5

Sustainability

5.1. Application

The following section establishes the recommended goals and strategies, and technical references to be considered during the design and construction of projects to promote sustainable design.

1. Project applicability

Selected strategies from these guidelines shall be incorporated into the design of individual projects if the University determines that such strategies are prudent and feasible. This determination will be based on evaluation of the following:

- Environmental benefits
- Capital cost differential
- Operational cost benefits
- Implications for maintenance
- Consistency with other design guidelines
- Compatibility with the project

2. Goals

The goals, which form the foundation of the following guidelines, are based on the LEED (Leadership in Energy and Environmental Design) rating system of the U.S. Green Building Council (USGBC). It is not the intent of the University to require LEED certification for University projects but to use the LEED rating system as a benchmark to encourage and measure the sustainability of campus development.

Parallel with the LEED program, the University's sustainability goals are categorized under the following subject areas:

- Sustainable Site Planning
- Water Efficiency
- Material and Resource Conservation
- Energy Efficiency
- Indoor Environmental Quality

5.2. Sustainable Site Planning

1. Efficient Growth Pattern

Encourage infill development and use of suitable new sites to minimize extension of infrastructure and impacts of development on the natural environment.

A. *Site selection.*

- Ensure consistency with the Campus Master Plan with regard to new building sites.
- Take advantage of previously developed/disturbed areas for new development.

B. *Site improvements and disturbance.* An Erosion and Sedimentation Control Plan shall be developed indicating the strategies to be used during construction to minimize soil erosion, sedimentation into storm sewers and/or receiving streams, and minimize dust and particulate pollution.

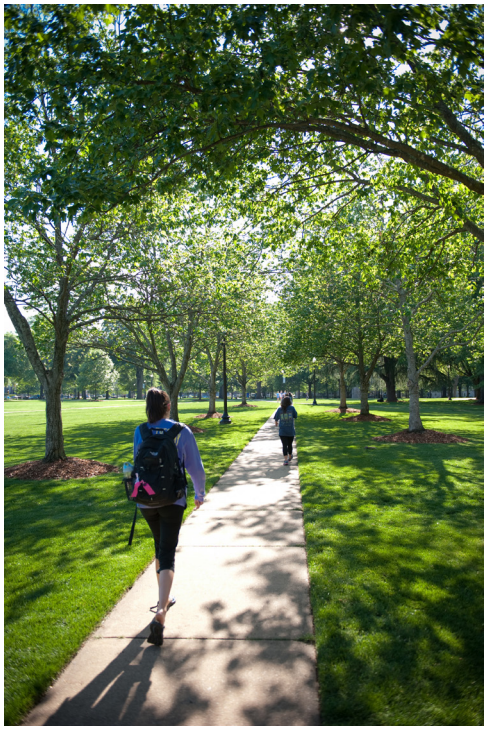
- Avoid disruption to land within 100 feet of designated wetlands. Install or retain vegetated buffers in proximity to wetlands. Strive to exceed mitigation requirements.
- Avoid development on lands less than five feet above designated 100-year floodplains. Strive to exceed mitigation requirements.
- Avoid disturbance of threatened and endangered species habitats.
- Conserve natural areas consistent with the Campus Master Plan and restore damaged natural areas.
- Establish limits of disturbance for previously undisturbed sites, including construction staging areas.
- Limit disruption of trees and vegetation in coordination with the University's Arboretum Environmental Education Program. Favor use of native or adapted plant species for low maintenance, water efficiency, and pest tolerance.
- Plan for maintenance access to avoid unnecessary disturbance.
- Where applicable, building downspouts and drainage shall be routed to underground stormwater systems to reduce erosion in landscape areas.

2. Multi-modal Accessibility

Encourage walking, bicycling, and use of campus and city transit systems.

A. *Transportation impacts of site selection.* Evaluate transportation impacts of potential sites to reduce the need for vehicular travel and maximize transit, pedestrian, and bicycle accessibility.

B. *Bicycle and pedestrian improvements.* Maintain and improve pedestrian and bicycle accessibility through new development and renovation.



3. Microclimate Impacts

Develop site features to minimize impacts to site microclimates.

A. *Avoid flat roofs.* However, where a flat roof is most appropriate, comply with EPA Energy Star® Guidelines, or consider a green roof.

B. *Use a white or light-colored roof.* Lighter colored roofs reduce the amount of heat absorbed into the interior of buildings from the sun and reduces cooling loads.

C. *Design for shade.*

- Reduce heat islands by maximizing shade with trees, trellises, and canopies.
- Where applicable, locate large paved areas on north side of buildings to allow shading by the building. Otherwise, shade parking areas up to 50% within five years.

4. Light Pollution

Minimize light pollution of the night sky and negative effects on nocturnal environments. See also §4.4.

5.3. Water Efficiency

1. Stormwater

Reduce stormwater runoff impacts on the quantity and quality of campus water resources.

A. *Minimize impervious surfaces.*

- Consider use of vegetated roofs for flat or low-sloping roofs. Use native or adapted species. See also §5.2.3.

Green roof. Photo credit: American Society of Landscape Architects.

- Consider use of permeable paving materials for drives and surface parking.

Permeable or porous pavers, Photo credit: Portland

Bureau of Environmental Sciences

B. *Site improvements.*

- Prevent stormwater flow increases leaving the site. Provide infiltration on all sites.
- Where feasible, collect rainwater and store for reuse or slow release.
- Use landscaping with high absorption.
- Reduce need for stormwater utilities and detention basins through use of bio-retention basins, swales, or rain gardens within the site or vicinity.

Bio-retention basin. Photo credit: Triangle J Council of

Governments.

2. Water Consumption

A. *Minimize outdoor water consumption.* To reduce potable water consumption in landscape irrigation, consider the following:

- Use drought tolerant planting and turf mixes.
- Where irrigation is necessary, use high-efficiency irrigation systems.
- Use native vegetation beds and meadows that require no irrigation, pesticide use, and/or mowing.
- Use non-potable sources, such as ponds and collected rainwater, for irrigation needs.

B. *Minimize indoor water consumption.* To reduce water consumption in buildings, consider the following:

- For renovation, replace plumbing fixtures to meet or exceed the Energy Policy Act of 1992 for fixture performance.
- Install low-flow, power-assisted toilets. Use dual-flushing toilets in women's restrooms.
- Use showers and faucets with flow restrictors to meet or exceed the Energy policy Act of 1992. Use infrared sensors on faucets.
- Use washing machines that comply with EPA Energy Star® Program.

3. Alternative Technologies

A. *Gray Water.* Consider gray water systems for water collection and conveyance to reduce stormwater impacts and consumption of potable water.

Consider reuse of collected wastewater from sinks, mechanical condensate, and drinking water fountains in toilet/urinal flushing. Work with local public health department to determine parameters for approval.

B. *Alternative Wastewater.* Explore use of alternative wastewater treatment methods to reduce demand on campus waste treatment operations including systems to treat black water: composting toilets, living machines, and constructed wetlands.

5.4. Material and Resource Conservation

1. Recycling

A. *Campus recycling program.* Maintain and expand campus recycling programs.

B. *Recycling Stations.*

- Provide easily accessible recycling stations for collection and separation of paper, cardboard, glass, plastics, and metals.
- Provide recycling stations at convenient locations inside and outside of buildings, and in events areas, parking lots, and plazas.
- Size recycling stations to accommodate the University's standard recycling containers.

2. Construction and Demolition Waste

To reduce construction and demolition waste from University projects, consider the following:

A. *Adaptive reuse.* Favor reuse of existing structures in lieu of new construction.

B. *Demolition Waste.* Strive to recycle and salvage demolition waste.

C. *New Construction.*

- Consider future reuse when determining floor-to-floor heights and planning modules. Use open environments, flexible systems furniture, and modular partitions for office areas.
- Design projects to be recyclable, using products that can be easily disassembled and/or recycled.
- Use durable materials that extend the life of the project.
- Use carpet, ceiling tiles, and other products from companies with reclamation programs to take back products after their useful life.
- Require a construction waste management plan from contractors that will reduce construction waste going to landfills.

3. Materials Selection

Consider environmental impacts, both globally and locally, when selecting materials.

A. *Favor local materials.* Maximize use of locally produced materials and locally manufactured products made from raw materials that are locally extracted.

B. *Favor durable, recycled, recyclable, renewable, and biodegradable materials.*

- Use durable products with a long service life. Evaluate initial cost, service life, and annual maintenance costs over 50-year life cycle for comparison with other products.
- Maximize use of recycled (20% post-consumer content or 40% post-industrial content) materials.
- Consider use of recyclable (wood, concrete, asphalt, brick, drywall, metals, etc.) and salvaged materials. Reduce use of composite materials that are costly to recycle.
- Consider use of renewable materials such as natural linoleum, bamboo, wood, and wheatboard from millwork substrates.
- Use biodegradable materials where appropriate, such as the use of earth dikes and straw bales for soil and erosion control.

C. *Toxic and ozone-depleting materials.* Avoid materials with toxic constituents: CCA (pressure-treated wood), mercury (thermostats), and chrome (plumbing fittings). Avoid ozone-depleting substances (such as CFCs and HCFCs in refrigerants and fire suppression systems).

5.5. Energy Efficiency

1. Energy Consumption

Reduce total energy consumption of existing and new buildings.

A. *Reduce dependence on mechanical heating and cooling:*

- Model energy performance to include interaction of multiple strategies.
- Optimize R-values. Exterior wall assemblies should be a minimum of R-19, and roof assemblies should be at least R-30.
- Favor use of double-glazed glass units with a low-E coating, argon-filled with a U-factor of 0.27 or less.
- Use passive solar design strategies and incorporate thermal mass within buildings.

B. *Choose operationally-efficient systems.*

- Require projects comply with minimum energy efficiency prescribed in ASHRAE Standard 90.1-2001.
- Use Energy Star® products wherever appropriate: equipment, transformers, and appliances. Use energy-efficient equipment with premium efficiency motors acceptable to local utility. Use variable speed drives.
- Use high-efficiency lighting with only electronic ballasts. Use sensors to control lighting in spaces not regularly occupied.
- Avoid over-sized equipment so that equipment runs at peak efficiency.
- Use demand-controlled ventilation strategies for classrooms and other spaces with large occupancy swings.
- Use heat recovery systems that capture and reuse waste heat.

C. *Adhere to Alabama Building Energy Code.*

D. *Harness site energy.*

- Consider feasibility of mixed-mode natural ventilation and operable windows in combination with micro-switches to control ventilation and cooling in residential buildings. Require air economizers.
- Explore use of solar hot water heaters.
- Maximize use of natural daylighting in combination with sensors and light modulation features.

2. Monitoring

Monitor performance of building systems for energy efficiency.

A. *Commissioning.*

- Require new buildings be fully commissioned by a third party commissioning agent (HVAC, building control systems, duct work and piping insulation, lighting controls, heat recovery, and automatic sensors). Involve the commissioning agent early in the design process.

- Require the commissioning agent produce a manual that describes the process for re-commissioning the building.

B. *Training.* Perform and record building operations training. Cover procedures for start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, controls set-up and programming, troubleshooting, alarms, systems interaction, adjustments, optimizing energy conservation, special maintenance and replacement sources, use of operations and maintenance manuals, and review of control drawings and schematics.

5.6. Indoor Environmental Quality

1. Air Quality

Ensure that indoor air quality is acceptable and free from known contaminants.

A. *Minimize pollutant infiltration.*

- Comply with ASHRAE 62-2004 Ventilation for Acceptable Indoor Air Quality for all new construction.

- Locate designated smoking areas away from building entrances and air intakes.

- Locate air intakes away from loading areas and building exhausts.

- Prevent airborne contamination from housekeeping, maintenance, copying/printing, and other areas where chemicals are used through use of dedicated exhaust systems that maintain negative pressure with respect to adjacent occupied spaces. Also maintain physical isolation of these spaces with deck to deck partitions and automatically closing doors.

- Place permanent entrance grates, grilles, or slotted systems—at least six feet in length in the direction of travel—at all entrances to capture dirt and particulates.

- Prevent water infiltration and mold development through building envelope design, including use of enclosure systems with vented cavities with drainage at the cavity bottom.

B. *Prevent long-term contamination from construction practices.*

- Require contractor to prepare plan for scheduling and on-site storage of absorptive materials (e.g. insulation, carpeting, ceiling tile, and gypsum wallboard) to prevent moisture contamination.

- Avoid use of permanently installed HVAC system during construction. If permanent air handlers are used, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 or better shall be used at all return air grilles.

- Replace filtration media after construction is completed. Use filtration media with a MERV of 13 or better to process both return and outside air to be delivered as air supply.

- Flush-out buildings following construction and prior to occupancy by supplying a total air volume of 14,000 cubic feet of outside air per square foot of floor area while maintaining an internal temperature of at least 60° F and a relative humidity no higher than 60% .

- Protect exterior wall assemblies and absorptive materials during construction to prevent mold development within the completed building.

C. *Use low-emitting materials for interior finishes.*

- Use no- or low-VOC sealants, adhesives, and primers for interior applications. Refer to South Coast Air Quality Management District (SCAQMD) Rule 1168. For aerosol adhesives refer to Green Seal Standard for Commercial Adhesives GS-36.

- Use no- or low-volatility organic compound (VOC) paints for building interiors. Refer to Green Seal Standard GS-03 and GS-11. For clear wood finishes, floor coatings, stains, sealers, ad shellacs, refer to SCAQMD Rule 1113.

- Use carpets that comply with the Carpet and Rug Institute Green Label Plus program.

- Use only composite wood and agrifiber products (e.g. particleboard, medium density fiberboard, plywood, wheatboard, strawboard, panel substrates, and door cores) inside buildings that contain no added urea-formaldehyde resins.

D. *Monitor air quality.*

- Consider carbon dioxide (CO2) monitoring to test ventilation, especially in high-occupancy spaces.

- Consider carbon monoxide and VOC monitoring to enable unhealthy air conditions alerts.

2. Healthy Interiors

Create healthy interior spaces comfortable to users.

A. *Thermal conditions.*

- Design interiors to comply with ASHRAE 55-2004: Thermal Environmental Conditions for Human Occupancy.
- Consider the use of a building humidification system where desirable and not in conflict with building use (such as artifact conservation).
- Use operable windows where practical to provide user controllability. Balance window operability with energy efficiency strategies.

B. *Light and shade.*

- Optimize natural light throughout buildings where not in conflict with building use.
- Optimize user-controllability of lighting wherever practical.
- Allow for internal shading in building designs to reduce glare.

C. *Visual access to the outdoors.* Provide outside views from most interior spaces.

Skylights are an essential way of providing natural lighting in building interiors where windows are not possible. Photo credit: www.inhabitat.com