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INTEGRATIVE DESIGN: GREEN BUILDING

Description:

Green building, also known as sustainable design, is the practice of safely fulfilling the needs of today's generation without jeopardizing the needs of future generations. Across the country, today's youths, our families, and the new crop of senior citizens are much more environmentally conscious compared to previous generations; and all are increasingly aware of the interactive impact of environmental elements. Declining natural resources, health factors, and volatile economic conditions have converged to sustain an interest in green design. From regional transportation, to cleaning products, to housing, green design is a growing trend that has touched all aspects of our daily lives.

Housing alternatives for older people, for families, and for people with disabilities; health care facilities; commercial structures; and public buildings can benefit greatly from green building techniques. The demand for buildings that are environmentally sensitive and healthy for their inhabitants will naturally increase as the emphasis on green, sustainable design grows. Several organizations have created rating systems to implement and evaluate the green building process. The most prestigious is the United States Green Building Council's *Leadership in Energy and Environmental Design* (LEED) Certification. Projects that are LEED certified must achieve a set number of points based on six topics: sustainable sites, water efficiency, materials and resources, indoor environmental quality, and innovations and design process.

The New York State Department of State continuously adjusts the State's building code to incorporate new findings on subjects such as energy use, water efficiency, indoor air quality, fire prevention, factory-manufactured buildings, and the removal of toxic materials. Organizations, such as the New York State Energy Research and Development Authority (NYSERDA), can provide technical and financial assistance for green building design and construction.

From heating bills to food costs, the fluctuation of energy prices affects all aspects of our lives, and a major goal is to reduce our dependence on fossil fuels without significantly decreasing our standard of living. By increasing the energy efficiency of a building and reducing demand, we can create comfortable places for people of all ages. Some steps for creating a more environmentally sensible and energy-efficient building include:

Site planning:

- *Reuse of building*: Reusing an existing building, rather than constructing a new one, saves natural resources and energy.
- *Building location*: Not locating the building in a wetland, an endangered habitat, or on prime farmland can help preserve natural features for future generations.

- *Solar orientation:* Orienting the building in the East-West direction allows the building design to take advantage of full southern sun and provides the opportunity for passive solar heating and cooling.
- *Vegetation:* Specifying native species and drought-resistant plants allows the site to be a habitat for animals, while reducing the amount of water and pesticides typically needed.
- *Trees:* Planting native deciduous trees around the property allows sun to penetrate into the building in the winter and provide shade in the summer, offsetting energy costs. Coniferous trees on the west side of the building block winter winds.
- *Water:* Installing silt fences and restrictions on the use of pesticides prevent the contamination of the local drinking water. Decisions made during construction and the grounds-maintenance policy should take the local water quality into consideration.

Materials:

- *Regional materials:* Choosing building and finish materials that are harvested and/or manufactured locally saves on energy for transportation and helps the local economy. Local materials that are aesthetically pleasing can create a "sense of place."
- *Sustainable harvest:* Forests that are certified by the Forest Stewardship Council (FSC) are sustainably managed to conserve animal habitat, reduce stormwater contamination, and preserve logging traditions.
- *Rapidly renewable products:* Specifying building materials that are rapidly renewable, such as bamboo and cork, decreases the need to consume old-growth forests.
- *Recycled Content:* Specifying building materials with recycled content completes the cycle and extends the life of a product; if recyclable materials are not reused, most will be sent to the landfill.

Energy:

- *Overhangs:* By using sunshades or overhangs, the sun can be used to heat the building in the wintertime and shade the building in the summer time.
- *Fenestration (the design and placement of windows in a building):* Placing high-performance windows in the right locations can greatly reduce energy consumption and help individuals who have vision difficulties in areas with low-light.
- *Insulation:* Using high-performance, blown-in foam insulation reduces energy consumption.

- *HVAC (heating, ventilating, and air conditioning):* Specify an energy-efficient HVAC system. Make sure the ducts are insulated and that the filters are changed regularly. Consider a radiant floor system that, if used properly, is more efficient and can aid with indoor air quality. Energy star ceiling fans effectively reduce air-conditioning use and increase air circulation.
- *Lighting:* Replace old light bulbs with more-efficient fluorescent and compact fluorescent bulbs. Fluorescent bulbs also have a better color range for individuals with poor vision. Design the lighting to accommodate low-vision difficulties by sizing the light fixture correctly and using up-lighting techniques to avoid glare.
- *Energy Star:* Energy cost can be greatly reduced if all appliances are Energy Star[®] rated.
- *Individual controls:* Allowing individuals to adjust the temperature in their own environments helps reduce the need to heat all spaces at once, and helps with the occupants' sense of comfort.
- *Renewable energy:* On-site renewable energy sources, such as photovoltaic (solar) panels and small wind turbines, can provide continuous energy. The use of ground source heat pumps, which adjust indoor ambient temperature by using the constant ground temperature, are also energy-efficient technologies.

Waste:

- *Construction and demolition waste:* By reducing, reusing, and recycling construction and demolition waste, fewer natural resources are extracted from the earth and fewer materials go to the landfill.
- *Recycling location:* Locating recycling bins in a convenient location within the building increases the practice of recycling by residents.

Benefits:

- Recycling and re-using materials and products reduce waste and reduce the use of land-fills.
- Over the long run, sustainable building practices are economically beneficial, saving energy costs, utility costs, and rehabilitation costs.
- Green, sustainable practices—
 - Conserve the use of limited, costly, non-renewable natural resources, such as oil and gas.
 - Conserve the use of the world's increasingly limited amount of potable water.
 - Maximize the use of renewable natural resources, such as wind, sun, and non-potable water.
 - Preserve natural (increasingly endangered) plant and wildlife.
 - Reduce the use of pesticides and other contaminants and pollutants.

- Improve the health and well-being of residents in homes and workers and staff in the workplace, which, in turn, has a positive impact on costs associated with the health care system.
- State and federal government agencies provide technical assistance, grants, and tax credits to offset the initial cost of employing green building products, materials, and techniques.

Impediments or barriers to development or implementation:

- Many builders, developers, and homeowners are unfamiliar with available green building products, materials, and technologies, which can lead to improper installation and use, user frustration, or a resulting contrary effect. Taking the time to understand the issues, asking questions, and having patience will rectify most issues. In the end, *asking* if a particular product is harmful to a resident's health or has any other consequences is the quickest way to understand its environmental impact.
- For some materials or products, there may be an increase in upfront construction cost to incorporate green techniques into a project. While these will be offset in the long run (with energy savings and better health and satisfaction for the building occupants), short-term financial considerations often win over a longer-term perspective.

Resource—examples:

- ***The Patrick H. Dollard Health Center***, Harris (Sullivan County), New York, is a diagnostic and treatment facility providing primary care, specialty medical care, and dental care to 250 residents with profound neurological and developmental impairments. It is the first medical center in New York State to implement green building standards that meet the State Department of Health's requirements. It is estimated that the building will save 30 per cent in energy use and expense over time, and the building is considerably more healthful and comfortable for the children and adults who use its critical and everyday health care services. <http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=233>. Characteristics of this sustainable development include:
 - U.S. Green Building Council LEED-NC, v.2/v.2.1--Level: Certified.
 - The green measures safeguard already fragile health of residents and build a foundation for high-performance healing environments.
 - The building is 48% more efficient than a building minimally compliant with ASHRAE 90.1 standards, due to a ground-source heat-pump system; a tight, high-performance envelope; extensive day-lighting; and efficient products and equipment.
 - A staggered, narrow building footprint and bold fenestration pattern allow public spaces the benefit of day-lighting during normal operating hours and reduces artificial lighting use.
 - Structural shading devices and a reflective metal roof are expected to reduce heat gain and air conditioning demands during the summer.
 - In selecting this site, the Center avoided prime agricultural land, opting instead to infill on a previously abandoned industrial agricultural site. A

bucolic pedestrian path system, open pasture, native plants, and farming fields occupy the site.

- Environmental health goals that apply directly to healthcare operations were considered at a structural level. Lifecycle assessments for finish materials and furnishings considered downstream health effects in addition to cost and durability.
- **Mission Creek Senior Community**, located in the Mission Bay area of San Francisco, CA. Collaboration between Mercy Housing California, San Francisco Housing Authority, San Francisco Redevelopment Agency, San Francisco Public Library, and others. A mixed-use development that includes apartments and services for very-low-income seniors, seniors transitioned from long-term institutionalization in Laguna Honda Hospital, and homeless seniors; Adult Day Health Center; 7,500 sq. ft. Mission Bay public library branch; coffee house; and community room. An EPA-award-winning development that includes many green, sustainable features, including:
 - Brownfield remediation project
 - Solar panels
 - Many energy-efficient features, including energy-efficient lighting and large windows to increase day-lighting
 - Low-flow fixtures
 - Reclaimed water use
 - Landscaping designed for low-water use
 - Long-lasting, low-maintenance interior finishes
 - Rapidly renewable and recycled-product content finishes
 - 25 feet away from a San Francisco Municipal street car stop
 - Two blocks from a region train line station (CalTrain)
 - Two blocks from a Bus stop

<http://www.housingfinance.com/ahf/articles/2007/aug/MISSION-CREEK0807.htm>.
http://www.epa.gov/piedpage/awards/sg_awards_publication_2008.htm#equitable For more information: Rick Sprague, Regional Director, Resource Development, Mercy Housing California, 916-414-4429, rsprague@mercyhousing.org.

Resource—written and web:

- Sandra F. Mendler and William Odell (2000). *The HOK Guidebook to Sustainable Design*. New York, NY: John Wiley & Sons.
- Bradford Perkins, with J. David Hoglund, Douglas King, and Eric Cohen (2004). *Building Type Basics for Senior Living*, Hoboken NJ: John Wiley & Sons.
- U.S. Green Building Council (USGBC) (October, 2007). *LEED-NC Reference Guide Version 2.2*, 3rd ed. Washington, DC: USGBC.
- New York State Energy Research and Development Authority:
<http://www.nyserda.ny.gov/>.

- United States Green Building Council: www.usgbc.org.
- Green Home NYC: www.greenhomenyc.org.
- Forest Stewardship Council: www.fscus.org.

Resource (free or fee-based)—technical assistance contact names:

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