

Sun Sequencing

Orientation to the sun is an organizing principle that is possibly the least expensive and most effective way to improve production housing design. The ideal sequence for designing housing with optimum sun orientation, whether production or custom, begins with one room, and then moves on to the home, the neighborhood, and the community. This sequence gives priority to the humans occupying the house. Production housing is generally planned in reverse. Engineers and land planners determine road placement, road placement determines the lot orientation, and lot orientation determines the house's orientation to the sun. This out-of-order sequence often rules out good house design and certainly rules out optimal sun orientation.

The sequence of room design relating first to the sun and then to other site considerations may be called sun sequencing. Sun sequencing is a building-block approach to house design. Homes designed in this manner may be called sun homes; their planning involves the following steps:

Step 1: Determine the target market. Design the house for a particular household with a particular lifestyle, keeping in mind that this household will evolve over time. Try to plan the house so that it can accommodate progression of the household's space requirements, or so that the structure can be easily adapted.

Step 2: Start designing the three to five rooms that are to receive priority orientation to the sun. The rooms chosen—library, kitchen, bedroom, or family room—will depend on the size, shape, and lifestyle of the target household.

Step 3: Gather the rooms selected for solar priority around outdoor spaces—for example, an alfresco dining area outside the kitchen or a morning or evening terrace outside the master bedroom—and choose a suitable building form. A detached house that embraces the sun in order to improve the whole living environment, as opposed to one that is oriented to the sun only to maximize energy efficiency, often has an L or U foundation plan.

Step 4: Select rooms and associated outdoor areas that will have secondary solar priority—for instance, a northern exposure—and a less strong indoor/outdoor relationship. Gather these rooms for the selected foundation shape and number of stories.

Step 5: The process of gathering rooms and outdoor places is complete, and strong physical and visual links between indoors and outdoors are created. Sightlines, window and door size and placement, and room shape now become important considerations. Use colored glass or window shape and depth to filter and sculpt light beams, adding character to the house. And consider various methods of suncreening.

Step 6: With the house plan complete, determine the required lot size and form. Orient the house and the lot to the sun, while considering landforms, surrounding structures and other objects, and legal and other boundaries.

Step 7: Incorporate roads and community elements. In a subdivision, three or four house plans can be designed using the sun-sequencing approach, and small clusters of, for example, three to eight homes can be placed on the property so that each cluster receives beneficial sun orientation for each home within it. The clusters of homes become building blocks. Again, with sun sequencing,

planning starts with the home and progresses out to the site.

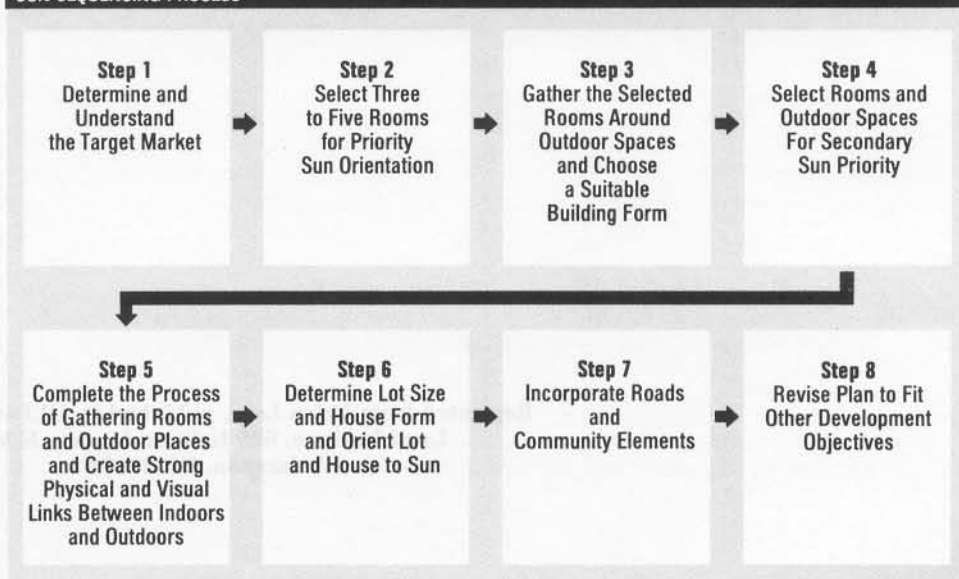
Finally, as in any development plan, revise the plan if necessary to balance sun orientation with other important objectives, such as the home and community living environment, project density, project cost, and approvals.

The value that a "sun home" provides makes it eminently marketable. Both the house and the lot will be more functional. Also, because this organizing principle focuses mostly on improving a house's quality through design rather than through spending, and because the better design achieves better value, the added costs are likely to be in balance with added revenues.

Numbers based on a hypothetical development of 21 sun homes on 7.5 acres make this case. The design calls for lots averaging 10,000 square feet with minimum 6,000-square-foot building pads; 1.5-story houses averaging 2,000 square feet; a combination of L, U, and rectangular foundations; and semidetached garages.

Direct construction costs for a traditionally designed 2,000-square-foot house would be approximately \$79,000 (\$39.50 per square foot). For a sun home, two turns in the foundation for a U plan would add about \$3,000 (\$1.50 per square foot) and

SUN-SEQUENCING PROCESS



sun-screening devices would cost around \$5,000 (\$2.50 per square foot). Thus, the added direct costs for the sun home are approximately \$8,000 (\$4 per square foot) or 10 percent. Direct and indirect construction costs (excluding land improvement costs) together add about \$10,300 (\$5.15 per square foot). (Indirect costs include permits and fees, architecture and engineering, property taxes, marketing and sales, land financing, construction financing, and profit and contingency.) Land improvement costs for a sun home on a 6,500-square-foot or larger lot are no higher than those for traditional homes.

Ordinary floor plans for comparable houses in the market are selling for \$220,000 (\$110 per square foot). The dramatically different design of the sun home should add a price premium of \$10,000.

All told, in this hypothetical development the residual value of the land decreases by only \$300 per unit (because of the relationship between revenues and costs). In fact, this may overstate the decrease; if sales for sun homes occur at a faster pace than for ordinary houses, which is likely because of the better design, the developer can save

up to several thousand dollars on financing costs and thus can gain a profit or a land-value premium.—**Mark Smith**

Mark Smith is a real estate researcher and management consultant with Pario Research in San Diego. His 25-page paper, "Redesigning Design: Improve Production Housing with an Organizing Principle," is available for \$5 from Pario, 2472 Montgomery Avenue, Cardiff, California 92007.

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