

UNC Sustainability Policy

Best Practice Concepts for Development and Operation of High Performance Facilities

These “best practices” ideas are intended to serve as guides to all constituent institutions and affiliated entities to achieve the goals of the UNC Sustainability policy, specifically related to the development and operation of sustainable, high performing facilities. Additional guidance can be obtained from those organizations that champion energy savings and sustainable design and from the achievements of other campuses within the UNC System as displayed on the respective sustainability websites. All existing laws and regulations regarding building and building system design, energy usage and protection of the natural environment should also be followed in planning, designing, constructing and operating campus facilities.

I. MASTER PLANNING, SITE PLANNING & LAND USE

A. Topography

1. Ensure that buildings, streets and other infrastructure respond to and enhance natural land forms.
2. Maintain open views from hilltops and high promontories.

B. Streams

1. Protect and enhance stream corridors and buffers.
2. Maintain open natural drainage ways.
3. Use bioengineering concepts when stream bank stabilization is required.
4. Maintain tree canopies over creeks and streams.
5. Bridge streets and paths over streams rather than the streams being diverted through culverts.

C. Forests, Open Areas & Vegetation

1. Maintain graded future building sites and cleared areas that are not planned for student/staff/faculty programming as meadows.
2. Preserve, enhance, and increase forest lands and tree cover,
3. Encourage the growth of native grasses and wildflowers in open areas, through naturalization and/or seeding.
4. Manage trees to provide aesthetic and climate benefits, including planting, trimming, removing, and replanting trees.
5. Plant diverse native tree species to favor native wildlife, reduce non-native species, and eliminate invasive species.
6. Provide access to natural areas with pedestrian pathways.

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7. Maintain street-tree canopies to provide a continuous habitat for birds and other urban wildlife and to provide shade for pedestrians.
8. Use exotic plants in the landscape for diversity, human food, teaching and research purposes, but do not use invasive species of exotic and native plants.

D. Storm water

1. Adopt a comprehensive landscape master plan that utilizes Low Impact Development (LID) techniques that include, but are not limited to, rain gardens, vegetated swales, and permeable pavers.
2. Manage erosion through the use of appropriate ground cover materials.
3. Manage storm water close to the source.
4. Consider projects that remove and replace impervious pavement with pervious surfaces, especially in campus areas prone to flooding.

E. Building Sites

1. Orient a building east/west whenever possible to take maximum advantage of natural light while limiting solar heat gain and/or configure portions of the building footprint and fenestration to achieve the same goals.
2. Consider the creation of outdoor common areas when siting and developing building footprints.
3. Design buildings located on the south side of a shared open space so that the cast shadow in the open space is minimized.

F. Community Connectivity

1. Reduce distances between necessary services by creating walkable, dense, mixed-use neighborhoods with both housing and dining that maximize open space and preserve campus natural areas.
2. Make an interconnected network of sidewalks, greenways and streets with slow speeds to reduce traffic congestion, reduce pedestrian/bicycle/vehicle conflicts and to provide safe, pleasurable walking and biking.

G. Transportation

1. Include comprehensive transportation planning as part of the campus master plan.

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2. Reduce storm water runoff from parking lots by using low impact development techniques.
3. Provide adequate facilities for bicycles including bicycle lanes/paths, storage racks, etc.
4. Construct appropriate bus shelters for public transportation use.
5. Provide electric vehicle charging stations.

II. DESIGN, CONSTRUCTION

A. Storm water

1. Keep storm water flow to predevelopment levels.
2. Utilize innovative, low maintenance methods for keeping storm water onsite, such as infiltration devices, vegetative practices, and detention/retention facilities.
3. Minimize contiguous impervious area.

B. Materials

1. Establish a minimum fifty-year design lifespan for all building materials.
2. Consider life-cycle environmental impact, durability and maintenance and operating costs when choosing materials.
3. Extend the life of existing buildings through renovation and reuse.
4. Select materials that are harvested and manufactured locally, have recycled content, or are from rapidly renewable or certified sustainable resources.
5. Consider use of white or reflective roofs to decrease solar heat gain.
6. Consider use of "green roof" techniques to provide energy savings, reduce storm water runoff and other environmental benefits.
7. Use front-loader washing machines in laundry rooms.
8. Install variable frequency drives on mechanical equipment.
9. Install non-heated hand driers.

C. Recycling and Reuse

1. Include planning for the reduction and recycling of construction waste in early design phases and in project specifications.
2. Use manufacturer recycling programs to reduce material in waste stream.

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3. Plan adequate, easily accessible accommodations in every building for the recycling of common material (paper, glass, aluminum, and so forth) easily accessible to individuals and to service providers.

D. Indoor Air Quality and Environment

1. Design a separate outside exhaust system where chemical use and storage or other air contaminants occur within buildings.
2. Provide occupant control of thermal, ventilation, and lighting systems to support optimum health, productivity, and comfort.
3. Plan for carbon dioxide and humidity monitoring equipment.
4. Ensure that building occupants are not exposed to tobacco smoke.
5. Improve the indoor environment for productive work and study by providing daylighting, acoustics attenuation, and views to indoor or outdoor vegetation.
6. Design placement of exterior and interior glass to bring natural light further into the building along with appropriate daylighting controls
7. Place and maintain mats at exterior doors to minimize dirt and pollution in buildings.
8. Locate noisy exterior activities and mechanical equipment to minimize the impact on building occupants.
9. Locate air intakes far away from loading docks and other sources of poor-quality air.

E. Energy

1. Establish the optimum level of energy efficiency for the building and systems by schematic design phase.
2. Reduce energy use with controls and sensors that minimize consumption when buildings are not in use.
3. Meter electricity, steam, chilled water, natural gas, and domestic water usage in each building to build an energy consumption database.
4. Commission each major facility to optimize building systems operation.
5. Control heat loss and gain through building envelope design.
6. Investigate renewable energy sources and energy-saving building technologies in building design. Examples: use of both small-scale and commercial wind

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energy systems, solar photovoltaic energy, solar water heating systems, and geothermal heating and cooling systems

7. Consider large scale energy efficiency projects such as performance contracts, alternative heating plant fuels, central heating plants for chilled water and steam, and use of energy storage mediums to facilitate load shedding.

F. Water

1. Meter domestic water usage at each facility.
2. Use water-conserving fixtures and equipment to minimize potable water demand and to decrease wastewater generation.
3. Where feasible, collect and reuse non-potable water.

III. **OPERATIONS & MAINTENANCE**

- A. Replace existing mechanical equipment that uses CFC-based refrigerants.
- B. Retro-commission each major facility to optimize building systems operation.
- C. Install high efficiency light bulbs.
- D. Use daylighting control sensors .
- E. Provide thermostat setback.
- F. Install plug load management systems.
- G. Share lab equipment including ultra-low-temperature freezers .
- H. Replace less efficient pumps and fans .
- I. Investigate task lighting alternatives.
- J. Reduce the use of pesticides.
- K. Harvest rainwater for use in irrigation and other applications where the use of grey water is appropriate.
- L. Reduce campus water consumption and waste with use of low-flow showerheads and water saving toilet fixture valves.
- M. Maximize space utilization.
- N. Salvage/repurpose materials from previous projects where possible.
- O. Establish effective preventive maintenance schedules for all mechanical and electrical systems and devices.