Sustainable Design Strategies at Lillis Hall: a Selected Sample

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CONTEXT

The design process for Lillis Hall started early in 1999, before adoption of version 2.0 of the LEED rating system, at a time that “sustainable design” was a very new term. The students and faculty of the Lundquist College of Business, with the support of the UO staff managing the project and with the support of SRG Partnership (the architects), requested that the building be designed from the outset to explore and possibly implement a wide variety of sustainable design practices. More support was provided by EWEB, by UO Facilities Services, and by the Oregon Department of Energy from early on.

DESIGN PROCESS STRATEGIES

INTEGRATED DESIGN
USER INVOLVEMENT
LIFE SPAN
SUSTAINABLE BUILDING VS. LEED RATING
COMPUTER MODELING AS A DESIGN TOOL
MOCK-UPS

SITE SELECTION

EXISTING “URBAN” REDEVELOPMENT

The UO decided early on to redevelop the existing complex of buildings through surgical removal of the most challenging elements, construction of a new building connecting the complex, and renovation of the remaining structures. This allowed for preservation of open space and of building materials and took maximum advantage of existing proximity to mass transit, housing, shopping, and other urban amenities.

ENERGY - LIGHTING

BUILDING ORIENTATION AND FORM

East-west long skinny orientation maximizes daylighting opportunities and minimizes challenging west (and east) facades.

INTEGRATED WINDOW AND BUILDING SKIN DESIGN

Deep window reveals, exterior horizontal shades, and interior light shelves maximize the usability of the daylight. Shading to prevent sun from directly striking glass except in winter minimizes cooling needs.

ROOM ORIENTATION AND DAYLIGHTING

Case study rooms were flipped around so that the presentation wall was farthest from the windows. The natural drop-off of daylight levels from the windows to the projection surface allows the room to work well without any electric lighting.

EFFICIENT ELECTRIC LIGHTING AND HUMAN PARAMETERS

Dimmable T-8 high-output fluorescent lighting provides only as much electric light as is needed. Interior light levels are sequenced to make the final destination appear bright.

ELECTRIC LIGHTING AND DAYLIGHTING CONTROLS

- motion sensors
- daylight sensors
- building lighting management system
- electric light dimming
- daylight shade control

PLUG LOADS

The Lundquist College became an early adopter of efficient equipment such as flat screen displays, compact fluorescent desk lamps, etc.
Motion sensors in offices also control designated receptacles for switchable loads such as task lighting, sound systems, etc.

ENERGY - VENTILATION, HEATING, AND COOLING

BUILDING ORIENTATION AND FORM

Long thin building with an east-west orientation is ideal for using wind for ventilation.

"PASSIVE" STACK EFFECTS

The central atrium acts as a chimney, exhausting hot air as it rises up through the atrium and out gravity vents in the roof. The code-mandated atrium smoke evacuation fans are used at low speeds to boost the effect when needed for night cooling. In addition, the two large lecture halls (182, 282) have a separate system of stack-effect chimneys for passive night-flush cooling of those two rooms.

THERMAL MASS AND NIGHT-FLUSH COOLING

Concrete mass was added to the floors and raised areas of the classrooms to be cooled at night in warm weather, and then act as a heat sink during the day.

OPERABLE WINDOWS

Much of the building has operable windows to supplement passive ventilation and improve indoor air quality under user control.

PASSIVELY COOLED OFFICES AND CLASSROOMS

The north-facing faculty offices are entirely passively cooled using night-flush ventilation. Case study classrooms and larger lecture rooms operate initially in passive mode, then switch to mechanical cooling when needed.

HIGH-ALBEDO ROOF AND SITE PAVING

The roof and sidewalks are lighter color than normal to reflect more light back to the sky, reducing the air temperature around the building in hot weather as well as reducing the amount of heat entering the building through the roof. In addition, the building air intakes are in deep shade on the north side of the building where air temperatures remain cool even in very warm weather.

EFFICIENT HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS
When the passive systems are not adequate, conventional heating and cooling systems step in. These are designed with a variety of energy-conserving strategies. Occupancy sensors ensure that the system only provides thermal comfort and ventilation where it is needed. Variable air volume fans provide it with a minimum of energy.

ENERGY GENERATION - PHOTOVOLTAIC CELLS

Photovoltaic cells (PV) generate electricity from the sun. There are PV arrays in the south atrium windows, in the atrium skylights, in flat arrays on the roof, and in flexible "peel-and-stick" systems on the penthouse roof. The energy is converted to 120 volt AC power and tied into the UFO and EWEB electrical grids.

MATERIALS

CONSTRUCTION RECYCLING
A very high percentage of construction waste was recycled by the contractor using very simple approaches that made recycling easier than the alternatives. This has since become standard practice for this contractor.

RECYCLE CONTENT
Many of the building materials have a high percentage of recycle content (steel, aluminum, glass), are easily recyclable, or use locally-produced materials (concrete).

RECYCLING SYSTEMS
Recycling stations are provided throughout the building in convenient locations, diverting a very high percentage of waste to recycling.

INDOOR AIR QUALITY

LOW QUANTITIES OF VOLATILE ORGANIC COMPOUNDS (VOCS)
All of the building materials were selected emit very low or no levels of volatile organic compounds, a significant issue for indoor air pollution. This influenced selection of particle boards, paints, flooring, sealants, carpets, adhesives, and many other building materials.

OPERABLE WINDOWS
Providing users with operable windows ensures that indoor air quality can be maintained under user control.

FLOOR MATERIALS REQUIRING LESS VOC-CONTAINING FINISHES
Many of the floor materials (ceramic tile, linoleum) were selected because they do not require regular application of synthetic waxes which release VOCs. Indoor air

pollution from maintenance is, on average, much more significant to indoor air pollution than is the initial release from new materials.

WATER QUALITY

GREEN ROOF PILOT PROJECT

A green roof was installed in the of the small roof panels over the third floor, with soil and plants. There have been problems with leaks in that part of the building ever since, and the plants have been removed to repair the roof.

ATTEMPT AT BIO-SWALE

The UO and the landscape architect, Larry Gilbert of Cameron McCarthy Gilbert Scheibe, developed a plan for a bioswale northwest of Lillis, but the relative newness of the concept was too much for others at the UO and on the design team.