

# SUSTAINABLE DESIGN STANDARDS

University facilities significantly impact land, air, water, natural resources, and public health. The University is committed to the protection of these resources at all stages of acquisition, design, development, and operation of its campus facilities.

As a consultant contracted by the University, the architect/engineer (A/E) shall comply with and integrate these Sustainable Design Standards in to all University building projects. However, the A/E is not limited to these Standards. The University of Minnesota encourages innovations outside of these Standards that serve to enhance the sustainable nature of its campus, buildings and operations.

## 1.0 UNIVERSITY POLICY & GUIDANCE

These Sustainable Design Standards and related procedures implement the environmental commitments of the University of Minnesota's [Board of Regents Policy for Sustainability and Energy Efficiency](#), [Administration and Operations Policy on Environmental Management](#) and [Systemwide Sustainability Goals](#). Excerpts from these guiding documents are below.

### **Board of Regents Policy for Sustainability and Energy Efficiency:**

Sustainability is a continuous effort integrating environmental, social, and economic goals through design, planning, and operational organization to meet current needs without compromising the ability of future generations to meet their own needs. Sustainability requires the collective actions of the University of Minnesota (University) community and shall be guided by the balanced use of all resources, within budgetary constraints. The University is committed to incorporating sustainability into its teaching, research, and outreach and the operations that support them.

The complete Regents Policy can be found on the policy section of the Board of Regents website at [http://www1.umn.edu/regents/policies/administrative/Sustain\\_Energy\\_Efficiency.pdf](http://www1.umn.edu/regents/policies/administrative/Sustain_Energy_Efficiency.pdf)

### **Administration and Operations Policy on Environmental Management:**

University activities and facilities significantly impact land, air, water, natural resources, and public health. The University is committed to the protection of these resources in all its activities and at all stages of acquisition, design, development, and operation of its campus facilities.

- *Acquisition and Development* - Real Estate, for acquisitions of new sites, and capital project managers, for development of existing sites, must incorporate into their transactions and projects the review of the environmental impacts from hazardous

substances and the cleanup of identified pollution to levels appropriate to the planned use of the site

- *Design* - Capital project managers must ensure that the design process for facilities identifies and addresses the environmental impacts of building and equipment, incorporates controls protective of environment, meets established environmental standards, and provides timely information for review and incorporation into University permits.
- *Construction* - Project managers and contractors must ensure that construction and renovation of facilities is done in a manner that protects the waters of State, minimizes demolition and construction wastes, fulfills regulatory requirements, and addresses environmental discoveries.

The complete Policy can be found on the UWide Policy Library website at <http://policy.umn.edu/Policies/Operations/Safety/ENVIRONMENT.html>.

### **Systemwide Sustainability Goals:**

#### Operational Improvements

- Plan, program, design, construct, and operate University of Minnesota facilities throughout their life cycle to provide restorative impacts to the natural environment and a healthy indoor environment for the University community
- Integrate environmental, economic, and social priorities into purchasing and contract decisions
- Manage resources for their highest end use by reducing consumption, minimizing waste, and strongly supporting the reuse and highest value recycling of unwanted materials
- Reduce energy use
- Pursue climate neutrality and energy efficient operations across the University of Minnesota

The complete Systemwide Sustainability Report can be found on the University Services “Sustainability and U” home page at [http://www.uservices.umn.edu/sustainableU/assets/pdf/UM\\_Systemwide\\_Sustainability\\_Final\\_Report.pdf](http://www.uservices.umn.edu/sustainableU/assets/pdf/UM_Systemwide_Sustainability_Final_Report.pdf).

## **2.0 DEFINITIONS**

### **2.1 Budgetary Constraints**

Consistent with State of Minnesota Sustainable Building 2030 legislation, any building efficiency that has a simple payback of 15 years or less (except those efficiencies that have an expected life that is less than the expected payback) is considered cost-effective and, therefore, within budgetary constraints.

## **3.0 PROCEDURES**

### **3.1 Minnesota Sustainable Building Guidelines – Buildings, Benchmarks & Beyond (B3)**

It is the intent of these Standards that all University building projects that meet the criteria listed below shall comply with the most current version of B3, regardless of project funding source. However, some projects by their nature while meeting the criteria listed here are not good candidates to meet the B3 requirements. If a project is considered unlikely to meet the B3 requirements and is not legislatively funded, an exceptions request can be submitted for review. The exceptions request must be submitted during the pre-design or earliest phase of the project.

#### B3 Criteria

##### New Building Applicability:

- The construction is considered a building under Minnesota Building Code

##### Building Renovation Applicability:

- Renovated area includes 10,000 square feet or more, and
- Renovated area includes the replacement of mechanical, electrical or plumbing systems

The current B3 Guidelines can be found on the Minnesota Sustainable Building Guidelines website at <http://www.msg.umn.edu>.

### **3.2 University Sustainability Checklists**

Projects not applicable to B3, per Section 3.1, must comply with the following University Sustainability Checklists:

- Project Energy and Engineering Review (PEER) Checklist
- Sustainability Opportunity Analysis Review (SOAR) Checklist

At the beginning of the design process, the A/E shall participate in a review of the PEER and SOAR Checklists. This requirement applies to **all** projects regardless of size or cost. Each checklist contains a number of Energy Efficiency Elements (EEE) and Sustainability Opportunities (SO) that must be considered for inclusion in to a project. As part of this review the A/E shall provide for consideration a:

- Simple payback analysis of all EEE's and SO's, and
- Life cycle cost analysis of all EEE's and SO's

This will inform decisions regarding which EEE's and SO's to include in the project. The A/E shall consult with the University Project Manager for more detail and access to the Checklists.

### **3.3 Energy Efficiencies**

Recognizing that energy efficiencies provide some of the largest and most clearly quantified economic, social and environmental benefits, the A/E shall comply with the following:

- Include the energy consumption target with all design documents starting with predesign. The energy target shall meet or exceed the B3 (SB2030) energy consumption limits (kBTU/GSF/Yr or approved equivalent). At each design stage provide an estimate of the projected energy consumption for the project using methods appropriate for the specific project. Typical methods that may be appropriate include hand calculations (small, simple projects), Bin calculations, and building energy simulations. The A/E shall produce a report at each design phase that includes the projected energy consumption and how that consumption compares to the target. The energy impact of all VE decisions must be included in the project documentation.
- Consult Excel Energy Assets Custom Energy Assistance Program or approved and equal program to assist in its efforts to design an energy efficient project. These services consist of modeling the projected energy use of proposed designs, suggesting strategies to reduce the projected energy use, and projecting the construction costs and energy savings associated with the suggested strategies. Review the suggested, project-specific energy conservation strategies with the Facilities Management Energy Conservation Group.
- The University Project Manager shall allot one (1) percent of GME costs for additional energy efficiency elements that go beyond the energy target. All additional efficiency elements with simple paybacks of 15 years or less will be pursued using the 1% allocation.

#### **4.0 ESSENTIAL SUSTAINABLE PROJECT ELEMENTS**

The University of Minnesota's Sustainable Design Standards include essential sustainable project elements, which the A/E is expected to consider, whenever applicable, on every University building project. These elements are further highlighted on the following pages with the intent of promoting the sustainability expectations of the University. The A/E is encouraged and expected to expand upon and be innovative in the ways in which these elements are integrated in to the project. The Essential Sustainable Project Elements include:

- 4.1 Planning for Conservation
- 4.2 Sustainable Sites
- 4.3 Water Efficiency
- 4.4 Energy Efficiency
- 4.5 Indoor Environmental Quality
- 4.6 Materials

## 4.7 Waste

## 4.8 Education

### **4.1 Planning for Conservation**

The University of Minnesota believes that the first step toward sustainable building is planning for conservation during the scoping, feasibility pre-design and design phases. The first step in this process should be the analysis of reuse of existing building resources done by A/E in conjunction with the University. Reusing existing buildings and materials conserves raw goods and energy, and lowers the overall cost of the building project. Conservation of open space and existing vegetation lessens the negative impact that a building has on the environment. Small, simple measures taken on each project to conserve space, materials, and energy can add up to have significant impact on the sustainability of our built environment.

### **4.2 Sustainable Sites**

Careful site selection is essential in every building project. Choose a brownfield or greyfield site rather than a greenfield site when possible, and avoid new construction on sites that have delicate ecosystems. A sustainable site encompasses the area outside of a building and addresses issues regarding landscape, runoff, drainage, and sediment control. Building placement has a direct impact on a site's existing living communities, hydrologic cycle, and quantity and quality of stormwater runoff. Landscaping should preserve the natural drainage system and hydrologic cycle of the site and minimize erosion and sedimentation to allow for cleaner runoff. The capture of stormwater runoff and redirection back into the natural drainage system reduces total sewer loads and minimizes potential of street flooding. Reducing erosion and sedimentation of our waterways not only allows for healthier aquaculture but also reduces future costs to repair impeded waterways. These practices for maintaining a sustainable site should be followed and carried through all phases of the project.

### **4.3 Water Efficiency**

Water efficiency pertains to water use by the building's systems and occupants, and it begins with overall water conservation through reduced potable water use. Water efficiency in a building's systems not only reduces the building's impact on freshwater resources, it also results in monetary savings. Stormwater and greywater reuse systems reduce potable water use. Water conservation practice by the building's occupants depends much on education and commitment of its users, however, automatic sensors and controls on fixtures promote this effort.

### **4.4 Energy Efficiency**

The first step in designing an energy efficient building is establishing the shared value of optimizing energy efficiency between owner, designer and builder. Energy efficiency also requires a collaborative design process; all team members (architects, engineers, contractors, etc) must meet regularly with stakeholders to ensure ongoing communication throughout the process. Placing energy efficient design as a high priority plays a significant role in lowering the amount of greenhouse gases emitted into the air as well as helping to mitigate global climate change. Similar to water efficiency, energy efficiency is directly connected to monetary savings

throughout the building's lifetime, and therefore efficiency measures must be considered in all aspects of the building. These efficiency measures range from the building's site, orientation, massing, lighting and ventilation systems, as well as consideration of energy consumption used in transportation to and from the site. For all projects, life cycle costing (LCC) analysis should be conducted to show estimated cost impact on construction and operations.

#### **4.5 Indoor Environmental Quality**

Indoor Environmental Quality (IEQ) of a building impacts the health, productivity and overall well-being of human activity inside the building. The IEQ considers pollutant levels of indoor environments caused by harmful chemicals like VOCs released by materials as well as thermal control and building aesthetics. The IEQ is unique in that the negative effects of poor indoor environmental quality in a building are displayed most clearly through its human inhabitants. These effects include reduced productivity and efficiency in work, increased discomfort in the work environment, and even building-related illnesses like asthma. Non-VOC containing materials should be used in all building projects. Where VOC-containing materials must be used, they should be low-VOC materials and installed so that they offgas with the least negative impact to the final indoor air quality. Natural lighting and ventilation increase the indoor air quality of a building by allowing fresh air to circulate throughout a space and diffused daylight to illuminate spaces less harshly than artificial lighting.

#### **4.6 Materials**

Choosing materials is more than deciding what has the lowest first cost or is the most aesthetically pleasing. Rather, the lifecycle of a material has long term affects on the building, its inhabitants, and the environment. Therefore, materials should be carefully chosen based on the extraction of the raw materials used to make the product, its manufacture, and the distribution of the product. It is also important to think of a material in terms of a "cradle to cradle" system—considering where it came from and where it will end up. Choosing materials that can return to the same system of extraction, manufacture and transport that it came from is recommended over materials that will ultimately end up in a landfill. Using regional materials or reusing existing material can significantly reduce energy consumption and total costs used for production and transportation of building materials. Purchasing materials of high recycled content increases the market for recycled materials and subsequently decreases the cumulative demand for raw goods.

#### **4.7 Waste**

An effective waste management policy is necessary in sustainable building. Controlling waste production during construction is crucial because this is usually when the most waste is created by a building during its lifetime. Designing a building in modules based on the building material's standard manufacturing size can reduce the amount of material waste during construction. Prefabricating building components can also reduce the amount of waste produced on site. Working with waste management companies that have a strong commitment to sustainable waste management practices assures that as much material waste is diverted from the landfill as possible. Waste reduction practices by occupants can be incorporated into the building's design by designating specific places for waste receptacles and convenient areas for

solid waste separation. All projects must use waste tracking systems during construction to measure waste production and reduction.

#### **4.8 Education**

Per the Board of Regents' Sustainability and Energy Efficiency policy, "The University shall promote educational and outreach activities that are linked to operational improvements and innovation principles." As a publicly supported institution, the University of Minnesota has a responsibility to continuously educate the University community, as well as the public, on how to incorporate sustainability into everyday life, including the design and construction of our built environment. Each project is an opportunity for education and outreach, and through these projects, users and visitors gain a greater understanding of how to incorporate sustainable elements into their own daily lives. The University is in a unique position to advance the knowledge of innovative sustainable design and sustainable living in to the public sphere.

#### **End of Sustainable Design Standards**