

# HEALTHCARE DESIGN

## A new approach to sustainable design at Palomar Medical Center West

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In 2004, when CO Architects began master planning and designing Palomar Medical Center West (Palomar West, a new 725,000-square-foot district hospital in northern San Diego County, we felt we had a once-in-a-generation opportunity. The historical context was right for redefining what sustainable design means for hospitals and medical care. Environmental awareness, advancements in technology, evidence-based design, and a visionary client—Palomar Pomerado Health—had all come together to allow us to create a high-performing hospital in which nature coexists with and is enhanced by technology.



Palomar Medical Center West, a new 725,000-square-foot district hospital in northern San Diego County

In a hospital, the benefits of a sustainable approach are not only in environmental conservation and operational savings. We believe that because of the built environment at the 11-story Palomar West, there will be better medical outcomes. Staff will be less stressed and deliver better care; patients in the 360 beds will heal faster. In an innovative approach to collaborative design, we have enhanced these aspects of a sustainable hospital through the use of Building Information Modeling (BIM).

### Old becomes new

From the beginning, the integration of nature into Palomar West was the overriding principle that guided design and decision making. This represents a departure from the 'modern' hospital—although, ironically, it is a return to hospital traditions of the 19th century. When hospitals became a building type in the 1800s, they were shaped by then-current beliefs and understanding of illness and health. The hospital was planned and built specifically to support healing through natural processes, and focused on gardens, views of nature, and natural ventilation. Over time, with the evolution of technology and the modern understandings of illnesses and the ways that they should be treated, the hospital departed from these principles and became more of a machine that relied on technology for its healing powers.

But, at CO Architects, we contend that a truly sustainable hospital requires the reevaluation of priorities for buildings that house and heal the sick. Sustainable healthcare design is, in part, a return to the early beliefs in the healing powers of the built environment that integrates nature. There is evidence that daylight, views, and access to the outdoors all contribute to human well-being and improved health. Though a hospital remains one of the most technologically intense building types, the coexistence with nature is not only possible, but desirable and necessary.

## Sustainable strategies

The vision for Palomar West is a model of sustainable design. It will operate with lower energy and water consumption and emphasize the stress-reducing and healing powers of nature, as well as the intensive programmatic needs of a hospital. CO Architects has planned a building where technology and nature coexist.

Some key elements:

- The building is organized around a vertical garden that is integrated into the nursing floors. On every floor of the nursing tower there are three garden balconies, accessible to patients, staff, and visitors.
- A 50,000-square-foot living roof over the two-story Diagnostic and Treatment (D&T) wing becomes a new ground plane, bringing nature closer to the patients in the tower.
- In the D&T wing, courtyards and skylights provide daylight and views of nature for the staff.
- Skylights to the basement provide daylight to staffers usually neglected in modern hospitals.
- Flexibility to accommodate future changes in the delivery of care will reduce future demolition and construction waste at Palomar West. The two-story D&T wing is disengaged from the structure of the tower above to allow flexibility in its framing and planning. With long-span trusses, relegation of fixed vertical elements to the perimeter, high interstitial spaces, and a high floor-to-floor dimension, the facility has an open loft space that can be reconfigured as necessary.
- High-efficiency HVAC systems, and low-flow plumbing fixtures.
- A wetlands treatment system for wastewater from the AC cooling towers, to prepare it for irrigation. Roughly 5 million gallons annually will be recycled, as will storm water from Palomar West roofs.
- When completed, Palomar West will consume up to 14% less energy than allowed under California Title 24 energy standards—even though hospitals are exempt and are notoriously intensive energy users.

## Technology/nature balance

Proper use of improved technologies and building materials can bring patients and staff closer to a natural setting. An interesting example involved the choice of the main mechanical system for ventilating patient rooms. We studied the various options for glazing and sunscreens in the building envelope in combination with different air delivery systems in energy models and life-cycle cost analyses. Surprisingly, the energy benefit did not come from the mechanical equipment or the sunscreens, but from the glass selection. With the right glass specification we were able to reduce the air changes required for comfort to the minimum required for ventilation. An equally important aspect of the sunshades was not energy savings, but the comfort of the family space in the patient room and the view to nature. A patient will be able to keep his or her shades up all day, thus benefiting from the natural light which studies have shown improve patient healing.

Patient rooms also will be outfitted with advanced light fixtures and controls, through which the patient can alter hue and intensity. The light can be programmed to mimic the changes in warmth of daylight throughout the day to reinforce the natural circadian rhythm of the patient. Evidence shows that having control over one's environment reduces stress and promotes healing. Reinforcing circadian rhythm helps balance natural hormone production and enhances the sleep-wake patterns of the patient.

## Collaboration, BIM, and sustainability

To achieve a truly efficient, high-performing, sustainable building, architects must collaborate with engineers and builders during the design phases through Building Information Modeling (BIM). We see BIM as an integral tool in achieving a more efficient, less wasteful, and more productive building industry.

The work with the MEP trade contractors through BIM was invaluable in both its validation of early design concepts and its influence on constructability, which morphed and improved the design. The long-span truss and the integrated MEP systems working together animated the shape of the 50,000-square-foot undulating living roof, over the D&T wing. By working with the structural and mechanical engineers and the trade contractors, we developed a truss design that saved 18 tons of steel and integrated structural support for MEP equipment—and allowed for nearly unlimited flexibility in the future to reorganize the space. This degree of modeling and collaboration was only possible through BIM.



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## Conclusions

The next wave in sustainable hospitals will not merely be efficient in energy or water usage, or defined by the selection of green building materials. In the future, we will see increasing use of BIM, and collaborative partnerships between owners, designers, engineers, builders, and manufacturers to design flexible hospitals in which material use is minimized, and adaptability is maximized. Sustainable hospitals will balance the required technology with the healing powers of nature to support each other in a truly healing environment.