Institutional Master Plan Notification Form / Project Notification Form

Submitted Pursuant to Article 80 of the Boston Zoning Code

Brigham and Women's Hospital 2012 IMP Amendment Project






Submitted to:
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

Submitted by:
The Brigham and Women's Hospital, Inc.
75 Francis Street
Boston, MA 02115

Prepared by:
Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754

In Association with:
Chan Krieger NBBJ
Nutter McClennen & Fish LLP
Vanasse Hangen Brustlin, Inc.

January 3, 2012

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Introduction and General Information

1.0 INTRODUCTION AND GENERAL INFORMATION

1.1 Introduction

The Brigham and Women's Hospital, Inc. (BWH or the Hospital) is pleased to submit this Institutional Master Plan Notification Form/Project Notification Form (IMPNF/PNF) to amend their existing IMP pursuant to Article 80D of the Boston Zoning Code (Code) and initiate Large Project Review pursuant to Article 80B of the Code in order to enable the development of the Project described herein.

BWH, a founding member of Partners HealthCare System Inc., is a Harvard-affiliated, non-profit, teaching hospital located in the Longwood Medical and Academic Area (LMA). Please see Figure 1-1 for a map of BWH's Campus and the boundaries of BWH's Institutional Master Plan (IMP) Overlay District. BWH has an international reputation for the quality of its medical care and innovative research. In addition, its varied educational programs provide the highest quality training for medical nursing and other health professions.

In order to maintain its leadership in medical research, BWH needs additional research space which it owns and controls instead of leases. This IMPNF/PNF is being filed to initiate approval of a single project: an approximately 360,000 square foot (sf) building dedicated to hospital uses, including laboratory, research and support spaces, as well as 355 below-grade replacement parking spaces. The 2012 BWH IMP Amendment Project (the Project) is located at 45 Avenue Louis Pasteur (the Project site) on Parcel C of Emmanuel College's Endowment Campus (see Figure 1-2). BWH currently occupies Parcel C pursuant to its lease with the Trustees of Emmanuel College of Alumnae Hall, together with parking accessory thereto, for hospital use, including office and dry research. BWH intends to enter into a long-term ground lease with Emmanuel College for Parcel C in order to enable development of the proposed Project. A description of the relationship between BWH and Emmanuel and the intent for the concurrent review of both institutions' plans for future development is included in Chapter 2.

As described in detail in BWH's 2010 IMP, BWH is a major institutional employer in Boston. Currently, BWH employs over 15,000 people, and approximately 30 percent of employees are Boston residents.

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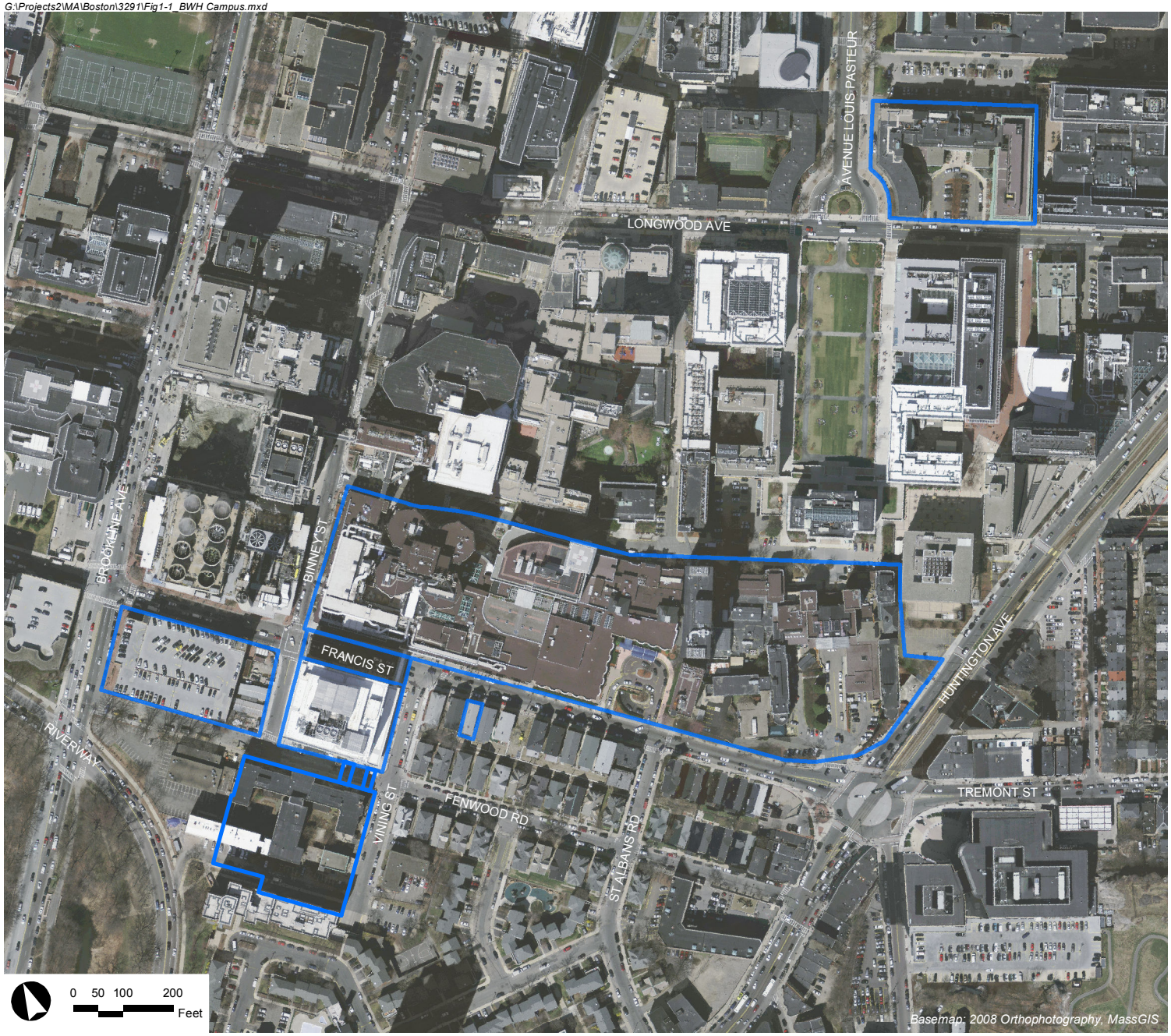

LEGEND

Existing BWH Campus

Source: BWH, BRA

2012 BWH IMP Amendment Project Boston, MA

Epsilon Associates Inc.

Figure 1-1
BWH Campus

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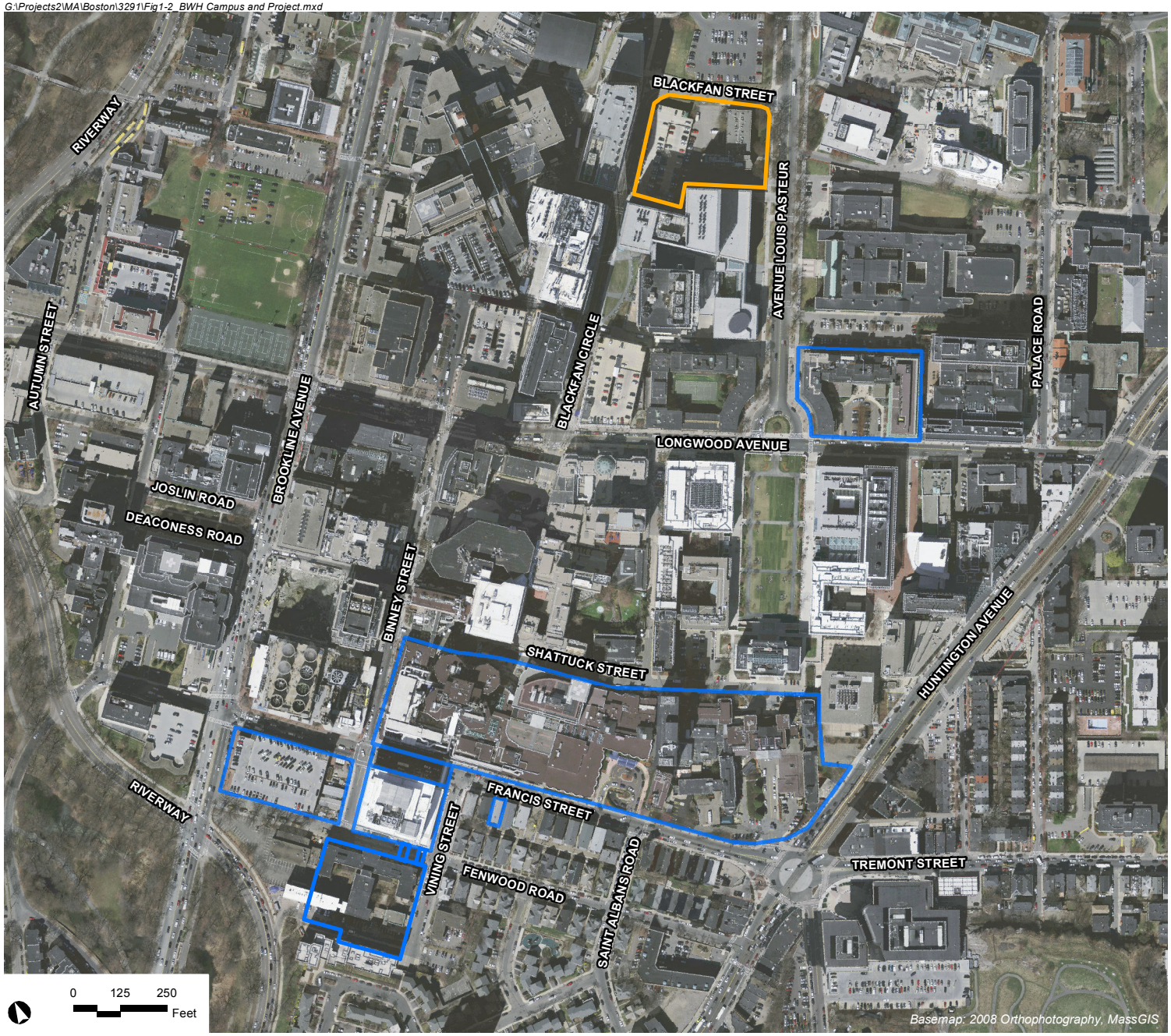

LEGEND

- Existing BWH Campus
- Project Site

Source: BWH, BRA

2012 BWH IMP Amendment Project Boston, MA

Epsilon Associates Inc.

Figure 1-2

BWH Campus and Project Site

BWH currently has 793 inpatient beds, 30 of which are licensed to Dana-Farber Cancer Institute. The BWH Campus also houses extensive outpatient facilities, and state-of-the-art research laboratories. BWH's pre-eminence and leadership are demonstrated in a wide variety of medical fields, as noted below.

- A preeminent provider of women's health services, BWH is New England's leading birthing center and a regional center of high-risk obstetrics and newborn care.
- The Hospital is known world-wide for its pioneering work in transplantation of vital organs and tissues, including the heart, lung, heart-lung, kidney and bone marrow, and has the largest heart transplant and bone marrow transplant programs in New England.
- BWH is one of the country's foremost centers for orthopedic and joint-replacement surgery.
- The Hospital has also achieved significant breakthroughs in treating arthritis, rheumatic disorders, and cardiovascular disease.
- BWH is one of only two burn trauma units within the Boston metropolitan region.
- Year after year, BWH has been a top recipient among independent U.S. hospitals of research funding from the National Institutes of Health (NIH).

Due to its leadership with clinical, basic, and population-based studies, which are critically linked to research, BWH is advancing the prevention, diagnosis, treatment and cure of diseases for people in New England, across the country, and around the world.

1.2 History of IMP Process to Date/Status of IMP Projects

The 2010 BWH IMP was approved by the BRA Board in February, 2010 and became effective March 30, 2010. The term of the IMP was 10 years, from 2010 to 2020, and included two new IMP Projects, the Binney Street Building and the Brigham and Women's Building, as well as the previously approved Brigham Green Enhancement and Parking Project.

The Binney Street Building

The Binney Street Building includes clinical and office space which will be used in the long-term by BWH for clinical uses. The building includes a meeting room that accommodates up to 120 people. In the short-term, the Department of Mental Health (DMH) will occupy the Binney Street Building until the DMH designated space within the Brigham and Women's Building is available. The Binney Street Building opened in November 2011.

The Brigham and Women's Building

The Brigham and Women's Building will contain approximately 358,670 sf of space for research and development, clinical, and office uses by BWH and DMH. The building also includes a 450-seat conference center for grand rounds, teaching and conferences. Construction of the Brigham and Women's Building is on the former Main Massachusetts Mental Health Center site. The Brigham and Women's Building is expected to start construction in 2013 with completion in 2016.

Brigham Green Enhancement and Parking Project

Current planning calls for the Brigham Green Enhancement and Parking Project to be started prior to the start of construction of the Brigham and Women's Building included in the 2010 BWH IMP. Construction of the Brigham Green Enhancement and Parking Project is expected to start in 2012 with completion in 2014.

Campus Additions and Campus Upgrades

The 2010 BWH IMP allowed for 20,000 sf of Campus additions and upgrades. BWH intends to conduct these improvements. In particular, BWH is anticipating an expansion of its Newborn Intensive Care Unit, located in the Connors Center for Women's Health, to accommodate increased demand for single rooms for newborns and their families.

1.3 Mission and Objectives

BWH is dedicated to serving the needs of the community. It is committed to providing the highest quality health care to patients and their families, to expanding the boundaries of medicine through research, and to training the next generation of health care professionals.

BWH's stated vision is stated below:

Brigham and Women's Hospital will be the academic and community teaching hospital and physicians of choice with the most distinguished caliber of physician and professional healthcare staff. We will create the highest quality of care through our commitment to patients and their families, the innovation inherent in our academic programs, and the strength of partnerships with members of Partners HealthCare System, Dana Farber Cancer Institute, Harvard University, and our local community, as well as our unique relationships with care provider groups such as Atrius Health.

BWH's values include:

- **Quality Patient Care:** Delivering quality patient care is the center of everything we do.
- **Teaching Excellence:** We seek to uphold the highest standards in training health care professionals.

- **Research Leadership:** We continuously seek new ways to demonstrate our leadership role in research.
- **Customer Focus:** Our focus is to serve our customers.
- **Respect for the Individual:** We recognize and value the contributions of every individual.
- **Teamwork:** We work toward a unified approach to developing health care solutions.
- **Embracing Change:** Embracing change will help us to be successful.
- **Operational Efficiency:** We strive for efficient and effective delivery of services.

Since the formation of BWH, the Hospital has distinguished itself in Boston and throughout the nation for its excellent patient care, research, and education.

1.3.1 Patient Care

BWH is a full-service, acute care teaching hospital, providing a number of specialized services to patients from Boston and New England. The Hospital has 793 beds and 43 operating rooms, and in 2010 admitted over 46,000 inpatients. Ambulatory visits have grown to more than 3.5 million per year, and the Emergency Department treated approximately 59,000 patients. The Newborn Intensive Care Unit cares for more than 1,300 infants annually.

BWH has one of the largest obstetrical programs in New England, with approximately 9,000 deliveries each year, and one of the most comprehensive high-risk obstetrics services in the country.

As described in the 2010 BWH IMP, BWH has two licensed health centers in Boston—Southern Jamaica Plain and Brookside (both located in Jamaica Plain)—saw a total of 152,504 ambulatory visits in FY 2008. The BWH's community health centers represent approximately 17% of BWH's total ambulatory volume. Specialties include primary care, pediatrics, adult medicine, obstetrics and gynecology, mental health, women's health, WICS, and dentistry. BWH purchased the building site at 640 Centre Street and invested $5.3 million to build the 18,000 sf health center (Southern Jamaica Plain Health Center) in 1997 to 1999 for residents of Jamaica Plain, Roslindale, Hyde Park and West Roxbury. BWH has undertaken a modest expansion and upgrade to the services offered at Southern Jamaica Plain Health Center to better meet the community's needs.

In 2001, BWH purchased the existing Brookside Community Health Center on Washington Street and completely renovated and expanded it to 27,000 square feet. BWH invested approximately $5.4 million in this important community health center to serve the residents of Jamaica Plain, Roxbury, North Dorchester and Mattapan. It is currently in the process of upgrading the parking and landscaped areas surrounding the Brookside Community Health Center, representing a further investment in the community. In addition to these major

capital investments, BWH underwrites the two health centers' operational budgets by approximately $4 million annually.

BWH is also one of the largest providers of free care to people without means to pay for health care in the Commonwealth, and a major provider of health care for patients on Medicaid.

1.3.2 Biomedical Research

Throughout its long history, BWH has been internationally recognized for excellence in biomedical research. In recent years, even greater contributions and recognition in research have been achieved. As described in the 2010 BWH IMP, BWH ranks second nationally among independent hospitals in research funding from the National Institutes of Health, receiving over $252 million from the NIH in FY 2008. Leading BWH research programs supported by the NIH include those in:

- Cardiology;
- Multiple Sclerosis;
- Alzheimer's Disease;
- Hypertension;
- Renal Medicine;
- Obstetrics and Gynecology;
- Infectious Diseases;
- Surgery;
- Pathology; and
- Rheumatology.

Additional research funding from other federal, state, not-for-profit, foundation, and industry funding sources is estimated to be over $189 million in FY 2008 bringing total research funding to over $441 million.

To foster the research missions of the Hospital, all of BWH's physicians are required to maintain faculty appointments at Harvard Medical School and to participate actively in both research and patient care. This universal requirement is unique among the Harvard-affiliated teaching hospitals. To permit integration of basic biomedical research with patient care applications, clinical facilities at BWH have been developed in close proximity to the BWH research laboratories and to basic sciences laboratories at Harvard Medical School. The furtherance of BWH's research mission, whose efficacy is demonstrated in clinical applications, is a key element of the BWH 2012 IMP Amendment.

1.3.3 Education

BWH is a major teaching affiliate of Harvard Medical School. As described in the 2010 BWH IMP, more than 40 percent of Harvard Medical School students undergo clinical training at BWH, and BWH faculty participates actively in formal courses at the school. In graduate medical education, BWH maintains 45 ACGME-accredited programs with approximately 850 residents and fellows each year. Educational experiences are provided additionally to research fellows funded primarily by the NIH. To promote its teaching mission, BWH has full-time clinical faculty of approximately 1,200 on the medical staff and an additional affiliate staff of approximately 800 physicians, all of whom hold faculty positions at Harvard Medical School.

In addition to educational programs in medicine, BWH serves as a clinical training site for nursing students, chaplaincy, dieticians, medical technologists, nuclear medicine technologists, occupational and physical therapists, pharmacists, radiology technologists, respiratory therapists, and social workers.

1.4 Existing Campus Description

1.4.1 BWH Campus and Facilities

The BWH Campus is located in Boston's LMA and includes:

(i) an area of land bounded generally by Francis Street, Huntington Avenue, Shattuck Street, and Binney Street (8.73 acres) which contains the Hospital's main buildings and below-grade parking garage;

(ii) an area on the south side of Francis Street between Binney and Vining streets (the site of the recently opened Shapiro Cardiovascular Center) (1.11 acres), as well as an area of Francis Street between the Shapiro Cardiovascular Center and 75 Francis Street;

(iii) an area south of the Shapiro Cardiovascular Center (approximately 1.5 acres), the site of the approved Brigham and Women's Building;

(iv) An area of Fenwood Road for tunnel levels and a bridge connection from the Brigham and Women's Building to the Shapiro Cardiovascular Center and to the BWH Campus;

(v) an area between Brookline Avenue and Binney Street (1.28 acres), the site of the Servicenter Complex which contains a materials handling center (owned by and used exclusively by BWH), approximately 12,989 sf of space devoted to doctor's offices used by BWH; and 643 parking spaces located in the garage;

(vi) property at 221 Longwood Avenue (1.60 acres) which hosts three hospital buildings, including the former Boston Lying-In Hospital buildings and the Eugene Braunwald Research Center; and

(vii) residential property at 48 Francis Street (0.07 acres), which houses a four-story residential structure with three units used for long term residential stays for oncology and thoracic surgery patients and families.

Together, these land areas totaling 14.4 acres are the BWH Campus and are co-extensive with the limits of the BWH Institutional Overlay District. The BWH Campus includes approximately two million gross square feet of building area.

The BWH-owned facilities are depicted in Figure 1-3.

1.4.1.1 Outside the LMA

BWH also owns and operates two large community health centers—Brookside Community Health Center and Southern Jamaica Plain Health Center—which are both located outside the LMA in Jamaica Plain.

1.4.2 BWH Leased Facilities

In addition to facilities it owns, BWH leases space in buildings in and around the LMA that support activities occurring on the BWH Campus. A wide variety of functions occur at the leased facilities. Leased space is depicted on Figure 1-3.

BWH leases include research space and parking facilities at several facilities, including Children's Hospital, Emmanuel College, and the Dana-Farber Cancer Institute.

1.4.3 Service and Loading

The primary location for materials handling and waste is the Servicenter Complex, where the Hospital's main loading docks are located on Fenwood Road. A service tunnel at the second below-ground level (L2) connects the loading docks to the BWH Campus, including the Shapiro Cardiovascular Center. Additional loading and service areas are located at West Plaza (20 Shattuck Street) and the Thorn Building (50 Shattuck Street).

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LEGEND

BWH Campus

BWH Owned Facilities

- **A1** Ambulatory Services Building 1
- **AB** A Building/Coolidge/Scan
- **AL** Amory Lab
- **AP** Ambulatory Garage [below grade]
- **BB** B Building
- **BI** Bicor Building
- **BP** Biophysics Building
- **CA** Carrie Hall/Clinics/Pearl
- **CW** Connors Center for Women's Health
- **LL** Lower Levels [not shown]
- **MR** Medical Research Building
- **NA** Nesson Ambulatory Center
- **PB** Peter Bent Brigham
- **RA** Radiology Building
- **SR** Surgery Building
- **TH** Thorn Research Center
- **TR** Tower Building
- **WP** West Plaza Infill
- **48** 48 Francis Street
- **BL** Boston Lying-In
- **BR** Eugene Braunwald Research Ctr.
- **RF** Richardson Fuller
- **SC** Servicenter
- **CC** Shapiro Cardiovascular Center

BWH Leased Facilities

- **AH** Alumnae Hall and Parking
- **BC** One Brigham Circle
- **CH** Children's Hospital Research Building (Karp Research Building)
- **DF** Dana-Farber Building (Smith Building)
- **HM** Harvard Institutes of Medicine
- **H1** 651 Huntington Avenue
- **H2** 741 Huntington Avenue
- **LG** Longwood Galleria
- **MP** Massachusetts College of Pharmacy
- **NH** Neville House
- **NR** New Research Building (Harvard)
- **MB** MASCO Building

Source: BWH, BRA

2012 BWH IMP Amendment Project Boston, MA

Epsilon ASSOCIATES INC.

Figure 1-3

Existing BWH LMA Facilities

1.5 Public Benefits

As described in the 2010 BWH IMP, BWH is one of the largest providers of Health Safety Net care to people without means to pay for health care in the Commonwealth. In FY 2008, more than $40 million worth of care was provided to approximately 3,000 patients. More than one-third of these patients came from Boston neighborhoods, including the communities of Dorchester, Mattapan, Jamaica Plain and Roxbury. At the same time, the Hospital treated nearly 5,000 patients insured under Commonwealth Care.

BWH is also a major provider of health care for patients on Medicaid, providing more than $161 million worth of care to more than 25,000 patients in FY 2008. Nearly half of those patients were from Jamaica Plain, Dorchester, and Roxbury.

1.5.1 Linkage

Under Section 80B-7 of the Code, projects that require zoning relief and that will devote more than 100,000 sf of space to "development impact uses," must make contributions to the City of Boston's Neighborhood Housing Trust and Neighborhood Jobs Trust. The proposed Project will make both a housing contribution grant and a jobs contribution grant to the Neighborhood Housing Trust and the Neighborhood Jobs Trust, respectively as required pursuant to Article 80B-7 of the Code.

1.6 Project Team

Proposed Project: 2012 BWH IMP Amendment Project

Address/Location: 45 Avenue Louis Pasteur, Emmanuel College Campus,
Longwood Medical and Academic Area

Proponent: The Brigham and Women's Hospital, Inc.
75 Francis Street
Boston, MA 02115
(617) 355-6000
Arthur Mombourquette

Architect: Chan Krieger NBBJ
8 Story Street
Cambridge, MA 02138
(617) 354-5315
Tom Sieniewicz

Environmental Consultants:	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Cindy Schlessinger Geoff Starsiak
Legal Counsel:	Nutter McClennen & Fish LLP Seaport West 155 Seaport Boulevard Boston, MA 02210 (617) 439-2000 Mary T. Marshall, Esq.
Transportation Consultants/Civil Engineers:	VHB/Vanasse Hangen Brustlin, Inc. 99 High Street Boston, MA 02110 (617) 728-7777 Sean Manning, PE, PTOE
Geotechnical Consultant:	Haley & Aldrich 465 Medford Street Boston, MA 02129 (617) 886 7400 Lisa Turturro

Chapter 2.0
Project Description

2.0 PROJECT DESCRIPTION

2.1 Program Need

Over the past several years, BWH-based research expenditures have been growing at 5 percent per year, and a total research budget of more than $537 million. As one of the country's leading recipient's of NIH grants, and mindful of anticipated termination of leased research space and growth of research programs, BWH determined that new research space proximate to the BWH Campus is essential. BWH needs additional research space to maintain its leadership in medical research. Expanding research needs requires retaining and attracting new researchers to BWH. These researchers also serve as doctors and educators and prefer connectivity between research space and clinical centers. In addition to wet lab space, an essential part of successful research is the ability to provide adequate dry space in close proximity to research areas for faculty, fellows, research assistants, monitors, students, and associated dry research functions. With the expiration of several leases in buildings owned by Children's Hospital Boston and the Dana-Farber Cancer Institute, BWH recognizes the need for new research space proximate to its Campus and clinical areas.

2.2 Project Site

The Project site is an approximately 78,588 square foot (sf) portion of Emmanuel College's Endowment Campus, known as Parcel C and as described in Emmanuel College's Institutional Master Plan, as approved in 2000. Parcel C is also commonly referred to as 45 Avenue Louis Pasteur. The site, currently leased by BWH, includes a two-story concrete and brick parking garage with 328 parking spaces, 27 surface parking spaces and Alumnae Hall, an approximately 50,000 sf, three-story building. BWH intends to enter into a long-term ground lease with Emmanuel College for Parcel C in order to enable development of the proposed Project. The existing structures on the site will be demolished in order to enable the development of the Project.

2.3 Proposed IMP Project

The 2012 BWH IMP Amendment Project is a new approximately 150-foot tall, 360,000 sf building for hospital use, including basic 'wet type' science labs for research. The proposed structure will have an associated underground parking garage for 355 cars. Research and imaging equipment will also be below grade. Figures 2-1 to 2-5 provide a site plan, section, massing and perspectives of the Project.

The Project will likely house research in support of the departments of Medicine and Surgery, particularly the divisions of pulmonary surgery and anesthesia. Advanced equipment will likely include a cyclotron facility to aid in nuclear pharmacology, a micro PET CT scanner and a research centered aquatics facility. Also in support of the laboratory facility will be an extensive safety office, laboratory administration and a building

management office. The Project will include a lecture auditorium with approximately 250 seats aiding in one of the Hospital's central missions to be a premier center for medical education. A small cafeteria is proposed for the building as well.

The Project will allow for the continuation of a strong tradition of research in support of patient care offered historically at BWH. Recent advances in medicine portend a future of customized medicine, an unprecedented compression of the distance between bench and bedside, a future of medicine that makes the individual patient the center of not only the care, but also the research enterprise. These labs will mean that BWH will continue to be seen as a leader in research not only regionally, but also nationally; BWH currently attracts the second largest amount of NIH funding in the country and the Project will allow BWH to continue this remarkable accomplishment. The Hospital's continued leadership in research and clinical care is dependent on the laboratory spaces it can offer its talented staff. The location of laboratories proximate to BWH's Campus is important, as well as BWH's ability to manage its laboratory space for the long-term with assurance.

A drop-off and main entry are proposed to be serviced at the existing curb cut along Avenue Louis Pasteur. This driveway will serve to keep all traffic off the Avenue.

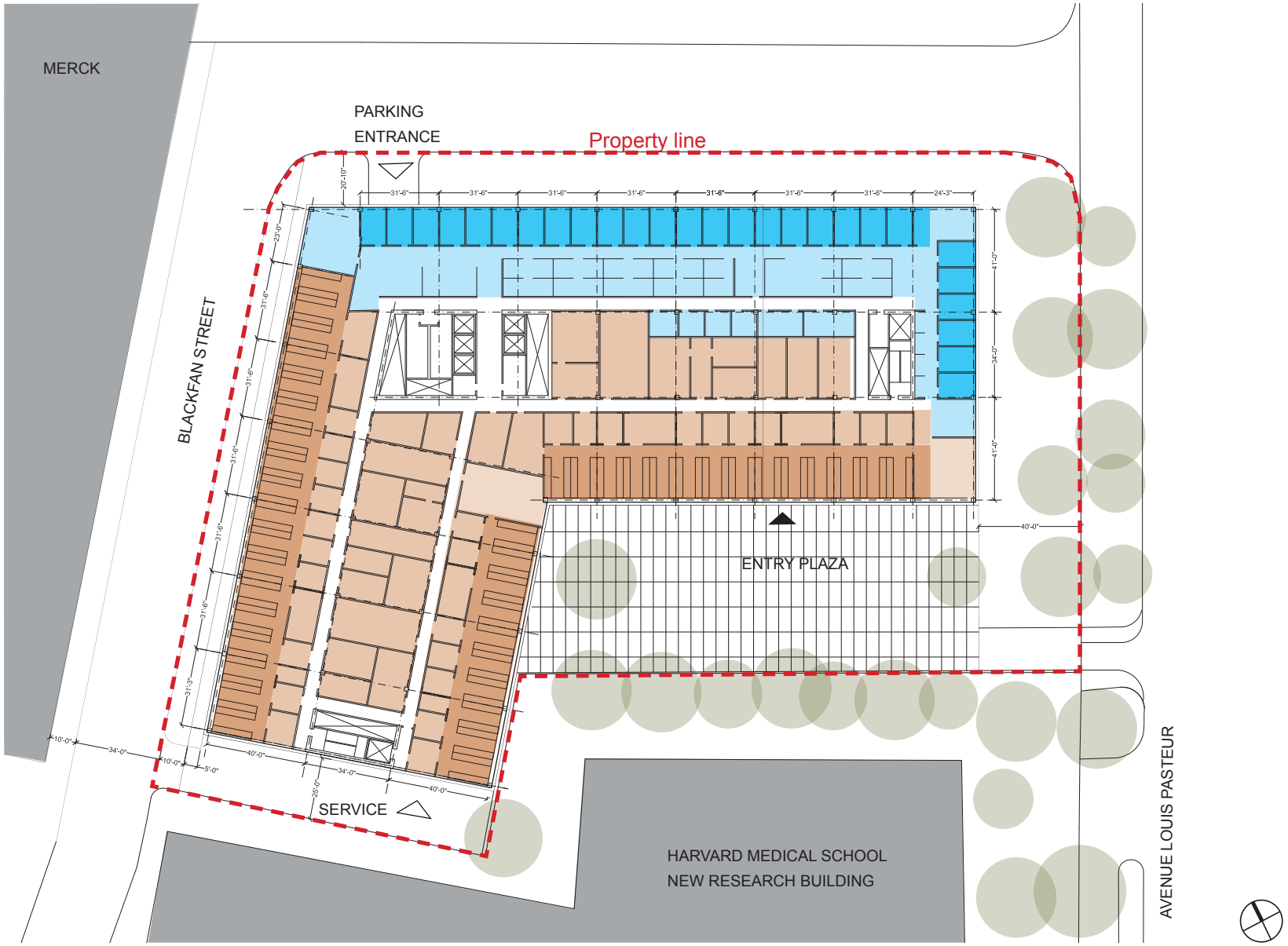
The building's architecture will be consistent with the district in which it stands, setback from Avenue Louis Pasteur and enclosed in a combination of glass curtain wall and masonry. The architecture presents the short dimension of its mass to this main street of the LMA.

2.3.1 Schedule

The Project schedule is still being determined, but once started, construction will span approximately 36 months.

2.4 Relationship with Emmanuel College

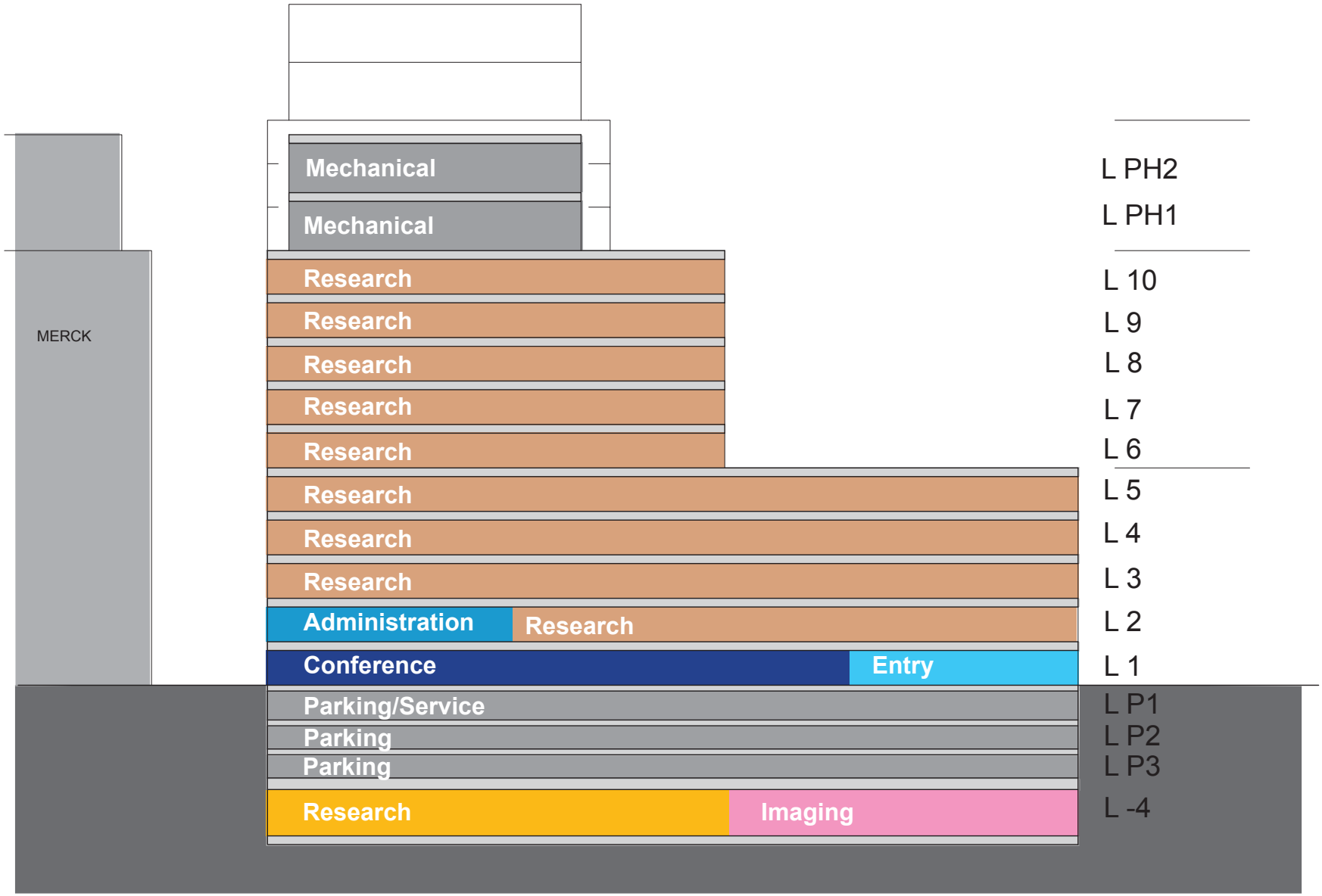
BWH intends to enter into a long-term ground lease with Emmanuel College for Parcel C in order to enable the development of the Project. Emmanuel College is currently in the process of amending and renewing its 2000 IMP and filed an Institutional Master Plan Notification Form for its Campus (including its Endowment and Academic Campus) on June 22, 2011 (Emmanuel's IMPNF). Emmanuel's IMPNF did not seek approval for future development on Parcel C, although it described the future filing of a Planned Development Area Plan (PDA Plan) authorizing similar density and use to that which is being proposed by BWH for its hospital purposes. Emmanuel College is now preparing a Institutional Master Plan for review and approval in accordance with Article 80D of the Code. By virtue of this filing, BWH is proceeding now to establish the relevant zoning approvals to authorize the development of Parcel C through a concurrent Article 80 process for the



2012 BWH IMP Amendment Project Boston, MA

CHAN KRIEGER NBBJ

Figure 2-1
Project Site


MERCK
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Conference
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Parking/Service
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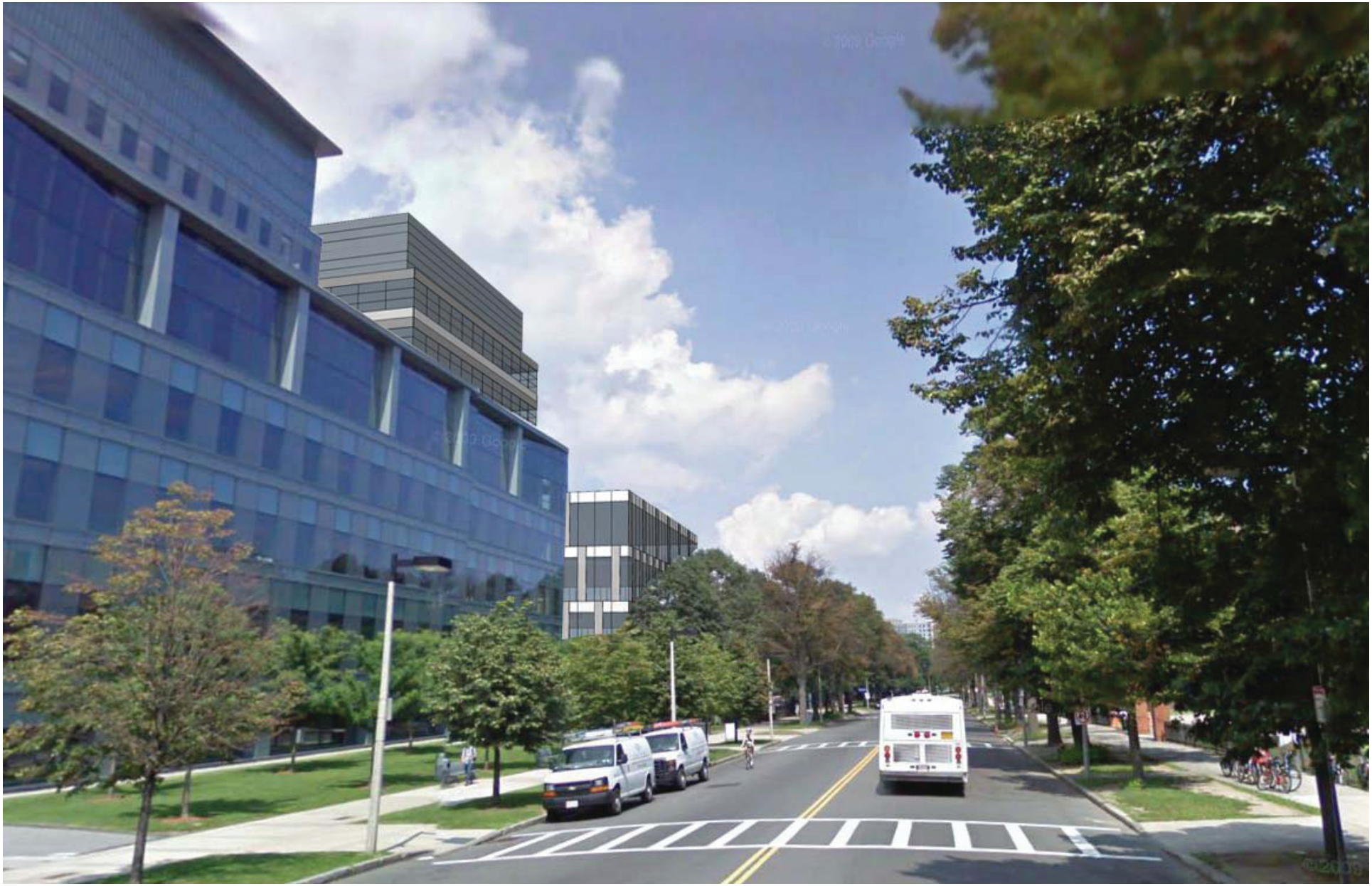
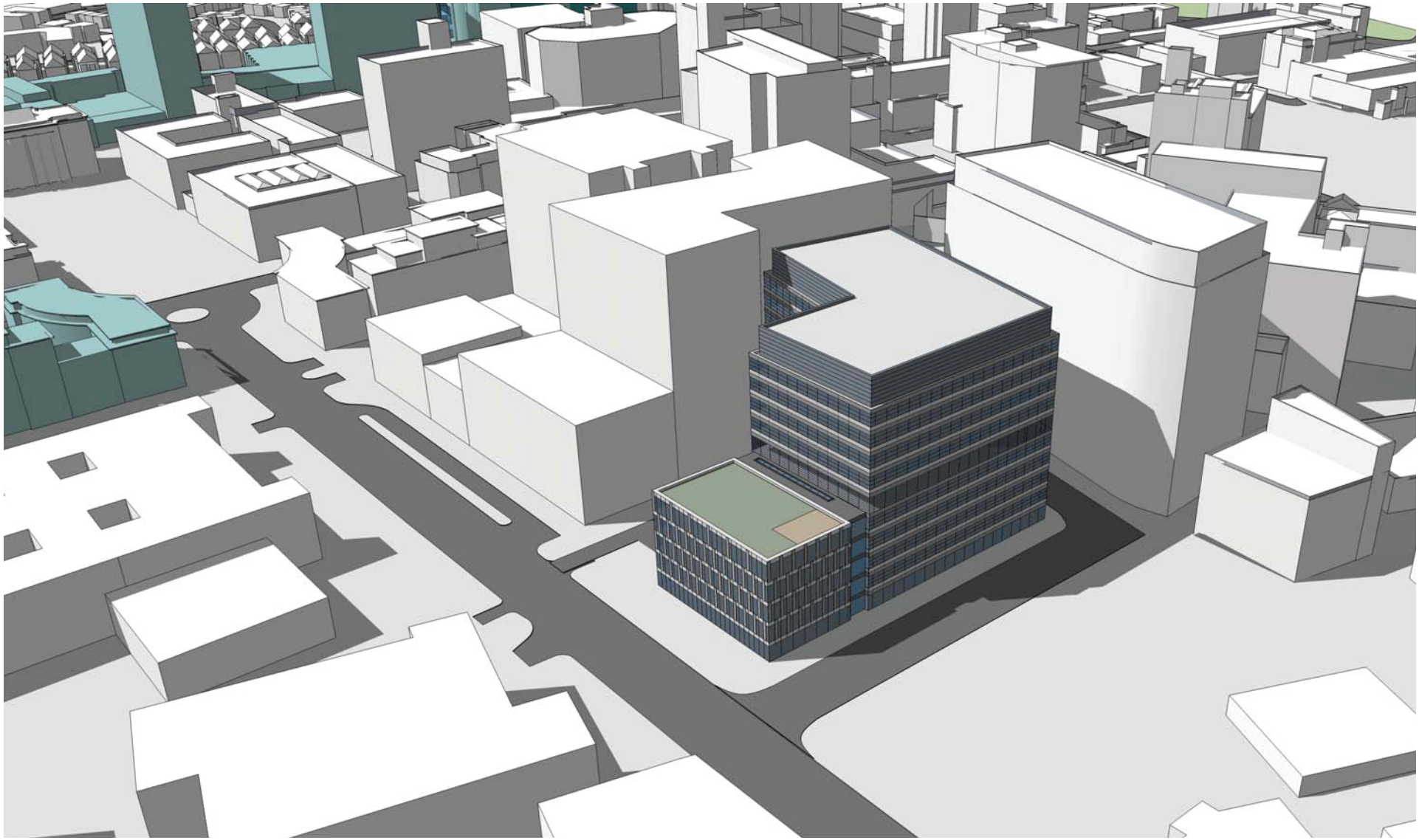


2012 BWH IMP Amendment Project Boston, MA

CHAN KRIEGER NBBJ

Figure 2-4

Perspective - Looking North



Project described herein. BWH's permitting and development of the Project on Parcel C is best coordinated with Emmanuel College's IMP approval, and both Emmanuel College and BWH are working collaboratively to achieve that end.

2.5 Zoning

As noted above, the proposed Project site, also referred to as Parcel C, is located within Emmanuel's Endowment Campus as described in Emmanuel's existing 2000 IMP and current IMPNF. The Project will be authorized by an amendment to BWH's 2010 IMP (BWH 2012 IMP Amendment) and corresponding modification of BWH's IMP Overlay District to include Parcel C and to authorize the development and use of the Project as described herein in accordance with the provisions of Article 80D and Article 80B of the Code.

2.6 Anticipated Permits and Approvals

While the Project's design has not advanced sufficiently to definitively identify all Project approvals, the following public approvals are those likely to be required in order to enable the Project:

Agency Name	Permit/Approval
City of Boston	
Boston Civic Design Commission	Review pursuant to Article 28 of General Massing and Site Strategy only
Boston Redevelopment Authority	Article 80B Large Project Review Article 80D Institutional Master Plan Review Other approvals as required
Boston Zoning Commission	Approval of the BWH Institutional Master Plan Amendment and corresponding changes to the boundaries of the BWH IMP Overlay District
Boston Water and Sewer Commission	Sewer Use Discharge Permits Site Plan Approvals Sewer Extension/Connection Permits Stormwater Connections
City of Boston Inspectional Services Department	Building and Occupancy Permit
City of Boston Public Improvement Commission	Streetscape Improvements and discontinuances (if required)
Boston Department of Public Works	Street Occupancy Permit (construction period) Curb Cut Approval (if required)
Boston Transportation Department	Transportation Access Plan Agreement Construction Management Plan
Boston Landmarks Commission	Article 85 Demolition Delay

Agency Name	Permit/Approval
Boston Parks and Recreation Commission	Approval of Construction within 100 feet of park or parkway (if required pending jurisdictional determination)
City of Boston Committee on Licenses	Permit to erect and maintain parking Flammable storage license
Boston Fire Department	Permits and review as necessary
Commonwealth of Massachusetts	
Department of Environmental Protection, Division of Air Quality Control	Environmental Results Program Review under Title V (if necessary) Abatement of hazardous materials permits (if required) DEP Concurrence re: Documentation of Public Benefits for use of Filled Tidelands
Executive Office of Environmental Affairs (MEPA Unit)	Secretary Certificate
Massachusetts Water Resources Authority	Sewer Use Discharge Permit Construction Dewatering Permit Industrial Discharge Permit for Project (if required)
Massachusetts Historic Commission	State Register Review
Massachusetts Aeronautics Commission	Notice of Pre-Construction

2.7 Legal Information

The Trustees of Emmanuel College own the fee ownership of Parcel C and the remainder of the Emmanuel College campus. Parcel B has been subject to a long-term ground lease which has been developed for use by Merck for research and development purposes and related use. Parcel A is also currently leased to Merck. Emmanuel College and BWH are contemplating entering into a similar long-term ground lease arrangement with respect to Parcel C which would allow for the development of the Project.

2.8 Consistency with LMA Guidelines

The Project is generally consistent with the LMA Interim Guidelines. The dimensions of the Project will be consistent, as the height of the building within the streetwall zone along Avenue Louis Pasteur is 75 feet and the height of the other portion of the building beyond the streetwall zone will be approximately 150 feet—elements of the building that exceed 75 feet will be set back 75 feet from the street frontage. The dimensions are also consistent with those requirements that pertain to the Parks and Boulevards Protection Zone. The Project will include a mix of uses, including research, office, and a cafeteria, as well as public access to the lobby and auditorium; ground floor retail is less suitable due to the characteristics of Avenue Louis Pasteur, and therefore is not proposed.

The Project will improve the streetscape and pedestrian environment in the area. The demolition of the parking garage will allow for the construction and continuation of 15 foot wide sidewalks on the eastern side of Blackfan Street where none exists today due to the close to zero setback condition of the parking garage. This pedestrian environment will be further enhanced by a 20 foot wide set back and sidewalk on the northern side of the Project site. This rationalization of the pedestrian environment will improve access, visibility and way-finding. The proposed streetscape planting and paving will enhance the public realm dramatically. Local vehicular drop-off and access to the site will be from Avenue Louis Pasteur across an existing curb-cut. The increase in traffic at this main entry to the Endowment Campus will be modest as the vast majority of the buildings occupants will either arrive by transit or have access to the building's garage from Blackfan Street. Access to services areas will also be from Blackfan Street.

Chapter 3.0
Assessment of Development Review Components

3.0 ASSESSMENT OF DEVELOPMENT REVIEW COMPONENTS

3.1 Transportation

The transportation section presents a summary of the 2012 BWH IMP Amendment Project and the BWH Campus from a transportation perspective, and provides an overview of the area's existing transportation infrastructure including:

- a brief discussion of the transportation characteristics of the Hospital and the Project;
- the existing transportation infrastructure surrounding the site, including descriptions of public transportation, area roadways, parking and patient valet operations, loading activities, and bicycle storage;
- an evaluation of future conditions with the Project in place, including future parking and bicycle storage, loading activities, and trip generation; and
- a discussion of anticipated transportation-related construction management actions and transportation demand management (TDM) measures that are expected to be employed in connection with the Project.

3.1.1 Project Summary

The Project site is presently part of the Emmanuel College campus and includes the 50,000 sf Alumnae Hall, a 328 space parking deck and 27 surface parking spaces (355 total existing parking spaces on-site). The existing building has been used both as swing space for Emmanuel's academic functions during building renovation projects on the Academic Campus, and as space for lease to other LMA institutions. Currently, the Project site, including the entire building and all 355 parking spaces, is leased by BWH.

As described previously in Chapter 2, BWH is proposing to develop an approximately 360,000 sf research building on the site. The building will include construction of a below-grade parking garage with 355 spaces. The 355 parking space will be replacement spaces for the existing on-site parking supply.

Table 3-1 presents the proposed program.

Table 3-1 2012 BWH IMP Amendment Project Program Summary

	Size (sf)	Parking
BWH Research Building	360,000	355
Demolition of Alumnae Hall and Parking Deck	(-50,000)	(-355)
Net New Total	310,000	0

3.1.2 Existing Transportation Conditions

This section provides a summary of existing transportation conditions at BWH and the Project site, including:

- a description of the existing BWH Campus and Project site;
- the existing roadway network;
- existing parking and valet services serving BWH;
- existing loading operations at the BWH Campus;
- public transportation services in the area; and
- a summary of bicycle amenities at the BWH Campus today.

3.1.2.1 Existing Site Description

The BWH Campus is located predominately in the LMA and abuts the Mission Hill residential neighborhood. The existing BWH Campus includes the block bounded by Francis Street, Shattuck Street, Brookline Avenue, and Huntington Avenue. BWH also owns the newly constructed Shapiro Cardiovascular Center at 70 Francis Street, the Servicenter Garage at 80 Francis Street and several buildings located at 221 Longwood Avenue. All of these properties are described in BWH's 2010 IMP and located within their IMP Overlay District.

The Project site is part of Emmanuel College's Endowment Campus and includes the 50,000 sf Alumnae Hall and 355 parking spaces. The site is bound by Avenue Louis Pasteur, Blackfan Street and Harvard Medical School. Parking on-site currently includes a 328-space parking deck and 27 additional surface parking spaces. Existing vehicle access and egress is provided via a curb cut on Avenue Louis Pasteur.

3.1.2.2 Roadway Descriptions

Avenue Louis Pasteur provides two-way travel between The Fenway and Longwood Avenue. The street provides one generous travel lane in each direction which affords a curbside drop-off/pick-up zone for parents and buses at the nearby Boston Latin School. In addition, the street provides staging for various LMA institutional buses. Sidewalks are provided on both sides of the street.

Blackfan Street, an extension of Blackfan Circle, provides two-way travel between Avenue Louis Pasteur and Longwood Avenue. One travel lane is provided in each direction. No on-street parking is provided. Sidewalks are provided on the west side of the street near the Project site.

3.1.2.3 BWH Existing Parking and Valet Activity

BWH currently controls approximately 5,873 total off-street parking spaces, with 1,525 parking spaces available for use by its patients and visitors, and 4,348 parking spaces available for staff. Approximately 44 percent of the employee parking supply (2,579 spaces) is located outside of the LMA in remote parking facilities. Most of the off-site parking is utilized by employees who either walk or use shuttle buses to travel between the Campus and these remote parking facilities. A summary of the existing parking supply is shown in Table 3-2.

Table 3-2 BWH Existing Parking Space Inventory (December 2011)

Parking Facility	Owned/ Leased	Number of BWH Spaces			Connecting Mode
		Total	Patient/Visitor	Employee	
On-Campus/LMA					
Mission Park Garage	Leased	1,315	160	1,155	Walk
Servicenter Complex	Owned	650*	650	0	Walk
ASB-II Garage (45 Francis)	Owned	247	246	1	Valet
221 Longwood	Owned	15	15	0	Walk/Valet
Harvard Garage	Leased	3	0	3	Walk
15 Francis Street	Owned	57	47	10	Walk/Valet
One Brigham Circle	Leased	248	0	248	Walk
Harvard NRB Garage	Leased	311	0	311	Walk
Mass College of Pharmacy	Leased	40	0	40	Walk
Smith Building (Dana Farber)	Leased	33	0	33	Walk
Children's Hospital Garage	Leased	20	0	20	Walk
Alumnae Hall (Emmanuel)	Leased	355	0	355	Walk
Total On-Campus/LMA		**3,294**	**1,118**	**2,176**	
Off-Campus					
20 Kent Street Lot **	Leased	24	0	24	Walk
850 Boylston Street **	Leased	681	407	274	Shuttle
Wentworth Lot	Leased	277	0	277	Shuttle
Lansdowne Garage	Leased	200	0	200	Shuttle
Red Sox Garage	Leased	107	0	107	Shuttle
116 Huntington Avenue	Leased	5	0	5	Walk
Colonnade Garage	Leased	15	0	15	Walk
Chestnut Hill Lot	Leased	146	0	146	Shuttle
Ipswich Garage	Leased	62	0	62	Shuttle
Atrium Mall	Leased	200	0	200	Shuttle

Table 3-2 BWH Existing Parking Space Inventory (December 2011) (Continued)

Parking Facility	Owned/ Leased	Number of BWH Spaces			Connecting Mode
Off-Campus					
One Brookline Place	Leased	12	0	12	Shuttle
1249 Boylston Street Lot	Leased	40	0	40	Shuttle
St. Lawrence Church	Leased	40	0	40	Walk
Crosstown Garage	Leased	616	0	616	Shuttle/Walk
65 Lansdowne Garage	Leased	122	0	122	Shuttle
Kenmore	Leased	32	0	32	Shuttle
Total Off-Campus		**2,579**	**407**	**2,172**	
Total BWH Parking Spaces		**5,873**	**1,525**	**4,348**	

**BWH controls 650 spaces; however most of the spaces are transient spaces and are used by other institutions.*

***Spaces provided do not support space in the LMA.*

In addition to the parking spaces above, BWH has 400 (249 net-new) spaces permitted at the future Brigham Green project site and 406 (300 net-new) spaces permitted at the Massachusetts Mental Health Center site. BWH expects to begin construction of the new Brigham Green parking facility in 2012. Below grade parking on the approved Massachusetts Mental Health Center site is not anticipated for several years, as discussed in greater detail within BWH's 2010 IMP.

The Project site currently provides 355 parking spaces in a combination of 328 structured spaces and 27 surface spaces.

3.1.2.4 BWH Loading and Service Activities

The main BWH loading and service area is located in the Servicenter Loading Dock at 89 Fenwood Road, underneath the Servicenter Parking Garage and connected to the main BWH Campus by an underground tunnel beneath Francis Street. Additional loading and service areas are located at the West Plaza Loading Dock (20 Shattuck Street) and the Thorn Building (50 Shattuck Street). Small deliveries, such as flowers, occasionally arrive at the 75 Francis Street entrance. No changes are anticipated at the existing loading facilities servicing the Campus as a result of the proposed Project.

3.1.2.5 Public Transportation and Shuttle Services

The Project site is well served by public transportation. The site is located between the Arborway (E Line) Branch and the Riverside Branch (D Line) of the MBTA Green Line. The Green Line connects to the North Station Commuter Rail Station. The Project is also close to the Orange Line which provides connections to Back Bay's Commuter Rail Station. MBTA services are described below:

- **Green Line D Branch** – The D (or Riverside) Branch of the Green Line light rail subway line runs on 5-minute headways during peak hours. The line runs above ground on a dedicated right-of-way from Riverside Station in Newton through multiple stations in Newton, Brookline, and Boston before turning north along the Riverway and joining the main below-grade Green Line east of Fenway Station. The main line continues through the Back Bay, Government Center, and North Station to its terminus at Lechmere Station. The D line stops closest to the site are the Fenway and Longwood stops, both located to the north. Passengers traveling to the site would either walk one-half mile from the Longwood stop, or transfer to MBTA bus routes 60 or 65 at Brookline Village.

- **Green Line E Branch** – The E (or Heath Street) Branch of the Green Line light rail subway line runs on 9-minute headways during peak hours. The line originates at Heath Street Station and runs east at grade within the median of Huntington Avenue. Southwest of Massachusetts Avenue, the line descends below grade to serve Symphony and Prudential stations before joining the main Green Line (described previously in the D Branch section) at Copley. The site is served by the line's Longwood and Museum of Fine Arts stops.

- **Orange Line** – The Orange Line heavy rail subway line runs on 5-minute headways during peak hours, using 6-car trains. From north to south, the line runs from Oak Grove Station in Malden through Medford, Charlestown, downtown Boston, the South End, and Roxbury, before reaching Forest Hills Station in Jamaica Plain. The Orange Line connects with the Green Line and with all northern commuter rail lines at North Station, with the Green Line at Haymarket, with the Blue Line at State Street, and with the Red Line at Downtown Crossing. It connects with all northern commuter rail lines at North Station. Orange Line passengers traveling to the site would either walk approximately one mile from Roxbury Crossing Station or take the MASCO Ruggles Express shuttle service from Ruggles Station to the LMA.

The MBTA also operates several bus routes that provide service within one-half mile of the Project site:

- **Crosstown 2 (CT2)** bus route operates on 20-minute headways between Kendall Square Station on the Red Line and Ruggles Station on the Orange Line.

- **Crosstown 3 (CT3)** bus route operates on 20-minute headways between the LMA and Andrew Square Station on the Red Line in Dorchester.

- **Route 8** operates on 20-minute intervals between Kenmore Square and Harbor Point in Dorchester, with high-frequency service between Kenmore Square and the Ruggles MBTA Orange Line/Commuter Rail Station during peak commuter periods.

- **Route 19** runs between Fields Corner Station on the Red Line and Kenmore Station on the Green Line. During peak hours this route stops at Ruggles Station on the Orange Line. During the midday, this route only provides service between Fields Corner and Ruggles Station.

- **Route 39** provides service between the Forest Hill Station and Back Bay Station, both of which are on the MBTA Orange Line. It operates on four-minute headways during peak periods and seven-minute headways during off-peak periods.

- **Route 47** provides service between Central Square and Broadway Stations on the MBTA Red Line via Ruggles Station on the MBTA Orange Line. It runs on 25-minute headways during peak hours and 45-minute headways during off-peak hours.

- **Route 60** provides service between Chestnut Hill in Newton and Kenmore Square via Brookline Village Station on the MBTA Green Line – D Branch. The route operates on 18-minute headways during peak periods and on 30-minute headways during off-peak periods.

- **Route 65** provides service between Harvard Square in Cambridge and Dudley Square and operates on 10-minute headways during peak periods and 15-minute headways during off-peak periods.

In addition to MBTA bus routes, MASCO operates several shuttle routes that provide service within one-half mile of the Project site:

- **Fenway Shuttle** connects the LMA to the Kenmore lot. The route connects to the Landmark Center and Harvard Vanguard along Brookline Avenue. The shuttle operates on approximately 10-minute headways in the morning peak hours and 8-minute headways during the afternoon/early evening hours.

- **Wentworth Shuttle** provides access from the LMA to the Wentworth parking lot in the morning and to and from the Ruggles MBTA Station during the evening. The shuttle operates on approximately 6- to 12-minute headways in the morning peak hours and 10-minute headways during the afternoon/early evening hours.

- **Crosstown Shuttle** connects the Crosstown Parking facility to the LMA. The morning peak period shuttle runs on 7- to 12-minute headways, while the evening peak period operates on 10- to 12-minute headways.

- **M6 Chestnut Hill** connects Hammond Pond Park to the LMA while operating on 10- to 15-minute headways during both the morning and evening peak hours.

- **M2 Cambridge-Harvard Shuttle** connects Harvard and MIT in Cambridge to the LMA. The shuttle operates from 6:40 a.m. to 11:30 p.m. on 10- to 15-minute headways during peak times.

- **Ruggles Express Shuttle** connects the LMA to the Ruggles MBTA Station which provides access to the Orange Line, as well as multiple bus and commuter rail lines. The shuttle runs on 5- to 10-minute headways during the morning peak and 6- to 10-minute headways during the evening peak.

- **JFK/UMass Shuttle** provides access to and from the JFK/UMass MBTA Red Line station in South Boston and the LMA. The shuttle operates on 10-minute headways during the morning and 15- to 20- minute headways during the afternoon.

- **Landmark Shuttle** provides service between the Landmark Center and the Harvard School of Public Health. The service runs on 25-minute headways from 8:00 a.m. to 6:30 p.m.

BWH employees, patient, and visitors are also eligible to ride the free shuttles offered by Partners Passenger Transportation Service.

3.1.2.6 Bicycle Storage

BWH encourages employees to commute by bicycle. Currently there are bicycle storage racks located throughout the Campus. BWH currently maintains 26 bicycle racks throughout the Campus. These racks are available to both employees and visitors.

Seasonal Hubway bicycle sharing stations are located throughout the LMA. The closest Hubway station to the Project site is located on Emmanuel College's campus adjacent to the Project site on the Fenway.

3.1.3 Future Conditions

This section provides a summary of future transportation conditions at the site including:.

- Future parking and bicycle storage;

- Loading activities; and

- Trip generation.

3.1.3.1 Future Parking

The Project will include the construction of 355 below-grade parking spaces on-site. The 355 parking spaces—which is identical to the amount of parking that is currently provided on this site and leased to BWH by Emmanuel College—will be replacement spaces for the existing on-site parking supply (resulting in no net new parking spaces allocated to BWH on this site).

3.1.3.2 Bicycle Storage

BWH will provide bicycle racks for visitor and employee use at the Project. As the design advances, BWH will work with BTD to determine the appropriate number of bicycle spaces and location of these spaces at the Project site.

3.1.3.3 Loading Activities

It is anticipated that the building will provide dedicated, off-street loading docks so that area roadways will not be impacted. As the building design advances, the Project team will work closely with BTD to ensure that loading and service needs are accommodated at the site and off-street from either Avenue Louis Pasteur or Blackfan Circle.

3.1.3.4 Future Trip Generation

This section provides a summary of preliminary trip generation estimates for the Project. Note that the trip generation estimates presented herein are preliminary. A more detailed, empirically-based estimate of future trip generation based on employment and comprehensive review of existing transportation conditions will be developed for the Draft PIR.

Unadjusted Vehicle Trip Generation

Consistent with BTD guidelines, trips were estimated using the Institute of Transportation Engineers (ITE) Trip Generation Manual. The ITE manual yields 'unadjusted' vehicle trips, meaning that these trips do not reflect alternative modes of transportation such as walking and public transportation. The following ITE land code was used for the new building:

- LUC 760 (Research and Development Center) – was used to estimate the BWH research and development space planned at the Project.

Table 3-3 summarizes net-new unadjusted ITE trips once existing trips are accounted for.

Table 3-3 Net-New Unadjusted Trip Generation*

Land Use	Land Use Code	Size	ITE Unadjusted Vehicle Trip Generation						
			AM Peak Hour			PM Peak Hour			Daily
			Enter	Exit	Total	Enter	Exit	Total	Total
Research and Development	R&D	360,000 sf	401	87	488	68	360	428	3,220
Less Alumnae Hall Demolition	R&D	50,000 sf	(-51)	(-11)	(-62)	(-8)	(-46)	(-54)	(-406)
Less Existing Parking Deck	N/A	355 Spaces**	(-95)	(-32)	(-127)	(-32)	(-95)	(-127)	(-952)
Net-New Trips			**255**	**44**	**299**	**28**	**219**	**247**	**1,862**

**Trips are not adjusted for local mode share.*

*** Does not include any parking trips directly associated with Alumnae Hall activities.*

Adjusted Vehicle Trip Generation

To account for alternative modes of transportation, mode splits were applied to the trip results presented in Table 3-3. The auto mode split includes all vehicle based trips including taxis. Mode splits for the area are based on BTD Guidelines and are shown in Table 3-4.

Table 3-4 Peak Hour Mode Splits

Mode	Work Trips
Automobile	47 %
Public Transit	33 %
Walk/Bike/Other	20 %

Source: BTD Guidelines, Zone 5

As shown in Table 3-5, according to BTD mode split guidelines, only 47 percent of work trips to the site will be by personal automobile. The remaining trips will be walk, bike, or transit trips.

Table 3-5 provides a summary of vehicle trips adjusted for the local mode share for the research and development building.

Table 3-5 Project Trip Generation (Adjusted)

Time Period/Direction	Walk/Bike/Other	Transit	R&D Vehicle Trips	Less Existing Trips*	Net-New Vehicle Trips
Daily Total	**385**	**1,752**	**1,138**	**(-1,110)**	**28**
AM Peak Hour					
Inbound	49	222	144	(-115)	29
Outbound	10	46	30	(-36)	(-6)
AM Total	**59**	**268**	**174**	**(-151)**	**23**
PM Peak Hour					
Inbound	8	35	23	(-35)	(-12)
Outbound	44	198	129	(-113)	16
PM Total	**52**	**233**	**152**	**(-148)**	**4**

*Includes demolition of 50,000 sf of office space and 355 parking spaces.

As shown in Table 3-5, the Project is expected to generate approximately 23 net-new vehicle trips (59 in, -6 out) during the weekday morning peak hour, and 4 new vehicle trips (-12 in, 16 out) during the weekday evening peak hour once the proposed Project is completed and fully occupied. On a daily basis, the Project is expected to generate only approximately 28 new vehicle trips.

A more detailed, empirically-based estimate of future trip generation based on actual employment and a comprehensive review of existing transportation conditions will be developed for the Draft PIR. The expected effects of this growth will be evaluated on nearby streets and at area intersections as part of the Draft PIR process.

3.1.4 Construction Management

BWH will develop and submit a Construction Management Plan (CMP) to the BTD. This plan will provide a detailed evaluation of potential short-term construction-related transportation impacts, including construction vehicle traffic, parking supply and demand, and pedestrian access to the Project site.

3.1.4.1 Construction Vehicle Traffic

Construction vehicles will be necessary to move construction materials to and from the Project site. Every reasonable effort will be made to reduce the noise, control dust, and minimize other disturbances associated with construction traffic. While not specifically planned at this time, BWH will likely use Avenue Louis Pasteur via Huntington Avenue as

the principal construction traffic route to the Project site. The CMP will attempt to minimize the disruption of the traffic. All construction traffic routes are subject to BTD approval. The primary lay-down area is expected to be located on the Project site, therefore reducing the impacts to adjacent properties.

3.1.4.2 Construction Parking Issues

Contractors will be required to develop access plans for their personnel that de-emphasize auto use (such as seeking off-site parking, provide transit subsidies, on-site lockers, etc.). Construction workers will also be encouraged to use public transportation to access the Project site because no new parking will be provided for them. BWH will work with the BTD, MASCO, and the Boston Police Department to ensure that parking regulations in the area and in designated residential parking areas are enforced.

3.1.4.3 Pedestrian Access during Construction

During the construction period, pedestrian access around the Project site may need to be re-routed. A variety of measures will be considered and implemented to protect the safety of pedestrians around the site that are affected by construction. Temporary walkways, appropriate lighting, and new directional and informational signage to direct pedestrians around the construction site will be provided. After construction is complete, finished pedestrian sidewalks will be reconstructed around the new building.

3.1.5 Transportation Demand Management

The Project has distinct land use types that require different Transportation Demand Management strategies. The research and development employees will be offered the same TDM incentives as currently offered on the BWH Campus as a means to reduce single occupant driving and increase use of alternative forms of transportation to access the workplace. Current measures include the following:

- Employee Transportation Advisor – Provides alternative transportation information for employees. BWH promotes alternative transportation through a variety of newsletters, information kiosks, websites, e-mail, and special events.
- Bicycle racks are provided throughout the Campus.
- 50 percent transit pass subsidy for employees - Provides a 50 percent subsidy in the cost of MBTA transit passes for employees. The cost of passes is deducted on a pre-tax basis, resulting in an additional cost savings to employees.
- Location-priced parking - Discouraging on-campus parking by offering market rate parking for employees on-campus and while offering parking at a significantly lower rate in off-campus parking locations. Vanpool members are offered a 50 percent parking discount.

- Member of the CommuteWorks Transportation Management Association, which is operated by MASCO. CommuteWorks offers an array of ongoing programs (discussed further below) designed to encourage employees to choose alternative options for commuting.
- Emergency Ride Home - With CommuteWorks' Emergency Ride Home program, registered BWH employees can receive a guaranteed ride home in the event of a personal emergency during the work day.
- The Longwood T Party Program - Under this CommuteWorks program, BWH employees who currently drive to work alone can try using public transit risk free, and have CommuteWorks help pay for it.
- CommuteFit Program - Employees who incorporate biking, walking, or jogging into their daily commute are eligible to participate in the CommuteFit Program which offers employee incentives.
- Ridesharing: Carpools and Vanpools - CommuteWorks partners with MassRides, the Massachusetts statewide travel options program, to help match BWH employees into carpools and vanpools from their home town.
- MASCO Shuttle Services - MASCO operates several shuttles to and from the LMA providing connecting service to commuter rail and rapid transit and off-site parking facilities. With the exception of the M2 Shuttle, these shuttles are free of charge to BWH employees.
- Zipcar Discounts - BWH Employees are eligible to join CommuteWorks' Zipcar program at a reduced membership fee. Through the MASCO discount, Zipcar members also receive reduced hourly rates when using Zipcars during regular business hours.
- Personalized Commuting Assistance - CommuteWorks answers any general commuting questions employees have and provides them with various travel options to help maximize the efficiency of their commute. CommuteWorks' personalized itineraries identify employees complete travel options with information on commuter rail, subway, bus, shuttles, ridesharing, biking and walking.
- Discounted regional bus services – BWH provides a 50 percent discount to employees who commute by non-MBTA bus services. This program includes private bus services to Cape Cod and New Hampshire.
- Secure bicycle storage – BWH offers bicycle storage throughout the Campus.
- Telecommuting and compressed workweeks – BWH has an informal policy of encouraging telecommuting and compressed workweeks for employees where reasonably feasible.

3.2 Wind

The proposed Project is anticipated to be approximately 150 feet tall, with a shorter 75 foot tall portion along Avenue Louis Pasteur. The building will be of similar height and massing to other buildings in the vicinity including Harvard Medical School's adjacent New Research Building. Potential pedestrian level impacts will be studied in the Draft PIR.

3.3 Shadow

The site is located in a densely built urban area with buildings of varying heights. The Olmsted Park system is north of the Project site. New shadows from the Project are not anticipated to be cast on the Olmsted Park system during most of the year. As part of the shadow study to be conducted for the Draft PIR, the BWH will analyze the shadow effects of the Project on the Olmsted Park system and other properties within the vicinity of the site.

3.4 Daylight

The purpose of a daylight analysis is to estimate the extent to which a proposed project affects the amount of daylight reaching public streets in the immediate vicinity of a project site. The proposed Project is located adjacent to Blackfan Street and Avenue Louis Pasteur. Along these streets are buildings of similar height and with similar setbacks. The Project's anticipated daylight impact is anticipated to be similar to other buildings in the surrounding area and on these two streets.

3.5 Solar Glare

The Project will be designed so as not to present an adverse safety impact on Project area traffic as a result of reflected solar glare. Although the façade materials of the Project have not been finalized, facades are not anticipated to be reflective glass and will incorporate low E high performance glass.

3.6 Air Quality

Potential long-term air quality impacts will be limited to emissions from Project-related mechanical equipment and pollutant emissions from vehicular traffic generated by the development of the Project. If changes in traffic operations are significant, the potential air quality impacts will be modeled for both existing and future conditions in the Draft PIR to demonstrate conformance with the National Ambient Air Quality Standards.

Construction period air quality impacts and mitigation are discussed below in Section 3.12.1.

3.7 Noise

During operations, the Project's mechanical equipment is not expected to result in a perceptible change in noise levels. These impacts, and the Project's compliance with the City of Boston Noise Ordinance, will be studied in the Draft PIR.

Construction period noise impacts and mitigation are discussed below in Section 3.12.2.

3.8 Stormwater/Water Quality

The Project is expected to produce beneficial changes in the quantity and quality of stormwater runoff from the site. Please see Section 3.18.4 for additional information.

3.9 Solid and Hazardous Waste

3.9.1 Existing Hazardous Waste Conditions

Characterization of soil and groundwater is planned at the appropriate stage of the design process to further evaluate site environmental conditions and soil management requirements for the building. Management of soil and groundwater will be conducted in accordance with applicable local, state, and federal laws and regulations.

The Project involves the demolition of existing structures. The demolition debris will be removed to a properly licensed solid waste disposal facility. Asbestos-containing materials or other hazardous materials, if present, will be managed in accordance with applicable local, state, and federal laws and regulations.

3.9.2 Operational Solid and Hazardous Wastes

The Project will generate solid waste typical of other medical research and office projects. Solid waste will include wastepaper, cardboard, glass, and bottles. A portion of the waste will be recycled. The remainder of the waste will be compacted and removed by waste haulers contracted by BWH. The Project's recycling programs will be described in the Draft PIR.

The Project may generate hazardous and medical wastes typical of medical research facilities. Management of hazardous and medical waste is highly regulated for the safety of the public, the environment and the hospital community. All hazardous and medical waste will be handled and disposed of in accordance with applicable laws and regulations.

BWH has long been a leader in healthcare recycling efforts. The hospital has established policies and procedures relating to the recycling of various materials used within the facility, such as mixed paper, cardboard, metals, batteries, and plastics among other things. Furthermore, during major construction or renovation projects, BWH works closely with its

contractors and their sub-contractors to utilize recycling practices to minimize the generation and disposal of construction waste. Additional information on BWH's recycling program will be provided in the Draft PIR.

3.10 Geotechnical and Groundwater Impacts

The geotechnical impacts from the proposed Project will be presented in the Draft PIR. An analysis of existing subsurface conditions, groundwater levels, potential for ground movement and settlement during excavation and potential impacts on adjacent buildings and utilities for each building will be included. In addition, the Draft PIR will describe measures to ensure that groundwater levels are maintained during and after construction.

3.11 Flood Zones and Wetlands

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the site located in the City of Boston - Community Panel Number 250286 0078 G indicates the FEMA Flood Zone Designations for the Project site. The map shows that the Project is located outside of the 500-year flood plain.

The Project site is developed and does not contain wetlands.

3.12 Construction Impacts

The proximity of city streets and abutting institutional properties to the site will require careful scheduling of material removal and delivery. Planning with the City and institutional neighbors will be essential to the successful development of the Project.

A Construction Management Plan (CMP) for the Project will be prepared and submitted to the BTD for review and approval prior to issuance of a building permit. The CMP will define truck routes which will help in minimizing the impact of trucks on local streets. A police detail will be provided to maintain access to adjacent properties and to direct pedestrian and vehicle flow, if required.

Construction methodologies that ensure public safety and protect nearby businesses will be employed. Techniques such as barricades, walkways, painted lines, and signage will be used as necessary. Construction management and scheduling—including plans for construction worker commuting and parking, routing plans and scheduling for trucking and deliveries, protection of existing utilities, maintenance of fire access, and control of noise and dust—will minimize impacts on the surrounding environment.

Throughout Project construction, a secure perimeter will be maintained to protect the public from construction activities.

3.12.1 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during the early phases of construction and during demolition. Plans for controlling fugitive dust during construction and demolition include mechanical street sweeping, wetting portions of the Site during periods of high wind, and careful removal of debris by covered trucks. The construction contract will provide for a number of strictly enforced measures to be used by contractors to reduce potential emissions and minimize impacts. These measures are expected to include:

- Using wetting agents on area of exposed soil on a scheduled basis;
- Using covered trucks;
- Minimizing spoils on the construction site;
- Monitoring of actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the site; and
- Periodic street and sidewalk cleaning with water to minimize dust accumulations.

3.12.2 Construction Noise

BWH is committed to mitigate noise impacts from the construction of the Project. Increased community sound levels, however, are an inherent consequence of construction activities. Construction work will comply with the requirements of the City of Boston Noise Ordinance. Every reasonable effort will be made to minimize the noise impact of construction activities.

Mitigation measures are expected to include:

- Instituting a proactive program to ensure compliance with the City of Boston noise limitation policy;
- Using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on continuously running equipment, such as air compressors and welding generators;
- Replacing specific construction operations and techniques by less noisy ones where feasible;
- Selecting the quietest of alternative items of equipment where feasible;

- Scheduling equipment operations to keep average noise levels low, to synchronize the noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels;

- Turning off idling equipment; and

- Locating noisy equipment at locations that protect sensitive locations by shielding or distance.

3.12.3 Construction Waste Management

BWH will reuse or recycle demolition and construction materials to the greatest extent feasible. Construction procedures will allow for the segregation, reuse, and recycling of materials. Materials that cannot be reused or recycled will be transported in covered trucks by a contract hauler to a licensed facility.

3.13 Rodent Control

A rodent extermination certificate will be filed as applicable with the building permit application to the City. Rodent inspection monitoring and treatment will be carried out before, during, and at the completion of all construction work for the proposed Project, in compliance with the City's requirements. Rodent extermination prior to work start-up will consist of treatment of areas throughout the site. During the construction process, regular service visits will be made.

3.14 Wildlife Habitat

The Project site is within a fully developed urban area and, as such, the Project will not impact wildlife habitats.

3.15 Sustainability

This section provides a discussion of the sustainability efforts BWH will pursue related to the Project.

BWH is committed to developing buildings that are sustainably designed, energy efficient, environmentally conscious and healthy for their researchers, staff, and visitors. As required under Article 37 of the Boston Zoning Code, projects that are subject to Article 80B, Large Project Review, will be Leadership in Energy and Environmental Design (LEED) certifiable. There are seven categories in the LEED certification guidelines: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation in Design Process and the additional Regional Priority Credits. The Project is targeting Gold Certification, which would exceed the zoning requirements. The

credits being targeted at this time are listed below, and the LEED NC v2009 checklist is included in Appendix A; the list will evolve as the Project evolves. Additional credits are still under consideration.

Sustainable Sites

Prerequisite 1: Construction Activity Pollution Prevention

The Construction Manager (CM) will create and implement an erosion and sedimentation control plan for all construction activities associated with the Project. The plan will conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit and local standards and codes, including State of Massachusetts and City of Boston requirements.

SS Credit 1: Site Selection

The proposed site is located on a previously developed parcel within the City of Boston. In addition, the Project does not include any development that would negate gaining this credit.

SS Credit 2: Development Density and Community Connectivity

The proposed site was previously developed, is within ½ mile of a dense residential neighborhood, and is within a ½ mile walk of more than 10 basic services.

SS Credit 4.1: Alternative Transportation—Public Transportation Access

The proposed site is located within approximately1/10 mile of multiple MBTA bus routes, including 8, 9, 19, 22, 47, and 57.

SS Credit 4.2: Alternative Transportation—Bicycle Storage and Changing Rooms

Bicycle storage will be provided within 200 yards of the main entrance of the building for more than 5% of the building users. In addition, shower and changing facilities will be provided for 0.5% of all full-time equivalent occupants.

SS Credit 6.1: Stormwater Design—Quantity Control

The Project will implement a stormwater management plan that protects receiving stream channels from excessive erosion. The stormwater management plan will include stream channel protection and quantity control strategies.

SS Credit 6.2: Stormwater Design—Quality Control

The stormwater management plan referenced above will be designed to reduce impervious cover, promote infiltration and capture and treat the stormwater runoff from 90% of the average annual.

SS Credit 7.1: Heat Island Effect—Nonroof

All of the parking spaces on the Project site will be below ground.

SS Credit 7.2: Heat Island Effect—Roof

Roofing surfaces will be a combination of high-albedo and vegetated.

SS Credit 8: Light Pollution Reduction

The lighting system in the building will be designed to automatically reduce the input power by at least 50% between 11:00 p.m. and 5:00 a.m.

Water Efficiency

WE Prerequisite 1: Water Use Reduction

The building will employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building.

WE Credit 1: Water Efficient Landscaping

Potable water use for irrigation will be reduced by at least 50% from a baseline case. In addition, the Project is considering using no potable water for irrigation.

WE Credit 2: Innovative Wastewater Technologies

Water conserving fixtures will be used in the Project to reduce potable water use and waste conveyance by 50%.

WE Credit 3: Water Use Reduction

While a research facility has significant water needs, the proposed Project will reduce baseline water use by 30%.

Energy and Atmosphere

EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems

The proposed building will be fully commissioned prior to occupancy to confirm that all systems are operating as designed.

EA Prerequisite 2: Minimum Energy Performance

While the path for achieving this prerequisite has not yet been determined, the proposed Project will be able to demonstrate minimum energy performance criteria.

EA Prerequisite 3: Fundamental Refrigerant Management

CFC based refrigerants will not be used in any heating, ventilation, air condition, and refrigeration (HVAC&R) systems within the proposed building.

EA Credit 1: Optimize Energy Performance

Energy performance will be increased so that environmental impacts are reduced. Due to the nature of research facilities, the building energy use is anticipated to be reduced by 20-30% from baseline performances. Energy modeling will most likely be used to achieve this point.

EA Credit 3: Enhanced Commissioning

Commissioning services will begin prior to construction, and the additional commissioning activities will be performed during the course of the proposed Project. The commissioning agent will be required to review the owner's Project requirements, create, distribute and implement a commissioning plan, and perform a design review of the Project documents.

EA Credit 4: Enhanced Refrigerant Management

Refrigerants used in the HVAC&R equipment within the proposed building will be carefully selected to conform to the requirements of this credit. Part of the strategy will be to use long-life, high-efficiency equipment.

EA Credit 5: Measurement and Verification

A measurement and verification plan will be developed by the owner and the design team to provide ongoing accountability of energy consumption over time.

EA Credit 6: Green Power

To help offset the energy use of the proposed building, the owner will engage in a contract to provide Green Power for 35% of the building's energy use.

Materials & Resources

MR Prerequisite 1: Storage and Collection of Recyclables

Space in the proposed building will be set aside for the collection and storage of recyclables.

MR Credit 2: Construction Waste Management

The CM will be responsible for developing a waste management plan that keeps at least 75% of construction waste out of landfills.

MR Credit 4: Recycled Content

The Project specifications will require materials to include pre- and or post-consumer recycled content. During construction, material submittals will include a document indicating the percentage of both pre- and post-consumer recycled content. The CM will track the recycled content for each material with a Project goal to achieve 20% recycled-content materials based on overall Project materials costs.

MR Credit 5: Regional Materials

Selection of specified materials will be made with a focus on those that are manufactured, harvested, and extracted within 500 miles of the Project. The goal of the Project is to use at least 20% regional materials.

MR Credit 6: Rapidly Renewable Materials

A minimum of 2.5% of the materials in the Project will be considered rapidly renewable.

MR Credit 7: Certified Wood

At least 50% of the permanently installed wood in the Project will be from certified forests.

Indoor Environmental Quality

IE Q Prerequisite 1: Minimum Indoor Air Quality Performance

The building mechanical systems are designed to meet or exceed the requirements of ASHRAE Standard 61.1-2007 sections 4 through 7 and all applicable building codes, which are generally more stringent.

IEQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control

Smoking will be prohibited throughout the proposed building. In addition, smoking will be prohibited within 25 feet of the building.

IEQ Credit 1: Outdoor Air Delivery Monitoring

The Project will incorporate permanent CO_2 sensors and measuring devices to provide feedback on the performance of the HVAC system. In addition, measurement devices will be provided on air in-takes as required at non-densely occupied spaces.

IEQ Credit 2: Increased Ventilation

The HVAC system will be designed to increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2007.

IEQ Credit 3.1: Construction Indoor Air Quality Management Plan—During Construction

The Project documents will be written so that the CM is required to implement an IAQ management plan that protects materials and systems from pollution created during construction.

IEQ Credit 4.1: Low-Emitting Materials—Adhesives and Sealants

All adhesives and sealants will be specified to comply with the South Coast Air Quality Management District Rule 1168.

IEQ Credit 4.2: Low-Emitting Materials—Paints and Coatings

All paints and coatings will be specified to comply with either the Green Seal Standard GS-11, the Green Seal Standard GC-03, or the South Coast Air Quality Management District Rule 1113 as applicable.

IEQ Credit 4.3: Low-Emitting Materials—Flooring Systems

All carpet will be specified to meet the Carpet and Rug Institute Green Label Plus program. All hard surfaces will be specified to meet the FloorScore requirements. All floor coatings will be specified to meet the South Coast Air Quality Management District Rule 1113. All tile adhesives and grouts will meet the South Coast Air Quality Management District Rule 1168.

IEQ Credit 4.4: Low-Emitting Materials—Composite Wood and Agrifiber Products

Composite wood and agrifiber products used on the interior of the building will not contain any added urea-formaldehyde resins. In addition, laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies will not contain added urea-formaldehyde resins.

IEQ Credit 5: Indoor Chemical and Pollutant Source Control

The proposed building will be designed to minimize and control the entry of pollutants into the building. The ventilation system will be designed to filter any pollutants from outdoor air. In addition, spaces where chemicals or gases are present will be properly exhausted.

IEQ Credit 6.1: Controllability of Systems—Lighting

Lighting controls will be provided throughout the building so that occupants can adjust the lighting within a space to meet their lighting needs.

IEQ Credit 8.1: Daylight and Views—Daylight

The building will be designed to have daylighting in at least 75% of regularly occupied spaces.

IEQ Credit 8.2: Daylight and Views—Views

The building will be designed so that 90% of building occupants have a direct line of sight to the outdoor environment.

Innovation in Design

ID Credit 1: Innovation in Design

The design team has identified Pilot Point 14 – Walkable Project Site as an opportunity for gaining an Innovation Credit.

ID Credit 2: Innovation in Design

The design team has identified Pilot Point 26 – Advanced Energy Metering as an opportunity for gaining an Innovation Credit.

Further ID Credits: Innovation in Design

In addition to the above, there are three opportunities for Innovation credits that will be explored as the design advances.

ID Credit 2: LEED Accredited Professional

There will be multiple LEED Accredited Professionals on the Project team.

Regional Priority Credits

Since the Project will achieve Sustainable Sites Credit 6.1, Sustainable Sites Credit 7.1, and Sustainable Sites Credit 7.2, three additional points will be acquired based on the Regional Priority Credits.

3.16 Urban Design

Avenue Louis Pasteur is the dominant urban form-giving element of the context in which the Project will be located. The Avenue's strong axial nature and role in connecting Boston's Emerald Necklace to the original Beaux Arts inspired layout of the Harvard Medical School—and by extension to the broader LMA—creates one of the City's most unique urban fabrics. The cultural and historic importance, both of Boston's open space system and its premier medical district, produces the further imperative to intervene very sensitively into this context.

The proposed Project maintains the setback and height guidelines established by the Boston Redevelopment Authority, and as demonstrated by existing adjoining buildings, especially the recently completed Harvard's New Research Building (NRB). In doing so, the Project will properly extend the scale and civic-nature of the Avenue. The Project will produce a continuation of the streetwall and streetscape along the Avenue which does not currently exist due to the location of the current structures on the site setback from the Avenue. With the eventual build-out of Emmanuel College's Endowment Parcel A the ambition of the original planners of Avenue Louis Pasteur—of creating a grand civic boulevard leading to the medical district—will be largely fulfilled.

Beyond the importance of properly addressing Avenue Louis Pasteur, the proposed Project will 'complete' Blackfan Street by providing an appropriate setback and sidewalk opposite the Merck facility, a feature currently lacking due to the existing garage on the property. The provision of a sidewalk and streetscape amenities will have the additional benefit of enlarging the space between the proposed building and the Merck façade. This will increase the sense of daylight at street level along this street.

As along Louis Pasteur Avenue, the urban and pedestrian nature of Blackfan Street will be enhanced with the removal of the existing parking garage. In addition, the ground levels of the proposed Project will accommodate a range of social spaces, including a generous lobby, cafe, and meeting and assembly spaces that will improve the site, making it more pedestrian friendly and creating a visual permeability. As the Project's design advances, the specific detailing of the facades will respond appropriately to the architectural character of the immediately adjacent Merck and Harvard NRB facilities.

Lastly, and as an increasingly important dimension of urban design, the proposed Project will aim to achieve Gold LEED certification as described in Section 3.15 above.

3.17 Historic and Archaeological Resources

There are no National Register listed properties on the site of the proposed Project

The Emmanuel College campus is included in the MHC's Inventory. The Boston Landmarks Commission (BLC) has recommended the Gothic-style Administration Building (1914, Maginnis, Sullivan & Walsh) for individual listing on the National Register of Historic Places and for Boston Landmark designation. The northern half of the campus, including the Administration Building and the Cardinal Cushing Library, is located within the Southwest Fenway Historic District, which has also been recommended for listing in the National Register of Historic Places by the BLC. Alumnae Hall, constructed 1947-1949, on the southern part of the campus, is a later example of the Gothic Revival style.

Several historic resources exist within the vicinity of the Project site. Notable resources include the Olmsted Park System/Emerald Necklace Historic District, the Isabella Stewart Gardner Museum at 280 The Fenway, and the Sears Roebuck & Company Mail Order Store at 309 Park Drive. The Project site is bounded to the south by Harvard's 430,000 sf New Research Building constructed in 2003.

3.17.1 Archaeological Resources

The Emmanuel College campus was constructed largely on filled land created in the late nineteenth century when the Muddy River was improved. No known archaeological sites are recorded within or in proximity to the Project site and there is little potential for significant archaeological resources to be impacted as a result of the Project.

3.17.2 Impacts to Historic Resources

Development of the 2012 BWH IMP Amendment Project will require some demolition on the Emmanuel College campus including Alumnae Hall. As the Project advances, BWH will coordinate review of the Project by the Boston Landmarks Commission (BLC) in accordance with Article 85 of the Boston Zoning Code, as necessary.

BWH will consult with MHC in accordance with M.G.L. Chapter 9, Sections 26-27C (950 CMR 71.00), as necessary, to assess potential impacts to significance historic resources. If impacts associated with the Project are unavoidable, BWH will work with MHC and interested parties, including BLC, in developing appropriate measures to mitigate Project impacts to historic resources.

Project-related impacts, such as design and shadow impacts, to other historic resources within the Project's vicinity will be studied as part of the Draft PIR.

3.18 Infrastructure

As described in detail within the BWH 2010 IMP, BWH completed a comprehensive analysis of the Hospital's campus, including new projects that were approved in connection with the review of the IMP, most notably the Binney Street Building and Brigham and Women's Building. This section includes a description of the infrastructure systems that will support the BWH 2012 BWH IMP Amendment Project.

While not specifically designed at this point, it is anticipated that the various Project infrastructure components will connect to existing City and utility company systems in the adjacent public and private streets. A preliminary evaluation is provided for the following utilities: wastewater, water, stormwater management, natural gas, electricity, and telecommunications.

A forthcoming design process for the Project will include required engineering analyses, and will adhere to applicable protocols and design standards ensuring that the proposed building is properly supported by, and in turn, properly uses the City's infrastructure. Detailed design of the Projects' utility systems will proceed in conjunction with the final design of the building and its interior mechanical systems—and a more detailed description of these activities will be provided as part of the forthcoming development and filing of a Draft PIR in support of the Project.

The systems discussed below include those owned or managed by the Boston Water and Sewer Commission (BWSC), private utility companies, and on-site infrastructure systems. There will be close coordination among these entities by BWH and their development team during future design and construction of the Project.

All improvements and connections to BWSC infrastructure will be reviewed by BWSC as part of the BWSC Site Plan Review process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands and capacity and establishment of service accounts.

3.18.1 Regulatory Framework

All connections will be designed and constructed in accordance with city, state, and federal standards.

- BWSC approval will be required for all water, sewer, and stormwater systems.
- Sewer connection self-certifications and/or permits will be filed with the Massachusetts Department of Environmental Protection (MassDEP) depending on the total expected sewer discharge expected from each building.
- The Boston Fire Department will review the proposed Project with respect to fire protection measures, such as siamese fire department connections, hydrants, and standpipes.
- Design of the site access, hydrant locations, and energy systems (gas and electric) will also be coordinated with the respective system owners.
- New utility connections will be authorized by the Boston Public Works Department through the street opening permit process, as required.

Additional information on the regulatory framework for each utility system is included in subsequent sections of this section.

A more complete list of state and local permits anticipated in connection with the Project infrastructure is included in Section 2.6.

3.18.2 Wastewater

3.18.2.1 Existing Wastewater

Local sanitary sewer service in the City is provided by the BWSC. Sewage generated by the Project will discharge to either the 39-inch x 41-inch BWSC sewer in Blackfan Street, or the 12-inch BWSC sewer in Avenue Louis Pasteur. These systems flow to the Metropolitan District Commission (MDC) Charles River Valley sewer, then to the Ward Street Headworks, then, via the Boston Main Drain, to the Columbus Park Headworks and finally to the Massachusetts Water Resources Authority's (MWRA) Deer Island Waste Water Treatment Plant for disposal.

3.18.2.2 Demand

The Massachusetts State Environmental Code (Sewer Connection and Extension Regulations, 310 CRM 15.203), does not define sewage generation rates for research and development facilities. Actual wastewater generation for this type of facility will be determined by tenant specific needs. A review of wastewater generation for similar facilities and sewage generation rates accepted by the BWSC for biomedical research facilities yielded a range of flow from 75 gallons per day (gpd) per 1,000 sf to 200 gpd per 1,000 sf. Based upon the more conservative sewage generation rate of 200 gpd per 1,000 sf, the Project will generate an average daily sewer flow of approximately 72,000 gallons per day (gpd). In addition, the Project's cooling towers may require up to 7,000 gpd of "blow down" water that must also be discharged to the BWSC's sewer system. In total, the Project will generate an average daily sewer flow of approximately 79,000 gpd, of which approximately 69,000 gpd represents net new sewage flows (when taking into consideration the demolition of the existing buildings in the site). Table 3-6 summarizes anticipated future sewage generation flows from the Project site.

Table 3-6 BWH Parcel C Project Net New Wastewater Generation

Use	SF	Rate	Total
Office/Lab/R&D (Proposed)	360,000	200 gpd/1000 SF	72,000 GPD
Cooling Tower (Proposed)	-------	7,000 gpd	7,000 GPD
Alumnae Hall (Existing – to be demolished)	50,000	200 gpd/1000 SF	10,000 GPD
Net New Sewage Flow			69,000 GPD

BWH also proposes to construct a 355-space parking garage beneath the building. As required, drainage from the parking garage will be conveyed to the sanitary sewer system. Drainage from the existing above grade Emmanuel Parking Deck was not subtracted from the net-new sewage flow rates in Table 3-6, as run-off from an open-air deck is typically discharged into the storm drain system. Sewage contributions to the sewer system from the proposed parking garage are expected to be minimal and consist primarily of occasional floor wash and snow melt from automobiles. Appropriate controls will be incorporated into this system, including any required oil and grit separators.

3.18.2.3 Proposed Connection

Wastewater generated by the building will meet all standards for effluent discharges. The proposed Project will likely have two separate sewer connections—one 10-inch sanitary sewer connection and one 10-inch lab waste sewer connection. These two connections are the result of two separate plumbing systems that will likely be designed within the building.

The separate sanitary sewer system will handle traditional waste from restrooms, drinking fountains, and break-room areas.

The lab waste sewer system will handle waste generated during any ongoing research processes. At this time, the exact composition of the lab waste is not known. Once the building is designed and programmed, the exact composition of their research by-products will be identified, and BWH will apply for a MWRA Sewer Use Discharge Permit.

The MWRA Sewer Use Discharge Permit requires the following:

- **Pretreatment Program**- BWH must disclose the complete chemical make-up of their lab waste sewer discharge and implement a pretreatment program as determined by the MWRA.

- **Monitoring**- BWH must implement a sampling and reporting program that allows the MWRA to monitor the building's sewer discharges.

- **Action Program**-BWH must develop a notification and action program in the event of a non-permitted discharge.

Compliance with the standards for the final site design will be reviewed as part of the BWSC Site Plan Review process. All lab discharges will be approved and continually monitored by the MWRA under the Project's Sewer Use Discharge Permit.

3.18.3 Water Infrastructure

3.18.3.1 Existing Water Supply System

The BWSC, in partnership with the MWRA, provides domestic and fire protection water service to the Project site. The BWSC delivers water to this site via a 12-inch water main in Blackfan Street and a 10-inch main in Avenue Louis Pasteur. These mains are supplemented by a 48-inch supply main in Longwood Avenue. Both of these mains are part of the BWSC's Southern Low (SL) distribution system. The SL distribution system is integrally connected to form loops that allow major water demands to be fed from more than one direction. This looping allows the system to perform at optimum efficiency and provides redundancy in the event of a water main break.

3.18.3.2 Proposed Connection

Water generation is based upon estimated sewage generation with an added factor of 10 percent for consumption, system losses, and other usage. Based upon a sewage generation rate of 200 gpd per 1,000 sf, the Project will require approximately 75,900 gpd of water.

In addition, the Project's cooling tower may require an average of 35,000 gpd of "blow down" and "make-up" water. The Project's overall water average daily water demand is expected to be approximately 110,900 gpd.

3.18.3.3 Domestic Water System Connections

The 12-inch water main in Blackfan Street or the 10-inch water main in Avenue Louis Pasteur will supply the Project with domestic water. The Project will likely require one 8-inch domestic water service connection. This connection will meet the latest city and state codes and standards including cross connection backflow prevention. Compliance with the standards for the final site design will be reviewed as part of the BWSC Site Plan Review process.

3.18.3.4 Fire Protection Connections

The proposed Project requires a separate, dedicated fire service connection to the mains in Blackfan Street or Avenue Louis Pasteur, likely to be an 8-inch service. The building's fire protection system will be designed to the latest Massachusetts Building Code, which refers to the National Fire Protection Association Handbook. In addition, the fire protection system will meet all applicable standards set by the Boston Fire Department (BFD). BWH will seek input from the BFD on emergency vehicle site access, siamese connection locations and hydrant locations during the design process.

3.18.4 Stormwater Management

3.18.4.1 Existing Conditions

The Project site is located within the Groundwater Conservation Overlay District (GCOD) and currently includes a three-story building and a two-level, above-grade parking deck. In addition to the structure, the site houses approximately 27 surface level parking spaces. The majority of the site is impervious building area and parking lot area. The balance is a combination of landscaped and other miscellaneous pervious area. Under the existing drainage pattern, stormwater runoff is directed to a 42-inch x 42-inch BWSC storm drain in Blackfan Street via several connections, which eventually discharges into the Charles River via the Muddy River.

3.18.4.2 Proposed Conditions

Construction of the proposed Project will not produce significant changes in either the pattern of, or rate of, stormwater runoff from the site. Stormwater management controls will be established in compliance with BWSC standards. In addition, the proposed Project will improve the water quality by removing parking lot stormwater runoff from the site. A significant portion of the site is currently a parking area that is within the proposed building footprint. The stormwater runoff collected via the roof drains of the proposed building will be significantly cleaner than the existing runoff from the parking lot and parking garage.

The majority of onsite drainage will be collected internally and directed to the BWSC collection system in Blackfan Street. The BWSC, as part of the Site Plan Review process, will review drainage facilities and related water quality performance.

BWH will install landscaping on-site and use best management practices for surface areas to control sediment and vehicle related contaminants when possible—including catch basins with sumps and hoods, street sweeping, and installing "Don't Dump—Drains to Charles River" castings at all proposed catch basins.

3.18.4.3 Groundwater Conservation Overlay District

Because the proposed Project site is located within the GCOD, the Project will be required to infiltrate at least one-inch of stormwater runoff from impervious areas into the ground to comply with Article 32 of the Boston Zoning Code. The stormwater management systems for the proposed building will likely include groundwater recharge systems to comply with Article 32. It is anticipated that the stormwater recharge systems will work to passively infiltrate site runoff into the ground with a gravity recharge system or with a combination of storage tanks in the building and pumps. Conceptual design for recharge systems have not been formulated at this time, but will be described in greater detail as part of a future Draft PIR filing for the Project.

As mentioned above, the proposed Project will decrease the amount of impervious area on the site, which will also increase groundwater recharge and aid to raise the water table. BWH will work closely with the City of Boston and the Boston Groundwater Trust to reduce water table impacts during and after construction of the proposed Project.

3.18.4.4 MassDEP Stormwater Management Policy Standards

In March 1997, MassDEP adopted a new Stormwater Management Policy to address non-point source pollution. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy, which was revised in February 2008, and has been incorporated into 310 CMR 10.05(6)(k) and 314 CMR 9.06(6)(a). The Policy prescribes specific stormwater management standards for development components, including urban pollutant removal criteria for components that may impact environmental resource areas. Compliance is achieved through the implementation of Best Management Practices (BMPs) in the stormwater management design. The Policy is administered locally pursuant to MGL Ch. 131, s. 40.

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

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

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

Standard #2: *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

Compliance: The proposed design will be devised with the goal to comply with this Standard. The existing discharge rate will be met or decreased as a result of the improvements associated with the proposed Project.

Standard #3: *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post development site should approximate the annual recharge from the pre-development or existing site conditions, based on soil types.*

Compliance: The proposed Project lies within the Groundwater Conservation Overlay District and will strive to meet this Standard by complying with the Zoning Code's requirement to recharge one-inch of stormwater over the entire new impervious area.

Standard #4: *For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when: Suitable nonstructural practices for source control and pollution prevention are implemented; Stormwater management BMPs are sized to capture the prescribed runoff volume; and Stormwater management BMPs are maintained as designed.*

Compliance: The proposed design will be devised with the goal to comply with this Standard. Within the proposed Project's limit of work, there will be mostly roof, landscaping, and pedestrian areas. Any paved areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected by deep sump, hooded catch basins and conveyed through water quality units before discharging into the BWSC system.

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

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

Standard #6: *Stormwater discharge to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold-water fisheries and recharge areas for public water supplies.*

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

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

Compliance: The proposed design will be devised with the goal to comply with this Standard. The proposed Project will comply with the Stormwater Management Standards as applicable to the development.

Standard #8: *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

Compliance: The proposed Project will be devised with the goal to comply with this standard. Sedimentation and erosion controls will be incorporated as part of the design of the Project and employed during construction.

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

Compliance: The proposed Project will be devised with the goal to comply with this standard. An O&M Plan will be developed during the design process of the buildings.

Standard 10: *All illicit discharges to the stormwater management system are prohibited.*

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

3.18.5 Fire Protection and Control

The fire protection systems for the Project will be designed in compliance with the latest Massachusetts Building Code, which refers to the *National Fire Protection Association Handbook.* In addition, the fire protection system will meet all applicable standards and requirements as set forth in the *Boston Fire Prevention Code*, the *Massachusetts Fire Prevention Regulation* (527 CMR), and the *Massachusetts Fire Prevention Laws* (MGL CH 148).

Compliance with the standards for the fire protection system connections will be determined as part of BWSC's Site Plan Review process.

The proposed Project requires a separate 8-inch, dedicated fire service connections to the 12-inch main in Blackfan Street. The building's fire protection system will be designed to the latest Massachusetts Building Code, which refers to the National Fire Protection Association Handbook. In addition, the fire protection system will meet all applicable standards set by the BFD. BWH will seek input from the BFD on emergency vehicle site access, siamese connection locations and hydrant locations during the design process.

BWH will also obtain required licenses for the storage of flammable materials, pursuant to the Boston Fire Prevention Code, CMR 527 and MGL Chapter 148, and parking garage permits, pursuant to St. 1913, c. 577, as amended (as required for erection of a parking garage in the City of Boston).

3.18.6 Anticipated Energy Needs

Superheated steam or natural gas is expected to provide the energy to meet the building's heating and hot water demand. Incorporating cogeneration capability within the Project is a potential source for steam, electricity, and chilled water in the future. A cogeneration plant typically has greater energy utilization efficiency than separate electrical generation and thermal energy generation. However, BWH will also explore the potential to supply the Project from other outside suppliers, including MATEP, NStar and others. As the design of the proposed Project progresses, BWH will work with the relevant energy suppliers to develop a final design.

3.18.6.1 Steam Service

The Project's estimated steam demand is initially estimated to be approximately 60,000 pounds per hour. Should BWH decide to use steam, the connection will meet applicable design standards.

3.18.6.2 Natural Gas Service

The proposed building will require natural gas for the laboratory uses. KeySpan Energy will provide gas service to the site via a 6-inch low pressure main that extends from Longwood Avenue along Blackfan Street. KeySpan has indicated that this line has the capacity to meet the proposed building's laboratory natural gas demand of 10,000 cubic feet per hour.

In addition to laboratory uses, the proposed Project may use natural gas to provide the energy required for heating and hot water and stand-by generators. KeySpan Energy has indicated that they could meet the required demand of the building by installing a lateral from their intermediate pressure main in Avenue Louis Pastor to the Project site. Should BWH decide to use natural gas, the connection will meet applicable design standards and be coordinated with KeySpan Energy.

3.18.6.3 Electrical Service

NSTAR will provide electric power to the proposed building from their infrastructure in Blackfan Street/Longwood Avenue. Representatives of BWH are currently coordinating the building design with NSTAR. BWH will coordinate the final design and installation of electrical service. The building's electric demand is expected to be 16.7 MVA.

3.18.6.4 Telecommunications

BWH will select private telecommunications companies to provide telephone, cable, and data services. There are several potential candidates with substantial downtown Boston networks capable of providing service. Upon selection of a provider or providers, BWH will coordinate service connection locations and obtain appropriate approvals.

3.18.7 Protection of Utilities

Existing public and private infrastructure located within the public right-of-way will be protected during construction. The installation of proposed utilities within the public way will be in accordance with BWSC, Boston Public Works Department, the Dig-Safe Program, and governing utility company requirements. All necessary permits will be obtained before the commencement of work. Specific methods for constructing proposed utilities where they are near to, or connect with, existing water, sewer, and drain facilities will be reviewed by the BWSC as part of its Site Plan Review process.

3.18.8 Construction Coordination

BWH will continue to work and coordinate with the utility companies to assure compliance and integrity to the proposed Project.

3.18.9 Sustainable Design/Energy Conservation

Energy conservation measures will be an integral part of the Project's infrastructure designs. The buildings will employ energy-efficient and water-conservation features for mechanical, electrical, architectural, and structural systems, assemblies, and materials where possible. The base configuration of the proposed buildings will meet the Massachusetts Energy Code. Mechanical and HVAC systems will be installed to the current industry standards, and full cooperation with the local utility providers will be maintained during design and construction. Additional information on sustainable design is provided in Section 3.15.

3.5.10 Conclusion

The Project will use the existing water, sewer, electrical, and natural gas systems available in public streets adjacent to the Project site. Research and coordination to date indicate that these services are adequately sized to support the increased demands associated with the development of the Project. The proposed Project will be designed with the goal to be consistent with MassDEP's Stormwater Management Policy, and incorporate a number of sustainable design and energy conservation measures.

Chapter 4.0
Coordination With Other Government Agencies

4.0 COORDINATION WITH OTHER GOVERNMENT AGENCIES

4.1 Architectural Access Board Requirements

The Project will comply with the requirements of the Massachusetts Architectural Access Board and will be designated to comply with the standards of the Americans with Disabilities Act.

4.2 Massachusetts Environmental Policy Act (MEPA)

It is anticipated that Massachusetts Environmental Policy Act (MEPA) review will be required.

4.3 Massachusetts Historical Commission

Because state permits and/or funding are likely to be involved, the Project will be subject to reviewed by the Massachusetts Historical Commission (MHC) in accordance with M.G.L., Chapter 9, Sec. 26-27c, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00). The ENF to be prepared as part of the MEPA process will be submitted to the MHC to initiate the Chapter 254 review process.

4.4 Boston Landmarks Commission

In the City of Boston, complete or partial demolition of properties greater than 50 years old are subject to review in accordance with the Boston Landmarks Commission (BLC) Article 85 (Demolition Delay) ordinance. Because the Project will involve the demolition of a building greater than 50 years old, the BLC's Article 85 (Demolition Delay) review will be required. The Proponent will consult with BLC staff and submit an Article 85 application at the appropriate time.

4.5 Boston Civic Design Commission

The Project will comply with the provisions of Article 28 of the Boston Zoning Code. This PNF will be submitted to the Boston Civic Design Commission by the BRA as part of the Article 80 process.

4.6 Other Permits and Approval

Section 2.6 contains a list of agencies from which permits and approvals for the proposed Projects will be sought.

Chapter 5.0
Project Certification

5.0 PROJECT CERTIFICATION

This form has been submitted to the Boston Redevelopment Authority as required by the Boston Zoning Code, Article 80.

Signature of Proponent's Representative

Arthur Mombourquette

The Brigham and Women's Hospital, Inc.
75 Francis Street
Boston, MA 02115

12/27/11
Date

Signature of Preparer

Geoffrey Starsiak

Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754

12/27/11
Date

Appendix A
LEED Checklist

LEED 2009 for New Construction and Major Renovations

Project Checklist

Brigham and Women's Hospital - Alumnae Hall Site

Dec-11

Sustainable Sites — Possible Points: 26

Y	?	N				
Y			Prereq 1	Construction Activity Pollution Prevention		
1			Credit 1	Site Selection	1	
5			Credit 2	Development Density and Community Connectivity	5	
		1	Credit 3	Brownfield Redevelopment	1	
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6	
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1	
	1		Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3	
	2		Credit 4.4	Alternative Transportation—Parking Capacity	2	
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1	
		1	Credit 5.2	Site Development—Maximize Open Space	1	
1			Credit 6.1	Stormwater Design—Quantity Control	1	
1			Credit 6.2	Stormwater Design—Quality Control	1	
1			Credit 7.1	Heat Island Effect—Non-roof	1	
1			Credit 7.2	Heat Island Effect—Roof	1	
1			Credit 8	Light Pollution Reduction	1	

Water Efficiency — Possible Points: 10

Y			Prereq 1	Water Use Reduction—20% Reduction		
2	2		Credit 1	Water Efficient Landscaping	2 to 4	
2			Credit 2	Innovative Wastewater Technologies	2	
2		2	Credit 3	Water Use Reduction	2 to 4	

Energy and Atmosphere — Possible Points: 35

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems		
Y			Prereq 2	Minimum Energy Performance		
Y			Prereq 3	Fundamental Refrigerant Management		
8	5	6	Credit 1	Optimize Energy Performance	1 to 19	
	2	5	Credit 2	On-Site Renewable Energy	1 to 7	
2			Credit 3	Enhanced Commissioning	2	
2			Credit 4	Enhanced Refrigerant Management	2	
3			Credit 5	Measurement and Verification	3	
2			Credit 6	Green Power	2	

Materials and Resources — Possible Points: 14

Y			Prereq 1	Storage and Collection of Recyclables		
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3	
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1	
2			Credit 2	Construction Waste Management	1 to 2	
		2	Credit 3	Materials Reuse	1 to 2	

Materials and Resources, Continued

Y	?	N			
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
1			Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 15

Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			Credit 1	Outdoor Air Delivery Monitoring	1
1			Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
	1		Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
	1		Credit 6.2	Controllability of Systems—Thermal Comfort	1
	1		Credit 7.1	Thermal Comfort—Design	1
	1		Credit 7.2	Thermal Comfort—Verification	1
1			Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

Innovation and Design Process — Possible Points: 6

1			Credit 1.1	Innovation in Design: Pilot Credit 14 - Walkable Project Site	1
1			Credit 1.2	Innovation in Design: Pilot Credit 26 - Advanced Energy Metering	1
	1		Credit 1.3	Innovation in Design: Specific Title	1
	1		Credit 1.4	Innovation in Design: Specific Title	1
	1		Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1

Regional Priority Credits — Possible Points: 4

1			Credit 1.1	Regional Priority: SSc6.1	1
1			Credit 1.2	Regional Priority: SSc7.1	1
1			Credit 1.3	Regional Priority: SSc7.2	1
		1	Credit 1.4	Regional Priority: Specific Credit	1

66	19	23	**Total**	Possible Points: **110**

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