

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



Looking at the cardboard mockup on the site, to test its feeling in relation to the site

the columns in front of the panel, the degree to which the beam came out over the columns — these aspects all changed during our efforts to make the configuration more harmonious, more real, and to give it deeper feeling.

And how could a capital be made, to make sense within this system? This was very hard to imagine because it was so complex with regard to water exclusion and flashings. But in the full-size cardboard reality, we began to be able to imagine the physical arrangement the flashings would need to have.

In the end, after a few days' work, we got shapes which meant something. They had solidity and feeling in proportion and mass. As a result of the development of the full-size cardboard models, GOOD SHAPE had made its appearance in the column capitals; CONTRAST, in the degree of offset between capital and shaft; ALTERNATING REPETITION, in the rhythm of columns and bay spacing; LEVELS OF SCALE, in the small details of reveal and depth in the modeling of the concrete surface.



Cardboard mockup of wall construction. This mockup was very detailed, full size, and allowed us to check the offset between one plane and another to the nearest half inch and quarter inch

The columns, the bays, the thin column capitals, the panels above and below the windows — and, of course, the windows themselves and the reveals — all existed as substantial cen-

ters in their own right. It was this process, the instilling of the centers with life, in these construction details, which gave the whole process its energy — and its success.



17 / PLASTERWORK EXPERIMENTS

COMPARABLE DETAILS BEGAN TO EMERGE FOR THE INTERIOR PLASTERWORK (DETAILS WHOSE CHARACTER WAS STARTING TO BE WORKED OUT NOW) EVEN THOUGH THE ACTUAL PLASTER WAS STILL NOT GOING TO BE BUILT FOR SEVERAL MONTHS.

Before I knew how to make the plasterwork surface inside the building, I knew we would need to cast the panels ourselves, but didn't yet know how to do it. We began experiments. Randy Schmidt started a number of plaster models, exploring the possibility of making flowers and other simple reliefs in plaster and trying the kind of casting techniques we might be able to use. What we were looking for was a treatment of detail in the plaster which would have a shimmering surface in the large, and be simple and touching in feeling: NOT-SEPARATENESS and INNER CALM. We did the experiments by gluing cardboard and balsa

wood surfaces, then casting from them, until surfaces began to appear which had a feeling of light in them.

By the end of these experiments with real casting plaster, the plaster panels emerged as flower-covered surfaces, embellished with leaves and latticework.



Closeup of one type of floral ornament which we tried



Early experiments in trying to make beautiful, but inexpensive, plaster panels for the interior