HARVARD
Faculty of Arts and Sciences

GREEN
is the new Crimson

Stone Hall
58 Plympton Street
Project Profile

LEED NC v2009
LEED PLATINUM
2014

The FAS Stone Hall project is a 59,100 square foot renovation of the existing house. This project is the first project within the larger, long-term renovation project to renew each of the twelve undergraduate Houses. Renovations to Stone Hall (formerly "Old Quincy) include total reprogramming of the student residential space to allow for code compliant egress (including elevators) as well as improved accessibility and visitability; seminar rooms and music practice spaces for student collaboration, and the addition of a large community room that leads out to the terrace.

Photo: copyright Peter Vanerwalker, 2013

In setting the sustainability goals to guide the project's design and operation, the project team utilized the Harvard University Green Building Standards for Major Renovations and the LEED-NC v2009 Certification requirements. The main sustainability goals for the project include the following.

- **Minimize energy demand** by installing new air handling units with energy recovery capabilities.
- **Minimize energy loss** by improving the building envelope.
- **Eliminate** existing acoustics issues associated with exterior as well as interior noise.
- **Improve** occupant comfort by adding cooling to common spaces.

LEED® Facts

Harvard University
Stone Hall

U.S. GREEN BUILDING COUNCIL LEED USGBC

Location……………………………….Cambridge, MA
Rating System………………………LEED-NC v2009
Certification……………………………… Platinum
Total Points…………………………………80/110

Sustainable Sites……………………………… 23/26
Water Efficiency………………………………… 8/10
Energy and Atmosphere…………………… 21/35
Materials and Resources…………………… 10/14
Indoor Environmental Quality……………… 9/15
Innovation and Design……………………… 6/6
Regional Priority……………………………… 3/4

Project Metrics

34% Energy cost savings when compared to ASHRAE 90.1-2007 baseline

46% Reduction of water use in all fixtures

61% Reduction of potable water use for irrigation

86% Reduction of potable water use for sewage conveyance

35% Electricity use provided by green power (over two years)

ENERGY EFFICIENCY AND INDOOR ENVIRONMENTAL QUALITY

MECHANICAL AND ELECTRICAL SYSTEMS

ECM 1: **Energy Recovery Unit** - This energy recovery unit (ERU) uses plate-type heat recovery in order to extract the energy out of the exhaust air, which would typically be lost energy as the air is exhausted to the outdoors. The unit uses this energy to precool and dehumidify air in warmer weather, and preheat and humidify air in cooler weather. This reduces the mechanical system's energy consumption related to tempering the incoming outdoor air to meet the system's set points.

ECM 2: **Variable Frequency Drives** - Variable frequency drives (VFD) are able to adjust fan speed and torque by varying motor input frequency and voltage. In this space, VFDs adjust the supply and return fan speed of the energy recovery units, as well as modulate the hot water, chilled water, exhaust, and steam tunnel heat recovery pumps. This allows for significant energy savings as the fans have the ability to run at a lower speed if the demand isn't at full load.

ECM 3: **Variable Refrigerant Flow System** - The project installed variable refrigerant flow (VRF) systems in some of the common spaces, mechanical spaces, and tutor apartments. The advantages of this type of system include part load efficiency, zone control (i.e. if cooling is needed in one space but not another, the system can cool only that one space), and heat recovery when some spaces need to be cooled and others need to be heated. These and other advantages result in significant energy savings.

ECM 4: **Occupancy Sensors** - The project utilizes passive dual technology occupancy sensors in corridor, restroom, and some common spaces. These sensors automatically turns on/off the lights and mechanical systems by first detecting motion and then detecting sound, which if detected indicates continued occupancy. In this way, occupancy sensors help conserve electricity when spaces are not in use and electricity is not needed.

Photo: copyright Peter Vanerwalker, 2013

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INDOOR ENVIRONMENTAL QUALITY

Low VOC - The project only uses low volatile organic compound (VOC) adhesives, paints, and coatings. This helps minimize off-gassing, which can be detrimental to the health of the space occupants. Off-gassing is the evaporation of volatile chemicals into the air. Off-gassing can continue for years after products are installed. Therefore, by only installing low VOC products, the design team helped provide a cleaner environment for space occupants.

High Efficiency Air Filters - The efficiencies of air filters are commonly rated on a scale from 1-20 using the MERV rating system (minimum efficiency reporting value). The ERU installed as part of the project contains air filters with a MERV rating of 13. The filters in the air handler unit (AHU) providing outdoor air to Room 102 and Room 103 were replaced by the building management team with MERV 13 filters. The efficiency of MERV 13 filters goes above and beyond what is typically required for a classroom—these filter efficiencies are typically suggested for hospital and general surgery.

Indoor Air Quality Testing - After construction was complete, the indoor air quality of the space was tested to ensure that concentrations of formaldehyde, particulates (PM10), total volatile organic compounds (tvoc), 4-Phenylcyclohexene (4-PCH), and Carbon Monoxide (CO) met the associated minimums, confirming that the space was safe for occupants.

PRODUCTS AND MATERIALS

Highlights

- **21% recycled content** value as a percentage of total materials cost
- **28% regionally manufactured** (within 500 miles) value as a percentage of total materials cost
- **81% Forest Stewardship Council (FSC) certified wood** value as a percentage of new wood materials cost
- **Only low-VOC, or no-VOC** adhesives, sealants, paints, coatings, and furniture were used

Hollow Metal Doors
Curries

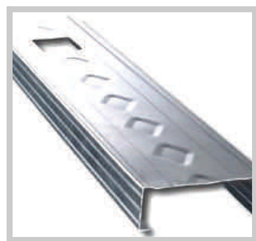
* 34.4% Post-consumer Recycled Content
* 7.2% Pre-consumer Recycled Content

Type X Gypsum Wall Board
USG

* 3.9% Post-consumer Recycled Content
* 93.5% Pre-consumer Recycled Content
* 97% Regionally Manufactured and Extracted

FR Vesta MDF ULEF
Flakeboard

* 100% Pre-consumer Recycled Content
* 100% FSC certified wood
* No added urea-formaldehyde
* Ultra-low emitting formaldehyde resins

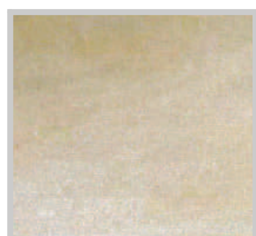


Metal Framing
ClarkDietrich

* 25.5% Post-consumer Recycled Content
* 6.8% Pre-consumer Recycled Content

Door Closers
Dorma

* 35.4% Post-consumer Recycled Content
* 20% Pre-consumer Recycled Content
* 100% Regionally Manufactured and Extracted



Marmoleum MCS
Forbo

* 46.5% Pre-consumer Recycled Content
* 33% Rapidly Renewable Content
* CHPS Low-emitting material

Insulation
Greenfiber

* 55% Post-consumer Recycled Content
* 30% Pre-consumer Recycled Content

L885 Adhesive
Forbo

* VOC Content = 0 g/L **vs.**
  VOC Limit = 60 g/L

UltraHide Eggshell Paint
Glidden

* VOC Content = 50 g/L **vs.**
  VOC Limit = 100 g/L

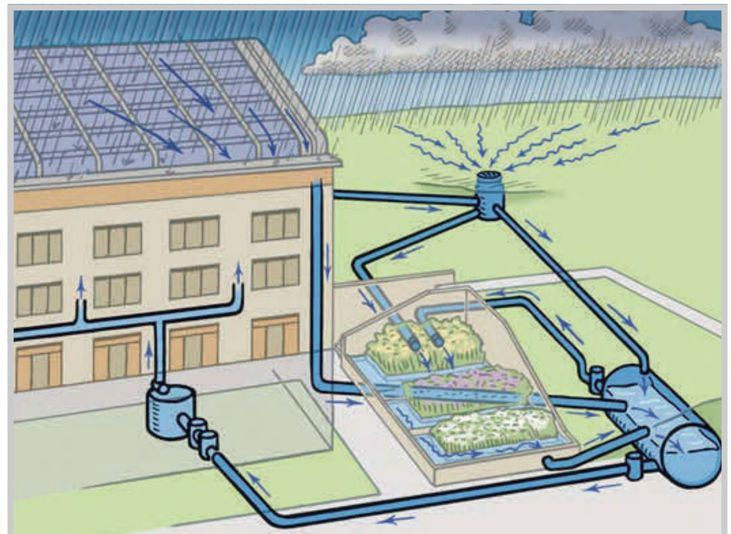
Amberseal
Bona

* VOC Content = 250 g/L **vs.**
  VOC Limit = 550 g/L

Unless otherwise indicated all product images are from the manufacturer's website.

RAINWATER HARVESTING SYSTEM

Rainwater harvesting is the collection of rainwater for later use. As part of the Stone Hall project, a 15,000-gallon rainwater cistern was installed under the central courtyard. The purpose of this cistern was to collect rainwater to be used for irrigation and toilet flushing on site. The graphic to the right gives a general idea of how rainwater is collected and redirected throughout the site. One of the benefits of this system is it helps reduce rainwater runoff. This is particularly critical due to Stone Hall's close proximity to the Charles River. Runoff can collect contaminants, such as petroleum from cars that commute along Memorial Drive, and carry them into the river, thus polluting the river and harming the river's ecosystem. Also, rainwater harvesting helps relieve the demand on local municipal water supply and treatment (particularly during heavy rains), saves the building money as it relates to potable water and sewage conveyance use, and conserves potable water for more critical uses like drinking water. The installation of this system is projected to help reduce the use of potable water by 60.9% and reduce 86% of potable water used for sewage conveyance.



Graphic: Nemec, Gregory. "Rainwater captured…" Graphic. *Yale School of Forestry & Environmental Studies*. 4 Feb. 2014. <http://environment.yale.edu/>

MORE INFORMATION

- Harvard Faculty of Arts and Sciences:
  http://www.fas.harvard.edu/home/
- Sustainability at Harvard - FAS:
  http://green.harvard.edu/schools-units/arts-sciences-fas
- Harvard - Green Building Resource:
  http://www.energyandfacilities.harvard.edu/green-building-resource
- Harvard - Green Building Services:
  http://www.energyandfacilities.harvard.edu/project-technical-support/capital-projects/sustainable-design-support-services
- Follow Green Building Services:
  http://www.facebook.com/HarvardGBS or @Harvard_GBS

PROJECT TEAM

Owner	Harvard Faculty of Arts and Sciences
Project Manager	Erin DeBruyn
Architect	Kieran Timberlake
MEP Engineer	BVH Integrated Services
Contractor	Dimeo Construction Company
Commissioning Authority	Jacobs Engineering Group Inc.
Sustainability Consultant	Harvard Green Building Services