

# APPENDIX

A SMALL EXAMPLE  
OF A LIVING PROCESS



## 1 / A RADICAL NEW PROCESS

Throughout Book 2, it has been my contention that when we design and build in such a way that what we build gets life, it is necessary to do things in a new way which respects the step-by-step unfolding of the field of centers. During the unfolding, each new center made at a certain time  $t$  is introduced and shaped in response to the wholeness that existed just before, at time  $t-1$ , and is then shaped according to its contribution to that wholeness. All this is accomplished by repeated application of structure-preserving transformations.

Although this may leave certain features of the professional architectural process intact, it also creates many revolutionary changes. To illustrate, this appendix contains one fully detailed practical example of the process, describing, in some detail, the making of a single house that I built in Berkeley for Christopher and Stephanie Upham during 1991 and 1992.<sup>1</sup> As we shall see, throughout this project the fundamental process and the fifteen transformations are used again and again and again, to get each new detail, as the whole unfolds.

This process is very different from the normally accepted process of architectural design and construction as it was in the 1990s.<sup>2</sup> To make the unfolding process possible, I was both architect and contractor for this house. The bank accepted the process, in spite of its innovative character. The submission of plans to the Berkeley building department was normal (however, see discussion on pages 604–05). The role of drawings was also very different from that in the normal professional process of today. Since the construction was indeed an unfolding process, we could not know how the house would turn out in detail, until it was finished. Although some drawings were made during the process — for permits, structural checking, and so on — all the participants knew that the drawings were merely a rough approximation of what was to become the finished building.

The house was carefully built to a fixed budget — according to contract — and came in *on* budget. The money was administered under a new kind of construction contract which I have developed with my colleagues over many years. This contract allows construction price to be guaranteed while unfolding is taking place, even though the design is not rigidly fixed ahead of time.<sup>3</sup> Thus the client does not have the financial uncertainty that such an open-ended project would create in a typical late 20th-century construction contract where many steps of the unfolding would be viewed as changes. Rather, in our contract the unfolding was a feasible process *within a fixed budget*, backed by the careful cost control necessary to make this possible. This was part of the agreement from the beginning.<sup>4</sup>

Our work was done by a small group of people including craftspeople, an architect, an engineer, apprentices and construction workers experienced in construction, an architect trained as an engineer, and people inexperienced in construction. The total calendar time spent was somewhat longer than usual. The fees were standard (though spent in smaller amounts over a longer period). The cost of construction management, fixed in advance as a percentage of the fixed construction budget, was also approximately standard (18%).<sup>5</sup> The Center for Environmental Structure (CES), the contracting body, is a non-profit organization, and it was part of the character of our agreement that every penny, except for the fixed fee, was to be spent on the building. CES had responsibility for allocating and reallocating the money dynamically, while design and construction were moving forward.

I am not proposing this example as a general model of all living process. Other processes will certainly need other new concepts to become living. Road building, land management, assignment of loans, zoning and planning, larger construction projects — all need different kinds of

revision in order to include the features of living process. Each sphere of process needs different aspects of process to be changed.

However, the degree of difference this pro-

cess has, compared with standard design and construction, illustrates the general proposition that *all* process is likely to need drastic change in order to achieve living process.



*The garden before the Uphams bought the land*



## 2 / FINDING A SITE

THE HOUSE WAS TO BE ABOUT 2500 SQUARE FEET, A GARAGE FOR TWO CARS, TERRACES, SMALL GARDENS, A MAIN BEDROOM FOR CHRIS AND STEPHANIE, ONE FOR SASHA (STEPHANIE'S DAUGHTER), AND A THIRD SPARE ROOM.

We searched for two years for the site. I encouraged Chris and Stephanie to find a site where they had, from the outset, a strong feeling of belonging to that place.

To find the right site, with my help, occasionally we drove to a possible site and discussed it. Several that we looked at were either unsuitable or unavailable. I want to emphasize that, in

keeping with the fundamental process, we rejected several sites that others might have accepted (buildable, financially sound, etc.), because they did not generate a sufficiently deep feeling of "this is ours" in Chris and Stephanie. At last, one day I got a call: "Come and look at this one." I went to a small beautiful garden, covered in flowers. It was part of another lot and was to be cut off and sold. A beautiful place, but very small, almost too small.

However, because it had the right feeling, we began the effort to build a beautiful house there, in spite of the site difficulties.



### 3 / FIRST ANALYSIS OF THE SITE WITH ROUGH TWISTED PAPER AND BALSA MODELS

FROM THE SITE, I FIRST DERIVED THE VOLUME AND POSITION OF THE HOUSE.

What was needed to preserve the structure of that place, that bend in the road? My first reaction was that it was a shame to destroy the beautiful garden. I talked to the seller, expressing my concern. He said that it didn't matter because he was getting old and couldn't garden anymore. But I felt that to destroy this garden might endanger or destroy the neighborhood.

The garden sat in the concave curve of a quiet street. It had a key position in the neighborhood. I noticed that to place a house there in a structure-preserving way, one would have to find a way of shaping the house, placing it, so that the beauty of the garden and the way it nourished the street could be left intact.

The idea of this was clear. What was not clear was whether the necessary volume could be put on the site without harming the street. I told the Uphams: "It is a beautiful site. But I am not sure I can do a good job there. It is so tiny; by the time we have a workable volume there, it may not be possible to preserve the quality of the street or of the garden. Before you buy the land, let's check it, to see whether a beautiful house with the qualities you want is possible there."

To check the site, I made a small clay model at 1:200 scale (1/16th inch = 1 foot) — and began playing with bits of balsa wood on this model, to find out what harmonious volume would unfold from the site itself. In essence, the problem was to find out how 2000 square feet of building



*Roughest sketch model in modeling clay and balsa wood*

could be put on the site, while leaving the beauty of the garden and street intact.

It turned out that it *was* possible. I was able to put the house rather snugly into the slope, not standing out, to preserve the structure of the land. The curve of the garden stayed as it was; the house and its curve preserved the system of centers formed by the garden and the curve of the street.

However, it quickly became clear that it would not be possible to build a two-car garage, without destroying the site. I had a talk with the Uphams about this. They said it was OK and that they would be satisfied with a one-car garage. With that difficulty out of the way, the overall volume of the house came, finally, as a rather awkward shape but the only relaxed and comfortable volume I could find, with its own proper centers, which made the site come to life

and left POSITIVE SPACE throughout the bowl of the site and towards the street.

To make this modeling process effective, the model was crude: bits of scrunched-up tissue paper, scraps of balsa. The roughness of the model was intentional, because it allowed me to play, move stuff around, see whether a harmonious arrangement of volume was possible. To find something good, I had to be able to play quickly, move fast, push things around. A carefully made model would have been disastrous because it would have slowed me down, constrained me by its cleanness. What was needed was a dynamic model in which I could tear things up, put them in, in which I could find out in a matter of minutes — even seconds when moving fast — whether something that preserved and extended the wholeness of that land and the surrounding buildings was truly possible.



#### 4 / FULL-SIZE TESTS OF VOLUME AND POSITION ON THE SITE

FROM THE POSITION AND CHARACTER OF THE HOUSE VOLUME GIVEN BY THE SMALL MODEL, NEXT, ON THE SITE ITSELF AND FROM THE FEELINGS WE GOT BY WALKING THERE, WE GOT THE DETAILED DIMENSIONS OF THE VOLUME.

The next step of unfolding. With a general feeling for the overall idea of the volume from the model, we went back to the site to check it out in more detail. I stood with one of my apprentices placing stakes. The only thing we were trying to do at this stage was to get clear about any facts or fixed points that I felt we could rely on, as fixed aspects of the emerging design.

At the site, the existing terraces of flowers were more impressive than on the model. There was a clear sense of the main terrace as the focus, but it wasn't very wide. We placed stakes in such a way that this terrace seemed to become believable as a real and comfortable place.

Here we see the unfolding at work again. The terrace existed in our minds as a rough shape — a sized and positioned “thing” — but as we asked ourselves what detailed shape unfolded from this loose and general terrace idea, the shape developed and became more clear, thus creating POSITIVE SPACE in the terrace. As a result of this, a kind of gentle bow appeared in the plan, where the terrace became slightly bigger and where the house bent toward the sun.

Another thing that became very clear as a further unfolding was the strong sense one had that it was best to enter the site at the west end, up stairs close to the neighbor's existing garden stairs. This was at the opposite end from the garage, and therefore seemed surprising — even illogical — but careful walks up and down the road in front of the house, looking at the flowers, seemed to confirm a strong feeling that it was indeed best to enter the site at the western end, up



*Another rough, but more detailed, clay and balsa study model*

a similar small stair. It appeared that the structure of the site was preserved and extended by a stair at the left, far more than by a stair at the right. So I made the decision — which some might call irrational — of not placing the stair by the garage, but a rather long way away from it.

One further thing. Since the main terrace was *very* narrow, we felt the building wall that we began to visualize above it couldn't be too much of a cliff, since it would overshadow the terrace and make it uncomfortable. Here the structure of the site, as it existed in my mind at that time, had to be extended by subtle detail to preserve the structure of the house and not to destroy it. So I began to see a balcony or porch upstairs, essentially reducing the impact of the house volume overshadowing the terrace. Here, as a result of the unfolding process, a **STRONG CENTER** began developing, with **GRADIENTS**, and **ALTERNATING REPETITION**.

The small room down the hill, at the eastern (right) end of the house, already seemed like a real place — a very nice additional center of the house which formed the tail end of the house in

its cascade — and again forming graded variation, and thus strengthening the main strong center of the house.

I had very little idea about the interior plan of the house at this stage: only a rough idea of the living room in the middle, the entrance at the western end, the main bedroom upstairs — and a vague notion of the kitchen at the eastern end in the narrow wing of the house. As I told the Uphams, the crucial thing at this stage was to get the volume of the house to the stage where it had a beautiful harmony with the site. We had that now, and were lucky to have it.

Our work on the site was then summarized in a further rough model. I want to stress the ordinariness, the *apparent* awkwardness and roughness, of this model, too. As finished, the house is beautifully situated and keeps the street alive. It genuinely responds to the wholeness of the site, makes what is there more alive. In order for the house to help the street and preserve the structure of the neighborhood, the positive space which has been formed on the main terrace, in front of the house, is the crucial ingredient. It

is this positiveness which maintains the neighborhood, the street, the garden.

All this became possible because of the informality of the model, which allowed the unfolding process and the center-creating process to take place unimpeded: indeed, encouraged them. I should emphasize my strong belief that an attempt to define this house volume on drawings, or by drawing, would have failed. The complex three-dimensional reality of site, house volume, space, slope, just could not have been visualized from a drawing. It was the little blocks of balsa

wood themselves, and the arrangements they made on the sloping clay, that led to the volume.

A house designed in drawings, or merely staked out on the site, would probably not have come as close to preserving the wholeness of the slope as we managed, because there would have been too little information there. It was the feedback from the many errors that became visible in the tiny model while I was making it — and which could then be corrected — that made the center-creating aspect of the fundamental process work.



## 5 / A FIRST SKETCH

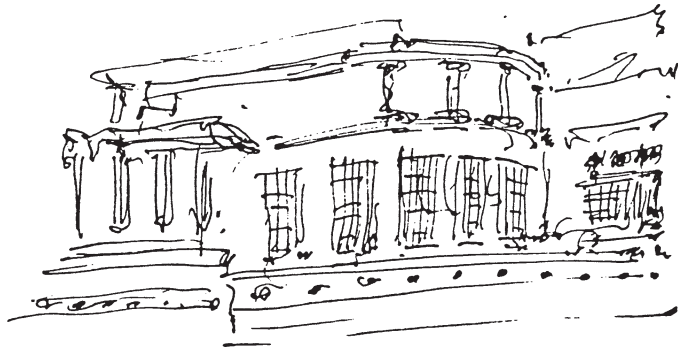
FROM THE POSITION OF THE HOUSE ON THE SITE, AS WE HAD STAKED IT OUT, I WAS ABLE TO GET A FIRST VISION OF ITS PHYSICAL CHARACTER, LIGHT, AND WINDOWS.

At this stage, I summarized the feeling of the house in a little rough pencil sketch (shown here). This was the first drawing I had made of the building.

The process of making this sketch was another step in the unfolding. The volume as I had understood it so far from the balsa wood model was, as a whole, too rough, too higgledy-piggledy, not harmonious enough. In this sketch,

I gathered together what was visible in the model and on the site into a single graceful sweep which simplified the structure and made a single building form consistent with the feeling of the street.

This step of the structure-preserving process resulted in a house that was kinder to the street, and more consistent with its structure than the many-volume building suggested by the balsa wood model. The cleaning-out process — vital to all structure-preserving — introduced SIMPLICITY and INNER CALM into the emerging whole. I was getting rid of dross.



*First sketch of the house as seen from the street: this sketch adds a new overall simplicity to the lumpy awkwardness inevitable in the rough study models*

The sketch now had the essence of the coming building. It had the volume, the feeling of masonry, the balcony upstairs with columns, the curve looking out toward the sun. It showed the bow, generated as a response to the view, swelling towards the south — and the wall of the small terrace. The balcony upstairs, stepping back the front wall of the building, was necessary because the terrace was so narrow. It came into view in the unfolding before there was even a suggestion of an upstairs plan.

Although the final building (see pages 630–31) is in *detail* quite different from this sketch,

in the broad morphological sweep of the whole, it is the same. This is typical of the fundamental process, which first creates broad structure that remains intact later, even when subsequent unfolding greatly changes details.

Within this step, preservation of the existing centers of the garden, and of the centers of the street and surrounding land, had been very important; and preservation of the site's wholeness took precedence over the program. GOOD SHAPE has appeared in the building; ROUGHNESS has appeared in the entrance path; and the terrace has been formed as a BOUNDARY.



## 6 / CHECKING THE NEIGHBORS' VIEWS

WE NOW MODIFIED THE VOLUME TO PRESERVE FURTHER THE STRUCTURE OF THE NEIGHBORS' VIEWS.

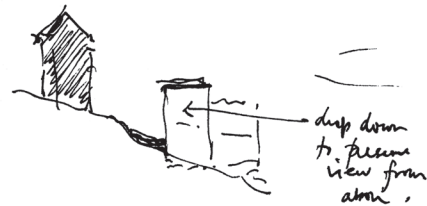
To make sure of the volumes, we went back to the site and had someone stand with long vertical two-by-fours to show the top, roof edge, and so on as real positions. We then climbed up to the houses above us and went into their living rooms, onto their terraces, to check the views that would be left if the building stood where the two-by-fours were. We looked out from everybody's windows, decks, and gardens, all around.

We saw, from this experiment, that it would be best — for the neighbors' views and for ourselves — to tuck the house as far back *into* the hill as possible, and keep the height less than 11 feet off the ground slope at the back, and 19 feet off the ground at the front edge. These heights were recorded on a contour drawing. This insight was different from prevailing wisdom in the Berkeley hills, which would have told us to place the house on stilts, far forward on the site and up high, often as much as 25 or 30 feet off the ground for a two-story building. This “in-the-air” approach generates the cheapest foundations

and is therefore common. Instead, we chose a more expensive foundation, digging deep into the hill, to preserve the hill, the garden, and the neighborhood's views.

To stay on budget, the expensive foundation had to be paid for later in the process with savings from other construction categories.

The impact of this step in the unfolding is to make the house long and narrow along the contour, thus introducing GOOD SHAPE and DEEP INTERLOCK into the volume of the building.



*Tucking the building down into the land,  
to maintain the neighbors' views*

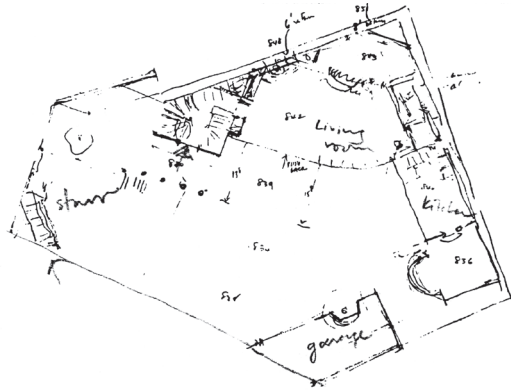




## 7 / FIRST EMERGENCE OF AN INTERIOR PLAN

THE FIRST ROUGH IDEAS OF ROOMS AND ROOM PLACEMENT EMERGED BY GOING INWARD FROM THE HOUSE VOLUME, WITH THE FUNDAMENTAL PROCESS.

In my first version of the house, the great curve, from the sketch, was a wonderful living room, full of light, in the middle of the house. The entrance was to one end (left on the accompanying plan sketch); other rooms were grouped around the right end, stepping downhill. The house would be entered from the northwest, and a stair would run up the back side of the house, to the second floor.



*First sketch of interior layout.*



## 8 / EXTENSION OF THE LOT: THE LITTLE PLUM TREE

WE NOW UNDERTOOK TO PRESERVE THE STRUCTURE OF THE LAND EVEN MORE DEEPLY BY ARRANGING FOR OUR CLIENTS TO BUY A BIT OF LAND WHICH HAD A SMALL PLUM TREE WHOSE PRESENCE HAD A PROFOUND EMOTIONAL EFFECT ON THE HOUSE.

In the conception of the house which had unfolded so far, the entrance, with a porch, was to be at the western end. With the plan in mind, I stood roughly on the site of the proposed porch at the western end of the house and noticed that as things stood, it was really too close to the lot boundary to be a nice entrance. In addition, the city had an ordinance which restricted the total area of the house to 40 percent of the site area. Given the very tiny site, and the configuration which was developing, this would have forced the house to be slightly too small.

Where I stood, just next to me was a little plum tree standing at the western end of the site — a beautiful spot, with a flat terrace, flowers, a couple of chairs. It had a magic and a pleas-

antness which would not really be present on the site without it. To make the house have life, the house *needed* that tree. I suggested to Chris and Stephanie that the small area with the plum tree to the west was needed to make this porch work, by giving it a spark of life and a bit more space.

The same point may be understood, too, in terms of unfolding. The site with the house as we had roughly located it and this tree together formed a complex. In this complex, the plum tree itself and the space which connected it to the house formed an essential center that was at that stage only *latent*. This latent center might simply be described as a potentially beautiful place to the west of the house, where house and plum tree together had the capacity to form a wonderful “thing,” a center. But this center was nearly there; it almost existed already. In the unfolding of wholeness, this center had, therefore, to be preserved, cherished, extended. Without it, the site as we were experiencing it would have been lessened, damaged.



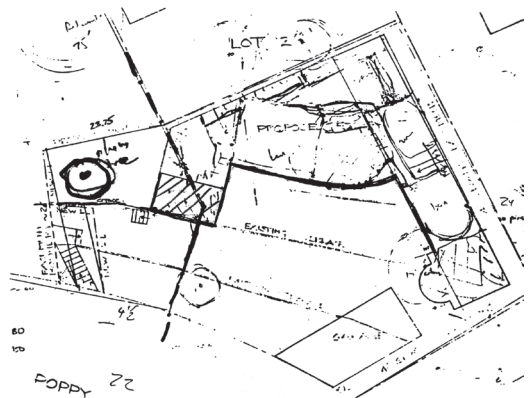
*The beautiful little plum tree*

I suggested to Chris and Stephanie that we broach the difficult topic of adding this piece of land to the property in our next discussion with the sellers. At first they refused. I wrote them a letter explaining that without this piece of land, the size restrictions imposed by the lot area would make the necessary house almost unbuildable. We held discussions for several weeks. Finally, they agreed to sell. Even then, an extraordinary number of special legal measures were needed to make the lot adjustment possible.

It took three months of work to get this one little thing. Its only purpose, really, was to intensify the one existing center — the terrace — with another — the kitchen porch — and to use the center created by the existing plum tree to make this possible. In the course of doing it, various subtle steps had to be taken to make the boundaries just right within the restriction of the zoning ordinance — for example, a few feet too many and the sellers' original property would become illegal. We also positioned the boundary in

such a way as to intensify the beauty of the sellers' garden, too, in that area, its terrace walls and bushes.

The parcel which was formed when we added the plum tree was odd in shape and caused some legal nuisance. But this nuisance was required if we were to follow the rule that the wholeness had to be obeyed and extended. This



*Extension of the lot, to include the plum tree*

devotion to the wholeness, and the protection and weaving in of the plum tree, let the process of the house design and layout take an unusual path: It made everyone conscious of the wholeness, and breathed a special life into the process. The house itself also benefited enormously.

The odd shape of the new lot is a perfect

example of ROUGHNESS coming into existence as a result of unfolding. The site, as originally drawn, was a regular five-sided figure. To intensify its wholeness, it had now become an irregular polygon, with a small piece stitched onto the larger shape. The roughness arose directly from the unfolding process.



## 9 / DEEPER QUESTIONS ABOUT THE FEELING OF THE PLAN

I BEGAN TO QUESTION THE DISPOSITION OF THE MAJOR ROOMS WITHIN THE HOUSE.

In the evolution of the plan so far, a certain pleasant feeling was emerging, more or less from careful attention to practical points, one by one: the preservation of the garden and the street, the volume of the house stepping back, the size of the terrace to make it comfortable, the beauty of the little plum tree.

But in the course of paying daily attention to feeling, one also sometimes has the experience of *wrong* feeling developing: The work does not always go right. Then one has to seize this intuition that the emerging form is wrong, stay with it, and change things at the right moment, to act upon the deep character of the form without drastic repercussion on cost.

That is what now happened in the evolution of the house interior. So far, what had followed from the volume and site, and from the location of the entrance at the left end, was a rough idea of

the ground floor — the main entrance at the left, then the kitchen, then a big irregular living room in the middle, then a spare room or study at the far right end (visible in sketch on page 580).

As we got used to the site, I became uneasy about this arrangement since I knew the light in the living room might be murky, not beautiful, and the distance to walk from entrance to kitchen to living room seemed too cumbersome. I also had an uneasy sense that this layout did not arise naturally from the true nature of the Uphams' life, the character of their relationship, their feelings. In short, I had a dim sense that this house, as presently conceived, did not yet have enough that they would experience as profound feeling: It did not go to the heart of family life as they knew it.

I therefore suggested that they come and speak with me, privately, in my own house, over a few drinks, so we could discuss the uneasiness that I was feeling.



## 10 / A DEEPER CONCEPTION OF THE LIVING ROOM

THE UNFOLDING PROCESS NOW TOOK A DECISIVE TURN. BY REEXAMINING THE EMOTIONAL CONFIGURATION OF THE FAMILY'S DAILY LIFE, THE FUNDAMENTAL PROCESS LED US ALL TO A NEW SENSE OF THE NATURE OF THE LIVING ROOM.

When Chris and Stephanie got to my house, I asked them to describe, in more detail, the main centers in the house, as they now imagined them. I pressed hard, and asked that they describe the key centers in the house again, as

ividly as possible. During this discussion, Stephanie finally broke down in tears, because she described her family as not real enough. It seemed to me that her tears were a lament for what she had lost by being the owner of a very successful children's clothing factory. A vision of a small rosy room, with its fire and comfortable chairs tightly grouped around, slowly came into being. Perhaps it arose directly from her lament, a place of comfort where her wounds could be healed: simple, small, warm, and strongly formed by GOOD SHAPE and LOCAL SYMMETRY.—Embedded in the plan, at its core somewhere, we had begun to imagine an intense smaller center at the very heart — quite different in feeling from the large living room we had originally

shown in the earlier plan. This new room was small, deeply embedded, intense, compact. It was the center of the center.

This deep-lying center also arose from structure-preserving transformations — in this instance, from the character of Stephanie Upham's feeling.

I have often found that the fifteen properties — in this case, the small nugget-like rosy center — often come in almost archetypal fashion, from close adherence to the deep feelings people really have. It was I, not she, who started the process that brought this to light. But it was *her* feeling, the reality of *her* family life, which made it true, made it a productive and essential part of the unfolding process.



## 11 / LAYING THE HOUSE OUT ON THE LAND

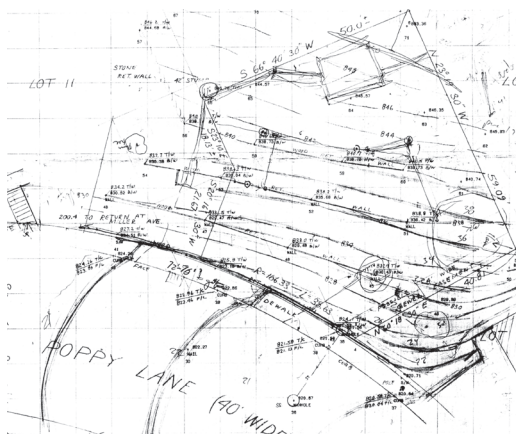
NOW WE ESTABLISHED THE PHYSICAL GEOMETRY OF THE HOUSE FOOTPRINT IN DETAIL.

To get the layout of the ground floor more clear — getting the other ground-floor rooms in relation to this core — Gary Black (vice president of CES), Stephen Duff (one of my apprentices) and I, with the Uphams, now staked out the whole ground floor of the house, room by room, on the land, as accurately as we could from what we then knew.

Afterward, working from these stakes, we constructed an exact plot of the house shape (shown in the drawing on this page). It was the first time we had seen an accurate picture of the house plan, based on detailed understanding of its relation to the land.

I want to stress the fact that the *stakes* came first, not the drawing. The drawing was made *from* the stakes. This is the opposite of the procedure architects more typically follow, by which they first draw a building on paper, and then use stakes on the land to indicate what they have drawn.

In the course of placing stakes, many points of the design became more clear: for instance, the profile of the front wall with the terrace as a thick BOUNDARY, and the position of the back retaining wall with the slope above it as another thick boundary made of STRONG CENTERS.



First stakes marking the terrace, and the south face of the building volume



## 12 / STARTING TO GET A GENERAL IDEA OF CONSTRUCTION

DURING THIS TIME, I BEGAN TO ASK MYSELF WHAT OVERALL FEELING OF MATERIAL AND BUILDING CONSTRUCTION WE SHOULD AIM FOR: I TRIED TO DERIVE THE PROPER FEELING FROM THE FEELING OF THE LAND.

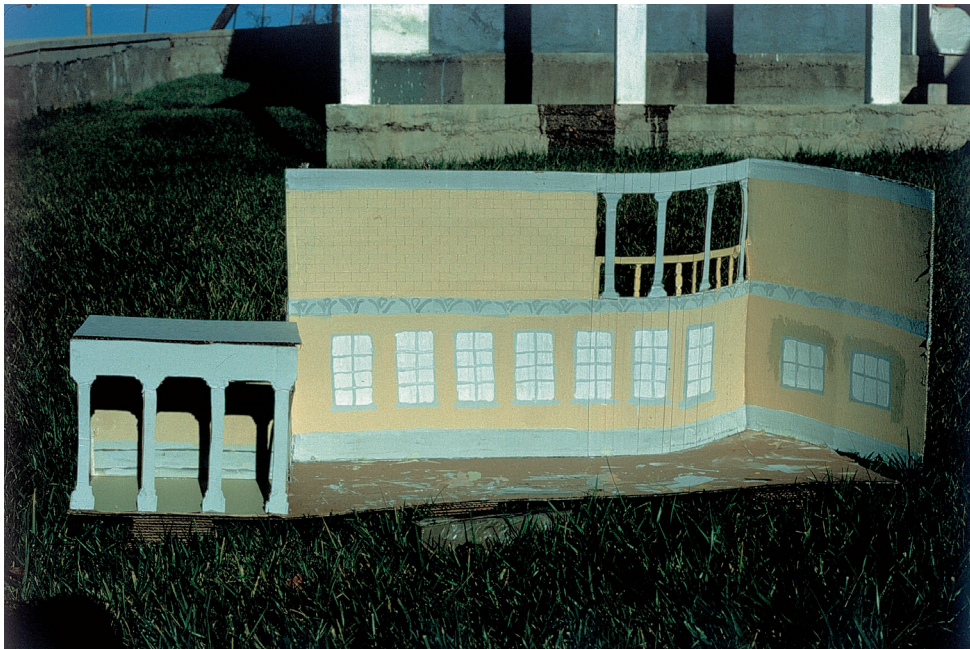
In a conventional process, one might now have gone on to develop the plan in more detail. But the unfolding process has peculiar demands. Having the core idea of the ground floor clear — emotionally — I noticed that what was missing now, most strikingly from the whole, was a sense of how this house was to be *made*.

It followed, therefore, that the next most significant aspect of the whole which had to be made clear was its actual material and substance. This arose, at this moment, because the vision of the core room, so deeply felt by the Uphams, was very physical, very material, in nature. It felt solid, more like plaster or masonry than like

wood. We could not therefore really go forward without having a more developed understanding of this material aspect of the whole.

So I put to our group the following question, as we worked: What is the house made of? Can we feel its essence, its substance? What are its materials? What is it, as one sees it from the outside, enters it, walks about in it? In more detail, what is its general construction method, what are its materials, even what is its overall color?

In these discussions, I concentrated, at this early stage, and sought to lead the discussion, only on the most global aspects of construction: the weight, the relative curviness or straightness. What is the density? What is the overall feeling of the real material thing going to be? What feeling was consistent with the site, and with the emerging whole?



*First cardboard model to explore the possible forms of material, construction, and color which might be consistent with the emerging whole*

THE PROCESS OF CREATING LIFE



*Trying to imagine a texture of concrete block and plaster*



*Testing wall texture using blocks*



*Chris Upham on the site*



*First mockup of poured concrete shapes with cement plaster and styrofoam insets*



*Another experiment trying a combination of red pavers, white plaster strips, brick, concrete, and concrete block*

At this very early stage, we got the idea that the house would be made of concrete block. As a group, we began to see a balance of pale yellow washed over concrete block, with gray bands of ornament. The ornament on the blocks and poured concrete wall introduced **LEVELS OF SCALE**; the bands of ornament created **ALTERNATING REPETITION**. I was not sure yet whether these bands of ornament were poured or specially made block. To answer the question, I asked my apprentices to test some possible ornaments, likely colors, and different arrangements and mixes of these colors on what we now knew the rough volume of the house to be. And even at this early stage, I already started looking at the character of ornament in some detail. My apprentices and I started building possible blocks, poured-concrete blocks, and block and concrete walls in our construction yard. We made up some

blocks which gave indications of a possible ornamented, but heavy structure. Some of these, with in-cut stars and crosses, were closer in feeling than others to the gestalt which was emerging from the unfolding process. The one that came closest was based on a Japanese ornamental concrete block. These details, even going to the actual ornamental shapes themselves and the sense of concrete, helped to fix the feeling of the house. The thickness of the concrete masonry introduced the possibility of **BOUNDARIES** at a smaller scale. We could judge, even now, that some of these ornaments had more business on the site than others, and this helped to establish the character of coming centers in the larger structure.

It should be borne in mind that at this stage we still did not yet know the room plan of the house in detail. But we were beginning to get a feeling for the building as a material structure.



### 13 / ESTABLISHING ROOMS

**T**HE NEXT CENTERS TO BE ESTABLISHED WERE THE MAIN DOWNSTAIRS ROOMS.

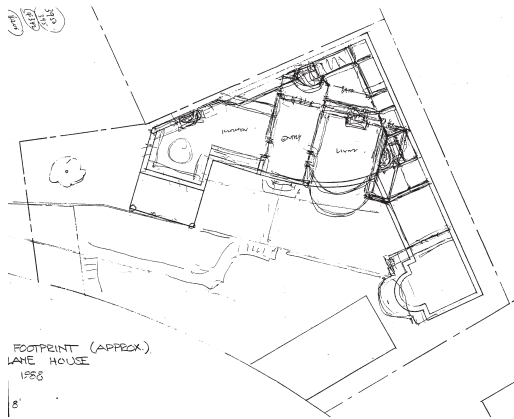
Having the substance of the house clear, the unfolding process naturally turned back to the plan because the plan relationships and centers forming the plan were now the *next* most important features which must emerge from the emerging wholeness: a wholeness which now consisted of an uncertain plan with a small compact living room at its core — within a structure made of concrete or masonry.

I had by now completely abandoned the overall plan which I had while I was first deciding the house volume. That first plan had its stair too far from the main center; its big living room had nothing to do with the vision of the small intense rose-painted room I had seen. Instead, given the core importance of the small compact living room, I now placed the stair towards the back of the footprint triangle — with an entrance room in front of it, thus mak-

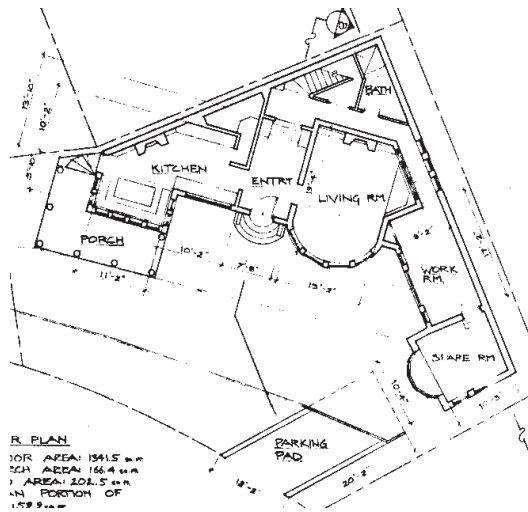
ing this entrance room the very center of the house and intensifying it as a **STRONG CENTER** properly, making a **GRADIENT** to the stair at the back. That left the main room to the right of the entrance room, also as a strong center, but small, as it had to be to catch the Uphams' feelings.

The next center which became clear was a rather large kitchen, with a big table to one side, where the Uphams were to eat. This living kitchen had not been clear at first, but now we got from our discussion with Stephanie a picture of a big hollow room, spare, quiet, not too decorated, where the family was to cook and eat. At this moment, this kitchen became clear in character — but not, at first, yet clear in its position. However, it was time now to fix positions.

Where to put the kitchen? East or west of the living room? After thinking about the sunshine in the kitchen, the little plum tree, and



First-floor plan sketch with its major centers worked out.



As drawn for submission to the city of Berkeley for the building permit

the approach to the house, we all together (the Uphams and I) decided to place the kitchen at the northwestern end where the porch had been on earlier sketches. Remaining rooms went to the southeastern end.

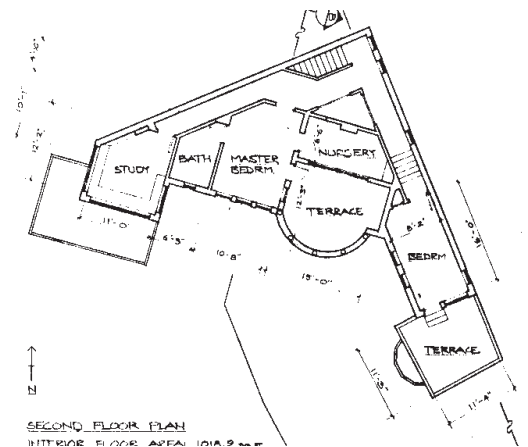
The combination of kitchen, stair, and living room now effectively defined the new layout of the house within the given volume. We drew the plan and prepared a set of preliminary drawings ready for submission to the city of Berkeley.



14 / UPSTAIRS ROOMS

WE ALSO TRIED — UNSUCCESSFULLY — TO GET THE UPSTAIRS ROOMS AS LIVING CENTERS.

I knew that it was too early to understand the upstairs rooms, since we were not yet standing on the second floor to judge them. However, we tried to get an upstairs layout, mainly to apply for a building permit and satisfy building requirements; it is shown here. Perhaps the most notable thing about this layout is the fact that by the time the construction process reached the upstairs, the drawn layout turned out to be entirely wrong and was then redone completely. Of all the upstairs rooms on this early plan, only one — the small bedroom at the southern end of the house — remained as it was.



Upstairs plan as drawn for building permit



The wholeness which one needed to see in order to determine the rooms upstairs just was not yet visible, so it is not surprising that these judgments could not yet be made.

It is remarkable that the architect's belief in his own powers dies hard. No matter how many times I tell myself that perhaps, just this once, I can work out what has to be done in a building

without being there, in the event I am always proved wrong, and it always turns out that the influences from nearby parts of the building and its environment which will determine and generate the plan, make a decisive impact not predictable at the time the building existed as a drawing (see page 610, below, where the second floor as it actually unfolded later, is shown in a plan view).



## 15 / ANALYSIS OF COST

IN PREPARATION FOR SETTLING THE WAY THAT WE WERE GOING TO BUILD THE HOUSE — REAL DETAILS OF CONSTRUCTION — WE HAD, SOME TIME EARLIER, BEGUN A CAREFUL ANALYSIS OF COST.

In the program-budgeting method I have used for years, we sit down, *before the building has been designed*, and make a plan of how to spend the money. That is — for a given amount of money, which is usually set at the beginning — we decide how much should be spent on walls, roof, foundations, terraces, exterior works, interior furnishing, and so on.

It is interesting to see how much of the picture of the finished building can be built up, merely by assigning numbers to the different operations and elements. For example, in the buildings I build we typically spend much more on construction of adjacent outdoor areas and spaces than is spent in other projects; we also spend more on the *structure* of the building than is spent in typical California buildings. From the very beginning, this has an effect on the architecture and on the whole way one sees the site.

In fact, one is able to visualize, judge, and modify the design, just from the numbers, even at this earliest stage when there is only a list of numbers on a piece of paper. *The list of numbers IS the earliest design*. It can already be visualized, experienced, from the point of view of the feeling it is likely to create.

In the case of the Upham house, our first cost picture of the building allocated rough num-

bers to foundations, walls, roof, windows, interior. This was an analysis made during early conceptual design. The problem with the first cost picture was that the overall cost was too high, and far more important, in proportion certain items seemed intuitively too low or too high, relative to one another, for the building that was imagined.

We then made a second educated guess about how costs ought to be apportioned, in the design, in order to make the overall feeling of the building sensible, and coherent. Here, for instance, we put high costs for windows (knowing that many large and beautiful windows were essential to the design). We put in expensive interior plaster work, also essential; and we put in masonry walls.

When we found out that these costs ran too high, we then had to decide how to keep things in proportion, keep the important things important (in terms of what was to be spent on them) and yet bring the whole cost picture to the level that the clients requested.

Some of the items we cut or raised in price, or lowered in price, may seem surprising by contemporary standards. We used more expensive flat roof membrane (since roof quality was essential in a flat roof building); we kept masonry construction on the first floor wall. We increased expenditure on outdoor items, but we removed a porch as inessential to the overall feeling. We kept terrazzo in the kitchen, but determined that

it could be done by students, while the grinding of terrazzo could be done by Chris Upham, thus taking an expensive item, allowing it to keep its quality, but cutting its cost drastically.

On the other hand, we had cheap knotty-pine planks in the upstairs floor; kept wide cherry floorboards in the living room. Other things were reduced, too. Bathroom fixtures and toilets were

kept low. The client agreed to paint the building interior and the exterior windows.

This judgment about the assignment of costs, what was reasonable, what created a good atmosphere, was based on the feeling which the whole had when one visualized the whole created by the budget amounts to be spent on different items.



## 16 / CONCRETE WALL DETAILS

WITHIN THE FRAMEWORK OF A TIGHTENED COST PICTURE, WITH PERCENTAGE OF 15 PERCENT ALLOCATED TO THE MAIN STRUCTURAL WALL OF THE HOUSE, DETAILS OF TECHNIQUE, SHAPE, AND FIGURE BEGAN TO EMERGE FROM THE MOCKUPS OF THE WALL CONSTRUCTION ELEMENTS.

Two things had been going ahead. As our cost picture was getting more detailed, we were starting to get bids from subcontractors on key items. We were also making progress on a number of items where the bid was not yet in or we didn't know how to perform the subcontract. Two examples were (1) the concrete front wall of the house and (2) the interior plasterwork. We were now sure that at least the lower floor of this building was to have concrete walls; but it had become clear, from the analysis of available money, that we could not afford to do the same upstairs — so we decided to use beautifully formed and poured concrete downstairs, and a cheaper, thick heavy concrete-like stucco over wood frame upstairs. I wanted the building to be something of permanent value — not like so much lightweight two-by-four frame construction, a temporary building which would be derelict after fifty years.

I began trying to imagine the concrete structure of the downstairs wall: columns, beams, openings, capitals. It was hard to visualize in detail. I tried sketching it, but couldn't get enough of a sense from the sketches; the prob-

lems were all three-dimensional, too hard to visualize in drawings. My apprentices made small models; but there wasn't enough detail in those models either, not enough to grasp.

Besides, the problem of cost of the formwork was looming as a huge problem. How could we build the complex shapes and articulation of columns, beams, capitals, frames — and not lose our shirts. How could we succeed in doing it within the budget.

I decided that the only way to get an idea of this thing was to build some full-size mockups in cardboard. Randy Schmidt (one of the main CES craftsmen on the job) and James Maguire (one of the CES construction managers) built a complete bay of the structure in cardboard, at full size. Interestingly, it was terrible at first, very crude. This is interesting because that first cardboard mockup exactly followed the drawings. It just showed us how far from a workable and desirable three-dimensional configuration the structure imagined in the first sketches had actually been.

It is worth noting that many of today's buildings which do not use such an unfolding process are doomed to just these kinds of mistakes, since in contemporary practice it is the drawn details which actually get *built*.

We made a second mockup, including a series of changes, looking at them while we did them. In heavy corrugated cardboard, this was very easy. The size of the columns, the offset of