Harvard Art Museums
Fogg Museum
Busch-Reisinger Museum
Arthur M. Sackler Museum

GREEN is the new Crimson

32 Quincy Street Expansion and Renovation
32 Quincy Street, Cambridge Massachusetts
Project Profile

LEED-NC v2.2
Gold
October 2014

In June 2008, the Harvard Art Museums closed their doors to begin the renovation and expansion of their historic 32 Quincy Street facility, former home of the Fogg Museum and Busch-Reisinger Museum. Designed by Coolidge, Shepley, Bulfinch and Abbot architects, the building was originally constructed in 1927 with later additions added over the course of 80 years. The renovation and expansion of the building was designed by architects Renzo Piano Building Workshop in collaboration with Payette to preserve the historic integrity while creating much needed additional space for the museums. The project brings together the Fogg Museum, Busch-Reisinger Museum, and the Arthur M. Salcker Museum and their collections in a single state-of-the art facility for the first time. The new 204,000 square foot facility includes 43,000 square feet of gallery space, an increase of 40%, for displaying a greater portion of the more than 250,000 works of art in the museums' collections.

Photo: copyright Nic Lehoux, 2014

The renovation and expansion included restoring the historic façade of the original 1927 building and the interior Calderwood Courtyard. Additionally, the mechanical, electrical, life safety, and security systems were upgraded and the building service cores were modernized, including new elevators. This revitalization along with the additional space allows the Harvard Art Museums to advance their mission of teaching and research and their pre-eminent role of training museum professionals. The new program includes not only new gallery space, but also an Art Study Center, expanded conservation laboratory, new classrooms, modern lecture halls and seminar room, upgraded public museum amenities, new support and curatorial offices, improved collections storage and circulation, and a new entrance to the museums on Prescott Street.

The Harvard Art Museums project represents Harvard's continued commitment to supporting the arts and preserving a historic structure while meeting the challenges of energy conservation. Sustainable highlights include: LED lights, recycled and regional material selections, demand control ventilation, and a focus on responsible construction practices.

LEED® Facts

32 Quincy Expansion &Renovation
Harvard Art Museums

Location..... Cambridge, Massachusetts
Rating System..... LEED NC v2.2
Certification Anticipated... ..... Gold
Total Points Anticipated..... 45/69

Sustainable Sites.....11/14
Water Efficiency..... 5/5
Energy and Atmosphere..... 6/17
Materials and Resources.....7/13
Indoor Environmental Quality.....11/15
Innovation and Design.....5/5

Project Metrics

95% Of the new wood (by cost) is Forest Stewardship Council certified.

68% reduction in overall water consumption as compared to EPACT 1992 baseline.

96% of all construction waste and debris (by weight) was diverted from land-fills.

20% reduction in lighting power density (watts/ square foot). ASHRAE 90.1-2004

32% Of the materials (by cost) contain recycled content.

Please print this project profile only if necessary.
If printing is required, please print double sided and recycle when finished. Thank you!

ENERGY EFFICIENCY

The Harvard Art Museums (HAM) has committed, along with Harvard University as a whole, to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth. Therefore, the following energy conservation measures (ECMs) were implemented as part of the 32 Quincy Expansion and Renovation.

MECHANICAL SYSTEMS

Demand Control Ventilation: galleries are equipped with CO2 sensors that are tied to the ventilation system. Variable Air Volume (VAV) boxes supply higher volumes of fresh air when the rooms are fully occupied. When occupancy decreases, energy is saved by reducing ventilation down to minimum requirements.

Enhanced Commissioning: the mechanical systems at 32 Quincy were fully reviewed by an independent commissioning agent to ensure that they are running as designed. A 3-year enhanced post-construction commissioning contract is intended to verify continued function and identify ongoing operational opportunities for improved performance and efficiency.

Building Energy recovery: Enthalpy wheels capture sensible and latent heat from general exhaust and transfer it to incoming supply air thereby reducing the need to condition the 100% outside air supply. The enthalpy wheels are anticipated to provide annual savings of 142 MTCDE to the 32 Quincy Project.

Free Cooling: Roof top dry cooling and CRAC units work together to provide free cooling during appropriate weather.

Mechanical Shading: Building mounted helioscopes track the suns movement and control shading devices to minimize solar heat gain.

photo credit: Zak Jensen, 2014

photo credit: Bill Stanton, 2014

photo credit: Zak Jensen, 2014

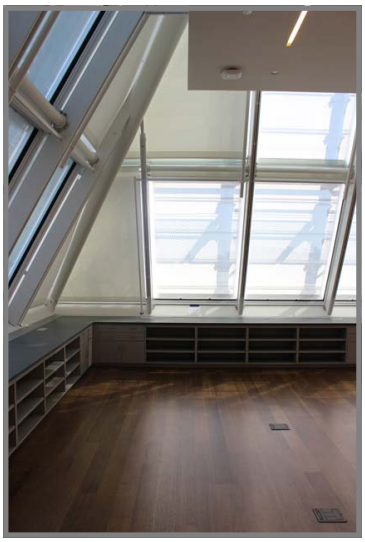


photo credit: Zak Jensen, 2014

ELECTRICAL SYSTEMS

Occupancy Sensors: Occupancy sensors are installed in all spaces to turn the lights on or off based on actual occupancy. The occupancy sensor time delay is set on a per room basis.

Daylight-Harvesting Dimming Controls: Daylight sensors are installed in the Straus Conservation Center. These sensors dim the lighting up or down in response to the amount of supplemental sunlight entering the space.

Reduction in Lighting Power Density: 20% reduction in Lighting Power Density (watts/ square foot) when compared to ASHRAE 90.1-2004 baseline. Reduction was achieved through the use of LEDs, high efficiency linear fluorescent lamps and efficient fixtures.

Direct Digital Control Building Management System (BMS): The air handling units, hot and cold water pumps, and VAV units are all monitored and can be adjusted by the BMS to ensure that the systems are working correctly and efficiently. In addition, the BMS monitors outdoor air temperature, RH, and CO_2 levels.

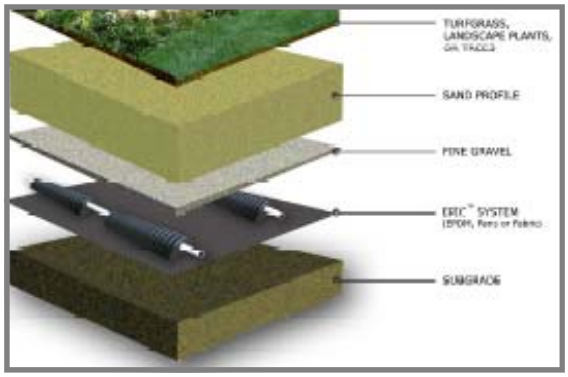
LANDSCAPE AND SITE

The 32 Quincy Street site occupies a transition zone between the Harvard campus and the Mid-Cambridge neighborhood district. Located in a dense urban environment, the site is adjacent a busy commercial district served by nearby subway and bus lines that decrease the building users' dependency on personal motor vehicles and increase community connectivity.

The building landscape was designed to maximize greenery and pedestrian use of the site, despite the constrained size. A continuous band of trees creates a green canopy around the building. The sidewalks along Quincy, Broadway, and Prescott streets were widened to reclaim public space and new bicycle racks were added to the site. A variety of low and average water-consuming plant species are mixed with ornamental and native shrubbery and drought-tolerant turf grass species to minimize water consumption.

Irrigation for the 38,650 square feet landscape greatly reduces the use of potable water through a combination of efficient permanently installed irrigation (initiated by soil moisture) and passive irrigation utilizing natural site drainage and soil capillary rise. All landscape watering is sourced from a 10,000 gallon underground cistern that harvests non-potable water generated from pumped foundation drainage for basement dewatering. This water would be otherwise discharged to the surrounding storm sewers at a daily rate of 21,600 gallons. Additional irrigation design efficiencies reduce the total irrigation water consumption 74.9%.

photo credit: Zak Jensen, 2014



graphic credit: "subsurface irrigation" - Irrigation Consulting Inc.

PLUMBING SYSTEMS AND POTABLE WATER USE REDUCTION

Toto® Metered Faucet

Baseline™ Irrigation Controller

Kohler® Waterless Fixture

Epic™ Water Collection System

A rainwater harvesting system at 32 Quincy Street combined with selecting efficient water fixtures contributes to a total estimated water savings of 48.9% in indoor potable water use as compared to EPAct 1992 standards. That's an estimated annual savings of 484,121 gallons of water.

These tremendous savings were realized through innovative wastewater technologies reducing building sewage conveyance by 81.1%. By installing efficient water closets with a flush rate of 1.28 gpf and waterless urinals, combined with the innovative reuse of 298,269 gallons of rainwater harvested from 37,110 square feet of collection surface roof areas; the building uses non-potable runoff water that is treated on site and reused in the building for plumbing flush fixtures.

LIGHTING AND CONTROLS

20% reduction in lighting power density (watts/square foot)

Custom Designed Pendant
Renzo Piano Workshop

✓ Perroquet Fixture modified with LED Driver

Light Activated Sun Shades

✓ Building mounted pyranometers track the suns movement and electronically control shading devices accordingly to protect from unwanted solar heat gain and glare.

Daylighting Sensor Module
Lutron

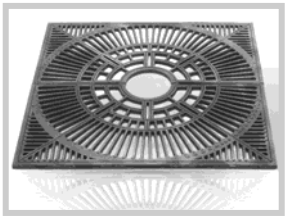
Uses Clear ConnectTM RF Technology for communication with Radio Power SavrTM occupancy sensors, and Radio Power Saver daylight sensors.

PRODUCTS AND MATERIALS (RECYCLED AND REGIONAL CONTENT)

39.8% recycled content value as a percentage of total materials cost
16% regionally manufactured value as a percentage of total materials cost

Minipile Casing Steel
OCI Global Drilling

- 100% post -consumer recycled content
- 100% regional manufacture and extraction—Brookline PA



Tree Grates & Frames
Urban Accessories

- 72% post -consumer recycled content
- 28% pre-consumer recycled content

Waterstruck Facing Brick
Cives Steel

- 5% pre-consumer recycled content
- 100% regional manufactured and extracted—Bridgewater MA

Structural Steel
Steelcraft

- 73% post -consumer recycled content
- 24% pre-consumer recycled content

Decorative Formed Metal
James Stearns Co.

- 76% pre-consumer recycled content
- 16% post-consumer recycled content

Curtainwall Metal Frame Skylights
Gartner Steel

- 51% post -consumer recycled content
- 14% pre-consumer recycled content

Sound Absorbing Ceiling Units
BASWA Acoustics

- 76% pre-consumer recycled content

Sound Control Underlayment
Pliteq

- 92% pre-consumer recycled content

Gypsum Board
Mapei

- 4% post-consumer recycled content
- 96% pre-consumer recycled content

Hollow Metal Doors
West Hartford Lock

- 50% post -consumer recycled content
- 100% regional manufacture and extraction—Easthampton MA

Please note that while many products are described in this project profile, these are provided for informational purposes only, to show a representative sample of what was included in this project. Harvard University and its affiliates do not specifically endorse nor recommend any of the products listed in this project profile and this profile may not be used in commercial or political materials, advertisements, emails, products, promotions that in any way suggests approval or endorsement of Harvard University.

HIGHLIGHT

The Harvard Art Museums implemented a strict materials testing protocol at the 32 Quincy expansion and renovation project to ensure all building materials installed in the project would be safe for occupants and would cause no chemical or physical degradation of art through off-gassing or contact.

The first round of testing identified the presence of harmful pollutants, followed by a month long second round to assess the long term corrosive impact of building materials in a controlled, humidity stabilized environment.

Building Commissioning and an Indoor Air Quality Management preoccupancy plan included a full building flush out as well as air quality testing for particulate and gaseous pollutants to ensure a premium indoor environment for building occupants as well as the long term storage and display of the museum artwork.

photo credit: Zak Jensen, 2014

Photo: copyright Peter Vanderwarker, 2014

PROJECT TEAM

Owner	Harvard Art Museums
Architect	Renzo Piano Buildng Workshop Payette Associates
Landscape Architect	Payette Associates
MEP Engineer	ARUP
Civil Engineer	Nitsch Engineering
Construction Manager	Skanska USA Building Inc.
Commissioning Authority	Jacobs Engineering Group
Sustainability Consultant	Harvard Green Building Services

MORE INFORMATION

- Harvard Art Museums: http://hmsc.harvard.edu/
- Harvard Green Building Resource: http://www.energyandfacilities.harvard.edu/green-building-resource
- Follow Green Building Services: http://www.facebook.com/HarvardGBS or @Harvard_GBS

Harvard Art Museums: 32 Quincy Street Expansion and Renovation - LEED-NC v2.2 Scorecard
LEED GOLD: 12/11/2014

11	**0**	**0**	**0**	**Sustainable Sites**						
Y	Required			Prereq 1	**Construction Activity Pollution Prevention**					
1				Credit 1	**Site Selection**					
1				Credit 2	**Development Density & Com. Connectivity**					
				Credit 3	**Brownfield Redevelopment**					
1				Credit 4.1	**Alternative Transportation**, Public Transportation Access					
1				Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms					
1				Credit 4.3	**Alternative Transportation**, Low Emitting & Fuel Efficient Vehicles					
1				Credit 4.4	**Alternative Transportation**, Parking Capacity					
				Credit 5.1	**Site Development**, Protect or Restore Habitat					
1				Credit 5.2	**Site Development**, Maximize Open Space					
1				Credit 6.1	**Storm water Design**, Quantity Control					
				Credit 6.2	**Stormwater Design**, Quality Control					
1				Credit 7.1	**Heat Island Effect**, Non-Roof					
1				Credit 7.2	**Heat Island Effect**, Roof					
1				Credit 8	**Light Pollution Reduction**					
5	**0**	**0**	**0**	**Water Efficiency**						
1				Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%					
1				Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation					
1				Credit 2	**Innovative Wastewater Technologies**					
1				Credit 3.1	**Water Use Reduction**, 20% Reduction					
1				Credit 3.2	**Water Use Reduction**, 30% Reduction					
6	**0**	**0**	**0**	**Energy & Atmosphere**						
Y	Required			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**					
Y	Required			Prereq 2	**Minimum Energy Performance**					
Y	Required			Prereq 3	**Fundamental Refrigerant Management**					
4				Credit 1	**Optimize Energy Performance**					
				Credit 2	**On-Site Renewable Energy**					
1				Credit 3	**Enhanced Commissioning**					
				Credit 4	**Enhanced Refrigerant Management**					
				Credit 5	**Measurement & Verification**					
1				Credit 6	**Green Power**					
7	**0**	**0**	**0**	**Materials & Resources**						
Y	Required			Prereq 1	**Storage & Collection of Recyclables**					
				Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors, Roof					
				Credit 1.2	**Building Reuse**, Maintain 95% of Walls, Floors, Roof					
				Credit 1.3	**Building Reuse**, Maintain 50% Non-Shell					
1				Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal					
1				Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal					
				Credit 3.1	**Materials Reuse**, 5%					
				Credit 3.2	**Materials Reuse**, 10%					
1				Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)					
1				Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)					
1				Credit 5.1	**Local/Regional Materials**, 10% Extracted, Processed & Manufactured Regionally					
1				Credit 5.2	**Local/Regional Materials**, 20% Extracted, Processed & Manufactured Regionally					
				Credit 6	**Rapidly Renewable Materials**					
1				Credit 7	**Certified Wood**					
11	**0**	**0**	**0**	**Indoor Environmental Quality**						
Y	Required			Prereq 1	**Minimum IAQ Performance**					
Y	Required			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**					
1				Credit 1	**Outdoor Air Delivery Monitoring**					

					Credit 2	**Increased Ventilation**				
1					Credit 3.1	**Construction IAQ Management Plan**, During Construction				
					Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy				
1					Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants				
1					Credit 4.2	**Low-Emitting Materials**, Paints & Coatings				
1					Credit 4.3	**Low-Emitting Materials**, Carpet Systems				
1					Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products				
1					Credit 5	**Indoor Chemical & Pollutant Source Control**				
1					Credit 6.1	**Controllability of Systems**, Lighting				
1					Credit 6.2	**Controllability of Systems**, Thermal Comfort				
1					Credit 7.1	**Thermal Comfort**, Design				
1					Credit 7.2	**Thermal Comfort**, Verification				
					Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces				
					Credit 8.2	**Daylight & Views**, Views for 90% of Spaces				
5	**0**	**0**	**0**	**Innovation & Design Process**						
1					Credit 1.1	**Innovation in Design:** 95% Construction Waste Diversion				
1					Credit 1.2	**Innovation in Design**: Exemplary Performance, WEc2 (40%+ below baseline)				
					Credit 1.x	**Innovation in Design**: Exemplary Performance: 70% Green Power				
1					Credit 1.3	**Innovation in Design:** Occupant Education, Case Study				
1					Credit 1.4	**Innovation in Design:** Reduced Energy Use During Construction				
					Credit 1.x	**Innovation in Design:** Low Hg Lighting / Skanska's EMP				
1					Credit 2	**LEED™ Accredited Professional**				
45	**0**	**0**	**0**	**Project Totals**						

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points