Case Study: University Center
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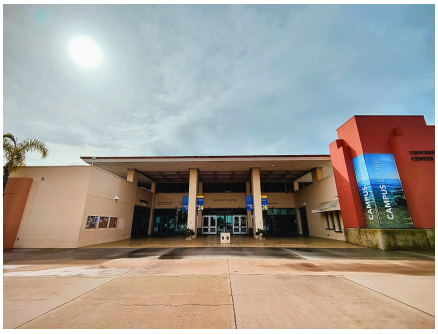
Executive Summary

This report details a simple building audit of the University Center (commonly referred to as "the UCen") at the University of California Santa Barbara (UCSB). This case study presents a qualitative assessment of building features and practices of the building that was performed with reference to the US Green Building Council's (USGBC) version 4 (v4) LEED Scorecard for Operations and Maintenance in school buildings. Water and energy analyses were conducted using the USGBC LEED v4 Indoor Water Use Reduction Calculator and ENERGY STAR Portfolio Manager to examine water and energy usage, respectively. Opportunities for operation and design improvements of the building were evaluated as well. Building Maintenance Manager Hugo Rios assisted me with this inspection by providing additional insight about the building.

Building Description

Located in the heart of the UCSB campus, the University Center is a 3-story multipurpose building built in 1964 that serves as a place to promote student union on campus. It offers a wide variety of services to students, staff, alumni, and its approximately 10,000 daily visitors through its wide range of restaurants, conference rooms, and catering services, as well as the campus store, post office, printshop, convenience store, food bank, and concert venue. The building provides jobs to about 500 student workers while having only a handful of full-time staff members for building maintenance and administrative duties.



The view of the University Center from outside the main entrance on the main floor.

Frequently, some of the 162,155 square-foot building area is used for indoor or outdoor events. The 6,000-square-foot Corwin Pavilion is a multipurpose venue often used for conferences, banquets, or fairs. The outdoor Lagoon Plaza features 3,200 square feet of event space often used for catering events. The Lagoon Lawn behind the building is also often used for events and provides beautiful views of the campus lagoon and the ocean behind it.

There are three levels inside the building. The main level is also referred to in this report as the second level because the sloped building site creates another ground entry on the level below it, which will be referred to as the first floor. The third story is smaller and can be accessed by staircases. The second level contains a few eateries, administration offices, conference rooms, and the campus bookstore, while the first floor accommodates additional restaurants, dining areas, and the post office.

Building Analysis

The evaluation of the building will be arranged following the credit categories of the LEED v4 Scorecard for Operations and Maintenance. Each category will include an analysis of several different features of the building that I had identified during the audit that align with the category, but it may not necessarily be represented on the LEED scorecard.

Location and Transportation

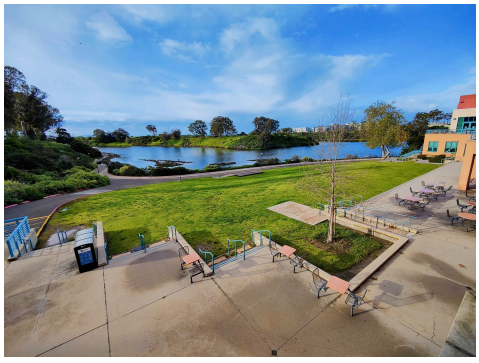
The central location in the center of UCSB's campus is an important aspect of the building. It can be easily accessed from any other building on the university's main campus with a short walk of up to 15 minutes. Large illuminated walking paths that are safe and well-maintained surround the building, which promote walking as the primary mode to access the building. A library, convenience store, and entertainment centers are a comfortable 5-minute walk away. It is also only a 15-minute walk to downtown Isla Vista, which conveniently offers services such as restaurants, grocery and convenience stores, barber shops, community centers, and others. Bus stops are a mere 10 minutes away on foot.

The building also encourages alternative modes of transportation. It has bike paths that lead to the building and bike racks that lie just outside of it. Nearby car parking is limited and conventional roads for motor vehicles are not incorporated into the site, with only a small access road behind it for retail and maintenance purposes.

Sustainable Sites

The building site protects natural habitat by restoring native plants and trees around the building. Planted areas with shrubs, trees, and other native plants surround the building site, providing aesthetic appeal and collection areas for stormwater runoff. The building (and the rest of campus) has a policy in which each tree that is cut down must be replaced with three additional trees. This policy likely did not exist during construction of the building, but trees removed during building renovation or for safety reasons are replaced with native or adaptive vegetation.

The building's proximity to the campus lagoon, which is a valued ecosystem that is essential to many species of aquatic birds, makes sustainable building practices vital to protect this key area.



The view of the Lagoon Lawn and the campus Lagoon from the UCen.

One way the design of the building site protects this area is with the Lagoon Lawn behind the building, which lies directly between the building and the lagoon. The lawn facilitates water absorption to prevent stormwater runoff from contaminating the lagoon. This protection design prevents pollutants and trash from flowing into the lagoon during storms. Additionally, large sections of the building roof are painted white to reduce the heat island effect, thereby minimizing the effect on microclimates.

Water Efficiency

Efficient water use is a top priority for the UCen. All flow fixtures in the building are equipped with aerators to reduce water consumption significantly, up to 90% as reported by the Building Maintenance Manager. Restroom flow fixtures are also sensor-activated and run for a maximum of three seconds at a time. Men's restrooms have water-free urinals. These water-efficient features have a substantial impact on reducing water consumption because these facilities are used by thousands of visitors on a daily basis.

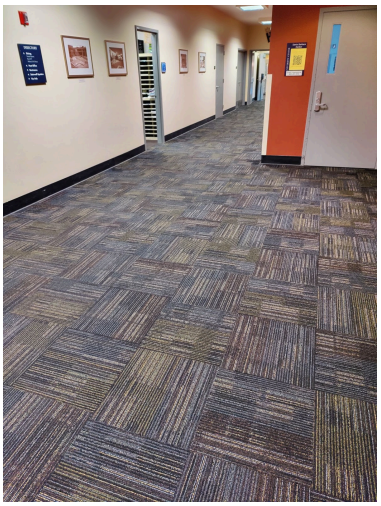
The Lagoon Lawn and planted areas surrounding the building are irrigated with reclaimed water. Watering intervals have also been reduced to one time a week to decrease water usage.

Energy and Atmosphere

The UCen takes advantage of the direct sunlight it receives throughout the day by balancing the amount of sunlight used for natural lighting and heating. This practice minimizes energy usage during the day. A large array of south-facing windows on the main floor allow in a comfortable amount of light, removing the need for artificial lighting. Multiple large skylights throughout the building bring natural light into the second and third floors, and high ceilings allow sunlight to radiate further.

An assembly of tinted windows on the UCen's main floor facing the south side with a large awning.

In areas where natural lighting cannot provide sufficient lighting, notably on the first floor, LED lighting is used. LED bulbs occupy 90% of the building, helping reduce energy consumption for lighting. The building also alternates lighting fixtures on and off if many are lined up adjacent to each other to reduce unnecessary energy usage.



An array of carpet tiling on the main floor of the University Center.

Materials and Resources

The UCen prioritizes sustainability in this category through its restaurants. Every eatery offers cutlery made out of biodegradable materials. This includes biodegradable plastic and paper containers. Additionally, some parts of the building are floored with carpet tiles, which is beneficial since individual tiles can be removed instead of the entire carpeting when replacement is needed. The third floor was also recently renovated, which removed asbestos from the building insulation.

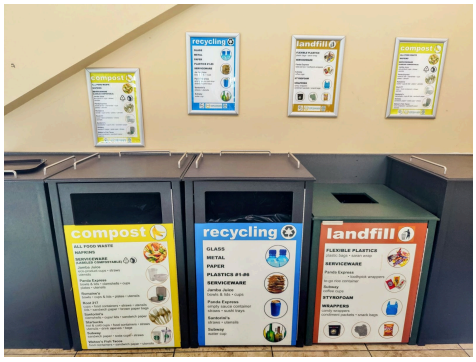
Indoor Environmental Quality

The indoor environment can be uncomfortable for both employees and visitors. The direct sunlight the building receives throughout the day brings an influx of excess heat, making the indoor environment often warm and stuffy. To mitigate this, the building features protective measures against an overabundance of direct sunlight. All exterior windows are tinted to reduce the amount of heat that enters the building while still allowing in an adequate amount of sunlight. Stationary awning design reduces direct sunlight during the summer months while encouraging more sunlight infiltration during the winter months. Doors and windows are also frequently left open during the day to optimize airflow to cool the building interior without relying on the HVAC system. These measures help create a more comfortable thermal environment.

Quality views are also an indicator of indoor environmental quality that the building possesses. Many of the building's windows are on its south side, allowing for optimal amounts of sunlight as well as beautiful views of the campus Lagoon, which is home to numerous bird species, and the ocean just behind it. These views create a relaxing indoor environment and likely contribute valuably to the mental well-being of the building's employees and visitors.

Innovation

The UCen also displays exemplary areas of innovation. Within the building site is a small garden, which provides fresh herbs for the building's restaurants. The garden takes up a minimal amount of space and is maintained by building employees. Additionally, the building features separated trash receptacles that split waste into recyclables and compostable waste. There is even a distinguished receptacle for battery disposal. Each container is marked with informational signage to encourage occupants to dispose of waste in the appropriate bins. This reinforces the UCen's commitment to maintaining sustainable building practices.



Compost, recycling, and landfill receptacles on the first floor.

Opportunities for Improvement

There are many areas in which the UCen can improve regarding sustainability. Firstly, the building's constant exposure to direct sunlight can be taken advantage of with a rooftop solar array and possibly solar water heaters. This technology can reduce energy costs, improve energy efficiency, and promote the use of sustainable energy, which aligns with campus goals. Since there are no tall buildings or large trees surrounding the building to provide shade, solar energy production can effectively be uninterrupted.

Though the building receives a lot of natural light, lighting in areas where sunlight cannot reach can be improved, primarily on the first floor. The Hub, the UCen's entertainment venue on the

bottom floor that is normally used as an eating area during daytime hours, lacks optimal lighting with only small light fixtures that hang from the ceiling. Additional LED lighting can improve this area, particularly with dimming capabilities so that the low-light ambiance that the Hub is known for can still be enjoyed when desired. Occupation sensors can also be installed throughout the building since its large size makes some parts of the building often unoccupied. Outdoor lighting should also be replaced, since it uses old bulbs and its spherical distribution of light contributes to light pollution at night. Installing down-facing LED lighting can provide ample lighting along walkways without contributing to interference with nocturnal wildlife.

The building can also improve its water usage with the installation of dual flush toilets. Most of the flush fixtures in the building are outdated and use more water than necessary. This switch would likely have a profound effect on water consumption because of the high volume of people that occupy the building on a typical day.

Water Analysis

I investigated the indoor water consumption for the UCen using USGBC's LEED v4 Indoor Water Use Reduction Calculator for Operations and Maintenance with a few assumptions. Kitchen facilities could not be accessed to determine the flow rates of the flow fixtures, so the baseline flow rate of 2.20 gallons per minute (gpm) was used in the calculator. The Building Maintenance Manager informed me that every flow fixture in the building has aerators installed on them but I could not determine their flow rate, so the baseline flow rate of 0.5 gpm was used. With these assumptions, the building's annual design water consumption was quantified to almost 190,000 gallons a year, which was 88% below the calculated water consumption maximum. A possible reason why design water consumption was evaluated to be remarkably lower than the water consumption maximum is because of the water-saving technologies incorporated in the building's restrooms. The UCen's 10,000 daily visitors magnify the amount of water saved from these facilities, making the investment of technology like aerators highly beneficial for saving water during building operations.

Energy Analysis

An energy benchmark on the UCen with ENERGY STAR® Portfolio Manager® was also conducted. The assessment was completed using energy metering data from 2018. The Site EUI (energy use intensity) was measured at 61.7 kBtu/ft^2 with a Source EUI of 137.8 kBtu/ft^2. Both of these values were approximately 24% below the national median, which seems appropriate since the building incorporates many energy-saving techniques. Electricity occupied a greater share of energy sources at 68% compared to 32% of the annual energy from natural gas. This is reasonable because although not much gas is used for heating or cooling of the building, the building's kitchens likely require a substantial amount of gas for stoves, ovens, and other kitchen appliances.