The joy of building as making. One of my crews in Mexicali taking a break.

The social snobbery inherent in this view is not my point here. I simply believe that it is factually wrong, and that the works of creation made by a carpenter, or by a tile-mason, or a tile-maker, or any other maker or craftsman do have a level of difficulty, intellectually, and a level of attainment — which is potentially as great as the greatest works of theoretical physics, sometimes perhaps far greater. Thus an intellectual view which establishes making as a foundation has the potential for respectability — artistically and intellectually — which is the equal of the most profound and most elevated sciences and is not something of which we ought to be ashamed.

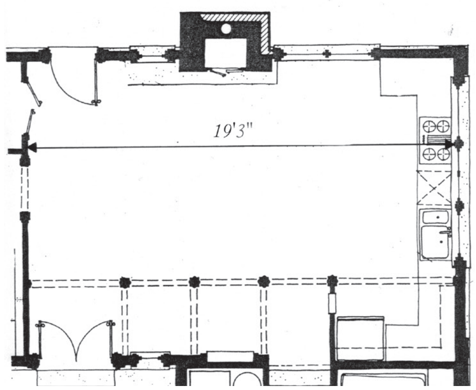
7 / THE NEAREST TENTH OF AN INCH

In most traditional buildings, the building details have a quality of shape, each one being shaped to fit where it belongs. If it is stone, the stone is cut to fit the cornice or the balustrade. If it is brickwork, bricks are cut, placed, to make whatever variety of wall, opening, ornament, and coping that is needed. If logs, the logs are carved to fit. If plaster, it is shaped according to the situation. If it is tile, it is painted, glazed, cut, and installed to order. If it is built-in furniture, it is made by hand to fit the niche. If windows, the window panes, sash, glass, glazing bars are made to order, usually by hand. The door is cut, carved, painted. The statues on the Eryctheum by the Acropolis were carved as columns to fit their circumstance, again by hand. In the Mycenean vase shown on page 605, even the vase has hand-painted lilies on it to fit the vase which was itself thrown, very likely, to fit the situation in the building.

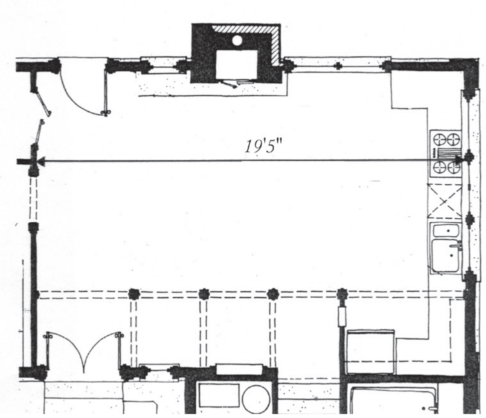
One had, in other words, an array of handmade, specially-sized, designed and built items. Each one took on the character of a center according to its situation.

All these shaped details had the quality, like the cells of a plant, or of the human body, that they are created, shaped, according to context, according to need, in such a way as to enhance the larger whole. None are prefabricated.

This is technically essential for unfolding, though it was difficult to achieve in the late 20th-century world. But the technical difficulty does not make it any less *necessary* from the point of view of life in the fabric of the building. Its life depends on its variability, on its flexibility, on the degree to which it can be shaped, and adapted, while it is being made. To understand the importance of "making" buildings in the technical sense I have defined, it is necessary to grasp fully how and to what extent the life of a living field of centers depends on getting small dimensions exactly right.



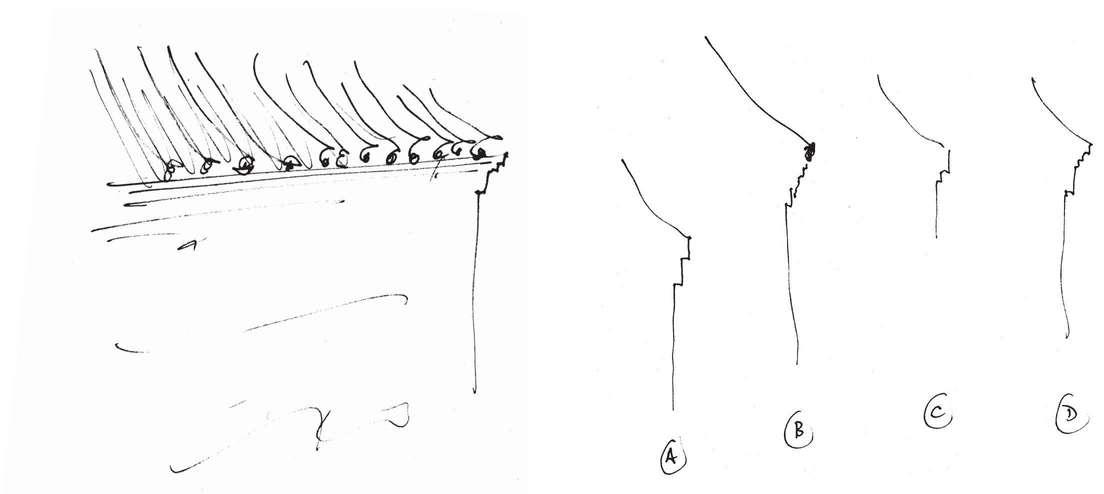
A sketch drawn from the making of the kitchen, in the Martinez House. At this length, 19'3'', the room has one feeling.



It is hard to believe, but although this is only different by two and a half inches — 19'5'' — the overall feeling, and the wholeness, are entirely different. This looks implausible on paper — indeed, these drawings contain no sense of it — but to a person standing in the room, at the time the experiment was being made, it was clear and factual.

During the course of their work with me, the one thing which all my apprentices have to do is to make judgments in real things — while these things are being made. And the one thing which astonishes them all is the extent to which life — the deep field of centers — is created, or destroyed, by minute subtleties of dimension, shape and color. If you move a line a tenth of an inch to the left the thing is good; a tenth of an inch to the right and feeling evaporates. The shape of an arch drawn in pencil on a board may be exactly right — it has a beautiful feeling. A copy of the shape, made by someone else who does not understand the centers, even if his copy is accurate to within a half inch all along the line — often has no feeling left in it at all.

I remember a case where we were placing the end wall of the main room in a house (the Martinez house in California). The room was about 16 feet wide, 19 or 20 feet long. On the site, we were trying to decide the exact position of the endwall. The house perimeter and walls were already built: the interior walls were being adjusted. We used lines, planks, and finally, a person holding a sheet of cardboard, to decide the best place for that wall. Finally, when we had it almost right, the length of the room stood at about 19 foot 3 inches. But even then, when one lengthened it to 19 foot five inches, or shortened it to nineteen foot one inch, it made a strong difference in the feeling of the room. The three lengths, though each one differed by only two inches from the next, gave three entirely different rooms. We finally chose the longest one, nineteen foot five, but it was only possible to settle it after an exhausting session, looking at each



Generic sketch of the kind of feeling desirable at the eave, to separate and connect the wall and the roof. Four different possible moldings for the roof edge: A, B, C, D. A is awkward and the steps a little too crude to be helpful. B is rather too strange to be helpful at all. Both C and D are more helpful: they make the transition and connection and gradient. Of the two, C looks to be a little better.

one, going back and forth between them, until we were sure we had the one which had the greatest depth of feeling.

Color is equally sensitive. A shade of color may be critical at a level so fine that it can only just be identified, and yet be critical. In one case, I tiled a floor in two shades — a deep green, and a pale, whitish-yellowish green. I worked out the tile arrangement, glazing the tiles with glazes from my stock, until the field of centers in the room was fairly harmonious. Then, when I had got it just right, I found out that the light yellowish green glaze I had used was no longer available — and, after a few phone calls, found out that the manufacturer had even thrown away the formula of that glaze. There was no way I could get any more of it.

I tried to match it with other greens. One was too white. One was too green. One had a slightly harsher yellowish cast. None of them worked. The green I had found originally was almost perfectly harmonious with the room where it was going. But not one of the other available glazes made a tile which preserved the living structure which this tile pattern created in the room. People who looked at the different sample tiles in my workshop, and compared them with the original sample, said, "They all look more or less the same. Surely one of them will be OK." But when one put the samples on the floor of the room itself, the one green worked and the others didn't, and *everyone could see it*.

To understand the same point geometrically, consider a simple building detail: a cornice molding at a roof edge, for example. People now sometimes say that moldings make sense only in classical architecture, that they are a matter of style. In fact they are more fundamental. They have to do with smooth transitions connecting center to center in a field of centers.

If we have the edge of one material (a roof edge, say) and another material coming up to it (the wall, say), then we need a certain definite geometry at the boundary to make sure that the two centers meet and melt in order to be whole. The roof is a center, and the wall is a center. To make these two centers meet and connect may require a geometrical transition of two or three steps. That is the thing we traditionally call a cornice molding. But the cornice will only work if its proportions have a very fine and subtle structure of smaller centers which really does preserve and intensify the big centers.

The sketches (above) give an idea of how it is supposed to work. You can get a feeling for the transition at this edge. As I have drawn it, the edge helps the *roof* to be a center, helps the *wall* to be a center, and helps the two centers to intensify each other. Now look carefully at the four possible cross sections of the cornice molding at the edge. You can see easily that A is not very helpful. B is slightly strange, also not very helpful. Both C and D are helpful. C looks to be a little better.

You can explain this effect by looking at the centers in detail. If we look at A, we see two more or less equal smaller centers. They do not create any kind of gradient, and as a result the two centers do not connect with or intensify the center which is the roof, nor the center which is the wall.

Looking at B, we see a long line of small steps. This creates one homogeneous gradient — but the gradient does not "point" towards the roof, nor towards the wall. As a result, B still does relatively little to support either of the major centers.

C has two centers, a large one and a small one. The two centers together create a gradient which points upward. Thus it connects the wall to these centers, and then connects this further to the roof. C is fairly successful.

D has a similar gradient, but is more complex. The gradient is caused by four or five centers which form a curve. Again the structure points upwards and downward and connects both to the wall and to the roof. Looking at the section, D looks less successful than C. Nevertheless, it is difficult to be sure which of these structures really does the most to connect and intensify the wall and roof. Note that D actually resembles the perspective sketch more closely than C. This could mean that although C looks better, D might be better in reality. My analysis may be faulty. It would be hard to choose definitively between C and D without building a full-scale mockup, holding it up against the real roof, and looking at it up against the sky. Then, in a particular case, we could be sure which one is really better.

The example of these four alternative cases shows how subtle and difficult it is to be sure about such details at a level of great finesse. But the main point is clear. *Tiny fractions of an inch have a large effect on the relative proportion of the parts and therefore define entirely different fields in the nearby space*. Sometimes a center no more than a quarter of an inch across may support another center which is fifteen or twenty feet in diameter.

This is the typical case, not an exception. The same thing happens everywhere in a building. Every single line you draw has, in its microstructure, the potential to have a critical effect on the presence or absence of centers in the large. If we don't get the proportions exactly right we don't produce the centers and the whole thing falls apart.

No center is alone. The smallest centers therefore play a key role in the intensity of the medium-sized centers — and these, in turn, play a crucial role in establishing the intensity of the largest ones.

It will not be possible to get life in a structure unless the actual method of *making* is capable of responding, step by step, to every subtle variation in the wholeness which exists. Two rooms which are more or less — but not exactly — the same, may need different-sized windows. Each will then require a different handling of the window trim because the window butts up against the wall differently in one case or in the other.

It is therefore inherently impossible to make a successful building by a form of mass production or prefabrication which relies on identically repeated details with no possibility of modification. This is true because the necessary adaptations of shape and size in every detail cannot be made if the components are standardized. It cannot be done because the minute adaptations which are needed to get the field of centers just right at each point has to be "on its toes." It has to be capable of responding to large changes and small changes, and these are not predictable.

The essential idea, then, is that every building part and every detail must have the capacity to form centers. That means, first the details must be of a type which is able to form a strong center; second, they should be made in a way that allows fine tuning so that once it is being built, it can be adjusted in size, shape, and character to make its existence as a center more deeply felt. Then the detail can come to life, and the larger centers made of these details may themselves be intensified.

It is only possible to do all this by means of a method of construction in which we gauge the wholeness which exists while the building is laid out, room by room, and then modify it gradually to get the living structure right in its microstructure, too.

8 / DETAILED SHAPE AND SIZE OF CAPITALS AT BACK-OF-THE MOON

Let us look at a concrete example: the process of sizing and shaping the column capitals on the three houses at Back-of-the-Moon in Austin, Texas (see pages 365–81).

After deciding that the porch columns were to be eight-by-eights, knowing their height, I had a rough idea of the shape and size of the capitals. Drawings, however, did not really provide the necessary tool for deciding how big, how thick, how long, to make these capitals. The feeling created by such a capital, after all, comes from a direct experience, standing in front of the thing, and it is in this position that the capital must make its impact. The bay spacing is a critical variable too, since the capital looks right, or not, according to the spacing of the columns, since it is the positive space in the hole made by base, columns and beam, which has to come out looking right before you know the capitals are OK. That depends on the centers. And the state of the centers can only be determined by looking at them in a real situation with real dimensions.

So, to test the feeling created by different shapes and sizes, we made a cardboard beam, a pair of cardboard columns in the yard (cheaper and easier to move around than full-sized eight-by-eights). We made a series of capitals (also in cardboard) of different height, thickness and so on, and looked at them. Within a matter of about half an hour's work, we were able to settle which one was best, which carried the most feeling — and, of course, which was the strongest and most powerful living center, especially because it also made the space between the columns strongest, and it made the space next to the capital (the "negative" space) strongest. The one

Cardboard mockups in our Berkeley yard, 1500 miles from the building site where our crews were working. On the left, our first try, a capital that is too shallow, not substantial enough to work with the beam. On the right, our second try, a capital that is too deep, too fat.