Summary

60 Oxford Street is a 93,923 gross square foot, $34 million building on the edge of a residential and institutional district. University Information Systems occupies the mezzanine, first and second floors. The third and fourth floors are home to the Division of Engineering and Applied Sciences’ (DEAS) faculty offices and computer labs. The project was completed in June 2004. After a lengthy appeal process, 60 Oxford successfully appealed 6 of 6 LEED credits and 1 of 1 Prerequisites to become LEED Certified in January, 2007.

Building Highlights

- Building is 25% more efficient than code
- Roof garden and a cool roof
- Raised access floor in data center
- Low-emitting carpet, paints, and adhesives
- Forest Stewardship Council certified wood
- Demountable interior partitions facilitate future modifications of interior space
Location

At the corner of Oxford and Hammond Streets, this architecturally significant building was subject to strict zoning and community review, as the community did not want another large, dark building to be constructed in their neighborhood. The landscaping and scale of the building were carefully designed to respect and complement its surroundings.

Program

The building houses a data center and offices for UIS and faculty offices and computer labs for DEAS. The 9,000 square foot data center houses the Network Operations Center and the Server Operations Center, together known as NOC/SOC. DEAS occupies the third and fourth floors.

The main entrance to the building is on Oxford Street. Another entrance is located through the north courtyard, facing the neighborhood. A three-story glass volume forms the southern wall of the courtyard and houses a large open circulating stair. Two levels of basement reduce the overall height of the building. One basement level supports the program, while the other holds the majority of the building’s mechanical equipment.

Sections of the buildings are only one or two stories high, to fit with the scale of the residential neighborhood. Beyond those zones, the building is four stories tall in order to reduce the footprint. This mass is where the bulk of the program occurs. Along Hammond Street a roof garden atop the two-story pavilion mitigates the four-story height of the data center. From the neighborhood’s perspective, the garden helps block the large Lesley College building on Oxford Street. From the outset, the neighbors wanted a traditional, residential-looking building. The garden worked well to soften the modern flat roof. The design team minimized the amount of rooftop mechanical equipment, and located it on the southern portion of the four-story building component, screened from the neighborhood. In the end, the community was pleased with the design of the building.

Project Team

This project began with University Information Systems (UIS) as the sole client. As a result of the site selection and pre-design conclusions, Harvard Real Estate Services (HRES) became the building developer and base building client. DEAS was added as a client when the project scope doubled.

A construction manager was involved in the discussions from the beginning of the project. Bond Brothers was involved in the initial feasibility study, but Lee Kennedy was brought onto the project. Lee Kennedy submitted a proposal for pre-construction and construction services. Pre-construction services included scheduling, cost estimation, construction methods and logistics. Ove Arup Engineers, known worldwide for their innovative sustainable design work, did a facade analysis for the west wall.

Architects, Base Building: Perry Dean Rogers and Partners
Architects, Interior fit-out, DEAS and initial feasibility study: Eichorn Yaffee Prescott
MEP: Eichorn Yaffee Prescott
Structural Engineer: LeMessurier Consultants, Inc.
Civil Engineer: Bryant Associates, Inc.
Landscape Architect: Michael Van Valkenburgh Associates
General Contractor and Cost Consultant: Lee Kennedy Co., Inc.
Commissioning Agent: Facility Dynamics, Tim Scruby
Environmental Adviser: Bryant Associates, Inc.
**Project History**

The impetus for this new construction was the need to move University Information Systems from 1730 Cambridge Street so that the Faculty of Arts and Sciences could build the Center for Government and International Studies.

In the fall of 1999, Eichorn Yaffee Prescott, the MEP, did a programming and relocation feasibility study for UIS. The study determined that the UIS program required approximately 40,000 gross square feet and was best accommodated on the Cambridge campus. Six sites for relocating the UIS program were included in EYP’s study. The sites selected either required new construction, renovation, or a combination of both. The relocation study was reevaluated again in February 2000, and HRES assessed 14 different sites. The university (including representatives from HPRE, VPA, UIS, FAS, and the Graduate School of Design) concluded that a new building should be developed by HRES to be occupied by UIS. In the Pre-Design phase, to make better use of the site, it was decided that HRES would double the original 40,000 GSF building to house multiple tenants, with an underground garage separate from the building.

Zoning and massing of the building were key to the neighborhood approval process. The building’s massing complies with the two zoning districts within which the building sits. Harvard University had been in discussions with the Hammond/Gorman Overlay District since 1998 in order to develop zoning language in tandem with their expectations. Seven community meetings were held to discuss the size and form of the building, building materials and setback.

**Design Process**

The mandate for sustainable design came into the process during Schematic Design. Early in Schematic Design, following a mandate from the Provost to adhere to Campus-wide Sustainability Principles across Harvard’s campus. The architect subsequently began to incorporate sustainable design concepts into the design. The architect felt that the project was loose enough at this stage that sustainability goals were introduced without detriment to the architecture. However, the fact that sustainability was introduced after the program was determined was one of many reasons of many why some sustainable initiatives were ultimately cut.

Because of the number of conflicting ideas within the team, the stakeholders went through a program called partnering. A day was organized to promote understanding among people on the team, and to address issues such as personality traits, and flow of communication and methods for dealing with the community. The partnering day provided an opportunity for the team to exchange ideas and develop synergies in order to solve problems with a new approach.

*(renderings by Perry Dean Rogers and Partners)*
**Green Deliverables**

During Schematic Design, in February 2001, the team began using a LEED Tracking Tool to evaluate each aspect of the building. The tool listed LEED requirements, explained who was responsible for following up on an action, tracked available points, and explained whether a credit was applicable to the project, whether it was already part of the program, or whether a strategy was feasible. There was also a column for added costs and life cycle savings. When no added costs were necessary, $0 was entered. Where there was a chance of increased cost, an placeholder amount was entered pending further information. At the end of the analysis, of 67 possible credits, 19 credits were included as part of the program, 13 were not feasible, and 18 required research.

PDR&P and EYP produced a thorough list of Green Design Items, which included the results of EYP’s analysis of systems and investigations for energy savings. The list proved very helpful in cataloging green strategies. However, the architect said that the list also aided in cutting out sustainable aspects at the time of value engineering, after the bids were received.

**Sustainable Initiatives**

The UIS program requires 50 watts/square foot of power, 24-hour operation and air conditioning, all year round. UIS was supportive of sustainable design, provided it did not compromise the server operations center. The design team’s goal was to reduce the energy use of the building.

The design team considered a green roof on the entire building; however, since there was no quantifiable pay-back, this option was only implemented on a portion of the roof.

Lee Kennedy’s pre-construction services included assisting the engineer and owner in evaluating the possibility of sustainability.

**Site**

60 Oxford Street was originally a parking lot. With site improvements, including a roof garden and vegetation, site imperviousness decreased to 60%. To reduce the heat island effect, the site was greened using trees and vine covered structures, so that at least 37% would be shaded within five years.

**Efficient Irrigation:** Efficient Rain Bird irrigation technology reduces potable water consumption for irrigation by 18% over conventional means. Rain sensors to stop irrigation during periods of rain.

**Exterior light pollution** is reduced with fixtures directed towards the ground.

**Alternative Transportation:** Bicycle racks and changing rooms encourage alternatives to driving. No new parking was added on site. MBTA bus and subway service is within walking distance; and occupants also have access to ZipCar discounts through the university.
Energy

The building was modeled by EYP using Trane TRACE 700. The building was designed to be 25% more efficient than an ASHRAE 90.1-1999 baseline building. The baseline case was compared to a design case by changing materials, glazing, and mechanical efficiencies.

Cool/Green Roof: The roof is designed to reduce solar heat gain and heat island effect. A white, albedo Saranfil G410 membrane covers 78.5% of the total roof area. The low two-story section is covered with a 900 square foot roof garden with crushed gravel, soils, and plantings. The combination intensive and extensive roof garden was integrated into the overall building’s design in the very early stages of the design process (Schematic Design). Its creation was part of a larger effort to make the building as sustainable as possible. Moreover, the landscape was carefully designed to respect and add to its environs by maintaining “a good relationship with the surrounding community.” Species of trees compatible with both the neighborhood and the university context were selected. The green roof was also integrated with the stormwater management system with two drains to evacuate water from the roof to a container, where water is kept for emergency use. Since 2003, only minor leaks have occurred and leaky areas were quickly identified and repaired, at a small cost.

According to the architect there were many reasons for proposing a green roof:

1) Stormwater management: “First, the City of Cambridge DPW no longer allows Harvard University to put stormwater into the street. New construction projects need to capture stormwater and recharge the ground water. The 60 Oxford Street project does so through the roof garden and a large, underground stormwater retention tank (below the courtyard facing Hammond Street). It is interesting to note that the city would not acknowledge the stormwater benefits of the roof garden year round in this climate because when the soil is frozen through in the winter its retention capacity is reduced to effectively nil.” (Jones, R. 2006)

2) Location: In order to streamline the negotiations with the Agassiz neighborhood committee, the idea of a “soft” roof was proposed. Together with a reduction of the building’s mass along Hammond Street facing the neighborhood, the proposal was accepted.

3) Outdoor Space: The courtyard facing Hammond Street is public. The roof garden provides private outdoor space and contributes to employee satisfaction. When the roof garden was closed for winter, occupants began calling the building manager in early March asking when it would reopen. Other reasons for including the roof garden were reduced heat island effect, use of indigenous plant material, etc. The design and details of the building were approved by the owner and their facilities group. As with any project there were some objections. They “included some concern about leaks and maintenance, and of course, cost. The former was dispelled with product information and a comprehensive review of the detailing by an independent waterproofing consultant. The latter was dealt with by looking at the cost benefit, and the project benefit (notably the neighborhood approvals”). The overall project benefit was also the main reason behind selecting this more expensive system. “Initially stormwater management [was the major reason],nnnn subsequently neighborhood approvals – as the neighborhood got behind the green initiatives, it became more and more difficult to remove them from the project”. (Jones, R. 2006).The major cost benefits are derived from insulative properties – keeping the building cool in the summer and warm in the winter with less mechanical system energy consumed to do so”. (Jones, R. 2006).

The roof garden is currently irrigated with potable water. However, they are considering using a grey water system. There is a tank located on the site, with capacity for a 100 year storm.

(Green roof research by Agnieszka Vorbrodt-Schurma, 2007)
Materials and Resources

75% of all construction waste was recycled or salvaged.

**Interior Finishes:** Wall panels were refurbished, and cubicle workstations and work surfaces were salvaged from other Harvard buildings. Carpet tiles aid future replacement.

**Local materials:** 23% of the building materials were manufactured within 500 miles.

**Recycled content materials:** 5% of the building materials (by cost) have recycled content.

**Certified wood:** 51% of wood used at 60 Oxford is certified by the Forest Stewardship Council.

**Demountable interior partitions** instead of typical fixed gypsum and stud walls allow the space to adapt to future uses.

Indoor Environmental Quality

An underfloor air distribution system in the building's data center improves energy efficiency and air quality. Network and computer equipment is often a source of continuous upward convection as the integral fans reject heat from the device to the room. Warm air rejected from these devices rises rapidly relative to the convection of typical office space heat sources. This more pronounced convection, found in areas with a high density of electrically powered heat sources, impedes delivery of cool air to where it is needed most in computer rooms – at the floor where the equipment resides. With an underfloor system, the coolest air is delivered to the space where the most heat is being generated.

HVAC fan energy is reduced since convection in the spaces now assists, rather than impedes, the HVAC system fans. Fan energy consumption is further decreased due to the elimination of much of the ductwork associated with overhead HVAC systems. Also, air can be delivered to spaces at a warmer temperature, since it is being delivered to the point where it is most needed before being warmed by other space loads, such as ceiling lights. The natural convection that underfloor air systems take advantage of also means that space contaminants, such as the dust byproducts emanating from fax and copy machines, are swept up and away from the breathing zone. Since clean, filtered supply air doesn't have to mix with unfiltered room air, the air that flows through the breathing zone is new, and cleaner. The health improvements associated with underfloor air systems are essential to occupant productivity, comfort, health, and safety.

Light shelves incorporated into the wall section bounce light deep into the building footprint.

**Low-emitting adhesives, sealants, paints, carpet, and composite wood** are used throughout the building.
Lessons Learned

The initial cost estimates came in over budget so the project went through a value engineering exercise. The raised floor plenum for HVAC within the UIS tenant space survived value engineering. Initially the architects designed a building that had a raised floor air distribution system on all five floors of occupied space. In the end the DEAS the design team changed the design on the 3rd and 4th floor to fan coil units.

The ventilated wall cavity on the west wall was also cut late in the design process, during value engineering. From early design stages, the architect wanted this building to work well in its context. To add daylight to the western edge of the building, the architect used transparent and translucent glass and buff-colored limestone walls. With western light, it is difficult to control solar gain with glass. They designed a ventilated wall cavity for two floors, which is primarily DEAS’s space. It involves ventilating louvers that, depending on the season, are open or closed. In the winter they would be closed, in the summer open, in the fall and spring, some open and some closed. Cat-walks allow the building crew to clean the louver motors.

In place of the glass system, PDR&P designed a large exterior metal louver scrim, which is a combination of galvanized and stainless steel. It is a finer, more densely packed, fixed louver at the clerestory level. At the third and fourth floors, the louver section is wider for light to bounce into the deep footprint of the building. Faculty inside have their own blinds with individual controls.

Perimeter lights on automatic dimmer controls were incorporated into the light-shelf. When daylight was present, the light would automatically be off. When daylight faded, the light would come on without user intervention. These were removed at value engineering to simplify the light shelf.

Another item removed at value engineering was stormwater reuse, which had a maximum life-cycle payback period of 11 years. The project manager discussed this with the co-chairs of the Green Campus Initiative. There are now interest-free loans for both upgrades of existing facilities and new construction. See the Green Campus Loan Fund page for more information. However, at the time there was nothing in place for new built initiatives.