RESULTS

The daylighting features incorporated into the 15,000 sq. ft. office building reduced the need for electrical lighting during normal operating hours which, in turn, reduced the cooling requirements and allowed the building designers to downsize the heating-ventilation-air-conditioning (HVAC) system. Extensive monitoring of this building demonstrated that annual lighting energy (kWh) consumption was reduced by 32 percent. In addition, the daylighting features saved dollars by reducing kW demand and HVAC equipment costs.

Employees have reacted favorably to their office space. Here are some comments from recent employee surveys:

“I love the space!”

“I feel the daylight is easier on the eyes than electric light.”

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“The atmosphere created by the light is calming and easy to work with.”

“Customers comment on the lighting every day. They find it very pleasant and pleasing to the eyes.”

RESOURCES

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- Architect: Brian Congleton, Architect AIA, Carmel, California
  831-626-1928
- Daylighting Design: Eley & Associates, San Francisco, California
- Dimmable Ballasts: Advance Transformer Co., Rosemont, Illinois
  www.advancetransformer.com — 1-800-372-3331
- Lighting Designers: Flack + Kurtz Consulting Engineers,
  San Francisco, California/www.fk.com — 415-398-3833
- Skylights & Automated Louvers: Sunoptics Prismatic Skylights
  www.sunoptics.com — 1-800-289-4700
- Photo & Motion Sensors: Sensor Switch Inc., Sacramento, California
  www.sensorswitchinc.com — 1-800-338-7633
- Window Films for Spectrally Selective Glazing: Southwall Technologies,
  Palo Alto, California/www.southwall.com — 1-800-365-8794

ADDITIONAL CONTACT INFORMATION

Pacific Energy Center, San Francisco, California

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The four-year-old California State Automobile Association (CSAA) district office in Antioch, California, has features in its successful daylighting design that are being considered for use in the company’s offices nationwide. The office space at CSAA in Antioch offers a spacious interior with high ceilings, advanced skylights, high-performance glazing, perforated blinds, and automated lighting controls that provide a bright and comfortable space.

**DAYLIGHTING INITIATIVE**

**CSAA · ANTIOCH CA**

**DAYLIGHTING AT CALIFORNIA STATE AUTOMOBILE ASSOCIATION**

The four-year-old California State Automobile Association (CSAA) district office in Antioch, California, has features in its successful daylighting design that are being considered for use in the company’s offices nationwide. The office space at CSAA in Antioch offers a spacious interior with high ceilings, advanced skylights, high-performance glazing, perforated blinds, and automated lighting controls that provide a bright and comfortable space.

**DAYLIGHTING FEATURES OF CSAA, ANTIOCH**

The original two-story design was changed to a single-story layout that uses daylight from skylights and perimeter windows as a primary lighting source. The lighting system was re-designed using T-8 and compact fluorescent technology to provide the required illuminance of 30–40 footcandles (fc) in the main work areas and 50–60 fc in task lights at desks. In this way, the design team developed a lighting system that maximized energy efficiency and provided a good working environment in a cost-effective manner. This was done through the use of physical daylighting models along with DOE2 energy simulation analyses.

**DOR2** is an hourly-hour thermal and energy simulation program that dynamically models a building’s energy consumption for a full year.

**SKYLIGHTS** In the center of the building, the ceiling height is raised to 15 feet while the perimeter ceiling is at 10 feet. A higher ceiling allows for a uniform daylighting distribution over the workstations. Twenty-nine triple-pane, acrylic, low-gain skylights, spaced approximately 20 feet apart, equivalent to 7.7 percent of the floor area, distribute daylight throughout the office. Skylight wells are slanted at 45-degree angles to provide optimal light quality and distribution. Skylights and high ceilings also enhance the architectural character of the building and give a feeling of spaciousness.

**LOUVERS** Louvers installed at the top of the skylight wells are controlled by photocells. Three daylight-sensitive controls open and close louver to continuously modulate the amount of light entering the building and maintain illumination at glare-free levels (~70 fc).

**BAROMETRIC EXHAUST VENTS** Barometric exhaust vents on each skylight provide building pressurization control and exhaust heat from skylight wells to reduce heat gain throughout the building.

**DURABLE ELECTRONIC BALLASTS** Dimmable electronic ballasts are incorporated in highly efficient T-8 fluorescent fixtures to allow continuous dimming control and continuous dimming reduces light output from 100 percent to 20 percent and power input from 100 percent to 40 percent as the daylight decreases. When the daylight illumination exceeds 60 fc, the electric lighting shuts off. Combination light and motion sensors also activate the lighting system when a space is occupied. A second photocell turns lights on and off at specified light levels.

**WORKSTATION LIGHTING** Workstations requiring enhanced lighting levels are equipped with fluorescent arm-mounted or under-ambient-mounted task lights. Both types of task lights use compact fluorescent lamps with electronic ballasts.

**GLAZING AND WINDOW BLINDS** Low-U-value, spectrally selective windows reduce thermal energy transfer and maintain comfortable environmental and visual conditions. To achieve optimal performance, light transmittance and shading coefficient characteristics were selected for each window based on the building’s orientation. Fixed-perforated window blinds provide glare control without decreasing visibility. There’s a bright, airy, and spacious feel to the space,” says Office Supervisor Janet Burns. “It’s a real morale booster for employees.”

**CSAA, ANTIOCH – AN ACT2 DEMONSTRATION SITE**

California State Automobile Association’s district office in Antioch, California, is one of nine PG&E ACT2 – Advanced Customer Technology Test For Maximum Energy Efficiency – demonstration sites that have tested energy efficiency and cost-effective packages of advanced technologies. The Antioch building includes energy-saving technologies and design features that reduced total energy consumption by 14 percent. (See ACT2 CSAA Commercial Site Impact Evaluation Report on the following web site: www.pge.com/pec/act2.)
DAYLIGHTING AT CALIFORNIA STATE AUTOMOBILE ASSOCIATION

The four-year-old California State Automobile Association (CSAA) district office in Antioch, California, has features in its successful daylighting design that are being considered for use in the company’s offices nationwide. The office space at CSAA in Antioch offers a spacious interior with high ceilings, advanced skylights, high-performance glazing, perforated blinds, and automated lighting controls that provide a bright and comfortable space.

DAYLIGHTING FEATURES OF CSAA, ANTIOCH

The original two-story design was changed to a single-story layout that uses daylight from skylights and perimeter windows as a primary lighting source. The lighting system was redesigned using T-8 and compact fluorescent technology to provide the required distribution of the floor area, distribute daylight throughout the office. Skylight wells are spaced at 45-degree angles to provide optimal light quality and distribution. Skylights and high ceilings also increase the architectural character of the building and give a feeling of spaciousness.

LIGHT SENSITIVE CONTROLS

LOUVERS: Louvers are installed at the top of each skylight well and are controlled by photocells. These daylight-sensitive controls open and close louvers to continuously modulate the amount of light entering the building and maintain illumination at glare-free levels (~ 70 fc).

BAROMETRIC EXHAUST VENTS: Barometric exhaust wells in each skylight provide ventilation of the building’s interior and reduce heat loss from the building.

BAROMETRIC EXHAUST VENTS

DIMMABLE ELECTRONIC BALLASTS: Dimmable electronic ballasts are incorporated into high-efficiency T-8 fluorescent fixtures to allow continuous dimming control and maintain interior light levels. Continuous dimming reduces lighting energy output from 100 percent to 20 percent and power input from 100 percent to 40 percent as the daylight increases. When the daylight illumination exceeds 60 fc, the electric lighting shuts off. Combination light and motion sensors also activate the lighting system when a space is occupied. A second photocell turns on lights when skylights provide less than 30 fc. Total installed lighting power is about 10.3 kW, requiring enhanced lighting levels are equipped with compact fluorescent lamps with electronic ballasts.

GLAZING AND WINDOW BLINDS

Low-E, spectrally selective window reduces thermal energy transfer and maintains comfortable environmental and visual conditions. To achieve optimal performance, light transmittance and shading coefficient characteristics were selected for each window on the basis of the building’s orientation. Fixed-glazed perforated window blinds provide glare control without decreasing visibility.

“There’s a bright, airy, and spacious feel to the space,” says Office Supervisor Janet Burns. “It’s a real morale booster for employees.”

CSAA, ANTIOCH – AN ACT® DEMONSTRATION SITE

California State Automobile Association’s district office in Antioch, California, is one of nine PG&E ACT® Advanced Customer Technology Test For Maximum Energy Efficiency demonstration sites that have tested energy efficiency and cost-effective packages of advanced technologies. The Antioch building models energy-saving technologies and designs features that reduced total energy consumption by 44 percent. (See page 23, California State Automobile Association’s district office in Antioch, California.)
RESULTS

The daylighting features incorporated into the 15,000 sq. ft. office building reduced the need for electrical lighting during normal operating hours which, in turn, reduced the cooling requirements and allowed the building designers to downsize the heating-ventilation-air-conditioning (HVAC) system. Extensive monitoring of this building demonstrated that annual lighting energy (kWh) consumption was reduced by 32 percent. In addition, the daylighting features saved dollars by reducing kW demand and HVAC equipment costs.

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www.advancetransformer.com — 1-800-372-3331


Skylights & Automated Louvers: Sunoptics Prismatic Skylights

www.sunoptics.com — 1-800-289-4700

Photo & Motion Sensors: Sensor Switch Inc., Sacramento, California

www.sensorswitchinc.com — 1-800-338-7633


ADDITIONAL CONTACT INFORMATION

Pacific Energy Center, San Francisco, California


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