Designing a House for the Sun: 4 Strategies

Orient the house and windows to ensure that all important spaces receive abundant, balanced light

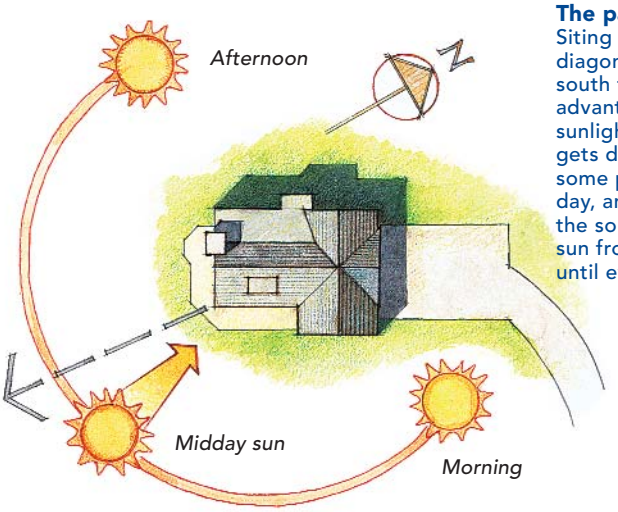
BY MAX JACOBSON, MURRAY SILVERSTEIN AND BARBARA WINSLOW

Humans are comfort-loving creatures: We turn toward the sun, seeking its light and warmth, needing it to nourish both spirit and body. The intensity of sunlight is so great that no artificial light can approach it, and it offers a complete color spectrum not present in most artificial lighting. When we build, homes should be located and organized to allow all important spaces to receive abundant natural light.

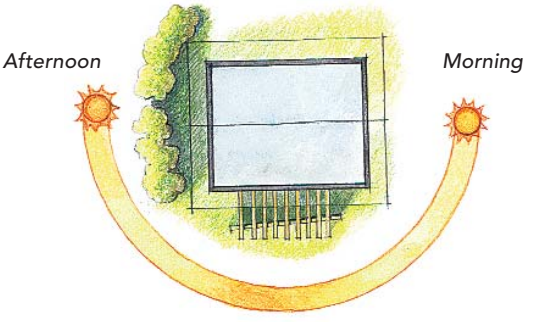


Light filtered through the vine-covered open framing *at the edge of this roof softens the bright summer sun yet creates a protected sunny pocket after the leaves have fallen in winter.*

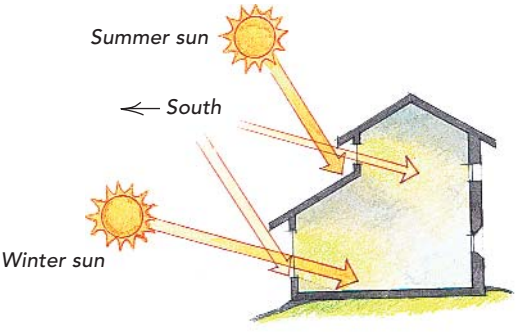
1 LOCATE THE HOUSE ON THE SITE SO THAT LIGHT IS MANAGED EASILY



The path of the sun
Siting the building diagonally to the south takes maximum advantage of available sunlight. Every room gets direct sun at some point during the day, and the rooms on the south corner get sun from morning until evening.



Shade the windows during the heat of the day
As the sun moves from east to west, the heat of the day increases and with it the need for shading south- and west-facing windows and doors.



Deep eaves provide summer shade and admit winter sun
In summer, the sun is higher in the sky than in winter. This fact allows windows to be protected from summer heat gain by deep eaves while still allowing the low winter sun to enter the house.

Illustrations: Gary Williamson

This single step probably has more effect on our perception of comfort than any other aspect of home design.

Consider the sun's path

The sun brings light and heat. This heat may be welcome in winter, but not in summer (photo facing page). In planning window and skylight locations, solar-heat gain is as big a consideration as admitting daylight. The rising sun is low, and east-facing windows receive direct light (drawing facing page). If you're an early riser, exposure to this eastern light enhances morning activities—waking up, eating breakfast, bathing—as the body responds to daylight by becoming more alert (photo below). In most climates, mornings are cool, overheating is not a big concern, and east-facing windows can admit light with minimum need for solar protection.

The sun is higher in the southern sky in summer than in winter; deep overhangs or shading devices above south-facing windows capitalize on this difference to keep out the midday sun during the hottest months, but to allow heat gain in winter. Other ways to let in winter sun while preventing summer overheating include trellises with deciduous vines, sunshades with angled louvers or tall deciduous trees planted on the south side; these strategies can have a major impact on the building's thermal comfort and still allow light and view.

Western light needs to be managed; as the sun goes lower in the sky, west-facing windows receive horizontal rays of light that enter below roof eaves or sunshades. On summer afternoons, the sun can be too warm: Excluding it requires a barrier between the window and the sun, blocking out views as well as light. Landscape elements such as trees to the west can provide seasonal

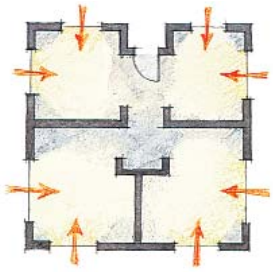
2 TO BALANCE LIGHT, SHAPE THE HOUSE SO THAT LIGHT CAN ENTER EVERY IMPORTANT ROOM FROM AT LEAST TWO SIDES



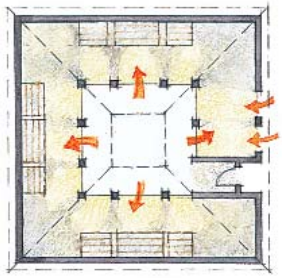
Windows on two sides fill this stair landing with light, *creating an inviting place to stop and linger.*



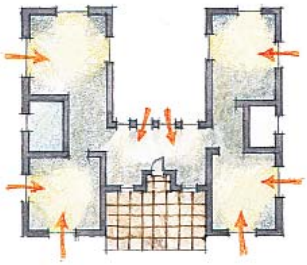
Morning sun helps the body to awaken gradually *in response to the increasing light level; the southeast-facing window and dormer in this master bedroom ensure that sleepers know when the sun has risen.*



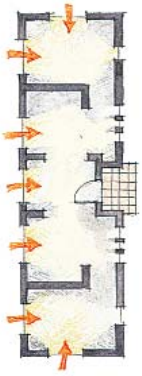
Located with one corner facing south, the simple four-square allows light into two sides of each corner room.



On tight sites, an innovative strategy is to wrap the house around a courtyard or atrium, or to provide skylights or roof monitors to light the center of the house from above.



A house with wings assembles pieces of a long, thin house form to create rooms with the potential for light on two or three sides.



Long, thin houses allow light to enter from two sides of most rooms.

protection. Or west-facing windows may require adjustable window coverings: Awnings, shades, adjustable louvers and shutters all control the amount of light and heat admitted.

In the northern hemisphere, the north side of the building receives almost no sun and thus offers no opportunity for solar-heat gain. Artists and craftsmakers, however, value northern light for its even quality and its consistent color rendering. North-facing windows tend to be a major source of heat loss, so in most climates, it is best to use them carefully.

Light every room from at least two sides

As the house takes shape, a primary goal is to bring light into each room from two sides. This strategy reduces glare and increases the sun exposure each room receives (top photo, p. 75).

In a rectangular house, each corner room has the potential for windows on two sides. A long, thin house or a house shaped with long wings could have windows on opposite walls (drawing p. 75). Even the most difficult sites can capture light effectively from two sides. A house on a tight, urban site, for example, could have its rooms organized around an inner court, with the walls facing this court filled with large windows. Walls facing the property sidelines might have windows up high to provide balancing light while maintaining privacy and security.

Light from above

Although windows at eye level can provide views as well as light and offer a wide variety of shading options, many situations require light brought to a space from above (photo left). Clerestory windows can balance light from windows on the opposite side (top photo, facing page). For rooms in the center of the house, skylights may be the only option (drawing left).

Light from above can take many forms; in the simplest, it is a glazed skylight. Overhead light tends to be intense in daytime, so skylight placement has a significant impact. To create a dramatic shaft of light, high openings are ideal. In rooms with vaulted ceilings, though, a skylight can be perceived as a bright spot against a dark surround—a perception that will be less apparent if light reflects off nearby surfaces.

An opening at the edge of a room washes the wall with light, brightening that side of the room. A shelf below a skylight bounces light back onto the ceiling, and a skylight that sits at the peak of the ridge in a room with vaulted ceilings allows light from one side of the ridge to flow down the opposite ceiling. All these strategies result in a brighter space with less glare.

In spaces with attics above, a shaft through the attic is necessary to conduct light to the space below. An obscure-glass panel at the plane of the ceiling below a skylight softens light. A more dramatic approach places a skylight shaft in the attic to shape space in the room below.

Match windows to the region's climate

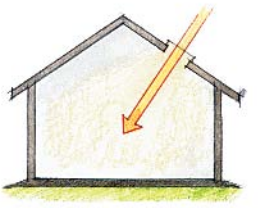
Interior light quality is strongly influenced by the size, style and location of windows, glazed doors and skylights. Strategies for sizing and placing these openings are heavily influenced by climate (drawing facing page).

In cold northern areas, conserving heat is critical. Windows tend

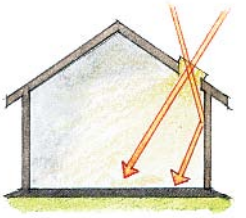
3 WHERE LIGHT FROM A SECOND SIDE ISN'T POSSIBLE, GATHER LIGHT FROM ABOVE



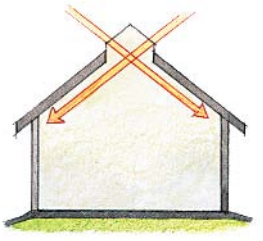
Light from the skylight *plays on the tile and reflects through water drops, heightening the bathing experience in this shower.*



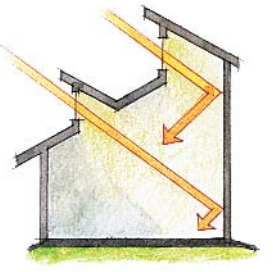
A skylight high in a ceiling admits a dramatic shaft of light, though other options result in a brighter space.



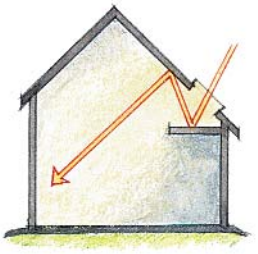
Skylight at the room edge washes the wall with light to brighten that side of the room.



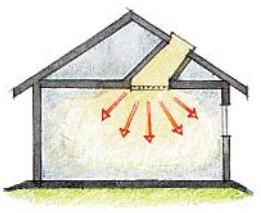
A ridge skylight allows light from one side of the ridge to flow down the opposite ceiling.



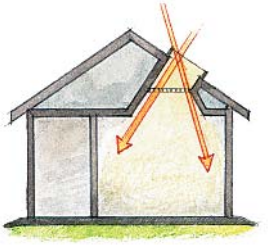
Light monitors, dormers and clerestory windows light from above, but with shading potential.



A light shelf below a skylight bounces light back onto the ceiling.



An obscure-glass diffusing panel below a skylight softens light.



Splayed shaft shapes space in the room below while filtering light.

Photo this page: Elizabeth Glasgow



The high clerestory windows fill the kitchen *with soft light. Protected by overhanging eaves, these south-facing windows don't admit direct summer sun, avoiding hot spots or glare on work surfaces.*

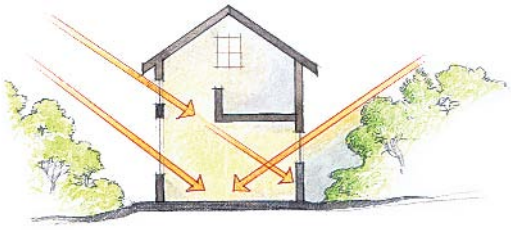


In warm climates, think of glazed doors as large windows. *Walls of glass that slide or fold to open to adjacent decks can extend both the visual and the usable space of the house.*

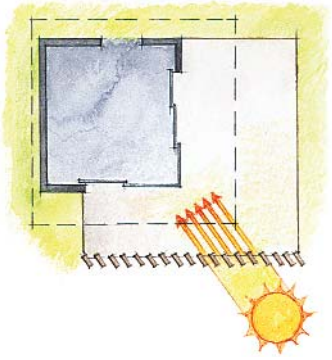
to be smaller and recessed within thick, heavily insulated walls. Traditional New England homes with small, deep-set, shuttered windows epitomize this approach. When cold climates limit the area of openings, locate windows effectively to ensure enough light in every room. Each window has the potential to be a key feature in a room, creating a special place that takes advantage of daylight.

Warm climates demand a different approach; walls dissolve as floor-to-ceiling panes of glass open the interior to the outside (photo above). Cooling shade and screening of openings play a critical role. Cross ventilation and a deep overhang to protect open windows during rainstorms may be essentials.

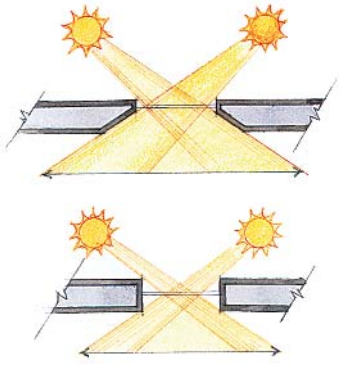
4 SHAPE AND LOCATE EACH OPENING TO SUIT BOTH THE CLIMATE AND THE ROOM



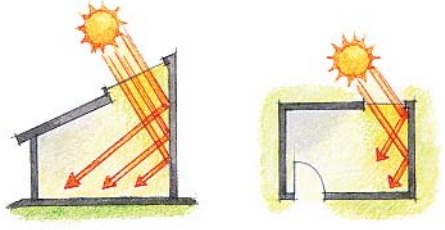
In cool climates, windows high in the wall so that they "see the sky" admit indirect bright light and allow it to penetrate deeply into the room.



In hot climates, plan or shade windows to admit only indirect light from the north or cool, early-morning light.

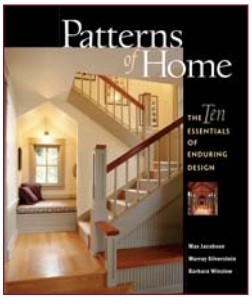


Splayed window jambs and sills admit more light by not blocking light rays at the perimeter of the window and by using the window jamb to bounce entering light.



Windows or skylights with one edge continuous with the adjoining wall allow light to flow along the surface, creating a glow, not the dark edge between light and shadow.

FOR MORE ON THIS TOPIC



This article is adapted from *Patterns of Home* by Max Jacobson, Murray Silverstein and Barbara Winslow (The Taunton Press, 2002; $34.95; 240 pp.; www.taunton.com; 800-888-8286). Photos by David Livingston, except where noted.