



DAYLIGHTING *initiative*

Design tools and information from PG&E

Industrial Application

Retail Application

School Application

Restaurant Application

Museum Application

Office Application



Dena Boer Elementary School

Getting Brighter At Dena

Daylighting an entire school — with



PG&E'S DAYLIGHTING INITIATIVE

PG&E's Daylighting Initiative has two goals: to raise awareness of good daylighting practice within the design community and to improve the practice of daylighting design. This case study is one of a dozen case studies undertaken within the initiative. Together, they document a wide range of successful technical solutions demonstrated across a number of different commercial applications.

The Daylighting Initiative includes projects that will make better design tools available to the daylighting design community. The Desktop Radiance project, a collaborative effort of Lawrence Berkeley National Laboratory and PG&E, is bringing the powerful Radiance lighting simulation capabilities into the practical world of architectural CAD software. The Daylighting Initiative also includes a series of workshops and seminars at the Pacific Energy Center in San Francisco. For more information, visit the project's web site at www.pge.com/pec/daylight.

The Dena Boer Elementary School in Salida, California is part of a continuing tradition of building well daylit schools within the Salida School District. Working within a standard construction budget, the architect placed a priority on creating pleasant interior spaces. Daylighting was used throughout the entire school at the same cost of building a typical school. The design incorporates deep overhangs at vertical windows and advanced prismatic skylights that provide balanced, high-quality light and a good learning environment for students. Built in 1997, the school operates on a year-round schedule.

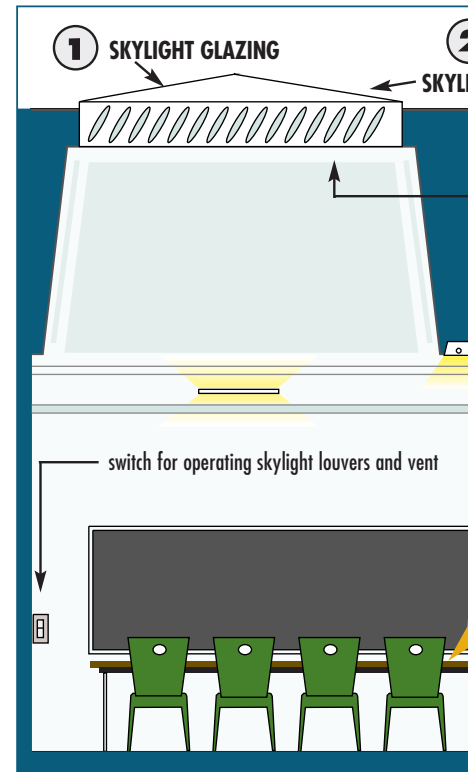
DAYLIGHTING FEATURES AT DENA BOER ELEMENTARY SCHOOL

1 SKYLIGHT GLAZING

Each skylight is triple-glazed with a prismatic, spectrally selective, acrylic material. Prisms refract light throughout the room, eliminating direct beam sunlight and visual "hot spots." The spectrally selective glazing allows much of the available visible light to pass through the skylight into the building interior. At the same time, it rejects most ultra-violet and long-wave radiation that produces heat but no visible light. Triple glazing also improves the R-value of the skylight which reduces thermal transfer across the unit.

2 SKYLIGHTS

Skylights distribute daylight throughout the building including classrooms, library, multipurpose room, and offices. The skylights and high ceilings provide pleasing classroom proportions and enhance the school's architectural character. They



provide plenty of full-spectrum light conducive to productive teaching and learning.

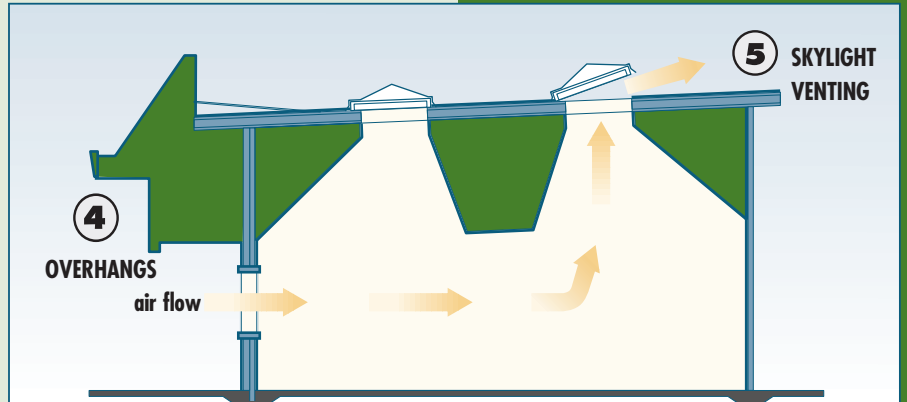
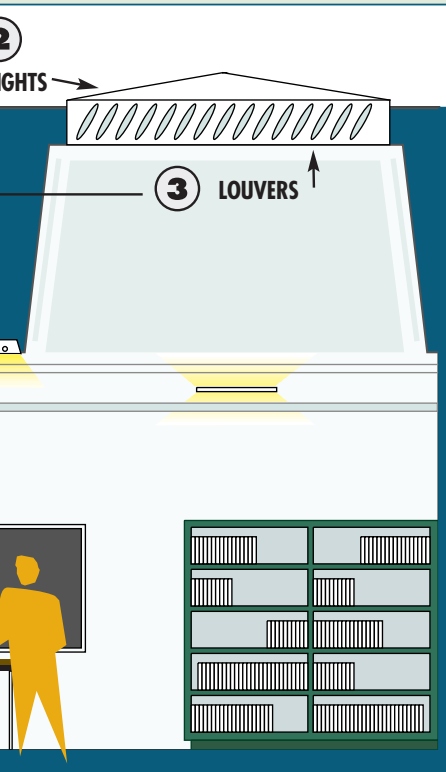
A typical classroom is lit by four 4-ft. x 4-ft. skylights set 12 feet apart on center with a well height of 17 feet. The perimeter ceiling is 12 feet. Skylight wells are splayed to reduce glare and help distribute daylight. High efficiency fluorescent lights—T-8s with electronic ballasts—are recessed in the horizontal ceiling bands between the skylight wells while wall sconces are placed strategically along the perimeter.

3 LOUVERS

Louvers installed at the top of skylight wells are controlled from an electronic wall switch so that occupants can modulate daylight levels and darken rooms as needed. At

Boer Elementary School

in a standard construction budget.



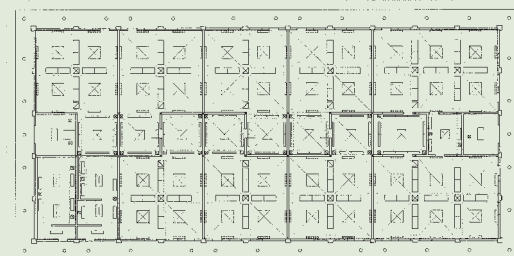
At Dena Boer Elementary School, a student is designated Skylight Monitor in addition to traditional Light Monitor duties.

“The skylights create an open, bright work environment. We just seem to have more room.”

Dena Boer Elementary School, a student is designated Skylight Monitor in addition to traditional Light Monitor duties.

4 OVERHANGS

Classrooms, the library, and many offices receive side light in addition to top light from skylights. Deep overhangs at vertical windows eliminate direct sunlight and its associated heat gain.



Skylight



Fluorescent Fixture

Skylights provide light throughout the entire school as shown in this reflected ceiling plan.

5 SKYLIGHT VENTING

In a typical classroom, one of the four skylights can be vented. It is controlled by an electronic wall switch. In conjunction with the operable windows at the building's edge, this offers the opportunity to cool the space using natural ventilation during warm periods in spring and fall.

Visitors say it sure is a pleasant place to come into.”

Rick Bartkowski
Principal
Dena Boer Elementary School



Electric lights can be turned on (Right) but daylighting alone provides quality light (Left) with sufficient illumination levels at all work surfaces.

RESULTS

The daylighting features in this 47,000 sq.ft. elementary school reduce the need for electrical lighting during normal operating hours. The pleasing effect of daylight contributes to a high-quality learning environment for students and teachers. A spot survey of conditions in the library indicate the system works well. On a clear day in May of 1998—relying solely upon daylight—library illumination levels at work surfaces measured an impressive 250 foot-candles. With the electric lights turned on, illumination levels rose to 340 foot-candles. Daylight alone is capable of providing 100 percent of lighting needs during many months of the year.

The lighting system at the school does not currently include daylight controls. Energy savings are dependent upon user behavior, requiring electric lights to be turned off when adequate daylight is available. The addition of dimmable electronic ballasts and a photocell-based control system offers a potential for energy savings that can be easily documented. Minimum projected annual energy savings of 1.85 kWh/sq.ft.-yr. or approximately \$9,000. With the emergence of simple-to-use daylight controls, the Salida School District is looking to implement these energy saving changes at Dena Boer and a new middle school.

This program is funded by California utility customers and administered by Pacific Gas and Electric Company, under the auspices of the California Public Utilities Commission.

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relying solely upon daylight—
library illumination levels at work
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250 foot-candles.

RESOURCES

PG&E does not endorse particular products or services from any specific manufacturer or service provider. High efficiency products and services similar to those used in this project are available from multiple suppliers. For informational purposes, PG&E notes that the following companies provided equipment or services to the project:

Skylights & Louvers:

Sunoptics Prismatic Skylights, Sacramento, California
www.sunoptics.com — 1-800-289-4700

Architects/Engineers:

Kenneth K. Kaestner & Associates, Modesto, California
1-800-KAESTNER

ADDITIONAL CONTACT INFORMATION

Pacific Energy Center, San Francisco, California
www.pge.com/pec/daylight — 415-973-7206