Drexel Planning Design and Construction Guidelines for Sustainable Building Designs November 15, 2007

Objectives

Drexel desires to move from the traditional regulatory and code driven approach to dealing with environmental issues to one that seeks to further reduce environmental impacts within our reach. This will be accomplished with an integrated design approach that achieves a reduced carbon footprint and greater energy efficiency. In so doing, we will, save money over the life of the project, and benefit the local and global environment overall. Sustainable design will:

- consider the true costs of a building's impact on the local and regional environment.
- consider the life cycle costs of specified product or systems.
- Promote systems that, when integrated, bring efficiencies to mechanical operation and human performance.
- minimize demolition and construction wastes and use products that minimize waste in their production and disposal.

Goals:

- a building that is energy and resource efficient.
- a building that is easily reconfigured and reused.
- a building with a healthy indoor environment.
- a building that includes an environmentally sound operations and maintenance regimen.

Design Guidelines

- Make sustainability an integral part of the design process.
- Establish an integrated design team that evaluates all aspects of the project from the standpoint of environmental stewardship as economic opportunity.
- Set aggressive goals for the building's energy budget (e.g., number of BTU/ft2/yr. for primary energy), lighting budget (e.g., number of watts/ft2 for ambient lighting), and water budget (number of gals/person/day or less).
- Verify that buildings energy related systems are installed, calibrated and perform according to basis of design, Drexel requirements and construction documents. (Fundamental Commissioning)
- Incorporate sustainable design requirements into contracts and specifications
- Document all aspects of sustainability achieved in the project. Publish the project achievements so, at a minimum, the building occupants can appreciate the efforts.

Site Guidelines

- Locate buildings to minimize environmental impact.
- Reuse brownfields and other disturbed areas.
- Recognize the value of existing buildings, streets, and other site amenities. Reuse existing buildings and structures whenever possible.
- Choose site materials and plantings that have low maintenance and water requirements.
- Optimize building shape and orientation to take advantage of sunlight, wind, and natural features.
- Consider access to mass transportation.

Enclosure Systems Guidelines

Thermal Comfort

- Optimize the thermal envelope before relying on building space conditioning systems for environment control.
- Understand the relationship between radiant surface temperatures and comfort. High performance glazing and enclosure systems that provide acceptable interior surface temperatures can reduce the need for expensive perimeter conditioning systems.
- Understand the role of building mass in controlling thermal comfort, especially in interiors. High mass buildings have an inherent ability to stabilize temperature swings and can contribute to cooling strategies using nighttime air.
- Select enclosure materials and detail building assemblies to limit uncontrolled infiltration.

Visual Comfort

- Provide environments that are visually stimulating. Humans respond well to variations in lighting levels, comfortable contrasts, and pleasant changes in light and shadow.
- Provide as much natural light as possible. Coordinate supplemental light sources with available daylight.
- Consider creative integration of daylight, energy efficient lighting options and effective control strategies. Include daylight as a factor when trying to meet industry standards for lighting.

Mechanical Systems Guidelines

Thermal Comfort

- Minimize loads on mechanical systems by optimizing orientation and envelope design.
- Organize interior spaces and locate equipment to minimize loads.
- Analyze the thermal requirements of each space and choose the most appropriate mechanical system for each area.
- Allow for thermally diverse environments that accommodate a range of heating and cooling environments.
- Use a building energy management system to monitor and optimize system performance.

Indoor Air Quality

- Evaluate the site and surrounding area for potential sources of interior air pollution. Carefully consider the impact of traffic, transit drop-offs, parking lots, and dumpsters on building air intakes.
- Avoid materials and furnishings comprised of petrochemicals and volatile organic compounds to reduce harmful off gassing.
- Give special attention to ventilation requirements and system configuration and controls.
- Perform cleaning and maintenance with nontoxic cleaning products and procedures.

Water/Wastewater Systems Guidelines

- Identify reuses for rainwater, such as toilet flushing, irrigation or heat recovery.
- Identify options to minimize water use, including maximizing number of recycles in cooling towers (6 or greater) and eliminating once-through heat exchangers.
- Use low flow and automatic shutoff plumbing fixtures.

Interior Systems Guidelines

Functional and Spatial Issues

- Plan space based on its use. Minimize areas dedicated to circulation. Design for shared services.
- Consider how a space may be reused in the future and design accordingly. Buildings or spaces expected to have a high churn factor should use demountable partitions and adaptable HVAC, electrical, and telecommunication systems.
- Allow occupants to control and interact with their personal environments.
- Use human ergonomics as a major space design determinant and furniture and equipment selection criterion.

Acoustic Quality

- Configure building massing, forms and building group relationships to reflect and dissipate sound.
- Use entrance air locks or revolving doors to reduce sound transmission and save energy.
- Consider acceptable acoustic performance in the design of mechanical equipment and energy distribution systems.

Lighting Systems

- Design lighting to serve the needs of building occupants. Uniform lighting seldom serves well as both ambient and task lighting.
- Begin with an effective daylighting scheme that optimizes the use of natural light.
- Incorporate high efficiency fixtures, lamps, and controls. Strive to reduce watts-per-square-foot design targets and actual connected loads.
- Enable occupant control of individual work stations or small work areas with task-ambient lighting systems, as opposed to large, uniformly lit interior areas.
- Include lighting systems in regular maintenance procedures to ensure optimum light output and energy efficiency.

Building Materials Guidelines

- Take life cycle costing into account, rather than first cost. This will typically lead to higher quality design and materials.
- Recycle construction and demolition waste at the job site. Develop and implement a construction and demolition waste management plan.
- Minimize waste by designing for standard sizes. Avoid over design of building systems.
- Use value engineered products such as prefabricated components for more efficient structures.
- Select durable and heavy materials that can provide thermal mass in buildings.
- Select materials with a high recycled content.
- Select materials that can be recycled at the end of their useful life.
- Avoid materials that harm the environment. For example, specify local timber and wood products that are sustainably harvested if available, or use recycled plastic lumber or other alternatives.
- Avoid materials that will impact indoor air quality. Impacts occur from off gassing from the material itself or the adhesives required for material installation.
- Choose materials with the lowest possible embodied energy that will accomplish the task. Lumber, brick, cement, and glass contain relatively little embodied energy, considering their useful life, compared to virgin plastics and raw aluminum.
- Minimize and recycle packaging materials.
- Use materials that do not require frequent or harmful maintenance procedures.