CASE STUDY HOUSE NO. 26 BY DAVID THORNE, ARCHITECT

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The underside of the house presents a clean, uncluttered appearance. The location of the utility room, kitchen and bathrooms against the hillside helped make this possible.

The architect's report:

Since first attempting hillside construction, I have been intrigued with resolving the integration of a space platform to the site without affecting the contours or natural state of the land or the occupants' feeling that they are living on a hillside.

However, on a hillside the level one-floor solution creates many awkward and ugly spaces. The designer of a residence on a steep lot is confronted with no less than six elevations, the hardest one to solve being the underside or fifth elevation. The sixth elevation or roof is easily resolved architecturally to create a pleasing form. But the fifth elevation exposing the underbelly of the house is not as easily tossed into space. This elevation creates not only an awkward, wedge-shaped space but also unnatural, flat shadows on the natural contours of the site. The more houses I do where this space is created, the more convinced I am of the necessity to study natural foliage on hillsides. The fifth elevation is more easily solved if natural shadows can be blended with the shadow cast by the underbelly. Reducing column lengths to a minimum creates a favorable shadow effect, but this becomes very difficult without resorting to extensive cantilevers or some form of step-down principle.

I think we reached a happy solution in the Case Study House. The maximum cantilever is ten feet and the maximum column height is nine feet. The site has not been disturbed in stepping down the hillside. Reduction in column height was achieved by setting the floor plane below the carport level.

The structural system is a series of nine identical rigid steel frames which were shop-fabricated by the Solano Steel Corporation. Four other steel bends form the carport roof and floor structure and the clerestory over the living and dining rooms. Field welding consisted of connecting these four bends to the living - dining rigid frames below. The other field welds were made at the juncture of the rigid frames to the foundation modulator beams. All these welding connections were temporarily field bolted to expedite field erection by the crane. Modular spacing was 10' 0" throughout except for both end bays which were increased 1 1/2" to provide identical sliding door openings and allow the end columns to be large enough to handle wind and earthquake shears.

The only earth retaining structure required was the concrete shear wall
The house at dusk with the clerestory well lighted. All light fixtures throughout the house are Presslite, carport concrete slab by Permanente Cement Company.

The steel-supported carport at the uphill level creates a good area for a landscaped patio off foyer and breakfast room.

The stepped-down design eliminates the hillside "stilt" appearance; the steel columns are only 9 feet high. The foundation pier forms are "Fibrotube" from Fibreboard Paper Products.

The carport roofline extends over the house below creating a natural clerestory.
The 10-foot-wide cantilevered deck, overlooking the golf course and the hills beyond, provides 800 square feet of deck, most of it covered. The finish over the exposed concrete aggregate is "Hillstone" concrete sealer.
at the termination of the non-structural portion of the driveway from the street. This wall has its plane perpendicular to the contour interval. Consequently, the natural drainage of the site virtually assures no hydraulic pressure build-up. Foundations are drilled caissons with an allowable soil bearing of 6 kips per square foot, since they have been drilled into the solid rock layer of the hillside. The carport drive and parking area is a conventional 5" reinforced concrete slab designed for continuity at the support.

Columns to simplify architectural detailing of sliding door frames have been rotated about their axis for the conventional rigid frame action, combining the weak axis (YY) of the column with the stiff axis (XX) of the beams, which required a slight additional weight in each column. The additional cost was easily saved in the simplicity of the connecting details.

The rotated column axis, placing stiff XX axis in the correct position in relation to the glass wall on the view side, added stiffness to this elevation and allowed the clerestory to be cantilevered from these lower columns, thus eliminating shear walls and adding to the openness of this clerestory space. Glazing of the clerestory was accomplished by gluing wood stops to the steel with 3M CTA-11 adhesive.

The house was to contain no more than 2,000 sq. ft. and was to include four bedrooms, two baths, utility room, kitchen, family room, living and
dining area. To give the living area an adequate share of space, I decided on the small bedrooms, setting the minimum bedroom size at 10 x 12 feet.

The breakfast room serves a dual function in that it is in the traffic pattern between the foyer and kitchen. The breakfast ceiling has been pierced for a space-flow visually into the 15-ft. ceiling height of the clerestory. This 5 x 5 hole introduces lighting from the clerestory and balances the natural light level in all these living spaces. The kitchen has been carefully planned and is as near the ideal doughnut-shaped kitchen as is possible. The actual cooking area has its own sink and garbage disposer. Partition cabinets allow space to flow into the breakfast room as well as the family room. The kitchen has a dead-end plan with no through traffic. This is important to families with two or three children.

The family room is closed off from the dining room by two doors — one a conventional swing door, the other an 8-ft.-wide Pella folding door. This device is always a good compromise between the private dining room and the open floor plan. Of course, with a structural steel frame, many or all of the partitions can be removed and we therefore feel the house is quite adaptable to various living requirements. The dining and living rooms have adequate space created by the clerestory, which is an extension of the carport roof. All rooms except the kitchen, two bathrooms and dressing room open onto the view deck or a landscaped service walk.

The carport is 30 x 24 with allowances in the approach driveway for additional guest parking, which is mandatory on a dead-end, hillside site.

The basic color scheme for the house was conceived during preliminary design stages, and the choice of exterior colors was dictated by the climate and the character of the surrounding landscape. The steel was painted dull gold because of the colors prevalent on the site: grays, greens, and browns. The gold color enhances the steel, blends well with the background and gives a warm feeling to the structure. Because the siding is white, medium and dark colors were chosen to emphasize architectural details: window trims, sashes, etc. The entrance, living and dining rooms are white, the kitchen and family room, a light saffron which blends with the gold of the steel. The den is gray-green, the boys' room, beige and the girls' room, apricot. All these colors harmonize well with the view outside. A light natural stain gives the wood ceiling a soft, warm look.

Furnishings were selected through S. Christian of Copenhagen, Inc. The rich teak woods of the modern Danish and Swedish pieces contrast most effectively with the exposed steelwork and the predominantly light colors of the interior. The textiles selected are mainly in the browns and golds to complement one another and the steelwork. The carpeting is a very durable yet warm-appearing brown and gold wool tweed.

One design change, other than the major flip in floor plan north to south which was previously reported (see Arts & Architecture, November, 1962), was the opening of the corners at the downhill side. This attempt to take advantage of additional light and spectacular views from the master bedroom and the family room proved very successful in its final form. Another change was the 5-foot-square hole into the clerestory above the breakfast room. This small room which serves as the transition space from the foyer to the kitchen is, I believe, the most successful area of the house. It achieves the sense of integration into or on the hill hoped for in the preliminary concept. From the breakfast room there is a view under the carport slab to a secluded, landscaped patio and another vista through the clerestory to the space frames of the carport and its foundation piers.

To repeat the piercing square theme which was started by this field design change, we introduced a series of squares at the juncture of the retaining slab and the driveway slab and grouted in glass blocks. The lighting effect, downward in daytime upward at night, is pleasant.
All kitchen appliances, oven, cook top, dishwasher, food disposer, refrigerator, are from Tappan; counter tops are white formica; cabinet work, walnut; the floor is Armstrong Montana Carlow.

LEGEND:

1. FAMILY ROOM
2. KITCHEN
3. DINING ROOM
4. LIVING ROOM
5. BREAKFAST ROOM
6. FOYER
7. BEDROOM
8. BEDROOM
9. BEDROOM
10. MASTER BEDROOM
11. DRESSING ROOM
12. BATHROOM
13. UTILITY ROOM
14. BATHROOM
15. CARPORT

Child's bedroom with sliding glass wall opening like all the bedrooms onto the deck.