Case Study: IV Theater

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Executive Summary

This case study explores UCSB's commitment to sustainability with a specific focus on the Isla Vista Theaters (IV Theater). The case study highlights commendable aspects, such as the walkable location, sustainability practices, effective waste management, and successful reduction of light pollution. However, many notable deficiencies are identified, particularly in the areas of indoor water use and overdue renovations. This study dives into the sustainability of these practices and aims to provide insights into potential improvements for the building's overall sustainability. By examining both strengths and weaknesses, this analysis offers an understanding of UCSB's sustainable initiatives and opportunities for enhancement within the community.

Building Description

Owned by UC Santa Barbara, the Isla Vista Theaters are located at 960 Embarcadero Del Norte. They function as classrooms during the day (hosting 60 classes weekly) and transform into event venues in the evening. With their two theaters, the facility caters to diverse events, from conferences to dance shows. These buildings were formerly the Magic Lantern, an independent movie theater that opened its doors in 1965. To pay homage to the rich history of the original theater, UCSB sponsors an evening film screening series called Magic Lantern every Monday and Friday night.

General Building Information

- Size: ~12,400 ft²
- Built in 1965
- Theater 1: Capacity 529 people
- Theater 2: Capacity 145 people
- Tiered floors
- No windows
- No full-time staff

Figure 0: Isla Vista Theater

Sustainable Features

Despite its age and limited refurbishment, the building contains a series of sustainable features that hold positive impact.

1. *Location and Transportation*

Figure 1.1: Bike racks located behind IV Theater

IV Theater enjoys excellent accessibility for students and residents alike, offering convenient commuting options such as buses, bikes, scooters, or simply walking. It is located amidst restaurants, parks, convenience stores, and barber shops, and it is less than a five-minute walk from the UCSB campus outskirts, facilitating easy access for students. While bike racks are plentiful behind the theater, as seen in Figure 1.1, parking in IV proves less accessible, prompting

residents to opt for walking, biking, or public transportation. Although bus service within IV is acknowledged for its unreliability, alternative routes are within a 10-minute walk from the building. It is given a commendable 79 on WalkScore.com for walkability, signifying that most errands can be accomplished on foot, and a perfect 100 Bike Score, indicating that daily errands are easily achievable by bike. IV Theater is strategically situated for effortless and sustainable accessibility.

2. *Sustainable Sites*

Another great sustainable feature is IV Theater's protection and restoration of habitat. The building is surrounded by native and adapted vegetation such as succulents, yucca, and agave (Figure 1.2), all of which require minimal water to thrive. Beyond creating a visually pleasing desert garden aesthetic, these plants play a crucial role in rainwater management, collecting stormwater runoff and preventing flooding in the surrounding area. The presence of larger trees and a gazebo at the front provides valuable shading, effectively mitigating the formation of heat islands. Additionally, the use of shielded lights ensures that the majority of the lighting directs illumination in a downward direction, minimizing light pollution. For those lights without this feature, their dimness contributes to the prevention of light pollution as well.

Figure 1.2: Front view of IV Theater

3. *Materials and Resources*

Similar to many other UCSB buildings, IV Theater maintains an effective recycling and landfill program. Outside the building recycling and landfill bins are clearly labeled with images to help students and residents distinguish where their waste belongs. This sorting convenience is also inside the building, where recycle bins are accompanied by detailed posters, offering a more extensive list of recyclable items compared to the outdoor bin labels. The commitment to sustainability is also evident in the bathrooms, where a sign on the paper towel dispenser encourages resource conservation with the message, "Please Conserve Our Natural Resources, USE ONLY WHAT YOU NEED." While there are more sustainable alternatives to paper towels, IV Theater excels in maintaining a favorable solid waste management program.

4. *Indoor Environmental Quality*

The air temperature within the theater is usually at a comfortable level with the AC set at 68-70 degrees, though it can get hotter during the summer months. Outside of the theaters, the doors are open in the hallway which allows for natural ventilation, and in the bathrooms to the right of the theater are situated by massive windows, also allowing for natural ventilation and enhanced indoor air quality. Some may critique the theater for its lack of windows and overall natural lighting within the theater, however the building *is* a theater. Natural lighting would interfere with the screens being projected. Furthermore, the theaters at IV Theater feature adjustable lighting, allowing professors and coordinators to customize the level of illumination during lectures and events. Between

these classes and events, the lights are routinely dimmed to about half capacity, effectively conserving energy.

Improvement Opportunities

With an old building comes several opportunities for increased sustainability. The following are believed to be the most effective for IV Theater.

1. *Renewable energy*

   While solar panels are in most locations across UCSB's campus and residential apartments, IV Theater is an exception. It is positioned under the sun's illumination throughout most of the day (with a slight exception in the late evening due to neighboring shadows). IV Theater also has a flat roof ideal for solar panel installation. The potential financial savings, potentially reaching thousands of dollars annually, depend on the size of the panels selected. UCSB proudly reads on its website that its buildings operate on 100% clean or carbon-neutral energy. The incorporation of IV Theater into these statistics isn't just plausible; it's an easily achievable prospect, aligning with the prior commitment to sustainability.

2. *Lighting control*

   UC Santa Barbara consistently grapples with a common issue regarding light management in its facilities. A recurring theme, identified in this case study and mirrored in several UCSB buildings, reveals a tendency to keep lights on unnecessarily in well-lit areas or during hours of low occupancy. Figure 2.1 captures an instance inside IV Theater at approximately 1:00 pm, where the entire room is naturally illuminated by daylight from the windows, yet the lights continue to stay on. Notably, even bathroom lights remain on throughout the day and night, despite being unoccupied. Addressing this inefficiency could be straightforward with the implementation of motion detector lights or timed systems that align with sunset, representing a practical solution to conserve energy by up to 30% and reduce costs.

Figure 2.1: Main entrance of IV Theater

3. *Recycled Refurnishing*

   Constructed in 1965, IV Theater, which has seen limited remodeling partly due to the absence of full-time staff—only daily custodial and technicians during events—reveals visible signs of aging during a casual walkthrough: cracked walls with ant infestations, outdated chairs, floors, non-functional water fountains, and aged bathrooms. As the building is in need of refurbishment, this presents an opportunity to embrace sustainable practices. We could begin by sourcing materials from a small radius to minimize fuel costs and emissions. Next we could prioritize high recycled content in new rubber flooring, tiles, ceiling tiles, furniture, and insulation. The utilization of cleaned and re-dyed carpet tiles could be sourced from certified sustainable harvests which further contribute to an environmentally conscious approach. Restroom stall partitions could be

made of up to 90% recycled plastics and countertops from recycled tumbled glass further underscore a deep commitment to sustainable refurbishment practices.

4. *Bathroom Improvements*

Figure 2.2: Women's bathroom next to Theater 2

Beyond incorporating sustainable materials into bathroom upgrades, enhancing the water system is another sustainable opportunity. Currently utilizing American-Standard toilets with a regular flush rate of 1.6 gallons per flush, transitioning to reclaimed water and implementing waterless urinals could yield substantial water savings—up to 40,000 gallons per year per waterless urinal. Further efficiency could be achieved through the adoption of dual flush toilets, reducing water usage by 20-60%, and the installation of automatic water sensors on sinks. Lastly, Figure 2.2 reveals a single reliance on paper towels for hand drying. Despite the sign that reads "USE ONLY WHAT YOU NEED" on the dispenser, introducing air dryers not only eliminates paper waste but also proves a cost-effective alternative.

Technical Assessment

Energy Analysis

When graphing the energy use by calendar month, the results followed a logical trend. Electricity stays at a constant rate throughout the year while natural gas peaks in the colder months as seen in Figure 3. By benchmarking the building through ENERGY STAR, I was able to calculate a Site EUI of 27.7 kBtu/ft2 and a Source EUI of 58.7 kBtu/ft2. Compared to the average movie theater with a Site EUI of 52.9 and a Source EUI of 112, IV Theater is 46.78% lower in total energy usage (performs better than other theaters). 61% of the energy is from the electric grid and 39% is from natural gas. The total GHG emissions from IV Theater are 22 metric tons of CO2 per year.

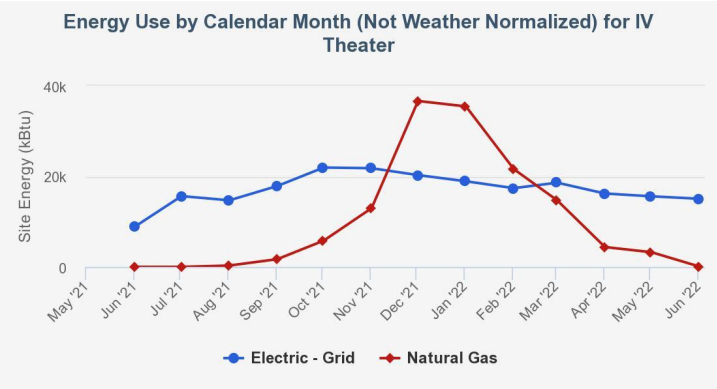

Figure 3: Energy Star Graph

Water Analysis

The Indoor Water Use Reduction Calculator was employed for these calculations. Assuming the theater operated for 250 days a week (excluding summer and winter breaks) with a balanced gender ratio and an average daily attendance of 2,000 visitors, we found that the toilets, being older models, had a flush rate of 3.5 gallons per flush. Based on these estimates, IV Theater's annual baseline water consumption was 232,500 gallons, while the annual design water consumption was 312,500 gallons. This resulted in a baseline multiplier of 120%, exceeding the

LEED maximum allowable multiplier of 20%. The water consumption ceiling should have been 279,000 gallons per year, but the actual usage exceeded this value by 12.01%, indicating a very inefficient water system at IV Theater. To address this inefficiency, installing green toilets and sinks could result in substantial water savings ranging from 10,000 to 15,000 gallons per year.

Lessons Learned

What struck me most in the case study was the absence of renewable energy in the building. Currently, UCSB has over 6.2 megawatts (MW) of on-site solar capacity, contributing to more than one-third of the campus's peak electrical demand. To further our sustainability efforts, we should continue to expand our investment in on and off-campus solar panels, not only for the environmental benefits but also for cost savings.

I was also reminded of the massive potential in sustainability when it comes to existing buildings. IV Theater is a prime opportunity for refurbishment using recycled and green materials. Numerous possible enhancements could be implemented over the span of just a few weeks. The potential for positive environmental impact is generous.