The Veterinary Medicine 3B project is a research facility that will house students and faculty of the School of Veterinary Medicine beginning in 2013. The building will contain laboratories, laboratory support, research office space, academic and administrative offices, and a small animal vivarium. From the start, the design team developed an “open” laboratory floor plan, providing flexibility and adaptability to future programmatic changes. Many of the sustainable strategies, such as bringing in daylight to the open floor plan zone by providing glazing between perimeter offices and open office space, will serve to reinforce the flexible nature of the office space. The open floor plan will encourage student-faculty interaction, collaboration between different research teams, and shared use of equipment. By locating the majority of work and office space in the open office zones and isolating the more ventilation-intensive lab space, the team optimized the percentage of space that could be served by natural ventilation and operable windows.

The “open” laboratory floor plan will foster research team interaction and optimize daylit work space.

The building will have an extensive rainwater and reclaimed water system, capturing storm water from the roof and recycling waste water from the Aquatics Lab. Rain water will be collected, providing sufficient water for dual-flush, low-flow toilets for seven months each year. The storm-water infiltration basin will serve as an overflow receiver for reclaimed water and also create a prominent landscape feature. The landscape team minimized water use, limiting lawns to a small area on the north side of the building, and taking advantage of tree canopies for shading the south side of the building. The design team carefully analyzed programmatic relationships and utilized horizontal fire exits to optimize occupant circulation and space ease-of-use, and as a result, the overall building area was reduced by 15% from the expected area. This decrease in gross-square-footage reduces construction costs as well as future energy demand. The design team’s use of building information modeling (BIM) from concept design through construction documents led to an efficient and well coordinated design that allowed for variables related to daylighting, electric lighting, and envelope design to be tested quickly. The design team carefully analyzed the massing, orientation, and facade strategy of the building in relation to daylight and solar gains using both computer software and physical models. Early energy modeling in the concept stage led to a complete change in orientation for the building from a plan organized lengthwise from north to south to one elongated from east to west. This decision limited the solar gain during early morning and late afternoon. As a result of more detailed modeling, the

UC Davis, Veterinary Medicine 3B

Integral to the success of the Veterinary Medicine 3B project was a design approach that, from the start, considered and analyzed numerous sustainable strategies while keeping an eye on budget limitations. The team examined every aspect of the program to develop an innovative approach to the lab building that would meet the needs of its future occupants.
western half of the building was bent northward and vertical fins were added to the eastern half to further decrease direct solar penetration, heat gain, and glare. Interior light shelves were also added on the south side to bounce sunlight further into the interior space.

In terms of lighting, a task-ambient strategy was developed with LED task lighting and T8 indirect/direct ambient luminaries to supplement daylighting. By repeating office and lab space room layouts as much as possible, the design team was able to conduct careful daylighting analysis for each room type and apply the resulting daylighting strategies throughout the building. Personal control is balanced with automatic controls for adjusting both the lighting and HVAC systems. Occupant sensors for overhead lighting will be supplemented by personal task lighting. Closed office spaces will be provided with individual thermostats.

In order to reduce energy demand and downsize the HVAC system, the design team separated personal workspaces from lab areas, reducing the total lab area that will require high ventilation rates.

The ventilation system is designed with occupancy sensors to enable unoccupied night setback from 6 to 4 air changes per hour when labs are vacant. The university also analyzed the plug loads of lab researchers on campus to accurately predict the loads and size cooling equipment appropriately for the new facility. The research labs also required a large amount of archival storage in ultra cold freezers. In order to drastically reduce energy use, the freezer farm will be cooled largely with ambient free cooling, taking advantage of the local climate’s extreme diurnal temperature swings.

In the office spaces, operable windows will allow for natural ventilation and occupant control. The main lobby will include a radiant slab and louvers that will use natural ventilation for cooling when climate conditions allow for it. The central stair tower is designed to utilize the stack effect to draw warm air from the main lobby and surrounding office spaces, and to exhaust the warm air through rooftop ventilators, eliminating the need for additional
cooling and ventilation in the stairwell and decreasing cooling loads in the lobby and offices. Enclosed office spaces will be conditioned with radiant ceiling panels. Ventilation air in these offices will be delivered at desk height, giving occupants the ability to control airflow direction. Open office areas away from the building perimeter, open labs, and closed labs will use active chilled beams for space cooling, decoupling the cooling loads from ventilation needs. A heat recovery system reduces heating energy by taking the heat exhaust in the labs and using it to pre-heat the supply air.

**LESSONS LEARNED**

Bill Starr, project manager at UC Davis, states that the success of the project depended on getting a great design team together that was ready to creatively problem solve and not hesitate to challenge aspects of the project program. The value of brainstorming potential approaches was emphasized from the start. Before hiring the design consultants, the university worked collaboratively in three-hour problem solving workshops with potential design firms, rather than the typical interviews in which firms present only past projects. From the start, the design team solicited feedback from future building users, and kept decision makers constantly informed so that decisions about cost and sustainability could be made quickly and efficiently. A fully integrated cost and constructability review tested and evaluated each concept, reducing the need for redesign and value engineering in later design phases. This cost savings approach allowed the team to keep unique aspects of the project in the budget, such as the glazing between perimeter, private offices and open offices that allows for increased natural light in more interior zones of the building and decreases electrical lighting.