

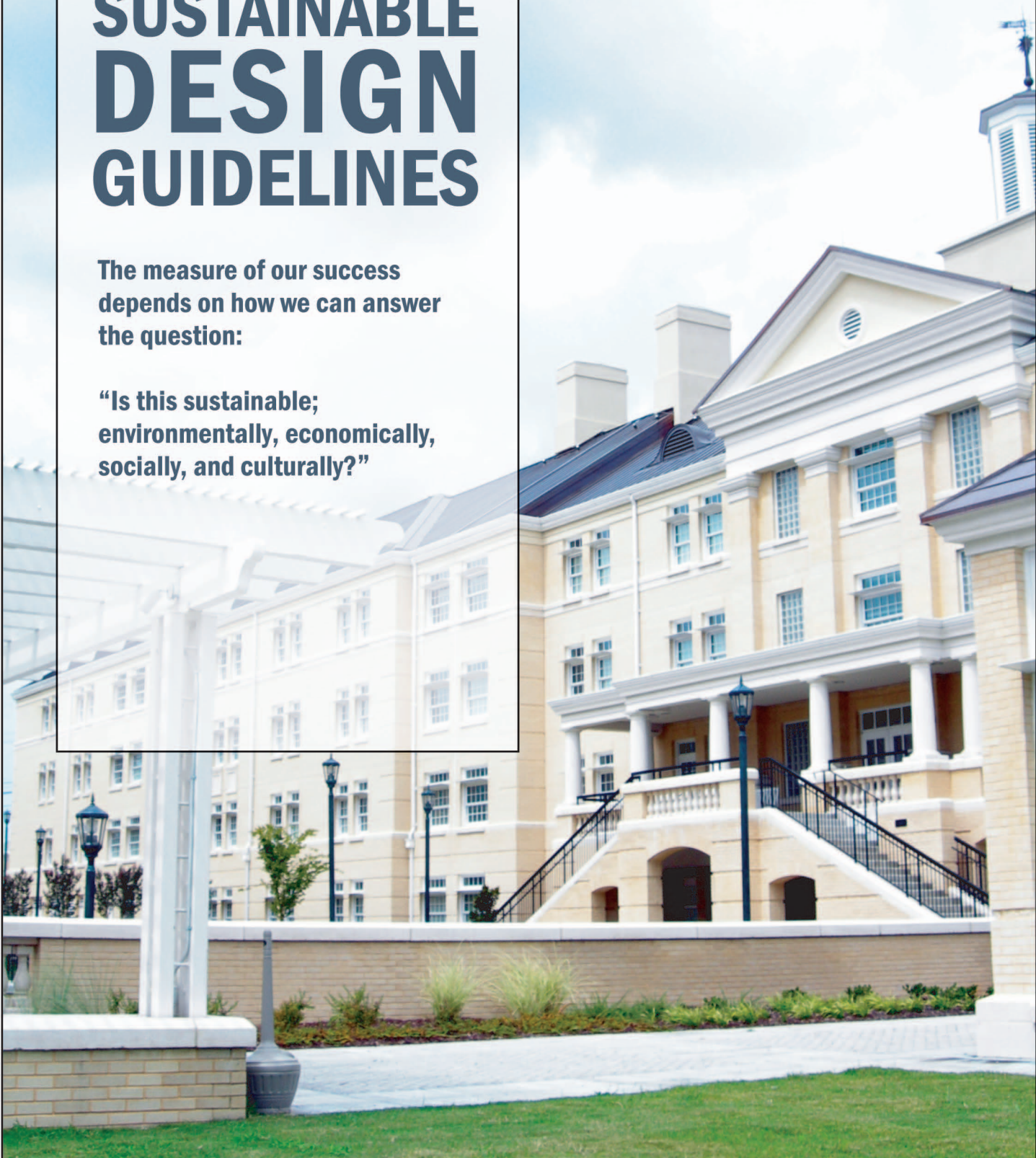


UNIVERSITY OF
SOUTH CAROLINA

SUSTAINABLE DESIGN GUIDELINES

**The measure of our success
depends on how we can answer
the question:**

**“Is this sustainable;
environmentally, economically,
socially, and culturally?”**



RECOGNITION

Many parts of this document were drawn from existing Sustainable Design Guidelines from the following institutions:

University of Cincinnati - Process Guide; Applying Sustainability to UC Projects

University of Connecticut - Campus Sustainable Design Guidelines

Stanford University - Guidelines for Sustainable Buildings

University of Minnesota - Sustainable Design Guide

City of New York - High Performance Building Guidelines

Special thanks to members of the South Carolina Chapter of the USGBC.



INTRODUCTION

The University of South Carolina community is committed that as the state flagship research university it has the responsibility to in the state. Our practice of sustainable development is planning for tomorrow by implementing our mission today while providing leadership to South Carolina and the nation. By doing so, USC models practices that reduce pollution and environmental impacts while enhancing our fiscal responsibility and stewardship for the future. By applying sustainable design practices we create enhanced and healthier living, learning and working environments. The University of South Carolina is proud to be a model for promoting and implementing sustainable practices for the state. While business works to implement sustainability, at Carolina 'Sustainability is the way we do business.'

Through promotion of integrated design practices, partnership development and a whole-building approach the University practices good stewardship and makes sound financial and environmental decisions. The goals established in The Guidelines will support our existing commitment to achieving the economic, health and environmental benefits of green buildings.

These guidelines demonstrate the University's commitment to plan and develop high-quality, long term facilities that support the mission of the University while reinforcing our commitment to current and future resource stewardship. The Guidelines provide a tool to assist decision makers, designers and contractors as they incorporate sustainability into all future construction and renovations on campus. The Guidelines insure that sustainability be considered a priority in all decisions on the front end of project consideration and design.

The Guidelines are considered a living document and will be continually updated to address new requirements and experience from each project to which they are applied. The document has three sections:

- 1** Process Guidelines to assist in applying Sustainability and LEED on campus. They explain the implementation of the University's approach to each project phase;
- 2** Technical Guidelines summarize specific goals to be considered and/or implemented in every project and strategies to reach the goals and;
- 3** Additional Resources and references to support sustainable design and construction on the USC campuses.

The University is committed to pursuing LEED goals in all projects. All projects are expected to apply the sustainable guidelines to the greatest extent possible, although not all efforts may be able to achieve LEED certification.

These specific construction and renovation guidelines follow from USC's broader leadership goals for Sustainable Buildings.



SUSTAINABLE BUILDING DESIGN GOALS

- Designate sustainability as a priority for all projects and practices.
- Create buildings and sites that improve the comfort, health, well-being and learning efforts of occupants.
- Increase expectations of facility performance among all project participants.
- Ensure capital design and construction practices result in sound long-term investments that make wise economic and environmental sense.
- Practice good stewardship in use of natural resources and taxpayer money.
- Develop partnerships in the design and construction process as well as the community around environmental and economic goals.
- Save money through utility and material efficiency, reduced maintenance costs and longer life spans.
- Design long term buildings with improved performance that may be operated and maintained within existing resources.
- Stimulate markets, partnerships and efforts of sustainability as well as sustainable products and technology in South Carolina.
- Ability to measure and verify efforts and performance of projects.
- Integrate sustainable practices into the mainstream by serving as a leader and an example.
- Promotion of projects to encourage others to implement sustainable design and educate the community.



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SECTION 1

PROCESS GUIDELINES

Guidelines for University Team

The University of South Carolina (University) requires project teams to evaluate all projects' sustainability potential by evaluating:

Applicability : Project teams will identify and pursue all sustainable design strategies that are feasible within the project's scope. Certification under the LEED rating system is a minimum requirement for all new and major construction projects as well as major renovations.

Affordability : The project team must choose those sustainable design measures that can be delivered within the established budget. The building owner with the assistance of the Environmental Programs Manager (EPM) and Campus Construction Services will make the final decision on recommended sustainable design strategies that affect cost, schedule, or program. The owner will include the end user representative and/or the department that is financially paying for the work.

Renovations and small projects may not be able to achieve LEED certification due to their scope and budget. Although they may not be able to pursue certification they are still be required to incorporate sustainable design principles wherever possible including meeting all required goals identified in Section 2 of these guidelines. The EPM will work with the owner and the Project Manager to identify applicable and affordable goals for each of these projects.

Programming

Each project should include Sustainability in the Program Statement as a fundamental design principle for each project. The policy outlined in this guideline should be referenced under project criteria in the program statement.

The EPM after discussions with the owner and the Project Manager will suggest one of the following courses for each project:

- 1 The project should pursue LEED certification and follow the registration process. This decision needs to be made early as it will influence the selection process for the Architect/Engineer.
- 2 Certification under LEED is not considered practical, but the project team should complete the LEED scorecard, follow LEED strategies and update it at each design phase submittal and at the end of the project.
- 3 Certification under LEED is not considered practical for the project; however the project is still expected to apply sustainability goals and practice to the maximum extent possible.

SECTION 1 - PROCESS GUIDELINES

PROGRAMMING

Budget Considerations

Though additional design time or costs may be required for some projects, sustainable design is considered normal practice by the department and not an added component with the exception of items listed in the Budgeting for Design section below.

Sustainable materials, services and design are becoming more affordable and competitive. The University encourages this trend through its implementation of sustainable design and use of LEED and will continue to assess the market to determine what it considers to be within normal fees or added scope and when to revise strategies. The University may decide to complete many of the steps identified in these guidelines with in-house personnel to reduce costs/fees and/or improve efficiencies.

Sustainable design strategies that provide a fast or short payback period will be utilized whenever possible but strategies that offer long term benefits will be considered. In such cases additional information, such as Life Cycle Analysis (LCA), may be required from the A/E to make decisions.

Budgeting for Design

- Include LEED registration and certification fees as well as costs for preparing documentation.
- Recognize that more design time may be required in the early design phases.
- Identify daylighting studies, energy modeling or LCA that may require excess time.
- Include fundamental Building Systems Commissioning costs (if additional commissioning not included in project)
- Identify areas such as documentation, registration, submittal and charrettes that the University may or can be responsible for to reduce costs. This may be done by presenting any additional fees in a line item format.

Special projects may be identified to reach for higher levels of LEED certification or to implement specific sustainable design strategies in support of the building's program or mission of the University. These projects and the source of additional funding should be identified early. Sustainable features in projects requiring additional funding will benefit from a LCA from the design team that will assist the University in their decision. Otherwise all projects will be expected to achieve sustainable goals, including LEED certification if required within the identified budget. Sustainability and Green Design will not be viewed as an extra that may be deleted during the design of any project. Sustainable Design is viewed as standard business practice for the University.

Education

The University is committed to promoting the education of the entire project community and will work to share experience and knowledge with project teams and contractors. The A/E will be expected to provide leadership and assistance in the education of contractors and subcontractors including their roles and responsibilities and how to ensure specific credits are achieved.

SECTION 1 - PROCESS GUIDELINES

PROGRAMMING

A/E Selection

Sustainable design should have a major influence in the selection of A/E services for all projects.

In a continual effort to promote sustainable buildings all projects pursuing LEED will require A/E firms to have LEED Accredited professionals as their representatives to the project. Additionally, all major disciplines on the design team will have LEED accredited professionals in their firm prior to design. Requests will be made for firms that have completed LEED certified projects. To encourage competition and promotion of LEED, firms that have not completed LEED projects will be considered if their qualifications statement demonstrates that their practice gives strong emphasis to sustainable design.

For projects not pursuing LEED, A/E firms do not need to meet the above selection criteria but must be interested in developing their knowledge and experience in sustainable design. They are expected to follow the guidelines of this document. The University will readily share its experience educate committed design teams throughout the process. But it does not intend to pay for the education, extra time, or outside consultants of design teams that lack experience.

Steps in Procuring/Selecting A/E Services

- Sustainable Design criteria must be a selection criteria for all LEED projects and major projects.
- The University will consider the firms experience/qualification in the area of sustainable building design when making its selection.
- Emphasize sustainability in Request for Professional Design Services, including reference to this document.
- Highlight that a collaborative/integrated design process is expected.
- Instruct respondents to address sustainable design in their selection interviews including how they will integrate sustainable design goals into their work if awarded the contract. A/E firms should include a statement of their design philosophy.
- Demonstrate proven record of delivering projects on time and on budget.
- Include sustainable design questions in A/E interviews (Sample questions are attached in Appendix A: Interviewing A/E candidates).
- Place a sustainability or environmental chair on selection committee for major projects.
- Describe the scope of sustainable design effort in contracts.
- Additional fees for Sustainable Design and LEED related aspects should be identified and broken out by line item. (This will allow USC to choose elements which may be conducted in-house.)
- Upon selection of an A/E firm, sustainable design requirements shall be included in the contract, including any specific deliverables related to sustainable design for each phase. (e.g. AIA B214 2004 LEED Services Document, incorporated into the owner-architect agreement (typical B141).

SECTION 1 - PROCESS GUIDELINES

THE DESIGN PHASES

The Design Phases

Each of the sustainable design steps, outputs or deliverables outlined in the Table 1 below are applicable to LEED pursuing projects. Projects not pursuing LEED certification should follow the modified design steps in order to incorporate sustainability to the greatest extent possible. (The requirements listed relate only to sustainable design requirements and are not all-inclusive submittal lists for each design phase nor do they supplant traditional or legal requirements for University projects.)

LEED Projects

1

PREDESIGN:

- Conduct sustainable design kickoff meeting
- Provide LEED registration data to Environmental Programs Manager
- Develop, update and obtain approval for pre-design deliverables
- Initiate commissioning activities

2

SCHEMATIC DESIGN:

- Conduct and/or coordinate design charette(s) plus additional LEED charette(s) is needed.
- Develop, update and obtain approval for schematic design and LEED deliverables
- Submit preliminary LEED scorecard to Environmental Programs Manager

3

DESIGN DEVELOPMENT:

- Develop, update and obtain approval for design development and LEED deliverables

4

CONSTRUCTION DOCUMENTS:

- Develop, update, and obtain approval for construction documents and LEED deliverables

Projects Following LEED but Not Pursuing Certification

PREDESIGN:

- Conduct project kickoff meeting and discuss sustainability opportunities.

SCHEMATIC DESIGN:

- Incorporate sustainable design into design meetings
- Develop, update and obtain approval for schematic design deliverables, including updated LEED scorecard.
- Initiate commissioning activities

DESIGN DEVELOPMENT:

- Develop, update and obtain approval for schematic design deliverables, including updated LEED scorecard

CONSTRUCTION DOCUMENTS:

- Develop, update and obtain approval for schematic design deliverables, including updated LEED scorecard

SECTION 1 - PROCESS GUIDELINES

THE DESIGN PHASES

5

OUTPUTS OR DELIVERABLES:

- LEED initial registration data (at schematic design).
- Applicable life-cycle assessments (LCA) updated at each phase
- Design documents for each phase
- LEED scorecard, tracking sheets and letter templates updated at each phase plus supporting documentation
- Commissioning Plan

OUTPUTS OR DELIVERABLES:

- Design documents for each phase
- LCA for each phase (only if specifically required by USC)
- Updated LEED scorecard for each phase
- Commissioning

PREDESIGN ACTIVITIES

Sustainable Design Kickoff Meeting

Prior to schematic design, the A/E and/or Project Manager will schedule and organize a sustainable design kickoff meeting with the assistance of the Environmental Programs Manager. Participants shall include, at least, the following:

- All design consultants and team members
- Engineering consultants for each discipline
- Environmental Programs Manager
- University Construction Project Manager
- Outside Project Management Company, if applicable
- Commissioning Agent, if in place
- Owner's Representatives
- Additional University representatives or outside partners as identified by Housing
- For some projects, the University may request that outside individuals be invited to contribute knowledge and gain exposure to the LEED process. This may include representatives of state agencies and utility companies, manufacturers, additional University personnel and graduate students. The number will be limited to keep the group at a working number.

Perform a climate/site analysis to identify summer and winter winds and wind speed, annual rainfall, site slopes, sun path, existing site habitats, stormwater conditions and patterns and other relevant site features. How the site and project fit into the overall campus design, function and infrastructure should also be considered.

The kickoff meeting will identify sustainable design goals and any additional requirements to be included in the project. The meeting will accomplish the following:

- Provide participants with an understanding of sustainable design and LEED
- Reinforce the University's commitment to sustainable design and LEED
- Develop an initial plan for the integrated design process
- Assist owner in formulation of design intent/basis of design (required for fundamental building systems commissioning).
- Establish project team consensus on the project's design goals and expectations
- Identify initial project strategies for attaining goals as well as additional requirements for meeting those goals
- Conduct the LEED credit review and determine which credits will be pursued
- Introduce the project's commissioning agent who will plan and oversee the commissioning process

For projects where LEED certification is not being sought and are not required to follow the LEED requirements, the EPM, Owner and University Project Manager will determine specific requirements for the A/E prior to a contract.

SECTION 1 - PROCESS GUIDELINES

THE DESIGN PHASES

Initiating the Commissioning Process

The commissioning process should begin prior to schematic design by determining the LEED commissioning requirements as well as any requirements by the University for additional commissioning. (The University expects the commissioning process to begin prior to design to maximize the input and benefit.) The Commissioning Agent (CA) is expected to participate in the design process.

The A/E, Project Manager and EPM will discuss commissioning requirements and responsibilities for securing the CA prior to the LEED kick off and Schematic Design.

The process will be expected to continue through the first year of occupancy including the near-one-year warranty review with A/E. The CA should provide reviews during DD and throughout CD. Preference should be considered for local or regional firms with a record of participation through all levels of a project and experience with LEED projects.

Conducting the LEED Credit Point Review

The kickoff meeting includes the preliminary discussion of which LEED credits the project will pursue and attempt to attain. The discussion will review each credit and score them as Achievable, Potentially Achievable or Non-Achievable on the LEED Scorecard.

Achievable (y) - The credit involves known practices that have been implemented before and/or are standard practice.

Potentially Achievable (?) - The credit will require additional discussion by the design team and possible research or exploration of technical or financial barriers. These credits may require a LCA or other additional research.

Non-Achievable (n) - The credit is known to be unachievable due to specific factors, regional or site issues, contradictory to other preferred and obtainable credits, against policy, or proven and documented to be cost prohibitive.

Even if a credit is not believed to be achievable it should not be completely dismissed. Many of these credits may still be pursued to the fullest extent possible.

(Example: Eliminate light pollution. Security issues will always take priority so it may not be possible to eliminate light pollution while meeting security requirements. There is still potential to reduce light pollution while providing a secure environment even if the credit is not met.)

Adding the Achievable and Potentially Achievable credits will determine the potential LEED certification level. Unless otherwise identified by the University the A/E shall be responsible for maintaining the LEED Scorecard and Matrix.

LEED has several rating systems that may apply to a project and the project team is encouraged to tally a potential point total for each applicable Rating System Checklist before determining which Rating System to utilize.

SECTION 1 - PROCESS GUIDELINES

THE DESIGN PHASES

SCHEMATIC DESIGN

Sustainability is viewed as a standard part of USC projects; not an added aspect.

The University encourages incorporating sustainable design sessions into traditional and regular meetings of the design team to ensure the integrated design process continues and LEED scorecard is being updated and credits achieved. Integrating LEED into traditional meetings will save time and money, nonetheless, additional meetings may be required to address specific issues or to ensure LEED requirements and paperwork are being addressed.

The A/E may choose to hold a LEED Meeting at any phase of design after the kickoff meeting. If these meetings can not be incorporated into traditional design meetings then the LEED meetings should be held at least once during every phase of the design process. These meetings will bring the entire team together to update and review sustainable strategies. The EPM should be invited to the meetings both as a resource for the team and to ensure progress.

Schematic Design Requirements

The schematic design process is expected to produce and provide the following information to the University:

- Updated identification and impact of programming on design and cost
- Analysis of potential sites identified in the pre-design phase if applicable
- Building Orientation and Shading: Presentation of how the buildings and the outdoor uses relate to each other and the site; include how solar orientation/exposure is addressed; demonstrate how prevailing winds relate to buildings and open space. Explanation of potential impacts and benefits.
- Energy Use: Initial energy modeling results of proposed building(s) to an established baseline. Include description of proposed systems to be utilized, if required.
- Updated LEED Score card
- Updated LEED Tracking Sheet (Matrix): Upon registration of the project, the EPM will make the tracking sheet available to the A/E for sharing among project team members. The tracking sheet facilitates tracking details of the credits being pursued on the LEED score card. It also includes credit assignment by team member(s), design strategy, status, and performance criteria.
- Any completed LEED Letter Templates: Upon registration the Letter Template Workbook will be available to all team members. It is an Excel document including calculations that may be shared among team members to collect and present the information needed to complete certification submittals of each point. These are required by the USGBC.
- Updated Life Cycle Assessments: All life cycle costs of materials or systems should be reported in a format that allows easy comparison between options. Assessments should include any options put forward by the University or the design team, including concepts generated during the kickoff charrette. The format must include the cost of each option and be break down total cost into the following elements:
 - Initial investment (product and installation cost)
 - Ongoing operation (including energy use and fuel costs)
 - Annual maintenance and repair
 - Replacement cost at end of system or material's intended life
 - Financial incentives available (if any)
 - Disposal cost at end of system or material's life
 - Life expectancy of system or material
 - Total life-cycle cost (based on 50-year study period) *
 - Identify most efficient and economical system
 - Additional benefits of system/material
 - Alternatives

* Utilize ASTM (1994): Standard Practice for Measuring Life Cycle Costs of Buildings and Building Systems. ASTM Designation E 917-99, American Society for Testing and Materials (ASTM), West Conshohocken, PA or other approved method.

SECTION 1 - PROCESS GUIDELINES

THE DESIGN PHASES

DESIGN DEVELOPMENT

Design Development Requirements

During Design Development updated versions of the following will be required:

- Updated identification and impact of programming on design and cost
- Building Orientation and Shading
- Updated Energy Use
- Updated LEED Score card
- Updated LEED Tracking Sheet (Matrix)
- Completed LEED Letter templates & documentation
- Updated Life Cycle Assessments
- For projects seeking LEED certification provide a statement and supporting data indicating that the design has met sustainable design goals for the project. This statement should be prepared according to LEED guidance and standards.

Demonstration of how Design addresses the following:

- Reduction of Water Pollution and Erosion
- Site Grading and Drainage Plans
- Building Orientation and Shading
- Energy Efficient Artificial and Natural Lighting
- Commissioning Plan, provide copy
- Collection/Storage of Construction Waste & Recyclables
- Global Warming and Protecting the Ozone Layer
- Building design that promotes Occupant Recycling
- Chemical Storage, Use and Disposal
- Air Monitoring
- Hazardous Materials Abatement and Disposal - for renovation projects if applicable
- Building Design that Supports Custodial and Maintenance Use/Needs
- Ability to track utility consumption once occupied

SECTION 1 - PROCESS GUIDELINES

THE DESIGN PHASES

CONSTRUCTION DOCUMENTS

Construction Document Requirements

Provide the following at 50% CD:

- Updated Energy Use
- Updated LEED Score card
- Updated LEED Tracking Sheet (Matrix)
- Completed LEED Letter templates & documentation
- Life Cycle Assessments
- Updated Site Grading and Drainage Plans
- Energy Efficient Artificial and Natural Lighting if changes
- Collection/Storage of Construction Waste & Recyclables (including any demolition of existing structures on site work)
- Updated Air Monitoring
- Hazardous Materials Abatement and Disposal - if applicable
- Plan for communication and construction oversight of sustainable aspects, LEED requirements and
- Commissioning required during construction
- Identify parties responsible for monitoring sustainable design objectives during construction
- Letter stating no changes have been made to specific categories

Bid Requirements For General Contractor

- Request documentation demonstrating experience with sustainable construction practices and any
- LEED projects in the qualification requirements.
- Refer contractor to these guidelines.
- Be clear of additional requirements expected of the contractor (e.g. which credits and supporting documentation will the contractor be expected to provide). **Placing all or a high percentage of the documentation and paperwork requirements on the contractor may reduce the number of bids and increase bid prices. This approach is not encouraged by the University.**
- Include LEED aspects in notes section of drawings
- One LEED Accredited professional on staff for all LEED seeking projects
- No Smoking in enclosed buildings or finished spaces

SECTION 1 - PROCESS GUIDELINES

Construction

The construction phase of the project requires clear and consistent communication between the A/E, owner and contractor to ensure the design and guidelines are being met. It is essential that the A/E discuss the sustainability goals, features and LEED requirements with the contractor to ensure quality. The University encourages large projects seeking LEED certification have a LEED Accredited professional on staff as a bid requirement.

PROJECTS SEEKING CERTIFICATION

- Prepare for commissioning activities
- Monitor construction and communicate sustainable objectives
- Contractor plans for Erosion &
- Sedimentation Controls, Construction Waste Management and Indoor Air Quality
- Submit Contractor & A/E submittals monthly to University

PROJECTS NOT SEEKING CERTIFICATION

- Prepare for commissioning activities if relevant
- Monitor construction and communicate sustainable objectives

Pre-Construction meeting

This meeting is for the general contractor, major subcontractors, A/E, Project Manager and EPM to discuss the sustainability goals and design features of the project. Opinions and ideas from the contractors will be encouraged to find efficiencies and innovations.

This meeting should serve to:

- Review the contractors requirements related to LEED, including development or implementation of specific plans.
- Verify the required considerations for implementing specific strategies and credits are commonly understood.
- Verify all material substitutions meet project goals and University requirements.
- Establish timeframe for the contractor to submit an Erosion & Sedimentation Control Plan, Indoor Air Quality Management Plan, and Construction Waste Management Plan prior to construction. The A/E will provide the contractor a template or assist in creation of Waste Management and IAQ Management Plans. The A/E will provide final versions to the EPM.
- Identify training needs required by contractor. The A/E will work with the EPM on how the A/E will address these needs.

If appropriate, this meeting may be combined with the commissioning meeting listed next to reduce time and commitments associated with meetings.

SECTION 1 - PROCESS GUIDELINES

CONSTRUCTION

Preparing for Commissioning

As required by the commissioning plan organize a meeting between the commissioning agent, contractor and relevant sub-contractors to review the commissioning requirements and schedule prior to construction. Educate the contractor on role/responsibility in implementing Commissioning and Erosion and Sedimentation Control Plans.

LEED Paperwork Submittals - The EPM will maintain and submit all required information for LEED certification to the USGBC. Paperwork is to be submitted with monthly pay applications to the USC Project Manager for final delivery to the EPM. Contractor submittals should be delivered to the A/E with monthly pay applications then follow the procedure above.

Construction Oversight

There should be ongoing communication and monitoring for sustainable design objectives including adherence to submitted plans for Indoor Air Quality, Construction Waste Management, and Erosion and Sedimentation Controls.

Photographic Record - The A/E is responsible for coordinating and maintaining photographs throughout all phases of the project to document any relevant credits (e.g. construction air quality) and to provide materials for educational and promotional use by USC.

Credit Interpretation Rulings (CIRs) - As the number of free CIRs is limited by the USGBC, judicious use of the CIRs is required. Prior to submitting a CIR the A/E should review past CIRs on the USGBC website as well as discuss the potential CIR with project team and owner. The A/E will document the CIR desired with all relevant information and the EPM will submit the CIR to the USGBC.

Project Meetings

Construction project meetings should meet weekly and the A/E is required to inform the EPM of these meetings so a representative can be present. Executive Meetings shall be held regularly to update the owner.

Training

Prior to construction the University should be made aware of any specific training requirements needed by contractors and how this training will be addressed. The A/E will provide assistance in addressing these requirements if needed, and the University may be able to assist. Training may be needed to address credits related to erosion and sedimentation control, construction waste management and construction air quality.

Assembling the LEED Certification Submittal

- The EPM will be responsible for maintaining and submitting the LEED certification.
- The A/E is expected to provide all required and any additional information needed by the EPM to ensure the application is complete.
- Continually update LEED documentation prepared throughout the project.
- The EPM will prepare submittals in number and format as required by the USGBC, to include:
 - Complete LEED application
 - LEED Project Scorecard
 - LEED Tracking Sheet
 - Completed LEED Letter Template for each prerequisite and credit sought and supporting documentation
- The University will require one hard copy and one electronic copy of all submittals. Submittals to the University should also include all supporting information assembled to support the initial LEED submittal.
- Projects not pursuing LEED certification will require information submitted directly to the University.

SECTION 1 - PROCESS GUIDELINES

Turnover and Closeout

STEPS

PROJECTS SEEKING CERTIFICATION

- o Deliver LEED Certification submittal to USGBC
- o Respond to USGBC review comments and questions promptly
- o Finalize commissioning activities
- o Conduct Post Occupancy Evaluation/Walk Thru

PROJECTS NOT SEEKING CERTIFICATION

- o Finalize commissioning activities
- o Conduct Post Occupancy Evaluation/Walk Thru
- o Update LEED Scorecard

OUTPUTS OR DELIVERABLES

- o LEED Certification Submittal
- o Commissioning Report
- o LEED Certification
- o Training on sustainable features

- o Commissioning Report
- o Training on sustainable features
- o Final LEED scorecard

Training

Even though the commissioning process will be responsible for training of the owner's personnel, the University expects training to take place prior to occupancy. Beyond training of traditional building systems, the program will include training on all sustainable features and how the building is supposed to operate, including any user-influenced control strategies. The University may wish to videotape all instructional sessions.

Delivering LEED Certification Submittal

- o The EPM will review with the A/E prior to submittal
- o The EPM include Certification Fee
- o The A/E and/or Project Manager will include Commissioning Report if Completed (if not utilize commissioning template and commissioning plan for the submittal and promptly provide final report to EPM upon completion).

Responding to USGBC Reviews

Upon submittal of the LEED application to the USGBC the EPM will coordinate with the A/E to respond to comments made by the USGBC during the Administrative Review and the Technical Review.

Administrative Review - Upon receipt of the application the USGBC will perform a review to ensure the application is complete and meets all submission requirements. The USGBC will notify the EPM of any deficiencies. The A/E is responsible for working with the EPM to address the deficiencies promptly. Once all deficiencies are addressed, the USGBC will proceed with the technical review.

Technical Review - Upon completion of the Administrative review, the USGBC will conduct the Technical Review and issue a preliminary report stating which credits have been met, which credits have been denied, and which credits are pending. Several credits may be selected for audit that will require further documentation to demonstrate the credit has been met. This report will come electronically and a copy must be provided to the Environmental Programs Manager immediately.

SECTION 1 - PROCESS GUIDELINES

TURNOVER AND CLOSEOUT

Upon receipt of preliminary report the EPM will contact the A/E with the list of deficiencies. **Within 14 days** of receiving the preliminary report the A/E must submit all required information needed to address the concerns of the Technical Review Report to the EPM. The EPM must provide the response to the USGBC **within 30 days** upon receipt of the preliminary report.

Certification - Upon notice of certification by the USGBC the certification date and level certified will be provided to the A/E and Project Manager by the EPM. Certification of the project is expected **within 3 months** of occupancy.

SECTION 2

TECHNICAL GUIDELINES

Design Objectives

The following technical guidelines establish the specific objectives of sustainable building design for the campus. The five categories follow the primary areas addressed in LEED. Each category presents specific goals to be considered followed by a list of strategies to reach the goals. Many other strategies are suggestions to be considered in addressing design where several are marked as REQUIRED and must be implemented in every project. The required strategies are part of standard campus practice in support of the overall goal of providing healthy facilities that promote learning while being energy and financially efficient and minimizing the impact on the environment.

Many of the sustainable design strategies relate to more than one category therefore the categories and strategies are interdependent. The integrated design approach encourages design teams to work together in developing systems that consider the whole building and all sustainability categories. This will allow members to see the impact of their decisions on the overall performance of the building. The list of strategies is not exhaustive nor can every strategy be implemented; however, it is to serve as a guide to the design team to ensure all areas are addressed.

SELECTING SUSTAINABLE SITES

Goal 1

Plan development on the most environmentally appropriate site possible that minimizes impact and preserves open space and natural resources.

Strategies

- Avoid flood plains - REQUIRED
- Preserve and protect wetlands - REQUIRED
- Protect habitats of threatened or endangered species - REQUIRED
- ENCOURAGE use of previously developed land and/or Brownfield sites when possible
- Preserve mature trees wherever possible

Goal 2

Minimize Impact by integrating building and site design into the overall campus master plan in a way that enhances the biodiversity, ecology and culture of the campus.

Strategies

- Consult the campus arborist prior to altering any tree or performing work near trees - REQUIRED
- Promote traffic patterns and areas that encourage pedestrian and bicyclist traffic - REQUIRED
- Address how the building will be accessed for future service -REQUIRED
- Design the site and landscape to establish contiguous networks with other natural systems within and beyond the site
- Avoid major alterations to topography, vegetation, and wildlife habitat
- Minimize the area of the site dedicated to the building, parking and access roads
- Site the building to create traffic patterns (vehicular, pedestrian and cyclist) that are integrated into the campus and cause minimum disruptions.
- Reduce the impact of automobiles and roadways by considering options that utilize and promote use of alternative fuel vehicles and mass transit.

SECTION 2 - TECHNICAL GUIDELINES

SELECTING SUSTAINABLE SITES

Goal **3**

Avoid designing structures and sites that create adverse microclimates.

Strategies

- Reduce heat island effect of non-roof areas through use of light-colored/high-albedo materials, providing shade, and/or use of open-grid pavement - REQUIRED
- Design site lighting that prevents or at least minimizes light pollution while meeting lighting and security needs. Take into consideration lighting from inside the building and off site that may migrate onto lighting design areas - REQUIRED
- Utilize landscape to complement heating and cooling of the building.
- Orient buildings and site features to take advantage of solar orientation and prevailing winds.
- Reduce heat island effect of roofing through use of Energy Star compliant surfaces and/or turf roofs
- Utilize shading and building placement to design useable outdoor spaces
- Promote natural ventilation of outdoor and indoor spaces while avoiding wind tunnels.

SECTION 2 - TECHNICAL GUIDELINES

WATER CONSERVATION AND MANAGEMENT

WATER CONSERVATION AND MANAGEMENT

Goal 1

Limit disruption of natural water flows by reducing stormwater runoff.

Strategies

- Prevent any increase in the rate of stormwater flow leaving the site. Maximize infiltration of stormwater runoff on site. REQUIRED
- Utilize permeable surfaces as much as possible. REQUIRED
- Collect rainwater for reuse or slow release.
- Design an overall stormwater management plan for the site to include high absorption landscape areas, use of swales and bio-retention, areas and reduction of associated utilities and detention basins.
- Consider on-site stormwater treatment and infiltration.

Goal 2

Reduce the use of potable water for irrigation needs.

Strategies

- Integrate these strategies with stormwater design - REQUIRED
- Do not over design landscape
- Select drought resistant plants, native vegetation and climate-adapted vegetation
- Utilize efficient systems that utilize drip irrigation, moisture sensors and/or timers
- Consider use of gray water

Goal 3

Reduce potable water use and impact of storm water.

Strategies

- Use of gray water for waste conveyance or possible irrigation
- Use of storm water for waste conveyance or irrigation
- Use of harvested rainwater for waste conveyance or irrigation

Goal 4

Design systems that reduce building water use to exceed the requirements of the Energy Policy Act of 1992. - REQUIRED

Strategies

- Automated controls in public spaces- REQUIRED
- Low flow toilets with a siphon jet - REQUIRED
- Low flow faucets and showerheads (2.2 GPM) - REQUIRED
- All appliances must be Energy Star Rated - REQUIRED
- Dual flush toilets have been proven effective in women's restrooms.
- Low flow urinals such as waterless urinals or 0.5 gallons per flush urinals
- Flow restrictors on lavatory faucets with a maximum 0.5 GPM

SECTION 2 - TECHNICAL GUIDELINES

ENERGY EFFICIENCY

ENERGY EFFICIENCY

Goal **1**

Reduce total building energy consumption.

Strategies

1. REDUCE LOADS

- Optimize Building Envelope Thermal Performance
- Select size openings, select glazing and utilize shading devices to optimize daylighting and glare control while minimizing heat loss/gain.
- Optimize insulation
- Incorporate thermal mass where appropriate
- Ensure envelope provides thermal comfort and prevents condensation.

Provide Daylighting Integrated with Electric Lighting Controls

Through integrated design ensure daylighting is coordinated with electric lighting to reduce energy consumption while maintaining required lighting.

- Utilize occupancy sensors (REQUIRED for many common spaces such as classrooms, restrooms as well as vending machines).
- Design site plan and building orientation with appropriate strategies to maximize the amount of useful, controlled daylight in occupied spaces
- Use shading devices to allow natural light in and reduce glare and overheating
- Utilize light shelves and reflective ceilings/paints to encourage deeper penetration of natural light.
- Select clear films or selective low-e glazing to increase daylighting and minimize heat gain. Examine each side and orientation of the building separately for selecting appropriate materials.
- Use photo cell dimming sensors to adjust lighting in response to daylight available.
- Provide operable windows

2. DESIGN EFFICIENT SYSTEMS

Provide Efficient Electric Lighting Systems and Controls

Design lighting systems to minimize electric consumption and waste while still meeting programming and quality requirements.

- Use high efficiency lamps and luminaires with electronic ballasts - REQUIRED
- Utilize low levels of ambient lighting and task lighting where appropriate
- Standardize and limit the number and variety of lights to minimize maintenance and inventory

Maximize Mechanical System Performance

Design the building HVAC system to work with the overall building design, envelope, daylighting and use to minimize energy use while maintaining standards for indoor air quality and occupant comfort.

- Use zero CFC-based refrigerants in HVAC and refrigeration equipment. REQUIRED
- Group similar building functions into the same control zone
- If not on the campus system, design with high efficiency equipment.
- Modulate outside air according to occupancy and activities through use of occupancy sensors and variable air volume systems.
- Use heat recovery systems.
- Utilize air economizers

SECTION 2 - TECHNICAL GUIDELINES

ENERGY EFFICIENCY

Use Efficient Equipment and Appliances

- All appliances must be Energy Star Rated - REQUIRED
- Select new equipment including transformers that meet Energy Star if available - REQUIRED

Improve and Verify Building Performance

- Utilize Commissioning - REQUIRED for all LEED projects
- Utilize energy modeling and analysis
- Integrate measurement and verification into existing Building Management System when feasible

Goal **2**

Eliminate the use of ozone-depleting substances.

Strategies

- Require zero CFC's or HCFC's in HVAC and for all refrigerants for new buildings - REQUIRED
- Do not utilize Halons in fire suppression systems for new buildings.
- Phase out CFC and HCFC's in existing buildings.

Goal **3**

Use Renewable or Alternative Energy Sources.

Strategies

- Evaluate use of passive solar design for hot water heating. This is REQUIRED for residence hall projects and should be addressed during budgeting to determine feasibility.
- Evaluate possibilities for use of photovoltaic panels, fuel cells or other options.
- Consider buying green power.

SECTION 2 - TECHNICAL GUIDELINES

CONSERVING MATERIALS AND RESOURCES

CONSERVING MATERIALS AND RESOURCES, MINIMIZING WASTE

Goal 1

Reduce waste associated with construction and demolition activities by diverting materials from landfills for reuse or recycling.

Strategies

- Incorporate a construction waste management plan to divert waste from landfills. Seek 75% or greater. - REQUIRED
- Salvage, Reuse and/or Recycle existing structures and site materials. This includes all furniture, concrete, brick, metal, fixtures, trees, soil, etc. Even if site work is not included as part of a LEED project, a 50% minimum must be met and 75% or greater sought. - REQUIRED
- Consider reuse of buildings whenever possible.
- Utilize durable materials to extend life of the building. Support with LCA if needed.
- Plan for future growth and expansion.
- Utilize flex design and flexible spaces.
- Specify materials from companies that incorporate reclamation programs such as ceiling tiles and carpet.
- Utilize materials that may be recycled. Avoid composite materials.

Goal 2

Evaluate and utilize materials that minimize environmental impacts.

Strategies

- Require 20 % minimum of materials to be manufactured within a 500 mile radius - REQUIRED
- Require 10 % of raw materials for manufactured materials to be harvested within a 500 mile radius.
- Specify materials with recycled content. To qualify materials should have 20 % post-consumer content or 20 % post-industrial content.
- Utilize salvaged materials.
- Specify renewable materials that may be replenished within a ten-year cycle.
- Avoid toxic materials or materials with environmental impacts such as VOC emissions

Goal 3

Promote the use of wood products from a sustainable source.

Strategies

- Utilize products that are certified by the Forest Stewardship Council (FSC). To achieve LEED credit, specify 50 % of all wood based materials and products for wood building components to meet FSC criteria. This includes, but not limited to, structural framing and general dimensional framing, flooring, finishes, furnishings, and non-rented temporary construction applications such as bracing, concrete form work and pedestrian barriers.

SECTION 2 - TECHNICAL GUIDELINES

INDOOR ENVIRONMENTAL QUALITY

INDOOR ENVIRONMENTAL QUALITY

Goal 1

Provide a healthy level of Indoor Air Quality.

Strategies

- Meet ASHRAE 62-1999, Ventilation for Acceptable Indoor Air Quality and approved -- Addenda using the
- Ventilation Rate Procedure. - REQUIRED
- Follow campus smoking policy banning smoking in buildings and locating smoking areas a minimum of 25 feet from entryways. - REQUIRED
- Remediation of any existing problems. - REQUIRED
- Prevent Contamination from Construction Practices including;
 - replacement of filters prior to occupancy - REQUIRED
 - two week minimum building flush out
 - protection of absorptive materials and ducts during construction - REQUIRED
 - keep moisture out of buildings/remove immediately. Replace any moisture or water damaged finishes immediately. - REQUIRED
- Utilize walk off mats in doorways.
- Address exhaust of chemical use areas such as copy rooms and custodial spaces.
- Provide for CO2 monitoring of common spaces such as classrooms.

Goal 2

Utilize Low-Emitting Materials.

Strategies

- Specify low or zero Volatile Organic Compounds (VOC) for all interior spaces to meet LEED standards. This includes paints, sealants, and adhesives. - REQUIRED
- All carpets comply with the Carpet and Rug Institute Green Label Testing Program -REQUIRED
- Specify all composite interior wood products are free from urea-formaldehyde resins. State preference for agri-board or wheat board.

Goal 3

Create healthy and comfortable spaces that promote learning.

Strategies

- Maximize daylighting for occupied spaces to meet or exceed 2 % - REQUIRED
- Provide exterior views from 75 % or more of occupied interior spaces wherever possible - REQUIRED
- Provide exterior views for 90% of occupied spaces
- Provide daylighting studies
- Provide occupant controls
- Reduce glare through shading systems
- Consider monitoring systems
- Provide operable windows

SECTION 3

APPENDIX

INTERVIEW QUESTIONS FOR A/E SELECTION

The key for design members to be successful on any sustainability project is that they are knowledgeable and supportive. If they have little experience, they must at least be open to the efforts.

If the firm has designed one or more LEED-certified buildings what types of facilities were they? What level of certification did they earn? What was the cost implication of pursuing LEED?

Has the firm designed any environmentally-responsible or sustainable facilities that did not pursue LEED?

Has the firm completed projects that comply with the requirements of any other green building system?

Does the firm have a LEED Accredited Professional on staff and available as project representative?

Does the firm have references for green building projects?

Have their LEED projects been delivered on time and on budget?

Can the firm cite examples of specific sustainable design approaches they have incorporated in other projects?

Can the firm outline how it uses an integrated process to deliver sustainable design?

Explain the philosophy on handling LEED submittals and paperwork including timeline and the amount of responsibility placed on the contractor.

Identify specific software systems utilized to accomplish LEED goals including day-lighting studies and energy analysis.

Describe in-house training/education available for your firm as well as available for project team and contractor(s).

Is sustainability a core belief/firm philosophy? If so is it integrated into all projects?

What type of specification systems are employed? (e.g. MasterSpec, other?)

Describe in-house training/education available for your firm as well as available for project team and contractor(s).

What role does the A/E take in training/educating the contractor(s)?

Explain approach to utilizing LEED on projects. Is it or what parts are seen as added scope/cost?

Describe efforts firm will make to promote project.

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RESOURCES

Building for Environmental and Economic Sustainability (BEES) for no charge at www.bfrel.nist.gov/oea/software/bees.html

State Budget & Control Board, Office of State Engineer: Manual for Planning and Execution of State Permanent Improvements

US Green Building Council www.usgbc.org

University of Minnesota Sustainable Design Guide <http://www.sustainabledesignguide.umn.edu/MSDG/guide2.html>

US DOE & USGBC Sustainable Building Technical Manual - <http://www.sustainable.doe.gov/pdf/sbt.pdf>

US DOE Charrette Guide for High Performance Projects - http://www.eere.energy.gov/buildings/highperformance/charrette_handbook.html

US DOE - Energy Efficiency and Renewable Energy - <http://www.eere.energy.gov/femp> for updated lists of high efficient equipment -

US DOE - Energy Efficiency and Renewable Energy - http://www.eere.energy.gov/femp/program/procuring_services.cfm - Guide to procuring A/E services for sustainable buildings

Green Specs from Building Green - www.buildinggreen.com

Sustainable Building Materials & Furnishing - <http://www.greensage.com>

Classroom acoustical standards, ANSI S12.60-2002 - <http://asastore.aip.org/>

Building Commissioning Association - www.bcxa.org

Portland Energy Conservation Inc - commissioning info - <http://www.peci.org/library.htm>

SC Department of Commerce Recycling Directory - <http://www.sccommerce.com/SearchRecycling.aspx>

Campus Consortium for Environmental Excellence - <http://www.c2e2.org/>

Sustainable Buildings Industry Council - <http://www.sbicouncil.org/>

Whole Building Design Guide - <http://www.wbdg.org/design/greenspec.php>

Green Flooring - www.greenfloors.com

EPA Guide to buying Green Power - <http://www.epa.gov/greenpower/buygreenpower/>

UC Berkeley - Environmental Design Library - <http://www.lib.berkeley.edu/ENVI/GreenAll.html>

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Energy Benchmark for High Performance Buildings - <http://www.poweryourdesign.com/ABbenchmark.pdf>

Stanford University' Guidelines for Sustainable Buildings
http://cpm.stanford.edu/process_new/Sustainable_Guidelines.pdf .

University of Cincinnati - Sustainable Design Guidelines <http://www.uc.edu/architect/tblcontsdes.asp>

University of Connecticut - <http://www.masterplan.uconn.edu/images/SDG.pdf>

City of New York High Performance Building Guidelines - <http://www.nyc.gov/html/ddc/html/ddcgreen/>

Carnegie Mellon University Center for Building Performance and Diagnostics - http://www.cmu.edu/greenpractices/green_initiatives/leed_buildings.html

Duke University Green Buildings - <http://www.duke.edu/sustainability/buildings.html>

Environmental Design & Construction Green Book -
http://www.edcmag.com/FILES/HTML/EDC_buyers_guide/0,5145,,00.html

Harvard Green Campus - <http://www.greencampus.harvard.edu/>

American Society of Interior Design: Sustainable Design Guide -
<http://www.asid.org/resource/Sustainable+Design+Information+Center.htm>

University of Georgia Xeriscape Guide - <http://pubs.caes.uga.edu/caespubs/pubs/PDF/B1073.pdf>

Berkeley National Labs - Window Daylighting guide -
<http://eande.lbl.gov/Search.html>