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Seeing the Light

5 Techniques to maximize daylighting

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MOUNTAIN *Majesty*

Daylighting with cutting-edge innovation and age-old traditions in Jackson, Wyo.

By Katherine Longfield

In mountain towns of the arid west such as Jackson, Wyo., sunlight historically played a decisive role in the built environment. Because the valley only receives sunlight 45 percent of the year and was not fully electrified until World War II, the ability to harness and utilize natural light was crucial to everyday life and thus an integral part of vernacular building traditions. Homestead cabins featured short eaves and horizontally rotated, double-hung windows to maximize natural light infiltration; typical commercial buildings included double-height plate glass windows to daylight interior merchandise; and many ranch structures were oriented with the most glazed, gable end of

TK PAD RESIDENCE LIVING ROOM, JACKSON, WYO. PHOTO BY PAUL WARCHOL.

the building oriented toward the south to capture the maximum amount of daylight.

As artificial light became increasingly efficient and popular in the second half of the twentieth century, the necessity for and use of daylighting diminished. This nationwide trend, coupled with Wyoming's low energy costs and Jackson Hole's development boom, further diminished the use of daylighting in the growing resort community. Despite the general trend away from natural light integration, the Jackson-based firm of Ward + Blake has made the practice a cornerstone of its residential, commercial and institutional projects for the sixteen years it's been in business.

Although they're both natives of the Rocky Mountain West, Ward + Blake principals Tom Ward and Mitch Blake don't attribute the consistent use of daylighting in their designs to vernacular precedents or the rise of the sustainability movement. Instead, the architects point to the pure practicality and undeniable functionality of tapping a naturally occurring light source to illuminate interior spaces. "It wasn't anything I ever had to consciously force myself to do when designing," says Ward. "It's like using mud to build an adobe wall; why wouldn't you use nature's light source to illuminate your house?"

In 2006, in the name of sustainable design, Teton County adopted the International Energy Conservation Code which limited the amount of glazing on residential structures, restricting Ward + Blake's ability to daylight interiors. The firm responded with a petition arguing that properly designed homes could remain energy efficient even with a high percentage of glazing. The county ultimately agreed with the firm's logic and has been flexible in its implementation of the glazing restriction so long as the design team can prove that the overall building envelope meets energy efficiency standards despite increased glazing.

Ward + Blake looked for other means to achieve its goal to bring in the light, turning to technology to expand its available options. Though champions of low-tech sustainable design solutions such as passive solar, the firm seeks out the best of what works — using a customized combination of techniques that include cutting-edge innovation and time-tested low-tech solutions. This holistic approach maximizes light gain as well as thermal gain, effectively minimizing energy consumption for artificial lighting while improving building occupants' experience. Blake points out that "in a town where people complain about seasonal affective disorder (SAD) stemming from a winter that seems to last from November until May, we have found that letting the light in goes a long way to offset the winter blues for our clients." Indeed, studies show that abnormalities in melatonin levels, a hormone our bodies suppress in response to light, directly influence the circadian rhythm and sleep patterns that are linked to SAD, giving weight to the firm's anecdotal experience.

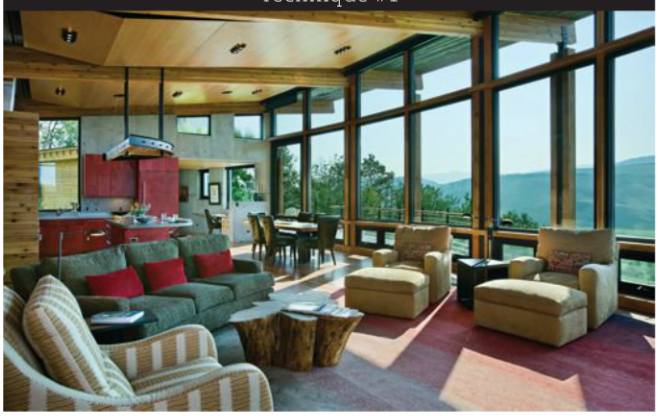
The team, comprised of site-specific designers by nature, uses the environmental conditions of a site to dictate the daylighting scheme for a given project. Likewise, the size, budget and program will determine the appropriate means to integrating natural light. "It's not a one-size-fits-all thing," Ward explains. "You have to be adaptive and see the opportunities and limitations of the site and client's needs and respond accordingly."

Here are some of the tricks the firm employs to achieve its daylit interiors:

Technique #1: Large, south-facing windows to capture natural light.

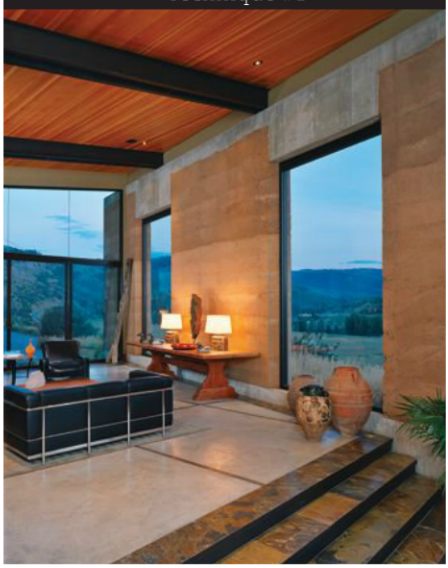
The design team often uses Solarban Z50, 60 and 70 Atlantica-tinted windows with low-emissivity coating that reduces glare, increases solar gain and features a natural appearance despite the tinting. The Solarban Atlantica-tinted windows

Technique #1

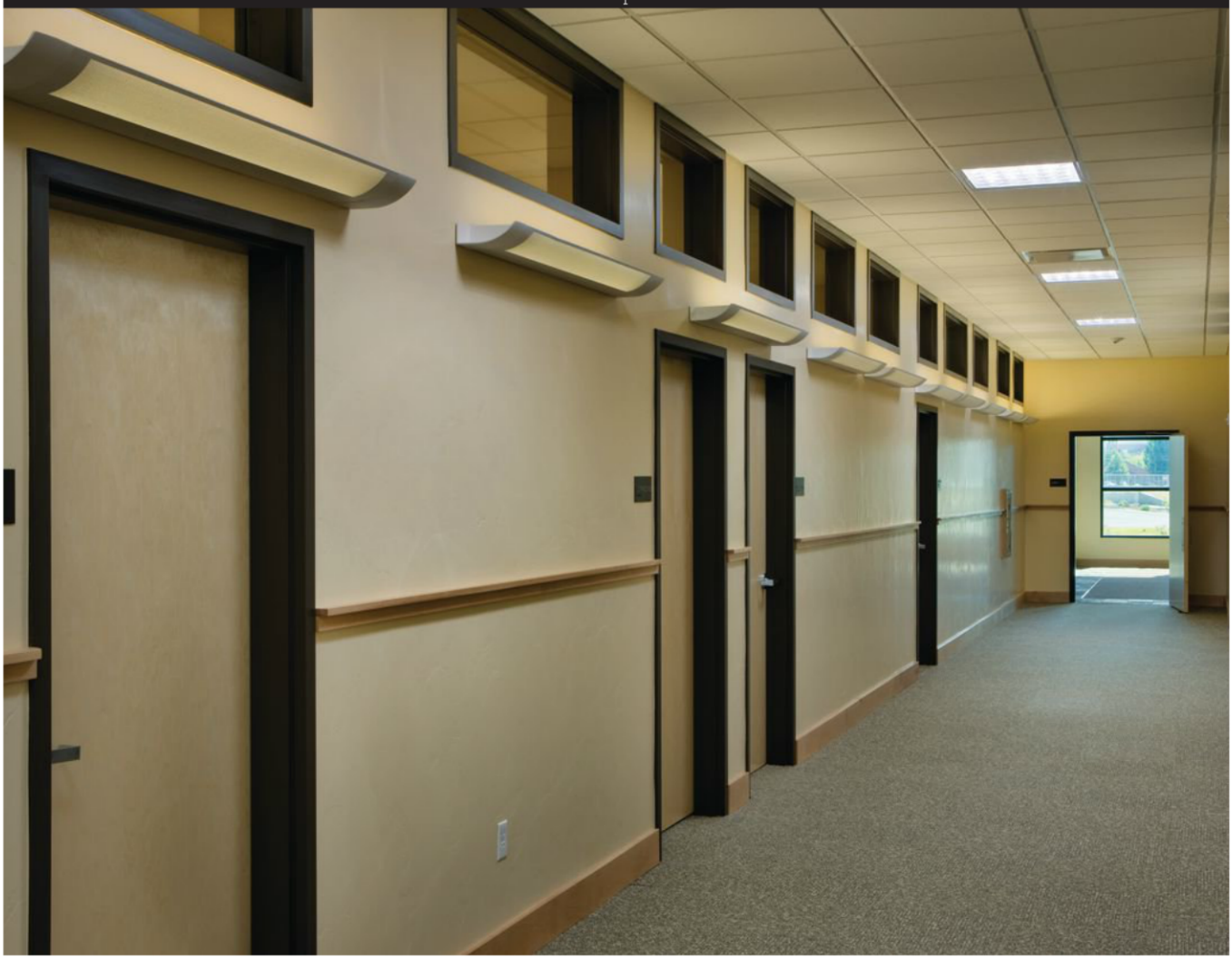


ABOVE: LANDES-OATEY RESIDENCE LIVING ROOM, JACKSON, WYO. PHOTO BY ROGER WADE STUDIOS. RIGHT: TK PAD RESIDENCE LIVING ROOM, JACKSON, WYO. PHOTO BY JK LAWRENCE.

Technique #1



Technique #2



TETON RADIOLOGY INTERIOR CORRIDOR, REXBURG, IDAHO. PHOTO BY ROGER WADE STUDIOS.

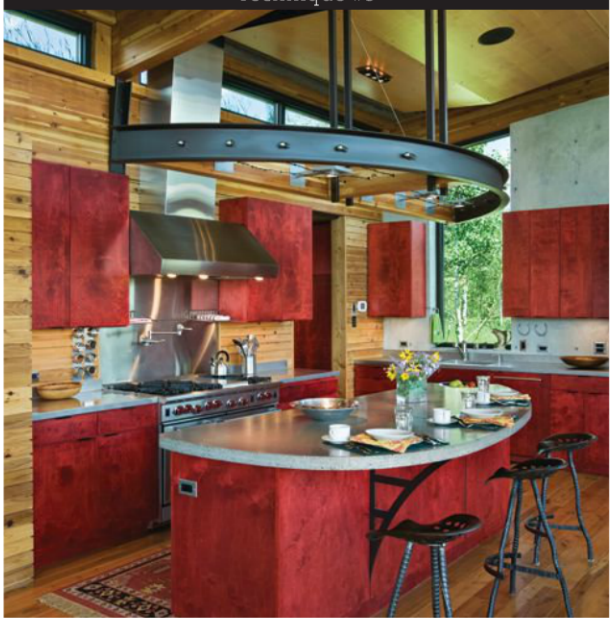
with low-emissivity coating perform multiple functions in a residence: The triple-insulated glass increases the windows' R-value for maximizing the view — a design priority in the scenic mountain area — without significant loss in energy efficiency. The Atlantica tint acts as a shading coefficient and screens out certain ultraviolet light while the low-emissivity coating traps infrared energy indoors in winter and reflects it away in intense summer sun. Nylon mesh screens installed above the windows allow residents to control the amount of sun in the living space for comfort, while the large floor-to-ceiling windows increase natural light to interior spaces, reducing the need for artificial lighting.

Technique #2: Solatubes and skylights.

Skylights — or an early version of a skylight without glass — date back to early Roman architecture and are still highly effective in providing natural light to a room that otherwise has no exposure to it. Skylights require a direct alignment between the roof and the ceiling opening in the room below and are most effective on roof slopes that receive ample sunlight.

Some newer skylight-inspired technologies can actually extend the usefulness of, and manipulate the power from, the sun's rays. These systems harvest exterior natural light and bring it to interior spaces while providing consistent intensity of light and controlling the amount of solar gain they accept depending on time of day. Most recently, Ward + Blake Architects has been using a daylighting system from Solatube International Inc. Solatube Daylighting Systems harvest daylight on the rooftop and carry it down through a highly reflective tube (which bends and can be up to 70 feet or more long), distributing it evenly into a room through a diffuser at the ceiling. The diffuser can resemble a recessed light fixture and spreads light uniformly throughout the room like a conventional light fixture. The Solatube Daylighting System relies on several patented enhancement devices, which combine to capture more light from all angles and reflect it down the tube for higher light output during early morning, late afternoon and in the winter months when the sun is low on the horizon. The system transfers the maximum amount of ambient light into a room with minimal light loss, allowing it to perform even on cloudy or rainy days.

Technique #3



LANDES-OATEY RESIDENCE KITCHEN, JACKSON, WYO. PHOTO BY ROGER WADE STUDIOS.

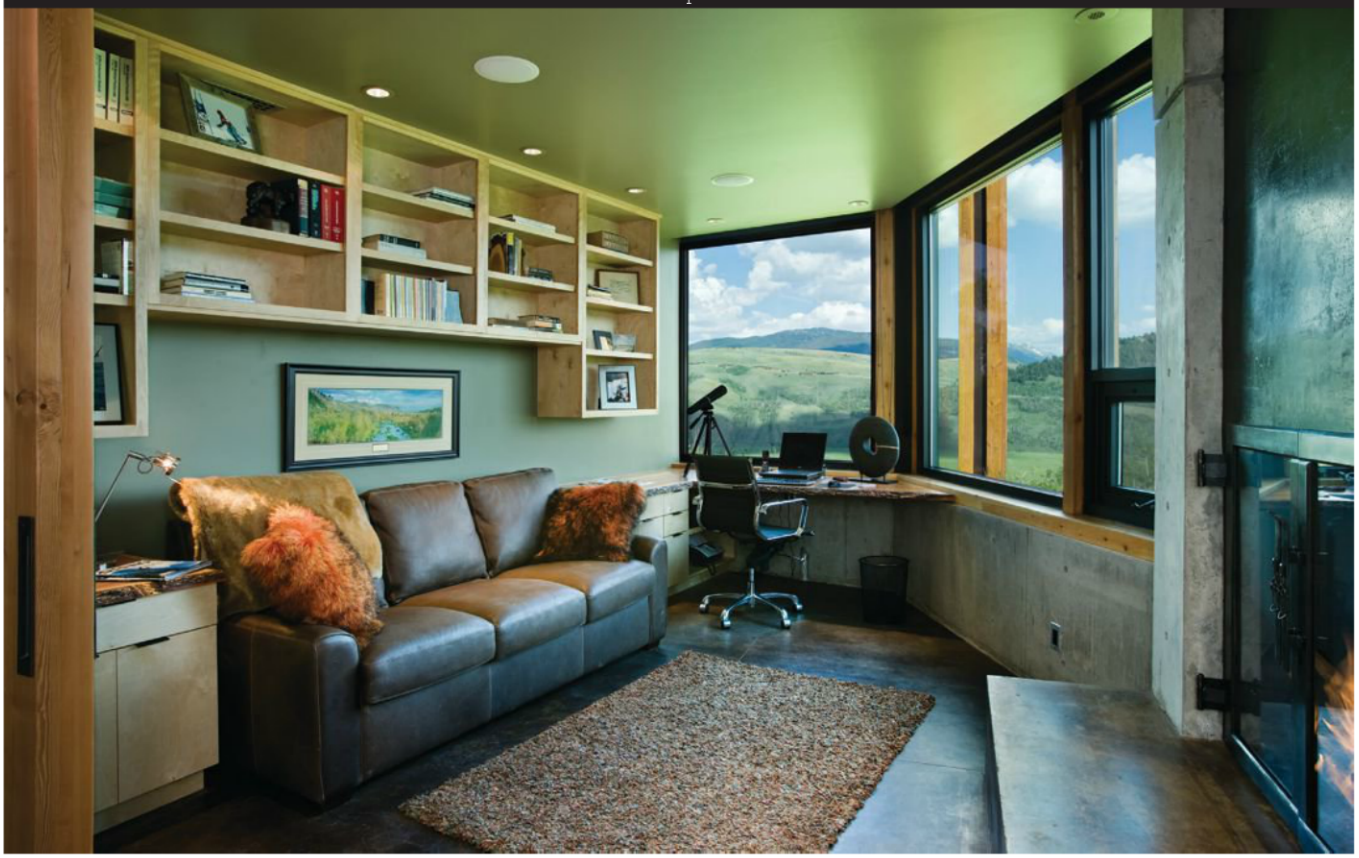
Technique #3: Clerestory windows on exterior elevations and between interior spaces.

When large expanses of glass are not practical, Ward + Blake maximizes natural light infiltration with clerestory windows on north-facing elevations. The small, energy-efficient windows provide light while limiting thermal loss. The architects particularly enjoy using these windows when they provide a glimpse to adjoining sod roofs where the swaying grasses combined with light infiltration can result in a beautiful play of light on interior walls. Used in conjunction with opposing glazed elevations, the pairing creates balanced light within the space. In the mountain setting the clerestory windows allow for a panoramic connection to the outdoor landscape that is essential for Ward + Blake's place-based designs. Ward + Blake also utilizes clerestory windows on interior walls to transfer natural light inward to less naturally lit spaces. These windows function like a band of transom windows when used in corridor.

Technique #4: Daylight spaces via grade.

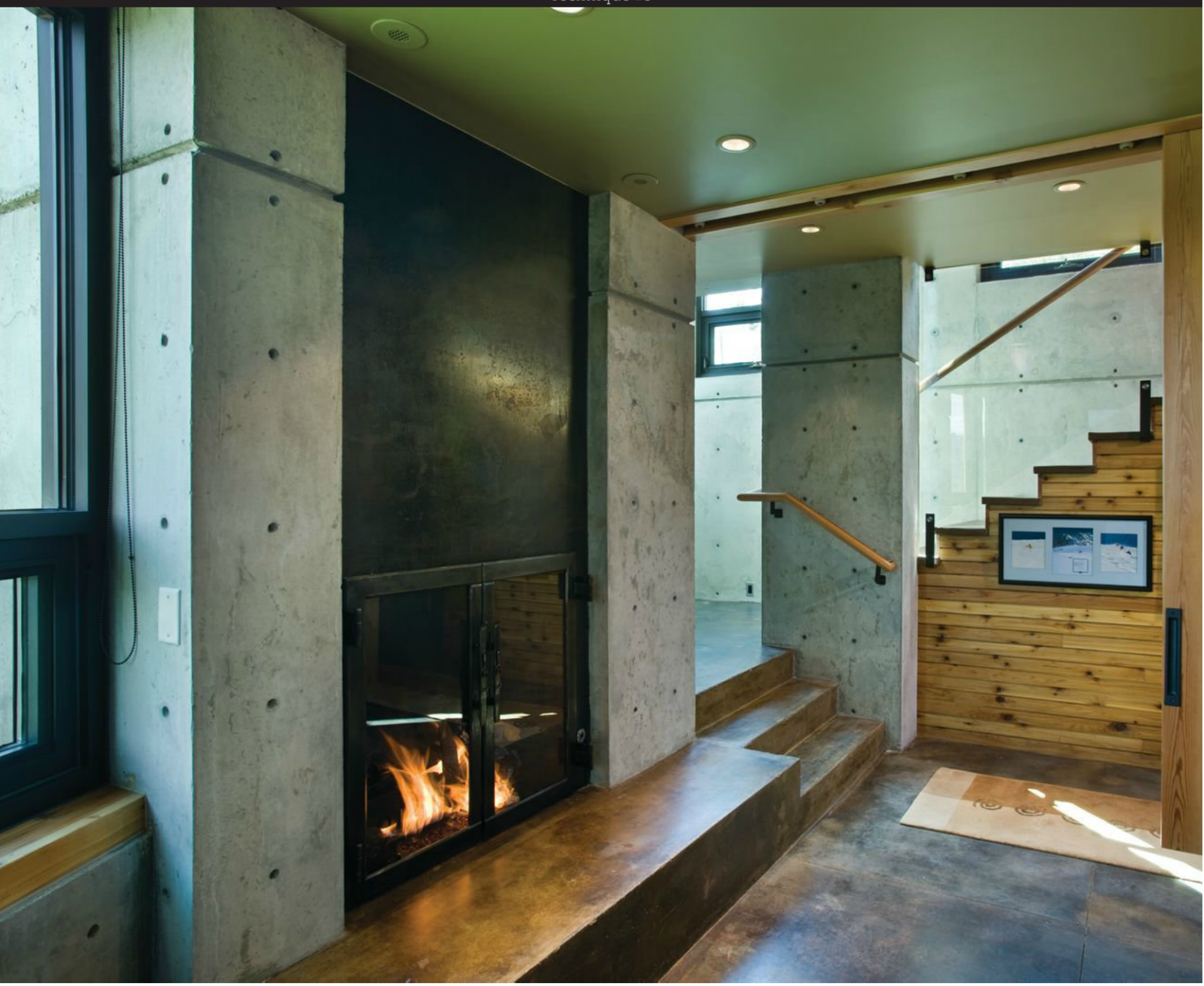
As part of the site-driven design process, when the team first visits a site it doesn't look to see how it can manipulate the topography to suit a preconceived design, it instead lets the topography and environment dictate the building massing, materials and orientation. The team looks to see if it can use the grade to optimize the potential for daylit basement rooms that retain the same inviting feel of at-grade rooms. Daylit basements require more than exterior glazing. Ward + Blake Architects enables light to travel into interior basement spaces through the use of slatted sliding door walls that provide privacy when necessary but allow for the transference of light to interior spaces when left open.

Technique #4



LANDES-OATEY RESIDENCE BASEMENT STUDY, JACKSON, WYO. PHOTO BY ROGER WADE STUDIOS.

Technique #5



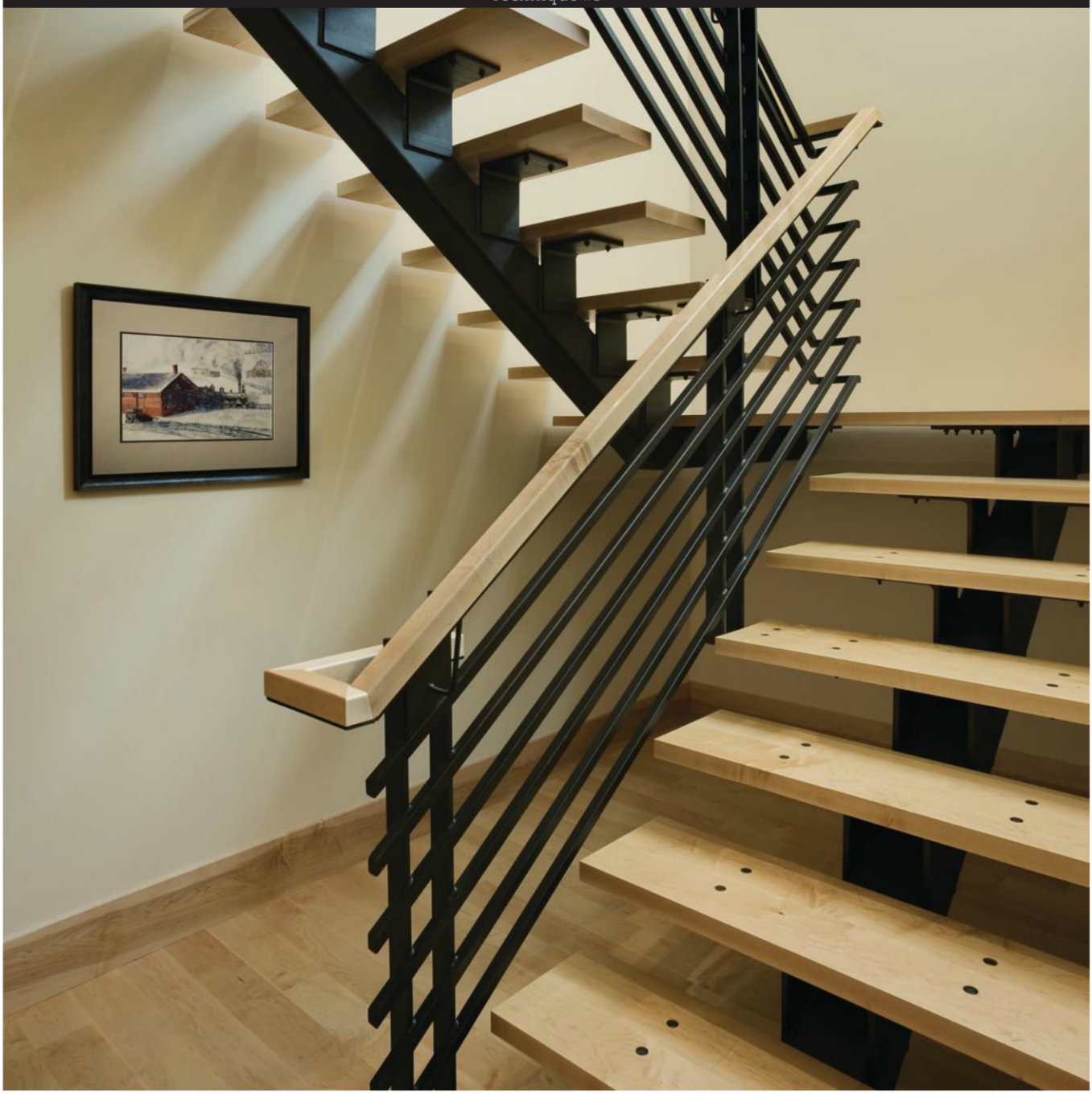
LANDES-OATEY RESIDENCE BASEMENT STUDY, JACKSON, WYO. PHOTO BY ROGER WADE STUDIOS.

Technique #5: Prioritizing spaces for daylight.

Try as the firm may to change it, Ward + Blake recognizes that not all rooms are created equal in terms of their potential to be daylit (even using sneaky high-tech devices to bring it there). Accordingly, Ward + Blake prioritizes the highest use areas in a home or commercial space for sun exposure. In the Martin-Pacifico residence for example, the team tucked the media room and guest bedroom into the darker entry-level lower floor despite the unconventional layout the configuration demanded. A custom-built metal staircase delivers visitors from the lower entryway to a sunny, glass-filled living space overlooking the valley floor. Likewise, in the Teton Radiology facility the firm designed in Idaho, the lobby features stunning large glass elevations, whereas the examination rooms and corridors are lit via Solatube lighting systems and clerestory windows.

While Ward + Blake's portfolio reflects the eclectic taste of its varied clientele, one

Technique #5



MARTIN-PACIFICO RESIDENCE HANGING STAIRCASE. PHOTO BY ROGER WADE STUDIOS.

aesthetic remains consistent: naturally lit interior spaces that provide connection to the surrounding environment. Not surprisingly, architect Tom Ward lives in one of the most daylit structures the firm has designed to date. As a result, he can tell clients firsthand the assets of living in daylit home: "There is something wonderful about living in a house where you don't have to turn the lights on until the sun is just about down," Ward says. Luckily, unlike the homesteaders who came before him, he also has the advantages of electric lights when the sun is gone. ed+c

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