

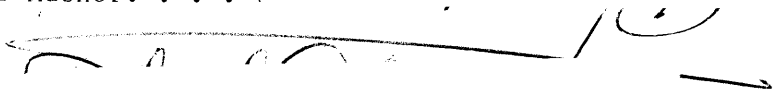
A Bakery/
in search of appropriate form

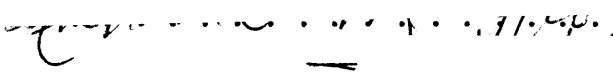
by
Katri Kuzmic

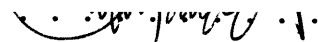
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Submitted in Partial Fulfillment of the Requirements for the Degree of
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Signature of Author.

Department of Architecture
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abstract

A Bakery/in search of appropriate form

by Katri Kuzmic

Submitted to the Department of Architecture in June 1982 in partial fulfillment of the requirements for the degree of Master of Architecture.

During the process of designing a building there occurs the continuous task of finding the forms, materials and structure that are fit to the particular building or situation at hand. It is the intent to combine these different elements that make a building and organize them in such a way to reflect a whole, expressive of its meaning. The task is to search for building form or forms that are responsive to the reasons for which they are built and to the people who live in or use them.

This thesis is an exploration toward the search for appropriate form. Forms are found and subsequently assembled to fit the situation of a specific building, mapping appropriate design decisions from cues given by the various activities of life the building holds. The design of a medium scale bakery was chosen for this exploration. Though the various activities and baking process that occur within a bakery are well documented, the primary intent of this thesis is to design this building as one example to reflect the search for appropriate form. The understanding of the nature of a bakery and how it works combined with the awareness of its users' needs serves as fuel toward this search for a form-al morphology fit to this singular building.

The actual design exploration or process will be preceded by three chapters. The first chapter is an introduction to appropriate form clarifying or possibly hinting at its meaning. The second chapter documents some built and written references selected to support the meaning as introduced as well as chosen as some building/form examples that have influenced my thinking toward this search for appropriate form. In chapter 3 a particular bakery is used as a prototype because of its unique baking process. This chapter includes the comparison of this particular small scale bakery to larger industrial form examples. The final chapter of this thesis exploration represents the documentation of the design process toward the design of a final building--a bakery. In Chapter 3..., this search for appropriate form takes place in five phases. The first covers the stronger, more basic reasons and form-al definitions toward the design of the bakery. The 5th or final phase documents the overall "unfolding of forms" that make the final building.

We are to consider our building, says Ruskin, "as a kind of an organized creature." Perhaps this is what I'm trying to do.

Thesis Supervisor: Richard C. Tremaglio

Title: Adjunct Professor of Architecture

acknowledgements

to **The Bakkens**
my father

to **The Baldwin Hill Bakers...**
with special thanks to **Paul Petrofsky** for sharing his time
and special knowledge of how a bakery works

to **Amanda** and her sea shells
Eric Schmidt
Elizabeth Willis

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word processing/editing **Peggy Wihtol**
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T A B L E

OF

abstract I

acknowledgements II

table of contents III

preface IV

1 introduction to appropriate form]

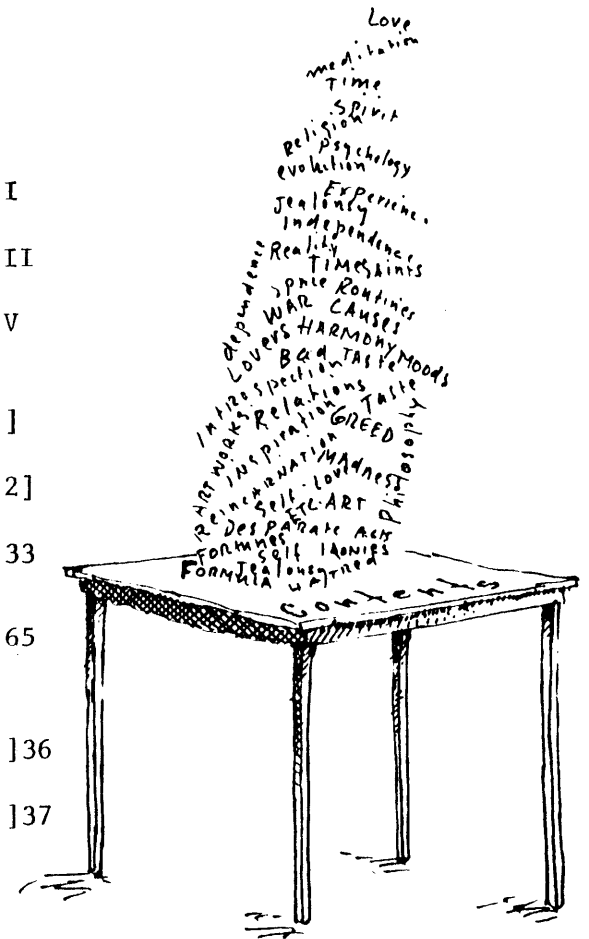
2 building/references toward appropriate form. 2]

3 introduction to a bakery 33

3...a bakery in search of appropriate form
the design process 65

appendix]36

bibliography]37



Richard Stine

preface

In nature, form is the result of the organisation of many distinct parts in space in such a way that life can unfold, fulfilling all its effects both in terms of the single part and in terms of the integrated whole; whereas in the geometrical cultures, form is derived from the laws of geometry ...

In nature all forms including crystals and other geometrically shaped ones are generated by specific internal forces, whereas in geometrical planning form is imposed from the outside, which is in opposition to its creation from within ... We must discover things and let them unfold their own forms. It goes against the grain to impose forms, to determine them from outside, to force them according to abstract laws. Basic geometrical figures are not original natural shapes for forms, they are abstract and derived from intellectual laws. The kind of unity which we construct on the basis of geometrical figures is for so many things merely a unity of form and not a unity with life ...

To impose geometrical forms is to make them uniform and mechanical, but we do not want things to be mechanical except in the way they are made. To mechanise things is to give them a mechanical life, a dead life, but to mechanise the process by which they are made is to win life ... If we prefer to search for shapes rather than to propose them, to discover forms rather than to construct them, we are in harmony with nature and act with her rather than against her ...

We must realise that the moment we reject our intellectual preconceptions and act in the way that nature acts, consciously planning in the way in which nature plans, we organise things in such a way that they develop a personality and serve life as a whole.

Hugo Häring

introduction to appropriate form

1

My attempt in this thesis is not to search for a kind of style or typology nor to search for rules, or necessarily a methodology in design. It is a search or exploration of building morphology appropriate to the specific 'life' situation to which it corresponds. Architectural form or forms should be responsive to the reason they are built and to the people who live in or use them. The term **appropriate form** is used loosely to describe the subsequent assemblage of spacial and physical definition, materials and structure resultant from the awareness and understanding of its users, the specific nature of what the building is, the particular region/culture (where it is built) or generally the 'life' for which the building is intended.

The assumption taken by the author is that buildings are thick with many layers of activities, exchanges and interrelationships that either allow or disallow the richness of life to happen due to physical and spacial definition, materials, structure, or other factors. A good building allows and enhances this life. It is the intention of this thesis to firstly explore these layers of variables unique to the situation of a particular building and its place to inform design decisions appropriate to the situation at hand. Subsequently, it is to search for **appropriate form** reflective of a particular situation and organized in such a way to let these life processes "unfold their own forms". Thus **appropriate form** is a process of discovery allowed to develop piecemeal in response to these particular uses, their interrelation and their final assemblage into a coherent whole--a building.

1

But there is always variation and uniqueness in the way the patterns manifest themselves.

Each pattern is a generic solution to some system of forces in the world. But the forces are never quite the same. Since the exact configuration of the surroundings at any one place and time is always unique, the configuration of the forces which the system is subject to is also unique--no other system of forces is ever subject to exactly the same configuration of forces. If the system is responsible to the forces it is subject to, it follows that the system too, must be unique; it cannot be exactly like any other, even though it is roughly similar. This is not an accidental consequence of the uniqueness of each system: it is an essential aspect of the life and wholeness of each part.

Christopher Alexander
The Timeless Way of Building

It must be observed, however, that when we speak about a new form of our time, we do not speak about a new "style-form" of our time. On the contrary, the more the matter of style is postponed, the clearer one is able to develop a direct and expressive form. For, beyond doubt, a sincere search for form by ignoring an intentional search for style, is the safest way--toward style.

Eliel Saarinen
The City/Its Growth, Its Decay, Its Future

The phrase or term **appropriate form** is not meant to connote a search for one overall form reflecting a building. Nor is it the final resolve of the many interrelations of activities which necessarily result in a pure singular geometrical form such as a circle, square or triangle. The intent is not a search for one ideal form to resolve all complexities and differences of activities. But the intent is to explore the nature of these complexities which in turn inform appropriate design decisions toward the making of an aggregate of forms. These forms are then responsive to the differences of the singular events and are assembled into an understandable organization reflective of the meaning for which the building is intended.

Though there is a time and place for such pure forms appropriate for understandable or possibly subjective reasons, subjectivity of form is not emphasized in this thesis. Due to the nature of a bakery, functional and spacial organization rank of higher importance. It is recognized by the author that other buildings may rank higher in subjectivity of **appropriate form** due to cultural, religious or shared beliefs in common of their inhabitants. For instance, a singular or homogenous event such as a planetarium or a convention hall may be resolved into a singular form such as a dome. Yet my interest in this particular thesis was to chose to design a building that is by nature internally organized and somewhat self-contained such as a factory and at the same time rich with differences of process and activities. A bakery provided a complex variety of activities from milling to baking to delivery sett-

ing forth a greater challenge for subsequent form-al resolve as well as a rich morphological exploration of building form. Therefore, **appropriate form** does not refer to one homogenous form being the right or only form which resolves all the differences of internal activities occurring within a bakery. But it is a more inclusive term expressive of the final assemblage and appropriate correlation of physical and spacial definition (its sizes and differences), materials, light, structure, the mechanical and color.¹

¹In the final assemblage of the model shown in the last chapter, color was of equal importance to other variables. Perhaps the differences in value tones in the photographs can show these changes/decisions in color, since thesis requirements allow black and white printing only.

Not much manipulation, however, is needed with the microscope to discern in organic life two phenomena; the existence of individual cells, and the correlation of these cells into cellular tissue. In itself, this revelation might seem an insignificant matter, yet it is amazing to learn that the whole universe, from the most microscopic to the utmost macroscopic, is constituted along this dual thought of individuals as such and of the correlation of these individuals into the whole. Furthermore one learns that vitality in all life manifestation depends, first, on the quality of the individual and second, on the quality of correlation. Consequently, there must exist two fundamental principles according to which these two mentioned qualities are constituted so as to foster and maintain vitality in the course of things. In fact, by a closer study of natural processes we will perceive two fundamental principles, "Expression" and "Correlation," of which the former principle brings individual form-shapings into true expression of the meaning behind these forms, and of which the latter brings the individual forms into organic correlation.

Eliel Saarinen
The City/Its Growth, Its Decay, Its Future

"What of architectural beauty I now see, I know has gradually grown from within outward, out of the necessities and character of the indweller, who is the only builder ..."

*Henry David Thoreau
Life in the Woods*

The process of how **appropriate form** may be achieved in building is one of transformation or a continual search unfolding form or forms fit to particular uses and meaning of a particular building correlated into a coherent overall organization. The success of a workable bakery is dependent on this clear internal organization. Thus forms are molded by user or human needs in combination with a particular process of bread making. To a greater extent most industrial building forms are governed only by this mechanical process and/or economy. Though the latter is vital to the economic survival of a bakery, the human and production relationship is emphasized in this thesis--to design an enjoyable work place where human needs of view, air, space, light, and interaction are correlated appropriately with the process of baking bread. The internal organization of the production process and mechanical requirements that make up the basic nature of a factory should be balanced with people's movement through the building and experience of each other. Thus the reconciliation of the internal organizat-

ion and the subsequent resolve of different forms, materials and structure to individual actions and meanings will happen from the author's understanding and awareness of how things work within. The final exterior forms or character of the building will unfold from this awareness.²

Again this search for differences of **appropriate form** is responsive to the changes of life and activities within the building. Each move, in this case, is a result of user needs, differences of actions as well as a general and specific awareness of the baking process--which is the primary purpose of a bakery. It is not the intent of this work to resolve the design of a small-scale factory into one fell-swoop of an orthogonal framework or open plan giving only parameters of a singular homogenous grid or space. The structural system, spacial and physical definition and materials are looked at as a whole with no single element governing the others. The intention of this search is to document **appropriate form** qualities, local and as a whole, to express and enhance the actual life and work that daily takes place.

²For reasons discussed in Chapter 3 the site is dealt with peripherilly.

This character will happen anywhere, where a part of the world is so well reconciled to its own inner forces that it is true to its own nature.

All those things which we loosely call nature--the grass, the trees, the winter wind, deep blue water, yellow crocuses, foxes, and the rain--in short the things which man has not made--are just those things which are true to their own nature. They are just those things which are perfectly reconciled with their own inner forces. And the things which are not "nature" are just those things which are at odds with their own inner forces.

And any system which is whole must have this character of nature. The morphology of nature, the softness of its lines, the almost infinite variety and the lack of gaps--all this follows directly from the fact that nature is whole. Mountains, rivers, forests, animals, rocks, flowers all have this character. But they do not have it simply by accident. They have it because they are whole, and because all their parts are whole. Any system which is whole must have this character.

*Christopher Alexander
The Timeless Way of Building*

What is vital to the making of **appropriate form** is that process of understanding all the variables of content as much as possible, of reinterpreting or transforming into a form vocabulary, unique to the situation, the designing of a particular bakery. Understanding the milling, baking and delivery (distribution) process combined with the awareness and observation of the differences of life and work activities inform these design decisions. These decisions made toward the subsequent design of forms, material and structure into an aggregate of meaningful relationships organized in such a way to reflect that nature of the building as a whole--a bakery.

A way or the beginning of understanding the nature of a small scale factory or bakery may be through observational means: observing how a bakery works and the activities that people do in the process of making bread--from milling the grain to the final delivery of finished breads. In his book, Managing a Sense of Region, Kevin Lynch describes a kind of observation process that generally took place in developing my own understanding of how a bakery works ...

Generalized observation can be sharpened by looking for particular kinds of action ... For example, one may concentrate on the movement of people and look for the things that influence that movement: The behavior at decision points, the barriers and the attractants, the origins and destinations, the involuntary delays and detours, the wayfinding behavior, the maintenance of personal space while moving, movement conflicts, and so on. One can look at territorial behavior or for the location and nature of meeting places. One may identify, map, time, and characterize the mosaic of behavior settings, that is, the localities in which repetitive social behavior is associated with specific kinds of spatial settings.

Through observational means as well as continual dialogue with the bakers, I was able to begin to understand how a bakery worked.³ This was a continual activity on my part that occurred simultaneously with the form exploration toward the finished design of a bakery. Needless to say, as my awareness increased of how things worked, my ability to make clearer design decisions increased. Thus the final chapter documenting this design or 'search for form' process is introduced through five phases. The last phase becomes close to a deeper decision making process which reflects **appropriate form** appropriate to the making of a bakery and reflective of its overall nature.

I have realized throughout this exploration that the finding of **appropriate form** or forms becomes a continual balancing act. It involves sensing which situations or layers of activities that occur within a bakery weigh primary or most important in a given situation and which are secondary to the overall success of a working bakery. The commercial bakery requires that the actual process of bread making serve as the primary framework of spacial organization and decision making. Thus the intensive understanding of spacial organization is the strong and most appropriate emphasis toward a successful bakery design.

³A specific bakery was used as a primary example toward this design exploration. This particular bakery is documented in chapter 3.

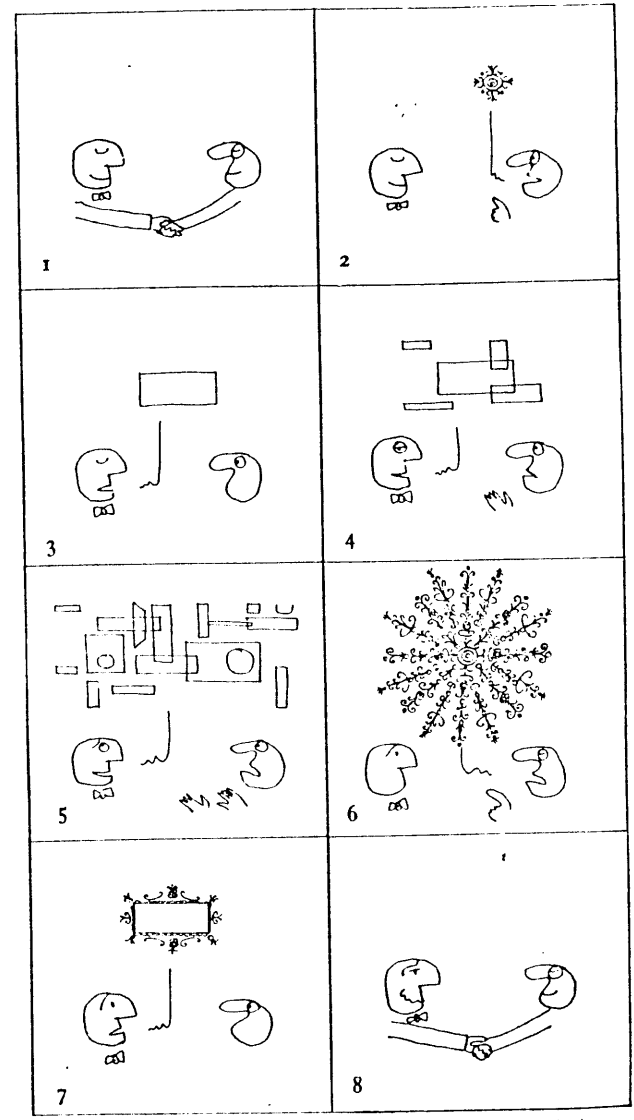
This experience reinforces the view that a brief is not a brief unless it not only states the problem but also understands it. This is the first stage of the creative process--UNDERSTANDING.

You are of no help to a client if you merely state his problem 'in your own words'. Many buildings are simply statements of problems, problems perpetuated in built form. In a good building the designer, by understanding, has used the problem and helped it to give birth to its own solution. The problem is there, inherent, but absorbed and enjoyed, in the final goal.

Aldington and Craig
Understanding People and Developing a Brief

A bakery or a factory by nature does not connote a spacial organization full of open choices mainly due to a specific mechanized or baking process. Yet to see or find those instances where form is open (to allow individual actions and choices to be made) was continually explored. The mechanical process of breadmaking did not thoroughly govern but was in constant relationship to the well being of those who work there.

Because of its primarily functional quality, a bakery serves as a fairly clear-cut case of how to approach **appropriate form** to fit the situation at hand. Designing one's house or perhaps a church would become a more difficult form-al search due to the subjective or individual reasons. Yet even in these cases, the scope of **appropriate form** has its limitations including the site, regional character, culture, personal life styles and budget that serve as unavoidable parameters. The common denominator continuous in the search for form is that it evolves as a naturally responsive architecture rooted in the qualities of life and an understandable nature of form and building.



THE CLIENT

Louis Mario Hillman

Really, if we were to undertake a survey of the best and most direct form developement that modern thought has produced, we would not be surprised to find this in kitchens, pantries, and bathrooms of homes. Here, form has escaped styles and other side-influences; it has been conceived clearly and simply to serve its purpose, and it has been moulded gracefully with good taste. Here, we can learn a lesson of how form problems must be solved.

Eliel Saarinen
The City/Its Growth, Its Decay, Its Future

Of course not every design decision and move must have a reason related to the appropriateness of that particular building. The basic meaning of the building should be clear, yet there should be room either spatially or in detailing which allows the inhabitants or actual builders to express individual touches and whims. Not everything is designed. A building will be be a background to actual living that takes place within and without, and hopefully enhance this.

Other dangers due to **appropriate form** being responsive only to particular situations and activities are the problem of over specialization of form, or worse, lack of flexibility. Because factories are usually designed toward a specific purpose or product chances are the building is organized around the production of the particular product. Yet many factories today are being reinhabited by different people for different uses. Often these buildings are easily adaptable due to a singular form, such as a rectangle, or are gutted to expose open floor space divided orthogonally by columns. This open-ended flexibility is not the intent of designing the bakery within the definition of **appropriate form**. It is assumed that the forms searched for are primarily a reflection of the nature of a bakery and its particular baking process. Yet enough spacial slack and looseness of form is recognized throughout the design process to allow for some adaptability if future change should occur.⁴

⁴Because of the stronger elements contained within the building such as two large brick ovens, milling areas and food production organization, any changes of use occurring will be somewhat limited.

What is really happening is that there is a feeling for a certain kind of morphology, which is geometrical in character, but which is a feeling, not a precisely stated mathematically precise relationship.

A pulsating, fluid, but nonetheless definite entity swims in your mind's eye. It is a geometrical image, it is far more than the knowledge of the problem, it is the knowledge of the problem, coupled with the knowledge of the kinds of geometrics which will solve the problem, and coupled with the feeling which is created by that kind of geometry solving that problem. It is above all, a feeling--a morphological feeling. This morphological feeling, which cannot be exactly stated, but can only be crudely hinted at by any one precise formulation, is the heart of every pattern.

Christopher Alexander
A Timeless Way of Building

This leads to the heart of this thesis and the most difficult yet vitally important meaning of **appropriate form**--to somehow attain a morphological understanding of form--to determine which forms, materials, and structure should be used when, where, how and why. Though many of the form-al decisions are quickly resolved because of purely functional reasons, not all design moves and decisions are purely functional. Thus the resultant forms and their correlation are also due to the awareness and care by those who work there toward the making of quality bread and to design an enjoyable working place which the architecture or building enhances.

Meanings are not always functional or clear-cut. To continually grasp the general nature or character of a particular building is one idea that can not be expressed in words yet is constant throughout this search for **appropriate form**. The final bakery design is not intended to be the only 'right' form for a bakery of its kind nor do I fool myself into thinking that the forms, materials, structural systems and spacial organization chosen are the most appropriate to the situation. This is due to my own limitations of understanding form and building.

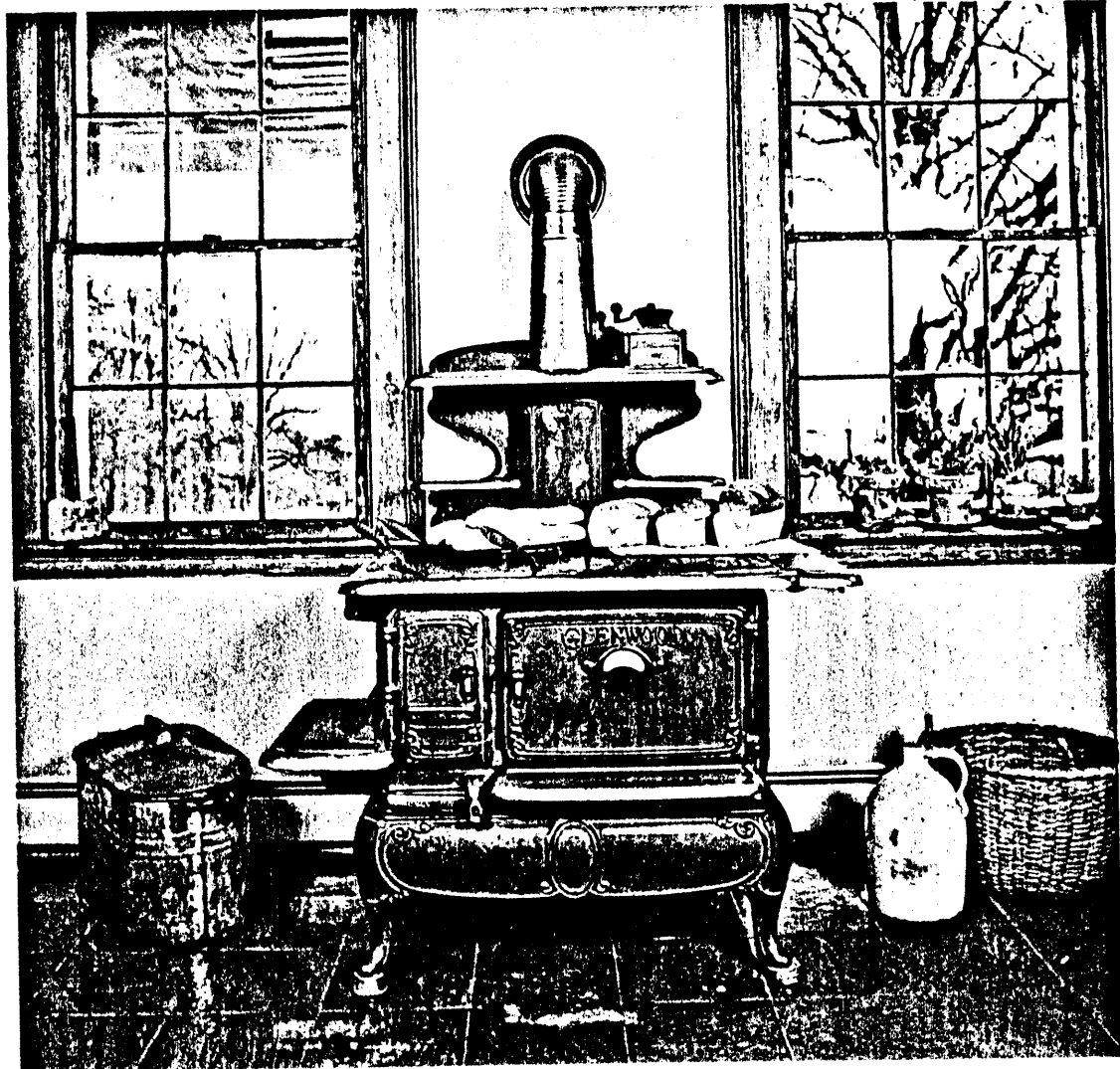
That is why this thesis is very much an exploration or a documentation of a search and is not meant to propose a singular theory proven in one building. This thesis is an exercise toward a morphological understanding and meaning of building.

There are other shells to help me to put in the row on my desk. Here is one I picked up yesterday. Not rare; there are many of them on the beach and yet each one is individual. You never find two alike. Each is fitted and formed by its own life and struggle to survive. It is an oyster, with small shells clinging to its humped back. Sprawling and uneven, it has the irregularity of something growing. It looks rather like the house of a big family, pushing out one addition after another to hold its teeming life-- here a sleeping porch for children, and there a veranda for the play-pen; here a garage for the extra car and there a shed for the bicycles.

Anne Morrow Lindberg
Gift From the Sea

building/references toward
appropriate form

2



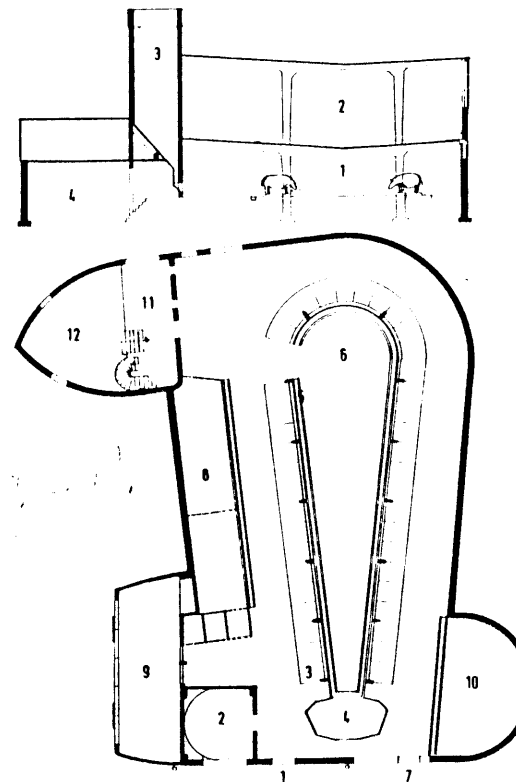
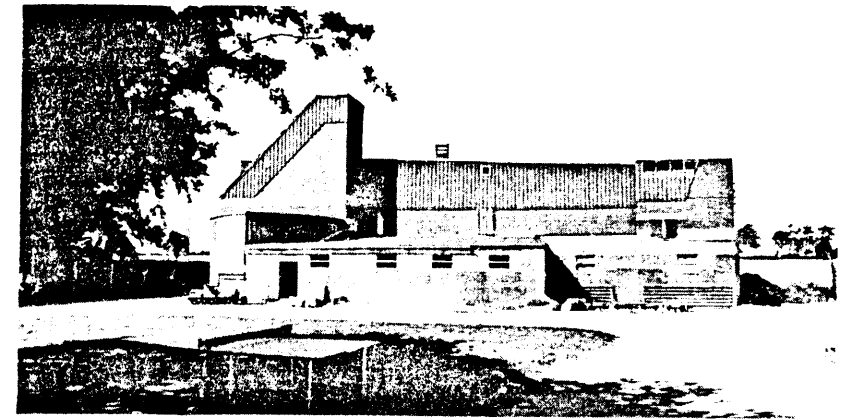
21

The Garkau farm buildings are adventurous yet modest, progressive yet in some ways traditional. In practical terms they have been highly successful, and are visited by farmers as well as by architects. In terms of image quality they are unmistakably agricultural...

The cowshed has a considerable more complex form. It is based on a comparatively simple but ingenious section in which the cows are stabled on either side of a central food distribution channel which can be supplied from a hayloft above. The loft floor slopes downwards towards the centre, thus simultaneously facilitating the movements of hay towards the central delivery slot and aiding the ventilation of the cowshed below by guiding foul warm air, which of course is rising, to ventilators along the tops of the windows in the outer walls. This section, if extruded in plan, would produce a long, thin, rectangular building. So why the pear shaped layout? Partly to avoid parallel stabling of cattle which results in cows breathing on each other, spreading disease, and partly because the bull needs accommodation along with the cows, fed from the same distribution channel...

The various adjuncts of the cowshed also have forms carefully chosen for functional reasons. The side pen for calves for example is semicircular in form to avoid corners. In rectangular enclosures calves tend to get caught in corners when they fight and are unable to escape aggressors. The cowshed itself was constructed in a remarkably convincing mixture of ancient and modern materials: concrete frame and brick infill combined with painted timber boarding sympathetic to local tradition.

MORPHOLOGICAL MEANING



Cowshed section: 1, cowshed; 2, hayloft; 3, silo; 4, root-cellar.

Plan: 1, entrance; 2, milking parlour; 3, stalls for 41 cows; 4, stall for bull; 5, feeding trough; 6, trap from hayloft over; 7, exit; 8, heifers; 9, young bulls; 10, calves; 11, silo over; 12, root cellar.

Hugo Haring
Cow Shed/Garkau Farm Holstein, Germany

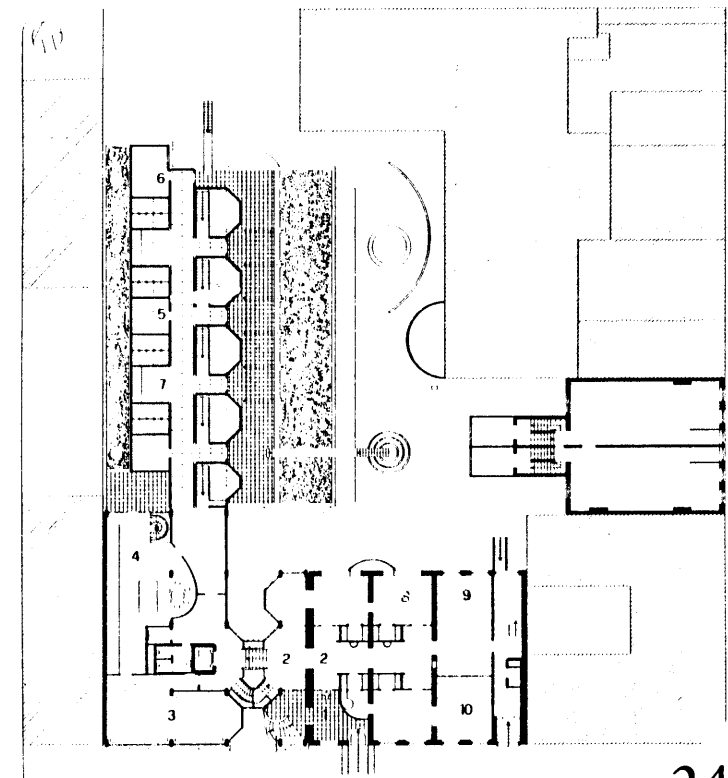
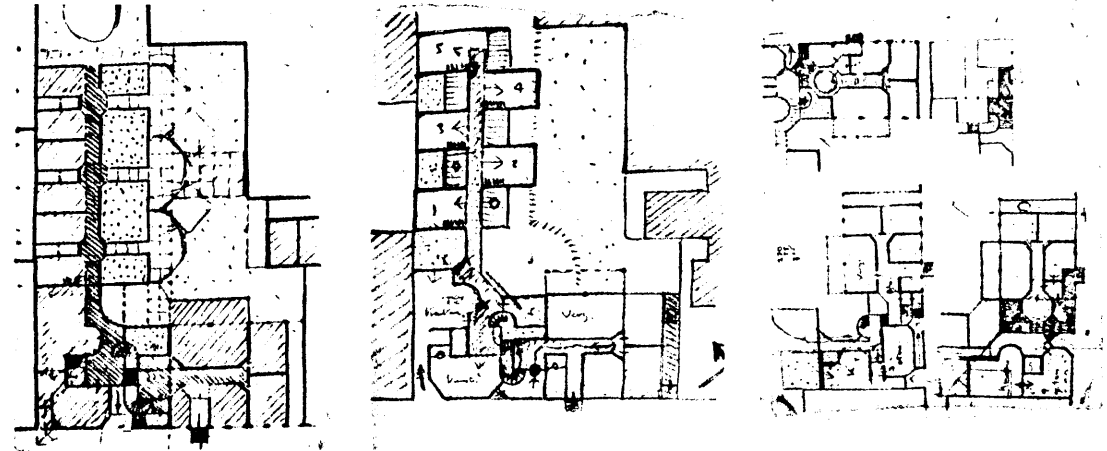
We now attempt not to allow our attitudes towards function to conflict with our needs for expression, but to keep them side by side... We should not try to express our own individuality, but rather the individuality of things: their expression should be what they are.

Hugo Haring
Hans Scharoun-A Monograph

The new house for mothers takes the primary conventions of 19th-century morphology as an institutional datum. In the first instance it adjusts itself to the latter, yet only to contradict it immediately, and in every respect...

It is in this general sense that Van Eyck's statement: "Architecture need do no more than assist man's homecoming" has to be understood, even if it turns out to be particularly appropriate to this case. But it is perhaps its very literal appropriateness which elicits quite concretely the contradictions that such a goal has to cope with...

Moreover, an institution that sets out to assist people's homecoming can't be a home itself. As Addie van Royen-Wortmann, formerly director and now building coordinator of Hubertus states: "We have a double task: we take in people, and at that moment we tell them: We will give you security, protection. We take them out of society and give them an interior, which means closedness. But from that very moment we are going to work with these people so as to get them back in to society, and that means openness. This seems to be diametrically opposed: open and closed, but both elements play an important part in our job. The day you say 'welcome' to people, you are already engaged in the process of dismissing them. And we have demanded this double nature of the architect: a doubleness, which seemed rather difficult to express in the house. It had to be very open and hospitable, with a low doorstep. But at the same time the people who've entered have to feel very safe with regard to a society which just happens to be very tiresome for them, and to present very tiresome consequences."



Aldo van Eyck
Home for one-parent families/
Plantage Middenlaan, Holland

However, in our experience, what is required in such situations is that the architect should take even greater care to make sure that his brief is 'human'. It is too easy to fall into the trap of thinking that as one does not necessarily know the building user one must therefore make a nondescript building in order that it may suit everybody, and in its characterless way offend no-one by being easily adapted to the 'average' person. But who is the average person? The average person doesn't exist, and so by designing buildings for the average person one is designing for non-existent people. There is no need to say more-just look around you.

Aldington and Craig
Understanding and Developing A Brief

"I've never met an 'ordinary' person in my life..."

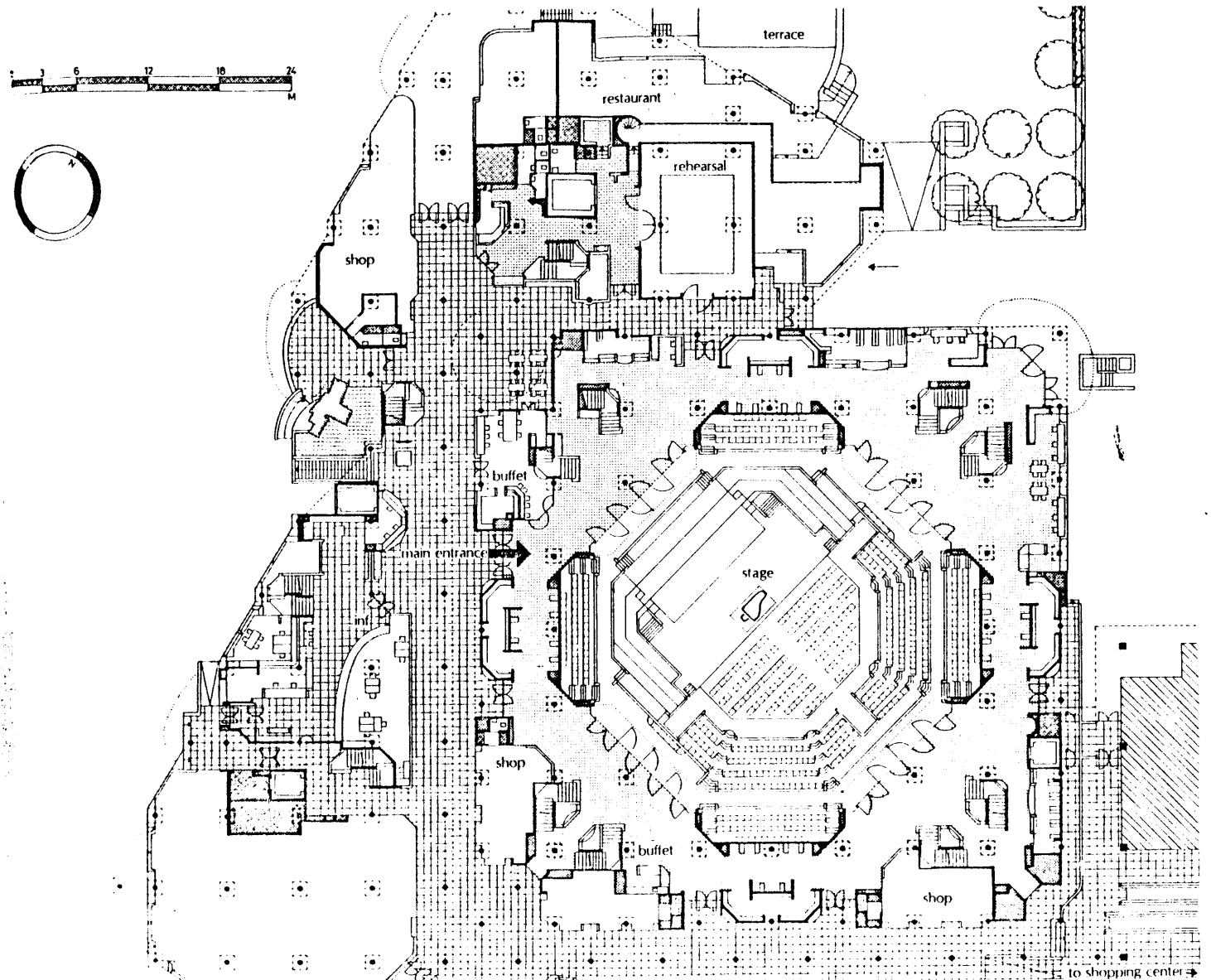
Michael Cooley
M.I.T. lecture on
human technology
Spring 1980

REGIONAL / CULTURAL INFLUENCE

Herman Hertzberger
Concert Hall/Utrecht, the Netherlands

The Dutch, as anyone who has visited Holland has noticed, are obsessed with keeping everything visible. Rooted, perhaps in part, in their Protestantism--where openness to observation contributes to moral rectitude--this curious national trait as it applies to inhabited spaces is also reflected in Dutch painting: one need only think of the countless scenes of domestic interiors by 17th-Century painters like Pieter de Hooch and Jan Vermeer. The concern with light was a significant aspect, but frequently one is confronted with a succession of rooms in the background, seen through open doors or windows.

The parallelism invoked here is by no means intended to suggest that Hertzberger as an architect consciously tried to incorporate such traditional modes of perception in his building, nor even to design with a painterly (i.e., pictorial) vocabulary--as one might say Le Corbusier did in the 1920s. No, as his previous buildings such as the Central Beheer and De Drie Hoven illustrate, Hertzberger has an extremely forceful architectural language that emerges from a twofold preoccupation: a structural system that is repetitive (for economic reasons) and visually apparent (for expressive potential). At the same time, that structural system should be conducive to maximizing liberty of arrangement and utilizing spaces to suit a variety of functions.



Conceive that here came a new sense of building on American soil that could grow building forms not only true to function but expressive far beyond mere function in the realm of the human spirit. Our new country might now have a true architecture hitherto unknown. Yes, architectural forms by this interior means might now grow up to express a deeper sense of human life values than any existing before. Architecture might extend the bounds of human individuality indefinitely by way of safe interior discipline. Not only had space come upon a new technique of its own but every material and every method might now speak for itself in objective terms of human life. Architects were no longer tied to Greek space but were free to enter into the space of Einstein.

Frank Lloyd Wright
The Natural House

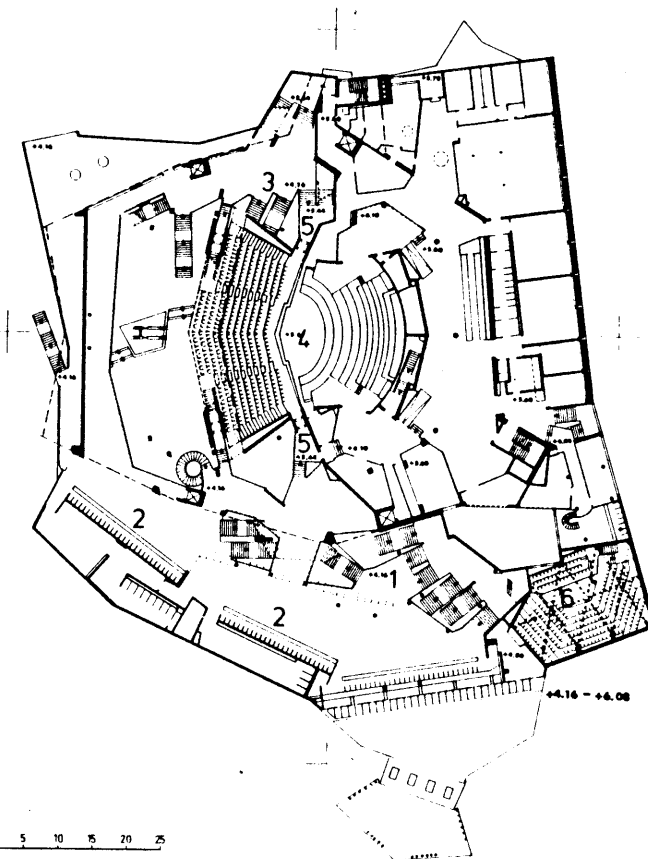
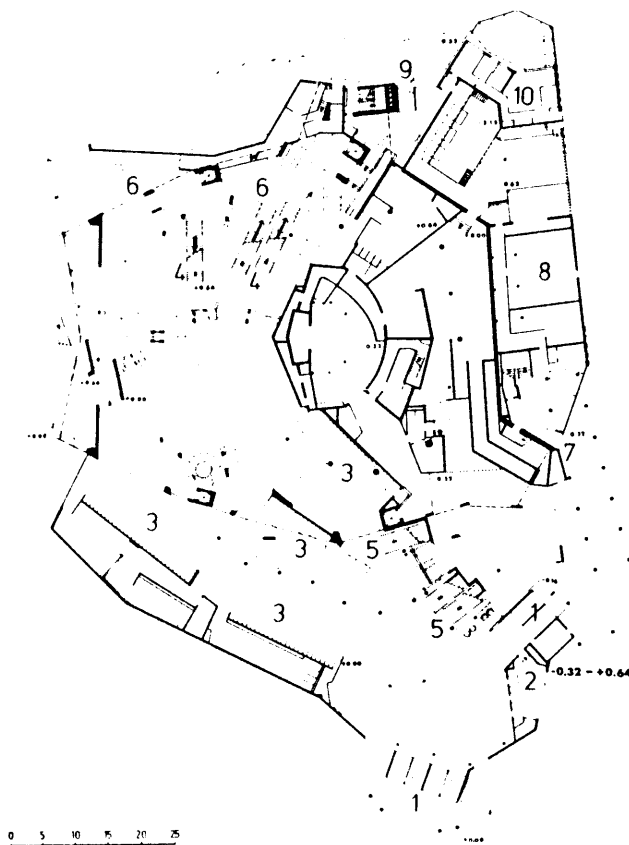
SPACIAL ORGANIZATION / FORM CORRELATION

Music as the focal point: this was the keynote from the very beginning. This dominating thought not only gave shape to the auditorium of Berlin's new Philharmonie Hall but also ensured its undisputed priority within the entire building scheme. The orchestra and conductor stand spatially and optically in the very middle and if this is not the mathematical centre, nonetheless they are completely enveloped by their audience. Here you will find no segregation of 'producers' and 'consumers' but rather a community of listeners grouped around an orchestra in the most natural of all seating arrangements. Thus, despite its size, the auditorium has retained certain intimacy, enabling a direct and co-creative share in the production of music. Here the creation and the experience of music occur in a hall not motivated by formal aesthetics, but whose design was inspired by the very purpose it serves. Man, music and space-- here they meet in a new relationship.

The unorthodox layout has been welcomed by many prominent musicians. Pierre Boulez, for example, has long felt the limitations of conventional halls, which, he claimed,

'were built for another purpose, and therefore you use them with great difficulty. The frame is not right, the disposition of the audience is not right, everything is wrong. It is better not to fight against these conditions, but to use another place...The Berlin Philharmonie is the only hall I know which is conceived in different terms.'

Hans Scharoun
Concert Hall/Berlin Germany



To be imbued with spatial imagination, presupposes that one's instinct for form-correlation must be alive. Consequently, because this spatial imagination was indigenously vital in the mediaeval sensing, instinct for form-correlation was a natural gift which made the Middle Age master-builder a genius in his profession...just as in nature, where a landscape could not achieve its ultimate beauty by the mere growth of trees, bushes, and plants into exquisite specimens, unless the individual and collective parts were conformed into proper interrelation.

Eliel Saarinen
The City/Its Growth, Its Decay, Its Future

The first big, round barn of stone was built by the Shakers at Hancock, Massachusetts, in 1826. "The interior," they said, "was designed so that a great number of workers might be simultaneously engaged at their tasks and no person be in another's way." It had a fortlike security in its nearly yard-wide walls; it held fifty-two head of cattle; and there was an immense hay-storage area in its center. The center supports created a ventilating column that ended in a louvered cupola at the top...

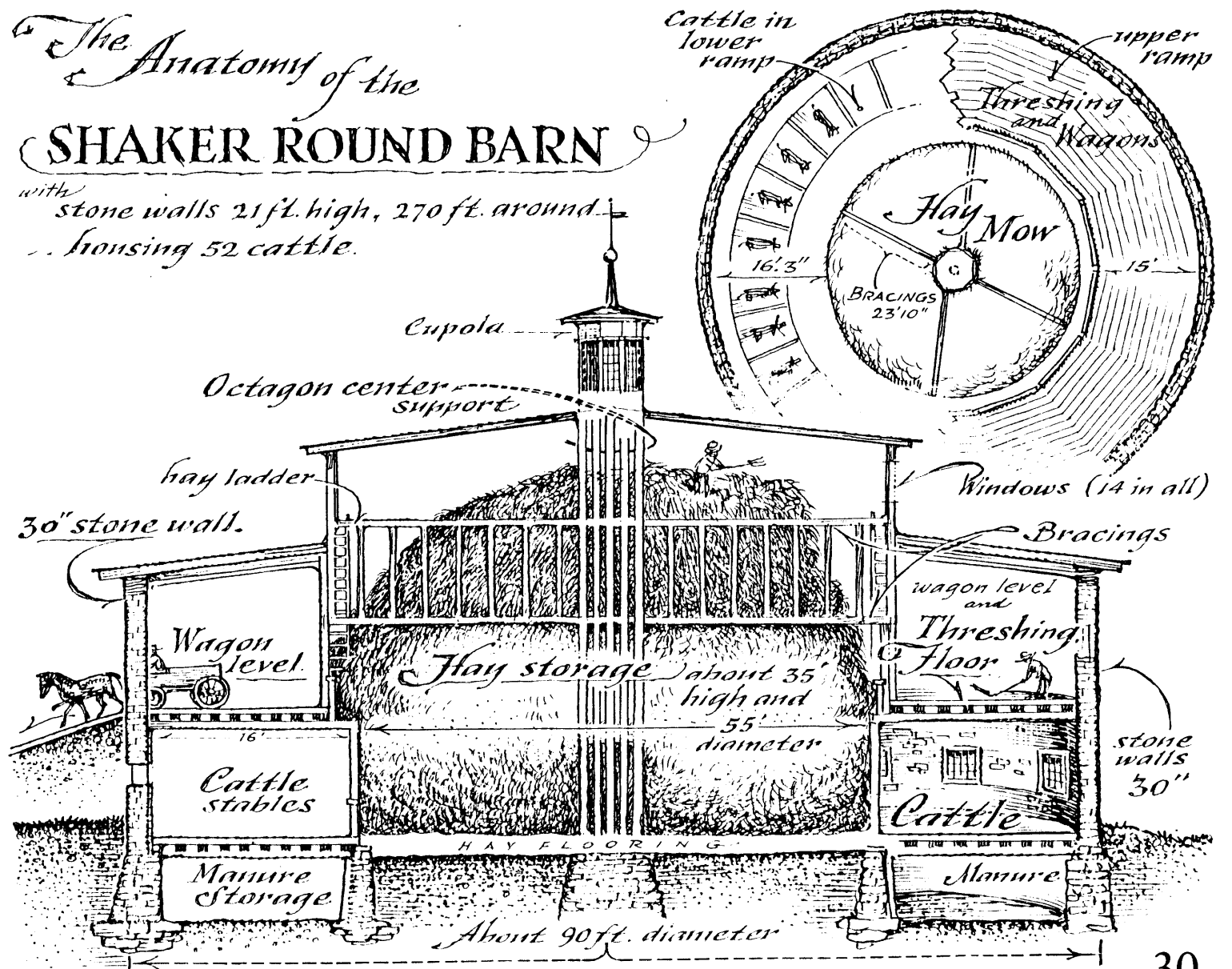
There were many religious sects--most of whose members specialized in agriculture--who sought New World paradises. The Shakers, the Quakers, and the Holy Rollers all farmed with perfection as their aim. Each sect had its special farm architecture...

These sects were ever conscious of emblems, customs, and ways of life that set them apart from other church-going people, and the circle frequently became their theme--there were "sewing circles," "singing circles," and "praying circles." Farmers made circular designs on their barns, and their wives sewed circular designs on quilts. The Shakers used the circle in their "inspirational drawings" and invented the circular saw; they took delight in round hats, rugs, and boxes; and they made round drawer pulls and hand-rests as relief for their severely angled furniture.

FUNCTIONAL / SUBJECTIVE FORM

The Anatomy of the
SHAKER ROUND BARN

with stone walls 21 ft. high, 270 ft. around... housing 52 cattle.



There are historians who do not agree with my theory that the early American barns are basically different structures. A barn is a barn, they reason, with four walls and a roof made in the simplest manner and quite similar to other structures of the time. I maintain that what a man creates is influenced by his reason and purpose for creating it. This is quite evident when you consider why the farmer built his barn the way he did. We so often say, "They don't build houses the way they used to." More to the point, it seems to me, is that now there is no reason to build that way!

Eric Sloane
An Age of Barns

To show you finally, how natural it is for anyone to formulate patterns which can be shared, I shall now describe a conversation with an Indian friend, in which I tried to help her define a pattern from her own experience.

Chris: First of all, just tell me a place that you like very much.

Gita: Shall I describe it to you?

C. No, just think of it, and visualize it, and remember what you like about it.

G. It is an Inn.

C. Now, please try to tell me what it is that makes this Inn a special and wonderful place.

G. Well, it is the things which happen there--it is a place where people who are on long journeys meet, and spend a little time together, and it is the wonderful atmosphere of all these things which happen there. I like it very much.

C. Can you try and isolate any feature of its design, which makes it so wonderful? I would like you to try and tell me, as clearly as you can, what I must do to create another place which is as nice as your Inn--please give me an instruction which captures one of the good things about the design.

G. It is not the building which makes this Inn so wonderful, but it is the things that happen there--it is the people you meet, the things you do there, the stories which people tell before they go to sleep.

C. Yes, this is exactly what I mean. Of course, it is the atmosphere which makes the Inn so wonderful--not the beauty of the building, or its geometry; but I am asking you if you can define for me, which features of the building it is, that make this atmosphere possible, the people who pass through the Inn to create this atmosphere all that....

G. I don't understand what you are saying. I have just told you it really doesn't depend on the buildings, but on the people.

introduction to a bakery

Throughout the exploration of this thesis, several bakeries were visited. Both large scale industrial bakeries as well as the smaller "family" operations (the latter primarily in the Italian North End of Boston) were observed fueling my first general steps toward understanding how bakeries work. It seemed to me that the smaller the bakery was, the closer the bakers (employees) were toward the care and understanding of the baking process. The smaller bakeries produced a lower daily quantity of bread yet offered a higher quality product while including a very personable and workable atmosphere.¹ Most of the bakers in these small scale bakeries took great pride in their work and the bakeries were often family businesses with 3 to 5 employees.

In contrast, large-scale industrial bakeries were often bent toward the general marketing and competitive aspects of the industry. The breads were made in large quantity, often for profitable reasons, with the bakery operating for full capacity in a growth market.

¹Most of these smaller scale bakeries were within in two rooms. A larger room containing the ovens and machinery needed for baking was typically located in back with a smaller room in front for retail. Because of the local clientele, truck delivery was not needed.

"If you get too big--you can't make good bread ..."

*quote from an Italian baker
at North End, Boston*

FOR BETTER HEALTH



A. BOSCHETTO & SON

French and Italian Bread

EAT MORE BREAD

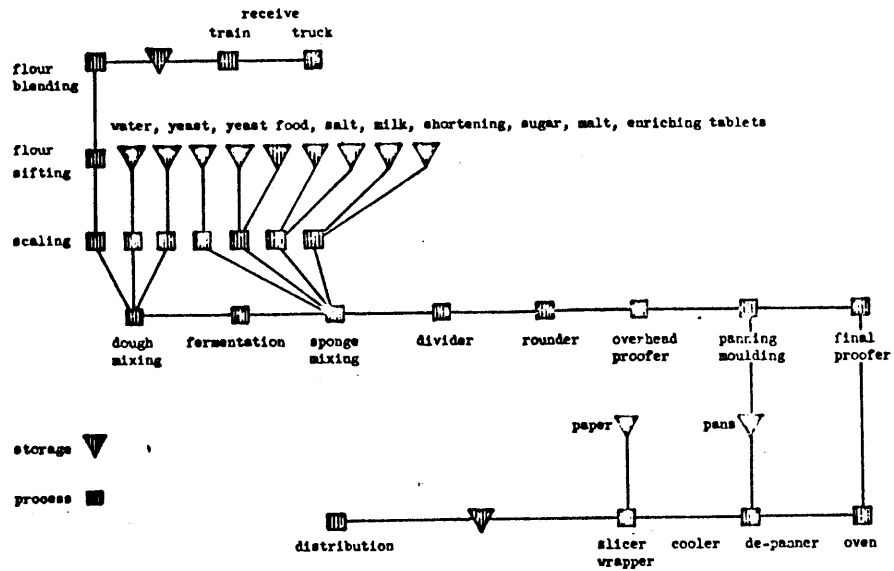
158 SALEM ST. BOSTON, MASS.

TEL: 523-9350

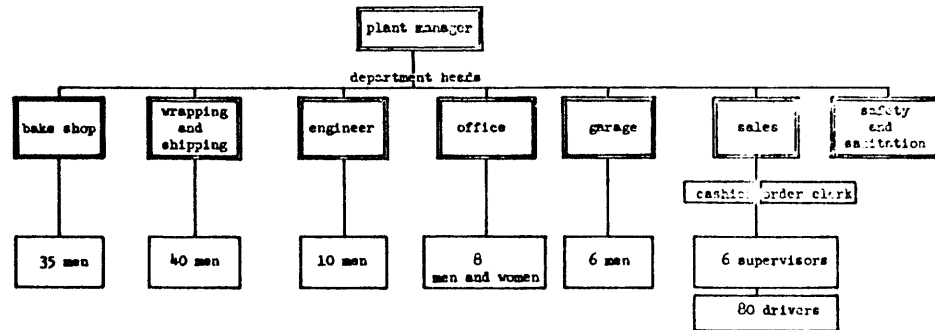
It should be noted that these capacities have been derived under the assumption that the bakery produces a constant volume each day and that it produces but one product. Neither of the assumptions is apt to be true in the operation of most plants. Larger plants, 4,000 to 10,000 pounds an hour, are increasingly more sensitive to economic loss due to variance from capacity production. It is for this combination of facts that the marketing conditions of the area are important to know.

Langendorf
An Industrial Bakery

The organizational form of a typical industrial bakery is primarily informed by these economic and technological factors reflecting a building literally as a "baking machine." Because of these factors the baking took the form of an assembly line process with one employee doing a singular job repetitively. To promote this expediency of production the users or employees were organized in a hierarchical fashion. Spacial organization for differences of activities was designed in a clear-cut program of--organization of personnel, storage, production, distribution systems of the plant, and the office and employee facilities. Though successful baking requires a continuous process, each activity was clearly separated from the other. The form was dictated foremost by the machinery used for baking bread.



flow process chart for bread production.



total employees in plant 115
drivers 80
total employees 195

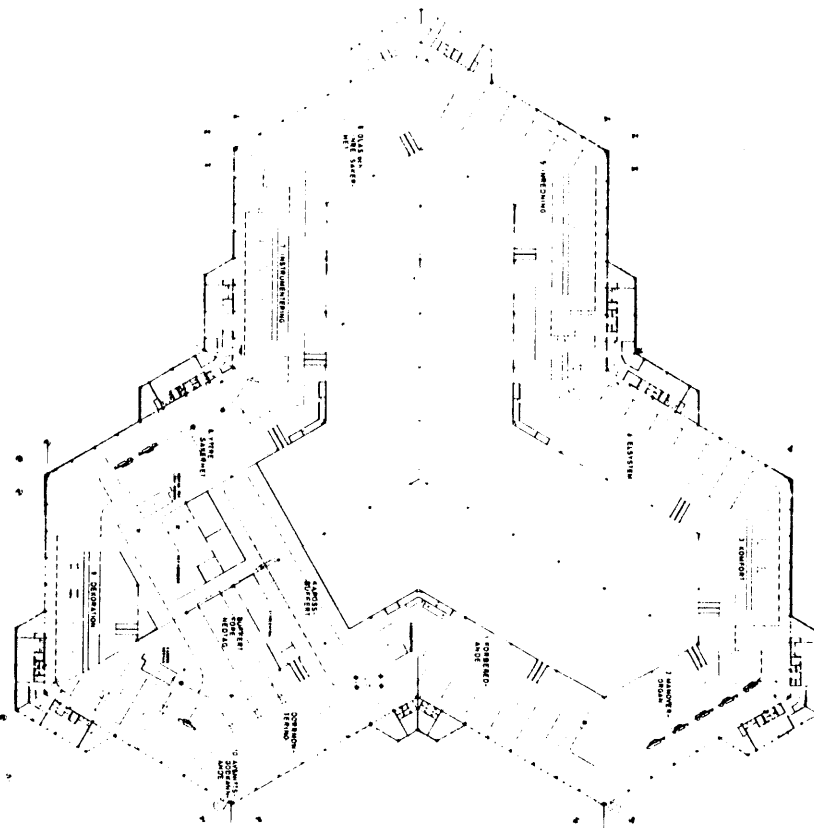
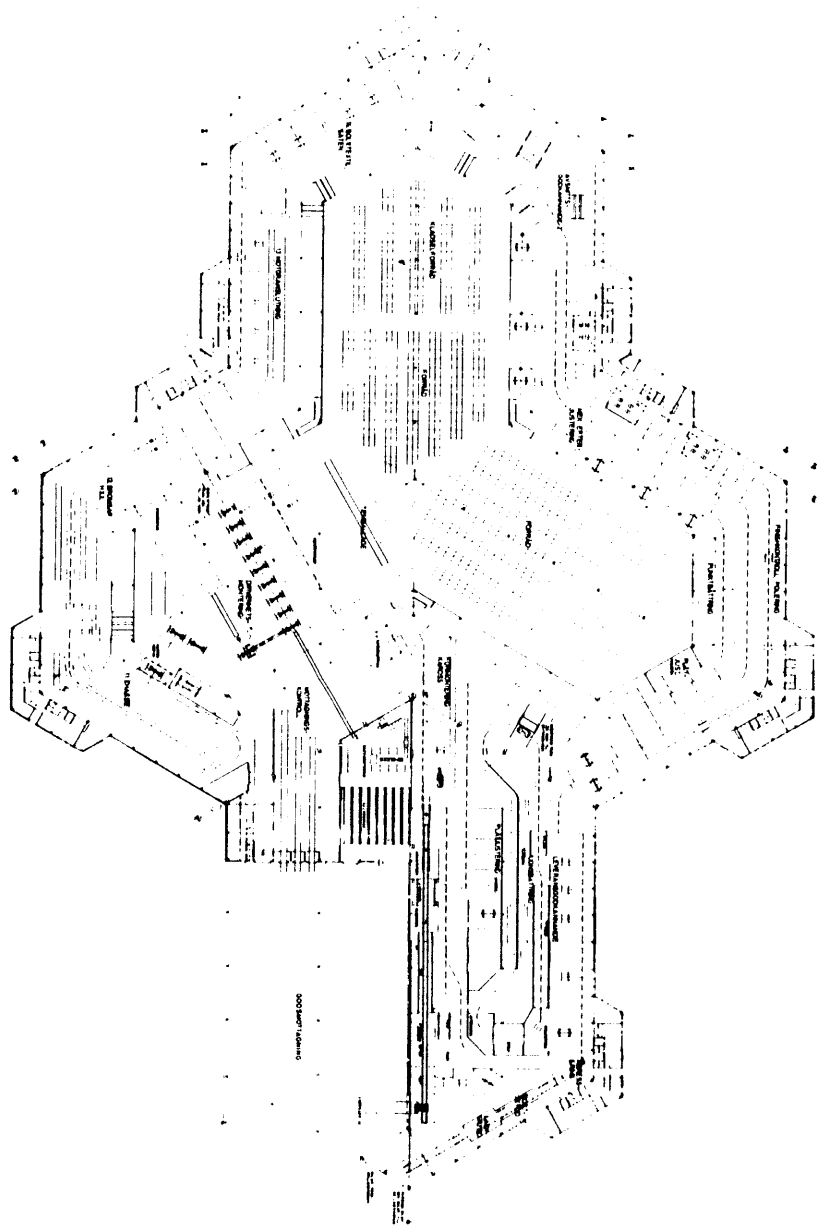
ORGANIZATION CHART

Within the definition of **appropriate form**, the typical hierarchical building forms, built for a large industry, are in keeping with the reason for which they were built--profit. This is where the making of **appropriate form** becomes a value decision to the architect. It is the assumption of the author that unless a building contains only machinery mechanical or storage of other inanimate objects it should be designed firstly for the users--human beings or in respect to the quality of life vital to its users. The designing of a factory or bakery requires much of the spacial organization to be dependent on the process of baking bread and of the machinery used toward its production. Yet it is the interest of the author not to allow this process of production to wholly dominate but to design forms for a bakery responsive to human needs in combination with a particular process of bread making.

One example of a large scale industry that combines human needs or the well being of its employees with the economic efficiency of a working factory is an automobile manufacturer in Sweden. This is the Volvo factory built in Kalmar designed to

*"produce a factory which without sacrificing efficiency and economic results, provides the possibility for the employees to work in groups, to communicate freely, to carry out job rotation, to vary their rate of work, to feel identification with the products, to be aware of quality responsibility, and be in a position to influence their working environment."*²

²Frampton, The Disappearing Factory: The Volvo Experiment at Kalmar



Factory: The Volvo Experiment at Kalmar

The building form is organized around this cybernetic control of decentralized production with the opportunity of an employee to pass from workshop to workshop until he or she has in effect completed the entire assembly cycle and, in an important sense, 'built the whole car.' Thus each employee is involved with the quality of the manufacturing process and the employees are not alienated from the production or from each other.

For purposes of designing a bakery, Baldwin Hill Bakery in Phillipston, Massachusetts was chosen to serve as the main prototype to fuel basic organizational and form decisions. Baldwin Hill, a medium scale bakery, is documented in this chapter for its unique baking process and care toward making a high quality product. Though the bakery designed for this thesis will be larger scale (two brick ovens as opposed to one oven at Baldwin Hill), the intimacy and interrelationship between people, machinery and the baking process existent at Baldwin Hill Bakery will be retained. The prototype bakery itself was built over a period of years by its proprietors and serves well for bakery production. The author did not necessarily study the bakery form as much as study and understand the various forms of activities, machinery used for baking, the continuous baking process or the process as a whole which the people went through to make bread from the milling of grain to the actual delivery of the finished breads.

— Introducing —

BALDWIN HILL



**Traditional European
Sourdough
Bread**

**Why we bake
Traditional European
Sourdough Bread**

Over the past fifty years there has been a gradual replacement of small, neighborhood bread bakeries by large scale, highly mechanized bread factories. As a consequence, the art of traditional breadmaking, with its many subtle skills, has also faded away.

Bread flour, once a whole and wholesome product, has given way to a bleached, chemicalized, highly refined material of little nutritive value. Many additives have become necessary to maintain an illusion of freshness and flavor.

A few traditional bakeries still remain, concentrated in the ethnic neighborhoods of larger cities; but even their products contain the same bleached, refined, "enriched" ingredients. The kind of bread which was once the mainstay of most families has disappeared.

In recent years there has been a revival of interest in high quality, whole natural foods, untainted by chemicals of any kind. This interest has been spurred by an increasing awareness of the alarming amount of disease which appears to be environmentally caused. Natural food stores have proliferated and manufacturers and distributors of natural food products have expanded to fill the burgeoning demand. Many fine new products have been created that are wholesome, pure, and skillfully crafted.

It was as part of this movement that the Baldwin Hill Bakery was established in 1974 by Hy Lerner and Paul Petrofsky. Our aim was to make real bread, using only whole, unrefined ingredients and traditional methods. Bread that would be absolutely delicious, completely digestible, and irresistible to all those who love fine bread. Our inspiration for this venture came from the LIMA bakery in Belgium, where we discovered bread more delicious than any we had ever eaten made only from the simplest and purest ingredients.

We studied breadmaking at the LIMA bakery in 1972 and again in 1973 and started experimenting with our own bread at the same time. The process of study, development, planning and construction of our bakery has occupied us for almost five years and we are still at it, expanding and improving our bakery.

Baldwin Hill bread is 100% whole wheat bread made with organic stoneground flour and pure well water; leavened with natural sourdough, and baked over a wood fire in a traditional brick oven.

Though no plans or written documents were available about Baldwin Hill, the awareness and understanding process actively took place from continual dialogue with Paul Petrofsky (one of the proprietors) and the bakers as well as continual observation and recording--photos, sketches, measuring, writing, etc. In the beginning of "understanding" how this particular bakery worked there were numerous visits to the bakery and conversations with bakers--this first phase was one of absorbing as much information as possible through observation and dialogue. The actual measuring, recording, and photographing came later when I had some grip of what to look for and a general understanding of production baking. The design process occurred simultaneously with my learning and observation process of Baldwin Hill.

Devising a program for a bakery congruent to the functional process occurring at Baldwin Hill combined with other activities congruent to a larger scale factory incorporated many suggestions from the bakers as well as from the author. One of these suggestions (by one of the bakers who complained about the intense summer heat combined with heat generated by the ovens) was a seasonal or summer baking area where one can continue the baking process outdoors. This and other suggestions were implemented to make up the final form of a bakery. Thus a program evolved as observation, dialogue and awareness increased.

But there is another kind of seeing that involves a letting go. When I see this way I sway transfixed and emptied. The difference between the two ways of seeing is the difference between walking with and without a camera. When I walk with a camera, I walk from shot to shot, reading the light on a calibrated meter. When I walk without a camera, my own shutter opens, and the moment's light prints on my own silver gut. When I see this second way I am above all an unscrupulous observer.

Annie Dillard
Pilgrim at Tinker Creek

What we want to emphasize is that the building form, although answering certain physical needs and the demands of certain activities, was mainly generated by the emotions and feelings of the users. As designers we feel the important thing is to allow these emotions and feelings to work upon our imagination so that they can be intensified into a solution which celebrates rather than merely paraphrases the requirements.

Aldington and Craig
Understanding People and Developing a Brief

The actual physical/spacial definitions and overall organization were observed while the baking went on, looking for form-al clues for factors that made each activity run smoothly or obstructions that seemed to give direct visible trouble to the users.

One may focus on a notation of each occasion when people make some tangible use of the physical setting, other than for walking or standing: Where to they sit, lie, lean against something, handle something? Still another possibility is to record "misfits" systematically: all the occasions when the setting can be seen to have given some direct, visible trouble to its users--as evidenced by accidents, delays, slips, squintings, grimaces, fumblings, and so on. Or one may look for the traces of human action left on the setting: trails, work places, minor modifications. Selective observation makes for pointed analysis.

Kevin Lynch
Managing the Sense of a Region

BALDWIN HILL

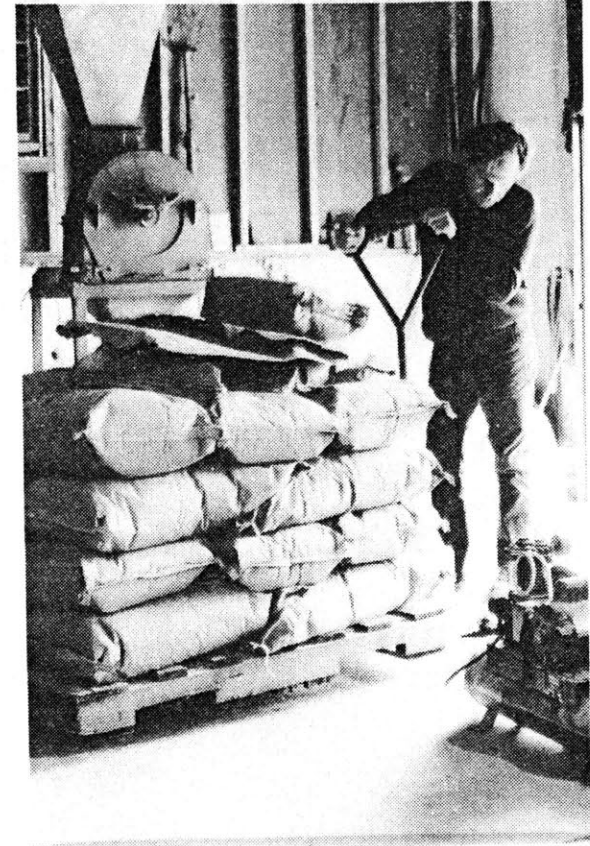


Process

THE MILL

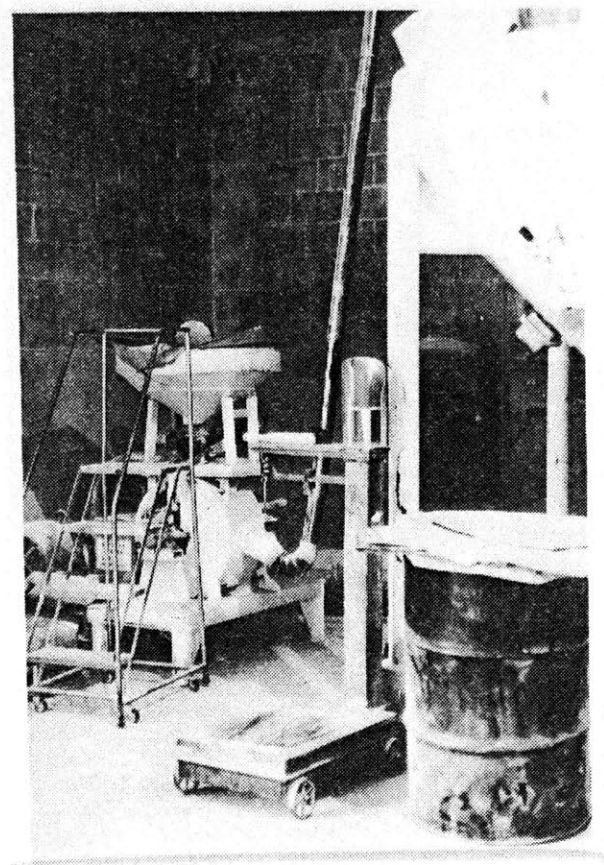
1. Grain Storage

80 pound bags of grain are delivered to the mill. The bags of wheat are stacked on wooden grain pallets and stored in rows against a wall. The daily supply of grain to be milled is removed from the grain storage area and wheeled to the milling machine.



2. Milling

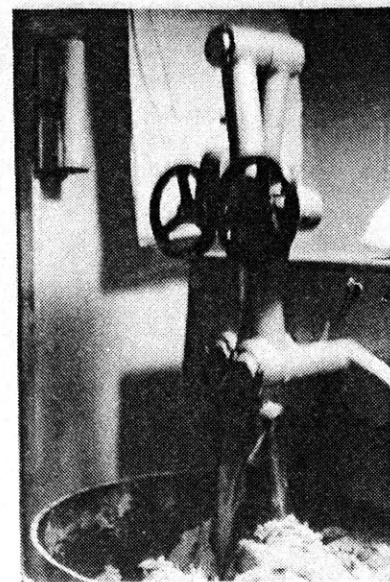
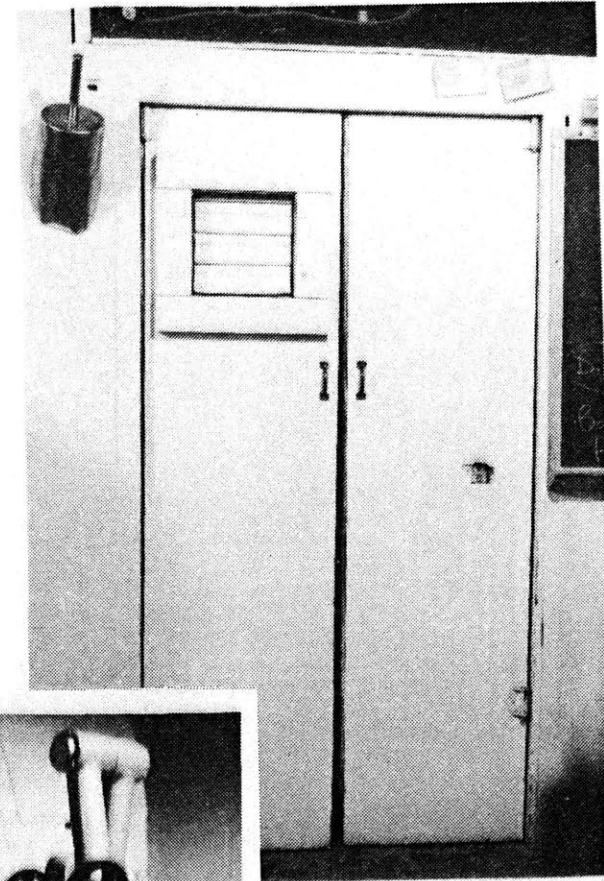
The grain is dumped into the hood of the milling machine. The milled grain or flour is transferred pneumatically into the hopper measuring 4 feet in diameter, 12 feet in height. Approximately 10,000 pounds of wheat is milled each week. The flour is poured from the hopper into 80 pound bags and delivered to the bakery.



THE BAKERY/BAKING PROCESS

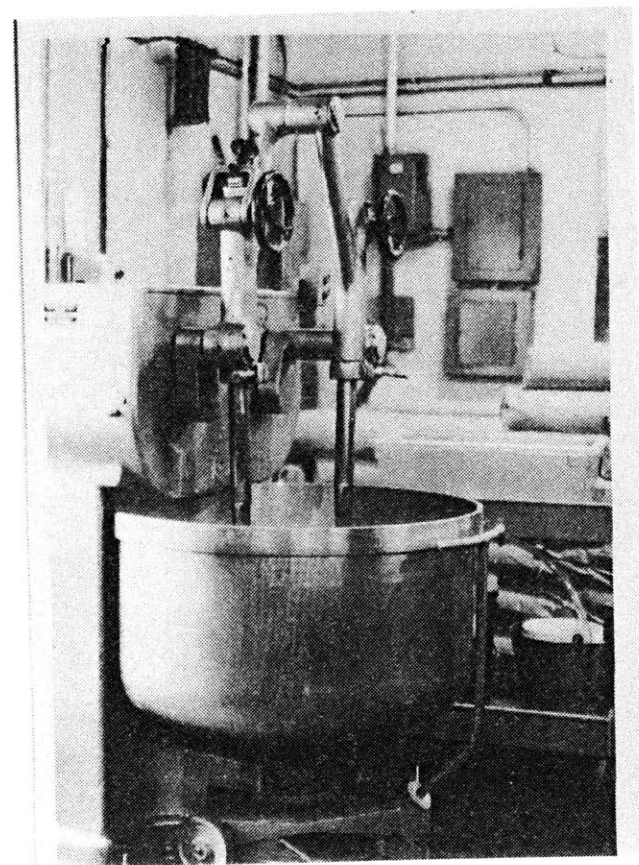
3. Diezem Room

A completely enclosed room used for making the sourdough starter. This is the beginning of the baking process. The diezem room is referred to as the 'heart' of the bakery. The whole functioning of Baldwin Hill Bakery is vitally dependant on the high quality of this sourdough starter. The starter dough is made in two mixing machines. Because of the fragile quality of the starter, the diezem room must maintain a constant temperature of 60 degrees. A natural sourdough starter is made from wheat and pure water only. It must ferment at a constant temperature to develop the proper degree of acidity. If properly maintained, it will keep its distinct qualities for many years and will improve with age.



4. **Mixing**

The appropriate proportions of flour, water, starter and other ingredients are dumped into the mixing bowl making the bread dough. Approximately 7 hours pass from the mixing of dough to the removal of loaves from the ovens.



5. Divider

The mixing bowl is removed from the mixer and the dough is dumped into the divider. The divider sections of measured lumps of dough for bread loaves. The divided dough is placed on bread racks to rest for a short period before they are removed to be rounded.



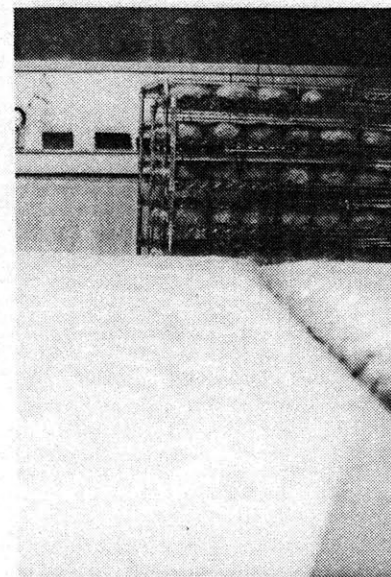
6. **Rounder**

The divided dough is placed one at a time into the rounding machine. Two bakers are needed for this particular process--one person feeds the divided lumps of dough into the rounding machine; the other baker places the rounded loaves on the bread tables.



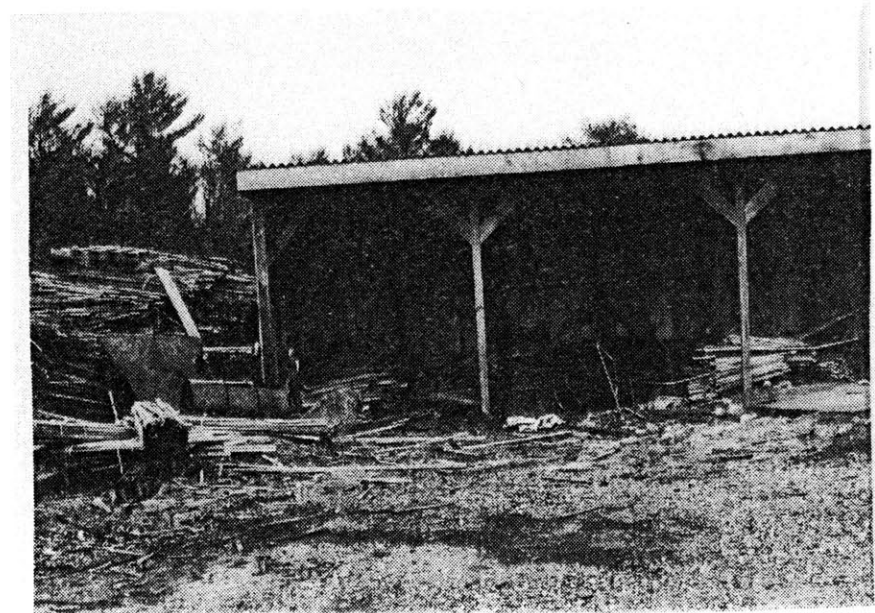
7. Proofing

The tables carrying the rounded loaves are wheeled into the proofing rooms (100 degrees). The loaves are steamed and left to rest for 1 to 2 hours before baking.



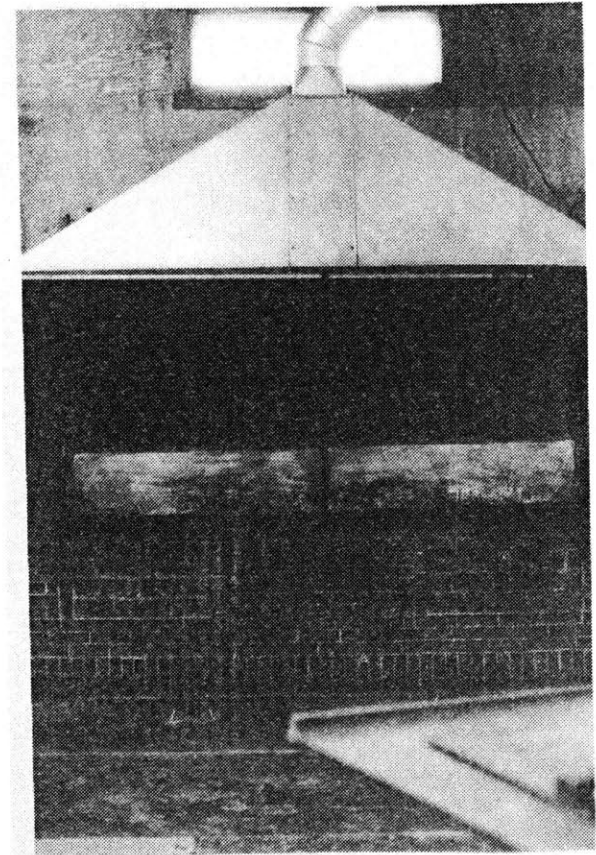
8. Wood Storage

Hardwood, readily available in New England, is stored in a woodshed adjacent to the bakery. The wood is used for fuel in the brick oven for baking the breads. Before the actual baking occurs, the wood is fed into the firebox bringing the oven temperature to between 450 and 550 degrees.



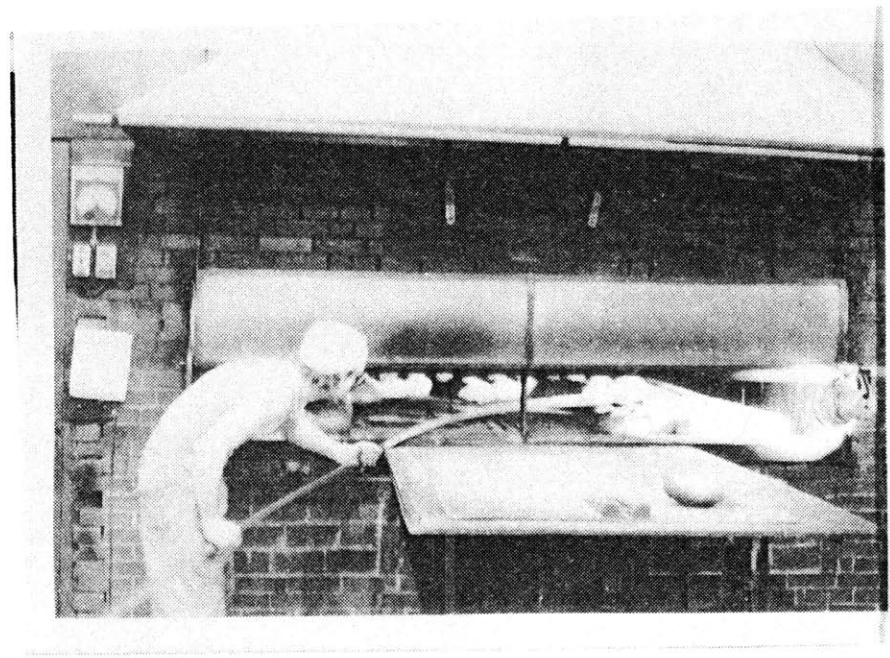
9. Ovens

The oven used for bread baking is constructed of red brick. Its walls are two feet thick. This great mass of brick holding high temperatures for long periods of time distributes heat evenly to the baking loaves. The baking chamber is approximately eight square feet in area, lined with firebrick, and with a spacial capacity of almost two hundred loaves. The breads are removed from the proofing rooms and loaded into the oven to bake for about forty-five minutes.



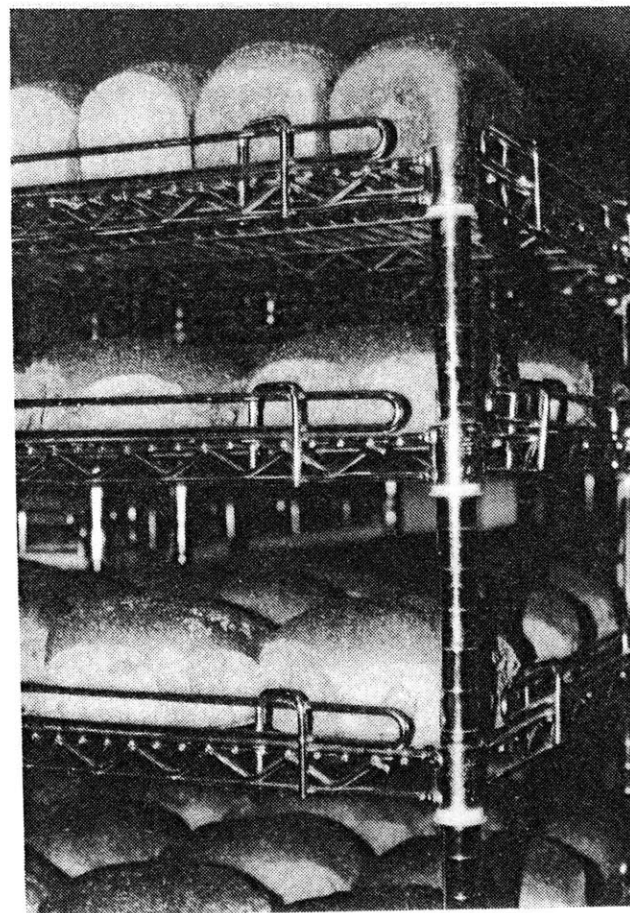
10. Removal of Baked Breads

The baked breads are removed from the oven with wooden peels and loaded onto bread racks.



11. Finished Breads Room

The racks of bread are wheeled into this room for cooling. The individual loaves are placed by hand into cellophane sacks ready for delivery.



12. Delivery/Distribution

Most of the breads are distributed throughout the New England area via truck. Baldwin Hill Bakery does not have a retail space sine there is little or no cliental in the Phillipston area. The 'sacked' loaves of bread are loaded each morning in a delivery truck for daily distribution.

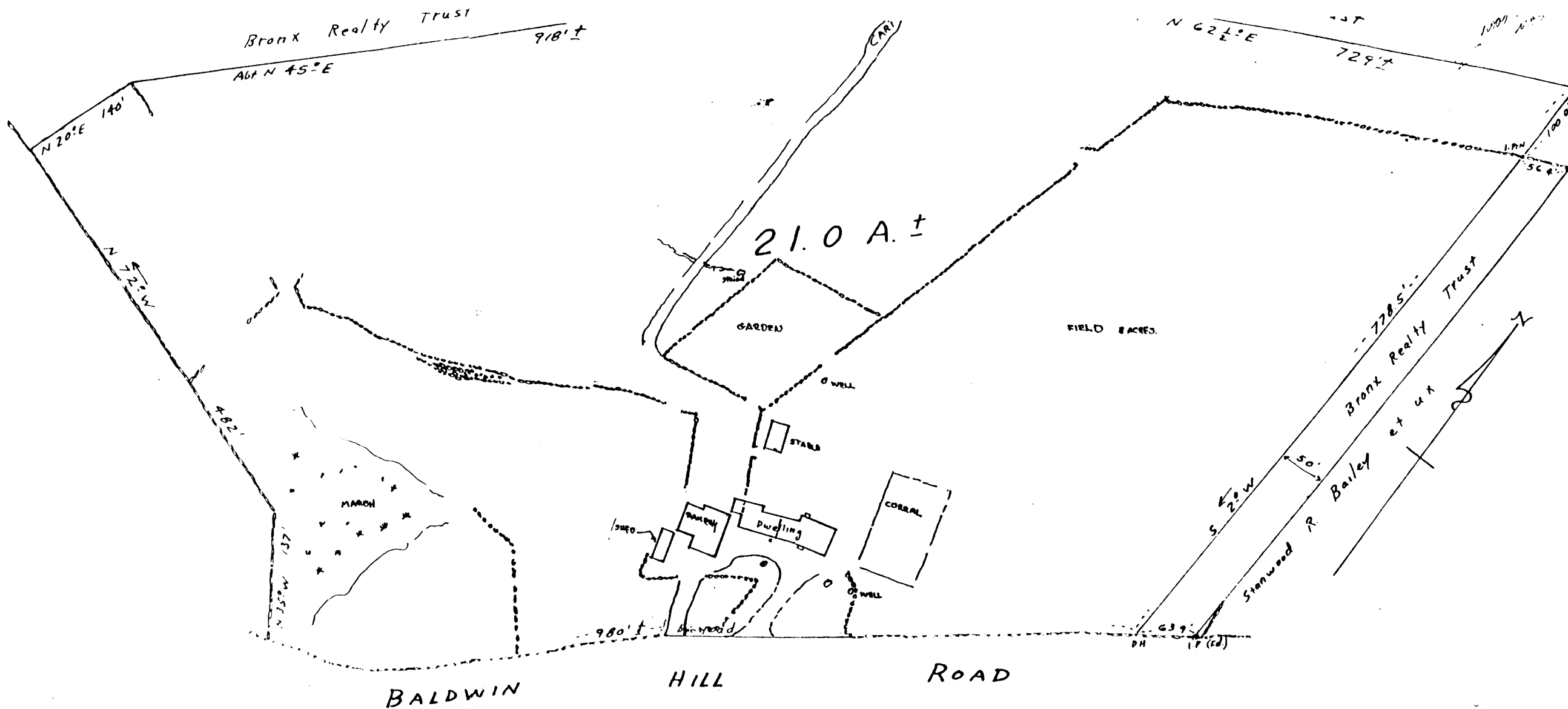


The Site

Baldwin Hill Bakery is located on a 21 acre farm in central Massachusetts. After many months of search, the proprietors chose this particular site primarily for the quality of well water it holds. Water that was crystal clear and free of impurities was a vital ingredient toward the making of high quality bread.³ This special quality of water was found in Phillipston; water supplied to the bakery by a drilled well about eighty feet deep. Therefore, the appropriate site was chosen after this special or appropriate "water" was found.

Because I've used the Baldwin Hill Bakery as the unique prototype for the baking process it seemed natural to also use this Phillipston site (see Plan of Land). Since the bakery designed for this thesis, was to be of a larger scale (small factory), it was suggested by the proprietor that the building be located north of the farm dwellings and current bakery within an 8 acre field. Because this grassed field was fairly open, at a continuous ground level and free of any built or unbuilt phys-

³To lessen the problems of distribution via truck delivery Baldwin Hill was to be set up within city limits of Boston. Yet because of urban water impurities, other locations were searched throughout nearby rural areas. Purity of water is more important than the cumbersome activities of truck delivery.



PLAN OF LAND
To Be CONVEYED BY

TOWN OF PHILLIPSTON

Witching for Water

Do you witch wells for the drillers?

Oh, no, I don't do it for the well drillers,
just friends and neighbors, this one and that.

How did you learn to locate water?

No learning to it. I just went out,
cut a peach tree limb, forked, like this,
and started witching one time when I was young.

Don't you have to hold the stick a certain way?

Oh, yes, someone showed me--I forget just who.
You walk and walk and when you cross water
the stick turns in your hand, twists, sort of.
You tell them there is water here, and there is,
every time.

Can anyone do it?

No, not everyone.

Why can you do it? Is it magic?

Magic? I never thought about it.
Maybe. I just do it. I don't think.
It works though. I can witch from north to south,
find water, then witch from east to west, criss-cross,
and the stick will turn at the same place every time.

I don't think. I just do it.

Joan Shaddox Isom

ical definition, the search for how a bakery worked within and the subsequent resolve into forms reflective of this internal organization was intensified. Yet it is importantly recognized by the author, that this limited scope of a formal search, concentrated primarily from the activities within a singular building, is only a focal point for reasons of clarifying **appropriate form** in this thesis. The design process documented in the final chapter deals with the design of a building within these limitations and is meant to be an exploration of **appropriate form** rather than a final building and site design. Therefore the site organization was not explored to the extent of traffic flow design, in depth site and environmental analysis or relationship to adjacent context to other farm buildings. Again these were omitted due to the limitation of thesis exploration.

The design of a singular building within "literally" an open field allowed the opportunity toward the limited scope of this exploration. Because of the flexibility of an open field, the primary direction or orientation of the building is governed by southern solar exposure (solar gain for peripheral baking activities and enclosures) with the main baking oriented north for lesser solar gain (because of the enormous heat generated from the ovens).

The site could not fully be understood unless one continued an awareness process identical or similar to the layers of life and activities (human and non-human) that take place within and without the proposed building at its parameters. To fully understand the site takes an equal amount of care

BUILDINGS

Why not make them
higher, and higher, and
higher—until they fall down?

•

Something about raw side
of cut cliff, with building
jammed against it, still hurts.

•

With world now
four billion, you
haven't even started yet.

•

Sentimental
about earth
and water,

and people?
Still got enough
to share?

•

But if you don't,
you won't
have it long.

•

The money's singing
in the walls of this building.

•

Sun's out. Big
lazy clouds float
over the buildings.
Thank god.

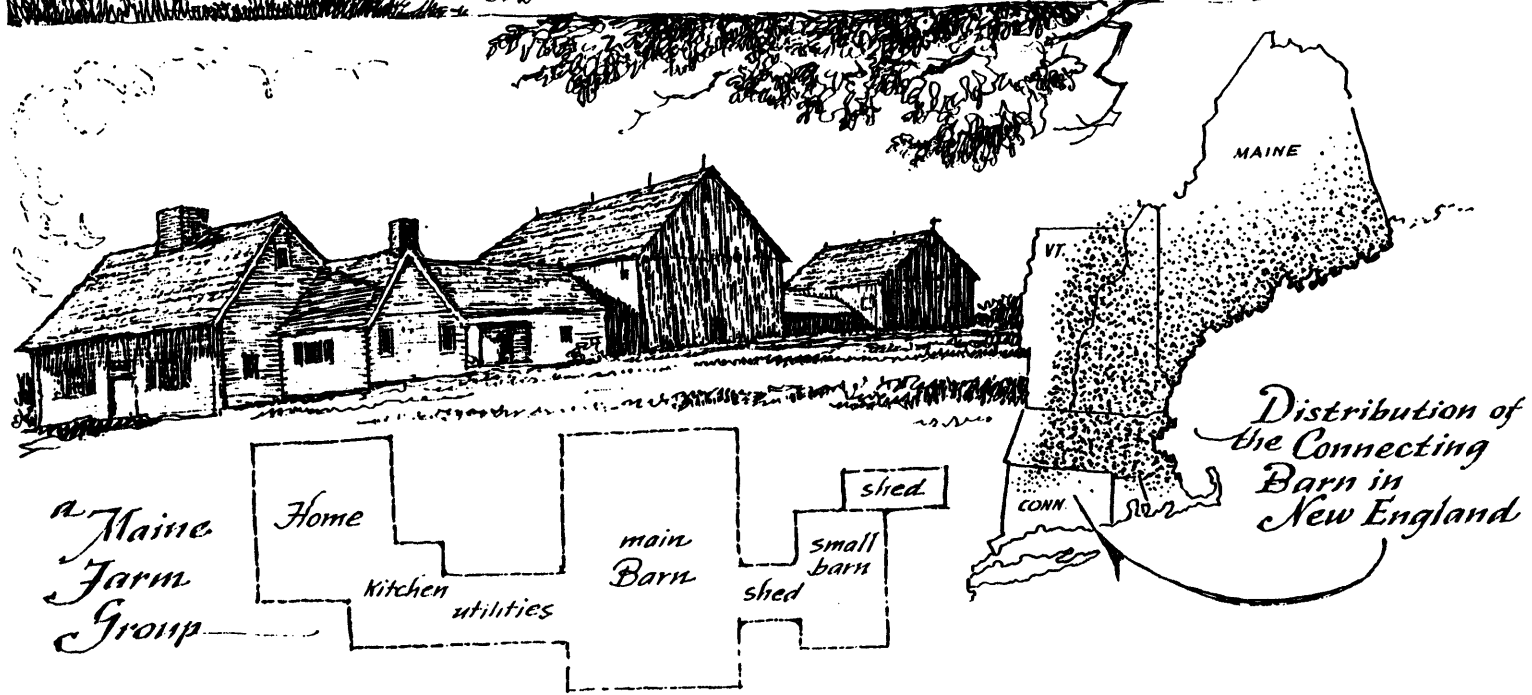
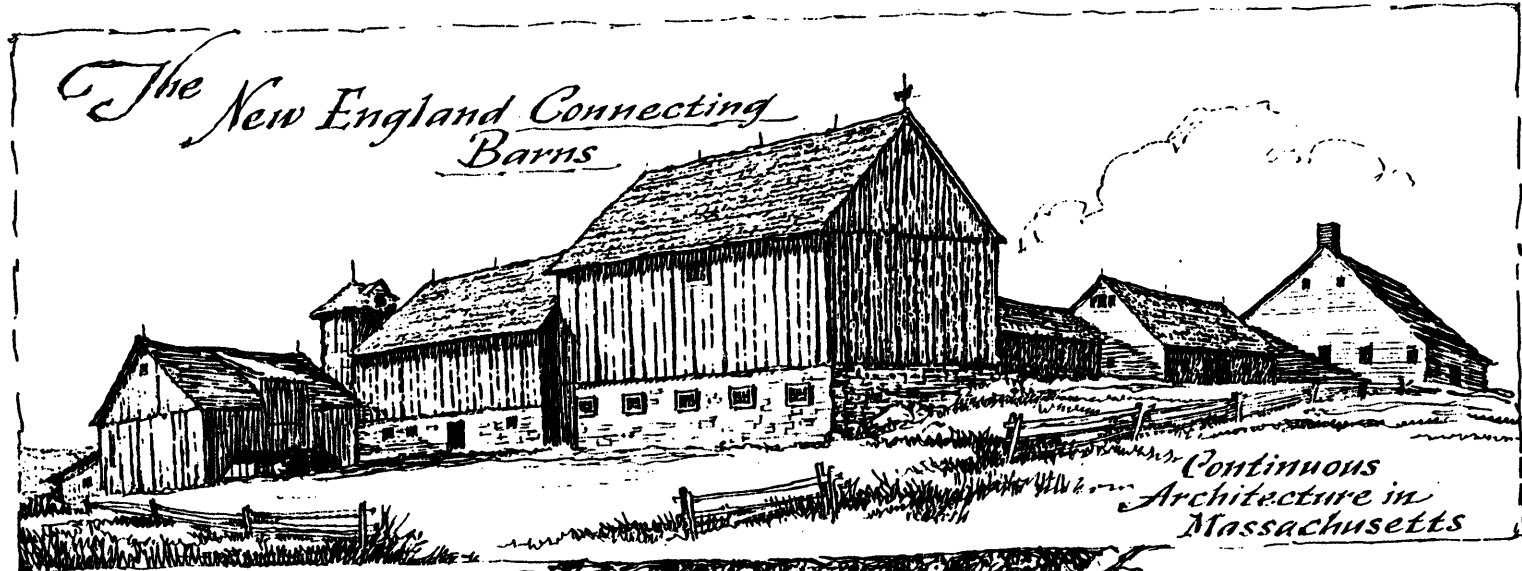
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Robert Creely

vital to the resultant design decisions and unobtrusive or compatible with the multitudinous forms and processes already in continuous existence within the site, especially within the situation of designing a factory in a rural area. Of course, in an actual designing/building process, the awareness of the many facets of a particular site or region is indispensable if not primary to the building as a whole.

Continually throughout the design process, the author has maintained this search for appropriate form within the limitations of a building. This is why a building self-contained by nature was chosen as an example for exploration. If the site and context was also fully understood, the final bakery or building would somewhat change and perhaps attain a fuller and richer form. Possibly this tangent of explorations will continue as a personal project beyond this thesis duration.

Yet the New England region and the rural character of the location cannot be ignored. It is also the intention of the author to search for appropriate form or building in response to this character (often due to climate, tradition, indigenous materials, and social/economic factors) and specific region. The farm-like character reflective of Baldwin Hill will continue in this search of appropriate forms, materials and scale.



The farm location of Baldwin Hill is typical of the connected building forms characteristic to New England. It is assumed that the close aggregate of these varied rectangular forms making one building occurred when "some farmer broke through the wall of his attached woodshed to make an opening into his kitchen."⁵ The high snow and severe winter climate was responsible for these connected farm buildings. As a result, a whole day's chores and activities could be done sheltered from bad weather.

⁵Eric Sloane/The Age of Barns p. 46.

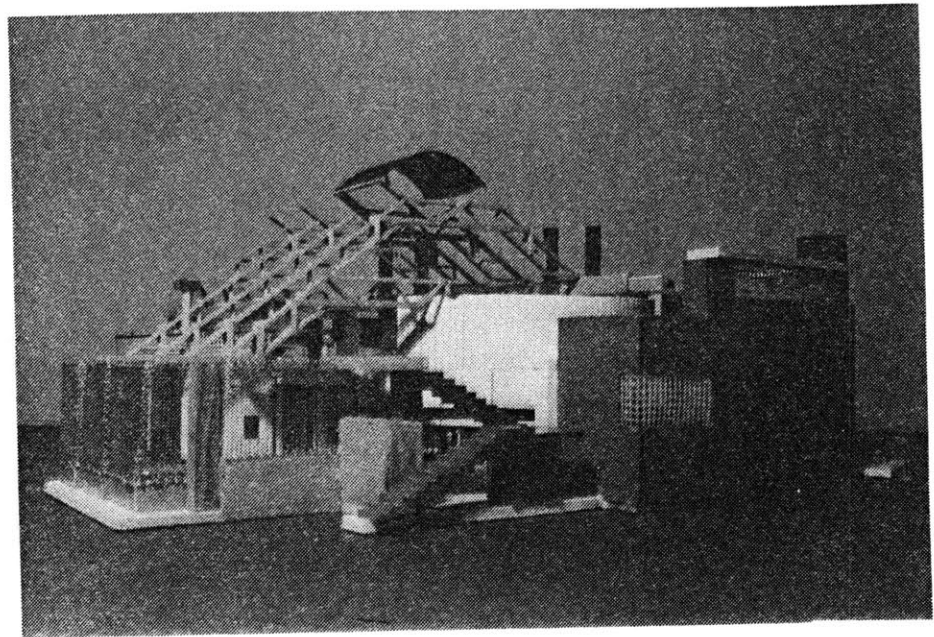
a bakery/in search of appropriate form 3...

The Design Process

bakery model

scale

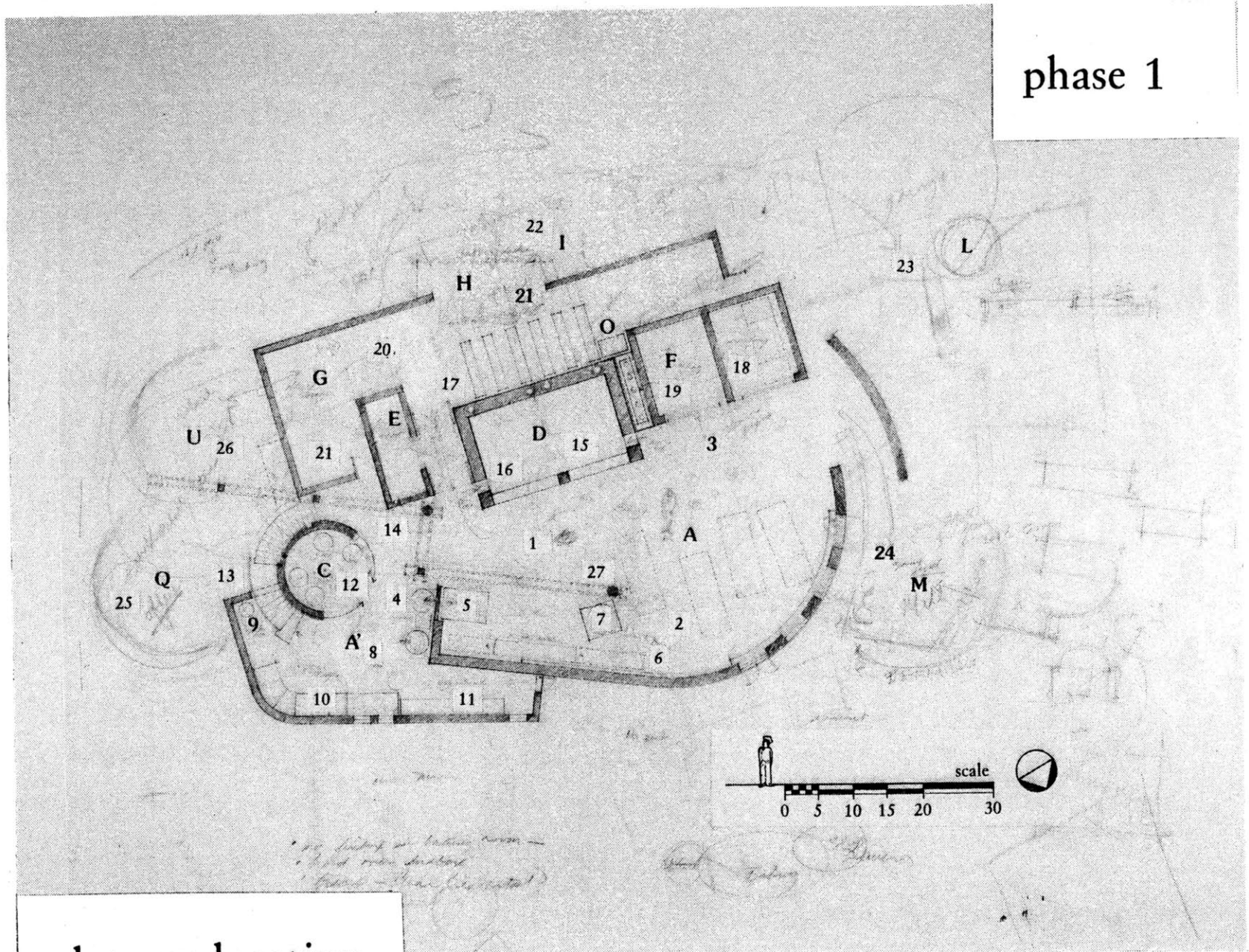
$\frac{1}{8}'' = 1' - 0''$



KEY TO BAKERY ACTIVITIES

- A. PRIMARY BAKING AREA
- A'. SECONDARY BAKING/PASTRY ROOM
- A''. SEASONAL BAKING/SUMMER BAKING AREA
- B. BAKING MEZZANINE
- C. DIEZEM ROOM
- D. OVENS
- E. WOOD STORAGE
- F. PROOFING ROOMS
- G. FINISHED BREADS ROOM
- H. DELIVERY (FIREWOOD/MACHINERY)
- I. LOADING DOCK (BREAD DISTRIBUTION)
- J. LOADING DOCK (GRAIN)
- K. STORAGE (SURPLUS)
- L. SILO
- M. MILL
- N. WELDING ROOM
- O. MECHANICAL
- P. EMPLOYEES LOUNGE
- Q. OFFICES/APPRENTICESHIP ROOMS
- R. MAIN OFFICE
- S. REST ROOMS
- T. PUBLIC MEETING ROOM
- U. PUBLIC ENTRY/RETAIL

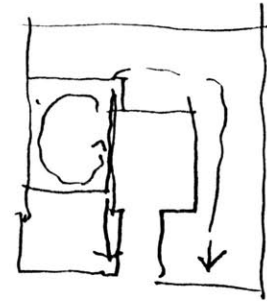
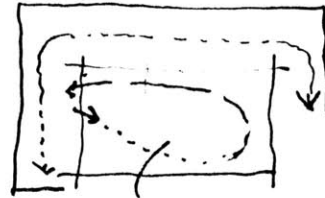
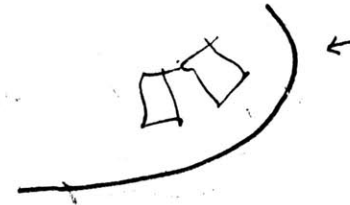
phase 1



plan exploration

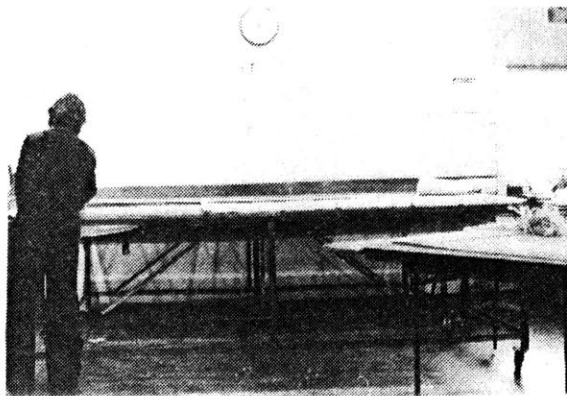
A. PRIMARY BAKING AREA

1. Because the whole baking process must run continuously with no physical obstructions or changes in floor level, the primary baking area is designed with an ample amount of space. From beginning to end the baking activities are often described as a 'circular' or 'continuous' loop process. This is reflected in the curved wall defining the main baking enclosure. Wall faces north penetrated with window openings for view (no direct solar gain/oven heated.).



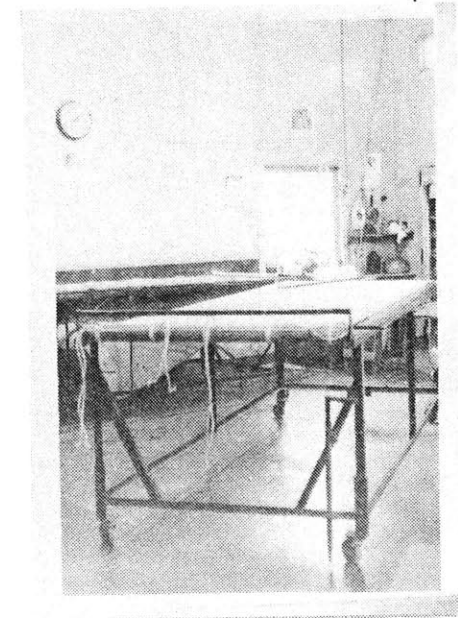
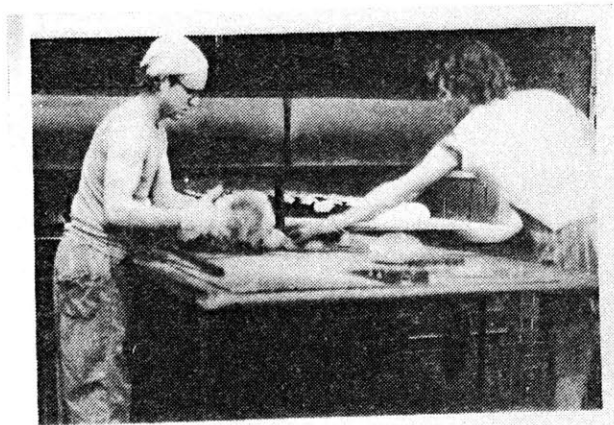
Baking Open loop process

damna?

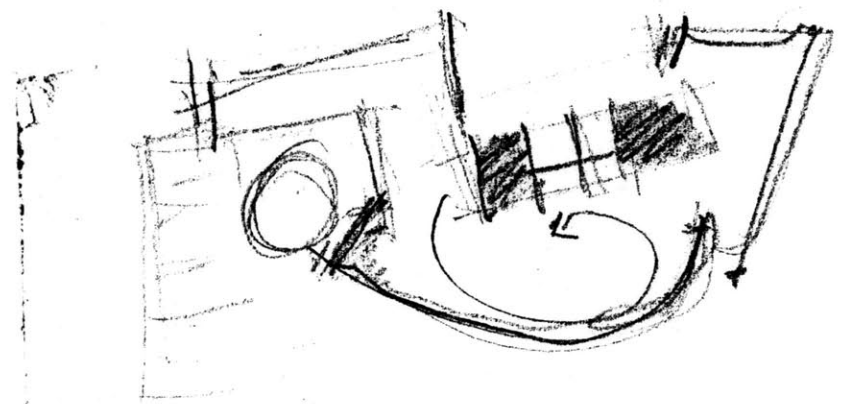
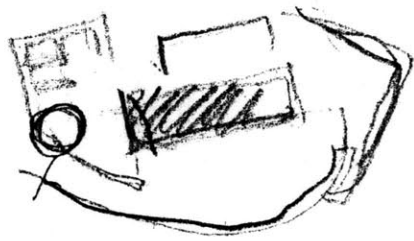
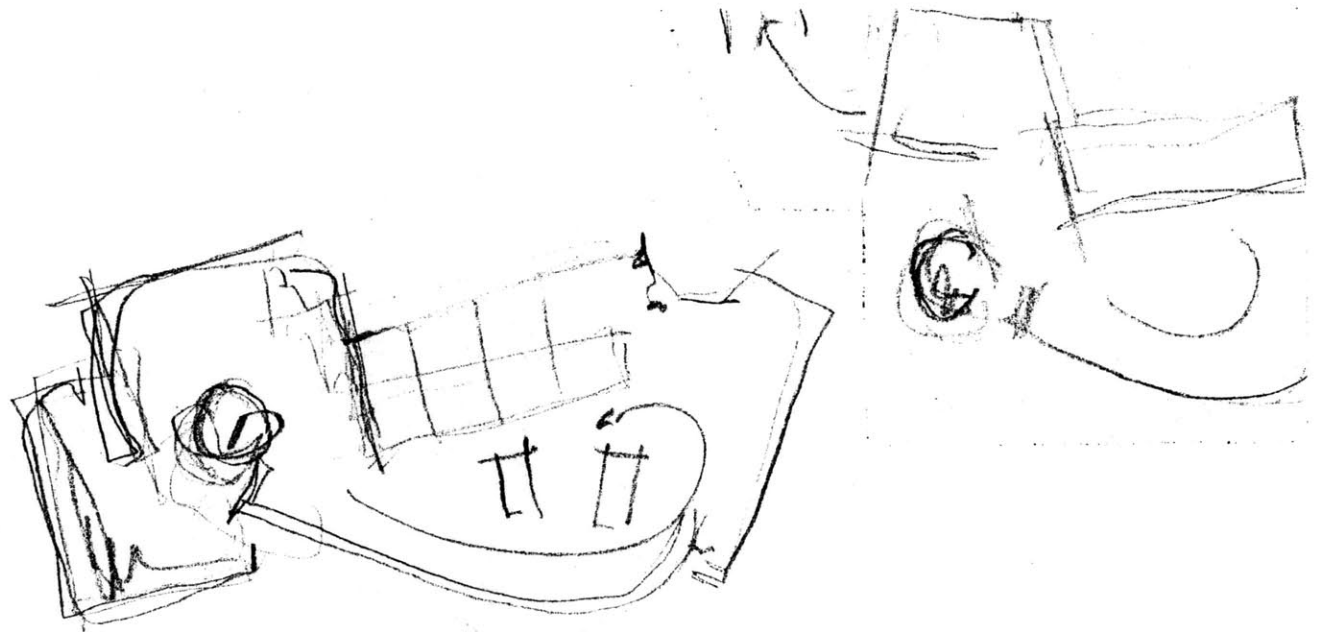


Baldwin Hill Bakery

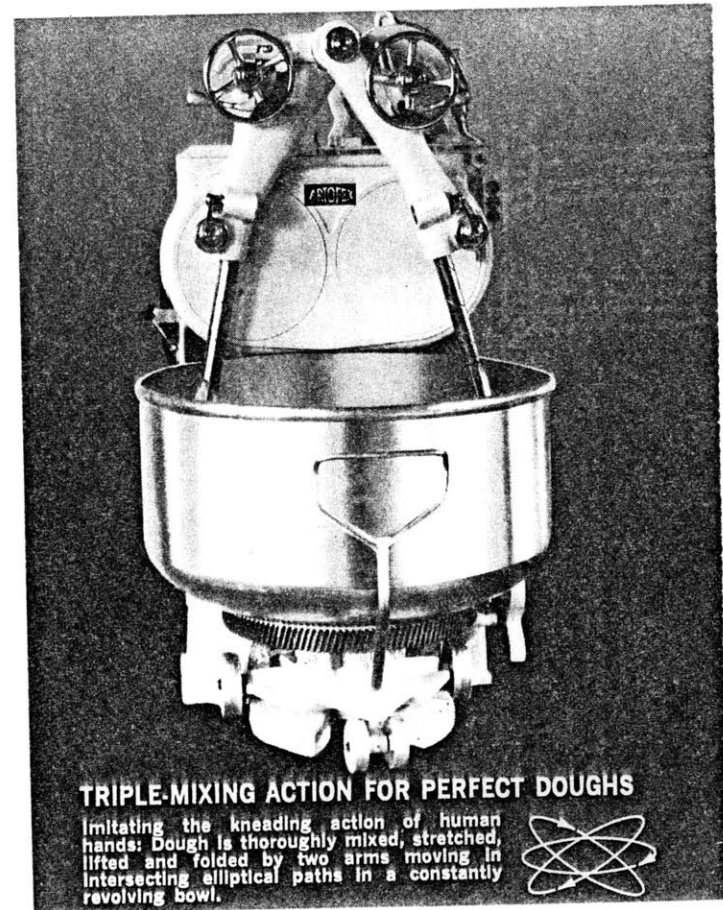
2. Baking tables, large and heavy, are set on wheels. They are often positioned in place briefly, only to be swung around from the rounding machine, to the proofing rooms, to the ovens and back to the rounder. The enclosed partially rounded spacial definition allows for this continuous dynamic motion.
3. Since the bread tables are pulled in and out of the proofing rooms every few hours, the largest dimension of space between the proofing rooms and outer wall of the baking area is made to keep the central baking area (in front of the ovens) free from obstructions.



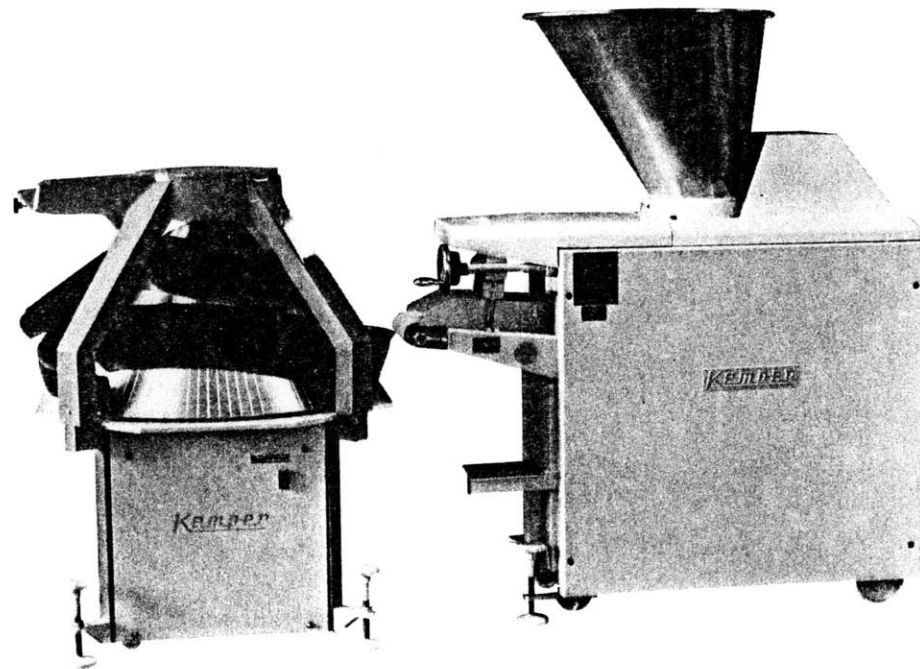
Baldwin Hill Bakery



4. Dough mixing machines are located near the diezem room at the beginning of the baking process. Two mixing machines are needed. Like most of the baking machinery, the mixing machines are located along the periphery of the main baking area to keep baking space free from obstructions other than the bakers and baking tables, bread racks and grain pallets (lifts). Mixing machines face the diezem room for easy access to started dough and grain (ingredients). A sink is located between mixers.
5. The divider machine continues the baking process into the main baking area. The close proximity to the mixer allows the dough to be dumped into the divider easily without carrying mixing bowls. A low wall separates these two defining the space between main baking area and diezem/pastry room.



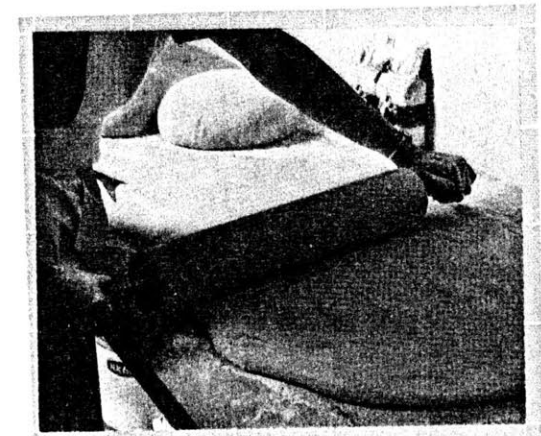
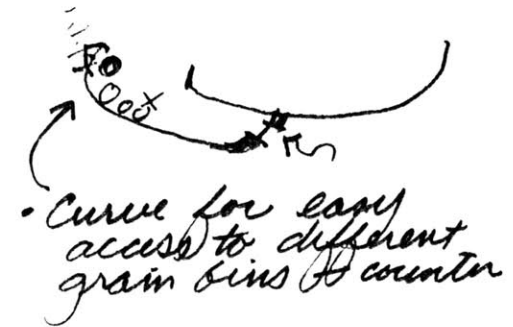
6. Bread racks holding the divided dough are set on tracks running a short distance along the main baking wall. The tracks allow bread racks to wheel back and forth between divider and rounder to keep spaces in between free for bakers--both physically and visually.
7. The rounder is located at the same plane to ovens setting up direction to center of baking area. Tables are stacked parallel to this direction to allow bakers to wheel baking tables from rounder to proofing rooms with ease.



KEMPER Conical Rounder in combination with
KEMPER Dough Dividing machine T 25 "Consul Mb"

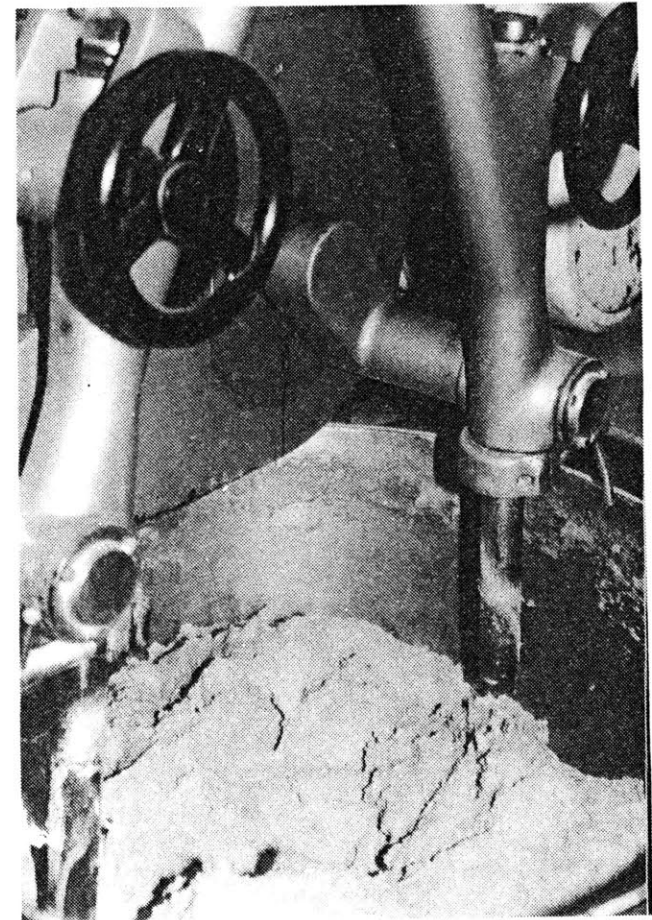
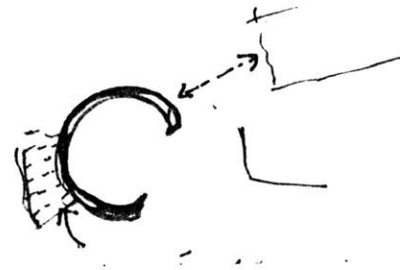
A'. SECONDARY BAKING/PASTRY ROOM

8. Spacial extension from main baking area. Exterior wall defines this relationship. Spacial enclosure open with large counter and pastry baking machinery along wall periphery. Open area for smaller pastry racks to wheel easily into finished breads room or retail.
9. Sink area for washing mixing bowls, pails and pastry baking utensils. Located for easy access yet away from both primary and secondary baking processes.
10. Pastry baking is a 'circular' or continuous process as well. Wall enclosure curves with work counter to enhance easy access to various pastry making activities.
11. Ingredients storage and extra grain for easy access to both primary and secondary baking areas. Wall definition serves as double airlock protecting dough mixing/dividing area. The dough is sensitive to inside/outside temperature change, condensation and extreme temperature drafts.



C. DIEZEM ROOM

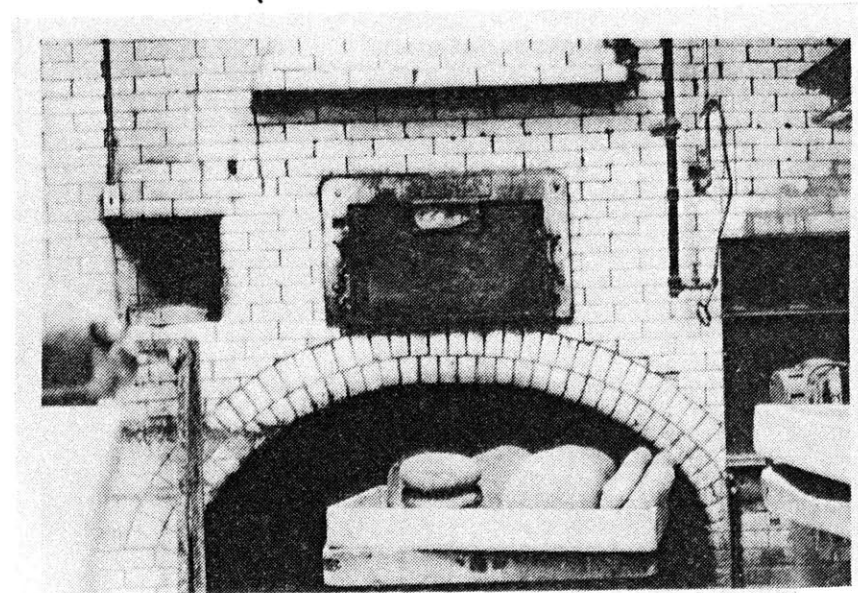
12. The heart of the bakery is placed as such somewhat literally in context. The functioning of the bakery is vitally dependent on the high quality of sour dough starter made within the Deisum Room. Because of the starter dough's sensitivity to an evenly distributed and constant temperature, the form is a circular enclosure ('heart'). The diezem room contains four dough mixers also round in form. The room is located a greater distance from the ovens so that the enormous heat generated is not absorbed into the 'starter dough' area.
13. Stairs to upper mezzanine are built around the outer diezem wall to set up the change in direction and serve as a vertical core.
14. The rounded form also serves as a hub gradually leading into many choices of direction on the main level. A solid stationary form built somewhat independently within the total spacial organization sets up the baker's choice of direction to upper mezzanine, finished baking room or retail.



D. OVENS

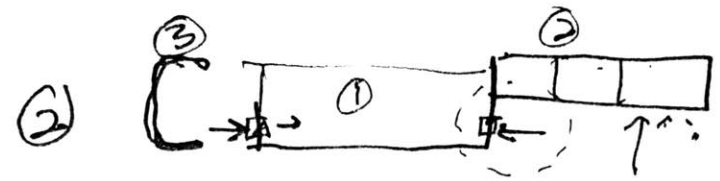
15. The basic form and oven design is taken from the oven used at Baldwin Hill Bakery for its superior functional quality and design. Because of the larger production capacity and scale of the bakery designed for this thesis, two ovens are used. The ovens are centrally placed for clearer accessibility and functioning in the primary baking area. The place is also reasonably chosen for rechanneling the high heat generated from the ovens into a primary heat source for the building. The ovens are made of thick brick walls, enclosed from the delivery area (heat radiation into delivery) and open into baking area. Like the diezem room, the oven serves as a strong physical definition.

*alternative to oven design -
flat arch oven (traditional)*

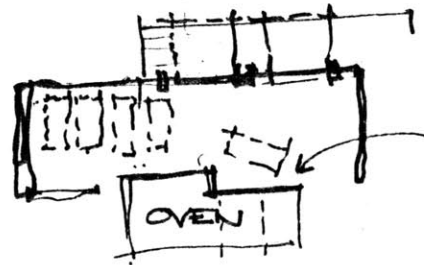
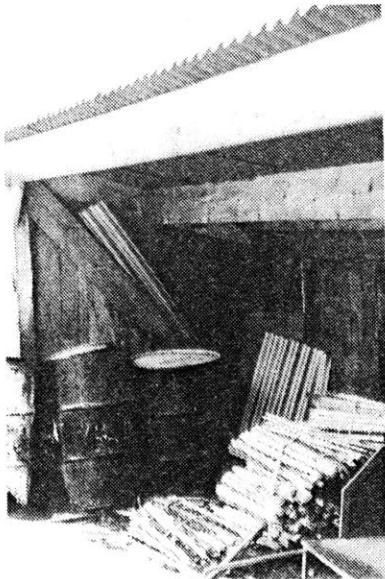


16. Fire wood is fed into two openings flanking both sides of the oven. Wood storage and proofing rooms are set back slightly to make room for these fire box openings.

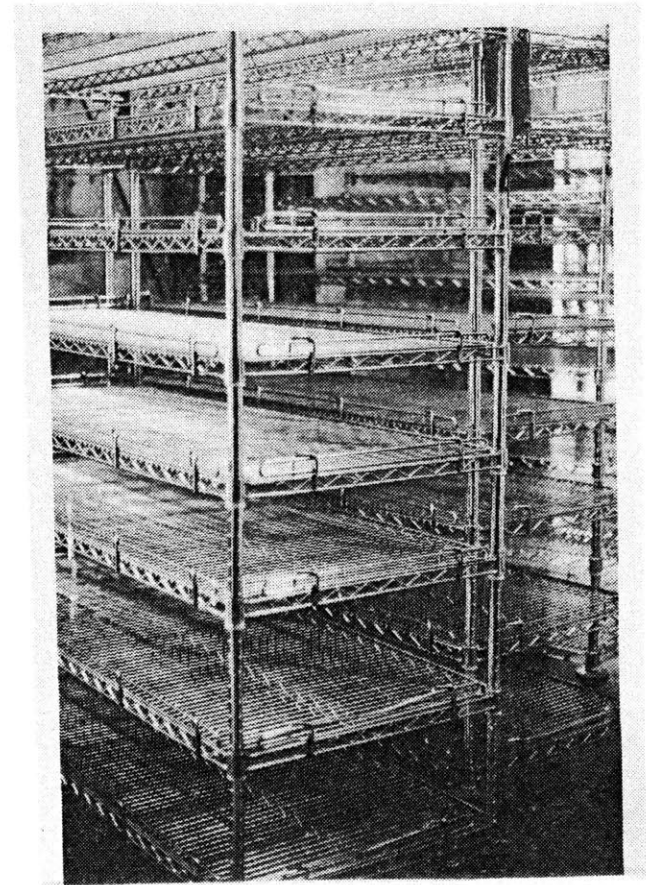
17. Finished bread racks are stacked along this continuous oven wall behind the oven. Since, the form of bread racks is long and rectangular and usually they are stationary for a length of time before distribution, a linear as opposed to a curved physical definition is needed. Enough room must be allowed for bakers to walk between bread racks.



a rectangular form because of bread tables -



Baldwin Hill Bakery



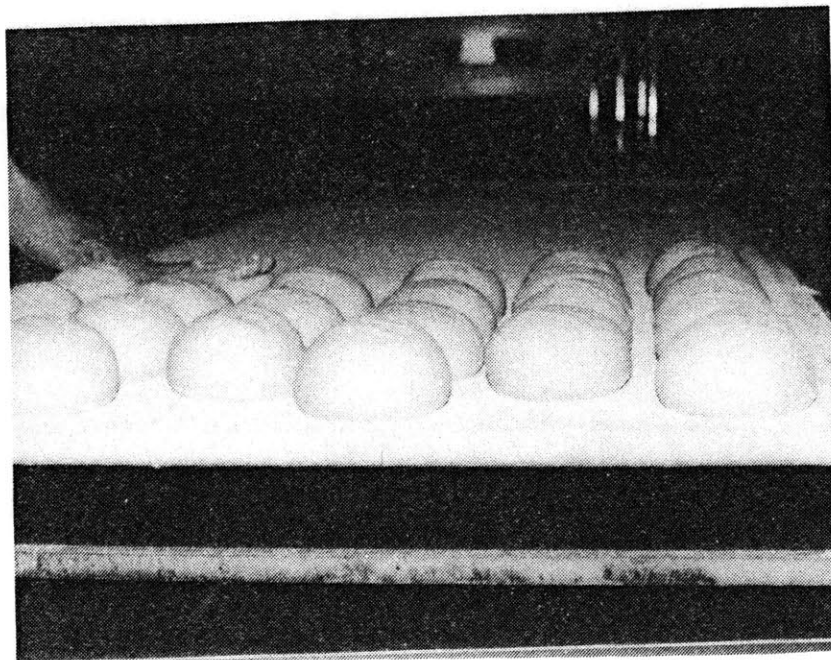
F. PROOFING ROOMS

18. Used to let the breads rest before baking, these are rectangular in form because of the rectangular forms of bread tables they enclose. A general constant temperature of 90 to 100 degrees F is maintained by the complete enclosure.
19. The breads are steamed during this resting phase so the proofing rooms are designed directly adjacent to ovens with steam generated from the continuous flow of water through piping heated by the ovens. A small generator located behind the proofing room is needed for pumping water.

G. FINISHED BREADS ROOM

20. Finished breads room encloses many rectangular or right-angle forms such as desks, counters, bread racks and tables for sacking, thus the over all form is somewhat rectangular and continuous in the plane (direction) set up by the ovens. Enough 'slack' or openness of space must be designed to allow the bakers and bread racks to move freely from one activity to another.
21. Area for putting finished breads into cellophane sacks -- 'sacking' -- located between bakery retail and delivery distribution areas.

Baldwin Hill Bakery



I. BREAD DISTRIBUTION/LOADING DOCK

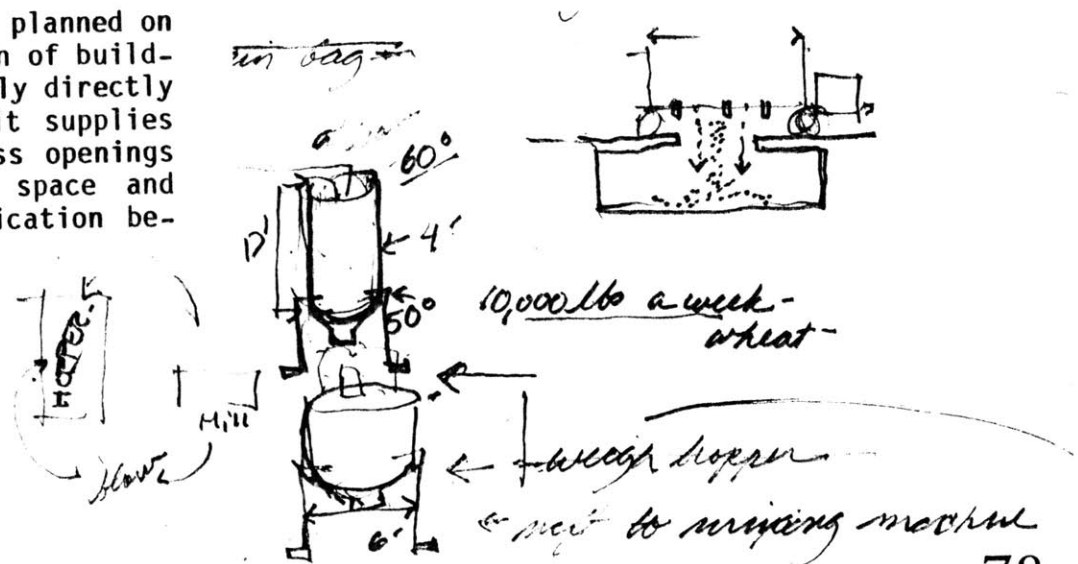
22. Because of this bakery's rural location, 80-90% of bread distribution occurs through truck delivery. In the plan, delivery area is designed as an extension along the south facing building edge. The form direction is expressed at a somewhat independent plane from the ovens due to its 'external' connotations of distribution. Fire wood is also supplied from this loading dock.

L. SILO/GRAIN STORAGE

23. General location of silo. A circular form to be organized outside the building enclosure.

M. MILL

24. The general location of mill is planned on the east or most private elevation of building. The mill correlated spacially directly to the main baking area where it supplies the freshly milled grain. Glass openings are made between the millers' space and bakers' space for visual communication between activities and each other.

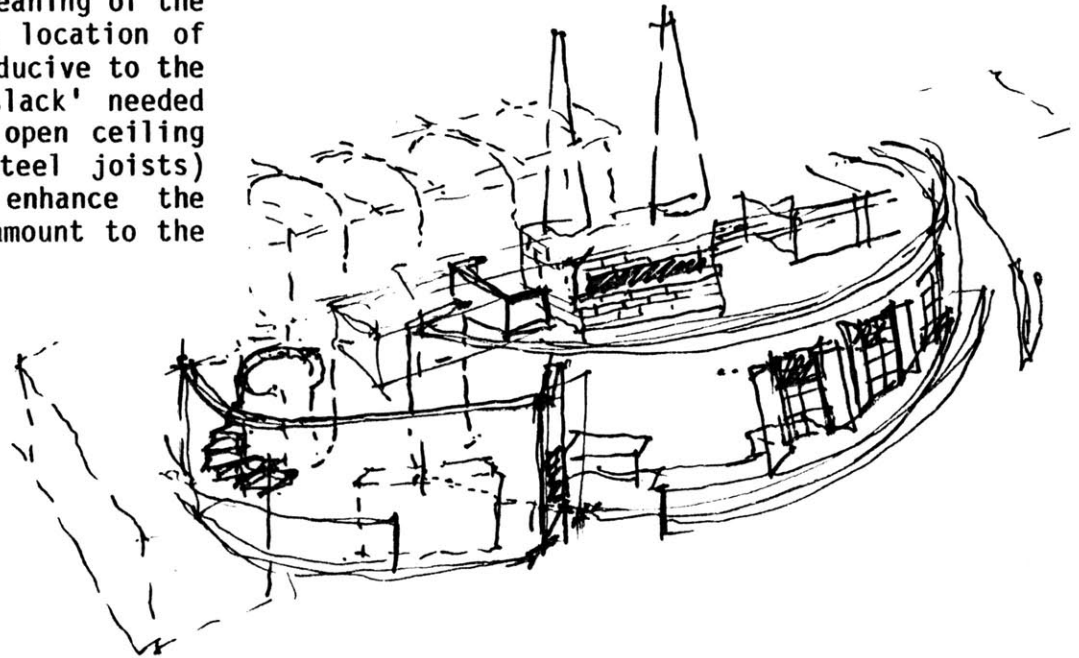


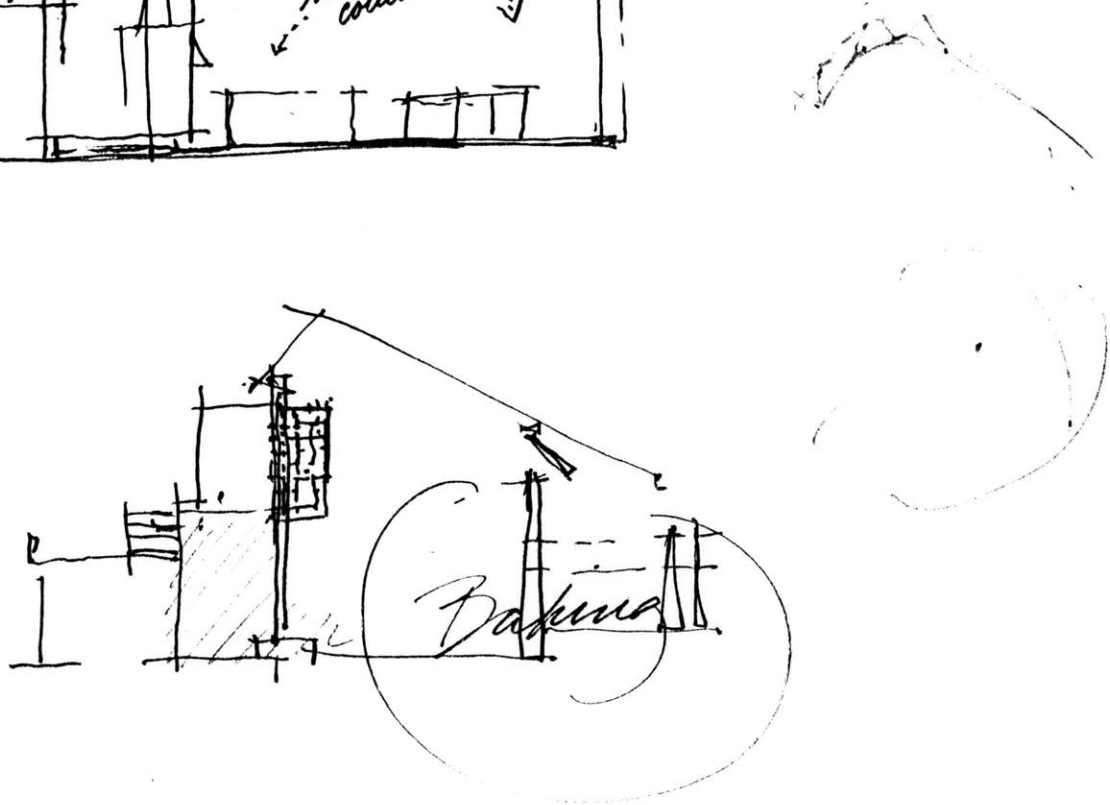
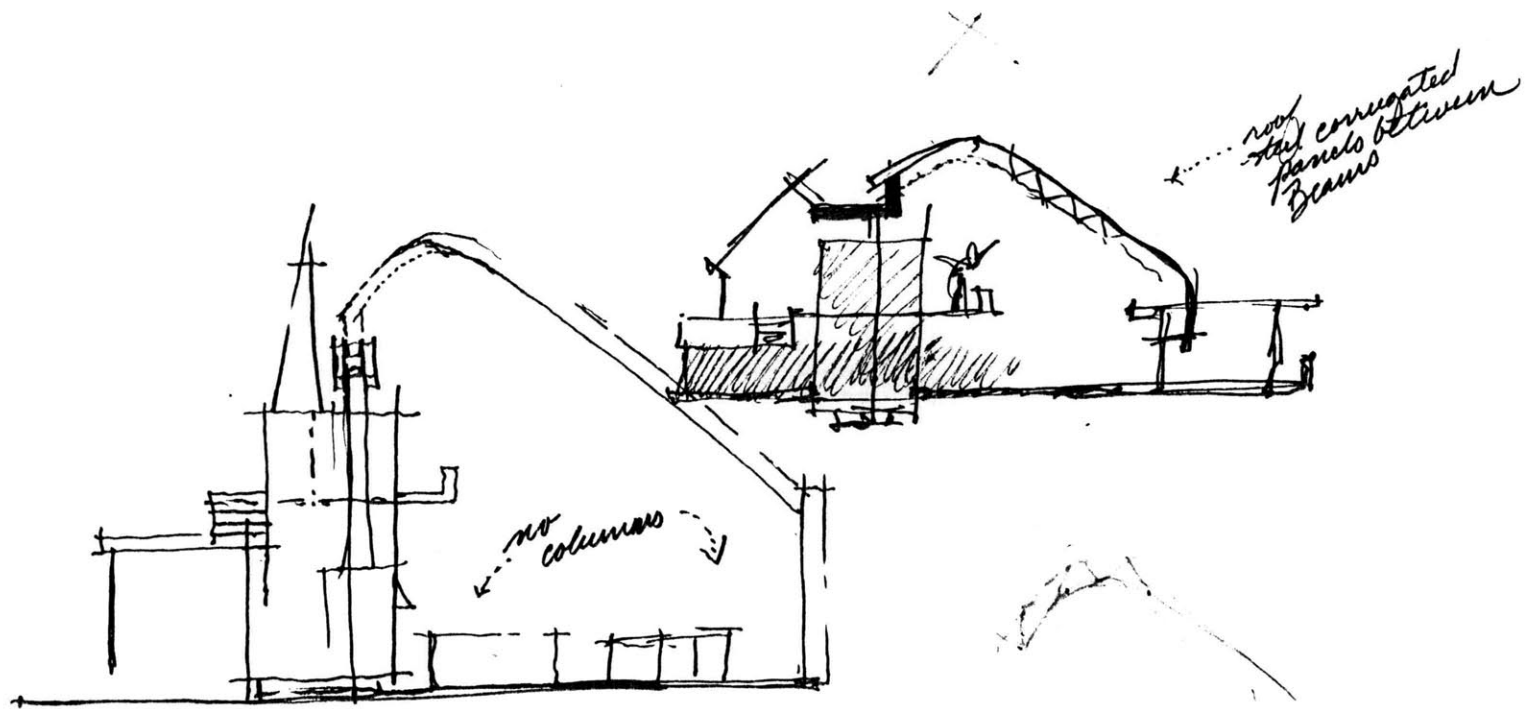
Q. OFFICES/APPRENTICESHIP ROOMS

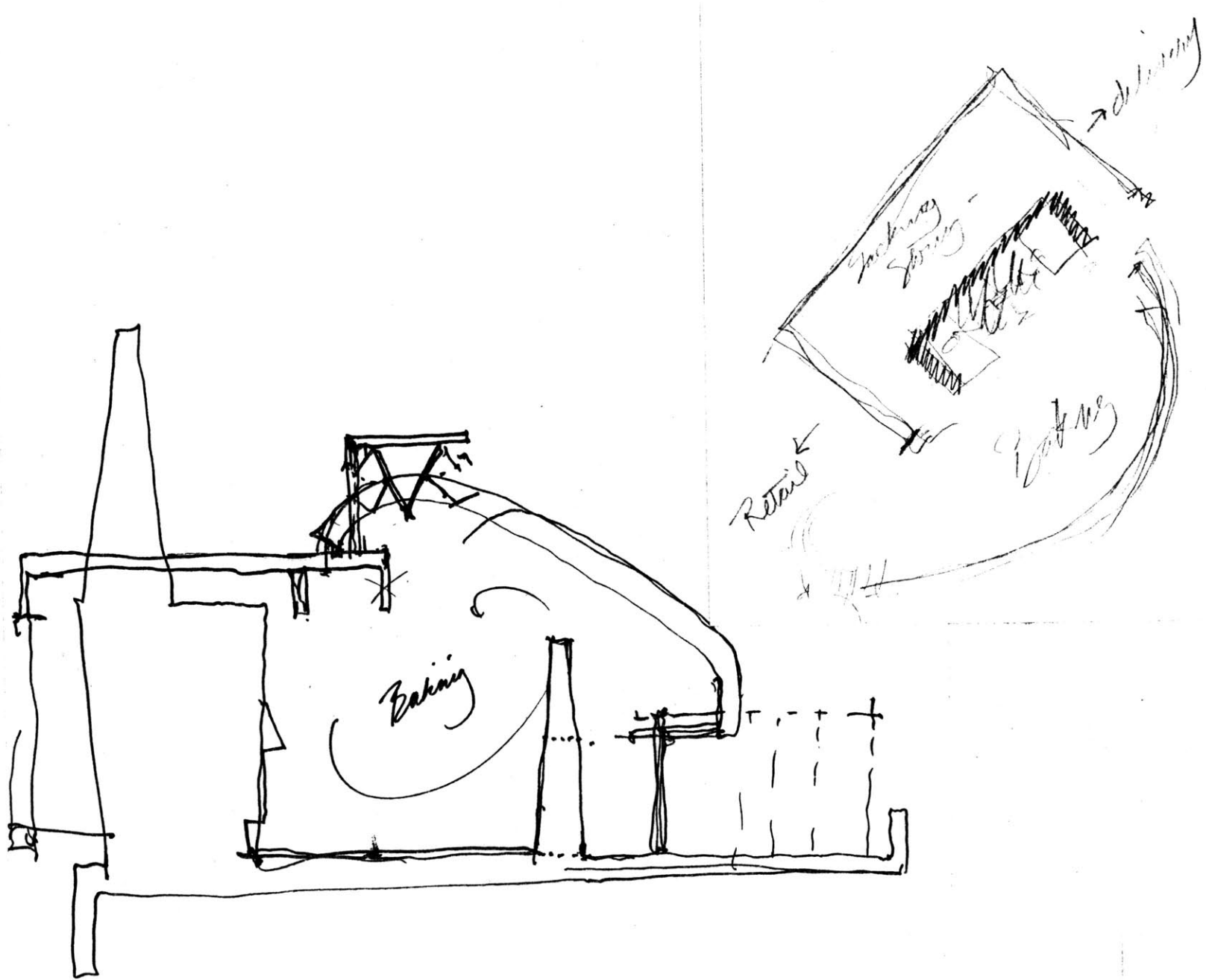
25. Located primarily along the east side of the building adjacent to retail, primary/secondary baking, finished breads room, delivery and vertical access.

U. PUBLIC ENTRY/RETAIL

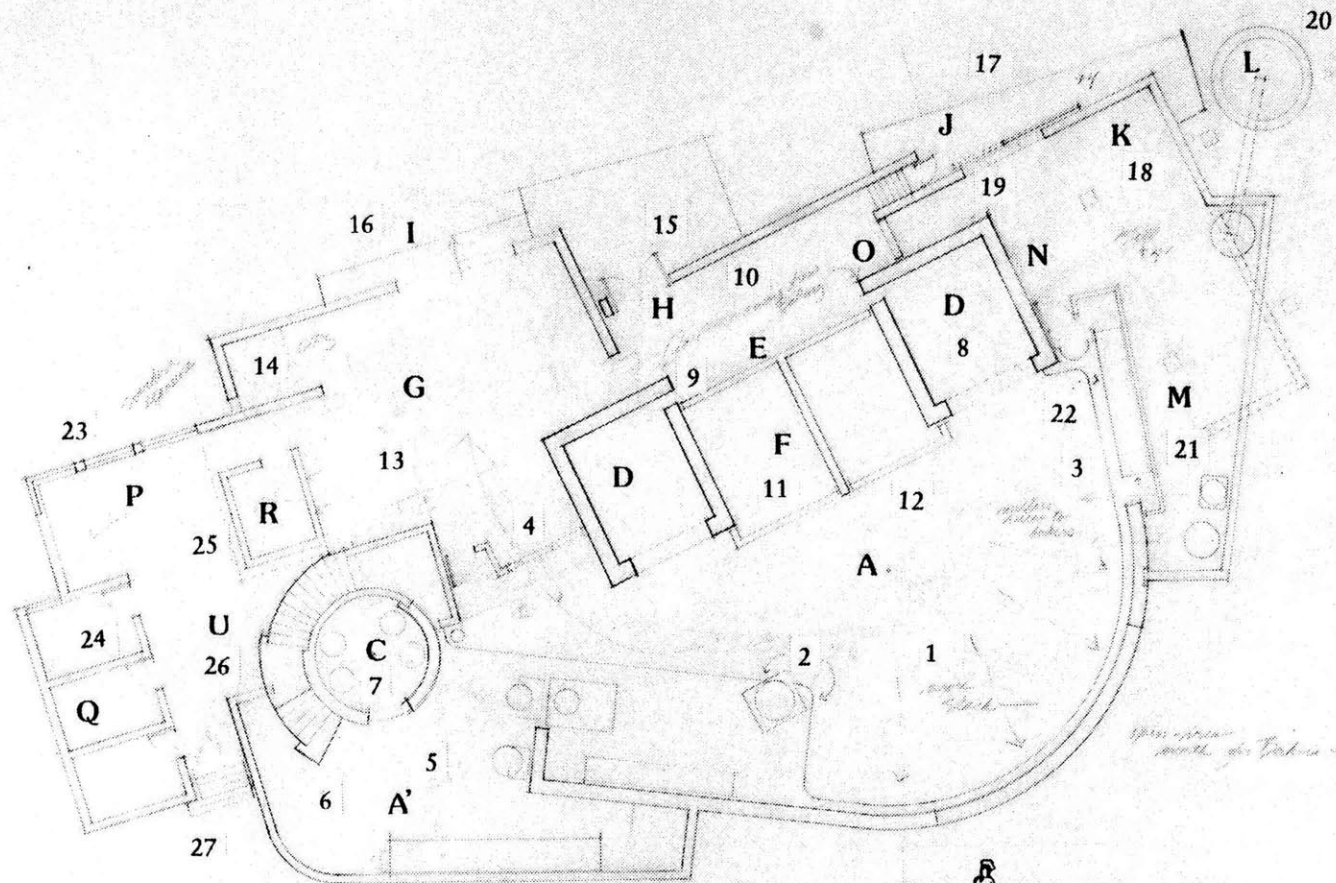
26. Generally located along the east facing or more public edge of building, because retail production of breads depends almost wholly on clientele outside of central Massachusetts, the retail area will remain small in spacial area.
27. A primary structural system was introduced compatible with the direction of the primary baking area (the main bulk or meaning of the building). Unfortunately the location of posts shown in plan was not conducive to the open, unobstructed spacial 'slack' needed for the baking process. An open ceiling structural system (open-web steel joists) needed to be explored to enhance the circular, unhindered flow paramount to the success of the baking process.



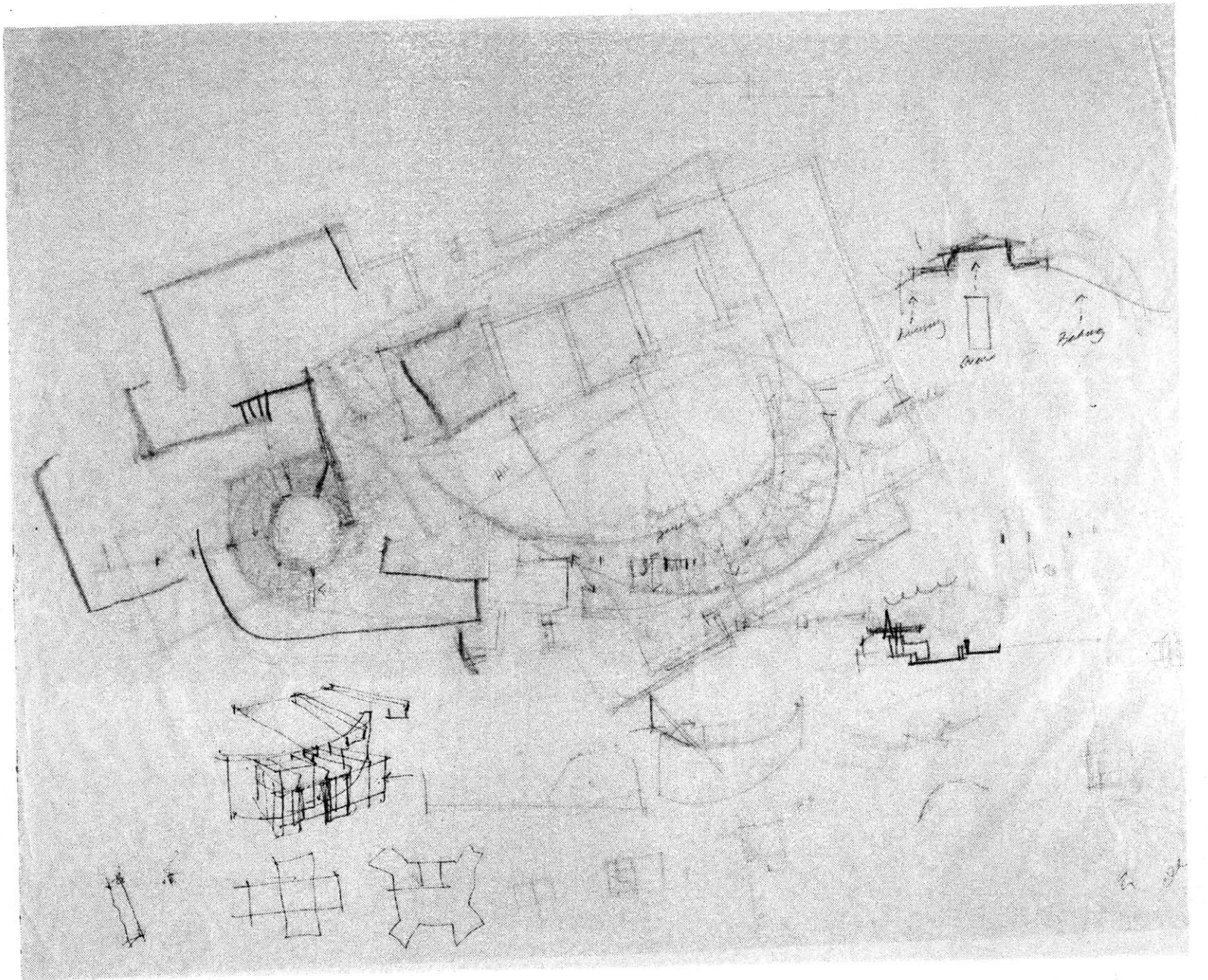




phase 2

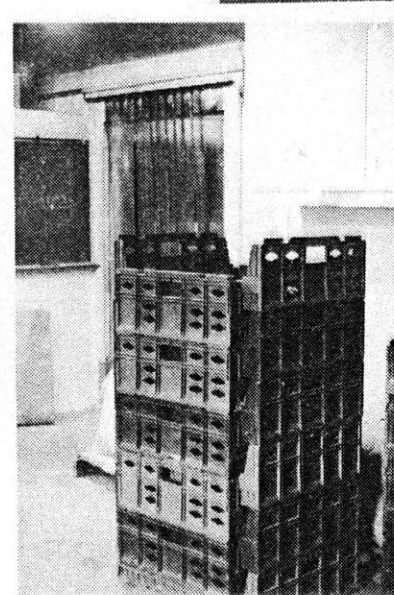
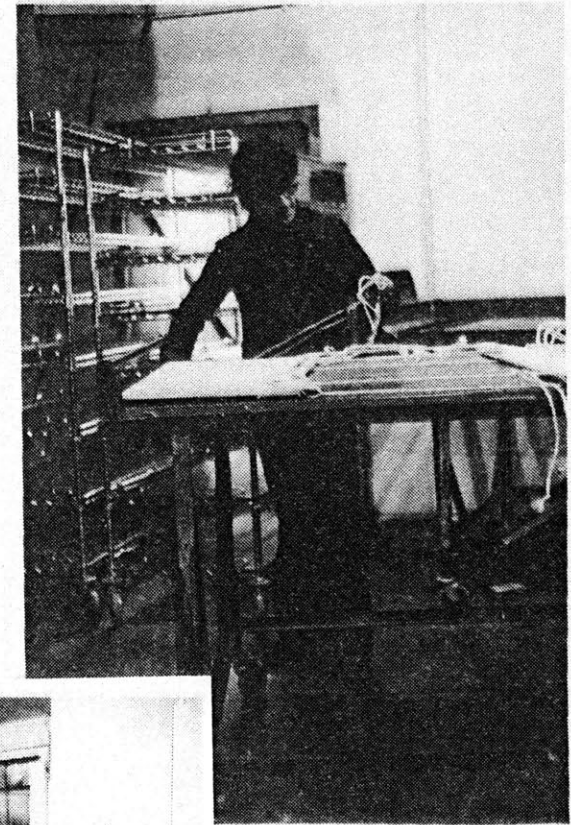


plan exploration



A. PRIMARY BAKING AREA

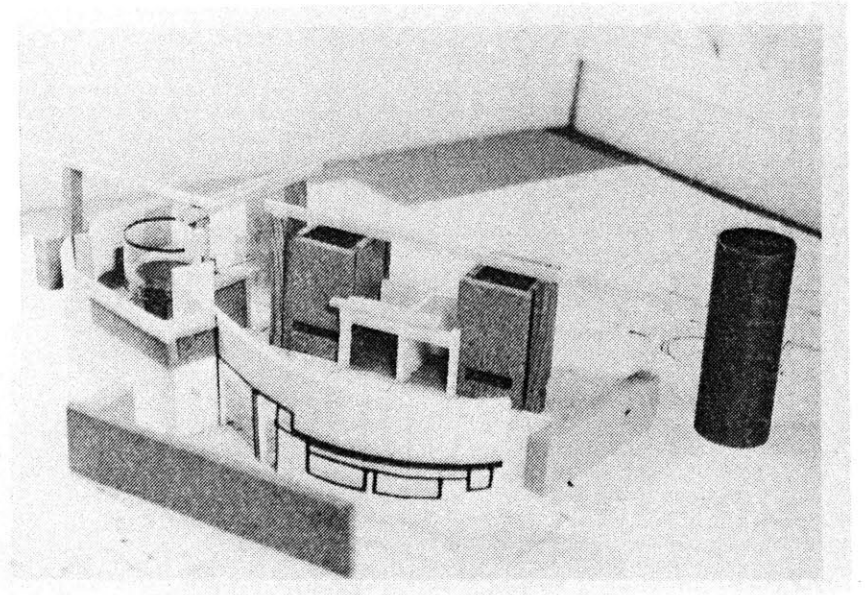
1. Because of the nature of the many activities that take place in the primary baking area—a larger more open spacial definition is needed. The curved wall (primary physical definition) is designed much fuller to allow greater 'slack' for these activities to occur. Auxiliary actions such as the changing of the canvas surfaces on the bread tables also take place in this primary baking area. The wall is made of poured concrete.
2. The weight of the tables carrying the rounded loaves of bread is extremely heavy. A hard floor surface such as steel or concrete is needed to support this weight of bread table movement. Hard ceramic tile or brick pavers are used. Hardwood floors are used where the bread tables are not wheeled onto them. The thin line shown in plan expresses this material change. Brick/tile floors are in main baking areas; hardwood floors where the dough is made and in secondary baking area.
3. This area is used for extra bread racks that remain in the primary baking area.
4. The transitional corridor between the primary baking area and finished breads room is designed larger for freedom of movement. An airlock is designed to keep winter drafts from delivery opening out of the baking area. Yet the loss of used space makes this transition too large.



Baldwin Hill Bakery

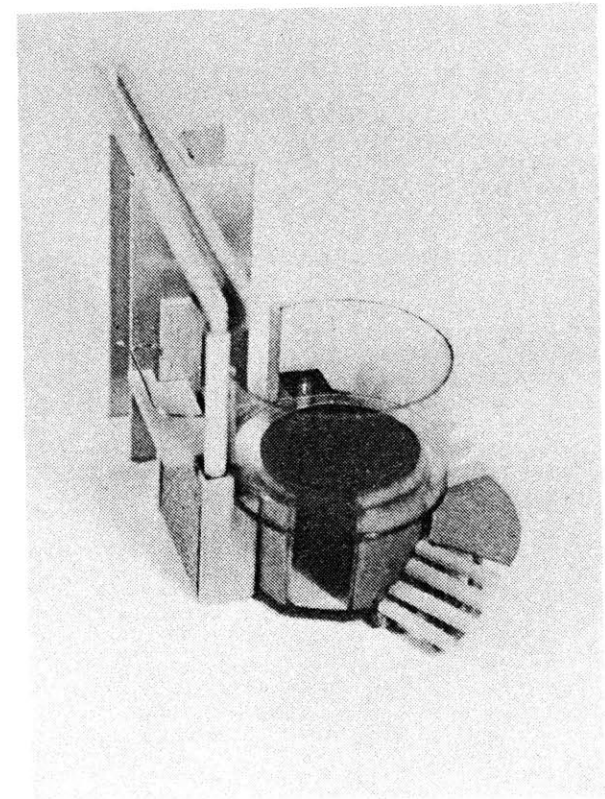
A'. SECONDARY BAKING/PASTRY ROOM

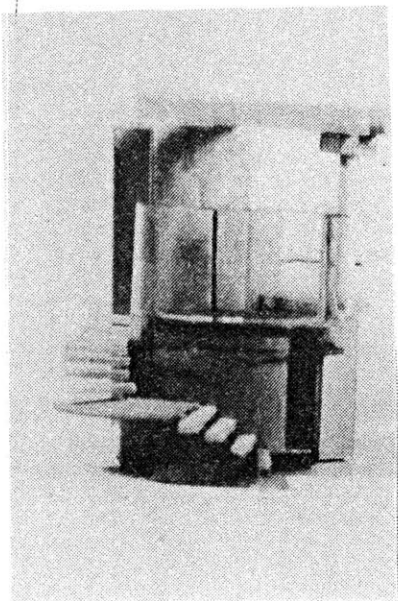
5. Again, for more room to allow various activities, the spacial definition is made larger.
6. Because of some extra 'slack' needed at the foot of the mezzanine stairs, the pastry room enclosure wall was set further north to allow more space for vertical circulation (private) and pastry baking.



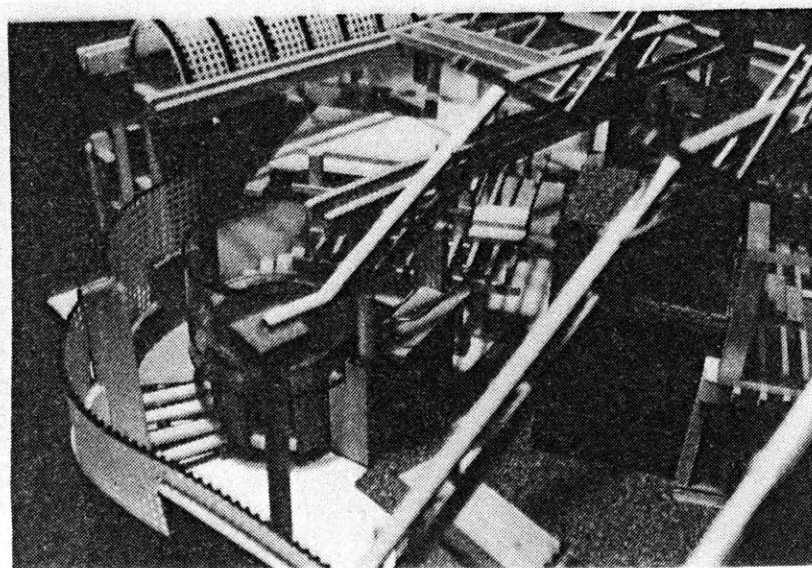
C. DIEZEM ROOM

7. The diezem room is strongly defined, the stairs and circular enclosure to be made of a singular material (such as poured concrete) or made as a strong singular form. The back of the form facing retail to be thoroughly enclosed save a few glass block openings for visual awareness to the public of the importance or nature (the heart) of the diezem room. The form is completed partially in glass block facing the baking areas for visual relationship. Concrete and glass block are used in combination as good insulating materials against the heat generated from the ovens. A public/private meeting room is designed on top of the diezem room. Primarily transparent glazing is used here for complete visual access to the multitudinous activities that involve baking. A balcony is designed on the mezzanine level of this diezem room piece so one can observe or 'get out into' the baking process without obstructing the continuous baking process or distracting the concentration of the working bakers.



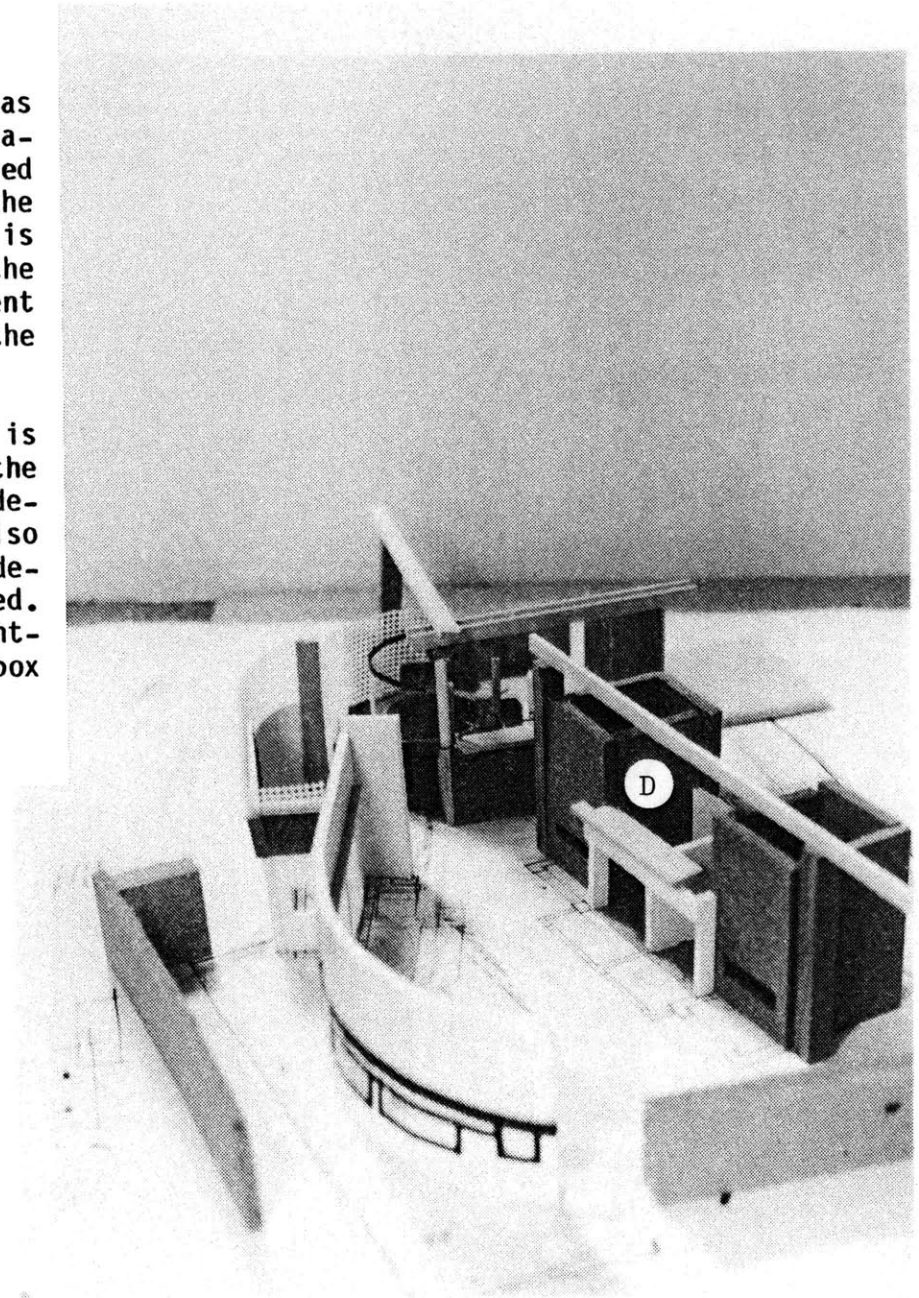


C



D. OVENS

8. For passive heating of the proofing rooms as well as for keeping the proofing temperatures constant, the ovens are designed flanking each side. The radiation from the ovens used for heating the proofing rooms is easily controlled. The outer surface of the ovens is made of glazed brick to prevent soot from accumulating. The soot from the wood fire can contaminate the breads.
9. To insure that the primary baking area is free from outside debris and kept clean, the fireboxes are placed in back where the delivery area is located. Fire wood is also delivered at this loading dock so this design decision was more reasonably resolved. Again, the proofing rooms are placed slightly forward to permit room for firebox openings.



E. WOOD STORAGE

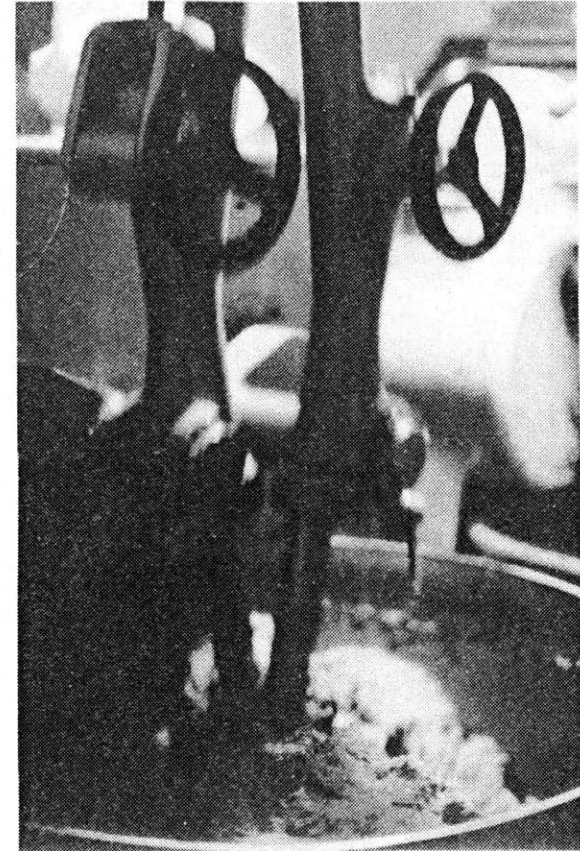
A daily or weekly supply of wood is contained next to the ovens for drying and access. A separate shed for wood surplus is to be designed outside, adjacent to the loading dock. This is similar to the wood storage area found at Baldwin Hill Bakery.

F. PROOFING ROOMS

11. Since the unbaked loaves of bread go directly to the proofing rooms from the rounder, it seemed more reasonable that these rooms should be located centrally in front of or in close proximity to the rounder.
12. More 'slack' is designed in front of proofing rooms.

G. FINISHED BREADS ROOM

13. Because this area should hold many 2' x 8' bread racks, the spacial area is designed larger.
14. Area for U.P.S. deliveries. A window opening and small counter can be designed out to the loading dock areas.



H. DELIVERY

15. Separate area for machinery, fire wood and employees outdoor access.

I. LOADING DOCK (BREAD DISTRIBUTION)

16. Because the finished loaves of breads, left cooling in racks, located in the finished baking area must be free of debris and dust brought in by fire wood, a separate loading dock is designed just for bread distribution. A door divides the delivery/ fire wood area from the finished breads room.

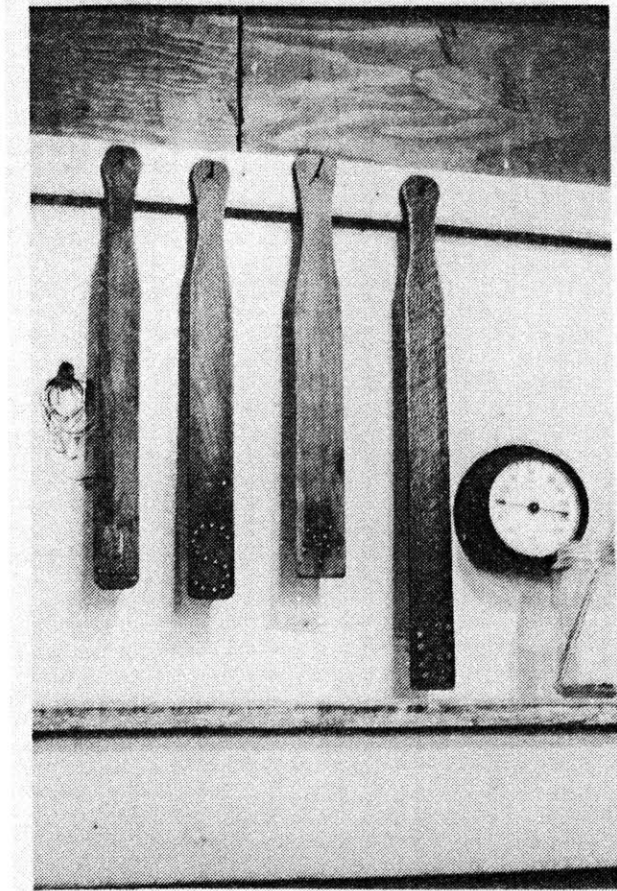


J. LOADING DOCK (GRAIN)

17. The trucks used for delivering large bulks of grain are larger than delivery trucks for breads and require a loading dock height of at least four feet. Because of fork lifts, grain pallets and machinery set on wheels, the milling floor is designed at one continuous level, higher than the main baking area. Because the mill is basically an independent entity correlated into the whole of the bakery, this level change gives the nature of a mill, as a "separate building within a building", stronger definition.

K. STORAGE (SURPLUS)

18. Area for storage placed somewhat near grain storage, welding room, mechanical room and milling for tools or other supportive items needed for daily maintenance of these areas.
19. Storage of baking machinery to be welded or maintained.



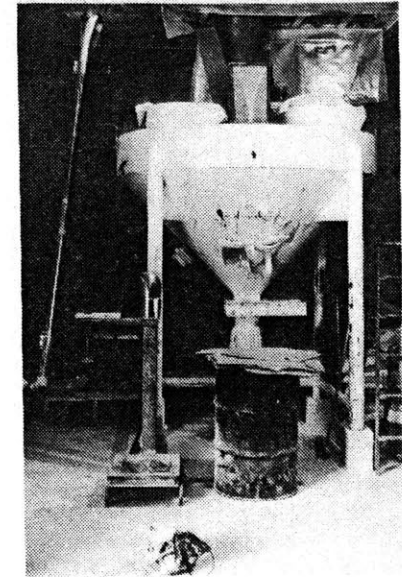
Baldwin Hill Bakery

L. SILO

20. Outdoor grain storage taking more spacial definition in plan. Relationship to mill and interior grain storage sets forth a stronger relationship.

M. MILL

21. Glazing occurs between the milling and baking areas. Since the space required for the actual milling of grain is quite small compared to the ample area needed for stacks of grain in sacks, the mill form tapers with the larger area for grain pallets--the smaller area for the hopper and milling machine.
22. Ramp is used for wheeled access from mill/storage to primary baking area--or vice versa. The ramp is located within the baking area, yet outside of the baking process.



Baldwin Hill Bakery

P. EMPLOYEES LOUNGE

23. Glazing is used along the south wall for solar heat gain, view as well as a sunny comfortable atmosphere for the bakery employees. Shading devices can be used during summer months.

Q. OFFICES/APPRENTICESHIP ROOMS

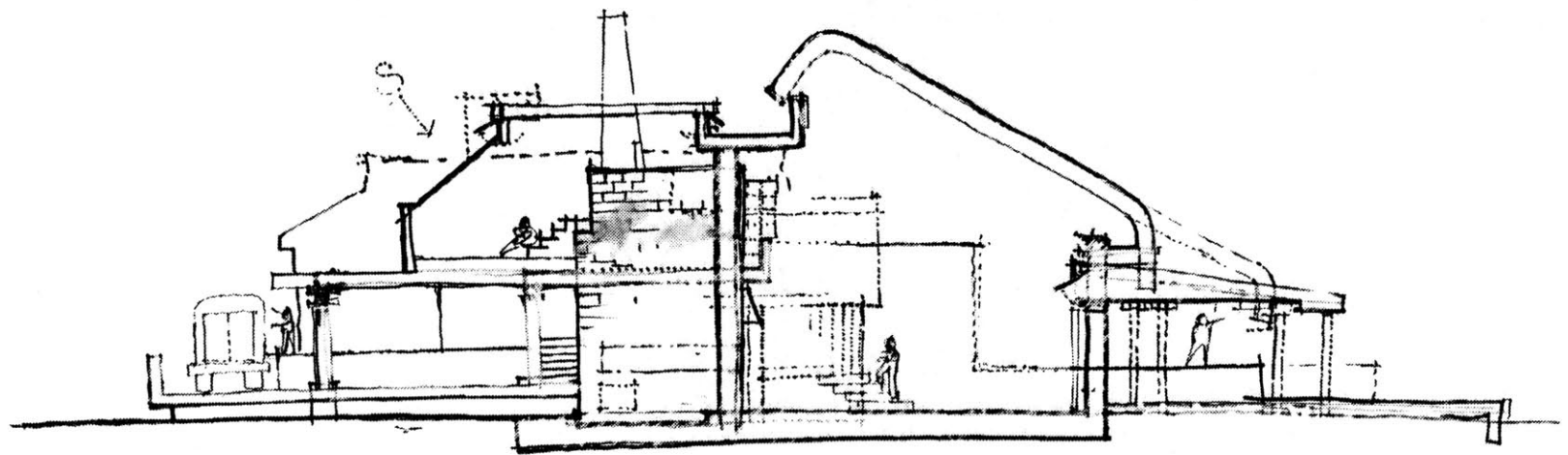
24. Located in close proximity, singular rooms, cellular in form, are one alternative to an open office space plan.

R. MAIN OFFICE

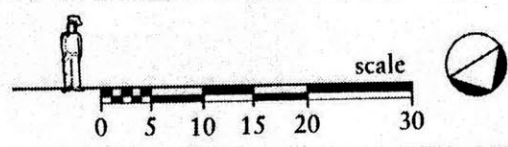
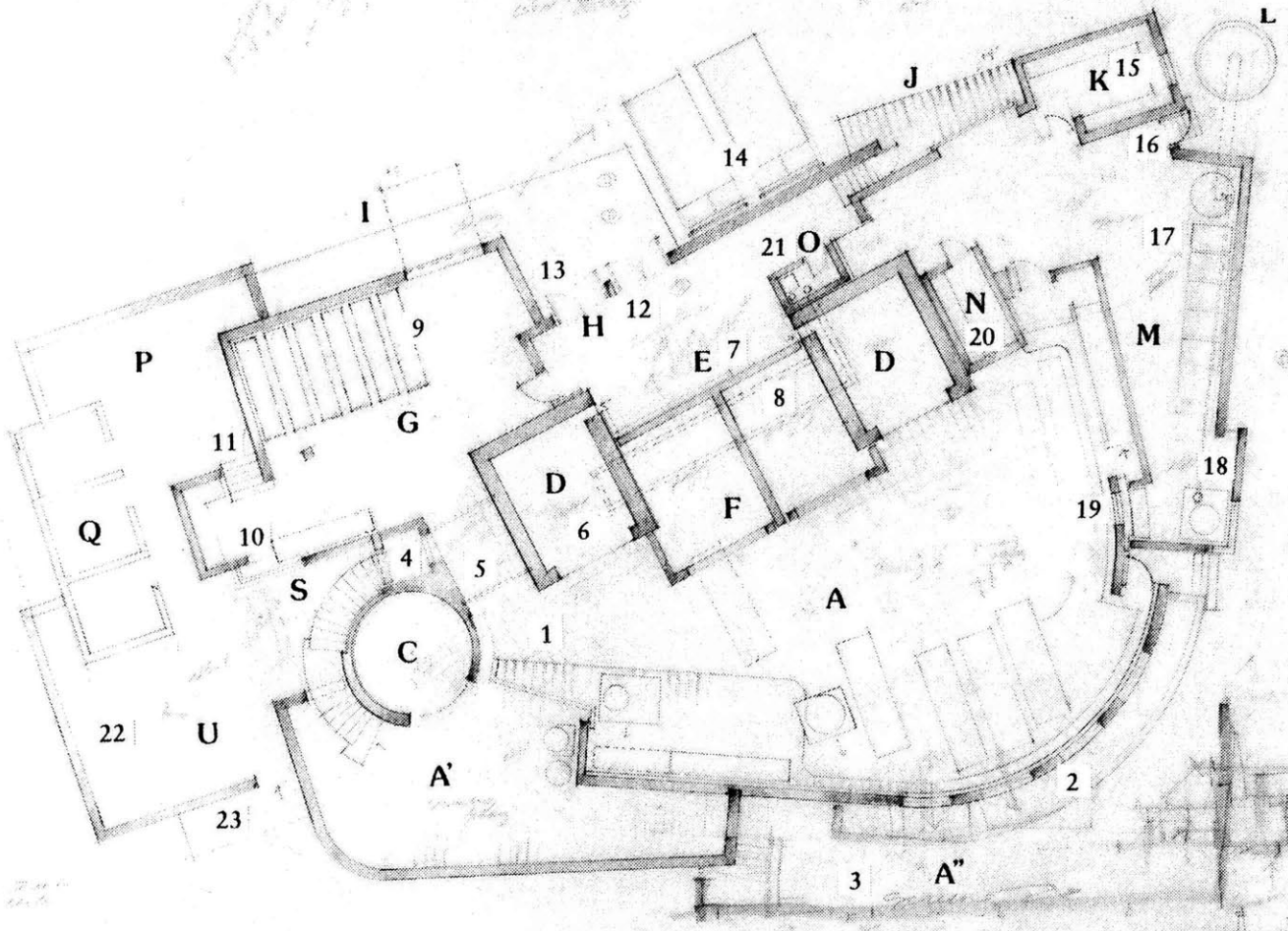
25. Located somewhat centrally to the finished breads and distribution activities.

U. PUBLIC ENTRY/RETAIL

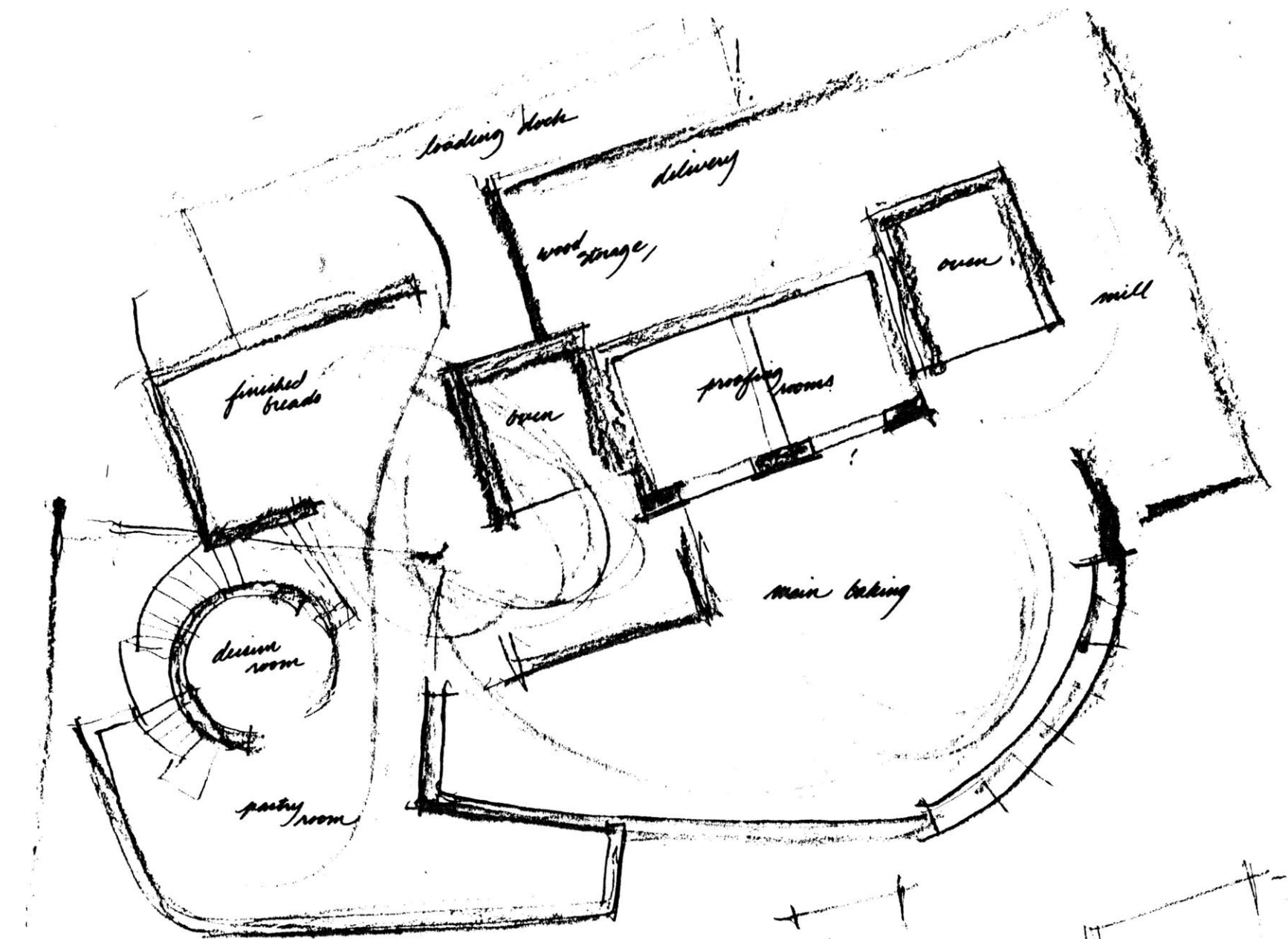
26. The northeast corner is the most public edge of the bakery--therefore, the retail location and entry shown in this approximate location in plan.
27. Exterior curved wall of pastry room introduces the direction into the public entry.



phase 3



plan exploration



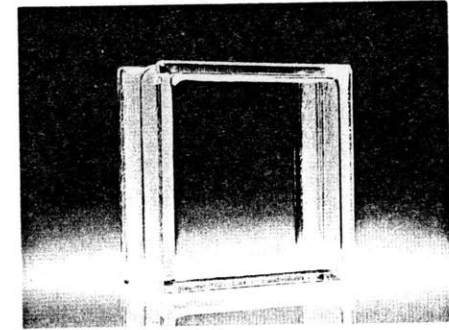
Entry

A'. SECONDARY BAKING/PASTRY ROOM

1. Sliding doors, installed on tracts to temporarily separate the pastry room from primary baking area for reasons such as the hosing down of the main baking floor after each daily cycle of baking. The exterior wall is made of poured concrete and clear (vue) glass block for daylighting.

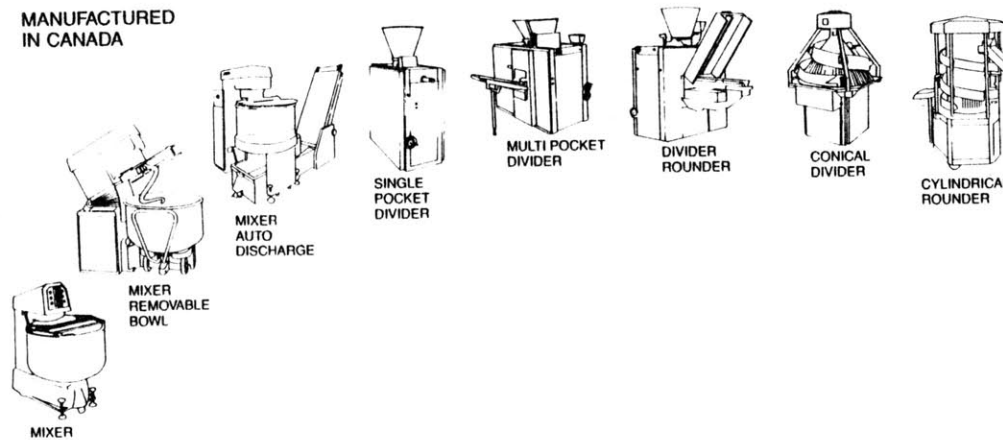


Vue®

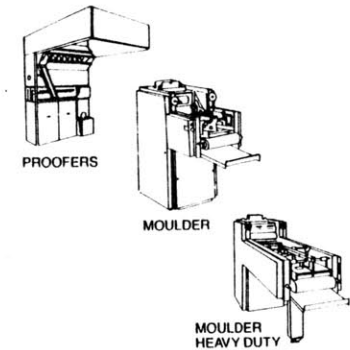


VUE® These glass block provide maximum light transmission and visibility because both the exterior and interior surfaces of the block are smooth and clear. VUE® glass block

MANUFACTURED
IN CANADA



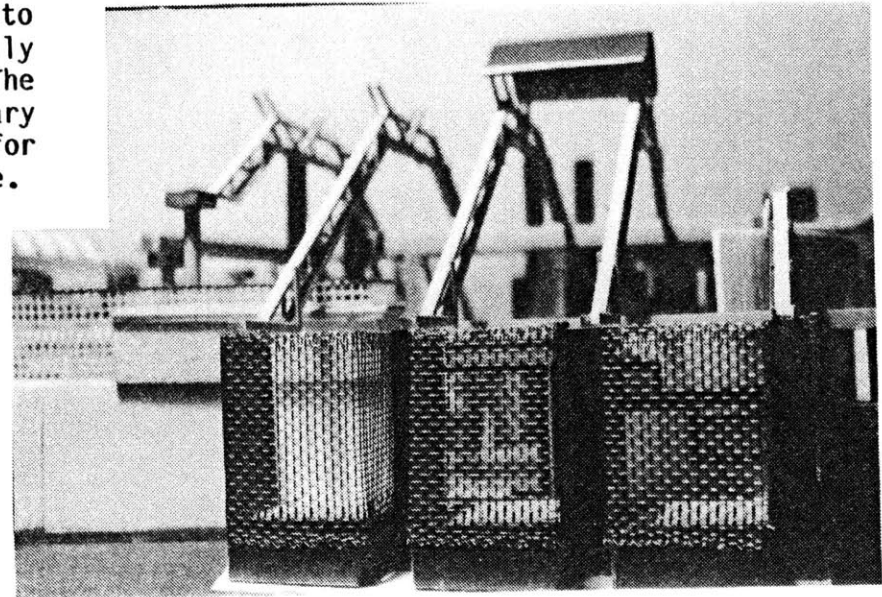
PARTS & SERVICE
AVAILABLE

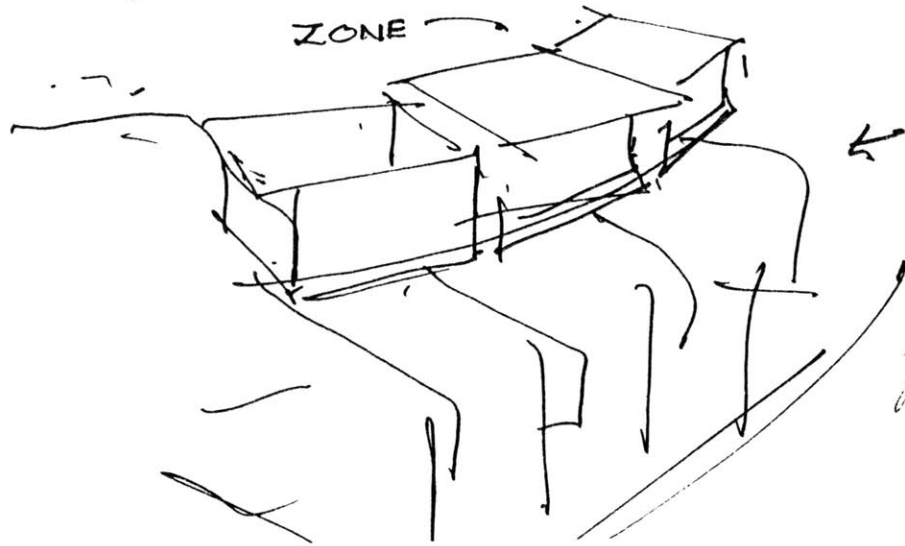
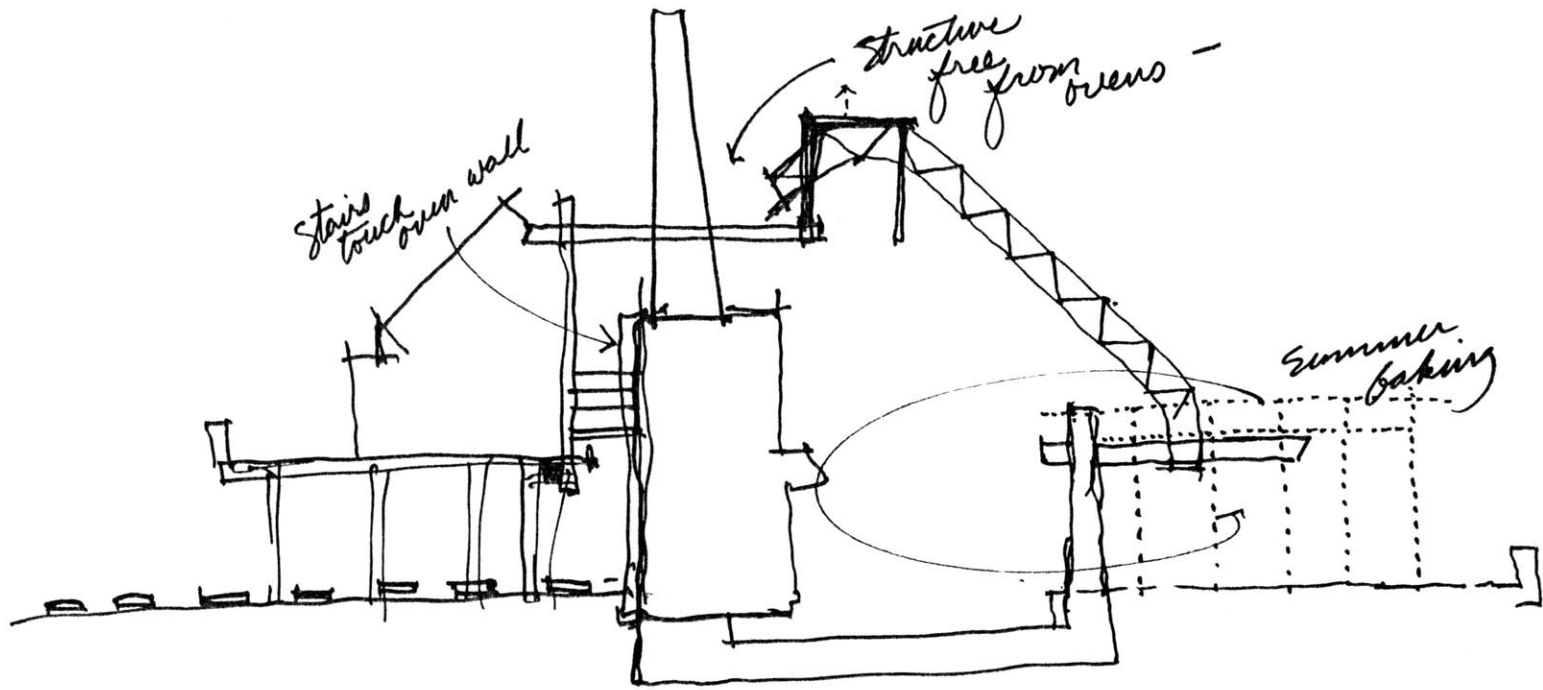


A''. SEASONAL BAKING/SUMMER BAKING AREA

2. A double wall was introduced for insulating of the main baking area. This allows the indoor baking temperature to be constant along the bakery wall where breads may be waiting for baking. A double wall with air lock allows both wall to be somewhat transparent for the bakers' visual relationship to the outside as well as acting as insurance against condensation damaging the bread dough.

3. The Baldwin Hill bakers suggested that an ideal summer baking situation would be to bake outside. Because of the continuous circular process of baking which cannot be interrupted and must remain constant, the seasonal baking area is explored as a zone extending north from the primary baking area. During the summer season, the open loop process of baking becomes wider into this outdoor screened zone, which can easily be closed off during winter months. The seasonal baking will intensify the primary baking area as a 'room within a room' for insulation from outside temperature change.

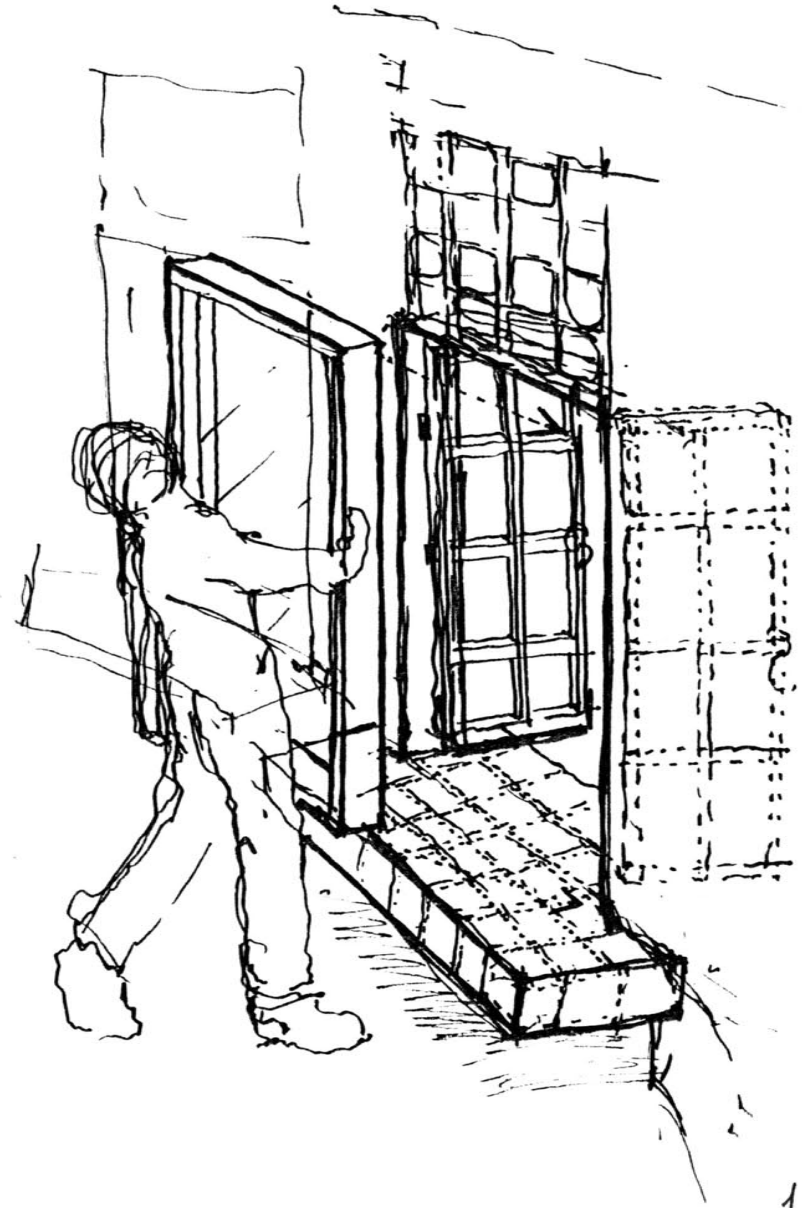




← Bakery Building Edge

② unstable zone between winter/summer baking

A''



C. DIEZEM ROOM

4. A pass through space as an extension of the whole diezum room form is designed for fresh pastry delivery from the secondary baking area.
5. Because only the bread racks, 1 to 2 feet in width, pass between the primary baking area and finished breads room, the width of the transitional corridor is made smaller to form an airlock vestibule which protects the dough from drafts. Yet the diezum room is possibly placed too close to the direct heat which radiates from the ovens.



D. OVENS

6. The east oven is pushed back from the baking area two feet further to allow more room for bread racks rolling in and out from the finished breads room to the baking areas.

E. WOOD STORAGE

7. Daily fire wood supplies are stored in the angular space formed by the oven and proofing rooms.

F. PROOFING ROOMS

8. The rooms are to be made of poured concrete similar to the material used for the outer baking area wall. Water pipes are installed through the masonry walls of ovens to proofing along the inside ceiling of the proofing rooms for steaming of breads. The generator used is located directly behind the west oven in the mechanical room

G. FINISHED BREAD ROOM

9. The long rectangular forms are conducive to uniform stacking along the linear wall shown in the plan.
10. Area for sacking breads provides visual relationship between employees from finished breads room into retail.
11. Level change access from finished bread room to employees lounge.

H. DELIVERY

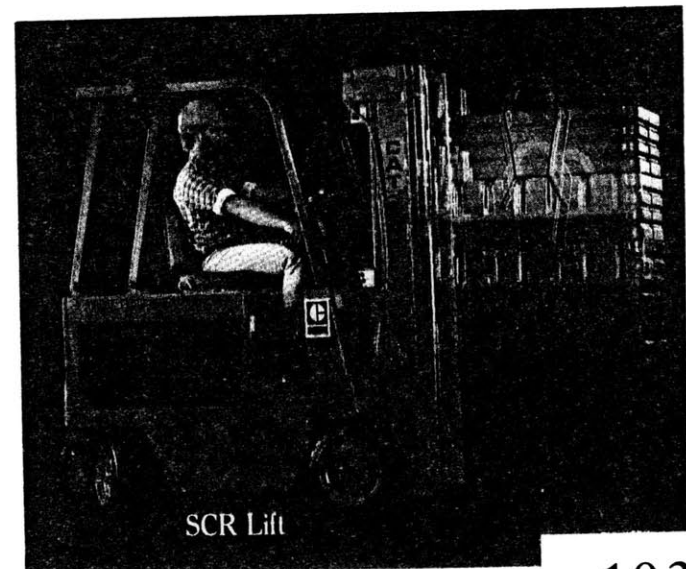
12. The spacial directional spine set up strongly by the east/west ovens defines the main directional movement or path of the employees both on the main level and mezzanine level. This is primarily a linear one directional path connecting the mill to the finished breads and retail areas. The circular directional flow occurring in the primary baking continues independently from these other supportive activities. This basic organization is similar to Baldwin Hill Bakery as well as the larger industrial bakeries. The delivery or main loading dock serves as the central node connecting these activities to the outside.
13. Larger opening is needed.

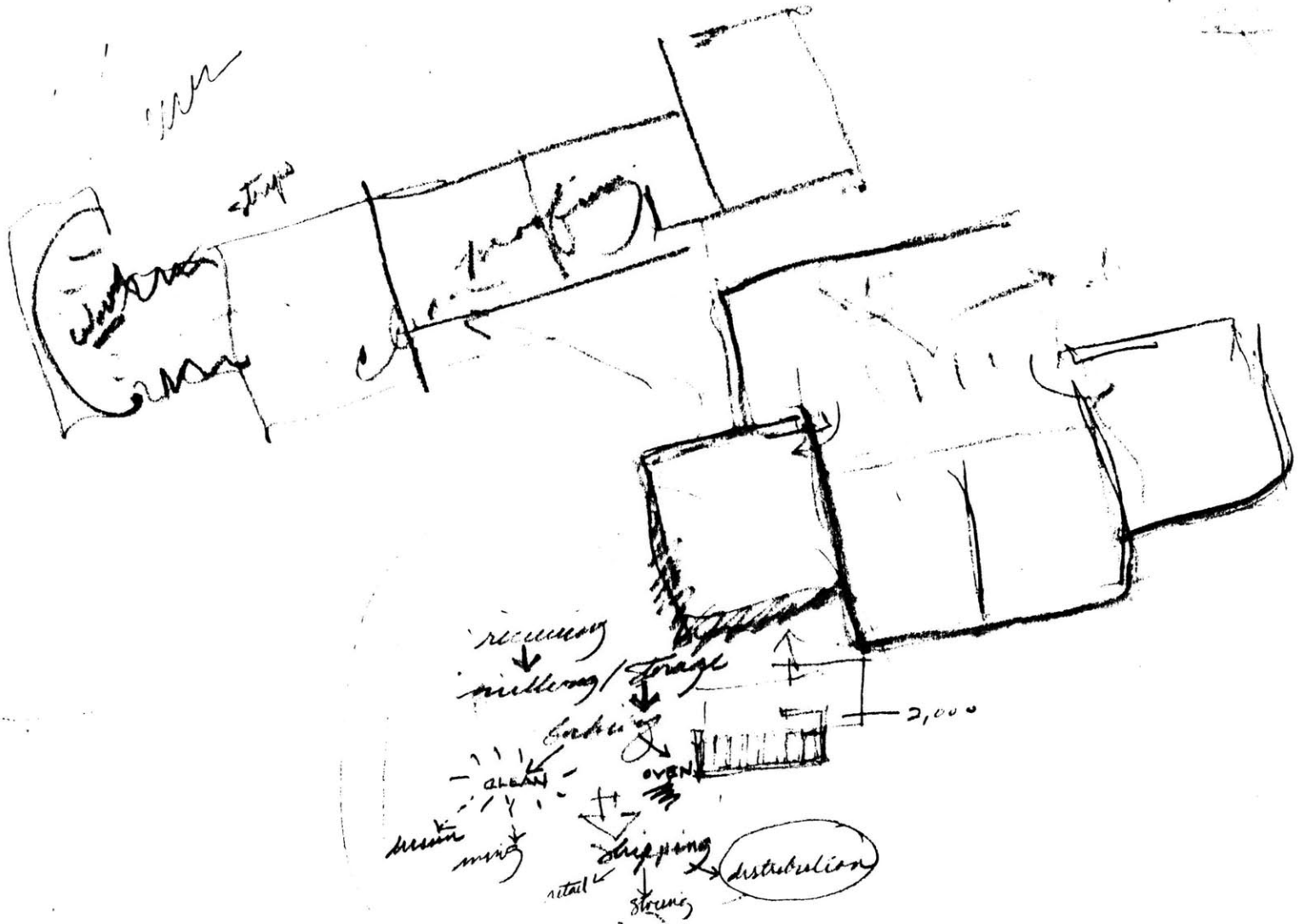
I. LOADING DOCK (BREAD DISTRIBUTION)

14. Delivery truck parking is spacially defined by bread distribution and grain loading docks.

K. STORAGE

15. Spacially defined as a complete enclosure separated from the bustle of activities--movement of forklifts, grain pallets, grain stacking, etc., which occur within the milling area. Ample 'slack' is designed for these activities with the actual milling, welding and storage areas spacially located along chosen edges of the 'slack'.

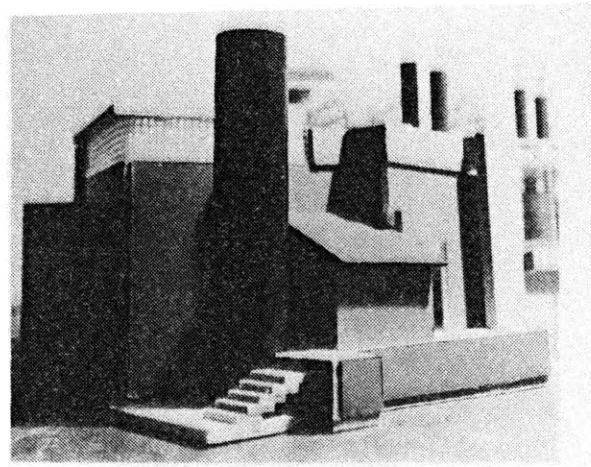




12'
 1.1.
 4.1.

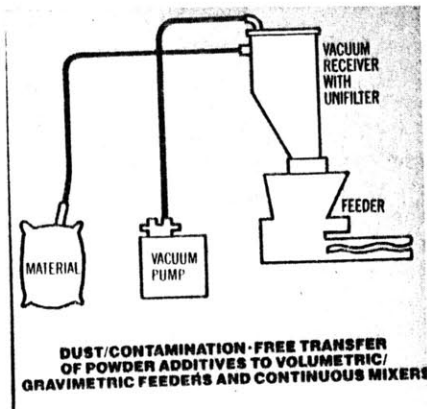
L. SILO

16. Stairs located outside silo grain storage.



M. MILL

17. Grain pallets are rectangular (as shown in illustration). Wood bases are for stacking the large sacks of grain. Each pallet is easily stacked on top of another along the milling wall. The largest square area used in a mill is for this storage of grain. Therefore the wall is made linear for stacking pallets tightly along its inside edge. Because the mill is basically a separate 'building' from the bakery, yet part of the organizational whole, its independency is intensified by over all change in material. While the walls enclosing the primary baking area are of poured concrete, the mill should be built of unit masonry such as concrete block.
18. Grain from the silo storage is transferred pneumatically through pipes to the grain hopper hovering directly above milling machine.
19. Window seat area for miller.



Baldwin Hill Bakery



N. WELDING ROOM

20. Welding room is built as completely enclosed structure as shown in plan with enough windows designed in elevation for adequate ventilation. The oven wall made from brick serves as appropriate material for welding against. Rebuilding of machinery takes place in this area.

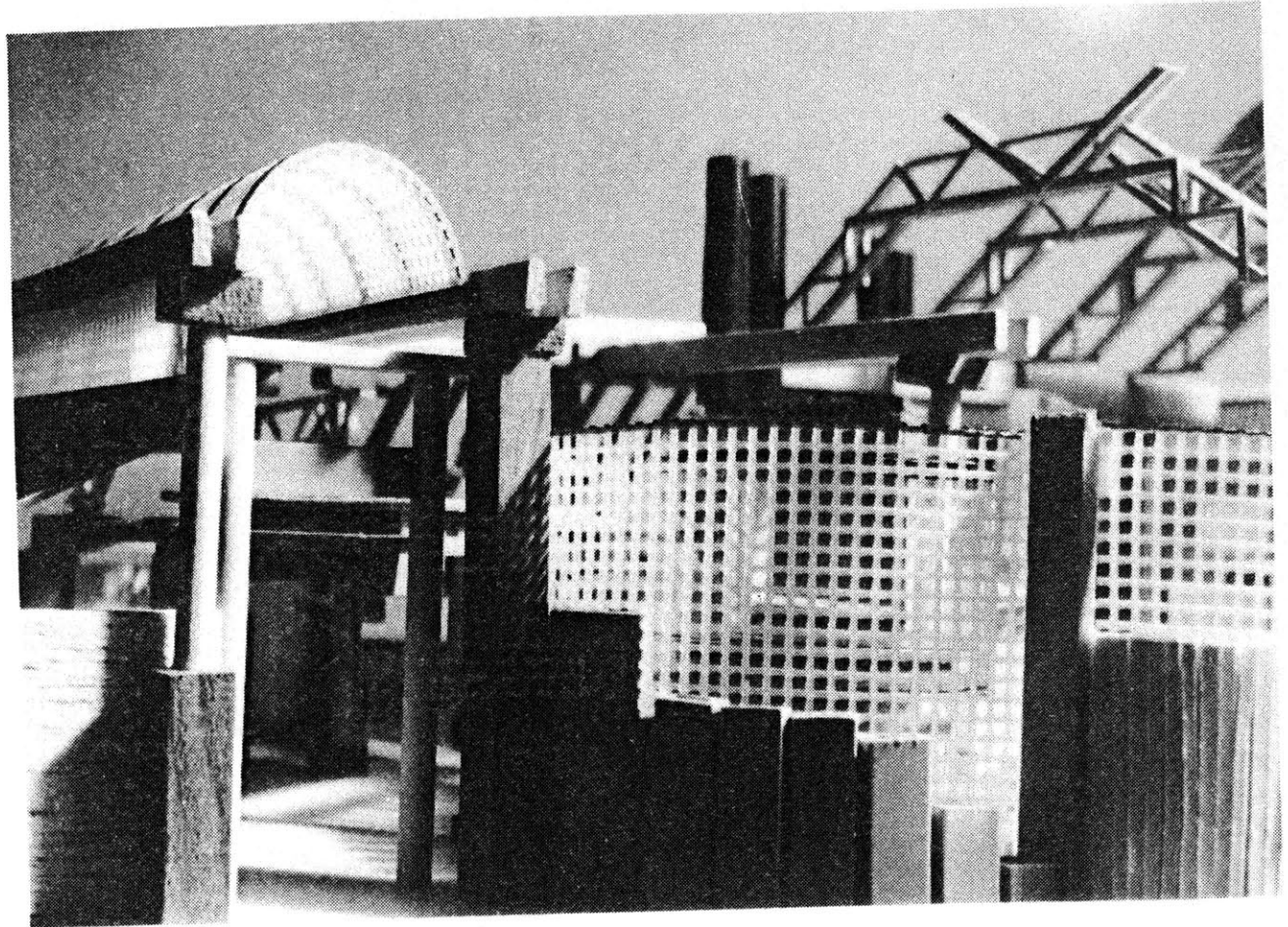
O. MECHANICAL

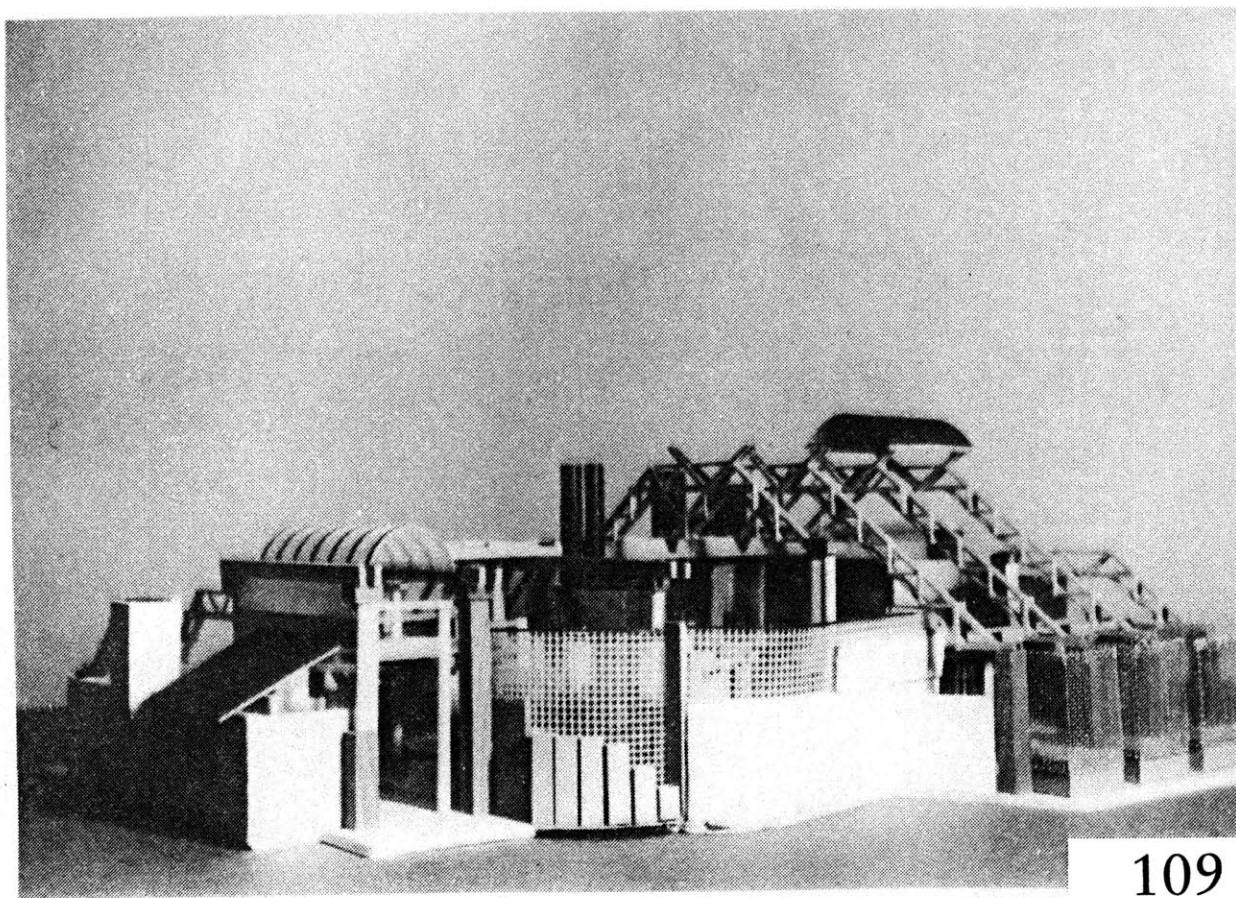
21. Mechanical room enclosed in appropriate location to proofing rooms and ovens.

U. PUBLIC ENTRY/RETAIL

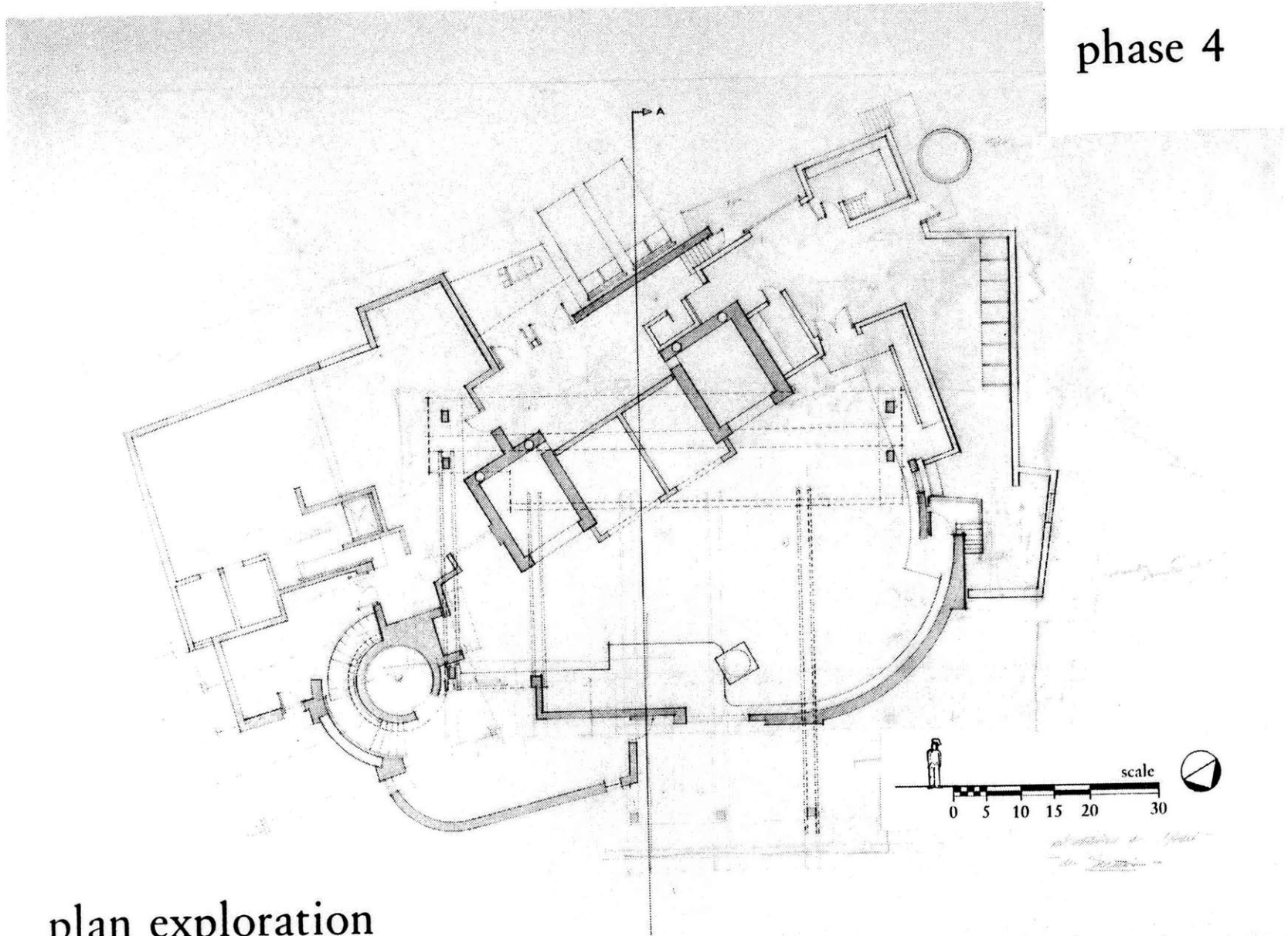
22. Rectangular bread racks are stacked in similar fashion and form to the bread racks area used in the finished breads room.
23. Entry 'porch' is continuous extension of ground form material used in the retail area.

U

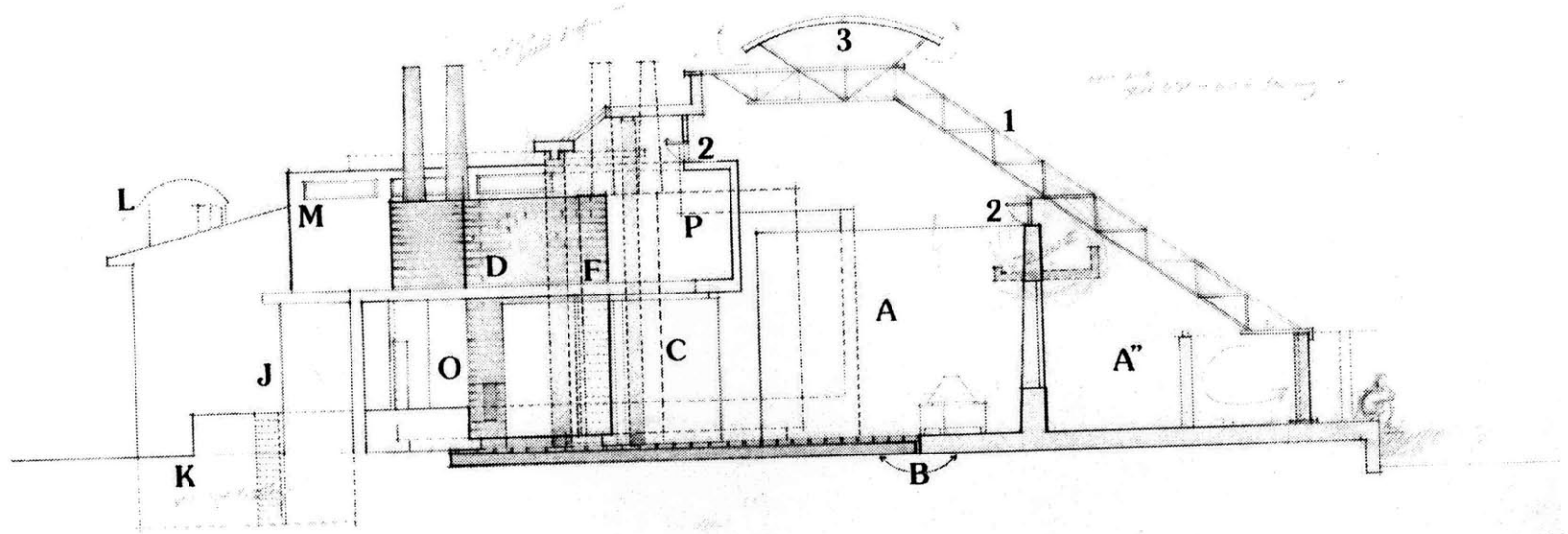




phase 4

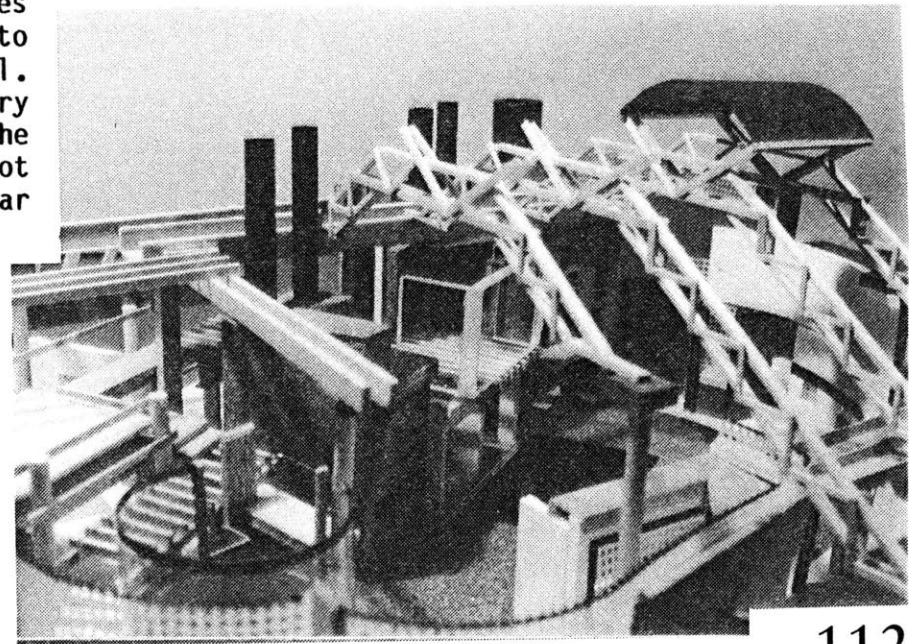


plan exploration

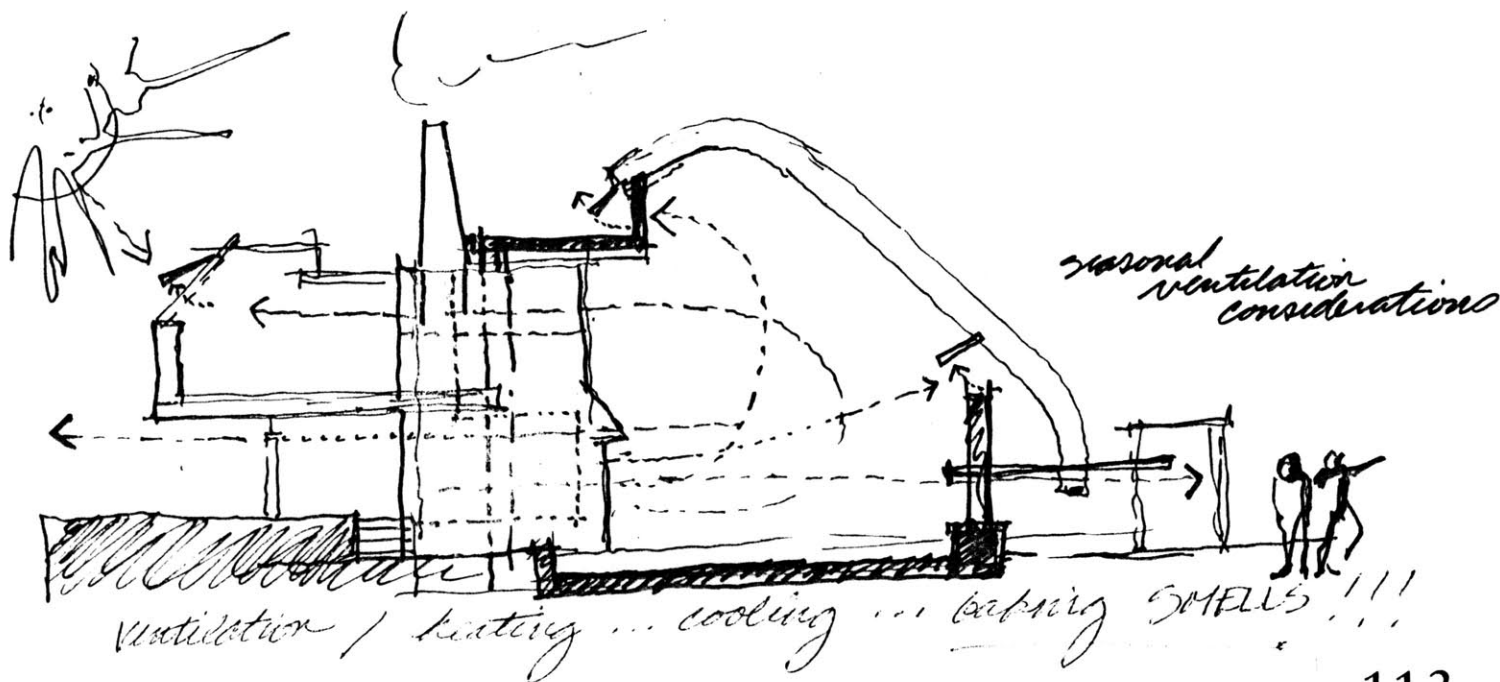


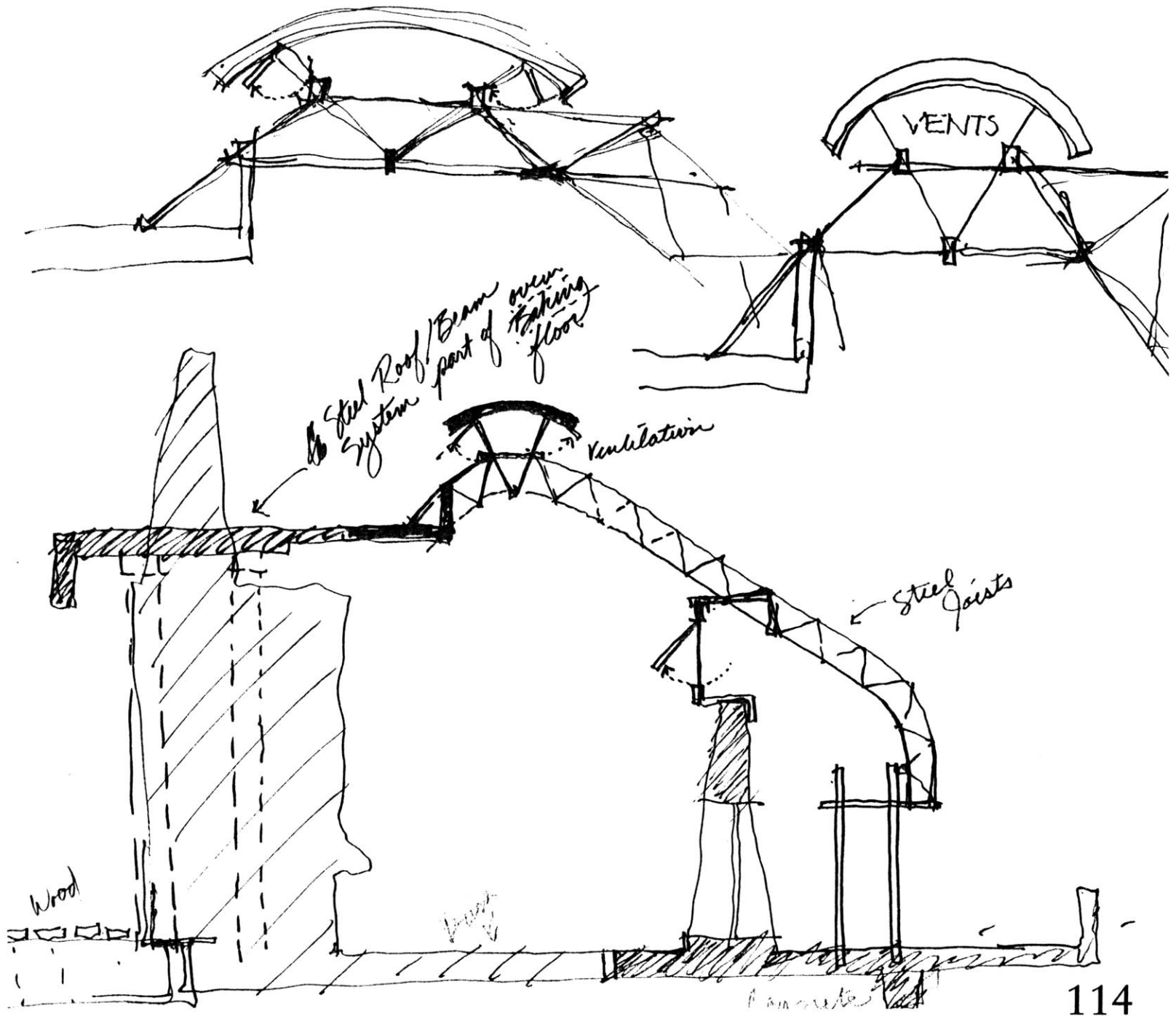
A. PRIMARY BAKING AREA

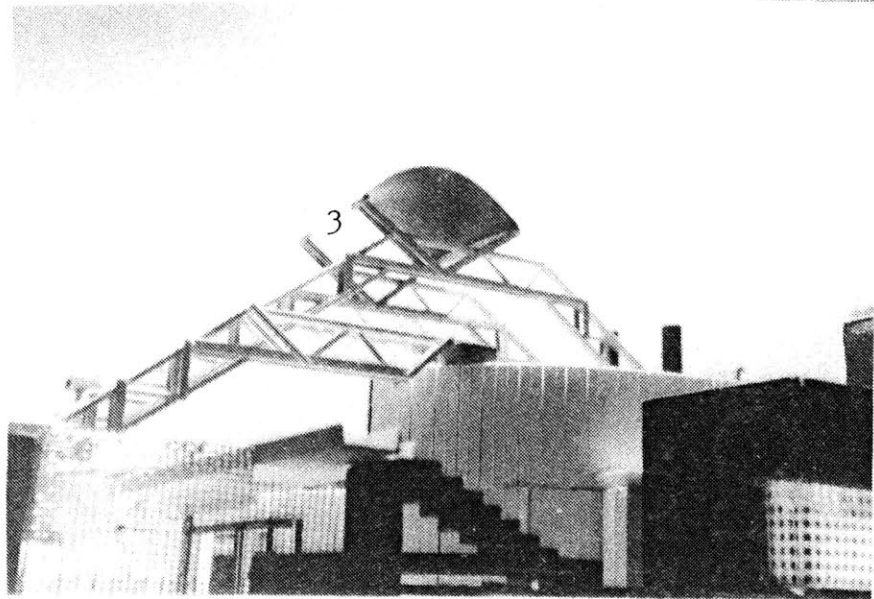
1. Open web steel joists are used to span over the primary and seasonal baking areas to keep the baking process area open and free from physical obstructions such as posts. The steel joists added repetitively along a continuous east/west direction are supported by the primary structural 'spine' of the building--a flat pre-cast concrete beam or possibly one made of steel. This spine intensifies the primary east/west direction set up by the strong physical definition of the exterior bakery wall. The roof made by these additive joists is the primary roof form of the bakery. "Primary" because the strongest roof form encloses the unique baking process.
2. The heat generated by the high temperatures of the ovens, rises and is rechanneled into vent openings to heat upper mezzanine level. Venting is also designed from the primary baking area to heat other spaces of the bakery especially those areas that do not have the south facing benefits of solar exposure such as the mill or retail area.



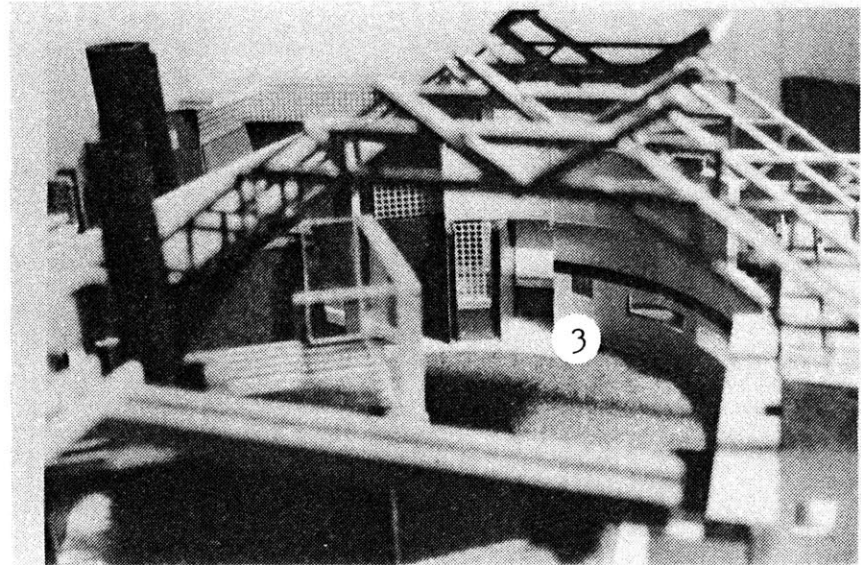
3. Much cross ventilation was an important consideration for the overall building organization, especially because of need for summer cooling. Cross ventilation was especially used throughout the primary baking area as well as in the finished breads room for cooling freshly baked loaves. Ventilation also circulates the wonderful smells of freshly baked bread. Smell is an important sensory factor to the meaning of a bakery.



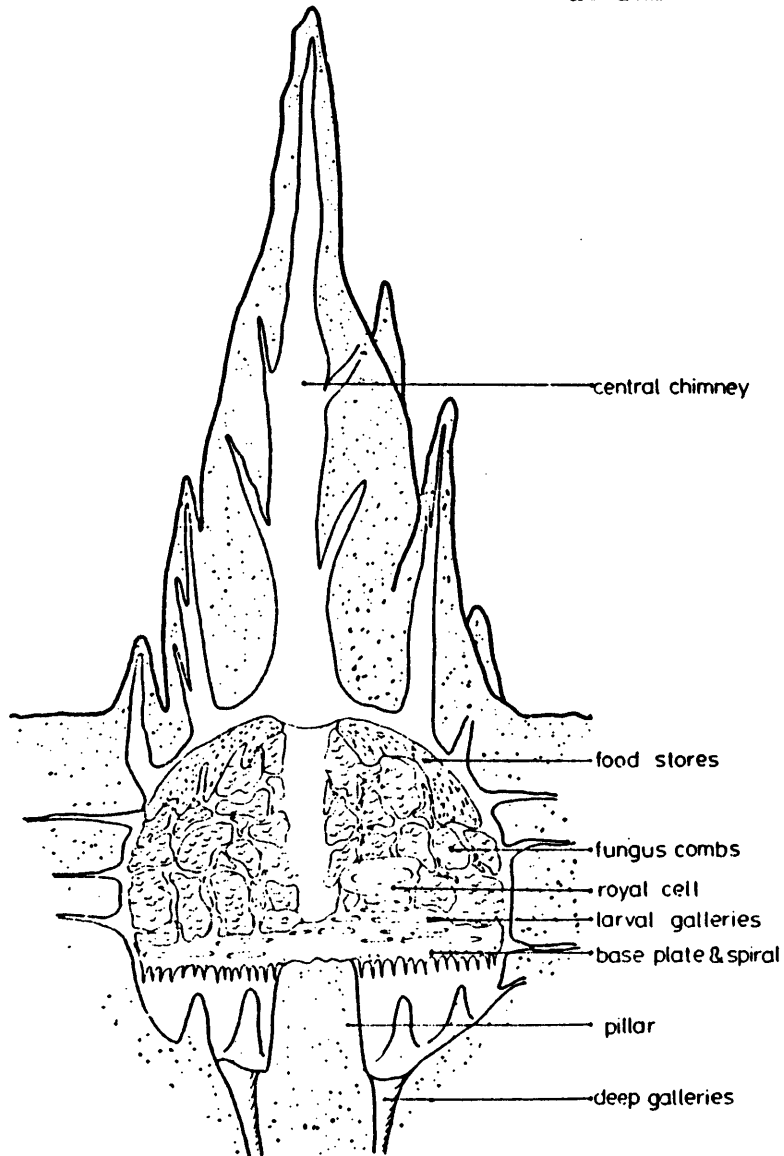




4. The primary ventilation used for summer cooling is operable openings located along the top of the primary roof (joist) system. The form of the vents is made from the extension of steel joist webbing. The venting cap is curved in form comparable to the curved form of the primary baking area. The curved form reflects this correlation to the main baking process for which these vents are needed. Corrugated aluminum used for curved vent material reflects the rural quality.

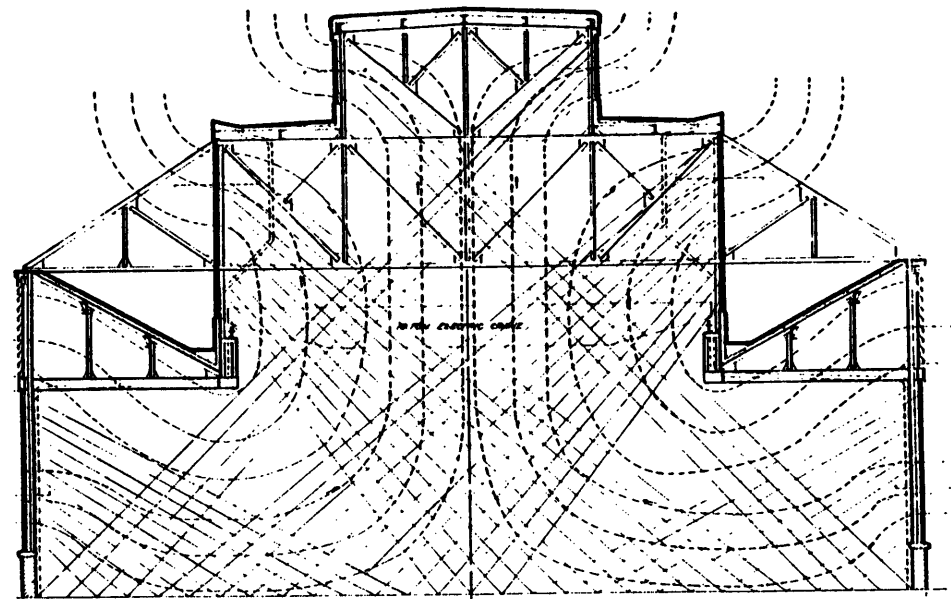


Natural Built



Hildebrand/Designing for Industry

Human Built

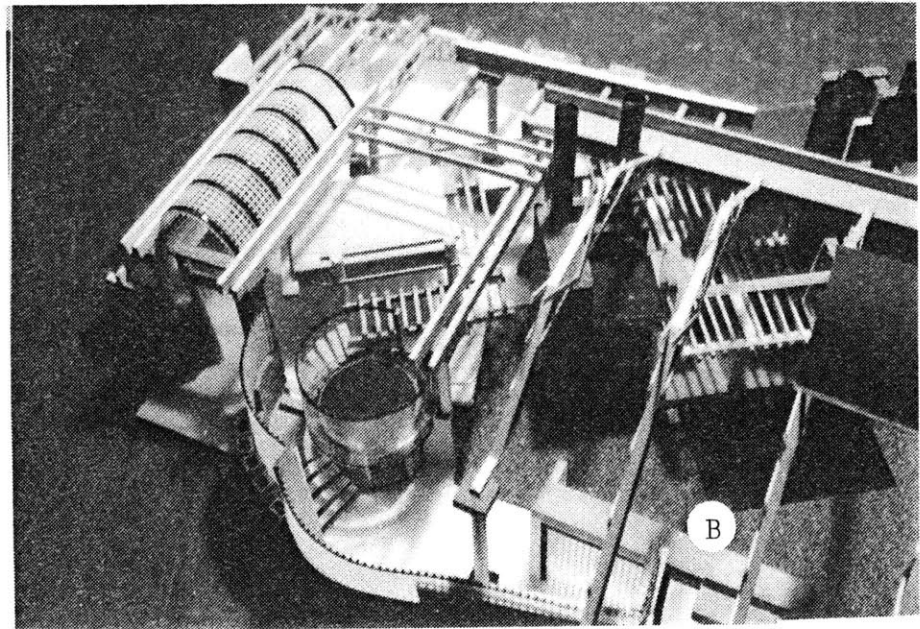


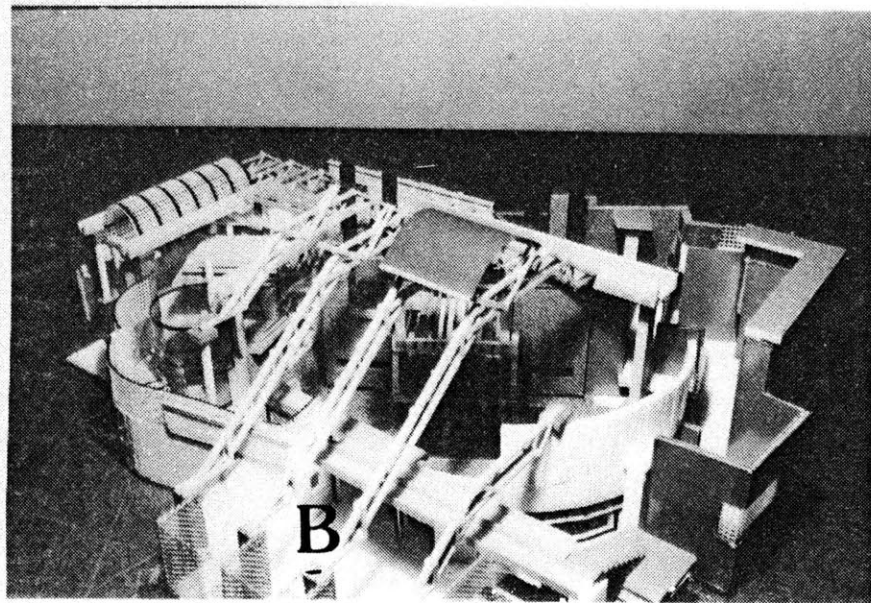
A''. SEASONAL BAKING/SUMMER BAKING AREA

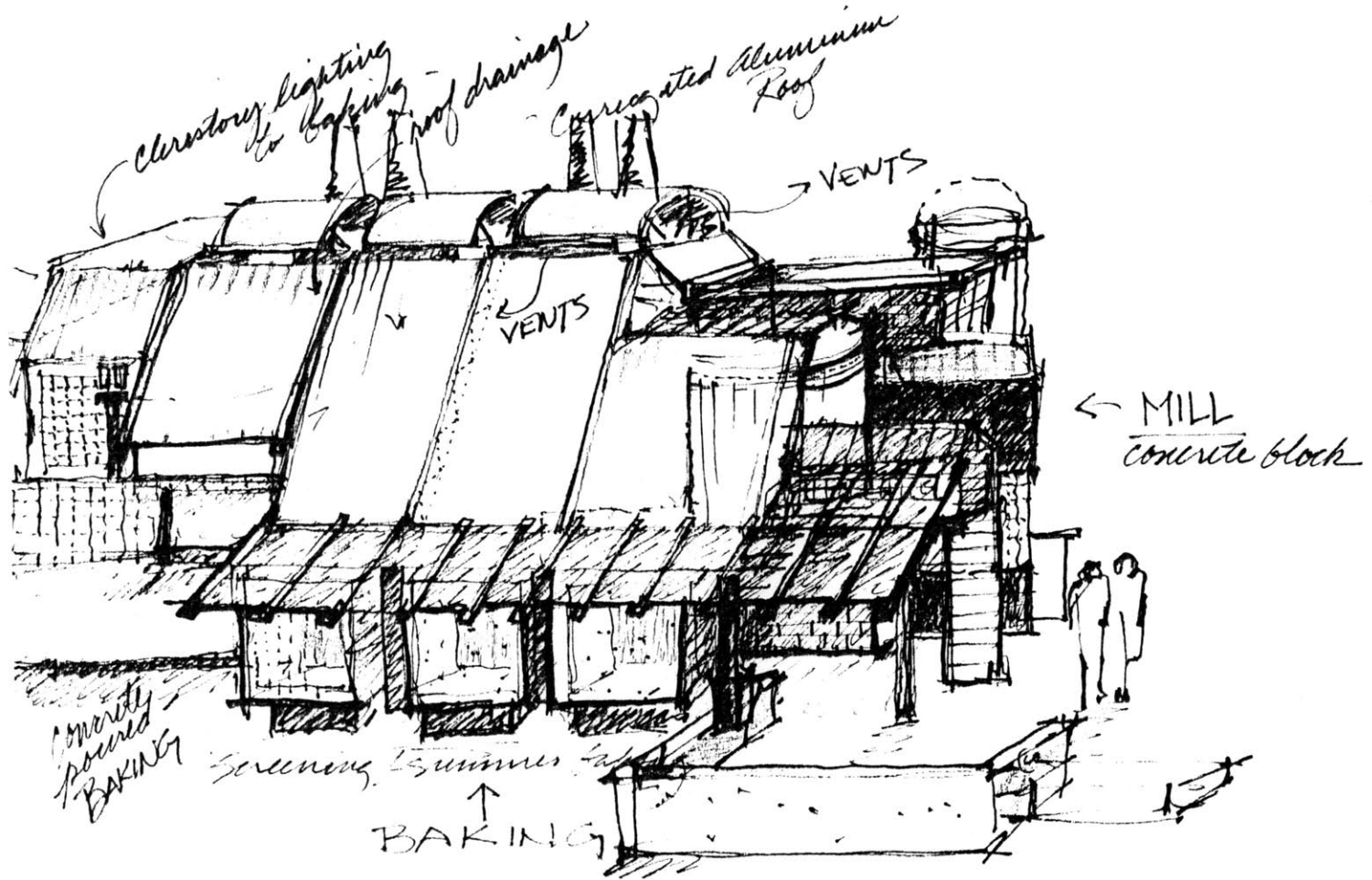
Floor and wall materials are continuous poured concrete. Brick is only used in areas compatible to the activities correlated directly with the brick ovens. The primary baking area floor is of brick pavers.

B. BAKING MEZZANINE

Upper mezzanine between the primary baking and seasonal baking areas is designed as a zone to represent the reciprocity between areas. The mezzanine can be used for drying food stuffs or breads to be made into bread crumbs. At Baldwin Hill, this food drying space is located under the ovens.

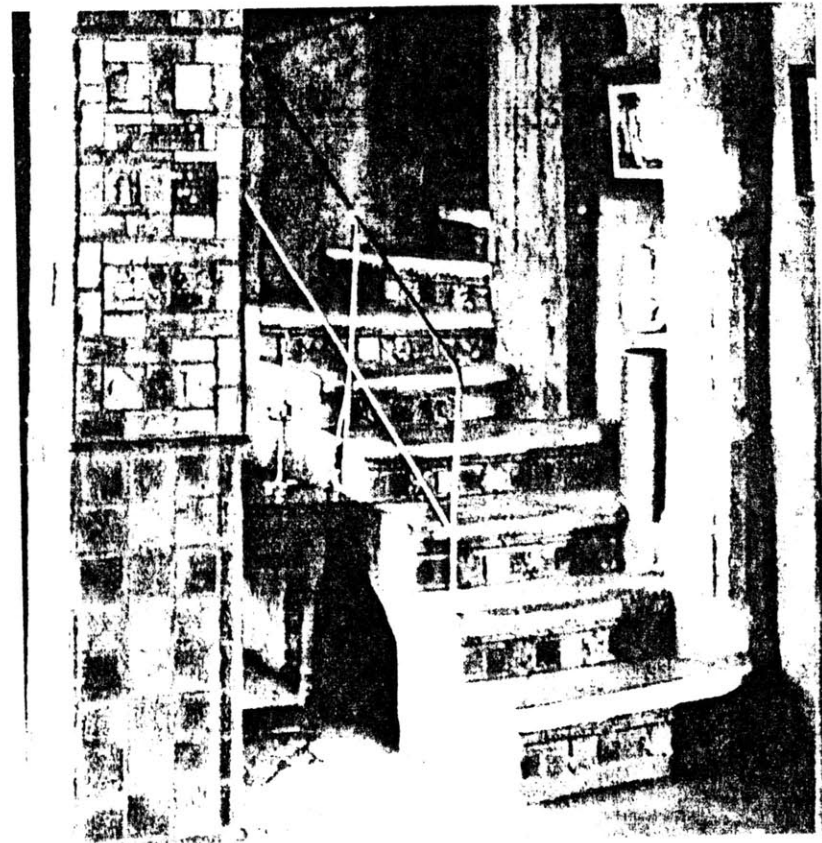






C. DIEZEM ROOM

Designed as a separate piece free from the primary structural system. Centrally located in section to intensify the nature of the diezem room as the 'heart' of the bakery. The rounded form is partially expressed to the outside public entry. The stair wall is made of concrete and glass block.



Henry Mercer/House in Concrete, Pennsylvania

D. OVENS

Direction of ovens in plan is purposely at a plane independent of the primary structural system to allow the brick ovens to stand alone. To design the ovens spacially free from the stable framework set up by the primary structural system, seemed to be an appropriate design decision in keeping with the nature of a brick oven.

F. PROOFING ROOMS

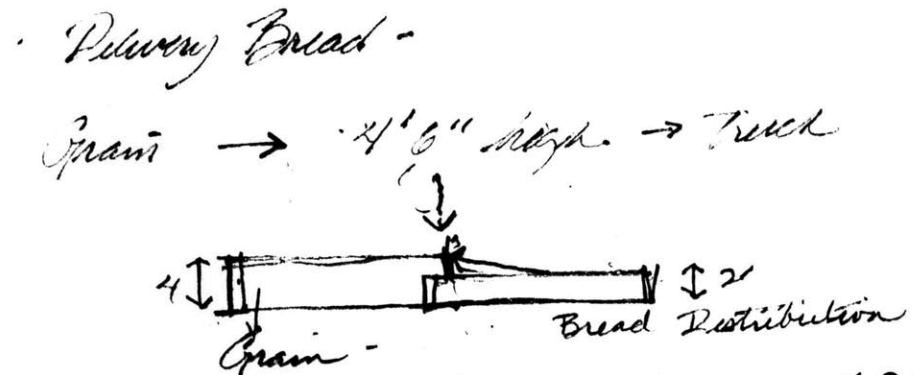
Proofing rooms are made of poured concrete supporting the mezzanine above, looking out over the primary baking area.

J. LOADING DOCK/GRAIN

Height of loading dock is four feet.

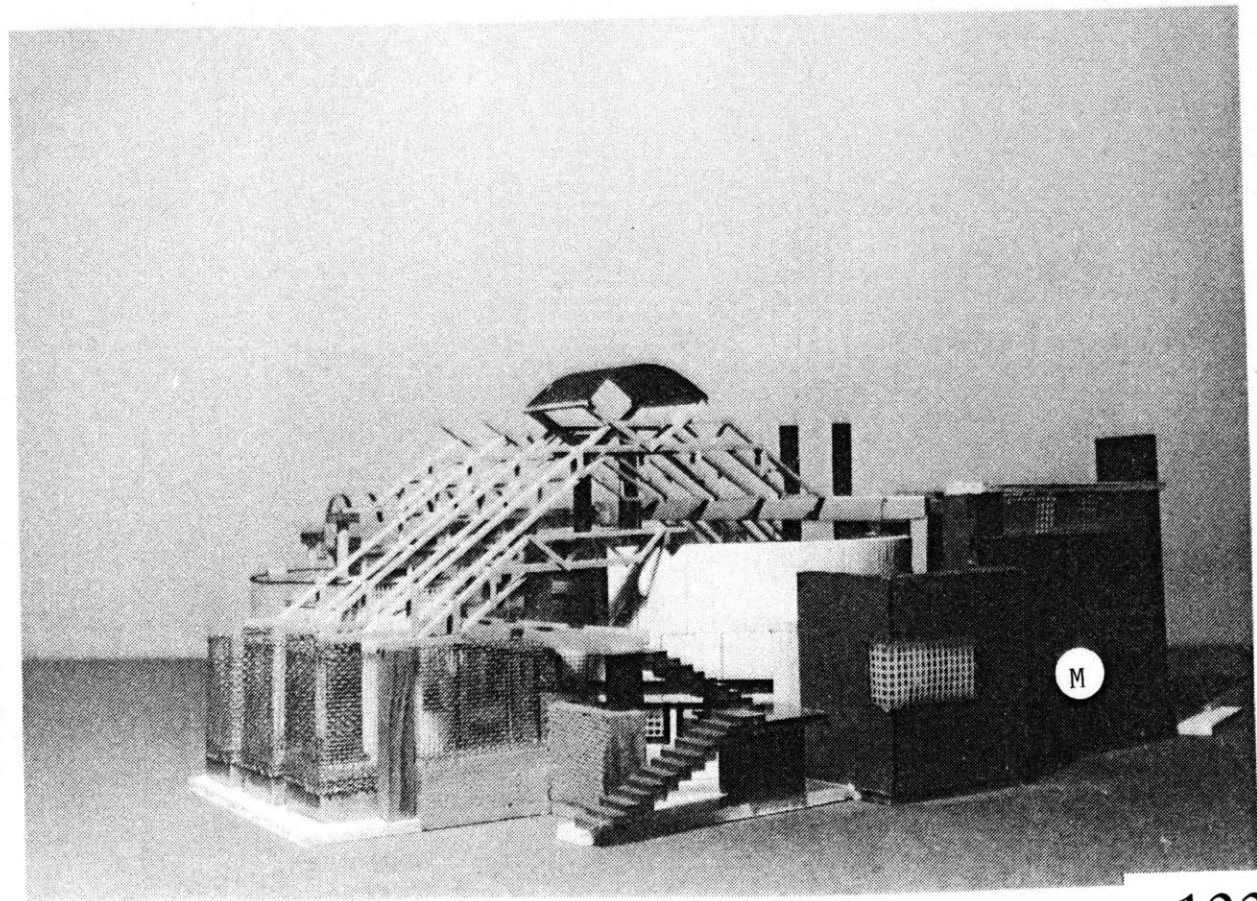
K. STORAGE

Stairs designed for extra storage space below first level storage room



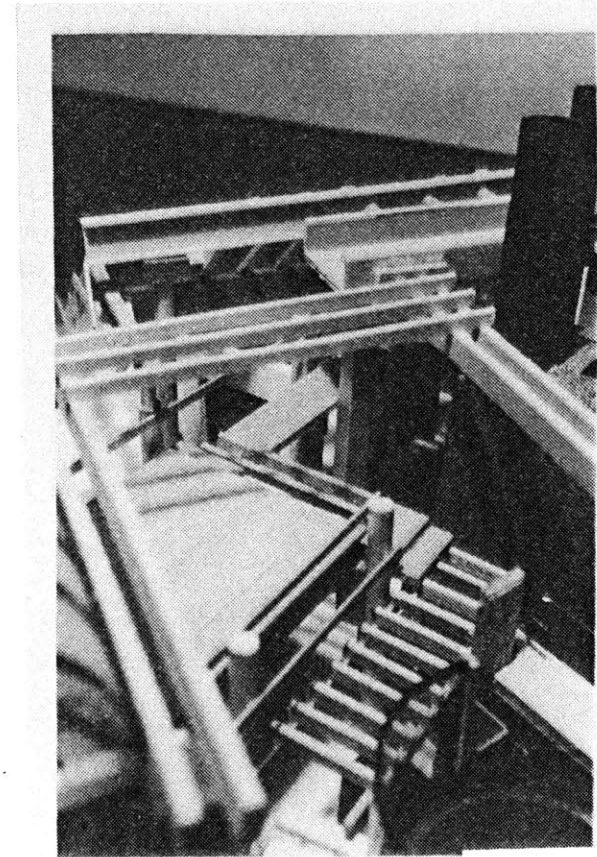
M. MILL

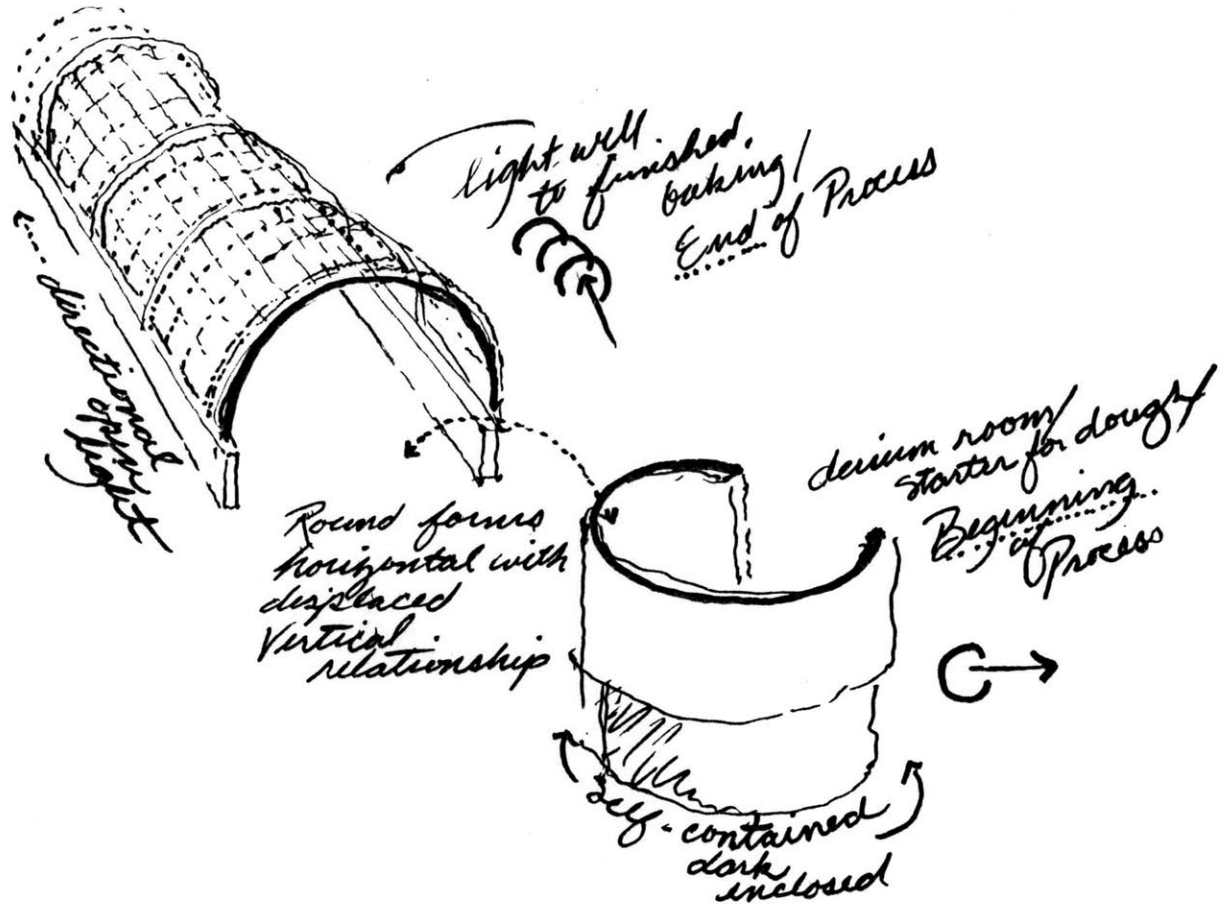
Mill designed as separate piece yet correlated into the organization of the bakery as a whole. Made of concrete block, the roof is flat to express the difference of the milling activities from the baking process activities. Clerestory openings are placed along upper edge of wall for daylight to enter the area. Bulk of wall is free for stacking grain pallets.



P. EMPLOYEES LOUNGE (PRIVATE)

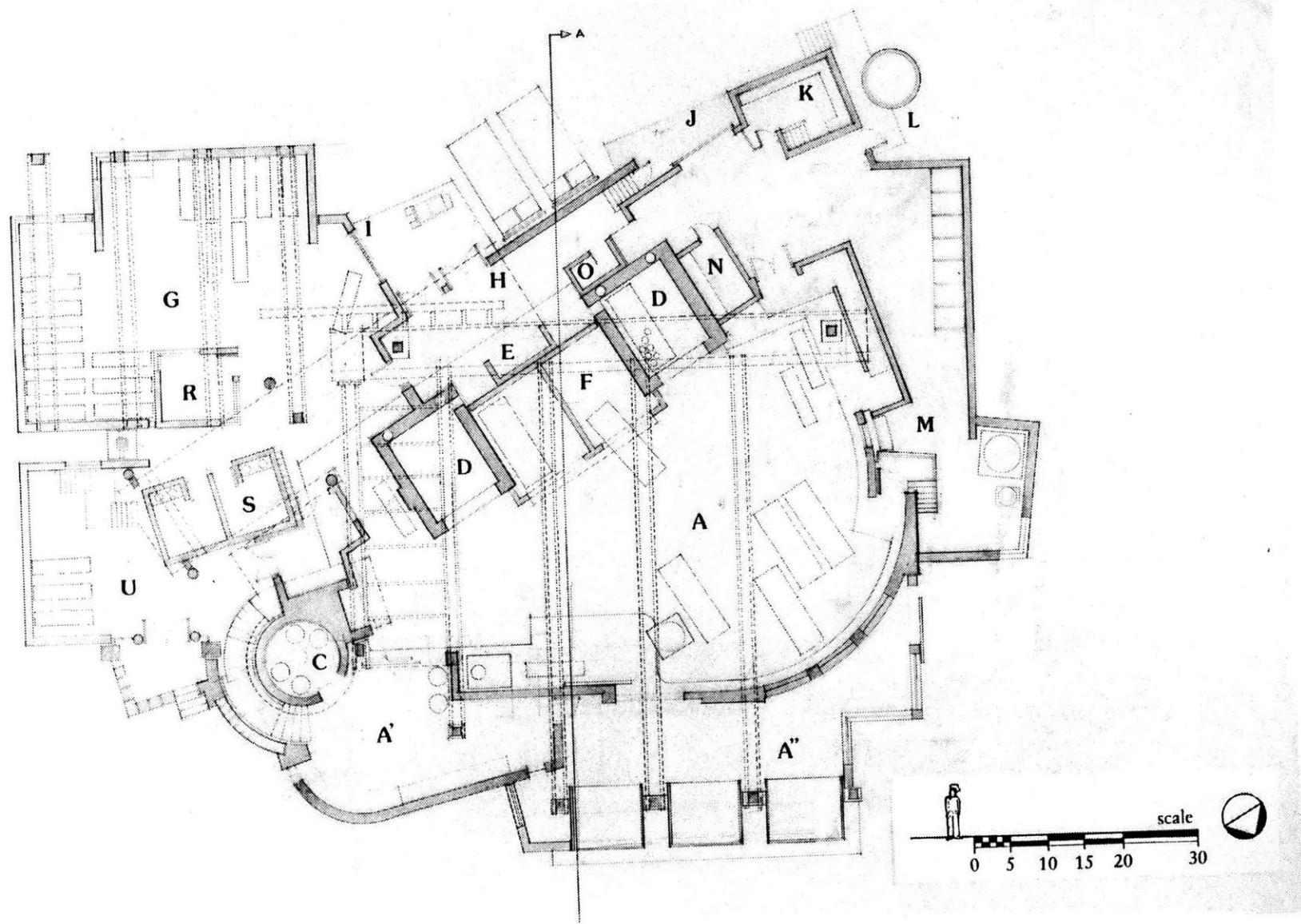
Located above proofing rooms for clear view of baking process and oriented south for outside view as well as for passive solar radiant heat. The upper mezzanine is for private use of the employees and is specially open for office and apprenticeship activities. The mezzanine is supported by a secondary structural system compatible with the direction set up by the ovens. Yet the secondary post and beam structure is detached from the brick ovens allowing the ovens to stand free from the framework structure. The shed roof form covering the delivery areas is penetrated with glass openings for view as well as for passive solar heat gain into the mezzanine level.





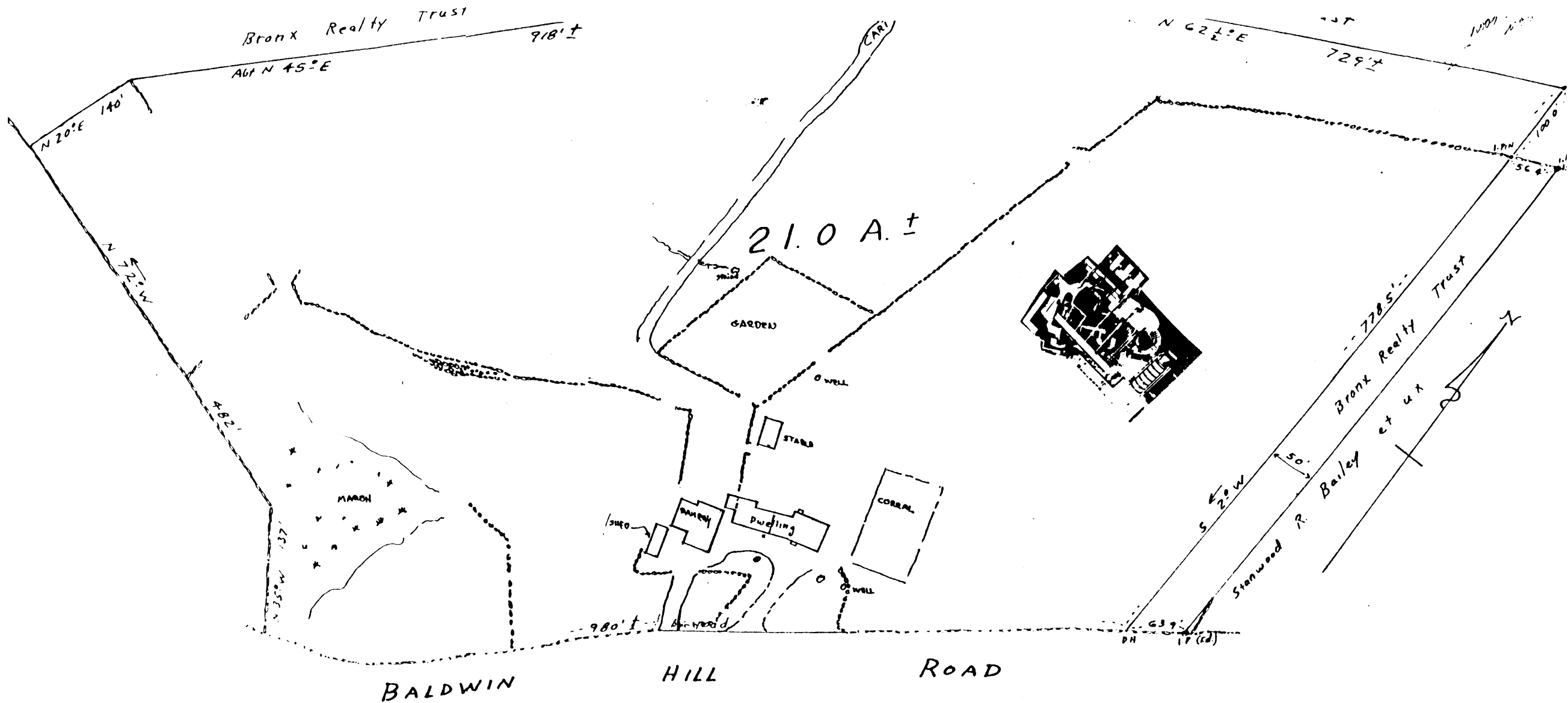
at the beginning of the process

phase 5



KEY TO BAKERY ACTIVITIES

- A. PRIMARY BAKING AREA .
- A'. SECONDARY BAKING/PASTRY ROOM
- A''. SEASONAL BAKING/SUMMER BAKING AREA
- B. BAKING MEZZANINE
- C. DIEZEM ROOM
- D. OVENS
- E. WOOD STORAGE
- F. PROOFING ROOMS
- G. FINISHED BREADS ROOM
- H. DELIVERY (FIREWOOD/MACHINERY)
- I. LOADING DOCK (BREAD DISTRIBUTION)
- J. LOADING DOCK (GRAIN)
- K. STORAGE (SURPLUS)
- L. SILO
- M. MILL
- N. WELDING ROOM
- O. MECHANICAL
- P. EMPLOYEES LOUNGE
- Q. OFFICES/APPRENTICESHIP ROOMS
- R. MAIN OFFICE
- S. REST ROOMS
- T. PUBLIC MEETING ROOM
- U. PUBLIC ENTRY/RETAIL



BALDWIN

HILL

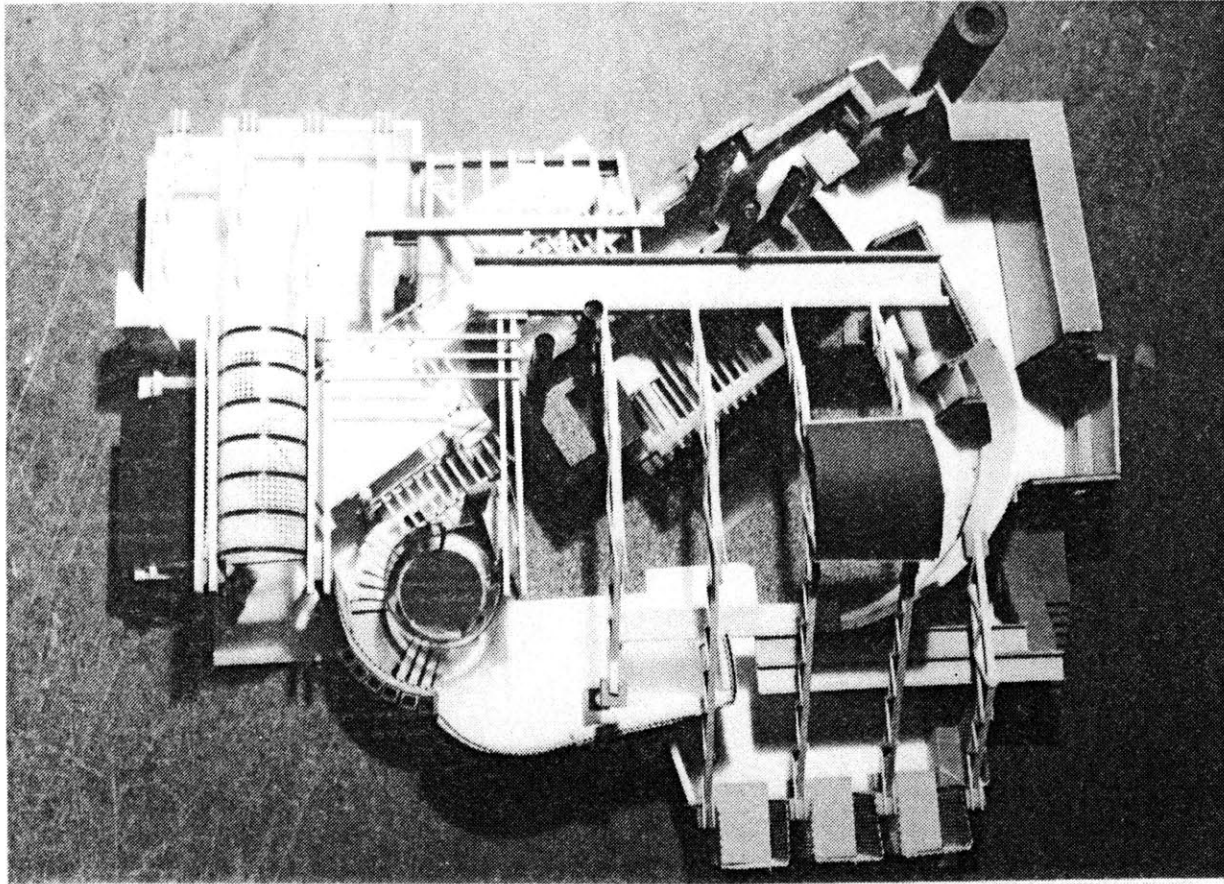
ROAD

PLAN OF LAND
To Be CONVEYED BY

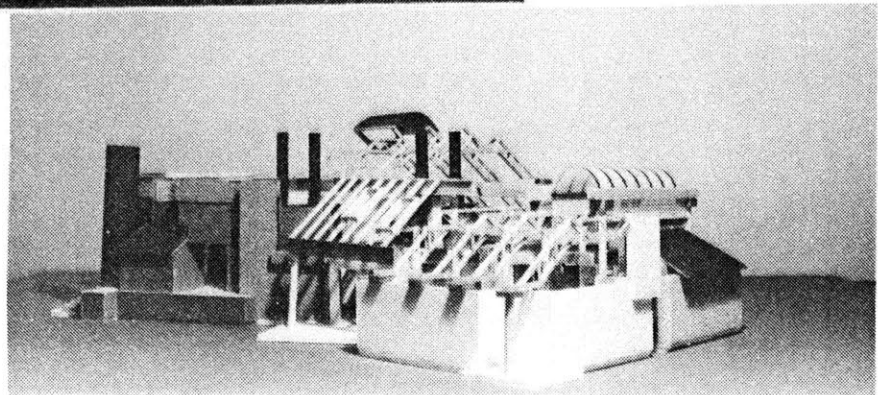


TOWN OF PHILLIPSTON

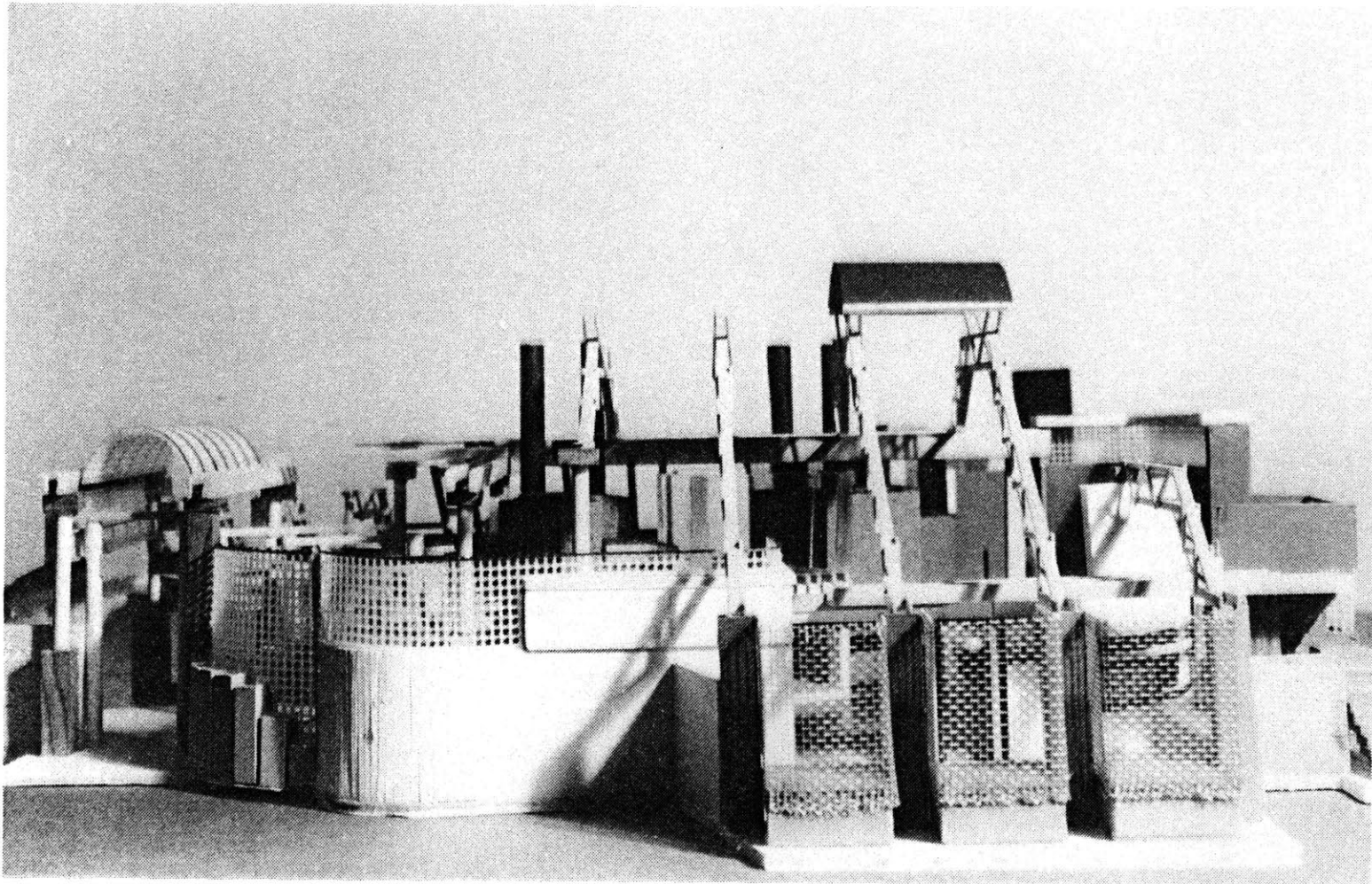
site orientation



roof plan

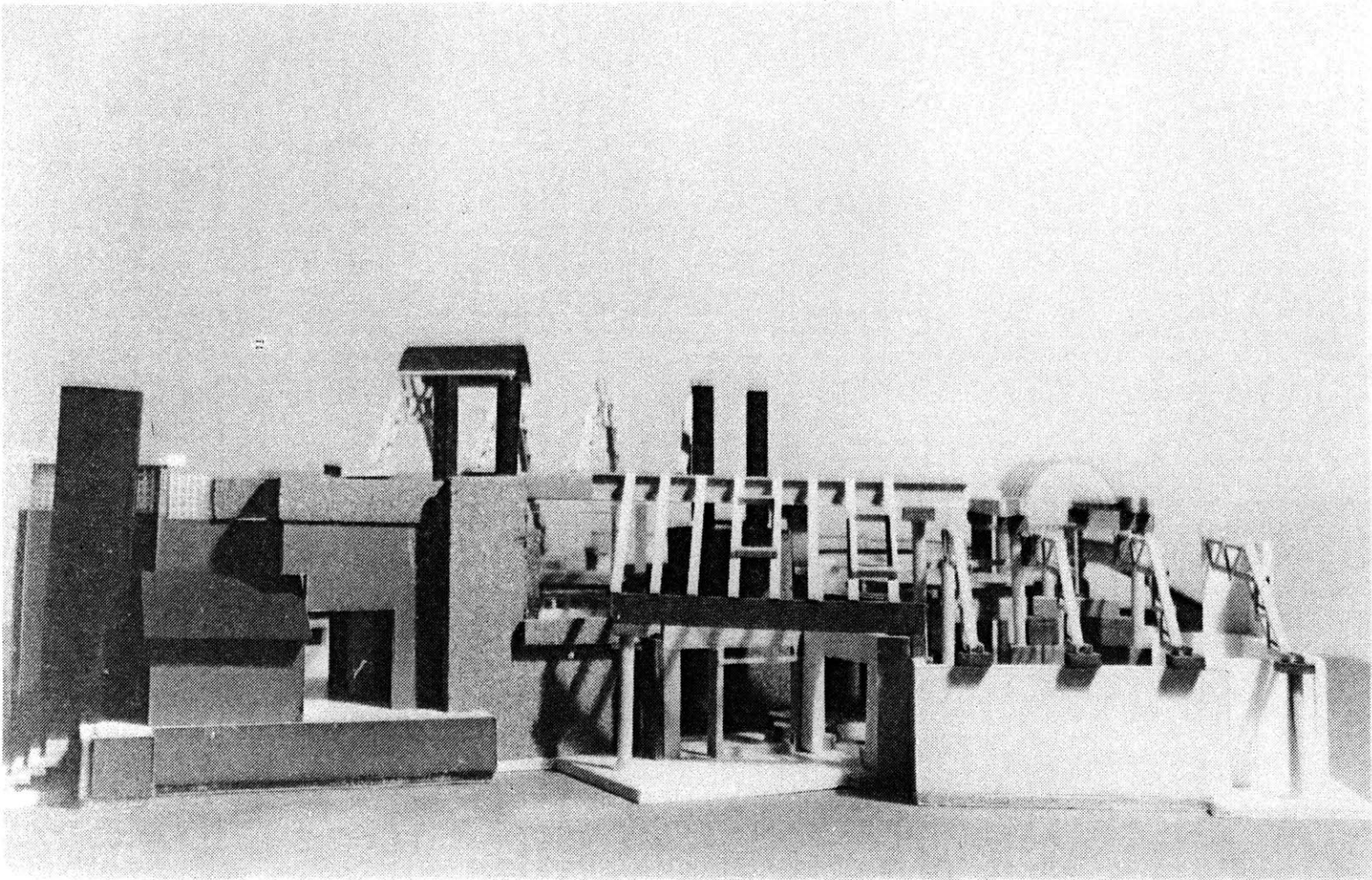


north elevation



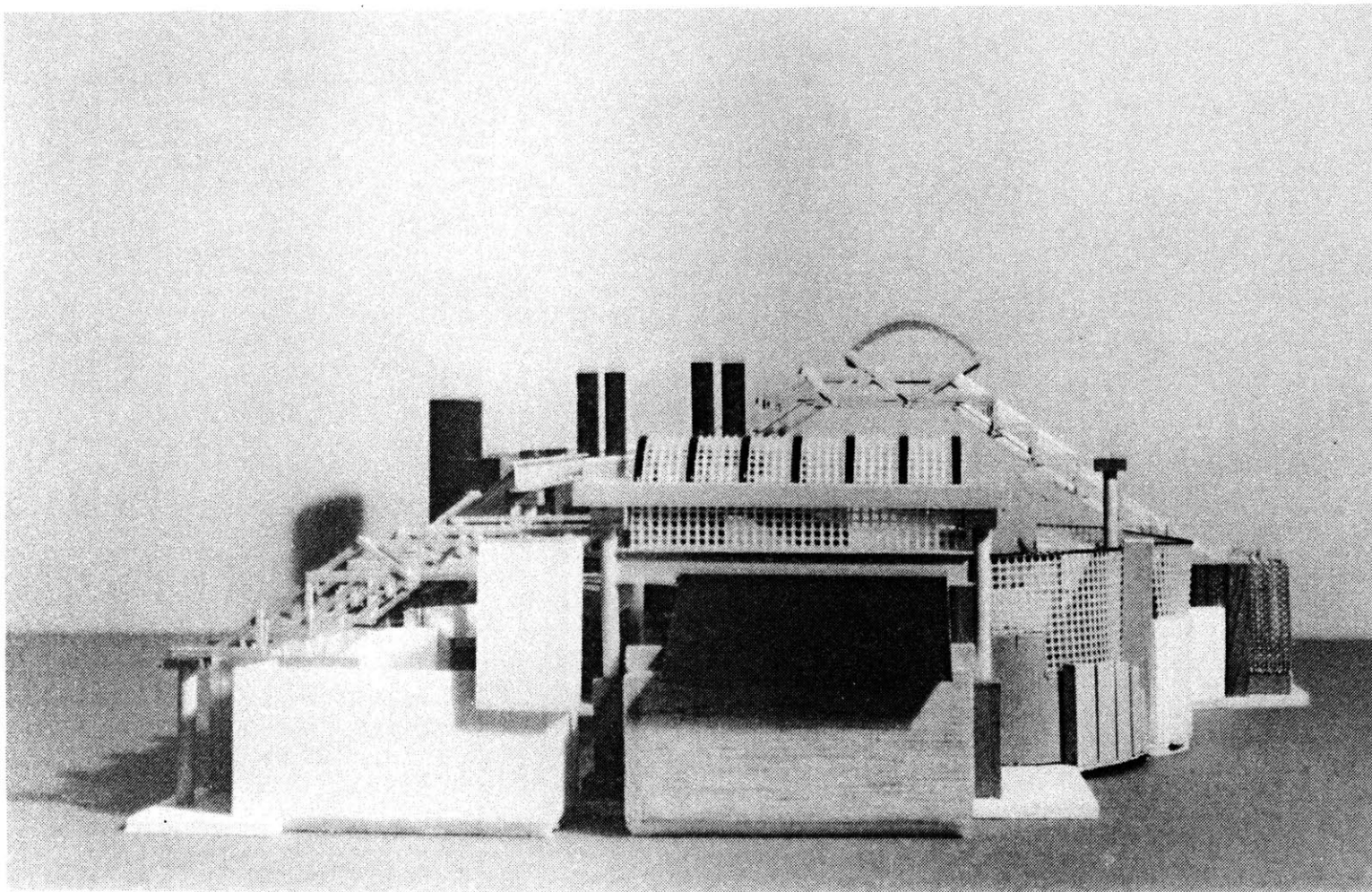
129

south elevation

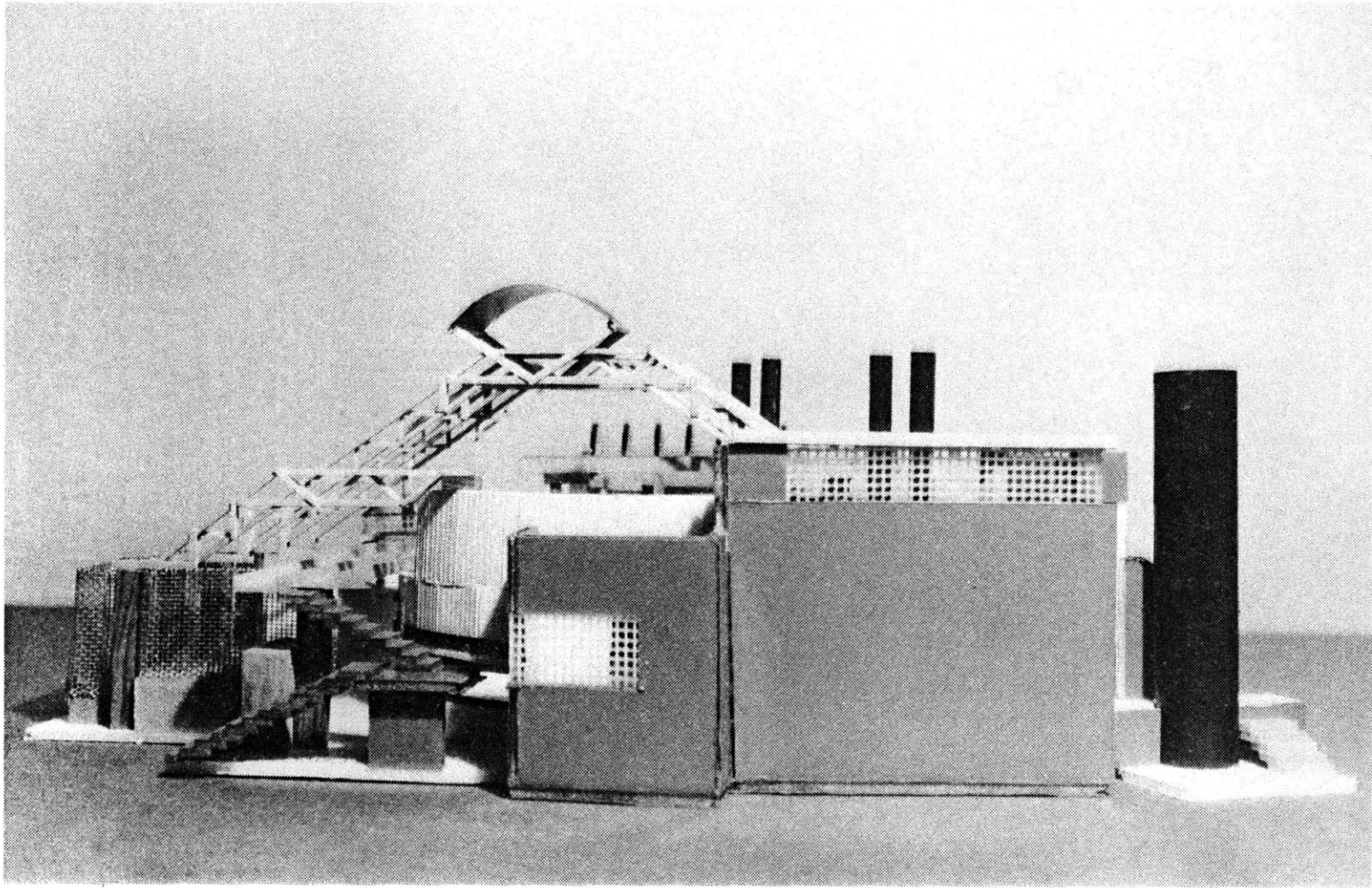


130

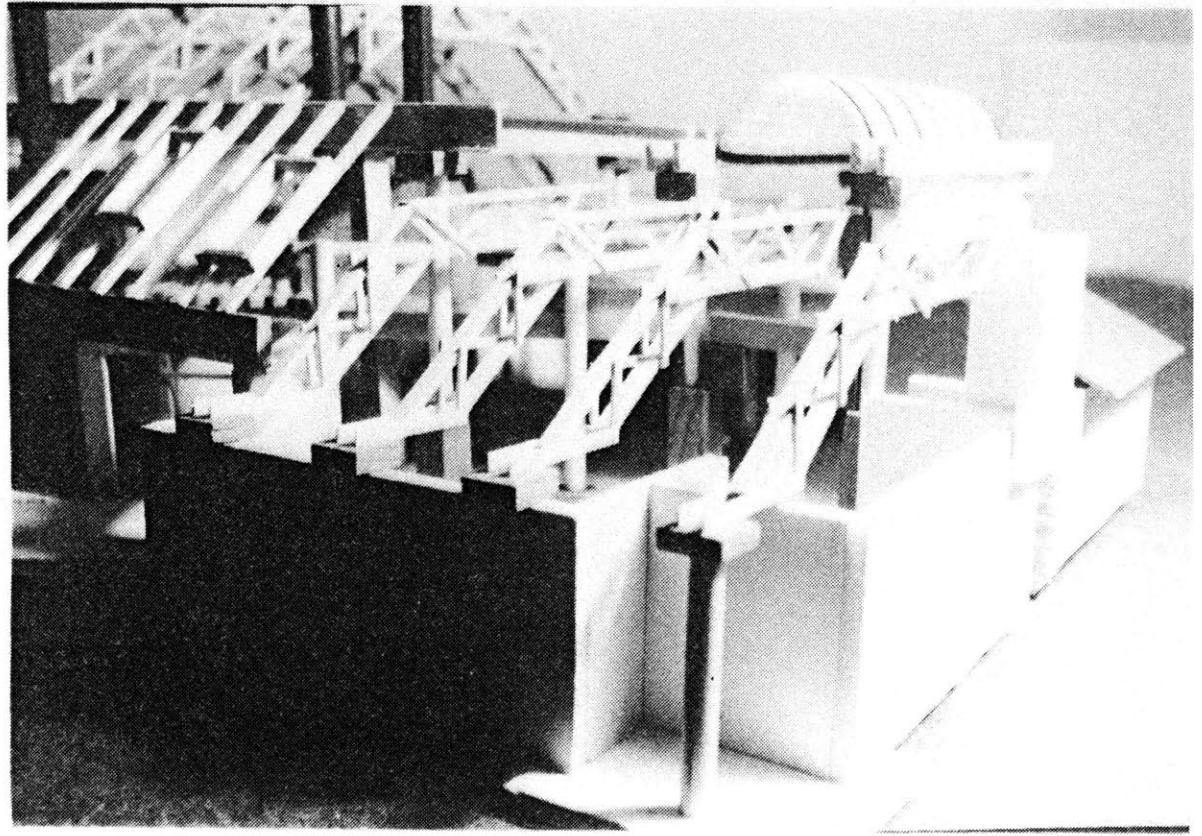
east elevation

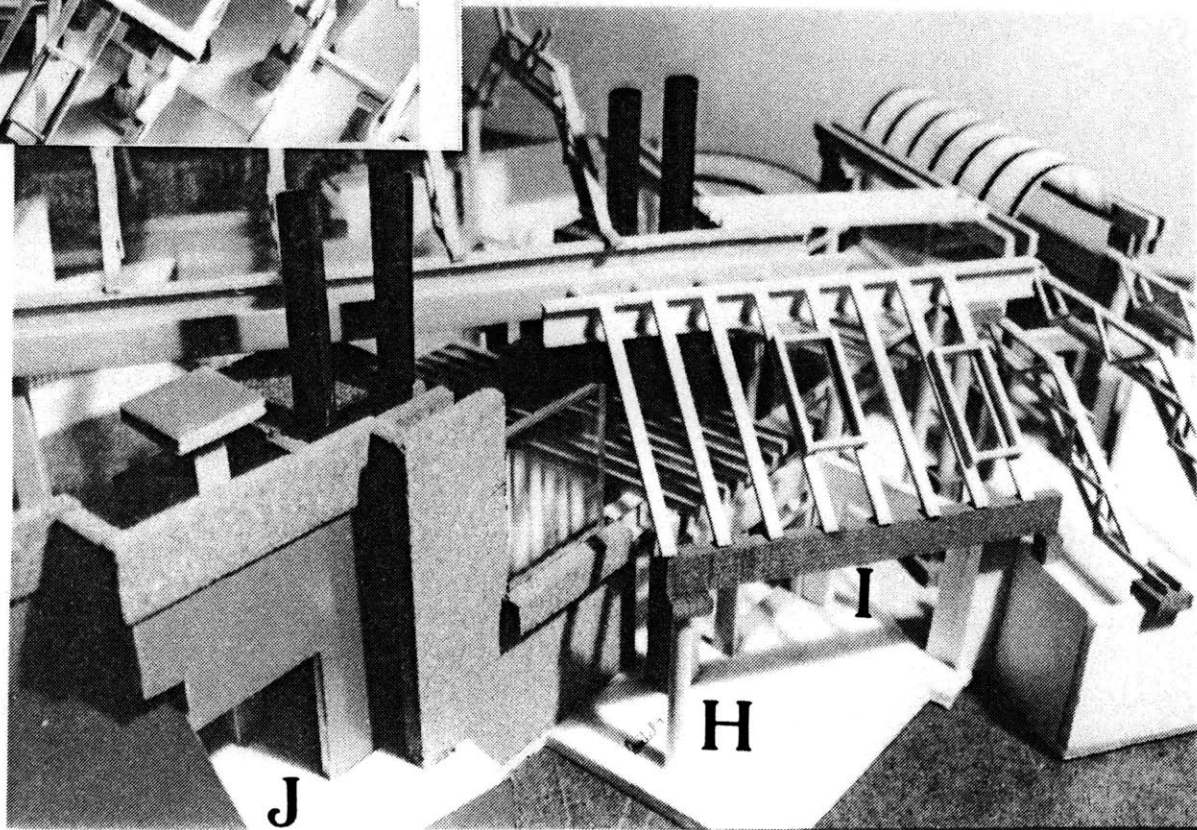
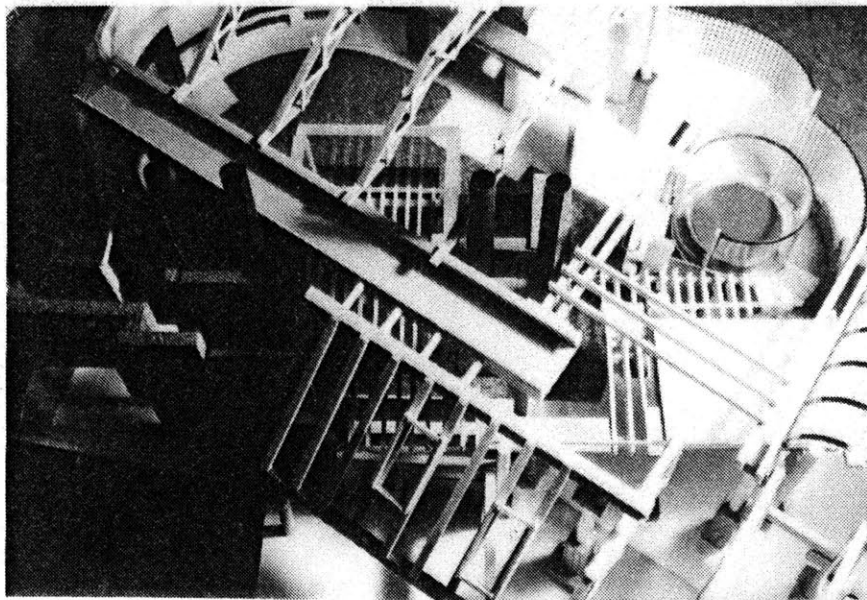


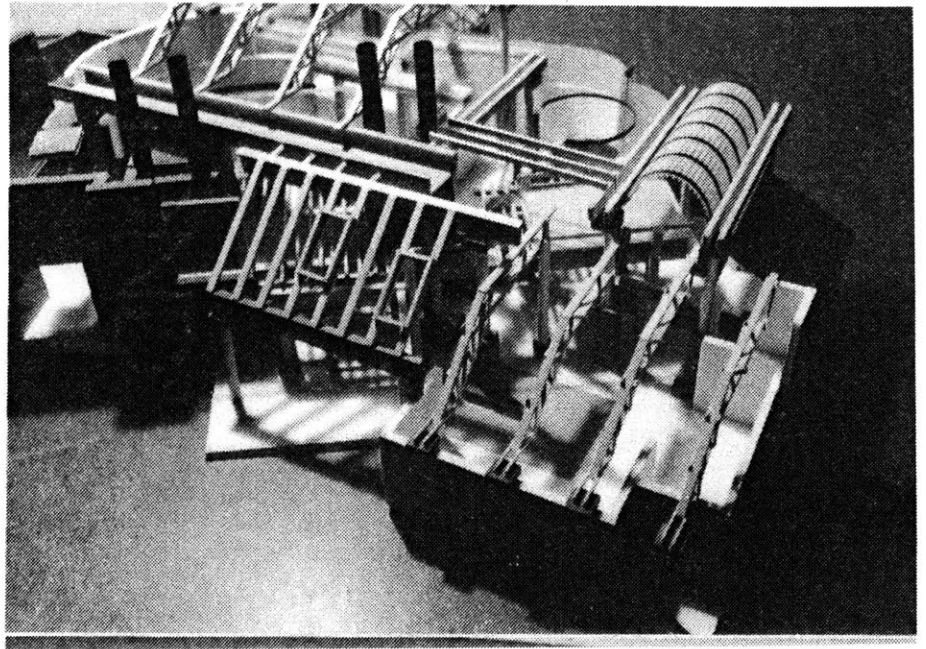
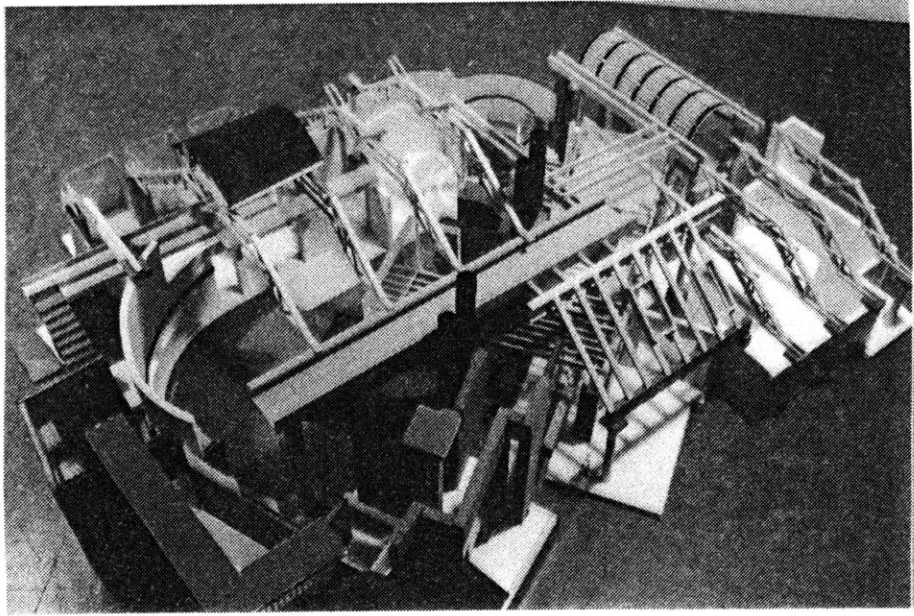
west elevation



G







Photography/Illustration Credits

Chapter 3 **Baldwin Hill Bakery**

author
Elizabeth Willis

Chapter 3...**Baldwin Hill Bakery**

author

Model

Chris Christopher
author

Industrial Illustration Sources

Bakery/Production and Marketing Vol. 17 No. 3
A Gorman Publication March 24, 1982
Baking Industry Vol. 149 No. 1818
A Putnam Publication February, 1982
Baking Industry Vol. 148 No. 1816
A Putnam Publication Decemaber, 1981
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Excelsior Industrial Equipment Co. (Artoflex)
Gemini
Kemper, Rietberg 2 W. Germany

photo developing Ferrante Dege Cambridge
Photo Quick Somerville

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