Sustainable Design and Green Building Approaches

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Externship

- Completed at LPA, a Sustainable Design Architecture Firm in Irvine, CA. I engaged in this activity to learn about green building technologies, to share this information with our students and encourage students to pursue “green” career pathways in engineering, architecture, and design.

Firm Bio: “At LPA sustainability is our passion. For more than 40 years our firm has been advocating the message that sustainable design can be achieved on any project, budget, building type and location. We believe sustainability is the foundation of beneficial, timeless design which transcends culture and trends. Long before the popularity of the green building movement, LPA professionals worked under the belief that sustainable design is smart design, and this consideration still remains true.”

- LPA advocates that sustainable design can add savings and value to any project type.
Building Materials and Choices

- **Insulation**: choose smart options like soybean-based insulation or cotton insulation (options available from recycled jeans, pictured in lower right corner)

- **Flooring**: Natural fiber, recycled carpeting, natural linoleum developed from jute, renewable wood sources such as bamboo, and wheat based boards, cork flooring tiles (pictured at right)

Select materials based on their ability to be recycled at the end of their use

- **“Build Smart”** – a green design principle – choose everything in the spirit of sustainability. Everything included in the project is needed, and works together, creating an efficient building with low energy consumption and costs. **Think simple, not high tech.**

- Green buildings provide abundant access to natural daylight, outdoor views, promotes a healthy indoor environment that decreases illness among building occupants, and creates a sense of community among occupants.
LEED  (Leadership in Energy & Environmental Design)

  - “LEED, or Leadership in Energy and Environmental Design, is redefining the way we think about the places where we live, work and learn. As an internationally recognized mark of excellence, LEED provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.”

- **The LEED Rating system was established to define and measure green buildings.** Points are awarded for:
  - Water Efficiency
  - Energy Efficiency
  - Indoor Environmental Quality, ie Air Quality, ventilation, temperature, comfort in the building
  - Materials and Resources used, ie sustainable furniture, sustainable food sources (food produced on organic farms within a 100 mile radius of the company, choosing local catering companies who follow these principles), etc.
• The firm uses their office space as a “lab” for building techniques and design approaches. The office is LEED certified, and the employees at the firm are 78% LEED accredited, meaning they have a very green staff!

• The 3 Main Components of Sustainability in the Lab that can be observed and measured are:

1. Energy
2. Air Quality
3. Water
Energy

Building uses a combination of efficient lighting sources to test out what is the most efficient:

- LED lights in some areas
- One region of the building contains lights that dim with the incoming daylight
- The building is designed without interior walls or closed offices to make the best use of natural light, therein reducing energy costs
When fluorescent lights must be used, the most efficient fluorescent lights are in place (T-8 Lamps, as they rate high efficiency in converting electrical energy to light).

Blinds in place in the office are controlled automatically by the Sun, they adjust and drop as the Sun moves, in place on the Sun intense sides of the building (in the East and West) and use a sensor to detect and respond to light.

Skylights are incorporated into the design to allow for natural light to decrease energy usage in artificial lighting; also to allow increases in energy efficiency and heating/cooling in the building.
Operable Windows

- Whereas most office buildings do not provide operable windows, sustainable design includes these. In the words of LPA president Dan Heinfeld, “You would never purchase a car that does not have operable windows, why work in a building or attend a school facility without operable windows?”
- This is one small design change that is a huge step in transforming buildings and the lives of those who work in the buildings.
- Employees report increased happiness with hearing the outside environmental noises and feeling the breezes.
- Operable windows communicate with the HVAC system – when a window is open, the HV system doesn’t deliver air in that area of the building, therein saving energy costs (6-7% gains in efficiency).
Air Quality: Designing for Health

- Indoor air quality is a constant thought in sustainable design.
  - Carpets are made of recycled textiles, and the glue that adheres the carpet is non-toxic. Carpets will later be recycled.
  - Paints are low Volatile Organic Compounds (VOCs) – VOCs are gases emitted from paints that have serious health consequences.
  - Ceilings are constructed from recycled materials.
- When the building was newly renovated and prior to having staff members inside it, it underwent a two week “flush out” where the air system was reversed to withdraw potentially irritating fumes and vapors out of the building.
- The operable windows and outside breezes improve the air quality in the building and cut down on “sick building syndrome,” where employees suffer health issues due to lack of ventilation and exposure to contaminants in the building.
Green Walls

Living plants grown on walls in the space, in lieu of passé potted plants.

- The plants are watered with recycled water from condensation from the HVAC system.
- Improves the overall air quality in the building to improve employee health.
Water

- The restrooms on site and in sustainable buildings are using the most efficient technology:
  - Toilets and urinals in use are high efficiency, ultra low-flow, and 40% more water efficient.
  - Faucets are high efficiency low-flow construction.
  - Electric Dryers are used in place of paper towels to save trees.
Printing & Reprographics

- **Sustainable Print Lab**: tests new technologies such as zero emission, edible toner (soy based)
- **100% recycling program**: all used paper is recycled and repurposed into sketchbooks and more
- Copiers are automatically set to double sided copying, **saving 718 trees per year!!**
Workstations are made of 70% recycled materials.

Walls separating workspaces are constructed from recycled materials which serve as a writeable surface as well for quick notes, cutting down on paper use.

Design elements enhancing the building, such as this window wall, are recycled materials from a jobsite.

Interior table surfaces are made of recycled milk glass.
Synopsis

- All design techniques used are to make the most green building possible, but never at the expense of employees. If employees are unhappy, uncomfortable (i.e. cold due to poor HVAC/air regulation), then the design is unsuccessful.

- The overall goal of sustainable design is to produce a “future proof” building that landlords, tenants, and building occupants enjoy so that the building will be loved, cared for, renovated and kept up, and used for a very long time to come, which is the very definition of sustainability.
The Green Solution

- When working with a client, the best solution for the project is discussed. Options are always explored to answer, “How can we make this building the most green?”
Who Works in Green Design?

- Structural Engineers
- Architects

What can I do now to get started?

- Study intensely and excel in core classes such as Physics, Algebra, Chemistry, Computer Science and Computer Programming
- As a high school student, take courses in ROP Computer Aided Drafting (CAD) to learn design skills, Construction Technology, Environmental & Energy Technology, and Rapid Product Development

College Majors to pursue this career pathway:

- Architecture, Architectural Engineering, Engineering, Structural Engineering, Landscape Architecture, Construction Management, Environmental Design
Take Away Lessons

- Do you have a passion for being & living green?

- The LPA firm has a strong positive energy and good feel in the building. These employees are passionate and motivated about the work they are doing for the community.

- In this line of work, you are not only giving back to your community and your world, you are building a new world for generations to come!