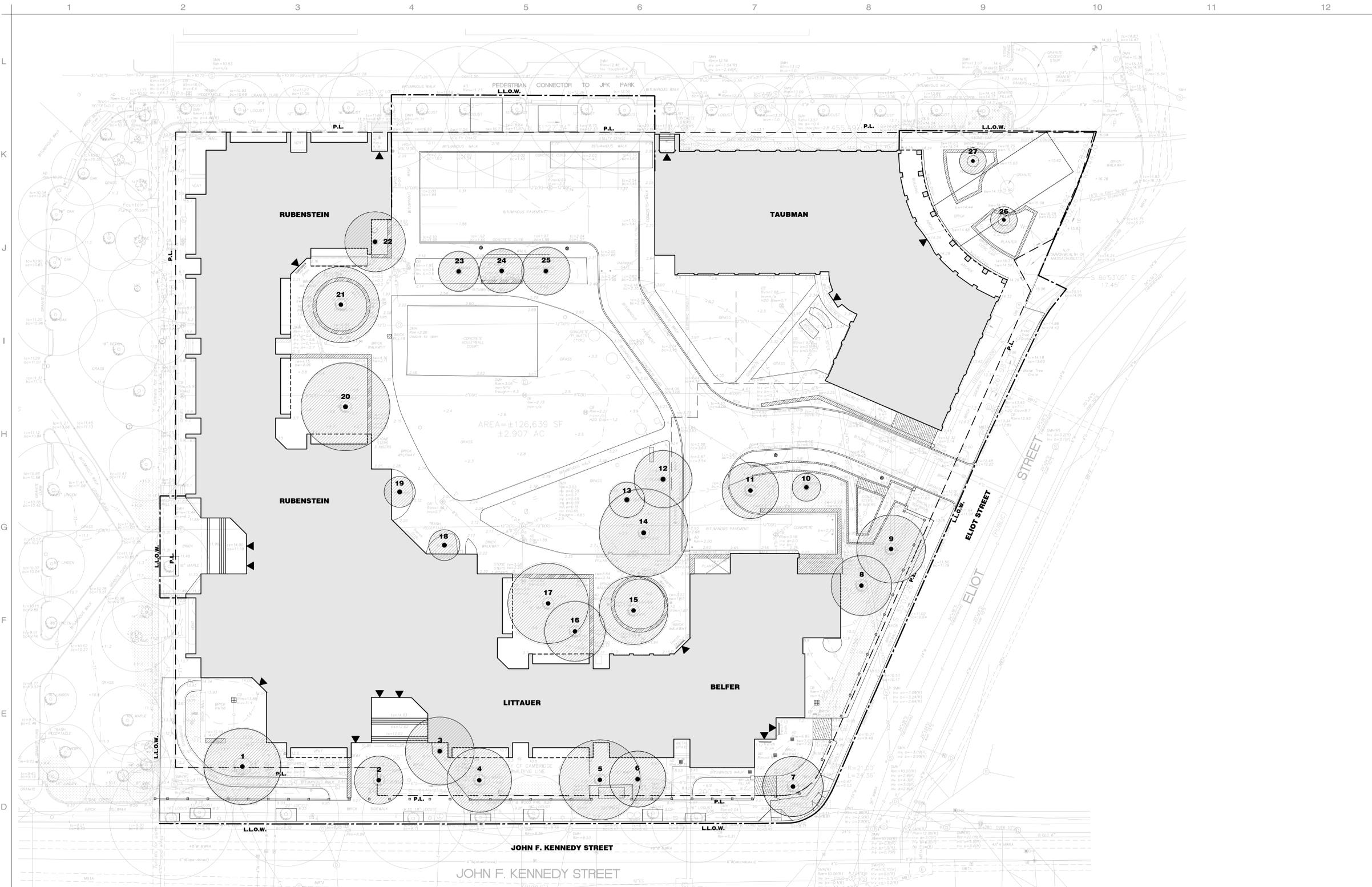


## APPENDICES

- A. Transportation Impact Study
- B. Tree Study
- C. LEED Checklist and Narrative
- D. Sewer Service Infrastructure Narrative
- E. Water Service Infrastructure Narrative
- F. Noise Mitigation Narrative
- G. Summary of Community Outreach
- H. Wind Study

## **B. Tree Study**



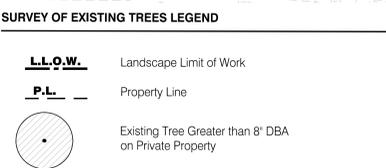
**EXISTING SIGNIFICANT TREES**

KEY	BOTANICAL NAME	CAL.	HT.	NOTES
1	<i>Acer rubrum</i>	20"	45'	
2	<i>Acer rubrum</i>	17"	40'	
3	<i>Cornus kousa</i>	9"	25'	
4	<i>Acer rubrum</i>	16"	40'	
5	<i>Acer rubrum</i>	17"	40'	
6	<i>Acer rubrum</i>	13"	35'	
7	<i>Cornus florida</i>	10"	20'	Multi-stem
8	<i>Liquidambar styraciflua</i>	21"	45'	
9	<i>Liquidambar styraciflua</i>	14"	45'	
10	<i>Cornus kousa</i>	10"	20'	
11	<i>Malus spp.</i>	15"	25'	
12	<i>Acer rubrum</i>	12"	30'	
13	<i>Prunus spp.</i>	9"	15'	
14	<i>Acer rubrum</i>	15"	40'	
15	<i>Acer rubrum</i>	18"	45'	

**SURVEY OF EXISTING TREES LEGEND**

KEY	BOTANICAL NAME	CAL.	HT.	NOTES
16	<i>Acer rubrum</i>	15"	45'	
17	<i>Acer saccharum</i>	15"	40'	
18	<i>Cornus kousa</i>	9"	15'	Multi-stem
19	<i>Cornus kousa</i>	8"	15'	Multi-stem
20	<i>Acer saccharum</i>	20"	40'	
21	<i>Fagus sylvatica</i>	15"	40'	
22	<i>Cornus florida</i>	8"	25'	Multi-stem
23	<i>Acer platanoides</i>	10"	25'	
24	<i>Acer platanoides</i>	10"	25'	
25	<i>Acer platanoides</i>	12"	25'	
26	<i>Prunus spp.</i>	8"	15'	
27	<i>Prunus spp.</i>	9"	15'	

**355" = Total DBH of Significant Trees**



LEGEND / NOTES

KEY PLAN



1	Tree Study	09/10/2014
No.	ISSUE	DATE

**HARVARD KENNEDY SCHOOL OF GOVERNMENT**  
79 John F. Kennedy St. - Cambridge, MA 02138

**ROBERT A.M. STERN ARCHITECTS, LLP.**

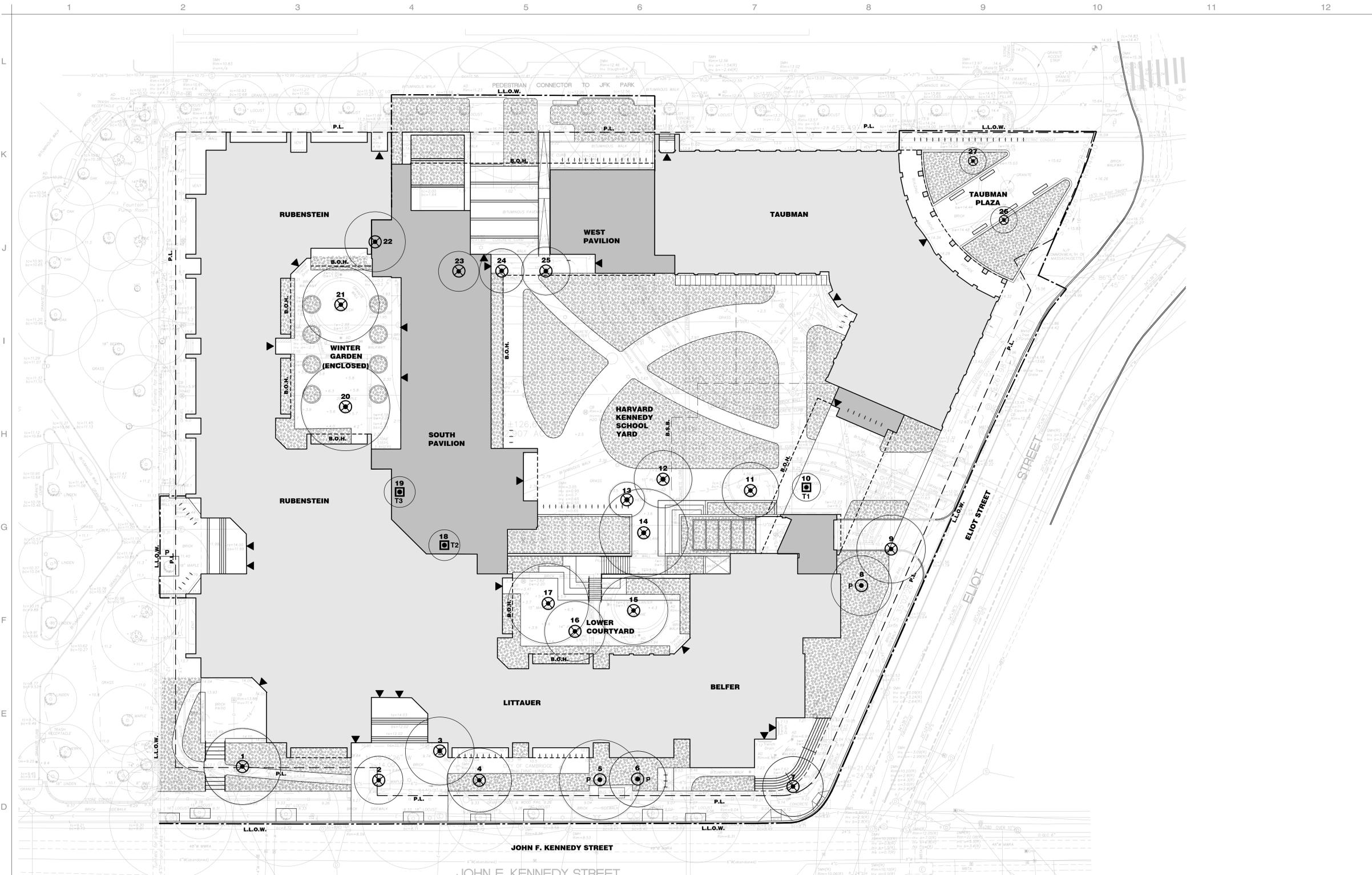
460 WEST 34th STREET, NEW YORK, NY 10001  
TEL: (212) 967-5100 | FAX: (212) 967-5588

**Michael Van Valkenburgh Associates, Inc.**  
231 Concord Avenue  
Cambridge, Massachusetts 02138  
Tel: 617.864.2076  
Fax: 617.492.3128

Tree Survey

Project No.	13038
CAD File No.	
Drawing No.	

**TS1.01**



LEGEND / NOTES

---

KEY PLAN

1 Tree Study	09/10/2014
No. ISSUE	DATE

---

**HARVARD KENNEDY SCHOOL OF GOVERNMENT**  
79 John F. Kennedy St. - Cambridge, MA 02138

---

**ROBERT A.M. STERN ARCHITECTS, LLP.**  
460 WEST 34th STREET, NEW YORK, NY 10001  
TEL: (212) 967-5100 | FAX: (212) 967-5588

---

**Michael Van Valkenburgh Associates, Inc.**  
231 Concord Avenue  
Cambridge, Massachusetts 02138  
Tel: 617.864.2076  
Fax: 617.492.3128

---

**Tree Protection Plan**

Project No.	13038
CAD File No.	
Drawing No.	

TS1.02

Copyright (c) Robert A.M. Stern Architects

**EXISTING SIGNIFICANT TREES TO BE REMOVED**

KEY	BOTANICAL NAME	CAL.	HT.	NOTES
1	<i>Acer rubrum</i>	20"	45'	
2	<i>Acer rubrum</i>	17"	40'	
3	<i>Cornus kousa</i>	9"	25'	
4	<i>Cornus florida</i>	10"	20'	Multi-stem
7	<i>Acer rubrum</i>	16"	40'	
9	<i>Liquidambar styraciflua</i>	14"	45'	
11	<i>Malus spp.</i>	15"	25'	
12	<i>Acer rubrum</i>	12"	30'	
13	<i>Prunus spp.</i>	9"	15'	
14	<i>Acer rubrum</i>	15"	40'	
15	<i>Acer rubrum</i>	18"	45'	
16	<i>Acer rubrum</i>	15"	45'	
17	<i>Acer saccharum</i>	15"	40'	
20	<i>Acer saccharum</i>	20"	40'	
21	<i>Fagus sylvatica</i>	15"	40'	
22	<i>Cornus florida</i>	8"	25'	Multi-stem
23	<i>Acer platanoides</i>	10"	25'	
24	<i>Acer platanoides</i>	10"	25'	
25	<i>Acer platanoides</i>	12"	25'	
26	<i>Prunus spp.</i>	8"	15'	
27	<i>Prunus spp.</i>	9"	15'	

**277" = Total DBH of Significant Trees to be Removed**

**EXISTING SIGNIFICANT TREES TO BE PROTECTED**

5	<i>Acer rubrum</i>	17"	40'	
6	<i>Acer rubrum</i>	13"	35'	
8	<i>Liquidambar styraciflua</i>	21"	45'	

**51" = Total DBH of Significant Trees to be Protected**

**EXISTING SIGNIFICANT TREES TO BE TRANSPLANTED**

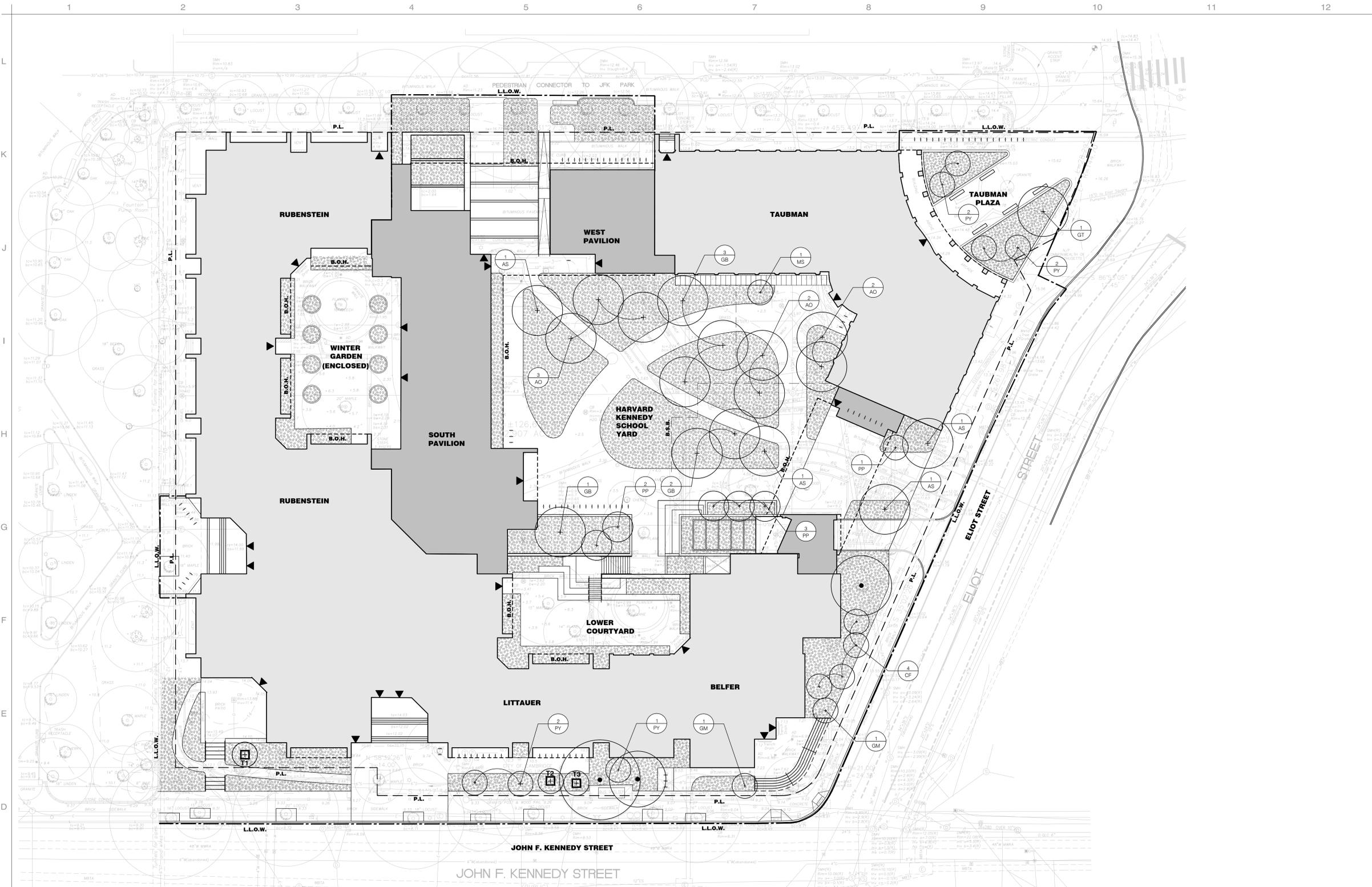
KEY	BOTANICAL NAME	CAL.	HT.	NOTES
10	<i>Cornus kousa</i>	10"	20'	
18	<i>Cornus kousa</i>	9"	15'	Multi-stem
19	<i>Cornus kousa</i>	8"	15'	Multi-stem

**27" = Total DBH of Significant Trees to be Transplanted**

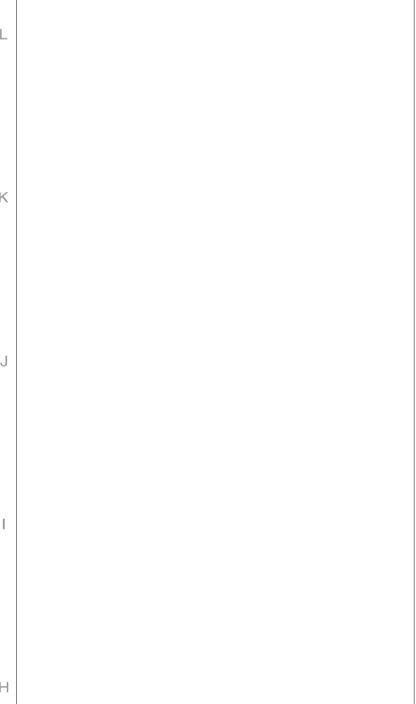
**TREE PROTECTION PLAN LEGEND**

	Landscape Limit of Work		Building Overhang Above
	Property Line		Building Structure Below
	Existing Tree Greater than 8" DBA on Private Property to Remain and be Protected		Proposed Plant Bed
	Existing Tree Greater than 8" DBA on Private Property to be Removed		Proposed Lawn
	Existing Tree Greater than 8" DBA on Private Property to be Transplanted, Stored and Maintained for Planting on this Project		

- NOTES:**
- Existing Significant Trees are to be Removed for the following reasons:
    - A. Located on Footprint of Proposed Building
    - B. Located on Area of Proposed Sidewalk
    - C. Located on Area to be Regraded
    - D. Replace Trees in Poor Condition
  - All Replacement Trees will be inspected and, if necessary, treated by a Certified Arborist once a year for five years.



LEGEND / NOTES



No.	ISSUE	DATE
1	Tree Study	09/10/2014

**HARVARD KENNEDY SCHOOL OF GOVERNMENT**  
79 John F. Kennedy St. - Cambridge, MA 02138

**ROBERT A.M. STERN ARCHITECTS, LLP.**  
460 WEST 34th STREET, NEW YORK, NY 10001  
TEL: (212) 967-5100 | FAX: (212) 967-5588

**Michael Van Valkenburgh Associates, Inc.**  
231 Concord Avenue  
Cambridge, Massachusetts 02138  
Tel: 617.864.2076  
Fax: 617.492.3128

**Tree Replacement and Mitigation Plan**

Project No. 13038  
CAD File No.  
Drawing No.  
**TS1.03**

**REPLACEMENT TREES**

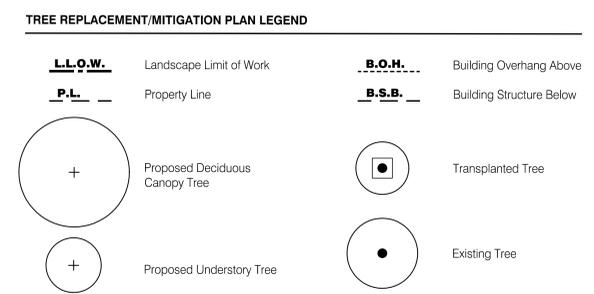
KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	TOTAL DBH	NOTES
AO	<i>Aesculus octandra</i>	Yellow Buckeye	7	8" CAL.	56"	Lowest Limb @ 8'-0"
AS	<i>Acer saccharum</i> 'Green Mountain'	'Green Mountain' Sugar Maple	4	8" CAL.	32"	Lowest Limb @ 12'-0"
CF	<i>Cornus florida</i> 'Appalachian Spring'	'Appalachian Spring' Dogwood	4	4" CAL.	16"	
GB	<i>Ginkgo biloba</i> 'Autumn Gold'	'Autumn Gold' Ginkgo	6	8" CAL.	48"	Lowest Limb @ 8'-0"
GM	<i>Ginkgo biloba</i> 'Magyar'	'Magyar' Ginkgo	2	5" CAL.	10"	Lowest Limb @ 7'-0"
GT	<i>Gleditsia triacanthos</i> 'Skyline'	'Skyline' Honeylocust	1	6" CAL.	6"	Lowest Limb @ 7'-0"
MS	<i>Magnolia x soulangeana</i>	Saucer Magnolia	1	4" CAL.	4"	
PP	<i>Parrotia persica</i>	Parrotia	6	4" CAL.	24"	
PY	<i>Prunus x yedoensis</i>	Yoshino Cherry	7	4" CAL.	28"	

**224" = Total DBH of Replacement Trees**

**TRANSPLANTED TREES**

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	TOTAL DBH	NOTES
T1	<i>Cornus kousa</i>	Dogwood	1	10" CAL.	10"	
T2	<i>Cornus kousa</i>	Dogwood	1	9" CAL.	9"	Multi-stem
T3	<i>Cornus kousa</i>	Dogwood	1	8" CAL.	8"	Multi-stem

**27" = Total DBH of Transplanted Trees**



- NOTES:**
- Existing Significant Trees Are to be Removed for the Following Reasons:
    - A. Located within Footprint of Proposed Buildings
    - B. Located on Area of Proposed Sidewalk Improvements
    - C. Located in Area To be Regraded
    - D. Located in Construction Staging Area
  - All Replacement Trees Will be Inspected and, If Necessary, Treated by a Certified Arborist Once a Year for Five Years.
  - The Approximate Cost of Purchasing, Planting, Watering and Maintaining Replacement Trees on Private Property for Five Years is \$375,000 as Estimated by Hartney Greymont, 433 Chestnut Street, Needham MA, 02492 and as Certified by Arborist Jon Madison, 433 Chestnut Street, Needham MA, 02492.

## **C. LEED Checklist and Narrative**

# HARVARD

CAMPUS SERVICES



## Harvard Kennedy School Pavilions Project

### LEED Certification Affidavit and Narrative

07.17.14

Harvard Green Building Services has been contracted to perform, among other duties, LEED certification administration for the Harvard Kennedy School Pavilions project. This project is registered with the Green Building Certification Institute as a LEED for Building Design and Construction (LEED-BD&C) Version 3 project and has been assigned a Project ID number of 1000043621. The project is also currently in compliance with the Harvard Green Building Standards, which is a set of process oriented requirements that go above and beyond those of LEED certification. The target LEED rating for this project is Gold, and the project is on track to achieve that goal.

As the attached scorecard shows, we are anticipating earning at least 61 points based on the project design, which is more than the 50 required to earn the Silver level of the LEED standard. There are an additional 36 points in the "Maybe" column, and the design team anticipates that many of these credits will be earned in addition to the 61 points listed in the "Yes" column. As a result, we are confident at this time that the project is on track to reach our certification goal.

In support of the above statements, the following pages list a point by point narrative of the status of each LEED credit. Credits not anticipated to be earned are not included. Additionally, my LEED AP certificate is attached on the following page.

I, Joel McKellar, affirm that all information stated within this document has been thoroughly reviewed and that the conclusions drawn from that review are accurate. The total building construction has 91,075 square foot of Gross Floor Area. The Harvard Kennedy School Pavilions project meets the Cambridge Zoning Ordinance requirement with regard to the LEED Silver level standard for construction of facilities greater than or equal to 50,000 square feet of gross floor area.

A handwritten signature in black ink that reads 'JOEL MCKELLAR'.

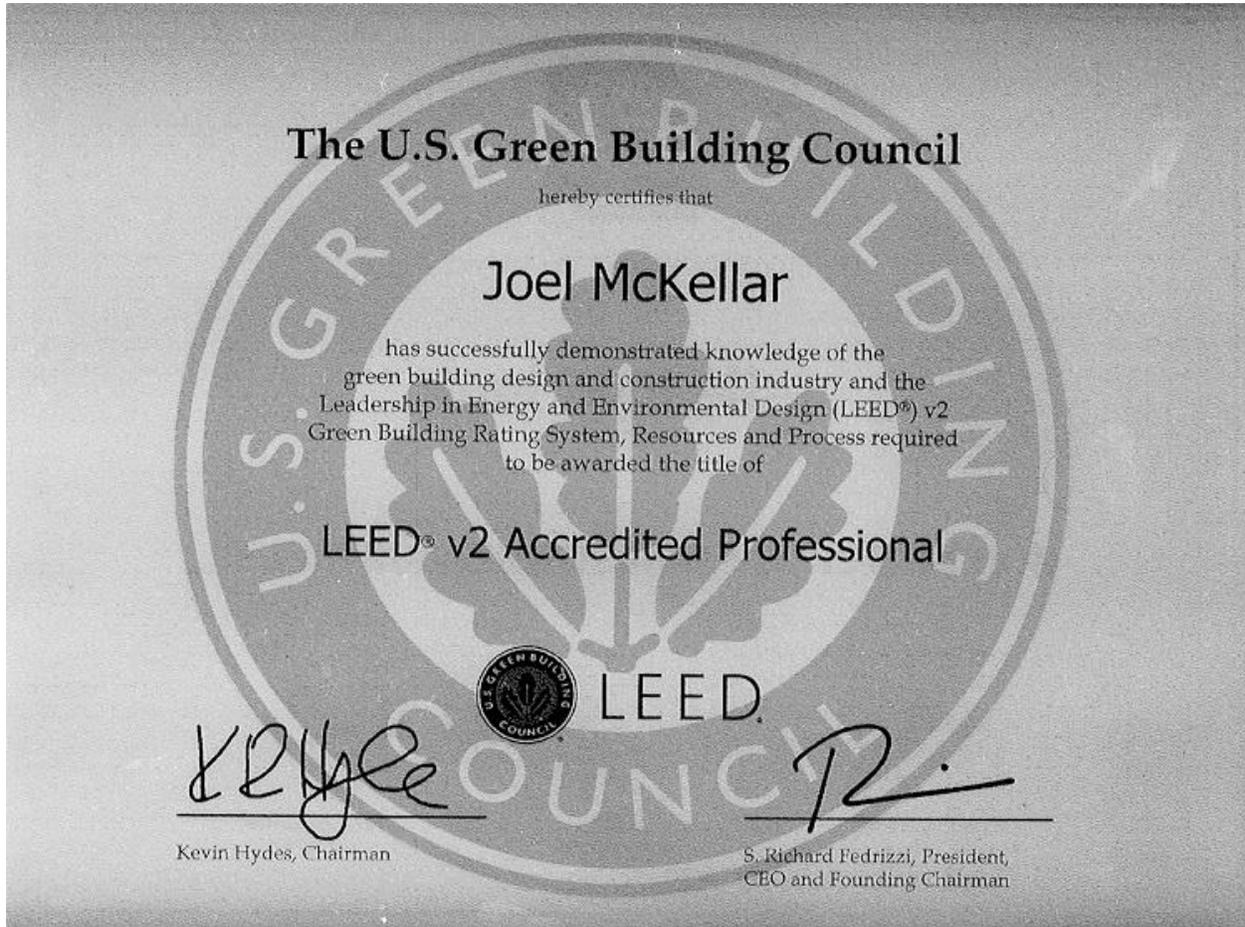
Joel McKellar, CBCP, LEED AP  
Associate Director – Harvard Green Building Services  
GBCI Number 87902 – Accredited since 06.15.2006

# HARVARD

CAMPUS SERVICES



## LEED Accreditation Certificate





LEED Online Access Code:		<b>KEY</b>  <b>Important - Upcoming Deadline</b> <b>Past Due</b> <b>X = HARVARD GREEN BUILDING STANDARDS REQUIREMENT</b> RP = Regional Priority Credit EP = Exemplary Performance point available
Demo Begins:	Projected Occupancy Date:	
Design Phase Submittal Target Date:		
Construction Phase Submittal Target Date:		
Bldg. Occupancy: <b>135 FTE/379 Trans</b>	Building GSF: <b>~91,075 SF</b>	
Project Occupancy: <b>135 FTE/379 Trans</b>		Project GSF (should match LPD): <b>~91,075 SF</b>
"X" in the "N" points column = Credit option is not being attempted, but no negative impact on points. This is for credits with multiple options to achieve the maximum available points and the project can select which option to pursue.		

POINTS Y ? N	POSSIBLE POINTS	HU GBS*	REVIEW PHASE	CREDIT	CREDIT NAME	TEAM MEMBER	NOTES
<b>GENERAL NOTES &amp; INFORMATION REQUESTS</b>							
<b>LEED PROJECT INFORMATION FORMS</b>							
	D	PI1	Minimum Program Requirements			GBS/HKS	
	D	PI2	Project Summary Details			GBS RAMSA	
	D	PI3	Occupant and Usage Data			GBS/HKS	
	D	PI4	Schedule and Overview Documents			GBS/HKS	

17	9	0	26 Points	<b>SUSTAINABLE SITES</b>			
Y			Required	C	SSp1	Construction Activity Pollution Prevention	Contractor
1			1	D	SSc1	Site Selection	GBS
5			5	D	SSc2	Development Density and Connectivity (EP)	GBS
	1		1	D	SSc3	Brownfield Redevelopment (RP)	GBS
6			6	D	SSc4.1	Alt. Transportation - Public Transp. Access (EP)	GBS
	1		1	D	SSc4.2	Alt. Transportation - Bike Storage and Showers	GBS
	3		3	D	SSc4.3	Alt. Transportation - Low Emitting/Efficient Vehicles	GBS
2			2	D	SSc4.4	Alt. Transportation - Parking Capacity	GBS
	1		1	C	SSc5.1	Site Development - Protect/Restore Habitat (EP)	GBS
	1		1	D	SSc5.2	Site Development - Maximize Open Space (EP)	GBS
1			1	D	SSc6.1	Stormwater Design - Quantity Control (RP)	Civil
1			1	D	SSc6.2	Stormwater Design - Quality Control	Civil
	1		1	C	SSc7.1	Heat Island Effect - Non-Roof (RP) (EP)	A10 RAMSA
	1		1	D	SSc7.2	Heat Island Effect - Roof (RP) (EP)	A10 RAMSA
1			1	D	SSc8	Light Pollution Reduction	A10

186 bike racks currently for 3,720 peak users at HKS. Remote showers at Malkin too far. Project is evaluating the inclusion of showers for .5% of FTE.

5	5	0	10 Points	<b>WATER EFFICIENCY</b>			
Y			Required	D	WEp1	Water Use Reduction, 20% Reduction	MEP Engineer
2			2 to 4	D	WEc1	Water Efficient Landscaping, 50% Reduction (2 pts)	Landscape Architect
2			2			Water Efficient Landscaping, No Potable Use (2 pts)	
	2		2	D	WEc2	Innovative Water Use, 50%, 100% (EP)	RAMSA A10
3	1		2 to 4	D	WEc3	Water Use Reduction, 30% (2pts), 35% (3pts), 40% (4pts), 45% (EP)	RAMSA A10

3  
35%

19	10	6	35 Points	<b>ENERGY &amp; ATMOSPHERE</b>			
Y			Required	C	EAp1	Fundamental Commissioning	Cx Agent
Y			Required	D	EAp2	Minimum Energy Performance 10% reduction below ASHRAE 90.1 for new buildings, 5% reduction for existing buildings	MEP Engineer RAMSA
Y			Required	D	EAp3	Fundamental Refrigerant Management	MEP Engineer
12	4	3	1 to 19	D	EAc1	Optimize Energy Performance Min. 12% for New Buildings, 8% for Renovations. 1 pt for every 2% increase. New building 34% or Renovations 30% = 12 pts. New building 50% or Renovations 46% = (EP)	MEP Engineer
	4	3	1 to 7	D	EAc2	On-Site Renewable Energy, 1% (1pt) (RP), 3% (2pts), 5% (3pts), 7% (4pts), 9% (5pts), 11% (6pts), 13% (7pts), 15% or more (EP)	MEP Engineer
2			2	D	EAc3	Enhanced Commissioning	Cx Agent
2			2	C	EAc4	Enhanced Refrigerant Management	MEP Engineer
3			3	D	EAc5	Measurement & Verification (3 points)	MEP GBS/HKS
	2		2	C	EAc6	Green Power, 35% 2 Years, 100% (EP)	GBS

12  
34%-  
30%

5	3	6	14 Points	<b>MATERIALS &amp; RESOURCES</b>			
Y			Required	D	MRp1	Storage & Collection of Recyclables	GBS RAMSA
		3	1 to 3	D	MRc1.1	Building Reuse - Walls, Floors, Roof 55% (1pt), 75% (2pts) (RP), 95% (3pts)	
		1	1	C	MRc1.2	Building Reuse, 50% Interior Non-Structural Components	
1			1	C	MRc2.1	Construction Waste Management, Divert 50% from Landfill	Contractor
1			1		MRc2.2	Construction Waste Management, Divert 75% from Landfill, 95% (EP)	
		2	2	C	MRc3	Materials Reuse, 5% (1pt), 10% (2pts), 15% (EP)	
1			1	C	MRc4.1	Recycled Content, 10% (post-consumer + 1/2 pre-consumer)	RAMSA Contractor
1			1		MRc4.2	Recycled Content, 20% (post-consumer + 1/2 pre-consumer), 30% (EP)	
1			1	C	MRc5.1	Regional Materials, 10% Extracted and Manufactured	RAMSA Contractor
1			1		MRc5.2	Regional Materials, 20% Extracted and Manufactured Regionally, 30% (EP)	
1			1	C	MRc6	Rapidly Renewable Materials, 2.5%, 5% (EP)	
1			1	C	MRc7	Certified Wood, 50%, 95% (EP)	RAMSA Contractor

2

8	7	0	15 Points	<b>INDOOR ENVIRONMENTAL QUALITY</b>			
Y			Required	D	EQp1	Minimum IAQ Performance	MEP Engineer
Y			Required	D	EQp2	Environmental Tobacco Smoke Control	HKS/GBS RAMSA
1			1	D	EQc1	Outdoor Air Delivery Monitoring	MEP Engineer
	1		1	D	EQc2	Increased Ventilation	MEP Engineer
1			1	C	EQc3.1	Construction IAQ Management Plan, During Construction	Contractor
1			1	C	EQc3.2	Construction IAQ Management Plan, Before Occupancy	Contractor
1			1	C	EQc4.1	Low-Emitting Materials, Adhesives and Sealants	RAMSA Contractor
1			1	C	EQc4.2	Low-Emitting Materials, Paints and Coatings	RAMSA Contractor
1			1	C	EQc4.3	Low-Emitting Materials, Flooring Systems	RAMSA Contractor

4

POINTS			POSSIBLE POINTS	HU GBS*	REVIEW PHASE	CREDIT	CREDIT NAME	TEAM MEMBER	NOTES
Y	?	N							
1			1		C	EQc4.4	Low-Emitting Materials, Composite Wood & Laminate Adhesives	RAMSA Contractor	
1			1		D	EQc5	Indoor Chemical and Pollutant Source Control	RAMSA Contractor	
	1		1		D	EQc6.1	Controllability of Systems, Lighting	MEP Contractor	
	1		1		D	EQc6.2	Controllability of Systems, Thermal Comfort	MEP Contractor	
	1		1		D	EQc7.1	Thermal Comfort, Design	MEP Contractor	
	1		1		D	EQc7.2	Thermal Comfort, Verification	HKS/GBS	
	1		1	1	D	EQc8.1	Daylight and Views - Daylight 75% of Spaces, 95% (EP)	A10	
	1		1			EQc8.2	Daylight and Views, Views for 90% of Spaces, with options for (EP)		
6	0	0	6 Points		<b>INNOVATION AND DESIGN PROCESS (max 3 Exemplary Performance Points)</b>				
1			1	1	D/C	IDc1.1	IDc1.1: Occupant Education w/ Case Study	GBS/HKS	
1			1	1	D/C	IDc1.2	IDc1.2: Low-Mercury Lighting	RAMSA Contractor	
1			1		D/C	IDc1.3	IDc1.3 - Exemplary Performance SSc3.1: AltTransportation	TBD	
1			1		D/C	IDc1.4	TBD:	TBD	
1			1		D/C	IDc1.5	TBD:	TBD	
			x		D/C	IDc1.X	Other Options: Various Exemplary Performance Credits		
1			1		D/C	IDc2	IDc2 LEED AP	GBS	
1	2	1	4 Points		<b>REGIONAL PRIORITY CREDITS</b>				
1			1		C	RP	Regional Priority Credit: SSc6.1	GBS	
	1		1		C	RP	Regional Priority Credit: EAc2 (1%)		
		1	1		C	RP	Regional Priority Credit: MRc1.1 (75%)		
	1		1		C	RP	Regional Priority Credit: SSc3, SSc7.1, SSc7.2		
61	36	13	110 Points		<b>TOTAL (pre-certification estimates)</b>				Certified 40 to 49 points    Silver 50 to 59 points Gold 60 to 79 points        Platinum 80 points and above

# HARVARD

CAMPUS SERVICES



## **Anticipated LEED Credits**

These are credits listed in the “Yes” column of the project scorecard, meaning credit achievement is either certain or extremely likely based on the current design. All prerequisites are met, and the total number of points associated with these credits, 61, is more than enough to meet the LEED Silver level of 50 points that the Cambridge Zoning Ordinance requires for projects greater than 50,000 square feet.

### ***PIf1 – Minimum Program Requirements - YES***

This property meets all LEED minimum program requirements. Harvard has committed to sharing utility data. The project complies with all environmental laws and other occupancy and site size requirements listed in this form.

### ***PIf2 – Project Summary Details***

This information will be updated to reflect final project design at the completion of Construction Documents.

### ***PIf3 – Occupant and Usage Data***

This information will be updated to reflect final project design at the completion of Construction Documents.

### ***PIf4 – Schedule and Overview Documents***

These are informational submittals and will be submitted when complete. Project is currently in Design Development and informational submittals will be revised through design and presented in the final Construction Documents and Specifications. A LEED project boundary, occupancy information, and area information will be finalized after Construction Documents are complete.

### ***SSp1 – Construction Activity Pollution and Prevention Plan –Prerequisite***

The Contractor will create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan will comply with the requirements of the 2003 EPA Construction General Permit and will include graphic and written descriptions demonstrating measures that:

- Prevent soil loss by stormwater runoff and/or wind erosion.
- Prevent sedimentation of storm sewers or receiving streams.
- Prevent pollution of air with dust and particulate matter.

### ***SSc1 – Site Selection –1 point***

The project will include no development on:

- Prime farmland
- Previously undeveloped land
- Land identified as habitat for endangered species
- Land within 100 feet of wetlands
- Land previously designated as public parkland

### ***SSc2 – Development Density and Community Connectivity – 5 points***

Being located directly adjacent to Harvard Square, this site greatly exceeds the requirements of the community connectivity compliance option. A sampling of businesses and institutions is available

# HARVARD

CAMPUS SERVICES



[here](#). This documentation will be completed with the LEED Design submission pending the completion of final Construction Documents.

### **SSc4.1– Alternative Transportation, Public Transportation Access– 6 points**

Extensive public transportation in the area (Red Line, 1, 68, 69, M2, and Harvard campus bus lines) vastly exceeds the requirements for this credit. The service levels are high enough to meet the 200 trips per day requirement for Exemplary Performance under IDc1.3. This documentation will be completed with the LEED Design submission pending the completion of final Construction Documents.

### **SSc4.4 – Alternative Transportation, Parking Capacity – 2 points**

This project complies under the option where no additional parking is provided.

### **SSc6.1 – Stormwater Design – Quantity Control – 1 points**

Underground storage tanks will capture stormwater runoff for treatment and reuse in the HKS Pavilions project. These storage tanks are integral to implementing a stormwater management plan. As the existing imperviousness on site is currently greater than 50%, the new tanks and stormwater plan will result in a 25% decrease in the volume of stormwater runoff from the 2-year 24-hour design storm.

### **SSc6.2 – Stormwater Design – Quality Control – 1 point**

The underground storage and water treatment plant are part of the project's stormwater management plan to capture and treat stormwater runoff from 90% of the average annual rainfall. Treatment will remove no less than 80% of the average annual post development total suspended solids.

### **SSc8 – Light Pollution Reduction – 1 point**

Automatic devices will reduce input power for all nonemergency interior luminaires with a direct line of sight to openings in the envelope by at least 50% between 11 p.m. and 5 a.m. and exterior lighting power densities will not exceed ANSI/ASHRAE/IESNA Standard 90.1-2007 for the classified zone.

### **WEp1 – Water Use Reduction, 20% - Prerequisite**

Stormwater treatment and reuse, as well as low flow fixtures will contribute to reducing water use in the proposed building by more than 20% when compared to a baseline building.

### **WEc1 – Water Efficient Landscaping, 50% Reduction- 2 points**

Stormwater reuse, efficient irrigation fixtures and controls, and well selected plantings will contribute to reducing potable water use for irrigation by 50%.

### **WEc3 – Water Use Reduction, 35%- 3 points**

Design flow rates are as follows, which are expected to result in a minimum 35% reduction overall based on project requirements established by the Harvard University Green Building Standards:

- 1.28 gpf for toilets in residential and public spaces
- .125 gpf for urinals in public spaces
- 1.85 gpm for showers
- 1.5 gpm for kitchen sinks

# HARVARD

CAMPUS SERVICES



- 0.1 gallon per cycle metering lavatory faucets for public spaces (.5 gpm at 12 seconds minimum cycle)

Stormwater treatment and reuse is expected to elevate water savings well beyond the 35% minimum requirement.

### ***EAp1 – Fundamental Commissioning - Prerequisite***

The Harvard Kennedy School has selected Synergy Consultants as the third party commissioning authority for this project.

### ***EAp2 – Minimum Energy Performance – Prerequisite***

The project team has created a Whole Building Energy Simulation model using eQuest to demonstrate the energy performance improvement in the proposed building when compared with a baseline building. Using the building performance rating method in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007, the proposed building is demonstrating an anticipated energy use reduction of 33.7%, as well as a reduction in expected utility costs of 35.4%, when compared to a baseline building. This exceeds the prerequisite minimum energy reduction of 10%. The Harvard Green building standards require a 34% reduction in expected energy costs.

### ***EAp3 – Fundamental Refrigerant Management – Prerequisite***

Cooling for this space will be provided with new chillers. New chillers and cooling for process uses (e.g. kitchen refrigeration units) will be specified CFC free.

### ***EAc1 – Optimize Energy Performance, 34% - 12 points***

The project team has created a Whole Building Energy Simulation model using eQuest to demonstrate the energy performance improvement in the proposed building when compared with a baseline building. Using the building performance rating method in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007, the proposed building is demonstrating an anticipated energy use reduction of 33.7%, as well as a reduction in expected utility costs of 35.4%, when compared to a baseline building. The Harvard Green building standards require a 34% reduction in expected energy costs.

Savings are expected as a result of implementing numerous Energy Efficiency measures including:

- VAVs and chilled beams in offices
- Expanded comfort conditions in the Wintergarden
- Shading to reduce solar heat gain
- Reduced glazing
- Aggressive Lighting Power Densities
- Daylighting and daylighting control throughout

Anticipated 33.7% energy reduction and 35.4% reduction in anticipated energy costs does not include savings from renewables, which are still under consideration at this point.

### ***EAc3 – Enhanced Commissioning – 2 Points***

A requirement of the Harvard Green Building Standards, fundamental commissioning is required to include enhanced commissioning which includes design review, submittal review, a 10 month post occupancy follow up with O&M staff and occupant education training.

### ***EAc4 – Enhanced Refrigerant Management– 2 Points***

# HARVARD

CAMPUS SERVICES



Refrigerants in HVAC&R equipment installed for the HKS Pavilions project will minimize or eliminate the emission of compounds that contribute to ozone depletion and global climate change.

### ***EAc5 – Measurement and Verification – 3 Points***

To comply with the Harvard Green Building Standards, the HKS Pavilions project team will develop and implement an M&V plan consistent with Option D as specified in the IPMVP Volume III covering a period at least 1 year of post-construction occupancy. The plan will include a process for corrective action if results indicate that energy savings are not being achieved.

### ***MRp1 – Storage and Collection of Recyclables - Prerequisite***

Appropriately sized commingled recycling bins will be provided throughout the building including, offices, the kitchen, and all shared spaces. The volume of this storage vastly exceeds the calculated recycling generation rate that is developed from Harvard annual trash, recycling, and composting rates.

### ***MRc2 – Construction Waste Management – 2 points***

With 85 LEED certifications to date at Harvard, only one has received lower than a 75% diversion rate. Even with the use of commingled recycling bins, typical diversion rates exceed 85% on a routine basis. The goal for this project is to achieve a 75% diversion rate by weight.

### ***MRc4 – Recycled Content – 1 point***

Project specifications require products to contain recycled content where applicable, and the Contractor is required to verify the recycled content of all materials within MasterFormat Divisions 02-10 and 12. GBS will review all submittals within these divisions to give the project the best opportunity to meet this credit. While it's impossible to know if these points will be earned until the Material Tracking Sheet is aggregated with all of the relevant products, all of our recent projects have earned at least one point in each category, and our goal is to meet the two point threshold for each. The following specifications will contain requirements for recycled content:

- 035416 – Cement Leveling Compound
- 055000 – Miscellaneous Metals
- 062000 – Carpentry
- 064023 – Architectural Woodwork
- 072100 – Thermal Insulation
- 075323 – EPDM Membrane Roofing and Roof Insulation
- 076200 – Sheet Metal Flashing
- 078100 – Sprayed Fire-Resistive Materials
- 078413 – Firestops and Smoke seals
- 079200 – Joint Sealers
- 081113 – Steel Doors and Frames
- 081416 – Wood Doors
- 083113 – Access Doors
- 083326 – Roll Up Grilles
- 083335 – Roll Up Counter Shutters
- 084313 – Aluminum Entrances and Storefronts
- 085200 – Exterior Wood Windows
- 088000 – Glass and Glazing

# HARVARD

## CAMPUS SERVICES



- 089000 – Louvers
- 092116 – Gypsum Board Assemblies
- 093013 – Tiling
- 095113 – Acoustical Panel Ceilings
- 096400 – Wood Strip Flooring
- 096510 – Linoleum Sheet Flooring
- 096516 – Slip Resilient Sheet Flooring
- 096813 – Carpet Tile
- 096816 – Carpet (Glue Down)
- 098413 – Acoustic Wall and Ceiling Panels
- 101100 – Visual Display Surfaces
- 101400 – Signage
- 102113 – Toilet Partitions
- 102226 – Operable Partitions
- 102600 – Wall Protection
- 102813 – Toilet Accessories

### ***MRC5 – Regional Materials – 1 point***

Project specifications require products to contain regional content (manufactured and raw material sourced) where applicable and the Contractor is required to verify the recycled content of all materials within MasterFormat Divisions 02-10 and 12. GBS will review all submittals within these divisions to give the project the best opportunity to meet this credit. While it's impossible to know if these points will be earned until the Material Tracking Sheet is aggregated with all of the relevant products, all of our recent projects have earned at least one point in each category, and our goal is to meet the two point threshold for each. The following specifications will contain requirements for recycled content:

- 035416 – Cement Leveling Compound
- 055000 – Miscellaneous Metals
- 062000 – Carpentry
- 064023 – Architectural Woodwork
- 072100 – Thermal Insulation
- 075323 – EPDM Membrane Roofing and Roof Insulation
- 076200 – Sheet Metal Flashing
- 078100 – Sprayed Fire-Resistive Materials
- 078413 – Firestops and Smoke seals
- 079200 – Joint Sealers
- 081113 – Steel Doors and Frames
- 081416 – Wood Doors
- 083113 – Access Doors
- 083326 – Roll Up Grilles
- 083335 – Roll Up Counter Shutters
- 084313 – Aluminum Entrances and Storefronts
- 085200 – Exterior Wood Windows
- 088000 – Glass and Glazing
- 089000 – Louvers

# HARVARD

## CAMPUS SERVICES



- 092116 – Gypsum Board Assemblies
- 093013 – Tiling
- 095113 – Acoustical Panel Ceilings
- 096400 – Wood Strip Flooring
- 096510 – Linoleum Sheet Flooring
- 096516 – Slip Resilient Sheet Flooring
- 096813 – Carpet Tile
- 096816 – Carpet (Glue Down)
- 098413 – Acoustic Wall and Ceiling Panels
- 101100 – Visual Display Surfaces
- 101400 – Signage
- 102113 – Toilet Partitions
- 102226 – Operable Partitions
- 102600 – Wall Protection
- 102813 – Toilet Accessories

### ***MRc7 – Certified Wood – 1 point***

Similarly, project specifications require new wood products to be harvested and manufactured from FSC certified sources. GBS will review all submittals within these divisions to give the project the best opportunity to meet this credit. However, it's impossible to know if these points will be earned until the Material Tracking Sheet is aggregated with all new wood products. The following specifications contain requirements for FSC certification of all new wood contained within the product:

- 062000 – Carpentry
- 064023 – Architectural Woodwork
- 081416 – Wood Doors

### ***EQp1 – Minimum Indoor Air Quality – Prerequisite***

Project MEP Engineer Vanderweil Engineering is ensuring the design of the ventilation system exceeds the ASHRAE 62.1 standards.

### ***EQp2 – Environmental Smoke Control – Prerequisite***

No smoking is permitted in the building or within 25 feet of doors, windows and outdoor air intakes. Appropriate signage will be installed.

### ***EQc1 – Outdoor Air Delivery Monitoring – 1 Point***

Design Engineer Vanderweil Engineering will design a ventilation system that includes permanent monitoring systems to ensure system maintains minimum requirements including installing CO2 sensors and a BAS that alarms when airflow and CO2 values vary by greater than 10% of design. The design will include monitoring CO2 levels throughout as part of demand control ventilation sequences as well as providing a direct outdoor airflow measurement device for measuring the minimum outdoor air intake flow.

### ***EQc3.1 – Construction IAQ Management Plan, During Construction – 1 point***

Project specifications require the contractor to comply with the appropriate SMACNA standards for managing IAQ during construction.



### ***EQc3.2 – Construction IAQ Management Plan, Before Occupancy – 1 point***

Project specifications require the contractor to comply with the appropriate SMACNA standards for managing IAQ post construction and before occupancy including a building flush-out or IAQ testing.

### ***EQc4.1 – Low-Emitting Materials, Adhesives and Sealants – 1 point***

As part of the Harvard Green Building Standards, specifications are required to include Low emitting material compliance for all adhesives and sealants. Specifications will require all adhesives and sealants comply with the SCAQMD Rule #1168.

### ***EQc4.2 – Low-Emitting Materials, Paints and Coatings – 1 point***

As part of the Harvard Green Building Standards, specifications are required to include Low emitting material compliance for all paints and coatings. Specifications will require all paints and coatings comply with the criteria as defined by Green Seal GS-11, GC-01 for anticorrosive paints, and SCAQMD Rule 1113 for Architectural coatings.

### ***EQc4.3 – Low-Emitting Materials, Flooring Systems – 1 point***

As part of the Harvard Green Building Standards, specifications are required to include Low emitting material compliance for all flooring systems. Specifications will require all flooring systems comply with the following standards:

- Green Label plus for carpets and Green Label for underlayment
- Floorscore or CA 01350 for all hard surfaces
- Adhesives and Sealants, including tile setting adhesives must comply with SCAQMD Rule #1168
- Floor finishes must comply with SCAQMD Rule #1113

### ***EQc4.4 – Low-Emitting Materials, Composite Wood & Laminate Adhesives – 1 point***

Project specifications require the purchase of low-VOC or no-added urea formaldehyde products where applicable. We anticipate earning EQc4.4 but final selections for flooring and systems furniture have not yet been reviewed for compliance at the current schematic design phase.

### ***EQc5 – Indoor Chemical and Pollutant Source Control – 1 point***

Permanent entryway systems will be located in the vestibules serving all exterior entrances to the HKS Pavilions project. MERV 13 filtration will be used for all recirculated and newly supplied air in all mechanically ventilated systems. Areas with hazardous chemical storage (such as janitor closets, and high volume print areas) will be separated from adjacent spaces and negatively pressurized to prevent air migration out of those spaces.

### ***IDc1.1 – Occupant Education w/ Case Study – 1 point***

As part of the Harvard Green Building Standards, all LEED projects are required to complete and publish a comprehensive [case study](#), and either (A) provide regular tours or (B) provide educational signage highlighting the LEED and sustainability features of the project. This project plans to incorporate option B through the use of digital signage in public spaces of the project.

### ***IDc1.2 – Low Mercury Lighting – 1 point***

# HARVARD

CAMPUS SERVICES



All fluorescent lighting is required via the project specifications to meet low-mercury requirements. This is submitted to LEED using the *MRC4, Sustainable Purchasing – Reduced Mercury in Lamps, 90 pg/lum-hr* credit as provided in the LEED-EBOM rating system. This strategy has been used successfully on multiple projects on campus, with many projects reducing mercury below 70 pg/lum-hr.

***IDc1.3 – Exemplary Performance: Alternative Transportation – 1 point***

See SSc3.1 for compliance information.

***IDc2 – LEED Accredited Professional – 1 point***

Joel McKellar, CBCP, LEED AP is on the project team and meets the requirements of this credit.

***RP1 – RP Credit – SSc6.1 – 1 point***

These credits are designated as a Regional Priority based on the zip code of this project. They are earned automatically as a result of earning **SSc6.1**, EAc2 (2%), MRc1.1 (75%), SSc3, SSc7.1, and SSc7.2.

## **Potential Credits**

These are credits listed in the “Maybe” column in the project scorecard, meaning credit achievement is possible but requires additional investigation or is based on construction practices that are difficult to estimate in the design phase. Extensive prior experience indicates that at least half to two-thirds of these credits will be earned at the completion of construction, and we currently have 35 total points in this classification, resulting in a low-end of 80 points (Platinum: 62 + (35\*50%) = 80) anticipated overall. This is likely a conservative estimate of the total points the project will achieve. As many of these credits require additional investigation or cannot be calculated, justifications for their achievement are not provided.



Please save the following information for future reference.

Project title	HKS Pavilions and Raised Courtyard
Project id	1000043621
Access code	151454647121350
Project city	Cambridge
Project state	MA
Project administrator	Emil Cuevas (emil_cuevas-melendez@harvard.edu)
Registration date	06/12/2014
Order number	0011685592
Item description	LEED-NC Registration
Item quantity	1.000
Total amount	\$900

Please Note:

1. An invoice has been automatically generated and emailed to you.
2. Payments made by credit card will be processed instantaneously.
3. Payments made by check will be processed within 15 business days. Please include a copy of the invoice with the payment.
4. A receipt will be emailed once your payment processed successfully.
5. Instructions for paying by wire transfer can be found here

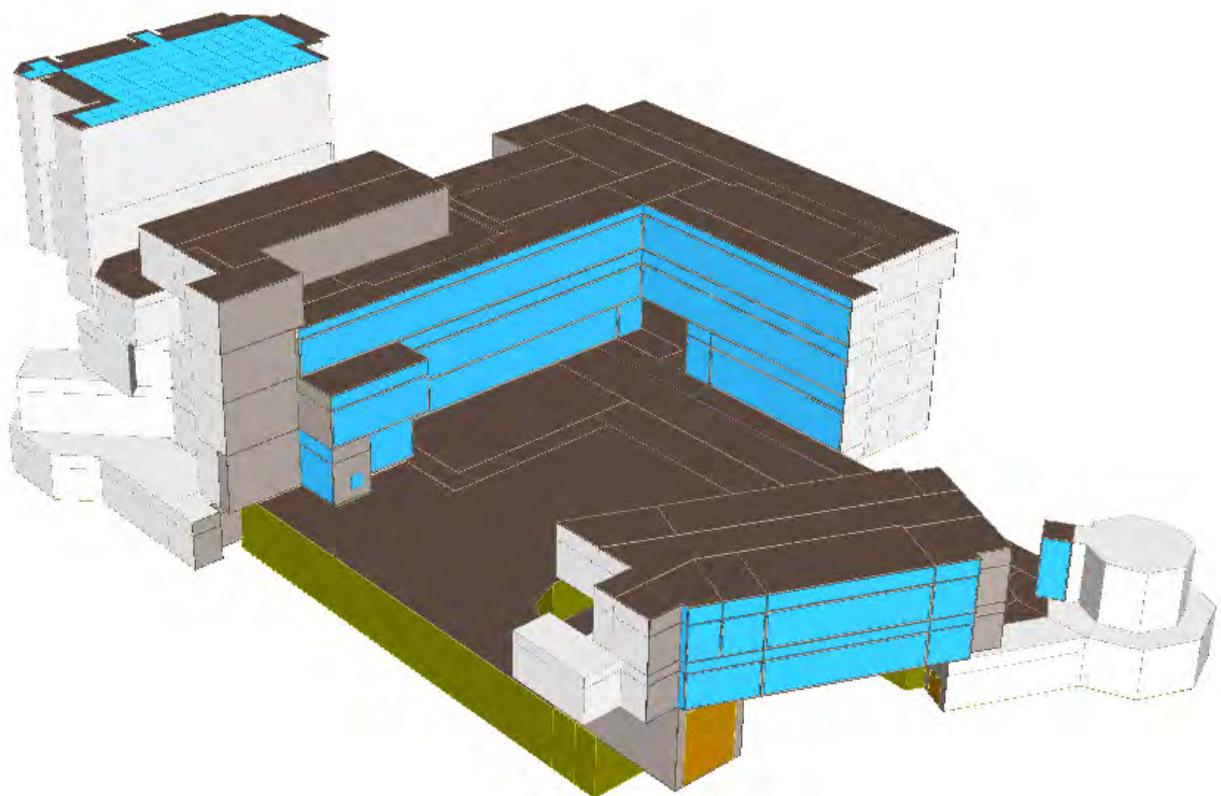
[https://www.leedonline.com/irj/go/km/docs/documents/usgbc/leed/config/common/LOv3Help/project\\_registration\\_.htm#InternationalWire](https://www.leedonline.com/irj/go/km/docs/documents/usgbc/leed/config/common/LOv3Help/project_registration_.htm#InternationalWire)



# Schematic Design Energy Model Assumptions

## Harvard Kennedy School Pavilions

June 13, 2014 (Rev.1: Revised from ASHRAE 90.1-2010 to 2007)



---Blank Page---

# Model Input Assumptions

**Analysis Tool:** eQUEST (DOE 2.2 Engine) v3.64

**Weather File:** DOE 2.2 TMY3 weather file for Boston, MA

**ASHRAE Climate Zone:** 5A

**Energy Modeling Methodology:** ASHRAE 90.1-2007 Appendix G Performance Rating Method

**Studied Building Area (as simulated with DOE 2.2):** approx. 85,700 ft<sup>2</sup> conditioned space

**Model Massing:** The total program consists of approximately 85,700 ft<sup>2</sup> of conditioned area and includes:

- 66,800 ft<sup>2</sup> Offices and Student Life
- 12,200 ft<sup>2</sup> Classrooms
- 6,700 ft<sup>2</sup> Kitchen
- 9,000 ft<sup>2</sup> Loading Dock (not conditioned space)

The thermal blocks for the energy analysis were based on the models received from RAMSA.

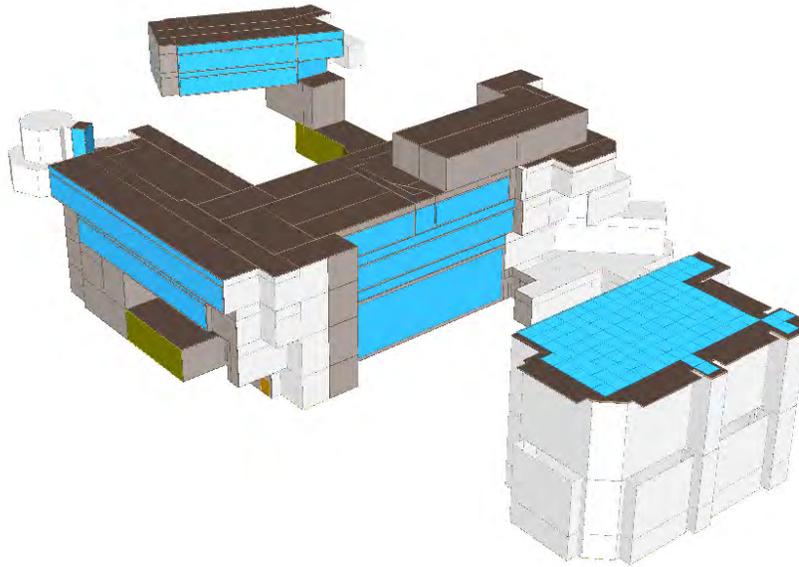
**Number of Floors:** South Pavilion: 3 above grade floors and 1 below

North Pavilion: 2 above grade floors

**New Construction:** 90-95% (To Be Coordinated with Design Team)

**Principal Heating Source:** Campus Steam

**Principal Cooling Source:** Chilled Water



Building Element	Baseline Design	Proposed Design
Exterior Wall Construction	ASHRAE Compliant Zone 5A Exterior Wall: Total U-value: 0.064 Btu/hr-ft <sup>2</sup> -°F (R-16)	Total U-value: 0.042 Btu/hr-ft <sup>2</sup> -°F (R-15 ci)
Roof Construction	ASHRAE Compliant Zone 5A Roof: Total U-value: 0.048 Btu/hr-ft <sup>2</sup> -°F (R-20)	Total U-value: 0.024 Btu/hr-ft <sup>2</sup> -°F (R-40 ci)
Slab on Grade	ASHRAE Compliant Zone 5A Unheated Slab: No insulation required	Same as Baseline Design

Building Element	Baseline Design	Proposed Design
Window-to-Wall Ratio	40% Overall	Approximately 55% Overall
Fenestration Type	ASHRAE Compliant Zone 5A Vertical Glazing	Same as Baseline Design
Vertical Fenestration U-value	ASHRAE Compliant Zone 5A Vertical Glazing Curtainwall Assembly U-value: 0.45 Btu/hr-ft <sup>2</sup> -°F Metal Framing Assembly U-value: 0.55 Btu/hr-ft <sup>2</sup> -°F	U:0.29 cog Btu/hr-ft <sup>2</sup> -°F
Vertical Fenestration SHGC (SC)	ASHRAE Compliant Zone 5A Vertical Glazing - 0.40 (0.46)	SHGC:0.39
Horizontal Fenestration U-value	ASHRAE Compliant Zone 5A Horizontal Glazing Assembly U-value: 0.69 Btu/hr-ft <sup>2</sup> -°F	Low-E Glass
Horizontal Fenestration SHGC (SC)	ASHRAE Compliant Zone 5A Horizontal Glazing - 0.39 (0.34)	Reduced SHGC with Automated Shades

Building Element	Baseline Design		Proposed Design	
	Space	LPD (W/sf.)	Space	LPD (W/sf.)
Interior Lighting Power Density	Corridor	0.50	Same as Baseline Design	
	Lounges	1.20		
	Office	1.10		
	Classrooms	1.40		
	Conference Rooms	1.30		
	Dining	0.90		
	Kitchen	1.20		
	Storage	0.80		
	Mech / Elec Spaces	1.50		
	Loading Dock	0.80		
	Restrooms	0.90		
	Lighting Controls (i.e. occupancy sensors)	Conference/Training as per App. G		
Receptacle Equipment Power Density	Space	EPD (W/sf.)	Space	EPD (W/sf.)
	Corridor	0.20	Same as Baseline Design	
	Lounges	0.50		
	Office	2.0		

	Classrooms	2.0	
	Conference Rooms	2.0	
	Dining	0.5	
<b>Kitchen</b>	18.0 W/sf. Max Load 1.2 w/sf. Min Load		Same as Baseline Design
<b>Elevators / Exterior Lighting</b>	10 kW Elevator Load 10 kW Exterior Lighting Load 0.61 kW Garage Exhaust Load		Same as Baseline Design

Building Element	Baseline Design	Proposed Design
<b>Mechanical Systems</b>		
HVAC System Type	As per ASHRAE 90.1-2007 Appendix G: System 3: Packaged Single Zone-AC for the Kitchen and Mechanical Spaces System 5: Packaged VAV with hot water reheat for all other spaces using Purchased Steam	Chilled Water VAV with HW Reheat Outside Air provided by DOAS
<b>Air-side System</b>		
<b>Cooling</b>		
AHU Minimum Supply Temp	55°F (based on a 20°F design delta T)	Same as Baseline Design
AHU Cooling Source	DX Cooling	Chilled Water
Cooling Efficiency	PSZ-AC: 11.0-11.7 EER PVAVS: 9.5-10.8 EER	n/a
Cool Control	PVAVS: Supply Temperature Reset based on warmest zone (5°F rise over minimum supply air temperature)	Same as Baseline Design
<b>Heating</b>		
Zone Entering Max Supply Air Temp	92 °F	Same as Baseline Design
Heating Source	PSZ-AC: Purchased Steam PVAVS: Purchased Steam with Zone Reheat	Purchased Steam with Zone Reheat
<b>Outside Air</b>		
Ventilation Air	Same as Proposed Design	Office – 17 cfm / person; Classrooms – 8 cfm / person; Conference – 6 cfm / person
<b>Fan Power</b>		
Total Fan System Power / Control	1.1 W/CFM	0.7 W/CFM
<b>Water-side System</b>		
<b>Cooling</b>		
Cooling Type	n/a	1 Electric water-cooled centrifugal chillers, 4.4 COP
Cool Control	n/a	Outdoor air reset: 44°F at 80°F dry bulb and above 54°F at 60°F dry bulb and below, Ramped linearly
CHW Pump Power	n/a	22 w/gpm; Modeled as primary/secondary systems with variable speed drives on the secondary loop.
<b>Condenser</b>		

Condenser Type	n/a	Axial fan cooling tower w/ variable speed drive
Condenser Water Supply / Range	n/a	85°F / 10°F
CW Pump Power, Control and Motor Class	n/a	19 w/gpm; Variable flow pump, premium efficiency motor
<b>Heating</b>		
Heating Type	Purchased Steam	Same as Baseline Design
Hot Water Supply/Return	180°F / 130°F	Same as Baseline Design

<b>Energy Efficiency Measures</b>	
EEM - 1 VAV + Chilled Beams in Offices	Chilled Beam System serving the Bridge Pavilion and the 4 <sup>th</sup> floor of the Southern Pavilion
EEM - 2 Campus Steam + Solar DHW	DHW supplemented by Solar Hot Water System - 1160 kBtu Solar Hot Water with 1400 Gallons Storage
EEM - 3 Semiconditioned Winter Garden	Expanded comfort conditions in Winter Garden
EEM - 4 Passive Winter Garden	Expanded comfort conditions in Winter Garden
EEM - 5 Full Height Glass with Shading	Vertical Shades provided for new glazing to achieve 30% reduction in solar heat gain.
EEM - 6 Reduced Glass with Shading	Height of glazing reduced by 2 ft. by raising the sill height and vertical Shades provided for new reduced glazing to achieve 30% reduction in solar heat gain.
EEM - 7 Triple Glazed	Replace double glazed windows with standard triple glazed units - U:0.24 cog, SHGC:0.37
EEM - 8 10% LPD Reduction	Lighting Power Density reduced 10% below ASHRAE 90.1-2010 Baseline LPD (W/ft <sup>2</sup> )
EEM - 9 20% LPD Reduction	Lighting Power Density reduced 20% below ASHRAE 90.1-2010 Baseline LPD (W/ft <sup>2</sup> )
EEM - 10 Daylighting Controls	Daylight Controls and Sensors added
EEM - 11 Renewables PV	70 kW installed Photovoltaic
EEM - 12 Cumulative	EEM - 1 VAV + Chilled Beams in Offices EEM - 6 Reduced Glass with Shading EEM - 7 Triple Glazed EEM - 9 20% LPD Reduction
EEM - 13 Cumulative + Renewables SHW and PV	EEM - 12 Cumulative EEM - 2 Campus Steam + Solar DHW EEM - 11 Renewables PV

EM: CR Review: MT, NK, CG

## D. Sewer Service Infrastructure Narrative

The site's wastewater infrastructure includes an MWRA main that traverses the middle of the campus, and the project team will be confirming with the MWRA regarding tying in to this main. The City of Cambridge has sewer mains adjacent to the campus in Eliot Street and in the DCR corridor that connects Eliot Street with the JFK Park. These City mains have the capacity to support the HKS project, but would require a pump station to enable a tie in. The city mains are considered an alternative if a MWRA tie in is not feasible.

The project will utilize a 75,000 gallon underground storage tank to capture stormwater runoff for onsite detention, treatment and reuse on the HKS campus. The storage tank will capture and treat stormwater runoff from approximately 90% of the average annual rainfall. Treated stormwater will be used for on-site irrigation.

Much of the existing HKS campus is essentially impervious due to the presence of the MBTA concrete slab directly below the courtyard. This slab has an underdrainage system that collects any infiltrated water (that is not runoff to the existing campus' catch basins and area drains) which then connects to the campus stormwater system. This system drains the campus across Eliot Street to the HKS Pump Station that then discharges the stormwater to a MA DCR line that eventually outlets to the Charles River.

Although the proposed project will not alter the fundamental presence of the concrete construction underlying the site, the courtyard will function as an intensive green roof, creating a large landscaped open space at the center of the site. The drainage system of the main courtyard will create the conditions for improved on-site stormwater management.

## **E. Water Service Infrastructure Narrative**

The capacity and condition of drinking water infrastructure systems are adequate. The project team has met with the Cambridge Water Department regarding tying into the existing 24" main in Eliot Street that has the capacity (both volume and pressure) to support the proposed development. This capacity will be confirmed via hydrant flow tests.

## **F. Noise Mitigation Narrative**

The new development utilizes lower level and interior spaces within the building to house mechanical equipment that will eliminate external noise impacts from these sources. A new 5<sup>th</sup> Floor mechanical penthouse will contain the majority of building support functions. This penthouse has been placed atop the proposed South Pavilion, which is interior to the campus, in order to minimize external impacts to campus neighbors. All outdoor mechanical equipment will be completely contained within screened mechanical wells and acoustically buffered to reduce noise, and will be designed to meet the standards contained in the Cambridge Noise Ordinance.

As part of the project Harvard will develop a construction mitigation plan that will include provisions for noise management. Construction work that generates noise will be conducted in accordance with the provisions for construction sites contained in the Cambridge Noise Ordinance.

## **G. Summary of Community Outreach**

During the course of project planning, the Harvard Kennedy School and Harvard Public Affairs & Communication has undertaken outreach with the project's immediate abutters including the 975 Memorial Drive Condominium Association, Carpenter Co. (owners of the Charles Square development), and the Harvard Square Business Association. As the project proceeds through permitting and into construction, Harvard will continue to meet with its abutters on a regular basis.

## H. Wind Study



Tel: 519.823.1311  
Fax: 519.823.1316

Rowan Williams Davies & Irwin Inc.  
650 Woodlawn Road West  
Guelph, Ontario, Canada N1K 1B8

August 26, 2014

George de Brigard, Senior Associate  
Robert A.M. Stern Architects, LLP  
460 West 34<sup>th</sup> Street  
New York, NY 10001  
[g.debrigard@ramsa.com](mailto:g.debrigard@ramsa.com)

**Re: Wind Comfort Assessment  
Harvard Kennedy School  
Cambridge, MA  
RWDI Project #1402561**

Dear Mr. de Brigard:

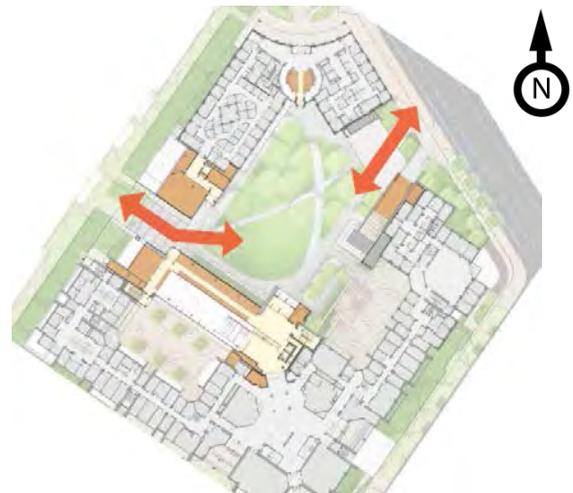
Rowan Williams Davies & Irwin Inc. (RWDI) has reviewed the potential wind conditions at the two proposed throughways at the Harvard Kennedy School in Cambridge, MA. This letter summarizes our main findings based on the current design drawings, local wind climate and our past experience of wind-tunnel testing for similar buildings.

### Site Information

The Harvard Kennedy School consists of several low buildings and a central courtyard, as shown in Image 1a. It is surrounded by buildings of a similar height in most directions with the exception of south through west, where an open park is located. The proposed development includes the north gateway building and south and west pavilions, plus two throughways between and under the existing and proposed buildings along the north and west sides of the school site (see Image 1b).



**Image 1a** - School Site and Surroundings  
(Courtesy of Google earth)



**1b** – Two Proposed Throughways

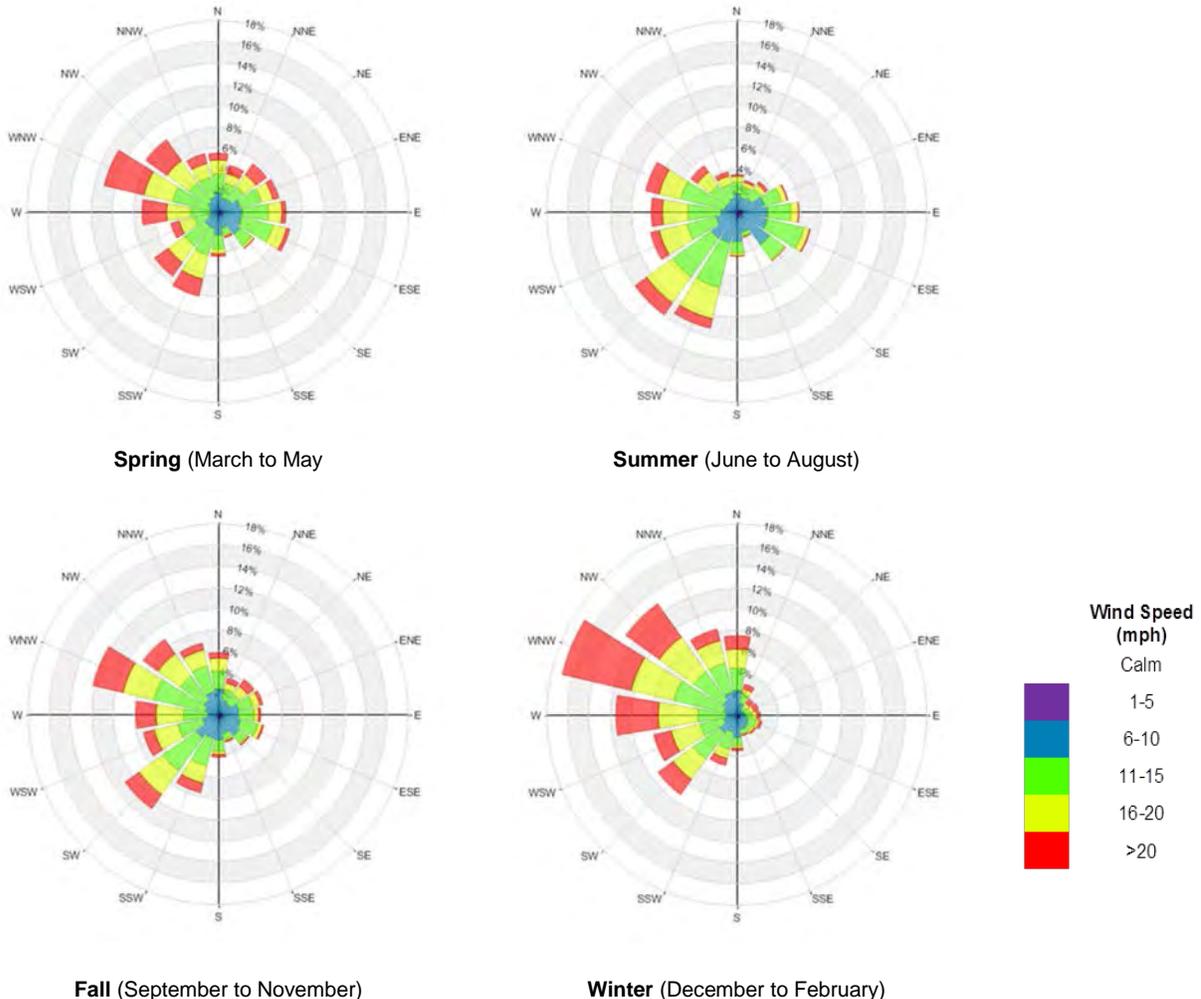
This document is intended for the sole use of the party to whom it is addressed and may contain information that is Privileged and/or confidential. If you have received this in error, please notify us immediately.

© RWDI name and logo are registered trademarks in Canada and the United States of America

## Local Wind Climate

Wind data recorded at Boston Logan International Airport between 1981 and 2011 were analyzed for the spring (March to May), summer (June to August), fall (September to November) and winter (December to February) seasons. Image 2 graphically depicts the distributions of wind frequency and directionality for these four seasons. When all winds are considered, winds from the northwest and southwest quadrants are predominant. The northeasterly winds are also frequent, especially in the spring.

Strong winds with mean speeds greater than 20 mph (red bands) measured at the airport are prevalently from the northwesterly directions throughout the year, while the southwesterly and northeasterly winds are also frequent. Therefore, winds from the northwest, southwest and northeast directions are considered most relevant to the current project, while winds from other directions are also considered in our assessment.



**Image 2 - Directional Distribution (%) of Winds (Blowing From) – Boston Logan International Airport (1973 - 2011)**

## Wind Assessment

The proposed north gateway building will be located between the 6-story Belfer Center and Taubman Building, with a throughway under the proposed 2-story link (see Image 3a), while the west throughway will be located between the new south and west pavilions and also under a 2-story link (Image 3b). Across Eliot Street from the north throughway, there is a 4-story parking garage (Image 4a). To the west of the west throughway, the existing buildings at Charles Square are slightly taller, with dense trees along the laneway (see Image 4b). The orientation of the proposed throughways and their surrounding buildings are critical in determining the potential wind conditions in these areas. A detailed assessment is provided below, based on local wind directionality and building configurations:



**Image 3a** - View of North Throughway from Eliot Street



**3b** – View of West Throughway from Charles Hotel



**Image 4a** - Southwest View of Existing School  
(Courtesy of Google earth)

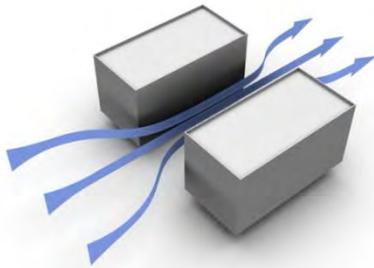


**4b** – Southeast View of Existing School  
(Courtesy of Google earth)

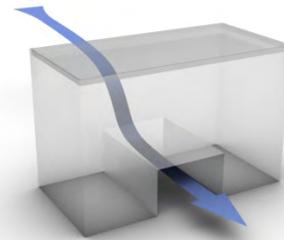
- Based on the local wind climate and our previous experience of wind studies in the areas, the existing wind conditions on the campus are considered to be generally comfortable for pedestrian sitting or standing during the summer and fall seasons. Higher wind speeds comfortable for walking are expected during the spring and winter seasons, when accelerated winds in the gaps

between buildings may become uncomfortable from time to time due to a channeling effect (Image 5a). Dangerous mean wind speeds or unacceptable gust speeds are unlikely to occur, due to the relatively low and dense buildings on the campus.

- The north throughway to Eliot Street will be sheltered by the existing Taubman Building from the prevailing northwesterly winds. The existing parking garage across the street will also provide some sheltering for the northeasterly winds (Image 4a). The proposed 2-story link will be stepped (Image 3a), which is positive for wind control. While the link is expected to reduce the total amount of northeast winds into the central courtyard, it will also funnel the winds through the opening underneath the link (Image 5b). In addition, the proposed south and west pavilions will cover part of the central courtyard and slightly reduce the direct impact of the southwesterly winds on the north throughway. Overall, the resultant wind conditions within the north throughway are predicted to be suitable for pedestrian walking or better. If more passive activities (e.g., sitting in an outdoor cafe or standing in a waiting area for taxi) are anticipated within or around the throughway, localized wind control measures will have to be considered and they may take the form of landscaping and wind screens – see examples in Image 6 on the next page.

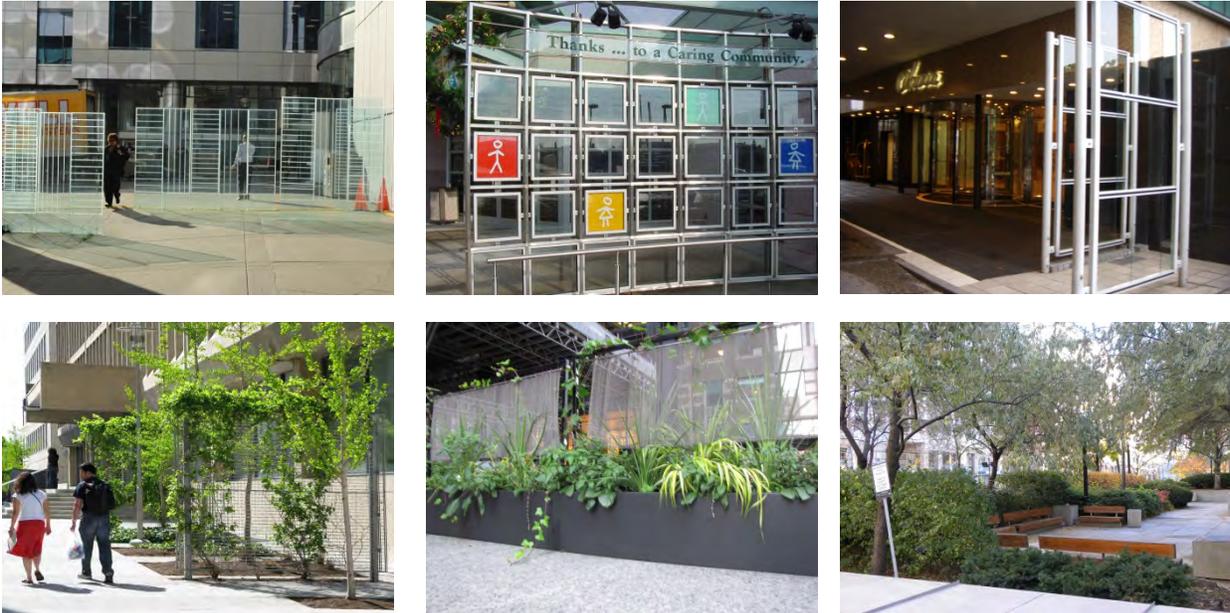


**Image 5a** - Channeling Effect



**5b** – Acceleration through Opening

- The west throughway will be largely sheltered by the existing taller buildings to the west (Image 4b) for the winds from the southwest and northwest directions. The existing dense trees along the west edge of the school are also beneficial for reducing winds along the laneway, especially during the summer season. The construction of the north gateway will reduce the amount of northeasterly winds into the central courtyard, but the proposed south and west pavilions will form an opening with a reduced dimension for winds to flow through and, therefore, higher wind speeds within the throughway. The resultant wind conditions at the west throughway are expected to be comfortable for walking in general, but not comfortable for sitting or standing all the time. Local wind mitigation may need to be developed for the sunken garden and building entrances if frequent use of these areas is anticipated (see examples in Image 6).
- The above assessment is qualitative in nature. If desired, physical modeling in a boundary-layer wind tunnel can be conducted to quantify these wind conditions and, where necessary, to develop wind control solutions.



*Image 6 – Examples of Wind Screens and Landscaping*

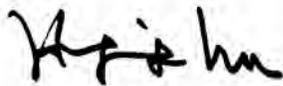
## Conclusion

Given the local wind climate and the low status of the study buildings and surroundings on the campus, it is our opinion that wind conditions within the two proposed throughways will be comfortable for walking or better, but not for more passive activities such as sitting or standing throughout the year. Localized wind control measures in the form of wind screens and landscaping may be needed for any seating areas, gardens and main entrances if frequent use of these areas is anticipated.

We trust this satisfies your requirements for the project. Should you have any questions or require additional information, please do not hesitate to contact us.

Yours very truly,

**ROWAN WILLIAMS DAVIES & IRWIN Inc.**



Hanqing Wu, Ph.D., P.Eng.  
Technical Director / Principal



Bill Smeaton, P.Eng.  
Senior Project Manager / Principal

## **Certification of Receipt of Plans**

1. Cambridge Department of Traffic, Parking and Transportation
2. Cambridge Department of Public Works
3. Cambridge City Arborist
4. Cambridge Water Department
5. Cambridge LEED Specialist



CITY OF CAMBRIDGE, MASSACHUSETTS

# PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE, MA 02139

## CERTIFICATION OF RECEIPT OF PLANS BY CITY OF CAMBRIDGE TRAFFIC, PARKING & TRANSPORTATION

City Department/Office: Traffic, Parking & Transportation

---

Project Address: 79 John F. Kennedy Street

---

Applicant Name: President and Fellows of Harvard College, c/o Harvard Planning & Project Management

---

For the purpose of fulfilling the requirements of Section 19.20 and/or 6.35.1 and/or 5.28.2 of the Cambridge Zoning Ordinance, this is to certify that this Department is in receipt of the application documents submitted to the Planning Board for approval of a Project Review Special Permit for the above referenced development project: (a) an application narrative, (b) small format application plans at 11" x 17" or the equivalent and (c) Certified Traffic Study. The Department understands that the receipt of these documents does not obligate it to take any action related thereto.

8/6/14

---

Signature of City Department/Office Representative

Date



CITY OF CAMBRIDGE, MASSACHUSETTS

# PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE, MA 02139

## CERTIFICATION OF RECEIPT OF PLANS BY CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

**City Department/Office:** Public Works

**Project Address:** 79 John F. Kennedy Street

**Applicant Name:** President and Fellows of Harvard College, c/o Harvard Planning & Project Management

For the purpose of fulfilling the requirements of Section 19.20 of the Cambridge Zoning Ordinance, this is to certify that this Department is in receipt of the application documents submitted to the Planning Board for approval of a Project Review Special Permit for the above referenced development project: (a) an application narrative and (b) small format application plans at 11" x 17" or the equivalent. The Department understands that the receipt of these documents does not obligate it to take any action related thereto.

K.M. Falis - ENGR  
Signature of City Department/Office Representative

8/5/14  
Date



CITY OF CAMBRIDGE, MASSACHUSETTS

# PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE, MA 02139

## CERTIFICATION OF RECEIPT OF PLANS BY CITY OF CAMBRIDGE TREE ARBORIST

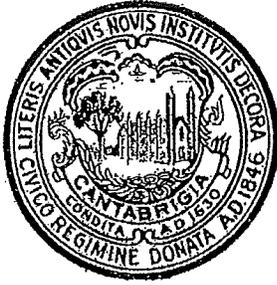
City Department/Office: City Arborist

Project Address: 79 John F. Kennedy Street

Applicant Name: President and Fellows of Harvard College, c/o Harvard Planning & Project Management

For the purpose of fulfilling the requirements of Section 4.26, 19.20 or 11.10 of the Cambridge Zoning Ordinance, this is to certify that this Department is in receipt of the application documents submitted to the Planning Board for approval of a MultiFamily, Project Review or Townhouse Special Permit for the above referenced development project: a Tree Study which shall include (a) Tree Survey, (b) Tree Protection Plan and if applicable, (c) Mitigation Plan, twenty one days before the Special Permit application to Community Development.

Dave Lefcourt / Catherine A. Foster 8/6/14  
Signature of City Department/Office Representative Date



CITY OF CAMBRIDGE, MASSACHUSETTS

# PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE, MA 02139

## CERTIFICATION OF RECEIPT OF PLANS BY CITY OF CAMBRIDGE WATER DEPARTMENT

City Department/Office: Water Department

---

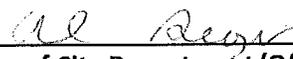
Project Address: 79 John F. Kennedy Street

---

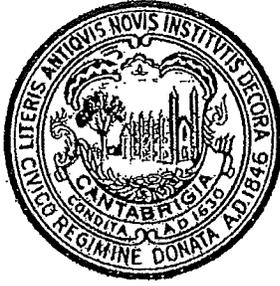
Applicant Name: President and Fellows of Harvard College, c/o Harvard Planning & Project Management

---

For the purpose of fulfilling the requirements of Section 19.20 of the Cambridge Zoning Ordinance, this is to certify that this Department is in receipt of the application documents submitted to the Planning Board for approval of a Project Review Special Permit for the above referenced development project: (a) an application narrative and (b) small format application plans at 11" x 17" or the equivalent. The Department understands that the receipt of these documents does not obligate it to take any action related thereto.

  
\_\_\_\_\_  
Signature of City Department/Office Representative

8-6-14  
\_\_\_\_\_  
Date



CITY OF CAMBRIDGE, MASSACHUSETTS

# PLANNING BOARD

CITY HALL ANNEX, 344 BROADWAY, CAMBRIDGE, MA 02139

## CERTIFICATION OF RECEIPT OF PLANS BY CITY OF CAMBRIDGE LEED SPECIALIST

City Department/Office: LEED Specialist

Project Address: 79 John F. Kennedy Street

Applicant Name: President and Fellows of Harvard College, c/o Harvard Planning & Project Management

For the purpose of fulfilling the requirements of Section 22.20 of the Cambridge Zoning Ordinance, this is to certify that this Department is in receipt of the application documents submitted to the Planning Board for approval of a Special Permit for the above referenced development project: (a) an application narrative, (b) small format application plans at 11" x 17" or the equivalent and (c) completed LEED Project Checklist for the appropriate LEED building standard, accompanying narrative and affidavit. The Department understands that the receipt of these documents does not obligate it to take any action related thereto.

*Blaine Thorne*

Signature of City Department/Office Representative

*8.6.2014*

Date