Summary

The Landmark Center project, completed in the fall of 2001, is a 42,000 build-out of the 4th floor of the historic Landmark Center, located at the corner of Brookline Avenue and Park Drive in Boston. The floor is occupied by the Department of Environmental Science and Engineering (ESE) of the Harvard School of Public Health. The space consists of offices, dry laboratories and classrooms for faculty and graduate students. Sustainable features include a DALI lighting system, recycled demountable walls, displacement ventilation, system furniture, and carpet tile.

See the Brochure on Landmark Center on the US Green Building Council Website.

Building Highlights

- Harvard’s first LEED building
- DALI lighting system for occupancy control—first use of this system in North America
- Efficient T-5 lighting
- Raised access floor
- Over 75% of spaces have access to daylight and views
- Renewable bamboo floor in some areas
- 20% reduction in water use
- Continuous CO2 monitoring
Location and Program

The Landmark Center is located at 401 Park Drive, at the corner of Brookline Avenue and Park Drive, in Boston. The surrounding area has a high development density and ample access to public transportation.

Since this was an existing structure, there was no external review process.

Google map location of Landmark Center

Budget Overview

Landmark is a good case study for budget overview because the project went through design and bidding, then went through redesign to incorporate high performance goals, and further bidding by the same contractor. Many of the line items had the same cost between the “conventional” bid and the “green” bid, such as overtime allowance, cutting and patching, demolition, concrete, masonry, miscellaneous metals, finish carpentry and General Conditions. Some line items broken out by cost show some of the major differences between the two pricings:

<table>
<thead>
<tr>
<th></th>
<th>'green' design</th>
<th>'conventional' design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rough carpentry</td>
<td>$66,980.00</td>
<td>$80,100.00</td>
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<tr>
<td>Drywall</td>
<td>$178,000.00</td>
<td>$569,600.00</td>
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<tr>
<td>Partition walls</td>
<td>$850,078.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Doors, frames &amp; hardware</td>
<td>$12,115.00</td>
<td>$151,300.00</td>
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<tr>
<td>Tate raised floor</td>
<td>$343,500.00</td>
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<tr>
<td>HVAC</td>
<td>$498,000.00</td>
<td>$712,000.00</td>
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<tr>
<td>Electrical</td>
<td>$486,500.00</td>
<td>$569,600.00</td>
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<tr>
<td>Acoustic ceilings</td>
<td>$1,540.00</td>
<td>$97,900.00</td>
</tr>
<tr>
<td></td>
<td>$2,503,693.00</td>
<td>$2,260,600.00</td>
</tr>
</tbody>
</table>

According to the contractor, the main cost increase was the demountable partitions. Exclusive of the demountable walls, the cost of constructing green versus conventionally was "minimal.” Green design cost $5.88 more per square foot.

Project Team

The client, the Harvard Department of Environmental Science and Engineering (ESE) is part of the larger Department of Environmental Health. ESE is the largest teaching part of the department, composed of 10 faculty members conducting research on air and water pollution, aerosols, and indoor air quality.

Architects: Janofsky/Hurley Architects

Engineers: Shooshanian Mechanical Engineers

General Contractor: Bond Brothers, Inc.
Design Process

In the spring of 2000, Dr. Spengler with the Department of Environmental Health, spearheaded the effort for sustainable design at Landmark. At his request, the architect researched sustainable alternatives. Paul Riccardi, Dean of Operations and Administration at HSPH, and Danny Beaudoin, PE, researched energy conservation projects. With Dr. Spengler, they formed a nucleus of partners willing to move the project forward to high performance building design.

Materials

- Recycling of construction and demolition waste was a goal of the project. However, when the LEED application was submitted, the contractor could not produce the receipts from the landfill, so this LEED credit was not granted.
- Renewable Materials: Bamboo flooring in Dr. Spengler’s office and the kitchen.
- Steelcase 70% recycled partitions, which can be reconfigured later.
- Carpet tile can be recycled and allows for plug and play flexibility in conjunction with the re-mountable partition walls and furniture. The built-in flexibility reduces waste.

Site

The project achieved Sustainable Sites credit 2 for Development Density and Community Connectivity since it is sited in a dense urban area.

Water

- Occupant water use was reduced by 20% through the use of low-flow technologies.

Indoor Environmental Quality

The environmental quality of the space was carefully considered, as the building has a very deep floor plate. From deep within the building footprint, occupants can see out a window.

- A graduate student at the School of Public Health developed a questionnaire for occupant health.
- Low-emitting adhesives, sealants, paints, carpet and furniture are used throughout the space.
Energy

An indoor vestibule or “front porch” runs between four offices and the windows. Circulation at the edge of the building decreases the loss of heat to windows in winter and reduces heat gain in summer, thereby contributing to the office’s overall energy efficiency.

Calculated energy savings are 5,653,990,465 MMBtu annually, which is equivalent to taking 83 cars off the road annually (12,000 miles/year, 23 mpg). In annual greenhouse gases saved:

- 44 lbs of coarse particulate matter (PM10)
- 398 lbs of sulfur dioxide (SO2)
- 3,850 lbs of nitrous oxide (NOx)
- 73 lbs of carbon monoxide (CO)
- 650,143 lbs of carbon dioxide (CO2)
- 53 lbs of volatile organic compounds (VOC)

Landmark installed North America’s first use of the DALI lighting system. The DALI system allows for occupant control of lights from personal computers. With the DALI system, lights can be brought to 80% of their intensity at times of peak loads when utilities are most costly. Photo-sensors help reduce demand for perimeter lighting, as they adjust to the intensity of daylight. The lights are non-mercury lamps. Sylvania-Osram is providing efficient T-5 technology at reduced costs. The lights also use low-voltage wiring.

The project expects improved indoor air quality due to raised access flooring, which is an energy-efficient and healthy means of circulating air. At the time of its construction, it was New England’s largest raised-access floor.

Continuous CO2 monitoring ensures that the optimal amount of ventilation is delivered to each space.

A commissioning agent, hired by the deans, verified building controls and installation of HVAC equipment.

HSPH and HGCI negotiated a two-year contract with Renewable Choice for green-e certified Tradable renewable energy. The HSPH purchase of 219,250 kWh Green-e tradable RECs exceeded the requirements for LEED-CI EA credit 4 (50%) by 50,785 kWh per year.