During the planning process, the building maintenance supervisor considered a profile of the energy use characteristics of a similar facility built in nearby Long Beach. Based on this profile, the utility bills for the new police headquarters were estimated at about $80,000 a month.

During the first year of operation, the building has been averaging around $50,000 a month in energy costs. The supervisor attributes these savings to the extra attention paid to designing a well-integrated, efficient building.

Police Facility Optimizes Savings Using Integrated Energy Solutions

When officials at the City of Santa Ana realized they had outgrown their previous police facility, they decided it was time to evaluate all their options for a new headquarters building. While the staff concentrated on providing features in the new facility that would most efficiently serve the public, they also encouraged their design team to deliver a structure that would operate with optimum energy efficiency.

The new facility consists of two adjoining four-story buildings and a separate building that houses a parking garage and a two-level firing range. The administration building contains approximately 191,000 square feet of floor space. It includes a large two-story entry lobby, offices, lunchroom and community room, locker and exercise areas, and storage rooms. Two atriums extend from the first floor to the roof in the center of the building providing natural light to the surrounding spaces. The adjacent holding facility has approximately 142,000 square feet of floor space. It includes inmate cells and dayrooms on the upper two floors as well as administrative support areas, a kitchen, laundry, and an intake area on the first two floors.

Three characteristics of this project provided an uncommon opportunity to reduce the overall energy use of the planned facility—the presence of a holding facility with a live-in population, 24-hour a day operation, and owner occupancy.

An on-site holding facility creates a large domestic hot water load, as hot water is required for laundries, showers, and cooking. At the same time, the building always has at least a small cooling load, which is a constant source of waste heat. By including a small chiller in the central plant, sequencing it to operate first, and using a plate and frame heat exchanger rather than a cooling tower, an average of 10 degrees of heat is recovered for preheating hot water.

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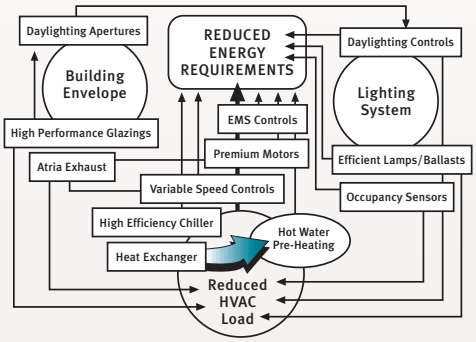

To offset the potentially large lighting loads associated with around-the-clock operations, the design team carefully studied lighting control opportunities. The final package of strategies includes daylighting systems utilizing the two atriums and strategically placed skylights, along with high-performance glazings, efficient lighting fixtures, occupancy sensors, and energy management system controls.

Several fenestration types were incorporated into the final design to maximize visible light through the apertures while minimizing heat gain into the buildings. The atrium glazing consists of insulating units with a low-emissivity coating and a 50 percent ceramic frit. A low U-value diffuse glazing is used for the translucent roof over the lunchroom, adjacent corridor, and community room. All vertical window glazing is single-pane glass with a high-performance green tint.

Lighting in the office areas incorporates high-efficiency luminaires with T-8 lamps and electronic ballasts. Compact fluorescent fixtures are used in circulation areas, and metal halide lamps are employed in high-ceiling areas such as dayrooms in the holding facility. Since the staff are frequently away from their desks, occupancy sensors are employed in the open office areas, as well as in enclosed, intermittently used areas such as locker rooms and storage areas. Using occupancy sensors to control light fixtures allows energy use to be reduced throughout the full 24-hour operation. At night the occupants appreciate having lights come on automatically when they enter a space.

Lighting energy savings are also realized by using the energy management control system, rather than photocell controls, to turn off lights in many areas. During the day, workers are essentially unaware that the lights are off in areas with access to natural light. These areas include the corridors adjacent to vertical glass, the lunchroom, and the community room. A similar strategy is used in areas with skylights such as the atrium areas and the dayrooms of the holding facility.

Designers were also able to utilize the atriums in a second way to enhance the overall energy efficiency of the building. Exhaust fans are installed at the top of each atrium to provide a portion of the required building exhaust as well as mitigate the increase in cooling load caused by the large glazing area. The facility cooling loads were further reduced by using high-efficiency filters in the firing range to allow a significant reduction in the amount of outside air required in this area.

While the property manager for the police facility initially questioned the wisdom of not placing any office space next to the windows, she says she now understands. With no walls to block the daylight from penetrating the building core, everyone's environment is enhanced. "People love the natural light," she says enthusiastically.