Building **Sustainability**

The Corporate Business Center (CBC) was designed and constructed using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system for sustainability strategies. LEED is a tool developed to help project teams transform the design and construction industries from conventional practice to strategies that are environmentally responsible and economically profitable and deliver healthy places to live and work.

Why build green?

The building sector has a tremendous impact on the environment. Buildings in the United States consume more than 30% of our total energy and more than 60% of our electricity annually according to the U.S. Department of Energy. They consume 5 billion gallons of potable water per day just to flush toilets. A typical North American commercial construction project generates up to 2.5 pounds of solid waste per square foot of floor space. Green buildings can substantially reduce these negative environmental impacts and reverse the trend of unsustainable construction activities. In addition, adding to the quality of the interior space can improve satisfaction and productivity and reduce absenteeism. Green buildings can benefit all building stakeholders, including owners, occupants, and the surrounding community.

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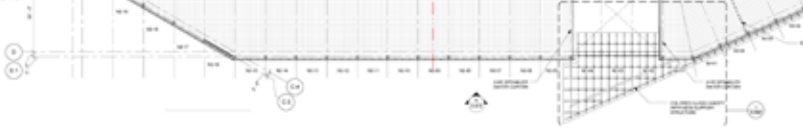


What is LEED?

The LEED rating system was developed in the mid-1990s as a tool for design and construction teams to use to benchmark green strategies against conventional construction. First implemented in August 1998 as a pilot program, it has grown and developed in the last 9 years to include specialized systems to address different types of projects, including new construction, core and shell, commercial interiors, and homes. This project has been developed using the LEED for New Construction system, which includes strategies about:

- ***Sustainable sites***
- ***Water efficiency***
- ***Energy and atmosphere***
- ***Materials and resources***
- ***Indoor environmental design***

Other strategies not covered by the defined categories are covered under a general category called "Innovation in Design."

Throughout the building, you will see signs highlighting specific sustainable strategies undertaken on this project. This display will serve as the key to help show what those strategies are and how they work to make the building greener.

Sustainable sites

Site selection

Selecting the right site to develop can have a significant impact on a project's environmental footprint. By selecting a site with existing infrastructure close to existing amenities and transportation, the project can save all the collateral impacts that developing on a pristine greenfield site can otherwise incur.

Alternative transportation

Transportation accounts for close to 28% of energy use in the United States; the vast majority (96%) of which is powered by petroleum-based fuels. In 2001, on average, each American traveled 40.25 miles per day with 88.2% of all daily travel attributed to private vehicles. Travel to and from work makes up nearly 30% of all the vehicle miles traveled in personal vehicles, and this percentage has steadily increased over the past few decades. Several different strategies were employed on this project which should significantly reduce the number of vehicle miles traveled by employees at this facility:

- By providing bicycle storage and shower facilities, the project can further reduce automobile use during the day.
- By providing 20+ electric vehicle charging stations on site for employees to use, the project can contribute to a reduction in fossil fuel emissions from employee automobile use.

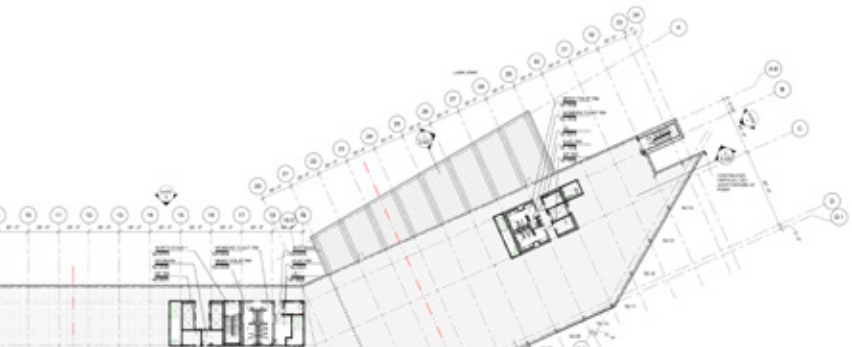
- By locating the CBC within ¼ mile of 2 lines of public transportation, this project was able to reduce land development impacts from automobile use. The city of Kingsport added a second KATS line to satisfy this LEED requirement.

- For each employee who takes an alternative method of transportation (public transportation, carpool, bicycle), they can reduce carbon emissions by approximately 1 ton per year (assuming an 8-mile average commute).

Reduction of heat island effect

The use of dark, nonreflective surfaces for parking, roofs, walkways, and other surfaces contributes to heat island effects when radiation from the sun is absorbed and transferred through convection and conduction back to surrounding areas.

By using roofing materials that have a high reflectance value and high solar reflectance index (SRI), the project can ensure that less heat is absorbed, protecting local microclimates and habitats and reducing the overall cooling loads on the building.



Water efficiency

On an annual basis, Americans use 3,700 billion gallons per year more than they return to the natural water system to recharge aquifers and other water sources. In some areas, water levels in these aquifers have dropped more than 100 feet since the 1940s. Facilities that use water efficiently can reduce costs through lower water use fees and reduced energy to heat this water. This project achieved a large amount of water savings through a series of conventional fixtures, sensors, and automatic controls.
Some strategies include:

- By using low-flow fixtures, including lavatory faucets (with auto shut-off controls), pantry sinks, and low-flow showers, the project can save an estimated 272,820 gallons of water per year.

- By using efficient flush fixtures (urinals and toilets) including dual-flush toilets, the project can save an estimated 300,250 gallons of water per year.

- By saving this estimated 573,070 gallons of water per year, the CBC is projected to use 38% less water than a conventional building.

- In an effort to reduce water use on site, the turf in the parking lot areas was not irrigated. The turf that was irrigated was done with high-efficiency sprinklers; all landscape areas are drip irrigated. The system is controlled via a soil moisture monitoring system that suspends irrigation when there is adequate moisture in the soil for the plants. Compared to an irrigation system that irrigated all the landscape on the site with standard sprinklers and a set-it-and-forget-it control system, it will save between 50%–60% on potable water use each year.

Energy and atmosphere

Buildings consume more than 30% of the total energy and more than 60% of the electricity produced in the United States annually. Electricity generated from oil and coal can affect the environment in many ways, including impact to the atmosphere as the fuels are extracted, burned, and exhausted. In addition, carbon dioxide released from electrical generation contributes to global climate change. Green building strategies associated with energy work in two primary ways—reducing the amount of energy used and using more benign forms of energy.

- Highly efficient systems were designed for both the amenity and office areas. In total, 95% of the luminaries in the building are high-efficiency LEDs.
- The lighting systems throughout the building are linked to occupancy sensors which will turn off the lights when employees are not present. Daylight-harvesting sensors adjust the intensity of light by taking advantage of natural light, further reducing energy consumption.
- Savings in lighting energy is achieved in two ways. The first is the primary energy savings from finding additional times to turn off or dim the lights, using less lighting power. The second is from reducing the heat that lighting gives off whenever it is turned on. By turning the lights off, the cooling system does not need to cool that additional heat load from the lighting.
- Refrigerants used in the cooling systems were selected to minimize both ozone depletion potential (ODP) and global warming potential (GWP). Many commonly used refrigerants in cooling and refrigeration systems can damage the atmosphere when they are released or leak from the system. Care was taken in the specification of systems and refrigerants for this project.
- The CBC is designed to use 38% less energy than a baseline building built without all of the additional features listed previously. This will result in a more efficient building, lower operating costs, and reduced emissions from energy generation. The roof is insulated to R-36 (code minimum is R-19).

Indoor environmental quality

On average, Americans spend 90% of their time indoors, and the U.S. EPA reports that levels of pollutants can be 2 to 5 times higher than outdoor levels. These pollutants can contribute to health problems and exacerbate symptoms of allergies or asthma. In addition, multiple studies have correlated occupant satisfaction and productivity with indoor air quality. Strategies employed on this project include the following:

Indoor air quality

Indoor air quality in the building contributes to employee health and productivity. This project ensured healthy indoor air quality in several distinct ways.

- Outdoor air delivery monitoring—by use of sensors both outside and inside the building, the systems are set up to increase the quantity of fresh air brought into the building based on indoor air sensor readings for carbon dioxide. The presence of high levels of CO_2 is associated with the presence of higher levels of other pollutants as well.
- During the construction process, extra care was taken to protect the ductwork and finish materials from dust, contaminants, and mold. High-efficiency filtration was used to keep the jobsite clean, and the filtration media was changed immediately before occupancy. The building was flushed after all dust- and contaminate-producing work was completed for 2 weeks prior to occupancy.
- Materials for the project were specified and installed with low levels of volatile organic compounds (VOC). Much of the indoor air quality issues of conventional buildings originate with offgassing from new construction materials, including paints, sealants, carpet systems, and adhesives. Furniture systems were certified by a third-party organization (GREENGUARD) to have low VOC levels.

Daylight and views

Visual access to the exterior environment has been correlated with high levels of employee and visitor satisfaction and productivity. This facility has been designed to maximize occupant views of the outdoors to provide this key component of the indoor environment.

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