Single Environmental Impact Report
EEA No. 1891

Kendall Square Urban Renewal Project (KSURP) Amendment No. 10

Cambridge, Massachusetts

SUBMITTED TO Executive Office of Energy and Environmental Affairs
Massachusetts Enviromental Policy Act Office

PROPONENT Cambridge Redevelopment Authority

PREPARED BY vhb

IN ASSOCIATION WITH:

Boston Properties
Sasaki Associates
Foley and Hoag
AHA Consulting Engineers
Haley & Aldrich

October 2015

October 15, 2015

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs
Attention: Deidre Buckley, Director of the MEPA Office
100 Cambridge Street, 9th Floor
Boston, MA 02114

Re: **Single Environmental Impact Report**
Kendall Square Urban Renewal Project (KSURP) Amendment No. 10
Cambridge, MA
EEA No. 1891

Dear Secretary Beaton and Director Buckley:

On behalf of the Cambridge Redevelopment Authority (the "Proponent") and Boston Properties (the "Redeveloper"), Vanasse Hangen Brustlin, Inc. (VHB) is pleased to submit the enclosed Single Environmental Impact Report (SEIR) for Plan Amendment No. 10 to the Kendall Square Urban Renewal Plan (KSURP) to allow for additional commercial and residential development within the Kendall Square neighborhood of the City of Cambridge (the "Project Change" or "Project"). On April 15, 2015, the Proponent filed an "expanded" Notice of Project Change (NPC) for a Major Plan Amendment to the KSURP. On May 29, 2015, a Certificate was issued requiring a SEIR. This SEIR addresses the Scope presented in the NPC Certificate and, at the request of City of Cambridge reviewers, represents a final complete document for the Project rather than providing a document that solely responds to the MEPA Scope. All new/updated information is denoted by double underline.

The approximately 43-acre KSURP area has been undergoing redevelopment since 1965 when the KSURP was originally approved. In 1977, the KSURP was amended to create a Mixed Use District (MXD) that has since been transformed into Cambridge Center—a major urban mixed-use project reviewed by MEPA at that time. The Redeveloper was selected by the Proponent in 1979 to take on the Cambridge Center project and most of the property is now owned and managed by the Redeveloper. The Project Change consists of new commercial office/innovation space development over the Cambridge Center North Garage, a new residential building at Eleven Cambridge Center, and a new mixed-use building at Three Cambridge Center. Additionally, the Project Change includes an approximately 60,000-square foot commercial office/lab expansion of the existing Whitehead Institute building at Nine Cambridge Center and the conversion of approximately 15,100 square feet of mechanical space into commercial office space at the Broad Institute at 75 Ames Street. These latter components of the KSURP expansion will be undertaken by other parities in coordination with the Proponent separate from the Redeveloper.

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In 2013, the Community Development Department of the City completed the K2 Planning Study after an extensive 3-year public planning process. The proposed Amendment No. 10 will advance the City's planning goals and recommendations for the KSURP area as stated in the K2 Planning Study, to increase the utilization of the existing urban infrastructure and leverage the hub of innovation in Kendall Square to create a more dynamic mixed-use environment. The KSURP will be updated to not only facilitate job growth and expand housing opportunities in Kendall Square, but to implement the broader goal of creating a sustainable, inviting and inclusive neighborhood.

Since the original MEPA approval of the first amendment to the KSURP in 1977, the Proponent has regularly consulted with and updated the MEPA office on Plan Amendments. With each submission, the Proponent included a complete and updated analysis of project impacts, with a particular focus on analyzing the impact of changes on projected traffic impacts in the MXD District of the KSURP area. This reporting has consistently shown that actual trip generation in Kendall Square is significantly lower than would be projected utilizing accepted, standardized methodology for average daily vehicle trip (ADVT) projections. Based upon this extensive record of updated analysis of the traffic impacts from the KSURP, including annual trip and parking counts completed by the Proponent over a 20 year period, a better forecast of vehicular and transit trips associated with the Project Change (utilizing an approach developed based on guidance from the City and, subsequently, approved by Massachusetts Department of Transportation) can be provided.

Throughout the development of Cambridge Center, the Proponent and the Redeveloper have remained focused on enhancing the favorable transportation mode split in Kendall Square that has played such an important role in the successful redevelopment of the area. It is acknowledged and well documented that an estimated 70 percent of trips travelled to Kendall Square utilize transit, walking, biking, shuttle and/or carpooling. This remarkable factor is at the core of the opportunity for the Project. The importance of maintaining and improving this mode split cannot be overstated, and is central to the Proponent's plans for expansion of the KSURP.

Plan Amendment No. 10 will be subject to review and consideration of the Cambridge City Council, which the Proponent anticipates will occur later this year, before approval by the Department of Housing and Community Development. The Project Change facilitating the development up to 1,034,000 square feet of net new development in the KSURP area incorporates measures to avoid, minimize or mitigate all areas of potential environmental impact (i.e., local roadway improvements, stormwater management facilities). No new MEPA review thresholds or Mandatory Environmental Impact Report (EIR) review thresholds are triggered as a result of the Project, with the exception of Transportation-related thresholds (new **unadjusted** projected daily traffic and new parking spaces). The technical analyses provided herein demonstrate that the Project Change does not result in any new significant environmental impacts (that have not been or are not addressed with mitigation) beyond those documented and analyzed in the most recently previously reviewed MEPA filing.

We look forward to working with you and your staff, other state agencies as well as members of the community to develop the best redevelopment plan for this location. We anticipate that the SEIR will be noticed in the next Environmental Monitor. Requests for copies of the SEIR should be directed to me at 617-607-0091 or via e-mail at ldevoe@vhb.com.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Lauren DeVoe, AICP, LEED AP BD+C
Senior Environmental Planner

Enclosure

cc: Tom Evans, Cambridge Redevelopment Authority
Ben Lavery, Boston Properties
Douglas McGarrah, Foley and Hoag
Sean Manning, VHB

Single Environmental Impact Report
EEA No. 1891

Kendall Square Urban Renewal Project (KSURP) Amendment No. 10

Cambridge,
Massachusetts

Submitted to **Executive Office of Energy and Environmental Affairs**
Massachusetts Enviromental Policy Act Office
100 Cambridge Street, Suite 900 (9th Floor)
Boston, MA 02114

Proponent **Cambridge Redevelopment Authority**
255 Main Street, 4th Floor
Cambridge, MA 02142

Prepared by **VHB**
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In association with:
Boston Properties
Sasaki Associates
Foley and Hoag
AHA Consulting Engineers
Haley & Aldrich

October 2015

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Included in this document:

A: Distribution List

B: Most Recent Previous MEPA Certificate

E: Draft Tenant Design and Construction Guidelines

F: Stormwater Management Supporting Documentation

G: Notice of Project Change Form

Provided as electronic files on the enclosed CD-Rom (*hard copies are available upon request*):

C: Transportation Supporting Documentation

D: Air Quality and Greenhouse Gas Emissions Assessment Supporting Documentation

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***Note: New/additional tables from the NPC filing are denoted with double underlined.**

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Project Summary

Pursuant to the Massachusetts Environmental Policy Act (MEPA) and its implementing regulations, the Cambridge Redevelopment Authority (CRA, or the "Proponent") in conjunction with Boston Properties (the "Redeveloper") submitted a Notice of Project Change (NPC) on April 15, 2015 for an amendment to the Kendall Square Urban Renewal Plan (KSURP) to allow an additional approximately 1,034,000 square feet of commercial and residential development within the Kendall Square neighborhood of the City of Cambridge (the "Project Change" or "Project"). Refer to Figure S.1 for a site location map. On May 29, 2015, the Secretary of Energy and Environmental Affairs (EEA) issued a Certificate requiring a Single Environmental Impact Report (SEIR). This document is intended to address the Scope presented in the NPC Certificate and, at the request of City of Cambridge reviewers, represent a final complete document for the Project rather than providing a document that solely responds to the MEPA Scope. All new or substantially revised/updated text, sub-sections, and/or table is denoted by double underline, as described in the 'Key' below, which is provided at the beginning of each section. Any new report figures are indicated by double underline in the 'List of Figures' section of the Table of Contents.

KEY:

Text represents new or substantially revised narrative description from the NPC.

Section Heading represents an entirely new or substantially revised section from the NPC.

Table Heading represents an entirely new or substantially revised table from the NPC.

Since the adoption of the KSURP in 1965 and the first Major Plan Amendment in 1977, the Kendall Square area has become a center of innovation, creativity and technology; exceeding the expectation of the planners, designers, and developers in 1960's and 70's. The proposed KSURP Amendment No. 10 will advance the City of Cambridge's (the "City") planning goals for the KSURP (consistent with the recommendations from the 2013 K2C2 Planning Study for the KSURP area) through more efficient and improved use of the Kendall Square area and existing infrastructure. The KSURP will be updated to not only facilitate the job growth and housing opportunities in Kendall Square, but the broader goal of creating a sustainable, inviting, and inclusive neighborhood.

The building construction limit of the KSURP, which has nearly been reached, is proposed to be increased to meet the continued demand for additional housing, office and biotechnology manufacturing space as well as to bring supporting retail to the KSURP area, while also enhancing open space opportunities. New provisions would assist the CRA in linking transit investment to development to ensure that the KSURP area's transit assets grow along with it. Requirements for innovation space, affordable

housing, and ground floor retail are included so that Kendall Square remains not only a destination for the great thinkers of today, but also a laboratory for the great ideas of tomorrow and a great urban neighborhood for Cambridge.

The following section provides a summary of the MEPA review and approval history of the KSURP Amendments 1 through 9, describes the existing site conditions, and presents an overview of the Project Change.

The following information is provided herein, in accordance with the NPC Certificate and to address other comments received on the NPC:

- Description of project changes since the NPC; and
- A comparison of the maximum permitted development within the KSURP area to the existing development and development proposed as part of the Project (Table S-2).

Project History, Background, and Status

Kendall Square Urban Renewal Plan

In 1965, the CRA prepared the KSURP, which was approved locally and by the U.S. Department of Housing and Urban Development (HUD). This approval allowed the CRA to carry out the acquisition of 70 parcels of land, relocation of over 100 businesses, demolition of about 100 buildings and clearance of 43 acres of land. The original Kendall Square Urban Renewal Area included land between Main, Third, and Binney Streets as well as the Grand Junction Railroad. Figure S.2 shows the 1976 KSURP area boundary and property acquisition areas. At the time, this area was an industrial and commercial area. The KSURP included that 29 acres of the 43 acres would be redeveloped by the National aeronautics and Space Administration (NASA). By 1970, NASA completed the development of 15 acres of land, including a campus-style complex consisting of one 12-story building and four 1- and 2-story buildings. The remaining 14 acres were planned to be developed by private parties and is currently occupied by the Volpe Transportation Research Center.

On December 29, 1969, NASA then announced that it would not complete its build-out of the 29-acre area because of program cutbacks. Subsequently, NASA transferred its development interests to the Department of Transportation for development by the Federal Government excluding 14 acres of undeveloped land on the north side of Broadway that was transferred back to the CRA in the early 1970s for redevelopment.

In the late 1970s, the CRA and Cambridge City Council engaged the public in a re-planning effort. In 1977, the plan was amended to create the Cambridge Center MXD District to attract mixed-use development to the area north of the Massachusetts Bay

Transportation Authority (MBTA) Kendall/MIT Red Line station. The MXD boundary, as shown in Figure S.3, represents the zoning district that was established in the 1970s to help complete the development within the Urban Renewal Area for all of the non-federally owned land. The CRA selected Boston Properties as the master developer of the Cambridge Center Master Plan (described further below).

The KSURP initially consisted of construction of up to 14 buildings totaling approximately 2.77 million gross square feet, three (3) parking garages to support the new buildings as well as public open space (parks, plazas) and other public improvements. The KSURP has been updated/amended a number of times (described more fully below) and, as part of the most recent Plan Amendment No. 8, its timeline for completion was extended to 2020. The 'MEPA Review History' section below describes the Plan Amendments and, subsequently, the 'Site Context and Redevelopment Background' section describes the build-out history of the Cambridge Center Master Plan.

MEPA Review History

The CRA first filed an Environmental Notification Form (ENF) for the KSURP for MEPA review in 1975. MEPA review extended over impacts related traffic, air quality, noise, infrastructure and land. According to the MEPA record, the March 15, 1977 Final Environmental Impact Report (the "1977 FEIR") was found adequate in January 1978.[1] The 1977 FEIR provided for the construction, marketing, and occupancy of 14 buildings totaling 2,773,000 gross square feet plus three (3) parking garages, public open space, including parks and plazas as well as related public improvements all within the KSURP area.

Importantly, the projected vehicle trips per day for the Preferred Plan in the 1977 FEIR (the land use plan that was adopted by the CRA) was 19,300 daily trips. The 1977 FEIR actually reviewed the first KSURP Major Plan Change. This Plan Amendment was a revision of the initial redevelopment program for Kendall Square, which included the NASA Electronic Research Center, and pre-dated MEPA. This Plan Amendment was adopted initially by the Cambridge City Council on February 14, 1977 and then revised on October 31, 1977. The KSURP contained an overall, or aggregate, gross floor area limitation that may float between developments parcels, with further restrictions for certain land, uses both of which have been adjusted over time.

Since the original MEPA approval of the KSURP, the Proponent has regularly consulted with and updated the MEPA office on Plan Amendments No. 2 through No. 8—all of which have been Minor Plan Amendments because they included no changes to the basic elements of the KSURP. In order for the Massachusetts

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[1] Date according to the online MEPA Project Information System, although given the length of time the accuracy of the information is uncertain.

Department of Housing and Community Development (DHCD) to rule on Urban Renewal Plan (URP) changes, the DHCD consults with the Secretary of the Executive Office of Energy and Environmental Affairs (EEA) via MEPA review to confirm a determination of a Minor Plan Amendment. Therefore, with each MEPA submission, the Proponent included a complete and updated analysis of project impacts with a particular focus on analyzing the impact of changes on projected traffic impacts in the KSURP area. Refer to Table S-1 for a summary of the KSURP MEPA review history.

Plan Amendment No. 2

In 1981, MEPA reviewed Plan Amendment No. 2,[2] which adjusted and broadened the permitted mix of uses under the approved KSURP, particularly with respect to the area north of Broadway, but did not increase the maximum allowed GSF under the KSURP. The original FEIR Preferred Plan had envisioned a greater proportion of traditional manufacturing uses than proved feasible during this period of rapid changes in technology. Thus, Plan Amendment No. 2 was intended to increase opportunity to develop technical offices and research facilities to respond to the market demands in this area.

Plan Amendment No. 3

In 1993, MEPA reviewed Plan Amendment No. 3,[3] which further adjusted the permitted mix of uses under KSURP, but again did not increase the maximum aggregate GSF of development permitted in the KSURP area. The primary purpose behind the change in Plan Amendment No. 3 was to provide additional flexibility under the KSURP to permit life science companies such as Biogen to locate and expand in the Plan area. It reallocated space under the office and manufacturing use allotment under the Plan and created a new "biotechnology manufacturing uses" category from the former "office uses" category and the overall square footage allowed for this use category was increased from 830,000 square feet to 1,305,000 square feet. Plan Amendment No. 3 also extended the term of KSURP plan until 2010 and increased the permitted maximum building height from 80 to 96 feet. This latter change was meant to accommodate greater floor to ceiling height for laboratory facilities.

The NPC for Plan Amendment No. 3 included a detailed traffic analysis prepared by Fay, Spofford & Thorndike (FST), which reduced the total projected ADVT under the maximum build-out of the KSURP to 13,700 from the 19,300 ADVT projected in the 1977 FEIR. In accepting this analysis, the MEPA approval for Plan Amendment No. 3 required that the Proponent annually update KSURP traffic counts, collect and

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[2] MEPA Certificate issued on September 21, 1981.
[3] MEPA Certificate issued on September 30, 1993.

analyze parking data, and review KSURP tenant surveys, to evaluate over time the reduced traffic and increased transit usage assumptions.

Plan Amendment No. 4

In 1997, MEPA reviewed Plan Amendment No. 4,[4] which increased hotel uses by 190,000 square feet but did not change the maximum allowed GSF under the Plan. Plan Amendment No. 4 also reduced residential uses by 100,000 square feet, retail uses by 20,000 square feet, and office uses by 70,000 square feet to accommodate the added hotel use. The FST analysis that was included with the CRA filing to MEPA projected approximately 13,670 ADVT for Plan Amendment No. 4 under maximum build-out, which was nearly identical to that projected under Plan Amendment No. 3.

Plan Amendment No. 5

In 2001, MEPA reviewed Plan Amendment No. 5, which added an additional 200,000 square feet of high-rise multi-family residential uses to the maximum build out analysis, bringing the total allowed development in the KSURP area to 2,973,000 GSF. Based upon actual, updated, ADVT information on the KSURP, FST projected that trip generation under a maximum build out under Plan Amendment No. 5 would generate 13,628 ADVT, again a figure nearly identical to that projected under Plan Amendment No. 3.

Plan Amendment No. 6

In 2004, MEPA reviewed Plan Amendment No. 6, which increased the biotechnology manufacturing and offices use category by 29,100 square feet, bringing the maximum build out analysis to 3,002,100 GSF, including the 200,000 GSF of residential use allowed under Plan Amendment No. 5. FST projected that a maximum build out under Plan Amendment No. 6 would generate 13,725 ADVT.

Plan Amendment No. 7

In 2005, MEPA reviewed Plan Amendment No. 7, which proposed to increase the multi-family residential uses approved under Plan Amendment No. 5 by 75,000 square feet. This change would have brought the maximum build out analysis to 3,077,100 GSF. The submission to MEPA for this Plan Amendment included a FST traffic analysis, which projected that a maximum build out under Plan Amendment No. 7 would have generated 14,034 ADVT; however, this Plan Amendment was not ultimately approved by City Council.

[4] MEPA Certificate issued on July 24, 1997.

Most Recent Previously-Reviewed Proposed Build Condition - Plan Amendment No. 8

The most recently reviewed proposed build condition, Plan Amendment No. 8, was reviewed as part of the NPC filed on June 15, 2010.[5] Plan Amendment No. 8 consisted of an additional 300,000 gross square feet of office and biotechnology manufacturing uses to the maximum build out analysis, extended KSURP for ten years to 2020, and reduced the high-rise multi-family use category back to the original 200,000 square feet approved under Plan Amendment No. 5 (an overall net increase of 225,000 GSF). The increase in the maximum build-out under Plan Amendment No. 8 was intended to accommodate a planned expansion of the Broad Institute, which has been realized (as identified on Figure S.4) and to conform the use categories of the KSURP with City of Cambridge Zoning Ordinance (the "Zoning Ordinance"). The MEPA NPC included an updated FST traffic analysis, which projected that a maximum build-out under Plan Amendment No. 8 would generate 13,6714 ADVT and was based upon trip generation methodology reflecting the 15 years of actual traffic trip generation data.

In March, the CRA approved Plan Amendment No. 9. This Plan Amendment consisted of a technical, conforming language and plan changes to be consistent with Zoning Ordinance changes to use categories adopted the previous year on December 9, 2013, which DHCD approved as a Minor Plan Amendment on May 28, 2014. Because this Plan Amendment was purely "ministerial" in nature and made no changes to the land uses in the KSURP area and, thus, would not result in any environmental impacts, no MEPA review was required. Therefore, for the purposes of this NPC, the most recent previously reviewed project is Plan Amendment No. 8 (the "Prior Project").

Amendment No. 10 (the Project)

On April 15, 2015, the Proponent filed an "expanded" NPC with request for Single Environmental Impact Report (SEIR) for a Major Plan Amendment to the KSURP (Amendment No. 10) to allow for up to 1,034,000 gross square feet of additional commercial and residential development. On May 29, 2015, the Secretary issued a Certificate allowing the filing of a SEIR. Appendix B includes a copy of this decision. This SEIR addresses the Scope included in the NPC Certificate and, at the request of the City, represents a final comprehensive final filing for the Project in place of providing information supplemental to the NPC.

[5] MEPA Certificate issued on June 25, 2010.

Table S-1
Summary of MEPA Review History of the KSURP (EEA No. 1891)[1]

Summary of Amendment & Environmental Impacts	Original KSURP (1977 FEIR)	Plan Amendment No. 2	Plan Amendment No. 3	Plan Amendment No. 4	Plan Amendment No. 5	Plan Amendment No. 6[2]	Plan Amendment No. 8[3]	Plan Amendment No. 10 (2015 NPC)
Description	Construction of 14 buildings and three parking garages with open space, parks, plazas and other public improvements.	Adjusted and broadened the permitted mix of uses, but did not increase allowed GSF	Adjusted and broadened the permitted mix of uses (i.e., life sciences), but did not increase allowed GSF. Extended the term of the Plan to 2010.	Reallocated residential, office and retail uses for increased hotel uses, but did not increase allowed GSF.	Added high-rise multi-family residential uses.	Increased biotechnology manufacturing and office uses.	Increased biotechnology and office uses to maximum build-out analysis (for Broad Institute expansion); reduced high-rise multi-family. Extended the term of the Plan to 2020.	Zoning modifications to allow additional office/innovation, retail, and residential uses. Increased parking required to accommodate new uses.
MEPA Approval[4]	January 1978	September 1981	September 1993	July 1997	July 2001	April 2004	June 2010	Anticipated Summer 2015
Total Project Site Acreage	43 acres[5]	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
Gross Square Footage	2,773,000 GSF	- 0 -	- 0 -	- 0 -	+200,000 GSF	+29,100 GSF	+300,000 GSF[6]	+1,034,600 GSF[7]
Vehicle Trips Per Day (adjusted)[8]	19,300	NA	(-5,600)	(-30)	(-42)	+97	- 0 -	+3,638
Total Parking Spaces	4,300[9]	- 0 -	(-755)	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -[10]

NA Not Applicable
GSF Gross Square Feet
1 Plan Amendment No. 1 was reviewed and approved under the original 1977 FEIR.
2 Plan Amendment No. 7, which increased multi-family residential use was reviewed under MEPA, but was not ultimately adopted by City Council.
3 Plan Amendment No. 9, approved by the CRA in May 2014, was a technical compliance measure with no impacts and, therefore, did not required MEPA review.
4 Dates according to the online MEPA Project Information System, although given the length of time the accuracy of the information is uncertain.
5 Represents developable acreage. The KSURP gross area is 63 acres when accounting for public right-of-way, open space, etc.
6 Reduced high-rise multi-family back to 200,000 GSF, per Plan Amendment No. 5.
7 Refer to Table 1-1 of this NPC for the proposed development program.
8 Accounts for mode splits and vehicle occupancy rates based on trip generation methodology reflecting 20 years of actual traffic trip generation data the FST annual reporting to MEPA. As demonstrated, (refer to Figure 2.1).
9 Represents maximum off-street parking supply permitted by the City and exempted from its parking freeze regulation, as agreed upon by MassDEP.
10 Collectively, the approximately 2,667 existing off-street parking spaces and proposed parking supply for the Project Change (±740 spaces) falls within the maximum off-street parking supply previously approved under Plan Amendment No. 3 (3,545 spaces). All new parking will be structured parking.

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Changes Since the NPC

Since the NPC filing, there have been no major changes to the overall proposed program for the Project. Over the course of public discussion related to the KSURP and the parallel drafting of zoning language changes for the Cambridge Zoning Code, refinements to the land use controls have taken place. These include an increase in the height bonus for residential uses from 300 feet to 350 feet, a reduction in the size of retail spaces that qualify for GFA exemptions from 10,000 square feet to 5,000 square feet, and refinement to the open space requirements. Additionally the procedure for future project review has been refined such that new development will be required to receive an Infill Development Concept Plan approval as a special permit, to be approved by the CRA Board and the Planning Board, rather than utilizing a building by building Article 19 review process. This will include all the elements of an Article 19 review plus additional district-wide planning documents that will provide Cambridge officials with a comprehensive look at the Project's phasing and a more refined analysis of the development as the Project moved into the next level of planning and design.

Refinements have been made to the building design, in response to the Department of Energy Resources (DOER) comments. The proposed building models for the North Garage and Office Buildings, Eleven Cambridge Center Residential Building, and Three Cambridge Center Mixed Use Building were revised so that the overall electric power consumption is less compared to the AHSRAE 90.1-2007 baseline models. To achieve this, the overall window-to-wall ratios were decreased and the lighting power densities in the office and retail spaces were reduced by 20 percent. These design changes resulted in an increase in overall energy savings (29.5 percent from 25.1 percent) and associated stationary source Greenhouse Gas (GHG) emissions (23.2 percent from 17.2 percent).

While more progress than a change to the Project, understanding the need for improved Red Line reliability and overall enhanced public transit services to the KSURP area, the Proponent and Redeveloper have advanced the Kendall Square Transit Enhancement Program (the "KSTEP") in the form of creating a public-private partnership to be established by a Memorandum of Understanding (MOU). The intent of the KSTEP is to address the anticipated capacity issues in the future through coordination with MassDOT, the MBTA, the City and other stakeholders, as described further in Chapter 2, *Transportation and Parking*. As an initial step, the Proponent is committed to entering into a MOU with MassDOT and the MBTA, together with the Redeveloper and the City, as a mechanism to implement the KSTEP. Also, the Proponent, in coordination with the City and the other parties to the MOU, will establish and maintain the Kendall Square Enhanced Transit Fund (the "KSETF") for the purpose of establishing funding priorities and allocations for identified transit improvement projects. Potential transit improvements are discussed further in Chapter 2.

The Proponent will file the draft MOU with MEPA for review by July 1, 2016 following the completion of MassDOT-led Kendall Square Mobility Task Force's work, which is anticipated to be completed in February 2016. Both the Proponent and Redeveloper are active members of the Task Force, and the Proponent intends to use the outcomes of the Task Force's study and recommendations to shape the final transit mitigation plan and measures for the Project, working in close cooperation with MassDOT and the MBTA. As a transit mitigation measure for the Project, an initial payment of the sum of not less than $6 million for transit improvements recommended by the KSTEP will be contributed to the KSETF as a "fair share" contribution. This one-time payment would be made at the time a Building Permit is obtained for the first major phase of the Project. Additionally, through a mechanism(s) to be determined by the terms of the MOU, the KSETF will receive additional funding to be provided by the Redeveloper, which will represent an allocation of funding under the KSURP supplemented by contributions from others. The MOU process will ultimately lead to a plan, agreed upon by all involved parties, of mitigation measures the Proponent and Redeveloper will implement to improve the public transportation infrastructure and experience within the KSURP area.

Site Context and Redevelopment Background

The approximately 43-acre KSURP area has been undergoing redevelopment since 1965 when HUD approved financial assistance for the plan. The following sections describe the KSURP redevelopment background.

The Cambridge Center Master Plan

Cambridge Center is a major urban mixed-use project being developed by the Redeveloper on a 24-acre site within the 43-acre KSURP area. Initially, the Proponent assembled the sites, managed the acquired properties, provided relocation assistance to on-site businesses, demolished buildings, prepared the sites for redevelopment, constructed public improvements, including infrastructure and selected Boston Properties as the developer (through a public competition). The Proponent continues to supervise the progress of redevelopment of the KSURP area, approves architect and general contractor selections, and is responsible for the installation of all public improvements and for the coordination of local and State approvals.

The Cambridge Center Master Plan, revised to reflect the addition of 200,000 square feet of residential use and 300,000 square feet of office and laboratory space approved by the Planning Board and the City Council and 29,100 square feet by the Zoning Board of Appeals, provides for over 3 million square feet of new development. All individual buildings and open space development are subject to a design review process conducted by the CRA.

Cambridge Center has been designed to accommodate a wide range of complementary uses. Residential space, hotel and retail space, first-class office space and biotechnology laboratory space, in high-rise and mid-rise buildings, is concentrated in the portion of the KSURP area between Main and Broadway (Parcel 4, or the - East Parcel) and on the western side (Parcel 3, or the West Parcel) with views of the Charles River, Boston and Cambridge. Mid-rise and low-rise, two to seven-story buildings on the ten-acre section north of Broadway (Parcel 2, or the North Parcel) provide space for uses, such as biotechnology research and development and laboratory functions, biotechnology office and manufacturing uses as well as first class office space.

These primary uses are being further complemented by the many services and amenities included in the development: a 431-room Marriott Hotel with a health club, business and conference facilities; a 221-room extended stay Residence Inn by Marriott facility; over 150,000 square feet of retail space offering restaurants, shops and business services; structured parking; direct service by the MBTA Red Line with six (6) MBTA bus routes and a like number of private shuttle buses serving the area. The KSURP area includes over 150,000 square feet of public open space, parks, and plazas.

Completed Development

Cambridge Center's development completed to date includes the properties listed below (in chronological order). Unless otherwise indicated, the buildings at Cambridge Center are owned and managed by the Redeveloper. Noted in parentheses are the new street addresses and garage names associated with the recent rebranding of Cambridge Center. Refer to Figure S.5 for a map key of the Cambridge Center properties.

- **Five Cambridge Center (355 Main Street):** An approximately 272,000-square foot multi-tenant office building completed in the summer of 1981. The building's major tenants include Whitehead Institute for Biomedical Research, VmWare, Arc and Google. Legal Sea Foods occupies approximately 9,100 square feet of the ground floor (over 300 seats).
- **Four Cambridge Center (90 Broadway):** An approximately 221,000-square foot building completed in January 1983. Tenants include Nokia and Akamai Technologies. A restaurant, Meadhall, occupies the ground floor and mezzanine space.
- **Cambridge Center East Garage (the "Green Garage"):** An approximately 804-space parking garage located between Five and Four Cambridge Center opened in April 1983. The garage is completely decked over by a fully landscaped one-acre park approximately 50 feet above grade, easily accessible by three elevators to the general public and Cambridge Center tenants. (Note: The 804-space capacity accounts for the approximately 40 parking spaces will be eliminated

upon completion of the recently approved Ames Street Residences described further below).

- **Fourteen Cambridge Center (250 Binney Street):** The first building to be constructed on Parcel 2 north of Broadway was an approximately 62,600-square foot biotechnology office and laboratory facility for Biogen. The building construction was finished in June 1983 and it is managed by Biogen. Major interior renovations were completed in 2002, which expanded the laboratory and research facilities.
- **Eleven Cambridge Center (145 Broadway):** An approximately 78,600-square foot, four-story building on Parcel 2 completed in June 1984 for the headquarters of the Open Software Foundation. Currently, the major tenant is EMC.
- **Nine Cambridge Center (Whitehead Institute):** An approximately 197,500-square foot Whitehead Institute for Biomedical Research located on Parcel 3 completed in the summer of 1984. It is managed and owned by the Whitehead Institute. An approximately 60,000-square foot addition to the original building was completed in 1996.
- **Two Cambridge Center (50 Broadway):** An approximately 330,000-square foot, 25-story Marriott Hotel with 431 rooms completed in September 1986. The hotel includes an approximately 10,000-square foot ballroom and additional shops, lounges, restaurants, including the recently renovated Champions, banquet facilities and meeting rooms facing the main public plaza. A major lobby renovation was is completed and includes the introduction of a Starbucks facility operated by Marriott staff.
- **Three Cambridge Center (325 Main Street):** An approximately 105,000-square foot, four-story building at the heart of the Cambridge Center complex completed in March 1987. The building consists of office space on floors two through four with an office lobby set symmetrically across a landscaped forecourt from the entrance to Five Cambridge Center, and a major retail facility of The Harvard Cooperative Society at the ground floor and lower level with a main entrance at the eastern end of the building facing the MBTA Kendall Station and the public plaza originally constructed by the CRA. This facility also includes a separate food court with enclosed seating under a glass shed facing the public plaza as well as outdoor seating.
- **One Cambridge Center (255 Main Street):** At the apex of the redevelopment of the KSURP area, this approximately 215,400-square foot building was initially occupied in September 1987. The 12-story building, which faces Boston was built, in part, over the MBTA traction power substation and a portion of the low-rise function wing of the hotel. The major tenants are Microsoft Corporation and Brightcove. A branch of the Boston Private Bank and Trust Company opened in October 2001 in ground floor retail.
- **Ten Cambridge Center (105 Broadway):** The third building on Parcel 2 north of Broadway was completed in March of 1990 is an approximately 145,600-square

foot, seven-story facility, which for ten years served as the national headquarters for Camp Dresser & McKee and is now fully occupied by Biogen.

- **Cambridge Center North Garage (the "Blue Garage"):** Provides parking for approximately 1,136 cars located in the central portion of Parcel 2. Opened in June 1990, this garage features a publicly-accessible perennial garden located at the Broadway frontage.
- **Twelve Cambridge Center (115 Broadway):** The fourth building on Parcel 2, an approximately 101,700-square foot, six-story biotechnology lab and office building, was constructed under the terms of a ground lease with the Redeveloper completed by Biogen in 1995. The building is owned, occupied, and managed by Biogen.
- **Six Cambridge Center (120 Broadway):** The second building constructed on Parcel 3 was an approximately 187,500-square foot (approximately 221 rooms), 15-story extended stay hotel owned by XENIA Hotels and operated by the Marriott as a Residence Inn. Construction commenced in November 1997 and the initial opening occurred on February 1, 1999. The building has approximately 2,000 square feet of ground floor space, which is occupied by Starbucks.
- **Eight Cambridge Center (150 Broadway):** The third building to be constructed on Parcel 3 was an approximately 176,600-square foot, nine-story office building that serves as the international headquarters for Akamai Technologies occupying the entire building. Construction commenced in February 1998 and was initially occupied in June 1991 by Cambridge Technology Partners, now Novell.
- **Fifteen Cambridge Center (125 Broadway):** The sixth building on Parcel 2 is an approximately 218,300-square foot, six-story research and development building built under the terms of a ground lease by and between the Redeveloper and Biogen. Initial construction activities commenced in July 1999 and the building was completed in January 2001. Biogen occupies, owns and manages the facility.
- **Twelve Cambridge Center (115 Broadway) – Expansion:** The seventh building on Parcel 2 is an approximately 100,000-square foot, six-story biotechnology lab and office building constructed under the terms of a ground lease with the Redeveloper. It has a unique co-generation plant supplying all energy services for Biogen's occupied approximately 800,000 square feet of real estate. Initial occupancy commenced in January 2006. The building is owned, occupied and managed by Biogen.
- **Seven Cambridge Center (415 Main Street)**: The fourth building on Parcel 3 consists of approximately 176,600 square feet of research and development and 11,800 square feet of retail uses in a 7-story building, which is master leased to MIT and occupied by the Broad Institute. The building is owned by the Redeveloper and managed by the Broad Institute. Initial occupancy began in March 2006.
- **Cambridge Center West Garage – Phase I (the "Yellow Garage"):** An approximately 727-space parking garage located between Six and Seven

Cambridge Center. Construction was substantially completed and the garage was opened in October 2005.

- **Broad Institute Expansion:** An approximately 246,000-square foot office and laboratory space expansion with approximately 4,000 square feet of retail at the Broad Institute's 75 Ames Street building.
- **Seventeen Cambridge Center (BioGen/300 Binney Street)**: An approximately 190,000-square foot research and development center constructed in 2013 for Biogen. The building also includes a daycare on the first floor.
- **Three Cambridge Center Connector:** An approximately 50,000-square foot expansion was added to Three, Four, and Five Cambridge Center buildings to accommodate Google.
- **Ames Street Residences:** A planned approximately 200,000-square foot (280 units) residential building with approximately 20,000 square feet of ground floor retail at 88 Ames Street between Four and Five Cambridge Center.

Gross Floor Area of Development

In accordance with the Certificate, Table S-2 below compares the currently allowed maximum permitted development (Gross Floor Area, or GFA, and housing units, parking spaces) to the as-built development and Project Change. Associated estimated impacts (vehicle trips, water/wastewater) are also presented.

Table S-2 Current Maximum, As-Built, and Proposed Maximum Development in the KSURP Area

	Current Maximum Development Allowed (Previously Reviewed)	Existing/As-Built Development	Proposed Maximum Development Allowed (Amendment No. 10)
Gross Floor Area (GFA)[1]	3,302,100 GFA	3,302,100 GFA	4,273,000 GFA[2]
Gross Square Footage (GSF)[3]	3,302,100 GSF	3,292,900 GSF[4]	4,312,500 GSF[5]
Housing GSF	200,000 GSF	200,000 GSF	600,000 GSF[6]
Housing Units	Up to 185 units	280 units[7]	840 units[8]
Daily Vehicle Trips (Unadjusted)	26,845	10,512	37,357
Daily Vehicle Trips (Adjusted)	13,714	3,638[9]	17,352
Off-Street Parking Spaces	3,545 spaces	2,667 spaces	3,545 spaces[10]
Water Use[11]	±1.24 million GPD	±118,740 GPD	±1.35 million GPD
Wastewater Generation[11]	±0.93 million GPD	±107,945 GPD	±1.04 million GPD

GPD Gallons Per Day

1 Represents the total development allowance, but does not account for bonuses associated with Innovation and Retail spaces.

2 Represents a difference of 29,100 square feet from the NPC (4,302,100 GFA) to account for a variance received for Broad Institute under Amendment No. 6.

3 Represents total square footage, including building area associated with bonus uses.

4 Includes the planned Ames Street Residences approximately 200,000-square foot residential building.

5 Represents the GFA cap plus an additional approximately 39,500 sf of Innovation and Retail space (bonus use).

6 Required to be housing; could build more housing as a substitute for commercial.
7 Represents the planned Ames Street Residences. Smaller unit sizes allowed for 95 additional housing units from the Current Maximum.
8 Existing/as-built units plus the proposed 560 units.
9 Based on actual FST reporting.
10 Represents maximum allowed off-street parking. Approximately 740 new off-street parking spaces are proposed to support the Project Change, which would result in a total of 3,407 spaces within the KSURP area.
11 Estimated based on Title V generation rates.

Public and Open Space Improvements

The Proponent constructed basic public improvements throughout the KSURP area, including new streets, and a major park/fountain/artwork amenity at the apex of Parcel 4, completed in June 1990, and dedicated as the Thomas J. Murphy Park, planted median strips, brick sidewalks, a heavily-landscaped Pedestrian Walkway and other street trees, furniture and landscaping. Basic infrastructure improvements and the construction of a new street network, tree planting, median strips and traffic improvements were completed.

In addition to required open space for each building, Boston Properties has constructed and maintains publicly accessible open space throughout Cambridge Center. These include Danny Lewin Park on Parcel 3 between Six and Eight Cambridge Center, North and South Parks located on the north and sides of the North Garage, respectively, and the Kendall Center Roof Garden on top of the Cambridge Center East Garage. Over 150,000 square feet of open space has been constructed to date – already exceeding the 100,000 square foot zoning requirements. It is anticipated that this base requirement may be tripled as part of the Project Change. At the present time, the Proponent is examining with all abutters the potential for a linear park extending along the railroad land from Main Street to Binney Street and a "Gateway" project at the Longfellow Bridge.

A major transit public plaza, framed by the Marriott Hotel at Two Cambridge Center, and One and Three Cambridge Center on Parcel 4, was initially constructed (and owned) by the Proponent. The plaza provides an important urban outdoor space, and setting for outdoor dining and scheduled activities. The plaza is currently programmed and maintained by the Redeveloper (Boston Properties). In 2011, this plaza was redesigned and reconstructed by the Redeveloper and in 2013, ownership was transferred from the CRA to Boston Properties.

Parking

Off-street parking is currently provided in the form of three parking garages for a total of approximately 2,667 spaces some limited interim on-grade parking. The first garage, the 804-space Cambridge Center East Garage (now referred to as the “Green Garage”) opened in April 1983, and is located on Parcel 4 between the Four and Five Cambridge Center. The second garage, the 1,36-space Cambridge Center North Garage (now referred to as the “Blue Garage”), was built to the northwest of the first garage on Parcel 2 in an interior area formed by the Ten, Eleven, Twelve and Fourteen

Cambridge Center. A third garage, the 727-space Cambridge Center West Garage (now referred to as the "Yellow Garage"), was constructed in 2004-2005 and is located in the center of Parcel 3 between Six and Seven Cambridge Center. All garages accommodate bicycles with a total of 215 dedicated spaces that are secured.

As provided for in the applicable MXD zoning regulations governing development in Kendall Square, each of the parking garages is operated on a pooled basis, serving tenants in a number of different Cambridge Center buildings. In addition to providing parking to tenants under long-term leases, the parking garages will also offer visitor parking, and daily and monthly leased parking to tenant's employees.

Public Transit

The reconstruction of the Kendall Square station and the construction of a new traction power substation on the MBTA Red Line is completed. This work consisted of new construction of an extension of the platform capacity and two station entrances and total modernization of the station. The new station entrances, which connect directly into Cambridge Center, opened in the spring of 1987.

Four (4) connecting bus lines operate within a ¼-mile of the KSURP area (as shown in Figure 2.4) as do a similar number of free private shuttle buses, including one connecting to the nearby CambridgeSide Galleria Mall in East Cambridge. This shuttle serves over 60,000 riders each month. Since January 2002, Charles River Transportation Management Association has run EZRide, a publicly-assisted, privately-funded shuttle service connecting the north side Commuter Rail lines, Orange/Green Line at North Station and Boston with the Red Line (Kendall Square) and University Park at MIT. EZRide had a ridership of 145,000 for the year 2004, with a daily ridership of 580 and a weekly ridership of 2,900. For 2010, the projected ridership is 425,000, with a daily ridership of 1,700 and a weekly ridership of 8,500. The location of the Kendall Square transit station was one of the key elements in the decision to renew Kendall Square and to develop Cambridge Center.

Existing Site Conditions

The specific parcels subject of the Project Change include three (3) key parcels within the existing Cambridge Center complex:

- Cambridge Center North Garage;
- Eleven Cambridge Center; and
- Three Cambridge Center.

Additionally, the existing Whitehead Institute building at Nine Cambridge Center and Broad Institute at 75 Ames Street are also included as part of the Project Change

because they involve changes to previously reviewed and approved uses (described further under the 'Project Change Overview' section below). Refer to Figure S.4 for the Project Components. The existing conditions for each subject parcel or building are described in the following sections.

Cambridge Center North Garage

The Cambridge Center North Garage is a 6-story approximately 92,000-square foot parking facility located at 121 Broadway and 280 Binney Street. The garage is surrounded on all sides by commercial office and biotech lab space. Refer to Figure S.6a for the existing conditions for the North Garage. Access to the garage is through roadways on either side of the garage that connect to Binney Street to the north and Broadway to the south. The land at the north and south ends of the garage is improved with landscaped areas, benches, and walkways. A large steam line runs through the garage property below the ground floor slab contained within a 30-foot wide utility easement.

Eleven Cambridge Center

The Eleven Cambridge Center site consists of approximately 37,862 square feet of land with an approximately 76,600-square foot commercial office building located at the corner of Broadway and Galileo Galilei Way. Refer to Figure S.6a for the existing conditions for Eleven Cambridge Center. The site is bordered by a tree lined landscaped area and Fifteen Cambridge Center to the north, the North Garage to the east, Broadway to the south and Galileo Galilei Way to the west. A large diameter drainage culvert exists parallel to Broadway below the sidewalk. The culvert leads directly to the Charles River located approximately 0.4 mile to the east. The drainage culvert also served historically as an aqueduct connecting the former industrial complex at One Kendall Square to the Charles River supplying cooling water to the facility.

Three Cambridge Center

The Three Cambridge Center consists of approximately 28,822 square feet of land with an approximately 105,100-square foot office building located at 247 Main Street. Refer to Figure S.6b for the existing conditions of Three Cambridge Center. The site is bordered by the Marriott Hotel (Two Cambridge Center) to the north, a paved courtyard to the east (shared with One and Two Cambridge Center), Main Street to the south across which there is an office/retail building, a bank, a hotel (formerly a fire station) and an entrance to the MBTA Red Line Kendall Square/MIT station, and Five Cambridge Center to the west. The MBTA Redline subway tunnel runs beneath Main Street adjacent to Three Cambridge Center. An entrance/exit headhouse is located in the adjacent courtyard area.

Whitehead Institute and Broad Institute Buildings

Figure S.6c shows the existing site conditions of the Whitehead Institute building and Broad Institute sites. The Whitehead Institute is an approximately 200,000-square foot existing commercial building with research and development/laboratory uses located at Nine Cambridge Center at the corner of Main Street and Galileo Galilei Way. Constructed in 2006, the approximately 246,000 square feet Broad Institute building located at 75 Ames Street was the subject of Plan Amendment No. 8 (the most recently previously reviewed project under MEPA).

Project Change Overview

The proposed Plan Amendment No. 10 includes the following elements:

- Updates to Goals and Objectives;
- Allow for additional development;
- Implement K2 Plan Overlay Policies (which aim to: (i) balance commercial and residential uses; (ii) incentivize ground floor retail; (iii) require innovation space; and (iv) incorporate sustainable measures);
- Establish housing policies;
- Create a transit investment tool; and
- Establish a coordinated Design Review Process.

Chapter 1, *Project Change Description* provides a detailed description of the proposed material changes to the KSURP, which are the subject of MEPA review (i.e., additional development and associated potential impacts). The Project Change consists of a Major Plan Amendment to the KSURP to allow up to 1,034,000 square feet of net new commercial and residential development. The Project Change aims to encourage new development in the form of the following key components (the "Project Components"):

- Cambridge Center North Garage Office Buildings;
- Eleven Cambridge Center Residential Building; and
- Three Cambridge Center Mixed Use Building.

Additionally, the existing Whitehead Institute building at Nine Cambridge Center and Broad Institute at 75 Ames Street are also included in this MEPA review because they involve changes to the build-out under the KSURP. The Whitehead Institute consists of an expansion of an existing use (an approximately 60,000-square foot commercial office/lab addition) and the Broad Institute proposes a change in use to their existing facility (conversion of approximately 15,100 square feet of mechanical space to commercial office space). These components will be undertaken by other

parties separate from the Redeveloper (referred to herein as "Other Developers"). Refer to Figure S.4 for the Project Components. Refer to Chapter 1, *Project Change Description* for additional detail on each Project Component.

Summary of Findings and Project Benefits

In the nearly 40 years since the adoption of Plan Amendment No. 1, the Proponent has facilitated many refinements to the KSURP, which have contributed to the transformation of Kendall Square and the neighborhood around it. Kendall Square has become a center of innovation, creativity and technology, perhaps even exceeding the expectations of the developers of the original KSURP back in the 1970s. Additionally, as demonstrated by the FST reporting over the last two decades, aggressive implementation of policies to maximize the use of alternative travel modes by the Proponent and the City have been successful at reducing traffic generated by the redevelopment, compared to what was historically projected for the KSURP area.

The Project will advance and implement many of the recommendations from the K2 Study. The Project will provide for significant urban design and public realm improvements, increase housing opportunities, and expand retail options, job creation, and additional state and local tax revenues. It will also result in sustainable, smart growth development in an urban area well-served by public transit.

The following sections summarize the key findings of the environmental impact analyses conducted for and highlights the public benefits associated with the Project. Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures* of this NPC provides a more comprehensive discussion of the proposed mitigation and other beneficial measures proposed as part of the Project Change.

Open Space & Public Realm

The Project will:

- Facilitate the creation of the Grand Junction Multi-Use Path within the MXD District, and beyond.
- Expand activity in the KSURP area beyond the typical business day (i.e., past 7PM) by introducing new residents and ground-floor retail uses.
- Enhance existing and create new ground level open spaces with multiple outdoor connections to buildings within the KSURP area.
- Create new urban open space opportunities on building rooftops while aiming to improve water quality and reduce heat island effect through green roofs and roof gardens for use by tenants.

- Implement and/or facilitate streetscape improvements along Broadway and Main Street between Ames Street to Galileo Galilei Way, the Sixth Street Connector, Point Park and Galileo Galilei Way between Ames and Binney Streets.

Social and Economic

The Project will:

- Expand the capacity of one of the top drivers of economic growth for the state and region, which is currently constrained by space.
- Support the economic development goals originally set forth by the KSURP by allowing new development and uses, which will bring new residents, customers, and employees.
- Continue to foster the economic activity in Kendall Square through the creation of commercial and innovation space targeted to a mix of tenants from the bio-tech, information technology, and/or health care industries.
- Provide opportunity for new ground floor retail that supports commercial and residential uses, such as food market or drug store.
- Provide up to 560 new housing units, 15 percent (84 units) of which will be provided at an affordable rate to low- and moderate-income households.
- Create an estimated 2,650 construction jobs in all trades and over 2,600 permanent jobs.
- Create a total of approximately $6.7 million in new annual local tax revenue.

Transportation and Parking

Vehicular Traffic

- Traffic operations within the KSURP area have been monitored by FST since the approval of Plan Amendment No. 3 in 1993, as required by MEPA. The FST analysis has consistently shown that actual trip generation in Kendall Square is significantly lower than accepted methodology for average daily vehicle trip projections due to the high proportion of alternative modes, including transit, walk and bike, by commuters, shoppers, visitors and residents in Kendall Square.
- When taking the historic FST traffic monitoring data and adjustments for area-specific mode splits and vehicle occupancy rates (which more accurately represent the actual number of vehicle trips to be generated), the Project will generate an estimated 3,638 adjusted vehicle trips.
- While the Project will add traffic to the 13,714 average vehicle trips per day projected by FST under Amendment No. 8, the estimated total number of vehicle

trips per day to the KSURP area is estimated to total 17,352, which is still approximately 10 percent less the projected 19,300 vehicle trips estimated in the 1977 FEIR.

- In coordination with the City, the Proponent and Redeveloper will work to improve traffic circulation to the local roadway network through intersection improvements.
- The Redeveloper will implement a robust TDM plan to reduce single-occupancy vehicles traveling to/from the Project Components.
- The Proponent will continue to implement an annual Transportation Monitoring Program (TMP) to assist in determining the effectiveness of TDM initiatives and traffic mitigation improvements. The Proponent plans to update the scope of the monitoring program to reflect the evolution of Cambridge's transportation priorities in a complex multi-modal urban environment, such as Kendall Square. The improved study will utilize up to date development square footage and traffic projections as well as more holistically consider additional data on bicycle usage, pedestrians, travel behavior and transit service as it becomes available.

Public Transit

- If the Red Line were to operate under the posted schedule, future ridership with and without the Project can be accommodated for all but one service segment.
- The Project would increase transit trips on the Red Line by only approximately two percent during the highest demand period (the morning peak hour inbound train entering Kendall/MIT station). This represents a *de minimus* impact to public transit capacity.
- The MBTA Kendall/MIT station platform could accommodate future passenger demand with and without the Project under LOS D conditions, which is considered acceptable for existing, urban stations.
- Establish a program (the KSTEP) in conjunction with MassDOT, the MBTA, the City and other stakeholders designed to enhance mobility around the KSURP area, including major transportation initiatives that will improve transit options and services. Initiatives may include a range of projects, programs, and services directed at improving and enhancing transit for people working, living and visiting the Kendall Square area.

Pedestrian Access and Bicycle Accommodations

- The Proponent and Redeveloper will continue to consider ways to utilize and expand the extensive existing transportation infrastructure currently serving the Project area, including expanded infrastructure for alternative modes (Red Line, bus routes, EZ Ride, and bicycle and pedestrian facilities. Bicycle enhancements

will include on-street bike lanes, cycle tracks, sidewalks, crosswalks and multi-use pathways).

- Both the Proponent and Redeveloper are committed to creating a cohesive integrated network of open spaces and connecting pathways while improving pedestrian safety, access, and circulation within the KSURP area. The Proponent, in conjunction with the Redeveloper, will work with the City to identify areas of improvement, such as:
  - Providing additional pedestrian countdown timers at study area intersections.
  - Implementing Leading Pedestrian Interval (LPI) programming at study area intersections.
  - Improve lighting on sidewalks and pathways for safer pedestrian accommodations, such as Sixth Street and other active pedestrian walkways in the KSURP area.
  - Enhance pedestrian access and circulation through development blocks, including incorporating a new mid-block pedestrian crossing at the Broadway crossing between the proposed North Garage Office Buildings and Danny Lewin Park on the south side of Broadway.
- Both the Proponent and Redeveloper are committed to enhancing bicycle infrastructure alongside each Project Component and within the KSURP area by connecting this infrastructure with other area-wide improvements.
- The Project will include approximately 802 long-term secure on-site bicycle spaces for residents and employees, and 142 exterior at-grade short-term bicycle spaces for visitors and customers, in accordance with the City's current bike parking requirements.
- The Proponent will discuss with the City the possibility of contributing to the proposed infrastructure improvements within the area, including the cycle track along Galileo Galilei Way, the Grand Junction Multi-Use Path, and explore opportunities to create a full-service bike station within the area (in close coordination with the City, the Redeveloper, and Other Developers).

Parking

- Collectively, the approximately 2,667 existing off-street parking spaces and the proposed 740 new off-street parking spaces falls within the maximum off-street parking supply previously approved under Plan Amendment No. 3 (3,545 spaces).
- All new parking will be structured parking. Two new levels of parking totaling of 370 spaces will be added to the Cambridge Center North Garage for tenant and visitor parking. The new residential building at Eleven Cambridge Center will provide 370 below-grade parking spaces for building residents. Spaces for the

new residents and tenants of Three Cambridge Center will be accommodated within the existing East Garage.

- A shared parking plan will be implemented to reduce the amount of new parking needed, while monitoring of the garages will ensure monthly and resident parkers are accommodated within their appropriate garages.

Air Quality

- The air quality assessment demonstrates that the Project complies with local, state, and federal air quality requirements.
- The Project is consistent with the guidelines of MassDEP because the Project will incorporate reasonable and feasible measures to reduce the projected 2024 Build Condition VOC and NO_x emissions associated with the Project's mobile sources, or single-occupancy vehicle trips.
- The proposed transportation-related mitigation and beneficial measures will have local and regional air quality benefits as they aim to reduce the amount of vehicle trips to/from the KSURP area, which results in reduced vehicle air emissions.

Sustainability and Greenhouse Gas Emissions

- The Project consists of urban infill with dense, high-efficient buildings, a building reuse component (the Cambridge Center North Garage Office Buildings) and reduced single-occupancy vehicle trips through alternative modes of transportation—all of which result in significantly less GHG emissions compared to a suburban "greenfield" development.
- The Proponent is committed to incorporating design and mitigation strategies consistent with the K2 Plan sustainability recommendations, and other local policies and initiatives, such as:
  - Optimize existing infrastructure developed to support greater density, such as the infill development proposed as part of the Project.
  - Use land efficiently by revitalizing an urban renewal era above-ground parking structure with dense mixed-use development.
  - Promote the use of non-single occupancy vehicles modes of transportation, encourage pedestrian activity and enhance the surrounding neighborhood.
- The Redeveloper is committed to incorporating sustainable design, construction, and operation principles into the Project, such as:
  - Limit the impact on the climate by reducing Project-related GHG emissions through thoughtful building design and by preserving the embodied energy of existing materials through the reuse of the Cambridge Center North Garage.

- Promote the use of local materials, provide for a high-quality indoor environment for users, and reduce environmental impacts both locally and globally.
- Incorporate sustainability throughout by thoughtfully planning for efficient use of energy and resources through all stages of design and during operations.
- Utilize the LEED Green Building Rating System as a design tool with a LEED Gold rating benchmark.
- Incorporate preferential parking for low-emission and clean-fuel vehicles as well as EV charging stations within the Cambridge Center North and East Garages.
- Lease and operate the buildings in a sustainable manner (i.e., develop Tenant Manual/Guidelines to encourage sustainable design and operation of tenant spaces, such as encouraging the use of LEED-CI).

- Through the implementation of a comprehensive design strategy, including responsive mitigated design and operational commitments, the Project is expected to result reductions in GHG emissions consistent with the MEPA Greenhouse Gas Emissions Policy and Protocol.
- All Project Components will meet the current Stretch Energy Code requirements, where applicable (i.e., achieve at least a 20 percent overall reduction in annual energy use compared to a baseline using requirements of ASHRAE 90.1-2007).
- The Proponent has considered additional energy efficiencies that may be required to meet the future potential Stretch Energy Code (i.e., approximately 15 percent more efficient than the IECC2012 and ASHRAE standard 90.1-2010, which is the current state-wide Base Energy Code).
- As demonstrated by the stationary source GHG assessment, overall the Project will achieve an estimated 23.2 percent reduction in stationary source CO_2 emissions by reducing overall energy consumption by approximately 29.5 percent through the implementation of energy optimizing building design and systems. (Note, the percentages of energy use are different than emission reductions due to emissions conversion factors.)
- Achieving reduction of 105 tons per year in mobile source GHG emissions by implementing the traffic mitigation measures.

Stormwater Management

- As the KSURP area is predominantly impervious, discharges are representative of a highly developed urban area in rate and water quality.
- Each Project Component will be required to mitigate stormwater runoff to comply with City and MassDEP standards.

- The Project will reduce the runoff discharge rate and improve the quality of the runoff to the City's stormwater system and the Charles River basin through the process of redevelopment by updating the stormwater management facilities to current standards, including possible incorporation of green roofs, rainwater harvesting for on-site re-use, groundwater recharge, and phosphorous mitigation.
- Where possible, the Proponent will coordinate with the City to explore creative solutions to stormwater management that go beyond the scope of individual Project Components to provide a more district-, or neighborhood-, wide solutions.

Water and Wastewater

- As part of the initial implementation of the KSURP, utility systems were rebuilt in the KSURP area in the 1960's and 1980's. Furthermore, the DPW and Cambridge Water Department (CWD) have invested in several projects in recent years to improve capacity issues in the Kendall Square neighborhood.
- The Project will infill the heavily developed area and, therefore, will benefit from infrastructure improvements implemented as part of the KSURP.
- The Project will require an estimated 118,740 gallons per day of potable water and is projected to generate approximately 107,945 gallons per day of wastewater.
- The Project will be required to mitigate its contributions of stormwater from the local sewer system at a ratio of 4:1 (an estimated 431,780 gallons per day).
- The Proponent will coordinate all sewer connections to City infrastructure with the City, as required by the DPW, as designs progress.
- The Project will attempt to conserve water through several methods, including low-flow plumbing fixtures, efficient air conditioning systems and efficient landscape irrigation practices.

Hazardous Materials

- The Project Component sites have either achieved regulatory closure under the MCP or were developed prior to the adoption of the Massachusetts Contingency Plan in 1988.
- It is anticipated that a majority of the historic fill and underlying soils will be impacted with petroleum oils and hazardous materials and, therefore, characterization of soil materials in-place prior to excavation is planned as part of the Project.
- It is anticipated that contaminated groundwater will also be encountered and that treatment of construction dewatering effluent will be required.
- The management of contaminated soil and groundwater, and implementation of measures to reduce the risk of exposure to contaminants at each Project

Component site will be conducted under a Release Abatement Measure (RAM) Plan. It is anticipated that the measures undertaken under the RAM will result in achieving a Permanent Solution for each property redevelopment.

Construction

- The Project will be construction in two key phases where Phase 1 will be split into two sub-phases.
- Temporary construction-period impacts (typically related to stormwater runoff, truck traffic, air quality/dust, noise and construction waste) will be managed to minimize disruption to the surrounding neighborhood through the preparation of Construction Management Plans for each Project Component in coordination with the City.
- The Proponent, Redeveloper and Other Developers will all work with the City, MBTA and local community to coordinate construction and seek to minimize any impacts from demolition and construction of new buildings (specifically, during Phase 2 to minimize impacts to the Kendall Square/MIT subway station entrance/exit headhouse located in the courtyard area adjacent to Three Cambridge Center).

Analysis of Relevant MEPA Project Change Factors

The technical analyses accompanying this "expanded" NPC demonstrate that the Project Change does not result in any new significant environmental impacts (that have not been or are not addressed with mitigation) beyond those documented and analyzed in the most recently previously reviewed filing. The Proponent requests a finding that the Project Change incorporates measures that adequately addresses environmental impacts such that a Single Environmental Impact Report is required. The Proponent is not requesting a finding that the Project Change is "insignificant" pursuant to the relevant MEPA regulatory provisions (301 CMR 11.10).

The Project Change will potentially result in environmental impacts associated with up to 1,034,000 square feet of net new development; however, as demonstrated herein, the Project incorporates measures to avoid, minimize, or mitigate all areas of potential environmental impact (i.e., local roadway improvements, stormwater management facilities). The expansion of the Project represents an approximately 31 percent increase in allowable development compared to what was has been approved through Plan Amendment No. 8 (up to approximately 3.3 million square feet). No new MEPA review thresholds or Mandatory Environmental Impact Report (EIR) review thresholds are triggered as a result of the Project with the exception of

Transportation-related thresholds (new unadjusted daily traffic and new parking spaces).

The following sections provide an evaluation of the significance of the Project Change under the relevant factors/considerations set forth in the MEPA regulations under 301 CMR 11.10(6).

Expansion of the Project

The Project Change will result in up to 1,034,000 square feet of new commercial and residential development. This represents an approximately 31 percent increase in overall currently allowable square footage approved as part of the Plan Amendments for an overall total of up to approximately 4,446,700 gross square feet of development.

Generation of Further Impact

No new MEPA review thresholds are triggered as a result of the Project Change. The only Mandatory Environmental Impact Report (EIR) review thresholds exceeded are Transportation thresholds for new traffic and parking spaces.

Traffic

As described in Chapter 2, *Transportation and Parking*, traffic operations within the KSURP area have been monitored by FST since their initial traffic analysis for Plan Amendment No. 3. In accepting this analysis, the MEPA approval for Plan Amendment No. 3 required that the CRA annually update KSURP traffic counts, collect and analyze parking data, and review KSURP tenant surveys to evaluate over time the reduced traffic and increased transit usage assumptions. The Proponent has been reporting on area traffic volumes and parking garage usage since the approval of Plan Amendment No. 3 in 1993. The FST reports have consistently shown that actual trip generation in Kendall Square is significantly lower than accepted methodology for average daily vehicle trip (ADVT) projections (as shown in Figure 2.1).

The conclusions summarized in the ongoing traffic FST reports can be used to better forecast trips associated with the Project Change. While traffic will increase as a result of the additional development, it will be at a lower rate than the standard Institute of Transportation (ITE) Trip Generation Manual rates (unadjusted) due to consideration of mode-share and the implementation of aggressive TDM measures, which have been successful at reducing traffic compared to what was historically projected for the KSURP area. Taking these factors into consideration, the Project Change will generate an estimated 3,638 ADVT. Adding this traffic to the 13,714 ADVT, as projected by FST under Plan Amendment No. 8, the overall estimated number of vehicle trips per day generated by the KSURP area redevelopment is 17,352. With the Project Change presented herein, the estimated future number of vehicle trips to the KSURP area

remains less (by approximately ten percent) than the originally projected 19,300 vehicle trips. (Note: The approach to traffic adjustments was based on direction from the Cambridge Traffic, Parking & Transportation Department and approved by the Massachusetts Department of Transportation according to their Transportation Scoping Letter [TSL] issued December 4, 2014. Appendix C includes a copy of the TSL.)

The Proponent and the Redeveloper remain focused, as they have throughout the development of Cambridge Center, on preserving and enhancing the favorable transportation mode split in Kendall Square that has played such an important role in the successful redevelopment of the area. It is acknowledged and well documented that an estimated 70 percent of trips travelled to Kendall Square utilize transit, walking, biking, shuttle and/or carpooling. This remarkable factor is at the core of the opportunity for the Project. The importance of preserving and enhancing this condition cannot be overstated and is central to the Proponent's plans for expansion of the KSURP.

Parking

The Project includes an additional 740 parking spaces all of which will be structured parking. The additional parking proposed as part of the Project is expected be shared parking among employees and residents within the area. Collectively, the approximately 2,667 existing off-street parking spaces and proposed parking supply for the Project Change falls within the maximum off-street parking supply previously approved under Plan Amendment No. 3 (3,545 spaces). This change in parking represents a 0.35 percent decrease in the maximum off-street parking supply originally contemplated for the KSURP area (4,300 spaces).[6]

The City has recommended new zoning requirements under the K2 Plan for parking standards in the area. New office and retail uses have no minimum parking requirement, but instead a maximum parking ratio. Additionally, the Proponent is considering reducing the residential parking requirement on current trends within the area. Refer to Chapter 2, *Transportation and Parking* for further details on the proposed parking supply for the Project Change.

Change in Schedule

The Project Change includes extending the completion date for the full build-out to 2030 from 2020, as previously approved under Plan Amendment No. 8.

[6] This maximum parking supply represents spaces permitted by the City and exempted from its parking freeze regulation, as agreed upon by MassDEP.

Change in the Project Site

The Project Change does not result in a change in the KSURP area as the subject parcels fall within the previously reviewed and approved KSURP area (Figure S.2).

Need for New Permits

No new or amended state permits are required for the Project Change.

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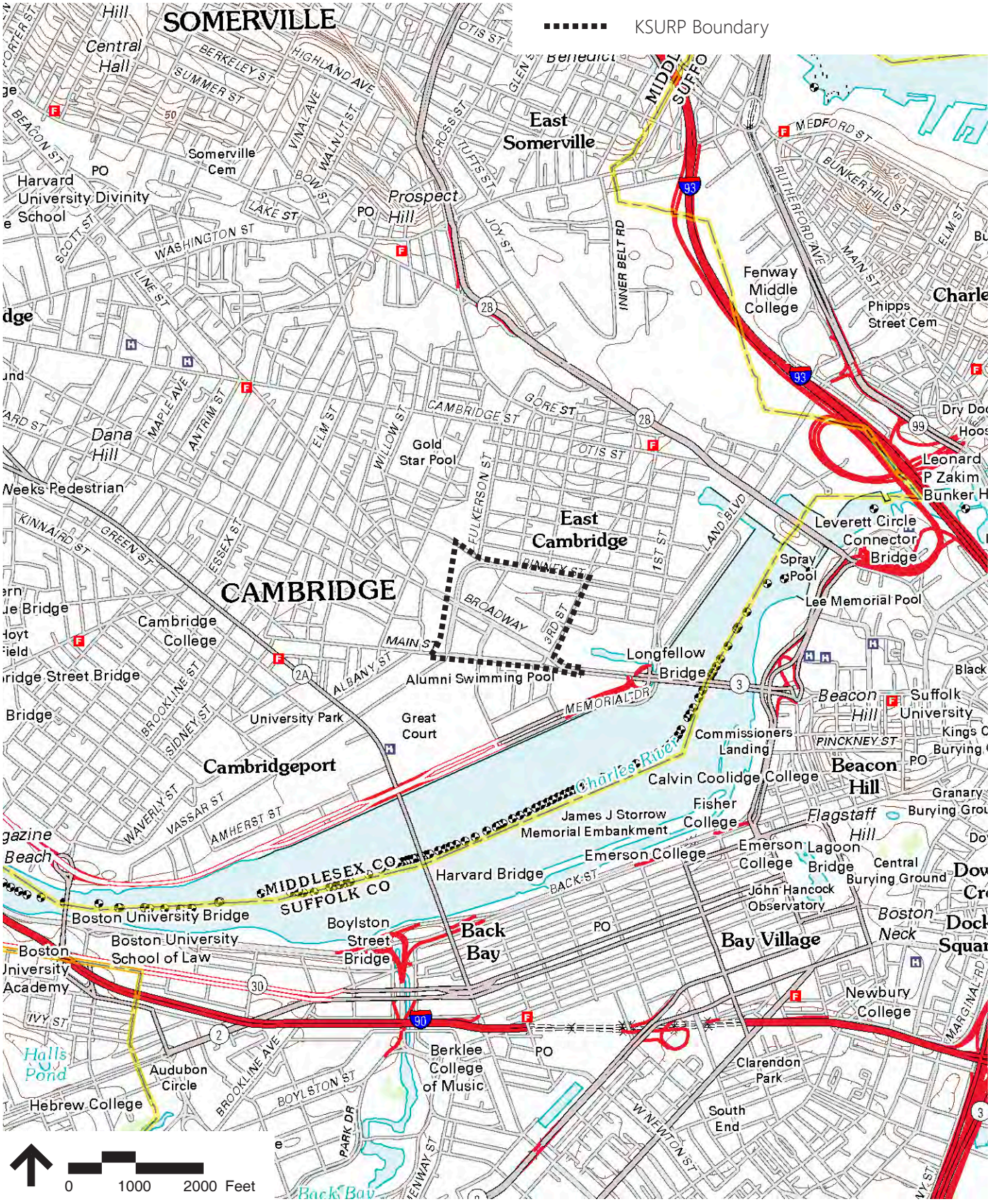

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Figure S.1
Site Location Map

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge GIS, MassGIS

URBAN RENEWAL AREA BOUNDARY

ACQUIRED BY CRA

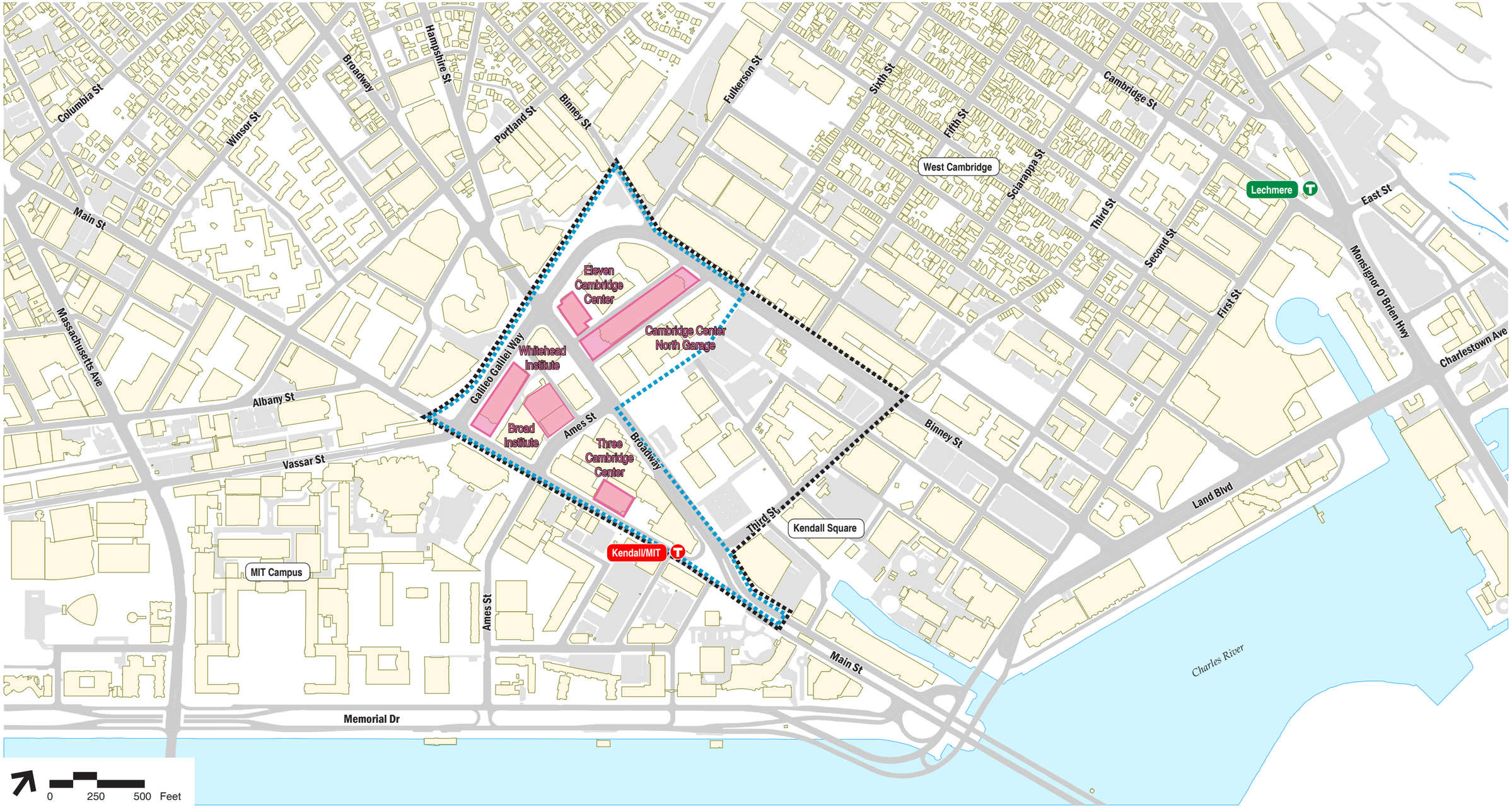
TO BE ACQUIRED BY CRA

CRA

Figure S.2
1976 KSURP Boundary and Property Acquisition Areas

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: Cambridge Redevelopment Authority



Source: City of Cambridge GIS

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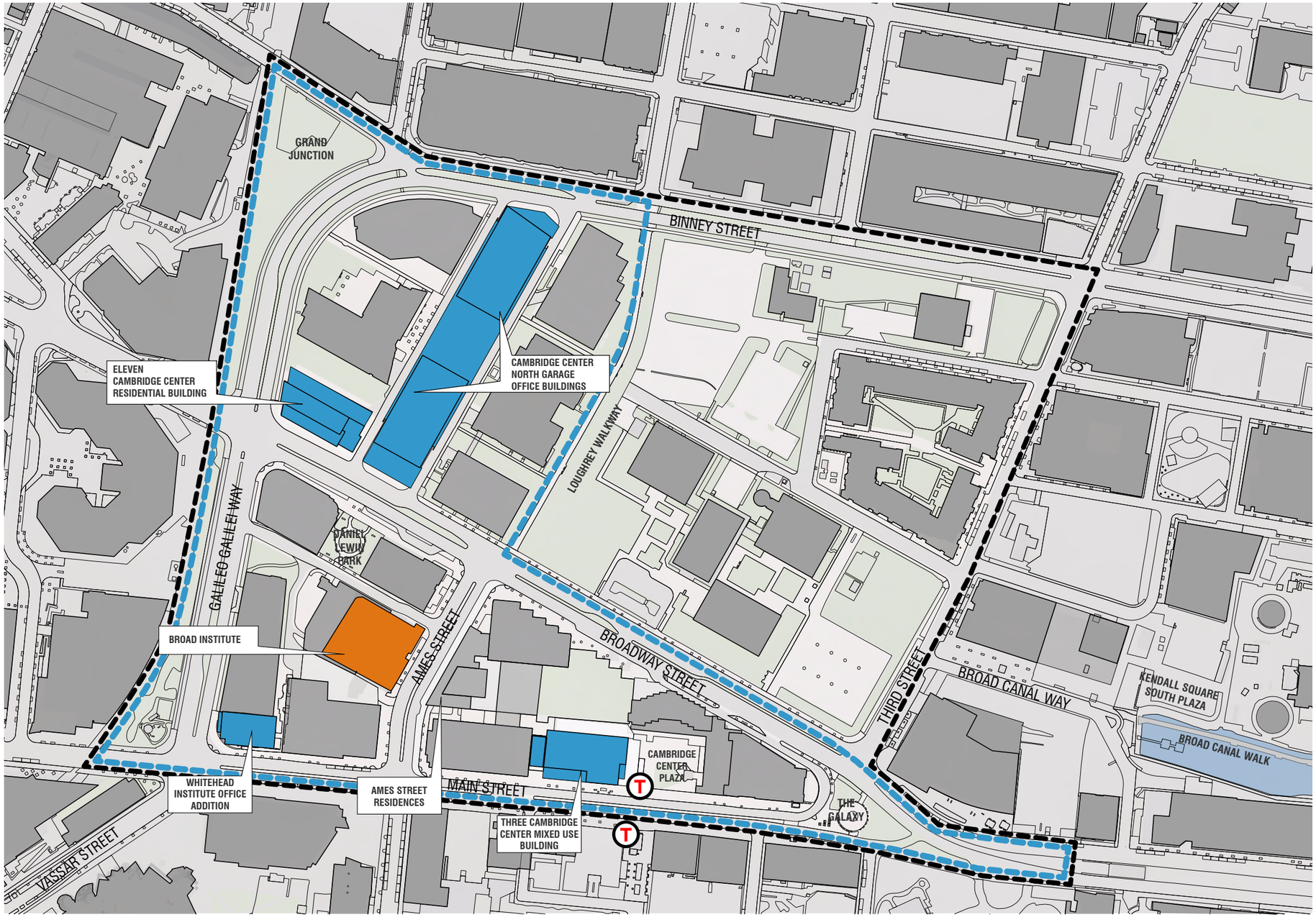
Figure S.3
Project Area Context

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA



LEGEND

- KSURP Boundary
- MXD Boundary
- Project Most Recently Previously Reviewed by MEPA
- Project Change (referred to herein as the Project Components)

Source: Sasaki Associates

0 100 200 Feet

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Figure S.4

Previously Reviewed Project and Proposed Project Change

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

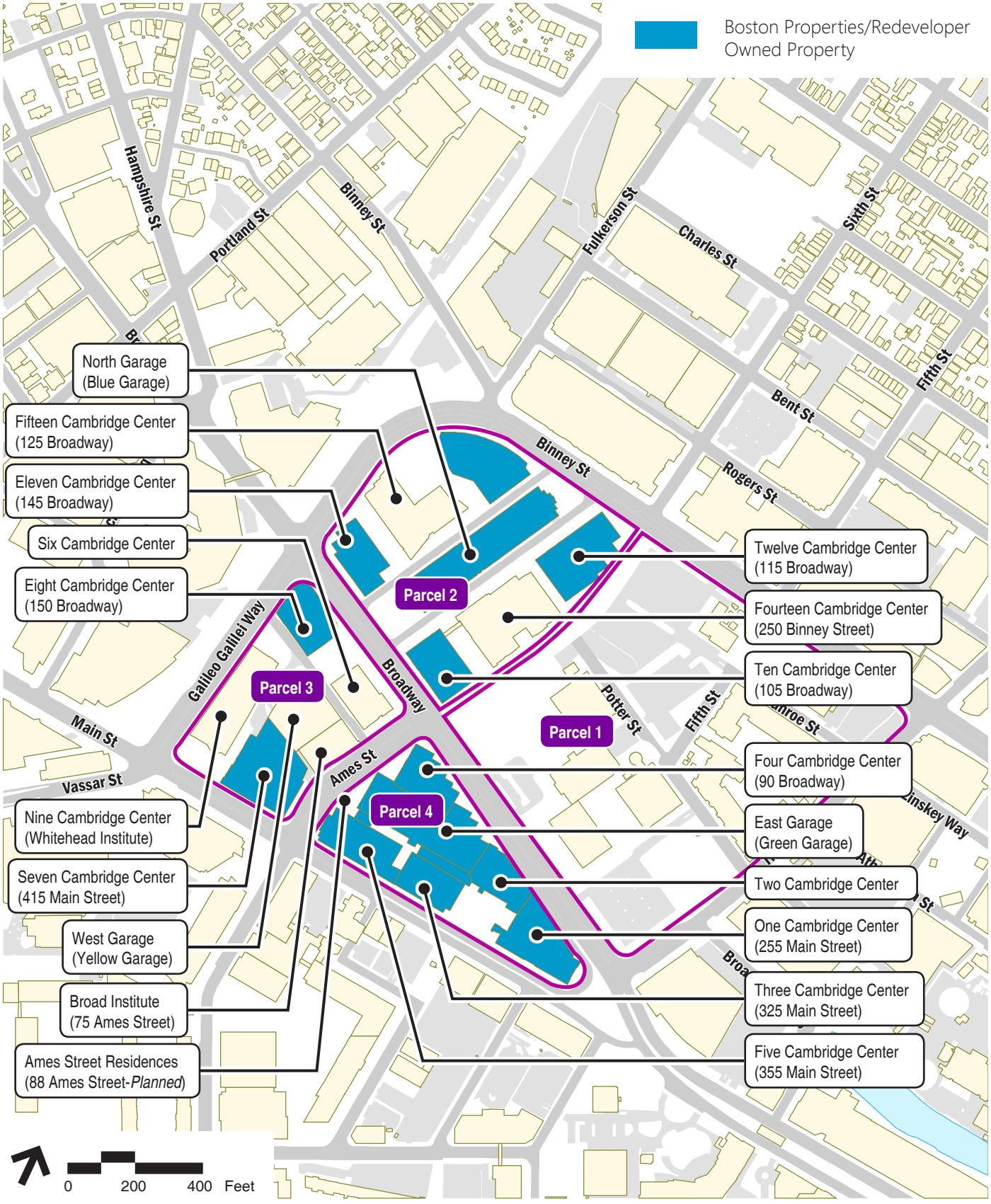

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Figure S.5
Cambridge Center Properties Key Map

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge GIS, MassGIS

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Figure S.6a
Existing Conditions - North Garage & Eleven Cambridge Center

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

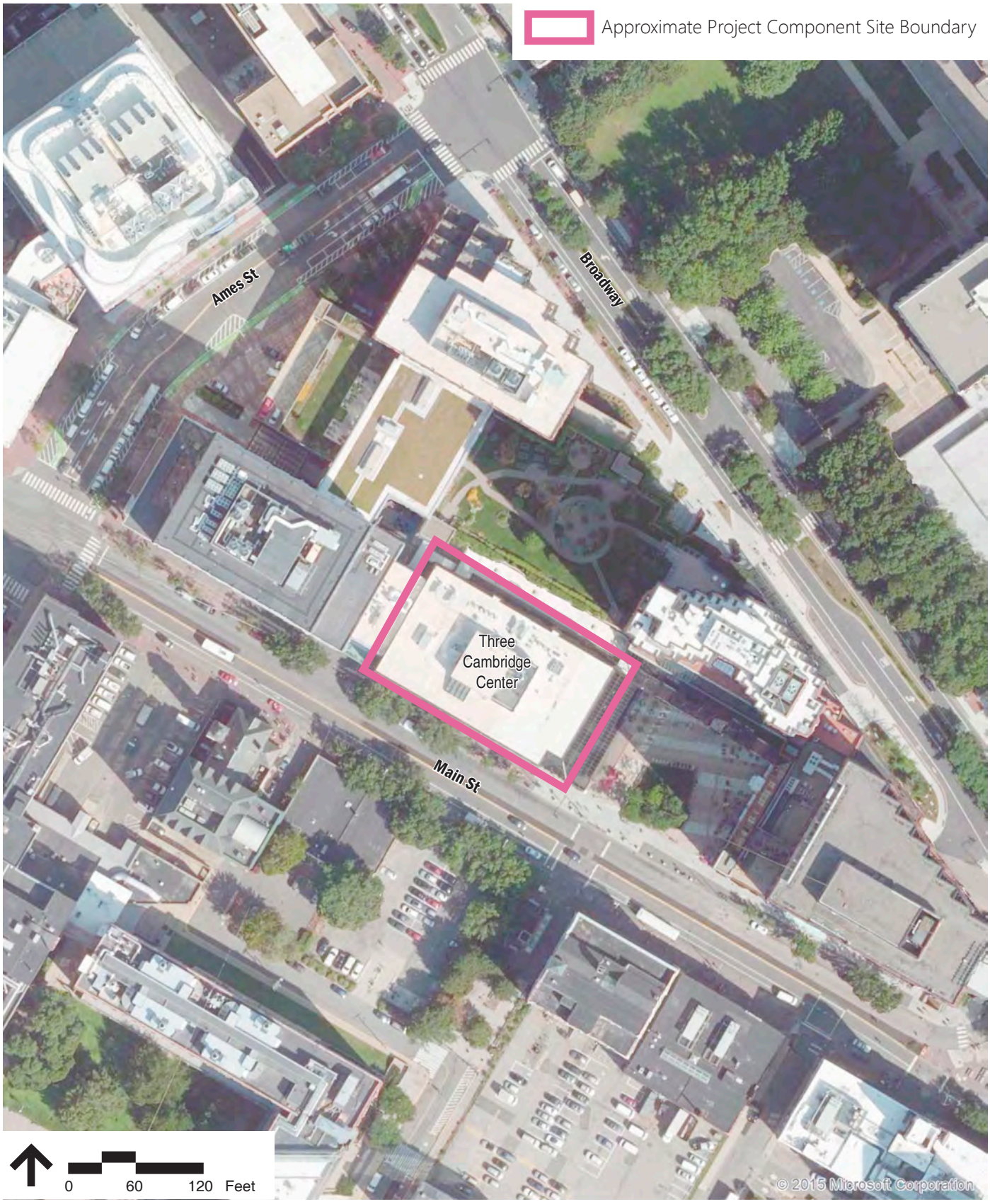

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Figure S.6b
Existing Conditions - Three Cambridge Center

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

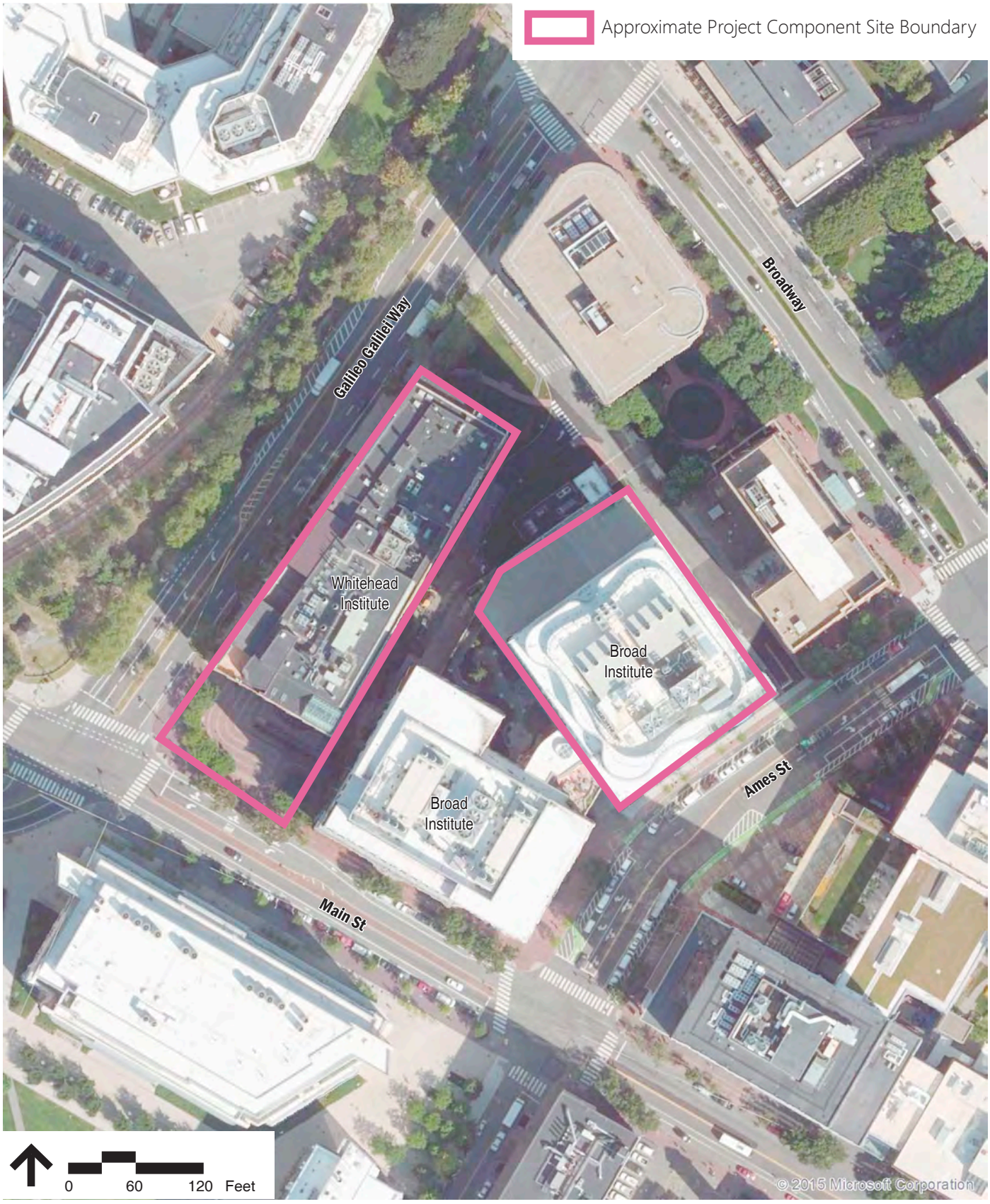

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Figure S.6c
Existing Conditions - Whitehead & Broad Institute Buildings

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

1

Project Change Description

KEY:

Text represents new or substantially revised narrative description from the NPC.

Section Heading represents an entirely new or substantially revised section from the NPC.

Table Heading represents an entirely new or substantially revised table from the NPC.

Introduction

The CRA, as the Proponent, in conjunction with Boston Properties, as the Redeveloper, submits this NPC for a Major Change to the KSURP—Plan Amendment No. 10 (referred to herein as the "Project Change" or "Project") to allow an additional approximately 1,034,000 square feet of commercial and residential development as a continuation of the enhancement of Kendall Square. The KSURP was originally reviewed and approved under MEPA in 1977 (EEA No. 1891) and has undergone a number of Plan Amendments, as described in detail in the *Notice of Project Change Form Narrative/Project Summary*.

The Project provides a significant opportunity to continue the success of the KSURP. As the development plan described in the original 1976 KSURP and subsequent Plan Amendments has been realized over the years, Cambridge Center and the Kendall Square area have become a hub for biotechnology and information technology as well as innovative start-up companies and work-renowned academic and research facilities. However, there continues to be a desire to transform Kendall Square into more of a 24/7 mixed use neighborhood by introducing more residents, retail and other services to support them as well as the thousands of weekday employees. The following chapter presents a detailed description of the Project, which aims to create such a place.

The following information is provided herein, in accordance with the NPC Certificate and to address other comments received on the NPC:

- A comprehensive description of the Project Components, including potential off-site mitigation measures;
- An updated list of anticipated permits and approvals (Table 1-2);
- A discussion on regulatory controls and how project will meet applicable standards;
- Description of the subsequent state agency and city department coordination for addressing outstanding issues, including identification of specific mitigation to address impacts on transit service and capacity in coordination with MassDOT, that may not be fully developed during the MEPA review process; and
- An expanded discussion of project consistency to address additional plans/policies.

Project Change Description

The Project consists of an amendment to the KSURP to allow up to 1,034,000 square feet of net new development. As shown in Figure S.4, the Project aims to encourage new development in the form of the following Project Components:

- Cambridge Center North Garage Office Buildings;
- Eleven Cambridge Center Residential Building; and
- Three Cambridge Center Mixed Use Building.

Table 1-1 below presents the proposed development program.

Table 1-1 Proposed Development Program

Project Component/Phase	Size/Quantity	Building Height
Phase 1A – Cambridge Center North Garage Office Buildings		
Commercial Office	546,000 GSF	Office Building A = ±226 feet (13 stories)
Innovation Space	39,000 GSF	
Retail	5,000 GSF	Office Building B = ±115 feet (8 stories)
NET NEW Phase 1A	*590,000 GSF*	
Phase 1B – Eleven Cambridge Center Residential Building		
Existing Eleven Cambridge Center Commercial Office (to be demolished)	(76,600 GSF)	±48 feet (4 stories)
Residential	210,000 GSF (294 units)	±249 feet[1] (22 stories)
Retail	25,000 GSF	
NET NEW Phase 1B	*158,400 GSF*	-

Project Component/Phase	Size/Quantity	Building Height
TOTAL NET NEW Phase 1	*748,400 GSF* *740 parking spaces*	-
Phase 2 – Three Cambridge Center Mixed Use Building		
Existing Three Cambridge Center Commercial Office (to be demolished)	(105,100 GSF)	±52 feet (4 stories)
Residential	190,000 GSF (266 units)	±250 feet[1] (19 stories)
Commercial	106,200 GSF	
Retail	20,000 GSF	
TOTAL NET NEW Phase 2	*211,100 GSF*	
Other Development		
Whitehead Institute Addition[2]	60,000 GSF	No change from existing (±84 feet, 6 stories)
Broad Institute Office Conversion[3]	15,100 GSF	NA
TOTAL NET NEW Other Development	*75,100 GSF*	-
TOTAL (NET NEW)	**1,034,600 GSF** **584,600 GSF Office[4]** **50,000 GSF Retail** **400,00 GSF Residential (560 units)** **740 spaces**	-

1 Allowable height up to 300 to 350 feet for residential buildings, as currently proposed in the Plan Amendment No. 10.
2 To the existing facility at Nine Cambridge Center.
3 Accounts for the conversion of existing mechanical space to be re-purposed/fit-out into leasable commercial office space at the Broad Institute's 75 Ames Street location.
4 Includes Innovation Space.

Additionally, the existing Whitehead Institute building at Nine Cambridge Center and Broad Institute at 75 Ames Street are also included in this MEPA review because they involve changes to the build-out under the KSURP. The Whitehead Institute consists of an expansion of an existing use (an approximately 60,000-square foot commercial office/lab addition) and the Broad Institute proposes a change in use to their existing facility (conversion of approximately 15,100 square feet of mechanical space to commercial office space) to be undertaken by the Other Developers.

The KSURP regulates the level of development through a cap on aggregate Gross Floor Area (GFA) of all land uses in the KSURP area. The level of development is further restricted through use limitation of land use groups and Floor Area Ratio (FAR) controls by land use. These three tiers of regulations are designed to provide flexibility in the distribution of development throughout the KSURP area while maintaining a balance of land use in the KSURP area. These regulations are repeated in the Cambridge Center Mixed Use District (MXD) of the Zoning Ordinance.

The proposed amendment to the KSURP includes a few exemptions to the GFA caps namely:

- 50 percent of the Innovation Office Space,
- Ground floor retail that is sub-divided into establishments of 5,000 square feet or less (but allows exceptions for larger format retail, such as pharmacies or grocery stores), and
- Housing units that are permanently restricted to Middle Income households.

Thus, the total GFA allowance in Plan Amendment No. 10 provides approximately 635,000 square feet of net new commercial development and 400,000 square feet of residential development. The analysis of environmental impacts provided herein includes anticipated square footage beyond these GFA caps that would take advantage of the proposed exemptions; 19,500 square feet of Innovation Space and 20,000 square feet of ground floor retail space.

Project Components

The following sections describe each Project Component in further detail.

Cambridge Center North Garage Office Buildings

Figure 1.1 presents the proposed Cambridge Center North Garage Office Buildings massing with a project rendering based on an early design concept. The redevelopment of the Cambridge Center North Garage (Phase 1A) consists of construction of two commercial office towers with some innovation space and ground-floor retail totaling approximately 590,000 gross square feet on top of the existing garage structure with new lobby space that will extend to Broadway.

A new enclosed public open space, or winter garden, is proposed to replace the existing public park. Figure 1.2 shows the proposed winter garden proposed for the entry plaza of the Cambridge Center North Garage Office Buildings.

Eleven Cambridge Center Residential Building

Figure 1.3 presents the proposed Eleven Cambridge Center Residential Building massing and project rendering based on an early design concept. This Project Component (Phase 1B) consists of a new 22-story residential building with up to 294 units and 25,000 square feet of ground-floor retail to be constructed in place of the existing 3-story commercial office building totaling approximately 158,400 gross square feet of net new development.

Figure 1.4 illustrates the conceptual ground-level pedestrian circulation along Broadway and through the new buildings.

Three Cambridge Center Mixed Use Building

Figure 1.5 presents the proposed Three Cambridge Center Mixed Use Building with a project rendering based on an early design concept. The Three Cambridge Center Mixed Use Building consists of 19 stories with commercial office on the lower floors, up to 266 residential units on the upper floors, and approximately 20,000 square feet of retail space at the ground level. This new building will replace the existing 105,100-gross square foot commercial office building resulting in a total of approximately 211,100 gross square feet of net new development.

Other New Development

As shown in Figure 1.6, the Project also includes projects from Other Developers, including an approximately 60,000-gross square foot commercial office addition at the Whitehead Institute at Nine Cambridge Center located at the corner of Main Street and Galileo Galilei Way. Also, the Broad Institute proposes to convert approximately 15,100 square feet of mechanical space at their existing facility located at 75 Ames Street into commercial office space. Collectively, these Project Components will result in approximately 75,100 gross square feet of net new development.

Parking

Up to approximately 740 parking spaces are proposed as part of Phase 1 in order to support the new commercial and residential development. New parking will be created in a combination of ways, including by adding an additional level to the Cambridge Center North Garage and in a separate, new below-grade facility to be located under the new Eleven Cambridge Center Residential Building. Collectively, the proposed parking supply for the Project Change and approximately 2,667 existing off-street parking spaces falls within the maximum off-street parking supply permitted by the City and exempted from its parking freeze regulation, as agreed upon by MassDEP, under Plan Amendment No. 3.

The Project will provide approximately 802 long-term bicycle spaces and 142 short-term bicycle spaces, in accordance with the City's current bike parking requirements. The long-term secure bicycle spaces will be distributed between the Cambridge Center North Garage, Cambridge Center West Garage, Cambridge Center East Garage, and proposed Eleven Cambridge Center Residential Building garage and Three Cambridge Center Mixed Use Building. Short-term outdoor spaces will be distributed around the KSURP area, focusing on areas around the Project Component sites and other high demand areas.

Potential Off-Site Mitigation/Beneficial Measures

Potential off-site mitigation measures generally consist of local roadway intersection improvements, streetscape and public open space improvements, improved pedestrian and bicycle facilities, efficiency enhancements of the public realm surrounding the MBTA Kendall Square/MIT station and transit capacity and/or operations improvements (to be identified by the KSTEP through the MOU, as described further under the 'Transportation and Parking' section below) as well as KSURP area-wide stormwater management enhancements. A neighborhood-scale stormwater management approach is being considered at a conceptual level in coordination with the City. Such projects would help local infrastructure and buildings be more resilient to flooding by compensating for developments not currently meeting the Cambridge stormwater standards. Refer to Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures* for a comprehensive description of these off-site measures.

Public Open Space Improvements

The Project includes enhancements to the public open space within the KSURP area, as shown in Figures 1.2 and 1.4. Within the KSURP area there are many opportunities to study open space improvement projects including, but not limited to the following considerations:

- Construction of a Winter Garden at the Cambridge Center North Garage that will provide for an activated, public and climate-controlled open space available for year round use (Figure 1.2).
- Improvements to the Sixth Street Connector to accommodate the higher volume and mixing of bikes and pedestrians, including new hardscapes, seating, and lighting as well as accessibility for food trucks.
- Increased pedestrian permeability between buildings by enhancing pathway qualities and features (Figure 1.4).
- Construction of a mid-lock pedestrian crosswalk at the Cambridge Center North Garage (Figure 1.4).
- Incorporation of bike paths, routes, and infrastructure throughout the KSURP area that are prioritized on the City's Bicycle Network Plan, including, but not limited to, the extension of the Grand Junction Multi-Use Path (which the CRA has already begun constructing on the edge of the KSURP) as well as the extension of the existing Binney Street Cycle Track from 3rd Street to Vassar and Main Streets (Figure 2.7).
- Improvements to pedestrian walkways along service roads on both sides of the Cambridge Center North Garage to promote permeability.

- Virtually concealing the Cambridge Center North Garage by architecturally enclosing the garage with a new structure.
- Narrowing the turning radius at some intersections associated with Galileo Galilei Way.
- Extending refuge islands into crosswalks in some areas.
- Introduction of a pedestrian wayfinding system, including improved signage indicating the pedestrian passageway through the Marriott Hotel to Broadway;
- Greater ground floor activation at existing buildings along Broadway.
- More space for outdoor seating.
- Continuing the road diet on Binney Street.
- Expanding the number of streets that have both pedestrian-scale lighting as well as vehicular-scale lighting.

Project Phasing and Schedule

The proposed approximately 15,100-square foot Broad Institute mechanical space conversion is expected to begin shortly after approval of Plan Amendment No. 10, which is anticipated to happen by the end of 2015. The Whitehead Institute Office Addition is likely to begin construction in 2017 and is estimated to be completed within 12 to 15 months.

The Project will be constructed in two key phases where Phase 1 will be split into two sub-phases. Phase 1A will consist of the redevelopment of the Cambridge Center North Garage with new commercial office/innovation space over the existing garage. Phase 1B will include demolition of the existing Eleven Cambridge Center commercial office building and construction of a new 294-unit residential with ground-floor retail space and below-grade parking. Phase 2 will include demolition of the existing Three Cambridge Center commercial office building and construction of a new mixed use building with commercial office space, ground-floor retail space, and 266 residential units.

Regulatory Controls, Approvals, and Permits

Table 1-2 below presents an updated list of anticipated permits and approvals required for the Project. It is possible that not all of these permits or actions will be required, or that additional permits or actions may be needed.

Table 1-2 List of Anticipated Permits and Approvals

Agency/Department	Permit/Approval/Action	Status
Commonwealth of Massachusetts[1]		
Massachusetts Department of Housing & Community Development	Urban Renewal Plan Amendment Approval	To be obtained
Executive Office of Energy and Environmental Affairs	Certificate Evidencing Completion of MEPA Review	Notice of Project Change submitted April 15, 2015; Single Environmental Impact Report submitted herein
Massachusetts Department of Transportation	Approval of Transportation Impact Study Scope Letter	December 4, 2014
Massachusetts Department of Environmental Protection, Division of Air Quality Control	Air Quality Permit (under 310 CMR 7.00) for heating boilers and emergency generators	To be obtained (if required)
Massachusetts Department of Environmental Protection	Compliance with Massachusetts Contingency Plan	To be completed
Massachusetts Water Resources Authority Toxic Reduction and Control Group	Sewer Use Discharge Permit	To be obtained (if required)
City of Cambridge		
Cambridge Redevelopment Authority	Urban Renewal Plan Amendment Approval	Approved July 15, 2015
Cambridge City Council	Urban Renewal Plan Amendment Approval	Under review
	MXD Zoning Petition	Under review
Cambridge Planning Board	Recommendation on Urban Renewal Plan Amendment Approval	To be obtained
	Recommendation on MXD Zoning Petition	To be obtained
	Approval of Infill Development Concept Plan & Special Permit	To be obtained

The Project will be designed to meet all applicable statutory and regulatory standard and requirements, as described more fully in the following sections. Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures* presents a comprehensive description of the proposed measures that aim to avoid, minimize, and/or mitigate environmental impacts as well as other beneficial measures associated with the Project.

Transportation and Parking

In accordance with the 1994 Section 61 Finding issued as part of the MEPA review process for Amendment No. 3 in 1994, the Proponent currently implements a traffic monitoring program. The annual report presents the daily vehicle volumes, trip generation rates, estimated development generated trips for any planned development and garage occupancy counts. As discussed in Chapter 2, *Transportation and Parking*, the KSURP traffic monitoring program and annual reporting will continue as part of the Project with adjustments to the format of the report to be determined in conjunction with MEPA and the City. In order to maintain a favorable mode split by reducing single-occupancy vehicle trips to/from the Project

Components and within the KSURP area, the Redeveloper is committed to implementing a robust TDM Plan, as documented in Chapter 2.

No state roadways require traffic operations or other improvements as a result of the Project. Chapter 2 describes the traffic operations, pedestrian, and bicycle improvements proposed for local roadways and to be coordinated with and confirmed by the City, which will be accomplished as part of the Infill Development Concept Plan review process (described further below). As part of this review and approval process, a Traffic Impact Study (TIS) will be developed for each Project Component in coordination with City staff.

The transit operations analysis provided in Chapter 2 demonstrates that, overall, the potential impacts on Red Line operations as a result of the Project are minimal. The results show that when accounting for estimated future ridership with and without the Project passenger demand can be supported by the Red Line when operating according to the published schedule with the exception for the morning peak hour inbound train entering Kendall Square/MIT station. Without the Project, this segment would operate at just over capacity (Table 2-36b). With the Project, there is a slight increase in passenger demand (approximately two percent) for this segment due to an estimated additional 181 transit trips (Table 2-36b). While the proposed TDM measures, including encouraging employers to allow employee flex-time and/or provide employee shuttles, will help to address this condition with some measure of relief anticipated, the MBTA system operational improvements that would be needed to address the Red Line capacity and frequency of service issues are larger and more complicated than any single development can reasonably impact. Therefore, the Proponent and Redeveloper propose to address the anticipated capacity issues in the future through development of the proposed KSTEP with other stakeholders (described further in Chapter 2). As an initial step, the Proponent is committed to entering into a MOU with MassDOT and the MBTA, together with the Redeveloper and the City, as a mechanism to implement the KSTEP. The Proponent, in coordination with the City and the other parties to the MOU, will establish and maintain the KSETF for the purpose of establishing funding priorities and allocations for identified transit improvement projects. Potential transit improvements are discussed further in Chapter 2.

The Proponent is committed to filing the draft MOU with MEPA for review by July 1, 2016 following the completion of MassDOT-led Kendall Square Mobility Task Force's work, which is anticipated to be completed in February 2016.[1] Both the Proponent and Redeveloper are active members of the Task Force, and the Proponent intends to use the outcomes of the Task Force's study and recommendations to shape the final transit mitigation plan and measures for the Project, working in close cooperation with MassDOT and the MBTA. As a transit mitigation measure for the Project, an

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[1] As discussed in Chapter 2, *Transportation and Parking*, the Kendall Square Mobility Task Force has been charged with identifying public transit improvement projects and policy initiatives in support of the continued success of Kendall Square. These projects and initiatives are intended to be technically and financially achievable over the short, medium, and long-term horizons.

initial payment of the sum of not less than $6 million for transit improvements recommended by the KSTEP will be contributed to the KSETF as a "fair share" contribution. This one-time payment would be made at the time a Building Permit is obtained for the first major phase of the Project. Additionally, through a mechanism(s) to be determined by the terms of the MOU, the KSETF will receive additional funding to be provided by the Redeveloper, which will represent an allocation of funding under the KSURP supplemented by contributions from others. The MOU process will ultimately lead to a plan, agreed upon by all involved parties, of mitigation measures the Proponent and Redeveloper will implement to improve the public transportation infrastructure and experience within the KSURP area.

Air Quality

The Project Components are expected to include several fossil fuel burning emission sources, such as cogeneration system, boilers, stationary turbines, and emergency generators. MassDEP has established regulations covering the installation and operation of most commercial and industrial fuel utilization facilities such as boilers and generators. Further, there are a variety of federal, state and local regulations that apply to stationary emission sources which may be applicable. These regulations are fairly complex, making it impossible to make too many generalizations regarding applicability for specific types and sizes of equipment. The Proponent will gather basic information related to each of the on-site energy sources as the project progresses and the specifics are known to allow the evaluation of regulatory applicability and requirements.

According to MassDEP requirements, the emission sources now need to meet specific requirements and provide specific documentation in the form of a Self-Certification process (forms supplied by MassDEP). In order to comply with the Self-Certification requirements, the engine installation will have to either meet extraordinary stack height requirements or perform an air emissions dispersion modeling analysis to demonstrate that the proposed installation will not cause or contribute to violations of National Ambient Air Quality Standards. Self-Certification is not required to be in place prior to equipment installation or operation; however, the Proponent will begin this process as early as possible as important equipment and installation design specifications may be required to comply with requirements associated with the Self-Certification process.

The Proponent will follow the MassDEP Division of Air Quality Control pre-installation approval requirements if the project will include the installation of any Fuel Utilization Facility that emits air contaminants (e.g., furnaces, fuel burning equipment, or certain boilers). The Project will follow all Code of Massachusetts Regulations 310 CMR 7.00 requirements.

Stormwater

Regarding site design, the Project will be designed to treat runoff to improve stormwater quality, in compliance with the MassDEP Stormwater Management Policy, as discussed in section of Chapter 5, *Stormwater Management*. Additionally, in accordance with the requirements set forth by the City, the Project will be required to mitigate stormwater effluent from the post-development 25-year design storm to the rates of the pre-development 2-year design storm, as well as reduce TSS by 80 percent from the pre-development condition.

Wastewater

The Project is projected to generate new wastewater flows and, therefore, must reduce stormwater inflow and infiltration (I/I) at a ratio of 4:1 from the Cambridge Sewer System, per the City's requirements in order to obtain a municipal sewer connection permit. MassDEP no longer requires self-certifications, as they have an agreement with the City for project reviews concerning wastewater. Therefore, at this stage of the design, it is anticipated that the Project will be required to remove 431,780 gallons per day of stormwater from the sewer system. (Refer to Table 6-2 of Chapter 6, *Water and Wastewater* for a breakdown of I/I removal required by Project Component.) This I/I reduction will be accomplished by coordinating with the City to either correct I/I issues in the vicinity of the Project or pay for projects the City is performing in an effort to reduce I/I.

The MWRA Toxic Reduction and Control (TRAC) Group is responsible for monitoring discharges to the MWRA-owned wastewater system. The Proponent will be required to comply with several Massachusetts State wastewater codes, which the TRAC Group will verify. If a commercial tenant proposing to discharge process and/or laboratory wastewater to the MWRA system occupies space within the Project Components discussed in this document, a MWRA Sewer Use Discharge Permit will be obtained from the TRAC Group to ensure compliance with applicable regulations. The Redeveloper will also comply with all state regulations, including the State Plumbing Code, in regards to the installation of gas/oil separators in enclosed parking garages associated with the Project. The Redeveloper will coordinate all Project Components with the TRAC Group to obtain necessary permits and ensure compliance with all relevant MWRA requirements as the design of each Project Component progresses in design.

Hazardous Materials

As discussed in Chapter 7, *Hazardous Materials*, each Project Component site will require characterization of the soil and groundwater conditions for management of contaminated soil during construction and to evaluate the residential use exposure scenario. It is assumed that testing of soil and groundwater at the Cambridge Center

North Garage and Eleven Cambridge Center sites will result in a new reporting condition(s) to MassDEP and that activities at these properties would be subject to the requirements of the MCP, 310 CMR 40.0000. It is anticipated that conditions in the area outside Three Cambridge Center will encounter similar contaminant levels in soil as those encountered during the recent plaza improvement and connector work at Three, Four, and Five Cambridge Center and, therefore, it is likely that new activities can proceed under the existing RTN. However, testing of groundwater may result in a new reporting condition.

The management of contaminated soil and groundwater, and implementation of measures to reduce the risk of exposure to contaminants at each Project Component site will be conducted under a Release Abatement Measure (RAM) Plan. It is anticipated that the measures undertaken under the RAM will result in achieving a Permanent Solution for each property redevelopment.

Major Plan Amendment Approval

According to M.G.L. Chapter 121B, a URP may be amended by a redevelopment authority after a duly noticed public meeting. Such an amendment may be deemed as either a Minor or Major Plan Amendment by DHCD. A Minor Amendment is one that includes no changes to the basic element s of the plan. Conversely, a Major Amendment involves significant changes to the core elements of the URP. The proposed Plan Amendment No. 10 of the KSURP is a Major Plan Amendment.

The CRA Board has discussed the proposed Plan Amendment No. 10 at multiple Board meetings over the past year. If approved by the CRA Board, a Major Plan Amendment must then be considered at a noticed public hearing and receive a recommendation from the Planning Board, and then finally be approved by the Cambridge City Council. The Proponent anticipates this approval will occur in late 2015. Following Cambridge City Council approval, the Plan Amendment is then forwarded to DHCD. The DHCD has up to 60 days to make a determination on the approval.

Infill Development Concept Plan

As part of the proposed KSURP Amendment No. 10, the Proponent proposes a specialized development impact review procedure in the form of the Infill Development Concept Plan (the "Concept Plan"). The Concept Plan shall be approved by the CRA and by a special permit granted by the Planning Board in order to authorize the Project Components. The purpose of the Concept Plan is to provide a context and a conceptual governance structure for existing and potential future development that allows development to proceed in a flexible manner without requiring additional special permits for each building. The Concept Plan is expected to evolve over time, and with each subsequent development proposal updates to the

Concept Plan shall be submitted. Amendments to the special permit may be granted, but revisions to a Concept Plan shall not necessarily require amending the special permit so long as the revisions remain in conformance with the conditions of the special permit. The conditions of the special permit shall set forth a process for future review and approval of the design of buildings, landscaping, and other significant components of an approved Concept Plan. Such process shall include representation by the CRA, Planning Board, and City staff, in compliance with the KSURP. The special permit may specify that no further review be required for any building design that is determined to have been sufficiently advanced at the time of granting of the special permit as to meet the standards for project review.

Agency Coordination and Public Outreach

This section summarizes state and city outreach completed prior to this filing.

Massachusetts Department of Transportation

The Proponent and Redeveloper are committed to developing an expanded program of transportation mitigation and enhancements designed to both preserve the favorable mode share balance in Kendall Square and provide additional improvements to mitigate the trip generation projected to result from the Project. On March 4, 2015, the Proponent engaged in preliminary discussions with the Massachusetts Department of Transportation (MassDOT) and MBTA to discuss the Project, its impacts, and potential transportation mitigation and enhancements in the Kendall Square area. A range of issues were identified and, as described more fully in Chapter 2, *Transportation and Parking*, potential improvement opportunities are being considered as a program of elements to be developed in conjunction with the many stakeholders engaged in transportation planning and operations in Kendall Square, including the Kendall Square Mobility Task Force, the MBTA, and MassDOT. The proposed KSTEP to be further developed through a MOU between the Proponent and Redeveloper, and MassDOT, the MBTA, and the City, would supplement the transportation mitigation measures outlined herein. The KSTEP would be designed to enhance transit access to and mobility around Kendall Square, which the Proponent believes is critical to the long-term economic success of the area. Over the coming months, the Proponent will work closely with the City, the MBTA, and MassDOT to develop and refine the KSTEP proposal, including additional details on the potential source of these funds and the range of transit mitigation projects and program options for consideration.

On July 24, 2015, the Proponent and Redeveloper engaged in preliminary discussions on the MOU with the Secretary & Chief Executive Officer of MassDOT and MassDOT staff. A key outcome of that meeting was the agreement on next steps to advance the development of the MOU within the Project's timeframe. Since this meeting, the

Proponent and Redeveloper have continued to meet and coordinate with MassDOT, including a working/coordination session held on October 9, 2015.

Massachusetts Environmental Policy Act Office

On September 9, 2015, the Proponent and Redeveloper held a pre-filing meeting with MEPA staff to present the Project Change and confirm the filing approach. The SEIR filing content in response to the Scope outlined in the NPC Certificate was discussed. Additionally, an update on ongoing coordination efforts with MassDOT and the City, and on the status and overall intent of the draft MOU was provided. A second follow-up meeting was held on October 13, 2015 to update MEPA staff on the status of the MOU.

City of Cambridge

The Proponent has coordinated with the City planning, environmental, and transportation departments throughout the MEPA review process. These City agencies have provided data from their own studies and initiatives to assist with analyzing environmental impacts, specifically climate change and sea level rise data. On May 18, 2015, the Proponent held a meeting with these departments to solicit preliminary review comments on the NPC and, generally, discuss the status and next steps of the MEPA review. Also, on July 21, 2015, the Proponent met with the Cambridge DPW to discuss the infrastructure anticipated to serve the Project Components. At this meeting, the Proponent and DPW agreed to coordinate neighborhood-scale infrastructure work associated with the Project over the next three to six months as the DPW develops infrastructure improvement strategies with their consultant team.

Public Outreach

The Project is the implementation of the Kendall Square Plan (the "K2 Plan"), which included an extensive 3-year public planning process (described further in the next section). The CRA currently utilizes a project website via coUrbanize in order to inform and engage Kendall Square residents, employees, visitors, and business owners in the process of permitting new development proposed through updates to the KSURP.[2]

The Proponent has held the following public meetings on the Project:

[2] http://courbanize.com/kendall-sq-urban-renewal/

- July 23, 2014 CRA Board Meeting – Discussion of the CRA process to initiate Plan Amendment No. 10 and MXD Zoning Revisions based on the K2 Plan recommendations.
- October 15, 2014 – Discussion regarding the existing Section 102: Urban Renewal Plan Objectives of the KSURP.
- November 19, 2014 – An informational slide presentation regarding Boston Properties' initial urban design concepts for the proposed future redevelopment (the Project Components). Discussion on the Project and MEPA review process also occurred during the full Board Meeting.
- January 15, 2015 – Informational slide presentation regarding Boston Properties' initial urban design concepts for future development phases on Parcels 2 and 4 within the KSURP area.
- February 25, 2015 – A preliminary draft of the proposed Plan Amendment No. 10 was issued.
- March 12, 2015 Public Forum – The Proponent presented on the Project, including a discussion of the potential next phase of commercial and housing development within the MXD portion of the KSURP area.
- March 18, 2015 – A revised draft of the proposed Plan Amendment No. 10 was reviewed during the full Board Meeting.
- April 15, 2015 – Overall Project and MEPA review process presented and discussed during the full Board Meeting.
- May 20, 2015 – A revised draft of the proposed Plan Amendment No. 10 was reviewed during the full Board Meeting.
- June 24, 2015 – A final draft of the proposed Plan Amendment No. 10 and a draft zoning petition was presented during the full Board Meeting.
- July 15, 2015 – Plan Amendment No. 10 was approved by the CRA Board and a zoning petition for the MXD District was authorized to be filed.
- August 10, 2015 – The Proponent submitted Plan Amendment No. 10 and an accompanying zoning petition for the MXD Zoning District to the City Clerk for summer meeting of the City Council.
- September 23, 2015 - Plan Amendment No 10 and MXD Zoning Petition were the subject of a City Council Ordinance Committee Public Hearing.
- October 8, 2015 - The Proponent presented the Project, Plan Amendment No. 10, and MXD zoning petition at a neighborhood meeting of the Area Four Neighborhood Coalition.
- October 13, 2015 - Plan Amendment No 10 and MXD Zoning Petition were the subject of a Planning Board hearing.

Project Consistency

The following describes how the Project is consistent with local, regional and/or state plans or policies. In response to the City's comment letter on the NPC, the following additional plans/policies are addressed:

- Cambridge Growth Policy;
- Cambridge Vehicle Trip Reduction Ordinance;
- Cambridge Parking and Transportation Demand Management Ordinance; and
- MassDOT's GreenDOT Goals (specifically, the Planning, Policy & Design category).

Consistency with the Cambridge Grown Policy is addressed below. Refer to Chapter 2, *Transportation and Parking* for consistency with state and local transportation-related planning efforts and policies, including the City's trip reduction and parking/TDM ordinances as well as MassDOT's GreenDOT goals. Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* for consistency with the City of Cambridge Climate Protection Goals & Objectives as well as other city and state sustainability-related initiatives.

Kendall Square Urban Renewal Plan

The KSURP was originally adopted in 1965, amended in 1977 to create the Cambridge Center MXD District, and has undergone numerous Plan Amendments since the early 1980s. The Proponent has regularly consulted with the MEPA office on the Plan Amendments and included a complete and updated analysis of project impacts with a particular focus on analyzing the impact of changes on projected traffic impacts in the KSURP area.

The overall purpose of the KSURP was to eliminate blighted conditions of Kendall Square and to encourage redevelopment of the area through well-planned, well-designed improvements that provide the most appropriate reuse of the land for the City. Originally, the plan designated the majority of the KSURP area for public (government) use specifically for NASA where the remainder of the area would allow uses permitted under the Business B District of the Zoning Ordinance. However, NASA withdrew from the KSURP, which resulted in a re-planning effort (Plan Amendment No. 1). This change permitted light industrial uses on Parcel 2 and an expansion of mixed use private development on Parcels 3 and 4.

In addition to eliminating the blighted conditions, the KSURP also had a number of other objectives, including:

- Maximize job opportunities;
- Improve land use and traffic circulation;

- Capitalize on and improve public transportation, utilities, and other public improvements;
- Create a livable, pleasant environment involving a mixture of land uses;
- Continue to establish a sense of place for Kendall Square; and
- Promote economic development that increases the City's tax base without significantly impacting the environment.

While the KSURP area is no longer blighted, the Project is consistent with these original objectives.

K2 Plan

The K2 Plan, published December 2013, was the result of an extensive community-based planning and design process. The K2 Plan created an opportunity to perform a comprehensive analysis of issues and opportunities that included sections on land use, environment and stormwater, transportation, and infrastructure among others. The analysis addressed Transit-Oriented Development (TOD) density, fostering a mix of land uses to meet the multiple needs of people who live within walking or biking distance, and enhanced TDM measures to discourage driving and encourage sustainable modes of transportation. It also emphasized the economic development benefits of focusing on sustainability: "Businesses are competing to attract the best and brightest talent to their companies and demonstrating leadership as a sustainable, cost-efficient place to do business could connect environmental and economic sustainability of Kendall Square."[3] As a good example of a TOD project that concentrates density close to public transit and other infrastructure for alternative modes of transportation (i.e., walking, biking), the Project achieves the objectives of the K2 Plan.

The K2 Plan also created a vision for Kendall Square with goals and objectives, or recommendations, to work implement for future growth. In summary, zoning- and urban design-related recommendations include to:

- Goal # 1 - Nurture Kendall's Innovation Culture;
- Goal #2 - Create Great Places;
- Goal #3 - Promote Environmental Sustainability; and
- Goal # 4 - Mix Living, Working and Playing.

The Project supports these K2 Plan recommendations by expanding opportunities for Kendall Square to grow while enhancing the public realm and incorporating

[3] Cambridge Community Development Department, Kendall Square Final Report 2013, page 40.

sustainable design and operation elements to further reduce the potential environmental impacts typically associated with new development.

Specifically, as part of Goal #4, the K2 Plan calls for "a well-balanced land use concept." The key goal is to increase housing and ground floor retail in order to create a true mixed use community. The Project is consistent with this goal in that it provides the opportunity for over 500 new residential units and ground floor retail through all Project Components.

Cambridge Growth Policy

In 1992, the City undertook a process to create a growth policy plan that analyzed the previous decade of extensive development to provide a framework for managing future growth. In addition to providing context, the growth policy document helps guide the rezoning process needed to achieve the visions of specific neighborhood plans.

As an update to the initial growth policy, the 2007 Cambridge Growth Policy reports on the many significant community-building accomplishments through plans, projects, and initiatives that have unfolded since 1993, and their relation to this master planning document. Further, the document provides suggestions for future development plans and initiatives.

The Project is consistent with the following policies (listed by key category):

Land Use

- Policy 8 states that the availability of transit services should guide the scale of development and mix of uses encouraged and permitted. A transit study of Kendall Square Station conducted during May 2015 through the MIT Kendall Square TIS showed that during the peak periods average platform capacity is at an acceptable level of service (LOS B), and that there is capacity within the Kendall Square station to accommodate additional demand. In addition, there are many project being undertaken by MassDOT and the MBTA to improve Red Line reliability, which will result in improved capacity throughout the line. The Proponent and Redeveloper have proposed a public-private partnership to further build upon these improvements.
- Policy 13 suggests that new development or redevelopment should be encouraged to maintain a health tax base while being consistent with the City's urban design objectives and without disrupting the local neighborhoods/residents or overburdening the city's water and sewer infrastructure. The Project will provide over 500 new residential units and ground floor retail. Its design will be consistent with the City's urban design objectives as well as the requirements of both the DPW, CWD and MassDEP Title V requirements regarding water, wastewater, and stormwater.

Transportation

- Policy 15 suggests enacting land use regulations that encourage use of transit and other forms of alternative modes of transportation by mixing land uses, creating/enhancing pedestrian and bicycle facilities, and focusing high-density development to areas near transit. As a TOD, the Project promotes greater mobility, specifically via walking and biking. The Project is committed to creating a cohesive integrated network of open spaces and connecting pathways while improving pedestrian safety, access and circulation within the KSURP area. The Project will provide approximately 800 long-term bicycle spaces and 142 short-term bicycle spaces, and the Proponent will explore opportunities to create a full service bike station within the area.
- Policy 17 aims to implement MBTA transit improvements to enhance/improve transit services to Cambridge. The Proponent and Redeveloper understand the need for improved Red Line reliability and have proposed a public-private partnership through the KSTEP. The KSTEP will be established by the Proponent together with the Redeveloper and the City, in coordination with MassDOT and the MBTA through a MOU. The KSTEP is intended to be a mechanism to identify and implement appropriate transit improvements, including building upon those already planned or underway. .
- Policy 23 aims to promote alternative modes (walking and biking) through infrastructure improvements. Sidewalks are provided on all roadways within the study area, and crosswalks are provided at all study area intersections. The KSURP area is also well serviced by bicycle facilities, including on-street bike lanes, cycle tracks, and multi-use pathways. The Proponent is committed to enhancing pedestrian and bicycle infrastructure at each Project Component and within the KSURP area by connecting this infrastructure with other area-wide improvements.
- Policy 24 aims to support transportation and land policies to reduce single vehicle trips to improve air quality. The Proponent will develop a robust program of TDM measures, the implementation of which is expected to improve air quality in the study area by promoting the use of alternative forms of transportation to the use of single-occupant motor vehicles as the principal travel mode to and from the KSURP area.

Housing

- Policy 27 suggests to construct new affordable housing that is appropriate for the neighborhood's character. The Project aims to create over 500 new housing units, 15 percent of which will be affordable units.
- Policy 33 aims to encourages new housing opportunities through rezoning, specifically in Kendall Square. Over 500 new residential units are included in the Project.

Economic Development and Employment

- Policy 37 allows the continued development of areas that have established and reviewed/approved plans, such as the KSURP.

Open Space

- Policy 63 states that open space and recreational facilities serving a wide range of functions and clientele, including the elderly and special needs populations, should be encouraged, either through expansion of the existing inventory, through multiple use of existing facilities, or through creative programming of those facilities. The Project's Winter Garden meets this goal by creating public space that is accessible, activated, climate-controlled and available for use year-round.

Environment and Sustainability

- The report notes that compliance with LEED certification standards and other evolving environmental efficiency standards is encouraged.
- The report states that redevelopment of private sites offers the opportunity to begin to address the environmental burden of storm water runoff. The Project proposes the use of Low Impact Development (LID) techniques including green roofs and bioretention landscaped areas and streetscape design.

Metropolitan Area Planning Council

Cambridge is located within the Metropolitan Area Planning Council (MAPC) planning area. In 2008, MAPC adopted its *MetroFuture: Making a Greater Boston Region* plan for collaborative approach to develop a regional plan that addresses the challenges and opportunities metropolitan Boston faces over the next planning horizon to 2030. MetroFuture includes detailed goals for development and preservation, and specific strategies to equitably distribute the benefits and burdens of growth. A key goal of MetroFuture is to focus growth where infrastructure already exists, including public transit in order to preserve natural resources. Other goals include the following:

- **Sustainable Growth Patterns**: Population and job growth will be focused in developed areas already well-served by infrastructure.
- **Housing Choices:** A diverse array of housing choices will meet the needs of the region's residents.
- **Healthy Communities:** Residents will be safe, healthy, well-educated, and engaged in their community.
- **Regional Prosperity:** A globally-competitive regional economy will provide opportunity for all the region's workers.
- **Transportation Choices:** An efficient transportation system will offer more choices and make it easier to get around.

- **Healthy Environment:** Natural resources will be protected thanks to a strong "environmental ethic."

The Project accomplishes many of the smart growth principles recommended by MAPC, including:

- Redevelopment of an urban site with existing infrastructure, including public transit;
- Partial re-use of an existing parking garage and reduced site disturbance;
- Creation of new housing opportunities, including affordable housing options;
- Creation of new employment opportunities;
- Implementation of a robust TDM plan to reduce single-occupancy vehicles by encouraging new transportation choices, such as car and bicycle sharing; and
- Incorporation of sustainable/green building features, including energy and water efficient building systems; thereby, reducing the Project's impacts on the environment.

While the KSURP has been successful in eliminating blighted conditions, the Project will continue to meet many of economic development goals and objectives of the KSURP. Such goals and objectives are generally in line with MetroFuture, including focusing new development in city and town centers, near transit and infrastructure, and preserving both environmental and financial resources that would be lost to sprawling, low density development. The Project will help meet these goals in part by developing sustainable buildings and enhancing the pedestrian environment while taking advantage of nearby existing public transportation.

Governor's Clean Energy and Climate Plan

The Global Warming Solutions Act of 2008 requires the Secretary of Energy and Environmental Affairs (EEA) to establish a statewide limit on GHG emissions of between 10 percent and 25 percent below 1990 levels for 2020 - on the way toward an 80 percent reduction in emissions by 2050 - along with a plan to achieve the 2020 target. In 2010, the EEA Secretary issued the state-wide Clean Energy and Climate Plan for 2020, which contains the measures necessary to meet these limits. A key goal of the plan is to assist and encourage businesses, households, municipalities, and institutions to better manage their energy needs by incorporating renewable and alternative sources of energy. The Project supports the state's Clean Energy and Climate plan by incorporating on-site alternative and renewable energy sources to reduce the Project's dependence on fossil fuels, including EV charging stations in the parking garages and rooftop solar panel systems (if deemed financially feasible upon further evaluation through project design).

Executive Order 385 – Planning for Growth

Generally, Executive Order 385 (EO 385) aims "…to actively promote sustainable economic development practices by advocating for state activities that are supported by adequate infrastructure and that are designed in such a way so that they do not adversely impact the natural environment." The Project is consistent with EO 385 because its design aims to redevelop a previously developed urban site with existing and adequate infrastructure, including public transit; therefore, reducing environmental impacts, such as traffic, new impervious surface, and new land alteration. The Project will improve water quality through proposed modifications/upgrades to the stormwater management system and incorporate measures for groundwater recharge. The Project aims to create a mix of activity and provides for new employment and diverse housing opportunities, including the creation of approximately 2,650 construction jobs in all trades over the estimated 10-year construction period and over 2,600 new transit-accessible employment opportunities as well as over 500 new housing units 15 percent of which will be affordable units—all of which will support the local and state economy. Furthermore, as demonstrated in this NPC, the Proponent will minimize any unavoidable environmental impacts through the implementation of mitigation measures, to the extent feasible.

Commonwealth's Sustainable Development Principles

The Project is consistent with several of the Office of Commonwealth Development's Sustainable Development Principles. The following lists the specific smart growth principles that the Project is generally consistent with.

- **Concentrate Development and Mix Uses.** The Project consists of redevelopment of an underutilized urban site with existing/adequate infrastructure and promotes a vibrant mixed-use development that will re-use part of the existing building.
- **Make Efficient Decisions.** A key goal of the Project is to re-use the existing Cambridge Center North Garage in order to limit construction new structures. The Project also introduces new pedestrian-friendly and transit-accessible employment and housing opportunities; thus, reducing traffic.
- **Protect Land and Ecosystems.** The Project protects land and ecosystems by redeveloping a previously disturbed/developed area in place of a 'greenfield' outside of Cambridge.
- **Use Natural Resources Wisely**. The Project promotes sustainable planning and design elements, including energy and water efficient building systems and operations, reduced construction and operational waste, and environmentally-preferable materials.

- **Expand Housing Opportunities.** The Project will expand housing opportunities, including affordable housing units in the Kendall Square neighborhood, which currently has little housing.
- **Provide Transportation Choices.** The Project is an example of a TOD development with direct access to various forms of public transit. In addition, transportation choices will be expanded for residents and visitors. Pedestrian and bicycle access and circulation will be enhanced as part of the Project.
- **Increase Job and Business Opportunities.** The Project provides for new employment opportunities (thousands of construction jobs in all trades and new transit-accessible permanent part-time and full-time jobs).
- **Promote Clean Energy.** Electric Vehicle (EV) charging stations and preferred parking for low-emitting/fuel-efficient/alternative fuel vehicles will be incorporated into the parking garages. In addition, consistent with the Proponent's sustainability goals, the incorporation of rooftop solar panels will be evaluated throughout project design.
- **Plan Regionally.** The Project was developed taking into consideration regional context, access, market area, and economics, and is consistent with the goals of the MAPC's MetroFuture plan for the Boston-Cambridge Metro region, as discussed above.

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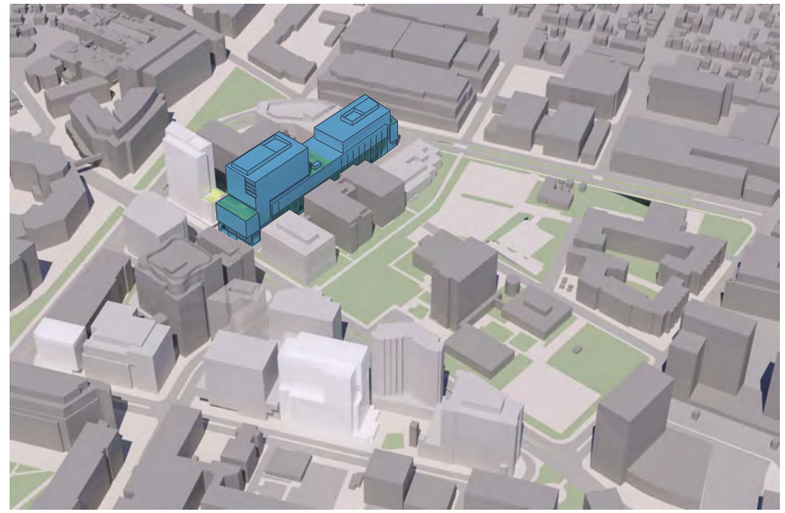
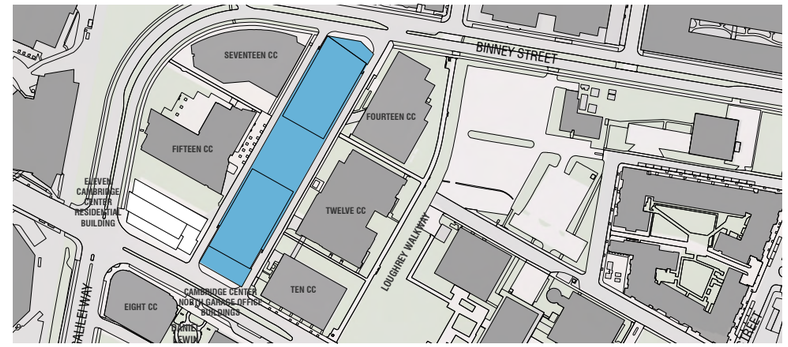
Broadway Street Perspective View





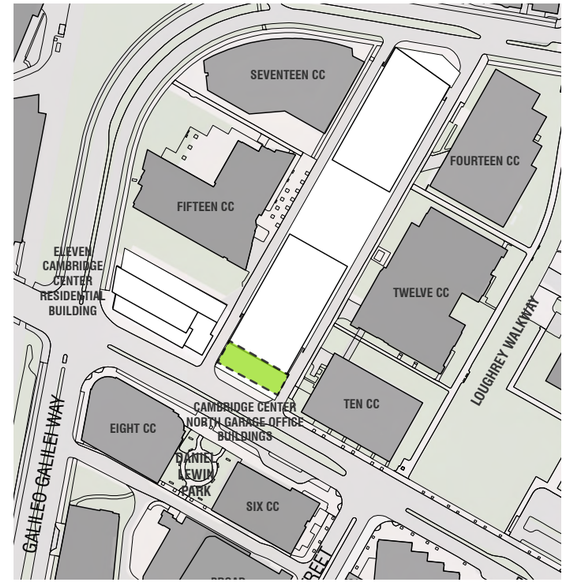
Existing Site Photo

Source: Sasaki Associates

CRA

Figure 1.1
Proposed Conditions with Rendering
Cambridge Center North Garage Office Buildings

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA



Location of Winter Garden at Street level

Cross Section of Broadway

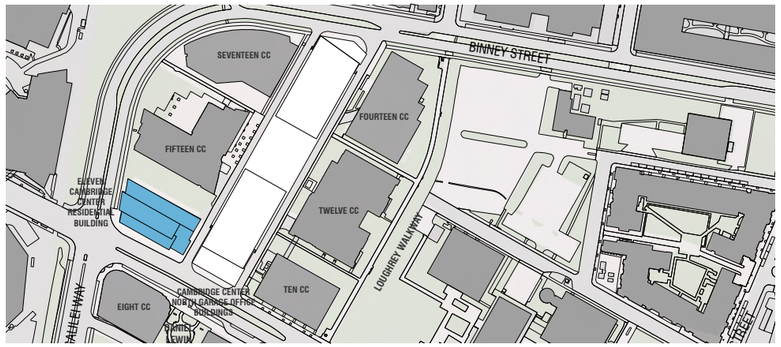
Source: Sasaki Associates

CRA

Figure 1.2
Proposed Winter Garden (Looking East)
Cambridge Center North Garage Office Buildings

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Broadway Street Perspective View



Existing Site Photo

Source: Sasaki Associates

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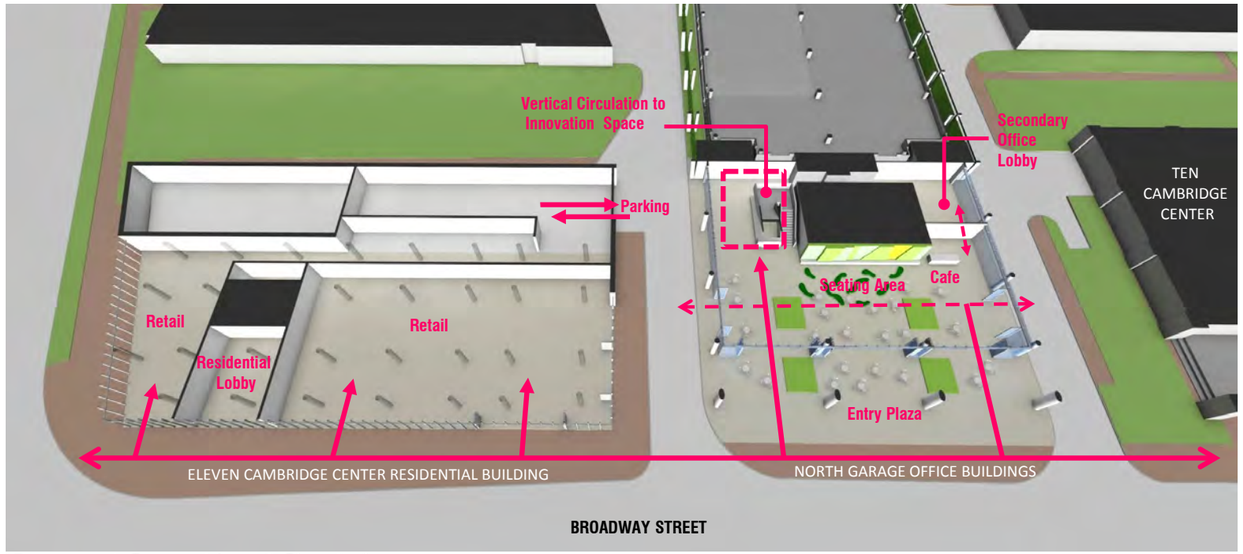
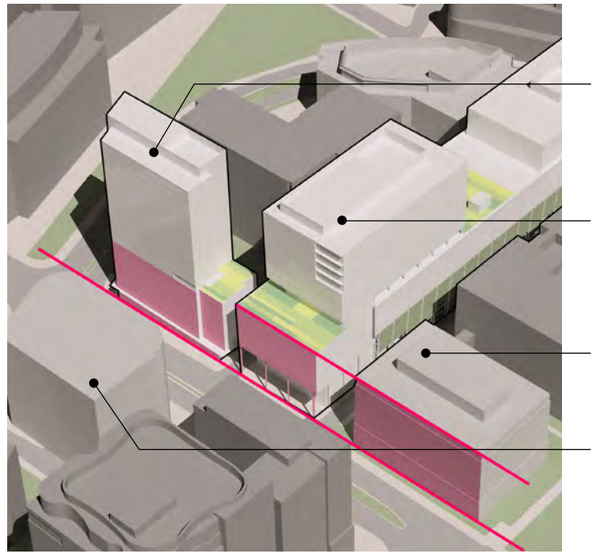
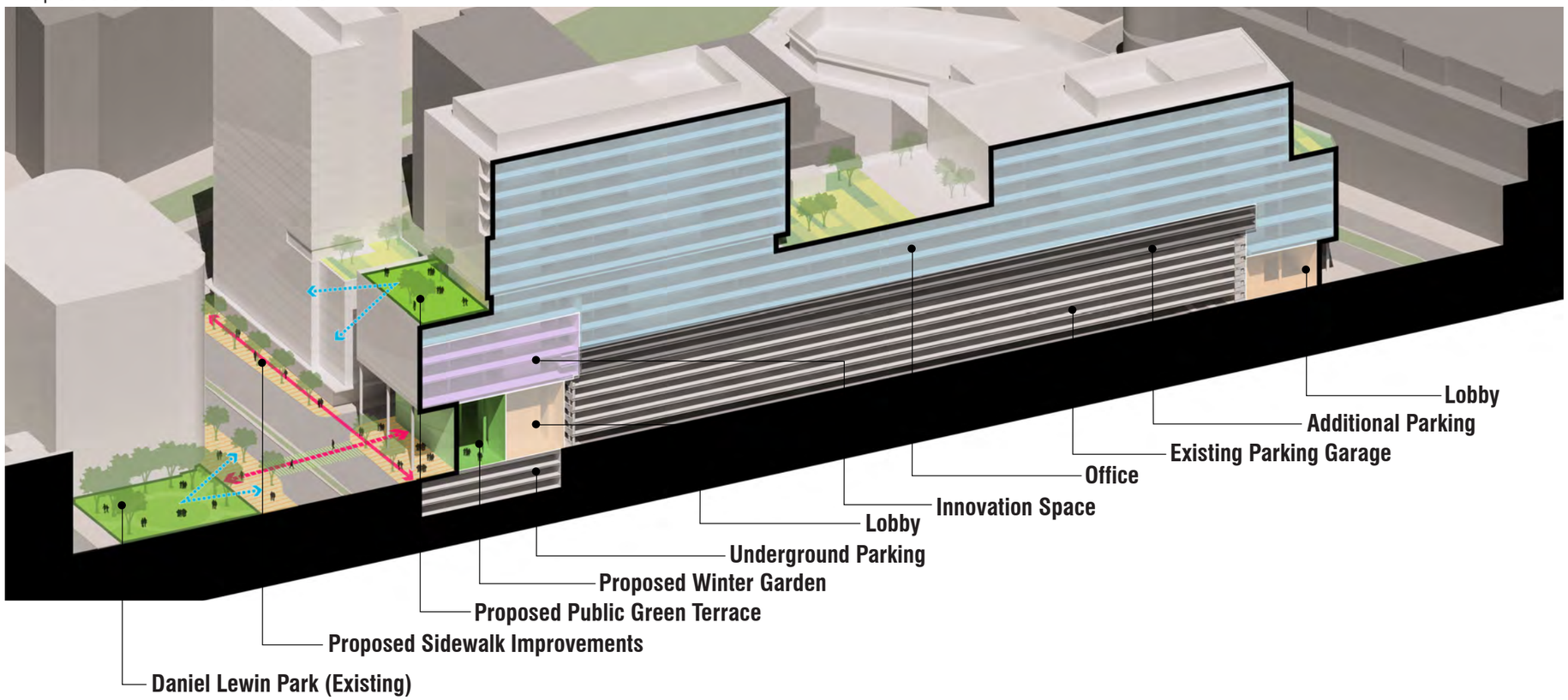
Figure 1.3
Proposed Conditions with Rendering
Eleven Cambridge Center Residential Building

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA





Proposed Ground Level Circulation



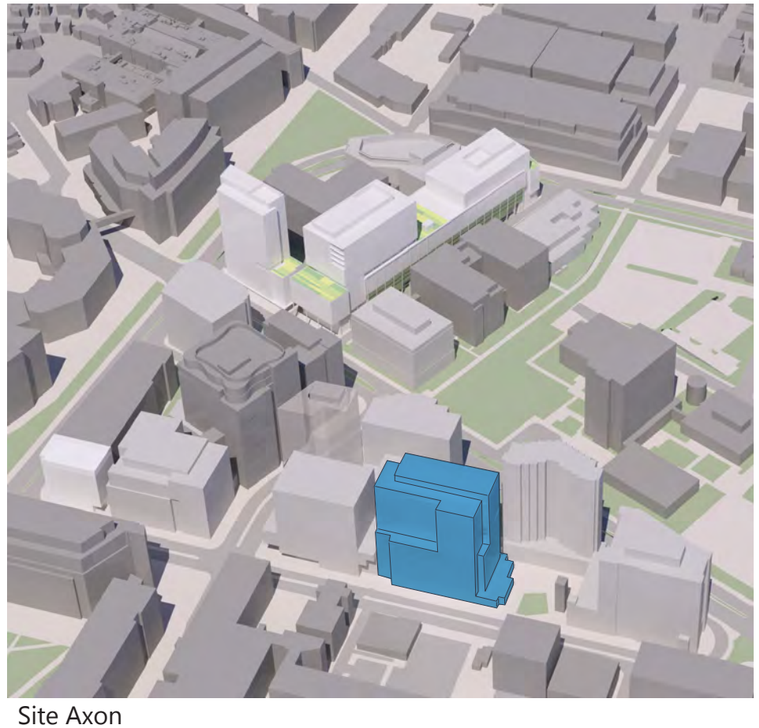
Source: Sasaki Associates

CRA

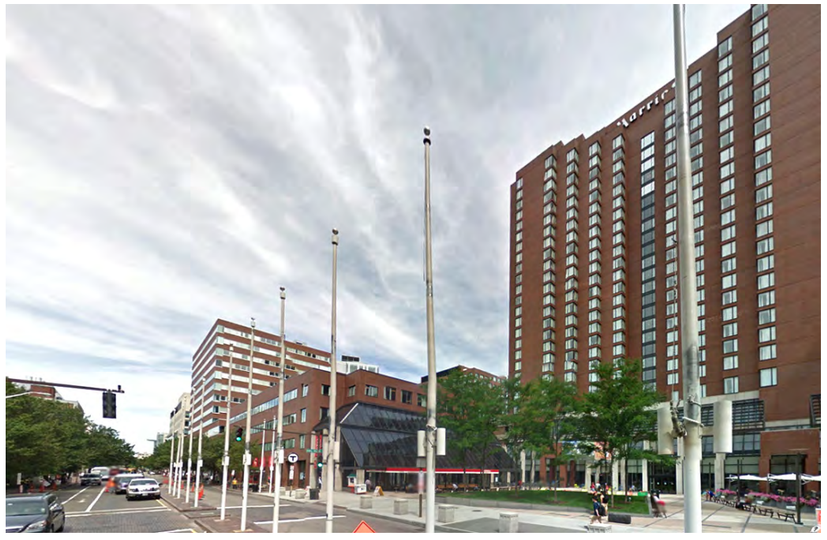
Figure 1.4
Proposed Circulation - Cambridge Center North Garage Office Buildings & Eleven Cambridge Center Residential Building

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

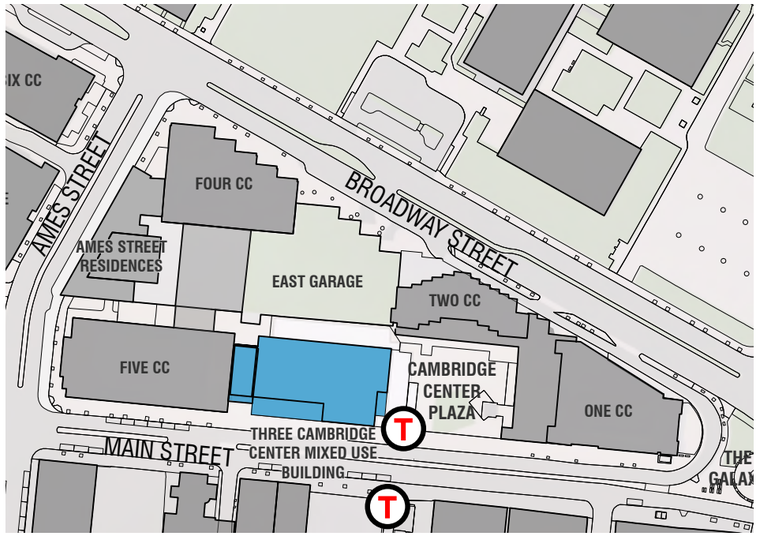
Massing Concept (Looking from Main Street)



Site Axon



Existing Site Photo



Proposed Site Plan

Source: Sasaki Associates

CRA

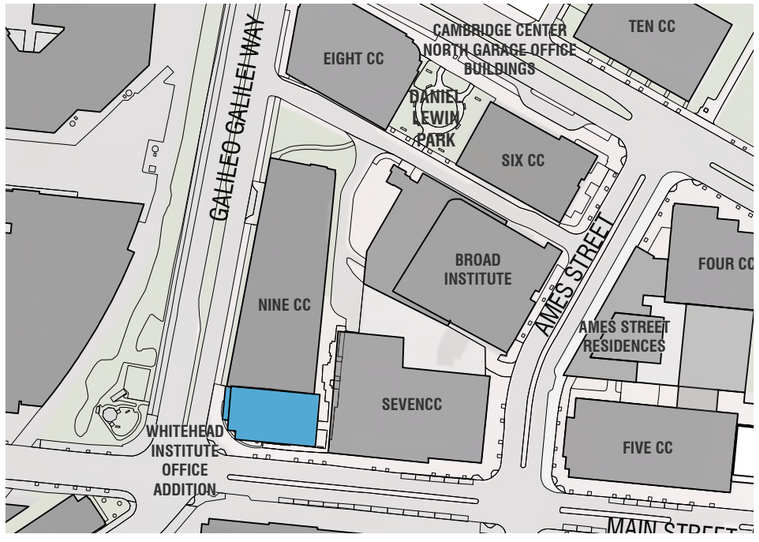
Figure 1.5
Proposed Conditions with Rendering
Three Cambridge Center Mixed Use Building

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Perspective View from Main Street

Site Axon

Existing Site Photo



Proposed Site Plan

Source: Sasaki Associates *Tsoi / Kobus & Associates

CRA

Figure 1.6
Proposed Conditions with Rendering
Whitehead Institute Office Addition

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

2

Transportation and Parking

KEY:

Text represents new or substantially revised narrative description from the NPC.

Section Heading represents an entirely new or substantially revised section from the NPC.

Table Heading represents an entirely new or substantially revised table from the NPC.

Introduction

This chapter presents a summary of the evaluation of the transportation and parking aspects of the Project, as described in detail in Chapter 1, *Project Change Description* and illustrated in Figures 1.1 through 1.6. Specifically, this evaluation includes the following elements:

- Definition and presentation of existing traffic, including roadway capacities, parking, transit, pedestrian and bicycle circulation, loading and overall Project site conditions.
- An evaluation of the Project's long-term impacts of traffic, including roadway capacities, parking transit, pedestrian and bicycle circulation, loading and overall KSURP area conditions.
- A detailed summary of the proposed transportation mitigation and improvements the development will contribute to the KSURP area to help reduce the transportation impacts and improve overall accessibility to and from the area.

Additional detail and supporting information is provided in Appendix C, which is provided electronically on the enclosed CD-ROM due to size. Hardcopies of any or all of these supporting materials are available upon request.

The Proponent and Redeveloper are committed to developing an expanded program of transportation mitigation and enhancements designed to both preserve the

favorable mode share balance in Kendall Square and provide additional improvements to mitigate the trip generation projected to result from the Project. The Proponent has engaged in preliminary discussions with MassDOT and MBTA representatives to discuss the Project, its impacts, and potential transportation mitigation and enhancements in the KSURP area. The Proponent has also begun to coordinate with the City's Traffic, Parking and Transportation (TP&T) Department to address additional requests from the City regarding traffic conditions analysis in Kendall Square and potential Project-related impacts to the local transportation infrastructure. Through the MEPA process, the Proponent continues to coordinate closely with both the City, MassDOT and MBTA to begin to address any comments and understand possible additional information needs.

The information and analysis provided in this chapter responds to the Transportation Scoping Letter (TSL) dated December 4, 2014 from MassDOT in response to the Proponent's Request for Scoping letter dated November 18, 2014. A copy of MassDOT's scoping letter is included in Appendix C. In developing the Request for Scoping letter, the Proponent engaged TP&T to provide guidance on the methodology used to analyze existing and future conditions including trip generation, mode split, trip distribution and trip assignment. The 'Project Description' section below describes the area and proposed development analyzed in this chapter.

Additional information is provided herein, in accordance with the NPC Certificate and to address other comments received on the NPC:

- Additional traffic operations analysis, including a multi-modal level-of-service analysis on key intersections within the KSURP Area, and a Roadway Segment Analysis for the segments of Broadway and Binney Street within the studied area;
- A description of the Roadway Safety Audit to be conducted as part of the MOU at a later date;
- Detailed analysis of future vehicle parking showing the current capacity and occupancy of the three KSURP garages with the added Project demand to demonstrate the need for the additional 740 proposed parking spaces;
- A shared parking program to manage the future parking demand, including a description of a long-term parking management and monitoring program;
- Additional public transportation analyses for the MBTA Red Line as well as MBTA Bus and EZRide Shuttle routes within the KSURP Area;
- A comprehensive supply and demand study of existing short- and long-term bicycle parking to understand the usage of these facilities to identify deficiencies within the KSURP Area and identify where new bicycle parking infrastructure should be located;
- Calculations for the number of bicycle parking spaces (both short- and long-term) needed for the current as-built KSURP Area to comply with current bicycle parking standards;

- Pedestrian level-of-service analysis for all study area signalized and unsignalized intersections; and
- Updates to the proposed transportation mitigation, including a draft MOU and a proposed update to enhance the existing Traffic Monitoring Program that has been implemented since 1994 (a requirement of the KSURP Amendment No. 3).

Project Description

The Project consists of approximately 1,034,600 square feet of new development to the previously permitted KSURP area increasing the maximum build out to approximately 4.3 million gross square feet of space. Originally adopted in 1965, the KSURP was developed to reenergize and revitalize the Kendall Square area of Cambridge. The Kendall Square Urban Renewal Project area is bounded by Main Street, the Grand Junction Railroad, Binney Street and Third Street. Together through the effort of the City, Proponent and private developers (the Redeveloper and Other Developers), the Kendall Square area has grown from an industrial district to a thriving innovative community.

In 2013, the CDD published the K2 Plan to explore future development opportunities in the Kendall Square area. Part of the planning study focuses on the MXD District which encompasses the proposed Project parcels that are proposed to be developed by Boston Properties. The K2 Plan study recommended increasing the allowable zoned development square footage to approximately four million square feet.

The Project will be located within Parcels 2, 3 and 4 of the KSURP area with development proposed for sites currently known as the Cambridge Center North Garage, Eleven Cambridge Center, Three Cambridge Center, the Whitehead Institute (Nine Cambridge Center) and the Broad Institute (75 Ames Street), as previously shown in Figure S.3. The Project Components, which are consistent with the K2 Plan zoning recommendations, are summarized in Table 2-1 below and described further in Chapter 1, *Project Change Description*.

The Project will be supported by approximately 740 new parking spaces, which would be added to the Cambridge Center North Garage as well as in a separate, new below-grade facility to be located under Eleven Cambridge Center. The additional parking will be operated as shared parking, serving office uses primarily during weekdays and residential uses overnight and on weekends. The Project will also provide approximately 800 covered and secured bicycle parking spaces and approximately 100 short-term external bicycle parking spaces in conformance with City's Bicycle Guidelines. These spaces will be distributed between the Cambridge Center North Garage, West Garage and East Garage as well as a new garage under Eleven Cambridge Center.

Table 2-1 Proposed Development Program

Project Component	Size/Quantity
Phase 1A – Cambridge Center North Garage Office Buildings	
Commercial Office	546,000 GSF
Innovation Space	39,000 GSF
Retail	5,000 GSF
NET NEW Phase 1A:	*590,000 GSF*
Phase 1B – Eleven Cambridge Center Residential Building	
Existing Eleven Cambridge Center Commercial Office (to be demolished)	(76,600 GSF)
Residential	210,000 GSF (294 units)
Retail	25,000 GSF
NET NEW Phase 1B:	*158,400 GSF*
TOTAL NET NEW Phase 1:	*748,400 GSF 740 parking spaces*
Phase 2 – Three Cambridge Center Mixed Use Building	
Existing Three Cambridge Center Commercial Office (to be demolished)	(105,100 GSF)
Residential	190,000 GSF (266 units)
Commercial	106,200 GSF
Retail	20,000 GSF
TOTAL NET NEW Phase 2:	*211,100 GSF*
Other Development	
Whitehead Institute Addition[1]	60,000 GSF
Broad Institute Office Conversion[2]	15,100 GSF
TOTAL NET NEW Other Development:	*75,100 GSF*
TOTAL (NET NEW)	**1,034,600 GSF** **584,600 GSF Office[3]** **50,000 GSF Retail** **400,00 GSF Residential (560 units)** **740 spaces**

GSF Gross Square Feet
1 To the existing facility at Nine Cambridge Center.
2 Accounts for the conversion of existing mechanical space to be re-purposed/fit-out into leasable commercial office space at 75 Ames Street.
3 Includes Innovation Space.

Summary of Project Change Impacts

Traffic operations within the KSURP area have been monitored by FST since their initial traffic analysis for Plan Amendment No. 3 for which the MEPA approval required the Proponent to annually update the KSURP traffic counts, collect and analyze parking data, and review KSURP tenant surveys. FST has been reporting on area traffic volumes and parking garage usage since the approval of Plan Amendment No. 3 in 1993. Through the annual reporting and analysis process, many favorable

transportation trends and observations have been documented, particularly relating to project trip generation rates.

The history of the KSURP with the MEPA process, as documented by the FST analysis, has consistently shown that actual trip generation in Kendall Square is significantly lower than accepted methodology for average daily vehicle trip (ADVT) projections, as shown in Figure 2.1. Obtaining accurate projections requires substantial downward adjustment from standard Institute of Transportation (ITE) Trip Generation Manual rates. This is due to the high proportion of alternative modes, including transit, walk and bike, by commuters, shoppers, visitors, and residents in Kendall Square. Traffic analyses submitted with KSURP Plan Amendment No. 3 and No. 8 in particular demonstrate this important conclusion.

FST summarized the traffic impact of Amendment No. 3 in a July 9, 1993 letter to then CRA Executive Director Joseph F. Tulimeri. FST conducted traffic counts and consulted parking surveys conducted by Kinney Systems, as well as employee commuting surveys from a large Kendall Square employer. FST explained that it employed a two-step method for projecting trip generation, as recommended by the ITE Trip Generation Handbook. First, FST used ITE rates to estimate daily trip generation, based on land use categories. Second, FST adjusted the ITE rates to account for local conditions, including the presence of mass transit, City and State laws and regulations affecting trip generation, and the various traffic count and parking data. These data together suggested that transit, carpool, and walking transit modes would account for approximately 32 percent of trips in Kendall Square. After applying the adjustment, FST projected that a full build out under Amendment No. 3 would generate no more than 13,700 vehicle trips per day, approximately 29 percent less than the 19,300 vehicle trips per day analyzed in the 1977 FEIR.

As required under the MEPA approval for Plan Amendment No. 3, FST has collected data on trends in land uses, updated traffic counts, collected and analyzed parking data, and reviewed tenant surveys on an annual basis since 1994. FST summarized its findings in a June 15, 2010 letter to the CRA, in connection with proposed Amendment No. 8. The historical record formed by data collection between 1994 and 2010 provided a "firm basis upon which to estimate future traffic impacts in the Area at full build out [as described in the 1977 FEIR and amended to a total of 3.3 million square feet]" and to conclude that overall trip generation under Amendment No. 8 would be lower than under Amendment No. 7 and substantially lower than estimated in the 1977 FEIR. Historically, trip generation counts suggested that actual trip generation "average[ed] 14 to 15 percent lower than projected trip generation."

In 2010, FST updated its projection methodology to take into account historical traffic measurements and the excellent transit services and favorable mode split in Kendall Square. Specifically, FST assumed a 43 percent adjustment downward from ITE rates, consistent with values from the 1994-2010 data. FST noted the 43 percent adjustment was actually conservative, as count data suggested that actual trip generation was more than 50 percent below unadjusted ITE rates.

Favorable mode split accounted for much of the adjustment. FST noted in particular that the 2009 tenant survey indicated that transit, walk-bike, shuttle, and carpool accounted for more than 70 percent of trip-making in Kendall Square. On that basis, FST concluded that maximum build out under Amendment No. 8 would generate approximately 13,714 vehicle trips per day, 28 to 30 percent fewer trips than estimated under the Preferred Plan in the FEIR. FST specifically noted that "[b]ecause of the excellent public transportation services, and newly installed bicycle circulation facilities, the extensive sidewalk system in the Area, and the City's Trip Reduction Ordinance, the Area continues to generate vehicle trips at rates far lower than those contained in the ITE Trip Generation Report."

The conclusions summarized in the FST reports can be used to help forecast the trips generated by proposed Amendment No. 10. The traffic produced by the proposed Project will increase traffic within the area, but at a rate lower than the reported ITE estimates. The analysis presented in the following sections provides a conservative approach to the trip generation methodology.

ITE unadjusted trip rates estimate that the Project will generate approximately 10,512 vehicle trips to the KSURP area. As FST has shown, this estimation is very high for the KSURP area and adjustments, making use of area-specific mode splits and vehicle occupancy rates, help to more accurately represent the actual number of vehicle trips generated by the Project. Taking these factors into consideration the Project will generate an estimated 3,638 adjusted vehicle trips. Adding this expected future traffic to the 13,714 average vehicle trips per day, as projected by FST under Amendment No. 8, the estimated total number of vehicle trips per day to the KSURP area is calculated to total 17,352, which is still approximately 10 percent less the projected 19,300 vehicle trips estimated in the 1977 FEIR.

Collectively, the actual approximately 2,667 existing off-street parking spaces with the proposed 740 new off-street parking spaces falls within the maximum off-street parking supply previously approved under Plan Amendment No. 3 (3,545 spaces).

Consistency with Transportation Planning and Policies

The following sections describe how the Project is consistent with transportation-related local, regional and/or state plans or policy initiatives.

Kendall Square Mobility Plan and Task Force

In early 2015, MassDOT established the Kendall Square Mobility Task Force (the "Task Force") to study the transportation network and facilities in the Kendall Square area, identify mobility issues for all modes of transportation, and provide recommendation for possible solutions. In recent years, the City, MassDOT, the MBTA, institutions and private organizations have all documented the need for

improved mobility in Kendall Square through a series of studies and initiatives. The existing mobility issues and deficiencies identified through these processes, coupled with planned growth in Kendall Square and East Cambridge, has created a need to develop a transportation strategy to address local and regional mobility needs and mitigate potential future impacts.

The Task Force, which meets bi-monthly, is co-chaired by a representative from the City and the Kendall Square Association (KSA)—a membership-based organization that consists of companies and institutions within Kendall Square. Specifically, together with MassDOT, the Task Force is currently made up of the following stakeholders:

- MBTA
- CRA (the Proponent)
- Cambridge TP&T Department
- Massachusetts Institute of Technology (MIT)
- Boston Properties (the Redeveloper) and other property owners
- Citizen representatives

The Task Force's first public meeting was held October 15, 2015 to receive community input on transportation priorities for Kendall Square.

Led by MassDOT, the Kendall Square Mobility Task Force will work over the next four to six months to identify projects and policy initiatives in support of the continued success of Kendall Square.[1] These projects and initiatives will be technically and financially achievable over the short, medium, and long-term horizons. The Task Force will consider the capacity of connections into and within the Kendall area and beyond, as appropriate. The Proponent is in full support of the Task Force and will use the outcomes of the study to help shape the mitigation plan for the Project (as discussed further below under the 'Proposed Public Transit Improvements' section below).

GreenDOT Implementation Plan

Following the 2010 GreenDOT Policy Directive, MassDOT worked to identify specific action steps for embedding the sustainability vision of GreenDOT into the core business practices of MassDOT. The 2012 GreenDOT Implementation Plan outlines sustainability initiatives for all MassDOT divisions under the themes of: air quality; energy consumption; material procurement; land management; transportation planning and design; waste management; and water resources. Under these themes

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[1] Refer to the MassDOT project website for upcoming meetings and projected schedule at: https://www.massdot.state.ma.us/planning/Main/CurrentStudies/KendallSquareMobility.aspx

the GreenDOT Implementation Plan establishes 15 broad sustainability goals to decrease resource use, minimize ecological impacts, and improve public health outcomes from MassDOT's operations and planning processes. Specifically, this Project is consistent with the 'Planning, Policy & Design' goals, including:

- Design a multi-modal transportation system;
- Promote healthy transportation and livable communities; and
- Triple mode share of bicycling, transit, and walking.

The Project includes infill development in an urban setting that has proven to support triple mode share due to its extensive network of alternative modes of transportation, including public transit, walkable sidewalks, and bicycle facilities. The transportation enhancements proposed as part of the Project (described in detail in Chapter 2, *Transportation and Parking*), support the expansion of the multi-model transportation and aim to promote a livable community. Specifically, the Project will significantly increase bicycle parking throughout the Project Components. And, the development of the KSTEP by the Proponent together with the Redeveloper and the City, in coordination with MassDOT and the MBTA through a MOU to improve the Red Line transit system performance.

Cambridge Vehicle Reduction Trip Ordinance

In general, the City's Vehicle Reduction Trip Ordinance aims to discourage, and provide alternatives to, vehicle trips, specifically single-occupancy vehicle trips to help reduce traffic congestion and associated air pollution, noise, and inconvenience all of which has a negative impact on the quality of life in Cambridge. Additionally, the ordinance contains measures to collect information and otherwise lay the foundation for future actions to reduce vehicle trips and improve air quality.

The Project is consistent with this ordinance in the following ways:

- Development of the KSTEP through a MOU between the Proponent (together with the Redeveloper and the City), and MassDOT and the MBTA to enhance public transit services to the KSURP area.
- Implementation of a traffic monitoring program for the KSURP area (ongoing since 1994).
- Revised parking space ratios from those specified in the City Zoning Ordinance to discourage the construction of new parking.
- Establish appropriate parking rates for off-street spaces.
- Provide new/enhanced bicycle and pedestrian facilities.
- Implementation of a TDM program, including encouraging businesses to provide employee transit subsidies, and offering resident transit subsidies (described

more fully under the 'Proposed Transportation Demand Management Measures' section below).

Cambridge Parking & Transportation Demand Management Ordinance

The purpose of this ordinance is to reduce air pollution from motor vehicles by formalizing parking and TDM planning, programs, and coordination through the requirement of Parking and Transportation Demand Management (PTDM) plans for commercial parking facilities and other types of non-residential parking facilities over a specified size prior to receiving other local permits. The Project will comply with this ordinance in the following ways:

- The Redeveloper will update applicable registrations all off-street parking spaces, as required.
- The Redeveloper will develop and submit an updated PTDM Plan for review and approval.

Existing Transportation Conditions

This section provides a summary of existing transportation conditions in the KSURP area. Discussions include the following:

- Existing area roadways and intersections;
- Pedestrian and bicycle activity and amenities;
- Public transportation options;
- Study area crash analysis;
- Nearby parking supply and regulations; and
- Existing loading activities and deliveries.

Study Area

Roadway Network

The Project Components are located within Parcels 2, 3 and 4 of the KSURP area, specifically at: the Cambridge Center North Garage; Eleven Cambridge Center; Three Cambridge Center; Nine Cambridge Center (Whitehead); and 75 Ames Street (Broad Institute), as previously shown in Figure S.3**.** The KSURP area is generally bounded by Binney Street to the north, Third Street to the east, Main Street to the south and Galileo Galilei Way to the west.

Binney Street is a four-lane divided roadway running east-west from Edwin H Land Boulevard along the Charles River Basin to the east to Galileo Galilei Way where it becomes a two-lane roadway to Cardinal Medeiros Avenue west of the Project area. Third Street runs north-south connecting Monsignor O'Brien Highway to Broadway near Kendall Square MBTA Station. Main Street is a two-lane roadway running east-west from the Longfellow Bridge to Massachusetts Avenue. Galileo Galilei Way runs north-south along the west side of the Project Site, providing two-lanes in each direction between Binney Street and Main Street. Broadway runs diagonal through the KSURP area providing a major connection between Cambridge Center/Kendall Square and Harvard Square.

Study Intersections

The study area includes twenty-four (24) key intersections, as illustrated in Figure 2.2 and described below.

1. O'Brien Highway/Third Street *(Signalized)*
2. Cambridge Street/Third Street *(Signalized)*
3. Cambridge Street/First Street *(Signalized)*
4. O'Brien Highway/Cambridge Street/East Street *(Signalized)*
5. O'Brien Highway/Land Boulevard/Charlestown Avenue *(Signalized)*
6. Binney Street/Galileo Galilei Way/Fulkerson Street *(Signalized)*
7. Binney Street/North Garage West Driveway *(Unsignalized)*
8. Binney Street/North Garage East Driveway *(Unsignalized)*
9. Binney Street/Third Street *(Signalized)*
10. Binney Street/First Street *(Signalized)*
11. Binney Street/Land Boulevard *(Signalized)*
12. Broadway/Galileo Galilei Way *(Signalized)*
13. Broadway/North Garage West Driveway *(Unsignalized)*
14. Broadway/North Garage East Driveway *(Unsignalized)*
15. Broadway/Ames Street *(Signalized)*
16. Broadway/Third Street *(Signalized)*
17. Broadway/Main Street *(Unsignalized)*
18. Broadway/Main Street/Memorial Drive *(Unsignalized)*
19. Main Street/Ames Street *(Signalized)*
20. Main Street/Galileo Galilei Way/Vassar Street *(Signalized)*
21. Massachusetts Avenue/Vassar Street *(Signalized)*
22. Memorial Drive/Route 3/Ames Street *(Unsignalized)*
23. Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps *(Signalized)*
24. Massachusetts Avenue/Memorial Drive Eastbound On/Off-Ramps *(Signalized)*

O'Brien Highway/Third Street is a three leg signalized intersection located north of the proposed development. Third Street is two lanes in the northbound direction with a left turn only lane and a general purpose lane. O'Brien Highway is three lanes in the both directions divided by a raised, concrete median. The westbound approach is one left/thru lane and two thru lanes. The eastbound approach is two thru and one

thru/right lanes. Crosswalks are located at the O'Brien Highway westbound leg and the Third Street leg of the intersection with wheelchair ramps.

Cambridge Street/Third Street is a four leg signalized intersection located to the north of the proposed development. Third Street northbound provides one general purpose lane while the southbound approach has two lanes with a left turn only lane and a thru/right lane. Cambridge Street provides a general purpose lane and a separate bike lane in both the westbound and eastbound directions. Crosswalks are located at each leg of the intersection with wheelchair ramps at all corners. Parking is permitted on the east side of the Third Street northbound approach and both sides of Cambridge Street.

Cambridge Street/First Street is a four leg signalized intersection located to the northeast of the KSURP area. First Street northbound approach has two lanes: a left turn and a right turn at the intersection, with a separate bike lane. In the southbound direction, there is an MBTA bus driveway for the Lechmere Station. Cambridge Street westbound provides two lanes: a left turn land and a thru lane. The eastbound approach is one thru/right lane. There is a separate bike lane in both directions on Cambridge Street. Crosswalks are located at each leg of the intersection with wheelchair ramps. Parking is permitted on both sides of the Cambridge Street to the west of the intersection.

O'Brien Highway/Cambridge Street/East Street is a four leg signalized intersection located northeast of the KSURP area. The eastbound Cambridge Street approach provides three lanes; one lane is left turn only onto East Street or O'Brien Highway and two are thru lanes that continue onto O'Brien Highway eastbound. East Street has a general purpose lane in the southbound direction with a separate bike lane. The O'Brien Highway north-westbound approach is four lanes, two left turn lanes, a thru lane, and a thru/right lane. The south-eastbound approach is five lanes with one left turn, three thru, and one right turn lane. Both legs of O'Brien Highway have concrete medians. The MBTA Lechmere Station has a driveway exit at the O'Brien Highway eastbound leg. Crosswalks with wheelchair ramps are located across both O'Brien Highway approaches and the East Street approach. Parking is prohibited along the intersection approaches.

O'Brien Highway/Land Boulevard/Charlestown Ave is a four leg signalized intersection located northeast of the KSURP area and the southeast of the O'Brien Highway/Cambridge Street/East Street intersection. The southeast approach on the O'Brien Highway provides a left turn only lane, a left/thru lane, two thru lanes, and a right turn only lane that is separated from the intersection with a median. The southwest approach on Charlestown Ave provides a left/thru lane and a thru/right lane. The northwest approach on the O'Brien Highway provides two left turn only lanes, two thru lanes, and a right turn only lane. The northeast approach on Land Boulevard provides a left turn only lane, two thru lanes, and a right turn only lane. Crosswalks are located at each leg of the intersection with wheelchair ramps. Parking is permitted along the intersection approaches.

Binney Street/Galileo Galilei Way/Fulkerson Street is a four leg signalized intersection located northwest of the proposed development. The Fulkerson Street southbound approach provides one bear right/right turn lane. Galileo Galilei Way is the southwest approach and provides two thru lanes onto Binney Street. The Binney Street northwest approach provides a right turn only lane and a bear left lane. Binney Street westbound approach provides two lanes, a thru and a thru/right lane. Crosswalks with wheelchair ramps are provided to cross all approaches. Parking around the intersection is limited to both sides of Fulkerson Street.

Binney Street/North Garage West Driveway is a three leg unsignalized intersection located north of the Cambridge Center North Garage. The northbound approach on the North Garage West Driveway provides a single lane designated as right turn only onto Binney Street eastbound. Vehicles are only allowed to turn right onto Binney Street because the North Garage West Driveway only intersects with the eastbound travel lanes. Binney Street eastbound and westbound both have two thru lanes with a grass median separation. Crosswalks with wheelchair ramps are located across the North Garage West Driveway approach. Parking is prohibited along the intersection approaches.

Binney Street/North Garage East Driveway is a three leg unsignalized intersection located north of the Cambridge Center North Garage and east of the Binney Street/North Garage West Driveway intersection. The northbound approach on the North Garage East Driveway provides left/right turn lane onto Binney Street in either the eastbound or westbound direction. Binney Street, at this intersection, has a break in the grass median separation, and vehicles are allowed to turn. The eastbound Binney Street approach provides a thru lane and a thru/right turn lane. The westbound Binney Street approach provides a U-turn/left lane and two thru lanes. No striped crosswalks are provided at this intersection, but there are wheelchair ramps across the North Garage East Driveway. Parking is prohibited along the intersection approaches.

Binney Street/Third Street is a four leg signalized intersection located northeast of the proposed development. Third Street northbound provides one left/thru lane and one right turn only lane. The southbound direction is one general purpose lane. Binney Street provides three lanes, a left turn only, a thru, and a thru/right lane in both the east and westbound directions. Bike lanes are provide along all intersection approaches. Crosswalks are provided across each leg of the intersection with wheelchair ramps. Just east of the intersection, on the south side of Binney Street is an EZRide stop for the MIT Shuttle.

Binney Street/First Street is a four leg signalized intersection located northeast of the KSURP proposed development. First Street provides travel in the north-south direction. The southbound approach is two lanes, a left/thru and a right turn only lane, with a bike lane. First Street northbound approach is one general purpose lane. Binney Street is three lanes, a left turn only, a thru, and a thru/right lane, in the eastbound direction. The westbound Binney Street approach is two lanes, a thru and a thru/right lane. Bike lanes and crosswalks are located at each leg of the intersection.

Binney Street/Land Boulevard is a three leg signalized intersection located northeast of the proposed development. Binney Street eastbound provides a left turn only and a

left/right turn lane. Land Boulevard northbound provides two left turn only lanes and three thru lanes. The southbound Land Boulevard approach provides two thru lanes and one right turn only lane. Crosswalks are located across each approach. No parking is allowed on any of the intersection approaches.

Broadway/Galileo Galilei Way is a four leg signalized intersection located at the western edge of the KSURP development area. Galileo Galilei Way southbound provides a left turn only lane, a thru lane, and a right turn only lane. The Galileo Galilei Way northbound approach provides a left turn lane, a thru lane, and a thru/right lane. Broadway south-eastbound provides a left turn only lane, a thru lane, and a right turn only lane. The Broadway north-westbound approach provides three lanes with a left turn only lane, a thru lane and a thru/right lane. All approaches provide bike lanes. Crosswalks are located at each leg of the intersection with wheelchair ramps. Just west of the intersection on the south side of Broadway is an MBTA bus stop for Route 64, 68, and 85 and just east of the intersection on the both sides of Broadway is an EZRide stop. Parking is prohibited at the intersection.

Broadway/North Garage West Driveway is a three leg unsignalized intersection located south of the Cambridge Center North Garage. The southbound approach on the North Garage West Driveway provides a single lane designated as right turn only onto Broadway westbound. Exiting vehicles are only allowed to turn right onto Broadway because the North Garage West Driveway only intersects with the westbound travel lanes. Broadway westbound has a left turn only lane (for a different upcoming intersection) a thru lane and a thru/right lane with a grass median separation from the two eastbound thru lanes. Vehicles are allowed to turn right onto North Garage West Driveway form Broadway westbound. There are no striped crosswalks, but there is a sidewalk at grade that spans across the North Garage West Driveway approach. Parking is prohibited along the intersection approaches.

Broadway/North Garage East Driveway is a three leg unsignalized intersection located south of the Cambridge Center North Garage. The southbound approach on the North Garage East Driveway provides a single lane designated as right turn only onto Broadway westbound. Exiting vehicles are only allowed to turn right onto Broadway because the North Garage West Driveway only intersects with the westbound travel lanes. Broadway westbound has three thru lanes with a grass median separation from the two eastbound thru lanes. Vehicles are restricted from turning right onto North Garage East Driveway from Broadway westbound. There is a crosswalk with wheelchair ramps across the North Garage East Driveway. Parking is prohibited along the intersection approaches.

Broadway/Ames Street is a three leg signalized intersection located in the heart of the KSURP development area. Ames Street northbound provides a left turn only lane and a right turn only lane. Broadway runs southeast-northwest through the study area providing two lanes, a right turn only and a thru lane at the south-eastbound approach. The north-eastbound approach provides one left turn only lane and one thru lane. All approaches provide bike lanes and crosswalks. Parking is permitted on both sides of Ames Street near the intersection.

Broadway/Third Street is a three leg signalized intersection located adjacent to the proposed Three Cambridge Center Mixed Use Building. Third Street southbound provides a left turn only and a right turn only lane and a separated bike lane. The south-eastbound Broadway approach provides a left turn and two thru lanes with a channelized right lane onto Main Street. The north-westbound Broadway approach is a thru and thru/right lane with a bike lane. Crosswalks are located at each leg of the intersection with wheelchair ramps. Parking is permitted at the Broadway north-westbound approach and on the east sides of Third Street.

Broadway at Third Street intersection is currently under construction with the new configuration discussed and analyzed under No-Build and Build Conditions.

Broadway/Main Street is a two leg unsignalized intersection with stop control on the Main Street approach. Broadway provides two through lanes eastbound with a channelized right turn onto Main Street westbound prior to the Broadway/Third Street signalized intersection. Main Street is one-way with a stop controlled, right turn onto Broadway eastbound. Main Street eastbound provides a designated bike lane. Crosswalks with wheelchair ramps are located at the Main Street eastbound approach and the Broadway channelized turn onto Main Street westbound. There are no bus stops near the intersection. Parking is prohibited at the intersection.

Broadway/Main Street/Memorial Drive is two separate two leg, unsignalized intersections with stop control on both Memorial Drive on/off-ramp approaches. The north most intersection includes the Memorial Drive southbound on/off-ramp and the Broadway/Main Street westbound leg. The south most intersection includes the Memorial Drive northbound on/off-ramp and the Broadway/Main Street eastbound leg. The MBTA Red Line run in the middle of Broadway/Main Street. In both directions, Broadway/Main Street is two lanes, a thru and a thru/right, with a separate bike lane. The Memorial Drive approaches are both one right turn lane. Crosswalks are located across both Memorial Drive approaches. Parking is permitted to the west of the intersection along the north side of Broadway/Main Street westbound.

Main Street/Ames Street is a four leg signalized intersection located on the southern edge of the KSURP development area. The southbound Ames Street approach provides a left/thru lane and a right turn only lane and a separate bike lane. The Ames Street northbound approach provides one general purpose lane. Main Street provides one general purpose lane in each direction. Protected bike lanes are provided along the north-, south- and eastbound approaches and crosswalks are provided across all intersections. East of the intersection on the north side of Main Street is an EZRide stop for the MIT Shuttle. Parking is permitted along all approaches near the intersection.

Main Street/Galileo Galilei Way/Vassar Street is a four leg signalized intersection adjacent to the proposed Whitehead addition. The Galileo Galilei Way southbound approach provides three lanes with a left turn only lane, a thru lane, and a right turn only lane. The northbound Vassar Street approach provides a left/thru lane and a thru/right lane, with a separate bike lane. Main Street travels east-west through the study area providing two lanes, a left turn and a thru/right, with a separate bike lane on both eastbound and westbound approaches. Crosswalks are located at each leg of

the intersection with wheelchair ramps. Just south of the intersection on the east side of Vassar Street is an EZRide stop for the MIT Shuttle.

Massachusetts Avenue/Vassar Street is a four leg signalized intersection located southwest of the proposed development area. The Vassar Street northeast and southeast approaches provide two lanes with one left turn only and one thru/right lane and a bike lane in both directions. Massachusetts Avenue is two lanes in each direction with one left/thru lane and one thru/right lane. Crosswalks are located at each leg of the intersection with wheelchair ramps. Just north of the intersection on both sides of Vassar Street is an MBTA bus stop for the Crosstown 2 (CT2) bus. Additionally, on the east side of the Vassar Street south-westbound leg is an EZRide stop for the MIT Shuttle. Parking is permitted on the north side of the Massachusetts Avenue north-westbound approach.

Memorial Drive/Route 3/Ames Street is a two leg unsignalized intersection with stop control on the Ames Street southbound approach. Ames Street southbound provides one thru/right lane at the intersection. The Ames Street thru lane crosses Memorial Drive south-westbound to become a stop controlled left turn onto Memorial Drive north-eastbound. Memorial Drive is free flowing in the south-west direction with one left/thru lane and one thru lane at the intersection. Crosswalks are located at each leg of the intersection with wheelchair ramps. Parking is permitted along the north side of Memorial Drive.

Massachusetts Avenue/Memorial Drive/ Westbound On/Off-Ramps and **Massachusetts Avenue/Memorial Drive Eastbound On/Off-Ramps** are two separate, but clustered, signalized intersections located southwest of the proposed development area. The southern intersection includes the Memorial Drive north-eastbound off-ramp and Massachusetts Avenue. Memorial Drive north-eastbound is a one-way right turn only lane. Massachusetts Avenue north-westbound provides one through lane and one thru/right lane. The south-eastbound approach provides two thru lanes. The northern intersection includes the Memorial Drive south-westbound off-ramp Massachusetts Avenue. Memorial Drive south-westbound is a one-way right turn only lane. Massachusetts Avenue north-westbound is one left turn only lane and two thru lanes. Massachusetts Avenue south-eastbound provides a through and a thru/right lane. There are bike lanes along both sides of Massachusetts Avenue at each intersection. Crosswalks with wheelchair ramps are located around the exterior of the two intersections. Just north of the intersections on the east side of Massachusetts Avenue is an MBTA bus stop for Route 1. Parking is prohibited at the intersection approaches.

Data Collection

Due to ongoing construction of the Longfellow Bridge, turning movement counts (TMCs) and automatic traffic recorder (ATRs) conducted at this time would not reflect typical traffic conditions. Therefore, turning movement counts conducted as part of other recent area studies will be used. These studies include the following:

- ARE, Binney TIS (May, 2009)

- Longfellow Bridge (January, 2010)
- Kendall Square K2 Plan Study (October, 2010)
- 300 Massachusetts Avenue TIS (April, 2013)
- 40 Thorndike Street TIS (May, 2013)

Many of the study area intersections have been counted under these various projects with the exception of Massachusetts Avenue/Memorial Drive Westbound and Eastbound and Memorial Drive/Route 3/Ames Street. These two intersections were counted in October, 2014. To account for the various years and months the TMC data was collected, all intersections were grown to October 2014 volumes using a 0.5 percent growth per year. In addition, some intersection volumes had to be proportionally adjusted to match adjacent intersection volumes if they were associated with different projects and counted during different time periods.

All of the TMCs captured the study area intersections during the morning and evening peak periods, 7:30 AM – 9:30 AM and 4:30 PM – 6:30 PM, respectively. The study area's traffic peak hours were determined to be 8:15 AM – 9:15 AM for the morning peak hour and 5:00 AM – 6:00 PM for the evening peak hour. Existing peak hour traffic volumes are shown in Figures 2.3a and 2.3b for the morning and evening commuter peaks, respectively.

ATR counts from the FST Kendall Square Urban Renewal Area 2013 Traffic Count Program and Trip Generation Analysis from May 2013 are presented in Table 2-2. The ATRs were collected for a total of eight consecutive days between May 11, 2014 and May 18, 2014. Counts for the 2014 report were provided, but due to the Longfellow Bridge construction a significant change in volumes was seen between the 2013 and previous years and the 2014 counts. This shift does not reflect the typical travel patterns or volumes seen on the study area roadways and therefore the 2013 ATR counts were used instead of the 2014 ATR counts.

All five locations counted in the study are within close proximity to the Project area. these locations include: 1) Main Street, east of Ames Street; 2) Broadway, east of the Mid-Block Connector; 3) Binney Street, west of Fifth Street; 4) Third Street, north of Broadway; and 5) Vassar Street, southwest of Main Street and the Western Connector. Table 2-2 provides a breakdown of the 2013 ATR counts and average weekday traffic volumes at the five locations.

Table 2-2 Existing Average Weekday Hourly Traffic Volumes

Hour Commencing	Main Street, east of Ames Street		Broadway, east of Mid-Block Connector		Binney Street, west of Third Street		Third Street, north of Broadway		Vassar Street, south of Main Street	
	EB	WB	EB	WB	EB	WB	NB	SB	NB	SB
12:00 AM	75	19	107	125	60	43	41	36	73	45
1:00	57	9	63	74	37	30	25	26	47	28
2:00	33	5	39	43	23	19	19	18	35	19
3:00	22	5	32	36	23	31	13	14	25	21
4:00	29	9	51	67	30	65	14	22	36	36
5:00	60	15	94	348	64	284	76	77	108	127
6:00	117	48	277	551	161	476	187	173	231	287
7:00	243	79	471	654	279	570	294	283	413	409
8:00	306	87	694	763	347	653	401	340	548	475
9:00	328	89	610	714	270	343	355	317	525	480
10:00	304	78	459	620	270	343	308	265	420	330
11:00	293	81	445	583	334	329	276	250	366	312
12:00 PM	295	86	467	585	370	339	283	261	354	324
1:00	307	88	520	540	402	327	292	269	350	309
2:00	363	91	651	554	551	304	309	305	369	367
3:00	389	85	658	575	731	302	346	410	414	396
4:00	374	112	689	626	757	326	340	520	420	409
5:00	385	128	797	633	773	391	345	551	537	459
6:00	353	131	649	633	528	360	333	459	446	350
7:00	238	96	496	493	335	212	239	284	314	254
8:00	203	58	358	399	227	167	178	200	237	167
9:00	192	49	311	355	171	142	151	159	190	175
10:00	163	39	264	325	129	109	123	127	162	150
11:00	125	33	193	221	103	72	87	90	116	86
Daily Total	**5,250**	**1,518**	**9,393**	**10,520**	**6,976**	**6,234**	**5,034**	**5,456**	**6,737**	**6,014**
Average Weekday Traffic Volume	**6,767**		**19,913**		**13,210**		**10,490**		**12,751**	

Crash Data

Crash data was investigated and quantified for the study area. Data was obtained from MassDOT for the most recent three-year period available (2010-2012) for the intersections within the study area. Crash results are summarized in Table 2-3 below.

Based on the crash data from the three most recent years, 2010 – 2012, five study area intersections have no crashes reported and are not presented in Table 2-3 above. These intersections include:

- Binney Street/North Garage West Driveway *(Unsignalized)*
- Binney Street/North Garage East Driveway *(Unsignalized)*

- Broadway/North Garage West Driveway *(Unsignalized)*
- Broadway/North Garage East Driveway *(Unsignalized)*
- Broadway/Main Street/Memorial Drive *(Unsignalized)*

Of the intersections with reported crashes, four exceed the MassDOT Average Crash Rate. These intersections include:

- Cambridge Street/First Street *(Signalized)*
- Main Street at Galileo Galilei Way/ Vassar Street *(Signalized)*
- Massachusetts Avenue/Vassar Street *(Signalized)*
- Massachusetts Avenue/Memorial Drive On-/Off-Ramps *(Signalized)*

Cambridge falls within the District 6 area of Massachusetts where the average crash rate for signalized intersections is 0.76 crashes per million entering vehicles and for unsignalized intersections 0.58 crashes per million entering vehicles. All of the intersections with calculated crash rates over the district average are signalized. There have been two fatal accidents, one at Cambridge Street/First Street and one at Massachusetts Avenue and Vassar Street. The fatal accident at Cambridge Street/First Street was between a pedestrian and a vehicle traveling westbound and occurred approximately 60 feet east of the intersection. The accident occurred in 2012 after dark under dry weather conditions. The accident at Massachusetts Avenue/Vassar Street occurred between a truck and a cyclist. The truck was traveling northbound on Massachusetts Avenue turning right onto Vassar Street when it struck the cyclist. This accident occurred at night in 2011 when it was raining and the roads were wet.

Two intersections have a calculated crash rates well above the Massachusetts District 6 average. The intersection of Massachusetts Avenue at Vassar Street has a calculated crash rate of 1.50 (42 over 3 years) crashes per million entering vehicles. One accident, as discussed previously, resulted in a pedestrian fatality and another 13 involved a pedestrian or bicyclist. 17 reported non-fatal injuries, while 14 reported only property damage. The majority of reported crashes occurred under dry conditions during non-peak weekday hours. The intersections of Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps and Massachusetts Avenue/Memorial Drive Eastbound On/Off-Ramps reported 55 crashes occurring over three years resulting in a crash rate of 1.71 crashes per million entering vehicles. The intersection is really a cluster of two intersections controlled by one control box, but for the purposes of the crash analysis it will be treated as one large intersection. No fatal accidents were reported, while 21 reported non-fatal injuries, 31 reported only property damage, and 3 did not report the crash severity. The majority of crashes, 29, occurred during non-peak weekday hours and 14 occurred during non-peak weekend hours. MassDOT crash rate worksheets for all intersections and collision diagrams for intersections with more than three crashes per year are provided in Appendix C.

Table 2-3 Summary of Crash Data (2010-2012)

	O'Brien Highway/ Third Street	Cambridge Street/ Third Street	Cambridge Street/ First Street	O'Brien Highway/ Cambridge Street/ East Street	O'Brien Highway/Land Boulevard/ Charlestown Avenue	Binney Street/ Galileo Galilei Way/ Fulkerson Ave	Binney Street/ Third Street	Binney Street/ First Street	Binney Street/ Land Boulevard	Broadway/ Galileo Galilei Way	Broadway/ Ames Street	Broadway/ Third Street	Broadway/ Main Street/ Memorial Drive	Main Street/ Ames Street	Main Street at Galileo Galilei Way/ Vassar Street	Mass. Ave/ Vassar Street	Memorial Drive/ Route 3/ Ames Street	Mass. Ave/ Memorial Drive On/Off-Ramps	Total
Year																			
2010	5	5	3	4	14	4	6	6	3	9	3	3	3	1	5	11	1	17	103
2011	5	6	4	2	9	2	3	1	3	7	5	4	5	1	10	17	3	16	106
2012	7	4	7	7	13	1	6	4	1	7	2	5	4	1	4	14	5	22	117
Total:	17	15	14	13	36	7	15	11	7	23	10	12	12	3	19	42	9	55	326
Average:	5.67	5.00	4.37	4.33	12.00	2.33	5.00	3.67	2.33	7.67	3.33	4.00	4.00	1.00	6.33	14.00	3.00	18.33	108.67
Collision Type																			
Angle	6	8	3	3	8	2	4	5	1	13	1	3	0	0	8	11	2	22	102
Head-on	0	1	2	0	3	0	0	2	0	1	0	0	2	0	1	3	0	2	18
Rear-end	7	3	3	2	15	2	4	1	3	1	5	3	4	0	3	10	5	17	90
Rear-to-Rear	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sideswipe, opposite direction	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
Sideswipe, same direction	0	2	4	3	4	1	0	1	1	2	1	2	2	2	4	6	1	6	42
Single vehicle crash	3	1	1	3	6	1	4	1	2	6	1	4	4	0	2	4	0	8	52
Unknown	0	0	0	0	0	1	0	1	0	0	1	0	0	1	0	2	0	0	6
Not reported	0	0	1	0	0	0	3	0	0	0	1	0	0	0	0	6	1	0	12
Total:	17	15	14	13	36	7	15	11	7	23	10	12	12	3	19	42	9	55	326
Crash Severity																			
Fatal injury	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
Non-fatal injury	2	6	5	5	7	2	4	3	3	8	4	6	4	0	6	17	2	21	106
Property damage only (none injured)	11	4	4	5	27	4	7	6	3	9	5	5	6	2	7	14	5	31	160
Not Reported	4	5	3	3	2	1	4	2	1	5	1	1	2	1	6	10	2	3	56
Unknown	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
Total:	17	15	14	13	36	7	15	11	7	23	10	12	12	3	19	42	9	55	326
Time of Day																			
Weekday, 7:00 AM - 9:00 AM	5	2	1	1	6	1	2	1	4	2	2	0	1	1	1	8	1	5	44
Weekday, 4:00 PM - 6:00 PM	0	2	2	2	5	2	2	1	1	7	1	3	2	0	6	5	2	7	51
Saturday, 11:00 AM - 2:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	1	4
Weekday, other time	8	7	9	8	15	3	8	6	2	10	7	7	8	2	10	20	3	29	165
Weekend, other time	4	4	2	2	10	1	3	3	0	2	0	2	1	0	2	8	3	14	62
Total:	17	15	14	13	36	7	15	11	7	23	10	12	12	3	19	42	9	55	326
Pavement Conditions																			
Dry	11	10	11	6	31	3	10	6	6	19	8	8	11	0	14	29	7	46	239
Wet	5	5	1	6	5	3	3	5	1	4	1	3	1	2	5	8	1	8	70
Snow	0	0	2	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	5
Ice	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
Sand, mud, dirt, oil, gravel	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Water (standing, moving)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slush	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Not reported	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	4	1	0	8
Total:	17	15	14	13	36	7	15	11	7	23	10	12	12	3	19	42	9	55	326
Non-Motorist (Bike, Pedestrian)	1	1	6	2	3	2	2	1	1	2	3	4	2	1	7	14	0	7	60
MassDOT Crash Rates	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.58	0.76	0.76	0.76	0.76	0.76	–
Calculated Crash Rate	0.48	0.75	0.94	0.39	0.57	0.38	0.59	0.72	0.22	0.71	0.51	0.48	0.46	0.24	0.89	1.50	0.26	1.71	–
Exceeds? (Yes or No)	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	–

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Public Transportation

The Massachusetts Bay Transportation Authority (MBTA) provides a variety of services near the Project area. The Kendall Square MBTA Station is located within less than a quarter-mile east of the site along Main Street and the Central Square MBTA station is less than one-mile west of the site. The stations provide access to the MBTA's Red Line providing service to Alewife to the northeast, downtown Boston and Braintree and Ashmont to the south. The Red Line connects with the Green Line at Park Street and the Orange and Silver Lines at Downtown Crossing. Connections to all southern commuter rail lines, the Red Line and Silver Line are made at South Station. In addition, the Fitchburg commuter rail line connects with the Red Line at Porter Square.

The Project area is also less than one-mile from the Lechmere MBTA Green Line Station. Lechmere is the first stop on the E Branch of the Green Line providing service through North Station and Park Street destined for the Heath Street Station in the Mission Hill neighborhood of Boston. The E Line connects with all other Green Line Branches and the Red Line at Park Street Station. North Station connects the Green Line to the Orange Line and all northern commuter rail lines.

The MBTA operates the following four bus routes that provide service within one-quarter mile of the KSURP area:

- **Crosstown 2 (CT2)** bus route operates on 20-minute headways during peak hours between Sullivan Square in East Cambridge and Ruggles Station. Passengers may connect to the Red Line at Kendall/MIT Station and the Needham, Franklin, Attleboro/Providence, and Stoughton Commuter Rail Lines, in addition to the Orange Line and other various MBTA bus routes at Ruggles Station. The closest stop is at the intersection of Hampshire Street and Portland Street. This route operates between the hours of 5:55 AM and 7:37 PM on weekdays and does not operate on weekends or Holidays.
- **Route 64** connects Oak Square in Brighton to University Park, Cambridge, and Kendall/MIT Station. The bus travels through the Project study area along Broadway to Kendall/MIT Station providing service between Central Square and Kendall Square. It operates with 15 to 25-minute headways during the morning peak and 30-minute headways during the evening peak. The closest stop is at the intersection of Broadway and Galileo Galilei Way with service on weekdays from 6:42 AM to 9:30 AM and 4:05 PM to 6:55 PM. Limited service is provided on Saturday and Sunday and some holidays. Saturday service starts at 5:20 AM providing one hour headways until 1:20 AM. Sunday service operates on one hour headways from 9:30 AM to 7:00 PM.
- **Route 68** operates between Harvard/Holyoke Gate and Kendall/MIT Station via Broadway. It operates with 30-minute headways during the morning peak and 40-minute headways during the evening peak. The closest stop is at the intersection of

Broadway and Galileo Galilei Way. Service is provided from 6:35 AM to 6:51 PM on weekdays. This route does not operate on weekends or Holidays.

- **Route 85** operates with 40-minute headways during peak hours between Spring Hill in Somerville and Kendall/MIT Station via Summer Street and Union Square. The closest stop is at the intersection of Broadway and Galileo Galilei Way. Service is provided from 5:45 AM to 7:53 PM on weekdays. This route does not operate on weekends or Holidays.

In addition, the Charles River Transportation Management Association (CRTMA) operates the *EZRide* shuttle service between North Station, Lechmere, Kendall Square, University Park, and Cambridgeport. The shuttle thereby provides connections to the Green Line at Lechmere Station and the northern commuter rail services, as well as the Green and Orange lines at North Station. The shuttle operates every 8-10 minutes from North Station to Cambridgeport via Kendall Square during morning (6:20 AM to 10:52 AM) and evening (3:04 PM to 8:00 PM) commutes, and the midday (10:44 AM to 3:04 PM) shuttle operates every 20 minutes between Kendall Square and Northwest Campus. The shuttle runs Monday through Friday with no weekend and holiday service. *EZRide* stops within the Project area include Binney Street/Third Street, Broadway/Galileo Galilei Way, and Kendall Square. The shuttle has a varying payment structure separate from the MBTA pass, as *EZRide* and the CRTMA are not affiliated with the MBTA. All *EZRide* Shuttle buses feature front-mounted bike racks for up to two standard bicycles. Figure 2.4 illustrates existing MBTA and CRTMA *EZRide* services in the study area.

Bicycle and Pedestrian Facilities

The City is a large proponent of supporting active modes of transportation including biking and walking, and provides appropriate infrastructure to encourage this behavior. The KSURP area is well serviced by bicycle and pedestrian facilities, including on-street bike lanes, cycle tracks, sidewalks, crosswalks and multi-use pathways. Bicycle and pedestrian volumes were collected simultaneously with traffic volume counts during the peak hours. The volumes used are from various other traffic studies, consistent with the vehicle volumes used to analysis existing traffic conditions. Peak hour bicycle volumes are illustrated in Figures 2.5a and 2.5b. Peak hour pedestrian volumes are illustrated in Figures 2.6a and 2.6b.

The Project Component sites offer ample bicycle parking. Currently, there are approximately 296 on-street publicly accessible bicycle spaces around the Project Component sites. The Cambridge Center North Garage provides 100 covered bicycle spaces in a bike box accessible via the west driveway. The Cambridge Center East Garage currently provides 138 covered bicycle spaces and with the proposed Ames Street Residences project an additional 296 covered spaces will be provided, which complies with City of Cambridge Zoning requirements. There will also be a smaller bicycle storage room inside the Cambridge Center East Garage for approximately 16 bicycles including tandem bikes and bikes with trailers. The Cambridge Center West

Garage provides four (4) secured bicycle cages with each cage each consisting of approximately 25 to 30 "inverted U" bicycle racks.

A 19-space Hubway station is located on the south side of Binney Street next to the North Garage East Driveway and across from the intersection of Binney Street and Sixth Street. Two other Hubway stations are located near the Three Cambridge Center site. A 19-space Hubway station is located along the north side of Main Street across from the intersection of Main Street and Hayward Street and a 15-space station is located along the north side of Broadway, outside of One Broadway. In addition the ample bicycle storage within the area, there are an abundance of bicycle lanes, cycle tracks, and multi-use pathways within the KSURP study area. Figure 2.7 shows the bicycle infrastructure within the area.

Pedestrian infrastructure within the KSURP study area allows for great connectivity to and from the Kendall Square MBTA Red Line Station and area businesses. Sidewalks are provided on all roadways within the study area ranging from 5 feet to 12 feet wide. Crosswalks are provided at all study area intersections with either a concurrent or exclusive pedestrian crossing, provided adequate time for pedestrians of all abilities to cross safely. As part of the City and MassDOT Broadway Improvements project, May 2011, the mid-block pedestrian crossing on Broadway between Ames and Third Streets was reconstructed with pedestrian warning signals. This mid-block crossing provides a valuable connection across the heavily travel road from the Boston Marriott and Cambridge Center East Garage on the south side of Broadway to the Volpe National Transportation Systems Center on the north side. Additionally, at Binney Street and Sixth Street there is a pedestrian crosswalk with flashing beacons to provide save crossing accommodations between the Cambridge Center North Garage to the south, and residences and businesses to the north.

The bicycle and pedestrian infrastructure throughout the study area and beyond provide ample accommodations that encourage people to use these alternative modes of transportation and not just rely on a motor vehicle.

Bicycle Parking Evaluation

Bicycle parking supply and occupancy counts for the KSURP Area were conducted on Tuesday, May 6, 2015 for short-term parking and on Tuesday, July 14, 2015 for long-term parking. The short-term bicycle parking study was conducted by MIT and presented in the MIT Kendall Square TIS dated July 17, 2015. These counts were used as they would have included student bicycle activity within the area. If conducted during the long-term parking study, no student activity would have been captured; thus, bicycle parking numbers could have been lower. As for the long-term bicycle parking, these spaces are only accessible to tenants and employees of the surrounding buildings and therefore a drastic seasonal shift (Spring to Summer) is not expected.

Short-Term Bicycle Parking Study

For the short-term on-street parking study, the total number of racks and spaces as well as the number of bikes locked to racks, signs, fences, trees, meters, and lamp posts were counted on Main Street from Galileo Galilei Way to Broadway, Broadway from Galileo Galilei Way to Third Street, Binney Street from Galileo Galilei Way/Fulkerson Street to Third Street, Galileo Galilei Way from Main Street to Binney Street/Fulkerson Street, Ames Street from Main Street to Binney Street, and Third Street from Main Street/ Broadway to Binney Street. It was found that there are approximately 264 bike parking spaces in racks around the study area. Occupancy counts for these bicycle spaces are provided in Tables 2-4 through 2-7.

Table 2-4 On-Street Short-Term Bike Parking (10:00 AM)

Roadway	Total Racks	Total Spaces	Parked to: Rack	Sign	Fence	Tree	Meter	Lamp Post	**Total**
Main Street	50	132	111	2	0	0	0	3	**116**
Broadway	32	64	14	1	0	0	1	0	**16**
Ames Street	1	2	2	8	0	6	5	1	**22**
3rd Street	13	50	39	4	0	0	0	0	**43**
Galileo Galilei Way	0	0	0	0	0	0	0	0	**0**
Binney Street	5	16	1	0	0	0	0	0	**1**
Total	**101**	**264**	**167**	**15**	**0**	**6**	**6**	**4**	**198**

Table 2-5 On-Street Short-Term Bike Parking (11:30 AM)

Roadway	Total Racks	Total Spaces	Parked to: Rack	Sign	Fence	Tree	Meter	Lamp Post	**Total**
Main Street	50	132	110	4	1	0	3	3	**121**
Broadway	32	64	14	1	0	0	1	0	**16**
Ames Street	1	2	2	9	0	8	6	2	**27**
3rd Street	13	50	44	5	0	0	0	0	**49**
Galileo Galilei Way	0	0	0	0	0	0	0	0	**0**
Binney Street	5	16	1	0	0	0	0	0	**1**
Total	**101**	**264**	**171**	**19**	**1**	**8**	**10**	**5**	**214**

Table 2-6 On-Street Short-Term Bike Parking (12:30 PM)

Roadway	Total Racks	Total Spaces	Parked to: Rack	Sign	Fence	Tree	Meter	Lamp Post	**Total**
Main Street	50	132	115	7	0	0	0	5	**127**
Broadway	32	64	12	1	0	0	1	0	**14**
Ames Street	1	2	2	9	0	5	5	2	**23**
3rd Street	13	50	45	10	0	0	1	0	**56**
Galileo Galilei Way	0	0	0	0	0	0	0	0	**0**
Binney Street	5	16	1	0	0	0	0	0	**1**
Total	**101**	**264**	**175**	**27**	**0**	**5**	**7**	**7**	**221**

Table 2-7 On-Street Short-Term Bike Parking (2:15 PM)

Roadway	Total Racks	Total Spaces	Parked to: Rack	Sign	Fence	Tree	Meter	Lamp Post	Total
Main Street	50	132	116	7	0	0	4	4	**131**
Broadway	32	64	15	0	0	0	1	0	**16**
Ames Street	1	2	2	9	0	5	6	3	**25**
3rd Street	13	50	44	10	0	0	0	0	**54**
Galileo Galilei Way	0	0	0	0	0	0	0	0	**0**
Binney Street	5	16	1	0	0	0	0	0	**1**
Total	**101**	**264**	**178**	**26**	**0**	**5**	**11**	**7**	**227**

It was found that the supply of short-term parking is highly utilized over the entire day, but can accommodate the existing observed demand. The highest demand for parking was at 2:15PM on Main Street where there were 131 bikes for the 132 spaces available (nearly 100 percent occupancy). This will be mitigated in the future with the reconstruction of Main Street from Ames Street to Broadway. The reconstruction includes 130 net-new short-term parking spaces (99 new racks) which will increase the future short-term parking along Main Street from 132 spaces to 262 spaces. Another planned project that will increase the number of short-term parking in the KSURP area is the 88 Ames Street Residences which includes 38 new short-term spaces. With the inclusion of the Main Street Reconstruction and the 88 Ames Street Residences, the KSURA will provide 432 short-term bicycle parking spaces. A breakdown of the planned future parking is provided in Table 2-8.

Table 2-8 Future On-street Short-term Bicycle Parking

Location/Project	Net New	Total
Existing Bike Parking	-	264
Main Street Reconstruction	+130	
88 Ames Street	+38	
Future Bike Parking	**+168**	**432**

Long-Term Bicycle Parking

For the long-term bicycle parking study, the total parking supply and demand was counted inside the three Cambridge Center Garages at the same time intervals as the short-term bicycle parking study as well as before the morning peak hour and after the evening peak hour. It was found that there are approximately 460 long-term bicycle parking spaces in the study area and the occupancy counts are provided in Table 2-9.

Table 2-9 Cambridge Center Garage Long-Term Bike Parking

Parking Garage	Number of Cages	Approximate Number of Spaces	Spaces Occupied					
			7AM	10AM	11:30AM	12:30PM	2:15PM	7PM
Cambridge Center North Garage (Blue Garage)	1	100	15	67	69	67	67	14
Cambridge Center West Garage* (Yellow Garage)	4	222	17	102	105	109	111	39
Cambridge Center East Garage (Green Garage)	2	138	21	90	107	80	94	48
Total	**7**	**460**	**53**	**259**	**281**	**256**	**272**	**101**

* Occupancy Counts do not include Basement Bicycle Cage which has approximately 48 bicycle spaces, number of cages and approximate number of spaces does include the basement bicycle cage

In the future, the construction of the 88 Ames Street Residences will provide 296 new bicycle parking spaces in the East Garage, increasing the future long-term bike parking to 756 spaces.

The Redeveloper has continued to upgrade bicycle storage facilities within the three Cambridge Center parking garages. Recently the facilities within the Cambridge Center East Garage (Green Garage) were updated to provide new hoop-style bike storage racks allowing for two attachment points for bicycle frames.

Vehicle Parking

Today, Cambridge Center provides an overall off-street parking supply of approximately 2,667 spaces all of which is in the form of structured parking. The Cambridge Center North Garage (commonly referred to as the "Blue Garage") currently occupies one of the proposed redevelopment sites of the Project. This garage is a five-story, 1,136-space parking garage that provides monthly and transient parking. There are two other Cambridge Center parking garages located within the KSURP area. The Cambridge Center West Garage (commonly referred to as the "Yellow Garage") is located in the parcel bordered by Broadway, Ames Street, Main Street, and Galileo Galilei Way and contains 727 parking spaces. The Cambridge Center East Garage (commonly referred to as the "Green Garage") is located to the east of the West Garage bordered by Broadway, Ames Street, and Main Street and currently contains 804 spaces. (Note, approximately 40 parking spaces will be lost upon completion of the recently approved Ames Street Residences project). Figure 2.8 shows the location of the three major parking garages within the KSURP area.

Garage occupancy counts are provided annually under the Urban Renewal Area Traffic Count Program and Trip Generation Analysis conducted by FST. Table 2-10 provides average weekday hourly parking occupancies of each garage and a summary of the total Cambridge Center garage occupancy for the week of May 3, 2014.

Table 2-10 Average Weekday Cambridge Center Garage Occupancy Counts (May 2014)

	North Garage		West Garage		East Garage		Total	
Hour Commencing	Spaces Occupied	Percent Occupied	Spaces Occupied	Percent Occupied	Spaces Occupied	Percent Occupied	Spaces Occupied	Percent Occupied
Total Spaces	**1,136**	**-**	**727**	**-**	**804**	**-**	**2,667**	**-**
12:00 AM	65	6%	51	7%	52	6%	168	6%
1:00	63	6%	51	7%	51	6%	165	6%
2:00	63	6%	50	7%	51	6%	164	6%
3:00	63	6%	52	7%	52	6%	167	6%
4:00	69	6%	55	8%	57	7%	181	7%
5:00	102	9%	70	10%	81	10%	253	9%
6:00	257	23%	116	16%	133	17%	506	19%
7:00	518	46%	220	30%	222	28%	960	36%
8:00	815	72%	392	54%	362	45%	1569	59%
9:00	980	86%	565	78%	521	65%	2066	77%
10:00	1,018	**90%**	637	88%	595	74%	2250	84%
11:00	1,019	**90%**	659	91%	616	**77%**	2294	**86%**
12:00 PM	1,009	89%	669	**92%**	612	76%	2290	**86%**
1:00	993	87%	648	89%	603	75%	2244	84%
2:00	946	83%	616	85%	563	70%	2125	80%
3:00	813	72%	544	75%	477	59%	1834	69%
4:00	565	50%	426	59%	347	43%	1338	50%
5:00	310	27%	273	38%	220	27%	803	30%
6:00	203	18%	184	25%	134	17%	521	20%
7:00	124	11%	129	18%	91	11%	344	13%
8:00	98	9%	90	12%	76	9%	264	10%
9:00	82	7%	67	9%	64	8%	213	8%
10:00	74	7%	58	8%	61	8%	193	7%
11:00	69	6%	53	7%	55	7%	177	7%

The Cambridge Center North Garage has a peak parking demand between 10:00 AM and 12:00 PM with 90 percent occupancy. At 90 percent the North Garage is operating at operational capacity, which is when the garage is 90 percent fully occupied. The Cambridge Center West Garage has a peak parking occupancy of 92 percent at 12:00 PM, indicating that the West Garage operates above operational capacity, during an average weekday. The Cambridge Center East Garage experiences a peak occupancy of 77 percent between 11:00 AM and 12:00 PM. As a whole the area wide parking demand occurs between 11:00 AM and 1:00 PM with an occupancy of 86 percent. The data shows that there is enough capacity in the total parking supply to accommodate current daytime demand. The area operates under operational capacity of 90 percent indicating that the area can handle additional demand. During overnight hours the garages are underutilized with an overall parking occupancy between six and seven percent.

In addition to off-street parking, on-street parking regulations were collected within a quarter-mile of the Cambridge Center North Garage and presented in Figure 2.9.

Although not abundant, there are multiple areas within the KSURP where on-street parking is available.

Loading and Service Activities

Within the KSURP area, there are adequate loading docks to accommodate the existing demand. Eleven Cambridge Center provides two loading docks on the northeast side of the building accessible off of Broadway west of the Cambridge Center North Garage access road. Nine Cambridge Center (Whitehead) provides a large loading area with two loading docks accessible off of Galileo Galilei Way northbound. Three Cambridge Center does not have a loading area on-site and uses the Cambridge Center East Garage loading dock off of Ames Street. In addition to these loading dock locations many delivery and service vehicles use the North Garage access roads to park and make deliveries to surrounding buildings.

The most active of the loading docks is the Cambridge Center East Garage loading dock off of Ames Street, which serves Three Cambridge Center, Four Cambridge Center and Five Cambridge Center. On an average day there are between 25 and 35 vans and trucks using the loading docks located at the East Garage.

Future 2024 No-Build Conditions

Roadway Improvement Projects

There are current and future roadway improvement projects within the Kendall Square Urban Renewal study area that have been incorporated into the future analysis conditions. These projects are described below:

- **Broadway/Third Street** intersection is being updated to 'T' up the Broadway eastbound U-Turn onto Main Street. The movement will be taken at the intersection with the new intersection alignment. The intersection will provide 3-lanes eastbound, a left-only, one thru and one thru/right lane in the future. Broadway westbound will provide one thru land and one right-only lane in the future. The Third Street southbound approach will provide one right only lane and one through/left lane. The new northbound approach is a receiving-only lane providing access from Broadway eastbound and Third Street to Main Street westbound.
- **Ames Street Residences** is located at 88 Ames Street within the Kendall Square Urban Renewal Area, is a new 280-unit residential building attached to the Cambridge Center East Garage. This project will include the redesign of the section of Ames Street between Main Street to the south and Broadway to the north. The new roadway layout will provide one lane in each direction, with a two-way cycle track and on-street parking on the east side of the street. The intersections of Ames Street with Broadway and Ames Street with Main Street will include bicycle signals to integrate the cycle track into the existing

intersections. The new signal timing were not integrated into the future analysis as the final design is still being worked out.

- **North Point Parcel** development is a large mix-use commercial, research and development, residential, and retail development located north of Monsignor O'Brien Highway and west of Charlestown Avenue (Gilmore Bridge). This project includes roadway improvements to O'Brien Highway from Third Street to Industrial Park Road. With the relocation of Lechmere Station under the Green Line Extension Project, First Street will be extended north to connect with O'Brien Highway at a signalized intersection. The intersection of O'Brien Highway/Cambridge Street/East Street will be reconfigured as well. All signalized intersections within the project limits will be optimized and retimed to accommodate the North Point development traffic and new traffic patterns from the roadway improvements. The changes implemented within the proposed Project's future conditions are based on the most current plans available at the time of the Notice of Project Change filing which would be the 25 percent Submittal of the Monsignor O'Brien Highway Access Permit Plan.
- **Alexandria Center at Kendall Square** is a mix-use, multiple building development primarily redeveloping parcels along Binney Street between Third and First Streets. The adjacent stretch of Binney Street (from Third Street to Land Boulevard) will be reconstructed as part of this development. The Binney Street and Land Boulevard intersection improvements will including an additional northbound left turn lane, a new crosswalk along the southern approach and retiming the intersection to allow for a 120 second cycle length and concurrent pedestrian crossings. The Binney Street and First Street intersection will be reconstructed with new signal equipment to provide a 120 second cycle length in coordination with the Binney Street/Land Boulevard intersection to provide better flow through these two closely spaced intersections. The signalized intersections along Binney Street including the Binney Street and Third Street intersection will be coordinated to provide better east/west travel through the corridor. In addition to these intersection improvements this section of Binney Street will reconstruct the sidewalks and install an off-street cycle track between Frist Street and Third Street that will connect to a proposed cycle track along Binney Street to the west of Third Street. This latter section of the cycle track is being constructed by the City and will be discussed in further detail under the Mitigation Section. On-street parking will also be added along Binney Street at various sections in front of the new Alexandria buildings.

Future Development Projects

There are other specific planned projects within the area of the Project area that will add additional traffic to the study area network. Due to the unique circumstances in which the 2014 existing network volumes were developed, a conservative approach was taken in determining which development projects would be included in the background projects. Some of the projects included in this analysis have been completed or partially completed since 2014, but these project generated volumes were not captured in some of the TMCs that were used. Therefore, trip forecasts for these development projects were added to the networks to provide a conservative approach. The vehicle trips generated by these projects have been added to the 2024 No-Build volumes to estimate future conditions without the proposed Project in place. These trips have been adjusted to account for mode split based on the individual projects' transportation study. A description of each project is provided below and categorized by project status.

The following three projects have been completed:

- **Broad Institute Expansion** is a 15-story building build within the KSURP area fronting Ames Street and expanding over the preexisting Cambridge Center West Garage. The building contains 246,000 square feet of research and development (R&D) and 4,000 square feet of ground floor retail/restaurant use. The facility houses state-of-the-art laboratory and ancillary space. A series of connector bridges link the new building to Broad's original headquarters at Seven Cambridge Center. The project was expected to generate 88 weekday morning and 82 weekday evening peak hour vehicle trips. This project was completed in 2014.
- **Seventeen Cambridge Center (BioGen)** includes a new building with 156,000 square feet of office/R&D and 13,000 square feet of daycare use. The project is linked to the preexisting BioGen building via a two-level connector. The project was predicted to generate 59 weekday morning and 52 weekday evening peak hour vehicle trips. The building was completed in 2013.
- **1 Education Street** includes the construction of a new building totaling 226,000 square feet of mixed-use office and education space. Parking for staff and visitors will be accommodated on the lower levels of the building, below the office and education space. The garage will accommodate up to 150 vehicles. This project is expected to generate 107 weekday morning and 99 weekday evening peak hour vehicle trips. This project was opened in the fall of 2014.

The following seven projects are partially completed or under construction:

- **300 Massachusetts Avenue** includes the redevelopment of the 300 Massachusetts Avenue Parcel with the construction of 257,500 square feet, including 242,500 square feet of office and R&D and 15,000 square feet of ground floor retail. Due to the similar size and nature of the land use in terms of traffic generation, the replacement ground floor retail has not been predicted to impact the site trip generation. The new office and R&D space is expected to generate 206 morning peak hour vehicle trips and 198 evening peak hour vehicle trips. Parking will be provided in the nearby existing 55 Franklin Street Garage and other University

Park garages. This project is currently under construction and expected to be completed in 2016.

- **Novartis R&D Expansion** at 181 Massachusetts Avenue consists of the demolition of the existing building and the associated surface parking facility at 21 Osborn Street. Two buildings will be constructed, totaling 530,000 square feet of R&D and laboratory space. A retail component of 8,000 square feet is also proposed for the ground floor frontage along Massachusetts Avenue. The site also includes a 35,000 square feet building at 209 Massachusetts Avenue that will be renovated. On-site below-grade parking accommodating 450 vehicles will be provided for employees. The site is predicted to generate 277 morning peak hour vehicle trips and 259 evening peak hour vehicle trips. This project is currently under construction and expected to be completed in 2015.
- **650 Main Street Office/R&D Development Project** includes a building comprising of two wings totaling 416,000 square feet. Wing A, fronting Main Street and Portland Street, is 186,000 square feet. Approximately 8,400 square feet of Wing A will comprise of street level retail space. An 820-space, three-level, below-grade parking garage will support the development. It was determined that this project will not result in a significant change in trip generation.
- **North Point** is a 45-acre mixed-use development site located north of Monsignor O'Brien Highway and west of Charlestown Avenue (Gilmore Bridge). The site includes a total of twenty development parcels with approximately 2.3 million square feet of residential and 2.2 million square feet of commercial space. This project will also include the O'Brien Highway improvement project, previously discussed.
- **22 Water Street** includes the construction of 392 residential units (528,000 square feet). An on-site parking space will be provided for each unit, with access off Water Street. A future connection from Water Street to East Street as part of the larger abutting North Point mixed-use development is also considered. The site is predicted to generate 104 morning peak hour vehicle trips and 123 evening peak hour vehicle trips. This project is currently under construction and expected to be completed in the spring of 2015.
- **Maple Leaf at 23 East Street** consists of the redevelopment of the existing Maple Leaf building from general office use to 104 residential apartment units. This project includes high-finish, micro-loft units ranging in size from 318 square feet to 665 square feet. All of the units will be studio or one bedroom units. It is expected that the residential building will function similarly as the existing Archstone building with similar traffic and parking demands. Parking will be provided in the Archstone garage.
- **Alexandria Center at Kendall Square** includes the redevelopment of six parcels totaling 1,753,200 square feet, supported by 1,932 parking spaces. 50 Binney Street contains 10 stories of 484,000 square feet of R&D, 7,000 square feet of ground level retail use, and 442 below grade parking spaces. 100 Binney Street includes a 10-story building with 385,000 square feet of R&D, 3,000 square feet of ground level retail use, and 681 below grade parking spaces. A portion of the 41 Linskey Way building was preserved for the physical representation of the Mixed-mode Transportation Hub. The first floor

and basement is a bicycle center, while an additional building functions as the pedestrian access to the garage below and 1,000 square feet of retail. 75 Binney Street is a five-story building with 164,000 square feet of R&D and 2,000 square feet of retail. 125 Binney Street is a five-story building with 173,000 square feet of R&D and an eight-story residential building. The below grade garage for 75 Binney Street and 125 Binney Street has a total of 532 parking spaces. 270 Third Street has 8,000 square feet of ground floor retail and 70 residential units. 225 Binney Street contains a five-story building with 308,000 square feet of R&D and 277 below grade parking spaces. 161 First Street is a five story building containing 150 residential units. Rogers Street Park and Triangle Park are two new green spaces. Of the six sites 255 Binney Street was completed in 2013 and 50 Binney Street, 75/125 Binney Street, 100 Binney Street, 270 Third Street, are currently under construction. 100 Binney Street is scheduled to start construction in 2015.

The following two projects are currently being proposed to the City:

- **Courthouse Redevelopment** includes the redevelopment of the existing courthouse building into 460,000 square feet of R&D/office space, 15,000 square feet of retail, and 24 residential apartments. The courthouse is currently vacant with the exception of the four-story jailhouse on the top floors. Parking will be provided by a mix of 92 below grade on-site spaces and 420 parking garage spaces on First Street that are expected to be leased on a long-term basis from the City. The site is expected to generate 253 weekday morning peak hour vehicle trips and 270 weekday evening peak hour vehicle trips. This project is currently in the design review process.
- **Ames Street Residences** is a 200,000-square foot, 22-story, multi-family residential building with 16,000 square feet of retail space on the ground floor. There will be a total of 280 units consisting of a mix of micro-units, studios, one-bedrooms, and two-bedrooms. The Cambridge Center East Garage will allocate 140 existing parking spaces for Ames Street residents. This project is currently under review.

General Background Traffic Growth

In addition to the area developments described above, a general area-wide traffic growth rate was applied to existing condition peak hour traffic volumes to reasonably account for other future through traffic growth in the Project study area. An annual growth rate of 0.5 percent per year between 2014 and 2024 was applied to the 2014 Existing Condition vehicle volumes.

Figures 2.10a and 2.10b provide the 2024 No-Build Condition morning and evening peak hour traffic volume networks.

Future 2024 Build Conditions

The 2024 Build Condition was developed to evaluate the future transportation conditions associated with the proposed Project. The 2024 Build Condition traffic volumes for study area roadways were developed by estimating Project-generated

traffic volumes, distributing these volumes, and assigning them to the study area intersections. The traffic volumes expected to be generated by the proposed Project were added to the 2024 No-Build Condition traffic volumes to create the 2024 Build Condition traffic volume networks. The following sections describe the procedures used to develop the 2024 Build Condition traffic volume networks.

Trip Generation

To estimate traffic generated by the Proposed Project, Institute of Transportation Engineers (ITE) trip generation rates for Apartment (LUC 220), Shopping Center (LUC 820), and General Office Building (LUC 710) were used. ITE rates produce unadjusted vehicle-trips for weekday daily, morning and evening peak hours. The unadjusted daily vehicle-trips are presented in Table 2-11.

Table 2-11 ITE Unadjusted Daily Vehicle Trips

		Trips		
Project Component/Land Use		**In**	**Out**	**Total**
Cambridge Center North Garage Office Buildings				
Office		2,513	2,513	5,026
	Total:	2,513	2,513	5,026
Whitehead Institute (Nine Cambridge Center)				
Office		445	445	890
	Total:	445	445	890
Broad Institute (75 Ames Street)				
Office		156	156	312
	Total:	156	156	312
Eleven Cambridge Center (Existing to be demolished)				
Office		-536	-536	-1,072
Eleven Cambridge Center Residential Building				
Residential		953	953	1,905
Retail		1,379	1,379	2,758
	Total:	1,796	1,796	3,591
Three Cambridge Center (Existing to be demolished)				
Retail		- 1,941	- 1,941	- 3,882
Office		-461	-461	-922
Three Cambridge Center Mixed-use Building				
Residential		868	868	1,736
Retail		1,193	1,193	2,386
Office		687	687	1,374
	Total:	346	346	692
	Total	**5,256**	**5,256**	**10,512**

The ITE unadjusted vehicle trips were converted into person-trips by applying a national average vehicle occupancy (AVO) of 1.13 for residential and work related trips and 1.78 for retail trips. The national AVO rates are based on the 2009 National Household Travel Survey.

Area mode splits were then used to proportion the calculated person-trips into various transportation modes including vehicle (drive), transit, walk, bike and other (telecommute, flextime, etc.). Residential mode split is based on the City's K2 Plan Study Enhanced TDM Mode Shares information presented at the Kendall Square Advisory Committee Meeting on January 26, 2012. Office and Retail mode splits are based on the FST *Kendal Square Urban Renewal Area 2014 Traffic Count Program and Trip Generation Analysis Report* from May 2013. Table 2-12 presents the mode splits used.

Table 2-12 Project Mode Splits

Mode	Residential[1]	Office[2]	Retail[3]
Vehicle	32%	34%	34%
Transit	30%	37%	37%
Walk	25%	6%	6%
Bike	10%	9%	9%
Other	3%	14%	14%

Source: 1 – City of Cambridge K2 Plan Enhanced TDM Mode Shares
2 – FST Kendall Square Urban Renewal Area Mode Shares
3 – FST Kendall Square Urban Renewal Area Mode Shares

A local AVO for residential and office/retail was calculated from the 2006-2010 American Community Survey to be 1.11 and 1.19, respectively. More recent data does not provide accurate origin - destination flow data to calculate residential AVO separate from office/retail AVO. The local AVO was used to convert the person-trips to vehicle-trips for the vehicle trip estimate. The resulting project trip generation by mode for the proposed Project is summarized in Table 2-13 below. Detailed project trip generation tables by building and land use are provided in Appendix C.

In total, the Project is expected to generate approximately 3,638 daily vehicle trips, with 390 occurring in the morning peak hour and 444 in the evening peak hour. Due to the numerous public transportation options within close proximity to the sites approximately 4,410 daily transit trips (639 during the morning peak hour and 716 during the evening peak hour) will be generated by the proposed development. In addition, approximately 1,544 daily pedestrian trips and 1,184 bicycle trips will be generated.

As discussed previously, the actual trip generation within the KSURP area has been lower than the accepted trip generation methodology as presented in the ITE Trip Generation Handbook. The annual FST report discusses this difference and presents a yearly analysis on the estimated versus observed trip generation by the KSURP area, as previously shown in Figure 2.1. Over the past ten years the estimated vehicle trip generation has been an average of 15 percent higher than observed trips. The data also shows that there has been very little change, year to year, in the number of

project trips to the area if no additional development was built. The Project generated trips are added to the 2014 estimated trips to show the impacts of the Project on the area trip generation. The average percent difference between estimated and observed was applied to the Project generated trips to show the anticipated actual number of trips the KSURP area will generate in the 2024 Build Condition.

The trip estimates presented in Table 2-13 were estimated using the ITE Trip Generation Guidelines and are assumed to be a very conservative estimation of the total number of trips the entire Project will likely generate once constructed and fully occupied.

Table 2-13 Total Estimated Project Generated Trips

		Vehicle			Transit			Walk			Bike			Other		
		Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak
Residential	Entering	593	19	73	617	19	76	514	16	63	206	6	25	61	2	8
	Exiting	593	74	39	617	76	40	514	63	34	206	25	13	61	8	4
	Total	1,186	93	112	1,234	95	116	1,028	79	97	412	31	38	122	10	12
Retail	Entering	321	10	26	416	13	33	67	2	6	101	4	8	157	5	13
	Exiting	321	6	28	416	9	36	67	1	5	101	2	9	157	3	13
	Total	642	16	54	832	22	69	134	3	11	202	6	17	314	8	26
Office	Entering	905	247	47	1,172	389	106	191	65	18	285	94	27	444	147	41
	Exiting	905	34	231	1,172	133	425	191	22	69	285	34	103	444	51	161
	Total	1,810	281	278	2,344	522	531	382	87	87	570	128	130	888	198	202
Total	Entering	1,819	276	146	2,205	421	215	772	83	87	592	104	60	662	154	62
	Exiting	1,819	114	298	2,205	218	501	772	86	108	592	61	125	662	62	178
	Total	3,638	390	444	4,410	639	716	1,544	169	195	1,184	165	185	1,324	216	240

KSURP Area Traffic Analysis

The estimated number of Project generated vehicle trips to the KSURP area as calculated by ITE unadjusted daily vehicle trips is 10,512, while the adjusted Project generated vehicle trips, taking into account AVO and mode split, is estimated to be 3,638 daily trips. This reduction in vehicle trips, about 65 percent, is expected due to the use of conservative ITE rates, previously discussed, and the historical vehicular traffic trends within the KSURP area. The annual FST report on the traffic operations within the KSURP area has consistently shown the average annual weekday traffic (AAWDT) volumes in the KSURP area are well below the projected AAWDT volumes from the original 1977 FEIR. Figure 2.11 shows the historic AAWDT volumes in the area from

1994 to 2014 as well as the FEIR projected volume. The figure also illustrates the estimated traffic volumes within the area for the 2024 Build Condition. The estimated traffic volume was estimated by increasing the 2013 volume by one percent per year for eleven years. This growth takes into account general area wide background growth and specific planned projects in the area. The 2014 AAWDT volumes were not used due to the Longfellow Bridge Rehabilitation project having significant impacts of the average vehicular volumes in the area, as shown in the figure.

Under 2024 conditions it can be seen that the estimated AAWDT volumes are well below the 1977 FEIR projected traffic volume. The Project generated vehicle trips, unadjusted and adjusted, have been added to this estimated AAWDT volume to show the impacts of the Project related to vehicle volumes. The unadjusted trips add 10,512 trips to the conservative estimate of 68,725 trips calculated for the future background volumes for 2024. This causes the total Project generated and future traffic to nearly reach the FEIR projection of 83,300 trips. By incorporating the AVO and mode split, this number is reduced to 72,363, and this estimated value falls well below the FEIR projection. Due to the small range of AAWDT volumes from 1994-2014, this number seems large in comparison. The highest recorded volume during those years occurred in 2001 when the AAWDT was 63,750. In recent years, with the exclusion of 2014, the AAWDT value have been on the higher end of the volume range. As the graph shows, the traffic volume data can increase or decrease 5,000-10,000 trips during any given year. According to these projections, the adjusted 3,638 Project generated trips will only make up 5 percent of the total trips in 2024 and will fall short of the FEIR projection by more than 10,000 trips.

Trip Distribution

Project trips for the 2024 Build Condition were distributed through the study area intersection based on local trip distribution data. Trip assignments for the vehicles traveling to and from the sites are based on the *K2 Plan Critical Sums Analysis – Trip Distribution Report* from August 2012. The Critical Sums Analysis provides office and retail distribution based on City of Cambridge PTDM data and residential distribution based on the 2000 U.S. Census Journey-to-Work survey. The K2 Plan report provides employee and residential arrival and departure distributions for particular sub-areas within the Kendall Square area. The proposed Project falls into sub-areas 2 and 3. Table 2-14 below and Figure 2.12 summarize the trip distribution used.

The Project trips were assigned to the study area network based on the data presented in Table 2-14. Figures 2.13a and 2.13b show the morning and evening peak hour trips distributed through the study area.

As previously mentioned, the adjusted Project generated trips were added to the 2024 No-Build traffic volumes to develop the 2024 Build Condition peak hour traffic volumes. These volumes are presented in Figures 2.14a and 2.14b.

Table 2-14 Trip Distribution

Trip Assignment	Residential	Office/Retail
Main Street (West)	21%	18%
Vassar Street	14%	5%
Ames Street (Arrival/Departure)	7%/4%	9%/5%
Wadsworth Street (Departure)	3%	4%
Broadway/Main Street (East)	14%	24%
Land Boulevard	12%	12%
First Street	5%	6%
Third Street	9%	14%
Binney Street (Arrival)	3%	3%
Broadway (Arrival/Departure)	15%/18%	9%/12%

Source: Kendall Square Central Square Critical Sums Analysis – Trip Distribution Sub-Area 3 Maps

Traffic Operations Analysis

Intersection capacity analysis was conducted for the 2014 Existing Condition, 2024 No-Build Condition, and 2024 Build Condition to determine how well the roadway facilities serve the existing and future traffic demands. The 2024 Build Condition only includes Project generated traffic and does not include proposed mitigation. A separate analysis is presented in a following section discussing possible mitigation measure to improve traffic flow at particular intersection. These intersection operating conditions are classified by a quantified level of service (LOS).

LOS is a qualitative measure of control delay at an intersection providing an index to the operational qualities of a roadway or intersection. LOS designations rang from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. LOS designation is reported differently for signalized and unsignalized intersections.

For signalized intersections, the analysis considers the operations of each land or land group entering the intersection and the LOS designation is for overall conditions at the intersection. For unsignalized intersections, however, analysis assumes that traffic on the mainline is not affected by traffic on the side streets. The LOS is only determined for left turns from the main street and all movements from the minor street. The LOS designation is for the most critical movement, which is most often the left turn out of the side street.

Synchro 8.0 software was used to evaluate the LOS operations at the study area intersections. This analysis is based on the 2000 Highway Capacity Manual (HCM). Table 2-15 below presents the level of service delay threshold criteria as defined in the HCM.

Table 2-15 Level of Service Criteria

Level of Service	Unsignalized Intersection Control Delay (sec/veh)	Signalized Intersection Control Delay (sec/veh)
LOS A	0 – 10	≤ 10
LOS B	> 10 – 15	> 10 – 20
LOS C	> 15 – 25	> 20 – 35
LOS D	> 25 – 35	> 35 – 55
LOS E	> 35 – 50	> 55 – 80
LOS F	> 50	> 80

Table 2-16a-b below summarizes the study area intersection level of service for all conditions during the AM and PM peak hours. The detailed LOS tables show the overall intersection and individual lane group volume to capacity ratios and delay, in seconds, as well as LOS.

Table 2-16a Intersection Level of Service (Morning Peak Hour)

	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
Intersection	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
O'Brien Highway/Third Street (Signalized)	**0.72**	**199.5**	**F**	**1.18**	**73.1**	**E**	**1.19**	**73.3**	**E**
Third Street NB left	0.20	19.2	B	0.45	39.1	D	0.47	39.4	D
Third Street NB thru	0.18	19.0	B	0.44	38.9	D	0.45	39.1	D
Third Street SB thru	--	--	--	0.04	51.4	D	0.04	51.4	D
Third Street SB right	0	0	A	--	--	--	--	--	--
O'Brien Highway SE thru	1.47	243.6	F	1.21	120.7	F	1.21	120.7	F
O'Brien Highway SE right	--	--	--	0.85	18.9	B	0.49	22.2	C
O'Brien Highway NW thru	0.33	33.9	C	0.77	9.9	A	0.43	9.7	A
Cambridge Street/Third Street (Signalized)	**0.88**	**27.5**	**C**	**1.27**	**156.8**	**F**	**1.34**	**178.7**	**F**
Cambridge Street EB thru	0.78	38.9	D	1.53	280.6	F	1.54	282.1	F
Cambridge Street WB thru	0.80	38.0	D	1.32	190.2	F	1.41	228.4	F
Third Street NB thru	0.44	7.8	A	0.99	56.5	E	1.19	125.3	F
Third Street SB left	0.18	14.6	B	0.20	16.3	B	0.20	16.4	B
Third Street SB thru	0.94	23.6	C	1.07	77.6	E	1.11	94.9	F
Cambridge Street/First Street (Signalized)	**0.63**	**59.1**	**E**	**0.73**	**23.4**	**C**	**0.75**	**23.8**	**C**
Cambridge Street EB thru	1.11	121.2	F	0.81	48.9	D	0.82	49.3	D
Cambridge Street WB left	0.95	49.7	D	--	--	--	--	--	--
Cambridge Street WB thru	0.84	33.8	C	--	--	--	--	--	--
First Street NB left	0.23	38.1	D	--	--	--	--	--	--
First Street NB thru	--	--	--	0.22	25.0	C	0.22	25.0	C
First Street NB right	0.24	16.7	B	0.75	48.6	D	0.78	50.8	D
Driveway SB left	0.12	36.3	D	--	--	--	--	--	--
Driveway SB thru	--	--	--	0.68	7.2	A	0.70	7.4	A

Table 2-16a Intersection Level of Service (Morning Peak Hour) (Continued)

	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
Intersection	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
O'Brien Highway/Cambridge Street/East Street (Signalized)	**0.84**	**22.5**	**C**	**0.73**	**14.1**	**B**	**0.74**	**14.3**	**B**
Cambridge Street EB thru	0.82	54.1	D	0.44	40.0	D	0.44	39.8	D
Cambridge Street EB right	0.25	2.8	A	0.65	42.2	D	0.66	42.5	D
East Street SB right	--	--	--	0.04	0.1	A	0.04	0.1	A
East Street SB left	0.01	24.3	C	--	--	--	--	--	--
O'Brien Highway SE left	0.15	3.6	A	--	--	--	--	--	--
O'Brien Highway SE thru	1.03	23.2	C	0.75	2.3	A	0.75	2.3	A
O'Brien Highway SE right	0.34	4.1	A	--	--	--	--	--	--
O'Brien Highway NW left	0.62	33.3	C	--	--	--	--	--	--
O'Brien Highway NW thru	0.43	25.2	C	0.56	16.8	B	0.57	17.0	B
O'Brien Highway/ Land Boulevard/ Charlestown Avenue (Signalized)	**1.73**	**272.3**	**F**	**1.81**	**244.4**	**F**	**1.84**	**252.7**	**F**
O'Brien Highway SE left	0.47	51.7	D	1.12	152.3	F	1.14	161.2	F
O'Brien Highway SE thru	1.44	254.7	F	1.18	136.9	F	1.18	138.5	F
O'Brien Highway SE right	2.74	846.0	F	2.25	619.2	F	2.25	619.2	F
O'Brien Highway NW left	0.52	51.0	D	1.78	424.9	F	1.88	468.2	F
O'Brien Highway NW thru	1.29	197.8	F	1.10	108.9	F	1.11	115.6	F
O'Brien Highway NW right	0.39	18.9	B	0.56	17.3	B	0.56	17.3	B
Land Boulevard NE left	1.04	141.0	F	1.16	162.4	F	1.19	174.7	F
Land Boulevard NE thru	1.23	184.3	F	1.06	110.7	F	1.07	115.8	F
Land Boulevard NE right	0.22	55.4	E	1.01	88.9	F	1.01	88.9	F
Charlestown Ave SW left	--	--	--	0.98	75.9	E	0.98	75.9	E
Charlestown Ave SW thru	1.54	288.0	F	1.79	398.7	F	1.82	413.3	F
Binney Street/Galileo Galilei Way/Fulkerson Street (Signalized)	**0.76**	**30.7**	**C**	**0.99**	**59.5**	**E**	**1.00**	**57.7**	**E**
Galileo Galilei Way EB thru	0.25	8.7	A	0.40	11.4	B	0.44	12.7	B
Binney Street WB thru	0.75	18.3	B	1.08	61.2	E	1.08	59.5	E
Fulkerson Street SB right	0.97	84.4	F	1.19	154.0	F	1.19	154.0	F
Binney Street SE left	0.56	41.1	D	0.63	44.3	D	0.66	46.0	D
Binney Street SE right	0.19	31.7	C	0.20	31.8	C	0.21	32.0	C
Binney Street/North Garage West Driveway (Unsignalized)									
North Garage West Driveway NB right	0.00	0.0	A	0.00	0.0	A	0.05	9.4	A
Binney Street/North Garage East Driveway (Unsignalized)									
North Garage East Driveway NB right	0.01	9.3	A	0.01	9.4	A	0.01	9.5	A

Table 2-16a Intersection Level of Service (Morning Peak Hour) (Continued)

Intersection	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Binney Street/Third Street (Signalized)	**0.95**	**124.9**	**F**	**1.16**	**84.0**	**F**	**1.23**	**99.6**	**F**
Binney Street EB left	0.32	42.8	D	0.78	48.7	D	0.83	54.6	D
Binney Street EB thru	0.26	18.3	B	0.83	63.1	E	0.89	66.6	E
Binney Street WB left	0.87	66.4	E	1.17	152.3	F	1.24	175.7	F
Binney Street WB thru	0.57	28.7	C	0.95	53.9	D	1.01	67.3	E
Third Street NB thru	0.78	55.5	E	0.43	19.7	B	0.45	19.9	B
Third Street NB right	0.31	29.0	C	0.30	18.1	B	0.31	18.3	B
Third Street SB thru	1.59	307.4	F	1.25	134.9	F	1.32	165.4	F
Binney Street/First Street (Signalized)	**0.78**	**41.0**	**D**	**1.28**	**46.5**	**D**	**1.36**	**50.8**	**D**
Binney Street EB left	0.34	50.4	D	1.26	169.1	F	1.36	208.8	F
Binney Street EB thru	0.18	8.2	A	0.20	5.9	A	0.21	5.9	A
Binney Street WB thru	0.95	52.2	D	0.74	11.2	B	0.77	11.1	B
Binney Street WB right	0.18	17.6	B	--	--	--	--	--	--
First Street NB thru	0.07	41.3	D	0.30	41.6	D	0.30	41.6	D
First Street SB thru	0.68	59.2	E	1.10	128.8	F	1.10	128.8	F
First Street SB right	0.48	51.4	D	0.77	59.7	E	0.84	69.7	E
Binney Street/Land Boulevard (Signalized)	**0.87**	**55.1**	**E**	**0.97**	**62.2**	**E**	**0.98**	**63.6**	**E**
Binney Street EB left	0.40	40.0	D	0.58	38.2	D	0.61	39.3	D
Land Boulevard NE left	0.80	56.3	E	0.97	67.2	E	0.97	67.2	E
Land Boulevard NE thru	0.44	28.8	C	0.28	6.6	A	0.28	6.6	A
Land Boulevard SW thru	1.07	86.1	F	1.18	112.6	F	1.10	112.9	F
Land Boulevard SW right	0.43	16.5	B	0.50	33.6	C	0.39	46.2	D
Broadway/Galileo Galilei Way (Signalized)	**1.30**	**104.6**	**F**	**1.68**	**185.1**	**F**	**1.69**	**191.4**	**F**
Broadway EB left	0.84	41.6	D	1.27	164.6	F	1.38	211.2	F
Broadway EB thru	1.16	114.2	F	1.25	153.2	F	1.27	160.8	F
Broadway EB right	0.43	34.2	C	0.42	32.6	C	0.42	32.7	C
Broadway WB left	1.33	234.9	F	1.42	247.7	F	1.75	387.6	F
Broadway WB thru	0.94	69.5	E	0.98	67.6	E	1.01	70.1	E
Galileo Galilei Way NB left	0.87	90.8	F	0.91	83.6	F	0.92	81.4	F
Galileo Galilei Way NB thru	0.45	27.3	C	0.72	33.5	C	0.78	34.5	C
Galileo Galilei Way SB left	0.86	46.6	D	0.93	52.1	D	0.95	44.2	D
Galileo Galilei Way SB thru	0.92	47.6	D	1.49	270.0	F	1.49	247.0	F
Galileo Galilei Way SB right	1.72	353.6	F	2.14	543.9	F	2.14	563.4	F
Broadway/North Garage West Driveway (Unsignalized)									
Driveway SB right	0.01	9.6	A	0.01	9.7	A	0.01	10.1	B
Broadway/North Garage East Driveway (Unsignalized)									
Driveway SB right	0.09	14.3	B	0.10	14.8	B	0.22	16.9	C

Table 2-16a Intersection Level of Service (Morning Peak Hour) (Continued)

	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
Intersection	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Broadway/Ames Street (Signalized)	**0.73**	**34.4**	**C**	**1.13**	**115.6**	**F**	**1.20**	**134.6**	**F**
Broadway EB thru	1.00	23.3	C	1.17	90.7	F	1.17	91.6	F
Broadway EB right	0.25	66.1	E	0.18	70.8	E	0.20	68.5	E
Broadway WB left	0.61	21.9	C	0.65	21.4	C	0.73	22.5	C
Broadway WB thru	0.84	51.0	D	0.92	54.8	D	1.02	70.9	E
Ames Street NB left	0.44	29.5	C	1.61	317.7	F	1.77	386.8	F
Ames Street NB right	0.25	21.9	C	--	--	--	--	--	--
Broadway/Third Street (Signalized)	**0.83**	**66.3**	**E**	**1.15**	**112.7**	**F**	**1.21**	**130.2**	**F**
Broadway EB left	0.64	24.1	C	0.92	31.9	C	0.95	34.7	C
Broadway EB thru	0.48	22.3	C	0.51	18.7	B	0.51	18.5	B
Broadway WB thru	1.14	103.3	F	1.30	170.6	F	1.36	197.9	F
Third Street SB left	0.54	39.1	D	1.20	160.1	F	1.27	184.8	F
Third Street SB right	0.54	35.9	D	0.48	34.4	C	0.55	36.6	D
Broadway/Main Street (Unsignalized)									
Main Street NE right	0.50	17.2	C	0.54	18.4	C	0.54	18.7	C
Broadway/Main Street/Memorial Drive (Unsignalized)									
Memorial Drive SB right	0.61	25.7	D	0.73	36.5	E	0.77	41.9	E
Main Street/Ames Street (Signalized)	**0.78**	**36.8**	**D**	**0.96**	**55.6**	**E**	**0.99**	**60.2**	**E**
Main Street EB thru	0.76	21.4	C	1.00	53.1	D	1.03	60.3	E
Main Street WB thru	0.17	11.4	B	0.26	22.3	C	0.33	22.2	C
Ames Street NB thru	0.82	50.4	D	0.88	59.2	E	0.89	61.3	E
Ames Street SB thru	0.45	54.9	D	0.86	83.3	F	0.92	91.6	F
Ames Street SB right	0.61	62.1	E	--	--	--	--	--	--
Main Street/Galileo Galilei Way/Vassar Street (Signalized)	**0.58**	**23.9**	**C**	**0.98**	**40.0**	**D**	**1.08**	**47.8**	**D**
Main Street EB left	0.39	20.8	C	0.83	43.9	D	0.99	72.9	E
Main Street EB thru	0.42	19.8	B	0.49	21.2	C	0.50	21.3	C
Main Street WB left	0.27	27.4	C	0.32	25.1	C	0.34	25.2	C
Main Street WB thru	0.34	35.8	D	0.40	26.1	C	0.41	26.0	C
Vassar Street NB thru	0.50	22.9	C	0.66	26.9	C	0.69	27.9	C
Galileo Galilei Way SB left	0.13	21.7	C	0.16	20.8	C	0.16	21.3	C
Galileo Galilei Way SB thru	0.58	23.2	C	0.74	24.1	C	0.17	25.3	C
Galileo Galilei Way SB right	0.76	27.3	C	1.14	92.1	F	1.18	110.4	F
Massachusetts Avenue/Vassar Street (Signalized)	**0.86**	**40.1**	**D**	**1.14**	**108.6**	**F**	**1.17**	**116.4**	**F**
Vassar Street EB left	0.39	47.0	D	0.58	54.9	D	0.58	54.9	D
Vassar Street EB thru	0.86	57.9	E	1.02	88.8	F	1.02	88.8	F
Vassar Street WB left	0.87	87.6	F	1.04	128.4	F	1.18	172.4	F
Vassar Street WB thru	0.83	58.9	E	1.06	105.7	F	1.06	105.7	F
Massachusetts Avenue SE thru	0.86	38.8	D	1.19	103.6	F	1.25	106.1	F
Massachusetts Avenue NW thru	0.83	21.4	C	1.22	121.2	F	1.24	131.4	F

Table 2-16a Intersection Level of Service (Morning Peak Hour) (Continued)

	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
Intersection	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Memorial Drive/Route 3/Ames Street (Unsignalized)									
Ames Street SB thru	0.60	38.2	E	0.83	75.4	F	0.84	77.2	F
Memorial Drive at Massachusetts Westbound On/Off-Ramps (Signalized)	**0.49**	**15.6**	**B**	**0.59**	**17.1**	**B**	**0.59**	**17.1**	**B**
Memorial Drive WB right	0.73	56.2	E	0.90	82.8	F	0.90	82.8	F
Massachusetts Avenue NB left	0.41	2.1	A	0.48	5.6	A	0.50	6.6	A
Massachusetts Avenue NB thru	0.53	1.5	A	0.66	1.8	A	0.67	1.9	A
Massachusetts Avenue SB thru	0.60	27.1	C	0.68	26.1	C	0.70	26.0	C
Memorial Drive Massachusetts Ave Eastbound On/Off-Ramps (Signalized)	**0.90**	**84.0**	**F**	**1.07**	**119.9**	**F**	**1.07**	**121.6**	**F**
Memorial Drive EB right	1.83	435.0	F	1.90	466.1	F	1.90	466.1	F
Massachusetts Ave NB thru	0.91	31.1	C	1.14	95.9	F	1.15	100.1	F
Massachusetts Ave SB thru	0.55	1.7	A	0.61	1.9	A	0.62	2.0	A
O'Brien Highway/First Street (Signalized)	**--**	**--**	**--**	**1.05**	**83.0**	**F**	**1.06**	**86.4**	**F**
First Street NB left	--	--	--	0.24	23.7	C	0.24	23.7	C
First Street NB thru	--	--	--	0.53	32.9	C	0.53	32.9	C
First Street SB thru	--	--	--	0.70	53.7	D	0.70	53.7	D
O'Brien Highway SE thru	--	--	--	1.15	105.5	F	1.15	105.5	F
O'Brien Highway NW left	--	--	--	1.17	129.9	F	1.21	145.8	F
O'Brien Highway NW thru	--	--	--	0.49	7.2	A	0.49	7.1	A

Table 2-16b Intersection Level of Service (Evening Peak Hour)

	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
Intersection	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
O'Brien Highway/Third Street (Signalized)	**0.90**	**495.8**	**F**	**1.15**	**92.1**	**F**	**1.17**	**94.8**	**F**
Third Street NB left	0.46	12.3	B	1.07	100.6	F	1.11	115.5	F
Third Street NB thru	0.44	12.0	B	1.05	92.6	F	1.09	105.5	F
Third Street SB thru	--	--	--	0.11	47.1	D	0.11	47.1	D
Third Street SB right	0.00	40.2	D	--	--	--	--	--	--
O'Brien Highway SE thru	2.87	885.7	F	0.96	38.1	D	0.96	38.1	D
O'Brien Highway SE right	--	--	--	0.39	7.2	A	0.41	7.3	A
O'Brien Highway NW thru	1.69	362.8	F	1.30	150.4	F	1.30	150.3	F
Cambridge Street/Third Street (Signalized)	**0.90**	**44.8**	**D**	**1.32**	**186.0**	**F**	**1.36**	**193.9**	**F**
Cambridge Street EB thru	1.02	79.8	E	1.72	367.4	F	1.72	365.2	F
Cambridge Street WB thru	1.04	96.5	F	1.55	287.1	F	1.58	301.2	F
Third Street NB thru	0.80	7.7	A	1.04	33.2	C	1.11	60.1	E
Third Street SB left	0.13	2.0	A	0.18	15.7	B	0.19	16.0	B
Third Street SB thru	0.52	5.2	A	0.51	19.4	B	0.53	19.9	B
Cambridge Street/First Street (Signalized)	**0.70**	**45.6**	**D**	**0.75**	**37.4**	**D**	**0.79**	**41.3**	**D**
Cambridge Street EB thru	0.97	85.1	F	0.53	35.0	C	0.59	36.3	D
Cambridge Street WB left	0.37	25.8	C	--	--	--	--	--	--
Cambridge Street WB thru	0.57	30.8	C	--	--	--	--	--	--
First Street NB left	0.56	47.5	D	--	--	--	--	--	--
First Street NB thru	--	--	--	0.33	25.5	C	0.33	25.5	C
First Street NB right	0.85	36.3	D	1.01	75.5	E	1.05	85.9	F
Driveway SB left	0.05	34.5	C	--	--	--	--	--	--
Driveway SB thru	--	--	--	0.72	9.1	A	0.73	9.4	A
O'Brien Highway/Cambridge Street/East Street (Signalized)	**1.33**	**81.4**	**F**	**1.14**	**42.1**	**D**	**1.16**	**45.2**	**D**
Cambridge Street EB thru	2.79	870.6	F	0.52	10.3	B	0.52	10.7	B
Cambridge Street EB right	0.48	20.0	C	1.05	52.5	D	>1.00	62.5	E
East Street SB right	--	--	--	0.13	0.2	A	0.13	0.2	A
East Street SB left	0.13	25.8	C	--	--	--	--	--	--
O'Brien Highway SE left	0.13	13.7	B	--	--	--	--	--	--
O'Brien Highway SE thru	0.64	20.6	C	0.73	23.0	C	0.73	23.0	C
O'Brien Highway SE right	0.18	13.8	B	--	--	--	--	--	--
O'Brien Highway NW left	0.35	28.6	C	--	--	--	--	--	--
O'Brien Highway NW thru	0.78	33.5	C	1.04	64.2	E	1.05	66.6	E

Table 2-16b Intersection Level of Service (Evening Peak Hour) (Continued)

Intersection	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
O'Brien Highway/Land Boulevard/ Charlestown Avenue (Signalized)	**1.41**	**192.3**	**F**	**1.62**	**236.3**	**F**	**1.65**	**244.4**	**F**
O'Brien Highway SE left	1.17	157.9	F	1.88	460.1	F	1.93	481.1	F
O'Brien Highway SE thru	1.16	135.5	F	1.05	90.8	F	1.07	94.9	F
O'Brien Highway SE right	1.46	276.4	F	0.80	38.2	D	0.80	38.2	D
O'Brien Highway NW left	0.72	54.1	D	1.56	316.9	F	1.60	331.5	F
O'Brien Highway NW thru	1.17	144.8	F	1.06	97.0	F	1.07	99.8	F
O'Brien Highway NW right	0.76	43.1	D	0.75	31.1	C	0.75	31.1	C
Land Boulevard NE left	1.15	143.2	F	1.50	289.5	F	1.50	289.5	F
Land Boulevard NE thru	1.67	355.3	F	2.15	570.2	F	2.18	584.1	F
Land Boulevard NE right	1.32	211.5	F	0.88	43.7	C	0.91	49.2	D
Charlestown Ave SW left	--	--	--	0.66	46.9	C	0.66	46.9	D
Charlestown Ave SW thru	1.29	190.1	F	1.15	131.9	F	1.18	141.9	F
Binney Street/Galileo Galilei Way/ Fulkerson Street (Signalized)	**0.66**	**23.7**	**C**	**0.94**	**25.8**	**C**	**0.94**	**24.4**	**C**
Galileo Galilei Way EB thru	0.38	1.2	A	0.52	1.0	A	0.55	1.1	A
Binney Street WB thru	0.44	19.2	B	0.96	28.2	C	0.93	21.2	C
Fulkerson Street SB right	0.85	59.8	E	0.90	68.0	E	0.95	79.3	E
Binney Street SE left	0.89	69.2	E	0.94	79.9	E	0.96	84.4	F
Binney Street SE right	0.07	29.7	C	0.07	29.8	C	0.07	29.8	C
Binney Street/North Garage West Driveway (Unsignalized)									
North Garage West Driveway NB right	0.04	9.3	A	0.04	9.2	A	0.20	10.1	B
Binney Street/North Garage East Driveway (Unsignalized)									
North Garage East Driveway NB right	0.17	11.2	B	0.17	10.8	B	0.21	12.4	B
Binney Street/Third Street (Signalized)	**1.09**	**226.1**	**F**	**1.29**	**124.1**	**F**	**1.35**	**137.4**	**F**
Binney Street EB left	0.91	63.0	E	1.08	106.3	F	1.17	137.8	F
Binney Street EB thru	0.37	16.6	B	0.81	46.0	D	0.94	57.7	E
Binney Street WB left	0.62	59.8	E	0.81	58.6	E	0.82	61.0	E
Binney Street WB thru	0.33	23.4	C	1.32	193.4	F	1.36	207.1	F
Third Street NB thru	2.34	649.3	F	1.44	239.2	F	1.48	258.0	F
Third Street NB right	1.25	177.3	F	0.95	61.5	E	1.00	74.3	E
Third Street SB thru	1.33	223.6	F	0.96	48.9	D	1.01	62.0	E
Binney Street/First Street (Signalized)	**0.67**	**47.5**	**D**	**0.98**	**38.5**	**D**	**1.06**	**43.2**	**D**
Binney Street EB left	1.12	147.6	F	0.90	42.6	D	0.97	58.0	E
Binney Street EB thru	0.24	9.6	A	0.31	9.6	A	0.32	9.7	C
Binney Street WB thru	0.49	24.2	C	0.39	6.1	A	0.42	6.8	A
Binney Street WB right	0.18	18.9	B	--	--	--	--	--	--
First Street NB thru	0.16	41.5	D	0.68	49.3	D	0.68	49.6	D
First Street SB thru	0.78	62.2	E	0.89	65.4	E	0.89	65.4	E
First Street SB right	0.36	46.0	D	1.05	107.1	F	1.11	128.5	F

Table 2-16b Intersection Level of Service (Evening Peak Hour) (Continued)

Intersection	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Binney Street/Land Boulevard (Signalized)	**0.85**	**33.6**	**C**	**0.94**	**59.8**	**E**	**0.95**	**59.2**	**E**
Binney Street EB left	0.56	42.0	D	0.69	34.0	C	0.74	35.5	D
Land Boulevard NE left	0.93	84.2	F	0.82	54.0	D	0.82	54.0	D
Land Boulevard NE thru	0.44	12.6	B	0.51	13.1	B	0.51	13.1	B
Land Boulevard SW thru	0.90	40.3	D	1.19	125.2	F	1.19	123.9	F
Land Boulevard SW right	0.19	9.2	A	0.27	26.6	C	0.29	26.8	C
Broadway/Galileo Galilei Way (Signalized)	**1.23**	**96.2**	**F**	**1.69**	**239.5**	**F**	**1.70**	**287.7**	**F**
Broadway EB left	1.44	237.2	F	2.28	616.2	F	2.37	657.6	F
Broadway EB thru	1.17	105.7	F	1.25	141.8	F	1.26	146.9	F
Broadway EB right	0.43	24.4	C	0.46	25.0	C	0.46	25.1	C
Broadway WB left	0.98	64.4	E	1.58	292.1	F	2.60	750.5	F
Broadway WB thru	0.88	47.9	D	1.07	71.9	E	1.12	94.3	F
Galileo Galilei Way NB left	1.15	158.7	F	1.26	178.4	F	1.31	190.9	F
Galileo Galilei Way NB thru	0.76	28.4	C	0.91	30.1	C	0.95	29.6	C
Galileo Galilei Way SB left	0.78	76.3	E	0.80	62.3	E	0.80	51.3	D
Galileo Galilei Way SB thru	0.79	26.8	C	1.13	76.4	E	1.13	118.7	F
Galileo Galilei Way SB right	1.40	247.8	F	3.29	1068.5	F	3.29	1075.2	F
Broadway/North Garage West Driveway (Unsignalized)									
North Garage West Driveway SB right	0.00	0.0	A	0.00	0.0	A	0.00	0.0	A
Broadway/North Garage East Driveway (Unsignalized)									
North Garage East Driveway SB right	0.04	10.9	B	0.04	11.6	B	0.27	14.1	B
Broadway/Ames Street (Signalized)	**0.78**	**50.6**	**D**	**1.27**	**240.2**	**F**	**1.41**	**312.3**	**F**
Broadway EB thru	1.04	49.9	D	1.12	82.3	F	1.12	84.9	F
Broadway EB right	0.16	17.2	B	0.17	16.5	B	0.18	16.5	B
Broadway WB left	0.43	47.6	D	0.34	43.7	D	0.36	44.0	D
Broadway WB thru	1.03	60.8	E	1.26	144.7	F	1.32	168.3	F
Ames Street NB left	0.55	31.3	C	2.38	662.1	F	2.79	850.6	F
Ames Street NB right	0.61	57.2	E	--	--	--	--	--	--
Broadway/Third Street (Signalized)	**0.94**	**53.4**	**D**	**1.17**	**105.4**	**F**	**1.24**	**129.5**	**F**
Broadway EB left	0.80	50.5	D	0.96	50.1	D	1.02	62.6	E
Broadway EB thru	0.64	16.4	B	0.69	23.3	C	0.70	24.4	C
Broadway WB thru	0.89	42.4	D	0.99	60.4	E	1.02	67.7	E
Third Street SB left	1.17	137.1	F	1.61	322.9	F	1.78	395.3	F
Third Street SB right	0.55	37.0	D	0.70	43.7	D	0.72	44.7	D
Broadway/Main Street (Unsignalized)									
Main Street NE right	0.44	12.1	B	0.52	13.6	B	0.54	14.5	B
Broadway/Main Street/Memorial Drive (Unsignalized)									
Memorial Drive SB right	0.09	11.6	B	0.10	12.2	B	0.11	12.4	B

Table 2-16b Intersection Level of Service (Evening Peak Hour) (Continued)

Intersection	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition		
	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
Main Street/Ames Street (Signalized)	**0.72**	**26.5**	**C**	**0.93**	**48.7**	**D**	**0.94**	**48.9**	**D**
Main Street EB thru	0.70	23.0	C	0.84	29.4	C	0.85	29.9	C
Main Street WB thru	0.27	13.1	B	0.40	24.0	C	0.44	24.4	C
Ames Street NB thru	0.73	39.1	D	0.80	44.0	D	0.80	44.0	D
Ames Street SB thru	0.61	26.3	C	1.08	101.6	F	1.09	103.2	F
Ames Street SB right	0.33	25.1	C	--	--	--	--	--	--
Main Street/Galileo Galilei Way/Vassar Street (Signalized)	**0.69**	**30.4**	**C**	**1.03**	**56.0**	**E**	**1.11**	**80.9**	**F**
Main Street EB left	0.61	24.6	C	0.98	64.8	E	1.05	84.2	F
Main Street EB thru	0.41	17.7	B	0.48	18.8	B	0.48	18.9	B
Main Street WB left	0.22	18.9	B	0.27	26.3	C	0.27	26.1	C
Main Street WB thru	0.24	18.2	B	0.28	25.8	C	0.28	25.5	C
Vassar Street NB thru	0.80	34.4	C	1.09	89.0	F	1.19	127.7	F
Galileo Galilei Way SB left	0.21	30.4	C	0.28	31.5	C	0.30	30.6	C
Galileo Galilei Way SB thru	0.55	46.5	D	0.77	39.0	D	0.86	40.0	D
Galileo Galilei Way SB right	0.70	44.0	D	1.01	58.3	E	1.19	130.7	F
Massachusetts Avenue/Vassar Street (Signalized)	**0.98**	**55.9**	**E**	**1.32**	**136.2**	**F**	**1.37**	**149.6**	**F**
Vassar Street EB left	0.35	42.5	D	0.39	43.7	D	0.39	43.7	D
Vassar Street EB thru	0.62	43.1	D	0.80	53.7	D	0.80	53.7	D
Vassar Street WB left	1.05	115.6	F	1.22	174.6	F	1.45	270.5	F
Vassar Street WB thru	1.09	114.6	F	1.40	234.0	F	1.40	234.0	F
Massachusetts Avenue SE thru	0.90	41.5	D	1.32	182.9	F	1.33	187.4	F
Massachusetts Avenue NW thru	0.82	31.8	C	1.01	56.4	E	1.04	62.1	E
Memorial Drive/Route 3/Ames Street (Unsignalized)									
Ames Street SB thru	1.31	193.6	F	1.81	410.5	F	1.80	408.9	F
Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps (Signalized)	**0.71**	**294.7**	**F**	**0.82**	**453.8**	**F**	**0.86**	**504.1**	**F**
Memorial Drive WB thru	0.40	25.3	C	0.42	25.0	C	0.42	25.0	C
Massachusetts Avenue NB left	0.37	15.8	B	0.40	16.9	B	0.40	17.0	B
Massachusetts Avenue NB thru	0.80	5.1	A	0.91	6.5	A	0.92	6.9	A
Massachusetts Avenue SB thru	2.39	661.7	F	3.04	950.7	F	3.24	1039.1	F
Massachusetts Avenue/ Memorial Drive Eastbound On/Off-Ramps (Signalized)	**1.04**	**315.6**	**F**	**1.16**	**455.8**	**F**	**1.17**	**468.7**	**F**
Memorial Drive EB thru	0.88	45.5	D	0.89	46.5	D	0.89	46.5	D
Massachusetts Avenue NB thru	1.53	277.3	F	1.69	352.0	F	1.71	358.9	F
Massachusetts Avenue SB thru	2.17	542.9	F	2.76	809.3	F	2.81	832.0	F
O'Brien Highway/First Street (Signalized)	**--**	**--**	**--**	**0.95**	**112.0**	**F**	**0.95**	**112.1**	**F**
First Street NB left	--	--	--	0.33	11.2	B	0.33	11.2	B
First Street NB thru	--	--	--	0.20	8.7	A	0.20	8.7	A
First Street SB thru	--	--	--	0.85	53.6	D	0.85	53.6	D
O'Brien Highway SE thru	--	--	--	1.39	220.6	F	1.39	220.5	F
O'Brien Highway NW left	--	--	--	0.89	62.4	E	0.92	64.7	E
O'Brien Highway NW thru	--	--	--	1.08	76.6	E	1.08	76.6	E

A description of LOS operations at each intersection is discussed below.

O'Brien Highway/Third Street operates at a LOS F during morning and evening peak periods under 2014 Existing Conditions. Under 2024 No-Build Conditions the intersection improves to an LOS E during the morning peak hour and greatly improves the overall delay experienced during the evening peak hour, although the intersection will continue to operate at LOS F. The re-optimization and geometry reconfiguration by the O'Brien Highway Improvement project greatly improves the intersection in the future. The 2024 Build Condition will increase overall delay by less than one second in the morning peak hour and 2.7 seconds in the evening peak hour. The overall intersection operations will be maintained at LOS E during the morning peak hour and LOS F during the evening peak hour.

Cambridge Street/Third Street operates at a LOS C during the morning peak hour and LOS D during evening peak hour under 2014 Existing Conditions. The increased traffic from 10 years of background growth and traffic due to planned development projects in the area degrade intersection operations to LOS F during both peak hours under 2024 No-Build Conditions. The intersection, with the addition of Project-generated trips will experiences an increase of 21.9 seconds of delay during the morning peak hour and 7.9 seconds during the evening peak hour. The intersection will continue to operate at LOS F during both peak hours under 2024 Build Conditions.

Cambridge Street/First Street, under 2014 Existing Conditions, operates at LOS E and LOS D during morning and evening peak hours, respectively. The Green Line Extension project and the North Point development will improve the area roadways which include improving the Cambridge Street/First Street intersection. First Street will be extended to O'Brien Highway adding a Frist Street southbound to the intersection. In the future the intersection will not allow left turns or a westbound approach and therefore traffic patterns will shift and the signal will be re-optimized. The intersection will improve during the morning peak hour to LOS C under 2024 No-Build Conditions and during the evening peak hour the intersection will continue to operate at LOS D. With the Project traffic added under 2024 Build Conditions, the intersection will continue to operate at a LOS C, with a delay increase of 0.4 seconds for the morning peak hour. The evening peak hour, under 2024 Build Conditions will increase overall delay by 3.9 seconds and continue to operate at a LOS D.

O'Brien Highway/Cambridge Street/East Street operates at LOS C and LOS F during the morning and evening peak hours respectively under 2014 Existing Conditions. Due to the infrastructure improvements at this intersection under 2024 No-Build Conditions the intersection improves to a LOS B during the morning peak hour and LOS D during the evening peak hour. The intersection continues to operate at these improved conditions under 2024 Build Conditions with an increase in delay of only 0.2 seconds during the morning peak hour and 3.1 seconds during the evening peak hour.

O'Brien Highway/Land Boulevard/Charlestown Avenue operates at a LOS F during the morning and evening peak hours under all conditions. The intersection is being improved under the North Point O'Brien Highway improvement project, but with the addition of other development project traffic and future area wide traffic growth the

intersection continues to operate at LOS F. The Project is anticipated to add an additional 8.3 seconds of delay, during the morning peak hour, to the overall intersection operations and 8.1 seconds of delay during the evening peak hour.

Binney Street/Galileo Galilei Way/Fulkerson Street intersection operates at LOS C under 2014 Existing Conditions during the morning and evening peak hours. The intersection degrades to an LOS E during the morning peak hour under 2024 No-Build Condition due to the traffic increase on Fulkerson Street southbound from the future area growth and development projects. The intersection will continue to operate at a LOS E, with a slight decrease in delay of 1.8 seconds, under 2024 Build Conditions. The evening peak hour continues to operate at LOS C under 2024 No-Build and 2024 Build Conditions, while the intersection shows slight improvement in delay of 1.4 seconds under 2024 Build Conditions.

Binney Street/North Garage West Driveway operates at a LOS A during the morning and evening peak hours under all conditions except during the evening 2024 Build Condition when the intersection operated at LOS B. The Project will increase delays at the North Garage Driveway approach by 9.4 seconds in the morning and 0.9 seconds in the evening.

Binney Street/North Garage East Driveway, under all analyzed conditions, operates at LOS A during the morning peak hour and LOS B during the evening peak hour. Under 2024 Build Conditions the Project will increase Driveway delays by 0.1 seconds in the morning and 1.6 seconds in the evening.

Binney Street/Third Street operates at an LOS F during both the morning and evening peak hours for all analyzed conditions. The Project-generated trips will impact the overall delay at this intersection with an increase of 15.6 seconds during the morning peak hour and 13.3 seconds during the evening peak hour.

Binney Street/First Street intersection operates at LOS D for both peak hours under 2014 Existing Conditions. Under the 2024 No-Build Condition the Alexandria project, previously discussed, implements signal and roadway improvements at this intersection to maintain an LOS D during both peak hours. The addition of Project trips does not greatly affect the operations at the intersection as the morning peak hour increases in delay by only 4.3 seconds and maintains a LOS D and the evening peak hour increases by 4.7 seconds and maintains an overall LOS D.

Binney Street/Land Boulevard, under 2014 Existing Conditions, operates at a LOS E during the morning peak hour and LOS C during the evening peak hour. With the Alexandria project the intersection has undergone capacity improvements and will be coordinated with the Binney Street corridor. These improvements will help offset the increased traffic estimated at this intersection in the future. During the morning peak hour the intersection continues to operate at LOS E and degrades to LOS E during the evening peak hour in the 2024 No-Build Condition. The Project impacts under the 2024 Build Conditions will only slightly increase overall intersection delay. The morning peak hour will increase by 1.4 seconds and maintain operations at LOS E.

The evening peak hour will slightly decrease in delay, 0.6 seconds, and maintain an overall intersection LOS E.

Broadway/Galileo Galilei Way operates at a LOS F under all conditions for the morning and evening peak hours. This is due to the high volumes, particularly turning volumes, on Broadway and Galileo Galilei Way. The Project-generated trips added under the 2024 Build Condition will increase morning peak hour delay by 6.3 seconds. During the evening peak hour the Project trips will have a significant impact on overall intersection delay with an increase of 48.2 seconds. This is due to a significant increase in vehicles wanting to turn left from Broadway onto Galileo Galilei Way.

Broadway/North Garage West Driveway intersection operates at LOS A for the morning and evening peak hours for the 2014 Existing and 2024 No-Build Conditions. The intersection falls to a LOS B during the morning peak hour due to the increase of 0.4 seconds in delay experienced by the North Garage West Driveway. The evening peak hour is expected to experience no increases in delay at the approach due to the addition of Project trips.

Broadway/North Garage East Driveway, under 2014 Existing Conditions, operates at a LOS A during the morning peak hour and LOS B during the evening peak hour. Increased westbound traffic on Broadway increases delays to the exiting traffic from the North Garage East Driveway and causes the intersection to operate at a LOS B during the morning peak hour and a LOS C under 2024 Build Conditions, with an increase of 2.1 seconds of delay. The intersection continues to operate at a LOS B for the evening peak hour under 2024 No-Build and 2024 Build Conditions, with an increase in delay of 2.5 seconds of delay.

Broadway/Ames Street operates at a LOS C and LOS D during the morning and evening peak hour, respectively under 2014 Existing Conditions. The intersection degrades to an LOS F for both peak hours under 2024 No-Build Conditions. This is due to the reconfiguration of Ames Street to one lane in each direction under the Ames Street Residences project to provide right-of-way for a two-way cycle track. The elimination of the separate left and right northbound lanes of Ames Street cause the approach to degrade the intersection to an LOS F. With the addition of Project-generated trips, the morning peak hour will experience an increase of 19.0 seconds of delay and continue to operate at a LOS F. The evening peak hour will experience a greater impact due to the project with an increase of 72.1 seconds of delay and will continue to operate at an overall LOS F. The significant increase in delay is due to a high number of Project trips assigned to the Ames Street northbound left movement onto Broadway.

Broadway/Third Street intersection operates at a LOS E during the morning peak hour under 2014 Existing Conditions and degrades to a LOS F under 2024 No-Build Conditions due to increased traffic at the intersection and new traffic patterns from the reconfiguration of the intersection. Under the 2024 Build Conditions, an increase in morning peak hour delay of 17.5 seconds is projected and the intersection will continue to operate at a LOS F. The evening peak hour operates at a LOS D under

2014 Existing Conditions and degrades to a LOS F for the 2024 No-Build and 2024 Build Conditions, with an increase of 24.1 seconds of delay due to Project generated trips passing through the intersection.

Broadway/Main Street operates at a LOS C during the morning peak hour and LOS B during the evening peak hour under 2014 Existing Conditions. Under 2024 No-Build and Build Conditions, the intersection LOS operations is maintained at LOS C during the morning peak hour and LOS B during the evening peak hour. Under the 2024 Build Condition, the Project will increase delay at the Main Street approach by less than one second during both the morning and evening peak hours.

Broadway/Main Street/Memorial Drive intersection operates at a LOS A for both peak hours under 2014 Existing Conditions. The intersection degrades to an LOS E during the morning peak hour under 2024 No-Build Conditions due to the increased volume on the Broadway/Main Street eastbound approach causing increased delay to the vehicle turning onto Broadway/Main Street from the Memorial Drive Off-Ramp. The evening peak hour slightly increases in delay and the intersection operates at a LOS B under 2024 No-Build Conditions. Under 2024 Build Conditions, the intersection continues to operate at LOS E during the morning peak hour with an increase in delay of 5.4 seconds and LOS B during the evening peak hour with an increase in delay of 0.2 seconds.

Main Street/Ames Street, under 2014 Existing Conditions, operates at a LOS D during the morning peak hour and degrades to a LOS E under 2024 No-Build Conditions. During the evening peak hour the intersection operates at a LOS C under 2014 Existing Conditions and degrades to a LOS D under 2024 No-Build Conditions. The LOS decrease is caused by the reconfiguration of Ames Street to one lane in each direction, causing the Ames Street southbound approach to increase in delay and therefore the overall intersection delay increases. The intersection continues to operate at LOS E and LOS D for the morning and evening peak hours, respectively, under 2024 Build Conditions. The overall intersection delay is only slightly increased under 2024 Build Conditions and the addition of Project trips. The morning peak hour increases by 4.6 seconds and the evening peak hour increases by 0.2 seconds.

Main Street/Galileo Galilei Way/Vassar Street operates at a LOS C during both peak hours under 2014 Existing Conditions. Due to increased traffic at the intersection, under 2024 No-Build Conditions the intersection degrades to an LOS D during the morning peak hour and LOS E during the evening peak hour. The intersection continues to operate at LOS D for the morning peak hour under 2024 Build Conditions with an increase in delay of 7.8 seconds. Project trips added to the intersection increase the approach delays and increase the overall intersection delay by 24.9 seconds and cause the intersection to operate at an LOS F for the evening peak hour under 2024 Build Conditions.

Massachusetts Avenue/Vassar Street intersection operates at a LOS D during the morning peak hour and LOS E during the evening peak hour under 2014 Existing Conditions. Under 2024 No-Build Conditions, with area-wide and specific future development traffic, the intersection degrades to a LOS F during both peak hours. The

intersection continues to operate at LOS F under 2024 Build Conditions for the morning and evening peak hours with overall intersection delay increase of 7.8 seconds and 13.4 seconds, respectively.

Memorial Drive/Route 3/Ames Street, under 2014 Existing Conditions, operates at a LOS E during the morning peak hour and LOS F during the evening peak hour. The high volumes on Memorial Drive cause delays for the Ames Street southbound traffic to enter the intersection causing delays. Under 2024 No-Build Conditions volumes along Memorial Drive increase as well as volumes at the Ames Street southbound approach, and this increases delay, causing the morning peak hour to operate at a LOS F. The evening peak hours also experiences increases in delay due to increased traffic and continues to operate at LOS F. Under 2024 Build Conditions the intersection continues to operate at LOS F for both the morning and evening peak hours. Project-generated trips will slightly increase intersection delay by 1.8 seconds during the morning peak hour and slightly decrease intersection delay by 1.6 seconds during the evening peak hour.

Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps intersection operates at an LOS B during the morning peak hour and LOS F during the evening peak hour for all analyzed conditions. With the addition of Project generated trips under 2024 Build Conditions the morning peak hour will experience no delay increases, while the evening peak hour will experience significant delay increases of 50.3 seconds.

Massachusetts Avenue/Memorial Drive Eastbound On/Off-Ramps operates at a LOS F during both peak hours under 2014 Existing, 2024 No-Build and 2024 Build Conditions. Project-generated trips will increase intersection delay by 1.7 seconds during the morning peak hour and 12.9 seconds during the evening peak hour.

O'Brien Highway/First Street is a new intersection under 2024 No-Build Conditions due to the relocation of the Lechmere MBTA Green Line Station and the O'Brien Highway Improvement Project. The intersection operates at a LOS F under both morning and evening peak hour conditions due to the heavy volumes at the O'Brien Highway approaches. The Project trips passing through this intersection will only slightly increase intersection delay. The morning peak hour delay will increase by 3.4 seconds while the evening peak hour will increase by 0.1 seconds.

In addition to intersection LOS analysis, an intersection queue analysis was performed. Detailed queue tables showing the 50th and 95th percentile queues are presented in Appendix C. Queues are related to the intersection LOS analysis and show the same changes as the LOS operations at each intersection through 2014 Existing Condition, 2024 No-Build Condition, and 2024 Build Condition.

Multi-Modal Level of Service (MMLOS) Analysis

Understanding the interaction of multiple modes of transportation is an important design and analysis tool. The Multimodal Level of Service (MMLOS) analysis tool was

introduced under the *2010 Highway Capacity Manual* (HCM) to help accomplish this. A MMLOS analysis looks at the interaction between each of the major modes of transportation, vehicle, pedestrian, bicycle, and transit modes. This allows for an analysis from a "complete streets" perspective, understanding that each of the four travel modes are affected by each other since all users have to be accommodated in the physical constraints of the street facility.

Methodology

The 2010 HCM provides a methodology for determining a MMLOS for signalized intersections, a MMLOS analysis can also be performed for a whole street, a specific section of a street, or an individual segment. This analysis provides a MMLOS for a select number of study area intersections.

Each travel mode is evaluated separately taking into account the individual performance measures used to analyze each mode's LOS. Individual mode LOS are not combined to provide an overall LOS due to the unique characteristics involved in analyzing individual mode LOS. The automobile LOS is evaluated based on measurable field data, including travel speed and stopping rate, while pedestrian, bicycle and transit LOS analysis is evaluated partially on the user's perception of the level of service a facility provides. The perception on level of service for each mode is different due to the characteristics and interactions each mode involves and therefore combining all mode LOSs into one overall LOS does not produce a meaningful result.

Individual mode LOS at intersections evaluates the LOS based on each user. A pedestrians perspective on the level of service provided to them is going to be different depending on the amount of cycle time given to pedestrian crossings, the sidewalk and crosswalk widths, pedestrian volume, etc. whereas a cyclist perspective would depend on the width of the bike lane provided, if any, the time and phasing of the intersection, is there a bicycle phase or are cyclist traveling with vehicles. In determining improvements or changes to an intersection it is important to evaluate how each mode will be affected, providing more time to vehicles will improve vehicle LOS but possibly decrease pedestrian LOS and vice versa. The MMLOS is a powerful design and planning tool to evaluate how intersection characteristics affect all users, not just focused on one individual user or mode.

Vehicle LOS is determined from the standard intersection evaluation routinely conducted for traffic studies, although HCM 2010 was used in this MMLOS analysis as opposed to HCM 2000, as was done in the previous section. There are slight differences between calculation in HCM 2000 and HCM 2010, particularly the need for NEMA phasing in HCM 2010, HCM can support multiple phasing sequences. HCM 2010 also does not support exclusive pedestrian phases or holds (all red phase, sometimes used to code a Leading Pedestrian Interval (LPI), HCM 2000 can analyze these features. There are other inputs that differ between HCM 2000 and HCM 2010, which can have an effect on the vehicle LOS output.

Pedestrian LOS is determined based on average pedestrian spacing, how crowded a sidewalk is, and pedestrian delay at each crosswalk. These factors are used to calculate at LOS score which correlates to an LOS grade. Table 2-17 provides the LOS for pedestrians when a sidewalk is available, which all evaluated intersections provide. If a sidewalk is not available Table 2-18 is used, which is also used for bicycle and transit LOS.

Table 2-17 Pedestrian (sidewalk available) LOS Criteria

Pedestrian LOS Score	LOS by Average Pedestrian Space (ft²/p)					
	>60	>40-60	>24-40	>15-24	>8.0-15[a]	≤8.0[a]
≤2.00	A	B	C	D	E	F
>2.00-2.75	B	B	C	D	E	F
>2.75-3.50	C	C	C	D	E	F
>3.50-4.25	D	D	D	D	E	F
>4.25-5.00	E	E	E	E	E	F
>5.00	F	F	F	F	F	F

Source: HCM 2010
[a] In cross-flow situations, the LOS E-F threshold is 13 ft²/p.

Bicycle LOS is determined based on bicycle delay at each approach of an intersection. This delay is used to calculate a LOS score which correlates to a LOS grade. Table 2-18 provides the LOS for pedestrian, bicycle, and transit LOS criteria.

Transit LOS is determined using the Transit Capacity & Quality of Service Manual, Third Edition. The manual uses various transit inputs, like the dwell time, frequency of service and other geometric information about the roadway. For the transit LOS the local bus routes that run through the selected intersections were analyzed. It was assumed that the average wait time from when a user arrives at the station and a bus arrives is 3.7 minutes, which is the average wait time for an MBTA Red Line train. All transit frequencies were found using data from the MBTA's timetables. For all other data that was not readily accessible, the default values from the Transit Capacity & Quality of Service Manual were used. The same thresholds for bicycle LOS also apply to the transit LOS and are shown in Table 2-18.

Table 2-18 Bicycle, Transit, and Pedestrian (sidewalk unavailable) LOS Criteria

LOS	LOS Score
A	≤2.00
B	>2.00–2.75
C	>2.75-3.50
D	>3.50-4.25
E	>4.25-5.00
F	>5.00

Source: HCM 2010

One of the limitations for the MMLOS analysis is that the transit LOS analyzes the entire segment between two intersections while the vehicle, pedestrian and bicycle analysis can focus on the intersections themselves. For this transit LOS analysis all approaches at each studied intersection where bus routes pass though were analyzed.

It should be noted that the pedestrian LOS presented under the *Pedestrian Operations* section is calculated differently than the pedestrian LOS presented below. This is due to the intricacies of a MMLOS where the pedestrian LOS presented below takes into account pedestrian perception which is influenced by vehicle traffic, sidewalk width, and sidewalk crowding. The pedestrian LOS presented under the *Pedestrian Operations* section only takes into account the amount of cycle time pedestrians have to cross an approach at a signalized intersection, not pedestrian perception is taken into account.

It is also important to note that due to the limitations of the 2010 HCM only signalized intersection with NEMA phasing (National Electrical Manufacturers Association) can be annualized for MMLOS. Sone of the study area intersection, as seen in the detailed Synchro printouts for intersection LOS analysis, do not conform to NEMA phasing and therefore cannot be analyzed for MMLOS.

Intersection Analysis

The MMLOS analysis for the Project was conducted for the following three intersections, as requested by the City in their comment letter on the NPC:

- Cambridge Street at Third Street
- Binney Street at Third Street
- Main Street at Ames Street

These intersections were identified as all having varying data inputs and different geometric and signal changes from existing to future conditions which could show the various levels of output a MMLOS can provide. Each intersection was analyzed using Synchro 8's 2010 HCM capabilities for vehicle, pedestrian and bicycle levels of service. The transit level of service was manually calculated using the Transit Capacity & Quality of Service Manual, Third Edition, as discussed previously. A summary of each intersection is provided for the morning and evening peak hours, followed by a discussion of what the analysis results can conclude. Detailed Synchro reports are presented in Appendix C.

Cambridge Street at Third Street

Cambridge Street at Third Street is a heavily traveled intersection by all modes. Although no signal timings or geometric changes are planned for this intersection in the future, this intersection will be affected by the O'Brien Highway Improvements Project as well as increased vehicle traffic due to background growth. These area changes could have an effect on the MMLOS shown in Tables 2-19a and 2-19b.

Table 2-19a Cambridge Street at Third Street MMLOS (Morning Peak Hour)

	2014 Existing				2024 No-Build				2024 Build			
	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
Vehicle Level of Service												
Approach Delay	32.1	39.0	26.7	52.4	>80.0	69.2	>80.0	62.7	>80.0	>80.0	>80.0	76.5
Approach LOS	C	D	C	D	F	E	F	E	F	F	F	E
Pedestrian Level of Service												
Delay	16.2	16.2	21.4	21.4	16.2	16.2	21.4	21.4	16.2	16.2	21.4	21.4
LOS Score	2.05	2.12	2.18	2.30	2.31	2.35	2.32	2.36	2.31	2.36	2.36	2.37
LOS	B	B	B	B	B	B	B	B	B	B	B	B
Bicycle Level of Service												
Delay	19.1	18.7	13.9	13.9	19.1	18.7	13.9	13.9	19.1	18.7	13.9	13.9
LOS Score	2.01	1.96	2.32	3.50	2.55	2.25	2.48	3.65	2.55	2.31	2.51	3.71
LOS	B	A	B	C	B	B	B	D	B	B	B	D
Transit Level of Service												
LOS Score	1.96		–	2.87	2.112	2.33	–	–	2.16	2.39	–	–
LOS	A	–	–	C	B	B	–	–	B	B	–	–

Table 2-19b Cambridge Street at Third Street MMLOS (Evening Peak Hour)

	2014 Existing				2024 No-Build				2024 Build			
	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
Vehicle Level of Service												
Approach Delay	50.0	49.6	22.9	19.0	>80.0	>80.0	32.7	19.0	>80.0	>80.0	38.4	19.5
Approach LOS	D	D	C	B	F	F	C	B	F	F	D	B
Pedestrian Level of Service												
Delay	15.0	15.0	22.8	22.8	15.0	15.0	22.8	22.8	15.0	15.0	22.8	22.8
LOS Score	2.06	2.10	2.16	2.39	2.30	2.30	2.26	2.43	2.30	2.31	2.29	2.45
LOS	B	B	B	B	B	B	B	B	B	B	B	B
Bicycle Level of Service												
Delay	20.1	20.0	12.8	12.8	20.1	20.0	12.8	12.8	20.1	20.0	12.8	12.8
LOS Score	2.08	2.11	2.88	2.95	2.14	2.47	3.13	2.95	2.41	2.48	3.80	2.98
LOS	B	B	C	C	B	B	C	C	B	B	C	C
Transit Level of Service												
LOS Score	1.97	–	–	2.77	2.08	2.43	–	–	2.19	2.52	–	–
LOS	A	–	–	C	B	B	–	–	B	B	–	–

As seen in the above tables the addition of vehicle traffic to the intersection has slight effects on pedestrian and bicycle LOS. The delays to pedestrian and bicycle modes stay the same from existing to future conditions since no geometric or signal timings change, the LOS Score slightly worsens due to the increase in vehicle traffic. With the transit LOS it can be seen that routes change from existing to build conditions due to the relocation of Lechmere Station and the bus terminal. This helps to better the transit LOS for these routes, while the routes using the EB approach experience slight increases in LOS score due to the increase in vehicle traffic.

Binney Street at Third Street

This intersection follows NEMA phasing under existing and future conditions. Under future conditions the intersection will undergo geometric and signal timing changes due to the Binney Street/Alexandria Project. New bicycle lanes will be added to the Binney Street approaches which could better the bicycle LOS. Signal timing changes could affect all modes. The only transit line that runs along Binney Street is the EZRide Shuttle which is evaluated under the transit LOS. Table 2-20a and 2-20b show the Binney Street at Third Street MMLOS results for the morning and evening peak hours, respectively.

Table 2-20a Binney Street at Third Street MMLOS (Morning Peak Hour)

	2014 Existing				2024 No-Build				2024 Build			
	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
Vehicle Level of Service												
Approach Delay	31.6	38.7	31.7	>80.0	59.2	60.7	18.4	>80.0	64.1	72.1	18.5	>80.0
Approach LOS	C	D	C	F	E	E	B	F	E	E	B	F
Pedestrian Level of Service												
Delay	36.5	36.5	29.6	29.6	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
LOS Score	2.62	2.67	2.24	2.13	2.65	2.69	2.31	2.24	2.66	2.69	2.33	2.26
LOS	B	B	B	B	B	B	B	B	B	B	B	B
Bicycle Level of Service												
Delay	18.2	21.4	24.3	24.3	26.5	23.8	15.7	15.7	26.5	23.9	15.7	15.7
LOS Score	2.71	1.75	2.13	3.69	2.52	2.51	2.00	3.29	2.55	2.55	2.02	3.36
LOS	B	A	B	D	B	B	B	C	B	B	B	C
Transit Level of Service												
LOS Score	1.53	2.69	–	–	1.56	2.79	–	–	1.57	2.99	–	–
LOS	A	B	–	–	A	C	–	–	A	C	–	–

Table 2-20b Binney Street at Third Street MMLOS (Evening Peak Hour)

	2014 Existing				2024 No-Build				2024 Build			
	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
Vehicle Level of Service												
Approach Delay	39.7	30.2	>80.0	>80.0	61.9	>80.0	>80.0	>80.0	76.1	>80.0	>80.0	>80.0
Approach LOS	D	C	F	F	E	F	F	F	E	F	F	F
Pedestrian Level of Service												
Delay	37.4	37.4	26.5	26.5	37.4	37.4	36.5	36.5	37.4	37.4	36.5	36.5
LOS Score	2.65	2.64	2.35	2.34	2.70	2.69	2.44	2.45	2.71	2.69	2.47	2.48
LOS	B	B	B	B	B	B	B	B	B	B	B	B
Bicycle Level of Service												
Delay	10.8	20.1	27.4	27.4	20.3	29.0	19.4	19.4	20.3	29.0	19.4	19.4
LOS Score	3.17	1.49	3.27	3.25	3.00	2.45	3.23	2.67	3.12	2.47	3.28	2.71
LOS	C	A	C	C	C	B	C	B	C	B	C	B
Transit Level of Service												
LOS Score	1.59	2.52	–	–	1.62	2.76	–	–	1.65	2.76	–	–
LOS	A	B	–	–	A	C	–	–	A	C	–	–

The Binney Street and Third Street intersection show high increases in vehicle delays due to the high increases in vehicle volume even with the retiming of the intersections. The bicycle LOS score shows that even with the addition of a cycle track at the westbound approach, vehicles have a significant impact on cyclist perception and therefore the LOS still degrades to a B. This intersection is a good example of the potential limitations of a single intersection MMLOS, which does not consider progression through the corridor, as Binney Street signals are being optimized and coordinated, as well as the limited ability to analyze different bicycle infrastructure. These limitations are discussed more in a following section.

Main Street at Ames Street

The intersection of Main Street and Ames Street is a key intersection within the KSURP. All modes of transportation rely on this intersection to move throughout the area and an intersection MMLOS could provide great insight into the operations at this intersection and possibly show what direction improvements should steer towards. Table 2-21a and 2-21b show the MMLOS for the morning and evening peak hours.

Table 2-21a Main Street at Ames Street MMLOS (Morning Peak Hour)

	2014 Existing				2024 No-Build				2024 Build			
	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
Vehicle Level of Service												
Approach Delay	4.0	11.2	40.5	33.1	7.4	11.9	35.6	37.3	7.5	12.7	36.3	39.4
Approach LOS	A	B	D	C	A	B	D	D	A	B	D	D
Pedestrian Level of Service												
Delay	37.4	37.4	28.0	28.0	37.4	37.4	28.0	28.0	37.4	37.4	28.0	28.0
LOS Score	2.13	2.01	1.90	2.23	2.15	2.02	1.93	2.18	2.15	2.04	1.93	2.21
LOS	B	B	A	B	B	B	A	B	B	B	A	B
Bicycle Level of Service												
Delay	10.4	9.9	22.8	23.1	10.4	9.9	22.8	23.1	10.4	9.9	22.8	23.1
LOS Score	1.88	2.05	2.35	2.27	2.01	0.75	2.37	2.22	2.02	0.79	2.37	2.25
LOS	A	B	B	B	B	A	B	B	B	A	B	B
Transit Level of Service												
LOS Score	1.65	1.71	1.01	–	1.68	1.60	1.01	–	1.68	1.73	1.01	–
LOS	A	A	A	–	A	A	A	–	A	A	A	–

Table 2-21b Main Street at Ames Street MMLOS (Evening Peak Hour)

	2014 Existing				2024 No-Build				2024 Build			
	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB
Vehicle Level of Service												
Approach Delay	3.2	13.7	38.3	30.6	15.4	14.7	31.1	45.0	15.7	15.2	31.1	45.3
Approach LOS	A	B	D	C	B	B	C	D	B	B	C	D
Pedestrian Level of Service												
Delay	34.7	34.7	29.6	29.6	34.7	34.7	29.6	29.6	34.7	34.7	29.6	29.6
LOS Score	2.09	2.09	1.95	2.19	2.11	2.13	2.00	2.10	2.11	2.14	2.00	2.12
LOS	B	B	A	B	B	B	A	B	B	B	A	B
Bicycle Level of Service												
Delay	13.4	11.7	23.4	23.0	11.5	11.5	20.9	20.7	11.5	11.5	20.9	20.7
LOS Score	1.58	2.10	2.64	2.18	2.07	0.80	2.41	2.38	2.07	0.83	2.41	2.38
LOS	A	B	B	B	B	A	B	B	B	A	B	B
Transit Level of Service												
LOS Score	–	1.86	2.42	2.27	–	1.75	2.43	2.32	–	1.86	2.43	2.32
LOS	–	A	B	B	–	A	B	B	–	A	B	B

The Main Street at Ames Street intersection shows an overall increase in vehicle delay, while some approaches get slightly better and others worse. The improvements made to the westbound approach of Main Street, particularly the addition of a separated bike lane, improves the bicycle LOS from LOS B in Existing Conditions to LOS A in No-Build Conditions for both morning and evening peak hours. The intersection also demonstrated the limitations of the bicycle analysis as a cycle track is being proposed along the length of Ames Street but due to the inability to distinguish between separated grade or protected (by permanent object) bike lanes as opposed to separated (pave) bike lanes the bicycle LOS decreases from Existing to No-Build for the north and southbound approaches.

Limitations and Challenges of MMLOS Analysis and HCM 2010

Some limitations of the MMLOS and HCM 2010 have been discussed above, particularly when discussing the vehicle LOS methodology. There were other limitations and challenges encountered while evaluating these test intersections, which are listed below. For the above analysis, these limitations and challenges were dealt with to the best of the analyst's abilities and it should be understood that the outputs presented are a test to understand the capabilities of a multimodal level of service analysis.

- Extensive field data is needed in order to perform precise and accurate MMLOS analysis. Many of these data needs are already collected through the TMCs, but some data that is currently not collected, which is needed for the MMLOS analysis include vehicle speed data, sidewalk widths and radii and directional pedestrian volumes (including pedestrians traversing the sidewalk corner but not entering the crosswalk).

- As discussed under methodology, the MMLOS analysis cannot process exclusive or leading pedestrian intervals (if coded as a hold) which the City of Cambridge already implements at many of their intersections. This limits the types of intersections that can be analyzed.
- A MMLOS does not distinguish between different types of bicycle lanes, it would seem that the bicyclist's perception would change depending on what type of bicycle lane is provided. Take Ames Street for example, there is currently a separated bicycle lane from Broadway to Main Street and in the future a cycle track is planned. The perception of safety and comfort by cyclist would probably increase with this change, but the analysis does not reflect this increased safety perception in the Bicycle LOS Score (lower score) and therefor LOS grade.
- Transit LOS is very data driven, with many of the data inputs not available because data already used for other analysis does not supply the specific information or the data is not readily available for public knowledge.

Although there are challenges with performing an MMLOS, this analysis provides a good first-step into providing a more complete analysis for all modes and understanding the intersections between each mode.

Roadway Segment Analysis

In addition to intersection analysis, roadway segment analyses were conducted for Binney Street and Broadway for those segments of corridor that are within the study area. Synchro 8 analysis software was used to perform the analysis, consistent with the study area intersection LOS analysis. Arterial LOS within Synchro 8 follows the methodology of Highway Capacity Manual (HCM) 2000 methodology for urban street analysis. The use of HCM 2000 is consistent with the LOS analysis performed for the study area intersections.

A roadway segment analysis is based on the average through-vehicle travel speed for a particular segment or an entire corridor. Travel speed is computed from the segment running times and the control delay for through movements at intersections. The level of service determined from the segment running time and control delay range from LOS A to LOS F. LOS A is the best grade for a segment with little to no delay experienced and progression through the segment is almost free-flowing. LOS F indicates that the segment experiences high delays with low speeds due to inappropriate signal timings, poor progression, and increased traffic flow through the segment. Table 2-22 below summarizes the LOS criteria based on average travel speed and urban street class.

Table 2-22 Roadway Segment LOS Criteria

Urban Street Class	I	II	III	IV
Range of free-flow speeds (FFS)	55 to 45 mi/h	45 to 35 mi/h	35 to 30 mi/h	35 to 25 mi/h
Typical FFS	50 mi/h	40 mi/h	35 mi/h	30 mi/h
LOS	**Average Travel Speed (mi/h)**			
A	>42	>35	>30	>25
B	>34-42	>28-35	>24-30	>19-25
C	>27-34	>22-28	>18-24	>13-19
D	>21-27	>17-22	>14-18	>9-13
E	>16.21	>13-17	>10-14	>7-9
F	≤ 16	≤ 13	≤ 10	≤ 7

Source: HCM 2000

Binney Street

The roadway segment analyzed for Binney Street is between Galileo Galilei Way and Land Boulevard with six segments, three in each travel direction. Binney Street is classified as a Class III roadway due to posted travel speeds of 30 mph. Each segment along with the overall LOS for each travel direction was evaluated for the morning and evening peak hours under all conditions, 2014 Existing, 2024 No-Build, and 2024 Build. Tables 2-23a and 2-23b below provide the segment and overall LOS for Binney Street for the AM peak and PM peak, respectively. Detailed Synchro reports are included in Appendix C.

Table 2-23a Binney Street Segment LOS (AM Peak)

	2014 Existing			2024 No-Build			2024 Build		
Segment	**Travel Time (seconds)**	**Travel Speed (mph)**	**LOS**	**Travel Time (seconds)**	**Travel Speed (mph)**	**LOS**	**Travel Time (seconds)**	**Travel Speed (mph)**	**LOS**
Galileo Galilei Way to Third Street (EB)	58.4	18.5	C	101.9	10.6	E	105.2	10.3	E
Third Street to First Street (EB)	36.0	21.8	C	33.6	23.3	C	33.7	23.3	C
First Street to Land Boulevard (EB)	47.9	3.6	F	45.8	3.8	F	47.2	3.7	F
Overall EB	**142.3**	**14.4**	**D**	**181.3**	**11.3**	**E**	**186.1**	**11.0**	**E**
Land Boulevard to First Street (WB)	60.7	2.9	F	19.9	8.7	F	19.5	8.9	F
First Street to Third Street (WB)	56.8	13.8	E	82.9	9.5	F	96.4	8.1	F
Third Street to Galileo Galilei Way (WB)	38.2	28.3	B	38.2	28.3	B	38.2	28.3	B
Overall WB	**155.7**	**13.1**	**E**	**141.0**	**14.5**	**D**	**154.1**	**13.2**	**E**

Table 2-23b Binney Street Segment LOS (PM Peak)

	2014 Existing			2024 No-Build			2024 Build		
Segment	Travel Time (seconds)	Travel Speed (mph)	LOS	Travel Time (seconds)	Travel Speed (mph)	LOS	Travel Time (seconds)	Travel Speed (mph)	LOS
Galileo Galilei Way to Third Street (EB)	55.1	19.7	C	85.1	12.7	E	96.8	11.2	E
Third Street to First Street (EB)	37.4	21.0	C	37.4	21.0	C	37.6	20.9	C
First Street to Land Boulevard (EB)	49.8	3.5	F	41.7	4.2	F	43.3	4.0	F
Overall EB	**142.3**	**14.4**	**D**	**164.2**	**12.5**	**E**	**177.7**	**11.5**	**E**
Land Boulevard to First Street (WB)	32.2	5.4	F	13.3	13.0	E	15.0	11.5	E
First Street to Third Street (WB)	51.4	15.3	D	216.9	3.6	F	230.1	3.4	F
Third Street to Galileo Galilei Way (WB)	38.2	28.3	B	38.2	28.3	B	38.2	28.3	B
Overall WB	**121.8**	**16.7**	**D**	**268.4**	**7.6**	**F**	**283.3**	**7.2**	**F**

The Binney Street roadway segment analysis indicates that the Project will increase travel times along the corridor although overall LOS will be maintained from No-Build to Build Conditions except for the westbound direction during the morning peak hour were the corridor falls from LOS D to LOS E. The Binney Street westbound corridor overall travel time increases by 13.1 seconds and drops to LOS E although no particular segment further degrades. Under future conditions, No-Build and Build, the Binney Street corridor will be operating at LOS lower than acceptable levels.

Broadway

The roadway segment analyzed for Broadway Street is between Galileo Galilei Way and Third Street with four segments, two in each travel direction. Broadway is classified as a Class III roadway due to posted travel speeds of 30 mph. Each segment along with the overall LOS for each travel direction was evaluated for the morning and evening peak hours under all conditions, 2014 Existing, 2024 No-Build and 2024 Build. Tables 2-24a and 2-24b below provide the segment and overall LOS for Binney Street for the AM peak and PM peak, respectively. Detailed Synchro reports are included in Appendix C.

Table 2-24a Broadway Segment LOS (AM Peak)

	2014 Existing			2024 No-Build			2024 Build		
Segment	Travel Time (seconds)	Travel Speed (mph)	LOS	Travel Time (seconds)	Travel Speed (mph)	LOS	Travel Time (seconds)	Travel Speed (mph)	LOS
Galileo Galilei Way to Ames Street (EB)	44.6	9.8	F	113.4	3.8	F	114.3	3.8	F
Ames Street to Third Street (EB)	44.9	14.6	D	41.4	15.8	D	41.2	15.9	D
Overall EB	**89.5**	**12.2**	**E**	**154.8**	**7.1**	**F**	**155.5**	**7.0**	**F**
Third Street to Ames Street (WB)	74.9	8.8	E	77.8	8.4	F	92.0	7.1	F
Ames Street to Galileo Galilei Way (WB)	78.0	5.6	F	85.1	5.1	F	87.2	5.0	F
Overall WB	**152.9**	**7.1**	**F**	**162.9**	**6.6**	**F**	**179.2**	**6.0**	**F**

Table 2-24b Broadway Segment LOS (PM Peak)

Segment	2014 Existing			2024 No-Build			2024 Build		
	Travel Time (seconds)	Travel Speed (mph)	LOS	Travel Time (seconds)	Travel Speed (mph)	LOS	Travel Time (seconds)	Travel Speed (mph)	LOS
Galileo Galilei Way to Ames Street (EB)	69.5	6.3	F	100.8	4.3	F	103.3	4.2	F
Ames Street to Third Street (EB)	39.2	16.7	D	46.0	14.3	D	46.9	14.0	E
Overall EB	**108.7**	**10.0**	**E**	**146.8**	**7.4**	**F**	**150.2**	**7.3**	**F**
Third Street to Ames Street (WB)	86.8	7.6	F	170.5	3.8	F	193.8	3.4	F
Ames Street to Galileo Galilei Way (WB)	65.7	6.6	F	88.7	4.9	F	110.0	4.0	F
Overall WB	**152.5**	**7.1**	**F**	**259.2**	**4.2**	**F**	**303.8**	**3.6**	**F**

The Broadway segment analysis indicates that under all conditions, Broadway is operating at lower than acceptable levels during the peak hours. In the future conditions, the Broadway corridor will operate at LOS F with minor increases in travel time during morning eastbound and evening eastbound travel, 0.7 seconds and 3.4 seconds respectively, moderate increases during morning westbound travel, 16.3 seconds and major increases during evening westbound travel, 44.6 seconds. These increases are due to the increases in traffic estimated for the Project, particularly for the North Garage Office and Eleven Cambridge Center Resident Components, which will use Broadway regularly.

Roadway Safety Audit

Study area intersections with crash rates above district average and are within Highway Safety Improvement Program (HSIP) clusters are subject to a Roadway Safety Audit (RSA), as requested by MassDOT in their NPC comment letter and the MEPA SEIR Scope.

Preliminary steps have been taken to identify possible intersections subject to the RSA. The crash rates reported under Existing Conditions over the district average and within a HSIP cluster have been identified as:

- Main Street at Galileo Galilei Way/Vassar Street;
- Massachusetts Avenue at Vassar Street; and
- Massachusetts Avenue at Memorial Drive.

The intersection of Cambridge Street at First Street, identified as an intersection qualifying for an RSA, has recently undergone the audit under the Monsignor O'Brien Highway (Route 28) Transportation Improvements Project in connection with North Point and the relocation of MBTA Lechmere Station. The RSA was conducted on May 22, 2014 and the final report was published in February 2015. Due to the recent study at this intersection and the improvements that will be conducted at this location in the coming years, an RSA would be uninformative and therefore this intersection is not be included.

As for the other three identified intersections above, the RSA(s) will be conducted at a later date, when the findings from the study will more accurately identify needed improvements in correlation to when those improvements could be made. Due to the Project schedule, and multiple ongoing and planned roadway improvement projects in the area, the Proponent, as discussed with MEPA and MassDOT, will wait to conduct the RSA(s). The RSA(s) will be conducted as part of the MOU agreement,, when a more realistic construction schedule is set and the outcomes of the RSA(s) are more current to the time when the improvements can be made.

Site Circulation and Access

The Cambridge Center North Garage will continue to provide access and egress off Broadway and Binney Street using the access roadways, and the new parking garage under Eleven Cambridge Center will use these access roadways for access and egress into the new garage. The proposed Cambridge Center North Garage Office Buildings will be accessed through street level lobbies on Broadway and Binney Street and through various entrances within the garage.

The proposed Eleven Cambridge Center Residential Building will provide various street level entrances to retail as well as a residential lobby for its residents. Access to and from the garage will be through the building lobby. All parking for Eleven Cambridge Center residents will be accommodated on site at the new underground parking garage with access off of the existing North Garage driveways.
Access to the proposed Three Cambridge Center Mixed Use Building office and residential components will be though a building lobby and retail access with be through various street level entrances. Parking associated with this Project will be accommodated by the existing Cambridge Center East Garage adjacent to the Project with access off of Ames Street and Binney Street.

Parking Operations

The Project will add up to an additional 740 parking spaces to the KSURP area. Collectively, the approximately 2,667 existing off-street parking spaces and proposed parking supply for the Project change falls within the maximum off-street parking supply previously approved under Plan Amendment No. 3 (3,545 spaces). All new parking will be structured parking.

Two new levels of parking, totaling of 370 spaces, will be added to the Cambridge Center North Garage for tenant and visitor parking. The new residential building at Eleven Cambridge Center will provide 370 below-grade parking spaces for building residents. Spaces for the new residents and tenants of Three Cambridge Center will be accommodated within the existing East Garage. Table 2-25 below outlines the future parking within the KSURP area.

Table 2-25 Future Parking Supply in the KSURP Area

Project Component/Garage	Size (Net-New)	Existing Parking	Proposed New Parking for the Project	Future Parking
Cambridge Center North Garage Office Buildings	590,000 GSF	1,136	370	1,506
Cambridge Center West Garage	—	727	0	727
Cambridge Center East Garage	—	804[1]	0	804[2]
Eleven Cambridge Center Residential Building	158,400 GSF	0	370	370
Three Cambridge Center Mixed Use Building	211,100 GSF	0	0	0
Total	**959,500 GSF[3]**	**2,667**	**740**	**3,407**

GSF Gross Square Feet
1 Accounts for the approximately 40 spaces within the East Garage that will be eliminated as a result of the recently approved Ames Street Residences project.
2 Includes spaces leased to the Marriott Hotel, approximately 75 spaces
3 Total GSF related to parking does not match the proposed development program GSF due to the exclusion of the Broad and Whitehead Expansions. Broad and Whitehead employees have been assigned to the existing Cambridge Center West Garage which has capacity to support these smaller expansions.

The additional 740 parking spaces being built with the approximately 1.03 million square feet of new development provides a parking ratio of only 0.7 spaces per 1,000 square feet of new development. The City has recommended new zoning requirements under the K2 Plan for parking standards in the area. New office uses have no minimum parking requirement, but instead a maximum parking ratio of 0.9 spaces per 1,000 square feet. And, retail uses have a maximum 0.5 space per 1,000 square feet parking requirement. In the K2 Plan, residential development has a minimum of 0.5 spaces per dwelling unit and a maximum ratio of 0.75 spaces per dwelling unit. However, the Proponent is considering reducing the residential parking requirement to 0.25 spaces per dwelling unit based on current utilization trends within the area.

The Cambridge Center North Garage Office Building will provide approximately 0.6 spaces per 1,000 square feet, including the office component of the Three Cambridge Center Mixed Use Building. The Eleven Cambridge Center Residential Building will provide 0.7 spaces per dwelling unit, including residential units from Three Cambridge Center Mixed Use Building and will be sharing parking with the retail component. Based on a shared parking approach, this parking supply is adequate because multiple uses will have opposite peak parking demand times. The area parking garages will also provide additional parking capacity if demand is above expected for the new development components.

The Proponent is obligated to collect tenant/employee travel mode data within the KSURP Area and summarize the results as part of the *Kendall Square Urban Renewal Area Annual Traffic Update* report. These surveys were administer by Boston Properties LLC to area firms and businesses and for the most recent year available, 2014, only 29 percent of respondents indicated that their primary mode was driving alone while 5 percent indicated they carpooled with two or more people. This data supports the low parking ratio for office and R&D components of the Project.

There is little information on residential car-ownership within the KSURP Area, as there are currently no residential buildings, but it is estimated, based on the American Community Survey (ACS) 5-year estimate (2009-2013) for the area, census tracts 3523 and 3524, approximately 40 percent of residents do not have access to a vehicle while less than 17 percent have access to more than two vehicles. It is expected that due to the residential locations of the Project, the vehicle ownership will be slightly lower than what the ACS data shows. The low car-ownership percentage estimated for the residential components provides the ability to provide additional parking for other users in the area.

Future Parking Analysis

To understand the parking demands of the Project and demonstrate the shared parking concepts, a detailed parking analysis was conducted. The most recent parking data from April 2014 was used to understand the parking patterns of each of the Cambridge Center garages. The monthly average activity reports for monthly and transient parkers was used to determine average existing occupancy and parking arrival and departure distributions. The average daily in and out distributions were calculated for both monthly card holder and transient parkers. These distributions were applied to the daily vehicle trips generated by each Project Component and adjusted to match the estimated morning and evening peak generated trips, presented previously in Table 2-13.

As previously discussed, the Project generated trips were assigned to specific garages based on geographical location and the trips removed due to the demolition of the existing Eleven Cambridge Center and Three Cambridge Center were from the North Garage and East Garage respectively. The following parking assignments were assumed for this analysis:

- New Cambridge Center North Garage Office Buildings' users will park in the North Garage.
- New Eleven Cambridge Center Residential Building residents will park in the new underground parking garage being constructed in conjunction with the new building.
- New Three Cambridge Center Mixed Use Building office users and residents will park in the East Garage.
- Whitehead Institute Addition users will park in the West Garage.
- Broad Institute Office Conversion users will park in the West Garage.
- All new retail components will park in various garages based on availability.

Based on the daily distribution patterns and parking assignments, Table 2-26 through Table 2-31 provides the future parking demand at each Cambridge Center parking facility.

Table 2-26 West Garage Future Parking

Time	Existing Occupancy	Whitehead Office Future Demand		Broad Institute Future Demand		Total Future Occupancy	Future Occupancy (%)
		In	Out	In	Out		
Supply	727					727	727
12:00 AM	45	0	1	0	0	44	6%
1:00 AM	44	0	0	0	0	43	6%
2:00 AM	45	1	0	0	0	45	6%
3:00 AM	46	1	0	0	0	47	6%
4:00 AM	51	1	0	0	0	53	7%
5:00 AM	69	5	1	2	0	77	11%
6:00 AM	117	11	1	4	0	139	19%
7:00 AM	198	18	2	7	1	242	33%
8:00 AM	321	36	8	12	5	400	55%
9:00 AM	468	30	2	11	2	584	80%
10:00 AM	539	14	2	6	0	673	93%
11:00 AM	563	7	3	2	1	702	97%
12:00 PM	566	4	4	1	0	706	97%
1:00 PM	548	3	5	1	0	687	94%
2:00 PM	513	3	6	1	1	649	89%
3:00 PM	436	2	14	1	3	558	77%
4:00 PM	328	1	22	0	5	424	58%
5:00 PM	213	5	39	2	26	251	35%
6:00 PM	130	1	19	0	5	145	20%
7:00 PM	91	1	8	0	1	98	13%
8:00 PM	70	0	3	0	0	74	10%
9:00 PM	53	0	2	0	0	55	8%
10:00 PM	49	0	1	0	0	50	7%
11:00 PM	44	0	1	0	0	44	6%

With the addition of project trips and the assumption that the additional Whitehead and Broad Institute vehicle trips will only park in the West Garage, during the average day, the garage would operate below maximum capacity, but slightly above operational capacity of 95 percent.

Table 2-27 East Garage Future Parking

Time	Existing Occupancy	Future Occupancy with Ames Street Residences	Existing Three Cambridge Center Office Component to be Removed		Existing Three Cambridge Center Retail Component to be Removed		New Three Cambridge Center Office Component Demand		New Three Cambridge Center Residential Component Demand		New Three Cambridge Center Retail Component Demand		Total Future Occupancy	Future Occupancy (%)
			In	Out	In	Out	In	Out	In	Out	In	Out		
Supply	781 [1]	729 [2]											729[2]	729[2]
12:00 AM	61	201	0	1	0	0	0	1	0	3	0	0	395	54%
1:00 AM	60	200	0	1	0	0	0	1	2	5	0	0	391	54%
2:00 AM	59	199	0	0	0	0	0	0	1	6	0	0	385	53%
3:00 AM	60	200	0	0	0	0	0	0	1	11	0	0	376	52%
4:00 AM	62	202	1	0	4	0	1	0	2	24	2	0	354	49%
5:00 AM	79	219	2	0	15	0	5	0	4	24	9	0	348	48%
6:00 AM	122	262	7	1	27	6	13	2	5	26	16	4	366	50%
7:00 AM	226	304	20	2	28	15	30	2	4	31	17	9	448	61%
8:00 AM	384	462	37	5	29	18	57	11	9	34	18	11	591	81%
9:00 AM	552	630	33	2	28	16	45	3	7	32	17	10	740	102%
10:00 AM	633	711	15	2	51	28	21	3	7	24	32	17	801	110%
11:00 AM	662	740	7	2	69	44	10	4	9	11	42	27	819	112%
12:00 PM	671	749	4	3	73	69	7	5	15	5	45	42	838	115%
1:00 PM	649	727	3	4	73	77	6	6	15	4	45	47	830	114%
2:00 PM	607	685	3	7	74	84	5	10	28	4	46	52	815	112%
3:00 PM	541	619	3	10	78	85	4	16	33	4	48	52	776	106%
4:00 PM	426	504	2	22	80	88	3	33	34	8	49	54	680	93%
5:00 PM	282	360	8	40	82	89	8	53	35	19	50	55	541	74%
6:00 PM	178	318	3	24	80	85	3	36	31	6	49	52	452	62%
7:00 PM	126	266	1	12	78	78	2	18	21	0	48	48	416	57%
8:00 PM	95	235	0	5	67	75	1	7	10	0	41	46	397	54%
9:00 PM	71	211	0	3	30	56	1	5	6	0	18	35	387	53%
10:00 PM	59	199	0	2	13	44	0	4	3	1	8	27	387	53%
11:00 PM	51	191	0	1	10	30	0	2	1	1	6	18	386	53%

1 The existing supply removes the approximate 75 leased spaces to the Marriott Hotel and does not account for the removal of approximately 40 spaces due to the Ames Street Residence Project. Also includes the approximately eight (8) ZipCar reserved spots. Therefore the supply previously documented in the report does not match.

2 The future supply accounts for the removal of the approximately 40 spaces due to the Ames Street Residences Project as well as other reserved spaces not available for monthly or transient parkers.

3 It is assumed that the starting occupancy of the new residential component is 200 vehicles, 0.75 vehicle for every unit of the building, per maximum parking zoning requirements. This is a conservative assumption.

Under future conditions, before any construction will start for the Project, the East Garage will undergo a renovation and lose approximately 40 parking spaces in connection with the future construction of the Ames Street Residential Project. With the removal of the existing Three Cambridge Center office building and the addition of the new Three Cambridge Center Office Mixed Use Building residential component, the East Garage would operate over capacity. This is assuming that all new Three Cambridge Center Mixed Use Building parkers will strictly park in the East Garage.

Table 2-28 North Garage Future Parking

Time	Existing Occupancy	Existing Eleven Cambridge Center Trips to be Removed		New North Garage Office Component Demand		Total Future Occupancy	Future Occupancy (%)
		In	Out	In	Out		
Supply	1136			+370		1506	1506
12:00 AM	60	0	0	1	2	59	4%
1:00 AM	58	0	0	0	2	55	4%
2:00 AM	56	0	0	0	2	51	3%
3:00 AM	56	0	0	1	1	51	3%
4:00 AM	61	1	0	5	1	59	4%
5:00 AM	89	5	0	22	1	103	7%
6:00 AM	248	25	0	118	1	354	24%
7:00 AM	476	38	3	178	12	713	47%
8:00 AM	766	45	7	216	37	1142	76%
9:00 AM	938	29	3	136	16	1408	93%
10:00 AM	982	9	2	40	7	1478	98%
11:00 AM	983	3	2	15	8	1485	99%
12:00 PM	979	2	2	8	8	1481	98%
1:00 PM	972	2	4	8	16	1468	97%
2:00 PM	925	2	9	7	38	1397	93%
3:00 PM	801	1	19	5	86	1210	80%
4:00 PM	567	1	39	4	177	841	56%
5:00 PM	320	6	42	30	197	463	31%
6:00 PM	198	2	21	7	97	270	18%
7:00 PM	115	1	12	3	57	144	10%
8:00 PM	87	0	4	2	21	101	7%
9:00 PM	71	0	3	2	12	78	5%
10:00 PM	64	1	2	2	7	67	4%
11:00 PM	59	0	1	1	5	59	4%

With the removal of the existing Eleven Cambridge Center trips and the addition of the North Garage Office Component, including the additional 370 parking spaces, the North Garage will operate below full capacity, but above operational capacity of 95 percent.

Table 2-29 Eleven Cambridge Center Garage Future Parking

Time	Eleven Cambridge Center Residential Component Demand In	Eleven Cambridge Center Residential Component Demand Out	New Eleven Cambridge Center Retail Component Demand In	New Eleven Cambridge Center Retail Component Demand Out	Total Future Occupancy	Future Occupancy (%)
Supply					+370	370
12:00 AM	0	2	0	0	219[1]	59%
1:00 AM	1	3	0	0	217	59%
2:00 AM	1	5	0	0	213	58%
3:00 AM	1	8	0	0	206	56%
4:00 AM	1	22	3	0	188	51%
5:00 AM	3	34	11	0	168	45%
6:00 AM	9	30	19	4	162	44%
7:00 AM	2	34	20	11	139	38%
8:00 AM	10	38	20	13	118	32%
9:00 AM	5	35	20	11	97	26%
10:00 AM	3	17	36	20	99	27%
11:00 AM	3	6	49	32	113	31%
12:00 PM	6	3	52	49	119	32%
1:00 PM	10	3	52	55	123	33%
2:00 PM	27	6	53	60	137	37%
3:00 PM	33	12	55	60	153	41%
4:00 PM	38	10	57	62	176	48%
5:00 PM	39	20	58	63	190	51%
6:00 PM	36	15	57	60	208	56%
7:00 PM	31	4	55	55	235	64%
8:00 PM	24	0	48	53	254	69%
9:00 PM	17	1	21	40	251	68%
10:00 PM	6	1	9	32	233	63%
11:00 PM	4	1	7	21	222	60%

Note: It is assumed that the starting occupancy of the new residential garage is 220 vehicles, 0.75 vehicle for every unit of the building, per maximum zoning parking regulations.
This is a conservative assumption as car ownership in the area is approximately 60%, as previously discussed.

The parking being built with the new Eleven Cambridge Center Residential Building would operate well under capacity during both the evening and daytime hours.

The evaluation of each individual garage shows that all existing garages will operate over operation capacity (95 percent) under future conditions with the addition of the Project generated trips. The new parking associated with the new Eleven Cambridge Center Residential building will operate below capacity during the overnight hours and well below full capacity during the daytime hours. This shows the vital need for a shared parking strategy among all the garages.

Table 2-30 provides a summary of the shared parking strategy being implemented within the new Eleven Cambridge Center Garage. The travel patterns and parking needs associated with office and residential land uses are compatible to a shared parking plan. Office land uses have a higher demand for parking during the daytime hours and a lower demand during the evening and overnight hours. Residential land uses have opposite demands, with lower parking demands during the daytime hours and higher parking demands during the evening and overnight hours.

Under the K2 Plan guidelines, residential parking can share 40 percent of the designated spaces, calculating out to be 148 spaces in the new Eleven Cambridge Center Garage (370 total spaces). This additional supply will be available to the North Garage Office Component parkers. Office parking can share up to 90 percent during the overnight hours. This shared parking strategy is being implemented at the East Garage for the Ames Street Residences and for the new Three Cambridge Center Mixed Use Building residential component.

Table 2-30 Cambridge Center North Garage/Eleven Cambridge Center Garage Shared Future Parking

Time	Future North Garage Occupancy	Shared Parking Supply	Future Occupancy (%)
12:00 AM	59	1506	4%
1:00 AM	55	1506	4%
2:00 AM	51	1506	3%
3:00 AM	51	1506	3%
4:00 AM	59	1506	4%
5:00 AM	103	1506	7%
6:00 AM	354	1654	21%
7:00 AM	713	1654	43%
8:00 AM	1142	1654	69%
9:00 AM	1408	1654	85%
10:00 AM	1478	1654	89%
11:00 AM	1485	1654	90%
12:00 PM	1481	1654	90%
1:00 PM	1468	1654	89%
2:00 PM	1397	1654	84%
3:00 PM	1210	1654	73%
4:00 PM	841	1654	51%
5:00 PM	463	1506	31%
6:00 PM	270	1506	18%
7:00 PM	144	1506	10%
8:00 PM	101	1506	7%
9:00 PM	78	1506	5%
10:00 PM	67	1506	4%
11:00 PM	59	1506	4%

By sharing the new parking being constructed with the new Eleven Cambridge Center building, the Cambridge Center North Garage will operate at or below operational capacity throughout the day. It can be seen that there is additional capacity that could be shared with the other Project Components to evenly space out demand and alleviate the demand at other garages, particularly at the East Garage. This is shown in Table 2-31; if all supply was open to all demand, there would be just enough parking to accommodate all estimated demand.

Table 2-31 Total KSURP Area Future Parking

Time	West Garage Future Occupancy	East Garage Future Occupancy	North Garage Future Occupancy	New Eleven Cambridge Center Garage Future Occupancy	Total Future Occupancy	Future Occupancy (%)
Supply	727	729	1506	370	3332	3332
12:00 AM	44	395	59	219	717	22%
1:00 AM	43	391	55	217	706	21%
2:00 AM	45	385	51	213	694	21%
3:00 AM	47	376	51	206	680	20%
4:00 AM	53	354	59	188	654	20%
5:00 AM	77	348	103	168	696	21%
6:00 AM	139	366	354	162	1021	31%
7:00 AM	242	448	713	139	1542	46%
8:00 AM	400	591	1142	118	2251	68%
9:00 AM	584	740	1408	97	2829	85%
10:00 AM	673	801	1478	99	3051	92%
11:00 AM	702	819	1485	113	3119	94%
12:00 PM	706	838	1481	119	3144	94%
1:00 PM	687	830	1468	123	3108	93%
2:00 PM	649	815	1397	137	2998	90%
3:00 PM	558	776	1210	153	2697	81%
4:00 PM	424	680	841	176	2121	64%
5:00 PM	251	541	463	190	1445	43%
6:00 PM	145	452	270	208	1075	32%
7:00 PM	98	416	144	235	893	27%
8:00 PM	74	397	101	254	826	25%
9:00 PM	55	387	78	251	771	23%
10:00 PM	50	387	67	233	737	22%
11:00 PM	44	386	59	222	711	21%

The table above is a theoretical assumption that all parking within the KSURA would be open to all users. This analysis indicates that there is some available capacity to accommodate all estimated vehicle trips, existing and future, to the area. The analysis does indicate however that the East Garage will have a demand well over the supplied capacity and the West Garage would function above operational capacity throughout the mid-day hours, 10:00 AM to 2:00 PM.

The analysis indicates that with a more robust and strict parking management plan including TDM measures, such as a car sharing program and shared parking strategies, the future parking demand in the KSURA can be met by the future parking supply.

Long-Term Parking Monitoring Program

All Cambridge Center parking facilities are monitored daily to ensure monthly cardholders are parking in the appropriate garages and transient parkers are dispersed efficiently among the three garages. Tenants of the area are provided a limited number of parking permits, as outlined in each individual lease, and are charged the full monthly cardholder price. Other employees or visitors without monthly permits are subject to the daily rates, up to $40.00 per day.

New tenants of the Project will negotiate the number of parking permits and the specified amount will be within the individual lease. All new monthly parking permits will be charged the full monthly rate. This will encourage more employees to take alternative modes of transportation and reduce the number of monthly parkers parking in the area on a regular basis.

Residential parkers will be provided the opportunity to buy a monthly parking permit at full price. This will encourage a low auto-ownership rate and could further reduce the demand for parking in the area.

A portion of the existing parking demand is from transient users. It is assumed that these users are comprised of employees who do not buy a monthly pass, visitors to area businesses and retail customers. These specific users would therefore be classified as infrequent users of the garage. Under future conditions it is estimated that the parking demand for these users will increase, particularly with the increase in retail to the area. It will be important to monitor the influx of transient users to the Cambridge Center Garages and limit the number of spaces available to transient parkers. There are many other commuting and parking options within the area including on-street parking and other parking garages and lots that transient parkers, and retail patrons in particular can utilize. By limiting the number of transient parking available, the garages can operate at an appropriate capacity.

Pricing Strategy

Currently the Cambridge Center Garages have a time-sensitive pricing strategy that discourages driving and parking in the area. A monthly cardholder pays up to $400.00 per month for a space within the KSURP garages and a transient parker pays up to $40.00 per day. It should be noted that the three garages have some of the highest parking rates in the immediate area with other garages having all-day parking for $23.00 to $30.00.

Due to the increasing parking demand within the area, the Proponent and other stakeholders are in discussions about implementing new pricing strategies to further discourage vehicle trips to the area. It is the intent of the draft MOUto continue to include a proactive parking strategy to discourage vehicle trips to the area as well as help offset other mitigation costs outlined in the MOU.

Transit Operations

In accordance with the NPC Certificate and to address reviewer comments received on the NPC, the transit operations analysis was expanded to include MBTA Red Line service analysis with future ridership and On-Time Performance information considered, MBTA Kendall/MIT station platform capacity analysis, and Project-related impacts on bus routes in the Kendall Square area. The conclusions of this expanded analysis indicate:

1. If the Red Line were to operate under the posted schedule, future ridership with and without the Project can be accommodated for all but one segment.
2. The Project would increase passenger demand on the Red Line at Kendall Square by only two percent during the highest demand period morning peak hour for the inbound train entering Kendall/MIT station. This segment would operate at capacity with and without the Project. Therefore, the Project would result in a *de minimus* impact to public transit capacity.
3. The MBTA Kendall/MIT station platform could accommodate future passenger demand with and without the Project under LOS D conditions, which is considered acceptable for existing, urban stations.

A transit analysis was conducted to understand the Projects' impacts on the public transit system within the area. The Project is expected to generate 639 new transit trips (421 entering, 218 exiting) during the morning peak hour and 716 new transit trips (215 entering, 501 exiting) during the evening peak hour as shown in Table 2-32 below.

Table 2-32 Project-Generated Transit Trips

	AM Peak Hour		PM Peak Hour	
Use	In	Out	In	Out
Residential	19	76	76	40
Office	389	133	106	425
Retail	13	9	33	36
Total	421	218	215	501

The most recent data available providing a breakdown of subway and bus public transportation usage is from the 2006-2010 American Community Survey. Data from the study area location shows that approximately 64 percent of employees who use transit will use subway or railway and approximately 36 percent will use bus to

commute to work. Data also shows that residents in this area using transit will have a 79/21 percent split between subway and bus services. The distribution is summarized in Table 2-33 below.

Table 2-33 Transit Distribution

Transit	Employees/Retail	Residents
Red Line	64%	79%
EZ-Ride	7%	4%
Route 64	7%	4%
Route 68	7%	4%
Route 85	7%	4%
CT2	8%	5%

Transit distribution is then applied to the Project generated transit trips presented previously in Table 2-13 in order to determine the Project-generated transit trips by line or route. The result is shown in Tables 2-34a and 2-34b below for the morning peak hour and evening peak hour, respectively.

Table 2-34a Morning Peak Hour Project-Generated Transit Trips by Line

	Employees/Retail		Residents		Total	
Transit	In	Out	In	Out	In	Out
Red Line	257	91	15	60	272	151
EZ-Ride	29	10	0	3	29	13
Route 64	29	10	1	3	30	13
Route 68	29	10	1	3	30	13
Route 85	29	10	1	3	30	13
CT2	29	11	1	4	30	15

Table 2-34b Evening Peak Hour Project-Generated Transit Trips by Line

	Employees/Retail		Residents		Total	
Transit	In	Out	In	Out	In	Out
Red Line	89	295	60	32	149	327
EZ-Ride	10	33	3	1	13	34
Route 64	10	33	3	1	13	34
Route 68	10	33	3	2	13	35
Route 85	10	33	3	2	13	35
CT2	10	34	4	2	14	36

The Project-generated transit trips by line or route are then added to the existing route volumes in order to calculate the morning and evening peak hour utilization for each service in the 2024 Build Condition.

MBTA Red Line Analysis

The proportion of Red Line transit trips, as described above, were assigned to inbound and outbound trains based on exiting ridership volumes. Tables below show the ridership and the utilization of the MBTA Red Line. All employees, retail patrons, and residents taking the subway are assumed to use the Red Line Kendall Square Station. This analysis assumed a baseline capacity within the peak hour of 13,026 persons per direction per hour. This capacity was calculated based on a Red Line car capacity of 167 passengers (policy capacity) and a standard 6-car train set as published in the MBTA Blue Book (14th edition) – Vehicle Load Standards, and the published Red Line schedule indicates a combined headway of 4.5 minutes, totaling 13 trains per peak hour. The standard capacity and existing ridership numbers of the Red Line are based on posted MBTA Red Line schedules and published average hourly weekday ridership data, respectively.

The Red Line's hourly ridership under the Future Condition with future projected ridership is shown in Figure 2.15. This analysis focuses on the Red Line segment between Charles MGH Station and Kendall/MIT Station since it carries the highest number of existing riders and Project-generated transit trips throughout the entire day. The Project-generated transit trips that travel though this section in the outbound and inbound directions were added to the future hourly ridership in order to calculate the total Future Condition hourly ridership.

Overall ridership will increase by approximately one percent with the addition of the Project-generated transit trips. During the morning peak hour, ridership is estimated to increase by one percent for inbound transit trips and two percent for outbound transit trips. Ridership during the evening peak hour is projected to increase by two percent for inbound transit trips and one percent for outbound transit trips. The capacity and existing ridership numbers are based on the posted MBTA Red Line schedule and published weekday hourly ridership numbers.

Table 2-35a below shows existing ridership and Volume to Capacity ratios during the peak hours (V/C) based on MBTA average weekday ridership from 2013 (the most recent data available). The estimated Project-generated transit trips were added to the existing ridership to evaluate the impacts associated with the Project.

Table 2-35a Existing Condition MBTA Subway Peak Hour Utilization (Standard Capacity)

		AM Peak Hour					PM Peak Hour				
Segment	Standard Capacity (hourly)[1]	Existing Ridership	Existing V/C	Project-Generated Transit Trips	Existing with Project Ridership	Existing with Project V/C	Existing Ridership	Existing V/C	Project-Generated Transit Trips	Existing with Project Ridership	Existing with Project V/C
Entering Kendall (inbound)	13,026	9,524	0.73	181	9,705	0.75	4,033	0.31	50	4,083	0.31
Exiting Kendall (Inbound)	13,026	8,514	0.65	111	8,625	0.66	5,469	0.42	125	5,594	0.43
Entering Kendall (outbound)	13,026	4,784	0.37	91	4,875	0.37	8,094	0.62	99	8,193	0.63
Exiting Kendall (outbound)	13,026	3,120	0.24	40	3,160	0.24	8,821	0.68	202	9,023	0.69

Source: MBTA Average Weekday Ridership 2013
V/C volume to capacity ratio
1 Assumes posted MBTA Red Line schedules.

In accordance with the NPC Certificate, the transit analysis was expanded to more closely resemble the MBTA Service Planning Department methodology. The MBTA publishes monthly Scorecards and as well an annual performance review which identifies an On-Time Performance (OTP) statistic that affects the headways and hourly capacity of the Red Line. The two sources define OTP differently with the MBTA Scorecard reporting an overall OTP of 95 percent and the 2014 Annual report reports an OTP of 86 percent. The expanded analysis uses the OTP of 86 percent to calculate the peak hour capacity of the Red Line. The OTP was first applied to the existing ridership data as shown in Table 2-35b below, where the capacity of the Red Line is approximately 11,202 passengers per hour.

Table 2-35b Existing Condition MBTA Subway Peak Hour Utilization (OTP Capacity)

		AM Peak Hour					PM Peak Hour				
Segment	OTP Capacity (hourly)[1]	Existing Ridership	Existing V/C	Project-Generated Transit Trips	Existing with Project Ridership	Existing with Project V/C	Existing Ridership	Existing V/C	Project-Generated Transit Trips	Existing with Project Ridership	Existing with Project V/C
Entering Kendall (inbound)	11,202	9,524	0.85	181	9,705	0.87	4,033	0.36	50	4083	0.36
Exiting Kendall (Inbound)	11,202	8,514	0.76	111	8,625	0.77	5,469	0.49	125	5594	0.50
Entering Kendall (outbound)	11,202	4,784	0.43	91	4,875	0.44	8,094	0.72	99	8193	0.73
Exiting Kendall (outbound)	11,202	3,120	0.28	40	3,160	0.28	8,821	0.79	202	9023	0.81

Source: MBTA Average Weekday Ridership 2013
1 On-Time Performance (OTP) Capacity – 13,026 x 0.86 = 11,202
V/C volume to capacity ratio

Under reduced capacity, based on the OTP, the existing ridership is able to be accommodated over the course of the peak hour, although the V/C ratios do increase.

With the addition of the Project-generated transit trips, the Red Line is able to operate under the reduced capacity.

Future Red Line capacity analysis was performed to understand the effects of the growing passenger demand under scheduled conditions and reduced capacity conditions based on OTP measures. The *Hub and Spoke Report* published in June 2012 forecasted a baseline, moderate, and high growth rates for MBTA ridership. The rates were 1.2, 1.5, and 2.9 percent respectively. It has been documented through the MBTA Blue Book reports that the Red Line ridership grows as a faster rate than the MBTA as a whole and, therefore, the highest growth rate of 2.9 percent was used to estimate future Red Line daily ridership. The existing 2013 average daily ridership was grown by 2.9 percent annually for 11 years to estimate the demand for the year 2024. Table 2-36a below shows the estimated future ridership and V/C ratios based on current OTP reduced capacity with and without the Project-generated transit trips.

Table 2-36a 2024 Future Condition MBTA Subway Peak Hour Utilization (OTP Capacity)

		AM Peak Hour					PM Peak Hour				
Segment	OTP Capacity[1] (hourly)	2024 Future Ridership[2]	2024 Future V/C	Project-Generated Transit Trips	2024 Future Ridership with Project	2024 Future V/C with Project	2024 Future Ridership	2024 Future V/C	Project-Generated Transit Trips	2024 Future Ridership with Project	2024 Future V/C with Project
Entering Kendall (inbound)	11,202	13,043	**1.16**	181	13,224	**1.18**	5,523	0.49	50	5,573	0.50
Exiting Kendall (Inbound)	11,202	11,660	**1.04**	111	11,771	**1.05**	7,490	0.67	125	7,615	0.68
Entering Kendall (outbound)	11,202	6,552	0.58	91	6,643	0.59	8,094	0.72	99	8,193	0.73
Exiting Kendall outbound)	11,202	4,273	0.38	40	4,313	0.39	12,081	**1.08**	202	12,283	**1.10**

V/C volume to capacity ratio
Bold indicates at or over capacity
1 OTP Capacity – 13,026 x 0.86 = 11,202
2 Existing Ridership increased by 2.9 percent per year for 11 years to 2024 Future Ridership. This increase is based Hub and Spoke report from June 2012.

Table 2-36a above shows that based on the current OTP measure and estimated future ridership, the morning peak inbound (entering and exiting) and evening peak outbound (exiting) Red Line segments are anticipated to function over policy capacity with or without the Project (in bold). If Red Line OTP was improved to resemble the published schedule, capacity would increase and the anticipated future ridership could be accommodated for these segments/times. Table 2-36b below demonstrates this need to improve Red Line reliability and OTP in the future.

Table 2-36b 2024 Future Condition MBTA Subway Peak Hour Utilization (Standard Capacity)

		AM Peak Hour					PM Peak Hour				
Segment	Standard Capacity[1] (hourly)	2024 Future Ridership[2]	2024 Future V/C	Project-Generated Transit Trips	2024 Future Ridership with Project	2024 Future V/C with Project	2024 Future Ridership	2024 Future V/C	Project-Generated Transit Trips	2024 Future Ridership with Project	2024 Future V/C with Project
Entering Kendall (inbound)	13,026	13,043	**1.00**	181	13,224	**1.02**	5,523	0.42	50	5,573	0.43
Exiting Kendall (Inbound)	13,026	11,660	0.90	111	11,771	0.90	7,490	0.58	125	7,615	0.58
Entering Kendall (outbound)	13,026	6,552	0.50	91	6,643	0.51	8,094	0.85	99	8,193	0.86
Exiting Kendall (outbound)	13,026	4,273	0.33	40	4,313	0.33	12,081	0.93	202	12,283	0.94

V/C volume to capacity ratio
Bold indicates at or over capacity
1 Assumes posted MBTA Red Line schedules.
2 Existing Ridership increased by 2.9% per year for 11 years to 2024 Future Ridership. This increase is based Hub and Spoke report from June 2012.

Table 2-36b above shows that future ridership with and without the Project, can be supported by the Red Line if OTP was improved to the published schedule with the exception for the inbound route entering Kendall Square station during the morning peak hour (in bold). With the Project, this segment would continue to operate over capacity where the increase is slight (1.00 to 1.02) due to an additional approximately 181 riders (Table 2-36b). This represents a *de minimus* impact to public transit capacity as a result of the Project.

The expanded transit analysis indicates that there is a great need for Red Line improvements if OTP stays the same and future ridership increases, creating demand higher than the available capacity (Table 2-36a). If improvements were implemented and trains ran according to the posted schedule of 4.5 minute headways, providing a peak hour capacity of 13,026 riders, there would be enough capacity to support the future demand, with the morning peak hour inbound route (entering the Kendall Square/MIT station) demand at capacity without the Project and slightly over capacity with the Project.

It is important to note that this analysis does not take into account the "peak of the peak" condition in which passengers experience crowded and uncomfortable riding conditions. The analysis demonstrates the need for the MBTA Red Line to run as scheduled. Oftentimes capacity is reduced due to train and signal breakdowns caused by outdated infrastructure, which leads to overcrowding and unpleasant riding conditions. Upgrades to the transit infrastructure would help the Red Line maintain the planned schedule, reduce overcrowding, and improve reliability.

Kendall/MIT Station Capacity Analysis

In addition to the tables above, Figure 2.16 shows the daily activity at the Kendall/MIT Station Platforms. Existing ridership volumes from the MBTA Average Weekday Ridership 2013 were used. The daily Project-generated transit trips for employee/retail and residential were broken up into directional (Inbound and Outbound) boardings and alightings using the distribution of existing transit trips throughout the day. These transit trips were added to the existing hourly volumes on the platform in order to show the estimated number of future riders under the 2024 Future Condition. Figure 2.16 shows that the Project will increase activity at the station by 14 percent inbound and six percent outbound during the morning peak hour and eight percent inbound and 15 percent outbound during the evening peak hour. Overall the Kendall/MIT Station platform activity will increase by approximately nine percent.

A platform capacity analysis was conducted to understand platform conditions under existing and future passenger demands. Platform capacity can be derived from the determination of platform LOS. LOS can be calculated based on the methodology in the Transit Capacity and Quality of Service Manual, 3rd Edition, published by the Transportation Research Board (TRB) in 2013. The manual defines platform LOS as a function of passenger queuing area and passenger walking area. The LOS criteria is presented in Table 2-37 below.

Table 2-37 Platform Level-of-Service Criteria

LOS	Average Queuing Pedestrian Area (square feet/person)	Average Walking Pedestrian Area (feet)
A	≥ 13	≥ 35.0
B	10-13	25-35
C	7-10	15-25
D	3-7	10-15
E	2-3	5-10
F	<2	<5

Source: Transit Capacity and Quality of Service Manual, 3rd Edition

The Manual states: "The typical design LOS for bus stops and station platforms is LOS C or D or better." Generally a new station is designed for LOS C while an existing station in an urban environment, like Kendall Station, is considered acceptable if it operates at an LOS D. To determine the current Kendall Square platform LOS the usable platform area was estimated from station plans and field observations. Within this usable area, benches, trashcans, other stationary objects, and the edge of platform buffer zone were taken into consideration and eliminated as usable queuing and walking area. There was also consideration taken for the queueing of passengers existing the station.

For this analysis the most recent MBTA data available was used to find passenger demand on the platform over the peak hours. As with the transit analysis the most recent MBTA Red Line counts available are from 2013 summarizing boarding,

alightings, and total passengers by hour. For the future analysis these volumes were grown to estimate the increase in ridership to the 2024 future conditions, based on a 2.9 percent annual growth rate, as previously discussed.

Four different demand conditions were analyzed for the inbound and outbound platforms during the morning and evening peak hours. These conditions are based on different factors related to performance measures and peak-of-the-peak transit demand described below.

- **Hourly Policy Operations** – This calculation spreads the hourly volume evenly over all arriving trains. The number of trains was determined based on MBTA policy operations of 4.5-minute headways, for approximately 13 trains per hour.
- **Hourly OTP Operations** – This calculation spreads the hourly volume evenly over all arriving trains. The number of trains took the policy operations, approximately 13 trains per hour, and applied MassDOT's Annual Performance Report 2014 Scorecard OTP of 86 percent. This reduced the number of trains to approximately 11 per hour.
- **Peak Policy Operations** – This calculation analyzes the peak-of-the-peak 15-minute demand at Kendall Square under MBTA policy operations of approximately 3 trains per 15 minutes. The peak demand was determined by dividing the hourly volume by four and increasing that 15-minute volume by 60 percent.
- **Peak OTP Operations** – This calculation analyzed the peak-of-the-peak 15-minute demand based on the OTP train reduction, for approximately 2.5 trains per 15 minutes. This condition is the worst case.

The MBTA Kendall Square station was analyzed using LOS D criteria because the MBTA considers it an acceptable operating standard for existing stations in a dense urban environment. The station was able to meet the space requirements for LOS D under existing and future conditions for all demand conditions. Refer to Appendix C for detailed calculations.

The station was then analyzed to see if it could meet the space requirements to provide a LOS C. The results indicated that while all existing conditions should provide an LOS C, some of the peak-of-the-peak conditions could not provide a LOS C for both queuing and walking passengers. Table 3-38 below provides an example of the comparison of the space requirements for the worst case scenario (Peak OTP Operations) for future passenger demand with and without the Project under LOS C and LOS D conditions. All analyzed condition comparison tables can be found in Appendix C along with the ridership demand calculations.

It is important to note that these results are based on even passenger spacing throughout the platform and actual passenger experience may differ as certain segments of the platform could be more heavily congested than others. It is also important to note that a peak 15-minute passenger platform demand percentage had

to be assumed as no peak-of-the-peak MBTA data is available and this demand could vary from day to day causing different platform capacity demands.

Since the NPC filing, a transit study of Kendall Station has been conducted and published as part of the MIT Kendall Square Transportation Impact Study (TIS) submitted to the City. The study uses published MBTA passenger data as well as two full-day observations conducted on May 12, 2015 for the outbound platform and May 13, 2015 for the inbound platform. General observations of platform crowding as documented in the TIS appendix show platform crowding levels as "comfortable circulation, with some people on the platform, moving freely"[2] during most of the observation hours.

Table 2-38 MBTA Kendall Square/MIT Station Platform Loading Capacity Summary for Peak OTP Operations (Worst Case)

	Maximum Future Demand (passengers)		Maximum Area Per Person Required (ft^2/pass)		Minimum Platform Area Required without Project		Minimum Platform Area Required with Project	
Platform Area Use	**Without Project**	**With Project**	**LOS C**	**LOS D**	**LOS C**	**LOS D**	**LOS C**	**LOS D**
Inbound Platform – AM Peak Hour								
Queuing Space	100	117	7	3	700	300	819	351
Walking Space	315	343	15	10	4725	3150	5145	3430
Total	415	460			5425	3450	5964	3781
Can LOS Space Requirements Be Met? Inbound Platform Usable Area = 3,950 ft^2					**NO**	YES	**NO**	YES
Inbound Platform – PM Peak Hour								
Queuing Space	354	373	7	3	2478	1062	2611	1119
Walking Space	49	56	15	10	735	490	840	560
Total	403	429			3213	1552	3451	1679
Can LOS Space Requirements Be Met? Inbound Platform Usable Area = 3,950 ft^2					YES	YES	YES	YES
Outbound Platform – AM Peak Hour								
Queuing Space	27	34	7	3	189	81	238	102
Walking Space	381	395	15	10	5715	3810	5925	3950
Total	408	429			5904	3891	6163	4052
Can LOS Space Requirements Be Met? Outbound Platform Usable Area = 4,175 ft^2					**NO**	YES	**NO**	YES
Outbound Platform – PM Peak Hour								
Queuing Space	278	309	7	3	1946	834	2163	927
Walking Space	123	139	15	10	1845	1230	2085	1390
Total	401	448			3791	2064	4248	2317
Can LOS Space Requirements Be Met? Outbound Platform Usable Area = 4,175 ft^2					YES	YES	YES	YES

Bold indicates that current usable platform area could not accommodate future passengers.

[2] MIT Kendall Square TIS Appendix, July 17, 2015

MBTA Planned Improvements to Red Line Service

The Red Line analysis conducted above shows the importance for Red Line reliability and schedule maintenance. With the Red Line operating at the current OTP of 86 percent combined with estimated future loads, three out of the eight analyzed conditions are over capacity. If OTP was improved to even 95 percent for only one condition, Inbound Entering Kendall AM Peak, it would operate overcapacity.

There are many projects being undertaken by MassDOT and the MBTA to improve Red Line reliability, resulting in improved capacity. MassDOT has ordered new Red Line replacement cars (at least 74 new cars) to replace the existing Red Line 1 fleet. The new cars are expected to be online in 2019, which should help reduce delays due to broken down trains and improve OTP. MassDOT will replace the Red Line tracks and third rail over the Longfellow Bridge in Cambridge as part of the Longfellow Bridge Rehabilitation and Restoration Project, thus, further upgrading Red Line infrastructure within close proximity of the Kendall Square Station.

MassDOT will be developing a new project prioritization process for next year's capital program process with improving transit reliability a high priority. The MBTA has identified projects which will improve Red Line reliability. One project underway, is the Red Line Floating Slab project. The Red Line track from Harvard to Alewife sits on concrete slabs floating on rubber disks that absorb noise and vibration from trains. Years of water infiltration into the tunnel has resulted in corrosion and cracking that must be addressed in order to maintain safe and reliable Red Line service. In addition to correcting problems with the floating slab structure, the project will involve the replacement of track and third rail, as well as repairs to leaks in the tunnel to prevent further deterioration to improve reliability of service.

Under the recently approved Winter Resiliency program, the MBTA will be installing new third rail, third rail heaters and switch heaters. In order to increase vehicle reliability, the MBTA will have sufficient inventory on hand to replace failed traction motors.

Up-grading of the electrical/signal system on the Red Line has been identified as an important system upgrade to maintaining a safe and reliable Red Line service. Signal improvements would help enable the MBTA maintain their scheduled headways and could enable the MBTA to reduce headways resulting in increased Red Line capacity. Up-grading of the electrical/signal system is not currently in the MBTA's one-year capital improvement program, but is expected to be considered in the MBTA's medium and long-term capital improvement programs. An important project for improvement in Red line service, which is underway is the planned addition of 74 new replacement train cars, equivalent to about one-third of the fleet. The Red line cars are expected to come on line in 2019. While this addition will not introduce new capacity per se, the new cars are expected to reduce the unreliability of the existing fleet cars and help maintain the current level of service capacity.

MassDOT, in conjunction with the Task Force, has begun a mobility study of Kendall Square, which will be multi-modal, and will identify short-, medium- and long-term projects and policies that are technically and financially achievable. Red line service to Kendall Square will be one component of the overall mobility options expected to be evaluated in the study. Both the Proponent and Redeveloper are active members of the Task Force convened by MassDOT and its work.

MBTA Bus and EZRide Shuttle Route Analysis

The proportion of bus and shuttle riders, as described previously, were distributed between inbound and outbound routes based on existing ridership. Table 2-39 below shows the build ridership and volume-to-capacity ratio for the MBTA bus routes and EZRide Shuttle routes. For this analysis, a bus capacity of 60 passengers was used.

Table 2-39 2024 Build Condition MBTA Bus Route Peak Hour Utilization

				AM Peak					PM Peak				
Route and Direction	Frequency (buses per hour)	Capacity	Existing Ridership	Existing V/C	Project Transit Trips	Build Ridership	Build V/C	Existing Ridership	Existing V/C	Project Transit Trips	Build Ridership	Build V/C
64 Inbound	3	180	177	0.98	30	207	**1.15**	48	0.27	13	61	0.34
Outbound	3	180	56	0.31	13	69	0.38	90	0.50	34	124	0.69
68 Inbound	2	120	40	0.33	30	70	0.58	29	0.24	13	42	0.35
Outbound	2	120	21	0.18	13	34	0.28	29	0.24	35	64	0.53
85 Inbound	2	120	98	0.82	30	128	**1.07**	11	0.09	13	24	0.20
Outbound	2	120	4	0.03	13	17	0.14	56	0.47	35	91	0.76
CT2 Inbound	3	180	211	**1.17**	30	241	**1.34**	207	**1.15**	14	221	**1.23**
Outbound	3	180	166	0.92	15	181	**1.01**	156	0.87	36	192	**1.07**
EZRide Shuttle												
Inbound	6	360	225	0.63	29	254	0.71	161	0.45	13	174	0.48
Outbound	6	360	326	0.91	13	339	0.94	85	0.24	34	119	0.33

Source: MBTA Fall 2012 APC data, EZRide Shuttle Data September 2014
Bold indicates bus routes operating at or above full capacity.

Many of the bus routes within the KSURP area experience high v/c ratios and are operating at or around full capacity under existing conditions. These routes include 64 Inbound, 85 Inbound and CT2 Inbound and Outbound during the morning peak hour and routes CT2 Inbound and Outbound during the evening peak hour. Under 2024 Build Conditions, with the Project-generated transit trips added to the ridership, v/c ratios increase. The routes already experiencing close to capacity ridership will be operating over capacity with the addition of the Project-generated transit trips. These routes include 64 Inbound (AM), 85 Inbound (AM) and CT2 Outbound (AM and PM).

Future traffic congestion due to regional growth and planned developments within the area, including the Project will affect the operations of the four MBTA bus routes and the EZRide Shuttle within the Kendall Square area. All MBTA bus routes will be

affected by traffic congestion along Broadway, Ames Street and Main Street, within the study area, and the CT2 bus will be impacted by Massachusetts Avenue and Vassar Street congestion as well. Congestion along First Street, Binney Street, Broadway, Ames Street, Memorial Drive and Massachusetts Avenue will affect operations to the EZRide Shuttle.

In order to quantify the affects and delays to bus operations due to the addition of Project traffic, the total delay, based on LOS analysis, along each bus route was used. The delay difference between No-Build and Build Conditions at each approach a particular bus route travels through within the study area was totaled to determine the estimated overall delay to the bus route. Table 2-40 provides a summary of the affects Project traffic would potentially have on the bus routes within the study area.

Table 2-40 Impacts to Bus Operations in Total Route Delay (seconds) Due to Project Traffic

	AM Peak		PM Peak	
Bus Route	**Inbound**	**Outbound**	**Inbound**	**Outbound**
64	8.3	-2.2	8.8	12.7
68	8.3	-2.2	8.8	12.7
69	1.7	-0.1	10.7	0.2
85	8.3	-2.2	8.8	12.7
CT2	8.1	7.7	8.9	55.1
EZRide	59.8	17.1	281.8	45.5

The analysis estimates that the Project will affect the EZRide Shuttle the most, particularly during the AM Peak hour inbound route and both inbound and outbound routes during the PM Peak. The CT2 Outbound route during the PM Peak will also be affected. A majority of the bus routes will experience increased delays between 8 and 13 seconds. Although this is a slight increase in the total travel time of a bus route, improvements through mitigation could reduce these delays and improve bus travel times though the KSURP area.

There are routes during the AM Peak hour that will experiences negligible improvements to travel time (represented by the negative) due to the actuated signal at Broadway and Galileo Galilei Way northbound left movements being allocated more time due to an increase in volume.

It is important to note that other factors have an influence on bus operations including:

- The change in travel speed along each segment of roadway along the bus route;
- Dwell times at each bus stop based on the increase in the number of passengers loading and unloading; and
- The time it takes busses to re-enter the flow of traffic after stops.

These variables are important and could be analyzed under mitigation. Decreasing dwell times and re-entry times could negate the increases in delay due to the Project. Some mitigation measures that could be considered include bus bulbs, priority signals, or designated bus lanes. These mitigation studies and strategies to reduce bus delays will be discussed as part of the KSTEP of the draft MOU.

Future Bicycle Parking and Infrastructure

There are many current and planned project in the area focused on improving bicycle accommodations. These projects are listed and described below.

- **Ames Street Residences** is a residential project in the KSURP area located at 88 Ames Street next to the Cambridge Center East Garage. The project will reconstruct Ames Street to provide a two-way cycle track and a new sidewalk on the east side of the roadway. The Project will also provide an additional 296 long-term bicycle spaces within the East Garage and 38 short-term spaces distributed throughout the Project Component sites.
- **Alexandria Center at Kendall Square** is a mixed-use, multi-building development project with building fronting Binney Street from Third Street to First Street. The project is reconstructing Binney Street from Third Street to Land Boulevard, reconstructing the sidewalk and installing a one-way elevated cycle track on each side of the roadway. The cycle track will connect to a proposed cycle track along Binney Street to the west of Third Street. This latter section of the cycle track is being constructed by the City. The project has also installed a new crosswalk along the southern approach of the Binney Street and Land Boulevard intersection and implemented concurrent pedestrian crossings at the intersection.
- **Main Street Reconstruction** will redesign Main Street from Ames Street to Third Street. This project includes the realignment of Main Street to the Broadway/Third Street intersection as discussed in the Roadway Improvements Section under Future No-Build Conditions. New sidewalks and streetscape will be included in the reconstruction as well as updates to the mid-block crossing between the Kendall Square MBTA Red Line Stations. The mid-block crossing between the headhouses will become a large raised crosswalk for a safer pedestrian crossing and slower vehicular speeds through the area. The plans also propose to eliminate the median running the length of Main Street from Broadway to Ames Street. A new crosswalk with a pedestrian warning signal is proposed across Broadway/Main Street just west of the Longfellow Bridge. New bicycle parking racks will be installed along this stretch of Main Street, based on the contract drawings from May 2014, the will be approximately 99 new bicycle racks being install, which amounts to roughly 198 parking spaces.
- **Longfellow Bridge Rehabilitation and Restoration Project** will provide bike lanes along the entire length of the bridge and connect to the improved bicycle accommodations at Third Street and Broadway with a protected bike lane from the bridge to Third Street. The project will also install a HAWK signal between

Third Street and the bridge to provide safer crossing accommodations within the area.

- **Grand Junction Multi-Use Path** is a proposed multi-use connection for pedestrians and bicyclists that would run alongside the existing Grand Junction railroad tracks. The path would run from the Boston University Bridge along the western edge of the KSURP area and connect to the planned extension of the Somerville Community Path.
- **Charles River Basin and Paul Dudley White Pathway** is an eight-and-a-half mile pedestrian and bicycle park connecting Watertown to Boston. The current path near the project site provides an approximately six-foot paved sidewalk along the Charles River and a parallel unpaved dirt pathway. The improvement project will greatly enhance the existing pathway by providing a 10-foot, two-way, paved shared-use path and a 6-foot unpaved pathway.

With these planned improvements in the area, the total bicycle parking supply both long- and short-term spaces will increase and better accommodate current demand.

Project Bicycle Parking Supply

The Project is expected to generate 1,184 daily bicycle trips, 165 AM peak hour trips and 185 PM peak hour trips. In accordance with the City's Bicycle Parking Guidelines, the Project will provide a total of approximately 802 long-term bicycle parking spaces and 142 short-term bicycle spaces. Table 2-41 below breaks down each buildings bicycle parking minimum requirements.

Table 2-41 Bicycle Parking Minimum Requirements

			Long Term		Short Term	
Project Component	**Land Use**	**Building Unit[1]**	**Rate**	**Spaces**	**Rate**	**Spaces**
Cambridge Center North Garage Office Buildings	Office	590,000	0.30 per 1,000 sf	177	0.06 per 1,000 sf	35
Eleven Cambridge Center Residential Building	Residential	294	1.05 per dwelling	309	0.10 per dwelling	29
	Retail	25,000	0.10 per 1,000 sf	3	1.00 per 1,000 sf	25
Three Cambridge Center Mixed Use Building	Residential	266	1.05 per dwelling	279	0.10 per dwelling	27
	Office	106,200	0.30 per 1,000 sf	32	0.06 per 1,000 sf	6
	Retail	20,000	0.10 per 1,000 sf	2	1.00 per 1,000 sf	20
Total		**1,034,600 sf**		**802**		**142**

sf square feet
1 Office land use unit - building square footage; Residential land use unit – dwelling

The 802 new long-term bicycle parking spaces will be located at appropriate areas within/around the Project Components. The 142 new short-term parking spaces will be provided throughout the KSURP area, where needed.

Pedestrian Operations

A significant number of walking trips will be generated by the Project, including an estimated 1,544 daily trips, 169 AM peak hour trips and 195 PM peak hour trips. All study area roadways provide sidewalks which are in good condition. All study area intersections provide crosswalks along at least two perpendicular approaches for pedestrians to safely cross the intersection.

Pedestrian level-of-service (PLOS) analysis was conducted for Existing, No-Build and Build Conditions to understand the impacts of the pedestrian accommodations on the existing and future pedestrians in the area. The results of PLOS analysis at intersection crosswalks are presented in Tables 2-42 and 2-43 for signalized and unsignalized intersections, respectively during the morning and evening peak hours. Equations 18-5 and 18-21 from the Highway Capacity Manual 2000 having been used to determine the delays at signalized and unsignalized intersection in the study area.

Pedestrian level-of-service at signalized intersections is dictated by the portion of the signal cycle dedicated to pedestrian crossings. Accordingly, increasing pedestrian volumes does not alter pedestrian level of service at signalized intersections, and no changes in PLOS are projected between No-Build and Build Conditions, due to the Project.

It is important to note that there are changes in the PLOS from Existing to No-Build Conditions due to the O'Brien Highway Improvements Project is correlation with North Point and MBTA Lechmere Station relocation Projects, the Binney Street (Alexandria) Project and the Main Street Reconstruction Project updating signal timings and intersection geometry.

Table 2-42 Pedestrian LOS Analysis – Signalized Intersections

Intersection	Crosswalk	AM Peak Hour			PM Peak Hour		
		2014 Existing	2024 No-Build	2024 Build	2014 Existing	2024 No-Build	2024 Build
O'Brien Highway at Third Street	East	D	E	E	D	E	E
	West	D	E	E	D	E	E
	South	D	E	E	D	E	E
Cambridge Street at Third Street	East	B	B	B	B	B	B
	West	B	B	B	B	B	B
	North	B	B	B	B	B	B
	South	B	B	B	B	B	B
Cambridge Street at First Street	East	D	E	E	D	D	D
	West	D	E	E	D	D	D
	South	D	E	E	D	D	D
O'Brien Highway at Cambridge Street / East Street	East	D	E	E	D	D	D
	West	D	E	E	D	D	D
	North	D	E	E	D	D	D
	South	C	E	E	C	D	D
O'Brien Highway at Land Boulevard / Gilmore Bridge	West	E	E	E	E	E	E
	North	E	E	E	E	E	E
	South	E	E	E	E	E	E
Binney Street at Galileo Galilei Way / Fulkerson Street	East	C	C	C	C	C	C
	West	C	C	C	C	C	C
	North	B	B	B	B	B	B
	North West	C	C	C	C	C	C

Table 2-42 Pedestrian LOS Analysis – Signalized Intersections (Continued)

Intersection	Crosswalk	AM Peak Hour			PM Peak Hour		
		2014 Existing	2024 No-Build	2024 Build	2014 Existing	2024 No-Build	2024 Build
Binney Street at Third Street	East	D	D	D	D	D	D
	West	D	D	D	D	D	D
	North	C	D	D	C	D	D
	South	C	D	D	C	D	D
Binney Street at First Street	East	E	E	E	E	E	E
	West	E	E	E	E	E	E
	North	B	E	E	B	E	E
	South	A	E	E	A	E	E
Binney Street at Land Boulevard	West	E	E	E	E	E	E
	North	E	E	E	E	E	E
	South	E	E	E	E	E	E
Broadway at Galileo Galilei Way	East	D	D	D	D	D	D
	West	D	D	D	D	D	D
	North	D	D	D	D	D	D
	South	D	D	D	D	D	D
Broadway at Ames Street	East	D	D	D	D	D	D
	West	D	D	D	D	D	D
	South	C	C	C	C	C	C
Broadway at Third Street	East	D	D	D	D	D	D
	West	D	D	D	D	D	D
	North	C	C	C	C	C	C
	South	-	C	C	-	C	C
Main Street at Ames Street	East	B	D	D	C	D	D
	West	B	D	D	C	D	D
	North	C	D	D	B	D	D
	South	C	D	D	B	D	D
Main Street at Vassar Street	East	C	C	C	C	C	C
	West	C	C	C	C	C	C
	North	C	C	C	B	B	B
	South	C	C	C	B	B	B
Massachusetts Avenue at Vassar Street	East	C	C	C	C	C	C
	West	C	C	C	C	C	C
	North	D	D	D	D	D	D
	South	D	D	D	D	D	D
Massachusetts Avenue at Memorial Drive WB	East	D	D	D	D	D	D
	West	D	D	D	D	D	D
	North	D	D	D	D	D	D
Massachusetts Avenue at Memorial Drive EB	East	D	D	D	D	D	D
	West	D	D	D	D	D	D
	South	D	D	D	D	D	D
O'Brien Highway at First Street	East	-	E	E	-	E	E
	West	-	E	E	-	D	D
	North	-	E	E	-	D	D
	South	-	E	E	-	D	D

The determination of pedestrian level-of-service at unsignalized intersections differs from signalized intersections. In practice, under Massachusetts State Law, vehicles are required to stop for pedestrians in crosswalks, however, the unsignalized intersection pedestrian LOS summary analysis has been performed using HCM equation 18-21. The PLOS results provided in Table 2-43 assume that the pedestrian experiences delay due to waiting in the crosswalk and therefore provides a significantly more conservative analysis than what is actually experienced in the field.

Table 2-43 Pedestrian LOS Analysis – Unsignalized Intersections

		AM Peak Hour			PM Peak Hour		
Intersection	Crosswalk	2014 Existing	2024 No-Build	2024 Build	2014 Existing	2024 No-Build	2024 Build
Broadway at Main Street	South	A	A	A	B	B	B
Main Street at Longfellow Bridge	North Approach	B	B	B	A	A	A
	North Receiving	B	B	B	A	B	B
	South Approach	A	A	A	A	A	A
	South Receiving	B	B	B	B	B	B
Memorial Drive WB at Ames Street	East	F	F	F	F	F	F
	West	F	F	F	F	F	F
	North	D	E	E	D	D	D
Memorial Drive EB at Ames Street	East	F	F	F	F	F	F
	West	F	F	F	F	F	F

Loading and Service

Loading and service to a portion of the Project, including the proposed Whitehead Institute Addition, Broad Institute Office Conversion, and Three Cambridge Center Mixed Use Building will use existing facilities. The new Eleven Cambridge Center Residential Building loading docks will be located and designed similar to the existing loading docks at the current Eleven Cambridge Center. The proposed Cambridge Center North Garage Office Buildings will use existing infrastructure within the area to accommodate loading and service to the new office component. The loading and service details will be incorporate into the design of the buildings and a designated transportation coordinator will oversee all loading and service operations.

Proposed Transportation Mitigation and Other Beneficial Measures

As indicated in the above analyses, the Project will have limited impacts to the surrounding transportation infrastructure. The Proponent will work with all stakeholders, including MassDOT, MBTA and the City to understand these impacts and establish a plan for mitigation and improvements to various transportation

infrastructures. As discussed previously, MassDOT has recently established the Kendall Square Mobility Task Force to study the Kendall Square area, identify mobility issues for all modes of transportation, and provide recommendation for possible solutions. The Proponent is in full support of the Task Force and will use the outcomes of the study to help shape the mitigation plan for the Project. The following sections describe various aspect of the proposed mitigation to be discussed in further detail with all stakeholders.

Proposed Public Transit Improvements

The transit operations analysis previously presented was expanded both in accordance with the NPC Certificate and to address reviewer comments received on the NPC. The updated analysis demonstrates that the potential impacts on Red Line capacity as a result of the Project are *de minimus*. Assuming that the Red Line operates according to the published schedule, it can accommodate future ridership with and without the Project, with the exception of one service segment. Without the Project and accounting for estimated future ridership, the morning peak hour inbound train entering Kendall Square/MIT station would operate at over capacity (Table 2-36b). With the Project, there is a slight increase in passenger demand (two percent) due to an estimated additional 181 transit trips during this service segment (Table 2-36b). The proposed TDM measures, including encouraging employers to allow employee flex-time and/or provide employee shuttles, will help to manage peak period congestion. However, the MBTA system operational improvements that would be needed to address the Red Line capacity and frequency of service issues are larger and more complicated than any single development can reasonably impact.

In recognition of the critically important role transit access and mobility play to the successful redevelopment and expansion in the MXD District and the Kendall Square area, the Proponent and Redeveloper have been meeting to discuss a more comprehensive approach to address potential future public transit capacity issues through development of a fund to implement transit improvements in the Kendall Square area following the completion of certain public review processes described below.

Led by MassDOT, the Kendall Square Mobility Task Force (the "Task Force") has been charged with work over the next year to identify public transit improvement projects and policy initiatives in support of the continued success of Kendall Square. These projects and initiatives are intended to be technically and financially achievable over the short, medium, and long-term horizons. Both the Proponent and Redeveloper are active members of the Task Force, and the Proponent intends to use the outcomes of the Task Force's study and recommendations to shape the final transit mitigation plan and measures for the Project, working in close cooperation with MassDOT and the MBTA.

The City established a Transit Advisory Committee in May of 2013 to help identify, plan, and provide support to the public transportation problems within the City. The committee published the Cambridge Transit Strategic Plan to identify the current conditions of public transportation in the City and established seven unique goals to help improve the system and provide better services to the residents, businesses and visitors of the City. These goals, listed below, align with the Proponents vision for the KSURP area.

- Mobility
- Funding
- Efficiency and Reliability
- Expansion
- Usability, Accessibility, and Safety
- Public Participation, Support, and Outreach
- Resiliency

The Proponent is currently discussing these goals and future vision of public transportation in the KSURP area with stakeholders, including MassDOT, the MBTA, and the City.

Proposed Kendall Square Transit Enhancement Program (KSTEP)

The Proponent and the Redeveloper remain focused, as they have throughout the development of Cambridge Center, on preserving and enhancing the favorable transportation mode split in Kendall Square that has played such an important role in the successful redevelopment of the area. It is acknowledged and well documented that 70 percent of trip making in Kendall Square utilizes transit, walking, biking, shuttle and carpool. This remarkable factor is at the core of the opportunity for the Project. The importance of preserving and enhancing this condition cannot be overstated and is central to the Proponent's plans for expansion of the KSURP.

The Proponent and Redeveloper are committed to developing an expanded program of transportation enhancements designed to both preserve the favorable mode share balance in Kendall Square and provide additional improvements to support local efforts to further reduce the vehicle trips generated as a result of the Project and the broader Kendall Square area. The KSTEP will be developed in conjunction with the many stakeholders engaged in transportation planning and operations in Kendall Square, including the Task Force, the MBTA, and MassDOT. The KSTEP would supplement the proposed transportation-related mitigation and other beneficial measures described herein.

The Proponent and Redeveloper have engaged in multiple discussions with MassDOT and the MBTA to discuss the Project, its impacts, and potential transportation mitigation and enhancements in the Kendall Square area. A range of issues have been identified and potential improvement opportunities considered for

inclusion in the KSTEP program. The KSTEP would be designed to enhance access to and mobility around Kendall Square, which the Proponent believes is critical to the long-term economic success of the area. It is expected that the KSTEP will be focused on major transportation initiatives that will improve transit options and services in Kendall Square. They will include a range of projects, programs, and services directed at improving and enhancing transit and related options for people working, living, and visiting the Kendall Square area. The KSTEP would focus on enhancements to transit. Transit and transit-related improvements options to be considered would include both capital and operational investments that would result in service level improvements and capacity expansion in Kendall Square.

The Proponent recognizes that the development of the KSTEP will require detailed consideration and analysis of the enhancement alternatives as well as careful coordination with the stakeholders and service providers. As stated above, the Proponent believes that this analysis can be undertaken in conjunction with the Task Force. The analysis will be designed to coordinate with the City's Transit Strategic Plan, which is focused on improving transit capacity and quality throughout the City. The Proponent, in coordination with the City, will work with Mass DOT and the MBTA to develop the elements of the KSTEP, which can be refined supplemented over time as the Task Force completes it work.

The KSTEP would be supported by immediate and long-term funding commitments facilitated by the Proponent and Redeveloper in connection with the approvals for the Project. It is the expectation of the Proponent that consultations with the MBTA, MassDOT, and the City will continue to examine a range of potential transit improvements for Kendall Square to be included in the KSTEP and on the appropriate mechanism(s) for making commitments for these improvements and incorporating the program elements into the transportation planning processes at the City and state level. The Proponent recognizes the extensive demands and limited resources available to MassDOT and the MBTA for service improvements throughout the system.

The Proponent is committed to developing a MOU with MassDOT and the MBTA, together with the Redeveloper and the City, as a mechanism to identify and implement appropriate transit improvements consistent with the KSTEP. The MOU will be developed following completion of Task Force efforts, which are expected to identify appropriate transit improvements in the KSURP area. The Proponent, in coordination with the City and the other parties to the MOU, will establish and maintain the Kendall Square Enhanced Transit Fund (the "KSETF") for the purpose of establishing funding priorities and allocations for identified transit improvement projects.

The Proponent is committed to filing the draft MOU with MEPA for review by July 1, 2016 following the completion of the Task Force's work and the initial efforts to create the KSTEP. The KSTEP will be based upon the recommendations of Task Force, which is anticipated to be completed in February 2016. As a transit mitigation measure for the Project, an initial payment of the sum of not less than $6 million for transit improvements

recommended by the KSTEP will be contributed to the KSETF as a "fair share" contribution. This one-time payment would be made at the time a Building Permit is obtained for the first major phase of the Project. Additionally, through a mechanism(s) to be determined by the terms of the MOU, the KSETF will receive additional funding to be provided by the Redeveloper, which will represent an allocation of funding under the KSURP supplemented by contributions from others. The MOU process will ultimately lead to a plan, agreed upon by all involved parties, of mitigation measures the Proponent and Redeveloper will implement to improve the public transportation infrastructure and experience within the KSURP area.

Over the coming months, the key stakeholders will continue to work closely to develop and refine the KSTEP proposal, including additional details on the potential source of these funds and the range of transit mitigation projects and program options for consideration, including:

- **MBTA Red Line Kendall Station Improvements** - Immediate operating and capital improvements to the existing transit infrastructure at Kendall Station, including station capacity and egress, Kendall Square transit information, communications and way-finding, Red Line ticketing, climate change adaptation/resiliency, bus and bicycle connectivity, and overall station functionality and appearance.
- **Kendall Station / Kendall Square Connection Enhancements** - Capital support for improving existing or new ground transportation via non-MBTA shuttles and/or MBTA buses or Bus Rapid Transit (BRT) aimed at facilitating access to and from Kendall Square.
- **MBTA Red Line Service Modernization and Improvements** - Signal, track and other technology improvements designed to increase capacity and reliability especially at peak-of-the-peak including enhancing headways (time between service) and other improvements that will positively impact the quality of transit service and the customer experience.
- **Long-Range Feasibility Investigations** – Planning for and potential capital investment toward new public transit services.

Proposed MBTA Bus and EZRide Shuttle Improvements

The Proponent understands the importance of the bus system within the Kendall Square area, both the MBTA routes and the EZRide Shuttle. As indicated in the analysis, bus operations will be affected by Project-generated traffic, particularly the EZRide Shuttle. The Proponent will work with the MBTA, City, and Charles River TMA to evaluate potential bus operations improvements in the KSURP area, including:

- Studying and partially funding the increase in EZRide service. The Proponent will work with the Charles River TMA to devise a plan as to how EZRide can best

serve the community in the future and provide support to the expansion of EZRide service including, but not limited to:

- Decreasing headways
- Increasing bus fleet
- Optimizing bus routes

- Implement the proposed local roadway intersection signal improvements, discussed and analyzed (refer to the 'Proposed Vehicular Access and Circulation Improvements' section below), which will decrease delay at specific intersections that MBTA buses pass through. The bus routes anticipated to experience reductions in delay include Routes 64, 68, 85 and EZRide at the intersections of Broadway at Galileo Galilei Way and Main Street at Galileo Galilei Way/Vassar Street, respectively.
- The Proponent will discuss with the City, MBTA and MassDOT as part of the MOU process, the study and possible implementation of the following bus mitigation measures along the bus routes serving the area:
  - Bus Priority Signals
  - Bus Lanes
  - Bus Shelter Improvements
- Implementing the extension of bus routes from Central Square to Kendall Square.

The August 25, 2014 draft report, Central Square Access and Circulation Study Existing conditions Analysis (Task 1) presents a story that there is a potential need for a bus connection between Central Square and Kendall Square. Many passengers riding buses that terminate at Central Square use the Red Line to make their last connection to Kendall Square. With the extension of MBTA bus route(s) to Kendall Square demand could be shifted away from the Red Line and a vital second connection would be made between Central Square and Kendall Square. This study is still ongoing as there are three more tasks to be completed with the anticipation that the study will result is recommendations directed at the topic of extending MBTA bus routes to Kendall Square. The Proponent is eager to learn of these recommendations and is committed to helping implement any recommendations directed at this topic. Due to the timeframe of this study and the proposed Project schedule, the Proponent will revisit this topic when the final recommendations are published and will work with the City and other stakeholders as to how these recommendations can be implemented.

Proposed Vehicular Access and Circulation Improvements

The LOS analysis performed at the study area intersections indicate that there are intersections where improvements could be made to reduce vehicle delay and enhance the overall intersection operations. These intersections have been studied from a vehicular operations standpoint and possible improvements have been

suggested below. These suggested improvements will be discussed in detail with all stakeholders in the broader context of other proposed improvements. The final design and implementation of any vehicular access and circulation improvements associated with the Project will be agreed upon by all involved parties.

The Proponent understands that other users including pedestrian and bicyclist use these intersections and any improvements made need to consider the safety of all users. Therefore, additional studies may need to be done to ensure improvements at study area intersections have considered all user groups and maintained or improved safety and operations for all. The intersections studied for the purposes of this mitigation analysis are summarized below and discussed in further detail in the following sections.

- **Cambridge Street/Third Street** – PM signal optimization;
- **Broadway/Galileo Galilei Way** – Signal optimization with permitted left turns;
- **Main Street/Vassar Street/Galileo Galilei Way** – Protected east/west left turn phase and signal optimization;
- **Memorial Drive/Route 3/Ames Street** – Additional right-turn only lane on Ames Street; and
- **Massachusetts Avenue/Memorial Drive Off-Ramps** – Signal optimization with right-turn on red.

The proposed mitigation at each of the intersections is documented and a 2024 Build Mitigated Level of Service analysis was performed to quantify the improved traffic operations at these intersections. The proposed vehicular improvements to particular intersection timings and phasing will maintain current cycle times as to not greatly impact pedestrian wait times at these intersections. All intersections with proposed mitigation will continue to provide adequate walk time for pedestrians of all abilities to safely cross the intersection. The Proponent will work with the City to determine the specific vehicular access and circulation improvements to be made within the study area. The goal of any intersection improvements will be to provide a balanced design and insure signal timings are equitable for all uses or modes of travel.

Cambridge Street/Third Street

Cambridge Street/Third Street operates at a LOS C during the morning peak hour and LOS D during evening peak hour under 2014 Existing Conditions. The increased traffic from 10 years of background growth and traffic due to planned development projects in the area degrade intersection operations to LOS F during both peak hours under 2024 No-Build Conditions. The intersection continues to operate at LOS F during both peak hours under 2024 Build Conditions, when the proposed Project traffic is added to the network. Due to the large increase in traffic entering this intersection in future conditions, signal timings should be adjusted to better accommodate these new volumes and travel patterns. Signal timing adjustments for

the evening peak hour presented significant delay improvements, while morning peak hour signal adjustment showed no improvement and therefore only evening timing optimization should be implemented. The results of the evening signal optimization is shown in Table 2-44 below.

Table 2-44 Cambridge Street/Third Street Mitigation Level of Service

Peak Hour	Lane Group	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition			2024 Build Mitigate Condition		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
PM	Cambridge Street EB thru	1.02	79.8	E	1.72	367.4	F	1.72	365.2	F	1.26	161.5	F
	Cambridge Street WB thru	1.04	96.5	F	1.55	287.1	F	1.58	301.2	F	1.30	175.3	F
	Third Street NB thru	0.80	7.7	A	1.04	33.2	C	1.11	60.1	E	1.30	151.5	F
	Third Street SB left	0.13	2.0	A	0.18	15.7	B	0.19	16.0	B	0.27	22.0	C
	Third Street SB thru	0.52	5.2	A	0.51	19.4	B	0.53	19.9	B	0.63	26.5	C
	Overall	**0.90**	**44.8**	**D**	**1.32**	**186.0**	**F**	**1.36**	**193.9**	**F**	**1.30**	**138.5**	**F**

Signal optimization for the evening peak hour reduces the overall intersection delay by approximately 50 seconds. The timing adjustments made were to better accommodate the Cambridge Street eastbound and westbound approaches, which reduced those respective approach delays. In better accommodating the Cambridge Street movements, the Third Street delays increase modestly. Although there is a significant increase in the Third Street northbound approach, the delay at the intersection is more evenly distributed creating a better overall intersection operation. Although the intersection still operates at an LOS F under the evening peak hour conditions the overall delay is reduced by almost 50 seconds.

Broadway/Galileo Galilei Way

Broadway/Galileo Galilei Way operates at a LOS F under current conditions and all future conditions studied during both the morning and evening peak hours. This is due to high volumes, particularly turning volumes, on Broadway and Galileo Galilei Way. Mitigation measures should be considered to reduce the overall delays experienced at this intersection. Restriping Galileo Galilei Way southbound to provide a through/right lane instead of an exclusive right lane allows for better flow through the intersection and does not greatly impact southbound right turns as there is no right on red designation at the intersection. In addition to the left turn protected phases, left turns should be permitted during through movements, allowing increased left turns to be made during gaps in opposing traffic. The morning and evening signal timings should be optimized to better accommodate the increase in traffic at the intersection. Table 2-45 below shows the operational improvements these mitigation measures have at the intersection.

Table 2-45 Broadway/Galileo Galilei Way Mitigation Level of Service

Peak Hour	Lane Group	2014 Existing Condition v/c	2014 Existing Condition Delay	2014 Existing Condition LOS	2024 No-Build Condition v/c	2024 No-Build Condition Delay	2024 No-Build Condition LOS	2024 Build Condition v/c	2024 Build Condition Delay	2024 Build Condition LOS	2024 Build Mitigate Condition v/c	2024 Build Mitigate Condition Delay	2024 Build Mitigate Condition LOS
	Broadway EB left	0.84	41.6	D	1.27	164.6	F	1.38	211.2	F	0.83	24.1	C
	Broadway EB thru	1.16	114.2	F	1.25	153.2	F	1.27	160.8	F	1.18	114.3	F
	Broadway EB right	0.43	34.2	C	0.42	32.6	C	0.42	32.7	C	0.38	26.9	C
	Broadway WB left	1.33	234.9	F	1.42	247.7	F	1.75	387.6	F	0.72	34.1	C
	Broadway WB thru	0.94	69.5	E	0.98	67.6	E	1.01	70.1	E	0.84	33.5	C
AM	Galileo Galilei Way NB left	0.87	90.8	F	0.91	83.6	F	0.92	81.4	F	0.54	25.1	C
	Galileo Galilei Way NB thru	0.45	27.3	C	0.72	33.5	C	0.78	34.5	C	0.77	32.2	C
	Galileo Galilei Way SB left	0.86	46.6	D	0.93	52.1	D	0.95	44.2	D	0.46	25.5	C
	Galileo Galilei Way SB thru	0.92	47.6	D	1.49	270.0	F	1.49	247.0	F	1.34	196.2	F
	Galileo Galilei Way SB right	1.72	353.6	F	2.14	543.9	F	2.14	563.4	F	--	--	--
	Overall	**1.30**	**104.6**	**F**	**1.68**	**185.1**	**F**	**1.69**	**191.4**	**F**	**1.15**	**95.0**	**F**
	Broadway EB left	1.44	237.2	F	2.28	616.2	F	2.37	657.6	F	1.45	243.1	F
	Broadway EB thru	1.17	105.7	F	1.25	141.8	F	1.26	146.9	F	1.13	113.3	F
	Broadway EB right	0.43	24.4	C	0.46	25.0	C	0.46	25.1	C	0.41	29.6	C
	Broadway WB left	0.98	64.4	E	1.58	292.1	F	2.60	750.5	F	1.39	227.6	F
	Broadway WB thru	0.88	47.9	D	1.07	71.9	E	1.12	94.3	F	1.03	73.2	E
PM	Galileo Galilei Way NB left	1.15	158.7	F	1.26	178.4	F	1.31	190.9	F	1.00	81.6	F
	Galileo Galilei Way NB thru	0.76	28.4	C	0.91	30.1	C	0.95	29.6	C	0.83	35.6	D
	Galileo Galilei Way SB left	0.78	76.3	E	0.80	62.3	E	0.80	51.3	D	0.43	21.2	C
	Galileo Galilei Way SB thru	0.79	26.8	C	1.13	76.4	E	1.13	118.7	F	1.13	105.9	F
	Galileo Galilei Way SB right	1.40	247.8	F	3.29	1068.5	F	3.29	1075.2	F	--	--	--
	Overall	**1.23**	**96.2**	**F**	**1.69**	**239.5**	**F**	**1.70**	**287.7**	**F**	**1.27**	**106.2**	**F**

Although the intersection continues to operate at s LOS F under both peak hours in the future, significant decreases in overall delay can be achieved when the mitigation measures are implemented. All left turning movements improve when permitted left turns are allowed and signal timings are adjusted. The southbound approach also greatly improves under mitigated conditions.

Main Street/Galileo Galilei Way/Vassar Street

Main Street/Galileo Galilei Way/Vassar Street operates at LOS C under 2014 Existing Conditions but decreases to LOS E during 2024 No-Build Conditions and LOS F during 2024 Build Conditions. This is due to the high volumes, particularly the left turn volume on Main Street to Galileo Galilei Way and the thru volume on Vassar Street to Galileo Galilei Way. Phasing and signal timing adjustments can be made to reduce the delay in future conditions. A protected left turn phase has been implemented for the Main Street east and westbound movements. During the new protected left phase, Galileo Galilei Way right turn movement will also receive a protected right turn. The new phasing will require retiming of the signal, but still

operate with a 90 second cycle length. The mitigation results are shown in Table 2-46 below.

Table 2-46 Main Street/Galileo Galilei Way/Vassar Street Mitigation Level of Service

Peak Hour	Lane Group	2014 Existing Condition v/c	Delay	LOS	2024 No-Build Condition v/c	Delay	LOS	2024 Build Condition v/c	Delay	LOS	2024 Build Mitigate Condition v/c	Delay	LOS
AM	Main Street EB left	0.39	20.8	C	0.83	43.9	D	0.99	72.9	E	0.75	28.5	C
	Main Street EB thru	0.42	19.8	B	0.49	21.2	C	0.50	21.3	C	0.57	25.8	C
	Main Street WB left	0.27	27.4	C	0.32	25.1	C	0.34	25.2	C	0.32	29.6	C
	Main Street WB thru	0.34	35.8	D	0.40	26.1	C	0.41	26.0	C	0.56	37.3	D
	Vassar Street NB thru	0.50	22.9	C	0.66	26.9	C	0.69	27.9	C	0.89	45.9	D
	Galileo Galilei Way SB left	0.13	21.7	C	0.16	20.8	C	0.16	21.3	C	0.20	31.0	C
	Galileo Galilei Way SB thru	0.58	23.2	C	0.74	24.1	C	0.17	25.3	C	0.90	35.7	D
	Galileo Galilei Way SB right	0.76	27.3	C	1.14	92.1	F	1.18	110.4	F	0.97	28.5	C
	Overall	**0.58**	**23.9**	**C**	**0.98**	**40.0**	**D**	**1.08**	**47.8**	**D**	**0.91**	**34.3**	**C**
PM	Main Street EB left	0.61	24.6	C	0.98	64.8	E	1.05	84.2	F	1.02	74.3	E
	Main Street EB thru	0.41	17.7	B	0.48	18.8	B	0.48	18.9	B	0.73	36.3	D
	Main Street WB left	0.22	18.8	B	0.27	26.3	C	0.27	26.1	C	0.35	36.5	D
	Main Street WB thru	0.24	18.2	B	0.28	25.8	C	0.28	25.5	C	0.54	42.6	D
	Vassar Street NB thru	0.80	34.4	C	1.09	89.0	F	1.19	127.7	F	0.96	48.6	D
	Galileo Galilei Way SB left	0.21	30.4	C	0.28	31.5	C	0.30	30.6	C	0.23	20.5	C
	Galileo Galilei Way SB thru	0.55	36.5	D	0.77	39.0	D	0.86	40.0	D	0.74	29.7	C
	Galileo Galilei Way SB right	0.70	44.0	D	1.01	58.3	E	1.19	130.7	F	0.79	28.5	C
	Overall	**0.69**	**30.4**	**C**	**1.03**	**56.0**	**E**	**1.11**	**80.9**	**F**	**1.03**	**43.3**	**D**

New phasing and signal timing adjustments will improve the overall operations at the Main Street and Galileo Galilei Way/Vassar Street intersection. The new phasing provides a protected left turn for Main Street east and west movements as well as a protected right turn from Galileo Galilei Way southbound. These movements were operating at LOS E and F's under Build Conditions and after mitigation operate at LOS E, D, and C's. Overall during the morning peak hour the intersection improves from a LOS D under Build Conditions to LOS C under Build Mitigate Conditions. For the evening peak hour, the intersection drastically improves from a LOS F under Build Conditions to LOS D under Build Mitigate Conditions, almost cutting the delay time in half.

Memorial Drive/Route 3/Ames Street

Memorial Drive/Route 3/Ames Street, under 2014 Existing Conditions operates at a LOS E during the morning peak hour and LOS F during the evening peak hour. The high volumes on Memorial Drive cause delays for the Ames Street southbound traffic to enter the intersection causing delays. Under 2024 No-Build Conditions, volumes along Memorial Drive increase as well as volumes at the Ames Street southbound

approach and cause delays to increase and the morning peak hour to operate at an LOS F. The evening peak hours also experiences increases in delay due to increase traffic and continues to operate at LOS F. Under 2024 Build Conditions the intersection continues to operate at LOS F for both the morning and evening peak hours. To reduce delays at this intersection, the Ames Street southbound approach should be widen to accommodate two lanes of traffic, an exclusive right lane and a through lane. This would allow for vehicles trying to travel through the intersection, across two lanes of traffic, to be separated from the right turning vehicles. In order to provide two lanes of traffic at the approach some metered parking would have to be eliminated on the west side of Ames Street. The results of this improvement are shown in Table 2-47.

Table 2-47 Memorial Drive/Route 3/Ames Street Mitigation Level of Service

Peak Hour	Lane Group	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition			2024 Build Mitigated Condition		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
AM	Ames Street SB thru	0.60	38.2	E	0.83	75.4	F	0.84	77.2	F	0.67	49.1	E
PM	Ames Street SB thru	1.31	193.6	F	1.81	410.5	F	1.80	408.9	F	1.35	197.1	F

With the addition of a second lane at the Ames Street southbound approach the morning peak hour improves from LOS F to LOS E. The evening peak hour continues to operate at LOS F, but there is an approximately 200 second reduction in delay at the approach. The addition of the second approach lane allows right turning vehicles to avoid waiting for vehicles wanting to travel across Memorial Drive. The through movement causes much of the delay at this approach, as a vehicle has to cross two lanes of traffic on a roadway were speeds can reach 40 to 50 miles per hour.

Another option, not explored in this analysis, but highly effective, would be to eliminate the southbound through movement and have Ames Street be a right turn only onto Memorial Drive westbound.

This suggested mitigation strategy focusses on the vehicular operation at the intersection. Other important factors such as pedestrian safety and bicycle accommodations should be considered. The Proponent understands the need to improve this intersection for all users and will actively participate in current and future discussions about improvements to the intersection. It is important to the proponent that all users are safely accommodated at the Memorial Drive/Route 3 and Ames Street intersection.

Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps and Massachusetts Avenue/Memorial Drive Eastbound On/Off-Ramps

Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps operates at a LOS F during both peak hours under 2014 Existing, 2024 No-Build and 2024 Build Conditions. This intersection operates as a clustered intersection with Massachusetts

Avenue/Memorial Drive Eastbound On/Off-Ramps less than 100 feet to the north. In optimizing the signal timings at these intersections and allow the Memorial Drive off-ramps to make right-turns-on-red will drastically reduce delays and increase operations at these intersections. The results of the signal optimization are shown in Tables 2-48 and 2-49 below.

Table 2-48 Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps Mitigation Level of Service

Peak Hour	Lane Group	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition			2024 Build Mitigated Condition		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
AM	Memorial Drive WB thru	0.73	56.2	E	0.90	82.8	F	0.41	30.8	C	0.13	43.7	D
	Massachusetts Avenue NB left	0.41	2.1	A	0.48	5.6	A	0.53	8.7	A	0.28	1.2	A
	Massachusetts Avenue NB thru	0.53	1.5	A	0.66	1.8	A	0.70	2.1	A	0.51	0.9	A
	Massachusetts Avenue SB thru	0.60	27.1	C	0.68	26.1	C	0.74	28.3	C	0.60	17.1	B
	OVERALL	**0.49**	**15.6**	**B**	**0.59**	**17.1**	**B**	**0.59**	**14.3**	**B**	**0.50**	**10.1**	**B**
PM	Memorial Drive WB thru	0.40	25.3	C	0.42	25.0	C	0.42	25.0	C	0.15	39.1	D
	Massachusetts Avenue NB left	0.37	15.8	B	0.40	16.9	B	0.40	17.0	B	0.59	34.9	C
	Massachusetts Avenue NB thru	0.80	5.1	A	0.91	6.5	A	0.92	6.9	A	0.54	1.7	A
	Massachusetts Avenue SB thru	2.39	661.7	F	3.04	950.7	F	3.24	1039.1	F	0.93	32.0	C
	OVERALL	**0.71**	**294.7**	**F**	**0.82**	**453.8**	**F**	**0.86**	**504.1**	**F**	**0.56**	**21.4**	**C**

Table 2-49 Massachusetts Avenue/Memorial Drive Eastbound On/Off-Ramps Mitigation Level of Service

Peak Hour	Lane Group	2014 Existing Condition			2024 No-Build Condition			2024 Build Condition			2024 Build Mitigated Condition		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
AM	Memorial Drive EB thru	1.83	435.0	F	1.90	466.1	F	0.88	52.9	D	0.32	45.4	D
	Massachusetts Avenue NB thru	0.91	31.1	C	1.15	95.9	F	1.21	125.3	F	0.87	16.7	B
	Massachusetts Avenue SB thru	0.55	1.7	A	0.61	1.9	A	0.66	2.4	A	0.54	1.5	A
	OVERALL	**0.90**	**84.0**	**F**	**1.07**	**119.9**	**F**	**1.06**	**82.3**	**F**	**0.79**	**16.3**	**B**
PM	Memorial Drive EB thru	0.88	45.5	D	0.89	46.5	D	0.89	46.5	D	0.73	54.3	D
	Massachusetts Avenue NB thru	1.53	277.3	F	1.69	352.0	F	1.71	358.9	F	0.97	39.0	D
	Massachusetts Avenue SB thru	2.17	542.9	F	2.76	809.3	F	2.81	832.0	F	0.82	3.9	A
	OVERALL	**1.04**	**315.6**	**F**	**1.16**	**455.8**	**F**	**1.17**	**468.7**	**F**	**0.76**	**29.5**	**C**

The small improvements made at this intersection result in drastic delay and LOS improvements. Allowing the Memorial Drive off-ramps to turn right on red allows the intersection to process these movements without having to allocate much cycle time to the movements as in the Build Conditions. More cycle time can be dedicated to the Massachusetts Avenue north and southbound movements. At the Memorial Drive/Massachusetts Avenue Bridge the signal timing adjustments reduce the northbound LOS from LOS F to LOS B during the morning peak hour and LOS F to LOS D during the evening peak hour. The Memorial Drive/Massachusetts Avenue intersection shows significant improvement at the southbound approach with signal timing adjustments. During the morning peak hour the LOS improves from LOS C to LOS B and in the evening peak hour from LOS F to LOS C. Overall the intersection

cluster improves from an overall LOS F/B to LOS B/B during the morning peak hour and LOS F/F to LOS C/C during the evening peak hour by implementing these minor mitigation measures.

Proposed Pedestrian Access, Safety, and Streetscape Improvements

As discussed previously, the KSURP area provides excellent pedestrian accommodations, including sidewalks on all study area roadways and crosswalks at all study area intersections. The City is ahead of many other communities in utilizing pedestrian countdown timers with LPI (Leading Pedestrian Interval) programming and many of the signalized intersections within the KSURP area have pedestrian countdown timers with such technology.

Both the Proponent and Redeveloper are committed to creating a cohesive integrated network of open spaces and connecting pathways while improving pedestrian safety, access and circulation within the KSURP area. The Proponent, in conjunction with the Redeveloper, will work with the City to identify areas of improvement. Measures could include the following:

- Provide additional pedestrian countdown timers at study area intersections.
- Implement LPI programming at study area intersection.
- Incorporate a new mid-block pedestrian crossing at the Broadway crossing between the proposed Cambridge Center North Garage Office Buildings and Danny Lewin Park on the south side of Broadway (refer to discussion below for more details).
- Improve the Sixth Street Connector by increasing driver awareness of the pedestrian crossing with advanced warning signs. In addition, this connection should be studied for the implementation of a HAWK system (discussed further below).
- Review all pedestrian crossings within the KSURP boundaries to assess their potential for bulb-outs, raised crossings, pedestrian refuge islands, Rectangular Rapid Flashing Beacons (RRFB's), re-aligned non-apex ramps and/or other treatments to enhance the comfort and visibility of crosswalks.
- Enhance the Main Street streetscape between Ames Street and Galileo Galilei Way.
- Enhance the Broadway streetscape from Ames Street to Galileo Galilei Way.
- Enhance the Binney Street and Galileo Galilei Way streetscape from Sixth Street to Broadway.
- Improve pedestrian safety by enhancing lighting along sidewalks and pathways for safer pedestrian accommodations.

- Enhance open spaces with multiple outdoor connection to buildings within the KSURP area.

Support roadway and streetscape improvements along Galileo Galilei Way between Binney and Main Streets.

Proposed Broadway Mid-Block Crossing

The segment of roadway between the proposed Cambridge Center North Garage Office Buildings and Danny Lewin Park on the south side of Broadway is a popular area for pedestrians to cross under existing conditions, although there is currently no crosswalk treatment at this location. With the addition of pedestrian attractions on the north side of Broadway (i.e., The Winter Garden), the addition of a mid-block crossing would accommodate pedestrians who will continue to create crossing desire lines in the future. As the design of each Project Component advances, the Proponent and/or Redeveloper will study the infrastructure needed to accommodate safe and efficient pedestrian crossing activity at this location in greater detail. These improvements will be reviewed and approved by the City in advance of their implementation. Possible crosswalk treatment options could include the following:

High Intensity Activated Crosswalk (HAWK)

HAWK systems consist of a three light beacon with one cluster overhead attached to a signal arm and another attached to the signal pole on the sidewalk. The beacon only illuminates once a pedestrian presses the button, and this begins the flashing yellow phase to warn vehicles that a change is about to occur. The next phase is a solid yellow light—an indication that vehicles should slow down and be prepared to stop soon. The third phase is a solid red light for vehicles to stop for pedestrians crossing the street. Once the pedestrian crossing time expires, the signal head changes from a solid red to a flashing red. The flashing red phase indicates to vehicles that they should stop and only proceed through the crosswalk after looking both ways. Once the entire cycle is complete, the signal lights are restored to their resting phase until the cross button is activated once again. This crossing treatment is ideal for streets with multiple lanes or wide lanes due to the use of a signal arm and a side signal on the post.

Rectangular Rapid Flash Beacon (RRFB)

This type of crosswalk treatment is pedestrian activated and it consists of pedestrian warning signs with two amber lights directly below. Once the system is activated, the two amber lights alternate flashing to indicate to drivers that there is a pedestrian present at or inside the crosswalk pavement markings. This system best serves roadways with more than one lane or wide geometry with the goal of avoiding the possible multiple threat crash scenario.

Illuminated Street Markings

The crosswalk could incorporate activated flashing lights that outline the markings along the crosswalk. These lights flash yellow for a designated crossing period to emphasize that drivers should use caution and stop if a pedestrian is present in the crosswalk area. In certain situations, this type of crosswalk treatment is used in conjunction with a raised crosswalk.

Advanced Warning Signage

The use of advanced warning signage alerts drivers that there is an upcoming crosswalk, and they should proceed with caution. This is the simplest crosswalk treatment due to the fact that it consists of signage and does not incorporate additional lighting, but some argue that the lack of dynamic lighting does not command driver attention and loses its effectiveness after it is implemented.

Pavement Markings

In areas of high pedestrian volumes, sometimes it is necessary to use more than one form of crosswalk treatment at one crossing location. The use of Sharks Teeth pavement markings before a crosswalk implies that the driver should slow down or yield. These markings may also be used with rumble strips to both reduce vehicle speeds and alert drivers that there is an upcoming crosswalk.

Raised Crosswalk

A raised crosswalk elevates the pedestrians in comparison to the standard at-grade crosswalk. Commonly, raised crosswalks consist of a different roadway material such as red brick to help drivers distinguish the change in elevation along the roadway. Signage is typically incorporated to label the raised crosswalk and provide advanced warning.

Proposed Bicycle Facilities

As discussed previously, the KSURP area is well serviced by bicycle facilities, including on-street bike lanes, cycle tracks, and multi-use pathways. As shown in Figure 2.7, the City and other improvement projects will further add to the bicycle infrastructure in the area.

Both the Proponent and Redeveloper are committed to enhancing bicycle infrastructure at each Project Component and within the KSURP area by connecting this infrastructure with other area-wide improvements. The Proponent will discuss with the City the possibility of contributing to the proposed infrastructure improvements within the area, including the cycle track along Galileo Galilei Way and the Grand Junction Multi-Use Path. Additionally, in close coordination with the

City, the Redeveloper, and Other Developers, the Proponent will also explore opportunities to create a full-service bike station within the area.

Based on the comprehensive evaluation of the existing KSRUP bicycle parking, the current number of supplied spaces complies with the original 1981 Bicycle Parking Requirements, while retrofitting the KSURP area to meet the 2013 Bicycle Parking Ordinance is not required by zoning. However, the Redeveloper is committed to supporting and expanding bicycle ridership within the district through current and future efforts in a variety of ways. The Redeveloper has donated sites for two Hubway stations located at 250 Binney Street and 255 Main Street. And, a third Hubway station will be installed at 88 Ames Street in 2018. In addition to these infrastructure commitments, the Redeveloper sponsors a breakfast during the annual "Bike to Work Week" in May as well as providing free bike tune-up and safety checks twice a year (Spring/Fall).

Based on the bicycle parking existing conditions occupancy study, the overall existing supply provides more than enough bicycle parking to meet current demand. The analysis did indicate that the North Garage was slightly over capacity during the day. In order to provide enough supply to meet this demand the Proponent will provide additional bicycle parking within the North Garage as part of the North Garage Office and Parking addition.

The Project will include approximately 802 long-term bicycle spaces and 142 short-term bicycle spaces, in accordance with the City's current bike parking requirements. Long-term secure bicycle spaces will be distributed between the Cambridge Center North, West, and East Garages, proposed Eleven Cambridge Center Residential Building garage, and Three Cambridge Center Mixed Use Building. Outdoor short-term bicycle parking spaces will be distributed around the KSURP area, focusing on areas around the Project Component sites and other high demand areas observed as part of the existing conditions occupancy study.

Proposed Transportation Demand Management Measures

The proposed TDM measures aim to reduce drive-alone trips, or single occupancy vehicles (SOVs), by encouraging employees, residents and visitors to use alternative modes of transportation. The proposed TDM plan for the Project includes consideration of enhanced TDM measures outlined in the K2 Final Report 2013, where applicable and feasible as well as Project-specific measures, with the goal of reducing SOV to 41 percent for office and 32 percent for residential. Overall, the goal of the proposed TDM Plan is to reduce the use SOVs by encouraging carpooling and vanpooling, bicycle commuting and walking, and increased use of the Kendall Square public transportation system by employees and residents. The following TDM measures are proposed to be implemented as part of the Project:

- Appropriate pricing of parking – market rate paid by employees.

- Encourage employers and tenants to provide transportation benefits paid to all employees for commuter expenses regardless of mode, or 100 percent transit subsidy.
- Offer new residents a transit subsidy (exact terms to be based on City coordination).
- Provide free access to EZRide shuttle to Lechmere and North Station.
- Encourage employers and tenants to provide private employee shuttles.
- Provide adequate bicycle parking and benefits including Hubway availability and possible membership subsidy.
- Maintain eight (8) parking spaces for ZipCar® car share parking currently in East Garage and determine the feasibility of implementing or sponsoring additional car-sharing program.
- Provide designated car-share parking spaces within and/or nearby Cambridge Center parking garages to the car-share business, if deemed feasible.
- Provide preferential parking to carpool and vanpool participants.
- Provide additional electric vehicle (EV) charging stations and preferential parking to alternative fuel vehicles, as dictated by market.
- Designate a Transportation Coordinator to oversee all transportation-related operational matters at each Project Component site, including vehicular operations, servicing and loading, parking and implementation of the TDM Plan. The Transportation Coordinator will act as the contact and liaison for the City, local Transportation Management Association (TMA) and tenants of the Project.
- Post and make available transit maps, schedules and other information relevant to commuting options in the office and residential building lobbies.
- Provide real-time transportation information in all new and "significantly" renovated/improved lobbies within the Project Components using Transit Screen or other similar products including online platforms.
- Display real-time transit information in the public plaza framed by the Marriott Hotel at Two Cambridge Center, and One and Three Cambridge Center on Parcel 4.
- Continue to participate in the Charles River TMA who's membership includes, but not limited to:
  - Emergency Ride Home,
  - NuRide – Ridematching system from MassRIDES, and
  - Carpool and vanpool matching.
- Implement shared parking strategies to reduce the number of new parking spaces needed to support the Project.
- Implement new parking pricing strategies to discourage parking in the area and reduce vehicle trips to the area.

- Monitor mode share goals identified as part of the K2 planning process though the proposed Traffic Monitoring Program (described further in the next section).

Proposed Traffic Monitoring Program

The Proponent will continue to conduct the annual traffic study and analysis of Kendall Square based on the 20 years of vehicle traffic data collected in compliance with the 1994 Section 61 Findings. The Proponent plans to update the scope of the monitoring program to reflect the evolution of Cambridge's transportation priorities in a complex multi-modal urban environment such as Kendall Square. The improved study shall utilize the most up to date development square footage and traffic projections as well as more holistically consider additional data on bicycles, pedestrians, travel behavior and transit service, as it becomes available.

Changes that may be considered in a new scope of work to be developed by the Proponent in the near future may include, but not limited to, the following:

- Obtain and utilize basic data on ridership at the MBTA Kendall Square/MIT station for both subway and bus services.
- Include boarding information from EZRide shuttle and other bus services in the area, as data becomes available.
- Update the tenant questionnaire to be more specific on the mode split – differentiating the type of bus (MBTA, EZRide) or new systems, such as Bridj™ and Uber.
- Differentiate between transient and monthly parkers in the garage data collection process.
- Evaluate new bicycle count locations in response to installation of new bicycle facilities.
- Evaluate the annual traffic data collected by other parties and investigate collaborative reporting over a broader geographic scope.
- Utilize emerging pedestrian, bicycle, and traffic counting technologies as they become feasible and fully comparable to existing dataset.

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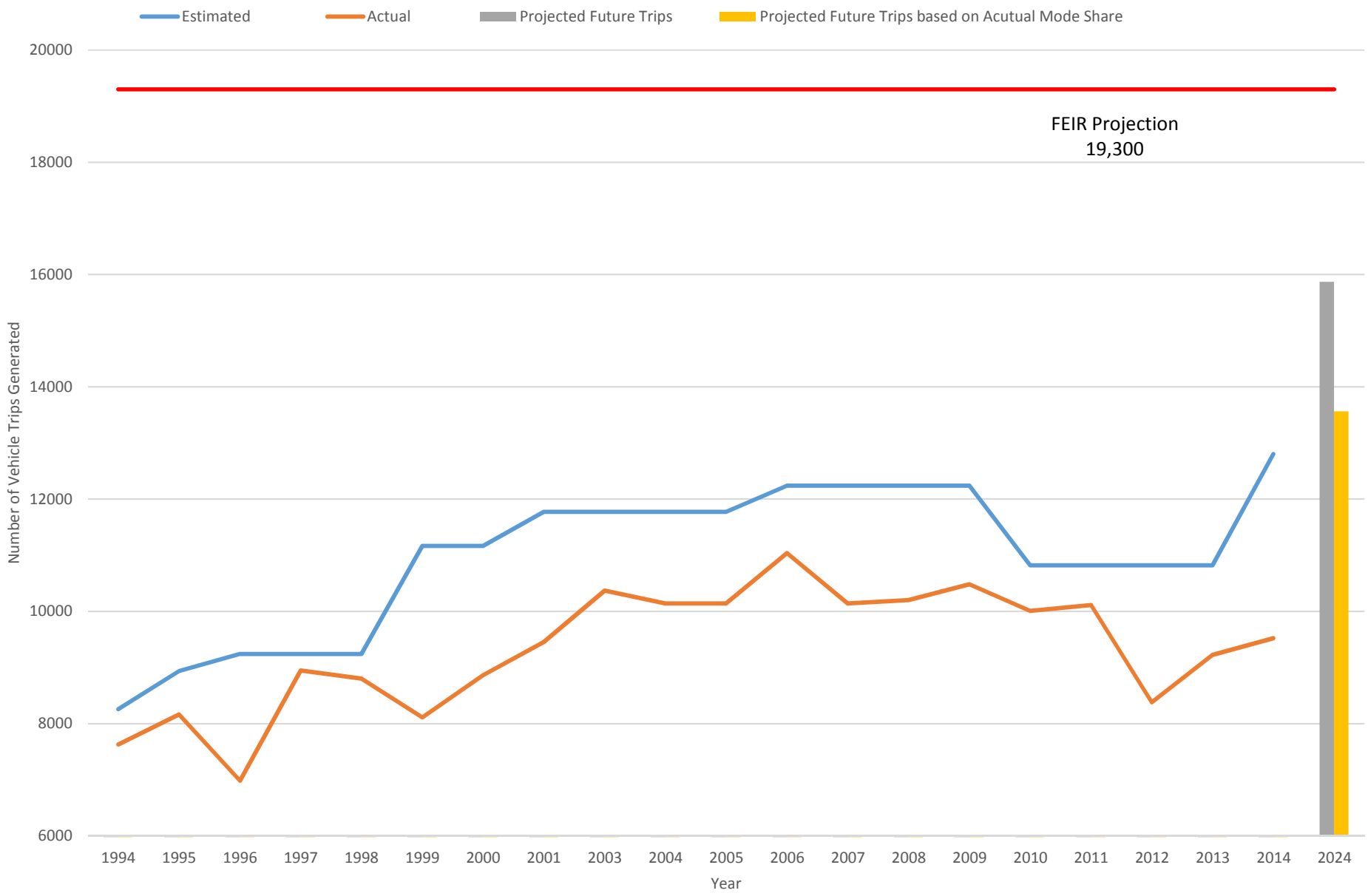

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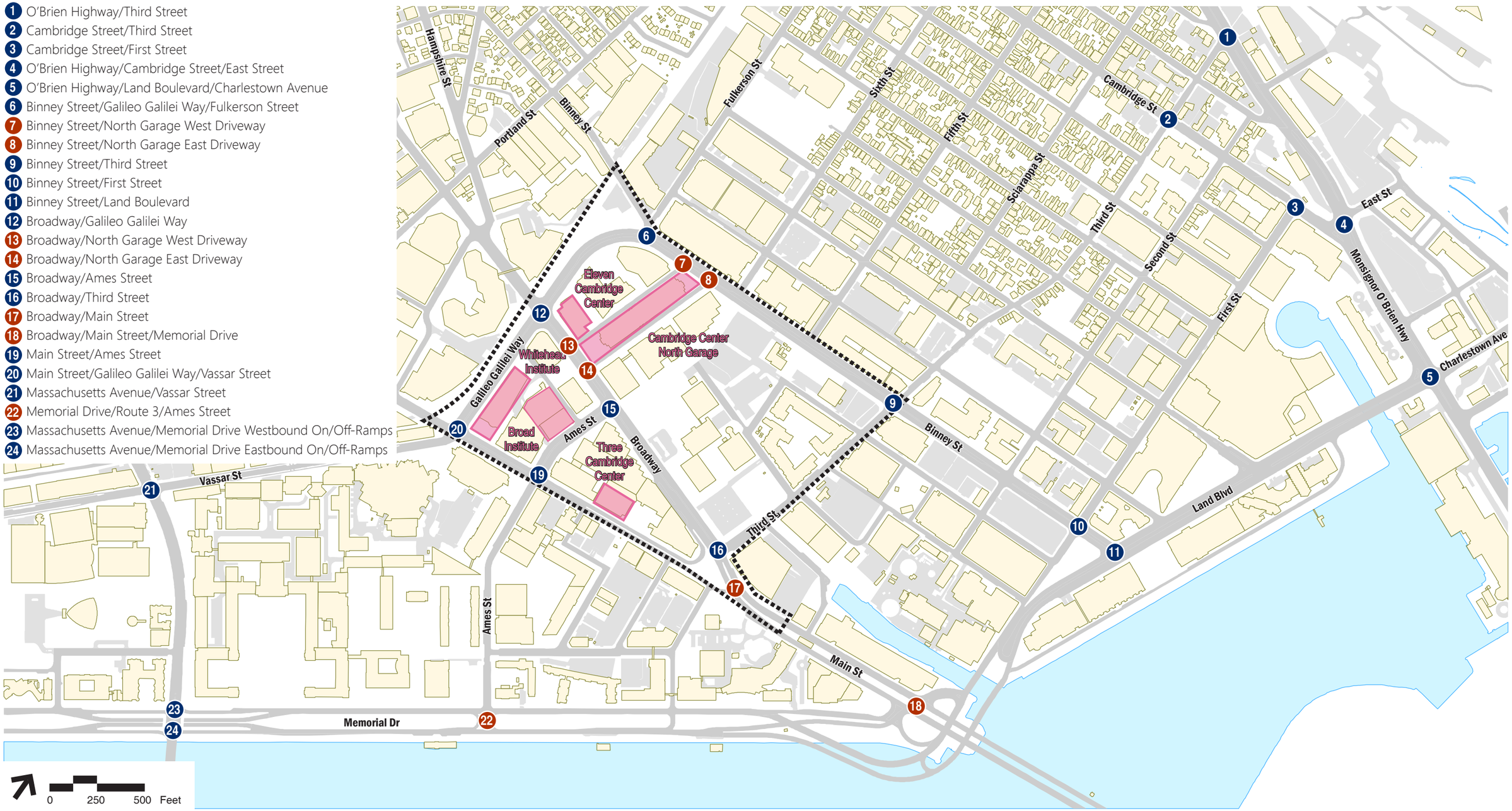
Figure 2.1
Trip Generation Estimated vs Observed (Actual)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: FST Kendall Square Urban Renewal Area Traffic Count Program and Trip Generation Analysis

1. O'Brien Highway/Third Street
2. Cambridge Street/Third Street
3. Cambridge Street/First Street
4. O'Brien Highway/Cambridge Street/East Street
5. O'Brien Highway/Land Boulevard/Charlestown Avenue
6. Binney Street/Galileo Galilei Way/Fulkerson Street
7. Binney Street/North Garage West Driveway
8. Binney Street/North Garage East Driveway
9. Binney Street/Third Street
10. Binney Street/First Street
11. Binney Street/Land Boulevard
12. Broadway/Galileo Galilei Way
13. Broadway/North Garage West Driveway
14. Broadway/North Garage East Driveway
15. Broadway/Ames Street
16. Broadway/Third Street
17. Broadway/Main Street
18. Broadway/Main Street/Memorial Drive
19. Main Street/Ames Street
20. Main Street/Galileo Galilei Way/Vassar Street
21. Massachusetts Avenue/Vassar Street
22. Memorial Drive/Route 3/Ames Street
23. Massachusetts Avenue/Memorial Drive Westbound On/Off-Ramps
24. Massachusetts Avenue/Memorial Drive Eastbound On/Off-Ramps



- KSURP Boundary
- Proposed Project Component
- # Signalized intersection
- # Unsignalized Intersection

Source: City of Cambridge GIS

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Figure 2.2
Study Area Intersections

Kendall Square Urban Renewal Project Amendment No. 10
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Neg □egligi□le

Binney St
Fulkerson St
Broadway
Galileo Galilei Way
Mass Ave
Vassar St
Memorial Dr
Whitehead
11 CC
CC North Garage
North Garage West Driveway
North Garage East Driveway
3 CC
Ames St
Binney St
Cambridge St
Monsignor O'Brien Hwy
3rd St
1st St
Land Blvd
Main St
East St
Charlestown Ave
Monsignor O'Brien Hwy

Not to Scale

CRA
VHB

Figure 2.3a
2014 Existing Condition Vehicle Volumes
Morning Peak Hour (8:15 AM - 9:15 AM)

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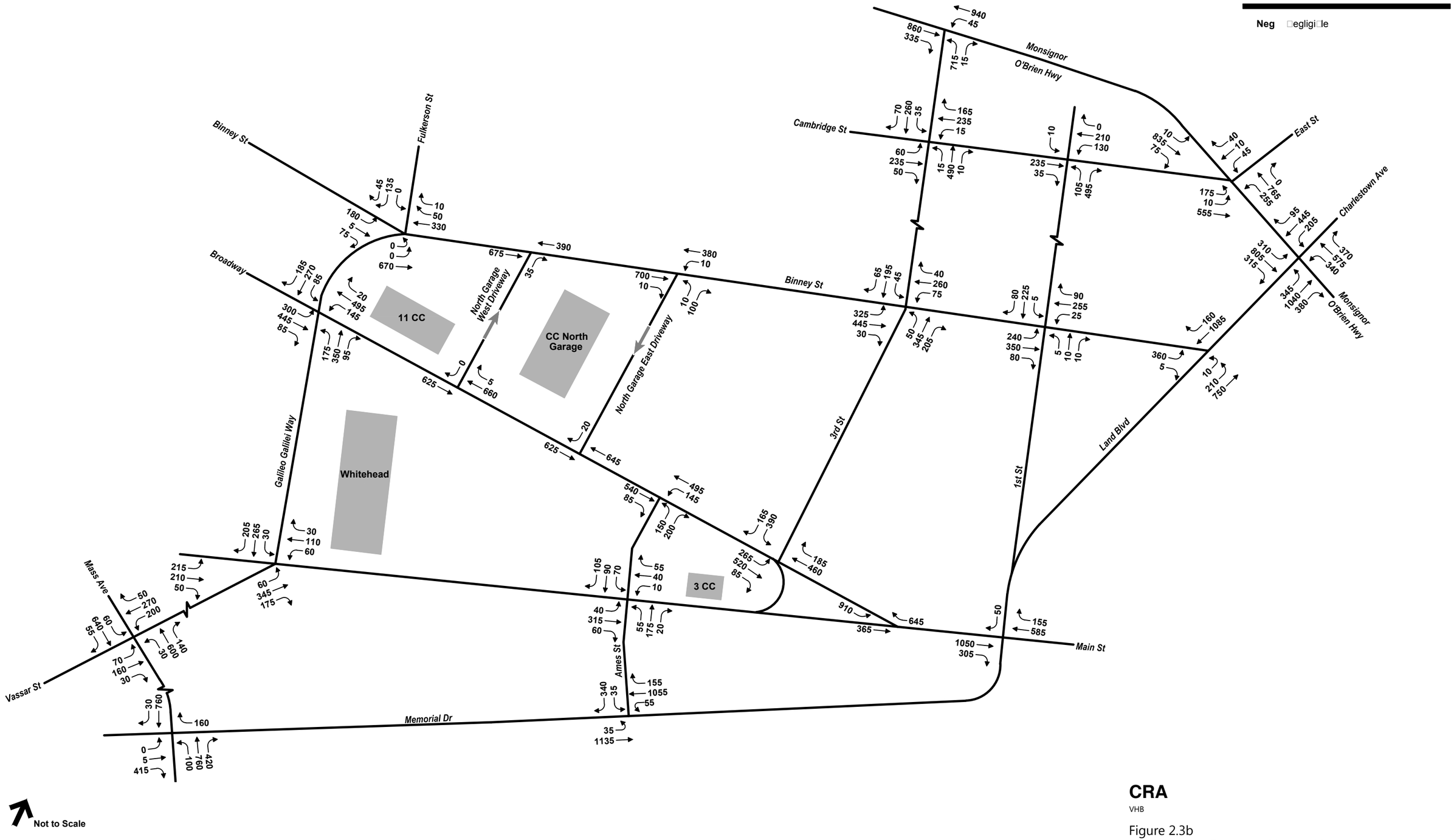
Neg □egligi□le



Not to Scale

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VHB

Figure 2.3b
2014 Existing Condition Vehicle Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

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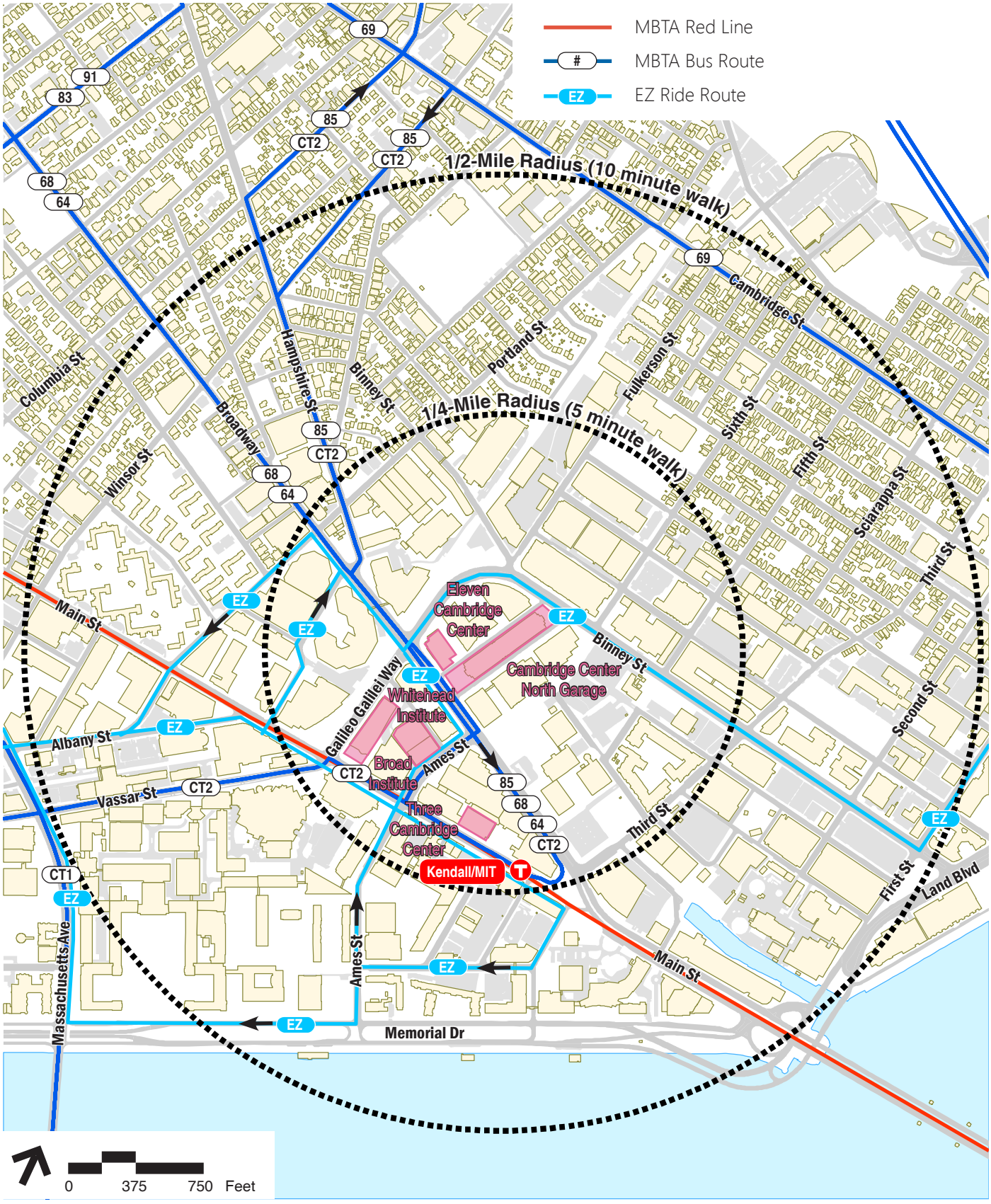

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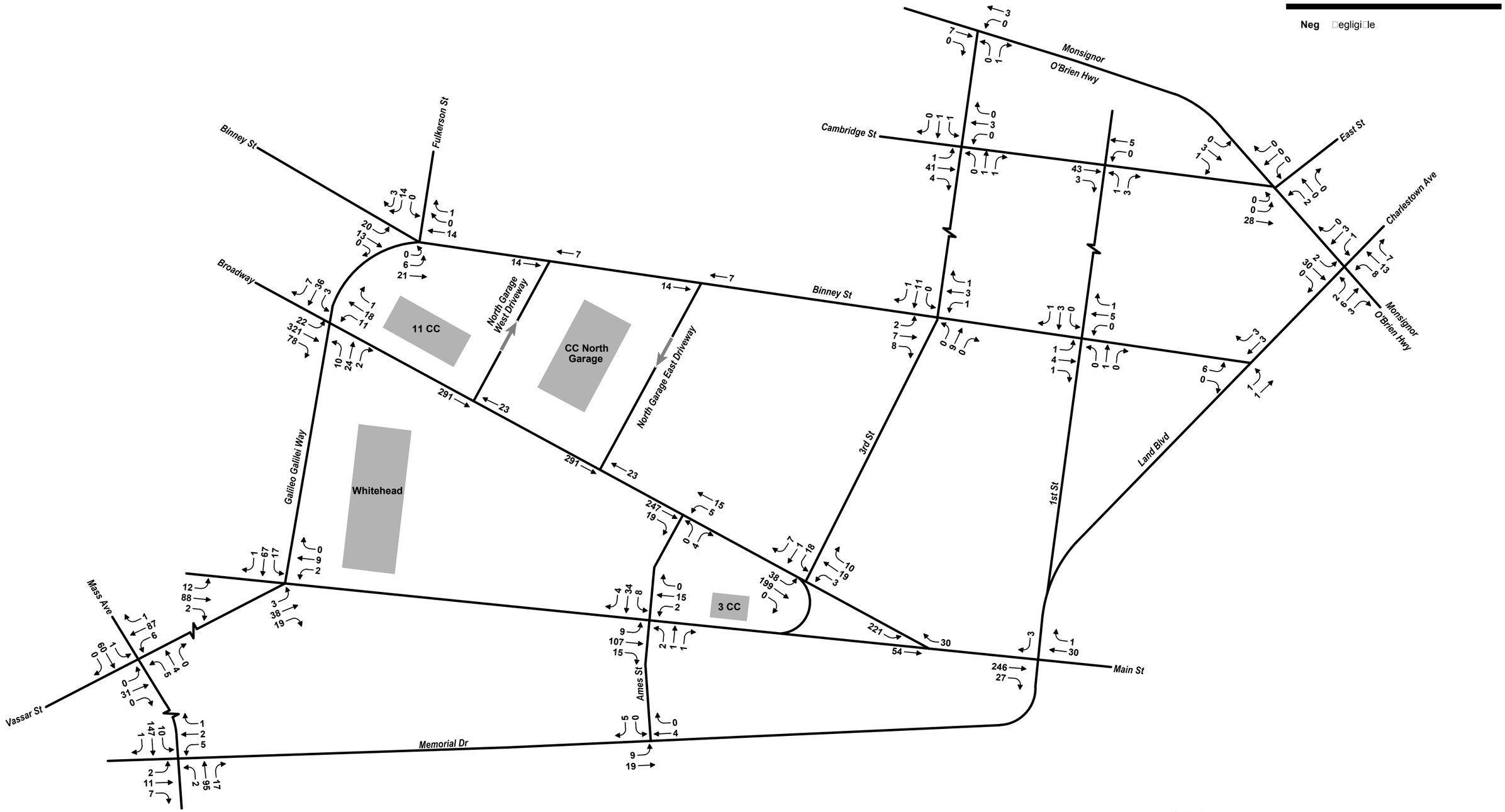
Figure 2.4
Existing Public Transportation

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge GIS, MassGIS

Neg □egligi□le



Not to Scale

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VHB

Figure 2.5a
2014 Existing Condition Bicycle Volumes
Morning Peak Hour (8:15 AM - 9:15 AM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Neg □egligi□le

Monsignor O'Brien Hwy
Cambridge St
East St
Charlestown Ave
Binney St
Fulkerson St
Broadway
11 CC
North Garage West Driveway
CC North Garage
North Garage East Driveway
Galileo Galilei Way
Whitehead
3rd St
1st St
Land Blvd
Mass Ave
3 CC
Ames St
Vassar St
Memorial Dr
Main St

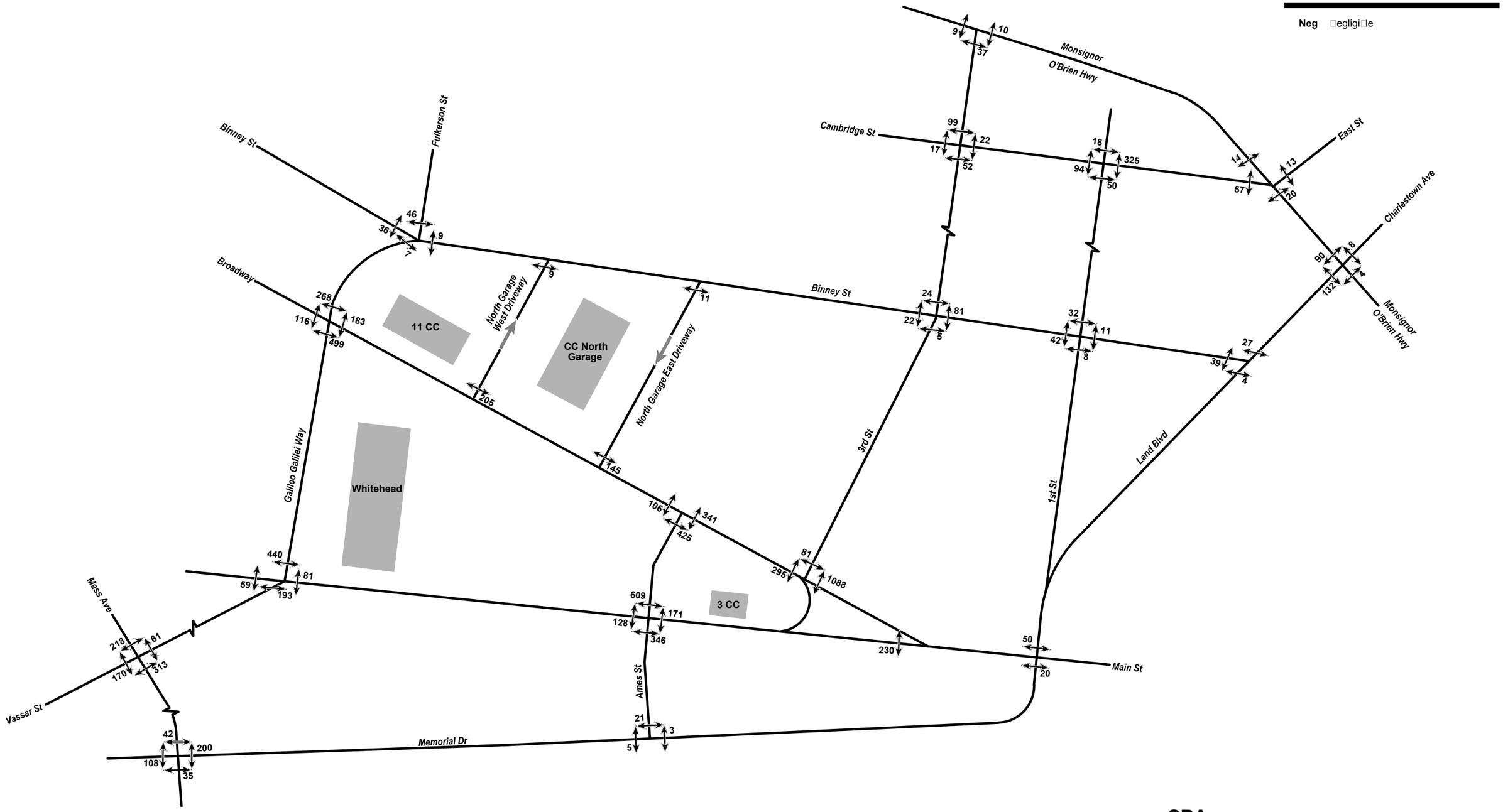
Not to Scale

CRA
VHB

Figure 2.5b
2014 Existing Condition Bicycle Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Neg □egligi□le



Not to Scale

CRA
VHB

Figure 2.6a
2014 Existing Condition Pedestrian Volumes
Morning Peak Hour (8:15 AM - 9:15 PM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Neg □egligi□le

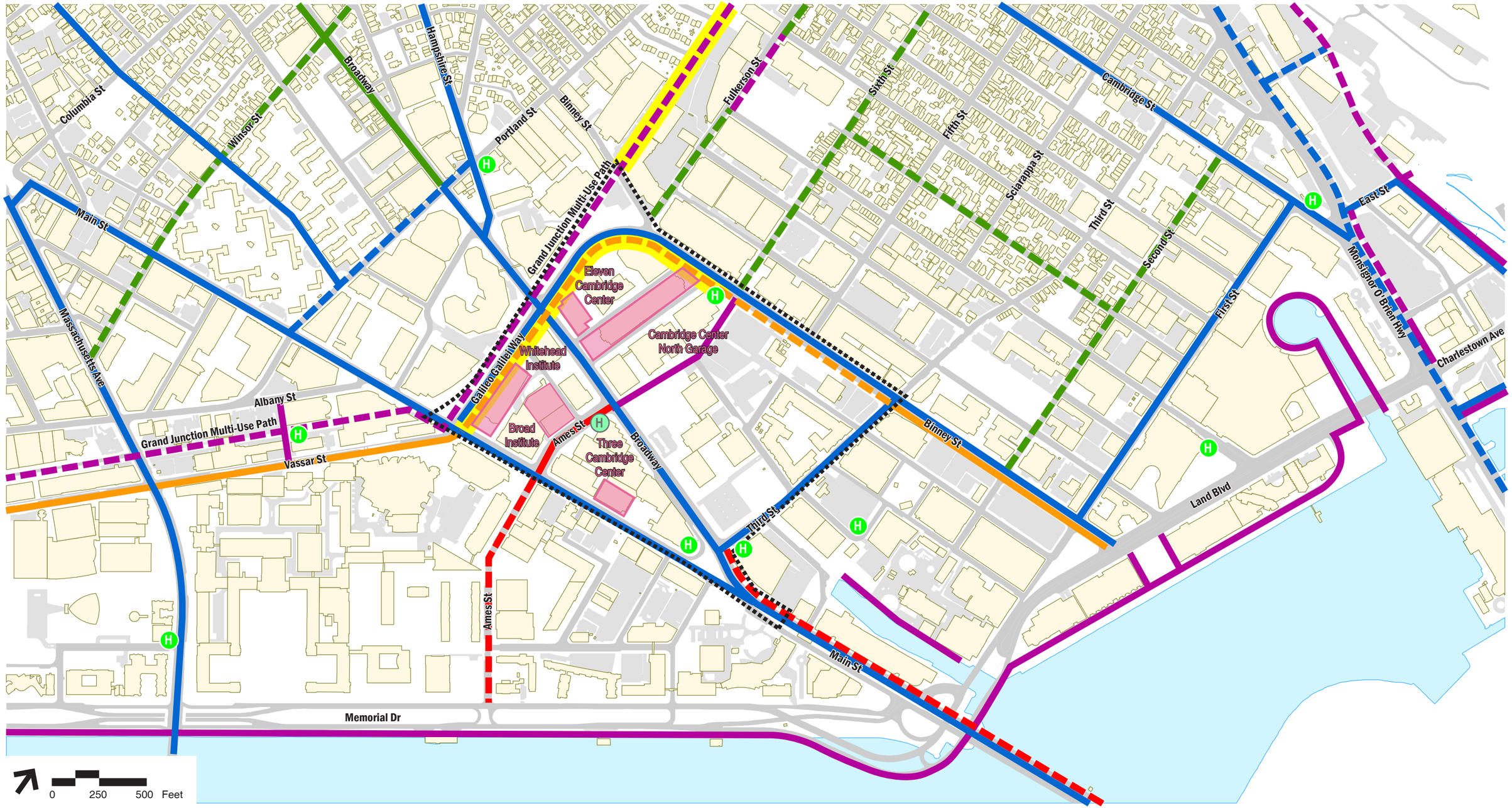
Monsignor O'Brien Hwy
Cambridge St
East St
Charlestown Ave
Binney St
Fulkerson St
Broadway
North Garage West Driveway
North Garage East Driveway
11 CC
CC North Garage
Whitehead
3 CC
Galileo Galilei Way
3rd St
1st St
Land Blvd
Mass Ave
Vassar St
Ames St
Memorial Dr
Main St

Not to Scale

CRA
VHB

Figure 2.6b
2014 Existing Condition Pedestrian Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA



Source: City of Cambridge Bike Facilities Map

Note: Per the City's Bicycle Parking Guidelines, the Project will provide a total of 802 long-term bicycle parking spaces and 142 short-term bicycle parking spaces (Table 2-18). The approximate locations of these spaces will be determined as the design of each Project Component progresses.

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Figure 2.7
Bicycle Facilities

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Future Parking Supply in KSURP Area

Building/Land Use	Existing Parking	Added Parking under Amendment 10	Future Parking
North Garage (Office)	1,136	370	1,506
West Garage	727	0	727
East Garage	804	0	804
11 CC (Residential/Retail)	0	370	370
3 CC (Office/Residential/Retail)	0	0	0
Total	**2,667**	**740**	**3,407**

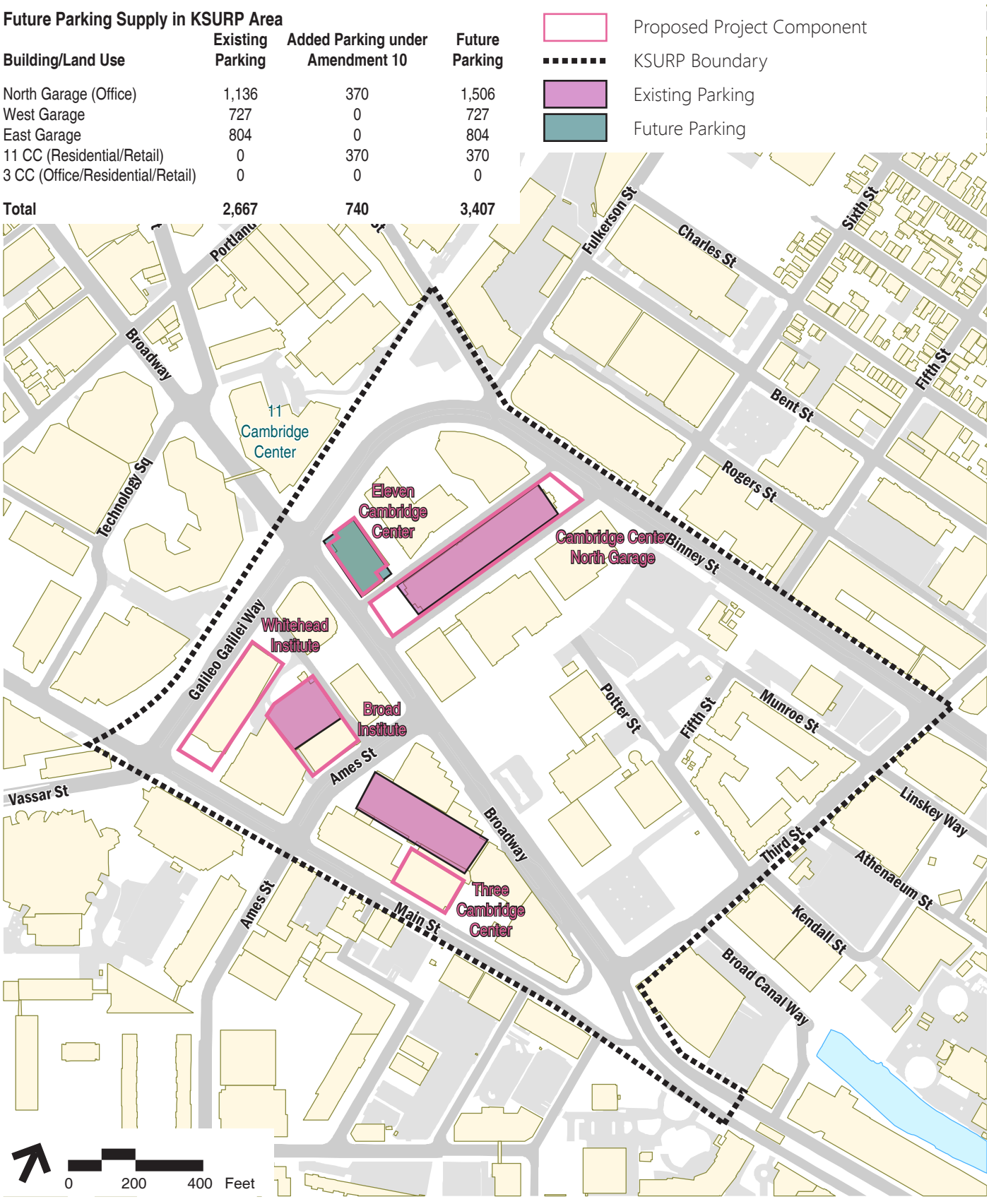

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Figure 2.8
Existing and Future Off-Street Parking

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge GIS, MassGIS

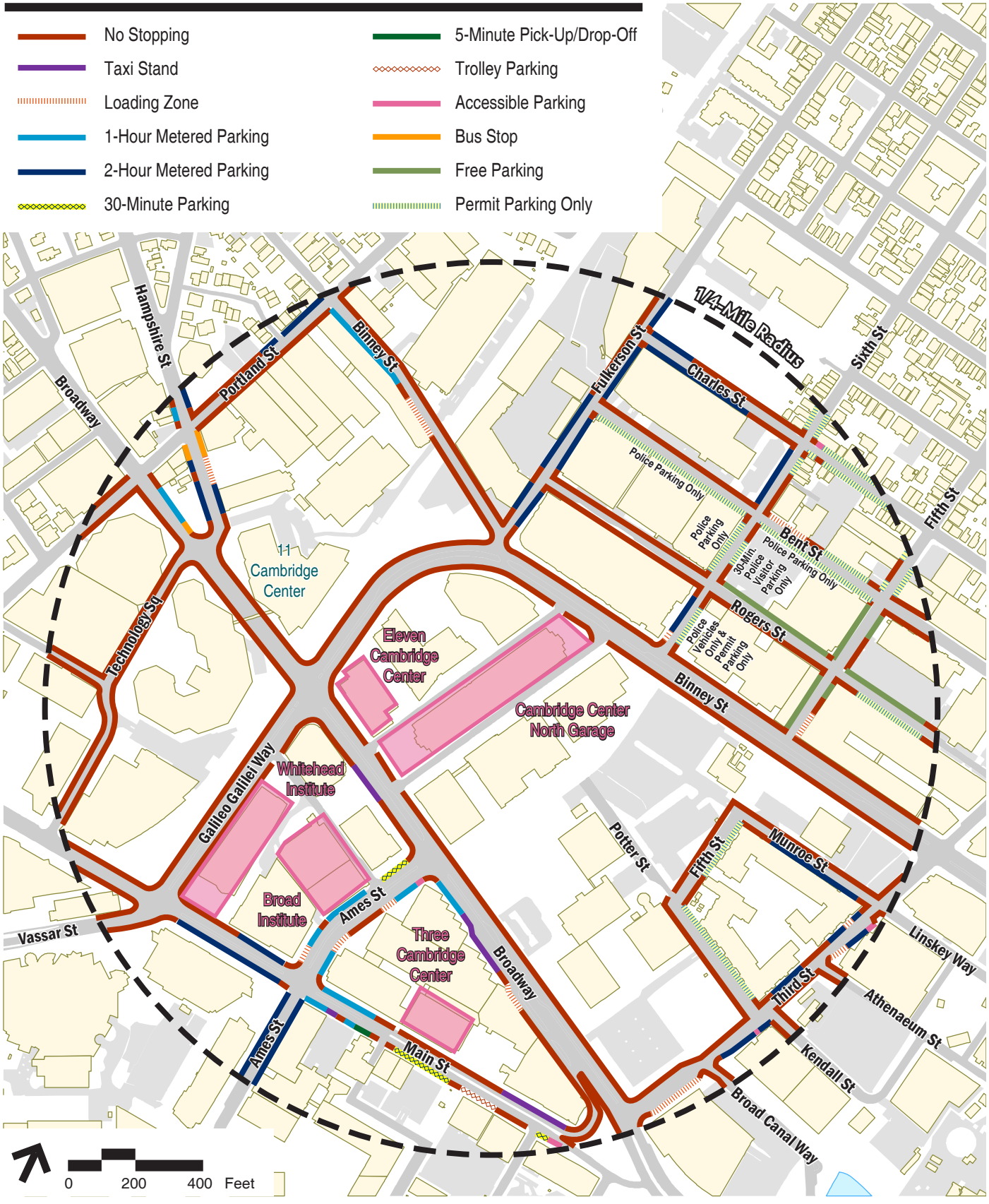

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Figure 2.9
On-Street Parking

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge GIS, MassGIS

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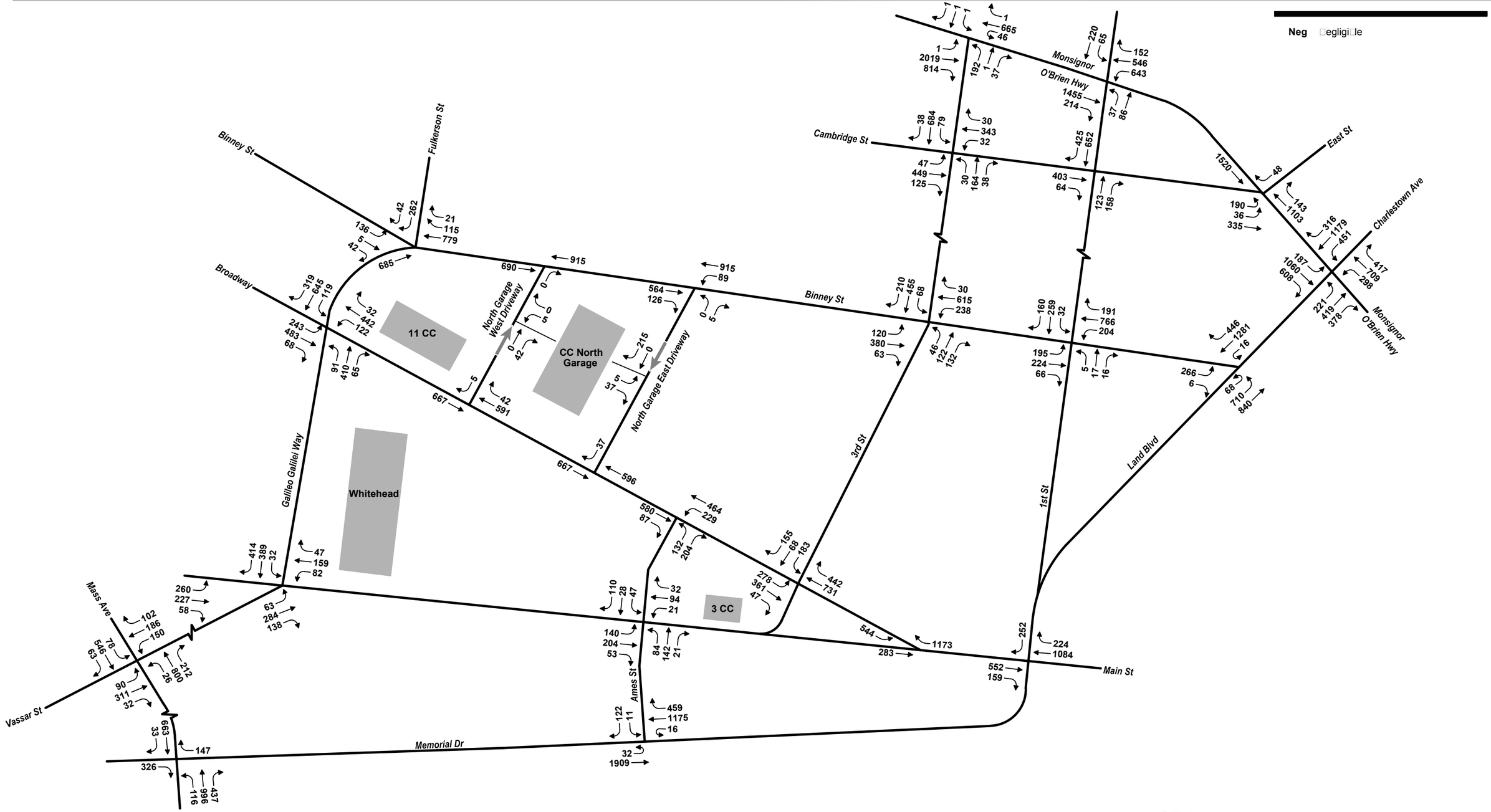

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Figure 2.10a
2024 No-Build Condition Vehicle Volumes
Morning Peak Hour (8:15 AM - 9:15 AM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Neg □egligi□le

Binney St
Fulkerson St
Broadway
Galileo Galilei Way
Mass Ave
Vassar St
Memorial Dr
Ames St
Main St
Cambridge St
Monsignor O'Brien Hwy
East St
Charlestown Ave
3rd St
1st St
Land Blvd
11 CC
CC North Garage
North Garage West Driveway
North Garage East Driveway
Whitehead
3 CC

Not to Scale

CRA
VHB

Figure 2.10b
2024 No-Build Condition Vehicle Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

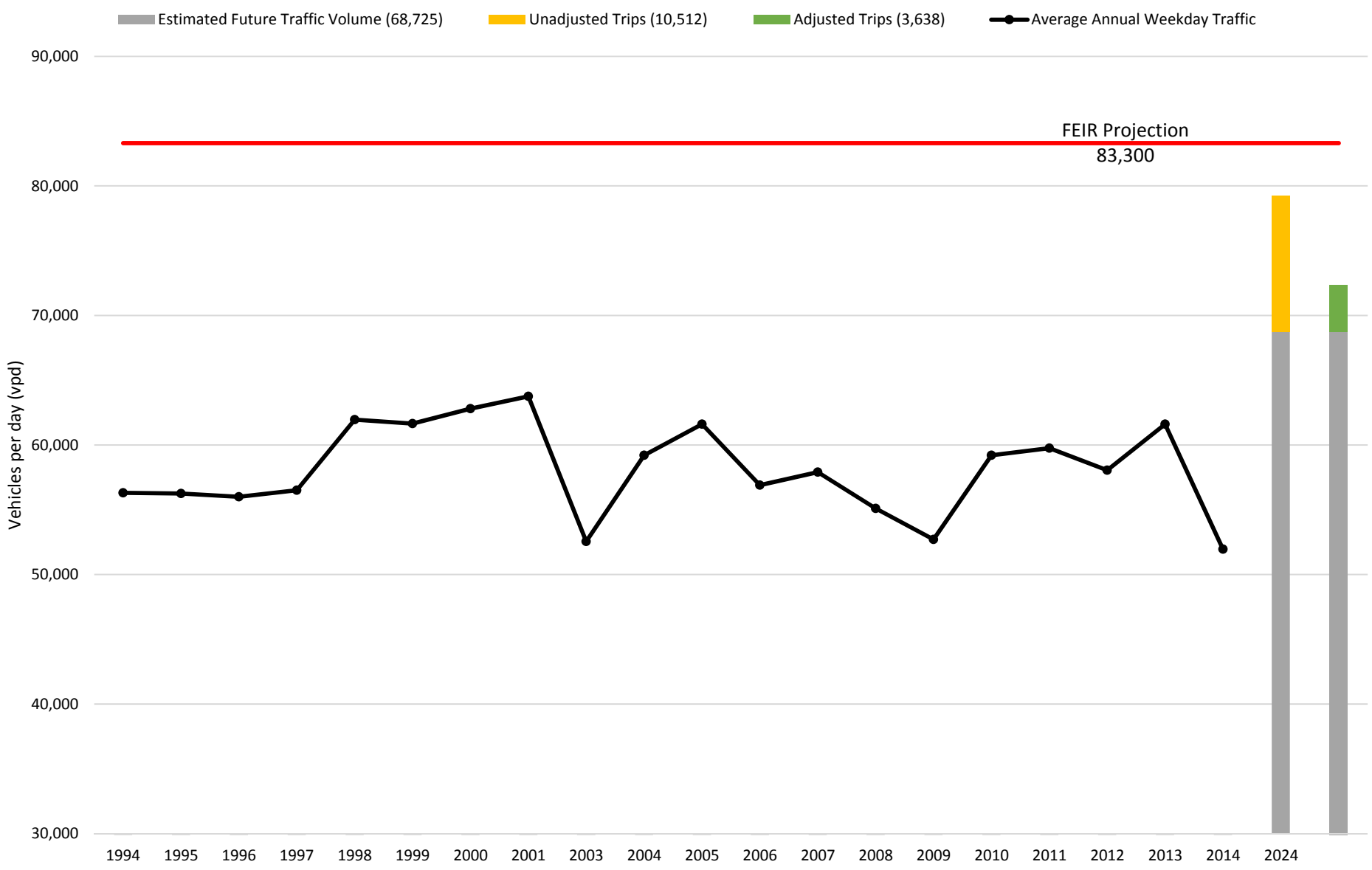

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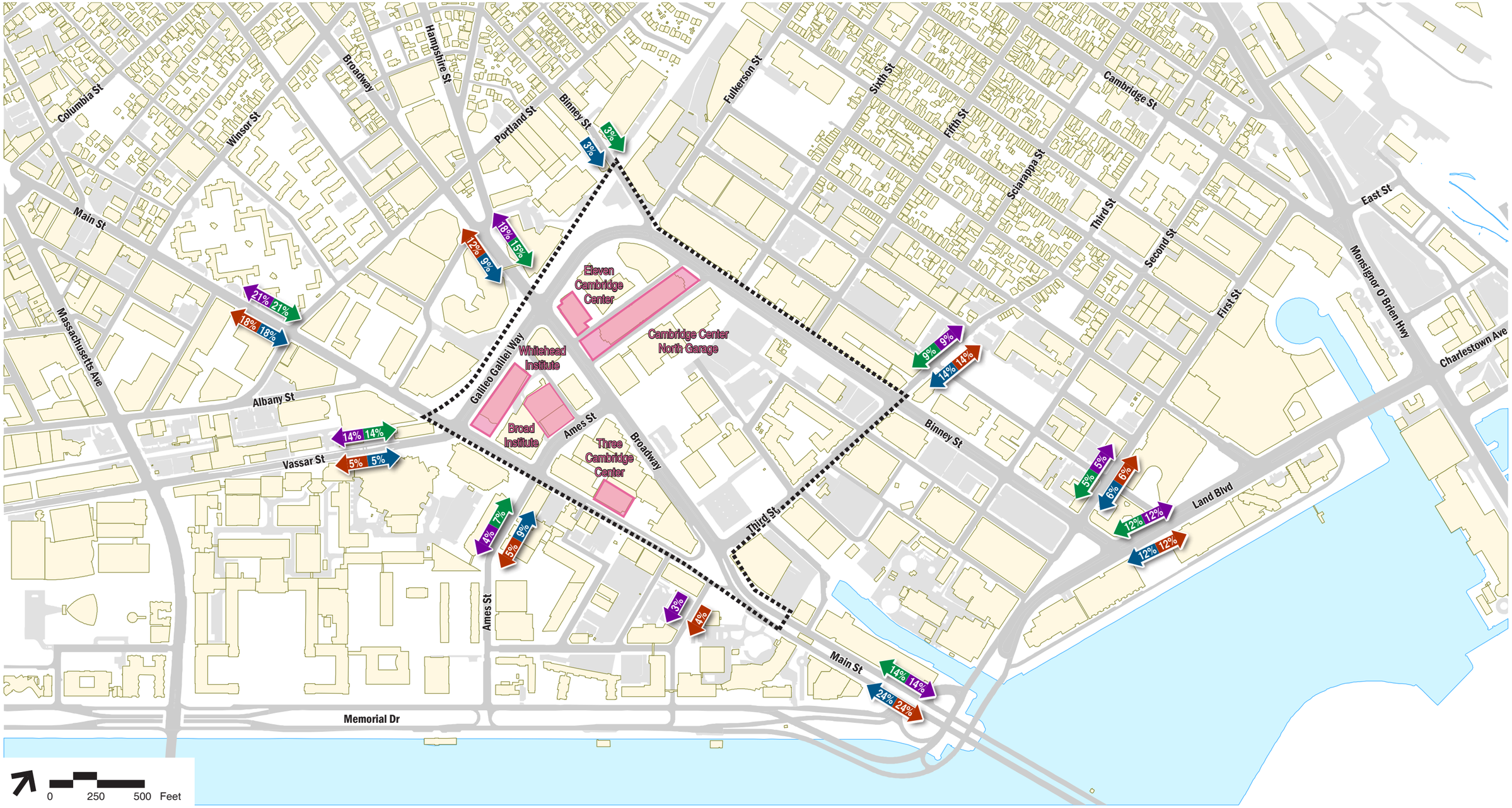
Figure 2.11
Average Annual Weekday Vehicle Traffic

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: FST Kendall Square Urban Renewal Area Traffic Count Program and Trip Generation Analysis



Source: City of Cambridge GIS

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Figure 2.12
Trip Distribution

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

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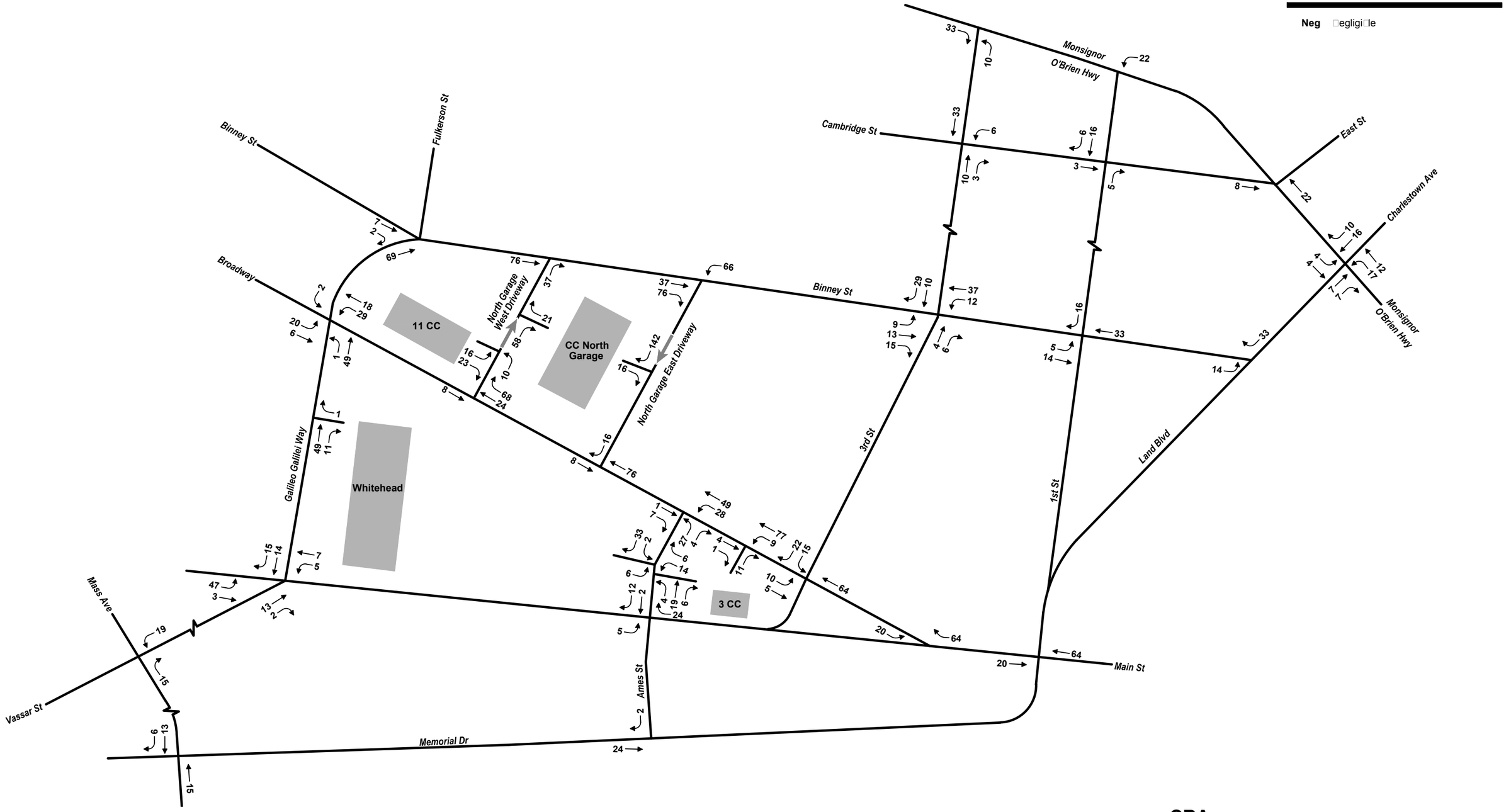

Not to Scale

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Figure 2.13a
Project Generated Trips
Morning Peak Hour (8:15 AM - 9:15 AM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Neg □egligi□le

Binney St
Fulkerson St
Broadway
Galileo Galilei Way
Mass Ave
Vassar St
Memorial Dr
Ames St
Main St
Binney St
Cambridge St
Monsignor O'Brien Hwy
East St
Charlestown Ave
Monsignor O'Brien Hwy
3rd St
1st St
Land Blvd
North Garage West Driveway
North Garage East Driveway
11 CC
CC North Garage
Whitehead
3 CC

Not to Scale

CRA
VHB

Figure 2.13b
Project Generated Trips
Evening Peak Hour (5:00 PM - 6:00 PM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Neg □egligi□le

Binney St
Fulkerson St
Broadway
Galileo Galilei Way
Mass Ave
Vassar St
Memorial Dr
Ames St
Cambridge St
Binney St
Monsignor O'Brien Hwy
East St
Charlestown Ave
3rd St
1st St
Land Blvd
Main St
North Garage West Driveway
North Garage East Driveway
11 CC
CC North Garage
Whitehead
3 CC

Not to Scale

CRA
VHB

Figure 2.14a
2024 Build Condition Vehicle Volumes
Morning Peak Hour (8:15 AM - 9:15 AM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

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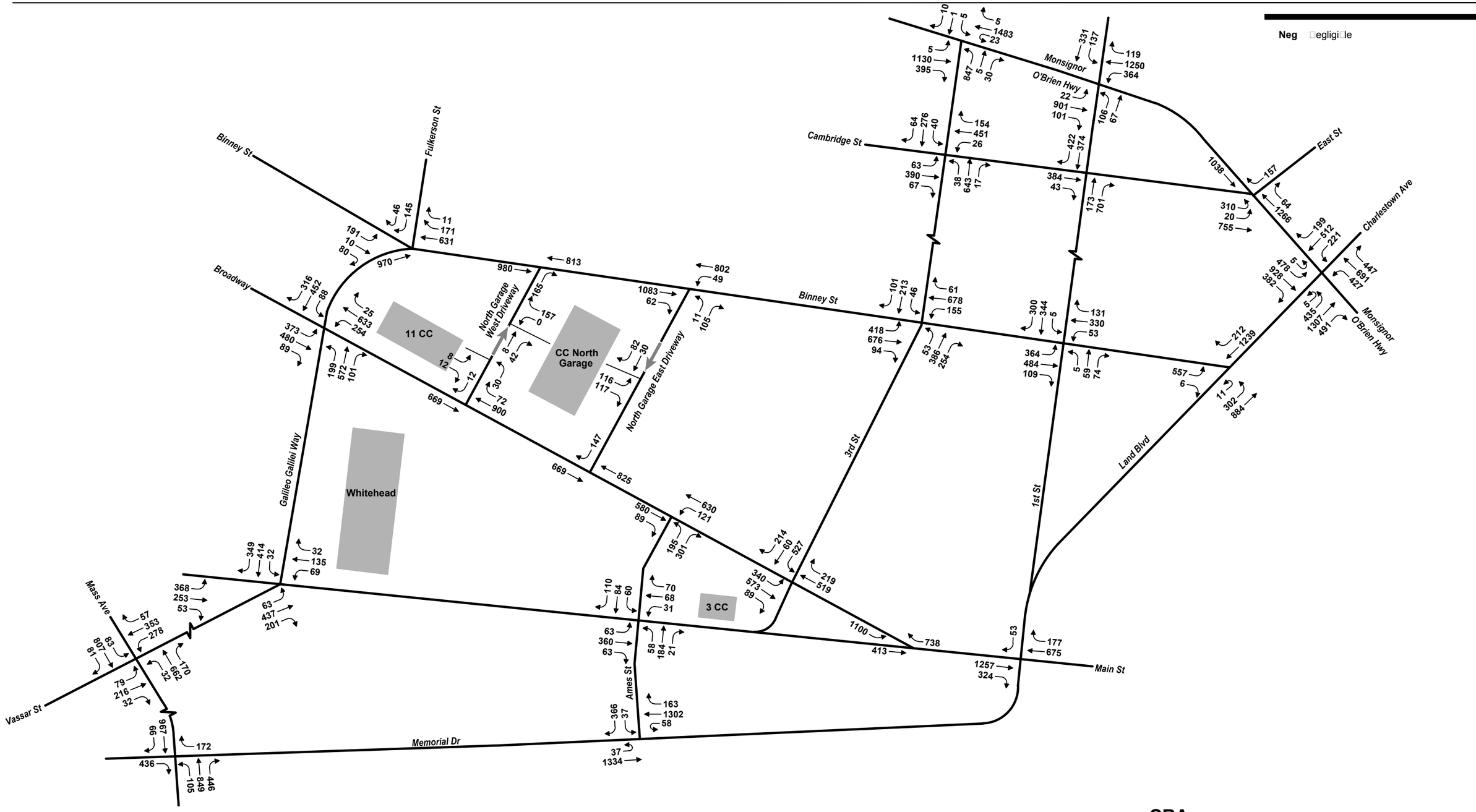

Not to Scale

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Figure 2.14b
2024 Build Condition Vehicle Volumes
Evening Peak Hour (5:00 PM - 6:00 PM)

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

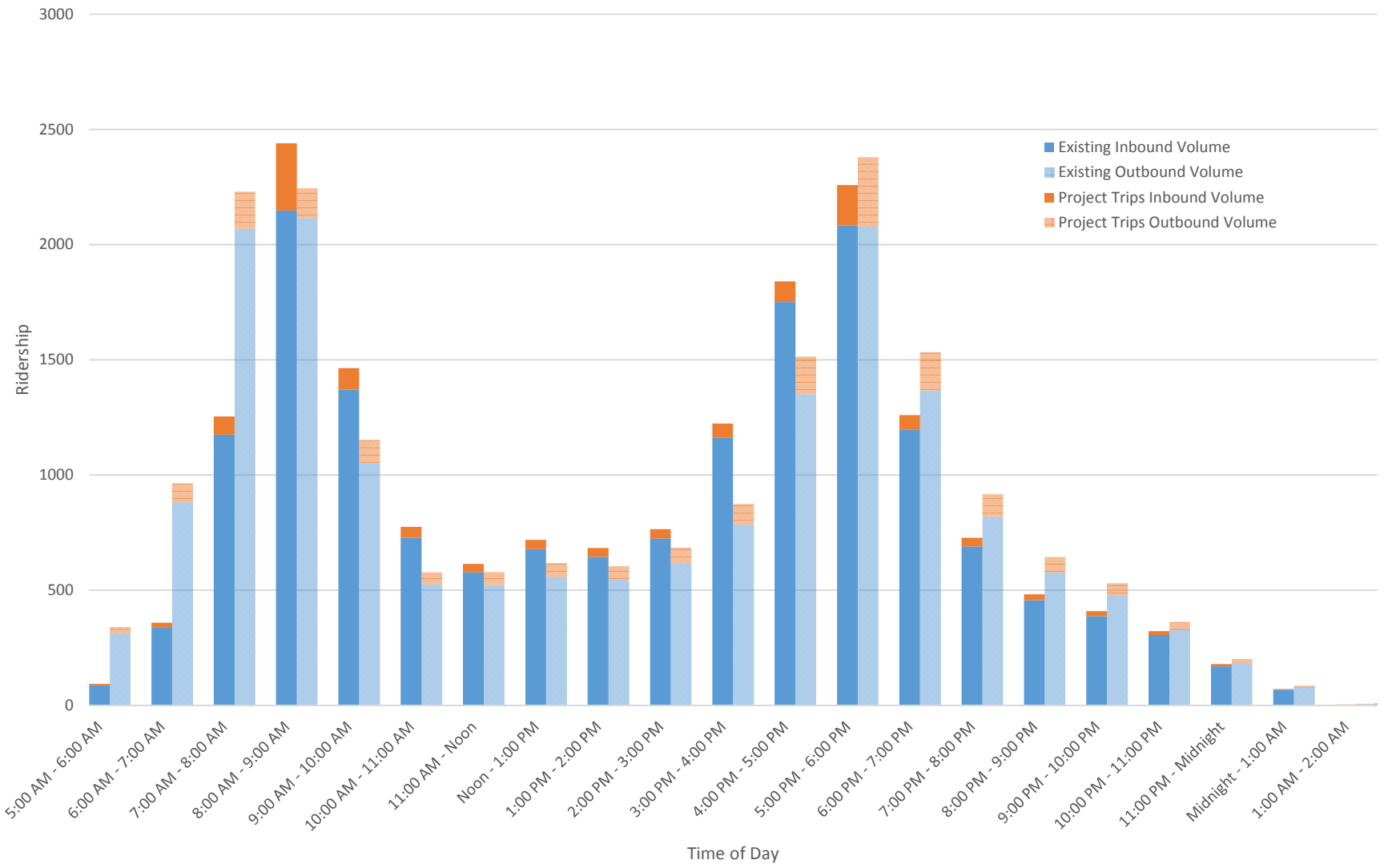

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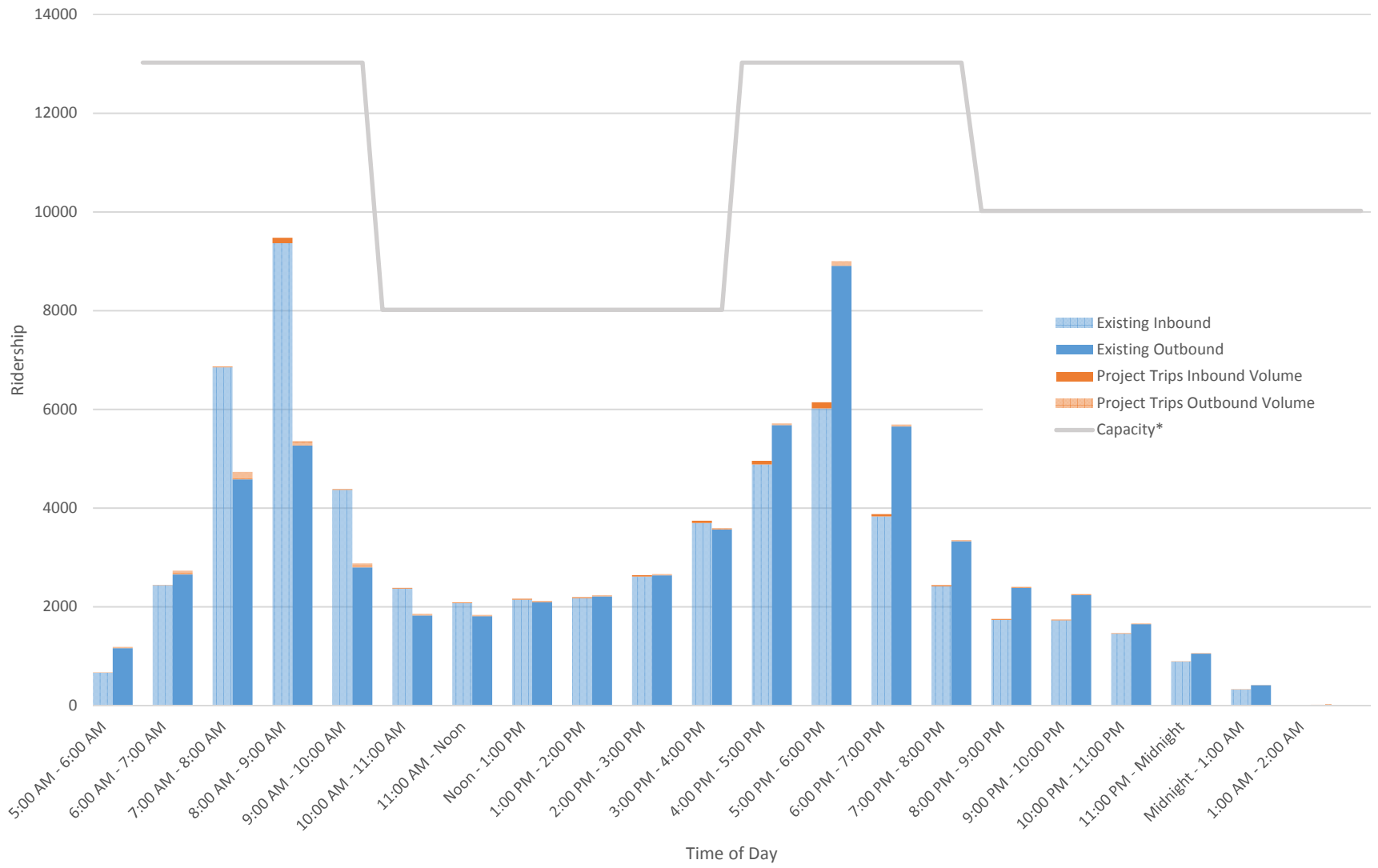
Figure 2.15
Kendall/MIT Station Future Conditions Weekday Platform Activity

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: MBTA Rapid Transit Schedules and Maps (Winter 2014)



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Source: MBTA Rapid Transit Schedules and Maps (Winter 2014)

Figure 2.16
MBTA Red Line Future Conditions Weekday Ridership
Kendall/MIT Station to Charles/MGH Station

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