11 / MATURA AS AN EXAMPLE

An example of a high-tech version of making, oriented to the focus on functional wholes in an emerging building rather than to segmented trades, was the approach taken by the company Matura in Holland and Germany for the construction of apartment interiors. The Matura company, founded by Professor John Habraken, was dedicated to the proposition that two parts of an apartment building must be separated:

(1) the shell of the building, containing foundations, walls, windows, roof, floors and
(2) the interiors of the apartments.

The company developed an integrated process through which they began with the rough construction of an apartment building and treated it as a shell which was then to be filled in. The infill consisted of a sub-floor with all drain lines, water lines, heating, partition walls, cabinets, and built-ins, plaster, paint, and electrical systems.

The apartments laid out (for instance by the process described on pages 382–84 of chapter 12) were then transferred to a detailed schedule of preformed materials and components for each complete apartment interior: the interior construction being an integrated system consisting of foam (to raise the floor), precut plastic pipes, walls, connections, plaster, sub-flooring, and floor surface. In this new apartment interior, all drain lines were to be laid within the subfloor. Once the layout of the apartment had been specified, all that followed was worked out in computer form, the parts needed were precut and numbered, and the entire assembly was then shipped to the site in a single 20-foot container. The interior of one apartment could then be assembled and installed by a three-person team. It usually took about three weeks to finish one apartment, and was done at a finished price of about $47 per square foot.

The men doing the work were highly skilled, but they were skilled in this complex combination of operations including placing electrical fittings, laying hot and cold water pipes, installing heaters and heating pipes, installing and connecting subfloor, and plastering preparation. Thus this team cut across the conventional trades which would separate all these skills, and instead provided a single high-speed, high-skill, operation for the construction of the apartment interior *as a whole*. The key point was that this unit of the construction process dealt with a *whole*. The process deals with a whole. The teams undertook a completed whole. Their satisfaction and their efficiency are all connected to the creation of a whole.

Such experiments, which represent the dawn of a new era of post-industrial "making," point the way to an entirely different organization of the construction industry.

Interesting though it was, Matura was flawed. The need to prefabricate all the components and then finally, "assemble" them, left too little room for fine tuning and adaptation at the smaller scales. We have now adopted a process in which details are specified by *process descriptions*, allowing each part to be formed uniquely, according to its context, without drawings, using only specification of procedure.

12 / WABI-TO-SABI: THE BALANCE OF ROUGH AND SMOOTH

To get exactness of adaptation, there is a price to pay. The price is roughness. To get the perfect adaptation which is required by the unfolding of a field of centers, you cannot avoid a certain

Mockup for a window. This fully formed cardboard model, made in our shops in California, once detailed to my satisfaction as sufficiently profound in feeling, was then translated into carpentry by our carpenters in Japan.

roughness in the results. That is because, to make each center come to life, there needs to be give and take that permits the needed complex superposition of relationships: hence uneven, unequal spaces, lines, straightness, curvature and so on. It is not possible to get perfection in the field of centers — true life — and also have the shallow mechanical perfection which 20th-century people often seemed to demand of buildings.

In present-day construction, especially in America, people in general — and contractors too — have become accustomed to buildings with an almost fanatical level of finish. For example, the tiles of a wall must be flat, square, coplanar, and equally spaced — all to within a few hundredths of an inch. They conform to a mechanical ideal of perfection. Why? Not for any practical reason.

Indeed, the attention needed to achieve this mechanical perfection drives out the possibility

Completed college building, showing these windows as they finally appeared in place.

Bernard Maybeck doing mockups of the roof chimney configuration of a house before he went ahead to build the chimney. Berkeley, California, c. 1920

of paying attention to *real* perfection or real adaptation in the centers. Instead, the typical tile-setter or carpenter in the industrial world, is not aware of life as an attribute of the things he makes, nor aware that he could steer the building processes in his care towards this "life" by paying attention to the life of every center as he works on it.

I believe this kind of thing happened in the 20th century largely because the real meaning of order and beauty had been lost — and craftsmen therefore maintained their pride of workmanship by appealing to a meaningless perfection of detail.

But this meaningless perfection of detail had nothing to do with the beauty of the wall. Indeed, it destroys the process of producing order. And the process of producing real order of the kind I have defined in these four books — the kind which is rooted in the field of centers — *can only happen when this fanatical attention to trivial and mechanical detail is abandoned*.

Unless there is a balance between those things which are done with great care and those things which are done more roughly, it is impossible to build order of the kind described within any ordinary budget. True spirituality in a building is achieved when there is a balance of perfection and roughness. It is the phenomenon which the Japanese call *wabi-to-sabi*: rusty beauty.

In Book 2, I have described the essential role of sequence and the way that proper sequence must be followed to allow the unfolding of life or wholeness in a thing.

What this amounts to is that we must always allow the essential thing to lead the inessential. We concentrate on the essential and let the inessential trail behind.

In the Eishin project in Tokyo, we wanted to use real *shikkui* — a soft shining plaster which is moving to see and touch — on the walls of the buildings. I felt it was essential. Of course it costs a little more than "ordinary" plaster or cheap substitutes.

I arranged to pay for the difference in cost by simplifying the low retaining walls in some of

Hand troweled slab, Mexicali. The red oxide was mixed with sand and scattered on the wet slab through a sieve, then troweled hard.

the site works. I asked Mr Nishida, our site-work construction manager, to make sure that these retaining walls for tennis courts, gardens, etc., were made very cheaply with wooden forms using lowest grade one-inch wooden boards and widely spaced stakes.

Fifth-floor penthouse, Emoto building, Tokyo, while design and construction were still going forward together.

"But the wall will have a bad surface, and the boards will warp out of plane." "I know," I said, "but I want them to be cheap, so that we can save money towards the *shikkui* for the important places. Also, there is no *reason* for these low retaining walls to be fancy. No one will look at them. All they have to do is to keep the earth in place when the rains come."

"But, but, but .... my men will refuse. They will not allow themselves to do such poor work." Then I tried another argument. I asked Mr. Nishida, "How would a farmer make this wall? He would just get the 1 inch boards and make the cheapest formwork he could, then pour a low grade concrete. He would do nothing inessential . . . In spirit, our small retaining walls are just like a walls a farmer would make. Why do something fancier when it is not essential? It is disturbing to the spiritual quality of work to make something more fancy than it needs to be." It took me almost two hours of discussion to convince Mr. Nishida that this was the right thing to do.

The plasterwork minutely adapted, the broken tiles then adapted to the curves of the plasterwork. Antonio Gaudi, Parc Guell, Barcelona, c. 1915.

The spirit is essential. It is in the nature of spirit to make a beautiful and special thing where a beautiful and special thing is required, and to offset it with a simple inexpensive thing. That is the most humble way to make it, and the beauty then shines out because of it.

And, of course, this has its counterpart in money, too. You cannot afford to make careful, expensive things everywhere. It is necessary to choose, to divide up the money in the best way, to make one part glorious, and make another part humble to pay for it.

The key lesson in all this is simple and extreme. The field of centers cannot be created as a by-product of some existing process. It will come about only when the entire process of making is organized and concentrated on just this one thing: to create a living field. If you concentrate on something else, you get something else.

One more example may help make this clear. In the center of Mexico City there is a beautiful house called the House of Tiles. It is a huge house, more of a palace really, built by Count Sanborn about 1800. The outside of the house is almost entirely covered with hand-painted tiles, mainly blue. From a distance, the house shimmers with the flickering color of these hundreds of tiles.

When I was there, I decided to go and have a closer look at the tilework and found something amazing. The tiles are about nine inches square, handmade and hand-painted. They cover the exterior walls. *But the way they are laid is astonishingly crude*. There are ridges between tiles, huge valleys, the tiles aren't all in the same plane, many of them are not even vertical. They meet, at their edges, in the roughest possible way. By modern American standards, this tilework would not be even remotely acceptable. Yet the House of Tiles is widely known as one of the most beautiful palaces in Mexico City.

We have become accustomed to a wrong-headed, almost fanatical, precision in the construction of buildings. Our tilework, for instance, is required to be perfectly aligned, perfectly square, every tile cut perfectly, and the

Rough-and-ready character coupled with infinite care and love in Mexican wall panel in tile.

whole thing accurate on a grid to a tolerance of a sixteenth of an inch. Yet our tilework is dead and ugly, without soul. A modern American tile-setter who has learned to get his satisfaction from the perfection of squareness, the perfection of plumb, and the perfection of the regularity of the tiles, *can never achieve the same result as the old Mexican tile-setter did on that shimmering blue house.* He cannot achieve it even if he knows the field of centers and understands it. The reason is that so long as the tile-setter's mind is occupied with technical perfection, he cannot concentrate on the field of centers — and so the living field will not spring to life in his work. There is not room for both. This is not because they are inconsistent. It is simply because you cannot concentrate on two goals, both so big, yet so different, at the same time.

In our era, many of us have been taught to strive for a meaningless perfection. To get wholeness, you must try instead to strive for a perfection where the things which matter less are left more rough, and the things which matter more are given deep attention. The result *seems* imperfect. Yet, in fact, what seems like roughness is a deeper kind of perfection.

Why is it that in the Mexican house, the tiles are rough, they are cut roughly, the wall is not perfectly plumb, the tiles don't even line up properly? Is it because these Mexican craftsmen didn't know how to do precise work? I do not think so. I believe they simply knew what is important and what is not, and they took good care only to pay attention to what is important. In this case it was the color.

So, when they made a wall of tiles, they

paid attention to the color, to the design, to the feeling of one tile, and its relationship with the next — these are the important things that create the harmony and feeling of the wall. As for the plumb, the alignment, these can be quite rough without making any difference to the essential color and therefore should be left rough — because it puts things in proportion and leaves the marvelous color shining out as visibly the most important thing.

They spent their effort in the way which made the most difference, and they produced a wonderful quality, this harmony, simply because *that is what they paid attention to and what they tried to do.*

13 / SUMMARY

I have said repeatedly that if you hope to create life in a building, the unfolding process must occur in your hands in the real world, in the actual construction of a building, not only on paper. In my view, this works best when an architect takes full contract responsibility for making the building, or as close to this ideal that he can achieve, via some form of direct management and control over money and over craftsmen and subcontractors. I am asking you, really, if you are an architect, to be a builder, to take the craft of building seriously as part of your work.

There is a profound reason. Your building will have life to the degree that every center in it has its life. When you succeed, there is a living quality in every center. This is true not only of the larger design elements: rooms, buildings, volumes, roofs. To make the building real you must strive to make it true, also, in the actual shape and size of individual pieces of wood, of the bottom of a wall, the edge of a roof, each pane of glass, even the surface of the paint.

Since each center is in a field of centers, the larger centers of the building can't have substantial life unless they are themselves made of smaller living centers. This means that ideally, all the individual elements — even nails, pieces of wood, joints, tiles, sills — should themselves all be living centers. They must themselves have emotional substance and actual substance, and you must give it to them. But such solidity and person-ness can be brought into these material construction elements only through actual physical experience and adaptation which is done by you, and by the people who work for you.

It means that each detail must be shaped within the context of the construction; it must get its form from its surroundings, be shaped in response to a larger whole. Above all, the elements cannot be fully planned on paper ahead of time, or prefabricated, and only then given to a general contractor to assemble. They must be thought out, felt, by an adaptive physical and human process in which you — the builder — experiment with the real materials, allow the construction details to emerge from your experience with the real materials, from the real context of the building.

This requires a level of involvement between the men and women making the building with you, and the individual physical materials of which the building is made. It makes an unbroken line of connection and control going on continuously throughout the construction — something which just is not possible when the professions of design and building are separated.

I appeal to you to understand this.

To make a living world, we MUST find ways of making details, shaping each one in relation to the whole. And for this to be possible, we need ways of *making* them, the actual ways of building them, fabricating them, which allows each one to become unique within the whole. That requires a new way of thinking about construction. In this new way, we shall judge building details not only according to their cost