HARVARD LAW SCHOOL

GREEN is the new Crimson

HARVARD LAW SCHOOL

LEED CI 2009

NORTH HALL RENOVATIONS

LEED GOLD

1651 Massachusetts Avenue, Cambridge, MA 02138

North Hall was built in 1960 as a hotel. In 1988, Harvard Law School acquired North Hall with the intent to repurpose the hotel as student housing. Few changes to the original building were made during this conversion. The building is comprised of six stories above grade and a finished basement, with a total combined area of 56,542 gross square feet. Residential units in North Hall are single room, furnished dormitory-style bedrooms with individual baths.

North Hall Renovations
Photo: Harvard Law School, 2010

Sustainability played a prominent role throughout the North Hall renovation project in both design and construction. By understanding the function of the dormitory spaces, the project team was able to select the components of the renovation with the most calculable, beneficial impact for achieving sustainable objectives. As part of preconstruction planning, a thorough study of heating plant options for both air and potable water was conducted to determine the most energy efficient and economical system design for heat transfer, distribution, and recovery.

A heavy focus was placed on the reuse of existing elements, as well as the application of sustainable furniture, materials, and energy efficient lighting. Energy Star rated equipment, as well as careful design of the mechanical and electrical systems helped reduce the facilities energy use. A commitment to clean energy was demonstrated by purchasing renewable energy from Sterling Planet Green America equal to two years of building power.

Harvard Law School is committed to sustainability and supporting Harvard University's goal to reduce greenhouse gas emissions 30% below 2006 levels by 2016, including growth. The North Hall Renovation project is distinct evidence of this commitment.

PROJECT HIGHLIGHTS

LEED® Facts

North Hall Renovations
Harvard Law School
2010

Location	Cambridge, MA
Rating System	LEED CI v.3
Certification	GOLD
Total Points	70/110
Sustainable Sites	17/21
Water Efficiency	8/11
Energy and Atmosphere	19/37
Materials and Resources	8/14
Indoor Environmental Quality	8/17
Innovation and Design	6/6
Regional Priority	4/4

95% of construction waste was diverted from landfills.

40% lighting power reduction below ASHRAE 90.1- 2007 standard was achieved.

63% of construction materials and furniture were extracted, harvested, or recovered as well as manufactured within 500 miles of the project.

35% reduction in water consumption below baseline.

100% of building power consumption provided by renewable sources for two yeas.

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

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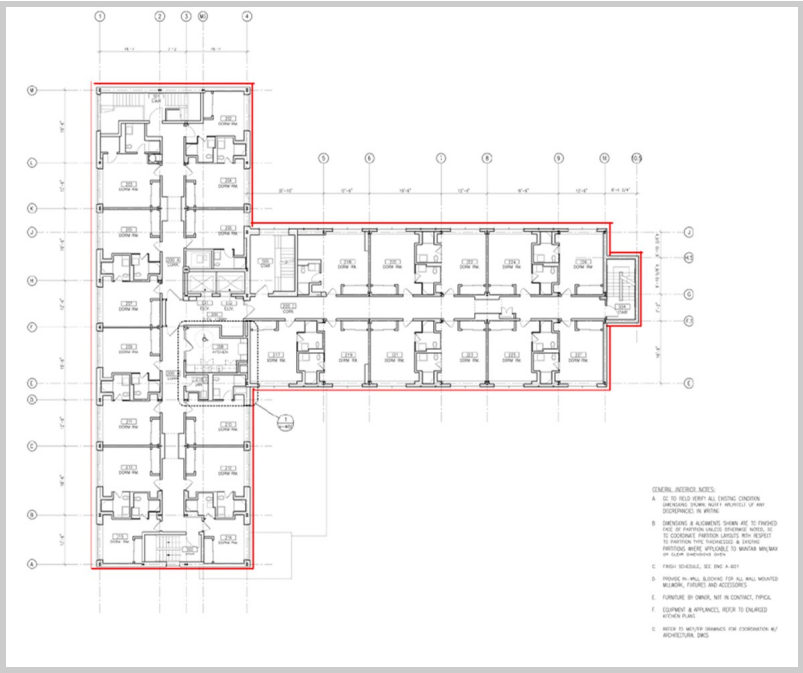
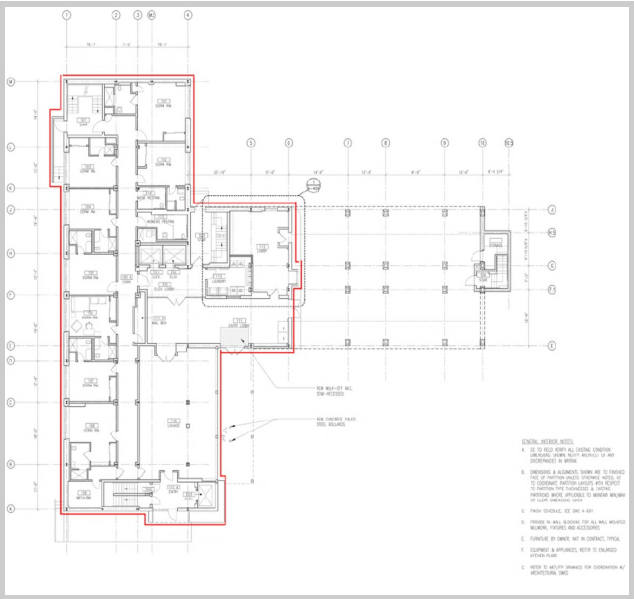
PROJECT OVERVIEW

NORTH HALL RENOVATIONS FLOOR PLAN & LEED BOUNDARY





North Hall Renovations
Austin Architects

North Hall Renovations
Photo: Harvard Law School

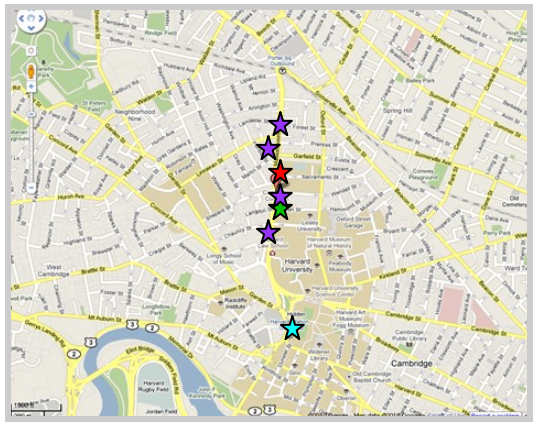
PROJECT TEAM

Owner	Harvard Law School
Project Manager	Harvard Law School Facilities Management
Architect	Austin Architects
Contractor	Bond Brothers
HVAC Engineer	Building Engineering Resources AKF Engineers
Commissioning Authority	MAW Consulting
Sustainability Consultant	Harvard University, Green Building Services

SITE

North Hall
1651 Massachusetts Avenue, Cambridge, MA
Photo: Google Earth

- To encourage alternatives to driving, all occupants of the North Hall building have access to Harvard's comprehensive ***CommuterChoice Program***, which provides incentives and discounts for all modes of alternative transportation as well as carpooling and fuel efficient vehicles.
- The building is located within walking distance to the Harvard Square MBTA stop, several bus lines, and the Harvard University Shuttle.
- Bicycle racks are provided at the building entrance.
- The building is located in a dense urban area, which allows occupants to walk and easily access amenities such as restaurants, banks,



North Hall Building
MBTA Bus Stops
Harvard University Shuttle Bus Stops
MBTA Subway Station

Bike Racks at North Hall
Photo: Harvard GBS, 2010

WATER EFFICIENCY

The installation of low flush and flow fixtures, including a 1.6 GPM shower heads and .5 GPM private lavatory faucets, the renovation resulted in a **35%** water consumption reduction below EPAct (2005) and UPC (2006) base line standards.

Differences in the Flush & Flow Rates for EPAct (2005) & UPC (2006) Standard Fixtures and the fixtures installed for the North Hall Project

Fixture Type	North Hall Flush & Flow Rates	EPAct (2005) & UPS (2006) Standard Flush & Flow Rates
Water Closet [GPF]	1.6	1.6
Urinal [GPF]	N/A	1.0
Bathroom Sink [GPM]	.5	2.2
Shower [GPM]	1.6	2.5
Kitchen Sink	1.5	2.2
GPF - Gallons Per Flush	GPM - Gallons Per Minute	

FIXTURES IN NORTH HALL PROJECT SCOPE

Delta Shower Head
1.6 gpm

Photo: Delta Product website, 2010

Photo: Chicago products website 2010

Chicago Faucets Aerator
0.5 gpm

ENERGY EFFICIENCY

Harvard Law School has committed, along with Harvard University as a whole, to reduce greenhouse gas emissions 30% below 2006 levels by 2016, inclusive of growth. Therefore, energy efficiency was a guiding principle of this project.

MECHANICAL SYSTEMS

Energy Recovery System: Three new AAON Energy Recovery Units (ERUs) replaced the existing make up air handlers on the roof. These ERUs contain energy recovery wheels that capture heat from the building exhaust and return it to the building supply by tempering the supply air, thus reducing building energy use. These new units save North Hall approximately $50,000 each year and reduce the building's greenhouse gasses emissions by 159 metric tons annually.

Demand Control Ventilation: In order to optimize ventilation effectiveness while minimizing operating cost, occupancy and CO_2 controls were added to the existing HVAC system serving the lounge area, which will demand outside air ventilation only when the space is occupied, and only enough outside air to provide for adequate ventilation for the use of the space.

Smart Thermostats: Advanced thermostat sensors help ensure occupied areas remain within design temperatures while occupied. These devices use a door mounted sensor to help lower temperature settings when a room is unoccupied. With these devices, Harvard Law School Facilities Management expects to save around $8,000 and 28 MTCDE each year by minimizing energy waste.

Commissioning: Functional performance testing of mechanical systems was performed to ensure equipment and systems were installed in accordance with manufacturer specifications and the basis of design.

AAONAIRE® energy recovery wheel
Photo: aaon.com, product cut sheet 2010

Smart Digital Thermostat E528
Photo: product cut sheet from INNCOM website, 2010

KENALL Millennium Stretch
Photo: KENALL Product Manual, 2008

ELECTRICAL SYSTEMS

Light Fixture Improvements: Existing light fixtures at common corridors and stairs were replaced with modern, energy efficient, ceiling mounted KENALL Millennium Stretch fixture.

Occupancy Sensors: Occupancy sensors were added in the common corridors to control lighting.

LED Lighting: New solid-state recessed LED fixtures were added in the first floor entry lobby, laundry room, and all new kitchens which helped reduce the lighting power density.

Reduction of Lamping Requirements: Existing wall mounted lights, which were two-lamp 32watt, T8 fluorescent fixtures were replaced with new one-lamp 32 watt, T8 fixtures.

Regenerative Energy Elevator: The two manual gear driven motor passenger elevators at North Hall were replaced with variable voltage, variable frequency regenerative motor elevators saving 60% of the energy used to operate them, which amounts to a savings of $1,636 annually.

INDOOR ENVIRONMENTAL QUALITY

Harvard Law School is committed to providing a healthy indoor environment for all occupants. The project team was careful to maintain healthy indoor air quality during construction and to also ensure the space is designed to promote healthy indoor air quality during occupancy.

Indoor Air Quality During Construction: An Indoor Air Quality (IAQ) management plan was developed and implemented for the construction phase of the renovation.

Only materials with **low or no VOC content** were used in the North Hall Renovations project. Volatile Organic Compounds (VOCs) are chemical compounds and known carcinogens found in many construction materials that are considered detrimental to indoor air quality. Reducing the use of VOCs whenever possible improves indoor air quality, which consequently benefits occupant health and productivity.

- **Carpet System** Bentley Prince Street flooring products which were CRI Green Label Plus certified and FloorScore certified Biobased tiles manufactured by Armstrong were specified and installed.

- **Adhesives and Sealants and Paints and Coatings** Benjamin Moore Eco Spec line paints were specified.

Construction IAQ Measures Implemented During Construction

Product Category	Product & Manufacturer	VOC Content (g/l)	VOC Limit (g/l)	Standard
Paints & Coatings	Benjamin Moore Eco Spec Flat	0	50	SCAQMD Rule 1113
	Benjamin Moore Eco Spec Primer	54	100	SCAQMD Rule 1113
	Benjamin Moore Eco Spec Eggshell	0	50	SCAQMD Rule 1113
Adhesives & Sealants	Phenoseal	90	250	SCAQMD Rule 1168
	U-Pol	176	250	SCAQMD Rule 1168

Green Label Plus Flooring
Photo: Bentley Prince Street Product Website, 2010

SCAQMD Rule 113 Compliant Architectural Coatings
Photo: Benjamin Moore product website, 2010

North Hall Renovations
Photo: FMO Green Cleaning Brochure

Green Cleaning: Green cleaning is defined as cleaning to protect health without harming the environment. The Harvard Law School has contracted Harvard Facilities Maintenance Operations (FMO) to perform green cleaning services. The green cleaning practices include the use of green cleaning chemicals, employing cleaning processes that benefit public health and the environment, and purchasing environmentally preferable janitorial products.

MATERIALS & WASTE

Selecting environmentally preferable materials and minimizing the amount of construction waste sent to landfill was important to the project. For the additional materials purchased, the project gave preference to low-emitting materials with recycled content and local manufacturing.

63% **of the total material value consists of products salvaged or manufactured locally.**

95% **of the on-site generated construction waste was diverted from the landfill.**

15% **of the total value of materials used in the project consist of materials with recycled content.**

ENVIRONMENTALLY PREFERABLE MATERIALS IN NORTH HALL

- Particle Board (Flakeboard)
  0% pre-consumer, **100%** post-consumer
- Hardware (Epco)
  12% pre-consumer, **48%** post-consumer
- Hinges (Blum)
  10% pre-consumer, **30%** post-consumer
- Drywall (USG)
  94% pre-consumer, **3%** post-consumer

Examples of regional materials used in project:

[Material Name]	[Manufacturer]	Distance between project & Manufacturer (mi)
Quartz Hard Surfaces	Zodiaq	305
Adhesive	Conbond	22
Insulation	Owens Corning	159

North Hall Lounge
Photo: Harvard Law School

North Hall Lobby
Photo: Harvard Law School

ADDITIONAL RESOURCES

- Harvard Law School: http://www.law.harvard.edu/index.html
- Harvard Law School Green Living Program: http://green.harvard.edu/hls/green-living
- HLS North Hall Information: http://www.law.harvard.edu/current/student-services/housing/on-campus/north-hall.html
- Harvard Green Building Services: http://green.harvard.edu/green-building-services
- Harvard Green Building Resource: http://green.harvard.edu/theresource