

CHAPTER 2

THE BUILDER'S YARD

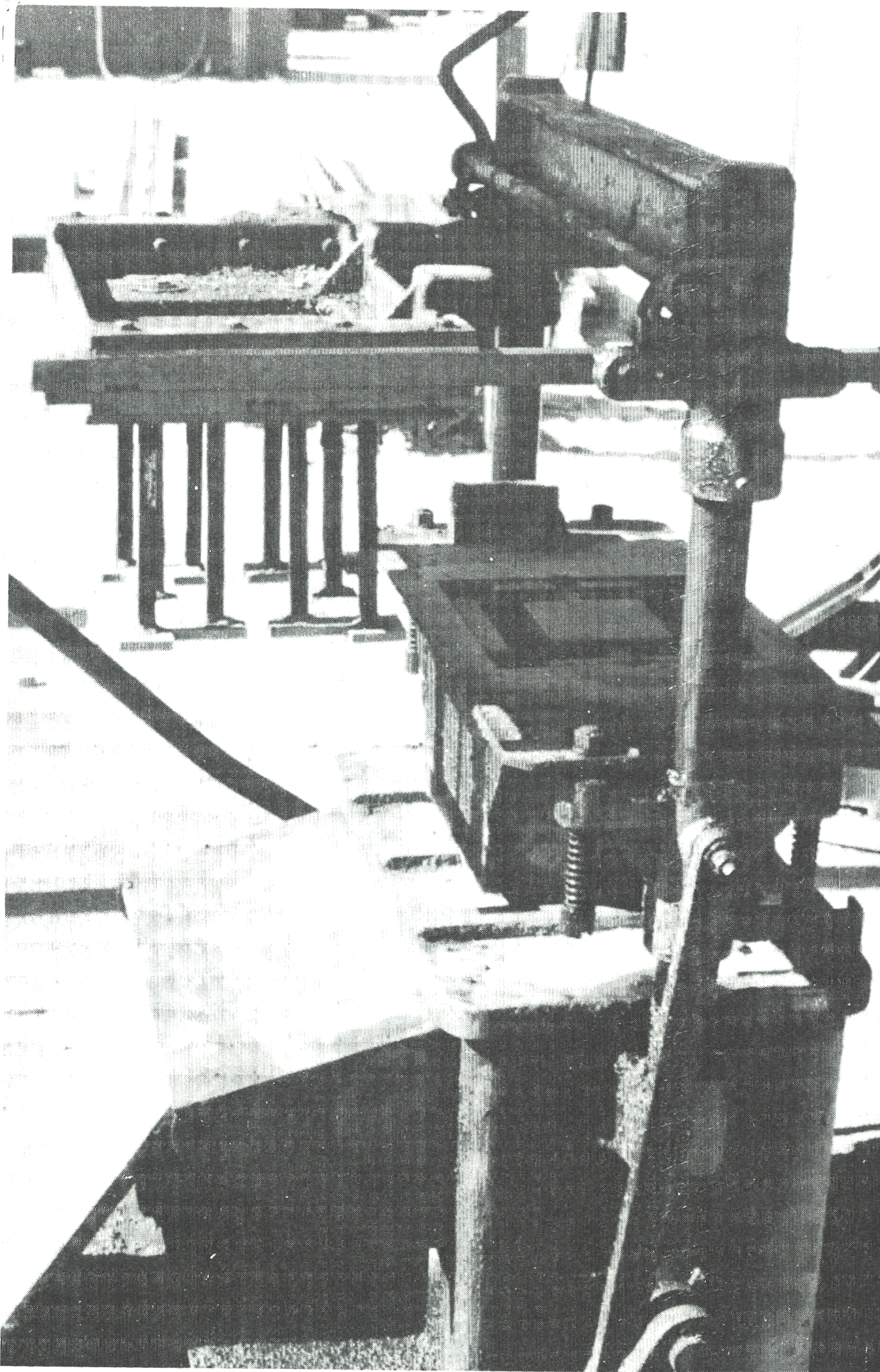
THE PRINCIPLE OF THE LOCAL BUILDER'S YARD

The actual production of houses is based on a system of widespread, decentralized local builder's yards. Each of these builder's yards contains the tools, equipment, supplies, materials, and offices needed for the production of houses in the area around it.

The essence of the builder's yard is that it lies physically close to the houses themselves. It becomes a part of the community which the houses create, even a nucleus in that community, which provides the center for later additions, new construction, maintenance, and care of public land, so that the builder's yard is not merely the origin of the production of the houses in the first place, but maintains a continuing relationship to the houses in later years.









In the first chapter, we have said that present-day control over housing production is misoriented, dramatically, by the separation of design from construction, and by the centralization of authority which typically goes with this separation.

To set things right, we have therefore established the principle of the architect-builder, and the principle that there are large numbers of architect-builders, each of whom takes direct control over a rather small number of houses at any one time . . . so that each architect-builder has direct personal contact with all the houses while they are being built. This means that he can help the families design the houses—and help to build them, when the families want to do that too—all in a personal way, which allows the details of each house to be correctly made.

In essence, then, we have established a process in which control is decentralized, socially, to a large number of builders who have more direct control over design than most builders do today.

Now we come to the spatial, or geographic, correlate of this social decentralization of master builders. For in order to make this social decentralization of control work, the control must also be decentralized geographically, spatially, within the community or town or region where houses are being made.

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In today's society, the process of construction is almost completely centralized. Almost all "modern" systems of production rely on large centralized construction firms. In these cases, control of the construction activity is remote from the immediate neighborhood where construction is taking place. The people who work on the construction site have no personal knowledge of the neighborhood, no knowledge of its peculiar character and needs; and anyway, have no control over what they are doing, since they are merely paid employees, so that even if they did have understanding of the neighborhood, they would be powerless to modify their activities accordingly.

The people who do actually control the construction corporations are not only remote from the neighborhood in spirit, but they also have very little immediate connection with their own building site, which is, for them, merely another source of income. They have no direct sense of responsibility for the neighborhood, and control the construction process on the basis of external issues, externally produced building materials, externally defined labor problems.

To replace the huge centralized system of construction corporations which now control the production of houses, we propose a system of highly decentralized local "builder's yards," each one with an organic relation to the neighborhood which it serves, each one capable of ordering and promoting local manufacture of building materials which are locally appropriate, each one with an ongoing responsibility to function as a nucleus of construction activity within the neighborhood in a coherent way.

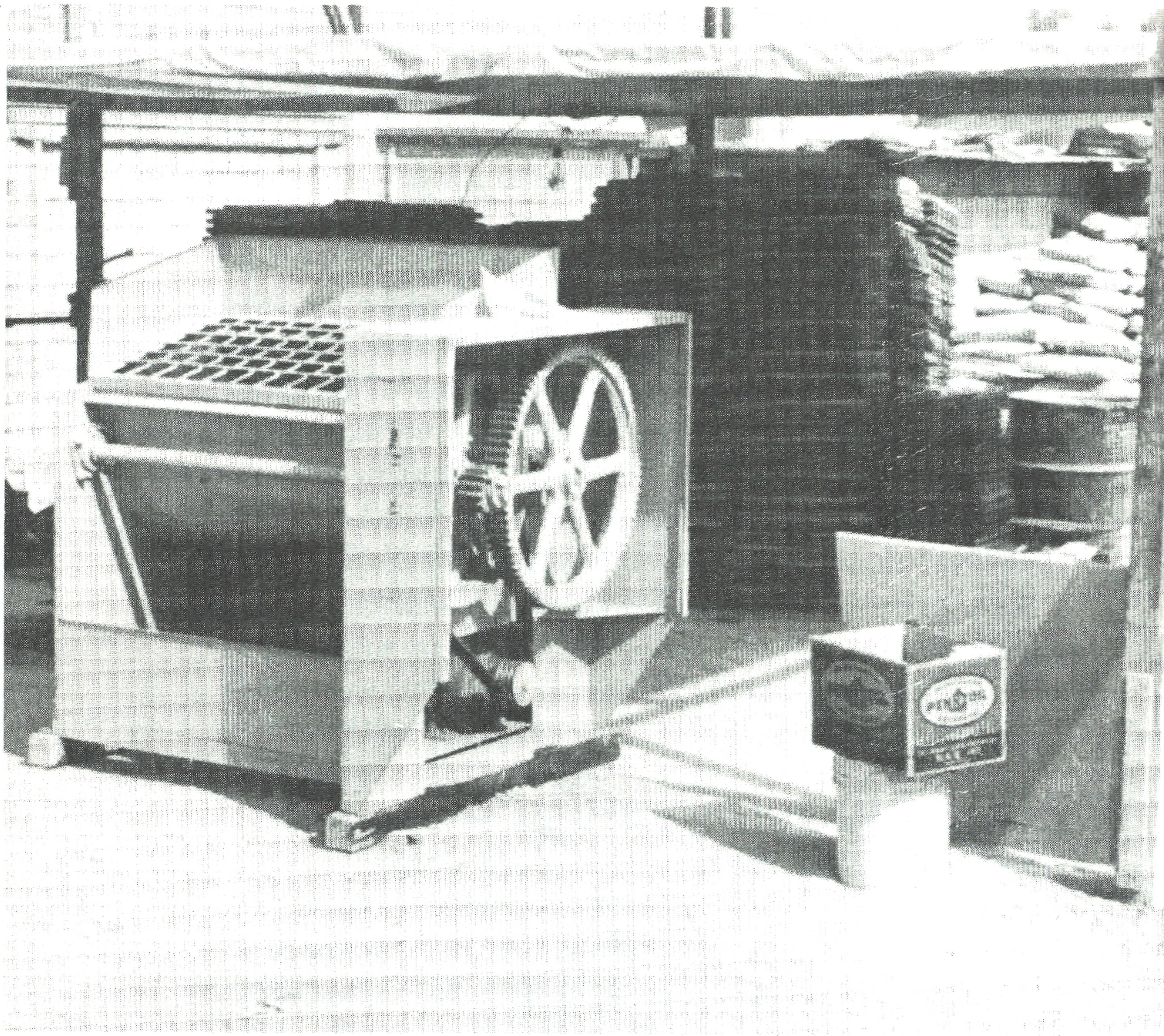
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Each of these local builder's yards, which we shall describe in this chapter, is the nucleus of an entirely different, and more personal, relationship between the builder and his community. The existence of the yard implies that the builder has a direct and personal relationship to one particular community, that many or most of his buildings, and works of building, will be in this one community, that he is, in short, attached to this community in an organic way, and, finally, that the builder's yard is the actual physical nucleus, the seedbed of construction, the central kernel spot in the community where he is based, and forms the basis of this more permanent attachment.

The builder's yard is the physical counterpart of the architect-builder. We saw the need, in Chapter I, for a single person capable of being an anchor point in the immensely complex and fluid human activity that will develop when people design their own houses and clusters of houses. For just the same reason, there must also be a physical anchor point: a source of information, tools, equipment, materials, and guidance. Just as there must be one person that the families can turn to as their leader in the process of house production, so there must be one place which they can come to to resolve their problems, one place which forms a well-defined social center and anchor point for their activities, while their houses are being built and being mended.

Specifically, this builder's yard has the following functions:

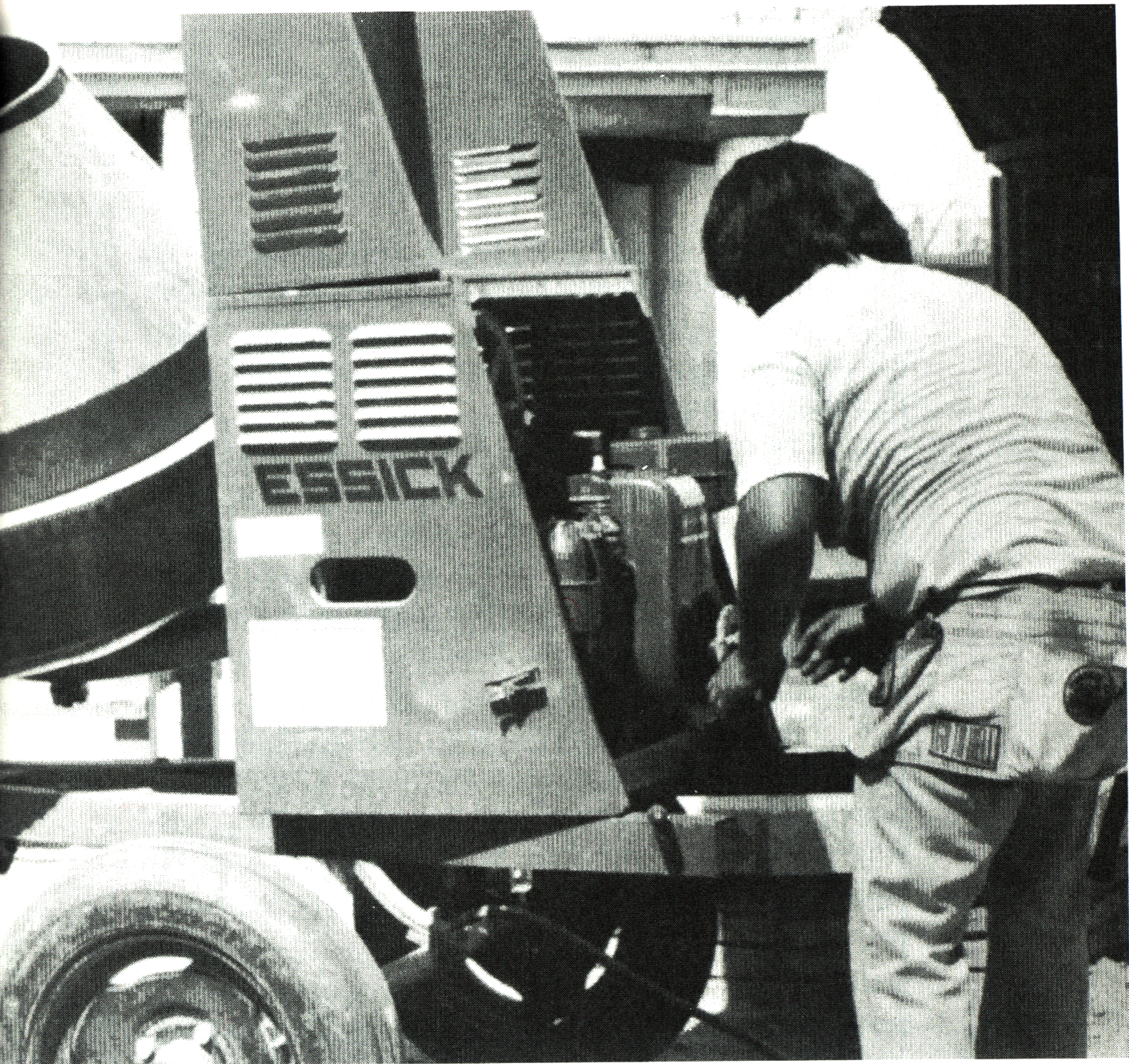
1. It provides the group of architect-builders with a home base; in some cases, with an office-workshop base; in some other cases with a living accommodation at the



same time. In the case of our Mexican project, it was all three.

2. It provides a base in which the building system resides. That is, its buildings physically embody the building system and serve as an example of what the various details look like and how they function in a variety of different contexts. And it provides a medium for experimentation with the building process.

3. It also provides the home base from which this building process can be generated. That is, it contains the complete set of tools which are needed for this process, including specialized tools like cutting jigs for windows, jigs for making perimeter beam spacers, etc.



It may be the place where parts themselves are manufactured with these tools.

4. It physically contains the pattern language which the families can use to design their houses. This requires a small room where people can read the language, study it and discuss it.

5. It contains all ongoing records of the actual building process in each cluster: that is, records of bills, quantities spent, cost control, hours worked by different families, etc.

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6. The builder's yard is also a gathering place for the architect-builders and families, during the construction process. For example, we ourselves had several dances in the loggia, and often spent late afternoon hours drinking around the fountain.

7. The builder's yard also functions as a nucleus in the larger community: there is a taco stand in ours; many people came to use the fountain as a source of water in the early days especially; and it creates the possibility of people throughout the community gradually becoming familiar with the building process, and perhaps taking it on themselves.

8. Finally, the builder's yard, once the building project is over, takes on a function as a community center, school, playground, church, dance hall, café, whatever seems appropriate: at this stage, most of the tools have gone, and it contains only a minimum kit of tools needed for routine repairs.



In the Mexicali project, we developed a very complete version of the builder's yard. Indeed, this yard was so extensive that it was almost as large as an entire cluster of houses. It was the seedbed, the kernel, of our project in Mexicali, and it did function almost exactly according to the model we describe in this chapter.

In order to understand this builder's yard as it was, a dynamic thing, a source of action and inspiration, the heart of all our work, we begin our description of the yard in Mexicali by going back to the very beginning—not merely to the layout of the builder's yard, but to an

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even earlier point, before we had even defined the construction system we were going to use.

For the place that became our builder's yard was, and was built, as a result of a continuous, ongoing series of experiments in construction; it was both the site of our experiments and their outcome, both the construction yard for the construction of the families' houses and the laboratory where we worked out the methods of construction we would use.

To grasp this clearly, it is necessary to understand the extreme way in which we, the architects and builders of this project, combined and saw as one the design of the buildings and their physical construction.

It is not merely that we were responsible for both. It was something much more, a physical love for the buildings and the building materials, a passion, a constant preoccupation with the physical structure of the buildings as fundamental to their larger layout and plan—a feeling that we were actually *making* these buildings, not merely designing them, and that we were therefore responsible for every detail in a way that had to be understood through hands and fingers—thoroughly understood, the way a painter understands his paint or a good cook understands the soup by tasting it.

And for this reason, we necessarily considered our builder's yard as a kind of experimental manufacturing workshop where we not only made blocks, beams, and other components, but where we invented them, tested them, developed them. *The ongoing course of these experiments, our growing understanding of the way the physical buildings could be built as simply and as beautifully as possible, was absolutely central to our lives in Mexico.*

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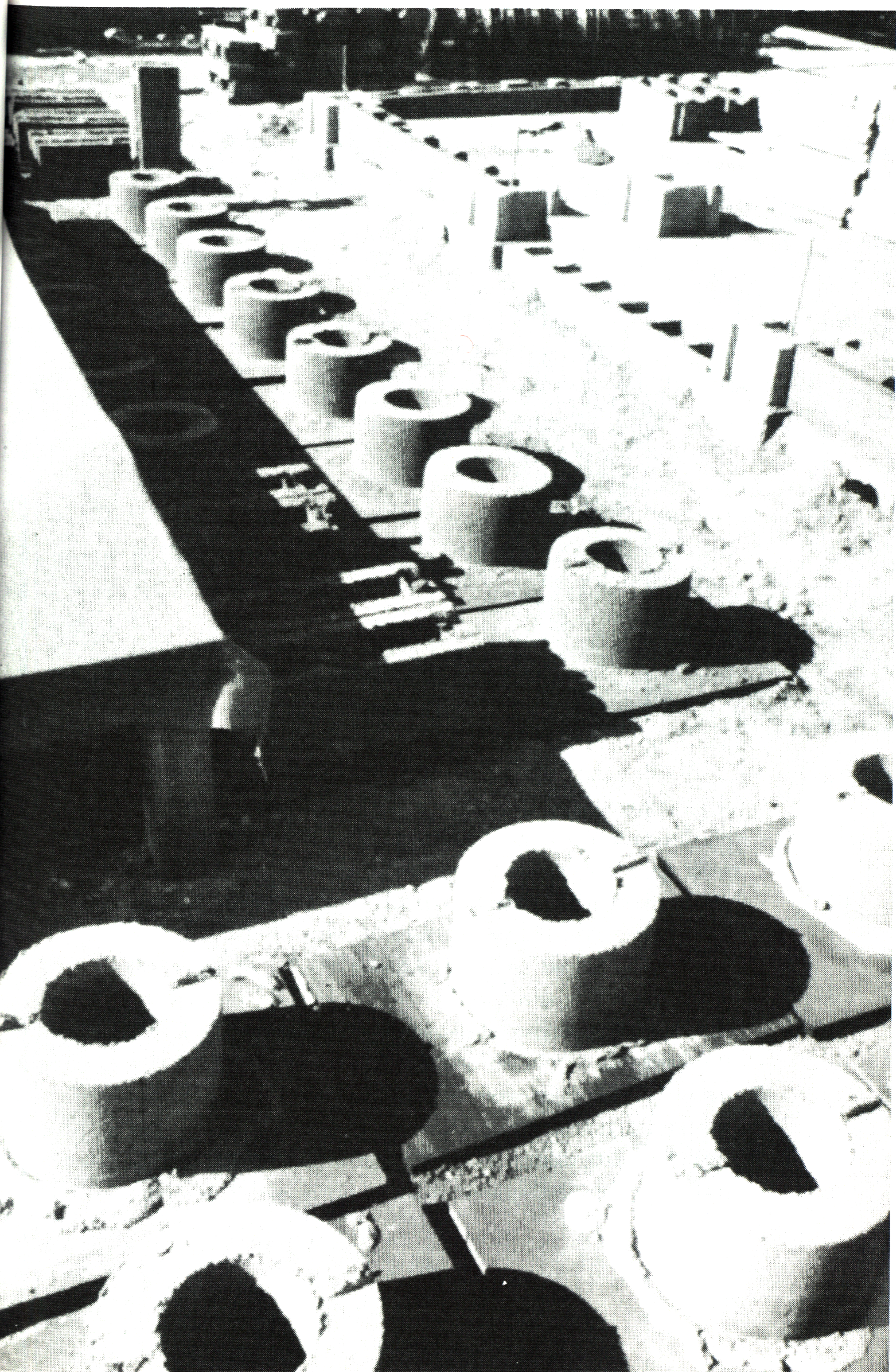
In short, from the very beginning of our project, we were conscious, above all, that it was a "construction" project—that the making of these buildings was, above all, an act of *making*, not merely an act of design. And in this spirit, we recognized, too, that the building system, the physical fabric of the buildings, was immensely important for three vital and connected reasons:

First, that to build buildings with the simplicity we wanted, with the possibility of individual designs, and built by people who knew nothing about building, would need a new kind of building process: one which unfolds while the house is being built, and which is easy to understand and transparently obvious in the way it fits together.

Second, that to build buildings which are buildings of the people, humane, simple, perhaps joyful, innocent, would require an entirely new kind of building process also, since those which already exist, complicated or simple, have become adapted so often to the joyless and mechanical conditions of our time.

Third, that after all, we had to build houses for some \$3,500 each, and that this meant that a new system would have to be devised in which every peso spent would create something of value, even under such conditions of extreme poverty and low cost—and this again meant that we had to invent materials, components, and processes with a very special character.

We began with certain assumptions. First, we decided that we would use the very fine adobe soil in Mexicali to manufacture soil-cement blocks which would be both cheaper than concrete blocks and also



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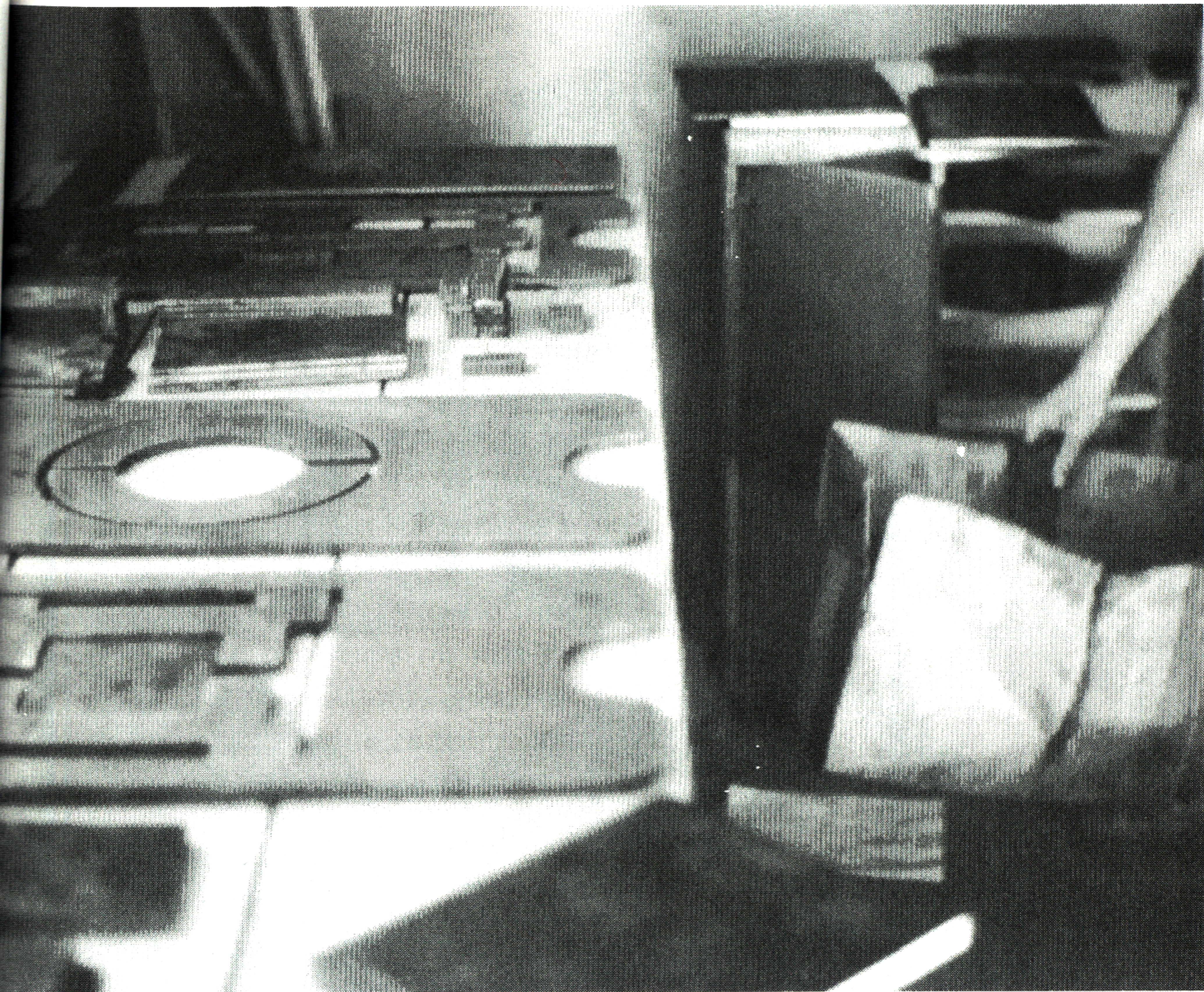
give much better insulation against the intense summer heat (115 degrees). From the very beginning, before we even went to Mexico, we had already begun to test a series of different possible blocks; we made rudimentary moulds from plywood, and pressed soil cement into them; tested a variety of different shapes; tried different mixes. Then, by the time we reached Mexico, we were ready to begin a much more complex series of tests. We bought a Rosacometa, an Italian block-making machine capable of making two concrete blocks at a time. We modified the machine so that we could compress the material, since the soil-cement mixture needed compression—not just vibration, as a concrete block does.

As for the shape of the blocks, that was extremely important. We designed special corner blocks: castellated blocks which receive the walls and which allow a building to be laid out without drawings. . . .

We designed the wall blocks, long, narrow blocks, with flanges for interlock, so that the walls could simply be stacked, without mortar, and the cells then filled with grout to stiffen them. . . .

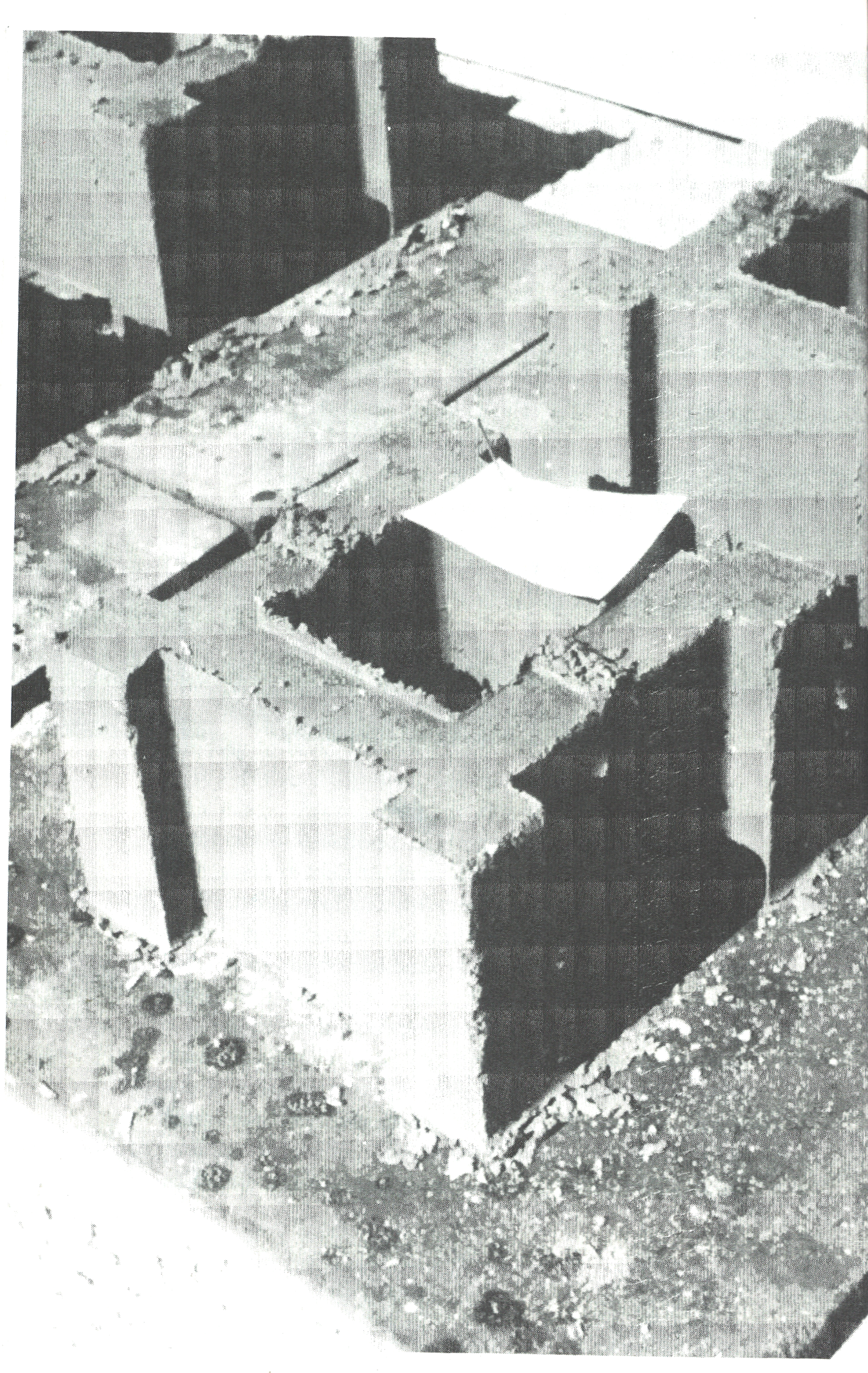
We designed the round column blocks—not available anywhere—which made it possible for porches and arcades and loggias to have these beautiful thick white round columns. . . .

We designed special foundation blocks, with rebars set right into them, so that the foundation could be laid out dry, on the ground, and the slab then poured inside the perimeter of the foundation blocks, in such a way that the slab would grip the rebars in the blocks and make the whole thing solid.



Preparing the block molds

None of this would have been possible if we had not ourselves made the moulds and ourselves made the blocks. We needed our own yard, our own pallets, and our own techniques to make these things; and it was these things, these seeming details, which made the project possible and made it what it was. We undertook an exhaustive series of experiments to determine the best mix, the best pressure, and the form of pallets which would best receive the blocks from our specially designed moulds. We designed the moulds, and fabricated them, first by cutting the steel, and then welding them—all this in our own workshop, on the site. We



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had our own drying yards and our own curing yards; we experimented with different aggregates, with different sands, from different parts of the mountains.

And we began, also, a large-scale series of experiments in the assembly of the buildings themselves. The vaults themselves we made with a mixture of volcanic pumice (a black lightweight rock locally available) and perlite (an ultralightweight and more expensive aggregate brought from California). During the course of our experiments on mix design, we experimented also with sawdust concretes, with thinner mixes, and with sawdust-perlite concretes.

The same in the design of the baskets which hold up the vaults. Our first baskets were woven in a rectangular fashion. Then we discovered that they became stronger when we pinned each intersection in the basket with a small nail; finally it became stronger still when we used a diamond lattice—strong enough so that these thin strips of material, $\frac{3}{8}$ of an inch thick, $1\frac{1}{4}$ inches wide, woven at one-foot centers over a sixteen-foot span, would form a basket that could support a man spread-eagled on it.

So again with the perimeter beams. Our first beams were the most rudimentary of all: a long burlap bag, hung from two thin 1x4's which ran along the upper edges of the beam. These burlap bags, filled with concrete, became beams . . . and in the loggia, our first building, you can see them. But the bags were hard to control . . . we tried a variety of other designs for the beams . . . finally settled on one made of two 2x6's, which stayed in place when the beam was poured and cured.

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And the reinforcing in the walls. We needed reinforcing in the cells to stiffen the walls against upturning earthquake forces. We thought we could improve on the price of steel. Wanted to use bamboo . . . but couldn't get any bamboo in that part of Mexico. Then we tried palm branches . . . very cheap, easy to get, very stringy, with lots of tough fibers for tension. They seemed great. But after we had tried them in half a dozen walls, and the walls had been there a few days, we noticed certain hairline cracks in the walls. They corresponded exactly to the places where we had used the palm branches, and we realized that the wet grout, poured in over the reinforcing, made the palm branch expand, swell, and put so much pressure on the setting grout that it made fine cracks in it—so we had to give it up, even though it was so strong and so cheap.

For every one of these experiments, the builder's yard served as our experimental ground. We could not possibly have done the project in the way we did without this daily, personal connection to the materials themselves, until we knew them perfectly, knew exactly what they could do, which ways to make a detail work, and which ones didn't. And the spirit, the feeling for the buildings, the possibility of using these new materials, new configurations, the possibility of creating a system of construction which people who knew nothing about building could follow, could use successfully in their own houses, depended essentially on this daily connection which we had to the design and to the building, both. It depended, in its very essence, on the fact that these buildings were, for us, made things, things understood, built, never drawn, never thought out for

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someone else to build . . . and that everything we ever knew was something we learned ourselves, in our own yard, from trial and error and experience.

This is the crux, the reason why a group of houses of this kind can only be made by a group of builder-architects—architects and builders both—working *in a builder's yard*.



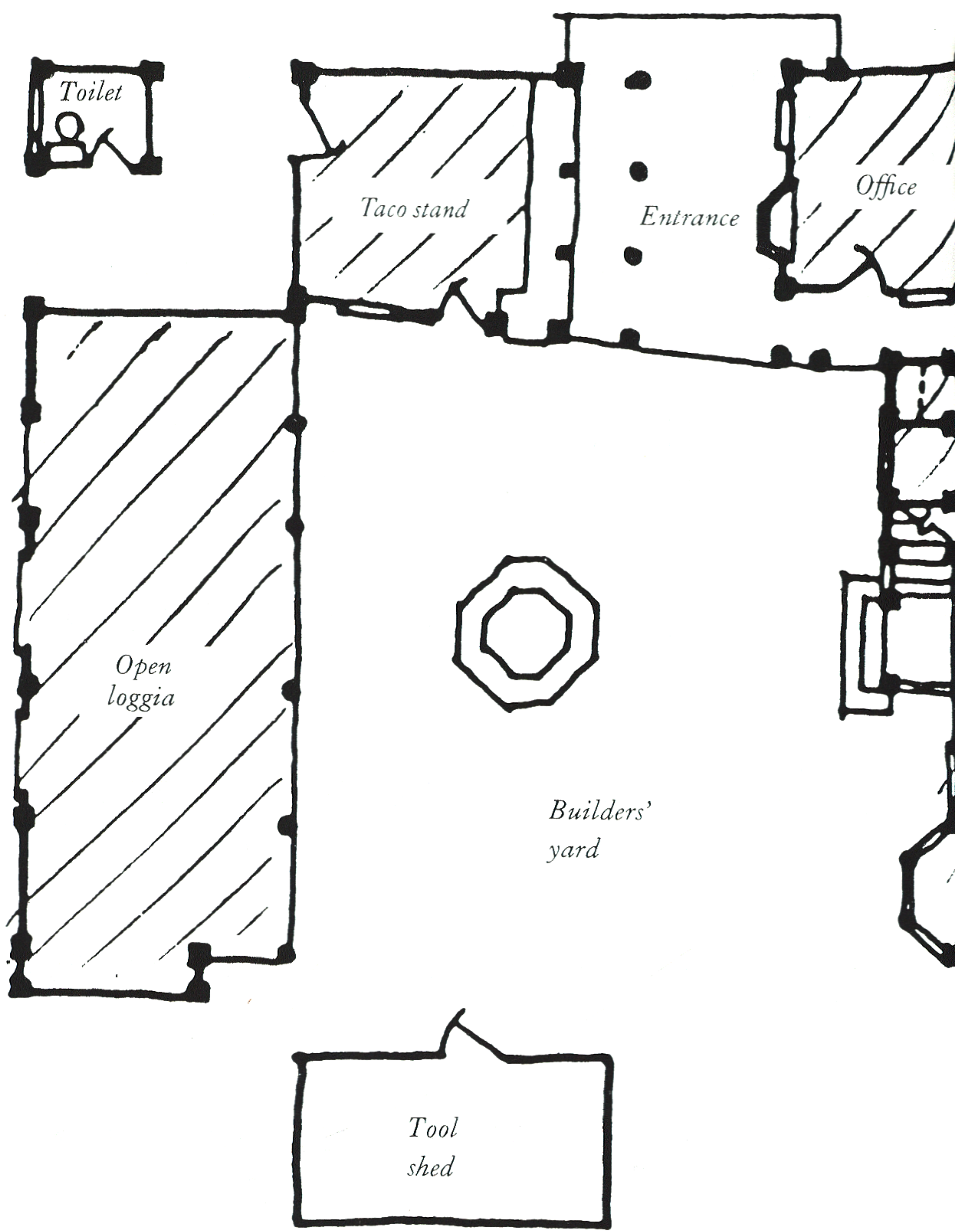
We see, then, that our builder's yard played an essential role in the physical development of construction techniques, which led to the emergence of a workable building system.

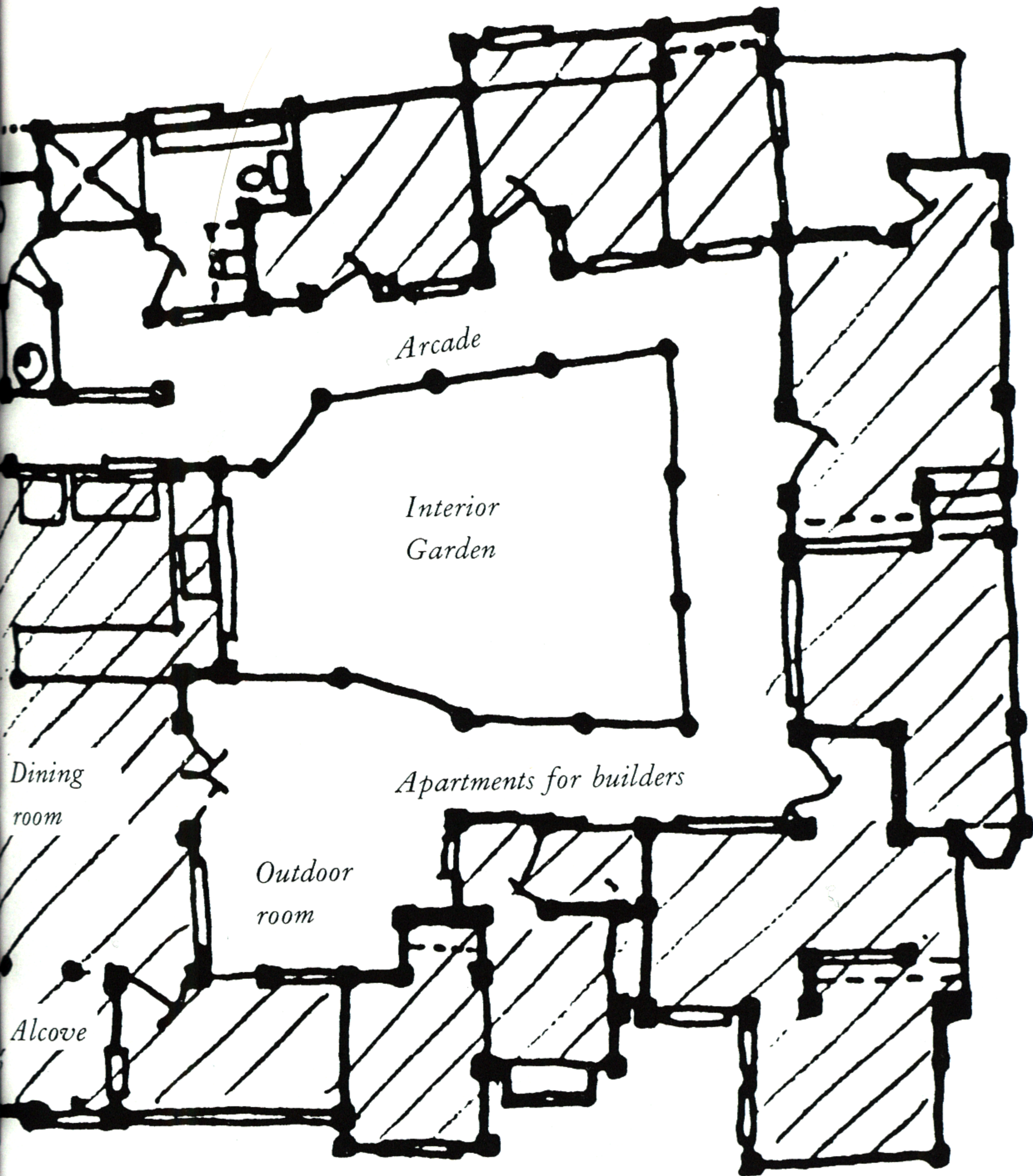
But at the same time, it was also intended as a place for people to come to, since it was a model of the very principles of planning and design which the houses themselves would later follow.

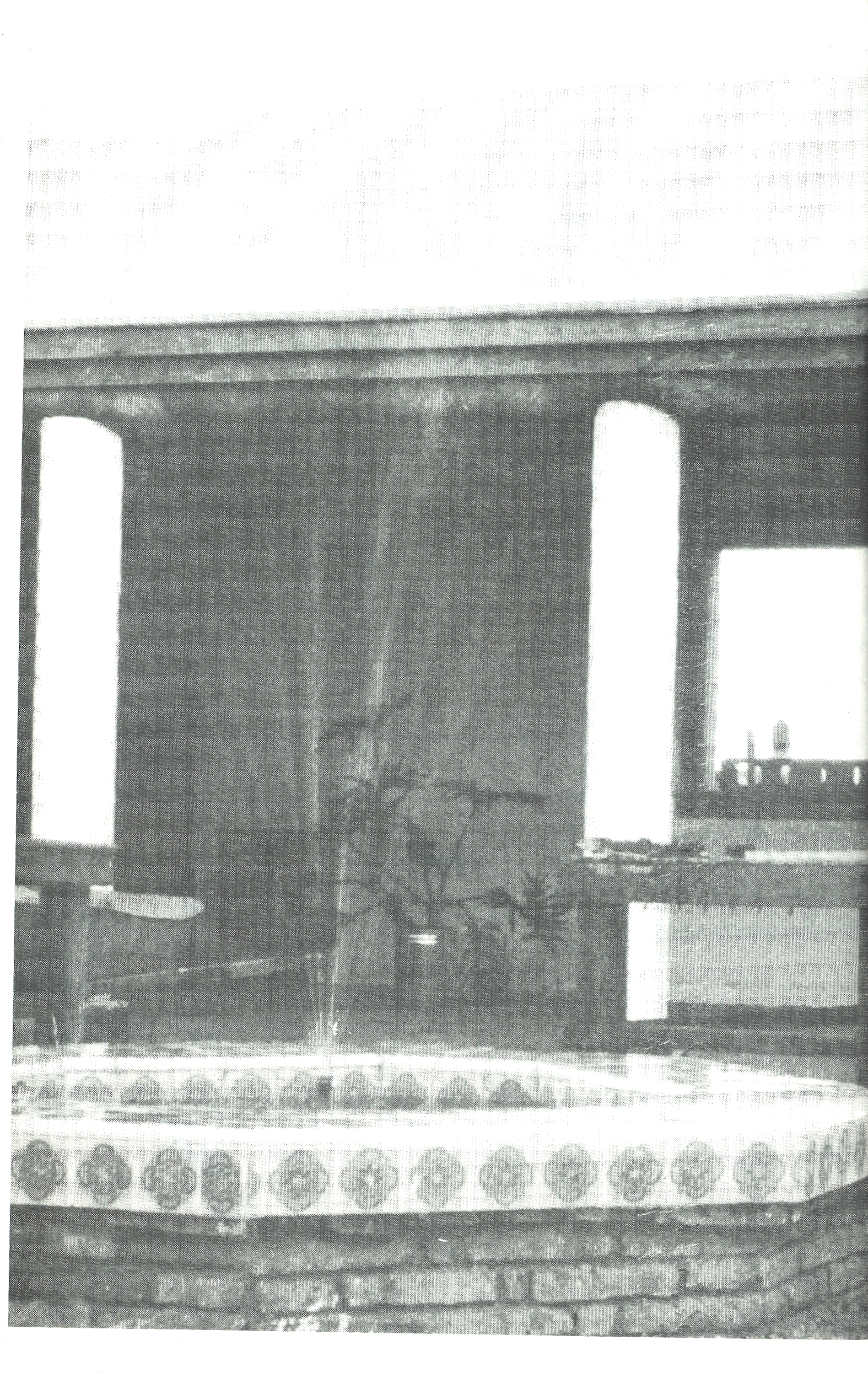
For these reasons, in our Mexican experiment the builder's yard was laid out as carefully as—perhaps even more carefully than—the houses themselves.

Since it was, in our intention, the heart of the community in that area, it is also a most beautiful place, which embodies, in its layout and design, all the ideas and feelings about the environment which we tried to put later into the houses themselves. It was, in fact, to be a place of inspiration, where the families would see just what an environment, correctly made, could be.

It has two courtyards, one a great courtyard where people enter through an arched main gateway. This courtyard is surrounded by the toolsheds, and the loggia, and the taco stand, and the stairs leading up to the









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second floor of the main gateway. It has a fountain in the middle.

The second courtyard, a private, interior court, is fully surrounded by a tiny colonnade, an arcade surrounding a central garden, and off this arcade there are various small rooms: living rooms, bedrooms, workshops, places where we, and later our apprentices, worked and lived while we were building the houses.

So the builder's yard was not only a physical nucleus for the construction. It also provided the physical model for what was to be built around it. The details that had been developed in the builder's yard were copied in the houses and the surrounding neighborhood. The patterns which were embodied in the builder's yard were copied in the houses built around it. The yard was the physical and spiritual starting point for the whole process, and it remained so throughout the process of production.

From the very beginning of the project, even from the first or second week, the yard began to function in this way. It was necessary to make block tests, to begin manufacture of blocks themselves, to organize the tools, to have a "home base" for meetings and building decisions. The block machine, the Rosacometa, was delivered and installed on one side of the site, positioned in-between the place where the raw materials for block manufacture would be delivered and the place where the blocks would cure and dry. These materials (sand, gravel, and cement) were delivered, and block production started in the second week. On the bare site, the block factory was already in operation—although that required various makeshift shelters: one for the machine itself, to keep the hot sun off the workers; and

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one for the blocks, to keep the sun off when drying.

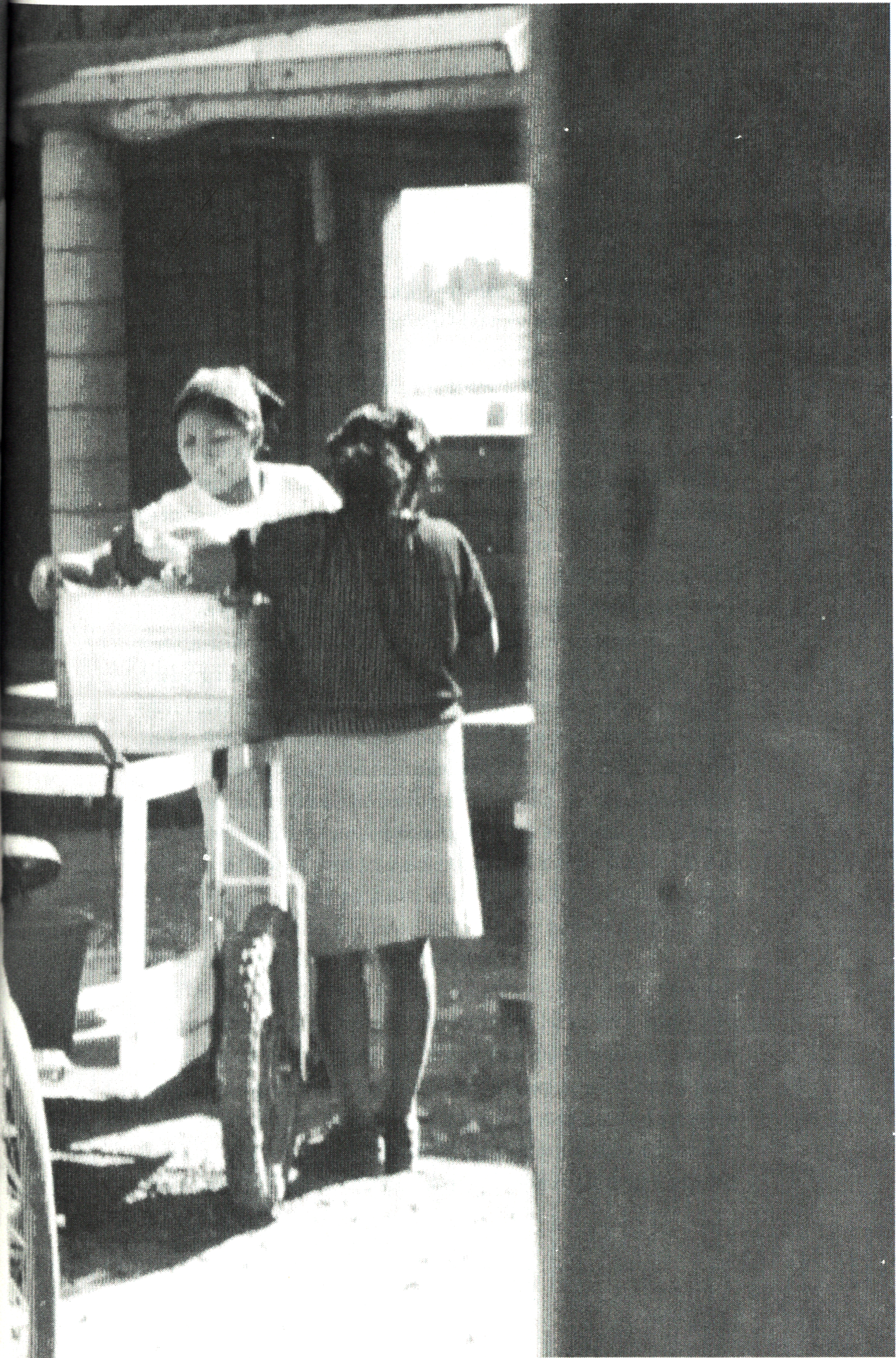
The loggia was the first experimental building to be completed and as soon as it was up, it was being used as a workshop, a place to do the woodwork for the perimeter beams, a place to do small repair jobs on the machine, and a place to have lunch in the shade after doing concrete work in the hot sun.

And throughout the project, the builder's yard was functioning as the social center of the project. The accounts, materials requests, and financial records were handled in the office. The individual architect-builders shared rooms; there they worked out building details, discussed problems with the families, played poker. On the other side of the yard, the block-making operation was proceeding at full steam: every couple of days, a truckload of sand and gravel would come; and truckloads of bags of cement for the blocks, rebars, and other materials were delivered behind the loggia before being allocated to the different families. The loggia itself housed the expensive woodworking tools; on workbenches there, the window and door frames were built, wood for the perimeter beams were sanded and cut, windows and doors were assembled.

The builder's yard was also an object of great interest in the community; it was the place where people came first to find out what was going on; it was the place where local officials were taken to see what was being proposed; it was the place where the initial contracts and loans for the houses were signed in a public ceremony.

From the very beginning of the builder's yard, the people of the neighborhood steadily used the fountain and the faucets near the fountain as a source of water.





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Sometimes they simply came there to haul water for their own use. Sometimes they came to do their laundry there. But the water was a center of activity.

And then, during construction, the builder's yard was again a continuous center of social activities: parties for the families and builders, dances for the students training there. At night, with a fire in the middle of the larger courtyard and music in the loggia, it became almost a carnival.

In the end, a builder's yard only makes sense if it has a long-term reality in a neighborhood. And this means that it must be inserted into a neighborhood with the understanding that the various functions which the architect-builders perform (teaching the pattern language, helping people design their own houses, helping people build their own houses, helping in the gradual repair of the neighborhood as a whole) all have a long-term life. This is a political and economic question. *But the builder's yard will only have a long-term life if it is clearly understood as a new social institution with an important function in every neighborhood, and with the funding—taken out of city or state or federal taxes—to support its existence.*



If we ask how the idea of the builder's yard might be implemented in different housing projects, we must recognize that it might take a great variety of forms in different places.

In the simplest case, it might be no more than a temporary house for the architect-builders. After con-

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struction this house could be sold and occupied by a family . . . or it might be used as a store or as a wayside inn.

In one case we know of in the Philippines, the builder's yard exists as a low-cost community hardware store run by a Jesuit priest to provide building materials and building know-how to poor families who want to build their houses for themselves.

In another case, the builder's yard might become a local center of art where painting and sculpture flourish alongside the building operation and as part of it, and where these arts become part of the community—first, perhaps, in a slightly frivolous way, and then, gradually, as people establish their connection to it, the yard can become more and more of a place where children, housewives, men after work, become serious artists who have a serious contribution to make to the community.

In the case of a cooperative village in northern Israel, which we are building now, the builder's yard will itself be a cooperative industry, owned communally by all members of the cooperative village, and run by three or four of them for the benefit of the others, so that it is helping the cooperative economically by helping to provide the economic base which the newly formed cooperative requires in order to flourish.

The most modest version of a builder's yard that we know about—and perhaps the most effective—is the one being tried on a national scale in Mexico under the direction of Abel Ibañez. These yards will be spread throughout the country, and will serve some eight hundred families each, spread throughout an area of local communities. Each of these yards will sell compo-

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nents and materials, piecemeal, to the families who are building their own houses. Any family can obtain a loan for material, provided they have enough income to pay for it month by month over a two-year period. Under these circumstances, each family will be able to build their house, room by room, as they can afford it. And the yard will not only provide them with credit and cheap materials, but also with architectural and engineering help—in short, essentially, with the services of an architect-builder, to help them use the materials they buy.

In any case, we believe that the local builder's yard, in one form or another, is an essential part of the process of housing production. It is precisely the builder's yard which is capable of decentralizing production, ultimately making it sensible and rooted in ordinary human experience. It is the closeness of the builder's yard to the community, its presence as the heart and nucleus of building activity in each local neighborhood, that is capable of transforming the housing process, making it a thing that has, above all, to do with people, and eliminating, once and for all, the idea of housing production as a mechanical and abstract process.

THE PRODUCTION OF HOUSES

Christopher Alexander

with

Howard Davis

Julio Martinez

Donald Corner



*Written with affection and respect for
our apprentices in Mexico*

Ramiro Ortuño

Donato Rechy

Julio Chavez

Jorge Torres

Emma Rivera

Enrique Ramirez

Gloria Hernandez

Javier Toscano

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