & 68 ON A PLAN OF SECTION 5 AND THENCE RUNNING
SOUTHWESTERLY ON SAID BREMEN STREET, TWENTY FEET; THENCE RUNNING
NORTHWESTERLY PARALLEL WITH SAID DIVISION LINE EIGHTY FEET; THENCE RUNNING
NORTHEASTERLY PARALLEL WITH BREMEN STREET TWENTY FEET; THENCE RUNNING
SOUTHEASTERLY PARALLEL WITH SAID DIVISION LINE EIGHTY FEET TO THE POINT OF BEGINNING.

PARCEL 2: BEGINNING AT A POINT ON THE NORTHERLY LINE OF BREMEN STREET TWENTY (20) FEET
SOUTHWESTERLY FROM THE SOUTHERLY CORNER OF LOT 68 ON THE ABOVE-DESCRIBED PLAN AND THENCE RUNNING
SOUTHWESTERLY ALONG THE LINE OF SAID STREET TWENTY (20) FEET; THENCE TURNING AT RIGHT ANGLES AND RUNNING
NORTHWESTERLY ON A LINE PARALLEL WITH BROOKS STREET EIGHTY (80) FEET TO LOT 29 ON SAID PLAN; THENCE TURNING AND RUNNING
NORTHEASTERLY BY SAID LOT 29 TWENTY (20) FEET; THENCE TURNING AT RIGHT ANGLES AND RUNNING
SOUTHEASTERLY ON A LINE PARALLEL WITH BROOKS STREET EIGHTY (80) FEET TO THE POINT OF BEGINNING.

TRACT III - 292 BREMEN STREET, EAST BOSTON (RECORDED LAND):

A CERTAIN PARCEL OF LAND ON THE NORTHWESTERLY SIDE OF BREMEN STREET, FORMERLY NUMBERED TWO HUNDRED NINETY-TWO (292) IN THE NUMBERING OF SAID BREMEN STREET, BETWEEN AN ESTATE NOW OR FORMERLY OF EMMANUEL CARCO AND ANOTHER (NUMBERED 294 BREMEN STREET) AND AN ESTATE NOW OR FORMERLY OF CARMELA ANZALONE (NUMBERED 290 BREMEN STREET) AND SUPPOSED TO CONTAIN ABOUT SIXTEEN HUNDRED (1600) SQUARE FEET.
SAID LAND IS SITUATED IN BLOCK 5 SECTION 5 IN THE EAST BOSTON DISTRICT SHOWN ON THE BOSTON ASSESSORS' PLANS OF SAID CITY, FILED IN THE OFFICE OF THE BOARD OF ASSESSORS.

TRACT IV - 294 BREMEN STREET, EAST BOSTON (RECORDED LAND):

A CERTAIN PARCEL OF LAND WITH THE BUILDINGS THEREON SITUATED IN THAT PART OF BOSTON CALLED EAST BOSTON AND BEING PART OF LOT 68 ON A PLAN OF SECTION 5, EAST BOSTON, BOUNDED AND DESCRIBED AS FOLLOWS:
SOUTHWESTERLY ON LOT 67 ON SAID PLAN, EIGHTY (80) FEET;
NORTHWESTERLY ON LOT 30 ON SAID PLAN, FIFTY (50) FEET;
NORTHEASTERLY ON THE REMAINING PART OF LOT 68, EIGHTY (80) FEET;
SOUTHEASTERLY ON BREMEN STREET, FIFTY (50) FEET.

TRACT V - 296, 298 AND 300 BREMEN STREET, EAST BOSTON (RECORDED LAND):

A CERTAIN PARCEL OF LAND SITUATED IN THAT PART OF BOSTON CALLED EAST BOSTON IN THE COUNTY OF SUFFOLK AND
COMMONWEALTH OF MASSACHUSETTS, BOUNDED AND DESCRIBED AS FOLLOWS:
THE LAND, WITH THE BUILDINGS THEREON, ON THE NORTHWESTERLY SIDE OF BREMEN STREET, NUMBERED TWO HUNDRED NINETY-SIX (296), TWO HUNDRED NINETY-EIGHT (298), AND THREE HUNDRED (300) IN THE NUMBERING OF SAID BREMEN STREET, BETWEEN ANOTHER ESTATE NOW OR FORMERLY OF SAID FINE AND AN ESTATE NOW OR FORMERLY OF EMANUEL CARCO AND ANOTHER (NUMBERED 294) AND SUPPOSED TO CONTAIN ABOUT FOUR THOUSAND (4000) SQUARE FEET.
SAID LAND IS SITUATED IN BLOCK 5 SEC. 5, IN THE EAST BOSTON DISTRICT SHOWN ON THE BOSTON ASSESSORS' PLANS OF SAID CITY, FILED IN THE OFFICE OF THE BOARD OF ASSESSORS.

TRACT VI - 308 BREMEN STREET, EAST BOSTON (RECORDED LAND):

A CERTAIN PARCEL OF LAND, WITH THE BUILDINGS THEREON, SITUATED IN THAT PART OF BOSTON, COUNTY OF SUFFOLK,
COMMONWEALTH OF MASSACHUSETTS, CALLED EAST BOSTON AND BOUNDED AS FOLLOWS:
SOUTHEASTERLY ON BREMEN STREET, 27 FEET;
SOUTHWESTERLY ON LOT 69, ON PLAN HEREINAFTER REFERRED TO, 80 FEET;
NORTHWESTERLY ON LOT 32, ON SAID PLAN, 27 FEET; AND
NORTHEASTERLY ON THE REMAINING PART OF LOT 70, ON SAID PLAN, 80 FEET.
SAID PREMISES IS KNOWN AND NUMBERED 308 BREMEN STREET, IN SAID EAST BOSTON, AND IS SHOWN AS PART OF LOT 70, ON SECTION 5 OF R.H. EDDY'S PLAN, DATED NOVEMBER 23, 1842, AND RECORDED WITH SUFFOLK REGISTRY OF DEEDS IN BOOK 492, AT THE END.

TRACT VII - 2 BROOKS STREET, EAST BOSTON (REGISTERED LAND):

A CERTAIN PARCEL OF LAND WITH THE BUILDINGS THEREON, NOW KNOWN AND NUMBERED AS 2 BROOKS STREET, SITUATED IN THAT PART OF BOSTON CALLED EAST BOSTON IN THE COUNTY OF SUFFOLK AND COMMONWEALTH OF MASSACHUSETTS, BOUNDED AND DESCRIBED AS FOLLOWS:
SOUTHEASTERLY BY BREMEN STREET, FIFTY (50) FEET;
SOUTHWESTERLY BY BROOKS STREET, EIGHTY (80) FEET;
NORTHWESTERLY BY LANDS NOW OR FORMERLY OF WILLIAM M. MCCARTHY, TRUSTEE, AND OF ALESSANDRO LAPUSATO, FIFTY (50) FEET, AND
NORTHEASTERLY BY LAND NOW OR FORMERLY OF ETTA GOLDBERG, EIGHTY (80) FEET.
ALL OF SAID BOUNDARIES ARE DETERMINED BY THE COURT TO BE LOCATED AS SHOWN ON A PLAN DRAWN BY JOSEPH F. PAGLIARULO, CIVIL ENGINEER, DATED JUNE 14, 1928 AS MODIFIED AND APPROVED BY THE COURT, FILED IN THE LAND REGISTRATION OFFICE AS PLAN NO. 12945-A, A COPY OF A PORTION OF WHICH IS FILED WITH CERTIFICATE OF TITLE NO. 24536.

TRACT VIII - 302-304 BREMEN STREET, EAST BOSTON (REGISTERED LAND):

A CERTAIN PARCEL OF VACANT LAND, KNOWN AND NUMBERED AS 302 AND 304 BREMEN STREET, IN THAT PART OF BOSTON CALLED EAST BOSTON, IN THE COUNTY OF SUFFOLK AND COMMONWEALTH OF MASSACHUSETTS, SITUATED ON BREMEN STREET. SAID LAND IS SHOWN AS LOT B ON A SUBDIVISION PLAN NO. 1125-B DRAWN BY C.B. HUMPHREY, SURVEYOR FOR THE LAND COURT, DATED FEBRUARY 12, 1913, FILED WITH CERTIFICATE OF TITLE NO. 5052.

TRACT IX - 306 BREMEN STREET, EAST BOSTON (REGISTERED LAND):

A CERTAIN PARCEL OF VACANT LAND, KNOWN AND NUMBERED AS 306 BREMEN STREET, IN THAT PART OF BOSTON CALLED EAST BOSTON, IN THE COUNTY OF SUFFOLK AND COMMONWEALTH OF MASSACHUSETTS, SITUATED ON BREMEN STREET. SAID LAND IS SHOWN AS LOT A ON A SUBDIVISION PLAN NO. 1125-B DRAWN BY C.B. HUMPHREY, SURVEYOR FOR THE LAND COURT, DATED FEBRUARY 12, 1913, FILED WITH CERTIFICATE OF TITLE NO. 5052.

NOTES

1. THIS PLAN WAS PREPARED FROM AN ACTUAL ON THE GROUND FIELD SURVEY CONDUCTED BY WSP USA INC. ON OCTOBER 1 AND 2, 2018.
2. THE HORIZONTAL DATUM SHOWN HEREON REFERS TO MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NAD83 AND IS BASED ON GPS OBSERVATIONS MADE BY WSP USA INC. ON OCTOBER 2, 2018.
3. ZONING CLASSIFICATION

EAST BOSTON NEIGHBORHOOD DISTRICT AND "3F-2000" SUBDISTRICT (THREE-FAMILY RESIDENTIAL SUBDISTRICT) PER "MAP 3A/3B EAST BOSTON NEIGHBORHOOD DISTRICT", ADOPTED JANUARY 19, 1993, EFFECTIVE SEPTEMBER 8, 2017, AS AMENDED.

DIMENSIONAL REQUIREMENTS:
(PER ARTICLE 53, TABLE F OF BOSTON ZONING CODE, UPDATE DATED JULY 17, 2018)

MINIMUM LOT AREA	1,000 S.F. FOR 1 UNIT
ADDITIONAL LOT AREA FOR EA. ADDITIONAL DWELLING UNIT	1,000 S.F.
MINIMUM LOT WIDTH	20'
MINIMUM FRONTAGE	20'
MAXIMUM FLOOR AREA RATIO	1.0
MAXIMUM BUILDING HEIGHT	35' (3 STORIES)
MINIMUM USABLE OPEN SPACE	300 S.F. PER UNIT
MINIMUM FRONT YARD	5'
MINIMUM SIDE YARD	2.5'
MINIMUM REAR YARD	40'
MAXIMUM REAR YARD OCCUPANCY BY ACCESSORY BUILDINGS	25%

4. FLOOD ZONE CLASSIFICATION

ZONE AE (EL.10) (AREA OF 1% ANNUAL CHANCE FLOOD WITH BASE FLOOD ELEVATIONS DETERMINED) AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAPS FOR THE CITY OF BOSTON, PANEL 19 OF 176, NUMBER 25025C0019J, COMMUNITY NUMBER 250286-0019-J, REVISED MARCH 16, 2016 AND PANEL 18 OF 176, NUMBER 25025C0018J, COMMUNITY NUMBER 250286-0018-J, REVISED MARCH 16, 2016.

5. THERE ARE NO DELINEATED PARKING SPACES ON THE PROPERTY.
6. THE SUBJECT PROPERTY IS CONTIGUOUS TO AND HAS ACCESS TO BREMEN STREET AND BROOKS STREET. DISTANCE TO NEAREST INTERSECTING STREET: 0 FT (PROPERTY ABUTS INTERSECTION OF BREMEN STREET AND BROOKS STREET)
7. THE SUBJECT PROPERTY IS SHOWN ON CITY OF BOSTON ASSESSORS MAP AS ASSESSOR PARCEL IDs 0106886000, 0106885000, 0106884000, 0106883000, 0106882000, 0106881010, 0106880010, 0106879010 AND 0106878000
8. A PORTION OF SIDEWALK ADJOINING THE SOUTHEASTERN SIDE OF THE PROPERTY ON BREMEN STREET IS UNDER CONSTRUCTION. NO OTHER EVIDENCE OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS AND NO EVIDENCE OF SITE USE AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL WERE OBSERVED WHEN CONDUCTING THE SURVEY.
9. THE PHYSICAL INSPECTION OF THE PROPERTY REVEALED NO WATERCOURSES OR WETLANDS ON THE PROPERTY.
10. THIS PLAN WAS PREPARED AS PART OF WSP USA INC. PROJECT NO. 190163C UNDER THE SUPERVISION OF:
F. LAWTON STRUBLE, III, PLS
WSP USA INC.
1300 SOLDIERS FIELD ROAD, BRIGHTON, MA 02135
TEL. 617-779-8200
E-MAIL: F.LAWTON.STRUBLE@WSP.COM
11. ALL OF THE TRACTS AND PARCELS DESCRIBED IN THE COMMITMENT, TAKEN AS A TRACT, COMPRISE ONE CONTIGUOUS PARCEL OF LAND WITH NO GAPS, STRIPS OR GORES.
12. THE PROPERTY AS SHOWN ON THE SURVEY IS SAME AS THE PROPERTY DESCRIBED IN THE TITLE COMMITMENT.

LOCUS OWNER

BREMEN STREET, LLC
282-308 BREMEN STREET AND 2 BROOKS STREET
EAST BOSTON, MA
DEED BOOK 60133 PAGE 34
DEED BOOK 60133 PAGE 39
LAND COURT DOCUMENT 886835

TAX ASSESSORS PID:
0106886000, 0106885000, 0106884000, 0106883000, 0106882000, 0106881010, 0106880010, 0106879010, 0106878000

PLAN REFERENCES

SUFFOLK COUNTY REGISTRY OF DEEDS:
1. PLAN IN DEED BOOK 492 PAGE END
2. PLAN IN DEED BOOK 2014 PAGE 265

MASSACHUSETTS LAND COURT:
3. PLAN LCC 1125B
4. PLAN LCC 12945A

AREAS OF POSSIBLE ENCROACHMENT:

(REFER TO THE ENCROACHMENT NUMBER ON THE PLAN: 1)

1. OVERHEAD WIRE CROSSES THE SOUTHEASTERLY BOUNDARY OF TRACT VII ONTO BREMEN STREET.
2. OVERHEAD WIRE FROM THE WESTERLY CORNER OF BUILDING CROSSES THE NORTHWESTERLY BOUNDARY OF TRACT IV, AND OVERHEAD WIRE FROM THE EASTERLY CORNER OF BUILDING CROSSES THE WESTERLY BOUNDARY OF TRACT V, TO CONNECT WITH THE OVERHEAD WIRE ON THE ABUTTING PROPERTIES.
3. BUILDING CORNER EXTENDS 0.5' OVER THE SOUTHEASTERLY BOUNDARY OF TRACT IX INTO BREMEN STREET.
4. CHAIN LINK FENCE POST AT ANGLE POINT ENCROACHES 0.1' INTO BREMEN STREET RIGHT-OF-WAY.
5. CHAIN LINK FENCE ALONG BROOKS STREET ENCROACHES 0.2' INTO BROOKS STREET RIGHT-OF-WAY.
6. OVERHEAD UTILITY WIRES ALONG NORTHERLY PROPERTY LINE SERVICE 294 BREMEN STREET PROPERTY AND ABUTTING PROPERTIES ALONG CHELSEA STREET.
7. OVERHEAD WIRE FROM THE CORNER OF BUILDING CROSSES THE SOUTHEASTERLY BOUNDARY OF TRACT IV ONTO BREMEN STREET.

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

SURVEYOR'S CERTIFICATION

TO: TRANSOM REAL ESTATE, LLC; BREMEN ACQUISITION, LLC; FIRST AMERICAN TITLE INSURANCE COMPANY; SHERIN AND LODGEN, LLP.

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2-4, 6(a), 7(a), 7(b)(1), 8, 9, 11, 13, 14, 16, 17 AND 19 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 2, 2018.

F. LAWTON STRUBLE, PLS
REG. NO. 47665
WSP USA INC.

11/7/18
DATE:

REVISION DATE	DESCRIPTION
11/07/18	ADDED ADDITIONAL OVERHEAD WIRE ENCROACHMENTS

ALTA/NSPS LAND TITLE SURVEY
282-308 BREMEN STREET
2 BROOKS STREET
BOSTON, MASSACHUSETTS
PREPARED FOR
TRANSOM REAL ESTATE, LLC

WSP USA Inc.
1300 Soldiers Field Road
Brighton, MA 02135
617.779.8200

Drawn By	MB/HT	Date	Job No.
Surveyed By	BG	OCTOBER 4, 2018	190163C
Checked By	FLS	Scale	Sheet No.
Book No.	AB-24	1" = 20'	1 OF 1

190163C-1.dwg

The Site circulation plan is designed to create a safe and pleasant entry to the Proposed Project from Bremen Street with a front door vehicle drop off from Bremen Street. The 1st floor garage will be accessed from Bremen Street. Service vehicle access will be provided from Brooks Street.

1.4 Summary of Project Impacts and Mitigation

1.4.1 Urban Design / Landscape Design Principles and Materials

Urban Design

Located on an edge condition, between sprawling greenspace and a dense, urban fabric, 282-308 Bremen Street poses unique urban design opportunities. The site is currently comprised of three structures, two of which are non-conforming automobile related uses, one small 4-unit residential rental building, and significant areas of mixed asphalt and earth. Surrounding the parcels are over 135 feet of curb-cuts, almost all of which will be removed to provide for additional street parking. The Bremen Street Community Park, to the east of the site, runs almost the entire length of Bremen Street and contains a variety of programmed and open greenspace. The neighborhood lying to the west, is made up of a majority of three family residences interspersed with a variety of building types including single family homes, multi-family residences and commercial space. The architecture of the proposed project weaves the two opposing conditions together by responding to its adjacent context.

The scale of the building is horizontally broken down based on a familiar East Boston residential width, each piece is then pushed and pulled giving the pedestrian relief along Bremen and Brooks and the adjacent buildings relief to the west and north.

An additional major urban element of the project is the activation of the ground floor along Bremen Street. The Bremen and Brooks Streets' intersection will be anchored with a small commercial space, ideal for a café, providing a much-needed public amenity for the surrounding neighborhood. Further, along Bremen Street, three live/work units have been designed to feature artisan work space on the ground floor with lofted living space above. The remaining Bremen Street frontage is programmed with various building elements: lobby, leasing, amenity spaces, and a small entry for the parking garage. With the building and public program utilizing the majority of the street facing ground floor, a single-story parking garage is located in the rear of the ground floor of the building. Loading is located along Brooks Street thereby limiting further activity.

Architecturally, the edge condition of the site is also enhanced by varying roof treatments. The park side of the project integrates a series of pitched roofs. By employing a familiar residential roof typology in an unfamiliar environment, the Bremen Street side of the project attempts to provide a strong edge to the park. The roofs along the opposite side of the building, facing the rear yards of adjacent properties, mirrors the flat roofs typically seen in East Boston.

The building will be built utilizing vertical plank material with a natural texture and color, referencing the verticality of the building design and offsets. The design team is looking into wood plank cladding materials and other plank options which provide a natural texture and color – grounding the built form and connecting it to the natural landscape and materials in the park across the street, as more fully described below. This cladding will be further complemented by bent metal window frames and spandrel panel.

Landscape Design

The landscape design integrates the project into the existing context through strong physical and visual connections to activate the streetscape. A strong pedestrian connection to the Bremen Street Community Park will play a vital role in the activation of Bremen Street. Clearly designated crosswalks will serve as a direct connection between the park and project site. The project will implement street trees in the same manner as the street trees along the park to create a beautiful treelined street and a cohesive streetscape experience between the park and project site. In addition, landscaping at rear of the site will provide a buffer.

1.4.2 Sustainable Design

To meet the City of Boston Requirements the project is demonstrating the compliance with the LEED BD&C v4 criteria. The project is currently tracking 53 points in the YES column with 15 in the study column, and intend to meet certification as presented in **Figure 3-15** in **Section 3.0.** Further study over the coming weeks and months will determine final credit achievement. We have outlined in the narrative below, how the project intends to achieve the prerequisites and credits for the LEED BD&C v4 certification.

1.4.3 Pedestrian Level Wind Conditions

The overall wind environment is not expected to change as a result of the Proposed Project. It is also expected that the Bremen Street Park's wind environment during the winter condition, with predominate north and northeast winds, will improve. The new structure should provide a buffer to those winds and expected to serve as mitigation for those walking in the Park during the winter months.

1.4.4 Shadow Impact Analysis

Section 4-1 of the PNF provides a shadow analysis describing and graphically depicting the anticipated shadow impacts from the Proposed Project for the No Build and Build condition. New shadows created by the project are limited in their impacts to surrounding buildings and to the nearby park.

1.4.5 Daylight Analysis

Daylight Analysis - Existing / No-Build Conditions

Under the Existing/No-Build Condition, the Project Site contains a mix of multi-family residential and commercial buildings up to three stories in height. As a result of the relatively low height and density of these structures, only three to four percent of daylight is obstructed when viewed from the adjacent public ways.

Daylight Analysis - Build Conditions

Under the Build Condition, there will be some increase in obstruction of the skydome along Bremen and Brooks Street.

See **Section 4.2** for a more complete discussion of the daylight analysis.

1.4.6 Solar Glare

It is not expected that the Proposed Project will include the use of reflective glass or other reflective materials on the building facades that would result in adverse impacts from reflected solar glare.

1.4.7 Air Quality Analysis

Tech Environmental, Inc., the Project's air quality consultant, conducted analyses to evaluate the existing air quality in the Project area, predict the worst-case air quality impacts from the Project, and evaluate the potential impacts of Project-generated traffic on the air quality at the most congested local intersections (See **Section 4.3**).

Recent representative air quality measurements from the Massachusetts Department of Environmental Protection (DEP) monitors reveal that the existing air quality in the Project area is in compliance with Massachusetts and National Ambient Air Quality Standards (NAAQS) for all of the criteria air pollutants.

The Project will not create an adverse impact on air quality. The maximum one-hour and eight-hour ambient CO impacts from the parking garage at all locations around the Project site, including background CO concentrations, are predicted to be safely in compliance with the NAAQS for CO.

1.4.8 Noise Analysis

Tech Environmental, Inc., the Project's noise consultant, conducted a noise study to determine whether the operation of the proposed Project will comply with the Massachusetts DEP Noise Policy and City of Boston Noise Regulations, and the Housing Urban Development (HUD) noise guideline (See **Section 4.4**).

This acoustical analysis involved five steps: (1) establishment of pre-construction ambient sound levels in the vicinity of the Site; (2) identification of potential major noise sources; (3) development of noise source terms based on manufacturer specifications (where available) and similar project designs; (4) conservative predictions of maximum sound level impacts at sensitive locations using industry standard acoustic methodology; and (5) determination of compliance with applicable City of Boston noise regulations, ordinances and guidelines and with the DEP Noise Policy.

Nighttime ambient baseline sound level (L_{90}) monitoring was conducted at four locations deemed to be representative of the nearby residential areas, during the time period when human activity is at a minimum and any future noise would be most noticeable. The lowest nighttime L_{90} measured in the Project area was 41.6 dBA.

The Proposed Project will not create a noise nuisance condition and will fully comply with the most stringent sound level limits set by the Massachusetts DEP Noise Policy, City of Boston Noise Regulations and the HUD Noise Guideline.

1.4.9 Stormwater Management and Water Quality

The Proposed Project is expected to substantially improve the water quality and will meet the MassDEP and Boston Water and Sewer Commission (BWSC) Site Plan requirements. (See **Section 4.5** for a more complete analysis). The Project will improve the quality and reduce the quantity of stormwater runoff being discharged to the City's storm drain system through the installation of an on-site infiltration system. The Project site is not within the Boston Groundwater Conservation Overlay District. It is anticipated that the equivalent of 1.25-inch of rainfall over the sites' impervious areas will be stored and recharged to the groundwater.

In addition to the installation of on-site infiltration systems, stormwater runoff will be treated for reduction of total suspended solids, and oil & water separation. A stormwater operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management systems.

1.4.10 Solid and Hazardous Waste

Solid Waste

During the preparation of the Site, debris, including asphalt, trash, and demolition debris will be removed. The Proponent will ensure that waste removal and disposal during construction and operation will be in conformance with the City and DEP's Regulations for Solid Waste.

In order to meet the requirements for the Boston Environmental Department and the LEED™ rating system, the Project will include space dedicated to the storage and collection of recyclables, including dedicated dumpsters at the loading area. The recycling program will meet or exceed the City's guidelines, and provide areas for waste paper and newspaper, metal, glass, and plastics (21 through 27, co-mingled).

Hazardous Waste

Based on the Phase I Environmental Site Assessment (ESA) completed by Boston Environmental Corporation on October 30, 2018, there is no evidence of any recognized environmental conditions (RECs), historical recognized environmental conditions (HRECs) or controlled recognized environmental conditions (CRECs) in association with the Site.

1.4.11 Geotechnical/Groundwater Impacts Analysis

Northeast Geotechnical, Inc., the Project's geotechnical engineer, completed a preliminary geotechnical analysis of the Site. Northeast's preliminary opinion is that existing fill materials and buried organic soils are not suitable to support a new building structure at the site, with a suitable option suggested instead including constructing a rammed aggregate piers and replacement of suitable structural fill material. The installation of rammed aggregate piers would typically allow for conventional shallow spread footings and slab on grade construction. As an alternative, it is also suggested to support conventional spread footings and a slab on grade with rigid inclusions. Off-site structural fill will likely be required for backfilling because of the need to replace existing fill materials.

In addition, groundwater was encountered in both of the borings in the fill deposits at depths of approximately 3+/- feet to 5+/- feet below the existing ground surface.

Please see **Section 4.7** for a more complete discussion of the geotechnical consultant's preliminary findings and recommendations.

1.4.12 Construction Impacts Analysis

Section 4.8 provides more details of the impacts likely to result from the Proposed Project's construction and the steps that will be taken to avoid or minimize environmental and transportation-related impacts. The Proponent will employ a construction manager that will be responsible for developing a construction phasing and staging plan and for coordinating construction activities with all appropriate regulatory agencies. The Project's geotechnical consultant will provide more detailed consulting services associated with foundation design recommendations, prepare geotechnical specifications, and review the construction contractor's proposed procedures.

Construction is expected to commence in the 2nd quarter 2020 and will require approximately 20-months to complete.

The Proponent will comply with applicable state and local regulations governing construction of the Project. The Proponent will require that the general contractor comply with the Construction Management Plan ("CMP") developed in consultation with and approved by the Boston Transportation Department ("BTD"), prior to the commencement of construction. The construction manager will be bound by the CMP, which will establish the guidelines for the duration of the

Project and will include specific mitigation measures and staging plans to minimize impacts on abutters.

Most construction activities will be accommodated within the current site boundaries. Details of the overall construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and routes will be addressed in detail in a Construction Management Plan to be filed with BTD in accordance with the City's transportation maintenance plan requirements. To minimize transportation impacts during the construction period, there will be limited construction worker parking on-site, carpooling will be encouraged, and secure on-site spaces will be provided for workers' supplies and tools so they do not have to be brought to the site each day. The Construction Management Plan to be executed with the City prior to commencement of construction will document all committed measures.

1.4.13 Wetlands/Flood Hazard Zone

The existing Project Site is a part of a wetland resource area regulated by the Massachusetts Wetland Protection Act, as described below, and may require review by the Boston Conservation Commission. According to the USGS topographic quadrangle, the Site is approximately 5 to 8 feet above mean sea level. The nearest surface waters to the Site are Chelsea Creek, located approximately 0.5 miles north, and Boston Harbor, located approximately 0.5 miles west, 0.8 miles south, and 0.7 miles east.

Based on the FEMA Flood Insurance Rate Maps (FIRM) for Suffolk County (Panel No. 250286 and 25025C0081J, eff. 03/16/16), the Project site is located in an AE 100-year base flood zone (i.e. a flood has a 1% annual chance of occurring in any given year). The base flood elevation indicated on the FEMA FIRM for this AE zone is 10 feet.

1.4.14 Historic Resources Component

According to files at the Massachusetts Historical Commission, there are no structures listed in the National or State Register of Historic Places, or the Inventory of Historical and Archaeological Assets of the Commonwealth on-site. It is not expected that the Project will cause adverse impacts on the historic or architectural elements of nearby historic resources outside the Project Site. (Please see **Section 5.0** for a description of historic resources within ¼ mile of the Site.)

1.4.15 Infrastructure Systems Component

An infrastructure system's analysis (**Section 6.0**) was completed by Sherwood Consulting & Design, the Project's Civil Engineer. The existing infrastructure surrounding the site appears sufficient to service the needs of the Proposed Project. This section describes the existing sewer, water, and drainage systems surrounding the site and explains how these systems will service the development. The analysis also discusses any anticipated Project-related impacts to the utilities and identifies mitigation measures to address these potential impacts.

1.4.16 Transportation Component

Section 7.0 presents the comprehensive transportation study completed by Howard Stein Hudson for the proposed Project in conformance with the BTD Transportation Access Plan Guidelines. The study analyzes existing conditions within the Project study area, as well as conditions forecast to be in place under the seven-year planning horizon of 2026.

The Project is situated to take advantage of the numerous public transportation opportunities in the area including Airport Station, which is approximately 420 feet away, and serves the MBTA's Blue Line subway and No. 3 Silver Line bus route. It is expected that due to the availability of public transportation and the walkability of the surrounding neighborhood and residents living in the development will rely heavily on alternative non-vehicular modes of transportation to access the site. The existing use of the site includes auto body and auto repair shops and a small 4-unit residential apartment building.

Vehicular access to the Project site will be provided by a new curb cut along Bremen Street. The other existing curb-cuts along Bremen Street will be closed as part of the Project, creating approximately 135 feet of additional on-street parking. The curb cut along Bremen Street will provide access to a parking garage with capacity of up to 68-vehicles using stackers. Based on the nature of the location of the Project, including its proximity to nearby transit opportunities, bike share outlets, and the walkability of the surrounding neighborhood, it is expected that the parking supply will accommodate the overall parking demand for the Project. The Project will also provide secure and covered storage for approximately 165-bicycles. Loading and service will be from Brooks Street and trash/recycling activity will occur on-site. Move-in/move-out activity is expected to be light and dispersed throughout the year.

The Project Proponent plans to provide an innovative building-managed private car share service for residents, further enhancing the transportation offerings of this transit-oriented development and further reducing the need for cars.

Primary pedestrian access to the site will be provided along Bremen Street. The Proponent is committed to upgrading all abutting sidewalks

The Proponent is committed to implementing a transportation demand management ("TDM") program that supports the City's efforts to reduce dependency on the automobile by encouraging alternatives to driving alone, especially during the peak travel periods. Proposed measures include but are not limited to designating an on-site transportation coordinator, secure covered bicycle parking, promotion of travel alternatives, and vehicle and bike-sharing incentive programs for residents as well as an innovative building-managed private car share service for residents.

The transportation analysis employed mode use data for the area surrounding the Project site based on the 2010 U.S. Census data and BTD data for the surrounding neighborhoods and identifies the number of trips expected to be generated by the Project by mode (walk, bicycle, transit, and vehicle). Due to the transit-oriented nature of the Project and non-automobile ownership alternatives such as BLUEbike, it is anticipated that many of the Project-generated trips will occur via transit, on foot, and by bicycle.

1.4.17 Response to Climate Change Questionnaire

Please see **Appendix E** for the Proponent's Response to the City of Boston's Climate Change Questionnaire.

1.4.18 Response to City of Boston Access Guidelines

Please see **Appendix F** for the Proponent's Response to the City of Boston's Access Guidelines.

1.4.19 Response to BPDA Broadband Questionnaire

Please see **Appendix G** for the Proponent's Response to the BPDA Broadband Questionnaire.

1.4.20 Response to Boston Smart Utilities Checklist

The proposed project is required to file information under "Green Infrastructure" for projects greater than 100,000 SF. Information is provided in **Appendix H** "Proponent's Response to the Boston Smart Utilities Checklist", and includes a graphic figure that shows the extent of pervious and impervious areas based on the architect's conceptual design plans contained in the PNF. Please also note that cross-sections and profiles for all utility infrastructure in the proposed development area will be developed in the design development phase.

With regard to "Adoption of signal technology", based on expected low vehicle project traffic impact, we are not at this time expecting that new traffic signals will be stipulated as mitigation in the Transportation Access Plan Agreement (TAPA) by BTD. If so, the Proponent will detail its response to BTD in the TAPA.

With regard to "Smart Street Lights", the Project has as yet to retain a MEP to outline specifics requested by the guidelines.

2.0 GENERAL INFORMATION

2.1 Applicant Information

2.1.1 Project Proponent

The Proponent is 282 Bremen Development, LLC.

2.1.2 Project Team

Project Name	282-308 Bremen Street, East Boston
Proponent/ Property Developer	**282 Bremen Development, LLC** c/o Transom Real Estate, LLC 527 Albany Street, Suite 100 Boston, MA 02118 Tel: 617-307-6533 Peter Spellios pspellios@transomrealestate.com Bryan Lee Blee@transomrealestate.com Neal Howard nhoward@transomrealestate.com
Article 80 Permitting Consultant	**Mitchell L. Fischman Consulting ("MLF Consulting") LLC** 41 Brush Hill Road Newton, MA 02461 Mitchell Fischman, Principal mitchfischman@gmail.com Tel: 781-760-1726
Legal Counsel	**McDermott Quilty & Miller LLP** 28 State Street, Suite 802 Boston, MA 02109 Joseph Hanley, Esq. - Partner jhanley@mqmllp.com Tel: 617-946-4600, Ext. 4438 Nicholas Zozula, Esq. nzozula@mqmllp.com Tel: 617-946-4600, Ext. 4440

Public/Neighborhood Outreach	**Waterville Consulting** 30 Rowes Wharf, Suite 600 Boston, MA 02110 Kate Kelly, Vice-President kkelly@watervilleconsulting.com Tel: 508-479-7884
Architect	**RODE ARCHITECTS Inc.** 535 Albany Street #405 Boston, MA 02118 Rodearchitects.com Tel: 617-422-0090 Eric Robinson eric@rodearchitects.com Ruthie Kuhlman ruthie@rodearchitects.com Zack Kutchin zack@rodearchitects.com
Landscape Architect	**OJB Landscape Architecture** 150 Stanford Street, Suite #5 Boston, MA 02114 Drew Stangel dstangel@ojb.com Andrew Cridlin acridlin@ojb.com
Transportation Planner / Engineer	**Howard Stein Hudson** 11 Beacon Street, Suite 1010 Boston, MA 02108 Tel: 617-482-7080 Thomas Tinlin ttinlin@hshassoc.com Brian Beisel, P.E. bbeisel@hshassoc.com Andrew Fabiszewski afabiszewski@hshassoc.com

Civil Engineer/ Infrastructure	**Sherwood Consulting & Design, LLC** 26 Smith Place, Suite 2 Cambridge, MA 02138 Tel: 617-680-9250 Arthur A. Spruch, PE aspruch@sherwoodcd.com
Sustainability Consultant	**Soden Sustainability Consulting** 19 Richardson Street Winchester, MA 01890 Tel: 617-372-7857 Colleen Ryan Soden, LEED AP BD+C colleen@sodensustainability.com
Noise and Air Consultant	**Tech Environmental, Inc.** Hobbs Brook Office Park 303 Wyman Street, Suite 295 Waltham, MA 02451 Marc C. Wallace mwallace@techenv.com Tel: 781-890-2220 x30
Geotechnical	**Northeast Geotechnical, Inc.** 166 Raymond Hall Drive North Attleboro, MA 02760 Tel: 508-588-3510 Antony E. Sousa, EIT James M. Handanyan, P.E.
Environmental / 21E	**Boston Environmental Corporation** 338 Howard Street Brockton, MA 02302 Tel: 508-427-6529 www.Bostonenvcorp.com Andrew Eckhardt, L.S.P.
Surveyor	**WSP USA, INC** 1300 Soldiers Field Road Brighton, MA 02135 Tel: 617-779-8200

Construction Commencement	2nd Quarter 2020
Construction Completion	1st Quarter 2022
Status of Project Design	Schematic

2.1.3 Legal Information

Legal Judgments or Actions Pending Concerning the Proposed Project:

None.

History of Tax Arrears on Property Owned in Boston by the Applicant:

There is no current or past history of tax arrears on property owned by the Applicant.

Nature and Extent of Any and All Public Easements:

The Site is bounded by utility easements for sewer, electric, telephone and gas. Additionally, there are utilities that cross the Site.

2.1.4 Public Benefits

The Proposed Project will provide substantial public benefits to the City of Boston and the East Boston neighborhood. The Proposed Project provides for:

- Creating 165 new multifamily housing units, including 21 affordable units in accordance with the City's Inclusionary Development Policy (IDP);
- Providing 2,000 gross square feet of space for three work/live units on the ground floor to help activate the street and provide artist live/work lofts;
- Adding approximately 2,000 gross square feet of new street level retail space along Bremen Street and Brooks Street;
- Introducing new neighborhood residents who will provide support to the local community and utilize local businesses and a project scope and scale that is intended to further the residential policy goals of Boston Mayor Martin J. Walsh's 2030 Housing Plan;

- Encouraging the use of alternative modes of transportation, such as mass transit, ride sharing services, and bicycle use due to the Site's close proximity to the MBTA Blue Line Airport Station and the Bremen Street Community Park;
- Activating an underutilized site at the crossroads of numerous modes of public transit with ready access to Logan Airport and the state highway system;
- Improving the safety and visual appearance of the site and immediate area by removing large curb cuts along both Bremen Street and Brooks Street and reintroducing approximately 135 feet of new on-street parking spaces along the same;
- Improving environmental conditions at the site, which is the longtime site of auto-body repair sites surround by unimproved parking lots with no open or pervious space;
- Exploring the planting of new street trees, widened sidewalks, and other streetscape amenities to improve and enhance the pedestrian landscape and experience;
- Establishing a premier example of sustainable construction and development;
- Temporarily creating many new jobs in the construction and building trade industries; and
- Substantially adding to real property taxes for the City of Boston.

2.2 Regulatory Controls and Permits

2.2.1 Zoning Overview

The Project Site is located within a 3F-2000 (Three-Family Residential) sub-district of the East Boston Neighborhood District, and is therefore subject to Article 53 of the Zoning Code. The Site is also located within the East Boston Interim Planning Overlay District and is subject to Article 27T of the Zoning Code. Additionally, the Site is subject to City Ordinance 7.4-11 and the Proposed Project requires Parks Design Review by the Boston Parks and Recreation Department due to the Site's proximity to the Bremen Street Community Park across Bremen Street. Certain dimensional characteristics of the Proposed Project will require relief from the terms of the Zoning Code.

It should also be noted that the BPDA, City officials and neighborhood participants are in the process of updating the zoning for East Boston with the PLAN: East Boston community driven, neighborhood-wide planning initiative. The Proposed Project has been thoughtfully designed to take into consideration potential anticipated new building height and massing limitations on Bremen Street.

While the garage has been redesigned to accommodate 68 off-street garage spaces using stackers in response to community feedback, the final amount of off-street parking and loading will be reviewed and determined by the BPDA pursuant to the provisions of the Article 80 Large Project review process.

2.2.2 Boston Zoning Code – Use Requirements

The Proposed Project will include residential space and accessory uses thereto. Multifamily Residential Use is a Forbidden Use within the relevant zoning sub-district, as are most commercial uses that are envisioned for inclusion in the new development. Therefore, the Proposed Project will require Use Variances for both the proposed Multifamily Residential Use and the proposed Retail Use on the ground floor of approximately 2,000 square feet. The surrounding neighborhood is a mix of primarily residential uses with scattered commercial/retail/office uses.

2.2.3 Boston Zoning Code – Dimensional Requirements

The Proposed Project will include approximately 125,000 square feet of gross floor area on a site that consists of approximately 34,160 square feet of land, for a resulting projected Floor Area Ratio (F.A.R.) of approximately 3.65. **Table 2-1** that follows, sets forth the applicable dimensional regulations under existing zoning and the zoning relief, if any, required for the Proposed Project. The development team continues to discuss required zoning relief requirements with the local Bremen Street neighborhood.

For a project that is subject to Large Project Review, required off-street parking spaces and off-street loading facilities are expected to be determined as a part of the Large Project Review process in accordance with the provisions of Article 80 of the Boston Zoning Code. Design elements of the Proposed Project will also be reviewed pursuant to Large Project Review.

Please see **Table 2-1** that follows for further presentation of existing and proposed zoning dimensional requirements.

Table 2-1. 3F-2000 Three-Family Residential Subdistrict - Dimensional Requirements

Dimensional Element	Existing 3F-2000 Subdistrict Requirements	Proposed Project (1)	Zoning Relief
Use	Three-Family	Multifamily and Commercial	Yes
Minimum Lot Size	2,000 SF	34,160 SF	No
Lot Area for Additional Units	1,000 sf per unit (163,000 SF Required)	34,160 SF	Yes
Max. Floor Area Ratio	1.0	3.65	Yes
Max. Building Height	35 feet /3-Stories	Range 5-6 stories (58-68 feet)	Yes
Useable Open Space	300 SF Per Dwelling Unit (49,500 SF Required)	68 SF per Dwelling Unit (11,182 SF)	Yes
Minimum Lot Width	20 feet	427 feet	No
Minimum Lot Frontage	20 feet	427 feet	No
Minimum Front Yard	5 feet (2)	2 - 12 feet	Yes
Minimum Side Yard	2-1/2 feet	0 - 10 feet	Yes
Minimum Rear Yard	30 feet	10 feet	Yes
Minimum Number of Parking Spaces	(3)	68 spaces (stackers)	(3)
Minimum Number of Loading Spaces	(3)	1 space	(3)

1. The dimensions described in this above table may change as the Proposed Project undergoes BPDA design review.
2. See Section 53-57.2 (Conformity with Existing Building Alignment). A bay window may protrude into a Front Yard.
3. Required off-street parking and loading spaces shall be determined through BRA's Large Project Review in accordance with Article 80 of the Code.

2.2.4 Preliminary List of Permits or Other Approvals Which May be Sought

Agency Name	Permit or Action*
Federal or State Agencies	
Federal Emergency Management Agency (FEMA)	FEMA Flood Zone Application and Approval
Local Agencies	
Boston Planning and Development Agency	Article 80 Review, Design Review and Execution of Related Agreements; Section 80B-6 Certificate of Compliance
Boston Civic Design Commission	Schematic Design Review
Boston Parks Commission	Proposed Project within 100 feet of park subject to City Ordinance 7.4-11
Boston Public Safety Commission Committee on Licenses	Garage License, Flammable Fuels
Boston Transportation Department	Transportation Access Plan Agreement; Construction Management Plan
Boston Department of Public Works Public Improvements Commission	Possible Sidewalk Repair Plan; Curb-Cut Permit; Street/Sidewalk Occupancy Permit; Permit for Street Opening
Boston Fire Department	Permits for Demolition, Approval of Fire Safety Equipment
Boston Water and Sewer Commission	Approval for Sewer and Water and Connections; Construction Site Dewatering; and Storm Drainage
Boston Department of Inspectional Services	Demolition Permit; Building Permits; Certificates of Occupancy; Other Construction-Related Permits
Boston Zoning Board of Appeal	Variances, IPOD Permit, Conditional Use Permit(s), Zoning Relief, as required
Boston Landmarks Commission	Article 85 Demolition Delay Application for demolition of existing buildings on site
Boston Conservation Commission	Flood Plain Wetlands Permit

*This is a preliminary list based on project information currently available. It is possible that not all of these permits or actions will be required, or that additional permits may be needed.

2.3 Public Review Process and Agency Coordination

In support of the required Article 80 Large Project Review process, the Proponent has conducted, and will continue to conduct, community outreach with neighbors and abutters of the Site, including meetings and discussions with the elected representatives and officials from the area, and with area residents, including offering to meet with all abutters within 300 feet of the site.

This process has included, to date, presentations to the Maverick Central Neighborhood Association on February 20, 2019 and April 17, 2019, as well as numerous in person meetings with various abutters as well as with Friends of the East Boston Greenway, Excel Academy Charter School, the YMCA, and with several elected representatives.

In accordance with Article 80 requirements, an Impact Advisory Committee ("IAG") has been formed and neighborhood meeting will be scheduled to review the PNF and receive community comments on the Project during the PNF public review period.

The Proponent will continue to meet with public agencies, neighborhood representatives, local business organizations, abutting property owners, and other interested parties, and will follow the requirements of Article 80 pertaining to the public review process.

2.4 Development Impact Payment ("DIP") Status

Based on current schematic design plans, it is not anticipated that Development Impact Payments ("DIP"), in accordance with Article 80B-7 of the Code, will be required as the Proposed Project is expected to be below the 100,000 gsf threshold for non-residential uses where DIP is required.

3.0 URBAN DESIGN AND SUSTAINABILITY COMPONENT

3.1 Site and Surroundings

The project site, comprised of nine parcels, is located in East Boston and is bounded on the southeast by Bremen St. and the southwest by Brooks Street. The northwest boundary is a series of rear yards from adjacent parcels while the northeast is bounded by both a zero-setback condition with a 3-family residence and a rear yard. Currently, there are three, free-standing structures located on the site. The southernmost building on the site, an autobody shop, is a single-story masonry structure comprising roughly 4,100 gsf. Located approximately 62-feet to the north of the Autobody shop is a three-story, four-unit apartment building totaling 4,000 gsf, leased as short-term, 6-month rentals. The northernmost building on the site is a two-story, 5,500 gsf autobody shop and offices. The remaining open space on the site is almost entirely covered in mixed pavements and used as car storage for the associated autobody shops.

The surrounding neighborhood to the southwest, northwest, and northeast is a mix of three-story residences with an occasional 4-5 story apartment building. The Bremen Street Community Park, runs the entirety of the site to the Southeast, connecting East Boston to the Airport MBTA station.

3.2 Project Description

The proposed project consists of construction of a new building of 5-6 stories with approximately 125,000 gsf, and containing 165 residential apartment units and up to 68-parking spaces using stackers within a single-story garage at-grade. The ground floor along Brooks Street and a portion of Bremen Street will be comprised of a 2,000 gsf commercial space while the remainder of Bremen Street will have three live/work units (helping to activate the street and to provide artist/work lofts), a residential lobby, amenity space and bike storage room. The remainder of the ground floor will be a screened garage parking.

Table 3-1. 282-308 Bremen Street - Summary of Proposed Project Dimensions

Lot Area	34,160 Sq. Ft.
Gross Floor Area (*Per Boston Zoning Code)*	125,000 Gross SF
Number of Residential Units	165-Units
Floor Area Ratio	3.65
Height of Tallest Portion of Building (*Per Zoning Code*)	58- 68-feet
Number of Stories	5 - Residential Floors
Parking Spaces: **Surface – On-Grade Garage**	68- Stacker Spaces

3.3 Urban Design and Landscape

3.3.1 Urban Design Principles

Located on an edge condition, between sprawling greenspace and a dense, urban, fabric, 282-308 Bremen Street poses unique urban design opportunities and challenges. The site is currently comprised of three structures, two of which are non-conforming automobile related uses, one related small residential rental building, and significant areas of mixed asphalt and earth. Surrounding the parcels are over 135-feet of curb-cuts, almost all of which will be removed for additional street parking. The Bremen Street Community Park, to the east of the site, runs almost the entire length of Bremen Street and contains a variety of programmed and open greenspace. The neighborhood lying to the west, is made up of a majority of three-family residences interspersed with a variety of building types including single-family homes, multi-family residences and commercial space. Conceptually, the architecture of the proposed project attempts to weave the two opposing conditions together by responding to its adjacent context.

The scale of the building is horizontally broken down based on a familiar East Boston residential width, each piece is then pushed and pulled giving the pedestrian relief along Bremen and Brooks and the adjacent buildings relief to the west and north.

An additional major urban element of the project is the activation of the ground floor along Bremen Street. The Bremen and Brooks Streets' intersection will be anchored with a small commercial space, ideal for a café, providing a much-needed public amenity for the surrounding neighborhood. Further along Bremen Street, three live/work units have been designed to feature artisan work space on the ground floor with lofted living space above. The remaining Bremen Street frontage is programmed with various building elements; lobby, leasing, fitness, and a small entry for the parking garage. With building and public program utilizing the majority of the street facing ground floor, a single-story parking garage has been pushed to the rear of the site. Loading is located along Brooks Street, an intentional move to remove additional stoppages and delays from Bremen Street.

Architecturally, the edge condition of the site is also enhanced by varying roof treatments. The park side of the project integrates a series of pitched roofs. By employing a familiar residential roof typology in an unfamiliar environment, the Bremen Street side of the project attempts to provide a strong edge to the park. The roofs along the opposite side of the building, facing the rear yards of adjacent properties, mirrors the flat roofs typically seen in East Boston.

3.3.2 Materials and Finishes

The building will be built utilizing vertical plank material with a natural texture and color, referencing the verticality of the building design and offsets. The design team is looking into wood plank cladding materials and other plank options which provide a natural texture and color – grounding the built form and connecting it to the natural landscape and materials in the park across the street, as more fully described below. This cladding will be further complemented by bent metal window frames and spandrel panel.

3.3.3 Landscape Design

The landscape design integrates the project into the existing context through strong physical and visual connections to activate the streetscape. A strong pedestrian connection to the Bremen Street Community Park will play a vital role in the activation of Bremen Street. Clearly designated crosswalks will serve as a direct connection between the park and project site. The project will implement street trees in the same manner as the street trees along the park to create a beautiful treelined street and a cohesive streetscape experience between the park and project site. In addition, landscaping at rear of the site will provide a buffer.

The streetscape will follow the Boston Complete Streets guidelines. The streetscape will provide a substantial clear pedestrian zone, a furnishing zone containing seating, bicycle racks, street lights, and street trees and on street parking. All pedestrian areas will be accessible and comply with ADA standards. The number of existing curb cuts will be greatly reduced, and a designated drop-off area will be implemented to increase the safety of pedestrians. Portions of the pedestrian zone will increase in size to provide opportunities for active outdoor retail space further activating the streetscape.

The landscape design will utilize the generous setbacks at the rear of the building to implement a lush garden of plants and trees. This landscape area will act as a natural buffer between the building and abutting parcels.

3.4 Sustainable Design/Energy Conservation

The proposed project involves developing a new 125,000 gsf mixed-use, multifamily residential/commercial complex with approximately 165 multifamily units, 2,000 gsf of commercial space, and three live / work units on a site located at 282-308 Bremen Street, East Boston.

To meet the City of Boston Requirements the project is demonstrating the compliance with the LEED BD&C v4 criteria. The project is currently tracking 53 points in the YES column with 15 in the study column. Further study over the coming weeks and months will determine final credit achievement. We have outlined in the narrative below, how the project intends to achieve the prerequisites and credits for the LEED BD&C v4 certification. Please see **Figure 3-15** at end of section for checklist.

3.4.1 Introduction

Sustainability informs every design decision. Enduring and efficient buildings conserve embodied energy and preserve natural resources. The project embraces the opportunity to positively influence the urban environment. Its urban location takes advantage of existing infrastructure while some access to mass transportation will reduce dependence on single occupant vehicle trips and minimize transportation impacts.

The Proponent and the Project design team are committed to an integrated design approach and are using the LEED Building Design and Construction v4 rating system and intend to meet certification as presented above. This rating will meet or exceed Boston's Green Building standard. The LEED rating system tracks the sustainable features of the project by achieving points in following categories: Location & Transportation; Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; and Innovation and Design Process.

3.4.2 Location and Transportation

The Location and Transportation credit category encourages development on previously developed land, minimizing a building's impact on ecosystems and waterways, regionally appropriate landscaping, smart transportation choices.

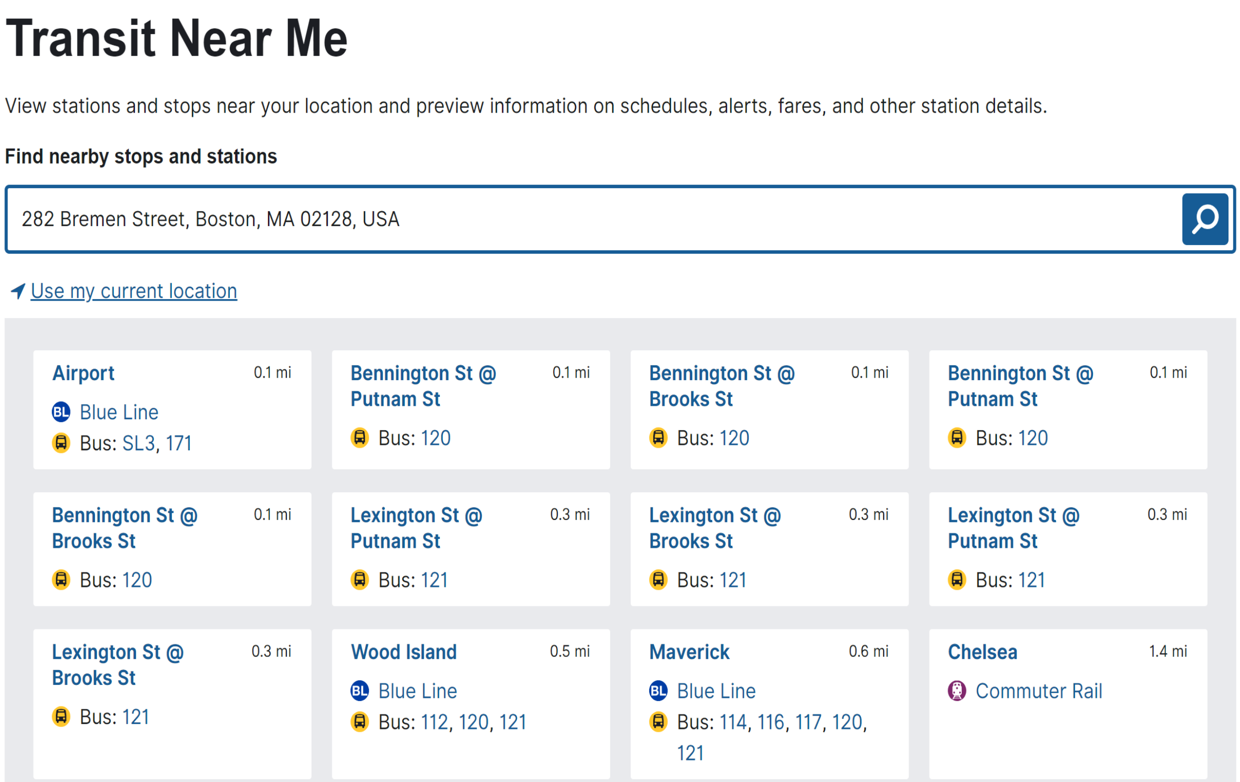
The site is located on a site that has been previously developed earning sensitive land protection. The site is also located on a site with some soil contamination may be present. The project is undergoing Phase II assessment. If contamination is found, we will perform remediation to the meet the requirements.

The site is located on a site whose surrounding existing density within a ¼-mile [400-meter] radius of the project boundary and provided dozens of amenities within 0.5 mile of the project site.

The project provides access to quality transit as the project is located within 0.1 of the Airport stop on the Blue line and 0.5 of Wood Island Blue Line and 0.1 miles of the SL3, 171, and 120 bus. The site has access to 365 weekday, and 234 weekend trips.

Blue Line	225 Trips weekday, 126 weekend
SL3	75 trips weekday, 75 weekend
171	25 weekday, 0 weekend
120	40 weekday, 33 weekend

The project is providing bicycle facilities and showers for the occupants of the building along with bicycle parking spots for visitors, far exceeding the LEED requirement. The project also achieves a 62% parking reduction from the LEED baseline, achieving exemplary performance.



3.4.3 Sustainable Sites

The development of sustainable sites is at the core of sustainable design, stormwater runoff management, and reduction of erosion, light pollution, heat island effect, and pollution related to construction and site maintenance are critical to lessening the impact of development.

The project will create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan will conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. Careful assessment of the site and location selection is part of our site assessment analysis for LEED.

In order to reduce the impact of urban heat island effect all the roofing and hardscape material will be low SRI or vegetated. The project is also pursuing Light Pollution Reduction and reviewing the Open Space credit compliance.

3.4.4 Water Efficiency

Buildings are major users of our potable water supply and conservation of water preserves a natural resource while reducing the amount of energy and chemicals used for sewage treatment. The goal of the Water Efficiency credit category is to encourage smarter use of water, inside and out. Water reduction is typically achieved through more efficient appliances, fixtures and fittings inside and water-wise landscaping outside. To satisfy the requirements of the Water Use Reduction Prerequisite and credit, the project will incorporate water conservation strategies that include low flow plumbing fixtures for water closets and faucets. The landscape will be designed so it will reduce the need for potable water for irrigation and select plant material that is native and adaptive.

The project is targeting a minimum 45% indoor water use reduction from the baseline. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling will have the Water Sense label. We anticipate needing irrigation for foundation plantings, if required this will be a highly efficient drip system achieving greater than a 50% reduction in potable water use.

The project will install permanent water meters that measure the total potable water use for the building and associated grounds in addition to water meters for two or more of the following water subsystems, as applicable to the project: Irrigation, Indoor plumbing fixtures and fittings, Domestic hot water, Boiler. Metering data will be compiled into monthly and annual summaries; and will be shared with USGBC the resulting whole-project water usage data.

3.4.5 Energy & Atmosphere

According to the U.S. Department of Energy, buildings use 39% of the energy and 74% of the electricity produced each year in the United States. The Energy and Atmosphere credit category encourages a wide variety of energy strategies: commissioning; energy use monitoring; efficient design and construction; efficient appliances, systems and lighting; the use of renewable and clean sources of energy, generated on-site or off-site; and other innovative practices.

Fundamental Commissioning and Enhanced commissioning will be pursued for the project. Envelope commissioning will also be evaluated as an alternative.

A preliminary whole-building energy simulation was performed for the project demonstrating a minimum improvement of 20% energy cost savings according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata. The team will continue to analyze efficiency measures during the design process and account for the results in design decision making.

The project will install new or use existing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc). Prereq 4- Fundamental refrigerant management. The project will not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems.

The project will evaluate renewable energy production if it is not possible the building will be solar ready. The project is also evaluating the Advanced Energy Metering.

The project will select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. Project will perform the calculations once systems are selected.

The project will also consider engaging in a contract for 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs).

Energy Modelling Summary

For the 282 Bremen Street Project PNF application, an energy analysis was performed based on the geometry and orientation described in the March 22, 2019 schematic building drawings. Analysis was performed by Allison Gaiko, PE, LEED AP for Soden Sustainability Consulting using eQuest3.65 to compare the proposed design case to two baseline scenarios:

- Energy cost comparison to ASHRAE 90.1-2010 Appendix G in accordance with LEED v4 requirements
- Energy use comparison to ASHRAE 90.1-2013 in accordance with MA Energy Code requirements

Minimum Energy Performance Calculators are contained in **Appendix E1.**

3.4.6 Materials & Resources

During both construction and operations, buildings generate tremendous waste and use many materials and resources. This credit category encourages the selection of sustainable materials, including those that are harvested and manufactured locally, contain high-recycled content, and are rapidly renewable. It also promotes the reduction of waste through building and material reuse, construction waste management, and ongoing recycling programs.

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

The project will develop and implement a construction and demolition waste management plan that will identifying at least five materials (both structural and nonstructural) targeted for diversion. approximate a percentage of the overall project waste that these materials represent. The project will divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams. The project will also consider completing a life-cycle assessment.

Careful material selection will be performed for the project. Where possible the project hopes to integrate products that have Environmental Product Declarations (EPD), Sourcing of raw materials and corporate sustainability reporting, and Material Ingredients disclosures.

3.4.7 Indoor Environmental Quality

The U.S. Environmental Protection Agency estimates that Americans spend about 90% of their day indoors, where the air quality can be significantly worse than outside. The Indoor Environmental Quality credit category promotes strategies that can improve indoor air through low emitting materials selection and increased ventilation. It also promotes access to natural daylight and views.

The project will meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent.

The project will provide enhanced indoor air quality strategies. The project will provide entryway systems design systems, interior cross-contamination prevention and filtration. The project is also targeting increased ventilation.

The project will target low emitting materials for all materials within the building interior is defined as everything within the waterproofing membrane. This includes requirements for product manufacturing volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials.

The project will develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building, meeting or exceeding all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3. The project will protect absorptive materials stored on-site and installed from moisture damage.

The project prohibits the use of all tobacco products inside the building and within 25 feet (8 meters) of the building entrance during construction. Daylight will be evaluated for energy efficiency opportunities and benefits for the occupants.

The project will achieve a direct line of sight to the outdoors for at least 75% of all regularly occupied floor area. View glazing in the contributing area will provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort color balance.

3.4.8 Innovation and Design Process

The Innovation in Design and Innovation in Operations credit categories provide additional points for projects that use new and innovative technologies, achieve performance well beyond what is required by LEED credits, or utilize green building strategies that are not specifically addressed elsewhere in LEED. This credit category also rewards projects for including a LEED Accredited Professional on the team to ensure a holistic, integrated approach to design, construction, operations and maintenance. Five credits are being pursued and could include the following.

- Innovation in Design: EP Reduced Parking Footprint
- Innovation in Design: Green Housekeeping
- Innovation in Design: Walkable Sites
- Innovation in Design: Integrated Pest Management
- Innovation in Design: Education

Regional Priority

- Regional Priority: High Priority Site (yes)
- Regional Priority: Indoor water use reduction (yes)
- Regional Priority: Optimize Energy (maybe)
- Regional Priority: Renewable Energy (maybe)

3.5 Urban Design Drawings and LEED Checklist

Urban design drawings and renderings depicting the Proposed Project and the LEED BD&C v4 Checklist include:

N

FIGURE 3-1 / **PROJECT LOCUS**

A

B

FIGURE 3-2 / ADDITIONAL EXISTING SITE PHOTOS

A

B

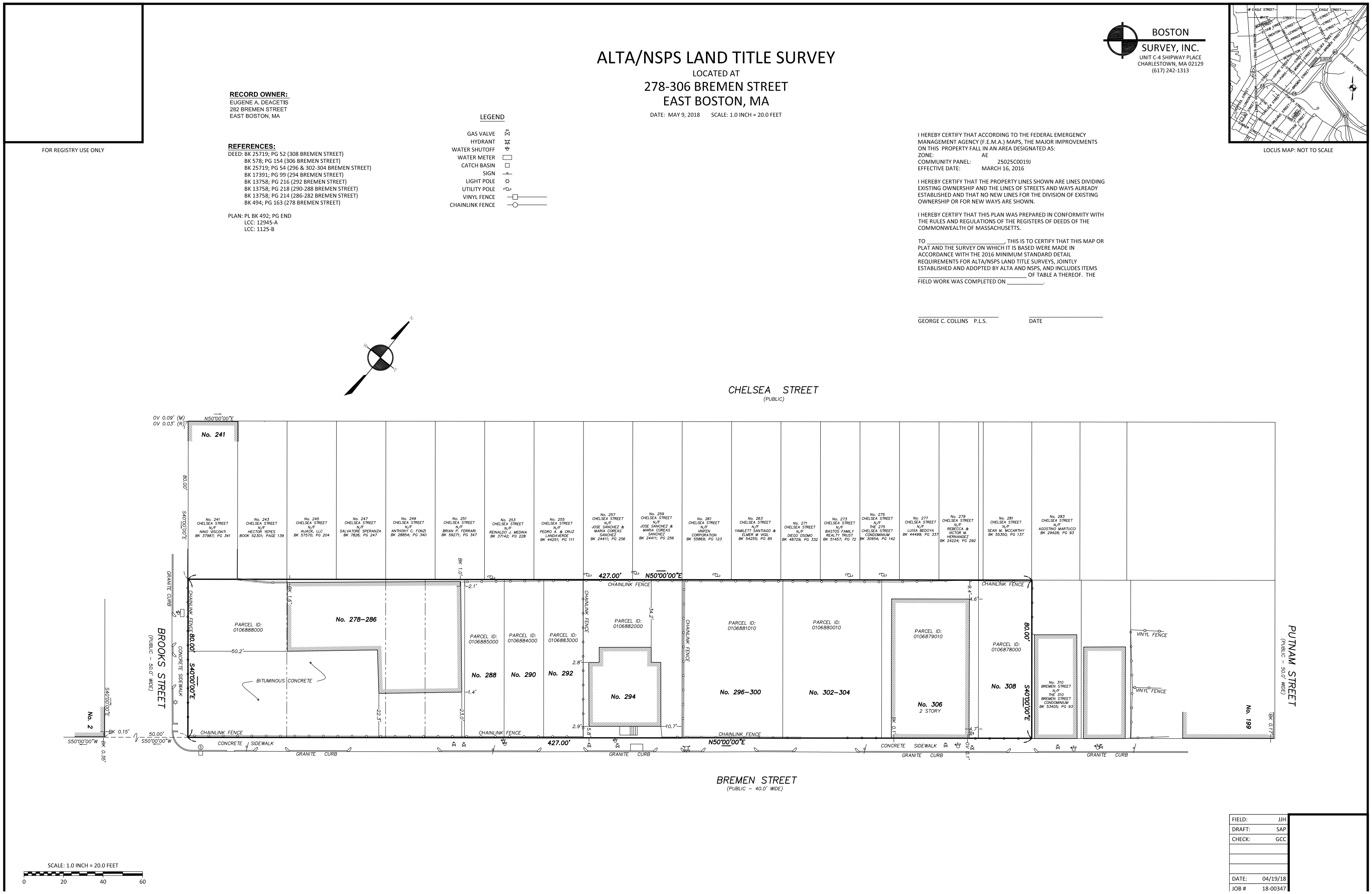


FIGURE 3-4 / SITE SURVEY

RODE

LEGEND

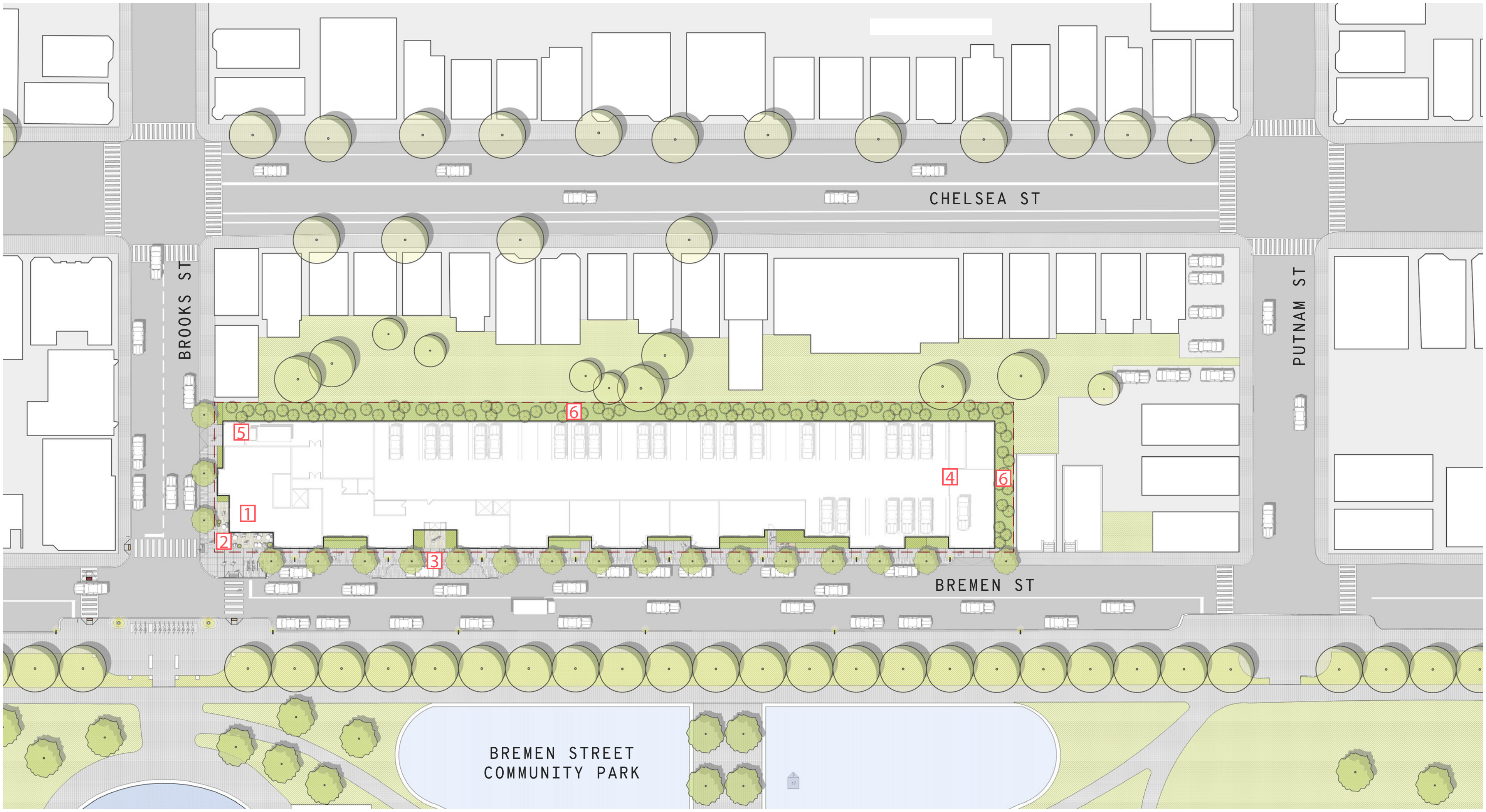
- SITE
- EXG. BUILDINGS
- GREENSPACE
- T STOP
- BUS STOP
- BLUE BIKE
- ZIPCAR LOCATION
- MAJOR ROADS
- INTERSTATE

FIGURE 3-5 / MOBILITY DIAGRAM

FIGURE 3-6 / EXISTING PERSPECTIVE: VIEW FROM BREMEN & BROOKS

RODE

FIGURE 3-7 / PROPOSED PERSPECTIVE: VIEW FROM BREMEN & BROOKS



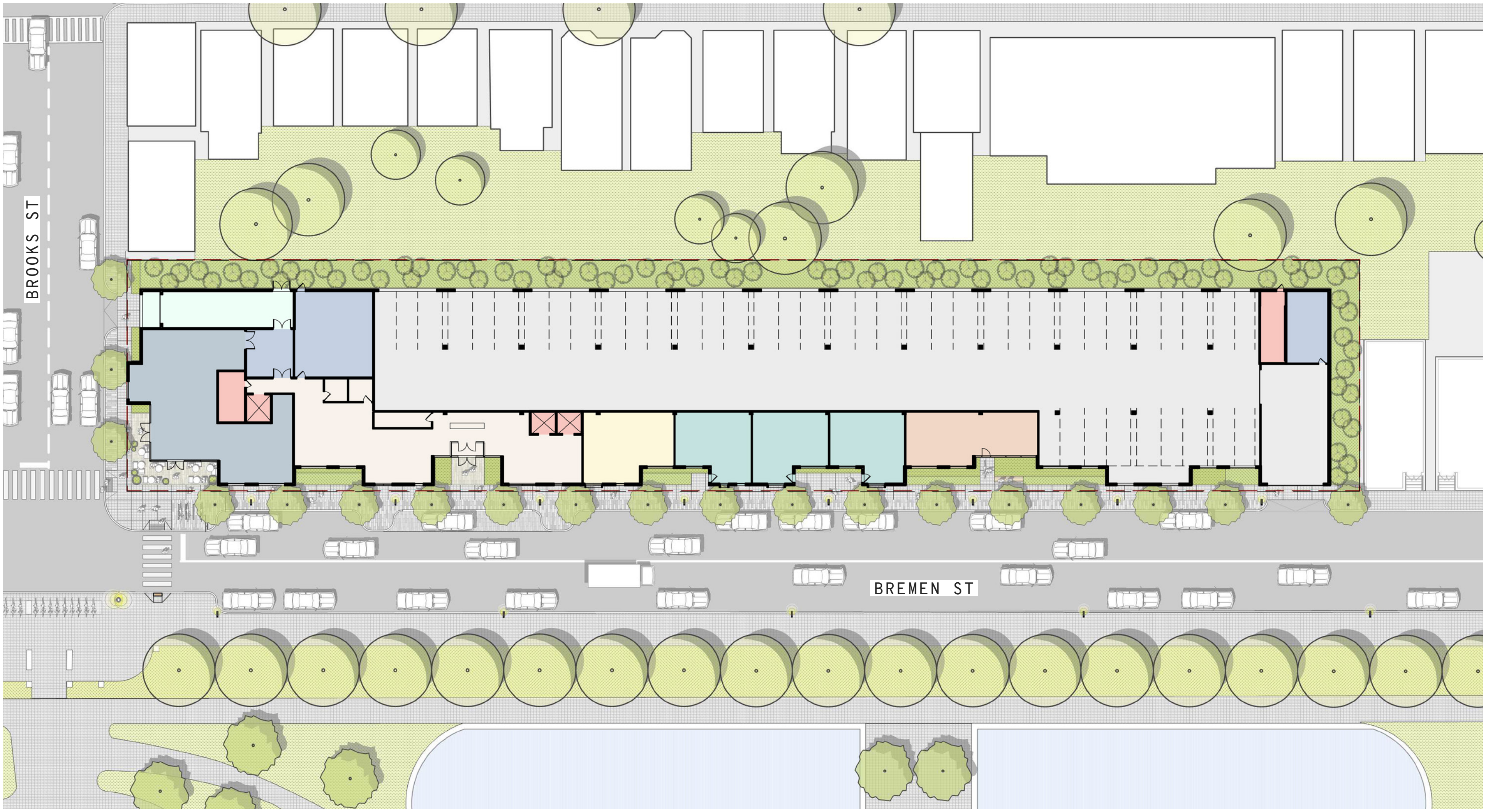
LEGEND

1. CAFE
2. CAFE SEATING
3. ARRIVAL/DROPOFF
4. GARAGE ENTRY
5. LOADING
6. LANDSCAPE BUFFER

N

FIGURE 3-8 / **SITE PLAN**

RODE



LEGEND

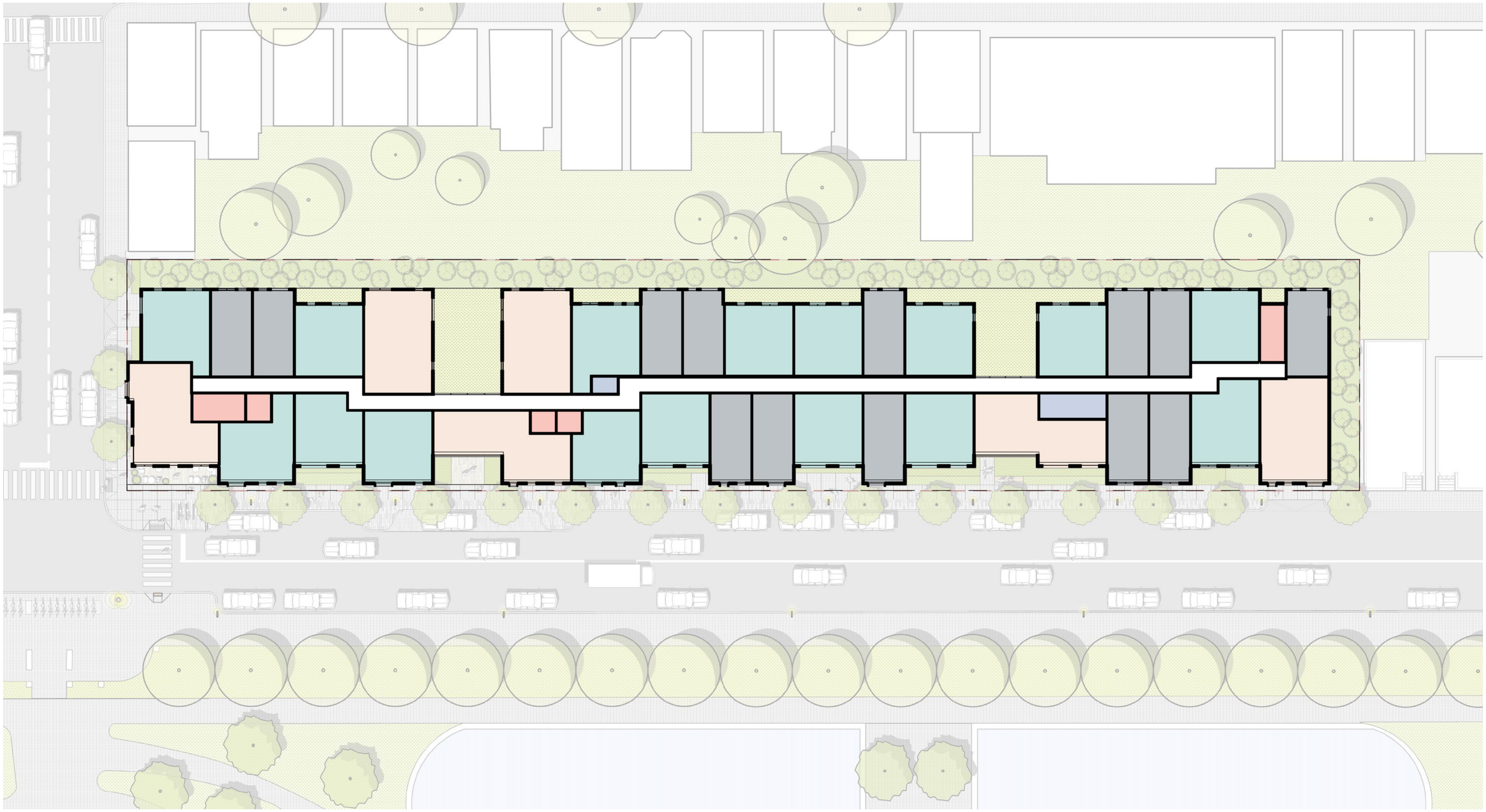
CAFE	SERVICE	PARKING
CIRCULATION	FITNESS	LOADING
LOBBY	LIVE & WORK	BIKES

N

1" = 50'-0"

FIGURE 3-9 / LEVEL 1 FLOOR PLAN

RODE



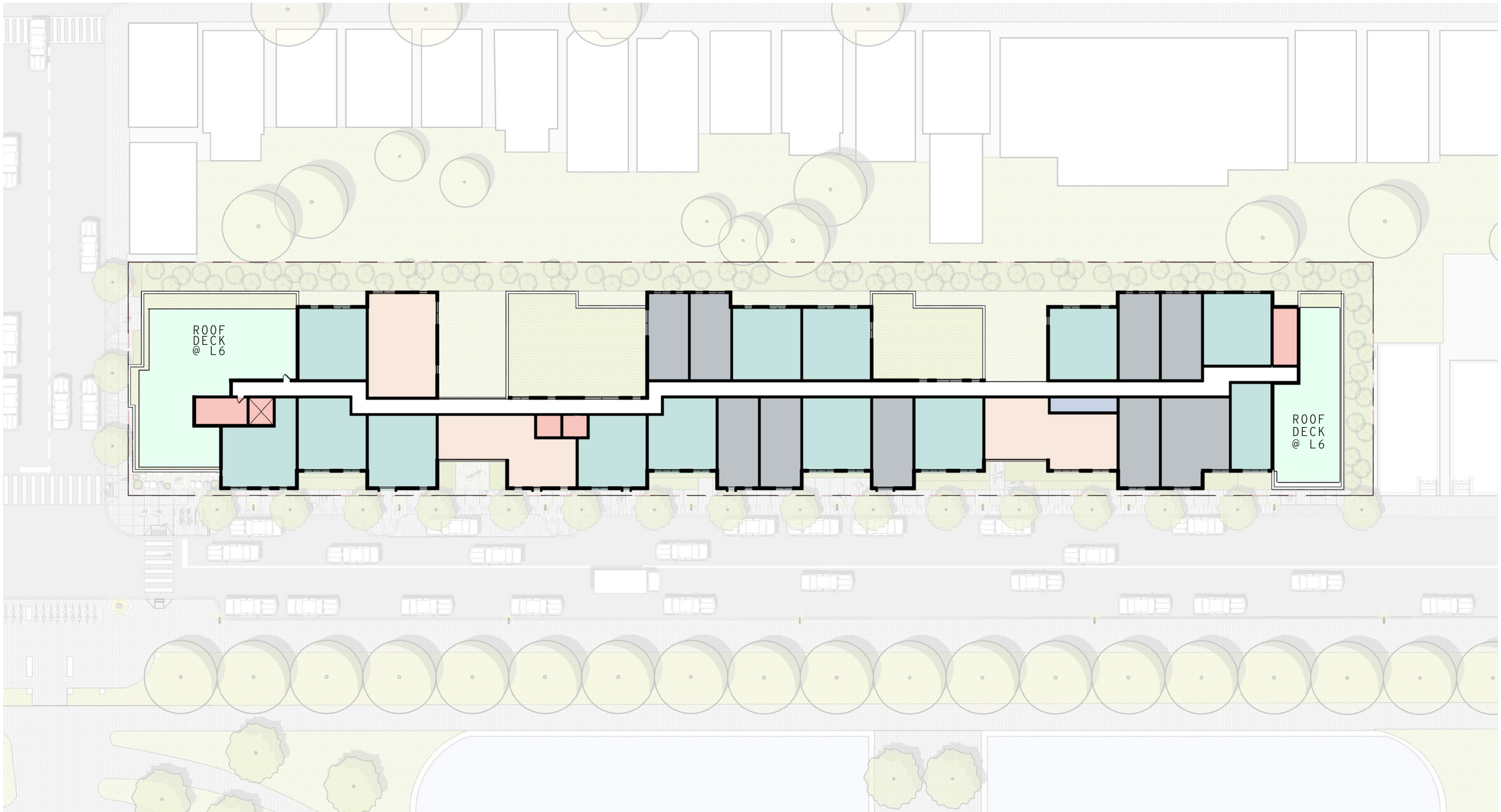
LEGEND

STUDIO
1-BED
2-BED
SERVICE
CIRCULATION

N
1" = 50'-0"

FIGURE 3-10 / LEVEL 2-5 FLOOR PLAN

RODE

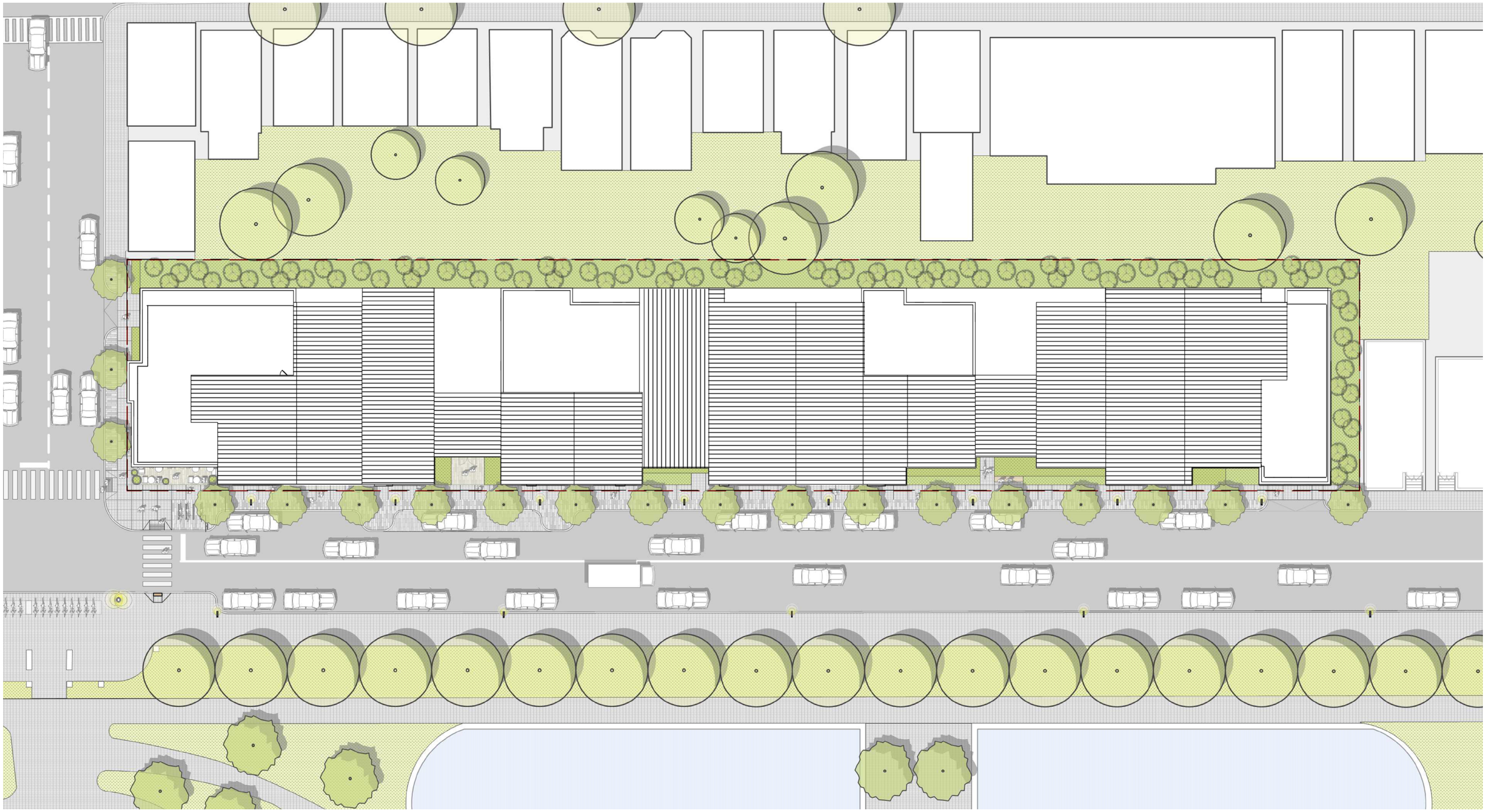


LEGEND

- STUDIO
- 1-BED
- 2-BED
- SERVICE
- CIRCULATION
- ROOF DECK

FIGURE 3-11 / **LEVEL 6 FLOOR PLAN**

RODE



RODE

FIGURE 3-12 / ROOF PLAN

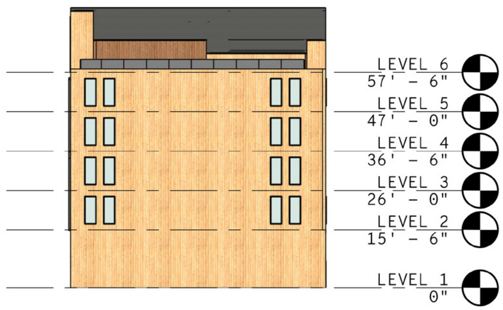
WEST ELEVATION

EAST ELEVATION

1" = 50'-0"

FIGURE 3-13 / **WEST & EAST ELEVATION**

RODE



NORTH ELEVATION

SOUTH ELEVATION

1” = 50’-0”

FIGURE 3-14 / NORTH & SOUTH ELEVATION

Figure 3-15

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: 285 Bremen Street

Date: 16-Apr-19

Y	?	N			
1			Credit	Integrative Process	1

Y	?	N			
15	**1**	**0**		**Location and Transportation**	**16**
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
1	1		Credit	High Priority Site	2
5			Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

Y	?	N			
2	**3**	**5**		**Sustainable Sites**	**10**
Y			Prereq	Construction Activity Pollution Prevention	Required
	1		Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
	1		Credit	Open Space	1
		3	Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
	1		Credit	Light Pollution Reduction	1

Y	?	N			
7	**2**	**2**		**Water Efficiency**	**11**
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
1	1		Credit	Outdoor Water Use Reduction	2
5	1		Credit	Indoor Water Use Reduction	6
		2	Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

Y	?	N			
13	**4**	**16**		**Energy and Atmosphere**	**33**
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
3	1	2	Credit	Enhanced Commissioing	6
8	1	9	Credit	Optimize Energy Performance	18
		1	Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
	1	2	Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

Y	?	N			
2	**2**	**9**		**Materials and Resources**	**13**
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
		5	Credit	Building Life-Cycle Impact Reduction	5
	1	1	Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
	1	1	Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

Y	?	N			
5	**1**	**10**		**Indoor Environmental Quality**	**16**
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
1	1		Credit	Enhanced Indoor Air Quality Strategies	2
		3	Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
1		1	Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
1		1	Credit	Interior Lighting	2
		3	Credit	Daylight	3
		1	Credit	Quality Views	1
		1	Credit	Acoustic Performance	1

Y	?	N			
6	**0**	**0**		**Innovation**	**6**
5			Credit	Innovation - EP Reduced Parking, Green Housekeeping, Education, IPM Thermal C	5
1			Credit	LEED Accredited Professional	1

Y	?	N			
2	**2**	**0**		**Regional Priority**	**4**
1			Credit	Regional Priority: Indoor Water Use	1
	1		Credit	Regional Priority: High Priority Site	1
1			Credit	Regional Priority: Optimize Energy	1
	1		Credit	Regional Priority: Renewable	1

Y	?	N			
53	**15**	**42**	**TOTALS**	Possible Points:	**110**

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

4.0 ENVIRONMENTAL PROTECTION COMPONENT

4.1 Shadow Impacts Analysis

4.1.1 Introduction

The following shadow study describes and graphically depicts anticipated new shadow impacts from the proposed project compared to shadows from existing buildings. The study presents the existing and built conditions for the proposed project for the hours 9:00 AM, 12:00 Noon, and 3:00 PM for the vernal equinox, summer solstice, autumnal equinox, and winter solstice, as required. In addition, shadows are depicted for 6:00 PM during the summer solstice and autumnal equinox.

4.1.2 Vernal Equinox (March 21)

Figures 4.1-1 through **4.1-3** depict shadows on March 21.

At 9:00 AM shadows are cast towards the northwest into the rear yards and first floors of the adjacent properties.

At 12:00 PM shadows are cast toward the north impacting half of the depth of the rear yards adjacent to the property.

At 3:00 PM shadows are cast toward the east onto portions of Bremen Street and only the most northernly abutter.

4.1.3 Summer Solstice (June 21)

Figures 4.1-4 through **4.1-7** depict shadows on June 21.

At 9:00 AM shadows are cast towards the northwest into the rear yards and first floors of the adjacent properties. A portion of Brooks Street is also impacted.

At 12:00 PM shadows are cast toward the north impacting the first few feet of the rear yards directly adjacent to the property line.

At 3:00 PM shadows are cast toward the east onto the sidewalk and a very small portion of Bremen Street.

At 6:00 PM shadows are cast toward the east onto Bremen Street and the first 50’ of the Bremen Street Community Park.

4.1.4 Autumnal Equinox (September 21)

Figures 4.1-8 through **4.1-11** depict shadows on September 21.

At 9:00 AM shadows are cast towards the northwest into the rear yards and the closest half of the adjacent buildings in the rear. A small portion of Brooks Street is also impacted.

At 12:00 PM shadows are cast toward the north impacting the rear yards directly adjacent to the property line.

At 3:00 PM shadows are cast toward the northeast onto the sidewalk and the most northernly neighbor.

At 6:00 PM shadows are cast toward the east onto Bremen Street and the Bremen Street Community Park.

4.1.5 Winter Solstice (December 21)

Figures 4.1-12 through **4.1-14** depict shadows on December 21.

At 9:00 AM shadows are cast towards the northwest into the rear yards and the adjacent properties to the rear.

At 12:00 PM shadows are cast toward the north impacting the rear yards adjacent to the property and a portion of the most northernly neighbor.

At 3:00 PM shadows are cast toward the north onto the northern neighbors.

4.1.6 Summary

New shadows created by the project are limited in their impacts to surrounding buildings and to the nearby park. The rear yards to the northwest of the site receive the greatest amount of impact in the morning and early afternoon, but the buildings themselves have almost no shadow impact on them. The park only receives limited shadows during summer and fall evenings which is consistent with the shadow patterns created by existing buildings on the site and further north and south along Bremen Street.

EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

9:00 AM
MARCH 21
ALTITUDE: 33.0
AZIMUTH: 125.7
N42.36, W71.06

N

FIGURE 4.1-1 / SHADOW STUDY: VERNAL EQUINOX

RODE

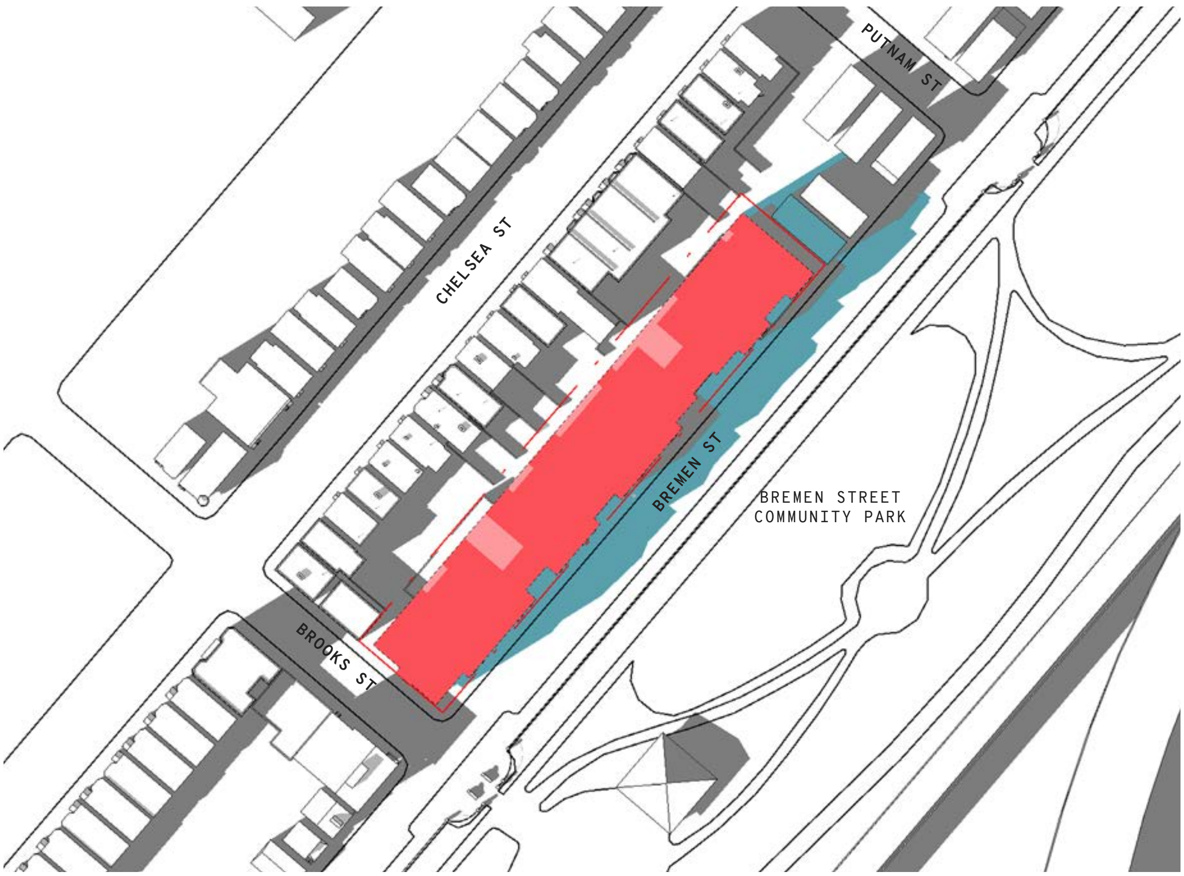
EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

12:00 PM
MARCH 21
ALTITUDE: 48.0
AZIMUTH: -176.9
N42.36, W71.06

N

FIGURE 4.1-2 / SHADOW STUDY: VERNAL EQUINOX

RODE



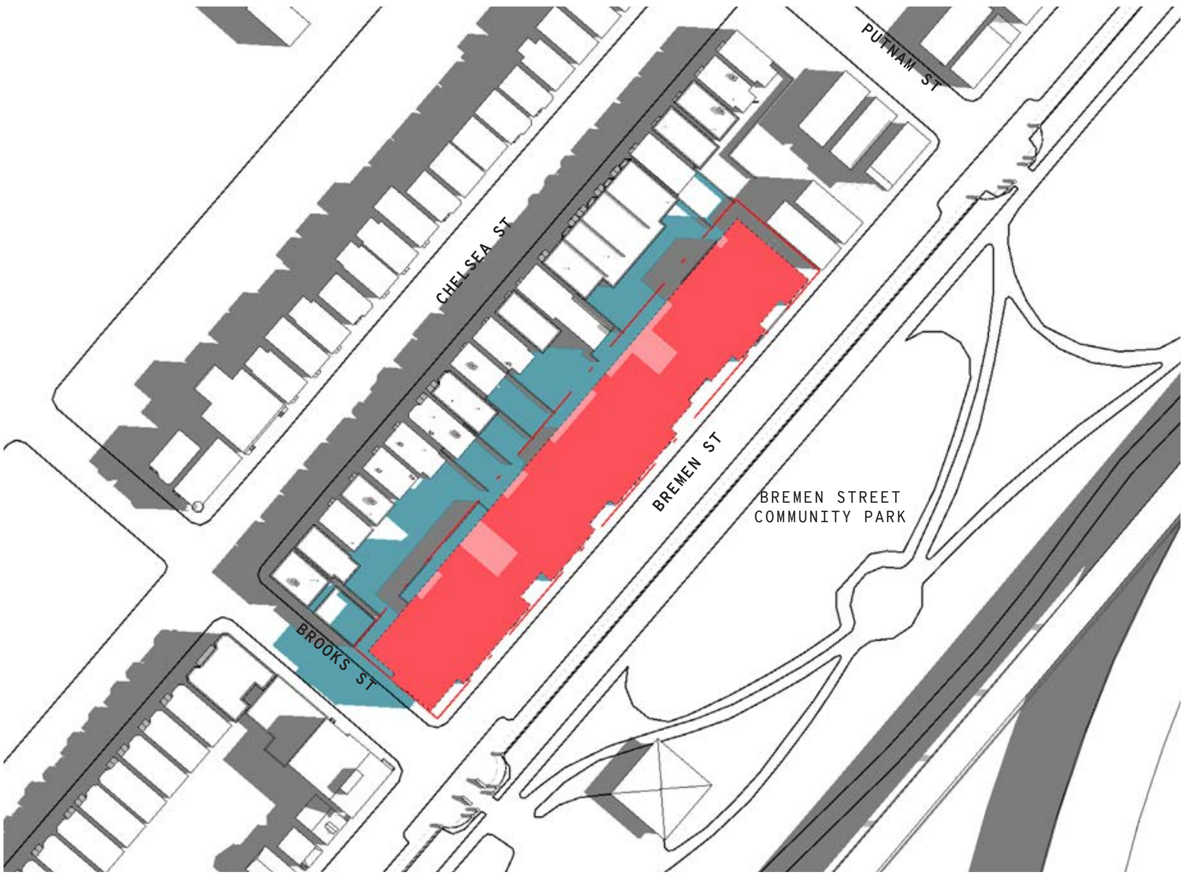
EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

3:00 PM
MARCH 21
ALTITUDE: 30.5
AZIMUTH: -121.8
N42.36, W71.06

N

FIGURE 4.1-3 / **SHADOW STUDY: VERNAL EQUINOX**

RODE



EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

9:00 AM
JUNE 21
ALTITUDE: 39.9
AZIMUTH: 93.5
N42.36, W71.06

N

FIGURE 4.1-4 / SHADOW STUDY: SUMMER SOLSTICE

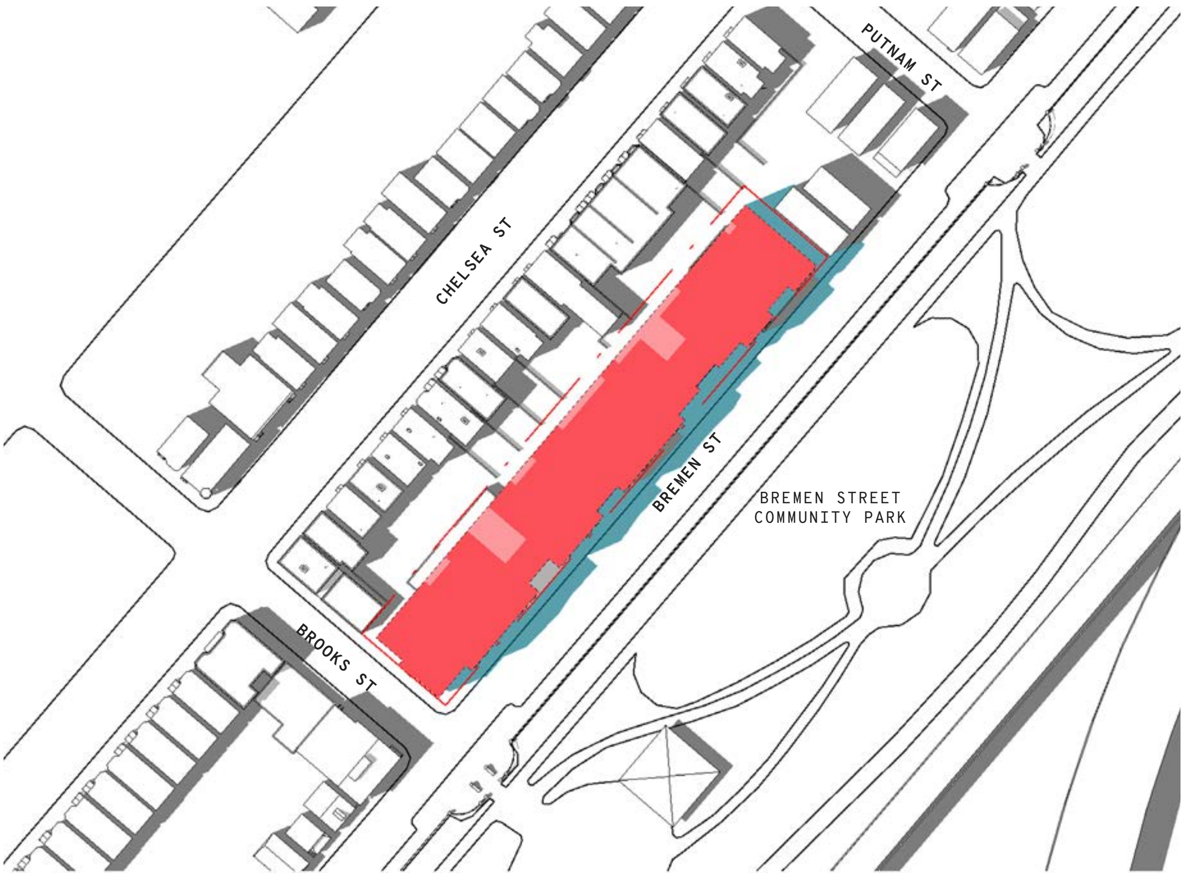
RODE

EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

12:00 PM
JUNE 21
ALTITUDE: 68.8
AZIMUTH: 149.4
N42.36, W71.06

N

FIGURE 4.1-5 / SHADOW STUDY: SUMMER SOLSTICE



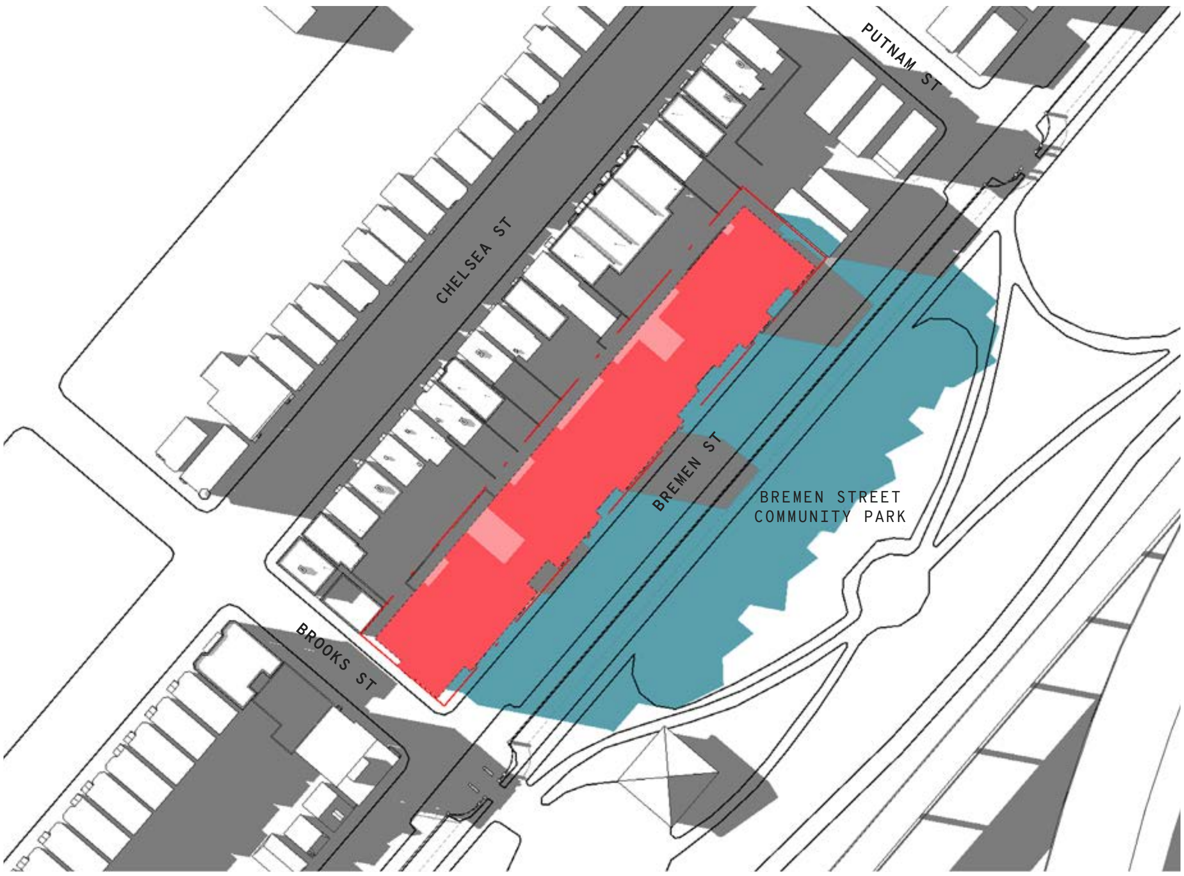
EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

3:00 PM
JUNE 21
ALTITUDE: 56.5
AZIMUTH: -113.7
N42.36, W71.06

N

FIGURE 4.1-6 / SHADOW STUDY: SUMMER SOLSTICE

RODE



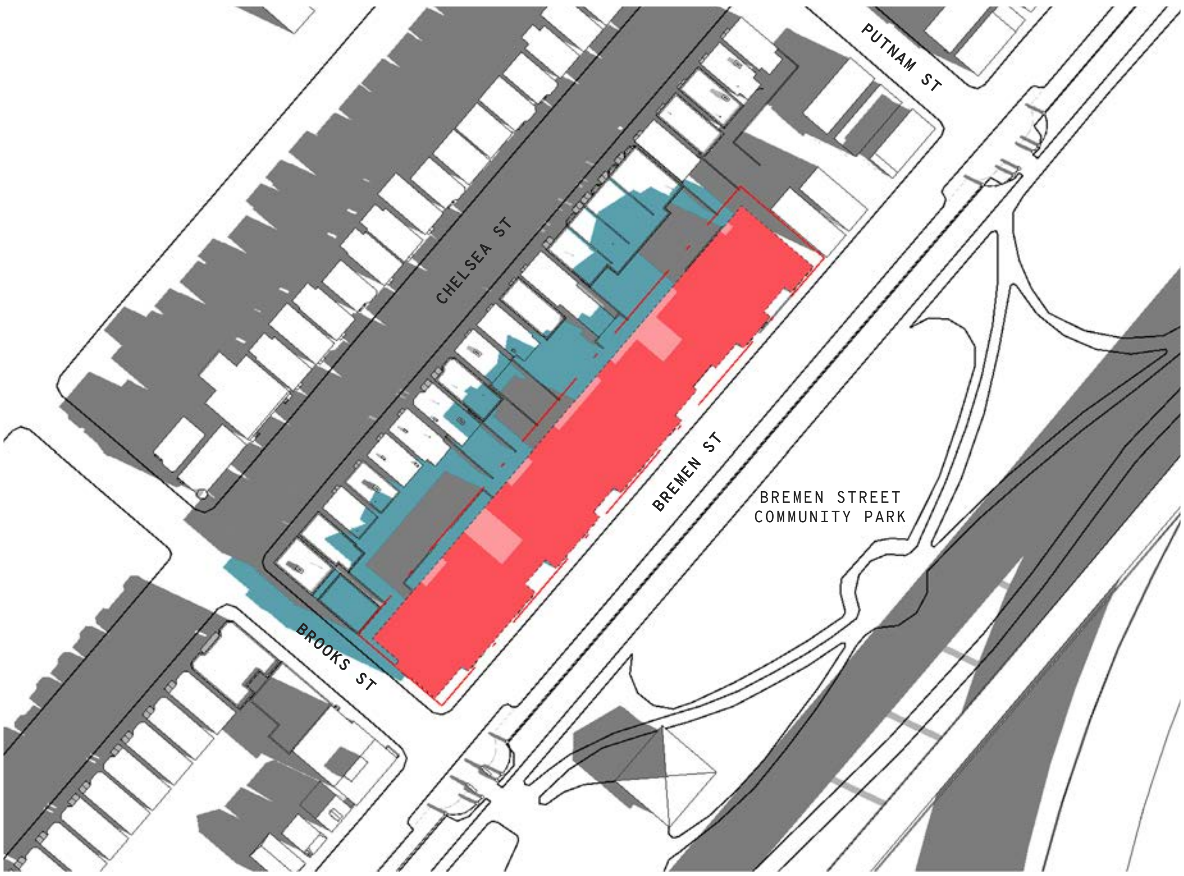
EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

6:00 PM
JUNE 21
ALTITUDE: 7.3
AZIMUTH: -96.0
N42.36, W71.06

N

FIGURE 4.1-7 / SHADOW STUDY: SUMMER SOLSTICE

RODE



EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

9:00 AM
SEPTEMBER 21
ALTITUDE: 25.9
AZIMUTH: 115.3
N42.36, W71.06

N

FIGURE 4.1-8 / SHADOW STUDY: AUTUMNAL EQUINOX

RODE

EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

12:00 PM
SEPTEMBER 21
ALTITUDE: 47.4
AZIMUTH: 166.0
N42.36, W71.06

N

FIGURE 4.1-9 / SHADOW STUDY: AUTUMNAL EQUINOX

RODE

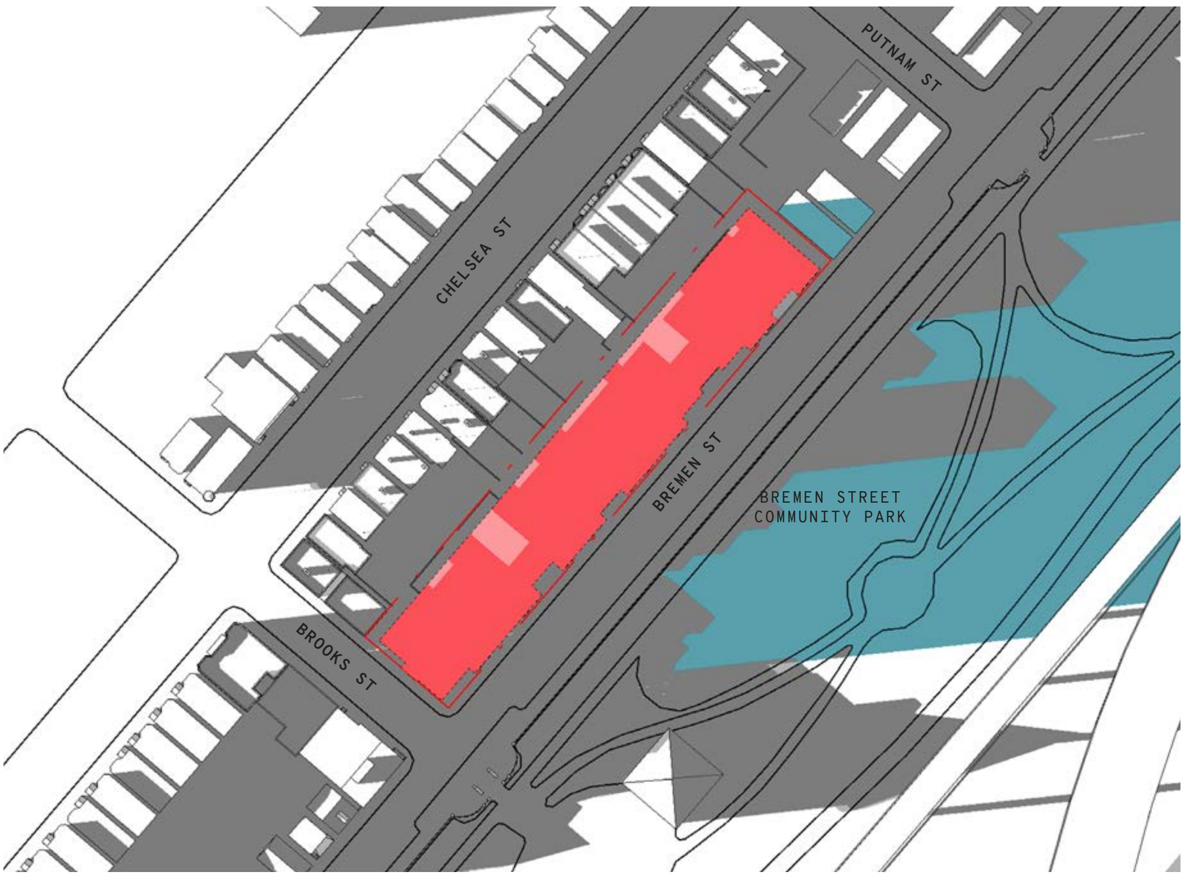
EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

3:00 PM
SEPTEMBER 21
ALTITUDE: 37.4
AZIMUTH: -132.9
N42.36, W71.06

N

FIGURE 4.1-10 / SHADOW STUDY: AUTUMNAL EQUINOX

RODE



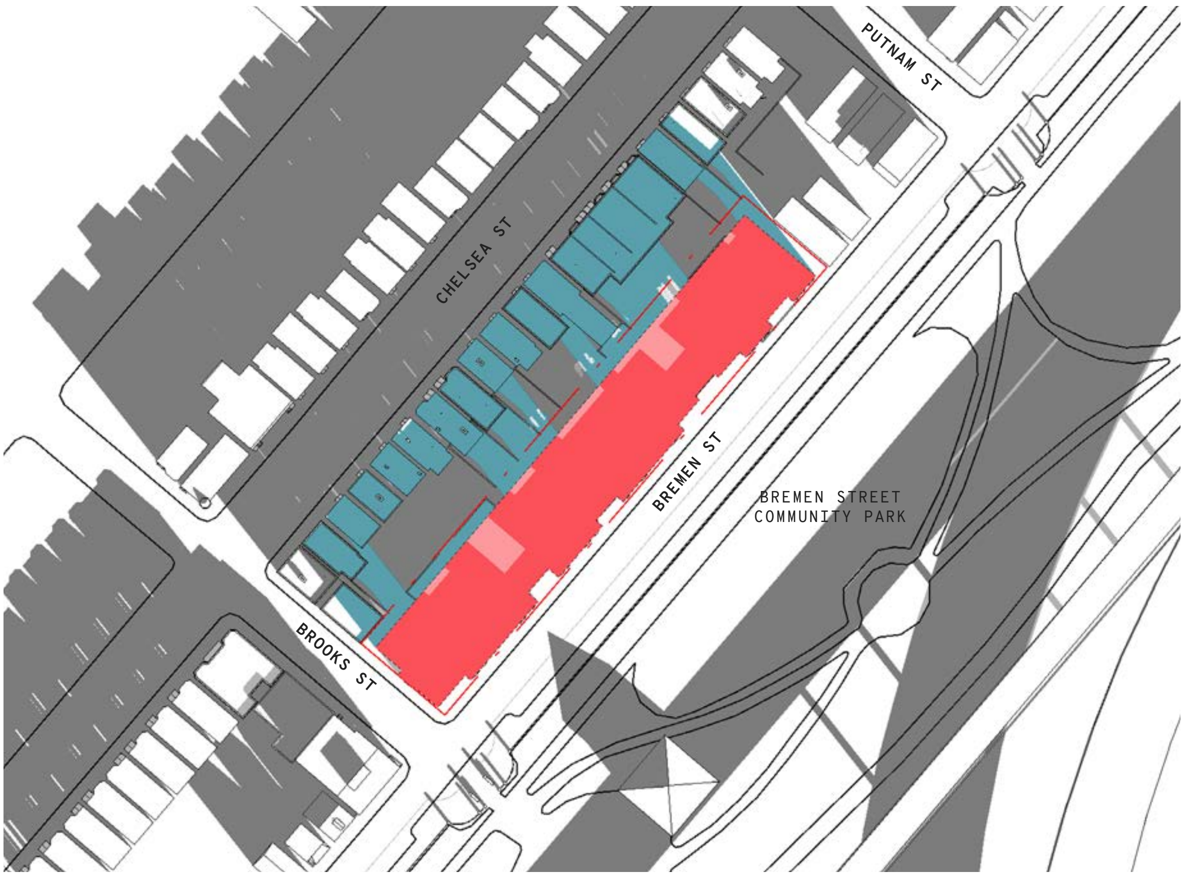
EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

6:00 PM
SEPTEMBER 21
ALTITUDE: 7.3
AZIMUTH: -96.0
N42.36, W71.06

N

FIGURE 4.1-11 / **SHADOW STUDY: AUTUMNAL EQUINOX**

RODE



EXISTING SHADOWS

PROPOSED SHADOWS

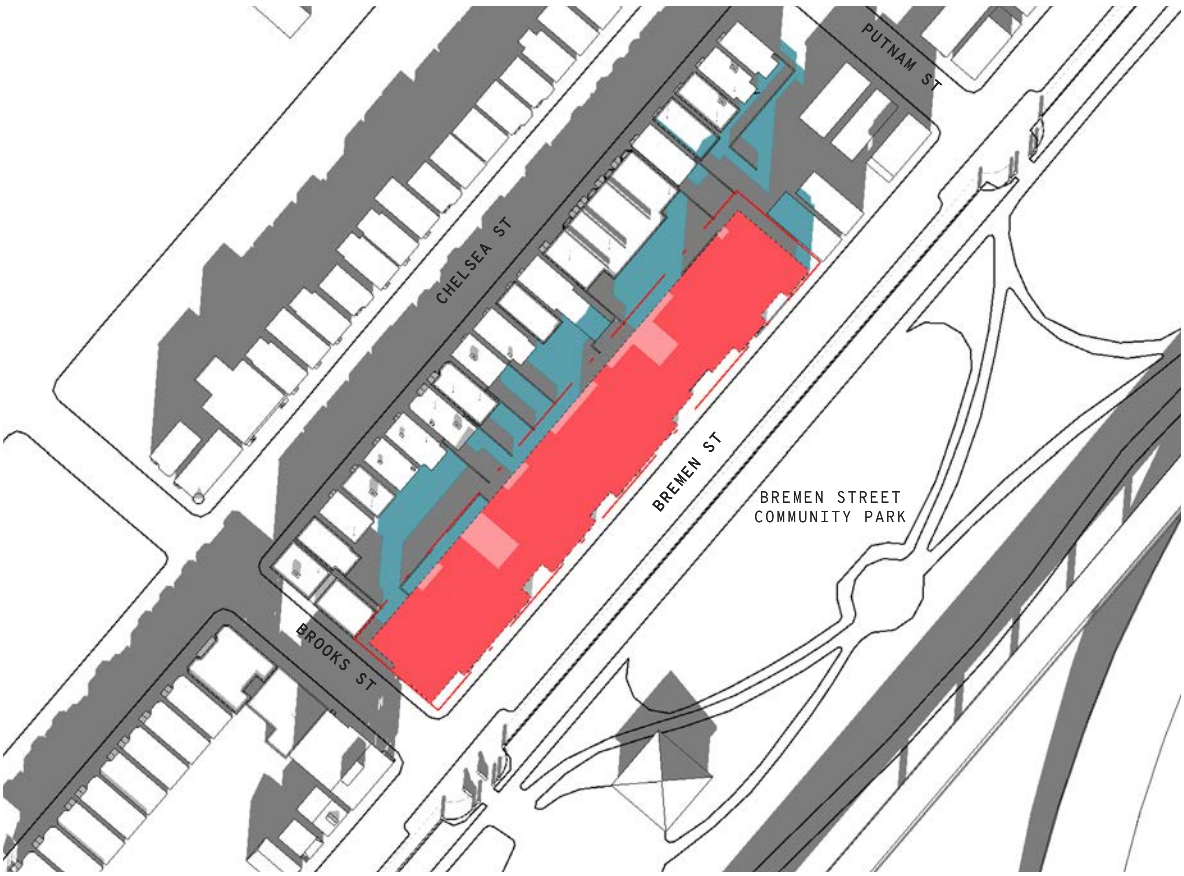
PROPOSED BUILDING

9:00 AM
DECEMBER 21
ALTITUDE: 14.2
AZIMUTH: 141.9
N42.36, W71.06

N

FIGURE 4.1-12 / **SHADOW STUDY: WINTER SOLSTICE**

RODE



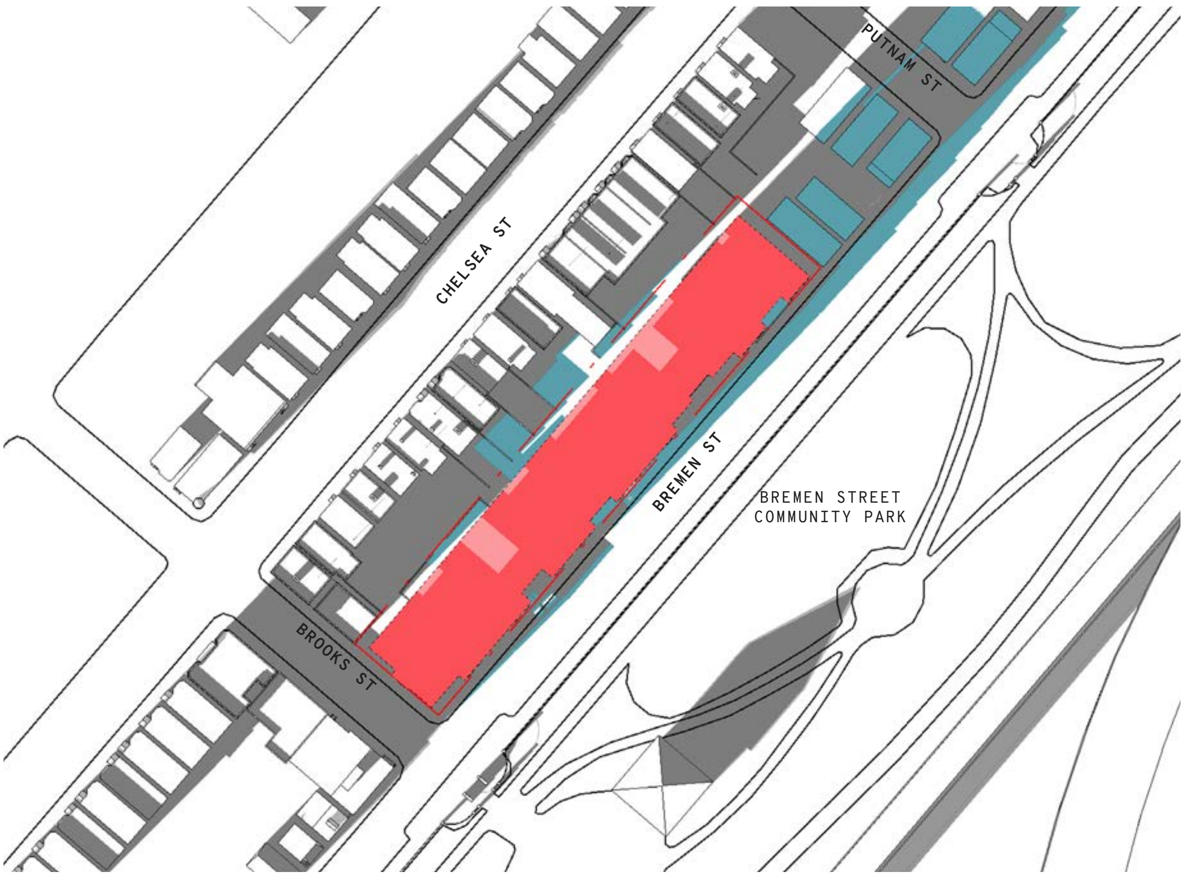
EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

12:00 PM
DECEMBER 21
ALTITUDE: 24.1
AZIMUTH: -175.6
N42.36, W71.06

N

FIGURE 4.1-13 / SHADOW STUDY: WINTER SOLSTICE

RODE



EXISTING SHADOWS
PROPOSED SHADOWS
PROPOSED BUILDING

3:00 PM
DECEMBER 21
ALTITUDE: 10.0
AZIMUTH: -135.1
N42.36, W71.06

N

FIGURE 4.1-14 / SHADOW STUDY: WINTER SOLSTICE

4.2 Daylight Analysis

The following section describes the anticipated effect on daylight coverage at the Project Site as a result of the Proposed Project. An analysis of the percentage of skydome obstructed under the No-Build and Build Conditions is a requirement of Article 80 (Section 80B-2(c)).

The results of the analysis are presented in attached **Figures 4.2-1** and **4.2-2.**

4.2.1 Methodology

The daylight analysis was conducted by VHB for the Proposed Project using the BRADA program developed in 1985 by the Massachusetts Institute of Technology to estimate the pedestrian's view of the skydome, taking into account building massing and building materials used. The software approximates a pedestrian's view of a given site based on input parameters such as: location of viewpoint; length and height of buildings and the relative reflectivity of the building façades. The model typically uses the midpoint of an adjacent right-of-way or sidewalk as the analysis viewpoint. Based on these data, the model calculates the perceived skydome obstruction, and provides a graphic depicting the analysis conditions.

The model inputs used for the study presented herein were taken from a combination of the BPDA's City of Boston model data, an existing conditions survey, and schematic design plans prepared by the Project's architects. As described above, the BRADA software considers the relative reflectivity of building façades when calculating perceived daylight obstruction. Highly reflective materials are thought to reduce the perceived skydome obstruction when compared to non-reflective materials. For the purposes of this daylight analysis, the building façades are considered to be non-reflective, resulting in a conservative estimate of daylight obstruction.

4.2.2 Viewpoints

The following viewpoints were used for this daylight analysis:

- **Bremen Street**– This viewpoint is located on the centerline of the Project Site along Bremen Street.
- **Brooks Street** – This viewpoint is located on the centerline of the Project Site along Brooks Street.

These points represent existing and proposed building façades when viewed from the adjacent public way.

4.2.3 Daylight Analysis Results

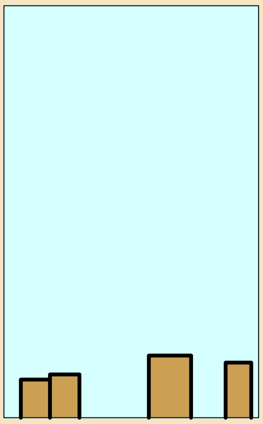
<u>Daylight Analysis - Existing / No-Build Conditions</u>

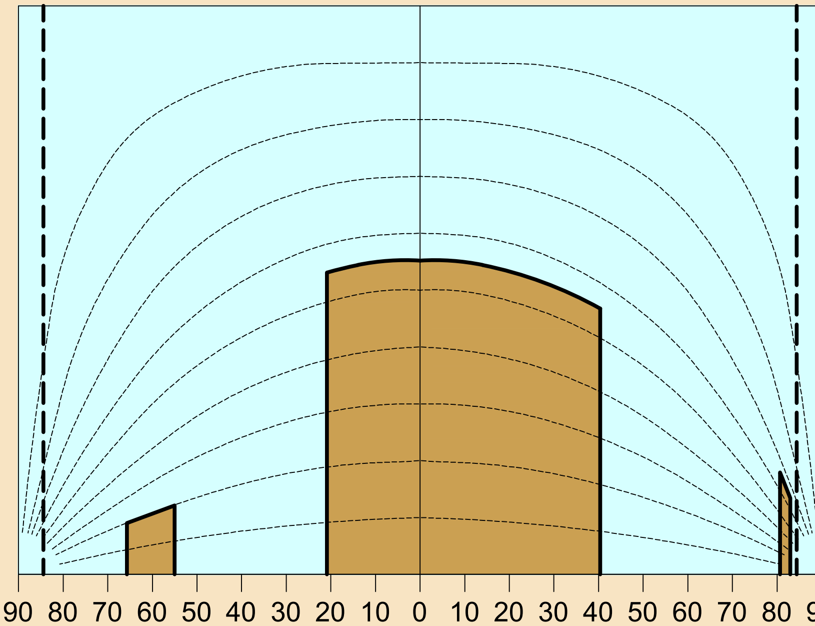
Under the Existing/No-Build Condition, the Project Site contains a mix of multi-family residential and commercial buildings up to three stories in height. As a result of the relatively low height and

\\vhb\gbl\proj\Boston\14510.00 MLF Daylight\Graphics\FIGURES\308 Bremen St Daylighting.dwg

Existing

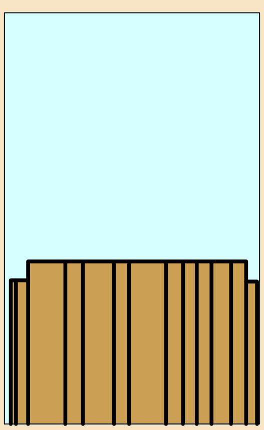
Obstruction of Skyplane = 3.6%

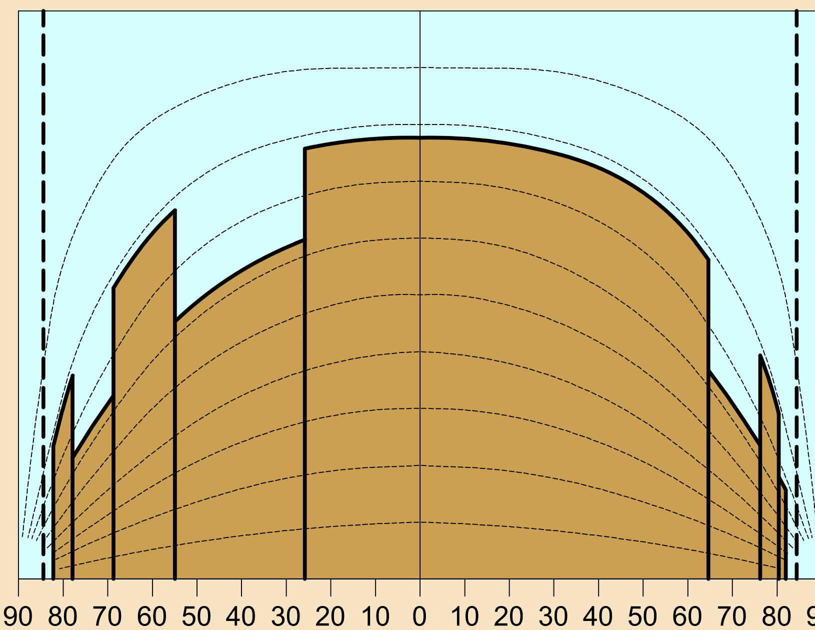




Proposed

Obstruction of Skyplane = 66.2%





vhb

Figure 4.2-1

Daylight Analysis
Center of bremen Street

308 Bremen Street
East Boston, Massachusetts

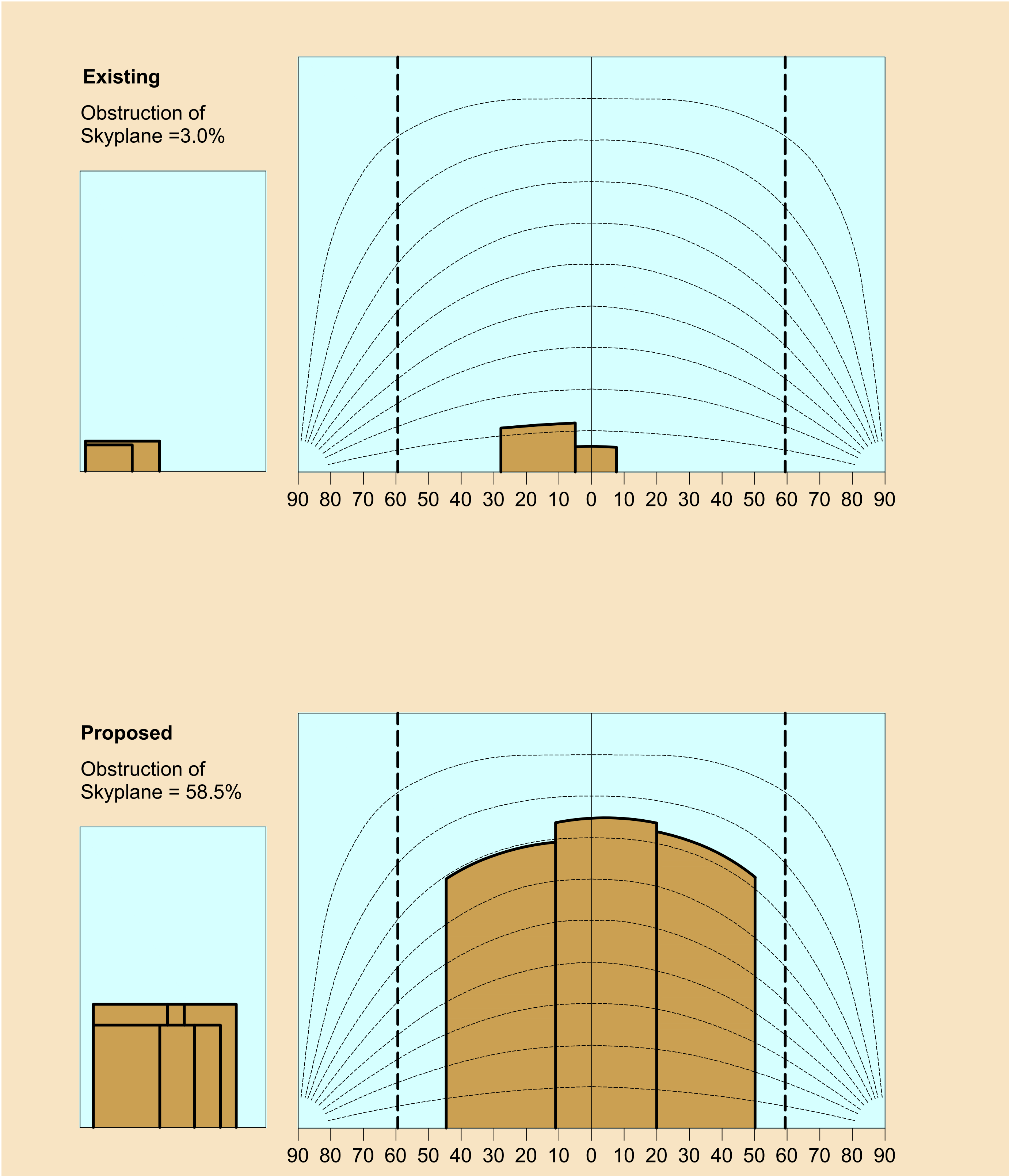


Figure 4.2-2

Centerline of Brooks Street
Daylight Analysis

308 Bremen Street
East Boston, Massachusetts

density of these structures, only three to four percent of daylight is obstructed when viewed from the adjacent public ways.

Daylight Analysis - Build Conditions

Under the Build Condition, there would be an increase in obstruction of the skydome to *66.2 percent* along Bremen Street, and *58.5 percent* along Brooks Street. This effect is to be expected when replacing the existing one to three story buildings with a new development of 5-6 stories.

4.3 Air Quality

Tech Environmental, Inc. performed air quality analyses for the Proposed Project (the "Project") to be located at 282-308 Bremen Street, East Boston, MA. These analyses consisted of: 1) an evaluation of existing air quality; 2) an evaluation of potential carbon monoxide (CO) impacts from the operation of the Project's partially-enclosed parking garage, and 3) a microscale CO analysis for intersections in the Project area that meet the BPDA criteria for requiring such an analysis.

4.3.1 Existing Air Quality

The City of Boston is currently classified as being in attainment of the Massachusetts and National Ambient Air Quality Standards ("NAAQS") for all of the criteria air pollutants except ozone (see **Table 4.3-1**). These air quality standards have been established to protect the public health and welfare in ambient air, with a margin for safety.

The Massachusetts Department of Environmental Protection ("DEP") currently operates air monitors in various locations throughout the city. The closest, most representative, DEP monitors for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), coarse particulate matter (PM_{10}), lead, and ozone (O_3) are located at Harrison Avenue (Dudley Square). The closest, most representative, DEP monitor for fine particulate matter ($PM_{2.5}$) is located at North Street (North End).

Table 4.3-2 summarizes the DEP air monitoring data, for the most recent available, complete, three-year period (2015-2017), that are considered to be representative of the project area. **Table 4.3-2** shows that the existing air quality in the Project area is generally much better than the NAAQS. The highest impacts relative to a NAAQS are for ozone and $PM_{2.5}$. Ozone is a regional air pollutant on which the small amount of additional traffic generated by this Project will have an insignificant impact. The Project's operations will not have a significant impact on local $PM_{2.5}$ concentrations.

Table 4.3-1. Massachusetts and National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)
SO_2	1-hour[P] 24-hour[P] Annual[P] (Arithmetic Mean)	196[a] 365[b] 80
CO	1-hour[P] 8-hour[P]	40,000[b] 10,000[b]
NO_2	1-hour[P] Annual[P/S] (Arithmetic Mean)	188[c] 100
PM_{10}	24-hour[P/S]	150
$PM_{2.5}$	24-hour[P/S] Annual[P/S] (Arithmetic Mean)	35[d] 12[e,f]
O_3	8-hour[P/S]	147[g]
Pb	Rolling 3-Month Avg.[P/S] Calendar Quarter[P/S] (Arithmetic Mean)	0.15 1.5

P = primary standard; S = secondary standard.
[a] 99th percentile 1-hour concentrations in a year (average over three years).
[b] One exceedance per year is allowed.
[c] 98th percentile 1-hour concentrations in a year (average over three years).
[d] 98th percentile 24-hour concentrations in a year (average over three years).
[e] Three-year average of annual arithmetic means.
[f] As of March 18, 2013, the U.S. EPA lowered the $PM_{2.5}$ annual standard from 15 ug/m^3 to 12 ug/m^3.
[g] Three-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must not exceed 0.075 ppm (147 ug/m^3) (effective May 27, 2008) and the annual PM_{10} standard was revoked in 2006.

Table 4.3-2. Representative Existing Air Quality in the Project Area

Pollutant, Averaging Period	Monitor Location	Value ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS
CO, 1-hour	Harrison Avenue, Boston	2,758	40,000	7%
CO, 8-hour	Harrison Avenue, Boston	1,438	10,000	14%
NO_2, 1-hour	Harrison Avenue, Boston	92.8	188	49%
NO_2, Annual	Harrison Avenue, Boston	41.6	100	42%
Ozone, 8-hour	Harrison Avenue, Boston	120	137	87%
PM_{10}, 24-hour	Harrison Avenue, Boston	28	150	19%
$PM_{2.5}$, 24-hour	North Street, Boston	15.1	35	42%
$PM_{2.5}$, Annual	North Street, Boston	7.2	12	59%
Lead, Quarterly	Harrison Avenue, Boston	0.017	1.5	12%
SO_2, 1-hour	Harrison Avenue, Boston	15.8	197	8%

Source: MassDEP, http://www.mass.gov/eea/agencies/massdep/air/quality/air-monitoring-reports-and-studies.html, downloaded February 20, 2018.

Notes:

(1) Annual averages are highest measured during the most recent three-year period for which data are available (2015 - 2017). Values for periods of 24-hours or less are highest, second-highest over the three-year period unless otherwise noted.

(2) The eight-hour ozone value is the 3-year average of the annual fourth-highest values, the 24-hour $PM_{2.5}$ value is the 3-year average of the 98th percentile values, the annual $PM_{2.5}$ value is the 3-year average of the annual values – these are the values used to determine compliance with the NAAQS for these air pollutants.

(3) The one-hour NO_2 value is the -year average of the 98th percentile values and the one-hour SO_2 value is the -year average of the 99th percentile values.

(4) Three-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must not exceed 0.070 ppm (137 ug/m^3) (effective December 28, 2015); the annual PM_{10} standard was revoked in 2006 and the 3-hour SO_2 standard was revoked by the US EPA in 2010.

4.3.2 Impacts from Parking Garage

The Project includes a partially-enclosed parking garage designed to provide parking spaces for 42 vehicles. An analysis of the worst-case air quality impacts from the proposed parking garage was performed (see **Appendix B**). The procedures used for this analysis are consistent with U.S. EPA's Volume 9 guidance.[3] CO emissions from motor vehicles operating inside the garage were calculated and the CO concentrations surrounding the Project were determined based on morning and afternoon peak traffic periods.

[3] US EPA, "Guidelines for Air Quality Maintenance Planning and Analysis Volume 9 (Revised): Evaluating Indirect Sources," EPA-450/4-78-001, September 1978.

The objective of this analysis was to determine the maximum CO concentrations at the closest sensitive receptors surrounding the Project. These closest sensitive receptors include: air intakes located on the proposed building and nearby existing buildings, and pedestrians at ground level anywhere near the Project. The parking garage CO emissions were modeled using an U.S. EPA-approved air model.

Peak Garage Traffic Volumes

The peak morning and afternoon one-hour entering and exiting traffic volumes for the garage are shown in **Table 4.3-3**. The values are for vehicles entering and exiting the garage.

Table 4.3-3. Peak-Hour Garage Traffic Volumes

Period	Entering (vehicles/hour)	Exiting (vehicles/hour)	Total (vehicles/hour)
Morning Peak Hour	4	8	12
Afternoon Peak Hour	8	6	14

Source: Howard Stein Hudson

Motor Vehicle Emission Rates

The U.S. Environmental Protection Agency (EPA) MOVES2014b emission factor model was used to calculate single vehicle CO emissions rates, for a vehicle speed of 5 mph. The inputs to the MOVES2014b model followed the latest guidance from the Massachusetts Department of Environmental Protection (DEP) and were performed for the future traffic year of 2026. The CO emission rate calculated by MOVES2014b, for vehicles moving at 5 miles per hour (mph), was 3.045 grams per vehicle-mile for each entering and exiting vehicle. These emission rates apply to wintertime conditions when motor vehicle CO emissions are greatest due to cold temperatures. MOVES2014b model output is provided in the **Appendix B.**

To determine the maximum one-hour CO emissions generated by the vehicle traffic it was necessary to estimate the amount of time each motor vehicle will be in the parking garage with its engine running. To be conservative, it was assumed that every car entering the garage will travel to the furthest parking spot, and that the vehicles leaving the garage will have to travel the same distance from inside the garage to the exit. The calculations in **Appendix B** show the distance each vehicle was calculated to travel in the garage for the weekday afternoon peak period.

Peak Ambient CO Concentration

Worst-case concentrations of CO from the parking garage were predicted for locations around the buildings using AERMOD model (Version 18081) in screening-mode. The results of the air quality analysis for locations outside and around the buildings are summarized in **Table 4.3-4**. The results in **Table 4.3-4** represent all outside locations on and near the Project Site, including nearby building air intakes and nearby residences. **Appendix B** contains the AERMOD model output.

The AERMOD model in screening-mode was used to predict the maximum concentration of CO by modeling the partially-enclosed parking garage emissions as a horizontal point source using worst-case meteorological conditions for an urban area. The screening-mode option simulates modeling results predicted by AERMOD. The predicted concentrations presented here represent the worst-case air quality impacts from the parking garage at all locations on and around the Project.

AERMOD predicted that the maximum one-hour CO concentration from the parking garage will be 0.034 ppm (39.36 $\mu g/m^3$). This concentration represents the maximum CO concentration at any location surrounding the Project. AERSCREEN guidance allows the maximum eight-hour CO impact to be conservatively estimated by multiplying the maximum one-hour impact by a factor of 0.9 (i.e. the eight-hour impact is 90% of the one-hour impact). The maximum predicted eight-hour CO concentration was determined to be approximately 0.031 ppm (0.034 ppm x 0.9).

The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare in ambient air, with a margin for safety. The NAAQS for CO are 35 ppm for a one-hour average and 9 ppm for an eight-hour average. The Commonwealth of Massachusetts has established the same standards for CO. The CO background values of 2.4 ppm for a one-hour period and 1.3 ppm for an eight-hour period were added to the maximum predicted garage ambient impacts to represent the CO contribution from other, more distant, sources. With the background concentration added, the peak, total, one-hour and eight-hour CO impacts from the parking garage, at any location around the building, will be no larger than 2.43 ppm and 1.33 ppm, respectively. These maximum predicted total CO concentrations (garage exhaust impacts plus background) are safely in compliance with the NAAQS. This analysis demonstrates that the operation of the parking garage will not have an adverse impact on air quality.

Table 4.3-4. Peak Predicted Parking Garage Air Quality Impacts

Location	Peak Predicted One-Hour Impact (ppm)	One-Hour NAAQS (ppm)	Peak Predicted Eight-Hour Impact (ppm)	Eight-Hour NAAQS (ppm)
Outside – Surrounding the Building* (Parking Garage)	2.43**	35 (NAAQS)	1.33**	9 (NAAQS)

NAAQS = Massachusetts and National Ambient Air Quality Standards for CO (ppm = parts per million)
* Representative of maximum CO impact at all nearby residences, buildings, and sidewalks.
** Includes background concentrations of 2.2 ppm for the one-hour period and 1.1 ppm for the eight-hour period.

4.3.3 Microscale CO Analysis for Selected Intersections

The Boston Planning & Development Agency (BPDA) and the DEP typically require a microscale air quality analysis for any intersection in the Project study area where the level of service (LOS) is expected to deteriorate to D and the proposed project causes a 10% increase in traffic (unless the increase in traffic volume is less than 100 vehicles per hour (vph)), or where the level of service is E or F and the project contributes to a reduction in LOS. For such intersections, a microscale air quality analysis is required to examine the carbon monoxide (CO) concentrations at sensitive receptors near the intersection.

A microscale air quality analysis was not performed for this Project due to three of the four intersections will not have a LOS D or lower in the Build (2026) Condition, except for the Chelsea Street/Putnam Street intersection. The No-Build 2026 Condition for this intersection was already at LOS D and the proposed project will not cause a 10% increase in traffic. Furthermore, the increase in vehicle delays is less than one second due to the proposed project. **Table 4.3-5** shows a comparison of the Existing (2019) and Build (2026) LOS at the four intersections.

Table 4.3-5. Summary of Build Case Level of Service

Intersection	Existing LOS (AM/PM)	Build LOS (AM/PM)	Requires Analysis?
Chelsea Street/Brooks Street - signalized	A/A	A/A	NO
Bremen Street/Brooks Street - unsignalized	B/B	B/B	NO
Bremen Street/Putnam Street - unsignalized	B/B	B/B	NO
Chelsea Street/Putnam Street - unsignalized	C/C	C/D	NO*

The LOS shown represents the overall delay at each intersection.
*Less than a 10% increase in traffic from the proposed project.

Source: Howard Stein Hudson

Conclusions

The motor vehicle trip generation from the Project will not have a significant impact on motor vehicle delays and air pollutant emissions at the analyzed intersections. Therefore, the motor vehicle traffic generated by the Project will not have a significant impact on air quality at any intersection in the Project area and a microscale air quality analysis is not necessary for this Project.

4.4 Noise Impacts

Tech Environmental, Inc., performed a noise study to determine whether the operation of the proposed Project will comply with the City of Boston Noise Regulations and the Massachusetts Department of Environmental Protection ("DEP") Noise Policy.

4.4.1 Common Measures of Community Noise

The unit of sound pressure is the decibel (dB). The decibel scale is logarithmic to accommodate the wide range of sound intensities to which the human ear is subjected. A property of the decibel scale is that the sound pressure levels of two separate sounds are not directly additive. For example, if a sound of 70 dB is added to another sound of 70 dB, the total is only a 3-decibel increase (or 73 dB), not a doubling to 140 dB. Thus, every 3-dB increase represents a doubling of sound energy. For broadband sounds, a 3-dB change is the minimum change perceptible to the human ear. **Table 4.4-1** gives the perceived change in loudness of different changes in sound pressure levels.[4]

[4] American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 1989 ASHRAE Handbook--Fundamentals (I-P) Edition, Atlanta, GA, 1989.

Table 4.4-1. Subjective Effects of Changes in Sound Pressure Levels

Change in Sound Level	Apparent Change in Loudness
3 dB	Just perceptible
5 dB	Noticeable
10 dB	Twice (or half) as loud

Non-steady noise exposure in a community is commonly expressed in terms of the A-weighted sound level (dBA); A-weighting approximates the frequency response of the human ear. Levels of many sounds change from moment to moment. Some are sharp impulses lasting 1 second or less, while others rise and fall over much longer periods of time. There are various measures of sound pressure designed for different purposes. To establish the background ambient sound level in an area, the L_{90} metric, which is the sound level exceeded 90 percent of the time, is typically used. The L_{90} can also be thought of as the level representing the quietest 10 percent of any time period. Similarly, the L_{10} can also be thought of as the level representing the quietest 90 percent of any time period. The L_{10} and L_{90} are broadband sound pressure measures, i.e., they include sounds at all frequencies.

Sound level measurements typically include an analysis of the sound spectrum into its various frequency components to determine tonal characteristics. The unit of frequency is Hertz (Hz), measuring the cycles per second of the sound pressure waves, and typically the frequency analysis examines nine octave bands from 32 Hz to 8,000 Hz. A source is said to create a pure tone if acoustic energy is concentrated in a narrow frequency range and one octave band has a sound level 3 dB greater than both adjacent octave bands.

The acoustic environment in an urban area such as the Project area results from numerous sources. Observations show that major contributors to the background sound level in the Project area include motor vehicle traffic on local and distant streets, aircraft over-flights, mechanical equipment on nearby buildings, nature noises such as insects, tree frogs, small animals, and general city noises such as street sweepers and police/fire sirens. Typical sound levels associated with various activities and environments are presented in **Table 4.4-2**.

4.4.2 Noise Regulations

<u>Commonwealth Noise Policy</u>

The DEP regulates noise through 310 CMR 7.00, “Air Pollution Control.” In these regulations “air contaminant” is defined to include sound and a condition of “air pollution” includes the presence of an air contaminant in such concentration and duration as to “cause a nuisance” or “unreasonably interfere with the comfortable enjoyment of life and property.”

Regulation 7.10 prohibits "unnecessary emissions" of noise. The DEP DAQC Policy Statement 90-001 (February 1, 1990) interprets a violation of this noise regulation to have occurred if the noise source causes either:

1. An increase in the broadband sound pressure level of more than 10 dBA above the ambient level; or
2. A "pure tone" condition.

The ambient background level is defined as the L_{90} level as measured during equipment operating hours. A "pure tone" condition occurs when any octave band sound pressure level exceeds both of the two adjacent octave band sound pressure levels by 3 dB or more.

The DEP does not regulate noise from motor vehicles accessing a site or the equipment backup notification alarms. Therefore, the provisions described above only apply to a portion of the sources that may generate sound following construction of the Project.

Local Regulations

The City of Boston Environment Department regulates noise through the Regulations for the Control of Noise as administered by the Air Pollution Control Commission. The Project is located in an area consisting of commercial and residential uses. The Project will have low-rise residential uses to the north, east, and south. The Project must comply with Regulation 2.2 for noise levels in Residential Zoning Districts at these residential locations**. Table 4.4-3** lists the maximum allowable octave band and broadband sound pressure levels for residential and business districts. Daytime is defined by the City of Boston Noise Regulations as occurring between the hours of 7:00 a.m. and 6:00 p.m. daily except Sunday. Compliance with the most restrictive nighttime residential limits will ensure compliance for other land uses with equal or higher noise limits.

Table 4.4-2. Common Indoor and Outdoor 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 1m
	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	Average Whisper
		15	Broadcast and Recording Studios
	63	10	
		5	Human Breathing
Reference Pressure Level	20	0	Threshold of Hearing

Notes: μPa, or micro-Pascals, describes sound pressure levels (force/area). DBA, or A-weighted decibels, describes sound pressure on a logarithmic scale with respect to 20 μPa (reference pressure level).

Table 4.3-3. Maximum Allowable Sound Pressure Levels (dB) City of Boston

Octave Band (Hz)	Zoning District		
	Residential (Daytime)	Residential (All Other Times)	Business (anytime)
32 Hz	76	68	79
63 Hz	75	67	78
125 Hz	69	61	73
250 Hz	62	52	68
500 Hz	56	46	62
1000 Hz	50	40	56
2000 Hz	45	33	51
4000 Hz	40	28	47
8000 Hz	38	26	44
Broadband (dBA)	**60**	**50**	**65**

4.4.3 Pre-Construction Sound Level Measurements

Existing baseline sound levels in the Project area were measured during the quietest overnight period when human activity and street traffic were at a minimum, and when the Project's mechanical equipment (the principal sound sources) could be operating. Since the Project's mechanical equipment may operate at any time during a 24-hour day, a weekday between 11:00 p.m. and 4:00 a.m. was selected as the worst-case time period, i.e., the time period when Project-related sounds may be most noticeable due to the quieter background sound levels. Establishing an existing background (L_{90}) during the quietest hours of the facility operation is a conservative approach for noise impact assessment and is required by the DEP Noise Policy.

The nighttime noise measurement locations are as follows (see the **Figure 1** in the **Appendix C**):

Monitoring Location #1: 23 Brooks Street

Monitoring Location #2: 285 Chelsea Street

Monitoring Location #3: 294 Bremen Street

Broadband (dBA) and octave band sound level measurements were made with a Bruel and Kjaer (B&K) Model 2250 environmental sound level analyzer, at each monitoring location, for a duration of approximately thirty minutes. The full octave band frequency analysis was performed on the frequencies spanning 16 to 16,000 Hertz. A time-integrated statistical analysis of the data used to quantify the sound variation was also performed, including the calculation of the L_{90}, which is used to set the ambient background sound level.

The B&K model 2250 is equipped with a ½" precision condenser microphone and has an operating range of 5 dB to 140 dB and an overall frequency range of 3.5 Hz to 20,000 Hz. This meter meets or exceeds all requirements set forth in the ANSI S1.4-1983 Standards for Type 1 quality and accuracy and the State and City requirements for sound level instrumentation. Prior to any measurements, this sound analyzer was calibrated with an ANSI Type 1 calibrator that has an accuracy traceable to the National Institute of Standards and Technology (NIST). During all measurements, the B&K 2250 was tripod mounted at approximately five feet above the ground in open areas away from vertical reflecting surfaces.

The sound level monitoring was conducted early Friday morning, February 22, 2019. Weather conditions during the sound survey were conducive to accurate sound level monitoring: the temperature was 43°F, the skies were partly cloudy, and the winds were 0 to 10 mph, from the northwest. The microphone of the sound level analyzer was fitted with a 7-inch windscreen to negate any effects of wind-generated noise.

The nighttime sound level measurements taken in the vicinity of the Project Site reveal sound levels that are typical for an urban area. A significant source of existing sound at all locations is motor vehicle traffic on nearby highways and local streets, residential and commercial air handling equipment, and aircraft over-flights.

The results of the nighttime baseline sound level measurements are presented in **Table 4.4-4**, and the complete measurement printouts are provided in **Appendix C**. The nighttime background L_{90} level was 42.5 dBA at Location #1, 49.0 dBA at Location #2, and 41.6 at Location #3. The octave band data in **Table 4.4-4** show that no pure tones were detected in the nighttime noise measurements.

Noise monitoring at the Project Site during the evening peak traffic period was used to evaluate the existing ambient sound levels and to evaluate conformance with the Site Acceptability Standards established by HUD for residential development. The purpose of the HUD guidelines is to provide standards for determining the acceptability of residential project locations with regards to existing sound levels. The HUD criteria regarding the day-night average sound level (L_{dn}) are listed below. These standards apply to L_{dn} measurements taken several feet from the building in the direction of the predominant source of noise.

- Normally Acceptable – L_{dn} not exceeding 65 dBA
- Normally Unacceptable – L_{dn} above 65 dBA but not exceeding 75 dBA
- Unacceptable – L_{dn} above 75 dBA.

These HUD standards do not apply to this Project, but are used as guidance regarding the suitability of the Project area with regard to background sound levels.

Daytime sound level measurements were taken to help estimate the L_{dn} for the Project Site. A 30-minute sound level measurement was taken during the morning, on Wednesday, February 6, 2019 between 8:16 a.m. and 8:46 a.m. at 294 Bremen Street (the closest location to the project). The weather conditions during the sound survey were conducive to accurate sound level monitoring: the skies were clear, and the winds were approximately 0-5 mph. The microphone of the sound level analyzer was fitted with a 7-inch windscreen to negate any effects of wind-generated noise.

The daytime sound level measurements taken in the vicinity of the Project Site reveal sound levels that are typical for an urban area. The main sources of noise during the evening period sound level measurements were motor vehicle traffic on nearby local streets, public buses and pedestrians.

The L_{eq} measured during the morning period was 64.3 dBA at Bremen Street. The L_{eq} sound level measured during the nighttime at the same location was 61.8 dBA. Using both the daytime and nighttime L_{eq} sound levels, the calculated L_{dn} for the site is 68.6 dBA, which is slightly above the HUD guideline noise limit of 65 dBA primarily due to the traffic on Bremen Street and on the nearby highway.

It is assumed that standard building construction practices will result in at least a 30-dBA reduction of sound from outdoor sound levels. The Proponent will incorporate sound mitigation, as necessary, to assure that the typical urban sound sources do not result in noise impacts greater than 45 dBA inside the residential units closest to the neighboring streets.

Table 4.4-4. Nighttime Baseline Sound Level Measurements, February 22, 2019

Sound Level Measurement	(Location #1) 23 Brooks Street 12:00 a.m. - 12:30 a.m.	(Location #2) 285 Chelsea Street 12:35 a.m.- 1:05 a.m.	(Location #3) 294 Bremen Street 1:18 a.m. - 1:48 a.m.
Broadband (dBA)	57.7	62.2	57.9
Background (L_{90})	43.4	49.0	41.6
Octave Band L_{90} (dB)			
16 Hz	50.0	57.1	52.5
32 Hz	52.9	58.0	54.1
63 Hz	52.8	54.9	50.3
125 Hz	47.5	49.2	45.5
250 Hz	43.4	44.3	43.1
500 Hz	41.8	44.8	39.1
1000 Hz	38.6	45.8	36.6
2000 Hz	30.2	38.6	30.9
4000 Hz	19.4	24.4	23.3
8000 Hz	15.2	15.5	14.4
16000 Hz	10.8	11.4	11.0
Pure Tone?	No	No	No

4.4.4 Reference Data and Candidate Mitigation Measures

The mechanical systems for the Proposed Project are in the early design stage. Typical sound power data for the equipment of the expected size and type for the Project have been used in the acoustic model to represent the Project's mechanical equipment. The sound levels from all potential significant Project noise sources are discussed in this section.

The design for the Proposed Project is expected to include the following significant mechanical equipment:

- One-Hundred and Sixty-Nine (169) Packaged HVAC Units

The equipment listed above, which will be located on the building rooftop, was included in the noise impact analysis. The Project's traffic was not included in the noise analysis because motor vehicles are exempt under both the City of Boston and Massachusetts DEP noise regulations.

The sound generation profiles for the mechanical equipment noise sources operating concurrently under full-load conditions were used to determine the maximum possible resultant sound levels from the Project Site as a whole, to define a worst-case scenario. To be in compliance with City and DEP regulations, the resultant sound level must not exceed the allowable octave band limits in the City of Boston noise regulation and must be below the allowable incremental noise increase, relative to existing noise levels, as required in the DEP Noise Policy.

This sound level impact analysis was performed using sound generation data for representative equipment to demonstrate compliance with noise regulations. As the building design evolves, the sound generation for the actual equipment selected may differ from the values that were utilized for the analysis.

4.4.5 Calculated Future Sound Levels

Methodology

Future maximum sound levels at the upper floors of all existing residences bordering the Project, and at the nearest residential property lines, were calculated with acoustic modeling software assuming simultaneous operation of all mechanical equipment at their maximum loads.

The Cadna-A computer program, a comprehensive 3-dimensional acoustical modeling software package was used to calculate Project generated sound propagation and attenuation.[5] The model is based on ISO 9613, an internationally recognized standard specifically developed to ensure the highly accurate calculation of environmental noise in an outdoor environment. ISO 9613 standard incorporates the propagation and attenuation of sound energy due to divergence with distance, surface and building reflections, air and ground absorption, and sound wave diffraction and shielding effects caused by barriers, buildings, and ground topography.

Receptors

The closest/worst-case sensitive (residential) location is to the west of the project area at 255 Chelsea Street. This location was selected based on the proximity of the equipment (smaller distances correspond to larger noise impacts) and the amount of shielding by the project (residences further from the project will experience less shielding from the Project's rooftop mechanical equipment, which may result in larger potential noise impacts from the Project). This location is expected to receive the largest sound level impacts from the Project's rooftop mechanical equipment. It can be classified as a residential zone.

The sound level impacts from the building's mechanical equipment were predicted at the closest residential location, as well as additional residential uses to the south (4 Brooks Street & 241 Chelsea Street), west (249 Chelsea Street, 261 Chelsea Street, 271 Chelsea Street & 277 Chelsea Street), and north (285 Chelsea Street & 310 Bremen Street), and at the Bremen Street Park to the east. Figure 2 in Appendix C shows the locations of the modeled noise receptors. Noise impacts at other nearby noise-sensitive locations (residences, parks, etc.) farther from the Project Site will be less than those predicted for these receptors.

[5] Cadna-A Computer Aided Noise Abatement Program, Version 4.3

4.4.6 Compliance with State and Local Noise Standards

The City of Boston and DEP noise standards apply to the operation of the mechanical equipment at the proposed Project. The details of the noise predictions are presented in **Tables 4.4-5** through **4.4-14**. The sound impact analysis includes the simultaneous operation of the Project's rooftop HVAC equipment. The predicted sound levels are worst-case predictions that represent all hours of the day, as the analysis assumes full operation of the mechanical equipment 24-hours a day. The typical sound level impacts from the mechanical equipment will likely be lower than what is presented here, since most of the mechanical equipment will operate at full-load only during certain times of the day and during the warmer months of the year, it is not likely that all of the mechanical equipment will operate at the same time. Sound level impacts at locations farther from the Project (e.g. other residences, etc.) will be lower than those presented in this report.

City of Boston Noise Standards

The noise impact analysis results, presented in **Tables 4.4-5** through **4.4-14**, reveal that the sound level impact at the upper floors of the closest residences will be between 37.4 and 46.1 dBA. The smallest sound level impact of 37.4 dBA is predicted to occur at 241 Chelsea Street. The largest sound level impact of 46.1 dBA is predicted to occur at 255 Chelsea Street. Noise impacts predicted at all locations are in compliance with the City of Boston's nighttime noise limit (50 dBA) for a residential area. Note that sound levels from the Project will be below the residential nighttime limits at all times. The results also demonstrate compliance with the City of Boston, residential, non-daytime, octave band noise limits at the closest locations.

The City of Boston noise limits for business areas are significantly higher than the nighttime noise limits for residential areas (see **Table 4.4-3**). The Project will also easily comply with the City of Boston business area noise limits at all surrounding commercial properties.

Massachusetts DEP Noise Regulations

The predicted sound level impacts at the worst-case residential locations were added to the measured L_{90} value of the quietest daily hour to test compliance with DEP's noise criteria. Assuming the Project's mechanical noise is constant throughout the day, the Project will cause the largest increase in sound levels during the period when the lowest background noise occurs. Minimum background sound levels (diurnal) typically occur between 12:00 a.m. and 5:00 a.m.

The predicted sound level impacts at the upper floors of the closest residences were added to the L_{90} values measured during the period with the least amount of background noise to test compliance with DEP's noise criteria. The predicted noise impacts at the property line and the closest residences were added to the most-representative measured L_{90} values to determine the largest possible increase in the sound level at each location during the quietest hour at the Project Site.

As shown in **Tables 4.4-5** through **4.4-14**, the Project is predicted to produce a less than 5 dBA change in the background sound levels at all modeled locations. Therefore, the Project's worst-case sound level impacts during the quietest nighttime periods will be in compliance with the Massachusetts DEP allowed noise increase of 10 dBA. The noise predictions for each octave band indicate that the mechanical equipment will not create a pure tone condition at any location.

Table 4.4-5. Estimated Future Sound Level Impacts – Anytime, 4 Brooks Street – Location R1

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	57
63 Hz	67	52
125 Hz	61	47
250 Hz	52	40
500 Hz	46	35
1000 Hz	40	30
2000 Hz	33	23
4000 Hz	28	15
8000 Hz	26	3
Broadband (dBA)	**50**	**38**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #3)	41.6
282-308 Bremen Street Project*	37.8
Calculated Combined Future Sound Level	43.1
Calculated Incremental Increase	+1.5
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-6. Estimated Future Sound Level Impacts – Anytime, 241 Chelsea Street – Location R2

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	58
63 Hz	67	53
125 Hz	61	47
250 Hz	52	40
500 Hz	46	34
1000 Hz	40	29
2000 Hz	33	23
4000 Hz	28	16
8000 Hz	26	5
Broadband (dBA)	**50**	**37**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	43.4
282-308 Bremen Street Project*	37.4
Calculated Combined Future Sound Level	44.4
Calculated Incremental Increase	+1.0
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-7. Estimated Future Sound Level Impacts – Anytime, 249 Chelsea Street – Location R3

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	60
63 Hz	67	57
125 Hz	61	53
250 Hz	52	47
500 Hz	46	43
1000 Hz	40	38
2000 Hz	33	30
4000 Hz	28	21
8000 Hz	26	7
Broadband (dBA)	**50**	**45**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	43.4
282-308 Bremen Street Project*	44.7
Calculated Combined Future Sound Level	47.1
Calculated Incremental Increase	+3.7
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-8. Estimated Future Sound Level Impacts – Anytime, 255 Chelsea Street (Closest/Worst Case Residence) – Location R4

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	62
63 Hz	67	58
125 Hz	61	54
250 Hz	52	48
500 Hz	46	45
1000 Hz	40	39
2000 Hz	33	32
4000 Hz	28	23
8000 Hz	26	10
Broadband (dBA)	**50**	**46**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	43.4
282-308 Bremen Street Project*	46.1
Calculated Combined Future Sound Level	48.0
Calculated Incremental Increase	+4.6
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-9. Estimated Future Sound Level Impacts – Anytime, 261 Chelsea Street – Location R5

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	61
63 Hz	67	57
125 Hz	61	53
250 Hz	52	48
500 Hz	46	44
1000 Hz	40	38
2000 Hz	33	31
4000 Hz	28	22
8000 Hz	26	9
Broadband (dBA)	**50**	**45**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	43.4
282-308 Bremen Street Project*	45.3
Calculated Combined Future Sound Level	47.5
Calculated Incremental Increase	+4.1
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-10. Estimated Future Sound Level Impacts – Anytime, 271 Chelsea Street – Location R6

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	59
63 Hz	67	55
125 Hz	61	49
250 Hz	52	42
500 Hz	46	37
1000 Hz	40	32
2000 Hz	33	25
4000 Hz	28	18
8000 Hz	26	7
Broadband (dBA)	**50**	**40**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #2)	49.0
282-308 Bremen Street Project*	39.6
Calculated Combined Future Sound Level	49.5
Calculated Incremental Increase	+0.5
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-11. Estimated Future Sound Level Impacts – Anytime, 277 Chelsea Street – Location R7

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	61
63 Hz	67	57
125 Hz	61	53
250 Hz	52	46
500 Hz	46	42
1000 Hz	40	36
2000 Hz	33	27
4000 Hz	28	19
8000 Hz	26	8
Broadband (dBA)	**50**	**44**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #2)	49.0
282-308 Bremen Street Project*	43.7
Calculated Combined Future Sound Level	50.1
Calculated Incremental Increase	+1.1
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-12. Estimated Future Sound Level Impacts – Anytime, 285 Chelsea Street – Location R8

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	59
63 Hz	67	55
125 Hz	61	51
250 Hz	52	45
500 Hz	46	40
1000 Hz	40	35
2000 Hz	33	26
4000 Hz	28	17
8000 Hz	26	4
Broadband (dBA)	**50**	**42**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #2)	49.0
282-308 Bremen Street Project*	42.3
Calculated Combined Future Sound Level	49.8
Calculated Incremental Increase	+0.8
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-13. Estimated Future Sound Level Impacts – Anytime, 310 Bremen Street – Location R9

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	60
63 Hz	67	55
125 Hz	61	49
250 Hz	52	42
500 Hz	46	36
1000 Hz	40	30
2000 Hz	33	24
4000 Hz	28	17
8000 Hz	26	6
Broadband (dBA)	**50**	**39**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #3)	41.3
282-308 Bremen Street Project*	39.0
Calculated Combined Future Sound Level	43.5
Calculated Incremental Increase	+1.9
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.4-14. Estimated Future Sound Level Impacts – Anytime, Bremen Street Park – Location R10

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	57
63 Hz	67	53
125 Hz	61	49
250 Hz	52	43
500 Hz	46	39
1000 Hz	40	33
2000 Hz	33	25
4000 Hz	28	15
8000 Hz	26	1
Broadband (dBA)	**50**	**40**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #3)	41.6
282-308 Bremen Street Project*	40.4
Calculated Combined Future Sound Level	44.1
Calculated Incremental Increase	+2.5
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

4.4.7 Conclusions

Sound levels at all nearby sensitive locations and at all property lines will fully comply with the most stringent City of Boston and DEP daytime and nighttime sound level limits.

This acoustic analysis demonstrates that the Project’s design will meet the applicable acoustic criteria.

4.5 Stormwater Management and Water Quality

The Proposed Project is expected to substantially improve the water quality (See **Section 6.5**) and will meet MassDEP stormwater standards and Boston Water and Sewer Commission (BWSC) Site Plan requirements. The existing combined sewer in Bremen Street appears to be of adequate capacity to service the needs of the Project. The Project will meet or reduce the existing peak rates of stormwater discharge and will improve the stormwater quality and reduce the quantity of stormwater runoff being discharged to the City storm drain system through the installation of on-site infiltration systems. Per BWSC requirements, the equivalent of 1-inch of rainfall over the sites' impervious areas will be stored and recharged.

In addition to the installation of on-site infiltration systems, stormwater runoff will be treated using deep sump hooded catch basins and manholes and, if necessary, stormwater quality treatment units to achieve the required pretreatment and reductions. A stormwater operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management systems.

4.6 Solid Waste

During the preparation of the Site, debris from the buildings and parking lots will be removed from the Project Site. The Proponent will ensure that waste removal and disposal during construction and operation will be in conformance with the City and DEP's Regulations for Solid Waste.

Upon completion of construction, the Project is estimated to generate approximately 231 tons of solid waste per year, based on the assumption that each of the 165 units will each generate approximately 1.4 tons per year. A significant portion of the waste will be recycled. The project will also include ambitious goals for construction waste management in order to meet the requirements for the LEED™ rating system. This strategy will divert demolition and construction waste by reusing and recycling materials.

In order to meet the requirements for the Boston Environmental Department and the LEED™ rating system, the Project will include space dedicated to the storage and collection of recyclables. The recycling program will meet or exceed the City's guidelines, and provide-areas for waste paper and newspaper, metal, glass, and plastics (21 through 27, co-mingled).

4.7 Geotechnical/Groundwater Impacts Analysis

Northeast Geotechnical, Inc., the Project's geotechnical engineer, completed a "Preliminary Engineering Evaluation" (the "Report") for the Proposed Site on October 19, 2018. The existing site is currently occupied by existing buildings and pavement. The buildings will be raised to accommodate the project.

Based on the results of the two test borings performed at the project site, urban fill was encountered to depths of approximately 8-10 feet below grade overlaying apparent natural organic soils which were about 2-5+ feet thick. The organics were underlain by approximately 12-13 feet of natural sand with varying amounts of silt, which was then underlain by natural silty clay deposits in which the borings were terminated at a depth of about 47 +/-feet to 52 +/- feet below the ground surface. Groundwater was encountered in both of the borings in the fill deposits at depths of approximately 3+/- feet to 5+/- feet below the existing ground surface.

The geotechnical engineer's preliminary opinion is that existing fill materials and buried organic soils are not suitable to support a new building structure at the site, with a suitable option suggested instead including constructing a rammed aggregate piers and replacement of suitable structural fill material. The installation of rammed aggregate piers would typically allow for conventional shallow spread footings and slab on grade construction. As an alternative, it is also suggested to support conventional spread footings and a slab on grade with rigid inclusions. Off-site structural fill will likely be required for backfilling because of the need to replace existing fill materials.

4.8 Construction Impact

The following section describes impacts likely to result from the 282-308 Bremen Street Proposed Project construction and the steps that will be taken to avoid or minimize environmental and transportation-related impacts. The Proponent will employ a construction manager that will be responsible for developing a construction phasing and staging plan and for coordinating construction activities with all appropriate regulatory agencies. The Project's geotechnical consultant will provide consulting services associated with foundation design recommendations, prepare geotechnical specifications, and review the construction contractor's proposed procedures.

4.8.1 Construction Management Plan

The Proponent will comply with applicable state and local regulations governing construction of the Project. The Proponent will require that the general contractor comply with the Construction Management Plan, ("CMP") developed in consultation with and approved by the Boston Transportation Department ("BTD"), prior to the commencement of construction. The construction manager will be bound by the CMP, which will establish the guidelines for the duration of the Project and will include specific mitigation measures and staging plans to minimize impacts on abutters.

Proper pre-construction planning with the neighborhood will be essential to the successful construction of this Project. Construction methodologies that will ensure safety will be employed, and signage will include construction manager contact information with emergency contact numbers. The Proponent will also coordinate construction with other ongoing projects in the neighborhood.

4.8.2 Proposed Construction Program

Construction Activity Schedule

The construction period for the Proposed Project is expected to last approximately 20 months, beginning in the 2nd Quarter 2020 and reaching completion in the 1st Quarter 2022. The City of

Boston Noise and Work Ordinances will dictate the normal work hours, which will be from 7:00 AM to 6:00 PM, Monday through Friday.

Perimeter Protection/Public Safety

The CMP will describe any necessary sidewalk closures, pedestrian re-routings, and barrier placements and/or fencing deemed necessary to ensure safety around the Site perimeter. If possible, the sidewalk will remain open to pedestrian traffic during the construction period. Barricades and secure fencing will be used to isolate construction areas from pedestrian traffic. In addition, sidewalk areas and walkways near construction activities will be well marked and lighted to ensure pedestrian safety.

Proper signage will be placed at every corner of the Project as well as those areas that may be confusing to pedestrians and automobile traffic.

The Proponent will continue to coordinate with all pertinent regulatory agencies and representatives of the surrounding neighborhoods to ensure they are informed of any changes in construction activities.

4.8.3 Construction Traffic Impacts

Construction Vehicle Routes

Estimated truck deliveries and routes are identified in at the end of this section. Specific truck routes will be established with BTD through the CMP. These established truck routes will prohibit travel on any residential side streets. Construction contracts will include clauses restricting truck travel to BTD requirements. Maps showing approved truck routes will be provided to all suppliers, contractors, and subcontractors. It is anticipated that all deliveries will be via Bremen Street direct to the site.

Construction Worker Parking

The number of workers required for construction of the Project will vary during the construction period. However, it is anticipated that all construction workers will arrive and depart prior to peak traffic periods.

Limited parking in designated areas of the Project Site and lay-down area(s) will be allowed. Parking will be discouraged in the immediate neighborhood. Further, public transit use will be encouraged with the Proponent and construction manager working to ensure the construction workers are informed of the public transportation options serving the area. Terms and conditions related to worker parking will be written into each subcontractor’s contract. The contractor will provide a weekly orientation with all new personnel to ensure enforcement of this policy.

Pedestrian Traffic

The Site abuts sidewalks on two streets. Pedestrian traffic may be temporarily impacted in these areas. The Construction Manager will minimize the impact the construction of the proposed building will have and the adjacent sidewalks. The contractor will implement a plan that will clearly denote all traffic patterns. Safety measures such as jersey barriers, fencing, and signage will be used to direct pedestrian traffic around the construction site and to secure the work area.

4.8.4 Construction Environmental Impacts and Mitigation

Construction Air Quality

Construction activities may generate fugitive dust, which will result in a localized increase of airborne particle levels. Fugitive dust emission from construction activities will depend on such factors as the properties of the emitting surface (e.g. moisture content), meteorological variables, and construction practices employed.

To reduce the emission of fugitive dust and minimize impacts on the local environment the construction contractor will adhere to a number of strictly enforceable mitigation measures. These measures may include:

- Using wetting agents to control and suppress dust from construction debris;
- Ensuring that all trucks traveling to and from the Project Site will be fully covered;
- Removing construction debris regularly;
- Monitoring construction practices closely to ensure any emissions of dust are negligible;
- Cleaning streets and sidewalks to minimize dust and dirt accumulation;
- Monitoring construction activities by the job site superintendent and safety officer; and
- Wheel-washing trucks before they leave the Project Site during the excavation phase.

Construction Noise Impacts

To reduce the noise impacts of construction on the surrounding neighborhood, a number of noise mitigation measures will be included in the CMP. Some of the measures that may be taken to ensure a low level of noise emissions include:

- Initiating a proactive program for compliance to the City of Boston’s noise limitation impact;
- Scheduling of work during regular working hours as much as possible;
- Using mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on continuously operating equipment, such as air compressors and welding generators;

- Scheduling construction activities so as to avoid the simultaneous operation of the noisiest construction activities;
- Turning off all idling equipment;
- Reminding truck drivers that trucks cannot idle more than five (5) minutes unless the engine is required to operate lifts of refrigeration units;
- Locating noisy equipment at locations that protect sensitive locations and neighborhoods through shielding or distance;
- Installing a site barricade at certain locations;
- Identifying and maintaining truck routes to minimize traffic and noise throughout the project;
- Replacing specific construction techniques by less noisy ones where feasible-e.g., using vibration pile driving instead of impact driving if practical and mixing concrete off-site instead of on-site; and
- Maintaining all equipment to have proper sound attenuation devices.

4.8.5 Rodent Control

The City of Boston enforces the requirements established under Massachusetts State Sanitary Code, Chapter 11, 105 CMR 410.550. This policy establishes that the elimination of rodents is required for issuance of any building permits. During construction, rodent control service visits will be made by a certified rodent control firm to monitor the situation.

5.0 HISTORIC RESOURCES COMPONENT

5.1 Historic Resources Within the Project Site

The Proposed Project site is located in East Boston. The current site has for the most part been used for auto repair facilities and also is occupied by a multi-family building along Bremen Street.

An historical review completed in the Phase I Environmental Site Assessment, reported that as early as 1888, the southern half of the site was developed with several structures which included a carriage house and stables, with several residential buildings occupying the site by 1900. With the exception of the current remaining residential building all of the former residential buildings were razed by the early 1990's. Historical commercial use of the Site through the 1900's included junk shops, a cannery, a tin shop, burlap bag and lead warehouse, office space, a column and iron works and a carpenter. Gino's Auto Body has occupied the Site from the early 1950's, and the Site building currently occupied by Braz Motor has been used for auto repair since the early 1990's.

5.2 Historic Resources within the Vicinity of the Project Site

The historic resources within one-quarter-mile radius of the Proposed Project are summarized in **Table 5-1** below.

Table 5-1. Historic Resources in the Vicinity of the Project Site

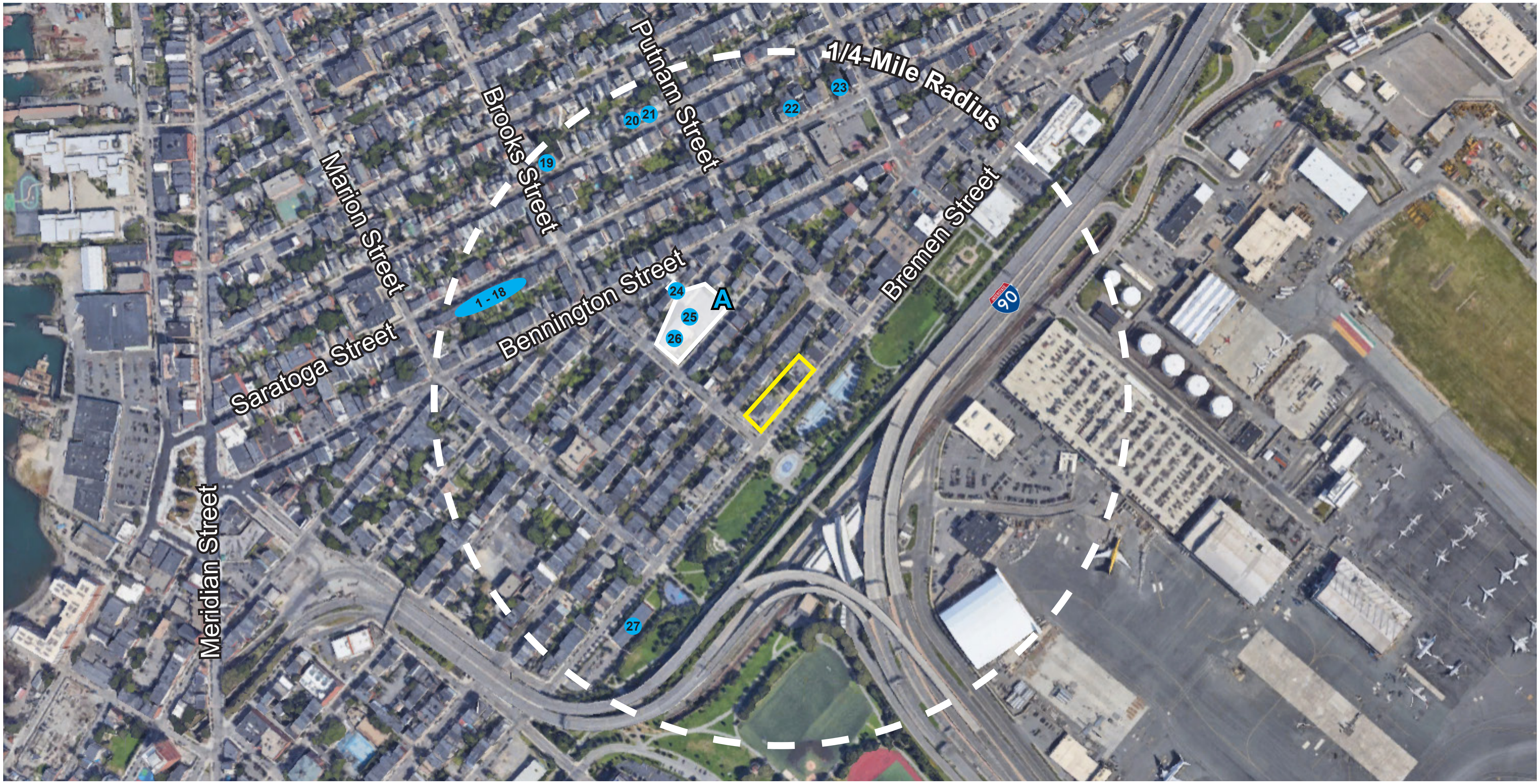
Key to Historic Resources in Figure 5-1	Historic Resource	Source of Listing
Properties Included the MA Inventory of Historical and Archaeological Assets		
1	113 Saratoga Street	MHC Inventory
2	Joseph H. Warren Row House	MHC Inventory
3	Oscar A. Gould Row House	MHC Inventory
4	Erastus O. Emery Row House	MHC Inventory
5	121 Saratoga Street	MHC Inventory
6	John Davis Row House	MHC Inventory
7	125 Saratoga Street	MHC Inventory
8	George W. Studley Row House	MHC Inventory
9	129 Saratoga Street	MHC Inventory

10	131 Saratoga Street	MHC Inventory
11	133 Saratoga Street	MHC Inventory
12	135 Saratoga Street	MHC Inventory
13	137 Saratoga Street	MHC Inventory
14	139 Saratoga Street	MHC Inventory
15	141 Saratoga Street	MHC Inventory
16	143 Saratoga Street	MHC Inventory
17	145 Saratoga Street	MHC Inventory
18	147 Saratoga Street	MHC Inventory
19	George W. Hargrave House	MHC Inventory
20	Catherine Sampson Double House	MHC Inventory
21	Benjamin Bates Double House	MHC Inventory
22	Saint John the Baptist Roman Catholic Church	MHC Inventory
23	East Boston Chemical Company #7 Fire House	MHC Inventory
24	Sacred Heart Roman Catholic Church Garage	MHC Inventory
25	Sacred Heart Roman Catholic Church Convent / Sacred Heart Roman Catholic	MHC Inventory
26	Sacred Heart Roman Catholic Church	MHC Inventory
27	Boston and Albany Railroad Engine House / Scolly Trucking and Warehouse	MHC Inventory

The Proposed Project is not expected to have effects on any of the listed historically significant resources in **Table 5-1.**

5.3 Archaeological Resources

No known archaeological resources were located within the Project site during the review of Massachusetts Historic Commission files and MACRIS, therefore no impacts to archaeological resources are anticipated.



282-308 Bremen Street

Inventoried Area

Inventoried Property

A- Sacred Heart Roman Catholic Church Complex
1. 113 Saratoga Street
2. Joseph H. Warren Row House
3. Oscar A. Gould Row House
4. Erastus O. Emery Row House
5. 121 Saratoga Street
6. John Davis Row House
7. 125 Saratoga Street
8. George W. Studley Row House
9. 129 Saratoga Street
10. 131 Saratoga Street
11. 133 Saratoga Street
12. 135 Saratoga Street
13. 137 Saratoga Street
14. 139 Saratoga Street
15. 141 Saratoga Street
16. 143 Saratoga Street
17. 145 Saratoga Street
18. 147 Saratoga Street
19. George W. Hargrave House
20. Catherine Sampson Double House
21. Benjamin Bates Double House
22. Saint John the Baptist Roman Catholic Church
23. East Boston Chemical Company #7 Fire House
24. Sacred Heart Roman Catholic Church Garage
25. Sacred Heart Roman Catholic Church Convent / Sacred Heart Roman Catholic Church Rectory
26. Sacred Heart Roman Catholic Church
27. Boston and Albany Railroad Engine House / Scolly Trucking and Warehouse

MLF CONSULTING LLC

Figure 5-1. 282-308 Bremen Street - Historic Resources

6.0 INFRASTRUCTURE SYSTEMS COMPONENT

The Project includes the demolition of the existing commercial building site located at 282 Bremen Street, at the intersection of Brooks Street. The existing site includes two auto repair businesses, a small 4-unit multifamily residence, and paved parking along the side and front of the structures along Bremen Street. The Proposed Project will be comprised of the construction of a 5-6 story apartment complex with parking within the ground floor structure.

Based on an analysis completed by Sherwood Consulting & Design LLC, the Project's civil engineer, the existing infrastructure surrounding the Project Site appears sufficient to service the needs of the Proposed Project. The following sections describe the existing sanitary sewer, water, storm drainage, electrical, steam, gas, telecom, and cable systems surrounding the sites and explain how these systems will service the development. The analysis also discusses any anticipated Project-related impacts to the utilities and identifies mitigation measures to address these potential impacts.

A detailed infrastructure analysis will be performed by the civil engineer when the Project proceeds to the Design Development Phase. The Project's team will coordinate with the appropriate utilities to address the capacity of the area utilities to provide services for the new building. A Boston Water and Sewer Commission (BWSC) Site Plan Approval and General Service Application are required for the new water, sanitary sewer, and storm drain connections.

A Drainage Discharge Permit Application is required from BWSC for any construction dewatering. The appropriate approvals from the Massachusetts Water Resource Authority (MWRA), Massachusetts Department of Environmental Protection (MassDEP), and the U.S. Environmental Protection Agency (EPA) will also be sought by the Contractor if required for construction dewatering.

6.1 Sanitary Sewer System

6.1.1 Existing Sewer System

Existing Boston Water and Sewer Commission (BWSC) combined sewer mains are located in Brooks Street and Bremen Street adjacent to the Project site.

<u>Bremen Street</u>

There is a 12-inch BWSC combined sewer main in Bremen Street which flows southwesterly connecting to the 36-inch by 54-inch BWSC combined sewer main at the intersection of Brooks Street which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

Brooks Street

There is a 36-inch by 54-inch BWSC combined sewer in Brooks Street which flows in a southeasterly direction and then continues in a southwesterly direction in Bremen Street which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

The existing sewer system is illustrated in **Figure 6-1.**

The Proponent will work with BWSC to determine where existing building sewer connections are located at the 282, 294 and 308 Bremen Street site so they can be cut and capped at the main. Illicit roof drain connections will be removed.

6.1.2 Project-Generated Sewage Flow

The Project's sanitary flows were estimated using 310 CMR 15.203 for residential and retail uses. 310 CMR 15.203 lists typical sewage generation values by the site use and are conservative values for estimating the sewage flows from the sites. The 310 CMR 15.203 values are used to evaluate new sewage flows, or to estimate existing sewer flows to determine the approximate increase or decrease in sewer flows due to the Project.

The existing sanitary flows generated is estimated to be 1,030 gpd. The Proposed Project will generate an estimated 21,540 gallons per day (gpd) based on design sewer flows provided in 310 CMR 15.203-The State Environmental Code, Title 5 and the proposed building program**. Table 6-1** describes the increased sewage generation in gallons per day (gpd) due to the Project.

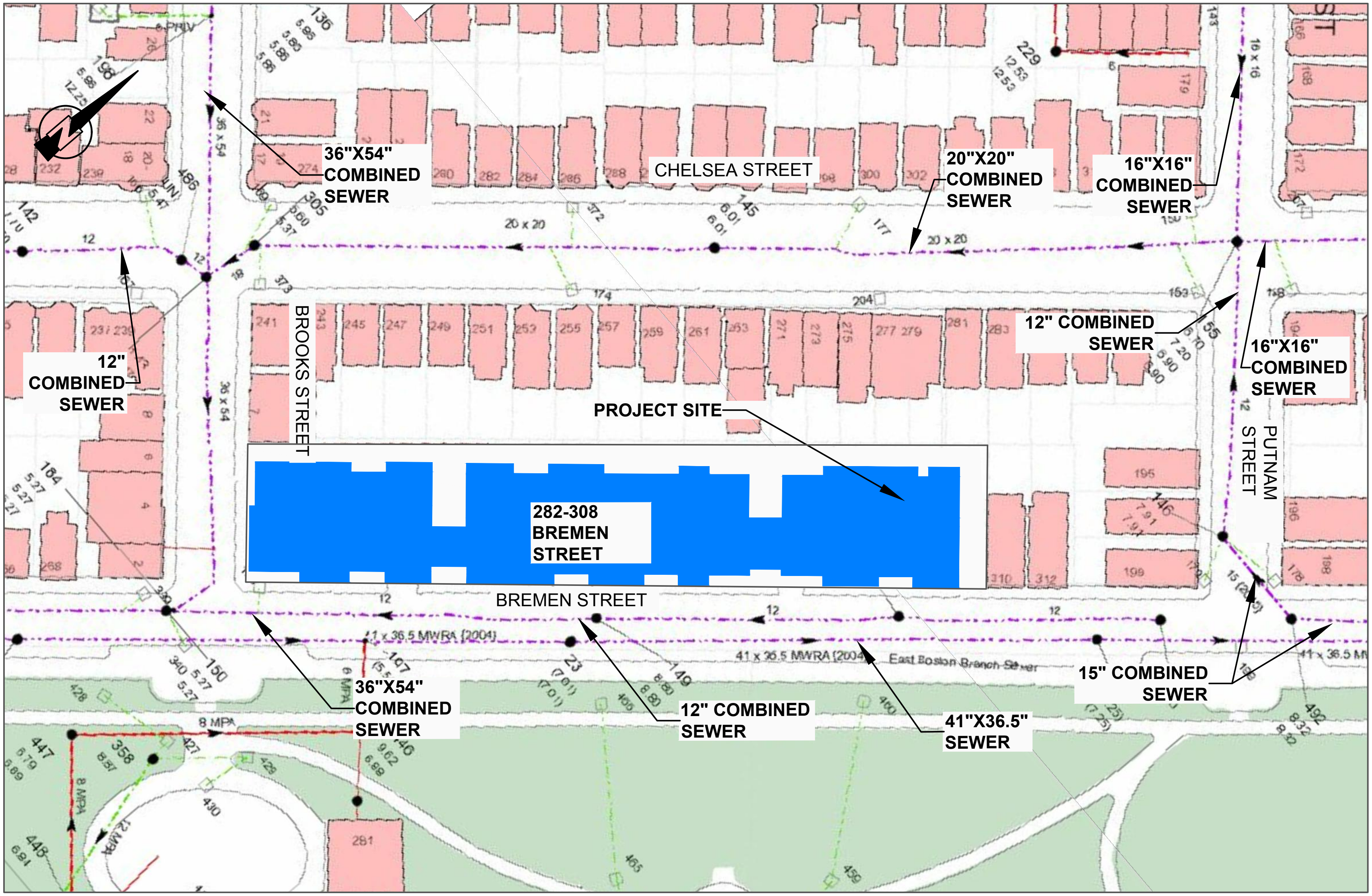


FIGURE 6-1
BWSC SEWER AND DRAIN SYSTEM MAP
SCALE: 1"=120'±

MLF CONSULTING LLC

Sherwood Consulting & Design, LLC
26 Smith Place, Suite 2
Cambridge, MA
(617) 945-0940 www.sherwoodcd.com

282-308 BREMEN STREET
PNF

Table 6-1. Projected Sanitary Sewer Flows

Use	Size/Unit	310 CMR Value (gpd/unit)	Total Flow (gpd)
Existing Commercial and Residential Buildings and Parking Lot (282, 294, and 308 Bremen Street)			
Commercial Buildings (Two Auto Body/Repair Shops)	10 people	15 gpd/person	**150**
Multi-Family Residence	8 bedrooms	110/bedroom	**880**
		Total Existing Sewer Flow (gpd)	**1,030 gpd**
Proposed Residential Project (using 310 CMR values)			
Rental Housing Units	194 bedrooms	110/bedroom	**21,340**
Retail*	2,000 sq.ft.	50 gpd/1000 sq. ft.	**200**
		Total Proposed Sewer Flows (gpd)	**21,540 gpd**
		Net Increase in Sewer Flows (gpd)	**20,510 gpd**

* Minimum allowed GDP for system design for retail use is 200 gpd.

6.1.3 Sanitary Sewage Connection

The proposed building will require a new sanitary sewer connection to the BWSC sewer system. Connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process for the Project. This process will include a comprehensive design review of the proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts. Coordination with BWSC will include review and approval of the design, capacity, connections, and flow increase resulting from the proposed discharges to the sanitary sewer system. In total, the complete Project sewer generation is expected to increase wastewater flows by approximately 20,510 gpd.

It is anticipated that the proposed building sanitary services will tie into the 12-inch combined sewer main in Bremen Street. Any required parking garage floor drains will be routed through an oil and sand trap in accordance with the BWSC's Requirements for Site Plans and plumbing code requirements, prior to discharge to the BWSC sanitary sewer system.

The Proponent will submit a Site Plan to the BWSC for review and approval, and an MWRA sewer connection permit if applicable. Based on the proposed estimated sanitary flow, which is greater than 15,000 gpd, BWSC will require the removal of infiltration/inflow (I/I) at a minimum ratio minimum 4:1 ratio of I/I removed to wastewater generated.

6.1.4 Sewer System Mitigation

To help conserve water and reduce the amount of sewage generated by the proposed Project, the Proponent will investigate the use of water-efficient toilets, aerated shower-heads, and low-flow lavatory faucets, in compliance with pertinent Code requirements to reduce water usage and sewage generation.

6.1.5 Sewage Capacity and Impacts

The adjacent existing BWSC sewer system in Brooks Street, Bremen Street, and potential building service connections to the sewer system were analyzed. The existing sewer system capacity calculations are presented in **Table 6-2**.

Table 6-2 indicates the hydraulic capacity of the existing 36-inch by 54-inch BWSC combined sewer in Brooks Street and the 12-inch BWSC combined sewer and 36-inch by 54-inch BWSC combined sewer main in Bremen Street. The minimum hydraulic capacity is 19.15 million gallons per day (MGD) or 29.65 cubic feet per second (cfs) for the 36-inch by 54-inch BWSC combined sewer main in Brooks Street and the 36-inch by 54-inch BWSC combined sewer that flows southwesterly from the site; and 1.0 million gallons per day (MGD) or 1.54 cubic feet per second (cfs) for the 12-inch BWSC combined sewer main in Bremen Street.

Based on an average daily flow estimate for the Project of 21,540 gpd or 0.02 MGD, which is an increase of 20,510 gpd or 0.02 MGD from the existing buildings; and with a factor of safety estimate of 10 (total estimate = 0.02 MGD x 10 = 0.20 MGD); pending BWSC review, no capacity issues are expected within the Project area BWSC sewer systems. The only other properties that are connected to the 12-inch combined sewer are 3 multifamily residences with a total of 20 bedrooms. These 3 residences have an average daily flow of 2,200 gpd or 0.002 MGD; and with a factor of safety estimate of 10 will generate a total estimate = 0.002 MGD x 10 = 0.02 MGD. The total average flow in the 12-inch combined sewer with a factor of safety of 10 is 0.22 MGD.

Table 6-2. Sewer Hydraulic Capacity Analysis

Manhole (BWSC Number)	Distance (feet)	Invert Elevation (up)	Invert Elevation (down)	Slope (%)	Diameter (inches)	Manning's Number	Flow Capacity (cfs)	Flow Capacity (MGD)
Brooks Street								
143 to 150	280	5.47	5.27	0.07%	36 x 54	0.013	29.65	19.15
Minimum Flow Analyzed:							29.65	19.15
Bremen Street								
147 to 149	320	10.10	9.50	0.19%	12	0.013	1.54	1.0
150 to 151	366	5.27	5.00	0.07%	36 x 54	0.013	29.65	19.15
Minimum Flow Analyzed:							1.54	1.0

Notes: 1. Manhole numbers taken from BWSC Sewer System Map
2. Flow Calculations based on Manning's Equation

6.2 Water System

6.2.1 Existing Water Service

Water for the Project will be provided by the BWSC. There are five water systems within the City, and these provide service to portions of the City based on ground surface elevation. The five systems are southern low (commonly known as low service), southern high (commonly known as high service), southern extra high, northern low, and northern high. Water mains are labeled by their pipe size, year installed, pipe material, and year cement lined (CL), if applicable. There are existing BWSC water mains in Bremen Street and Brooks Street.

The water mains in the vicinity of the Project are owned and maintained by BWSC. BWSC record drawings indicate there is a 12-inch Class 56 DICL Northern Low Main installed in 2015 in Bremen Street. There is a 12-inch PCI Northern Low Main installed in 1902 in Brooks Street.

The existing BWSC water system is shown in **Figure 6-2**.

The site is within the service radius of four (4) hydrants. There is a hydrant (H108) on the north side of Bremen Street at the intersection of Brooks Street, a second hydrant (H128) at 294 Bremen Street, a third hydrant (H130) on the north side of Bremen Street at the intersection of Putnam Street and a forth hydrant (H132) on the south side of Chelsea Street at the intersection of Brooks Street north of the project site. The Proponent will confirm that the hydrants are sufficient for the development with BWSC and the Boston Fire Department (BFD) during the detailed design phase.

6.2.2 Anticipated Water Consumption

The Project's water demand estimate for domestic services is based on the Project's estimated sewage generation, described above. A conservative factor of 1.1 (10%) is applied to the estimated average daily wastewater flows calculated with 310 CMR 15.203 values to account for consumption, system losses and other usages to estimate an average daily water demand. The Project's estimated total domestic water demand is 23,694 gpd. Water for the Project will be supplied by the BWSC water system in Bremen or Brooks Street.

6.2.3 Proposed Water Service

Domestic water and fire protection services for the Project will be directly tapped from the 12-inch water main in Bremen Street or Brooks Street. The water supply systems servicing the building will be gated so as to minimize public hazard or inconvenience in the event of a water main break. The building will require domestic water and fire protection services. Final locations and sizes of the services will be determined during the detailed design phase and submitted to BWSC for review and approval through the Site Plan Approval process.

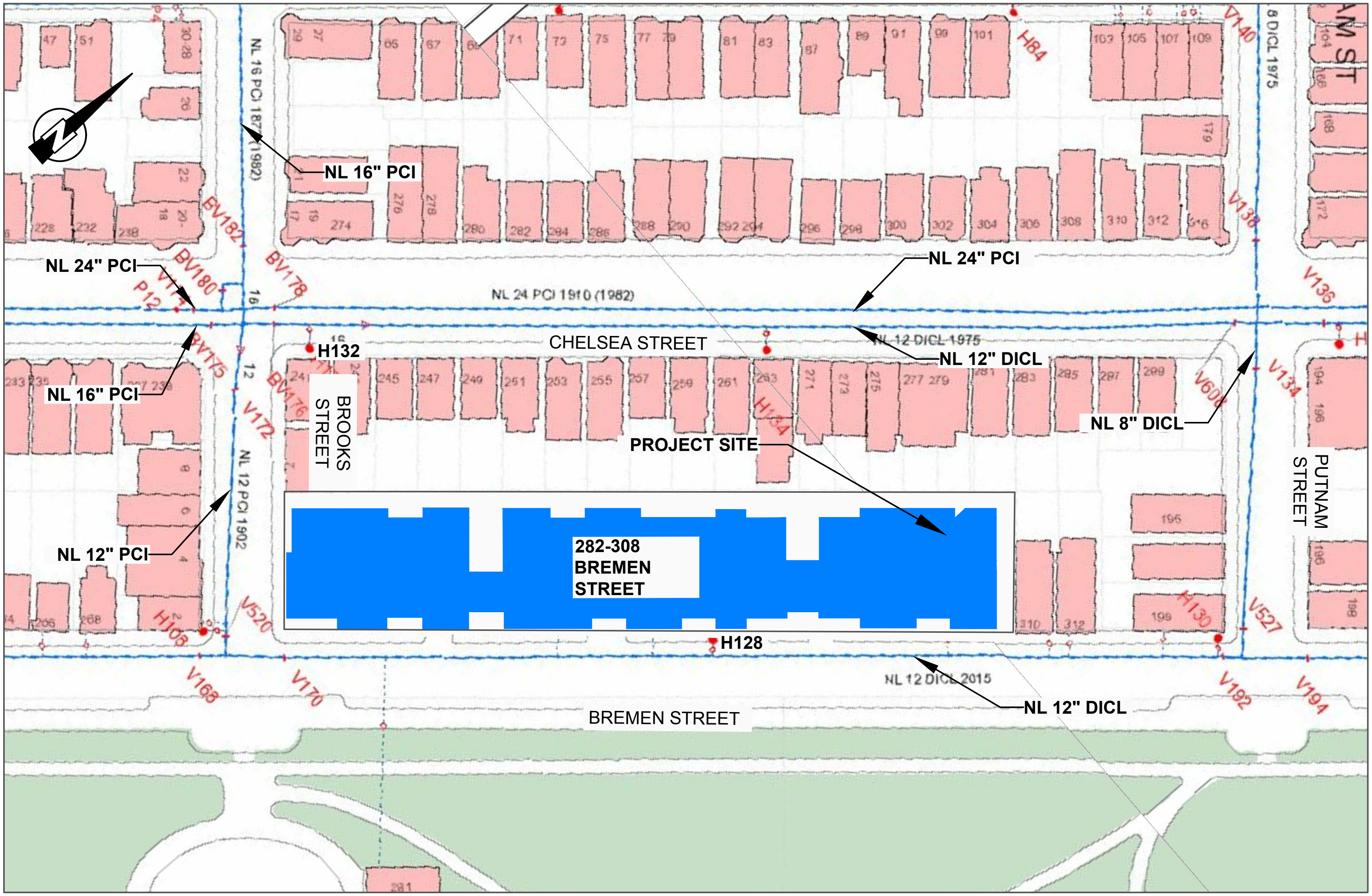


FIGURE 6-2
BWSC WATER SYSTEM MAP
SCALE: 1"=120'±

Water service to the building will be metered in accordance with BWSC's requirements. The property owner will provide a suitable location for a Meter Transmission Unit (MTU) as part of BWSC's Automatic Meter Reading System. A backflow preventer will be installed on the fire protection service and will be coordinated with BWSC's Cross Connection Control Department. This review will include sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections that conform to BWSC and Boston Fire Department requirements.

6.3 Water Supply System Mitigation

As discussed in the Sewer System Mitigation Section, water conservation measures such as the use of water-efficient toilets, low-flow lavatory faucets, and aerated showerheads in compliance with pertinent Code requirements are being considered to reduce potable water usage. Water usage for landscape irrigation will be reduced by the selection of native and adaptive plantings and using soil moisture sensors as part of the irrigation system.

6.4 Storm Drainage System

6.4.1 Existing Drainage Conditions

There are existing BWSC combined sewer mains in Bremen Street and Brooks Street adjacent to the Project site, as previously described in Section 6.1.1. The existing combined sewer mains in Brooks Street and Bremen Street ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

<u>Bremen Street</u>

There is a 12-inch BWSC combined sewer main in Bremen Street which flows southwesterly connecting to the 36-inch by 54-inch BWSC combined sewer main which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

<u>Brooks Street</u>

There is a 36-inch by 54-inch BWSC combined sewer in Brooks Street which flows in a southeasterly direction and then continues in a southwesterly direction in Bremen Street which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

The existing site at 282 Bremen Street contains 2 commercial buildings, a multifamily residence, broken bituminous asphalt with limited planting areas and grass. Stormwater runoff from the paved area flows overland untreated to the adjacent catch basins in Bremen Street. Stormwater collected from the existing building roof flows overland to the adjacent catch basin in Bremen Street. Stormwater in the roadways is captured by existing catch basins, which flow to the existing BWSC combined sewer mains in Bremen Street.

The existing BWSC storm drain system is shown in **Figure 6-1**.

6.4.2 Proposed Drainage Systems

The Project is expected to substantially improve the stormwater quality runoff from the sites and will meet the Mass DEP and Boston Water and Sewer Commission (BWSC) Site Plan requirements. The existing combined sewer in Bremen Street and Brooks Street appears to be of adequate capacity to service the needs of the Project. The Project will meet or reduce the existing peak rates of stormwater discharge and will improve the stormwater quality and reduce the quantity of stormwater runoff being discharged to City storm drain system through the installation of on-site infiltration systems. Per BWSC requirements, the equivalent of 1-inch of rainfall over the sites' impervious areas will be stored and recharged.

In addition to the installation of on-site infiltration systems, stormwater runoff will be treated using deep sump hooded catch basins and manholes and, if necessary, stormwater quality treatment units to achieve the required pretreatment and reductions. A stormwater operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management systems.

6.5 Stormwater Quality

The Project will improve the quality of stormwater leaving the sites through the installation of onsite infiltration systems and therefore is not expected to have negative impacts on the water quality of the nearby water bodies. Erosion and sediment controls will be used during construction to protect adjacent properties and the municipal storm drain system. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

Necessary dewatering will be conducted in accordance with applicable Federal, State, and BWSC discharge permits. Once construction is complete, the Proposed Project will be in compliance with BWSC Site Plan requirements.

6.5.1 MassDEP Stormwater Management Policy Standards

In March 1997, MassDEP adopted a Stormwater Management Policy to address non-point source pollution. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy, which was revised in February 2008. The Policy prescribes specific stormwater management standards for development projects, including urban pollutant removal criteria for projects that may impact environmental resource areas. Compliance is achieved through the implementation of Best Management Practices (BMPs) in the stormwater management design. The Policy is administered locally pursuant to MGL Ch. 131, s. 40.

A brief explanation of each Policy Standard and the system compliance is provided below.

Standard 1: *No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

Compliance: The Project will comply with this Standard. The proposed design will incorporate the appropriate stormwater treatment, and no new untreated stormwater will be directly discharged to, nor will erosion be caused to wetlands or waters of the Commonwealth as a result of stormwater discharges related to the Project.

Standard 2: *Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR.*

Compliance: The Project will comply with this Standard. The existing discharge rate will be met or decreased as a result of the improvements associated with the Project to the maximum extent practicable.

Standard 3: *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmental sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.*

Compliance: The Project will comply with this Standard since BWSC requirements exceed this.

Standard 4: *Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:*

> *a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
>
> *b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
>
> *c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

Compliance: The Project will comply with this Standard. Within the Project's limit of work, there will be mostly building roof, paved sidewalk, and roadway areas. Runoff from paved areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected by deep sump hooded catch basins, and conveyed through stormwater quality units before discharging into the BWSC system.

<u>Standard 5</u>: *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

Compliance: The proposed design will comply with this Standard. The Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-6).

<u>Standard 6</u>: *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.*

Compliance: The Project will comply with this Standard. The Project will not discharge untreated stormwater to a sensitive area or any other area.

<u>Standard 7</u>: *A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

Compliance: The Project will meet this Standard. The Project is a redevelopment.

<u>Standard 8</u>*: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.*

Compliance: The Project will comply with this Standard. Sedimentation and erosion controls will be incorporated as part of the design of this Project and employed during construction.

<u>Standard 9</u>*: A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

Compliance: The Project will comply with this standard. An O&M Plan, including long-term BMP operation requirements, will be prepared for the proposed Project and will assure proper maintenance and functioning of the stormwater management system.

<u>Standard 10</u>*: All illicit discharges to the stormwater management system are prohibited.*

Compliance: The Project will comply with this Standard. There will be no illicit connections associated with the Proposed Project.

6.6 Electric Systems

Eversource owns and maintains the electrical transmission system in the vicinity of the Proposed Project. There is existing underground service in Brooks Street and overhead service from utility poles on the south side of Bremen Street. It is expected that electrical service can be provided by Eversource. Electric power supply design and any upgrades that may be required, will be further coordinated with Eversource as the design for each phase progresses. The Proponent will investigate energy conservation measures, including high-efficiency lighting.

6.7 Telephone and Cable Systems

Verizon, Comcast, and RCN provide overhead telecommunication service in the Project area from utility poles on the south side of Bremen Street. It is anticipated that telephone service can be provided by any of the providers. Any upgrades will be coordinated with the providers. Telephone and telecommunication systems will be reviewed with the providers as the design progresses.

6.8 Steam and Gas Systems

The Proposed Project will not require steam service and there is no steam infrastructure in the Project area.

National Grid provides natural gas in the Project area. National Grid owns and maintains a 6-inch main in Bremen Street and Brooks Street. It is expected that there is an adequate supply of natural gas in the area for the proposed building use. The actual size and location of the building services will be coordinated with National Grid.

6.9 Utility Protection During Construction

The Contractor will notify utility companies and call “Dig Safe” prior to excavation. During construction, infrastructure will be protected using sheeting and shoring, temporary relocations, and construction staging as required. The Construction Contractor will be required to coordinate all protection measures, temporary supports, and temporary shutdowns of all utilities with the appropriate utility owners and/or agencies. The Construction Contractor will also be required to provide adequate notification to the utility owner prior to any work commencing on their utility. Also, in the event a utility cannot be maintained in service during the switch over to a temporary or permanent system, the Construction Contractor will be required to coordinate the shutdown with the utility owners and Project abutters to minimize impacts and inconveniences.

7.0 TRANSPORTATION COMPONENT

7.1 Introduction

Howard Stein Hudson (HSH) has conducted an evaluation of the transportation impacts of the proposed redevelopment to be located at 282-308 Bremen Street (the "Project" and/or "Site"), in the East Boston neighborhood of Boston, Massachusetts. This transportation study adheres to the Boston Transportation Department (BTD) Transportation Access Plan Guidelines and the Boston Planning and Development Agency (BPDA) Article 80 development review process. The study includes an evaluation of existing condition, future conditions with and without the Project, projected parking demand, transit services, and pedestrian and bicycle activity. The project is not expected to have a significant impact on the existing neighborhood or surrounding transportation facilities.

7.2 Project Description

The Project site is located at 282-308 Bremen Street to the west of Bremen Street and is bounded by Chelsea Street to the west, Putnam Street to the north, and Brooks Street to the south. The Bremen Street Park is across the street from the Project site which provides access to the East Boston Greenway path as well as the Blue Line Airport MBTA Station. Two auto body/auto repair shops are currently located on the Project site in addition to a small 4-unit multifamily residential building.

The Project will include the demolition of the existing structures and construction of a new residential building with approximately 165 residential units and ground floor retail space. Parking for residents will be provided for 68 vehicles using stackers.

7.2.1 Study Area

The transportation study area is generally bounded by Bremen Street to the east, Chelsea Street to the west, Putnam Street to the north, and Brooks Street to the south. The study area includes the following four intersections, shown in **Figure 7-1:**

- Chelsea Street/Brooks Street (signalized);
- Bremen Street/Brooks Street (unsignalized);
- Bremen Street/Putnam Street (unsignalized); and
- Chelsea Street/Putnam Street (unsignalized).

7.2.2 Study Methodology

The Existing (2019) Condition analysis includes an inventory of the existing transportation conditions such as traffic characteristics, parking, curb usage, transit, pedestrian circulation, bicycle facilities, loading, and site conditions. Existing counts for vehicles, bicycles, and pedestrians were collected at the study area intersections. The traffic data collection effort and observations form the basis for the transportation analysis conducted as part of this evaluation.

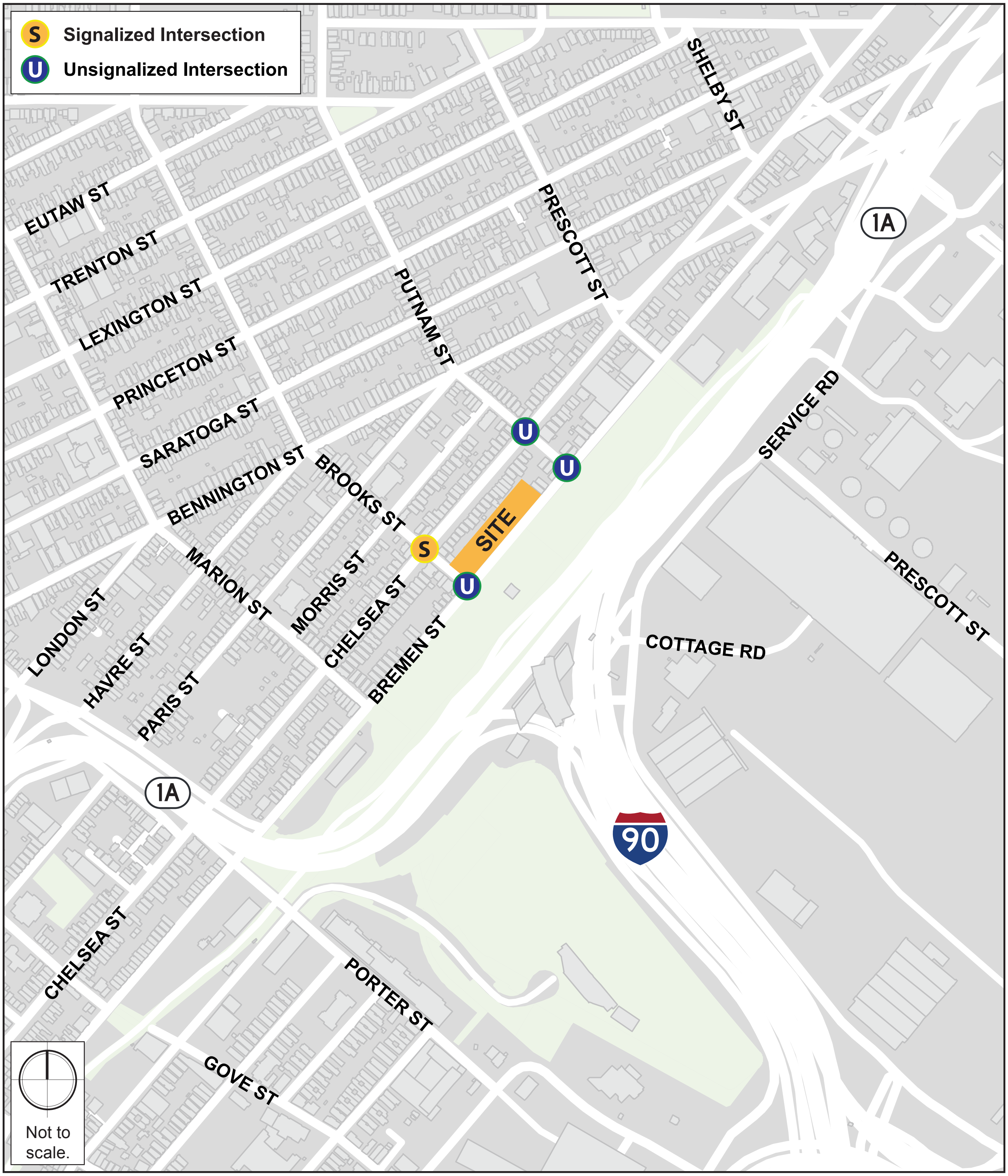


Figure 7-1.
Study Area Intersections

The future transportation condition analysis evaluates potential transportation impacts associated with the Project. Long-term impacts are evaluated for the year 2026, based on a seven-year horizon from the year of the filing of this traffic study.

The No-Build (2026) Condition includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned in the vicinity of the Project site.

The Build (2026) Condition includes the increase in traffic volume due to the addition of Project-generated trip estimates to the No-Build (2026) Condition traffic volumes. Expected roadway, parking, transit, pedestrian, bicycle accommodations, and loading operations are identified.

The final part of the transportation study identifies measures to mitigate Project-related impacts and to address any traffic, pedestrian, bicycle, transit, safety, or construction related issues that are necessary to accommodate the Project.

An evaluation of short-term traffic impacts associated with construction activities is also provided.

7.3 Existing (2019) Condition

This section includes descriptions of existing study area roadway geometries, intersection traffic control, peak-hour vehicular and pedestrian volumes, average daily traffic volumes, transit availability, parking, curb usage, and loading operations.

7.3.1 Existing Roadway Condition

The study area includes the following roadways, which are categorized according to the Massachusetts Department of Transportation (MassDOT) Office of Transportation Planning functional classifications:

Bremen Street is a two-way, two-lane roadway located to the east of the Project site. Bremen Street is classified as an urban minor arterial roadway under BTD jurisdiction and runs between Washington Street to the west and Summer Street to the south. In the vicinity of the Site, limited on-street parking is available along both sides of the roadway. Sidewalks are provided on both sides of the roadway.

Chelsea Street is a two-way, two-lane roadway located east of the Project site. Chelsea Street is classified as an urban minor arterial roadway under BTD jurisdiction and runs between Maverick Square to the south and Eastern Avenue in Chelsea to the north. In the vicinity of the Site, on-street parking is available along both sides of the roadway. Sidewalks and bicycle lanes are provided on both sides of the roadway.

Brooks Street between Chelsea Street and Bremen Street is a two-way, two lane roadway. Northwest of Chelsea Street, Brooks Street is a one-way one lane roadway leaving the study area.

Brooks Street is classified as a local roadway under BTD jurisdiction and runs between Bremen Street to the southeast and Condor Street to the northwest. In the vicinity of the Site, on-street parking is available along both sides of the roadway. Sidewalks are provided on both sides of the roadway.

Putnam Street between Chelsea Street and Bremen Street is a two-way, two lane roadway. Northwest of Chelsea Street, Putnam Street is a one-way one lane roadway entering the study area. Putnam Street is classified as a local roadway under BTD jurisdiction and runs between Bremen Street to the southeast and Condor Street to the northwest. In the vicinity of the Site, on-street parking is available along both sides of the roadway. Sidewalks are provided on both sides of the roadway.

7.3.2 Existing Intersection Condition

The existing study area intersections are described below. Intersection characteristics such as traffic control, lane usage, pedestrian facilities, pavement markings, and adjacent land use are described.

Chelsea Street/Brooks Street is a four-legged, signalized intersection with three approaches located to the west of the Project site. The Brooks Street westbound approach consists of one shared left-turn/through/right-turn lane. The Chelsea Street northbound and southbound approaches consist of one shared left-turn/through/right-turn lane with a bike lane. The Brooks Street western leg of the intersection is a single lane departing the intersection. On-street parking is provided along all approaches to the intersection. Crosswalks, pedestrian signal equipment, and apex tactile wheelchair ramps are provided at each approach. The pedestrian phases operate concurrent to the vehicle phases.

Bremen Street/Brooks Street is a three-legged, all-way stop-controlled intersection located south of the Project site. The Brooks Street eastbound approach consists of one shared left-turn/right-turn lane. The Bremen Street northbound approach consists of one shared left-turn/through lane and the Bremen Street southbound approach consists of one shared through/right-turn lane. On-street parking is provided along all approaches to the intersection. Crosswalks and wheelchair ramps are provided across both of the Bremen Street approaches.

Bremen Street/Putnam Street is a three-legged, all-way stop-controlled intersection located northeast of the Project site. The Putnam Street eastbound approach consists of one shared left-turn/right-turn lane. The Bremen Street northbound approach consists of one shared left-turn/through lane and the Bremen Street southbound approach consists of one shared through/right-turn lane. On-street parking is provided along all approaches to the intersection. Crosswalks and wheelchair ramps are provided across all approaches to the intersection.

Chelsea Street/Putnam Street is a four-legged, unsignalized intersection located to the north of the Project site. The Putnam Street eastbound approach is one-way entering the intersection and consists of a shared left-turn/through/right-turn lane. The Putnam Street westbound approach consists of a shared left-turn/right-turn lane. The Chelsea Street northbound approach consists of a shared through/right-turn lane and a bike lane. The Chelsea street southbound approach consists of a shared left-turn/through lane and a bike lane. On-street parking is provided along all approaches to the intersection. Crosswalks and wheelchair ramps are provided across all approaches to the intersection.

7.3.3 Existing Parking and Curb Use

An inventory of the on-street parking in the vicinity of the Project was collected. On-street parking generally consists of East Boston Resident Only parking and 2-hour parking except for East Boston Residents. The on-street parking regulations within the study area are shown in **Figure 7-2**.

7.3.4 Car Sharing Services

Car sharing enables easy access to short-term vehicular transportation. Vehicles are rented on an hourly or daily basis, and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location.

Car sharing, predominantly served by Zipcar in the Boston area, provides easy access to vehicular transportation for those who do not own cars. There are no car sharing locations nearby the Project. The closest location to walk to is located at 177 London Street, which is approximately ½ mile away. Additionally, car sharing and rental services can be accessed at Logan Airport, which is located a short walk and a shuttle ride from the Project.

7.3.5 Existing Traffic Data

Traffic volume data was collected at the study area intersections on January 31, 2019. Turning Movement Counts (TMCs) were conducted during the weekday a.m. and p.m. peak periods (7:00 to 9:00 a.m. and 4:00 to 6:00 p.m., respectively) at the study area intersections. The TMCs collected vehicle classification including car, heavy vehicle, pedestrian, and bicycle movements. Based on the TMC data, the vehicular traffic peak hours for the study area intersection are generally 7:30 a.m. to 8:30 a.m. and 4:15 p.m. to 5:15 p.m. The detailed traffic counts are provided in **Appendix D.**

In order to account for variation in traffic volumes throughout the year, seasonal data provided by MassDOT were reviewed. The most recent (2016) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the January 2019 TMCs. The seasonal adjustment factor for roadways similar to the study area (U4-U7) during the month of January is 1.02. This indicates that average month traffic volumes are approximately two percent higher than

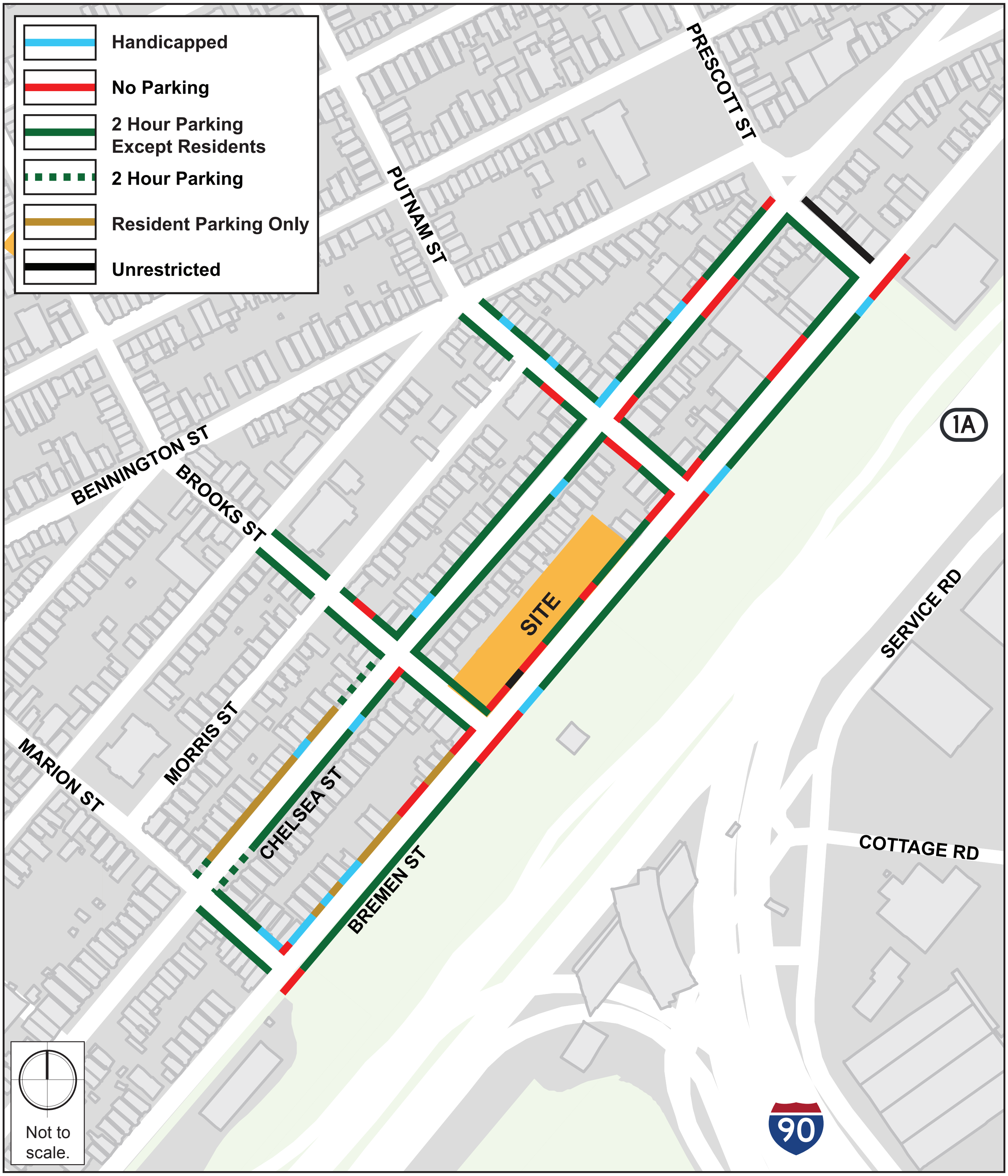


Figure 7-2.
On-Street Parking Regulations

the traffic volumes that were collected. The traffic counts were increased two percent to reflect the average month condition in order to provide an analysis consistent with the season traffic volumes. The MassDOT 2016 Weekday Seasonal Factors table is provided in **Appendix D**.

7.3.6 Existing (2019) Traffic Volumes

Existing traffic volumes were balanced, where necessary, to develop the Existing (2019) Condition vehicular traffic volumes. The Existing (2019) Condition weekday a.m. and p.m. peak hour traffic volumes are shown in **Figure 7-3**.

7.3.7 Existing Pedestrian Condition

Sidewalks are provided along both sides of all of the roadways in the study area. In general, the sidewalks provided along nearby roadways are in good condition with level grades and few cracks. There is a crosswalk at the Site across Bremen Street that provides connections to the East Boston Greenway and the MBTA Airport Station. Wheelchair ramps are provided along the nearby crosswalks.

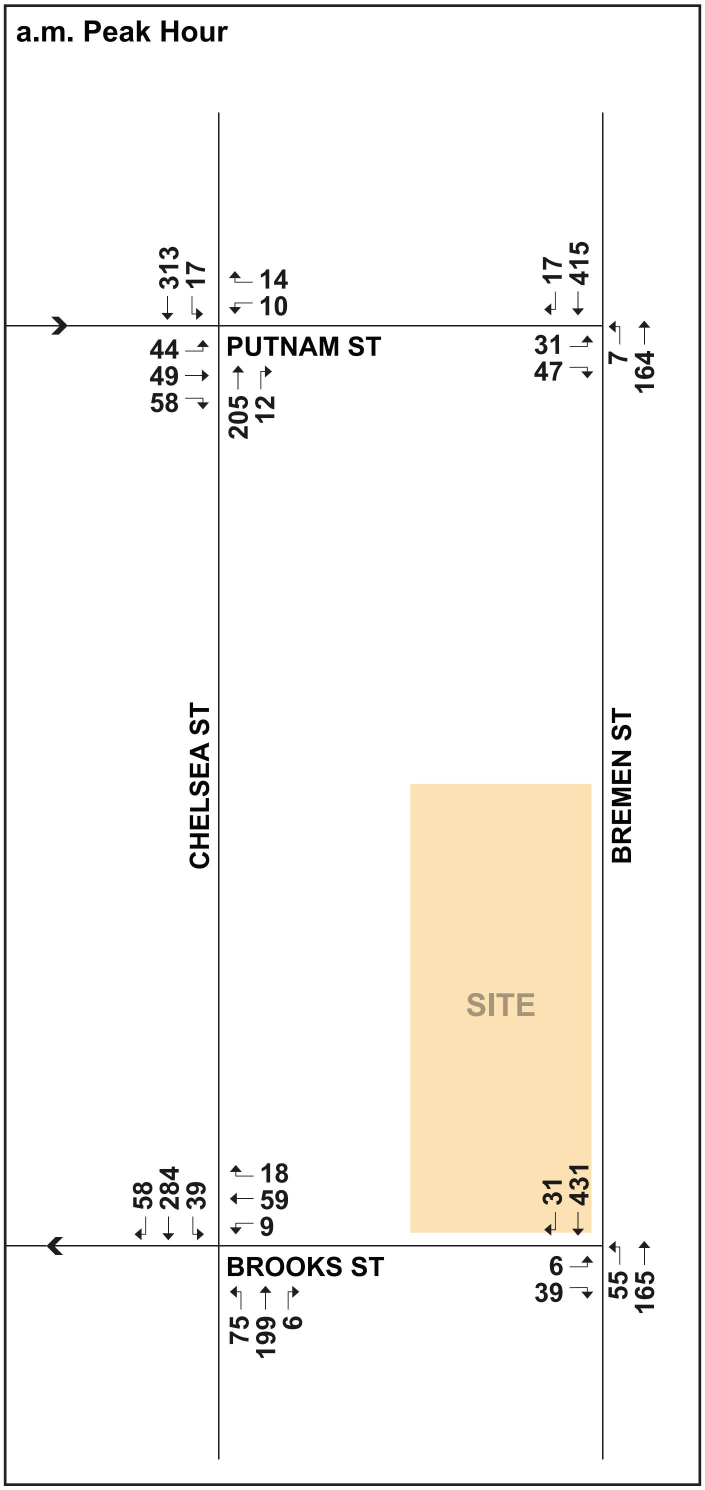
To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted as part of the TMCs on January 31, 2019 at the study area intersection. The weekday a.m. and p.m. peak hour pedestrian volumes are presented in **Figure 7-4**.

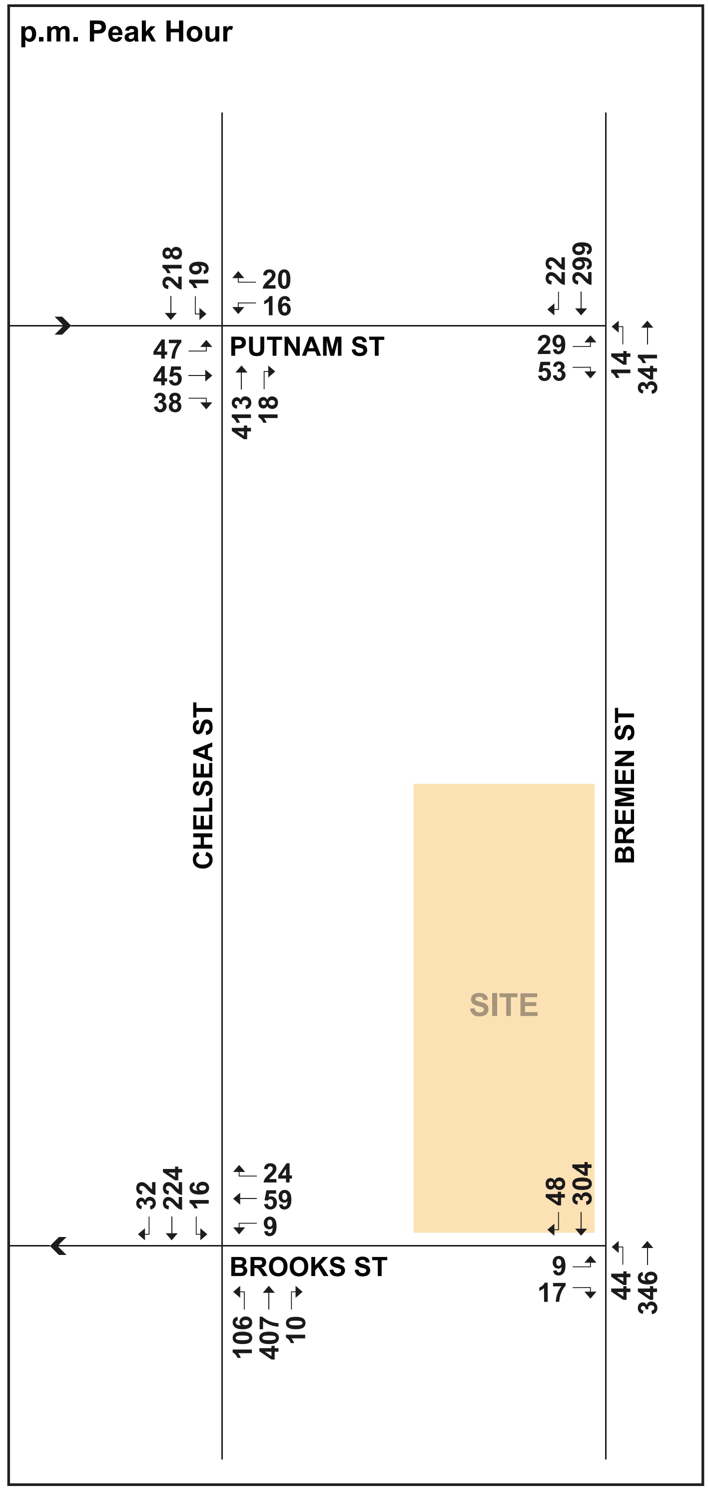
7.3.8 Existing Bicycle Condition

In recent years, bicycle use has increased dramatically throughout the City of Boston. To the west of the Site there are bicycle lanes along Chelsea Street and to the east of the Site there is a fully separated shared use path along the East Boston Greenway. The East Boston Greenway provides safe, fully separated cycling with access to Maverick Square and Orient Heights.

Bicycle counts were conducted concurrent with the vehicular TMCs on January 31, 2019 and are presented in **Figure 7-5**. It is also important to note that the majority of the traffic counts were conducted in the winter months when bicycling activity is typically lower than it is during the spring and summer months.

The Site is also located close to bicycle sharing stations provided by BLUEbikes. BLUEbikes is the docked bicycle sharing system in the Boston area, which was launched in 2011, and consists of over 260 stations and maintains 2,500 bicycles in four municipalities. There are also two BLUEbike stations located in proximity to the Project site, as shown in **Figure 7-6**.





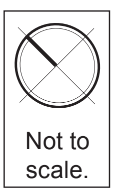


Figure 7-3.
Existing (2019) Condition Traffic Volumes, Weekday a.m. and p.m. Peak Hours

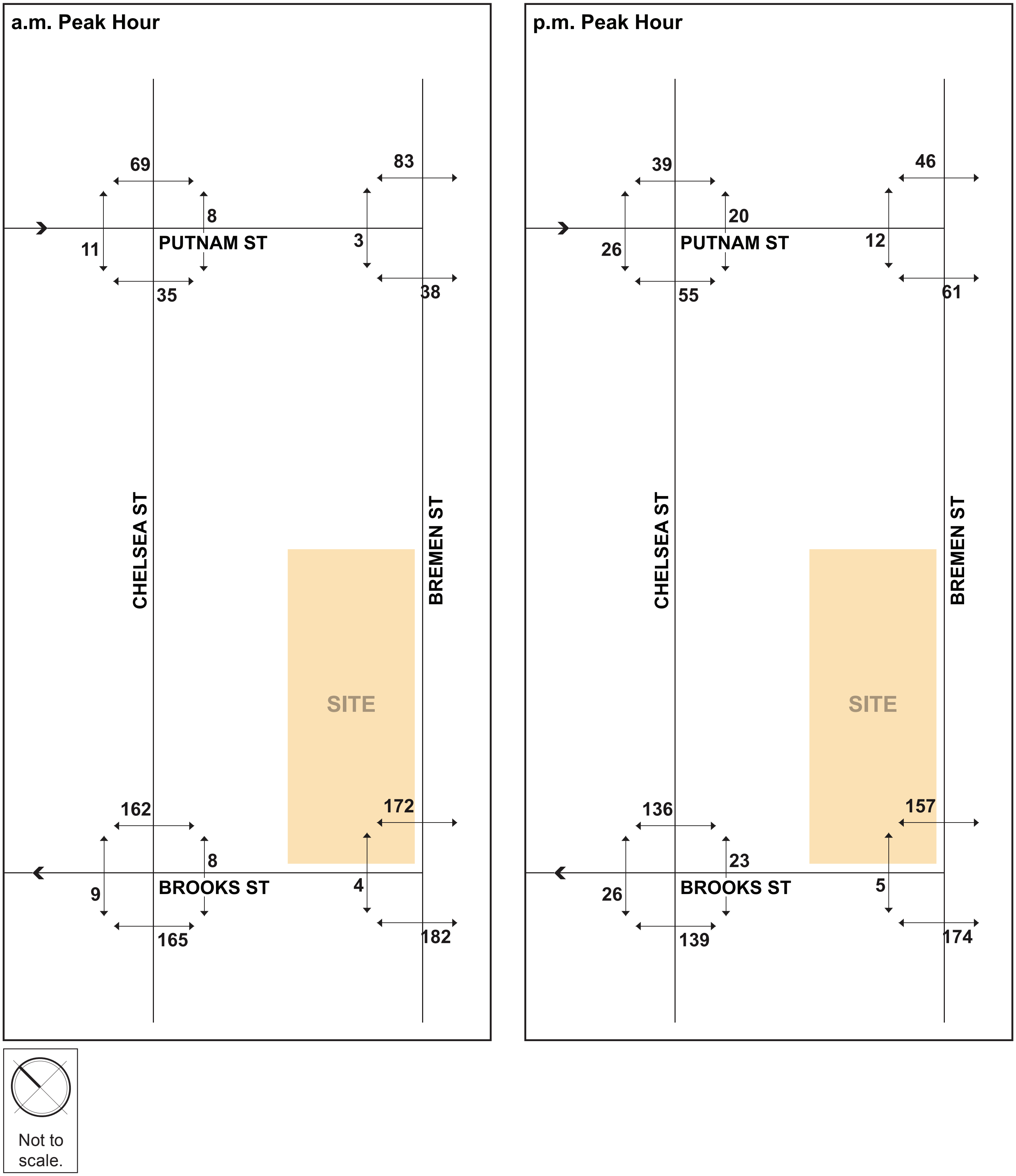


Figure 7-4.
Existing (2019) Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours

Figure 7-5.
Existing (2019) Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

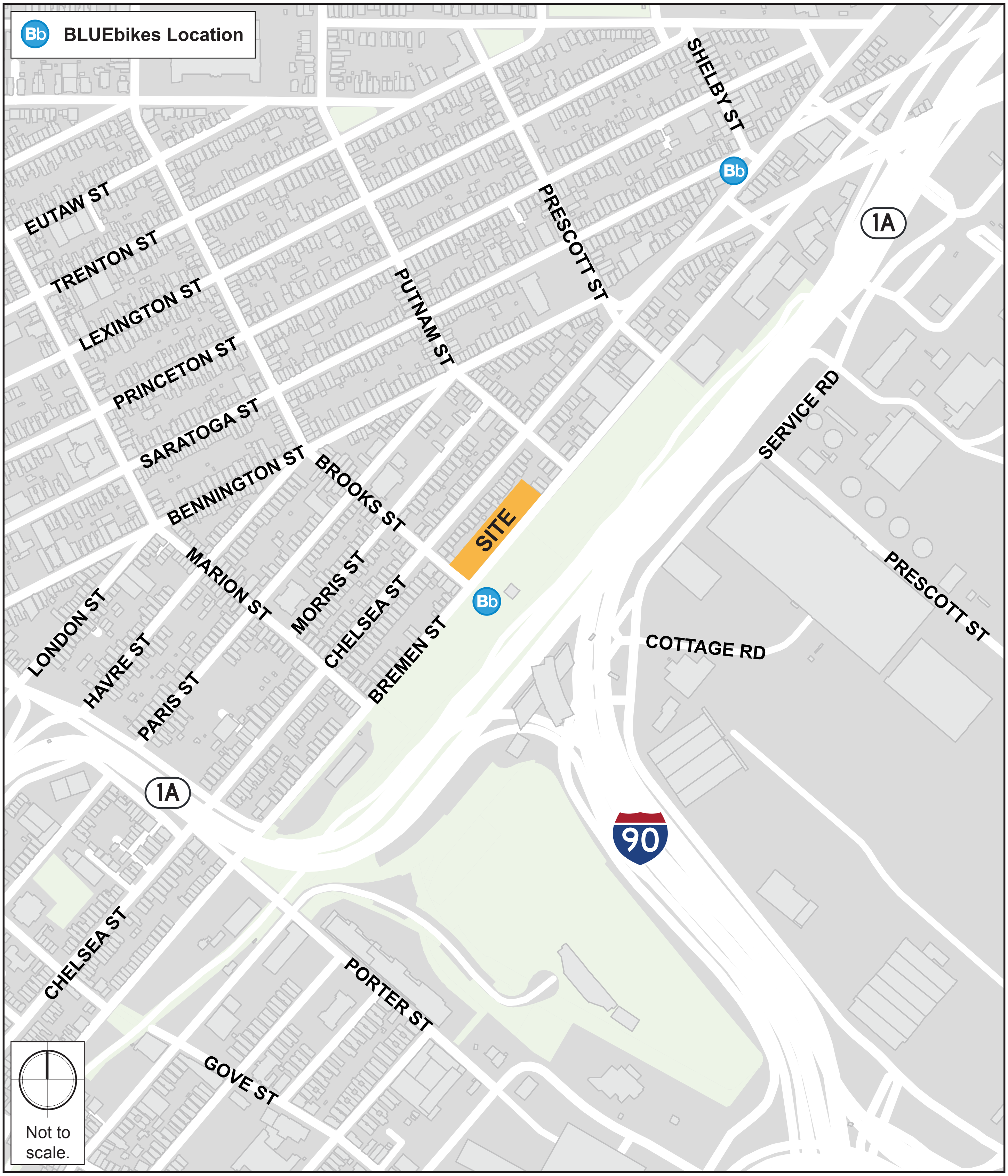


Figure 7-6.
Bike Sharing Locations

7.3.9 Existing Public Transportation

The Project site is located in Boston's East Boston neighborhood close to public transportation opportunities. Airport Station is located approximately 420 feet away and within a five-minute walk of the Project site and provides access to the MBTA Blue Line, Silver Line, and shuttles to the Logan Airport terminals. **Table 7-1** describes each public transportation route located in the vicinity of the Project site, with a map of the nearby public transportation services shown in **Figure 7-7**.

Table 7-1. Existing Public Transportation

MBTA Transit Service	Description	Weekday Service Duration	Peak-Hour Headway (minutes)
Blue Line	Bowdoin – Wonderland	5:13 a.m. – 1:21 a.m.	5
SL3	South Station – Chelsea	4:25 a.m. – 1:45 a.m.	10-12
Route 120	Orient Heights - Maverick	5:25 a.m. – 1:17 a.m.	20-30
Route 121	Wood Island - Maverick	6:00 a.m. – 6:46 p.m.	25-30

Headway is the time between service, headways vary.

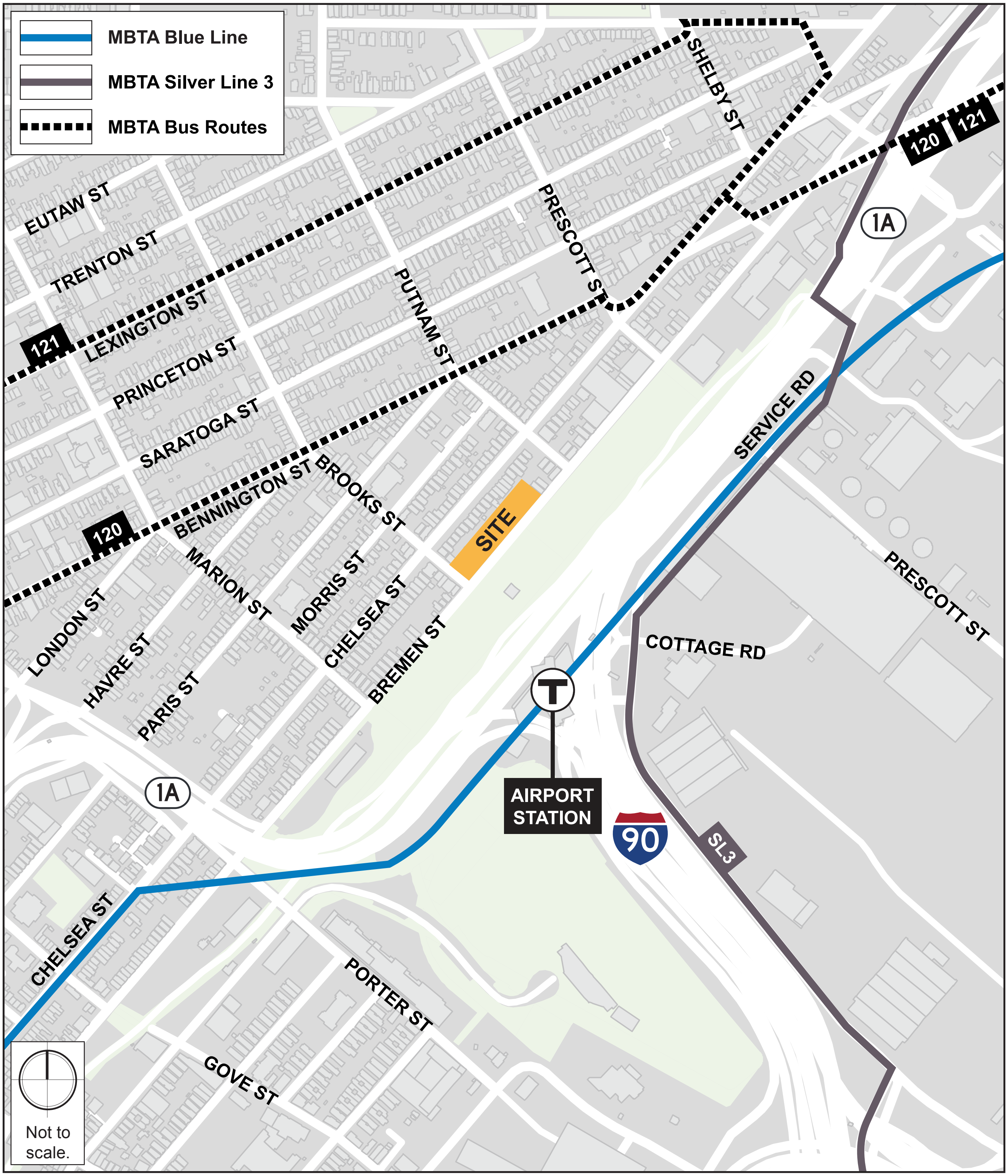


Figure 7-7.
Public Transportation

7.4 No-Build (2026) Condition

The No-Build (2026) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of any specific project, traffic associated with other planned specific developments, and planned infrastructure improvements that will affect travel patterns throughout the study area. Infrastructure improvements include roadway, public transportation, pedestrian, and bicycle improvements. The No-Build (2026) Condition does not include the impact of the Project.

7.4.1 Background Traffic Growth

The methodology to account for generic future background traffic growth, independent of large development projects, may be affected by changes in demographics, smaller scale development projects, or projects unforeseen at this time. Based on a review of recent and historic traffic data collected recently and to account for any additional unforeseen traffic growth, a one-half percent per year annual traffic growth rate was used, consistent with other projects in the area.

7.4.2 Specific Development Traffic Growth

Traffic volumes associated with the larger or closer known development projects can affect traffic patterns throughout the study area within the future analysis time horizon. Five projects have been identified in the proximity of the Site. **Figure 7-8** show the specific development programs accounted for, which are summarized as follows:

319-327 Chelsea Street– This project consists of the demolition of an existing building and construction of a new 5-story building with 38 residential units and ground floor commercial space with 34 parking spaces. This project has been approved by the BPDA Board.

Paris Village – This project consists of the construction of a mixed-income, four story building with 32 residential units and 21 parking spaces. This project has been approved by the BPDA Board and is currently under construction.

135 Bremen Street – This project will construct of 94 residential units, 8,300 sf of commercial space and 110 off-street parking spaces. This project has been approved by the BPDA Board.

175 Orleans Street - This project consists of the rehabilitation of the historic structure at 175 Orleans Street into a 127-room boutique hotel with 65 at-grade parking spaces. This project has been approved by the BPDA Board.

Frankfort + Gove Street Housing – This project consists of the demolition of two existing structures, the renovation of a former church into a residential building and the construction of a total of 108 residential units and 84 parking spaces. This project is currently under review by the BPDA board.

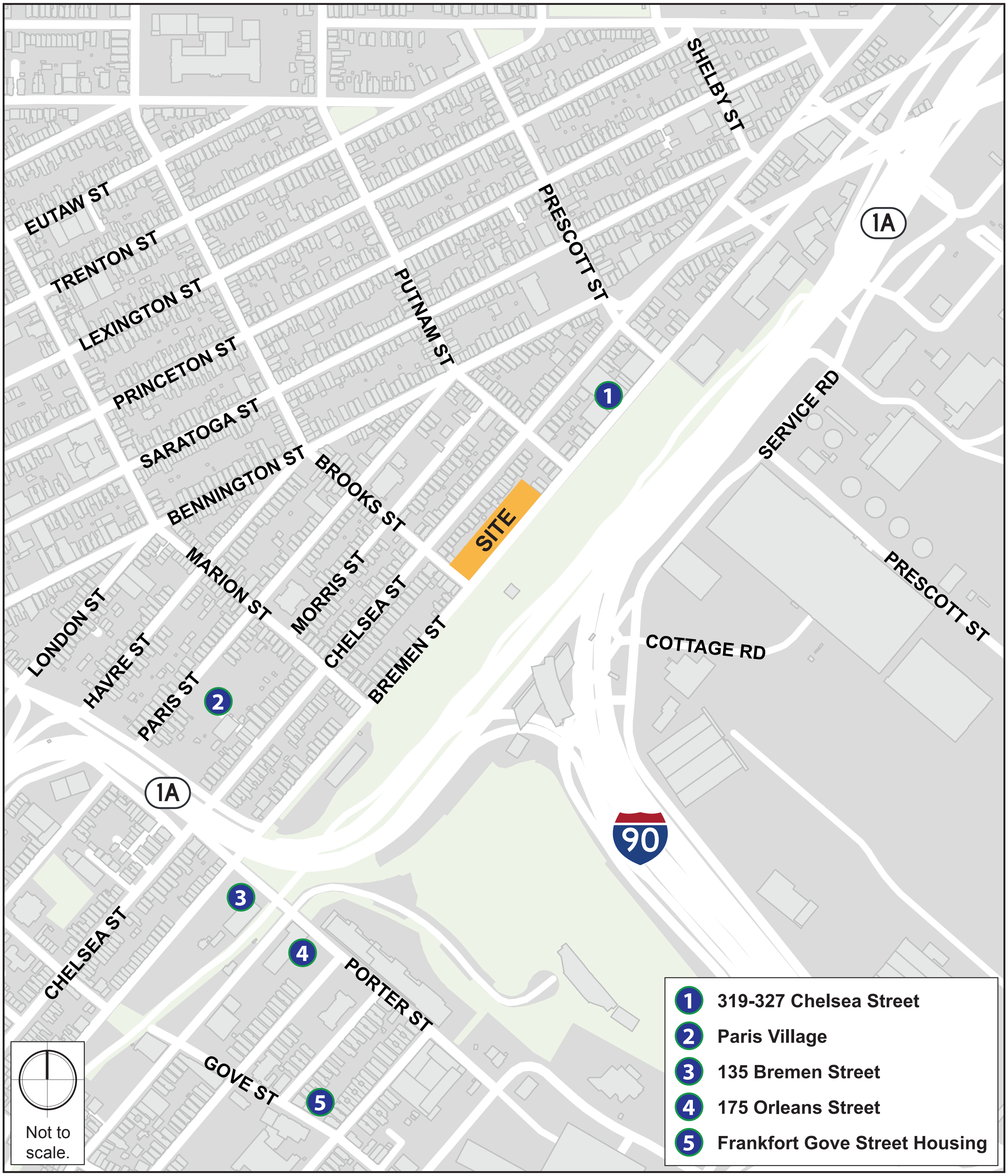


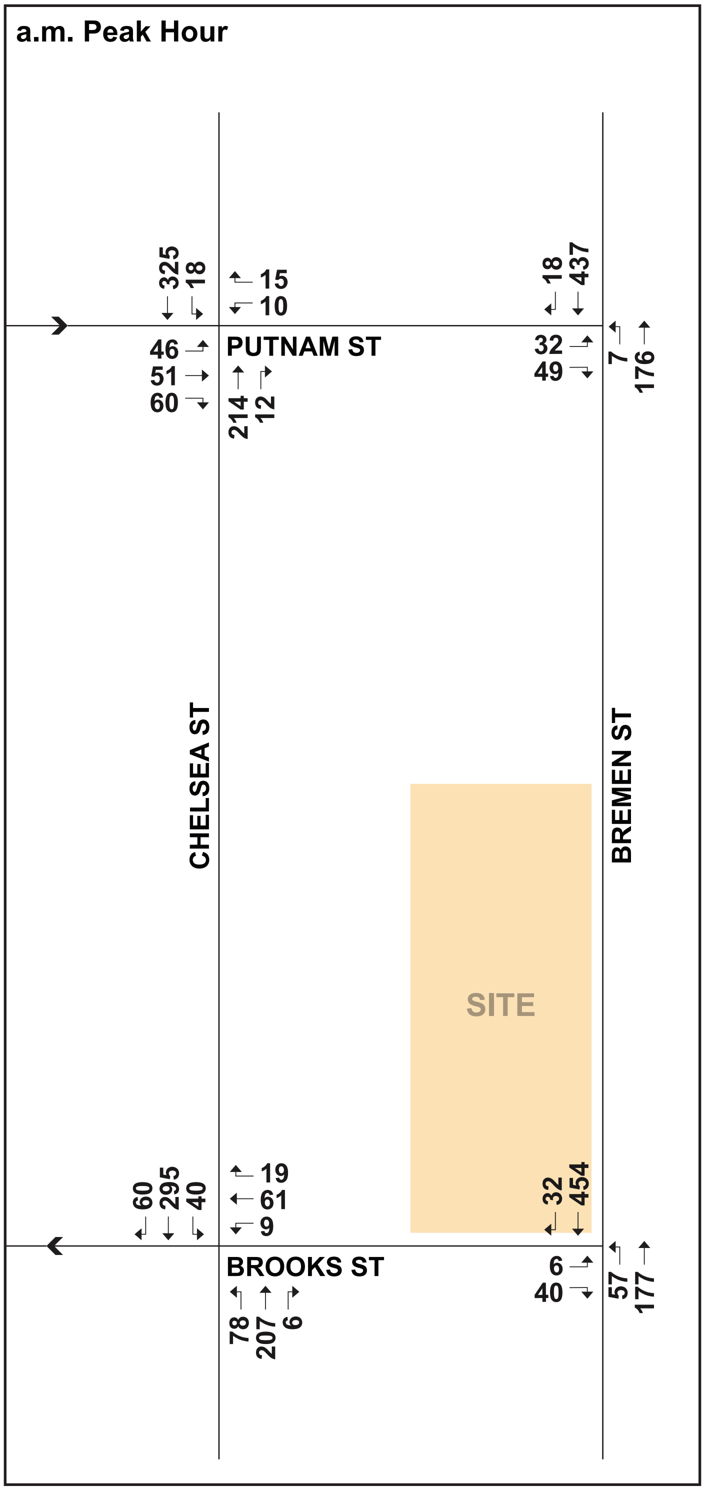
Figure 7-8.
Specific Development Projects

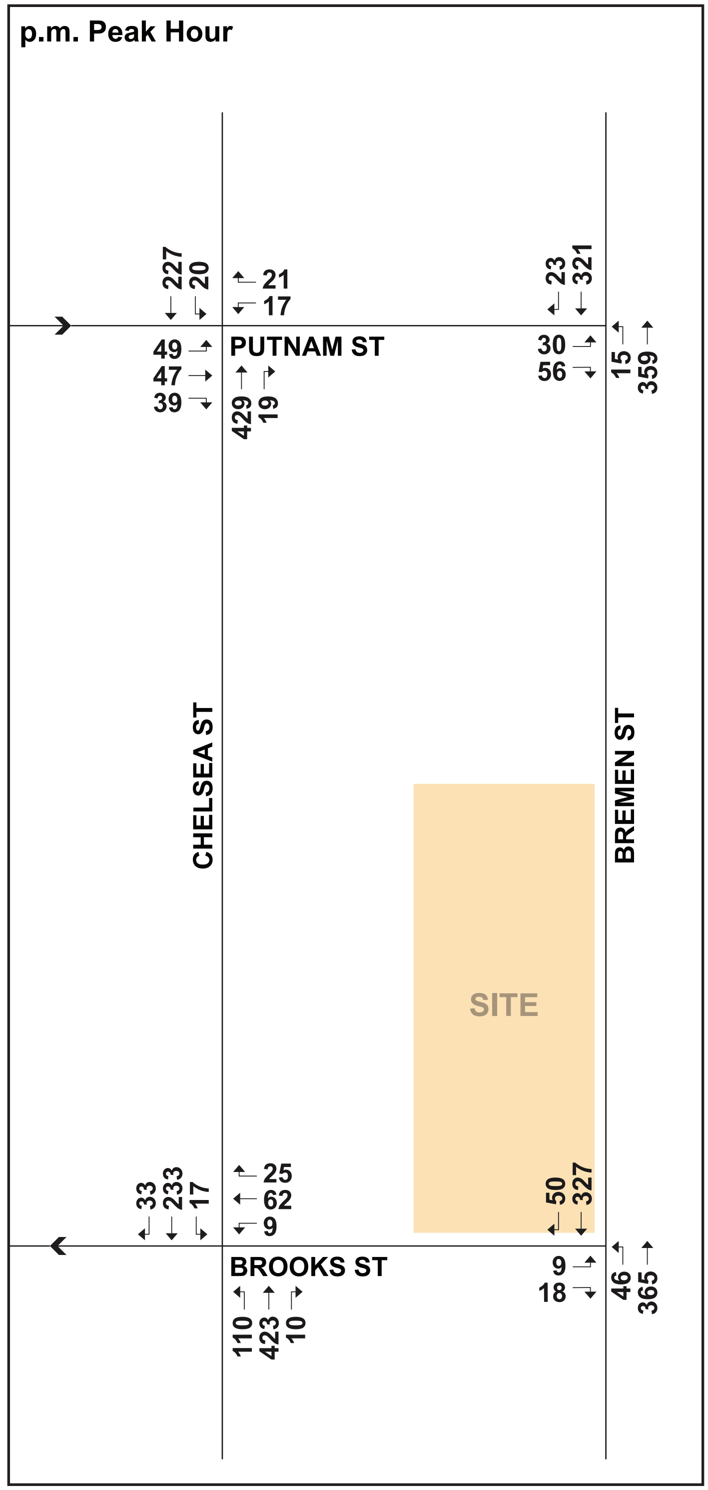
7.4.3 Proposed Infrastructure Improvements

A review of planned improvements to roadway, transit, bicycle, and pedestrian facilities was conducted to determine if there are any nearby improvement projects in the vicinity of the study area. Based on this review, no planned improvements were identified.

7.4.4 No-Build (2026) Condition Traffic Volumes

The one-half percent per year annual growth rate was applied to the Existing (2019) Condition traffic volumes, then the traffic volumes associated with the background development project listed above was added to develop the No-Build (2026) Condition traffic volumes. The No-Build (2026) weekday a.m. and p.m. peak hour traffic volumes are shown on **Figure 7-9**.





Not to scale.

Figure 7-9.
No-build (2026) Condition Traffic Volumes, Weekday a.m. and p.m. Peak Hours

7.5 Build (2026) Condition

As previously summarized, the Project will include the demolition of the existing buildings and the construction of a new six story building and one level of at-grade parking with 68 stacker spaces. The ground floor will contain parking, 2,000 gsf of retail use, three live-work spaces to better activate the street and provide artist/live work lofts, and the lobby/amenities for the residents. The upper five floors will contain 165 new residential units.

7.5.1 Site Access and Circulation

Vehicular access will be provided on Bremen Street to the northeast of the site. The primary pedestrian entrance to the lobby will be located on the southeast corner of the site in the central lobby along Bremen Street. Entrances to the retail component will be located on the southeast corner of the Site on Brooks and Bremen Streets. The ground floor plan is shown in **Figure 7-10**.

7.5.2 Parking

The parking goals developed by the BTD for this section of East Boston are a maximum of 0.75 to 1.25 parking spaces per residential unit within a ten-minute walk of an MBTA station. As previously mentioned, the Project will include 68 parking spaces (with stackers) in an at-grade garage. The 68 parking spaces results in a parking ratio of approximately 0.41 parking spaces per residential unit, consistent with the BTD parking ratio maximum for the area. Additionally, curb cuts along Bremen Street will lead to 135-feet of new parking spaces or approximately 6 spaces. Since the development is less than 500 feet from the MBTA Blue Line, car ownership will not be more unlikely for residents.

7.5.3 Loading and Service Accommodations

Loading and service operations will occur on-site, with access on the west side of the building along Brooks Street. Deliveries to the Site will likely be limited to 36-foot-long box trucks (SU-36) or smaller delivery vehicles. Residential move-in/move-out loading/unloading activity will take place within the Site. Loading associated with the retail component will also take place within the Site

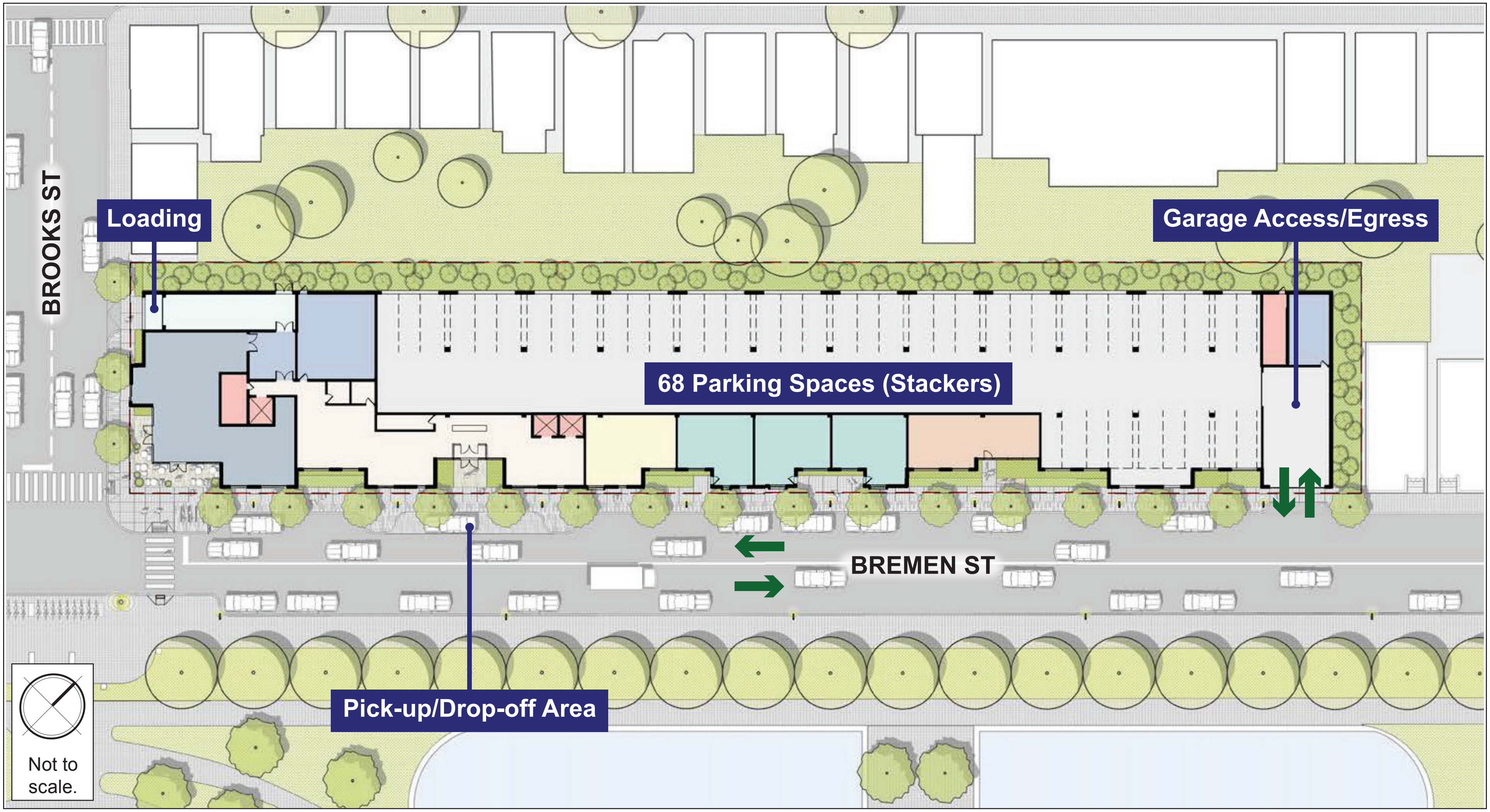


Figure 7-10.
Site Access Plan

7.5.4 Bicycle Accommodations

BTD has established guidelines requiring projects subject to Transportation Access Plan Agreements to provide secure bicycle parking for residents. Based on BTD guidelines, the Project will supply a minimum of 165 secure bicycle parking/storage spaces within the parking garage, at a rate of one secure indoor bicycle parking spaces per residential unit. Additional storage will be provided by outdoor bicycle racks accessible to visitors to the site in accordance with BTD guidelines.

7.5.5 Trip Generation Methodology

Determining the future trip generation of the Project is a complex, multi-step process that produces an estimate of vehicle trips, transit trips, walk trips, and bicycle trips associated with a proposed development and a specific land use program. A project's location and proximity to different travel modes determines how people will travel to and from a project site.

To estimate the number of trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*[6] were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well-served by transit, adjustments are necessary to account for other travel mode shares such as walking, bicycling, and transit.

To estimate the unadjusted number of vehicular trips for the Project, the following ITE land use code (LUCs) was used:

Land Use Code 221 – Multifamily Housing (Mid-Rise). Mid-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three and ten floors. The trip generation estimates are based on the average rate per dwelling units.

Land Use Code 820 – Shopping Center. The Shopping Center land use code is defined as an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Shopping center trip generation estimates are based on average vehicle rates per square footage of retail space. Calculations of the number of trips use ITE's average rate per 1,000 square feet.

7.5.6 Existing Trip Generation

The current site consists of two auto repair shops and a residential building. All three will be demolished and the trips associated with them will no longer occur. To provide a conservative

6 Trip Generation Manual, 10th Edition; Institute of Transportation Engineers; Washington, D.C.; 2017.

estimate of traffic operations resulting from this Project, the trips associated with these buildings were not credited to this development.

7.5.7 Mode Share

The US Census American Community Survey (ACS) provides mode share data on how specific census tracts commute to work. This data was used for the residential portion of the development instead of the BTD data due to the proximity of the Site to transit that is not reflected in BTD's Area 7 – East Boston data. Since the ACS data is not provided for retail uses, the BTD mode share data was used to establish how trips to the retail shop would be made.

The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[7]. The person trips were then distributed to different modes according to the mode shares shown in **Table 7-2**.

Table 7-2. Travel Mode Shares

Land Use		*Walk/Bicycle Share*	*Transit Share*	*Auto Share*	*Vehicle Occupancy Rate*
Daily					
Residential[1]	In	6%	78%	16%	1.18
	Out	6%	78%	16%	1.18
Retail[2]	In	52%	6%	42%	1.82
	Out	52%	6%	42%	1.82
a.m. Peak					
Residential[1]	In	6%	78%	16%	1.18
	Out	6%	78%	16%	1.18
Retail[2]	In	52%	6%	42%	1.82
	Out	52%	6%	42%	1.82
p.m. Peak					
Residential[1]	In	6%	78%	16%	1.18
	Out	6%	78%	16%	1.18
Retail[2]	In	52%	6%	42%	1.82
	Out	52%	6%	42%	1.82

1. Based on data published by the United States Census ACS for Census Tract 507.
2. Based on rates published by the Boston Transportation Department for Area 7 – East Boston.

The mode share percentages shown in **Table 7-2** were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates. The trip generation for the

7 *Summary of Travel Trends: 2009 National Household Travel Survey*; FHWA; Washington, D.C.; June 2011.

Project by mode is shown in **Table 7-3**. The detailed trip generation information is provided in **Appendix D.**

Table 7-3. Trip Generation Summary

Land Use		Walk/Bicycle Trips	Tran sit Trips	Private Auto Trips
Daily				
Residential[1]	In	32	413	72
	Out	32	413	72
	Total	64	826	144
Retail[2]	In	36	4	16
	Out	36	4	16
	Total	72	8	32
a.m. Peak				
Residential[1]	In	1	14	3
	Out	3	41	7
	Total	4	55	10
Retail[2]	In	1	0	1
	Out	1	0	1
	Total	2	0	2
p.m. Peak				
Residential[1]	In	3	41	7
	Out	2	26	4
	Total	5	67	11
Retail[2]	In	4	1	1
	Out	4	0	2
	Total	8	1	3

1. Based on ITE LUC 221 – Multifamily Housing (Mid-rise), 165 dwelling units, average rate.
2. Based on ITE LUC 820 – Shopping Center, 2 ksf, average rate

The Project is expected to generate approximately 176 new daily vehicle trips with 12 new vehicle trips (four entering and eight exiting) during the weekday a.m. peak hour and 14 new vehicle trips (eight entering and six exiting) during the weekday p.m. peak hour. The project is also expected to generate 136 new daily pedestrian trips and 826 new daily transit trips.

7.5.8 Trip Distribution

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project site. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 7 – East Boston and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for the Project are illustrated in **Figure 7-11**.

7.5.9 Build (2026) Traffic Volumes

The vehicle trips were distributed through the study area. The project-generated trips for the weekday a.m. and p.m. peak hours are shown in **Figure 7-12**. The trip assignments were added to the No-Build (2026) Condition vehicular traffic volumes to develop the Build (2026) Condition vehicular traffic volumes. The Build (2026) weekday a.m. and p.m. peak hour traffic volumes are shown on **Figure 7-13**.

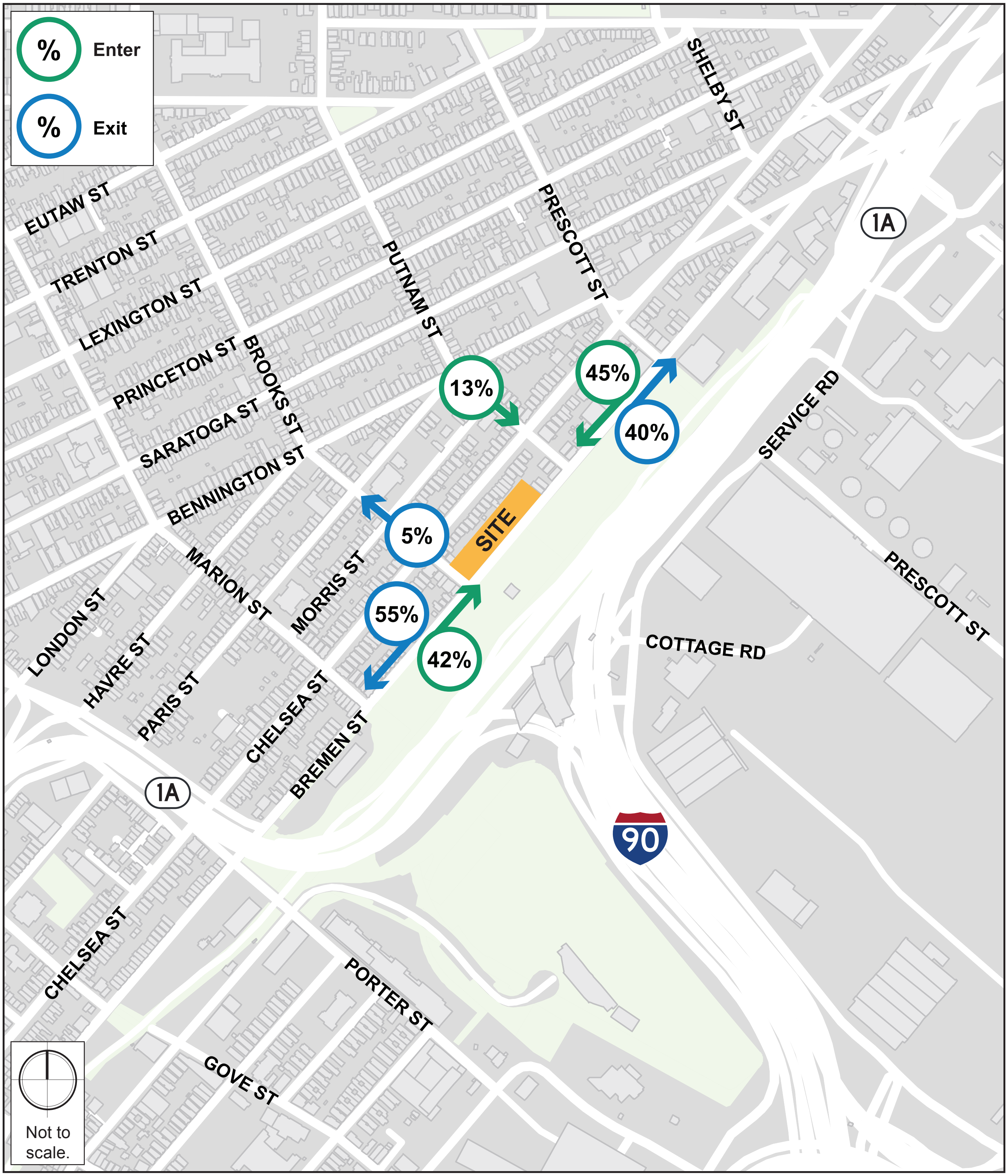
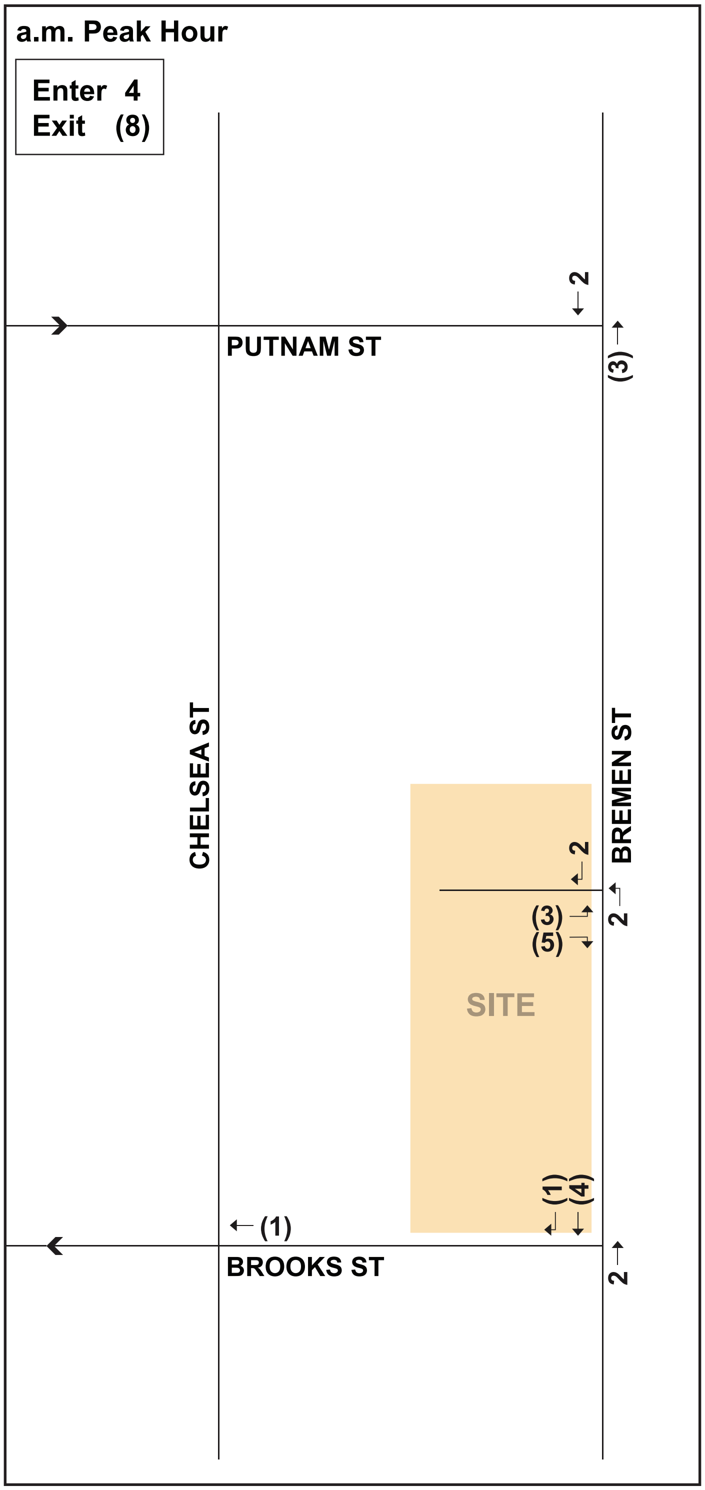


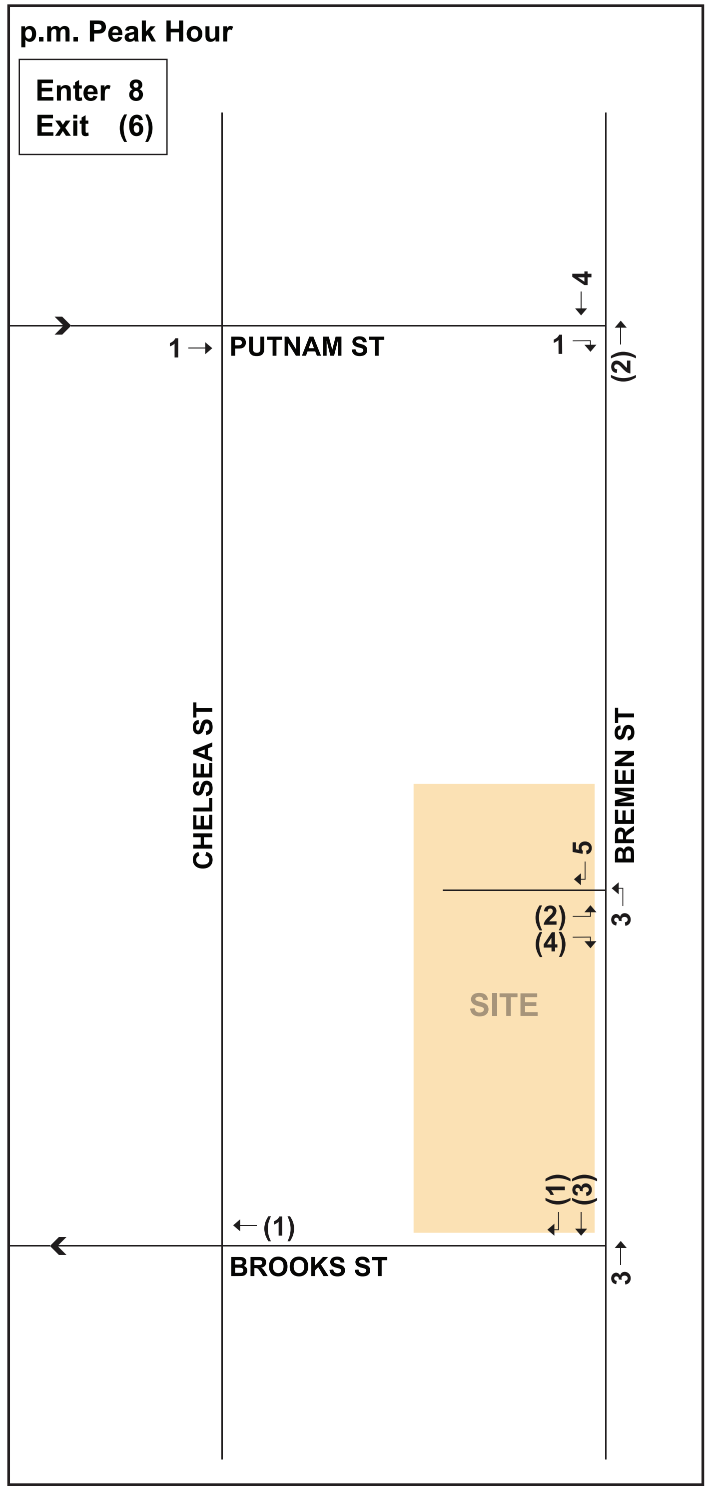
Figure 7-11.
Trip Distribution

MLF CONSULTING LLC

HOWARD STEIN HUDSON
Engineers + Planners

282-308 Bremen Street





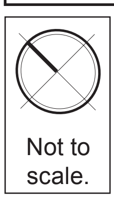


Figure 7-12.
Project Generated Vehicle Trip Assignment, Weekday a.m. and p.m. Peak Hours

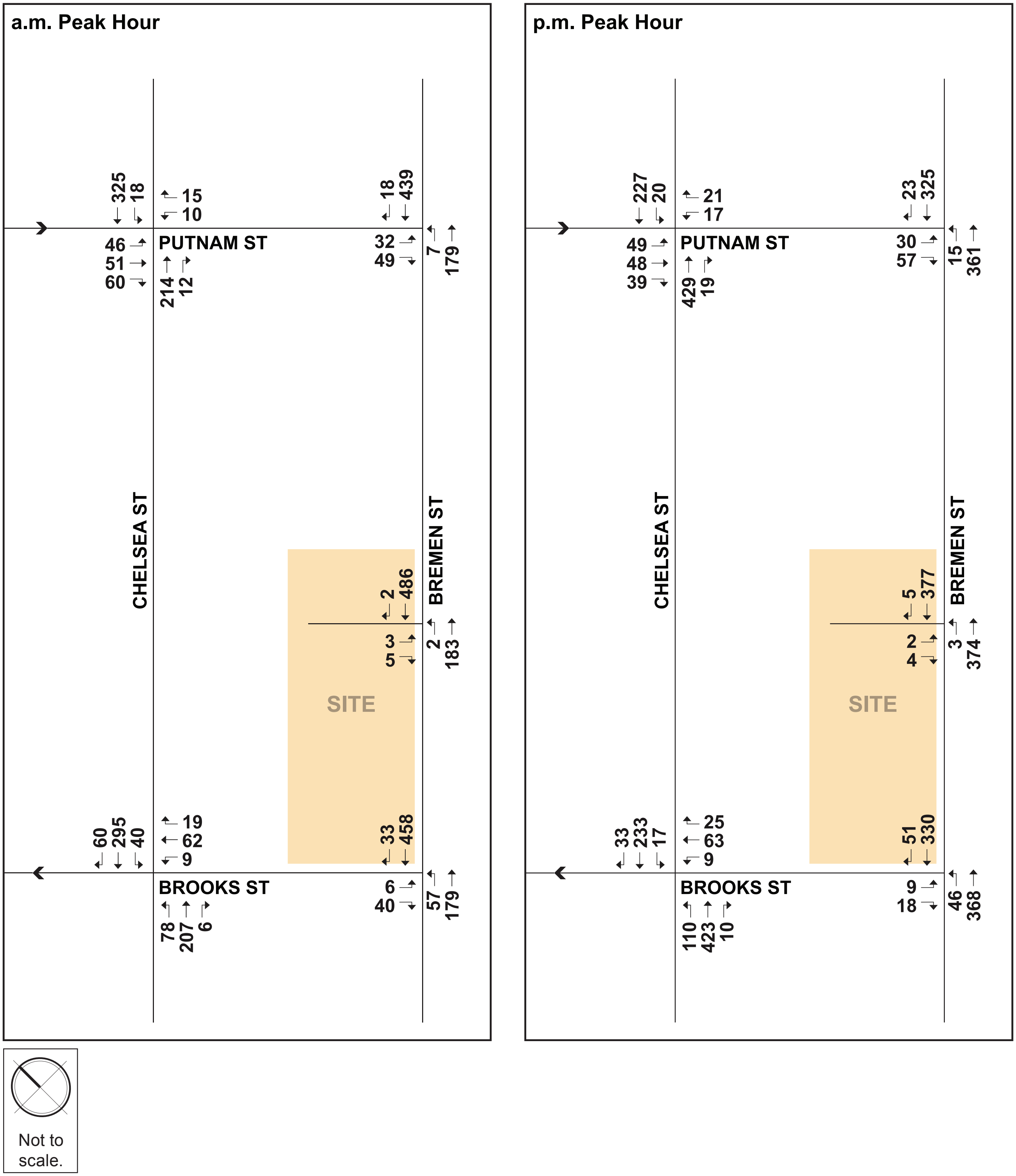


Figure 7-13.
Build (2026) Condition Traffic Volumes, Weekday a.m. and p.m. Peak Hours

7.6 Traffic Operation Analysis

Trafficware's Synchro (version 9) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2010 Highway Capacity Manual (HCM).

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. **Table 7-4** displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered acceptable in an urban area. However, LOS E or F is often typical for a stop controlled minor street that intersects a major roadway.

Table 7-4. Vehicle Level of Service Criteria

Level of Service	Average Stopped Delay (sec/veh)	
	Signalized Intersection	Unsignalized Intersection
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: 2010 Highway Capacity Manual, Transportation Research Board.

In addition to delay and LOS, the operational capacity and vehicular queues are calculated and used to further quantify traffic operations at intersections. The following describes these other calculated measures.

The volume-to-capacity (v/c) ratio is a measure of congestion at an intersection approach. A v/c ratio below one indicates that the intersection approach has adequate capacity to process the arriving traffic volumes over the course of an hour. A v/c ratio of one or greater indicates that the traffic volume on the intersection approach exceeds capacity.

The 50th percentile queue length, measured in feet, represents the maximum queue length during a cycle of the traffic signal with typical (or median) entering traffic volumes.

The 95th percentile queue length, measured in feet, represents the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line during five percent of all signal cycles. The 95th percentile queue will not be seen during each cycle. The queue would be this long only five percent of the time and would typically not occur during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" scenario. Queues at the intersection are generally below the 95th percentile queue throughout the course of the peak hour. It is also unlikely that the 95th percentile queues for each approach to the intersection will occur simultaneously.

Table 7-5 and **Table 7-6** summarize the Existing (2019) Condition, the No-Build (2026) Condition, and the Build (2026) Condition capacity analysis for the study area intersection during the weekday a.m. and p.m. peak hours, respectively. The detailed analysis of the Synchro results is provided in **Appendix D.**

Table 7-5. Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Movement	Existing (2019) Condition				No-Build (2026) Condition				Build (2026) Condition			
	LOS	Delay (s)	V/C ratio	95th Percentile Queue (ft)	LOS	Delay (s)	V/C ratio	95th Percentile Queue (ft)	LOS	Delay (s)	V/C ratio	95th Percentile Queue (ft)
Signalized Intersection												
Chelsea Street/Brooks Street	**A**	**7.7**	-	-	**A**	**7.8**	-	-	**A**	**7.9**	-	-
Brooks St WB left/thru/right	B	19.2	0.30	52	B	19.1	0.31	53	B	19.1	0.31	54
Chelsea St NB left/thru/right	A	6.1	0.31	86	A	6.3	0.33	90	A	6.3	0.33	90
Chelsea St SB left/thru/right	A	6.2	0.38	115	A	6.4	0.39	121	A	6.4	0.39	121
Unsignalized Intersections												
Bremen Street/Brooks Street	-	-	-	-	-	-	-	-	-	-	-	-
Brooks St EB left/right	A	8.4	0.07	5	A	8.5	0.07	5	A	8.5	0.07	5
Bremen St NB left/thru	A	9.5	0.29	30	A	9.7	0.31	33	A	9.8	0.32	35
Bremen St SB thru/right	B	13.6	0.60	103	B	14.6	0.64	118	B	14.8	0.64	120
Bremen Street/Putnam Street	-	-	-	-	-	-	-	-	-	-	-	-
Putnam St EB left/right	A	8.8	0.12	10	A	9.0	0.13	10	A	9.0	0.13	10
Bremen St NB left/thru	A	9.0	0.22	23	A	9.2	0.24	23	A	9.2	0.25	25
Bremen St SB thru/right	B	12.8	0.56	90	B	13.7	0.60	103	B	13.8	0.60	103
Chelsea Street/Putnam Street	-	-	-	-	-	-	-	-	-	-	-	-
Putnam St EB left/thru/right	C	18.9	0.39	45	C	20.2	0.42	50	C	20.2	0.42	50
Putnam St WB left/right	B	14.6	0.08	6	B	14.9	0.08	7	B	14.9	0.08	7
Chelsea St NB thru/right	A	0.0	0.14	0	A	0.0	0.14	0	A	0.0	0.14	0
Chelsea St SB left/thru	A	0.5	0.01	1	A	0.6	0.02	1	A	0.6	0.02	1

Gray shading indicates decrease in LOS from Existing Condition below LOS E or LOS F.

Table 7-6. Capacity Analysis Summary, Weekday p.m. Peak Hour

Intersection/Movement	Existing (2019) Condition				No-Build (2026) Condition				Build (2026) Condition			
	LOS	Delay (s)	V/C ratio	95th Percentile Queue (ft)	LOS	Delay (s)	V/C ratio	95th Percentile Queue (ft)	LOS	Delay (s)	V/C ratio	95th Percentile Queue (ft)
Signalized Intersection												
Chelsea Street/Brooks Street	**A**	**7.9**	-	-	**A**	**8.1**	-	-	**A**	**8.1**	-	-
Brooks St WB left/thru/right	B	17.5	0.29	53	B	17.5	0.30	55	B	17.6	0.30	55
Chelsea St NB left/thru/right	A	7.6	0.48	175	A	7.9	0.50	186	A	7.9	0.50	186
Chelsea St SB left/thru/right	A	5.0	0.23	69	A	5.1	0.24	73	A	5.1	0.24	73
Unsignalized Intersections												
Bremen Street/Brooks Street	-	-	-	-	-	-	-	-	-	-	-	-
Brooks St EB left/right	A	8.6	0.05	3	A	8.7	0.05	5	A	8.7	0.05	5
Bremen St NB left/thru	B	11.8	0.51	73	B	12.5	0.54	83	B	12.6	0.54	83
Bremen St SB thru/right	B	11.0	0.46	63	B	11.7	0.50	70	B	11.8	0.50	73
Bremen Street/Putnam Street	-	-	-	-	-	-	-	-	-	-	-	-
Putnam St EB left/right	A	9.0	0.12	10	A	9.1	0.13	13	A	9.2	0.13	13
Bremen St NB left/thru	B	11.3	0.46	63	B	11.9	0.49	68	B	12.0	0.49	70
Bremen St SB thru/right	B	10.7	0.42	53	B	11.3	0.45	60	B	11.4	0.46	60
Chelsea Street/Putnam Street	-	-	-	-	-	-	-	-	-	-	-	-
Putnam St EB left/thru/right	C	23.7	0.43	52	D	25.8	0.47	59	D	25.9	0.47	60
Putnam St WB left/right	C	18.9	0.13	11	C	20.0	0.15	13	C	20.0	0.15	13
Chelsea St NB thru/right	A	0.0	0.27	0	A	0.0	0.28	0	A	0.0	0.28	0
Chelsea St SB left/thru	A	0.9	0.02	2	A	0.9	0.02	2	A	0.9	0.02	2

Gray shading indicates decrease in LOS from Existing Condition below LOS E or LOS F.

As shown in Table 7-5 and Table 7-6, all of the intersections and approaches have acceptable operations (LOS D or better) under the Existing (2019) Condition, the No-Build (2026) Condition, and the Build (2026) Condition.

7.7 Transportation Demand Management

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to minimize automobile usage and Project related traffic impacts. TDM will be facilitated by the nature of the Project (which does not generate significant peak hour trips) and its proximity to public transit alternatives.

On-site management will keep a supply of transit information (schedules, maps, and fare information) to be made available to the residents of the building. The Proponent will work with the City to develop a TDM program appropriate to the Project and consistent with its level of impact.

The Proponent is prepared to take advantage of good transit access in marketing the site to future residents by working with them to implement the following TDM measures to encourage the use of non-vehicular modes of travel.

The TDM measures for the Project may include but are not limited to the following:

- **Transportation Coordinator**: The Proponent will encourage building to designate a full-time, on-site employee as the transportation coordinator for the site. The transportation coordinator will oversee all transportation issues. This includes managing vehicular operations, service and loading operations, and TDM programs.
- **Information and Promotion of Travel Alternatives**: The Proponent will encourage the building to provide public transit system maps, schedules, and other information on transit services in the area;
- **Annual News Letter**: The Proponent will encourage the building to provide an annual (or more frequent) newsletter or bulletin summarizing transit, ridesharing, bicycling, alternative work schedules, and other travel options;
- **Real Time Transit Info**: he Proponent will encourage the building to provide real-time information on travel alternatives via the Internet in the building lobby.
- **Electric Vehicle Charging**: The Proponent will explore the feasibility of providing electric vehicle charging station(s) within the garage.
- **Vehicle Sharing Program**: The Proponent will explore the feasibility of providing spaces in the garage for a car sharing service. The Proponent plans to provide an innovative building-managed private car share service for residents, further enhancing the transportation offerings of this transit-oriented development and further reducing the need for cars.
- **Bicycle Accommodation**: The Proponent will provide bicycle storage in secure, sheltered areas for residents and employees to encourage bicycling as an alternative mode of transportation. Subject to necessary approvals, public use bicycle racks for visitors will be placed near building entrances.

7.8 Transportation Mitigation Measures

While the traffic impacts associated with the new trips are minimal, the Proponent will continue to work with the City of Boston to create a Project that efficiently serves vehicle trips, improves the pedestrian environment, and encourages transit and bicycle use. As part of the Project, the Proponent will bring all abutting sidewalks and pedestrian ramps to the City of Boston standards in accordance with the Boston Complete Streets design guidelines. This will include the reconstruction and widening of the sidewalks where possible, the installation of new, accessible ramps, improvements to street lighting where necessary, planting of street trees, and providing bicycle storage racks surrounding the site, where appropriate.

The Proponent is responsible for preparation of the Transportation Access Plan Agreement (TAPA), a formal legal agreement between the Proponent and the BTD. The TAPA formalizes the findings of the transportation study, mitigation commitments, elements of access and physical design, travel demand management measures, and any other responsibilities that are agreed to by both the Proponent and the BTD. Because the TAPA must incorporate the results of the technical analysis, it must be executed after these other processes have been completed. The proposed measures listed above and any additional transportation improvements to be undertaken as part of this Project will be defined and documented in the TAPA.

The Proponent will also produce a Construction Management Plan (CMP) for review and approval by BTD. The CMP will detail the schedule, staging, parking, delivery, and other associated impacts of the construction of the Project.

7.9 Evaluation of Short-Term Construction Impacts

Most construction activities will be accommodated within the current site boundaries. Details of the overall construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and routes will be addressed in detail in a Construction Management Plan to be filed with BTD in accordance with the City's transportation maintenance plan requirements. The Construction Management Plan will document all committed measures and will be executed with the City prior to commencement of construction.

To minimize transportation impacts during the construction period, the following measures will be considered for the Construction Management Plan:

- Limited construction worker parking on-site;
- Encouragement of worker carpooling; and
- Providing secure spaces on-site for workers' supplies and tools so they do not have to be brought to the site each day.

8.0 Coordination with Governmental Agencies

8.1 Architectural Access Board Requirements

This Project will comply with the requirements of the Architectural Access Board. The Project will also be designed to comply with the Standards of the Americans with Disabilities Act.

8.2 Massachusetts Environmental Policy Act

Based on information currently available, development of the Proposed Project will not result in a state permit/state agency action and meet a review threshold that would require MEPA review by the MEPA Office of the Executive Office of Energy and Environmental Affairs.

8.3 Boston Civic Design Commission

The Project expects to exceed the 100,000 gross square feet size threshold requirement requiring review by the Boston Civic Design Commission.

8.4 Boston Parks Commission

As the Proposed Project is across from the Bremen Street Community Park, review by the Boston Parks Commission will be required.

9.0 PROJECT CERTIFICATION

This form has been circulated to the Boston Planning and Development Agency as required by Article 80 of the Boston Zoning Code.

282 Bremen Development, LLC

Signature of Proponent

05-08-2019
Date

Mitchell L. Fischman ("MLF") Consulting LLC

Signature of Preparer
Mitchell L. Fischman, Principal

05/08/19
Date

APPENDIX A – LETTER OF INTENT TO FILE PNF, MARCH 21, 2019

McDERMOTT
QUILTY &
MILLER LLP

28 STATE STREET, SUITE 802
BOSTON, MA 02109

30 ROWES WHARF, SUITE 600
BOSTON, MA 02110

March 21, 2019

Mr. Brian Golden, Director
Boston Planning and Development Agency
One City Hall Plaza, 9th Floor
Boston, MA 02201

Attn: Raul Duverge, Project Manager

Re: Letter of Intent to File Expanded Project Notification Form ("EPNF")
Article 80B Large Project Review
282-308 Bremen Street, East Boston

Dear Director Golden:

As zoning and permitting counsel to Bremen Acquisition, LLC (the "Proponent"), which has secured development rights to the combined real property at 282-308 Bremen Street, East Boston (the "Project Site"), I am writing to notify the Boston Planning and Development Agency (the "BPDA") of the Proponent's intent to file an Expanded Project Notification Form ("EPNF") with the BPDA pursuant to Article 80B, Large Project Review requirements of the Boston Zoning Code (the "Code").

The Proponent seeks to revitalize this non-conforming and outdated industrial Project Site in a residential section of the East Boston Neighborhood, with a vibrant mixed-use development of approximately 125,000 gross square feet. The proposed project will include approximately 165 residential units, 8,500 square feet of street level retail/lobby space and garaged parking in a building that varies in height between five (5) and six (6) stories along Bremen Street, with related upgrades in public realm improvements, including pedestrian and vehicular access, landscaping and streetscape design (the "Proposed Project"). The scope and scale of the Proponent's residential program is also intended to further the residential policy goals of Boston Mayor Martin J. Walsh's 2030 Housing Plan.

With a combined land area of approximately 34,160 square feet, the site consists of 9 contiguous parcels of land with a series of non-descript automobile repair structures, one small wood frame residential building, surface parking and multiple curb cuts off Bremen Street (the

"Project Site"). As part of the Proposed Project, the Proponent proposes the removal of many of these curb cuts, with the potential instead for approximately 135 feet of new additional on-street public parking. Uniquely situated across from the Bremen Street Community Park and within a short walk to the MBTA's Blue Line Airport Subway Station, the Project Site is an ideal location for the upgrade and conversion of these non-conforming parcels into much-needed residential housing. Consistent with the existing residential character of the area, the Proposed Project has also been carefully designed with certain building and site measures that help to appropriately transition from residential properties along Chelsea Street at the rear to a more prominent engagement along the Bremen Street frontage. Please see attached **Figure 1 - Project Locus**.

As the Proposed Project exceeds 50,000 square-feet of new construction at this location in the East Boston neighborhood, it is subject to the BPDA's Article 80B Large Project Review requirements, pursuant to Article 80 of the Code. The EPNF filing is expected to address many issues normally presented in a Draft Project Impact Report ("DPIR"), including a transportation analysis and air and noise, shadow, infrastructure, historic resources and other environmental evaluations of potential project impacts and any needed mitigation measures.

In support of the required Article 80 Large Project Review process, the Proponent and its development team have also conducted, and continue to undertake, community outreach with neighbors and abutters of the Project Site, including meetings and discussions with local elected and appointed officials from the area. Preliminary outreach to-date has also included an initial project presentation to the Maverick Central Neighborhood Association.

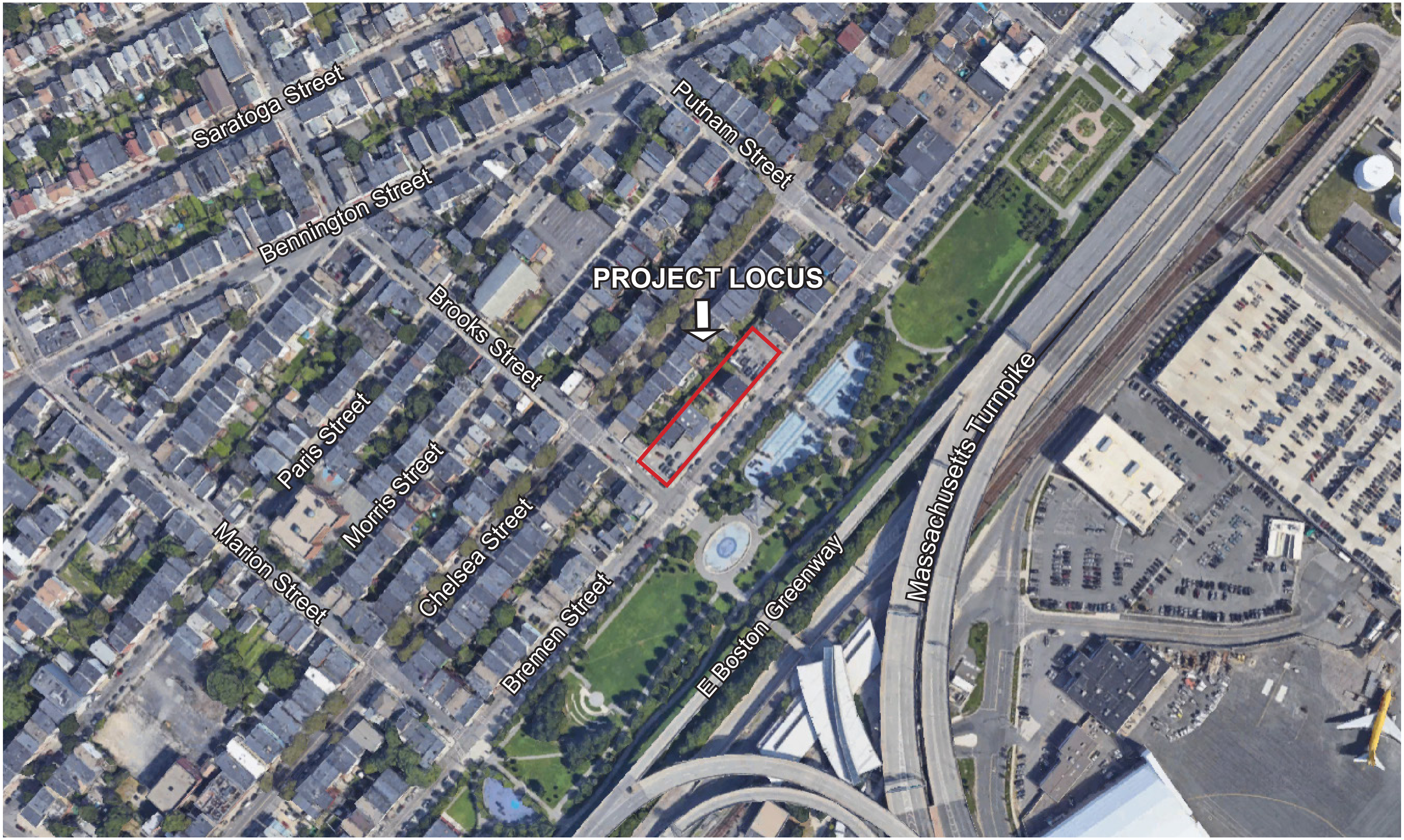
Thank you for your time and attention, and our team looks forward to working with you, the BPDA staff, prospective members of the Impact Advisory Group, local elected officials and the community on the Proposed Project. Please also do not hesitate to contact me should you have any questions or for more information.

Very truly yours,

Joseph P. Hanley, Esq.
Partner - McDermott, Quilty & Miller, LLP

Attachment: **Figure 1. Project Locus**

cc: City Councilor Edwards
State Senator Boncore
State Representative Madaro
Jose Garcia-Mota, Mayor's Office of Neighborhood Services
Jonathan Greeley, BPDA Development Director
Raul Duverge, BPDA Project Manager



282-308 Bremen Street

Figure 1. Project Locus
282-308 Bremen Street

MLF CONSULTING LLC

Letter of Intent to File PNF

APPENDIX B – AIR QUALITY APPENDIX

APPENDIX B
AIR QUALITY

282 BREMEN STREET
PROJECT NOTIFICATION FORM

Pages **Contents**

```
*** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  NOCHKD  SCREEN  NODRYDPLT  NOWETDPLT  URBAN

                                    ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Model Is Setup For Calculation of Average CONCentration Values.

  --  DEPOSITION LOGIC  --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
**Model Uses NO WET DEPLETION.  WETDPLT  =  F

**Model Uses URBAN Dispersion Algorithm for the SBL for     5 Source(s),
  for Total of    1 Urban Area(s):
  Urban Population =     71532.0 ;  Urban Roughness Length =  1.000 m

**Model Allows User-Specified Options:
        1. Stack-tip Downwash.
        2. Model Assumes Receptors on FLAT Terrain.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Full Conversion Assumed for NO2.
        6. Urban Roughness Length of 1.0 Meter Used.
        7. Option for Capped & Horiz Stacks Selected With:
                0 Capped Stack(s); and      5 Horizontal Stack(s)

**Other Options Specified:
        NOCHKD   - Suppresses checking of date sequence in meteorology files
        SCREEN   - Use screening option
which forces calculation of centerline values

**Model Accepts FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of:  CO

**Model Calculates  1 Short Term Average(s) of:   1-HR

**This Run Includes:      5 Source(s);       1 Source Group(s); and     777 Receptor(s)

               with:      5 POINT(s), including
                          0 POINTCAP(s) and      5 POINTHOR(s)
                and:      0 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with      0 line(s)


**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date:  18081

**Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =     6.10 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                              ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      3.6 MB of RAM.
```

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**Output Print File:             CO_5yrs_CO.LST

**File for Summary of Results:   W:\Apps\aermod\4425\CO_5yrs_CO.SUM
*** AERMOD - VERSION  18081 ***   *** 282 Bremen Street BPDA                                             ***        04/11/19
*** AERMET - VERSION  18081 ***   ***                                                                    ***        14:27:26
                                                                                                                    PAGE   2
*** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  NOCHKD  SCREEN  NODRYDPLT  NOWETDPLT  URBAN

                                        *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                           (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1

               NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.



                                  *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                         (METERS/SEC)

                                               1.54,   3.09,   5.14,   8.23,  10.80,
*** AERMOD - VERSION  18081 ***   *** 282 Bremen Street BPDA                                             ***        04/11/19
*** AERMET - VERSION  18081 ***   ***                                                                    ***        14:27:26
                                                                                                                    PAGE   3
*** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  NOCHKD  SCREEN  NODRYDPLT  NOWETDPLT  URBAN

                                    *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

  Surface file:   Urban.sfc                                                                       Met Version:  18081
  Profile file:   Urban.PFL
  Surface format: FREE
  Profile format: FREE
  Surface station no.:     11111                  Upper air station no.:     22222
                 Name: UNKNOWN                                   Name: UNKNOWN
                 Year:   2010                                    Year:   2010

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 10 01 01   1 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   10.   10.0  255.2    2.0
 10 01 02   2 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   20.   10.0  255.2    2.0
 10 01 03   3 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   30.   10.0  255.2    2.0
 10 01 04   4 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   40.   10.0  255.2    2.0
 10 01 05   5 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   50.   10.0  255.2    2.0
 10 01 06   6 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   60.   10.0  255.2    2.0
 10 01 07   7 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   70.   10.0  255.2    2.0
 10 01 08   8 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   80.   10.0  255.2    2.0
 10 01 09   9 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50   90.   10.0  255.2    2.0
 10 01 10  10 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  100.   10.0  255.2    2.0
 10 01 11  11 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  110.   10.0  255.2    2.0
 10 01 12  12 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  120.   10.0  255.2    2.0
 10 01 13  13 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  130.   10.0  255.2    2.0
 10 01 14  14 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  140.   10.0  255.2    2.0
 10 01 15  15 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  150.   10.0  255.2    2.0
 10 01 16  16 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  160.   10.0  255.2    2.0
 10 01 17  17 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  170.   10.0  255.2    2.0
 10 01 18  18 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  180.   10.0  255.2    2.0
 10 01 19  19 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  190.   10.0  255.2    2.0
 10 01 20  20 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  200.   10.0  255.2    2.0
 10 01 21  21 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  210.   10.0  255.2    2.0
 10 01 22  22 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  220.   10.0  255.2    2.0
 10 01 23  23 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  230.   10.0  255.2    2.0
 10 01 24  24 01   -1.2  0.043 -9.000  0.020 -999.   21.      5.5  1.00   1.62   0.21    0.50  240.   10.0  255.2    2.0
```

```
 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 10 01 01 01   10.0 1   10.    0.50   255.3   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
 *** AERMOD - VERSION  18081 ***   *** 282 Bremen Street BPDA                                             ***        04/11/19
 *** AERMET - VERSION  18081 ***   ***                                                                    ***        14:27:26
                                                                                                                     PAGE   4
 *** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  NOCHKD  SCREEN  NODRYDPLT  NOWETDPLT  URBAN

                                                *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                    ** CONC OF CO       IN MICROGRAMS/M**3                          **

                                                  DATE                                                           NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS      15.30053  ON 10011301: AT (  332775.40,  4693514.03,     6.10,     6.10,    4.52)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
 *** AERMOD - VERSION  18081 ***   *** 282 Bremen Street BPDA                                             ***        04/11/19
 *** AERMET - VERSION  18081 ***   ***                                                                    ***        14:27:26
                                                                                                                     PAGE   5
 *** MODELOPTs:    NonDFAULT  CONC  FLAT  FLGPOL  NOCHKD  SCREEN  NODRYDPLT  NOWETDPLT  URBAN

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of           0 Fatal Error Message(s)
 A Total of           1 Warning Message(s)
 A Total of           0 Informational Message(s)

 A Total of       18504 Hours Were Processed

 A Total of           0 Calm Hours Identified

 A Total of           0 Missing Hours Identified (  0.00 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***
```

INDOOR GARAGE ANALYSIS PROGRAM

PROJECT: 282 BREMEN STREET GARAGE PEAK PM HOUR - YEAR: 2026

DISTANCE IN:	**114 METERS**
DISTANCE OUT:	**114 METERS**
NUMBER OF EXIT LANES:	**1 LANE(S)**
PEAK VOLUME:	**14 VEH/HOUR**
CO RATE:	**3.045 GRAMS CO/MILE**
SPEED IN GARAGE:	**5.0 M.P.H.**

TOTAL CO EMISSIONS = 0.050 GRAMS/MIN = 0.00084 GRAMS/SEC

MOVES2014B OUTPUT – 282 BREMEN STREET

Zone ID	Road Type ID	Link Length (miles)	Link Volume (Vehicles/Hr)	Link Avg Speed (Miles/Hr)	Pollutant	Emission Factor (Grams/veh-mi)
250250	5	0.071022727	12	5	CO	3.04536
250250	5	0.071022727	14	5	CO	3.04536

APPENDIX C – NOISE APPENDIX

APPENDIX C
NOISE

282-308 BREMEN STREET
PROJECT NOTIFICATION FORM

Page **Contents**

Figure 1
Sound Monitoring & Modeling Locations
282-308 Bremen Street East Boston, MA

Tech environmental
FOCUSED KNOWLEDGE. REAL SOLUTIONS.

Figure 2
Sound Modeling Receptor Locations
282-308 Bremen Street, East Boston, MA

TECH environmental

Cadna Noise Modeling Results

	31.5	63	125	250	500	1000	2000	4000	8000	A-Wtd	
Local Nighttime Limit	68	67	61	52	46	40	33	28	26	**50**	
NIGHTTIME RESULTS & CITY OF BOSTON ANALYSIS	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**A-Wtd**	**Complies Night?**
4 Brooks Street	57	52	47	40	35	30	23	15	3	38	**YES**
241 Chelsea Street	58	53	47	40	34	29	23	16	5	37	**YES**
249 Chelsea Street	60	57	53	47	43	38	30	21	7	45	**YES**
255 Chelsea Street	62	58	54	48	45	39	32	23	10	46	**YES**
261 Chelsea Street	61	57	53	48	44	38	31	22	9	45	**YES**
271 Chelsea Street	59	55	49	42	37	32	25	18	7	40	**YES**
277 Chelsea Street	61	57	53	46	42	36	27	19	8	44	**YES**
285 Chelsea Street	59	55	51	45	40	35	26	17	4	42	**YES**
310 Bremen Street	60	55	49	42	36	30	24	17	6	39	**YES**
Bremen Street Park Playground	57	53	49	43	39	33	25	15	1	40	**YES**

NIGHTTIME RESULTS & MASSDEP ANALYSIS (< +10 dBA)	**Impact Level (dBA)**	**Background Level (dBA)**	***Total Level (dBA)***	***Increase (dBA)***	**Complies Night?**
4 Brooks Street	37.8	41.6	43.1	**+1.5**	**YES**
241 Chelsea Street	37.4	43.4	44.4	**+1.0**	**YES**
249 Chelsea Street	44.7	43.4	47.1	**+3.7**	**YES**
255 Chelsea Street	46.1	43.4	48.0	**+4.6**	**YES**
261 Chelsea Street	45.3	43.4	47.5	**+4.1**	**YES**
271 Chelsea Street	39.6	49.0	49.5	**+0.5**	**YES**
277 Chelsea Street	43.7	49.0	50.1	**+1.1**	**YES**
285 Chelsea Street	42.3	49.0	49.8	**+0.8**	**YES**
310 Bremen Street	39.0	41.6	43.5	**+1.9**	**YES**
Bremen Street Park Playground	40.4	41.6	44.1	**+2.5**	**YES**

APPENDIX D – TRANSPORTATION APPENDIX

Client:	Andrew Fabiszewski
Project #:	323_C008_HSH
BTD #:	Location 1
Location:	East Boston, MA
Street 1:	Chelsea Street
Street 2:	Brooks Street
Count Date:	1/31/2019
Day of Week:	Thursday
Weather:	Mostly Sunny, 10°F

BOSTON
TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
www.BostonTrafficData.com

PASSENGER CARS & HEAVY VEHICLES COMBINED

	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	15	40	1	0	2	57	7	0	0	0	0	0	1	7	3
7:15 AM	0	17	43	1	0	3	60	8	0	0	0	0	0	3	9	4
7:30 AM	0	19	46	2	0	6	63	12	0	0	0	0	0	2	12	5
7:45 AM	0	20	50	1	0	11	66	17	0	0	0	0	0	3	15	5
8:00 AM	0	18	53	2	0	10	71	15	0	0	0	0	0	3	16	4
8:15 AM	0	17	46	1	0	11	78	13	0	0	0	0	0	1	14	4
8:30 AM	0	15	39	1	0	7	62	10	0	0	0	0	0	1	13	2
8:45 AM	0	16	37	1	0	3	47	9	0	0	0	0	0	1	12	1

	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	18	84	2	0	4	56	10	0	0	0	0	0	3	10	9
4:15 PM	0	20	88	2	0	6	59	13	0	0	0	0	0	4	11	10
4:30 PM	0	22	96	3	0	3	53	11	0	0	0	0	0	3	13	8
4:45 PM	0	25	101	2	0	2	49	9	0	0	0	0	0	1	14	5
5:00 PM	0	27	107	3	0	5	55	6	0	0	0	0	0	2	13	6
5:15 PM	0	30	95	2	0	6	58	5	0	0	0	0	0	3	12	5
5:30 PM	0	35	84	1	0	5	56	8	0	0	0	0	0	2	13	4
5:45 PM	0	32	81	2	0	5	55	12	0	0	0	0	0	2	12	3

AM PEAK HOUR 7:30 AM to 8:30 AM	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**74**	**195**	**6**	**0**	**38**	**278**	**57**	**0**	**0**	**0**	**0**	**0**	**9**	**57**	**18**
PHF	**0.94**				**0.91**				**0.00**				**0.91**			
HV %	**0.0%**	**4.1%**	**7.7%**	**0.0%**	**0.0%**	**0.0%**	**3.2%**	**3.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:30 PM to 5:30 PM	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**104**	**399**	**10**	**0**	**16**	**215**	**31**	**0**	**0**	**0**	**0**	**0**	**9**	**52**	**24**
PHF	**0.94**				**0.95**				**0.00**				**0.89**			
HV %	**0.0%**	**0.0%**	**2.0%**	**0.0%**	**0.0%**	**0.0%**	**4.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client: Andrew Fabiszewski
Project #: 323_C008_HSH
BTD #: Location 1
Location: East Boston, MA
Street 1: Chelsea Street
Street 2: Brooks Street
Count Date: 1/31/2019
Day of Week: Thursday
Weather: Mostly Sunny, 10°F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
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HEAVY VEHICLES

	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0
7:15 AM	0	1	3	0	0	0	3	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0
7:45 AM	0	2	4	0	0	0	2	1	0	0	0	0	0	0	0	0
8:00 AM	0	1	5	0	0	0	3	1	0	0	0	0	0	0	0	0
8:15 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	1	0
8:45 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	1	0

	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	2	0	0	0	2	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:15 AM to 8:15 AM	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**4**	**15**	**0**	**0**	**0**	**10**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.79**				**0.75**				**0.00**				**0.00**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Chelsea Street Northbound				Chelsea Street Southbound				Brooks Street Eastbound				Brooks Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**9**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.83**				**0.75**				**0.00**				**0.00**			

Client:	Andrew Fabiszewski
Project #:	323_C008_HSH
BTD #:	Location 1
Location:	East Boston, MA
Street 1:	Chelsea Street
Street 2:	Brooks Street
Count Date:	1/31/2019
Day of Week:	Thursday
Weather:	Mostly Sunny, 10°F

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PEDESTRIANS & BICYCLES

	Chelsea Street Northbound					Chelsea Street Southbound					Brooks Street Eastbound					Brooks Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	40		0	0	0	45		0	0	0	0		0	0	0	0	
7:15 AM	0	0	0	42		0	0	0	40		0	0	0	1		0	0	0	2	
7:30 AM	0	0	0	41		0	0	0	43		0	0	0	2		0	0	0	1	
7:45 AM	0	0	0	44		0	0	0	46		0	0	0	2		0	0	0	2	
8:00 AM	0	0	0	46		0	1	0	38		0	0	0	3		0	0	0	3	
8:15 AM	0	1	0	34		0	0	0	35		0	0	0	2		0	0	0	2	
8:30 AM	0	0	0	42		0	0	0	30		0	0	0	3		0	0	0	2	
8:45 AM	0	0	0	38		0	0	0	28		0	0	0	2		0	0	0	3	

	Chelsea Street Northbound					Chelsea Street Southbound					Brooks Street Eastbound					Brooks Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	47		0	0	0	38		0	0	0	3		0	0	0	4	
4:15 PM	0	1	0	44		0	0	0	35		0	0	0	4		0	0	0	5	
4:30 PM	0	0	0	37		0	0	0	36		0	0	0	5		0	0	0	4	
4:45 PM	0	0	0	38		0	1	0	37		0	0	0	6		0	0	0	5	
5:00 PM	0	1	0	30		0	0	0	33		0	0	0	8		0	0	0	6	
5:15 PM	0	0	0	34		0	0	0	30		0	0	0	7		0	0	0	8	
5:30 PM	0	0	0	32		0	0	0	32		0	0	0	5		0	0	0	7	
5:45 PM	0	0	0	35		0	0	0	29		0	0	0	4		0	0	0	5	

AM PEAK HOUR[1]	Chelsea Street Northbound					Chelsea Street Southbound					Brooks Street Eastbound					Brooks Street Westbound				
7:30 AM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:30 AM	0	1	0	165		0	1	0	162		0	0	0	9		0	0	0	8	

PM PEAK HOUR[1]	Chelsea Street Northbound					Chelsea Street Southbound					Brooks Street Eastbound					Brooks Street Westbound				
4:30 PM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:30 PM	0	1	0	139		0	1	0	136		0	0	0	26		0	0	0	23	

[1] *Peak hours corresponds to vehicular peak hours.*

Client: Andrew Fabiszewski
Project #: 323_C008_HSH
BTD #: Location 2
Location: East Boston, MA
Street 1: Bremen Street
Street 2: Brooks Street
Count Date: 1/31/2019
Day of Week: Thursday
Weather: Mostly Sunny, 10°F

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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	9	33	0	0	0	83	2	0	0	0	3	0	0	0	0
7:15 AM	0	11	35	0	0	0	86	5	0	0	0	4	0	0	0	0
7:30 AM	0	12	39	0	0	0	102	7	0	1	0	7	0	0	0	0
7:45 AM	0	14	40	0	0	0	116	9	0	2	0	10	0	0	0	0
8:00 AM	0	15	41	0	0	0	108	8	0	2	0	10	0	0	0	0
8:15 AM	0	13	42	0	0	0	97	6	0	1	0	11	0	0	0	0
8:30 AM	0	12	40	0	0	0	99	4	0	2	0	6	0	0	0	0
8:45 AM	0	9	38	0	0	0	102	5	0	3	0	1	0	0	0	0

	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	10	65	0	0	0	78	12	0	2	0	4	0	0	0	0
4:15 PM	0	12	77	0	0	0	81	13	0	3	0	5	0	0	0	0
4:30 PM	0	13	89	0	0	0	76	11	0	2	0	4	0	0	0	0
4:45 PM	0	10	87	0	1	0	71	10	0	1	0	3	0	0	0	0
5:00 PM	0	8	86	0	0	0	70	13	0	3	0	5	0	0	0	0
5:15 PM	0	6	78	0	0	0	69	14	0	4	0	4	0	0	0	0
5:30 PM	0	7	58	0	0	0	67	12	0	2	0	4	0	0	0	0
5:45 PM	0	6	56	0	0	0	64	11	0	2	0	5	0	0	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**54**	**162**	**0**	**0**	**0**	**423**	**30**	**0**	**6**	**0**	**38**	**0**	**0**	**0**	**0**
PHF	**0.96**				**0.91**				**0.92**				**0.00**			
HV %	**0.0%**	**0.0%**	**4.9%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:15 PM to 5:15 PM	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**43**	**339**	**0**	**1**	**0**	**298**	**47**	**0**	**9**	**0**	**17**	**0**	**0**	**0**	**0**
PHF	**0.94**				**0.92**				**0.81**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.6%**	**0.0%**	**0.0%**	**0.0%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client: Andrew Fabiszewski
Project #: 323_C008_HSH
BTD #: Location 2
Location: East Boston, MA
Street 1: Bremen Street
Street 2: Brooks Street
Count Date: 1/31/2019
Day of Week: Thursday
Weather: Mostly Sunny, 10°F

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HEAVY VEHICLES

	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0
8:30 AM	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0
8:45 AM	0	1	2	0	0	0	3	0	0	0	0	0	0	0	0	0

	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 8:00 AM to 9:00 AM	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**2**	**8**	**0**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.83**				**0.75**				**0.00**				**0.00**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Bremen Street Northbound				Bremen Street Southbound				Brooks Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**2**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.50**				**0.00**				**0.00**			

Client:	Andrew Fabiszewski
Project #:	323_C008_HSH
BTD #:	Location 2
Location:	East Boston, MA
Street 1:	Bremen Street
Street 2:	Brooks Street
Count Date:	1/31/2019
Day of Week:	Thursday
Weather:	Mostly Sunny, 10°F

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PEDESTRIANS & BICYCLES

	Bremen Street Northbound					Bremen Street Southbound					Brooks Street Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	44		0	0	0	50		0	0	0	1		0	0	0	0	
7:15 AM	0	0	0	43		0	0	0	48		0	0	0	0		0	0	0	0	
7:30 AM	0	0	0	45		0	0	0	46		0	0	0	1		0	0	0	0	
7:45 AM	0	0	0	46		0	0	0	44		0	0	0	1		0	0	0	0	
8:00 AM	0	0	0	47		0	0	0	42		0	0	0	2		0	0	0	0	
8:15 AM	0	0	0	44		0	0	0	40		0	0	0	0		0	0	0	0	
8:30 AM	0	0	0	48		0	0	0	38		0	0	0	1		0	0	0	0	
8:45 AM	0	0	0	40		0	0	0	32		0	0	0	1		0	0	0	0	

	Bremen Street Northbound					Bremen Street Southbound					Brooks Street Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	45		0	0	0	44		0	0	0	0		0	0	0	0	
4:15 PM	0	0	0	48		0	0	0	42		0	0	0	1		0	0	0	0	
4:30 PM	0	0	0	46		0	0	0	48		0	0	0	2		0	0	0	0	
4:45 PM	0	0	0	42		0	0	0	37		0	0	0	1		0	0	0	0	
5:00 PM	0	0	0	38		0	0	0	30		0	0	0	1		0	0	0	0	
5:15 PM	0	0	0	35		0	0	0	34		0	0	0	0		0	0	0	0	
5:30 PM	0	0	0	33		0	0	0	37		0	0	0	1		0	0	0	0	
5:45 PM	0	0	0	34		0	0	0	32		0	0	0	2		0	0	0	0	

AM PEAK HOUR[1] 7:30 AM to 8:30 AM	Bremen Street Northbound					Bremen Street Southbound					Brooks Street Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	0	182		0	0	0	172		0	0	0	4		0	0	0	0	

PM PEAK HOUR[1] 4:15 PM to 5:15 PM	Bremen Street Northbound					Bremen Street Southbound					Brooks Street Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	0	174		0	0	0	157		0	0	0	5		0	0	0	0	

[1] *Peak hours corresponds to vehicular peak hours.*

Client: Andrew Fabiszewski
Project #: 323_C008_HSH
BTD #: Location 4
Location: East Boston, MA
Street 1: Bremen Street
Street 2: Putnam Street
Count Date: 1/31/2019
Day of Week: Thursday
Weather: Mostly Sunny, 10°F

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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	33	0	0	0	77	0	0	4	0	8	0	0	0	0
7:15 AM	0	1	34	0	0	0	81	2	0	6	0	10	0	0	0	0
7:30 AM	0	2	38	0	0	0	97	4	0	7	0	12	0	0	0	0
7:45 AM	0	2	40	0	0	0	112	3	0	8	0	13	0	0	0	0
8:00 AM	0	1	42	0	0	0	104	4	0	9	0	12	0	0	0	0
8:15 AM	1	2	40	0	0	0	93	6	0	6	0	9	0	0	0	0
8:30 AM	0	3	39	0	0	0	95	10	0	4	0	8	0	0	0	0
8:45 AM	0	2	39	0	0	0	100	8	0	4	0	7	0	0	0	0

	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	4	63	0	0	0	77	5	0	4	0	13	0	0	0	0
4:15 PM	0	3	77	0	0	0	81	4	0	6	0	13	0	0	0	0
4:30 PM	0	4	87	0	0	0	73	5	0	7	0	14	0	0	0	0
4:45 PM	0	3	85	0	0	0	68	7	0	8	0	13	0	0	0	0
5:00 PM	0	4	85	0	0	0	71	6	0	7	0	12	0	0	0	0
5:15 PM	0	4	78	0	0	0	69	7	0	6	0	14	0	0	0	0
5:30 PM	0	3	57	0	0	0	66	9	0	5	0	13	0	0	0	0
5:45 PM	0	4	54	0	0	0	63	7	0	6	0	12	0	0	0	0

AM PEAK HOUR 7:30 AM to 8:30 AM	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**7**	**160**	**0**	**0**	**0**	**406**	**17**	**0**	**30**	**0**	**46**	**0**	**0**	**0**	**0**
PHF	**0.98**				**0.92**				**0.90**				**0.00**			
HV %	**0.0%**	**0.0%**	**5.0%**	**0.0%**	**0.0%**	**0.0%**	**2.2%**	**0.0%**	**0.0%**	**3.3%**	**0.0%**	**4.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:15 PM to 5:15 PM	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**14**	**334**	**0**	**0**	**0**	**293**	**22**	**0**	**28**	**0**	**52**	**0**	**0**	**0**	**0**
PHF	**0.96**				**0.93**				**0.95**				**0.00**			
HV %	**0.0%**	**0.0%**	**0.6%**	**0.0%**	**0.0%**	**0.0%**	**1.4%**	**4.5%**	**0.0%**	**3.6%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Client: Andrew Fabiszewski
Project #: 323_C008_HSH
BTD #: Location 4
Location: East Boston, MA
Street 1: Bremen Street
Street 2: Putnam Street
Count Date: 1/31/2019
Day of Week: Thursday
Weather: Mostly Sunny, 10°F

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HEAVY VEHICLES

	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	2	0	0	0	2	0	0	1	0	1	0	0	0	0
8:00 AM	0	0	3	0	0	0	2	0	0	0	0	1	0	0	0	0
8:15 AM	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0
8:45 AM	0	1	1	0	0	0	3	0	0	0	0	0	0	0	0	0

	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	1	0	0	0	2	0	0	1	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:15 AM to 8:15 AM	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**8**	**0**	**0**	**0**	**9**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**
PHF	**0.67**				**0.75**				**0.38**				**0.00**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Bremen Street Northbound				Bremen Street Southbound				Putnam Street Eastbound				Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**2**	**0**	**0**	**0**	**4**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.50**				**0.63**				**0.25**				**0.00**			

Client:	Andrew Fabiszewski
Project #:	323_C008_HSH
BTD #:	Location 4
Location:	East Boston, MA
Street 1:	Bremen Street
Street 2:	Putnam Street
Count Date:	1/31/2019
Day of Week:	Thursday
Weather:	Mostly Sunny, 10°F

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PEDESTRIANS & BICYCLES

	Bremen Street Northbound					Bremen Street Southbound					Putnam Street Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	8		0	0	0	14		0	0	0	0		0	0	0	0	
7:15 AM	0	0	0	10		0	0	0	17		0	0	0	1		0	0	0	0	
7:30 AM	0	0	0	12		0	0	0	18		0	0	0	0		0	0	0	0	
7:45 AM	0	0	0	11		0	0	0	19		0	0	0	1		0	0	0	0	
8:00 AM	0	0	0	8		0	0	0	22		0	0	0	2		0	0	0	0	
8:15 AM	0	0	0	7		0	0	0	24		0	0	0	0		0	0	0	0	
8:30 AM	0	0	0	4		0	0	0	20		0	0	0	1		0	0	0	0	
8:45 AM	0	0	0	3		0	0	0	21		0	0	0	1		0	0	0	0	

	Bremen Street Northbound					Bremen Street Southbound					Putnam Street Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	10		0	0	0	11		0	0	0	2		0	0	0	0	
4:15 PM	0	0	0	11		0	0	0	15		0	0	0	4		0	0	0	0	
4:30 PM	0	0	0	14		0	0	0	10		0	0	0	3		0	0	0	0	
4:45 PM	0	0	0	17		0	0	0	9		0	0	0	1		0	0	0	0	
5:00 PM	0	0	0	19		0	0	0	12		0	0	0	4		0	0	0	0	
5:15 PM	0	0	0	23		0	0	0	19		0	0	1	6		0	0	0	0	
5:30 PM	0	0	0	20		0	0	0	23		0	0	0	5		0	0	0	0	
5:45 PM	0	0	0	24		0	0	0	27		0	0	0	12		0	0	0	0	

AM PEAK HOUR[1] 7:30 AM to 8:30 AM	Bremen Street Northbound					Bremen Street Southbound					Putnam Street Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	0	38		0	0	0	83		0	0	0	3		0	0	0	0	

PM PEAK HOUR[1] 4:15 PM to 5:15 PM	Bremen Street Northbound					Bremen Street Southbound					Putnam Street Eastbound					Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	0	61		0	0	0	46		0	0	0	12		0	0	0	0	

[1] *Peak hours corresponds to vehicular peak hours.*

Client:	Andrew Fabiszewski
Project #:	323_C008_HSH
BTD #:	Location 3
Location:	East Boston, MA
Street 1:	Chelsea Street
Street 2:	Putnam Street
Count Date:	1/31/2019
Day of Week:	Thursday
Weather:	Mostly Sunny, 10°F

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PASSENGER CARS & HEAVY VEHICLES COMBINED

	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	1	0	42	0	0	3	54	0	0	8	9	10	0	0	0	0
7:15 AM	0	0	46	1	0	4	57	0	0	10	11	11	0	2	0	1
7:30 AM	0	0	49	2	0	5	64	0	0	10	12	12	0	4	0	2
7:45 AM	0	0	50	3	0	4	77	0	0	9	14	13	0	2	0	3
8:00 AM	0	0	52	5	1	3	78	0	0	11	13	15	0	1	0	4
8:15 AM	0	0	49	2	0	5	81	0	0	13	8	17	0	3	0	5
8:30 AM	0	0	40	1	0	6	61	0	0	7	5	11	0	6	0	7
8:45 AM	0	0	36	2	0	4	49	0	0	2	5	5	0	4	0	6

	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	90	3	0	7	53	0	0	11	7	11	0	4	0	5
4:15 PM	0	0	94	4	0	5	59	0	0	12	10	13	0	3	0	4
4:30 PM	0	0	98	5	0	5	53	0	0	12	11	10	0	4	0	5
4:45 PM	0	0	101	5	0	4	48	0	0	13	12	7	0	5	0	5
5:00 PM	0	0	109	4	0	5	54	0	0	9	10	7	0	4	0	6
5:15 PM	0	0	97	4	0	7	60	0	0	6	9	6	0	3	0	8
5:30 PM	0	0	85	3	0	8	59	0	0	7	7	8	0	2	0	10
5:45 PM	0	0	81	3	0	7	61	0	0	8	8	10	0	2	0	9

AM PEAK HOUR 7:30 AM to 8:30 AM	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**200**	**12**	**1**	**17**	**300**	**0**	**0**	**43**	**47**	**57**	**0**	**10**	**0**	**14**
PHF	**0.93**				**0.92**				**0.94**				**0.75**			
HV %	**0.0%**	**0.0%**	**7.0%**	**8.3%**	**0.0%**	**0.0%**	**3.7%**	**0.0%**	**0.0%**	**4.7%**	**4.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

PM PEAK HOUR 4:15 PM to 5:15 PM	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**402**	**18**	**0**	**19**	**214**	**0**	**0**	**46**	**43**	**37**	**0**	**16**	**0**	**20**
PHF	**0.93**				**0.91**				**0.90**				**0.90**			
HV %	**0.0%**	**0.0%**	**2.2%**	**0.0%**	**0.0%**	**5.3%**	**3.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**6.3%**	**0.0%**	**0.0%**

Client:	Andrew Fabiszewski
Project #:	323_C008_HSH
BTD #:	Location 3
Location:	East Boston, MA
Street 1:	Chelsea Street
Street 2:	Putnam Street
Count Date:	1/31/2019
Day of Week:	Thursday
Weather:	Mostly Sunny, 10°F

BOSTON
TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
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HEAVY VEHICLES

	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	4	1	0	0	3	0	0	0	1	0	0	0	0	0
8:00 AM	0	0	4	0	0	0	3	0	0	2	1	0	0	0	0	0
8:15 AM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0

	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	2	0	0	0	1	0	0	1	0	0	0	0	0	0
4:15 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	2	0	0	0	1	0	0	0	0	0	0	1	0	0
4:45 PM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	2	0	0	1	2	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:15 AM to 8:15 AM	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**14**	**1**	**0**	**0**	**11**	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**0**
PHF	**0.75**				**0.92**				**0.33**				**0.00**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Chelsea Street Northbound				Chelsea Street Southbound				Putnam Street Eastbound				Putnam Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**9**	**0**	**0**	**1**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
PHF	**0.75**				**0.67**				**0.00**				**0.25**			

Client:	Andrew Fabiszewski
Project #:	323_C008_HSH
BTD #:	Location 3
Location:	East Boston, MA
Street 1:	Chelsea Street
Street 2:	Putnam Street
Count Date:	1/31/2019
Day of Week:	Thursday
Weather:	Mostly Sunny, 10°F

BOSTON
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PEDESTRIANS & BICYCLES

	Chelsea Street Northbound					Chelsea Street Southbound					Putnam Street Eastbound					Putnam Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	7		0	0	0	14		0	0	0	1		0	0	0	1	
7:15 AM	0	0	0	10		0	0	0	18		0	0	0	1		0	0	0	2	
7:30 AM	0	0	0	11		0	0	0	16		0	0	0	2		0	0	0	2	
7:45 AM	0	0	0	8		0	0	0	15		0	0	0	3		0	0	0	1	
8:00 AM	0	0	0	9		0	1	0	17		0	0	0	4		0	0	0	3	
8:15 AM	0	1	0	7		0	0	0	21		0	0	0	2		0	0	0	2	
8:30 AM	0	0	0	5		0	0	0	18		0	0	0	3		0	0	0	2	
8:45 AM	0	0	0	3		0	0	0	15		0	0	0	2		0	0	0	1	

	Chelsea Street Northbound					Chelsea Street Southbound					Putnam Street Eastbound					Putnam Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	10		0	0	0	9		0	0	0	5		0	0	0	3	
4:15 PM	0	1	0	11		0	0	0	12		0	0	0	6		0	0	0	4	
4:30 PM	0	0	0	13		0	0	0	8		0	0	0	8		0	0	0	5	
4:45 PM	0	0	0	16		0	1	0	9		0	0	0	7		0	0	0	6	
5:00 PM	0	1	0	15		0	0	0	10		0	0	0	5		0	0	0	5	
5:15 PM	0	0	0	18		0	0	0	13		0	2	0	4		0	0	0	5	
5:30 PM	0	0	0	19		0	0	0	16		0	0	0	5		0	0	0	6	
5:45 PM	0	0	0	22		0	0	0	18		0	0	0	6		0	0	0	5	

AM PEAK HOUR[1]	Chelsea Street Northbound					Chelsea Street Southbound					Putnam Street Eastbound					Putnam Street Westbound				
7:30 AM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:30 AM	0	1	0	35		0	1	0	69		0	0	0	11		0	0	0	8	

PM PEAK HOUR[1]	Chelsea Street Northbound					Chelsea Street Southbound					Putnam Street Eastbound					Putnam Street Westbound				
4:15 PM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:15 PM	0	2	0	55		0	1	0	39		0	0	0	26		0	0	0	20	

[1] *Peak hours corresponds to vehicular peak hours.*

Massachusetts Highway Department

Statewide Traffic Data Collection

2016 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.21	1.17	1.10	1.04	0.97	0.92	0.90	0.88	0.97	0.93	0.97	1.05	0.88
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.03	1.02	0.99	0.92	0.91	0.91	0.90	0.94	0.93	0.99	1.02	0.97
R4-R7	1.09	1.13	1.06	1.05	0.95	0.90	0.88	0.91	0.95	0.95	1.04	1.07	0.95
U1-Boston	1.03	1.04	0.99	0.96	0.94	0.91	0.93	0.91	0.95	0.93	0.98	0.98	0.93
U1-Essex	1.06	1.08	1.04	1.01	0.95	0.89	0.88	0.86	0.94	0.94	1.01	1.05	0.91
U1-Southeast	1.07	1.12	1.05	1.01	0.95	0.89	0.87	0.86	0.94	0.95	0.99	1.01	0.94
U1-West	0.97	0.97	0.91	0.95	0.92	0.90	0.94	0.92	0.92	0.90	0.93	0.94	0.94
U1-Worcester	1.10	1.14	1.03	1.00	0.94	0.91	0.92	0.90	0.94	0.93	0.97	1.04	0.92
U2	1.02	1.00	0.97	0.96	0.93	0.90	0.93	0.91	0.94	0.93	0.96	0.99	0.95
U3	1.00	1.00	0.96	0.95	0.92	0.89	0.94	0.92	0.94	0.93	0.96	0.97	0.96
U4-U7	1.02	1.03	0.97	0.96	0.92	0.89	0.93	0.92	0.94	0.95	0.98	0.96	0.93
Rec - East	1.18	1.17	1.13	1.05	0.93	0.84	0.79	0.80	0.93	1.00	1.09	1.13	0.99
Rec - West	1.20	1.24	1.29	1.18	1.03	0.85	0.70	0.81	0.92	0.95	1.11	1.15	0.98

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

282-302 Bremen St

Trip Generation Assessment

XXX Means Columns U, X, and AA do not sum to Column R; hard code adjustements are needed

HOWARD STEIN HUDSON

XX HARD CODED TO BALANCE (Manually change formatting)

1-Feb-2019

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Vehicle Trips	Assumed National Vehicle Occupancy Rate[1]	Unadjusted Person-Trips	Internal Capture Person-Trips[2]	Pass-By Person-Trips Share	Pass-By Person-Trips	Non-Primary Person-Trips	Primary Person Trips	Transit Share[3]	Transit Person-Trips	Walk/Bike/ Other Share[3]	Walk/ Bike/ Other Trips	Auto Share[3]	Auto Person-Trips	Assumed Local Auto Occupancy Rate[4]	Total Adjusted Auto Trips
Daily Peak Hour																				
Multifamily Housing (Mid Rise)[5]	165	Total		5.440	898	1.18	**1,060**	0		0	0	**1,060**	78%	**826**	6%	**64**	16%	**170**	1.18	**144**
	units	In	50%	2.720	449	1.18	**530**		0%	0	0	**530**	78%	**413**	6%	**32**	16%	**85**	1.18	**72**
		Out	50%	2.720	449	1.18	**530**		0%	0	0	**530**	78%	**413**	6%	**32**	16%	**85**	1.18	**72**
Shopping Center[6]	2	Total		37.750	76	1.82	**138**	0		0	0	**138**	6%	**8**	52%	**72**	42%	**58**	1.82	**32**
	KSF	In	50%	18.875	38	1.82	**69**		0%	0	0	**69**	6%	**4**	52%	**36**	42%	**29**	1.82	**16**
		Out	50%	18.875	38	1.82	**69**		0%	0	0	**69**	6%	**4**	52%	**36**	42%	**29**	1.82	**16**
Total		Total			**974**		**1,198**	**0**		**0**	**0**	**1,198**		**834**		**136**		**228**		**176**
		In			**487**		**599**	**0**		**0**	**0**	**599**		**417**		**68**		**114**		**88**
		Out			**487**		**599**	**0**		**0**	**0**	**599**		**417**		**68**		**114**		**88**
AM Peak Hour																				
Multifamily Housing (Mid Rise)[5]	165	Total		0.360	59	1.18	**70**	0		0	0	**70**		**55**		**4**		**11**	1.18	**10**
	units	In	26%	0.094	15	1.18	**18**		0%	0	0	**18**	78%	**14**	6%	**1**	16%	**3**	1.18	**3**
		Out	74%	0.266	44	1.18	**52**		0%	0	0	**52**	78%	**41**	6%	**3**	16%	**8**	1.18	**7**
Shopping Center[6]	2	Total		0.94	2	1.82	**4**	0		0	0	**4**		**0**		**2**		**2**	1.82	**2**
	KSF	In	62%	0.583	1	1.82	**2**		0%	0	0	**2**	5%	**0**	58%	**1**	37%	**1**	1.82	**1**
		Out	38%	0.357	1	1.82	**2**		0%	0	0	**2**	9%	**0**	56%	**1**	35%	**1**	1.82	**1**
Total		Total			**61**		**74**	**0**		**0**	**0**	**74**		**55**		**6**		**13**		**12**
		In			**16**		**20**	**0**		**0**	**0**	**20**		**14**		**2**		**4**		**4**
		Out			**45**		**54**	**0**		**0**	**0**	**54**		**41**		**4**		**9**		**8**
PM Peak Hour																				
Multifamily Housing (Mid Rise)[5]	165	Total		0.440	72	1.18	**85**	0		0	0	**85**		**67**		**5**		**13**	1.18	**11**
	units	In	61%	0.268	44	1.18	**52**		0%	0	0	**52**	78%	**41**	6%	**3**	16%	**8**	1.18	**7**
		Out	39%	0.172	28	1.18	**33**		0%	0	0	**33**	78%	**26**	6%	**2**	16%	**5**	1.18	**4**
Shopping Center[6]	2	Total		3.81	8	1.82	**14**	0		0	0	**14**		**1**		**8**		**5**	1.82	**3**
	KSF	In	48%	1.829	4	1.82	**7**		0%	0	0	**7**	9%	**1**	56%	**4**	35%	**2**	1.82	**1**
		Out	52%	1.981	4	1.82	**7**		0%	0	0	**7**	5%	**0**	58%	**4**	37%	**3**	1.82	**2**
Total		Total			**80**		**99**	**0**		**0**	**0**	**99**		**68**		**13**		**18**		**14**
		In			**48**		**59**	**0**		**0**	**0**	**59**		**42**		**7**		**10**		**8**
		Out			**32**		**40**	**0**		**0**	**0**	**40**		**26**		**6**		**8**		**6**

1. 2017 National vehicle occupancy rates - 1.18:home to work; 1.82: family/personal business; 1.82: shopping; 2.1 social/recreational
2. Based on ITE Trip Generation Handbook, 3rd Edition method
3. Mode shares based on peak-hour BTD Data for Area 7 for Retail, US Census Data for Residential
4. Local vehicle occupancy rates based on 2009 National vehicle occupancy rates
5. ITE Trip Generation Manual, 10th Edition, LUC 221 (Multifamily Housing Mid-Rise (3-10 floors)), average rate
6. ITE Trip Generation Manual, 10th Edition, LUC 820 (Shopping Center), average rate

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	9	59	18	75	199	6	39	284	58
Future Volume (vph)	0	0	0	9	59	18	75	199	6	39	284	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.89			1.00			1.00	
Frt					0.972			0.997			0.979	
Flt Protected					0.995			0.987			0.995	
Satd. Flow (prot)	0	0	0	0	1531	0	0	1575	0	0	1613	0
Flt Permitted					0.995			0.827			0.950	
Satd. Flow (perm)	0	0	0	0	1475	0	0	1318	0	0	1539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					20			3			23	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		526			232			479			603	
Travel Time (s)		12.0			5.3			10.9			13.7	
Confl. Peds. (#/hr)				165		162	9		8	8		9
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.94	0.94	0.94	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	4%	8%	0%	0%	3%	4%
Parking (#/hr)					0			0			0	
Adj. Flow (vph)	0	0	0	10	65	20	80	212	6	43	312	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	95	0	0	298	0	0	419	0
Turn Type				Perm	NA		Perm	NA		Perm	NA	
Protected Phases					5			1			1	
Permitted Phases				5			1			1		
Detector Phase				5	5		1	1		1	1	
Switch Phase												
Minimum Initial (s)				6.0	6.0		10.0	10.0		10.0	10.0	
Minimum Split (s)				19.0	19.0		39.0	39.0		39.0	39.0	
Total Split (s)				24.0	24.0		39.0	39.0		39.0	39.0	
Total Split (%)				38.1%	38.1%		61.9%	61.9%		61.9%	61.9%	
Maximum Green (s)				20.0	20.0		35.0	35.0		35.0	35.0	
Yellow Time (s)				3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)				1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode				None	None		Max	Max		Max	Max	
Walk Time (s)				7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)				8.0	8.0		28.0	28.0		28.0	28.0	
Pedestrian Calls (#/hr)				165	165		0	0		0	0	
Act Effct Green (s)					13.1			45.9			45.9	
Actuated g/C Ratio					0.21			0.72			0.72	
v/c Ratio					0.30			0.31			0.38	
Control Delay					19.2			6.1			6.2	
Queue Delay					0.0			0.0			0.0	
Total Delay					19.2			6.1			6.2	
LOS					B			A			A	
Approach Delay					19.2			6.1			6.2	
Approach LOS					B			A			A	
Queue Length 50th (ft)					27			45			63	
Queue Length 95th (ft)					52			86			115	
Internal Link Dist (ft)		446			152			399			523	
Turn Bay Length (ft)												
Base Capacity (vph)					482			949			1114	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.20			0.31			0.38	

Intersection Summary

Area Type: Other
Cycle Length: 63
Actuated Cycle Length: 63.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.38
Intersection Signal Delay: 7.7 Intersection LOS: A
Intersection Capacity Utilization 49.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Chelsea Street & Brooks Street

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	39	55	165	431	31
Future Vol, veh/h	6	39	55	165	431	31
Peak Hour Factor	0.92	0.92	0.96	0.96	0.91	0.91
Heavy Vehicles, %	0	0	0	5	3	0
Mvmt Flow	7	42	57	172	474	34
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.4	9.5	13.6
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	25%	13%	0%
Vol Thru, %	75%	0%	93%
Vol Right, %	0%	87%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	220	45	462
LT Vol	55	6	0
Through Vol	165	0	431
RT Vol	0	39	31
Lane Flow Rate	229	49	508
Geometry Grp	1	1	1
Degree of Util (X)	0.292	0.068	0.603
Departure Headway (Hd)	4.58	4.984	4.276
Convergence, Y/N	Yes	Yes	Yes
Cap	786	717	848
Service Time	2.604	3.027	2.296
HCM Lane V/C Ratio	0.291	0.068	0.599
HCM Control Delay	9.5	8.4	13.6
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1.2	0.2	4.1

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	47	7	164	415	17
Future Vol, veh/h	31	47	7	164	415	17
Peak Hour Factor	0.90	0.90	0.98	0.98	0.92	0.92
Heavy Vehicles, %	3	4	0	5	2	0
Mvmt Flow	34	52	7	167	451	18
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.8	9	12.8
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	40%	0%
Vol Thru, %	96%	0%	96%
Vol Right, %	0%	60%	4%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	171	78	432
LT Vol	7	31	0
Through Vol	164	0	415
RT Vol	0	47	17
Lane Flow Rate	174	87	470
Geometry Grp	1	1	1
Degree of Util (X)	0.224	0.122	0.564
Departure Headway (Hd)	4.615	5.072	4.324
Convergence, Y/N	Yes	Yes	Yes
Cap	776	705	836
Service Time	2.648	3.119	2.349
HCM Lane V/C Ratio	0.224	0.123	0.562
HCM Control Delay	9	8.8	12.8
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.9	0.4	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	49	58	10	0	14	0	205	12	17	313	0
Future Volume (Veh/h)	44	49	58	10	0	14	0	205	12	17	313	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.75	0.75	0.75	0.93	0.93	0.93	0.92	0.92	0.92
Hourly flow rate (vph)	47	52	62	13	0	19	0	220	13	18	340	0
Pedestrians		11			8			35			69	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			3			7	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								603				
pX, platoon unblocked												
vC, conflicting volume	702	628	386	734	622	304	351			241		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	702	628	386	734	622	304	351			241		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	86	90	95	100	97	100			99		
cM capacity (veh/h)	306	385	637	257	393	687	1206			1327		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	32	233	358
Volume Left	47	13	0	18
Volume Right	62	19	13	0
cSH	417	409	1700	1327
Volume to Capacity	0.39	0.08	0.14	0.01
Queue Length 95th (ft)	45	6	0	1
Control Delay (s)	18.9	14.6	0.0	0.5
Lane LOS	C	B		A
Approach Delay (s)	18.9	14.6	0.0	0.5
Approach LOS	C	B		

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	9	59	24	106	407	10	16	224	32
Future Volume (vph)	0	0	0	9	59	24	106	407	10	16	224	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.90			1.00			0.99	
Frt					0.965			0.997			0.984	
Flt Protected					0.995			0.990			0.997	
Satd. Flow (prot)	0	0	0	0	1681	0	0	1845	0	0	1795	0
Flt Permitted					0.995			0.878			0.967	
Satd. Flow (perm)	0	0	0	0	1633	0	0	1631	0	0	1740	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					27			3			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		526			232			479			603	
Travel Time (s)		12.0			5.3			10.9			13.7	
Confl. Peds. (#/hr)				139		136	26		23	23		26
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.94	0.94	0.94	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	2%	0%	0%	4%	0%
Adj. Flow (vph)	0	0	0	10	66	27	113	433	11	17	236	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	103	0	0	557	0	0	287	0
Turn Type				Perm	NA		Perm	NA		Perm	NA	
Protected Phases					5			1			1	
Permitted Phases				5			1			1		
Detector Phase				5	5		1	1		1	1	
Switch Phase												
Minimum Initial (s)				6.0	6.0		10.0	10.0		10.0	10.0	
Minimum Split (s)				19.0	19.0		39.0	39.0		39.0	39.0	
Total Split (s)				24.0	24.0		39.0	39.0		39.0	39.0	
Total Split (%)				38.1%	38.1%		61.9%	61.9%		61.9%	61.9%	
Maximum Green (s)				20.0	20.0		35.0	35.0		35.0	35.0	
Yellow Time (s)				3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)				1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode				None	None		Max	Max		Max	Max	
Walk Time (s)				7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)				8.0	8.0		28.0	28.0		28.0	28.0	
Pedestrian Calls (#/hr)				139	139		0	0		0	0	
Act Effct Green (s)					13.1			45.3			45.3	
Actuated g/C Ratio					0.21			0.72			0.72	
v/c Ratio					0.29			0.48			0.23	
Control Delay					17.5			7.6			5.0	
Queue Delay					0.0			0.0			0.0	
Total Delay					17.5			7.6			5.0	
LOS					B			A			A	
Approach Delay					17.5			7.6			5.0	
Approach LOS					B			A			A	
Queue Length 50th (ft)					26			99			38	
Queue Length 95th (ft)					53			175			69	
Internal Link Dist (ft)		446			152			399			523	
Turn Bay Length (ft)												
Base Capacity (vph)					541			1169			1251	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.19			0.48			0.23	

Intersection Summary

Area Type: Other
Cycle Length: 63
Actuated Cycle Length: 63.2
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 7.9 Intersection LOS: A
Intersection Capacity Utilization 78.5% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Chelsea Street & Brooks Street

Intersection	
Intersection Delay, s/veh	11.3
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	17	44	346	304	48
Future Vol, veh/h	9	17	44	346	304	48
Peak Hour Factor	0.81	0.81	0.94	0.94	0.92	0.92
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	11	21	47	368	330	52
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.6	11.8	11
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	11%	35%	0%
Vol Thru, %	89%	0%	86%
Vol Right, %	0%	65%	14%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	390	26	352
LT Vol	44	9	0
Through Vol	346	0	304
RT Vol	0	17	48
Lane Flow Rate	415	32	383
Geometry Grp	1	1	1
Degree of Util (X)	0.506	0.047	0.461
Departure Headway (Hd)	4.388	5.256	4.338
Convergence, Y/N	Yes	Yes	Yes
Cap	821	680	830
Service Time	2.408	3.301	2.359
HCM Lane V/C Ratio	0.505	0.047	0.461
HCM Control Delay	11.8	8.6	11
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.9	0.1	2.5

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	53	14	341	299	22
Future Vol, veh/h	29	53	14	341	299	22
Peak Hour Factor	0.95	0.95	0.96	0.96	0.96	0.96
Heavy Vehicles, %	4	0	0	1	1	5
Mvmt Flow	31	56	15	355	311	23
Number of Lanes	1	0	0	1	1	0

Approach	EB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	SB		EB			
Conflicting Lanes Left	1		1		0	
Conflicting Approach Right	NB				EB	
Conflicting Lanes Right	1		0		1	
HCM Control Delay	9		11.3		10.7	
HCM LOS	A		B		B	

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	35%	0%
Vol Thru, %	96%	0%	93%
Vol Right, %	0%	65%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	355	82	321
LT Vol	14	29	0
Through Vol	341	0	299
RT Vol	0	53	22
Lane Flow Rate	370	86	334
Geometry Grp	1	1	1
Degree of Util (X)	0.461	0.124	0.417
Departure Headway (Hd)	4.488	5.175	4.493
Convergence, Y/N	Yes	Yes	Yes
Cap	802	690	799
Service Time	2.522	3.231	2.528
HCM Lane V/C Ratio	0.461	0.125	0.418
HCM Control Delay	11.3	9	10.7
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.5	0.4	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	45	38	16	0	20	0	413	18	19	218	0
Future Volume (Veh/h)	47	45	38	16	0	20	0	413	18	19	218	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.91	0.91	0.91
Hourly flow rate (vph)	52	50	42	18	0	22	0	444	19	21	240	0
Pedestrians		26			20			55			39	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		2			2			5			4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								603				
pX, platoon unblocked	0.93	0.93		0.93	0.93	0.93				0.93		
vC, conflicting volume	822	791	321	878	782	512	266			483		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	768	734	321	828	724	433	266			401		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	80	84	94	91	100	96	100			98		
cM capacity (veh/h)	255	303	670	192	308	548	1277			1036		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	144	40	463	261
Volume Left	52	18	0	21
Volume Right	42	22	19	0
cSH	334	299	1700	1036
Volume to Capacity	0.43	0.13	0.27	0.02
Queue Length 95th (ft)	52	11	0	2
Control Delay (s)	23.7	18.9	0.0	0.9
Lane LOS	C	C		A
Approach Delay (s)	23.7	18.9	0.0	0.9
Approach LOS	C	C		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	9	62	25	110	423	10	17	233	33
Future Volume (vph)	0	0	0	9	62	25	110	423	10	17	233	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.90			1.00			0.99	
Frt					0.965			0.997			0.984	
Flt Protected					0.995			0.990			0.997	
Satd. Flow (prot)	0	0	0	0	1682	0	0	1845	0	0	1795	0
Flt Permitted					0.995			0.874			0.964	
Satd. Flow (perm)	0	0	0	0	1637	0	0	1624	0	0	1735	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28			2			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		526			232			479			603	
Travel Time (s)		12.0			5.3			10.9			13.7	
Confl. Peds. (#/hr)				139		136	26		23	23		26
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.94	0.94	0.94	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	2%	0%	0%	4%	0%
Adj. Flow (vph)	0	0	0	10	70	28	117	450	11	18	245	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	108	0	0	578	0	0	298	0
Turn Type				Perm	NA		Perm	NA		Perm	NA	
Protected Phases					5			1			1	
Permitted Phases				5			1			1		
Detector Phase				5	5		1	1		1	1	
Switch Phase												
Minimum Initial (s)				6.0	6.0		10.0	10.0		10.0	10.0	
Minimum Split (s)				19.0	19.0		39.0	39.0		39.0	39.0	
Total Split (s)				24.0	24.0		39.0	39.0		39.0	39.0	
Total Split (%)				38.1%	38.1%		61.9%	61.9%		61.9%	61.9%	
Maximum Green (s)				20.0	20.0		35.0	35.0		35.0	35.0	
Yellow Time (s)				3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)				1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode				None	None		Max	Max		Max	Max	
Walk Time (s)				7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)				8.0	8.0		28.0	28.0		28.0	28.0	
Pedestrian Calls (#/hr)				139	139		0	0		0	0	
Act Effct Green (s)					13.1			44.9			44.9	
Actuated g/C Ratio					0.21			0.71			0.71	
v/c Ratio					0.30			0.50			0.24	
Control Delay					17.5			7.9			5.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					17.5			7.9			5.1	
LOS					B			A			A	
Approach Delay					17.5			7.9			5.1	
Approach LOS					B			A			A	
Queue Length 50th (ft)					27			105			40	
Queue Length 95th (ft)					55			186			73	
Internal Link Dist (ft)		446			152			399			523	
Turn Bay Length (ft)												
Base Capacity (vph)					546			1161			1244	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.20			0.50			0.24	

Intersection Summary

Area Type: Other
Cycle Length: 63
Actuated Cycle Length: 62.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 8.1 Intersection LOS: A
Intersection Capacity Utilization 80.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Chelsea Street & Brooks Street

Ø1 39 s
Ø5 24 s

Intersection	
Intersection Delay, s/veh	12
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	18	46	365	327	50
Future Vol, veh/h	9	18	46	365	327	50
Peak Hour Factor	0.81	0.81	0.94	0.94	0.92	0.92
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	11	22	49	388	355	54
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.7	12.5	11.7
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	11%	33%	0%
Vol Thru, %	89%	0%	87%
Vol Right, %	0%	67%	13%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	411	27	377
LT Vol	46	9	0
Through Vol	365	0	327
RT Vol	0	18	50
Lane Flow Rate	437	33	410
Geometry Grp	1	1	1
Degree of Util (X)	0.537	0.05	0.498
Departure Headway (Hd)	4.423	5.347	4.372
Convergence, Y/N	Yes	Yes	Yes
Cap	818	667	824
Service Time	2.446	3.4	2.394
HCM Lane V/C Ratio	0.534	0.049	0.498
HCM Control Delay	12.5	8.7	11.7
HCM Lane LOS	B	A	B
HCM 95th-tile Q	3.3	0.2	2.8

Intersection	
Intersection Delay, s/veh	11.3
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	56	15	359	321	23
Future Vol, veh/h	30	56	15	359	321	23
Peak Hour Factor	0.95	0.95	0.96	0.96	0.96	0.96
Heavy Vehicles, %	4	0	0	1	1	5
Mvmt Flow	32	59	16	374	334	24
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.1	11.9	11.3
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	35%	0%
Vol Thru, %	96%	0%	93%
Vol Right, %	0%	65%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	374	86	344
LT Vol	15	30	0
Through Vol	359	0	321
RT Vol	0	56	23
Lane Flow Rate	390	91	358
Geometry Grp	1	1	1
Degree of Util (X)	0.49	0.132	0.451
Departure Headway (Hd)	4.53	5.265	4.533
Convergence, Y/N	Yes	Yes	Yes
Cap	795	677	792
Service Time	2.569	3.33	2.573
HCM Lane V/C Ratio	0.491	0.134	0.452
HCM Control Delay	11.9	9.1	11.3
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.7	0.5	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	49	47	39	17	0	21	0	429	19	20	227	0
Future Volume (Veh/h)	49	47	39	17	0	21	0	429	19	20	227	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.91	0.91	0.91
Hourly flow rate (vph)	54	52	43	19	0	23	0	461	20	22	249	0
Pedestrians		26			20			55			39	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		2			2			5			4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								603				
pX, platoon unblocked	0.92	0.92		0.92	0.92	0.92				0.92		
vC, conflicting volume	852	820	330	908	810	530	275			501		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	792	757	330	853	746	440	275			408		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	78	82	94	89	100	96	100			98		
cM capacity (veh/h)	242	291	662	180	295	537	1268			1018		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	149	42	481	271
Volume Left	54	19	0	22
Volume Right	43	23	20	0
cSH	319	282	1700	1018
Volume to Capacity	0.47	0.15	0.28	0.02
Queue Length 95th (ft)	59	13	0	2
Control Delay (s)	25.8	20.0	0.0	0.9
Lane LOS	D	C		A
Approach Delay (s)	25.8	20.0	0.0	0.9
Approach LOS	D	C		

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	9	61	19	78	207	6	40	295	60
Future Volume (vph)	0	0	0	9	61	19	78	207	6	40	295	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.89			1.00			1.00	
Frt					0.971			0.997			0.979	
Flt Protected					0.995			0.987			0.995	
Satd. Flow (prot)	0	0	0	0	1527	0	0	1575	0	0	1613	0
Flt Permitted					0.995			0.821			0.949	
Satd. Flow (perm)	0	0	0	0	1473	0	0	1309	0	0	1537	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					21			3			23	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		526			232			479			603	
Travel Time (s)		12.0			5.3			10.9			13.7	
Confl. Peds. (#/hr)				165		162	9		8	8		9
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.94	0.94	0.94	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	4%	8%	0%	0%	3%	4%
Parking (#/hr)					0			0			0	
Adj. Flow (vph)	0	0	0	10	67	21	83	220	6	44	324	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	98	0	0	309	0	0	434	0
Turn Type				Perm	NA		Perm	NA		Perm	NA	
Protected Phases					5			1			1	
Permitted Phases				5			1			1		
Detector Phase				5	5		1	1		1	1	
Switch Phase												
Minimum Initial (s)				6.0	6.0		10.0	10.0		10.0	10.0	
Minimum Split (s)				19.0	19.0		39.0	39.0		39.0	39.0	
Total Split (s)				24.0	24.0		39.0	39.0		39.0	39.0	
Total Split (%)				38.1%	38.1%		61.9%	61.9%		61.9%	61.9%	
Maximum Green (s)				20.0	20.0		35.0	35.0		35.0	35.0	
Yellow Time (s)				3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)				1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode				None	None		Max	Max		Max	Max	
Walk Time (s)				7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)				8.0	8.0		28.0	28.0		28.0	28.0	
Pedestrian Calls (#/hr)				165	165		0	0		0	0	
Act Effct Green (s)					13.1			45.7			45.7	
Actuated g/C Ratio					0.21			0.72			0.72	
v/c Ratio					0.31			0.33			0.39	
Control Delay					19.1			6.3			6.4	
Queue Delay					0.0			0.0			0.0	
Total Delay					19.1			6.3			6.4	
LOS					B			A			A	
Approach Delay					19.1			6.3			6.4	
Approach LOS					B			A			A	
Queue Length 50th (ft)					28			47			66	
Queue Length 95th (ft)					53			90			121	
Internal Link Dist (ft)		446			152			399			523	
Turn Bay Length (ft)												
Base Capacity (vph)					483			941			1111	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.20			0.33			0.39	

Intersection Summary

Area Type: Other
Cycle Length: 63
Actuated Cycle Length: 63.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.39
Intersection Signal Delay: 7.8 Intersection LOS: A
Intersection Capacity Utilization 50.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Chelsea Street & Brooks Street

Ø1	Ø5
39 s	24 s

Intersection	
Intersection Delay, s/veh	12.8
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	40	57	177	454	32
Future Vol, veh/h	6	40	57	177	454	32
Peak Hour Factor	0.92	0.92	0.96	0.96	0.91	0.91
Heavy Vehicles, %	0	0	0	5	3	0
Mvmt Flow	7	43	59	184	499	35
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.5	9.7	14.6
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	24%	13%	0%
Vol Thru, %	76%	0%	93%
Vol Right, %	0%	87%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	234	46	486
LT Vol	57	6	0
Through Vol	177	0	454
RT Vol	0	40	32
Lane Flow Rate	244	50	534
Geometry Grp	1	1	1
Degree of Util (X)	0.312	0.07	0.638
Departure Headway (Hd)	4.611	5.07	4.299
Convergence, Y/N	Yes	Yes	Yes
Cap	780	705	844
Service Time	2.637	3.116	2.319
HCM Lane V/C Ratio	0.313	0.071	0.633
HCM Control Delay	9.7	8.5	14.6
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1.3	0.2	4.7

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	49	7	176	437	18
Future Vol, veh/h	32	49	7	176	437	18
Peak Hour Factor	0.90	0.90	0.98	0.98	0.92	0.92
Heavy Vehicles, %	3	4	0	5	2	0
Mvmt Flow	36	54	7	180	475	20
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9	9.2	13.7
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	40%	0%
Vol Thru, %	96%	0%	96%
Vol Right, %	0%	60%	4%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	183	81	455
LT Vol	7	32	0
Through Vol	176	0	437
RT Vol	0	49	18
Lane Flow Rate	187	90	495
Geometry Grp	1	1	1
Degree of Util (X)	0.242	0.129	0.598
Departure Headway (Hd)	4.656	5.155	4.351
Convergence, Y/N	Yes	Yes	Yes
Cap	769	693	831
Service Time	2.693	3.206	2.379
HCM Lane V/C Ratio	0.243	0.13	0.596
HCM Control Delay	9.2	9	13.7
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.9	0.4	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	51	60	10	0	15	0	214	12	18	325	0
Future Volume (Veh/h)	46	51	60	10	0	15	0	214	12	18	325	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.75	0.75	0.75	0.93	0.93	0.93	0.92	0.92	0.92
Hourly flow rate (vph)	49	54	64	13	0	20	0	230	13	20	353	0
Pedestrians		11			8			35			69	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			3			7	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								603				
pX, platoon unblocked												
vC, conflicting volume	730	655	399	764	648	314	364			251		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	730	655	399	764	648	314	364			251		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	85	90	95	100	97	100			98		
cM capacity (veh/h)	292	370	627	241	379	678	1193			1316		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	167	33	243	373
Volume Left	49	13	0	20
Volume Right	64	20	13	0
cSH	402	396	1700	1316
Volume to Capacity	0.42	0.08	0.14	0.02
Queue Length 95th (ft)	50	7	0	1
Control Delay (s)	20.2	14.9	0.0	0.6
Lane LOS	C	B		A
Approach Delay (s)	20.2	14.9	0.0	0.6
Approach LOS	C	B		

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	9	62	19	78	207	6	40	295	60
Future Volume (vph)	0	0	0	9	62	19	78	207	6	40	295	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.89			1.00			1.00	
Frt					0.971			0.997			0.979	
Flt Protected					0.995			0.987			0.995	
Satd. Flow (prot)	0	0	0	0	1528	0	0	1575	0	0	1613	0
Flt Permitted					0.995			0.821			0.949	
Satd. Flow (perm)	0	0	0	0	1475	0	0	1309	0	0	1537	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					21			3			23	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		526			232			479			603	
Travel Time (s)		12.0			5.3			10.9			13.7	
Confl. Peds. (#/hr)				165		162	9		8	8		9
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.94	0.94	0.94	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	4%	8%	0%	0%	3%	4%
Parking (#/hr)					0			0			0	
Adj. Flow (vph)	0	0	0	10	68	21	83	220	6	44	324	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	99	0	0	309	0	0	434	0
Turn Type				Perm	NA		Perm	NA		Perm	NA	
Protected Phases					5			1			1	
Permitted Phases				5			1			1		
Detector Phase				5	5		1	1		1	1	
Switch Phase												
Minimum Initial (s)				6.0	6.0		10.0	10.0		10.0	10.0	
Minimum Split (s)				19.0	19.0		39.0	39.0		39.0	39.0	
Total Split (s)				24.0	24.0		39.0	39.0		39.0	39.0	
Total Split (%)				38.1%	38.1%		61.9%	61.9%		61.9%	61.9%	
Maximum Green (s)				20.0	20.0		35.0	35.0		35.0	35.0	
Yellow Time (s)				3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)				1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode				None	None		Max	Max		Max	Max	
Walk Time (s)				7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)				8.0	8.0		28.0	28.0		28.0	28.0	
Pedestrian Calls (#/hr)				165	165		0	0		0	0	
Act Effct Green (s)					13.1			45.6			45.6	
Actuated g/C Ratio					0.21			0.72			0.72	
v/c Ratio					0.31			0.33			0.39	
Control Delay					19.1			6.3			6.4	
Queue Delay					0.0			0.0			0.0	
Total Delay					19.1			6.3			6.4	
LOS					B			A			A	
Approach Delay					19.1			6.3			6.4	
Approach LOS					B			A			A	
Queue Length 50th (ft)					28			47			66	
Queue Length 95th (ft)					54			90			121	
Internal Link Dist (ft)		446			152			399			523	
Turn Bay Length (ft)												
Base Capacity (vph)					484			941			1110	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.20			0.33			0.39	

Intersection Summary

Area Type: Other
Cycle Length: 63
Actuated Cycle Length: 63.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.39
Intersection Signal Delay: 7.9 Intersection LOS: A
Intersection Capacity Utilization 50.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: Chelsea Street & Brooks Street

Intersection	
Intersection Delay, s/veh	13
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	40	57	179	458	33
Future Vol, veh/h	6	40	57	179	458	33
Peak Hour Factor	0.92	0.92	0.96	0.96	0.91	0.91
Heavy Vehicles, %	0	0	0	5	3	0
Mvmt Flow	7	43	59	186	503	36
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.5	9.8	14.8
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	24%	13%	0%
Vol Thru, %	76%	0%	93%
Vol Right, %	0%	87%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	236	46	491
LT Vol	57	6	0
Through Vol	179	0	458
RT Vol	0	40	33
Lane Flow Rate	246	50	540
Geometry Grp	1	1	1
Degree of Util (X)	0.315	0.071	0.644
Departure Headway (Hd)	4.616	5.084	4.3
Convergence, Y/N	Yes	Yes	Yes
Cap	779	703	842
Service Time	2.644	3.131	2.322
HCM Lane V/C Ratio	0.316	0.071	0.641
HCM Control Delay	9.8	8.5	14.8
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1.4	0.2	4.8

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	49	7	179	439	18
Future Vol, veh/h	32	49	7	179	439	18
Peak Hour Factor	0.90	0.90	0.98	0.98	0.92	0.92
Heavy Vehicles, %	3	4	0	5	2	0
Mvmt Flow	36	54	7	183	477	20
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9	9.2	13.8
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	40%	0%
Vol Thru, %	96%	0%	96%
Vol Right, %	0%	60%	4%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	186	81	457
LT Vol	7	32	0
Through Vol	179	0	439
RT Vol	0	49	18
Lane Flow Rate	190	90	497
Geometry Grp	1	1	1
Degree of Util (X)	0.246	0.129	0.601
Departure Headway (Hd)	4.658	5.166	4.355
Convergence, Y/N	Yes	Yes	Yes
Cap	769	691	830
Service Time	2.695	3.217	2.383
HCM Lane V/C Ratio	0.247	0.13	0.599
HCM Control Delay	9.2	9	13.8
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1	0.4	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	51	60	10	0	15	0	214	12	18	325	0
Future Volume (Veh/h)	46	51	60	10	0	15	0	214	12	18	325	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.75	0.75	0.75	0.93	0.93	0.93	0.92	0.92	0.92
Hourly flow rate (vph)	49	54	64	13	0	20	0	230	13	20	353	0
Pedestrians		11			8			35			69	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			3			7	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								603				
pX, platoon unblocked												
vC, conflicting volume	730	655	399	764	648	314	364			251		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	730	655	399	764	648	314	364			251		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	85	90	95	100	97	100			98		
cM capacity (veh/h)	292	370	627	241	379	678	1193			1316		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	167	33	243	373
Volume Left	49	13	0	20
Volume Right	64	20	13	0
cSH	402	396	1700	1316
Volume to Capacity	0.42	0.08	0.14	0.02
Queue Length 95th (ft)	50	7	0	1
Control Delay (s)	20.2	14.9	0.0	0.6
Lane LOS	C	B		A
Approach Delay (s)	20.2	14.9	0.0	0.6
Approach LOS	C	B		

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	5	2	183	486	2
Future Volume (Veh/h)	3	5	2	183	486	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	5	2	199	528	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	732	529	530			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	732	529	530			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	388	550	1037			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	8	201	530
Volume Left	3	2	0
Volume Right	5	0	2
cSH	475	1037	1700
Volume to Capacity	0.02	0.00	0.31
Queue Length 95th (ft)	1	0	0
Control Delay (s)	12.7	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.7	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					✥			✥			✥	
Traffic Volume (vph)	0	0	0	9	63	25	110	423	10	17	233	33
Future Volume (vph)	0	0	0	9	63	25	110	423	10	17	233	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.90			1.00			0.99	
Frt					0.965			0.997			0.984	
Flt Protected					0.995			0.990			0.997	
Satd. Flow (prot)	0	0	0	0	1684	0	0	1845	0	0	1795	0
Flt Permitted					0.995			0.874			0.964	
Satd. Flow (perm)	0	0	0	0	1639	0	0	1624	0	0	1735	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28			2			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		526			232			479			603	
Travel Time (s)		12.0			5.3			10.9			13.7	
Confl. Peds. (#/hr)				139		136	26		23	23		26
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.94	0.94	0.94	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	2%	0%	0%	4%	0%
Adj. Flow (vph)	0	0	0	10	71	28	117	450	11	18	245	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	109	0	0	578	0	0	298	0
Turn Type				Perm	NA		Perm	NA		Perm	NA	
Protected Phases					5			1			1	
Permitted Phases				5			1			1		
Detector Phase				5	5		1	1		1	1	
Switch Phase												
Minimum Initial (s)				6.0	6.0		10.0	10.0		10.0	10.0	
Minimum Split (s)				19.0	19.0		39.0	39.0		39.0	39.0	
Total Split (s)				24.0	24.0		39.0	39.0		39.0	39.0	
Total Split (%)				38.1%	38.1%		61.9%	61.9%		61.9%	61.9%	
Maximum Green (s)				20.0	20.0		35.0	35.0		35.0	35.0	
Yellow Time (s)				3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)				1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)				2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode				None	None		Max	Max		Max	Max	
Walk Time (s)				7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)				8.0	8.0		28.0	28.0		28.0	28.0	
Pedestrian Calls (#/hr)				139	139		0	0		0	0	
Act Effct Green (s)					13.1			44.8			44.8	
Actuated g/C Ratio					0.21			0.71			0.71	
v/c Ratio					0.30			0.50			0.24	
Control Delay					17.6			7.9			5.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					17.6			7.9			5.1	
LOS					B			A			A	
Approach Delay					17.6			7.9			5.1	
Approach LOS					B			A			A	
Queue Length 50th (ft)					27			105			40	
Queue Length 95th (ft)					55			186			73	
Internal Link Dist (ft)		446			152			399			523	
Turn Bay Length (ft)												
Base Capacity (vph)					547			1160			1244	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.20			0.50			0.24	

Intersection Summary

Area Type: Other
Cycle Length: 63
Actuated Cycle Length: 62.7
Natural Cycle: 60
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 8.1 — Intersection LOS: A
Intersection Capacity Utilization 80.3% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Chelsea Street & Brooks Street

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	18	46	368	330	51
Future Vol, veh/h	9	18	46	368	330	51
Peak Hour Factor	0.81	0.81	0.94	0.94	0.92	0.92
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	11	22	49	391	359	55
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.7	12.6	11.8
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	11%	33%	0%
Vol Thru, %	89%	0%	87%
Vol Right, %	0%	67%	13%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	414	27	381
LT Vol	46	9	0
Through Vol	368	0	330
RT Vol	0	18	51
Lane Flow Rate	440	33	414
Geometry Grp	1	1	1
Degree of Util (X)	0.542	0.05	0.503
Departure Headway (Hd)	4.427	5.362	4.374
Convergence, Y/N	Yes	Yes	Yes
Cap	815	665	824
Service Time	2.45	3.416	2.398
HCM Lane V/C Ratio	0.54	0.05	0.502
HCM Control Delay	12.6	8.7	11.8
HCM Lane LOS	B	A	B
HCM 95th-tile Q	3.3	0.2	2.9

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	57	15	361	325	23
Future Vol, veh/h	30	57	15	361	325	23
Peak Hour Factor	0.95	0.95	0.96	0.96	0.96	0.96
Heavy Vehicles, %	4	0	0	1	1	5
Mvmt Flow	32	60	16	376	339	24
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.2	12	11.4
HCM LOS	A	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	4%	34%	0%
Vol Thru, %	96%	0%	93%
Vol Right, %	0%	66%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	376	87	348
LT Vol	15	30	0
Through Vol	361	0	325
RT Vol	0	57	23
Lane Flow Rate	392	92	362
Geometry Grp	1	1	1
Degree of Util (X)	0.494	0.134	0.457
Departure Headway (Hd)	4.539	5.276	4.54
Convergence, Y/N	Yes	Yes	Yes
Cap	791	675	790
Service Time	2.579	3.343	2.581
HCM Lane V/C Ratio	0.496	0.136	0.458
HCM Control Delay	12	9.2	11.4
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.8	0.5	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			↱			↰	
Traffic Volume (veh/h)	49	48	39	17	0	21	0	429	19	20	227	0
Future Volume (Veh/h)	49	48	39	17	0	21	0	429	19	20	227	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.91	0.91	0.91
Hourly flow rate (vph)	54	53	43	19	0	23	0	461	20	22	249	0
Pedestrians		26			20			55			39	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		2			2			5			4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								603				
pX, platoon unblocked	0.92	0.92		0.92	0.92	0.92				0.92		
vC, conflicting volume	852	820	330	908	810	530	275			501		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	792	757	330	854	746	440	275			408		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	78	82	94	89	100	96	100			98		
cM capacity (veh/h)	242	291	662	179	295	537	1268			1018		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	150	42	481	271
Volume Left	54	19	0	22
Volume Right	43	23	20	0
cSH	319	282	1700	1018
Volume to Capacity	0.47	0.15	0.28	0.02
Queue Length 95th (ft)	60	13	0	2
Control Delay (s)	25.9	20.0	0.0	0.9
Lane LOS	D	C		A
Approach Delay (s)	25.9	20.0	0.0	0.9
Approach LOS	D	C		

Intersection Summary				
Average Delay		5.3		
Intersection Capacity Utilization		48.0%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	4	3	374	377	5
Future Volume (Veh/h)	2	4	3	374	377	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	4	3	407	410	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	826	412	415			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	826	412	415			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	341	640	1144			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	6	410	415
Volume Left	2	3	0
Volume Right	4	0	5
cSH	495	1144	1700
Volume to Capacity	0.01	0.00	0.24
Queue Length 95th (ft)	1	0	0
Control Delay (s)	12.4	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.4	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX E – RESPONSE TO CLIMATE CHANGE QUESTIONNAIRE

A.1 - Project Information

Project Name:	**282-308 Bremen Street**			
Project Address:	282-308 Bremen Street			
Project Address Additional:				
Filing Type (*select*)	*Initial (**PNF**, EPNF, NPC or other substantial filing)* *Design / Building Permit (prior to final design approval), or* *Construction / Certificate of Occupancy (post construction completion)*			
Filing Contact	*Colleen Soden*	*Soden Sustainability Consulting*	*colleen@sodensustainability.com*	*617-372-7857*
Is MEPA approval required	*Yes/**no***		*Date*	

A.3 - Project Team

Owner / Developer:	282 Bremen Development, LLC
Architect:	RODE Architects, Inc.
Engineer:	Sherwood Consulting & Design, LLC
Sustainability / LEED:	Soden Sustainability
Permitting:	Mitchell L. Fischman ("MLF") Consulting LLC
Construction Management:	TBD

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Residential
List the First Floor Uses:	2,000 gross square feet of ground floor retail space plus amenity, lobby, circulation, BOH spaces,
List any Critical Site Infrastructure and or Building Uses:	n/a

Site and Building:

Site Area:	*34,160 SF*	Building Area:	*125,000 SF*
Building Height:	*68 Ft*	Building Height:	*5-6 Stories*
Existing Site Elevation – Low:	*14.5 Ft BCB*	Existing Site Elevation – High:	*16.5 Ft BCB*
Proposed Site Elevation – Low:	*14.5 Ft BCB*	Proposed Site Elevation – High:	*16.5 Ft BCB*
Proposed First Floor Elevation:	*Ft BCB*	Below grade levels:	*0 Stories*

Article 37 Green Building:

LEED Version - Rating System :	LEED v4 BDC	LEED Certification:	*Yes / **No***
Proposed LEED rating:	*Certified/**Silve**r/ Gold/Platinum*	Proposed LEED point score:	*53 Pts.*

Building Envelope

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Roof:	*30 (R)*	Exposed Floor:	*12.5(R)*
Foundation Wall:	*7.5(R)*	Slab Edge (at or below grade):	*R10 Unheated R 15 Heated*

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	*2(%)*	Wall & Spandrel Assembly Value:	*.064(U)*
Area of Framed & Insulated / Standard Wall:	*67.5(%)*	Wall Value	*R13 + R 7.5 ci*
Area of Vision Window:	*30%*	Window Glazing Assembly Value:	*.45(U)*
		Window Glazing SHGC:	*0.40(SHGC)*
Area of Doors:	*.5%*	Door Assembly Value:	*u- 0.77 Glazed, U -0.37 Opaque*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	*Energy performance was evaluated using an eQuest v3.65 energy model created based on 3/22/19 schematic drawings. Loads were estimated based on building size and use type*		
Annual Electric:	*1,197,540(kWh)*	Peak Electric:	*1,026(kW)*
Annual Heating:	*2,030(MMbtu/hr)*	Peak Heating:	*1.5 (MMbtu)*
Annual Cooling:	*65,000(Tons/hr)*	Peak Cooling:	*47.5(Tons)*
Energy Use - Below ASHRAE 90.1 - 2013:	*31%*	Have the local utilities reviewed the building energy performance?:	*Yes / **no***
Energy Use - Below Mass. Code:	*28.2%*	Energy Use Intensity:	*48.8 (kBtu/SF)*

Back-up / Emergency Power System

Electrical Generation Output:	*150(kW)*	Number of Power Units:	1
System Type:	*Ground(kW)*	Fuel Source:	Natural Gas

Emergency and Critical System Loads (in the event of a service interruption)

Electric:	*145(kW)*	Heating:	*.8(MMbtu/hr)*
		Cooling:	*30(Tons/hr)*

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing GHG emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon neutrality by 2050 new buildings performance will need to progressively improve to net carbon zero and positive.

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions: *1,093 (Tons)*

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

We have completed early SD modeling to determine the ECMs that we will study as the project evolves

Describe building specific passive energy efficiency measures including orientation, massing, envelop, and systems:

This building aims to maximize daylighting to reduce the need for artificial lighting

Describe building specific active energy efficiency measures including equipment, controls, fixtures, and systems:

The high efficiency equipment includes: low flow plumbing fixtures, high efficiency condensing boilers, high efficiency condensing domestic hot water heaters and LED lighting.

Describe building specific load reduction strategies including on-site renewable, clean, and energy storage systems:

Solar is being evaluated for this project

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

None at this time

Describe any energy efficiency assistance or support provided or to be provided to the project:

Engagement with ICF is in progress.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The building has space on the roof that could house both a solar PV array to offset electrical use as well as solar hot water heaters to reduce natural gas use in the building.

C - Extreme Heat Events

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

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	*3 Deg.*	Temperature Range - High:	*103 Deg.*
Annual Heating Degree Days:	5596	Annual Cooling Degree Days	900

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90°:	*25#*	Days – Above 100°:	*10#*
Number of Heatwaves / Year:	*5#*	Average Duration of Heatwave (Days):	*4#*

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

Heat island effect is reduced by incorporating reflective building materials as well as underground parking.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

The building is cooled by many individual heat pumps that can operate independently to maintain indoor conditions at higher outdoor average temperatures.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

Interruptions of power can be mitigated in the short term by the emergency generator. Longer power outages could require operable windows to provide ventilation and natural cooling.

D - Extreme Precipitation Events

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

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm: *4.90 In.*

Describe all building and site measures for reducing storm water run-off:

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

E – Sea Level Rise and Storms

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

Is any portion of the site in a FEMA SFHA?	***Yes*** / *No*	What Zone:	AE, AH, AO, AR, A99, V, VE
		Current FEMA SFHA Zone Base Flood Elevation:	*16.46 Ft BCB*

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online BPDA SLR-FHA Mapping Tool to assess the susceptibility of the project site.	***Yes*** / *No*

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online BPDA SLR-FHA Mapping Tool to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24” of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12” of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	*19.3 Ft BCB*		
Sea Level Rise - Design Flood Elevation:	*21.3 Ft BCB*	First Floor Elevation:	*16.5 Ft BCB*
Site Elevations at Building:	*TBD Ft BCB*	Accessible Route Elevation:	*TBD Ft BCB*

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Specific measures are currently under consideration

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

Specific measures are currently under consideration

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Specific measures are currently under consideration

Describe any strategies that would support rapid recovery after a weather event:

Specific measures are currently under consideration

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Specific measures are currently under consideration

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

Specific measures are currently under consideration

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

For questions or comments about this checklist or Climate Change best practices, please contact: John.Dalzell@boston.gov

Appendix E1. 282-308 Bremen St, East Boston, MA
PNF Application Preliminary Energy Model Analysis

Summary

For the 282 Bremen Street Project PNF application, an energy analysis was performed based on the geometry and orientation described in the March 22, 2019 schematic building drawings. Analysis was performed by Allison Gaiko, PE, LEED AP for Soden Sustainability Consulting using eQuest3.65 to compare the proposed design case to two baseline scenarios:

- Energy cost comparison to ASHRAE 90.1-2010 Appendix G in accordance with LEED v4 requirements
- Energy use comparison to ASHRAE 90.1-2013 in accordance with MA Energy Code requirements

Model Input Assumptions

Below is a table summarizing the input of the proposed design and two baseline energy models

		ASHRAE 90.1-2010	ASHRAE 90.1-2013		Proposed
Opaque Assemblies	Roof	R20ci insulation – U-0.048	R30ci insulation – U-0.032		R30ci insulation - U-0.032 (White roof)
	Above Grade Walls	R13 + R7.5ci – U-0.064	R13 + R10ci – U-0.055		R13 + R7.5ci – U0.064
	Exposed Floor	R30 – U-0.038	R30 – U-0.038		R12ci – U-0.065
	Slab on Grade (unheated)	F-0.730	F-0.688		F-0.730
Glazing	Metal Framing U-Factor (other)	Assembly U-0.55	Assembly U-0.50 (operable)		Assembly U-0.45
	Metal Framing U-Factor (curtainwall/storefront)	Assembly U-0.45	Assembly U-0.42 (fixed)		Assembly U-0.45
	SHGC	Assembly SHGC - 0.4	Assembly SHGC - 0.4		Assembly SHGC - 0.4
Lighting	Residential Dwelling[3]	0.90 W/SF	0.81 W/SF		0.72 W/SF
	Retail Sales[3]	1.68 W/SF	1.30 W/SF		1.34 W/SF
	Corridor/Transition[3]	0.66 W/SF	0.59 W/SF		0.53 W/SF
	Parking Garage[3]	0.19 W/SF	0.17 W/SF		0.15 W/SF
Process Loads	Residential Dwelling[1]	2.08 W/SF	2.08 W/SF		1.94 W/SF
	Corridor/Transition	0.2 W/SF	0.2 W/SF		0.2 W/SF
	Elevator	30 kW/car	30 kW/car		30 kW/car

Appendix E1. 282-308 Bremen St, East Boston, MA
PNF Application Preliminary Energy Model Analysis

		ASHRAE 90.1-2010	ASHRAE 90.1-2013		Proposed
DHW	Hot Water Heater Efficiency	80%	80%		95%
	Lavatory Sink Flow[2]	2.2 GPM	2.2 GPM		0.5 GPM
	Kitchen Sink Flow[2]	2.2 GPM	2.2 GPM		1.5 GPM
	Shower Flow[2]	2.5 GPM	2.5 GPM		1.5 GPM
HVAC	Boiler[3]	80%	88%		95%
	HW temperature	180 °F	180 °F		150 °F
	EER 65< DX <135 MBH[3]	11 EER	13.1 EER		12.1 EER
	EER 240 < DX <760 MBH[3]	9.8 EER	13.4 EER		10.8 EER
	SEER DX < 65[3]	13 SEER	13.3 EER		15.4 SEER

Please note that the energy model is not created to predict actual energy use for the proposed building but rather to compare energy consumption between the design case and baseline cases. Inputs such as occupancy, weather data and individual occupants' habits affect the proposed model's ability to predict energy use. For this reason, the baseline and design models were created with identical weather data as well as identical schedules for parameters such as occupancy, lighting EFLH (electrical full load hours), and temperature set points. Schedules were based on the EFLH Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.

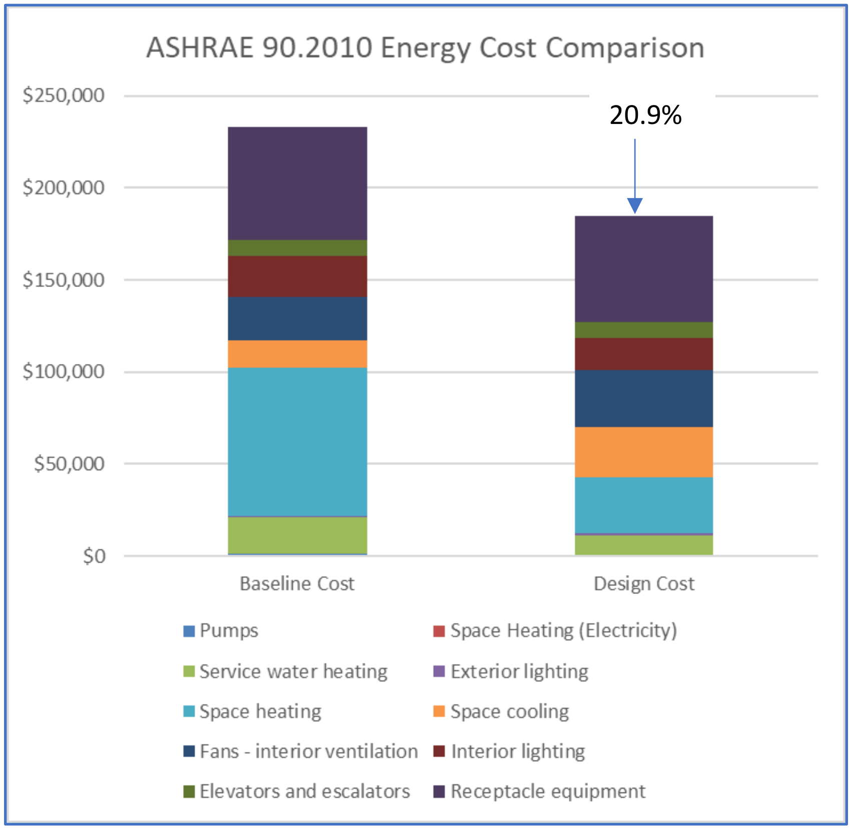
Table notes:

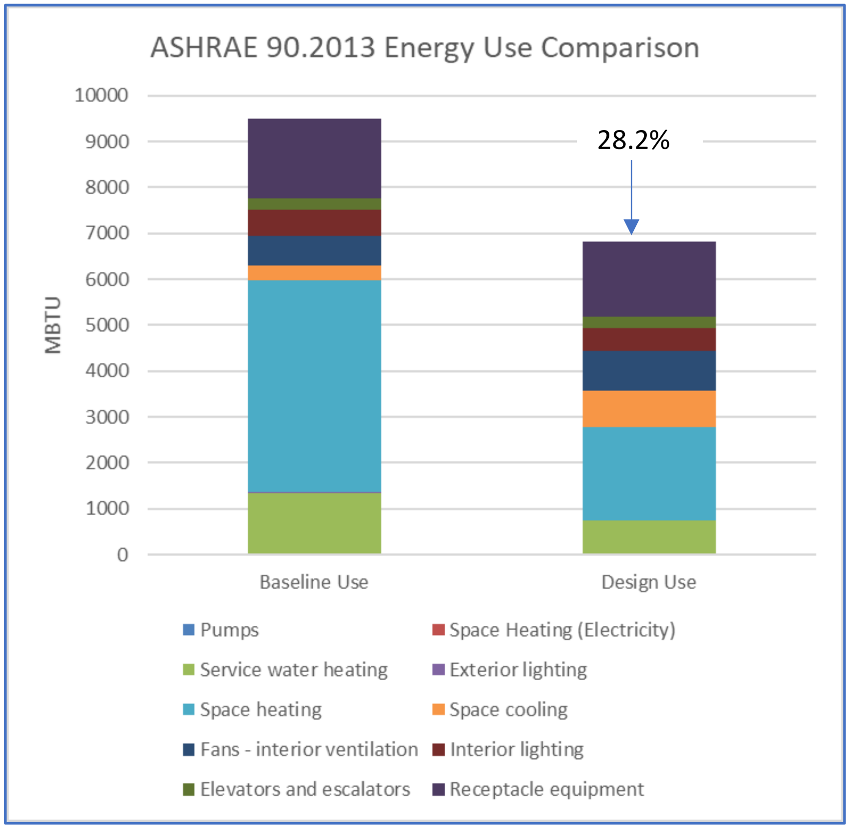
1. Reduction in plug load in the residential units is based on Energy Star appliances that have been incorporated in the project and has been calculated based on the Multi-Family Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.
2. Reduction in domestic hot water flow in the residential units is based on the reduced flow fixtures and Energy Star appliances that have been incorporated in the project and has been calculated based on the Multi-Family Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.
3. In accordance with Massachusetts Code requirements section C406, two additional efficiency package options were included in the ASHARAE 90.1-2013 baseline case. The two options selected were (1) More efficient HVAC performance – Exceed energy efficiency provisions by 10% and (2) Reduced lighting power density by 10%.

Model Results

The results of the 282 Bremen Street preliminary energy model analysis show:

- 20.9% annual energy cost reduction vs ASHRAE 90.1-2010 (8 LEEDv4 points)
- 28.2% annual energy use reduction vs ASHRAE 90.1-2013 (MA Energy Code)





Most of the energy savings in the 282 Bremen Street project are the result of reduced lighting, heat recovery of apartment exhaust, efficient domestic hot water heaters and efficient boilers, and are represented in the above graphs by reductions in space heating, interior lighting and service water heating energy use and cost.

Appendix

(OPTIONAL) Equivalent Full Load Hours Calculator

Default Schedules

Residential Dwelling Unit Default Schedules

Schedule Name: Dwelling Unit Thermostat setpoint schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	Hours/day	Hours/year
Daily Heating Setpoint	70.0	70.0	70.0	70.0	70.0	70.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	70.0	24.00	8,760
Daily Cooling Setpoint	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	80.0	80.0	80.0	80.0	80.0	80.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	24.00	8,760

Schedule Name: Dwelling Unit Lighting Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	585
Weekend	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	243
Holiday	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	26
Total Equivalent Full Load Hours of Operation per Year																										854

Schedule Name: Dwelling Unit Miscellaneous Equipment Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	1,450
Weekend	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	603
Holiday	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	64
Total Equivalent Full Load Hours of Operation per Year																										2,117

Schedule Name: Residential Common Area Miscellaneous Equipment Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	2,250
Weekend	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	936
Holiday	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	99
Total Equivalent Full Load Hours of Operation per Year																										3,285

Schedule Name: Residential DHW Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	1,675
Weekend	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	697
Holiday	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	74
Total Equivalent Full Load Hours of Operation per Year																										2,446

Schedule Name: Garage Exhaust

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	7%	7%	7%	7%	7%	7%	17%	20%	50%	50%	15%	15%	35%	15%	15%	15%	25%	50%	50%	25%	7%	7%	7%	7%	4.64	1,159
Weekend	7%	7%	7%	7%	7%	7%	17%	20%	50%	50%	15%	15%	35%	15%	15%	15%	25%	50%	50%	25%	7%	7%	7%	7%	4.64	482
Holiday	7%	7%	7%	7%	7%	7%	17%	20%	50%	50%	15%	15%	35%	15%	15%	15%	25%	50%	50%	25%	7%	7%	7%	7%	4.64	51
Total Equivalent Full Load Hours of Operation per Year																										1,693

Copy & Paste Schedule Above

Schedule Name: Apt Elev

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	20%	40%	50%	40%	40%	35%	35%	30%	30%	30%	40%	45%	50%	40%	35%	30%	10%	5%	6.35	1,588
Weekend	5%	5%	5%	5%	5%	5%	10%	25%	50%	50%	50%	40%	45%	45%	40%	40%	50%	45%	45%	45%	30%	30%	25%	15%	7.10	738
Holiday	5%	5%	5%	5%	5%	5%	10%	25%	50%	50%	50%	40%	45%	45%	40%	40%	50%	45%	45%	45%	30%	30%	25%	15%	7.10	78
Total Equivalent Full Load Hours of Operation per Year																										2,404

Multifamily Home Details

Complete the table for each building in the project. Input the number of units and the average floor area for units with the corresponding bedroom number.

Building Unit summary

Building ID	Studio		1 Bedroom		2 Bedrooms		3 Bedrooms		4 Bedrooms		5 Bedrooms		6 Bedrooms		7 Bedrooms		8 Bedrooms	
	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)	Qty	Average Floor Area (sq ft)
282 Bremen St	61	435	77	650	27	900												
Total number of units																		165
Total number of bedrooms																		132
Total Area of Dwelling Units (square feet)																		100,885

Building ID	Total Number of Units	Total Number of Bedrooms	Total Area of Dwelling Units (square feet)	Average Number of Bedrooms Per Unit	Average Floor Area per Unit (square feet)	Average Floor Area Per Unit for Reference Building (square feet)
282 Bremen St	165	192	100,885	1.16	611	1,098

Homes Dwelling Unit Equipment Calculator

Enter the appliances and equipment that is present in the residential dwelling units for the project. For clothes washers and dryers, enter the quantity of each unit installed within the project scope of work. For fans, enter the total supply volume for all fans installed for the project.

Building ID	Load Source	Quantity (or sum total fan volume [cfm] for fans)	Energy Star Eqp?	Average bedrooms per dwelling unit		Electric Loads: Annual Consumption (kWh/year) Baseline	Electric Loads: Annual Consumption (kWh/year) Proposed	Electric Loads: Sensible Ratio	Electric Loads: Latent Ratio		Natural Gas Loads: Annual Consumption (therms/year) Baseline	Natural Gas Loads: Annual Consumption (therms/year) Proposed	Natural Gas Loads: Sensible Ratio	Natural Gas Loads: Latent Ratio		Annual Service Hot Water Load (gallons/year): Baseline Per Equipment	Proposed Per Equipment	Baseline Total	Proposed Total
282 Bremen St	Cooking (electric stove/range)	165	Yes	1.16364		99660	99660	0.4	0.3		0	0	0.00	0.00		0.00	0.00	0.00	0
282 Bremen St	Clothes Dryer (In-unit electric)	165	Yes	1.16364		95658	95658	0.15	0.05		0	0	0.00	0.00		0.00	0.00	0.00	0
282 Bremen St	Bath / Utility Fan, 10 to 89 cfm	13050	Yes	1.16364		7938.75	6804.64	0	0		0	0	0.00	0.00		0.00	0.00	0.00	0
282 Bremen St	Refrigerator	165	Yes	1.1636364		87,285	69,795	1	0		0	0	0.00	0.00		0.00	0.00	0.0	0.0
282 Bremen St	Dishwasher	165	Yes	1.1636364		33,990	27,060	0.6	0.15		0	0	0.00	0.00		1,290.00	860.00	212,850.0	141,900.0
282 Bremen St	Clothes Washer (In-unit)	165	Yes	1.1636364		13,365	9,405	0.8	0		0	0	0.00	0.00		2,435.80	1,127.40	401,907.0	186,021.0

Add Row | Delete Row

Homes Dwelling Unit Equipment Modeling Summary

Report the modeled Receptacle Equipment and Appliances Equivalent Full Load Hours of Operation in the Schedules tab before referring to the table below. The Equivalent Full Load Hours of Operation is used to calculate the equipment power density for resdential dwelling units that must be modeled based on the building equipment reported for the building. After confirming the Equivalent Full Load Hours of Operation in the schedules tab, use the values below for the Baseline and Proposed Miscellaneous Equipment Loads in the Dwelling Units. These loads include 0.5 Watts per square foot of electric miscellaneous equipment load with a 0.9 sensible ratio and 0.1 latent ratio in addition to the equipment load sources selected above.

Building ID	Equivalent Full Load Hours of Dwelling Unit Miscellaneous Equipment Operation Per Year	Total Area of Dwelling Units (square feet)		Electric Miscellaneous Loads in Dwelling Unit (including appliances and equipment listed above): Baseline Equipment Power Density (Watts/ sq ft)	Baseline Sensible Ratio	Baseline Latent Ratio	Proposed Equipment Power Density (Watts/ sq ft)	Proposed Sensible Ratio	Proposed Latent Ratio		Natural Gas Miscellaneous Loads in Dwelling Unit (including appliances and equipment listed above): Baseline Equipment Power Density (Btu/ sq ft)	Baseline Sensible Ratio	Baseline Latent Ratio	Proposed Equipment Power Density (Btu/ sq ft)	Proposed Sensible Ratio	Proposed Latent Ratio		Dwelling Unit Equipment Hot Water Loads: Base	Proposed
282 Bremen St	2,117	100885		2.08	0.60	0.11	1.94	0.59	0.12		0.00			0.00				614757.00	327921.00

April 3, 2019

Homes Service Water Heating Load Summary

Residential Usage Profile Dependent on Project Demographics		Baseline Residential Usage per person Excluding Clothes / Dish Washers	
Low	Demographics such as all occupants working, seniors, middle income, and higher population density.	12	gallons/day
Medium	Demographics such as mixture of working / non-working occupants, mixture of age groups, medium population densities.	25	gallons/day
High	Demographics such high percentages of children, low income, public assistance, or no occupants working.	44	gallons/day

Report the modeled Service Water Heating Full Load Hours of Operation in the Schedules tab before referring to the table below. The Equivalent Full Load Hours of Operation is used to calculate the DHW modeled peak residential flow a the DHW Heater that must be modeled to be consistent with the annual hot water consumption calculated here. After confirming the Equivalent Full Load Hours of Operation in the schedules tab,Identify the residential service water heating usage profile, and the average fixture flows for sink and shower fixtures. Supply temperature at fixture point of use shall be 120 degrees F. If the modeled supply DHW temperature from the DHW heater is higher than this, indicate the supply DHW temperature from the DHW heater and the average cold water input temperature below.

This information along with the appliance information entered above and the schedule data from the schedules tab is used to determine the DHW modeled Peak Flow at DHW heater,which should be input into the energy model.

Building ID	Residential Usage Profile	Average Fixture Flows (gallons/minute)		DHW Temperature Settings (degrees F)			DHW Sink and Shower Fixture Loads at Point of Use (gallons / year)		DHW In-Unit Appliance Loads at Point of Use (gallons / year)		DHW Laundry Room Equipment Loads at Point of Use (gallons / year)		DHW Total Residential Loads at Point of Use (gallons / year)		DHW Total Residential Loads at DHW Heater (gallons / year)		DHW Equivalent Full Load Hours of Operation	DHW Modeled Peak Residential Flow at DHW Heater (gallons / minute)	
		Showers	Sinks	DHW Supply Temp	Average Cold Water Temp	DHW Temp at Fixture Point of Use	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed		Baseline	Proposed
282 Bremen St	Medium	1.50	0.50	135.0	50.0	120.0	1,752,000	1,238,186	614,757	327,921	0	0	2,366,757	1,566,107	1,949,094	1,289,735	2,446	13.281	8.788

Note: Flow rates are based on Energy Star Multifamily Simulation Guidance. One person is assumed per bedroom.

General Information

Complete the General Information tab before completing any other tabs. Note that the selections in this tab will determine the selections available within other tabs, including multiple building selections, residential dwelling unit selections, rating system dependent selections, and district energy selections.

LEED Project ID #	
LEED Project Name	282 Bremen St
Rating system	LEED v4 BD+C: New Construction
Unit of measurement	IP units

Note: The selections above must match the rating system and unit of measurement chosen during project registration.

Percent new construction (%)*	100.00%
Percent renovation/existing (%)*	0.00%

* Percentage based on floor area

Project has multiple buildings?	No
Conditioned building area (sq ft)	125,000
Unconditioned building area (sq ft)	14,400
Total building area (sq ft)	139,400
Project has residential Dwelling Units?	Yes

Energy Model Information

Energy modeler	Allison Gaiko, PE, LEED AP
Energy model based on	Other - Please Describe

Please describe the phase in which the Energy model is based on

Schematic 2/6/19

Simulation program	eQuest
Energy code used	ASHRAE 90.1 2010 Appendix G
Simulation weather file	Boston, MA
Climate zone	5A

ASHRAE 90.1 Addenda used in the energy model(s), if any. Addenda are not required to be used for the project. However, each addenda must be used in its entirety if applied to the project, and must be consistent across all relevant LEED Credits.

☑ **Compliant energy simulation software.** The energy simulation software used for this project has all capabilities described in EITHER section "G2 Simulation General Requirements" in Appendix G of ASHRAE 90.1-2010 OR the analogous section of the alternative qualifying energy code used.

☑ **Compliant energy modeling methodology.** Energy simulation runs for both the baseline and proposed use the assumptions and modeling methodology described in EITHER ASHRAE 90.1-2010 Appendix G OR the analogous section of the alternative qualifying energy code used.

Schedules

Complete the table for each building in the project. Provide information for the Main Building Schedules and for each additional area or set of areas where the schedules differ significantly. Ensure that the reported schedules are consistent with the energy-model entered values, and that schedules account for all mandatory controls. Ensure that schedules account for all mandatory controls.
*Note: The following Equivalent full load schedule information may be optionally excluded from the Table: (1) End-uses that do not significantly influence overall energy consumption for the project building type (i.e. service water heating for an office building < 5% of total energy consumption), (2) Spaces modeled with differing schedules that contribute minimally to overall building energy consumption (i.e. electrical/mechanical rooms in a school building that contribute < 5% of total building energy consumption

Note: The EFLH Calculator tab in this spreadsheet may be used as an optional tool for determining Equivalent Full Load hours of operation

Building ID	Areas Served	Equivalent Full Load Hours of Operation Per Year (maximum of 8,760). Leave blank or enter N/A if not applicable.										HVAC: hours per year fans running continuously	Occupied Mode Setpoint		Setback Mode Setpoint	
		Interior Lighting	Service Water Heating	Receptacle Equipment and Appliances	Refriger-ation	Server Equip-ment	Cooking Equip-ment	Elevators / Escalators	Exterior Lighting	Other Loads (Indicate Loads)			Cooling (degrees F)	Heating (degrees F)	Cooling (degrees F)	Heating (degrees F)
282 Bremen St	Dwelling Units	854	2,446	2,117				2,404				8,760	78.0	72.0	80.0	70.0

Opaque Assemblies

Instructions: Complete the Opaque Building Envelope Requirements section, then describe each unique opaque building envelope construction on a separate row in the Opaque Building Envelope Constructions table. Please refer to the column header notes for information about Appendix G modeling protocol. For any information not applicable to the project, simply enter "N/A". Baseline information will autogenerate for new construction when the space conditioning category is selected.

Opaque Building Envelope Requirements

All residential spaces (guest rooms, living quarters, private living space, in-patient rooms, and sleeping quarters) have been modeled with the required residential construction types from Table 5.5	Yes
For existing spaces, have there been any changes to the space conditioning category (for example, previously unconditioned spaces becoming fully conditioned)?	N/A (no existing space)
All spaces qualifying as semiheated are not defined as heated per Table 3.1 or indirectly conditioned (see Section 3.2 definition of space).	N/A (no semiheated space)
Opaque envelope assemblies separating conditioned space from unconditioned or semiheated space in the baseline are modeled using semiheated envelope assemblies per the *ASHRAE 90.1-2010 User's Manual*, Section 5.1.2, *Space Conditioning Categories* (Page 5-2). Refer to Figure 5-B.	Yes
All ***baseline new construction*** opaque envelope assemblies were modeled as required by Table 5.5 for the project's climate zone and Table G3.1#5(b) as lightweight assembly types.	Yes
All baseline existing roofs, above-grade exterior walls, below-grade exterior walls, exposed floors, slab-on-grade floors, and opaque doors were modeled using the existing conditions prior to any revisions in spaces with unchanged space conditioning categories.	N/A
All ***proposed*** roofs, above-grade exterior walls, below-grade exterior walls, exposed floors, slab-on-grade floors, and opaque doors were modeled as-designed and with assembly U-factors, C-factors, and F-factors consistent with Appendix A values.	Yes
Infiltration rates and schedules have been modeled identically in the baseline and proposed.	Yes

For each item entered as "No" above, describe the applicable ASHRAE 90.1 Appendix G exception(s) that apply, or the circumstances preventing the opaque envelope parameters from being modeled as required. If the energy simulation software is not capable of modeling the required parameters, describe the adjustments that were made to provide a thermodynamically similar representation or provide a narrative justifying why the predicted energy performance results will not be influenced.

Opaque Building Envelope Constructions

Roof Constructions

General Information			Baseline		Proposed		Roof Solar Reflectance and Thermal Emittance	
Building ID	New or Existing Construction	Space-Conditioning Category	Description	Assembly U-factor	Description	Assembly U-factor	Baseline	Proposed
Helpful Notes			• Describe the Baseline roof construction (for example: R-20 (R-2.6) continuous insulation entirely above metal deck). • New roofs: insulation entirely above deck with U-factor from appropriate Table 5.5 per Table G3.1#5(b). • Existing roofs: existing conditions per Table G3.1#5(f).		• Describe the Proposed roof construction and Appendix A Table if referenced (for example: R-30 (R-5.3) continuous insulation entirely above metal deck per Table A2.2). • Proposed construction assembly U-factor should be as-designed and consistent with Appendix A of ASHRAE 90.1.		• In accordance with Section 5.5.3.1.1(a) or 0.3/0.9 per Table G3.1#5(c). • Verify Baseline requirements for climate zones 1 through 3.	
282 Bremen St	New	Residential	R-20 insulation entirely above deck with a U-factor of 0.048	U-0.048	R30 insulation entirely above deck with a U-factor of 0.032	U-0.032	Reflectance 0.3 / Emittance 0.9	Other (describe in additional notes below)
282 Bremen St								

Above-Grade Exterior Wall Constructions

General Information			Baseline		Proposed	
Building ID	New or Existing Construction	Space-Conditioning Category	Description	Assembly U-factor	Description	Assembly U-factor
Helpful Notes			• Describe the Baseline above-grade exterior wall construction (for example: steel-framed with R-13.0 (R-2.3) cavity insulation and R-7.5 (R-1.3)continuous insulation). • New above-grade walls: steel-framed with U-factor from appropriate Table 5.5 per Table G3.1#5(b). • Existing above-grade walls: existing conditions per Table G3.1#5(f).		• Describe the Proposed above-grade exterior wall construction and Appendix A Table referenced (for example: 6" (150mm) steel frames spaced 24" (610mm) on center with R-21 cavity insulation and R-10 (R3.7)continuous insulation per Table A3.3). • Proposed construction assembly U-factor should be as-designed and consistent with Appendix A of ASHRAE 90.1.	
282 Bremen St	New	Residential	steel-framed with R-13 cavity and R-7.5 continuous insulation with a U-factor of 0.064	U-0.064	Steel framed with R-13 and R7.5 continuous insulation with a U-factor of	U-0.064
282 Bremen St						

Below-Grade Exterior Wall Constructions

General Information			Baseline		Proposed	
Building ID	New or Existing Construction	Space-Conditioning Category	Description	Assembly C-factor	Description	Assembly C-factor

Helpful Notes			• Describe the Baseline below-grade exterior wall construction (for example: 8" (200mm) medium-weight concrete block with solid grouted cores and R-7.5 (R-1.3)continuous insulation). • New below-grade walls: 8" medium weight concrete block with solid grouted cores as defined in A4.1 with C-factor from appropriate Table 5.5 per Table G3.1#5(b). • Existing below-grade walls: existing conditions per Table G3.1#5(f).		• Describe the Baseline below-grade exterior wall construction and Appendix A Table referenced (for example: 8" (200mm) medium-weight concrete b-lock with solid grouted cores and R-10 (R3.7) continuous insulation per Table A4.2). • Proposed construction assembly U-factor should be as-designed and consistent with Appendix A of ASHRAE 90.1.	
282 Bremen St						
282 Bremen St						

Exposed Floor Constructions

General Information			Baseline		Proposed	
Building ID	New or Existing Construction	Space-Conditioning Category	Description	Assembly U-factor	Description	Assembly U-factor
Helpful Notes			• Describe the Baseline floor construction (for example: steel-joist with R-30 (R-5.3) batt insulation between the floor joists) • New floors: steel-joist with U-factor from appropriate Table 5.5 per Table G3.1#5(b). • Existing floors: existing conditions per Table G3.1#5(f). • For floor assemblies above unconditioned or semiheated space, select the space conditioning category as semiheated per 90.1-2010 User's Manual, Section 5.1.2-Space Conditioning Categories (Figure 5-B)		• Describe the Proposed floor construction and Appendix A Table referenced (for example: steel-joist with R-20 (R-2.6) spray-on insulation on underside of floor and joists per Table A5.3). • Proposed construction assembly U-factor should be as-designed and consistent with Appendix A of ASHRAE 90.1.	
282 Bremen St	New	Residential	steel-joist with R-30 insulation with a U-factor of 0.038	U-0.038	R12.5ci	0.065
282 Bremen St						

Slab-On-Grade Floors

General Information			Baseline		Proposed	
Building ID	New or Existing Construction	Space-Conditioning Category	Description	Assembly F-factor	Description	Assembly F-factor
Helpful Notes			• Describe the Baseline slab-on-grade floor construction (for example: unheated 6" (150 mm) concrete slab poured directly on the earth with no insulation). • New slab-on-grade floors: unheated 6" concrete slab as defined in A4.6 with F-factor from appropriate Table 5.5 per Table G3.1#5(b). • Existing slab-on-grade floors: existing conditions per Table G3.1#5(f).		• Describe the Proposed slab-on-grade floor construction and Appendix A Table referenced (for example: unheated 6" (150 mm) concrete slab poured directly on the earth with 24" R-10 (610 mm R-3.7) vertical insulation per Table A6.3). • Proposed construction assembly U-factor should be as-designed and consistent with Appendix A of ASHRAE 90.1 .	
282 Bremen St	New	Semiheated	6" concrete slabs with no insulation with an F-factor of 0.730	F-0.730	6" concrete slabs with no insulation with an F-factor of 0.730	F-0.730
282 Bremen St						

Opaque Doors

General Information			Baseline		Proposed	
Building ID	New or Existing Construction	Space-Conditioning Category	Description	Assembly U-factor	Description	Assembly U-factor
Helpful Notes			• Describe the Baseline opaque door construction (for example: swinging or nonswinging). • New opaque doors: U-factor from appropriate Table 5.5 per Table G3.1#5(b). • Existing opaque doors: existing conditions per Table G3.1#5(f).		• Describe the Proposed opaque door construction (for example: insulated metal swinging door). • Proposed construction assembly U-factor should be as-designed and consistent with Appendix A of ASHRAE 90.1.	
282 Bremen St	New	Residential	Swinging Doors: U-factor of 0.500; Nonswinging Doors: U-factor of 0.500	U-0.500 / U-0.500	Swinging Doors: U-factor of 0.500; Nonswinging Doors: U-factor of 0.500	U-0.500 / U-0.500
282 Bremen St						

Shading and Fenestration

Building Massing and Zoning

Instructions: Provide the following shading and orientation information. An example of the expected level of detail has been provided for each input. For any information not applicable to the project, simply enter "N/A".

Manual fenestration shading devices such as blinds or shades have been modeled or not modeled, the same as in the proposed.	Yes
Any shading by adjacent structures and terrain or manual shading devices have been modeled or not modeled, the same as in the proposed.	Yes
The baseline is modeled with the same shape and orientation as the proposed.	Yes
All baseline existing fenestration for spaces with unchanged space conditioning categories has been modeled using existing conditions prior to revisions that are part of the project scope of work.	Yes
Thermal Blocks were modeled consistent with Table G3.1#7 and Table G3.1#8 as applicable, and were modeled identically in the Baseline and Proposed design models	Yes

For each item entered as "No" above, describe the applicable ASHRAE 90.1 Appendix G exception(s) that apply, or the circumstances preventing the building massing modeling parameters from being modeled as required. If the energy simulation software is not capable of modeling the required parameters, describe the adjustments that were made to provide a thermodynamically similar representation or provide a narrative justifying why the predicted energy performance results will not be influenced.

Building ID	282 Bremen St						
Model Input Parameter		**Baseline**			**Proposed**		
Helpful Notes:		• All vertical glazing flush with exterior wall and no shading projections per Table G3.1#5(c) • Manual shading devices such as blinds or shades may be modeled per Table G3.1#5(c) • No self-shading per Table G3.1#5 • Total vertical fenestration areas for new construction equal to Proposed up to 40% maximum, and distributed on each face of the building in the same proportions as the Proposed design per Table G3.1#5(c)			• Manual shading devices such as blinds or shades may be modeled and must be consistent with the baseline per Table G3.1#5(d) • Permanent shading devices (such as fins, overhangs, and light shelves) and automatically controlled shades or blinds must be modeled per Table G3.1#5(d)		
Above-grade wall and vertical glazing area by orientation	Orientation	Above-Grade Wall Area (sq ft)	Vertical Glazing Area (sq ft)	Vertical Glazing Area (%)	Above-Grade Wall Area (sq ft)	Vertical Glazing Area (sq ft)	Vertical Glazing Area (%)
	North	12,535	4,512	36.0%	Identical to baseline	4,512	36.0%
	East	27,562	9,631	34.9%	Identical to baseline	9,631	34.9%
	South	12,535	4,492	35.8%	Identical to baseline	4,492	35.8%
	West	27,562	7,608	27.6%	Identical to baseline	7,608	27.6%
	Total	80,193	26,243	32.7%	80,193	26,243	32.7%
Roof and skylight area		Roof Area (sq ft)	Skylight Area (sq ft)	Skylight Area (%)	Roof Area (sq ft)	Skylight Area (sq ft)	Skylight Area (%)
		67,032	0	0.0%	Identical to baseline	0	0.0%
Number of Thermal Blocks		Conditioned	Semi-heated	Unconditioned	Conditioned	Semi-heated	Unconditioned
		25 to 50	0.00	1 to 5	Identical to baseline	Identical to baseline	Identical to baseline

Fenestration

Instructions: Describe each unique fenestration assembly on a separate row in the following table. Please refer to the column header notes for information about Appendix G modeling protocol. For any information not applicable to the project, simply enter "N/A". Baseline information will autogenerate for new construction.

Vertical Glazing

General Information			Baseline			Proposed			
Building ID	New or Existing Construction	Space-Conditioning Category	Description	Assembly U-factor	SHGC	Description	Assembly U-factor	SHGC	VLT
Helpful Notes:			• New vertical glazing: • If "New" is chosen, select a description. • Assembly U-factor and SHGC from appropriate Table 5.5 per Table G3.1#5(c). • Existing vertical glazing: • If "Existing" is chosen, provide a description. • Existing conditions per Table G3.1#5(f). • Enter the Baseline vertical glazing assembly solar heat gain coefficient (SHGC). Please note that this is not equivalent to the shading coefficient (SC).			• Proposed vertical glazing assembly U-factor should be as-designed and account for the impact of the frames on the whole assembly. Reference Table A8.2 of ASHRAE 90.1 as necessary. • Describe the Proposed vertical glazing assembly (for example: double glazing, argon filled, low-e coating, aluminum frame with thermal break) • Enter the Proposed vertical glazing assembly solar heat gain coefficient (SHGC). Please note that this is not equivalent to the shading coefficient (SC). • Enter the Proposed vertical glazing assembly visual light transmittance (VLT)			
282 Bremen St	New	Residential	Metal framing (all other)	0.55	0.4	Glazing Assembly U-0.45	0.45	0.4	0.47
282 Bremen St	New	Residential	Metal framing (curtainwall/storefront)	0.45	0.4	Curtain Wall assembely U-0.45	0.45	0.4	0.47

Lighting

Interior Lighting

Instructions: Confirm that the energy model complies with the Interior lighting requirements listed, and provide a narrative explaining any discrepancies. Select the interior lighting categorization procedure, and then complete the corresponding lighting table(s). Please refer to the column header notes for information about Appendix G modeling protocol. For any information not applicable to the project, simply enter "N/A".

Interior Lighting Requirements

All lighting schedules have been modeled identically in the baseline and proposed and reflect the anticipated operating schedules of each space.	Yes
The proposed lighting power includes all lighting system components shown or provided for on the plans (including lamps and ballasts and task and furniture-mounted fixtures except where specifically exempted).	Yes
Baseline and proposed lighting is modeled using the automatic and manual controls in Section 9.4 including automated shutoff controls, daylighting controls, occupant sensor controls, etc. The energy modeling schedules account for these mandatory control requirements.	Yes
Ocupant sensors or timer switches are included in the proposed, and modeled in the baseline for classrooms, lecture halls, confrence rooms, meeting rooms, training rooms, employee lunch and break rooms, storage and supply rooms between 50 to 1,000 sq ft (15.24 to 304.8 sq m), copying and printing rooms, office spaces up to 250 sq ft (76.2 sq m), restrooms, dresssing rooms, locker rooms, fitting rooms, and parking garages per Section 9.4.1.2b and 9.4.1.3b.	Yes
Mandatory automatic daylighting controls are included in the proposed, and modeled in the baseline for primary sidelighted areas in enclosed spaces greater than 250 sq ft (23 sq m), and top lighted areas greater than 900 sq ft (84 sq m), and parking garages as applicable per Sections 9.4.1.4, 9.4.1.5, and 9.4.1.3 respectively.	Yes
Mandatory step controls are included in the proposed, and modeled in the baseline for all spaces enclosed by ceiling height partitions per Sections 9.4.1.2a.	Yes

For each item entered as "No" above, describe the applicable ASHRAE 90.1 Appendix G exception(s) that apply, or the circumstances preventing the lighting parameters from being modeled as required. If the energy simulation software is not capable of modeling the required parameters, describe the adjustments that were made to provide a similar representation or provide a narrative justifying why the predicted energy performance results will not be influenced.

Categorization Procedure

Select the categorization procedure used to determine the lighting power density (LPD) in the proposed and baseline	○ Building Area Method ● Space by Space Method

Space by Space Method

If attempting to take additional credit/adjustments in the baseline for room geometry and/or in the proposed for automatic lighting controls, further work will be required. Taking the additional credit is optional.
Note: This method employs Addendum cg to 90.1-2010 due to contradictions in the originally published standard. If the project team does not wish to apply the addendum, provide a substantially similar spreadsheet to verify the inputs for the interior lighting power.

Are adjustments being taken for room geometry in the baseline? (Optional)	
Are adjustments being taken for automatic lighting controls beyond what is required by Section 9.4.1 in the proposed? (Optional)	

General Information			Baseline						Proposed				
				Section 9.6.3 Room Geometry Adjustment *(Only complete for spaces where credit is taken for room geometry)*							Section 9.6.2(c) Control Factor Adjustment		
Building ID	Table 9.6.1 Space Type	Total Space Type Area (sq ft)	Maximum Allowance (W/sq ft)	Luminaire Mounting Height (ft)	Work-plane (ft)	Room Perimeter Length (ft)	Room Cavity Ratio	Total Baseline LPD Allowance (W/sq ft)	Design LPD (W/sq ft)	Describe Automatic Lighting Controls	Lighting Power Under Control (W)	Table 9.6.2 adjust-ment	Modeled Design LPD (W/sq ft)
Helpful Notes									• Lighting power should be modeled as designed (or installed) including all lighting system components (lamps and ballasts) • Enter the design (or installed) lighting power density (excluding any additional lighting lighting power from Section 9.6.2 or any process lighting) for this space type in the Proposed case. This value should not include Table G3.2 adjustments. • Credit for automatic lighting controls should be modeled using the appropriate power adjustment from Table G3.2, applied only to the controlled lighting power and not where required by 9.4.1. per Table G3.1#6(g) • Automatic daylighting controls must either be modeled directly in the simulation, or modeled using schedule adjustments determined by a separate daylighting analysis per Table G3.1#6(f)				
282 Bremen St	Residential Dwelling Units	118,840	0.90				0.0	0.90	0.72				0.72
282 Bremen St	Parking garage - garage area	14,400	0.19				0.0	0.19	0.15				0.15
282 Bremen St	Corridor/transition	4,160	0.66				0.0	0.66	0.53				0.53
282 Bremen St	Retail - sales area (see 9.6.3(c) for accent ltg)	2,000	1.68				0.0	1.68	1.34				1.34
282 Bremen St													
Total		139,400	0.83					0.83	0.66				0.66

Section 9.6.2 Additional Lighting Power (if applicable)

Building ID	Table 9.6.1 Space Type	9.6.2 (a) or 9.6.2 (b)		Additional Lighting Power Description or Additional Control Method
		Floor Area (sq ft)	Additional Power Allowance (W)	
Helpful Notes	Select the space type from the above table where additional lighting power is installed	This should only include the area used for the products being sold (e.g. in a retail building, the entire floor area would not be expected to be devoted to sales area)		
282 Bremen St				
282 Bremen St				
282 Bremen St				
282 Bremen St				
282 Bremen St				
Total		0	0.0	

Lighting equipment is installed in sales area for highlighting merchandise	
The additional lighting schedule has been modeled separately from the general lighting schedule to reflect the differing controls (May be modeled only when installed and automatically controlled, separately from the general lighting, to be turned off during non-business hours.)	
Additional lighting power has been modeled identically in the baseline and proposed up to the value allowed in Section 9.6.2	

Summary

Total modeled interior lighting power, based on inputs above

Building ID	Average LPD		Total Power	
	Baseline Maximum Allowance (W/sq ft)	Design Maximum Allowance (W/sq ft)	Baseline Maximum Allowance (kW)	Design Maximum Allowance (kW)
282 Bremen St	0.83	0.66	115.80	92.64

Interior Process Lighting (if applicable)

Building ID	Description	Section 9.2.2.3 Exemption	Total Process Lighting Power (W)	Modeled Identically In Baseline?
Helpful Notes	Describe any process lighting included in the design (example: 4 kW stage lighting and 20 3-Watt exit signs)	Indicate the specific exemption from Section 9.2.2.3 that excludes the lighting from the Section 9.5 or Section 9.6 lighting power density requirements [example: Stage lighting - 9.2.2.3(f); Exit signs - 9.2.2.3(k)]		Any lighting not regulated by ASHRAE 90.1 is considered process and must be modeled identically in the Proposed and Baseline case unless an Exceptional Calculation is submitted.
282 Bremen St				
282 Bremen St				
282 Bremen St				

Exterior Lighting

Instructions: Select the applicable exterior lighting categories and then complete the corresponding lighting table(s). An example of the expected level of detail has been provided for each input. Please refer to the column header notes for information about Appendix G modeling protocol. For any information not applicable to the project, simply enter "N/A".

Exterior Lighting Requirements

No additional lighting power allowance has been claimed in the baseline for surfaces that are not provided with lighting in the actual design and lighting fixtures have not been double-counted for different exterior surfaces	Yes

Table 9.4.3A Exterior Lighting Zone

Lighting Zone	Zone Description	Base Allowance (W)
Zone 2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed use areas	600

Tradable Surfaces

This table is only required to be completed if Tradable Exterior Lighting is selected above.

General Information			Baseline		Proposed
Table 9.4.5 Tradable Exterior Lighting Application	Required Input (Area or Length)	Total Area (sq ft) or Length (ft)	Allowed LPD	Lighting Power Allowance (W)	Design Lighting Power (W)
Table 9.4.5 Tradable Exterior Lighting Application	***Required Input (Area or Length)***	***Total Area (sq ft) or Length (ft)***	***Allowed LPD***	***Lighting Power Allowance (W)***	***Design Lighting Power (W)***
Helpful Notes: Fixtures cannot be double-counted for multiple exterior surface types		Only enter area or length of illuminated surface in the design	Allowance calculated using the maximum lighting power density from Table 9.4.5		Lighting power should be modeled as designed (or installed)
Walkways less than 10 ft wide	Length	425	0.70	298	1,900
Main entries	Length	48	20.00	960	
Parking areas and drives	Area	0	0.06	0	
Total tradable surface lighting allowance				1,258	1,900

Nontradable Surfaces

This table is only required to be completed if Nontradable Exterior Lighting is selected above.

General Information			Baseline		Proposed
Table 9.4.5 Nontradable Exterior Lighting Application	Required Input	Quantity of Required Input for Project	Allowed LPD	Lighting Power Allowance (W)	Design Lighting Power (W)
Helpful Notes: • Only enter area or length of illuminated surface in the design • Fixtures cannot be double-counted for multiple exterior surface types			Total allowance calculated using the lesser of the design lighting power, or the lighting power allowance used, since no credit is permitted for nontradable surfaces.		Lighting power should be modeled as designed (or installed)
Building facades	Area		0.10	0.00	
ATMs and night depositories	Number of ATMs		270 W + 90 W per additional		
Entrances and gatehouse inspection stations at guarded facilities	Uncovered Area		0.75	0.00	
Loading areas for law enforcement, fire, ambulance, and other emergency service vehicles	Uncovered Area		0.5	0.00	
Drive-through windows at fast food restaurants	Drive-throughs		400	0.00	
Parking near 24-hour retail entrances	Main Entries		800	0.00	
Total nontradable surface lighting allowance				0.00	0

Summary

Input Parameter	Baseline	Proposed
Total modeled exterior lighting power, including base allowance, based on inputs above (kW)	1.9	1.9

Process Loads

Instructions: Select the method(s) used to model receptacle equipment, and then complete the corresponding receptacle equipment table(s). Non-receptacle process equipment should be reported in the last table. Please refer to the column header notes for information about Appendix G modeling protocol. For any information not applicable to the project, simply enter "N/A".

Process Load Requirements

At least 50% of all 125 volt 15 and 20 Amper receptacles installed in private offices, open offices, and computer classrooms shall be controlled by an automatic device which functions on a scheduled basis, an occupant sensor, or a signal from another control system that indicates the area is unoccupied, in accordance with Section 8.4.2.	N/A

All receptacle equipment and other process equipment designed or anticipated for the building have been accounted for in the energy models.	Yes

If not all the process equipment has been accounted for in the energy model, indicated as "No" above, the project does not likely comply with LEED modeling requirements. It is recommended that the project team pursue a "Credit Interpretation Ruling" to justify the modeling approach. Please also provide any further information below to justify the modeling approach used.

Receptacle Equipment Modeling Method

Indicate whether the receptacle equipment was modeled using an average equipment power density for the building, equipment power densities by space type, or by entering the power associated with specific devices in each space. (select all that apply)	☐	Building average equipment power density
	☑	Space by space equipment power density

Space by Space Equipment Power Densities

Building ID	Building Type	Total Space Type Area (sq ft)	Equipment Power Density (W/sq ft)	Equipment Included in Power Density	Baseline Modeled Identically
282 Bremen St	Hotel guest rooms	118,840	2.08		No
282 Bremen St	Corridor/transition	4,160	0.20		Yes
282 Bremen St	Retail - sales area (see 9.6.3(c) for accent ltg)	2,000	1.60		Yes
282 Bremen St					
282 Bremen St					
282 Bremen St					
282 Bremen St					
Totals		125,000	2.01		
Total power modeled using space by space method (kW)					251.5

Note: Any credit for improved receptacle equipment must be submitted using the Exceptional Calculation Method.

Note: The above table is for spaces other than dwelling units. To enter dwelling unit values, use the Multifamily Details tab.

Summary

Building ID	Input Parameter	kW
282 Bremen St	Total power for receptacle equipment	251.47

Non-Receptacle Process Equipment

Building ID	Equipment Type	Energy Source	Energy Demand (kW for electricity) (Btuh for non-electricity)	Modeling Parameters	Baseline Modeled Identically
Helpful Notes	Modify equipment types as necessary. Note: Complete the Data Center Calculator (found under the "Resources" tab of the Credit Library) in order to claim credit for data center equipment.			Provide a description of the equipment, the operating schedule, and any latent and sensible loads modeled in the associated space (example: 15 kW electric range with hood; operates 2 full load hours/day; 6.3 kBtu/h (1.8 kW) sensible heat gain).	All process loads must be modeled identically between the Proposed and Baseline case and included in the simulations per Table G3.1#12. Exception: When the process or receptacle equipment includes components regulated by minimum efficiency requirements in ASHRAE 90.1, these components may be modeled in the Baseline Case using the minimum ASHRAE 90.1 efficiencies, and in the proposed case using actual proposed case efficiencies (e.g. Baseline may be modeled using furnace efficiencies from Table 6.8.1E, boiler efficiencies from Table 6.8.1G, chiller efficiencies from Table 6.8.1C or Section 6.4.1.2, or motor efficiency from Section 10.4).
282 Bremen St	Refrigeration equipment				
282 Bremen St	Kitchen equipment				
282 Bremen St	Data center equipment				
282 Bremen St	Process exhaust fans				
282 Bremen St	Escalators	Electricity	30	30 kW/car	Yes
282 Bremen St					
282 Bremen St					

Note: Any credit for improved process equipment must be submitted using the Exceptional Calculation Method.

Garage Fan Power Calculation

☐ Credit is being taken for garage fan power

Building ID	Total Design Fan Power (kW)	Total Base Fan Power (kW)	Ventilated Parking Area (square feet)	Proposed Airflow CFM	Baseline Airflow CFM	Design EFLH	Base EFLH
282 Bremen St	1.144	Same as Design	14,400	11436	Same as Design	1,693	Same as Design

Note:
1. The Baseline parking area must meet the requirements of ASHRAE 90.1-2010 Section 6.4.3.4.5 which establish mandatory Demand Controlled Ventilation (DCV).
2. Fan power for the Baseline case is limited to 0.3 W/CFM
3. Additional requirements are listed in LEED Interpretation #10371 which outlines DCV as an Energy Conservation Measure (ECM) in garage areas.

Service Water Heating

Instructions: Complete the Service Water Heaters table for each unique type of system in the project. Use the Add System button for more than one type of system. If the project includes service hot water circulation pumps, complete the Service Hot Water Pumps table. Please refer to the column header notes for information about Appendix G modeling protocol. Complete the Service Hot Water Fixtures table if credit is modeled for low-flow fixtures in the proposed. For any information not applicable to the project, simply enter "N/A".

Service Water Heaters

Model Input Parameter		Baseline	Proposed
Helpful Notes:	• Condenser Heat Recovery - Verify that condenser heat recovery has been modeled in the Baseline if required by 6.5.6.2 and describe any condenser heat recovery modeled; otherwise enter "Not required" (example: preheats service hot water to 85°F (29°C))	• New systems: minimum performance requirements from Table 7.8 per Table G3.1#11(b) • Existing systems: actual system inputs per Table G3.1#11(a) • Model separate service water heating system when design uses combined system with space heating per Table G3.1#11(e) • Condenser heat recovery as required by 6.5.6.2 per Table G3.1#11(f)	• Service water heaters modeled as designed (or installed) per Table G3.1#11(a&b) • Where no service hot water system exists or has been specified but the building will have service hot water loads, a service hot water system should be modeled identical to the Baseline per Table G3.1#11(c) • For buildings with no service hot water loads, no service hot water system should be modeled per Table G3.1#11(d)
Building ID		Project Name	
System type and fuel		Gas	Gas
Input rating (kW, MBH, etc.)		96 MBH	65 MBH
Efficiency (EF, SL, %, etc.)		80%	95%
Storage volume (gal)		150	150
Storage temperature (°F)		135	135
Peak hot water demand (gpm)		13.28082584	8.788057551
Condenser heat recovery			
Number of pumps		0	
Total pump power (kW)		0	
Type of pump			

General HVAC

Instructions: Confirm that the energy model complies with the General HVAC requirements listed, and provide a narrative explaining any discrepancies. Select the types of water-side systems that are installed on the project site (proposed). Describe each type of HVAC system in the proposed. Select the applicable baseline HVAC system type(s). Confirm that each of the HVAC modeling requirements have been incorporated into the energy models. Please refer to the column header notes for information about Appendix G modeling protocol. For any information not applicable to the project, simply enter "N/A".

Enclosed parking garage ventilation systems automatically detect contaminant levels and modulate fan airflows rates to 50% or less of design capacity per Section 6.4.3.4.5	Yes
Spaces larger than 500 square feet (50 square meters), with occupancy of greater than 40 people per 1,000 square feet (100 square meters), and are served by systems that have one of the following: an air-side economizer, automatic modulating control of the outdoor air damper, or a design outdoor airflow of greater than 3,000 cfm (1,400 L/s), have been designed with demand control ventilation per Section 6.4.3.9.	N/A
Air handling and fan coil units with chilled water cooling coils and with supply fans motors greater than or equal to 5 hp (4 kW) have their supply fans controlled by two-speed motors or variable speed drives per Section 6.4.3.10.	N/A
Direct expanstion cooling equipment with an AHRI cooling capacity greater than or equal to 110,000 Btu/h (32 kW) that serve single zones have been designed with supply fans controlled by two-speed motors or variable speed drives per Section 6.4.3.10.	N/A

For each item entered as "No" above, describe the applicable ASHRAE 90.1 Appendix G exception(s) that apply, or the circumstances preventing the lighting parameters from being modeled as required. If the energy simulation software is not capable of modeling the required parameters, describe the adjustments that were made to provide a similar representation or provide a narrative justifying why the predicted energy performance results will not be influenced.

Proposed HVAC System Type(s)

Building ID	System Description	Spaces Modeled
Helpful Notes	• Describe each type of HVAC system included in the Proposed building (example: Constant volume single-zone ground source heat pumps with dedicated outdoor air units with energy recovery).	• List the spaces modeled with the primary system type (example: all spaces except kitchen). • The HVAC system type and all related parameters, such as equipment capacities and efficiencies, must be modeled as designed (or installed) per Table G3.1#10(a&b) • Where no heating system exists or has been designed, the classification is assumed to be electric and the heating system is modeled identically to the Baseline case per Table G3.1#10(c) • Where no cooling system exists or has been designed, the cooling system is modeled identically to the Baseline case per Table G3.1#10(d), unless using baseline HVAC system types 9 or 10.
282 Bremen St	UHT	MEP Support rooms
282 Bremen St	PTAC	Apartments
282 Bremen St	Packaged VAV with HW Reheat	Corridor and retail

Baseline HVAC System Type(s)

Building ID	Model Input Parameter	Table G3.1.1A System Type (or Semiconditioned System Description)	G3.1.1 Exception (or Semiconditioned Capacity and Area)	Spaces Modeled
Helpful Notes	• Refer to Section G3.1.1 and Table G3.1.1A (including footnotes) for Primary HVAC System selection • A system with any combination of fossil fuel and electric heat is considered fossil/electric hybrid • Systems 1-4: each thermal block shall be modeled with its own system • Systems 5-10: each floor shall be modeled with a separate system • Additional system types for conditioned spaces only permitted using Exceptions to G3.1.1 (min 20,000 sq ft (1860 sq m) required for exception (a)) • Systems serving semiconditioned spaces should be modeled identically to the system in the Proposed case (see definition of space in Section 3.2 of ASHRAE 90.1 • For California Title-24 projects, type in the appropriate system type		• Conditioned: describe the exception from G3.1.1 used to model this additional Baseline system type (example: Exception (b) used since peak loads differ by more than 10 Btu/h-sq ft (0.03 kW/sq m)) • Semiconditioned: list the total system capacity and floor area it serves	• List the spaces modeled with the primary system type (example: all spaces except kitchen)
282 Bremen St	Primary HVAC System	System 1 - PTAC		Apartments
282 Bremen St	Other HVAC System	System 5 - Packaged VAV with Reheat		Corridor
282 Bremen St	Other HVAC System	System 9 - Heating and Ventilation		MEP Support rooms

HVAC Modeling Requirements

All proposed and baseline HVAC system types must be entered above to generate the correct modeling requirements below. Identify each applicable item (indicated in gray) as "Yes" or "No", and provide a further description for any items marked as "No".

Proposed HVAC Requirements

All ***proposed*** HVAC systems and related parameters, such as equipment capacities, efficiencies, airflows, fans, etc. have been modeled as designed and are consistent with supporting documentation.	Yes	Required for all systems

Each ***proposed*** HVAC thermal zone has been modeled as a separate thermal block except as allowed by Table G3.1#7.	Yes	Required for all systems
All ***proposed*** HVAC systems serving conditioned spaces have been modeled with heating and cooling as required by Table G3.1#1(b), with heating and/or cooling added as necessary identically to the ***baseline*** per Table G3.1#10(c&d) except where System types (9) or (10) have been modeled.	Yes	Required for all systems
All ***proposed*** HVAC systems and related parameters can be modeled directly in the energy simulation program used.	Yes	Required for all systems
All ***proposed*** fan part-load efficiency curves for variable volume fans have been modeled identically to the ***baseline*** curves for variable volume fans (if not, provide a description of the fan curves used in the space at the bottom of this table, and confirm that the proposed curves are representative of the actual building design).	Yes	Required for all systems

Baseline Air-Side HVAC Requirements

All ***baseline*** single zone systems have been modeled with a separate HVAC system for each thermal block per G3.1.1.	Yes	Required for Systems 1-4
All ***baseline*** VAV systems have been modeled with an HVAC system per floor, or one system per group of thermodynamically similar floors per G3.1.1.	Yes	Required for Systems 5-8
All ***baseline*** heating and ventilation systems have been modeled with an HVAC system per floor or one system per group of thermodynamically similar floors per G3.1.1.	Yes	Required for Systems 9 and 10
All applicable ***baseline*** exceptions to G3.1.1 have been implemented. Note that these exceptions are required, not optional.	Yes	Required for all systems
Where ***baseline or proposed*** efficiency ratings for DX cooling equipment, such as EER and COP, include fan energy, the descriptor is broken down into its components so that supply fan energy can be modeled separately per G3.1.2.1.	Yes	Required for Systems 1-6 Required for Systems 1, 3, and 5 if District Heating has been selected on the General Information tab Not required if District Cooling has been slected
All ***baseline*** system cooling capacities auto-sized with 15% oversizing per G3.1.2.2 (at the system or plant level, but not both).	Yes	Required for all systems
All ***baseline*** system heating capacities auto-sized with 25% oversizing per G3.1.2.2 (at the system or plant level, but not both).	Yes	Required for all systems
If the ***proposed*** system has a preheat coil, it has been modeled and controlled in the same manner in the ***baseline*** system per G3.1.2.4.	N/A	Required for all systems
All ***baseline*** supply and return fans operate continuously when spaces are occupied and cycle when unoccupied per G3.1.2.5.	Yes	Required for all systems
Demand control ventilation is modeled in the ***baseline*** case for all spaces larger than 500 sq ft (50 sq m) that have a design occupancy for ventilation of greater than 40 people per 1,000 sq ft (100 sq m) of floor area (except for spaces served by ***baseline*** systems that do not have one of the following: an air-side economizer, automatic modulating control of the outdoor air damper, or a design outdoor airflow of greater than 3,000 cfm (1,400 L/s)) per G3.1.2.6 / 6.4.3.9.	N/A	Required for Systems 3-8
Per Section G3.1.2.6, the minimum baseline outdoor air ventilation rates are modeled using ASHRAE 62.1 minimum outside air volume or the minimum outside air volume required by local code. The proposed outdoor air ventilation rates are modeled as designed. The baseline outside air volume (equal to the sum of the baseline outside air volume per system) does not exceed the proposed outside air volume (equal to the sum of the outside air volume per system) except using schedule variations for spaces where demand control ventilation has been designed where its use is not required, or when providing Baseline and Proposed ASHRAE 62.1 calculations for systems where the Proposed system Ez > 1.0. Note that the Baseline outside air volume and Proposed outside air volume values must be reported consistently with the information provided in IEQ Prerequisite: Minimum Indoor Air Quality, or supplemental documentation must be provided to support the local OA volume requirements or Baseline calculations for systems with Ez > 1.0.	Yes	Required for all systems
All ***baseline*** systems are modeled with zero outside airflow when fans are cycled to meet unoccupied setback temperatures.	Yes	Required for all systems
All ***baseline*** supply airflows for Systems 1-8 have been auto-sized based on a 20°F (11.1°C) supply-air-to-room-air cooling temperature difference (or the airflow rate required to comply with applicable codes/standards, whichever is greater) per G3.1.2.9.1. Exception: Laboratory spaces have been modeled with a 17°F (9.4°C) supply-air-to-room air temperature difference or the required ventilation air or makeup air, whichever is greater.	Yes	Required for Systems 1-8
All ***baseline*** supply airflows for systems 9-10 have been autosized based on the difference between a supply air temperature set point of 105°F (40.6°C) and the design space heating temperature set point (or the airflow rate required to comply with applicable codes/standards, whichever is greater) per G3.1.2.9.2.	Yes	Required for Systems 9 and 10
All ***baseline*** heat pumps modeled with electric auxiliary heat only energized below 40°F (4°C) and as the last thermostat stage per G3.1.3.1 (compressor still enabled below 40°F (4°C)). The compressor continues to operate in conjunction with the electric auxiliary heat as low as 17°F(-8.3°C), in accordance with the Baseline equipment efficiency ratings from ASHRAE 90.1 Section 6.8. See ASHRAE Interpretation 90.1-2007-09 for more information.		Required for Systems 2 and 4 Not required if District Heating and/or Cooling has been selected on the General Information tab
All ***baseline*** VAV systems modeled with supply air temperature reset of 5°F (2.3°C) under minimum cooling load conditions per G3.1.3.12.	Yes	Required for Systems 5-8
All ***baseline*** VAV reheat boxes modeled with a minimum flow setpoint of 30% of peak zone flow (or minimum outdoor airflow rate or code required rate) per G3.1.3.13.	Yes	Required for Systems 5 and 7
All ***baseline*** fans in parallel VAV fan-powered boxes sized for 50% of peak primary airflow and modeled with 0.35 W/cfm (0.74 W/L/s) fan power and a minimum flow setpoint of 30% of peak (or minimum ventilation rate) per G3.1.3.14.		Required for Systems 6 and 8
All ***baseline*** VAV fans (Systems 5-8) are modeled with VAV part-load performance curves consistent with Table G3.1.3.15 Method 1 or Method 2.	Yes	Required for Systems 5-8

Baseline Water-Side HVAC Requirements

The ***baseline*** boiler(s) have been modeled as natural draft per G3.1.3.2.	Yes	Required for Systems 1, 5, and 7 Required for Systems 1-2 and 5-8 if District Cooling has been selected on the General Information tab Not required if District Heating has been selected
The ***baseline*** hot water design supply temperature has been modeled as 180°F (82°C)with a return temperature of 130°F (54°C) per G3.1.3.3.	Yes	Required for Systems 1, 5, and 7 Required for Systems 1-2 and 5-8 if District Cooling has been selected on the General Information tab Not required if District Heating has been selected
The ***baseline*** hot water supply temperature reset schedule has been modeled as 180°F (82°C) at outdoor temperatures 20°F (-7°C) and below, 150°F (66°C) at outdoor temperatures 50°F (10°C) and above, and ramped linearly between 180°F (82°C) and 150°F (66°C) at outdoor temperatures between 20°F (-7°C) and 50°F (10°C) per G3.1.3.4.	Yes	Required for Systems 1, 5, and 7 Required for Systems 1-2 and 5-8 if District Cooling has been selected on the General Information tab Not required if District Heating has been selected

The ***baseline*** hot water pump power has been modeled as 19 W/gpm (301 kW/1,000 L/s) per G3.1.3.5.	Yes	Required for Systems 1, 5, and 7 Required for Systems 1-2 and 5-8 if District Cooling has been selected on the General Information tab Not required if District Heating has been selected
Piping losses have not been modeled in the ***baseline*** for hot or chilled water per G3.1.3.6.	Yes	Required for Systems 1, 5, 7, and 8 Required for all Systems if District Heating and/or Cooling has been selected on the General Information tab

Air-Side HVAC

Instructions: Enter all applicable input parameters for the baseline and proposed air-side HVAC systems below. All systems included in the model should be entered. Each individual system may be entered separately, or multiple systems may be grouped together if all input parameters identified with an (*) are similar. The table is set up for two unique HVAC systems (or two groups of similar systems), and additional systems (or groups of similar systems) should be added as necessary using the Add Baseline or Add Proposed button. For any information not applicable to the project, simply enter "N/A". Note: All baseline systems must be identified in the General HVAC Tab in order to display the relevant baseline inputs below. If General HVAC system types are changed, system types must be reselected in this tab.

Air-Side HVAC System Schedule

Model Input Parameter		Helpful Notes	Units	Totals: Baseline	Totals: Proposed	Baseline	Baseline	Baseline	Proposed	Proposed	Proposed
						Building ID 282 Bremen St	Building ID **282 Bremen St**	Building ID **282 Bremen St**	Building ID 282 Bremen St	Building ID **282 Bremen St**	Building ID **282 Bremen St**
						* System type System 1 - PTAC	* System type System 5 - Packaged VAV with Reheat	* System type System 9 - Heating and Ventilation	* System type PTAC	* System type Packaged VAV with HW Reheat	* System type UHT
						System designation(s) PTAC	System designation(s) EL2 Sys3	System designation(s) MEP	System designation(s) PTAC	System designation(s) EL2 Sys3	System designation(s) MEP
						Number of similar systems 29	Number of similar systems 6	Number of similar systems 1	Number of similar systems 29	Number of similar systems 6	Number of similar systems 1
Total cooling capacity		Enter the modeled cooling capacity for the Baseline HVAC system (or the total cooling capacity for a group of similar systems) (example: 105 kBtu/h (30.7 kW)) Note: Auto-sized with 15% oversizing per G3.1.2.2	kBtu/h	3,002	3,585	2,672	330	0	2,659	926	0
* Table 6.8.1 Unitary Cooling (Systems 1 through 6)	Table 6.8.1 unitary cooling capacity range	Enter the cooling capacity size category from the appropriate Table 6.8.1 for the Baseline HVAC system (or group of similar systems) (example: 65-135 kBtu/h (19-39.5 kW)) Note: Systems 1 & 2: Table 6.8.1D Systems 3, 5, & 6: Table 6.8.1A System 4: Table 6.8.1B Systems 7-10: N/A	kBtu/h			<65; >65 and < 135; >240 and <760	<65; <240	NA	n/a	n/a	n/a
	Unitary cooling efficiency	Units should be consistent with the ASHRAE 90.1 minimum efficiency rating requirements for this system type. If modeled units are different than ASHRAE 90.1 units (e.g. EIR rather than SEER), report both units. Since the packaged cooling efficiency ratings are calculated at ARI-rated conditions, the fans must also be broken out at ARI-rated conditions (fan power at ARI conditions is typically much lower than fan power at design conditions). If the simulation software does not perform this step automatically, provide the calculations. For the Baseline Case, the project team may use ASHRAE 90.1 – 2010 Addendum bl or the RMI EMIT translator as optional methods for breaking out the fan power. For the Proposed case, use the method documented in the ASHRAE 90.1 User's Manual to break out the fan power.	EER			SEER 13; 11.0 EER, 9.8 EER	SEER 13; 10.8 EER	NA	SEER 14.3, 12.1 EER; 10.8 EER	SEER 14.3; 12.1 EER; 10.8 EER	NA
	Unitary cooling part-load efficiency (if applicable)	Enter the modeled unitary cooling efficiency for the Baseline HVAC system (or group of similar systems) in units consistent with the appropriate Table 6.8.1 (example: 11.0 EER (3.23 COP))	IEER			NA; 11.2; 9.9	NA	NA	NA; 12.3; 10.9	NA	NA
Total heating capacity		Enter the modeled heating capacity for the Baseline HVAC system (or the total heating capacity for a group of similar systems) in units of kBtu/h (kW) Note: Auto-sized with 25% oversizing per G3.1.2.2	kBtu/h	1,888	1,850	1,791	87	10	1,737	103	10
* Table 6.8.1 Unitary Heating (Systems 2, 3, 4, and 9)	Table 6.8.1 unitary heating capacity range	• System 2: Table 6.8.1D • Systems 3 & 9: Table 6.8.1E • System 4: Table 6.8.1B • Systems 1, 5-8, 10: N/A	kBtu/h			NA	NA	<225	n/a	n/a	n/a
	Unitary heating efficiency	List all relevant efficiencies (e.g. 3.2 COP at 47°F db/43°F wb, 2.0 COP at 17°F db/15°F wb outdoor air) (e.g. 3.2 COP at 8.3°C db/6.1°C wb, 2.0 COP at -8.3°C db/-9.4°C wb outdoor air)	%Et			NA	NA	80	NA	NA	NA
* Fan control		• Systems 1-4, 9 & 10: Constant Volume • Systems 5-8: Variable Volume				Constant Volume	Variable Speed	Constant Volume	Constant Volume	Variable Speed	Constant Volume
Supply airflow		• Systems 1-8: Auto-sized based on 20°F (11.1°C) ΔT • Systems 9-10: Auto-sized based on 105°F (40.6°C) SAT	cfm	78,457	88,440	70,949	7,318	190	68,889	19,360	191
Outdoor airflow		• If DCV modeled in Proposed only: ASHRAE 62.1 minimum ventilation rates reported in EQ Prerequisite Minimum Indoor Air Quality • All other cases: identical to Proposed	cfm	14,203	14,185	13,091	1,112	0	13,073	1,112	0
Demand control ventilation		If required by Section 6.4.3.9 (spaces >500 sq ft (50 m2) with >40 people/1,000 sq ft (100 m2))	n/a			No	No	No	No	No	No
* Economizer high-limit shutoff		• Systems 1, 2, 9 & 10: N/A • Systems 3-8: as required by G3.1.2.7 & G3.1.2.8 by Climate Zone: • Not Required - 1a, 1b, 2a, 3a, 4a • 75°F - 1b, 2b, 3b, 3c, 4b, 4c, 5b, 5c, 6b, 7b, 8 • 70°F - 5a, 6a, 7a				Not Required	70	Not Required	No	70	No
* Supply air temperature reset		• Systems 5-8: Supply air temperature reset of 5°F under minimum cooling load conditions per G3.1.3.12 (e.g. from 55 °F to 60 °F (12.7 °C to 15.6 °C)) • All other systems: Not required	n/a			Supply air temperature reset of 5°F under minimum cooling load conditions	Supply air temperature reset of 5°F under minimum cooling load conditions	Not Required	Supply air temperature reset of 5°F under minimum cooling load conditions	Supply air temperature reset of 5°F under minimum cooling load conditions	No
* Energy Recovery per 6.5.6.1	For Baseline, any individual systems where supply airflow rate exceeds value in Table 6.5.6.1 based on climate zone and percent outdoor air? For proposed, indicate if energy recovery is modeled.	• Exhaust air energy recovery required for individual systems exceeding Table 6.5.6.1 per G3.1.2.11 unless any exceptions apply • 50% energy recovery effectiveness • Bypass or control to permit economizer	n/a			No	No	No	Yes	No	No
	Exhaust air energy recovery effectiveness or 6.5.6.1 exception claimed	If energy recovery is modeled for the Baseline HVAC system, list the recovery effectiveness. If energy recovery is required but not modeled, list the exception from G3.1.2.10 used (example: not modeled per exception b)	% energy recovery effectiveness			n/a	n/a	n/a	40%		n/a
Fan Power	Supply fan power	Report exhaust fans not interlocked with HVAC operation (such as parking garage ventilation fans, or unconditioned electrical room exhaust fans), and exhaust fans not required in the calculations (such as those applying Exception 6.5.3.1.1, or kitchen hoods operating independently of the building HVAC system) in "Process Equipment"	kW			19.8	9.9	0.1	19.2	9.2	0.1
	Return or relief fan power		kW			0.0	0.0	0.0	0.0	0.0	0.0
	Exhaust fan power		kW			1.7	0.0	0.0	1.7	0.0	0.0
	System fan power		kW	31	30	21.4	9.9	0.1	20.9	9.2	0.1
	Allowed fan power		kW			21.3	9.9	0.1	n/a	n/a	n/a
* Pressure Drop Adjustments (Systems 3 through 8)	For each pressure drop adjustment claimed, input the design airflow rate, CFMD, through each applicable device.										
	Fully ducted return and/or exhaust air systems	Adjustment = 0.5 in. w.c. (125 Pa) (2.15 in. w.c. (535 Pa) for laboratory and vivarium systems)	CFMD: cfm			13,050			n/a	n/a	n/a
			Adjustment: in. w. c.			0.5			n/a	n/a	n/a
	Return and/or exhaust airflow control devices	Only where modulated to maintain relative negative or positive space pressure (e.g. lab, operating room)	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.			0.5	0.5	0.5	n/a	n/a	n/a
	Exhaust filters, scrubbers, or other exhaust treatment	Adjustment = Pressure drop of device calculated at fan system design condition	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Particulate filtration credit: MERV 9 through 12	Adjustment = 0.5 in. w.c. (125 Pa)	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.			0.5	0.5	0.5	n/a	n/a	n/a
	Particulate filtration credit: MERV 13 through 15	Adjustment = 0.9 in. w.c. (225 Pa)	CFMD: cfm			70,949	7,318		n/a	n/a	n/a
			Adjustment: in. w. c.			0.9	0.9	0.9	n/a	n/a	n/a
	Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Adjustment = Pressure drop calculated at 2× clean filter pressure drop at fan system design condition	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Carbon and other gas-phase air cleaners	Adjustment = Clean filter pressure drop at fan system design condition	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Biosafety cabinet	Adjustment = Pressure drop of device at fan system design condition	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Energy recovery device, other than coil runaround loop	May only be claimed if required in the baseline per Table G3.1.2.9 footnote.	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Coil runaround loop	May only be claimed if required in the baseline per Table G3.1.2.9 footnote.	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Evaporative humidifier/cooler in series with another cooling coil	May only be claimed if required in the baseline.	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Sound attenuation section	Adjustment = 0.15 in. w.c. (38 Pa)	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.			0.15	0.15	0.15	n/a	n/a	n/a
	Exhaust system serving fume hoods	Adjustment = 0.35 in. w.c. (85 Pa)	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.			0.35	0.35	0.35	n/a	n/a	n/a
	Laboratory and vivarium exhaust systems in high-rise buildings	Adjustment = 0.25 in. w.c./100 ft of vertical duct exceeding 75 ft (60 Pa/30 m of vertical duct exceeding 25 m)	CFMD: cfm						n/a	n/a	n/a
			Adjustment: in. w. c.						n/a	n/a	n/a
	Total Table 6.5.3.1.1B pressure drop adjustment (A)		bhp			17.0	1.6	0.0	n/a	n/a	n/a
Fan power adjustments	Non-mechanical cooling fan - additional fan power allowance	For Systems 9 and 10, if present in the proposed design, increases the baseline fan power allowance by 0.054	cfm						n/a	n/a	n/a
			fan power per cfm (kW)			0.000054	0.000054	0.000054	n/a	n/a	n/a

Water-Side HVAC

Instructions: Enter all applicable input parameters for the baseline and proposed water-side HVAC systems below. All systems included in the model should be entered. Please refer to the row header notes for information about Appendix G modeling protocol. For any information not applicable to the project, simply enter "N/A". If taking credit for a campus or district plant efficiency using the DES Path 2 or 3 Guidance, please include all relevant information regarding the District Plant equipment in the proposed Case.

Water-Side HVAC System Schedule

Chilled Water

Model Input Parameter	Baseline Systems Helpful Notes	Units	Baseline: 282 Bremen St	Proposed: Project
Number and type of chillers(and capacity per chiller if more than one type or size of chiller)	• ≤300 tons (≤1055 kW) building peak: 1 water-cooled screw chiller • 300-600 tons (1055 - 2110 kW) building peak: 2 equally-sized water-cooled screw chillers • ≥600 tons (>2110 kW) building peak: At least 2 water-cooled centrifugal chillers (800 tons max per chiller) Note: Overwrite entry if more than 2 water-cooled centrifugal chillers, or N/A if purchased chilled water is modeled.	n/a		
Purchased chilled water rate (cost per unit energy)	Describe how the purchased chilled water rate was determined. Local purchased energy rates must be used when available; when not available, the rates must account for the total costs associated with maintaining the district equipment, and generating and delivering the energy to the project site.	$		
Total chiller capacity	Auto-sized with 15% oversizing (unless oversized at the system coil) per G3.1.2.2			
Chiller efficiency - full load	Per Table 6.8.1C efficiencies			
Chiller efficiency - part load	Per Table 6.8.1C efficiencies			
Chilled water (CHW) supply temp	• 44°F (6.7°C) per G3.1.3.8 • ASHRAE 90.1 (Path 1): Baseline supply temperature based on actual chilled water loop conditions in Proposed Case.	°F		
CHW ΔT	• 12°F (6.3°C) per G3.1.3.8 • ASHRAE 90.1 (Path 1): CHW ΔT based on actual chilled water loop conditions in Proposed Case.	°F		
CHW supply temp reset parameters	• 44°F (7°C) at outdoor temps 80°F (27°C) and above, 54°F (12°C) at outdoor temps 60°F (16°C) and below, and ramped linearly between 44°F (7°C) and 54°F (12°C) at outdoor temps between 80°F (27°C) and 60°F (16°C) per G3.1.3.9 • ASHRAE 90.1 (Path 1): CHW Temp Reset based on actual CHW loop conditions in Proposed Case.	n/a		
CHW loop configuration	• Primary/secondary per G3.1.3.10 • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3): only building distribution pumps shall be modeled, in which case pump controls shall match the Baseline secondary CHW pump control requirements.	n/a		
Number of primary or DES plant CHW pumps	• 1 per chiller per G3.1.3.11 • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3): no primary CHW pumps should be modeled (since these are considered part of the upstream source)	#		
Primary or DES plant CHW pump power	• The sum of primary and secondary must be 22 W/gpm (349 kW/1000 L/s) per G3.1.3.10. Recommended that the pump power be split as one-third (primary) and two-thirds (secondary). • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3): Not applicable			
Primary or DES plant CHW pump flow	Auto-sized with a capacity ratio of 1.0 based on CHW temperatures	gpm		
Primary or DES plant CHW pump control	Constant Flow - each primary pump interlocked to operate with associated chiller - G3.1.3.10, G3.1.3.11	n/a		
Number of secondary or building booster CHW pumps	• 1 per G3.1.3.10 • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3): one on-site CHW distribution pump shall only be modeled if CHW distribution pumps are present on site (these would otherwise be considered part of the upstream source) (per G3.1.3.4)	#		
Secondary or building booster CHW pump power	• The sum of primary and secondary must be 22 W/gpm (349 kW/1000 L/s) per G3.1.3.10. Recommended that the pump power be split as one-third (primary) and two-thirds (secondary). • ASHRAE 90.1 (Path 1): 16 W/gpm (254 kW/1000 L/s) per exception to G3.1.3.10 • California Title 24 (Path 4): Same W/gpm (kW/1000 L/s) as Proposed or 22 W/gpm (349 kW/1000 L/s)			
Secondary or building booster CHW pump flow	Auto-sized with a capacity ratio of 1.0 based on CHW temperatures	gpm		
Secondary or building booster CHW pump control	• <300 tons (1055kW): riding the pump curve • ≥300 tons (1055 kW): variable speed	n/a		
Water-side economizer		n/a		
Water-side energy recovery		n/a		

Cooling Tower and Condenser Water

Model Input Parameter	Baseline Systems Helpful Notes	Units	282 Bremen St	Project
Number of cooling towers or fluid coolers	1 per G3.1.3.11	#		
Cooling tower fan power	Minimum 38.2 gpm/hp (3.23 L/s·kW) (maximum 0.0262 hp/gpm or 19.5 W/gpm) (0.301 kW/L/s) per Table 6.8.1G			
Cooling tower fan control	Two-speed axial fans per G3.1.3.11	n/a		
Condenser water (CW) leaving temp	85°F (29°C) or 10°F (5.6°C) approaching design wet-bulb temperature, whichever is lower per G3.1.3.11	°F		
CW ΔT	10°F (5.6°) per G3.1.3.11	°F		
CW loop temp reset parameters	Maintain a 70°F (21°C) leaving water temperature where weather permits, floating up to leaving water temperature at design conditions per G3.1.3.11	n/a		
Number of CW pumps	1 per chiller per G3.1.3.11	#		
CW pump power	19 W/gpm (310 kW/1000 L/s) per G3.1.3.11			
CW pump flow	Auto-sized with a capacity ratio of 1.0 based on CW temperatures	gpm		
CW pump control	Riding the pump curve per G3.1.3.11	n/a		

Hot Water or Steam

Model Input Parameter	Baseline Systems Helpful Notes	Units	282 Bremen St	Project
Number and type of boilers	• ≤15,000 sq ft (1400 m2): 1 natural draft hot water boiler • >15,000 sq ft (1400 m2): 2 equally-sized natural draft hot water boilers staged as required by the load	n/a	2 equally-sized natural draft hot water boilers	2 condensing boilers
Purchased heating rate (cost per unit energy)	Describe how the purchased heating rate was determined. Local purchased energy rates must be used when available; when not available, the rates must account for the total costs associated with maintaining the district equipment, and generating and delivering the energy to the project site.	$		
Total boiler capacity	Auto-sized with 25% oversizing (unless oversized at the system coil) per G3.1.2.2	MBH	3572	3496
Boiler efficiency	Per Table 6.8.1F minimum efficiencies	%	80	95
Hot water or steam (HHW) supply temp	• 180°F (82°C) per G3.1.3.3 • ASHRAE 90.1 (Path 1) or Full DES (Path 2): Purchased Energy - Baseline supply temperature based on actual HHW/Steam loop conditions in Proposed Case	°F	180	150
HHW ΔT	• 50°F (28°C) per G3.1.3.3 • ASHRAE 90.1 (Path 1): Baseline ΔT based on actual HHW/Steam loop conditions in Proposed Case	°F	50	45
HHW temp reset parameters	• 180°F (83°C) at outdoor temps 20°F (-7°C) and below, 150°F (66°C) at outdoor temps 50°F (10°C) and above, and ramped linearly between 180°F (83°C) and 150°F (66°C) at outdoor temps between 20°F(-7°C) and 50°F (10°C) per G3.1.3.4 • ASHRAE 90.1 (Path 1): Baseline Temp Reset based on actual HHW/Steam loop conditions in Proposed Case	n/a	OA Reset per ASHRAE 90.1 G3.1.3.4	Load reset
HHW loop configuration	• Primary-only per G3.1.3.5 • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3): Baseline pumps shall only be modeled if distribution pumps are present in the building, in which case buildings shall be modeled as primary-only per G3.1.3.5	n/a	Primary Only	Primary Only
Number of primary or DES plant HHW pumps	• One pump • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3): equal to the number of distribution pumps present in the building	#	1	1
Primary or DES plant HHW pump power	• 19 W/gpm (301 kW/1000 L/s) per G3.1.3.5 • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3): - 14 W/gpm (222 kW/1000 L/s) per exception to G3.1.3.5 • ASHRAE 90.1 (Path 1) or Streamlined DES (Path 3) - same as the W/gpm (kW/1000 L/s) for the Proposed Case pumps (or alternatively 14 W/gpm (222 kW/1000 L/s) limit from Addendum ai G3.1.3.5 would be acceptable)		18.99300699	18.99100257
Primary or DES plant HHW pump flow	Auto-sized with a capacity ratio of 1.0 based on HHW temperatures	gpm	143	155.6
Primary or DES plant HHW pump control	• <120,000 sq ft (11,160 m2): riding the pump curve • ≥120,000 sq ft (11,160 m2): variable speed	n/a	Variable speed	Variable speed
Number of secondary or building booster HHW pumps	Baseline is primary-only	#		
Secondary or building booster HHW pump power	Baseline is primary-only	n/a		
Secondary or building booster HHW pump flow	Baseline is primary-only	n/a		
Secondary or building booster HHW pump control	Baseline is primary-only	n/a		

Performance Rating Method Outputs

Energy Model ID	282 Bremen St

Energy Sources

Enter each energy source serving the project, the units for the energy consumption and demand, and the associated utility rate name and tariff structure. Default EIA Rates may be used in lieu of local utility rates at the discretion of the energy modeler. All project energy types and the demand and consumption units must be entered before entering energy simulation output data. Also enter the units used to report energy consumption totals (the sum of all energy types) for site energy consumption and source energy consumption (generally, the IP units are Btu x 10^6, the SI site energy units are kWh, and the SI source energy units are MJ).

Energy Type	Energy Consumption Units	Demand Units	Utility Rate Name	Utility Rate Structure	Unit Conversion Factors	
					Energy Type Consumption Units to Site Energy Consumption (Btu x 10^6)	Energy Type Consumption Units to Source Energy Consumption (Btu x 10^6)
Electricity	kWh	kW			0.0034120	0.0107137
Natural Gas	therm	Btuh x 10^6			0.1000000	0.1050000
District Cooling	MWh	MW			3.4120000	3.4120000
Site energy consumption units used to report energy consumption totals (sum of energy types)					Btu x 10^6	
Source energy consumption units used to report energy consumption totals (sum of energy types)					Btu x 10^6	

On-Site Renewable Energy Production

☐ The project building uses on-site renewable energy systems. (Optional)

Exceptional Calculation Methods

☐ The building energy analysis includes exceptional calculation methods. (Optional)

Energy Modeling Output Reporting Method

Select one of the following before entering any simulation output data:
Note: If this is selected after data has been entered in the tables below, the energy types, baseline energy by end use, and baseline cost data will be cleared from these tables.

◉ Complete the baseline results for each of the four building orientations, in addition to the proposed results.

○ Report the averaged baseline results, in addition to the proposed results. In the EAp2 form uploads, provide simulation output summaries from the simulation output software that include the energy consumption by end-use, total energy consumption by energy type, and total energy cost by energy type, reported separately for each of the four baseline rotations, and the average baseline energy consumption by end-use, energy consumption by energy type, and energy cost by energy type. (The simulation software must report this average as a standard report in order to use this option).

○ The project is not required to simulate four baseline orientations because (a) the vertical fenestration area on each orientation varies by less than 5%, (b) the energy code used does not require simulation of four baseline orientations, or (c) the building is more than 50% existing based on conditioned floor area. Report the non-rotated baseline results, in addition to the proposed results.

○ The project is not required to simulate four baseline orientations because the building orientation is dictated by site consideration, as allowed by Table G3.1.5 (a) (baseline) Exception 1. Report the non-rotated baseline results, in addition to the proposed results.

Performance Rating Method Compliance Report

Table: Baseline energy summary by end use

Complete the table below for the proposed, providing information on baseline energy consumption and peak demand by end-use. This data will be used to autopopulate the Performance tables below. If an end-use has two energy types (e.g. proposed space heating includes both fossil fuel and electric), enter the end-use twice in the table, and list the two different energy types.

End Use	Unregulated?	Energy Type	Units of Annual Energy and Peak Demand	Baseline 0° rotation	Baseline 90° rotation	Baseline 180° rotation	Baseline 270° rotation	Baseline Design Total (Average of 4 rotations)
Interior lighting		Electricity	Consumption (kWh)	182,195.0	182,195.0	182,195.0	182,195.0	182,195.0
			Demand (kW)	33.4	33.4	33.4	33.4	33.4
Exterior lighting		Electricity	Consumption (kWh)	6,519.0	6,519.0	6,519.0	6,519.0	6,519.0
			Demand (kW)	1.7	1.7	1.7	1.7	1.7
Space heating		Natural Gas	Consumption (therm)	53,916.0	55,144.0	54,281.0	55,070.0	54,602.8
			Demand (Btuh x 10^6)					
Space cooling		Electricity	Consumption (kWh)	122,456.0	117,319.0	120,855.0	119,380.0	120,002.5
			Demand (kW)	157.0	162.2	165.1	157.1	160.3
Pumps		Electricity	Consumption (kWh)	11,228.0	11,468.0	11,634.0	11,696.0	11,506.5
			Demand (kW)	1.6	1.6	1.6	1.6	1.6
Heat rejection		Electricity	Consumption (kWh)	0.0	0.0	0.0	0.0	0.0
			Demand (kW)	0.0	0.0	0.0	0.0	0.0
Fans - interior ventilation		Electricity	Consumption (kWh)	198,213.0	194,650.0	198,092.0	193,379.0	196,083.5
			Demand (kW)	29.5	30.6	29.2	28.0	29.3
Fans - parking garage	x	Electricity	Consumption (kWh)					
			Demand (kW)					
Service water heating		Natural Gas	Consumption (therm)	12,972.0	12,972.0	12,972.0	12,972.0	12,972.0
			Demand (Btuh x 10^6)					
Receptacle equipment	x	Electricity	Consumption (kWh)	513,678.0	513,678.0	513,678.0	513,678.0	513,678.0
			Demand (kW)	120.9	120.9	120.9	120.9	120.9
IT equipment	x	Electricity	Consumption (kWh)					
			Demand (kW)					
Interior lighting - process	x	Electricity	Consumption (kWh)					
			Demand (kW)					
Refrigeration equipment	x	Electricity	Consumption (kWh)					
			Demand (kW)					
Fans - Kitchen Ventilation	x	Electricity	Consumption (kWh)					
			Demand (kW)					
Cooking	x	Electricity	Consumption (kWh)					
			Demand (kW)					
Industrial Process	x	Electricity	Consumption (kWh)					
			Demand (kW)					
Elevators and escalators	x	Electricity	Consumption (kWh)	72,098.0	72,098.0	72,098.0	72,098.0	72,098.0
			Demand (kW)	15.0	15.0	15.0	15.0	15.0
Heat Pump Supplementary		Electricity	Consumption (kWh)	0.0	0.0	0.0	0.0	0.0

Heat Pump Supplementary		Electricity	Demand (kW)	0.0	0.0	0.0	0.0	0.0
Space Heating (Electricity)		Electricity	Consumption (kWh)	0.0	0.0	0.0	0.0	0.0
			Demand (kW)	0.0	0.0	0.0	0.0	0.0
Misc Equipment (Natural Gas)		Natural Gas	Consumption (therm)	0.0	0.0	0.0	0.0	0.0
			Demand (Btuh x 10^6)					
Auxilary (Natural Gas)		Natural Gas	Consumption (therm)	0.0	0.0	0.0	0.0	0.0
			Demand (Btuh x 10^6)					
Cooling (Natural Gas)		Natural Gas	Consumption (therm)	0.0	0.0	0.0	0.0	0.0
			Demand (Btuh x 10^6)					
Total energy consumption by energy type		Electricity	kWh	1,106,387.0	1,097,927.0	1,105,071.0	1,098,945.0	1,102,082.5
		Natural Gas	therm	66,888.0	68,116.0	67,253.0	68,042.0	67,574.8
		District Cooling	MWh	0.0	0.0	0.0	0.0	0.0
Total site energy (Btu x 10^6)				10,463.8	10,557.7	10,495.8	10,553.8	10,517.8
Total source energy (Btu x 10^6)				18,876.7	18,915.0	18,900.9	18,918.2	18,902.7

Table: Baseline building annual energy cost by energy type

Energy Type		Baseline 0° rotation	Baseline 90° rotation	Baseline 180° rotation	Baseline 270° rotation	Baseline Design Total
Electricity	kWh	$ 132,766	$ 131,751	$ 132,609	$ 131,873	$ 132,250
Natural Gas	therm	$ 100,332	$ 102,174	$ 100,880	$ 102,063	$ 101,362
District Cooling	MWh					
Baseline annual energy cost		$ 233,098	$ 233,925	$ 233,488	$ 233,936	$ 233,612

Table: Proposed energy summary by end use

End Use	Unregulated?	Energy Type	Units of Annual Energy and Peak Demand	Baseline	Proposed	Energy / Demand Savings per End-Use	End Use Percent Contribution to Total Energy Savings	End Use Percent Contribution to Total Cost Savings	Percent of Total Proposed Site Energy Consumption
Interior lighting		Electricity	Consumption (kWh)	182,195	145,756	20.0%	3.4%	9.0%	7.3%
			Demand (kW)	33	27	20.0%			
Exterior lighting		Electricity	Consumption (kWh)	6,519	6,519	0.0%	0.0%	0.0%	0.3%
			Demand (kW)	1.7	2	0.0%			
Space heating		Natural Gas	Consumption (therm)	54,603	20,269	62.9%	93.0%	105.6%	29.7%
			Demand (Btuh x 10^6)						
Space cooling		Electricity	Consumption (kWh)	120,003	230,322	-91.9%	-10.2%	-27.1%	11.5%
			Demand (kW)	160.3	167	-4.1%			
Pumps		Electricity	Consumption (kWh)	11,507	1,654	85.6%	0.9%	2.4%	0.1%
			Demand (kW)	1.6	0	81.7%			
Heat rejection		Electricity	Consumption (kWh)				0.0%	0.0%	0.0%
			Demand (kW)						
Fans - interior ventilation		Electricity	Consumption (kWh)	196,084	256,702	-30.9%	-5.6%	-14.9%	12.8%
			Demand (kW)	29.3	734	-2403.6%			
Fans - parking garage	x	Electricity	Consumption (kWh)						
			Demand (kW)						
Service water heating		Natural Gas	Consumption (therm)	12,972	7,141	45.0%	15.8%	17.9%	10.5%
			Demand (Btuh x 10^6)						
Receptacle equipment	x	Electricity	Consumption (kWh)	513,678	480,479	6.5%	3.1%	8.2%	24.0%
			Demand (kW)	120.9	113	6.5%			
IT equipment	x	Electricity	Consumption (kWh)						
			Demand (kW)						
Interior lighting - process	x	Electricity	Consumption (kWh)						
			Demand (kW)						
Refrigeration equipment	x	Electricity	Consumption (kWh)						
			Demand (kW)						
Fans - Kitchen Ventilation	x	Electricity	Consumption (kWh)						
			Demand (kW)						
Cooking	x	Electricity	Consumption (kWh)						
			Demand (kW)						
Industrial Process	x	Electricity	Consumption (kWh)						
			Demand (kW)						
Elevators and escalators	x	Electricity	Consumption (kWh)	72,098	72,098	0.0%	0.0%	0.0%	3.6%
			Demand (kW)	15.0	15	0.0%			
Heat Pump Supplementary		Electricity	Consumption (kWh)				0.0%	0.0%	0.0%
			Demand (kW)						
Space Heating (Electricity)		Electricity	Consumption (kWh)		4,010		-0.4%	-1.0%	0.2%
			Demand (kW)		1				
Misc Equipment (Natural Gas)		Natural Gas	Consumption (therm)				0.0%	0.0%	0.0%
			Demand (Btuh x 10^6)						
Auxilary (Natural Gas)		Natural Gas	Consumption (therm)				0.0%	0.0%	0.0%
			Demand (Btuh x 10^6)						
Cooling (Natural Gas)		Natural Gas	Consumption (therm)				0.0%	0.0%	0.0%
			Demand (Btuh x 10^6)						

Table: Performance rating energy consumption and cost by fuel type

Energy Type	Site Energy Units	Baseline			Proposed			Percent Savings	
		Site Energy Use (Units shown per energy type)	Source Energy Use (Btu x 10^6)	Cost	Site Energy Use (Units shown per energy type)	Source Energy Use (Btu x 10^6)	Cost	Site Energy Use	Cost
Electricity	kWh	1,102,082.5	11,807.4	$ 132,250	1,197,540.0	12,830.1	$ 143,705	-8.7%	-8.7%
Natural Gas	therm	67,574.8	7,095.3	$ 101,362	27,410.0	2,878.1	$ 41,115	59.4%	59.4%
District Cooling	MWh	0.0	0.0		0.0	0.0			

Energy model subtotal (Btu x 10^6)	10,517.8	18,902.7	$	233,612	6,827.0	15,708.1	$	184,820	35.1%	20.9%

Table: Virtual rate (average energy cost per unit energy)

Energy Type		Baseline	Proposed	Percent Variance
Electricity	$ / kWh	$0.120	$0.120	0.0%
Natural Gas	$ / therm	$1.500	$1.500	0.0%
District Cooling	$ / MWh			

Total energy cost savings (excluding site-generated renewable energy) (%)	20.9%

Table: Total energy usage

Energy Type	Site Energy Units	Baseline				Proposed			Percent Savings	
		Site Energy Use (Units shown per energy type)	Source Energy Use (Btu x 10^6)		Cost	Site Energy Use (Units shown per energy type)	Source Energy Use (Btu x 10^6)	Cost	Site Energy Use	Cost
Electricity	kWh	1,102,082.5	11,807.4	$	132,250	1,197,540.0	12,830.1	143,704.8	-8.7%	-8.7%
Natural Gas	therm	67,574.8	7,095.3	$	101,362	27,410.0	2,878.1	41,115.0	59.4%	59.4%
District Cooling	MWh	0.0	0.0	$	-	0.0	0.0	0.0		
Totals		10,517.8	18,902.7	$	233,612	6,827.0	15,708.1	$ 184,820	35.1%	20.9%
Total energy cost savings (including site-generated renewable energy) (%)										20.9%

Unmet Loads

Enter the non-coincident unmet load hours, consistent with the energy simulation output reports.

Unmet Loads	Baseline	Proposed
Number of hours heating loads not met	83	109
Number of hours cooling loads not met	1	10
Totals	84	119
Compliance	Yes	

Summary

Note: All information in this section is READ-ONLY. To edit, see previous tabs.

Total energy cost savings (excluding site-generated renewable energy) (%) 20.9%

For projects pursuing EA Credit Optimize Energy Performance

Total energy cost savings (including site-generated renewable energy) (%) 20.9%

Performance Threshold

Thresholds are based on the major renovation area as a percentage of total conditioned building area.

Performance Improvement Threshold																														
5%	6%	8%	10%	12%	14%	16%	18%	**20%**	22%	24%	26%	29%	32%	35%	38%	42%	46%	50%												54%
Y	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18												EP

APPENDIX F – RESPONSE TO COB ACCESSIBILTY GUIDELINES

Article 80 – Accessibility Checklist

A requirement of the Boston Planning & Development Agency (BPDA)
Article 80 Development Review Process

The Mayor's Commission for Persons with Disabilities strives to reduce architectural, procedural, attitudinal, and communication barriers that affect persons with disabilities in the City of Boston. In 2009, a Disability Advisory Board was appointed by the Mayor to work alongside the Commission in creating universal access throughout the city's built environment. The Disability Advisory Board is made up of 13 volunteer Boston residents with disabilities who have been tasked with representing the accessibility needs of their neighborhoods and increasing inclusion of people with disabilities.

In conformance with this directive, the BDPA has instituted this Accessibility Checklist as a tool to encourage developers to begin thinking about access and inclusion at the beginning of development projects, and strive to go beyond meeting only minimum MAAB / ADAAG compliance requirements. Instead, our goal is for developers to create ideal design for accessibility which will ensure that the built environment provides equitable experiences for all people, regardless of their abilities. As such, any project subject to Boston Zoning Article 80 Small or Large Project Review, including Institutional Master Plan modifications and updates, must complete this Accessibility Checklist thoroughly to provide specific detail about accessibility and inclusion, including descriptions, diagrams, and data.

For more information on compliance requirements, advancing best practices, and learning about progressive approaches to expand accessibility throughout Boston's built environment. Proponents are highly encouraged to meet with Commission staff, prior to filing.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
   http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Massachusetts State Building Code 780 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/building-codebbrs.html
4. Massachusetts Office of Disability – Disabled Parking Regulations
   http://www.mass.gov/anf/docs/mod/hp-parking-regulations-summary-mod.pdf
5. MBTA Fixed Route Accessible Transit Stations
   http://www.mbta.com/riding_the_t/accessible_services/
6. City of Boston – Complete Street Guidelines
   http://bostoncompletestreets.org/
7. City of Boston – Mayor's Commission for Persons with Disabilities Advisory Board
   www.boston.gov/disability
8. City of Boston – Public Works Sidewalk Reconstruction Policy
   http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
9. City of Boston – Public Improvement Commission Sidewalk Café Policy
   http://www.cityofboston.gov/images_documents/Sidewalk_cafes_tcm3-1845.pdf

Glossary of Terms:

1. ***Accessible Route*** – A continuous and unobstructed path of travel that meets or exceeds the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 20
2. ***Accessible Group 2 Units*** – Residential units with additional floor space that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 9.4
3. ***Accessible Guestrooms*** – Guestrooms with additional floor space, that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 8.4
4. ***Inclusionary Development Policy (IDP)*** – Program run by the BPDA that preserves access to affordable housing opportunities, in the City. For more information visit: http://www.bostonplans.org/housing/overview
5. ***Public Improvement Commission (PIC)*** – The regulatory body in charge of managing the public right of way. For more information visit: https://www.boston.gov/pic
6. ***Visitability*** – A place's ability to be accessed and visited by persons with disabilities that cause functional limitations; where architectural barriers do not inhibit access to entrances/doors and bathrooms.

<table>
<tr><td colspan="4">1. Project Information:
If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.</td></tr>
<tr><td>Project Name:</td><td colspan="3">282-308 Bremen Street</td></tr>
<tr><td>Primary Project Address:</td><td colspan="3">282-308 Bremen St, Boston, MA 02128</td></tr>
<tr><td>Total Number of Phases/Buildings:</td><td colspan="3">One Phase/Building</td></tr>
<tr><td>Primary Contact (Name / Title / Company / Email / Phone):</td><td colspan="3"></td></tr>
<tr><td>Owner / Developer:</td><td colspan="3">282 Bremen Development LLC</td></tr>
<tr><td>Architect:</td><td colspan="3">RODE Architects, Inc</td></tr>
<tr><td>Civil Engineer:</td><td colspan="3">Sherwood Consulting & Design, LLC</td></tr>
<tr><td>Landscape Architect:</td><td colspan="3">OJB Landscape Architecture</td></tr>
<tr><td>Permitting:</td><td colspan="3">Mitchell L. Fischman (“MLF”) Consulting LLC</td></tr>
<tr><td>Construction Management:</td><td colspan="3">TBD</td></tr>
<tr><td colspan="4">At what stage is the project at time of this questionnaire? Select below:</td></tr>
<tr><td rowspan="2"></td><td>☑ PNF / Expanded PNF Submitted</td><td>Draft / Final Project Impact Report Submitted</td><td>BPDA Board Approved</td></tr>
<tr><td>BPDA Design Approved</td><td>Under Construction</td><td>Construction Completed:</td></tr>
<tr><td>Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? If yes, identify and explain.</td><td colspan="3">Yes, outlets at exterior walls and group 1 sink depth.</td></tr>
<tr><td colspan="4">2. Building Classification and Description:
This section identifies preliminary construction information about the project including size and uses.</td></tr>
<tr><td colspan="4">What are the dimensions of the project?</td></tr>
<tr><td>Site Area:</td><td>34,160 SF</td><td>Building Area:</td><td>Approx. 125,000 GSF</td></tr>
</table>

Building Height:	*58-68 FT*	Number of Stories:		*5-6 Floors*
First Floor Elevation:	10'-0"	Is there below grade space:		*Yes /☑ No*
What is the Construction Type? (Select most appropriate type)				
	☑ Wood Frame	Masonry	Steel Frame	Concrete
What are the principal building uses? (IBC definitions are below – select all appropriate that apply)				
	Residential – One - Three Unit	☑ Residential - Multi-unit, Four +	Institutional	Educational
	Business	Mercantile	Factory	Hospitality
	Laboratory / Medical	Storage, Utility and Other		
List street-level uses of the building:	*Lobby, Commercial, Live/Work, Parking, Resident Amenity Space, Bike storage, Leasing, Loading, Trash,*			

3. Assessment of Existing Infrastructure for Accessibility:

This section explores the proximity to accessible transit lines and institutions, such as (but not limited to) hospitals, elderly & disabled housing, and general neighborhood resources. Identify how the area surrounding the development is accessible for people with mobility impairments and analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.

Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The site is located in East Boston along Bremen St. between Brooks St. and Putnam St. and across from the Bremen Street Community Park. The neighborhood, much like the rest of East Boston is the artificial outcome of large amounts of man-made fill resulting in relatively little elevation change over the entire land mass. The site is virtually flat with a subtle downward slope of ~5"/400' from the South to the North.
List the surrounding accessible MBTA transit lines and their proximity to development site: commuter rail / subway stations, bus stops:	• MBTA Subway – Blue Line, Airport Station (accessible), 0.1 miles away; Located directly across from the site on the opposite side of the Bremen Street Community Park. • MBTA Bus lines: Silver Line SL3 to South Station from Airport Station, 0.1 miles away. Bus Route 120 operates along Bennington St, 0.2 miles North West of the site. .All MBTA Bus Routes are accessible.

List the surrounding institutions: hospitals, public housing, elderly and disabled housing developments, educational facilities, others:	**Affordable/Public Housing:** 406 Meridian Street, Section 8 - Family 129 Havre Street, Section 8 - Family 172 Maverick Street, Section 8 – Family 209 Sumner Street, Federal Family & Elderly/Disabled 38 Vallar Road, State Family **Assisted Living:** Don Orione Home, 111 Orient Ave **Schools:** Boston Public: Early Ed / Elementary Bradley, Guild, PJ Kennedy, O'Donnell, Otis, Alighieri Montessori, Adams, K-12: East Boston HS, Other: McKay K-8, Umana Academy, East Boston EEC **Police:** Boston Police District A-7, Station 0.6 miles **Fire:** District 1; Engine Co.'s 5, 9, & 56. Ladder's 2 & 21 **Hospitals:** East Boston Neighborhood Health Center, 0.6 miles; Ambulance Districts 7
List the surrounding government buildings: libraries, community centers, recreational facilities, and other related facilities:	**Recreation/Open Space:** Bremen Street Community Park, East Boston Memorial Park, Bremen Street Park II, East Boston Greenway, Piers Park, LoPresti Park **Public Library:** Boston Public Library East Boston Branch – 0.1 miles **Community Center:** Paris Street Community Center, 112 Paris St Harborside Community Center, 312 Border St BCYF Martin Pino Community Center, 86 Boardman St **Transit:** Site is located (0.1 miles) to the Airport Station Blue Line and Silver Line station connecting the site to major Boston public facilities.
4. Surrounding Site Conditions – Existing: *This section identifies current condition of the sidewalks and pedestrian ramps at the development site.*	
Is the development site within a historic district? ***If yes,*** identify which district:	The development team is not aware of the project site being located within an historic district. The nearest historic district is the Beacon Hill District, 3.3 miles away.
Are there sidewalks and pedestrian ramps existing at the development site? ***If yes***, list the existing sidewalk and pedestrian ramp dimensions, slopes, materials, and physical condition at the development site:	Yes, existing sidewalk widths vary from 7'-0" to 8'-0" with a 6" curb. There is an existing non-compliant accessible curb cut along Bremen St. at the intersection of Brooks. There are approximately a total 158' of existing non-accessible curb cuts along both Bremen and Brooks. The sidewalks are in various levels of disrepair and are comprised of cast in place concrete.

Are the sidewalks and pedestrian ramps existing-to-remain? ***If yes,*** have they been verified as ADA / MAAB compliant (with yellow composite detectable warning surfaces, cast in concrete)? ***If yes,*** provide description and photos:	No existing sidewalks and pedestrian ramps are to remain.

5. Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps around the development site. Sidewalk width contributes to the degree of comfort walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Wider sidewalks allow people to walk side by side and pass each other comfortably walking alone, walking in pairs, or using a wheelchair.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? ***If yes***, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard.	The proposed sidewalk complies with the Boston Complete Streets Guidelines and will fall under the *Residential* Street Type. The streetscape will focus on pedestrian safety, street trees, and well-defined connections to public transportation and public parks and amenities.
What are the total dimensions and slopes of the proposed sidewalks? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone:	The total dimension of the proposed sidewalk is 9'. The total dimension will align with the adjacent existing sidewalk. The Pedestrian Zone will be 5' 6" and the Greenscape/Furnishing Zone is 3' wide with a 6" curb. The slope of the sidewalks will follow the grade of the existing sidewalk. There are also 3 pedestrian bump outs of 9' into the right of way bringing the total proposed pedestrian zone to 18' in those areas.
List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?	Th Pedestrian Zone will be concrete. The Greenscape/Furnishing Zone will also be concrete. The proposed materials will be on both the City of Boston pedestrian right-of-way and 2' of the project site
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way? ***If yes,*** what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way clearance be?	No

If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	Yes, the development team will be seeking a pedestrian easement with the Public Works Department or Public Improvement Commission, if needed.
Will any portion of the Project be going through the PIC? *If yes,* identify PIC actions and provide details.	Yes, the project may go through the PIC process.
6. Accessible Parking: *See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability – Disabled Parking Regulations*.	
What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage?	Approx. 68 spaces utilizing stackers located within a parking garage.
What is the total number of accessible spaces provided at the development site? How many of these are "Van Accessible" spaces with an 8 foot access aisle?	2 accessible spaces, 1 will be van accessible
Will any on-street accessible parking spaces be required? *If yes,* has the proponent contacted the Commission for Persons with Disabilities regarding this need?	All accessible parking requirements are met on site.
Where is the accessible visitor parking located?	Accessible parking spaces are located in the parking garage, closest to the elevator core. These parking spaces can be designated for visitors as required.
Has a drop-off area been identified? *If yes,* will it be accessible?	Yes, all provided drop-off areas will be accessible.

7. Circulation and Accessible Routes: *The primary objective in designing smooth and continuous paths of travel is to create universal access to entryways and common spaces, which accommodates persons of all abilities and allows for visitability with neighbors.*	
Describe accessibility at each entryway: Example: Flush Condition, Stairs, Ramp, Lift or Elevator:	All entryways are flush conditions.
Are the accessible entrances and standard entrance integrated? ***If yes,*** *describe.* ***If no***, what is the reason?	Yes, all standard entrances are accessible.
If project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes way-finding / signage package.	All future way-finding signage will be developed to meet Building Code and Accessibility Board Requirements
8. Accessible Units (Group 2) and Guestrooms: (If applicable) *In order to facilitate access to housing and hospitality, this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing and hotel rooms.*	
What is the total number of proposed housing units or hotel rooms for the development?	Approx. 165 Multifamily Rental Units
If a residential development, how many units are for sale? How many are for rent? What is the breakdown of market value units vs. IDP (Inclusionary Development Policy) units?	Approx. 165 rental units The development will include affordable units in compliance with the City of Boston's Inclusionary Housing Policy.
If a residential development, how many accessible Group 2 units are being proposed?	5% of the 165 rental units will be accessible: 9 units will be provided in full compliance with MAAB Group-2A regulations
If a residential development, how many accessible Group 2 units will also be IDP units? ***If none***, describe reason.	Accessible units will include a mix of affordable and market rate units, in a proportion similar to the overall composition of units. Final breakdown to be determined.

If a hospitality development, how many accessible units will feature a wheel-in shower? Will accessible equipment be provided as well? ***If yes,*** provide amount and location of equipment.	N/A
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs / thresholds at entry, step to balcony, others. ***If yes***, provide reason.	No
Are there interior elevators, ramps or lifts located in the development for access around architectural barriers and/or to separate floors? ***If yes***, describe:	Interior elevators are provided to access all floors.
9. Community Impact: *Accessibility and inclusion extend past required compliance with building codes. Providing an overall scheme that allows full and equal participation of persons with disabilities makes the development an asset to the surrounding community.*	
Is this project providing any funding or improvements to the surrounding neighborhood? Examples: adding extra street trees, building or refurbishing a local park, or supporting other community-based initiatives?	Yes, the project is improving the Bremen Street and Brooks street crossings by providing a pedestrian sidewalk bump out to minimize the crossing distance.
What inclusion elements does this development provide for persons with disabilities in common social and open spaces? Example: Indoor seating and TVs in common rooms; outdoor seating and barbeque grills in yard. Will all of these spaces and features provide accessibility?	All amenity spaces will be fully accessible, with all accessible controls and appliances and will accommodate for accessible seating, and accessible amenity bathrooms.

Are any restrooms planned in common public spaces? ***If yes,*** will any be single-stall, ADA compliant and designated as "Family"/ "Companion" restrooms? ***If no***, explain why not.	Yes.
Has the proponent reviewed the proposed plan with the City of Boston Disability Commissioner or with their Architectural Access staff? ***If yes,*** did they approve? ***If no,*** what were their comments?	Proposed plan has not yet been reviewed with the Boston Disability Commissioner or Architectural Access Staff.
Has the proponent presented the proposed plan to the Disability Advisory Board at one of their monthly meetings? Did the Advisory Board vote to support this project? ***If no,*** what recommendations did the Advisory Board give to make this project more accessible?	Has not yet been presented.

10. Attachments

Include a list of all documents you are submitting with this Checklist. This may include drawings, diagrams, photos, or any other material that describes the accessible and inclusive elements of this project.

Provide a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations, including route distances**. See Figures F-1, F-2, and F-3 that follow.**
Provide a diagram of the accessible route connections through the site, including distances.
Provide a diagram the accessible route to any roof decks or outdoor courtyard space? (if applicable)
Provide a plan and diagram of the accessible Group 2 units, including locations and route from accessible entry.
Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project.

This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to help achieve ideal accessibility and to ensure that all buildings, sidewalks, parks, and open spaces are usable and welcoming to Boston's diverse residents and visitors, including those with physical, sensory, and other disabilities.

For questions or comments about this checklist, or for more information on best practices for improving accessibility and inclusion, visit www.boston.gov/disability, or our office:

The Mayor’s Commission for Persons with Disabilities
1 City Hall Square, Room 967,
Boston MA 02201.

Architectural Access staff can be reached at:

accessibility@boston.gov | patricia.mendez@boston.gov | sarah.leung@boston.gov | 617-635-3682

LEGEND

CAFE
CIRCULATION
LOBBY
SERVICE
FITNESS
LIVE & WORK
PARKING
LOADING
BIKES
ENTRY
ACCESSIBLE ROUTE
VEHICULAR ROUTE

N

1" = 50'-0"

FIGURE F-1 / **ACCESSIBILITY (SITE + L1)**

RODE

LEGEND

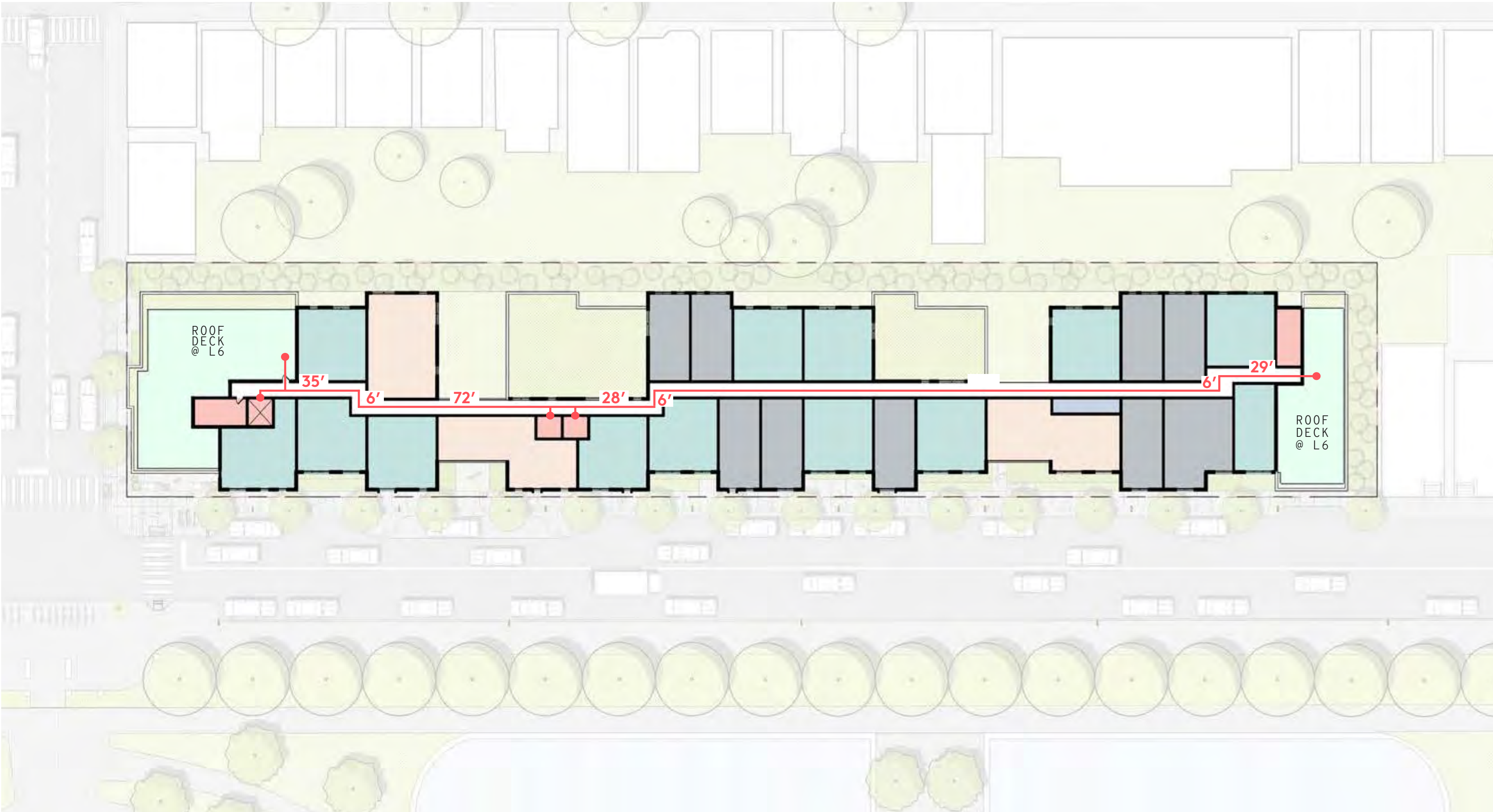
- STUDIO
- 1-BED
- 2-BED
- SERVICE
- CIRCULATION
- ROOF DECK
- ACCESSIBLE ROUTE

N

1" = 50'-0"

RODE

FIGURE F-2 / ACCESSIBILITY (LEVEL 2-5)



LEGEND

STUDIO
1-BED
2-BED
SERVICE
CIRCULATION
ROOF DECK
ACCESSIBLE ROUTE

N
1" = 50'-0"

FIGURE F-3 / **ACCESSIBILITY (LEVEL 6 FLOOR PLAN)**

RODE

APPENDIX G – RESPONSE TO COB BROADBAND QUESTIONNAIRE

Appendix G

Broadband Ready Buildings Questionnaire

282-308 Bremen Street, East Boston

The City of Boston is working to cultivate a broadband ecosystem that serves the current and future connectivity needs of residents, businesses, and institutions. The real estate development process offers a unique opportunity to create a building stock in Boston that enables this vision. In partnership with the development community, the Boston Planning and Development Authority and the City of Boston will begin to leverage this opportunity by adding a broadband readiness component to the Article 80 Design Review. This component will take the form of a set of questions to be completed as part of the Project Notification Form. Thoughtful integration of future-looking broadband practices into this process will contribute to progress towards the following goals:

1. Enable an environment of competition and choice that results in all residents and businesses having a choice of 2 or more wireline or fixed wireless high-speed Internet providers
2. Create a built environment that is responsive to new and emerging connectivity technologies
3. Minimize disruption to the public right of way during and after construction of the building

The information that is shared through the Project Notification Form will help BPDA and the City understand how developers currently integrate telecommunications planning in their work and how this integration can be most responsive to a changing technological landscape.

Upon submission of this online form, a PDF of the responses provided will be sent to the email address of the individual entered as Project Contact. Please include this PDF in the Project Notification Form packet submitted to BPDA.

Section 1: General Questions

For consistency, general intake questions below are modeled after Boston Planning and Development Agency Climate Change Resiliency and Preparedness Checklist.

Project Information

- Project Name: **282-308 Bremen Street, East Boston**
- Project Address Primary: **282-308 Bremen Street, East Boston**
- Project Address Additional: **N/A**
- Project Contact: **Bryan Lee, Blee@transomrealeastate.com, Tel: 617-307-6530**
- Expected completion date: **2022**

Team Description

- Owner / Developer: **282 Bremen Development, LLC, c/o Transom Real Estate, LLC**
- Architect: **RODE Architects Inc.**
- Engineer (building systems): **TBD**
- Permitting: **Mitchell L. Fischman ("MLF") Consulting LLC**
- Construction Management: **TBD**

Section 2: Right of Way to Building

Point of Entry Planning

Point of entry planning has important implications for the ease with which your building's telecommunications services can be installed, maintained, and expanded over time.

#1: Please provide the following information for your building's point of entry planning (conduits from building to street for telecommunications). Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- Number of Points of Entry: **Unknown**
- Locations of Points of Entry: **Bremen or Brooks Streets**
- Quantity and size of conduits: **Unknown**
- Location where conduits connect (e.g. building-owned manhole, carrier-specific manhole or stubbed at property line): **Unknown**
- Other information/comments: **Unknown**

#2: Do you plan to conduct a utility site assessment to identify where cabling is located within the street? This information can be helpful in determining the locations of POEs and telco rooms. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- **Yes**
- No
- Unknown

Section 3: Inside of the Building

Riser Planning

Riser capacity can enable multiple telecom providers to serve tenants in your building.

#3: Please provide the following information about the riser plans throughout the building. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- Number of risers: **Unknown**
- Distance between risers (if more than one): **Unknown**
- Dimensions of riser closets: **Unknown**
- Riser or conduit will reach to top floor: **Unknown**
- Number and size of conduits or sleeves within each riser: **Unknown**

- Proximity to other utilities (e.g. electrical, heating): **Unknown**
- Other information/comments: **Unknown**

Telecom Room

A well designed telecom room with appropriate security and resiliency measures can be an enabler of tenant choice and reduce the risk of service disruption and costly damage to telecom equipment.

#4: Please provide the following information about the telecom room plans. Please enter ‘unknown’ if these decisions have not yet been made or you are presently unsure.

- What is the size of the telecom room? **Unknown**

- Describe the electrical capacity of the telecom room (i.e. # and size of electrical circuits) **Unknown**

- Will the telecom room be located in an area of the building containing one or more load bearing walls? **Unknown**

- Will the telecom room be climate controlled?

  - **Yes**
  - No
  - Unknown

- If the building is within a flood-prone geographic area, will the telecom equipment will be located above the floodplain?
  - **Yes**
  - No
  - Unknown

- Will the telecom room be located on a floor where water or other liquid storage is present?
  - Yes
  - **No**
  - Unknown

- Will the telecom room contain a flood drain?
  - Yes
  - No
  - **Unknown**
- Will the telecom room be single use (telecom only) or shared with other utilities?
  - Telecom only

- ○ Shared with other utilities
- **Unknown**

Delivery of Service Within Building (Residential Only)

Please enter 'unknown' if these decisions have not yet been made or you are presently unsure. Questions 5 through 8 are for residential development only.

#5: Will building/developer supply common inside wiring to all floors of the building?

- Yes
- No
- **Unknown**

#6: If so, what transmission medium (e.g. coax, fiber)? Please enter 'unknown' if these decisions have not yet been made or you are presently unsure. **Unknown**

#7: Is the building/developer providing wiring within each unit?

- **Yes**
- No
- Unknown

#8: If so, what transmission medium (e.g. coax, fiber)? Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

<u>Section 4: Accommodation of New and Emerging Technologies</u>

Cellular Reception

The quality of cellular reception in your building can have major impacts on quality of life and business operations.

Please provide the following information on your plans to facilitate high quality cellular coverage in your building. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

#9: Will the building conduct any RF benchmark testing to assess cellular coverage?

- **Yes**
- No
- Unknown

#10: Will the building allocate any floor space for future in-building wireless solutions (DAS/small **cell/booster equipment)?**

- **Yes**
- No
- Unknown

#11: Will the building be providing an in-building solution (DAS/ Small cell/ booster)?

- **Yes**
- No
- Unknown

#12: If so, are you partnering with a carrier, neutral host provider, or self-installing?

- Carrier
- Neutral host provider
- **Self-installing**

Rooftop Access

Building rooftops are frequently used by telecommunications providers to install equipment critical to the provision of service to tenants.

Please provide the following information regarding your plans for roof access and usage. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

#13: Will you allow cellular providers to place equipment on the roof?

- Yes
- No
- **Unknown**

#14: Will you allow broadband providers (fixed wireless) to install equipment on the roof?

- Yes
- No
- **Unknown**

<u>Section 5: Telecom Provider Outreach</u>

Supporting Competition and Choice

Having a choice of broadband providers is a value add for property owners looking to attract tenants and for tenants in Boston seeking fast, affordable, and reliable broadband service. In addition to enabling tenant choice in your building, early outreach to telecom providers can also reduce cost and disruption to the public right of way. The following questions focus on steps that property owners can take to ensure that multiple wireline or fixed wireless broadband providers can access your building and provide service to your tenants.

#15: (Residential Only) Please provide the date upon which each of the below providers were successfully contacted, whether or not they will serve the building, what transmission medium they will use (e.g. coax, fiber) and the reason they provided if the answer was ‘no’. **TO BE COMPLETED DURING DESIGN DEVELOPMENT**

- Comcast - enter contact info
- RCN - enter contact info
- Verizon - enter contact info
- Wicked Broadband - enter contact info
- WebPass
- Starry
- Level 3
- Cogent
- Lightower
- XO Communications
- AT&T
- Zayo
- Other(s) - please specify - enter contact info

#16: Do you plan to abstain from exclusivity agreements with broadband and cable providers?

- **Yes**
- No
- Unknown

#17: Do you plan to make public to tenants and prospective tenants the list of broadband/cable providers who serve the building?

- Yes
- No
- **Unknown**

<u>Section 6: Feedback for Boston Planning and Development Agency</u>

The Boston Planning and Development Agency looks forward to supporting the developer community in enabling broadband choice for resident and businesses. Please provide feedback on your experience completing these questions. **Some of these questions are difficult to respond to at this point in the design process.**

APPENDIX H – RESPONSE TO BOSTON SMART UTILITIES CHECKLIST

Appendix H. Response to Boston Smart Utilities Checklist
282-308 Bremen Street, East Boston

Date Submitted:	05/08/19
Submitted by:	Mitchell L. Fischman Consulting LLC

Background

The Smart Utilities Checklist will facilitate the Boston Smart Utilities Steering Committee's review of:

a) compliance with the Smart Utilities Policy for Article 80 Development Review, which calls for the integration of five (5) Smart Utility Technologies (SUTs) into Article 80 developments

b) integration of the Smart Utility Standards

More information about the Boston Smart Utilities Vision project, including the Smart Utilities Policy and Smart Utility Standards, is available at: www.http://bostonplans.org/smart-utilities

Note: Any documents submitted via email to manuel.esquivel@boston.gov will not be attached to the pdf form generated after submission, but are available upon request.

Part 1 - General Project Information

1.1 Project Name	282-308 Bremen Street
1.2 Project Address	282-308 Bremen Street, East Boston
1.3 Building Size (square feet) **For a multi-building development, enter total development size (square feet)*	Approx. 125,000 gsf
1.4 Filing Stage	Project Notification Form

Appendix H. Response to Boston Smart Utilities Checklist
282-308 Bremen Street, East Boston

1.5 Filing Contact Information

1.5a Name	**Mitchell L. Fischman**
1.5b Company	**Mitchell L. Fischman (“MLF”) Consulting LLC**
1.5c E-mail	mitchfischman@gmail.com
1.5d Phone Number	**781-760-1726**

1.6 Project Team

1.6a Project Owner/Developer	**282 Bremen Development, LLC** **c/o Transom Real Estate, LLC**
1.6b Architect	**RODE Architects, Inc.**
1.6c Permitting	**MLF Consulting LLC**
1.6d Construction Management	**TBD**

Part 2 - District Energy Microgrids

Fill out this section if the proposed project’s total development size is equal to or greater than 1.5 million square feet.

Note on submission requirements timeline:

Feasibility Assessment Part A should be submitted with PNF or any other initial filing.

Feasibility Assessment Part B should be submitted with any major filing during the Development Review stage (i.e., DPIR)

District Energy Microgrid Master Plan Part A should be submitted before submission of the Draft Board Memorandum by the BPDA Project Manager (Note: Draft Board Memorandums are due one month ahead of the BPDA Board meetings)

District Energy Microgrid Master Plan Part B should be submitted before applying for a Building Permit

Please email submission to manuel.esquivel@boston.gov

Appendix H. Response to Boston Smart Utilities Checklist
282-308 Bremen Street, East Boston

2.1 Consultant Assessing/Designing District Energy Microgrid (if applicable)	
2.2 Latest document submitted	
2.3 Date of latest submission	
2.4 Which of the following have you had engagement/review meetings with regarding District Energy Microgrids? (select all that apply)	
2.5 What engagement meetings have you had with utilities and/or other agencies (i.e., MA DOER, MassCEC) regarding District Energy Microgrids? (Optional: include dates)	

Part 3 - Telecommunications Utilidor

Fill out this section if the proposed project's total development size is equal to or greater than 1.5 million square feet OR if the project will include the construction of roadways equal to or greater than 0.5 miles in length.

Please submit a map/diagram highlighting the sections of the roads on the development area where a Telecom Utilidor will be installed, including access points to the Telcom Utilidor (i.e., manholes)

Please email submission to manuel.esquivel@boston.gov

3.1 Consultant Assessing/Designing Telecom Utilidor (if applicable)	

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3.2 Date Telecom Utilidor Map/Diagram was submitted	
3.3 Dimensions of Telecom Utilidor (include units)	
3.3a Cross-section (i.e., diameter, width X height)	
3.3b Length	
3.4 Capacity of Telecom Utilidor (i.e., number of interducts, 2 inch (ID) pipes, etc.)	
3.5 Which of the following have you had engagement/review meetings with regarding the Telecom Utilidor? (select all that apply)	
3.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding the Telecom Utilidor? (Optional: include dates)	

Part 4 - Green Infrastructure

Fill out this section if the proposed project's total development size is equal to or greater than 100,000 square feet.

Please submit a map/diagram highlighting where on the development Green Infrastructure will be installed.

Please email submission to manuel.esquivel@boston.gov

4.1 Consultant Assessing/Designing Green Infrastructure (if applicable)	Sherwood Consulting and Design, LLC

Appendix H. Response to Boston Smart Utilities Checklist
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4.2 Date Green Infrastructure Map/Diagram was submitted	See Response to Item 4.3 below.
4.3 Types of Green Infrastructure included in the project (select all that apply)	It is too early to define type LLCs of Green Infrastructure and to determine if any are possible or feasible for this site until we are in design development. Please note: the site has limited landscaping area to employ these strategies effectively.
4.4 Total impervious area of the development (in square inches)	4,072,752 square inches (See graphic of pervious and impervious areas that follows based on the architect's conceptual design plans contained in the PNF)
4.5 Volume of stormwater that will be retained (in cubic inches)* **Note: Should equal to at least "Total impervious area (entered in section 4.3)" times "1.25 inches"*	5,090,940 cubic inches
4.6 Which of the following have you had engagement/review meetings with regarding Green Infrastructure? (select all that apply)	No meetings to date.
4.7 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Green Infrastructure? (Optional: include dates)	No meetings to date.

Appendix H. Response to Boston Smart Utilities Checklist
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Part 5 - Adaptive Signal Technology (AST)

Fill out this section if as part of your project BTD will require you to install new traffic signals or make significant improvements to the existing signal system.

Please submit a map/diagram highlighting the context of AST around the proposed development area, as well as any areas within the development where new traffic signals will be installed or where significant improvements to traffic signals will be made.

Please email submission to manuel.esquivel@boston.gov

5.1 Consultant Assessing/Designing Adaptive Signal Technology (if applicable)	Howard Stein Hudson
5.2 Date AST Map/Diagram was submitted	**Will be submitted at the time of the TAPA review.**
5.3 Describe how the AST system will benefit/impact the following transportation modes	
5.3a Pedestrians	**Will be determined at the time of the TAPA review.**
5.3b Bicycles	**Will be determined at the time of the TAPA review.**
5.3c Buses and other Public Transportation	**Will be determined at the time of the TAPA review.**
5.3d Other Motorized Vehicles	**Will be determined at the time of the TAPA review.**
5.4 Describe the components of the AST system (including system design and components)	**Will be determined at the time of the TAPA review.**
5.5 Which of the following have you had engagement/review meetings with regarding AST? (select all that apply)	**No meetings to date. Will be determined at the time of the TAPA review.**

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5.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding AST? (Optional: include dates)	**No meetings to date. Will engage in meetings at the time of the TAPA and the PIC reviews.**

Part 6 - Smart Street Lights

Fill out this section if as part of your project PWD and PIC will require you to install new street lights or make significant improvements to the existing street light system.

Please submit a map/diagram highlighting where new street lights will be installed or where improvements to street lights will be made.

Please email submission to manuel.esquivel@boston.gov

6.1 Consultant Assessing/Designing Smart Street Lights (if applicable)	**Sherwood Consulting and Design, LLC, RODE Architects, and MEP to be determined.**
6.2 Date Smart Street Lights Map/Diagram was submitted	**Will be determined and provided at the time of the PIC Review.**
6.3 Which of the following have you had engagement/review meetings with regarding Smart Street Lights? (select all that apply)	**Will be determined at the time of the PIC Review.**
6.4 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Smart Street Lights? (Optional: include dates)	**Will include discussions with Boston Street Lighting at the time of the PIC Review.**

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Part 7 - Smart Utility Standards

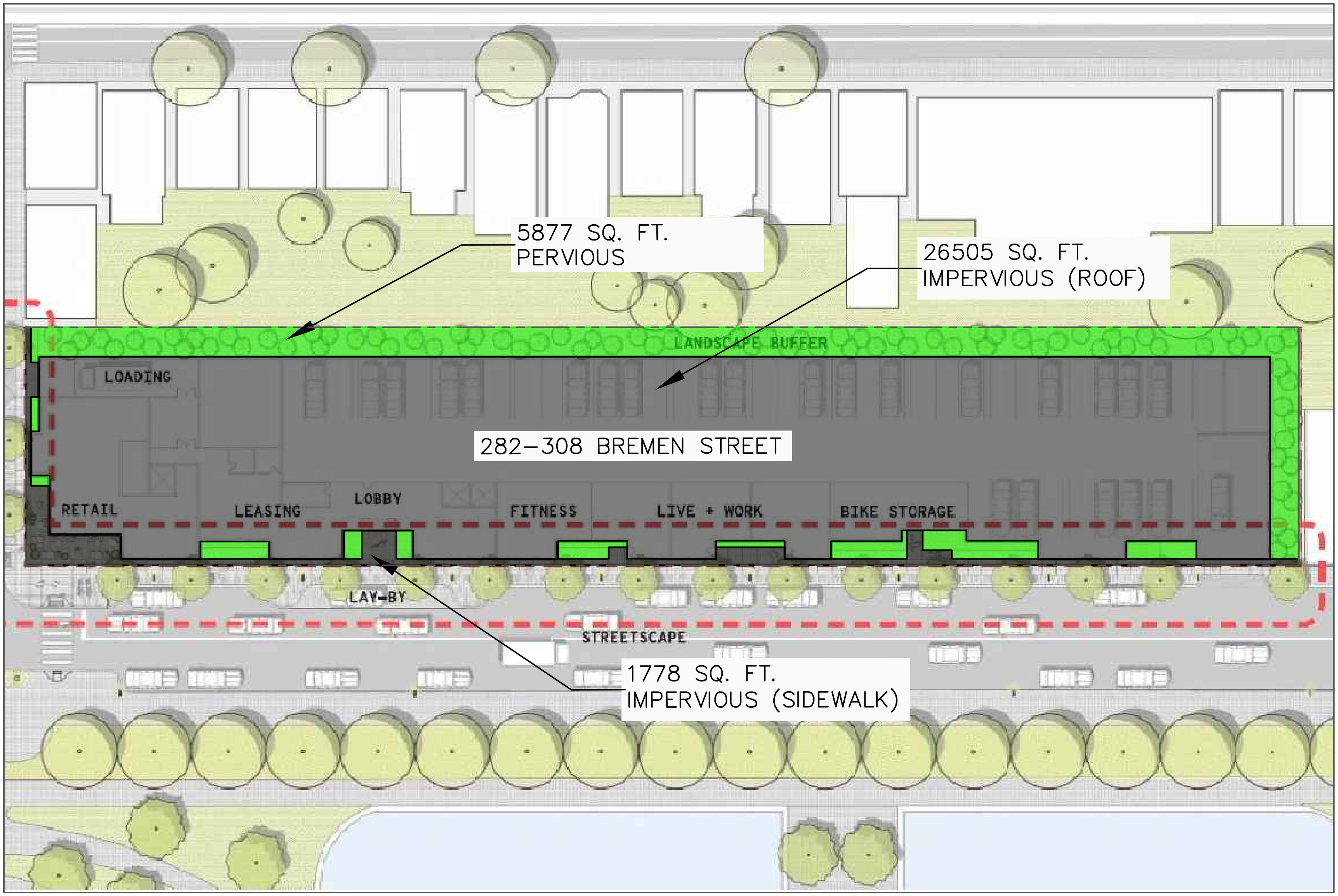
The Smart Utility Standards set forth guidelines for planning and integration of SUTs with existing utility infrastructure in existing or new streets, including cross-section, lateral, and intersection diagrams. The Smart Utility Standards are intended to serve as guidelines for developers, architects, engineers, and utility providers for planning, designing, and locating utilities. The Smart Utility Standards will serve as the baseline for discussions on any deviations from the standards needed/proposed for any given utility infrastructure.

Please submit typical below and above grade cross section diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Please submit typical below and above grade lateral diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Please email submission to manuel.esquivel@boston.gov

7.1 Date Cross Section Diagram(s) was submitted	
7.2 Date Lateral Diagram(s) was submitted	



282-308 BREMEN STREET
SCALE: 1"=50'

282-308 Bremen Street, East Boston

MLF CONSULTING LLC