



Award Category

Overall Sustainable Design

Green Features

Power purchase agreement for solar hot water system

80 flat panel solar hot water collectors with 500-gallon storage

Retained legacy site trees and reused wood from removed trees

Natural ventilation with manual and automatically operated windows

Diversity of unit types, including double rooms and four-bedroom apartments

Corridors on alternate floors

Low-water landscape with capillary subsurface irrigation

Covered bike storage for 23% of residents

Annual Energy Savings

33% greater energy efficiency than 2008 Title-24

39% utility cost savings based on LEED model

University of California, Berkeley Maximino Martinez Commons

Challenging site conditions helped shape the climate responsive configuration of this 416-bed residence hall that showcases compelling architectural design, diverse unit plans, impressive sustainability achievements and sensitive responses to the local cultural context.

In some cases site conditions conflict with sustainability goals, as the optimal orientation and massing for passive strategies may not mesh well with a site's geometry or context. Fortunately this was not the case in the design of Maximino Martinez Commons (MMC) at UC Berkeley, a 416-bed sophomore housing project completed in 2012, in which the site's unique features contributed positively to the project's outcome.

In early planning studies the building was conceived as a monolithic volume in order to maximize the site for a large number of units. This conception drove the project proforma, even though it had not taken into account important contextual considerations including adjacent historic structures and numerous legacy trees, including a 100-year-old Queensland kauri-pine, believed to be one of the largest of its species on the West Coast.

In addition to aggressive resource efficiency, the project contributes to its cultural context through connections to nearby People's Park and an active commercial district.

Staff at UC Berkeley's Residential and Student Service Programs (RSSP) brought in local design firms known for their expertise in sustainability, and also globally recognized practitioners from Germany. The team's first challenge was to reconcile the program with site issues, sustainability goals, and planning code requirements. The architects ultimately devised a double courtyard scheme to retain key trees, and to create semi-private spaces.

This building configuration also created a narrow cross section well suited for daylighting and natural ventilation, taking advantage of Berkeley's mild climate. The

six-story building includes alternate floor corridors, allowing many units to have full through-building ventilation, and saving energy by reducing reliance on elevators. It also allows for a diversity of room types, including double occupancy residence hall rooms, and four-bedroom apartments on one or two levels.



The wood and glass main entry faces the street and entry plaza to the northeast. Image: Russell Abraham.

All public spaces and dorm rooms rely on natural ventilation from operable windows, with the exception of spaces where mechanical ventilation was required by code. Windows in public areas are motor operated and controlled by the building management system, opening for ventilation and cooling, or when a threshold CO₂ level is reached, and closing in case of rain. A nighttime cooling strategy is augmented by the building's exposed concrete structure, and the lobby skylight can open for cooling. Hydronic heating is provided by wall radiators in residential rooms and radiant floors in public areas, using 95 percent efficient condensing boilers. Service runs above corridors allow for higher ceilings in residences, and all corridors terminate with windows or study spaces with high ceilings to maximize daylighting.

Envelope features further reduce the heating and cooling loads. Large glazed areas on the ground floor are largely shaded, or provided

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Size

145,500 ft²

416 beds

Cost

\$62 million
construction cost

Completion Date

August 2012

Project Team

Design Architect:
Behnisch Architekten

Construction
Administration Architect:
EHDD

General Contractor:
Vance Brown, Inc.

Landscape:
Andrea Cochran
Landscape Architecture

Structural: Forell/
Elsesser Engineers

MEP Engineer:
IBE Consulting
Engineers

Civil Engineer: Sandis

Lighting:
Loisos + Ubbelohde

Telecommunications:
Teecom Design Group

Climate Engineer:
TransSolar

LEED Consultant:
Simon & Associates

Commissioning:
Enovity

with a 40 percent fritted pattern. The glazing provides a high ratio of visible light transmittance (63 percent) to solar heat gain, and windows in the residences are expressed elegantly and with constraint on the facade.

The design team conducted daylight simulations using RADIANCE software and proprietary tools to predict daylight "autonomy" and to integrate lighting with controls. Daylight sensors control lighting in public areas, and residences have occupancy sensors that respond to heat and motion. Exterior lights are controlled by an astrological clock, and exit stair lights dim when unoccupied. The lighting system is calculated to save 48 percent below baseline, according to Title-24 standards. The LEED model (which unlike Title-24 includes effects of controls) estimates cost savings at 67 percent.



The east elevation facing the entry plaza (above) and the main lobby showing repurposed woods from removed site trees. Images: Russell Abraham.

The gently terraced lobby responds to site topography creating free-flowing circulation through the building, linking spaces for study, group activities and student services.

As domestic hot water is a major energy load in student housing, the MMC is provided with a solar hot water system that provides 65 percent of the hot water required, according to measured data for the first six months of occupancy. The system includes a closed-loop glycol system, 80 roof-mounted flat plate solar collectors, and a 500-gallon water storage tank. High-efficiency plumbing fixtures reduce the overall water use, and are expected to reduce water use by 30 percent (based on LEED v3 calculations). During the first months of operation the measured hot

water savings was meeting this target at 31 percent below baseline.

For the procurement of the solar system, the campus used a third-party purchase arrangement, a first for UC Berkeley. Working with Sun Light & Power, RSSP established a 20-year power purchase agreement so the system could be purchased with a minimal initial cost to campus. The power purchase agreement was added late in the project, something that illustrates the team's openness to try new approaches, explains Chris Harvey, the Director for Capital Projects for RSSP.

As the site is close to campus and well served by transit, parking was not included, a move that is cost effective and greatly lowers the project footprint in terms of both traffic impacts and carbon emissions. Secure parking



is provided for 95 bicycles, enough to serve 23% of the residents.

The site was planted with drought tolerant and native species, with meadow grasses replacing conventional lawns. Areas near the building entry that will receive ongoing irrigation rely on a buried "geo-textile" fabric that distributes water through natural capillary action, allowing moisture to seep slowly and directly to root areas. Overall potable water use for landscape is estimated to be 58 percent below the baseline for a conventional landscape.

Of the trees that were removed from the site, many were milled for reuse on the project as benches, counter tops, paneling and security desks. An educational exhibit in the lobby displays wood samples from trees, explaining their use on the project. The wood cladding on lower floors of the exterior were sourced from

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Additional Awards

Anticipating
LEED-NC Gold

Contacts

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More Information

<http://www.sfgate.com/bayarea/place/article/UC-Berkeley-s-colorful-new-dorm-4109399.php>

<http://www.dailycal.org/2012/08/08/new-student-housing-to-open-in-heart-of-telegraph/>

<http://www.housing.berkeley.edu/livingatcal/martinez.html>

<https://us.pulseenergy.com/UCBHousing/dashboard/#/location/1000067>

teak reclaimed from buildings in Indonesia, and provides a welcoming element to highly visible elevations.

Overall the project is estimated to reduce energy use by 33 percent below Title-24, however this calculation does not take into account the energy conserving benefits of natural ventilation or lighting controls. A LEED compliance model shows an annual utility savings of 39 percent, and the project is on track to obtain LEED Gold certification. The energy use of the building is publicly available on a website, and in the building lobby, providing a salient educational lesson for student residents and visitors. The project has received excellent marks from students, and over 1700 students picked it as their first housing choice in its first year of operation.



LESSONS LEARNED

The campus team for the project, including Project Manager Valerie Zylla, Assistant Director of the Green Building Program Judy Chess, and Chris Harvey, explain that the team's first priority was to make the right decisions for the project, and not to chase LEED credits indiscriminately. They also found that the design architects explored a variety of innovative solutions that have been used in Europe, but that ultimately proved to be either too expensive or impractical for use on a California campus. For example, they considered a custom hydronic solar collector to be designed into exterior walls, automated exterior shading of windows, and a gray water system with storage. The project team notes that having a design team with such intellectual curiosity and a willingness to consider new approaches is beneficial, but such investigations must be balanced with the concern for cost effectiveness and practicality.



Clockwise from top left: Secure bicycle parking, south elevation with secondary entry and fitness room facing People's Park, and the project viewed from the Telegraph Avenue commercial district. Images: Russell Abraham.

Best Practices case studies are coordinated by the Green Building Research Center, at the University of California, Berkeley.

The Best Practices Competition showcases successful projects on UC and CSU campuses to assist campuses in achieving energy efficiency and sustainability goals. Funding for *Best Practices* is provided by the UC/CSU/IOU Energy Efficiency Partnership.



Pacific Gas and
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