



ABSTRACT

EXTENDABLE HOUSING IN DRACUT, MASSACHUSETTS  
(or the bedroom that came in from the porch)

by David John Mullman

Submitted to the Department of Architecture on the 10th of February, 1977,  
in partial fulfillment of the requirements for the degree of Master of  
Architecture.

This thesis is an investigation of homes that can grow incrementally.  
The intention of the project is to provide a series of frameworks that will  
allow an individual to personalize his living environment both initially  
and over time. The exploration was done in the context of a design for 42  
units in Dracut, Massachusetts.

Thesis Supervisor: Jan Wampler  
Title: Associate Professor

ACKNOWLEDGEMENTS

First I want to thank my two advisors

Jan Wampler  
and  
Michael Underhill

for their advice, guidance, and support.

I also want to thank

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Diane Georgopolus  
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Bill Rawn  
and Jim Rosen

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Finally, I want to thank all those people whose crits, moral support and help I am indebted to

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Matthew Gottsegen  
Tina Stack  
Jim Fitzgibbon  
and my family

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## AN EXPLANATION

The purpose of this project was to explore the extendable home, particularly in the context of the American housing tradition. The extendable single-family home has a long tradition in this country, from the New England farm house to Levitt Town. It is a tradition that has provided homes that are responsive to the changing needs of their owners, and by so doing has produced a more varied, expressive and richer environment than any single architect or developer could.

Most new single-family housing does not provide this potential. This is partly because the plan, section and siting of most new housing does not facilitate additions and alterations easily. By planning for additions and alterations the designer enables the owner to personalize and 'imprint' his home with his personality. I believe this gives the owner a stronger sense of association with and control over his environment.

I also pursued this exploration in the hope that by building a very small home (basically a studio-home) costs could be reduced and therefore more people would be able to afford their own home. Planning for growth would then allow the owners to add on as they needed and as money became available.

## THE APPROACH

There are many different ways to approach the design of extendable homes. I chose to approach the problem by exploring different physical frameworks within which the defined spaces could be used in different ways, and to which addition would be relatively easy. The framework attempts not only to facilitate growth but also to suggest growth and the form of

that growth.

Although today's single-family homes are often added to, the additions frequently cause problems with the existing plan. By planning for growth future additions need not block light to a room, make a corridor out of an existing room or make adjacent spaces hard to use.

It also seemed clear to me that a "low-tech" construction system had to be used. A wood system was chosen so that the owner himself or a local contractor could easily make modifications. Because the design parameters required that walls be easily removed without the floor or roof above coming down, a post and beam system was used. Where party walls and retaining walls were necessary, masonry was used. Standard stud walls were used for all the infill.

Multiple plumbing chases were provided so that an owner would have many kitchen and bathroom options.

The framework is not just a jungle gym of columns and pipes but is rather a very small wood home that enables the user to have more control over his own environment.

#### AN EXPLANATION/WHY THE SUBURBAN CONTEXT?

Although I saw the pressing need for this kind of framework in a high-density urban context, I chose a lower-density suburban context. I felt that the suburban context offered more opportunities and avenues to explore. The generic strategies for addition seem very limited at higher densities, and are for the most part a smaller set of the larger set of different possibilities the single-family home offers.

A suburban site also offered fewer site constraints than an urban one.

This allowed me to spend more time on the unit development. I also limited the scope of the site planning by establishing a program of approximately 40 units. Although this may not have been realistic in terms of the economies of scale implied in this kind of design, it seemed enough units to generate a meaningful organization and provided a comparable density with the surrounding area.

#### THE CONTEXT AND SITE PLAN

The site is 16.3 acres, located in Dracut, Massachusetts, just north of Lowell and 25-30 miles north of Boston. Dracut is a middle-income suburban town from which many residents commute to Boston and Lowell.

The site slopes south and is divided into an upper pine woods and a lower meadow facing the road. Adjoining the site to the north is a large meadow (almost twice the size of the site). Tract homes line the east, west and south sides.

My first decision was not to aim for a contextural design but rather to offer an alternative to what surrounded the site. I hoped to do this both in the site organization and land use distribution.

I used a linear organization similar to ones found in many older New England towns. The street was seen as the public framework or 'life line', with the highest intensity of development between two dead-end streets or 'spurs' (one higher up, perpendicular to the 'life line', and one lower down).

The community facilities are located at the corners of the 'life line' and each of the 'spurs'. The major community facility has a day-care center to serve the local area, indoor recreation space, a laundry,

and spaces which could become darkrooms, crafts rooms, shops or meeting places. The other community facility has rental space for studios, offices and apartments.

The houses, along with their garages, either 'enfront' the street framework, or at the 'spurs' pull back from the street around a courtyard. The garages act as a buffer between the courtyard and the road.

The street allows for a connection to a possible future development on the parcel of land adjoining the site to the north.

The land use zoning is fairly straightforward. There is privately-owned land and community-owned land. The community-owned land includes most of the wooded part of the site, a strip of land running along the intermittent stream, the lower part of the meadow, the apple orchard, the community buildings and the public framework (the street and the public spaces off the street). The privately-owned land runs in lots extending from the street to an undetermined distance behind the house. Basically, this organizes the land into smaller parcels of private land and larger, more continuous areas of public land. While the overall density is similar to the existing pattern in the area, the land use distribution is different.

#### FRAMEWORK

As the diagrams indicate, the framework is designed to zone the home into two living areas, while maintaining an open plan. This allows for two separate, possibly conflicting, activities to go on at one time in the house. Within each zone the spatial definition allows for two related activities.



Since there are plumbing chases in both zones, it is possible to have the kitchen/eating zone or the more formal living zone in either the front or the back.

The basic home is conceived of as a 'studio' home. There is no bedroom or large living room, rather a small sitting area/sleeping nook. Once a bedroom is added (converting the attic is most likely), then the living space becomes larger.

The framework is assembled of more permanent pieces and alterable pieces. For instance, the masonry party walls, masonry retaining walls, columns, beams, load-bearing partitions (around the 'core'), stairs, bath, and closets would be difficult to change. On the other hand, the non-structural pieces (partitions and majority of exterior walls) can be modified and/or removed. Many of the structural pieces extend into the yard to facilitate and suggest possible additions.

I have tried to use the garage to define useable outdoor space. For example, in the detached house, the garage makes a breezeway between itself and the house. Should the house be extended, as suggested in the plan, the area behind the garage could become a nicely defined patio. For the row houses on the sloped part of the site the roof of the garage is useable outdoor space which could be built on to make more rooms.

The construction system is as follows:

- (1) unit masonry walls on a concrete foundation (clay tile was what I had in mind but it seems to have many shortcomings);
- (2) 4" x 4" or 4" x 6" columns;
- (3) 4" x 8" beams for 12' and shorter spans and 4" x 10" beams for 15' spans;

(4) 2" x 6" joists and rafters.

A three-foot grid was used in designing the units. This helped make many pieces of the framework(s) uniform and kept a fairly consistent joist and rafter span of 9". There was also an attempt to have repeating pieces used through most of the scheme (see diagram), but this was never fully resolved.

The mechanical system is also fairly schematic. Generally, each unit has three plumbing chases, of which two are shared with the adjacent unit. Each chase carries a soil pipe, vent pipe, drain, hot and cold water, and many carry a flue to which a wood-burning stove could be attached. Each of the waste pipes come down into the basement and crawl space and then join into a larger pipe which goes to the street sewer system (leaching is not possible on this site). The furnace is also located in the basement. Air ducts in the basement/crawl space carry the hot air to the rooms above. If the attic were converted into habitable space, a duct could be run upstairs in one of the closets.

#### ADDITIONS AND CONVERSIONS

The diagrams should be fairly clear, but more explanations are needed. I tried to correlate the easiest additions with the most likely additions. For example, adding bedrooms is an adding-in operation, expanding a kitchen or living area involves adding under an existing roof, making a very large room is usually a filling-in operation. Adding a series of rooms is more difficult.

The direction, height, and slope of the roof often have a controlling effect on an addition. The roof pitches have been calculated so

that a reasonable amount of space can be added without having to change roof direction or have a flat roof. On the back side of the house (where the extensive additions are most likely) a change in roof direction is provided. This permits the addition of a series of rooms without running into problems with the roof pitch. The primary roof direction is continued for a short distance beyond the change in roof direction to allow for a small expansion without building a new roof. If a series of rooms are to be added, then the smaller piece of roof is ripped off. To understand this more clearly, look at the sections. The primary roof direction is maintained on the street side of the house because I felt it was important to reinforce the direction of the public edge (street).

I should also explain the strategy behind the conversions shown in the drawings. I tried to use the separation of the two living zones as the new separation between units or uses. This was not resolved very successfully, but I still believe that it is a better approach than to try and convert the house into a separate upstairs use and downstairs use or unit. By using the separation of zones as the break line, you get a smaller unit on the ground floor facing the street and a larger unit with an upstairs and a back yard.

#### CONCLUSION

Much has been repeated and much has been left out of the text above. At this point I really can't think of anything else to say except to tell you what you've heard before. If I had to do it all over again (I would not!) I would probably do it differently. I wish I had gotten farther. I enjoyed parts of the process. I hated parts of the process. Jan and

Mike were real helpful. My friends and fellow thesis students were great. I really enjoyed doing the drawings (even though micro \_\_\_\_ed up) and finally, if you ever have to do a thesis, don't leave the writing for the last night. It makes writing conclusions very difficult.

## HOW TO READ THE UNIT DRAWINGS

(everyone needs a how-to page)

### Framework

The framework drawing is exactly what it says. It is bare of everything. It shows the permanent pieces, initial exterior skin, and surrounding fabric before there has been any inhabitation.

### Options

It is important to know that the home buyer would pick one of the options (A, B or C) before he moved in. The location of the kitchen is the critical difference between the options. The rest of the furniture is just a projection on my part. A large double bed is shown in almost all the options. It should be understood that in terms of space this is the extreme case. People may often have fold-out couches, smaller beds, or make a bedroom in the attic immediately. Please note on the Row House/Garage drawing only one unit of the 4 shown in the framework part is used in the options-additions-conversion matrix.

### Additions

I hope it is clear that the additions shown with each option are not specific but, are interchangeable. It is also assumed that these projections are often showing the framework expanded to its outer limits.

### Conversions

This should be very clear.

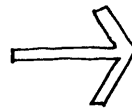
2nd Floor

This shows the second floor framework with the dotted lines indicating potential bedrooms, rooms and baths.

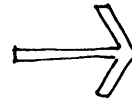
# COMMON ADDITION TYPES

## ADD IN

FINISH UNFINISHED SPACE



ATTIC



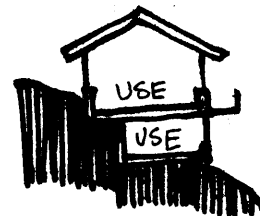
BASEMENT



LOFT

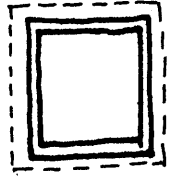
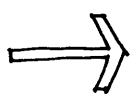
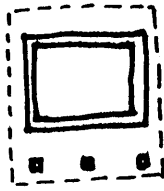


HILL

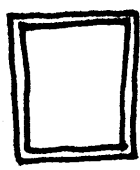
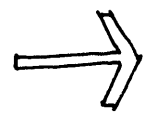
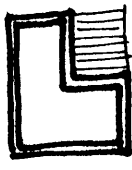


ADD ON

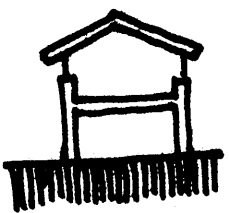
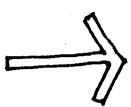
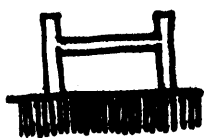
PORCH



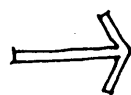
DECK



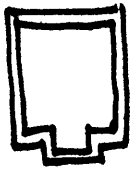
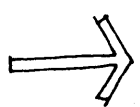
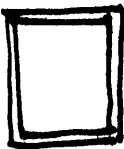
ROOF



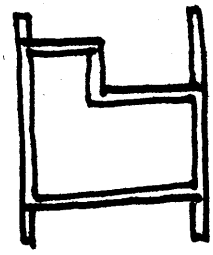
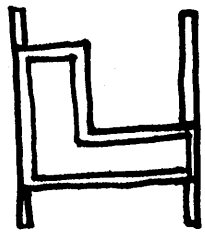
BALCONY



TACK ON



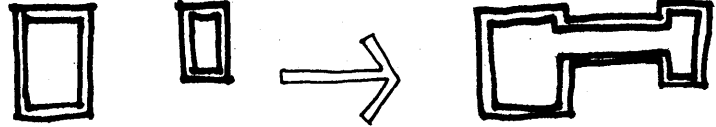
FOUNDATION



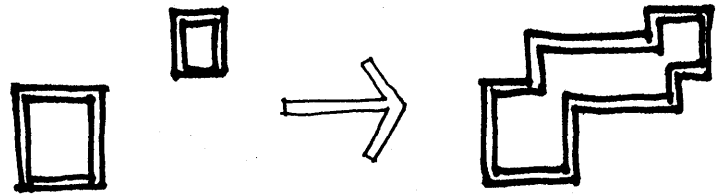


ADD ON CONT.

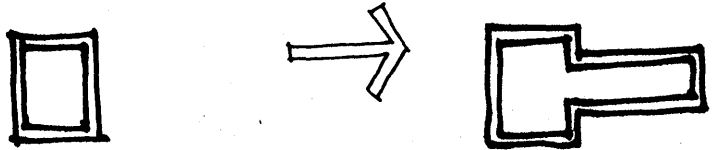
CONNECTION



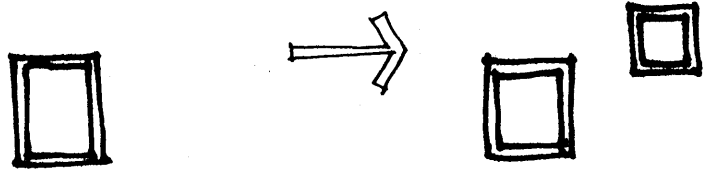
OR



ROOMS

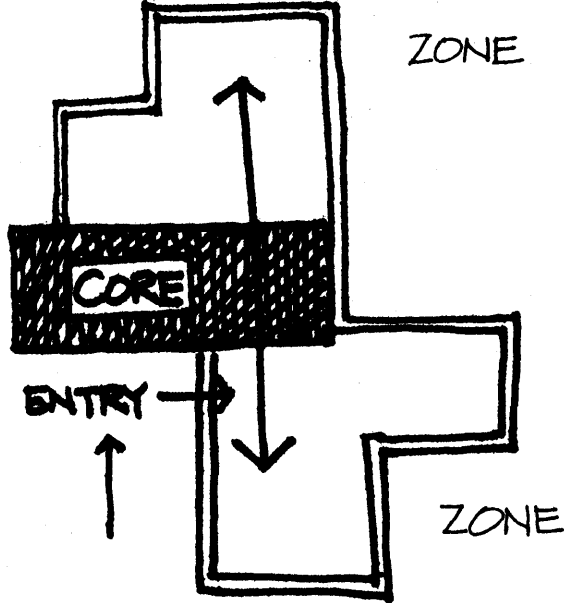


PAVILION



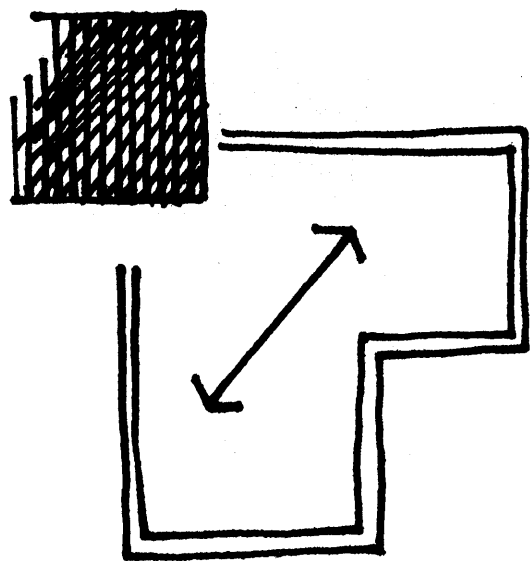
# STARTER UNIT

THE HOME IS ZONED INTO 2 LIVING AREAS. THE 'CORE' (STAIRS, BATH, AND CLOSETS) ACTS AS A DIVIDER.



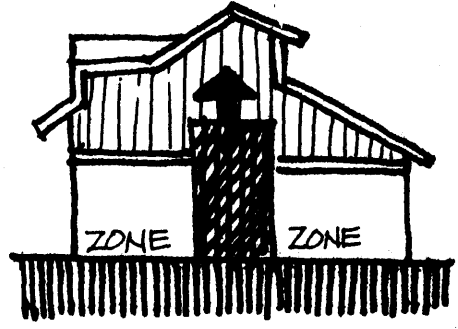
IN EACH ZONE THE DEFINITION ALLOWS FOR 2 RELATED ACTIVITIES.

- KITCHEN/EATING
- SITTING/SLEEPING
- SITTING/STUDY NOOK
- SITTING/SMALLER SITTING NOOK



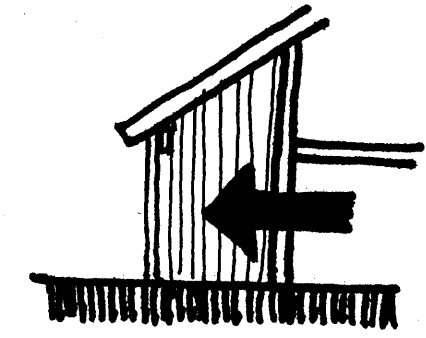
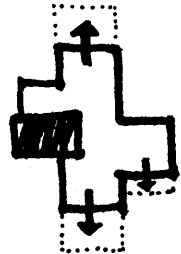
# ADDITIONS

THE EASIEST ADDITION (ADD IN) IS PROBABLY THE MOST LIKELY.



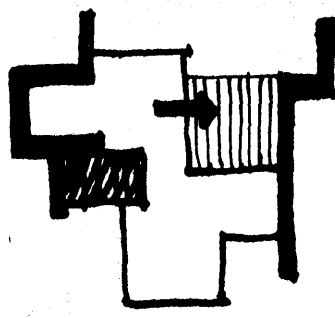
ATTIC CONVERTED INTO FINISHED SPACE (BRS.)

THE OTHER EASY ADDITION IS TO FILL IN UNDER AN EXISTING ROOF.



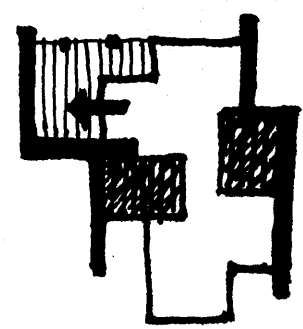
EXPANSION OF A ZONE

EXTENDING Laterally TO THE PARTY WALL WILL PROVIDE A LARGE SPACE.



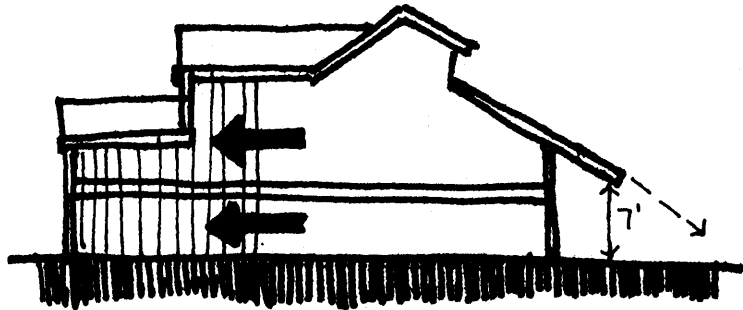
THE STRUCTURE (BEAMS AND A PARTY WALL) SUGGEST AND AID IN ADDING ON.

OR

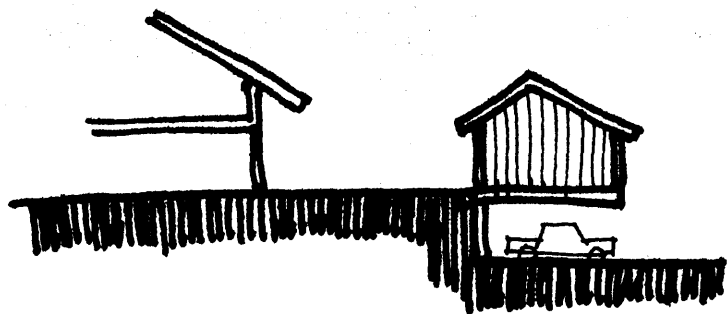
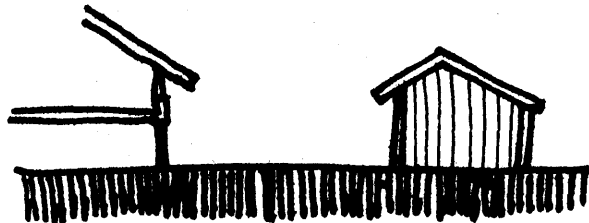


# ADDITIONS CONT.

FOR A VERY EXTENSIVE ADDITION (USUALLY INVOLVING A SERIES OF SPACES) A CHANGE IN ROOF DIRECTION IS PROVIDED IN THE BACK OF THE HOUSE.

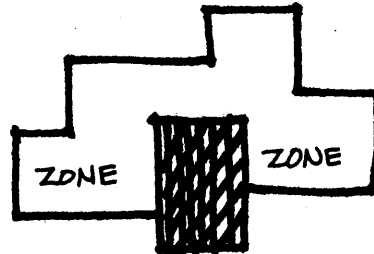


FINALLY HOMES WITH A SEPARATE GARAGE CAN ADD A SEPARATE STUDIO OR APARTMENT IN OR ON THE GARAGE

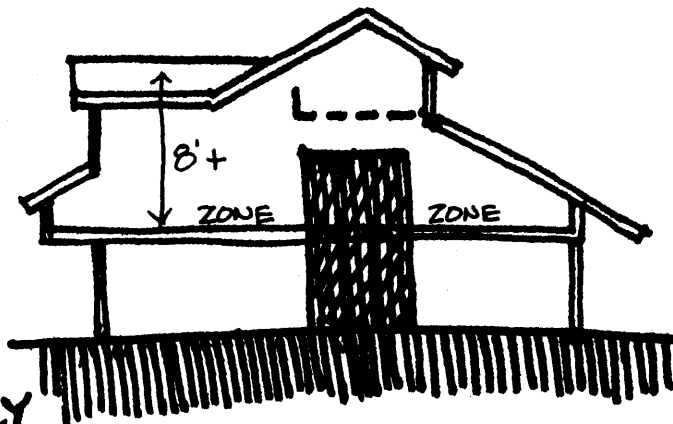


## THE ATTIC

THE ATTIC IS ALSO ZONED INTO 2 AREAS, BOTH BY THE CORE AND BY THE CEILING HEIGHTS.

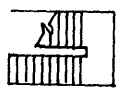
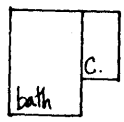
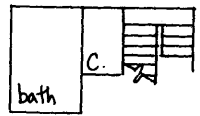


THEREFORE ONE PART OF THE ATTIC IS HABITABLE ALMOST IMMEDIATELY (IT STILL NEEDS TO BE FINISHED). BECAUSE OF THE CEILING HEIGHT IN THE OTHER ZONE A DORMER WOULD USUALLY BE REQUIRED. MANY OF THE HOMES ALSO HAVE SPACE FOR A LOFT.

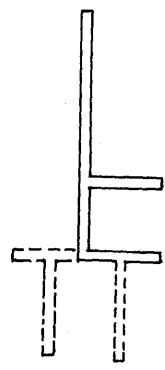
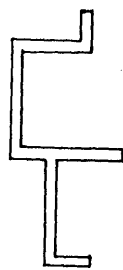


# REPEATING ELEMENTS

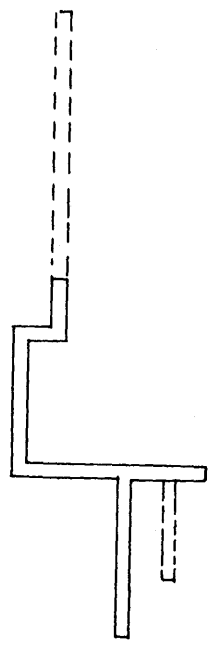
## CORE PIECES

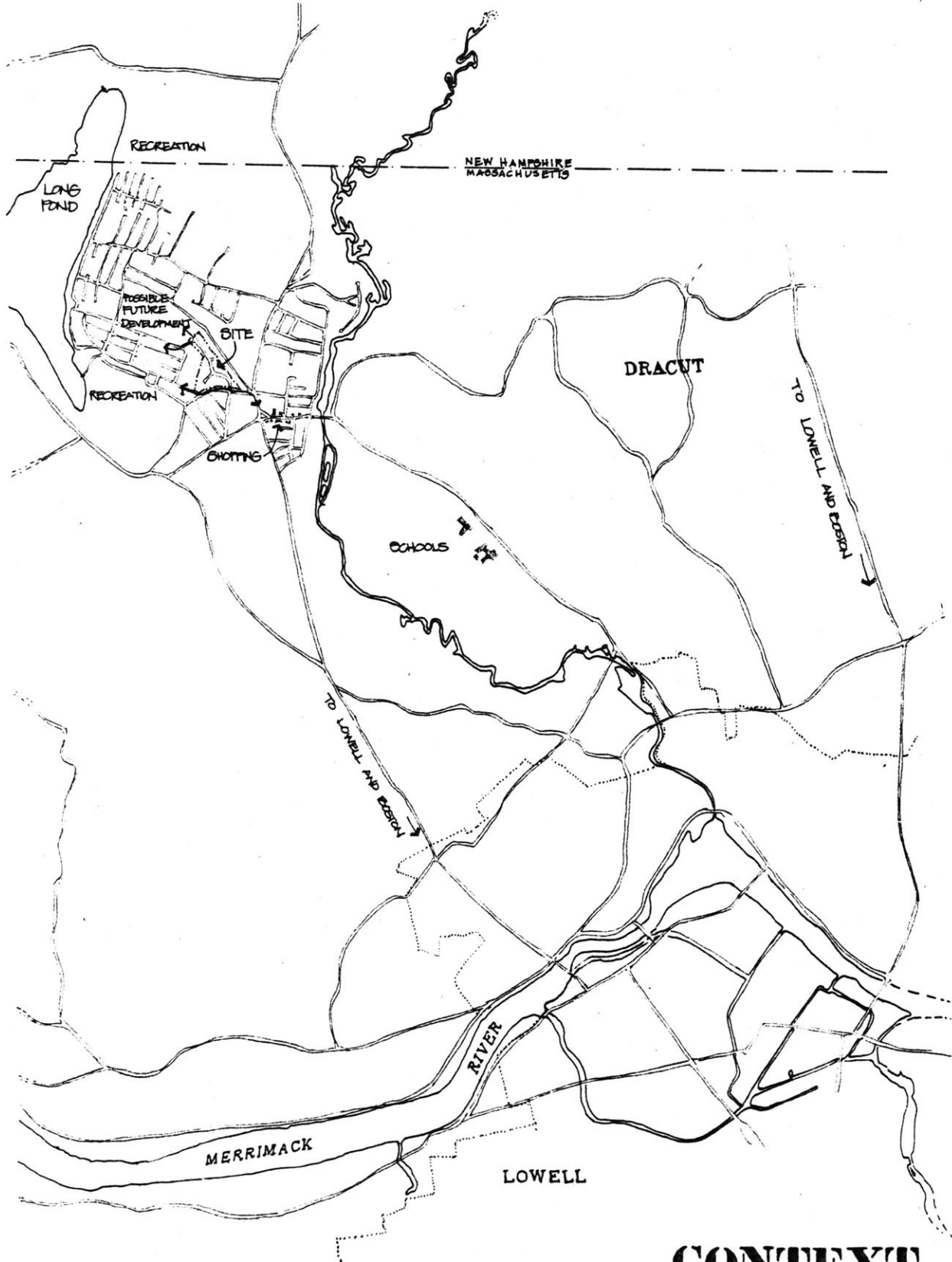


## MASONRY PARTY WALL PIECES

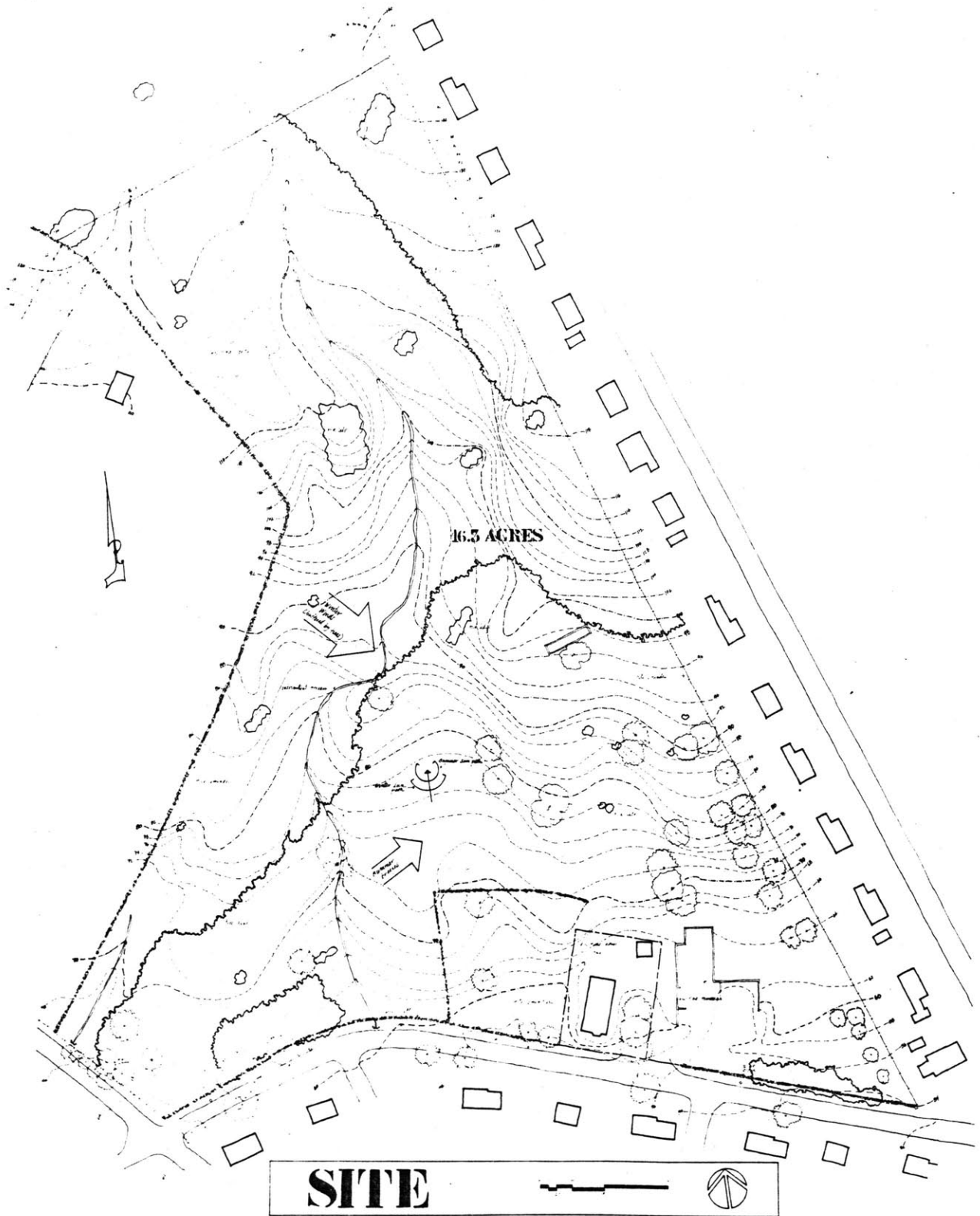


MANY WOOD FRAME WALLS (NOT SHOWN HERE) ALSO REPEAT. A 3' SQUARE MODULE WAS USED.



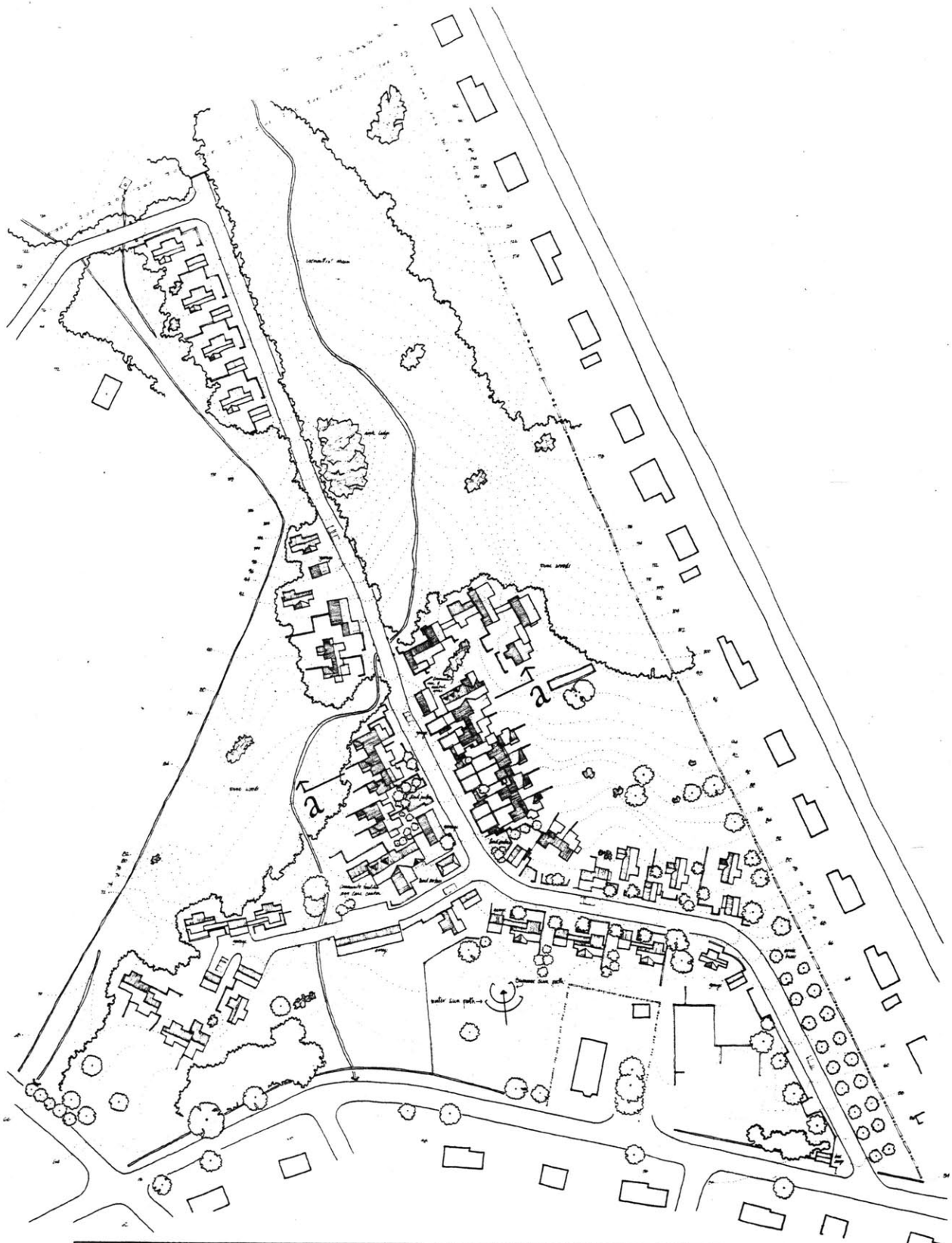


# CONTEXT



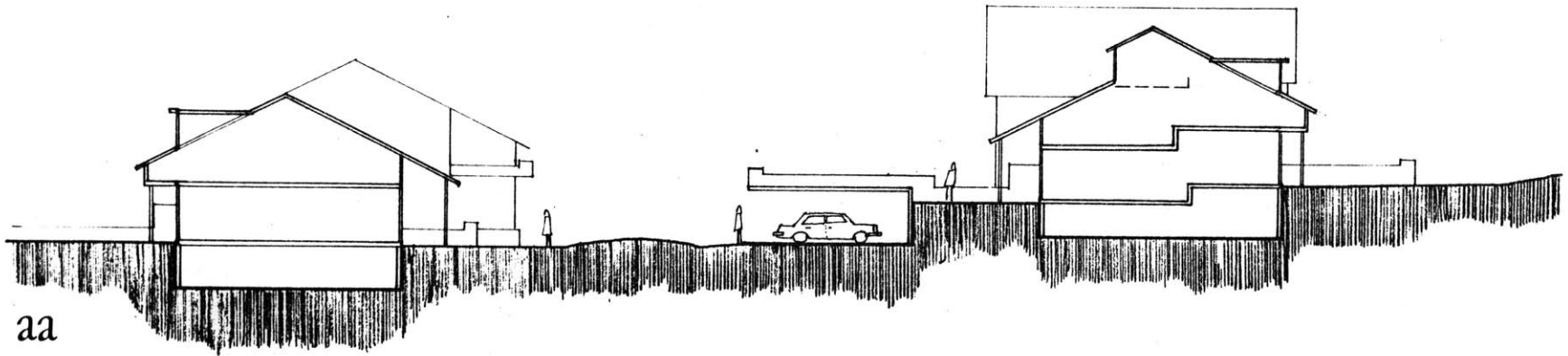
**SITE**





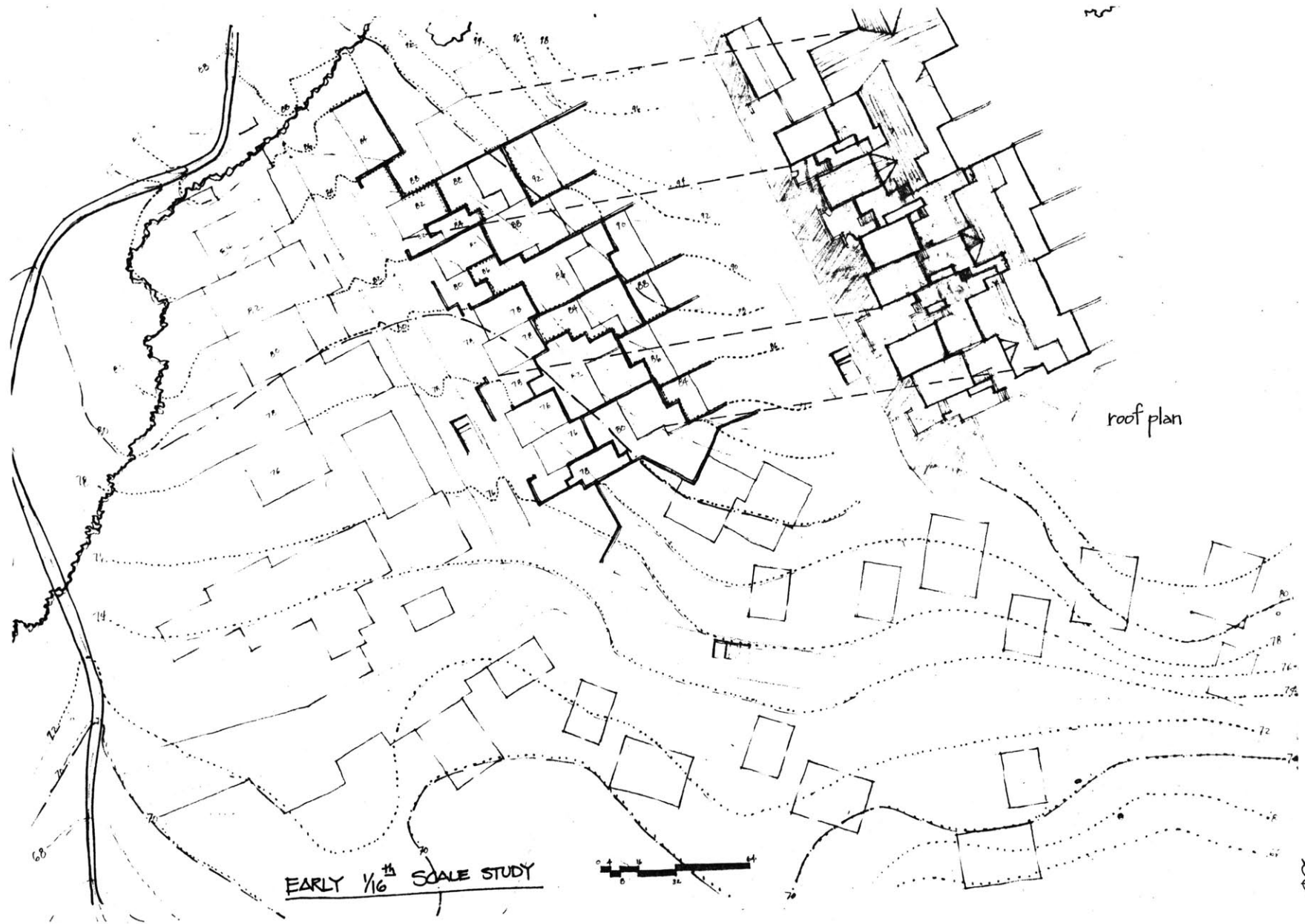
**SITE PLAN**





**SITE SECTION**

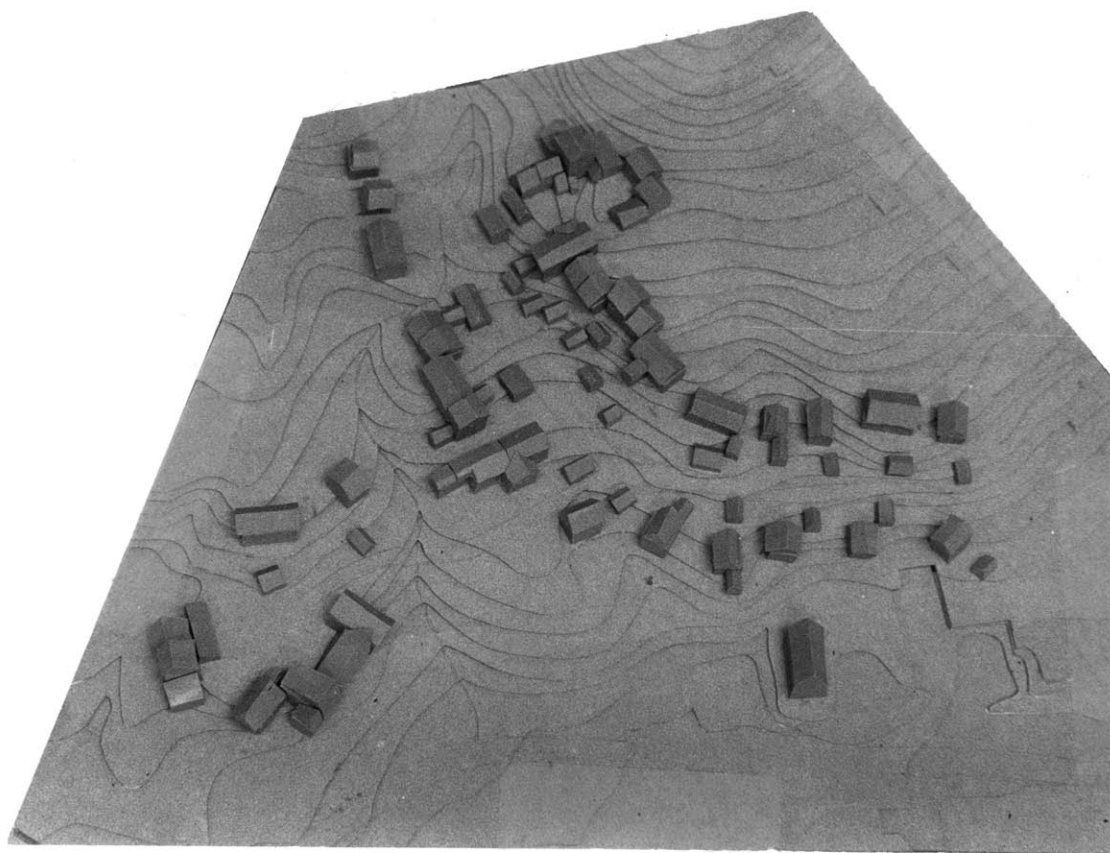
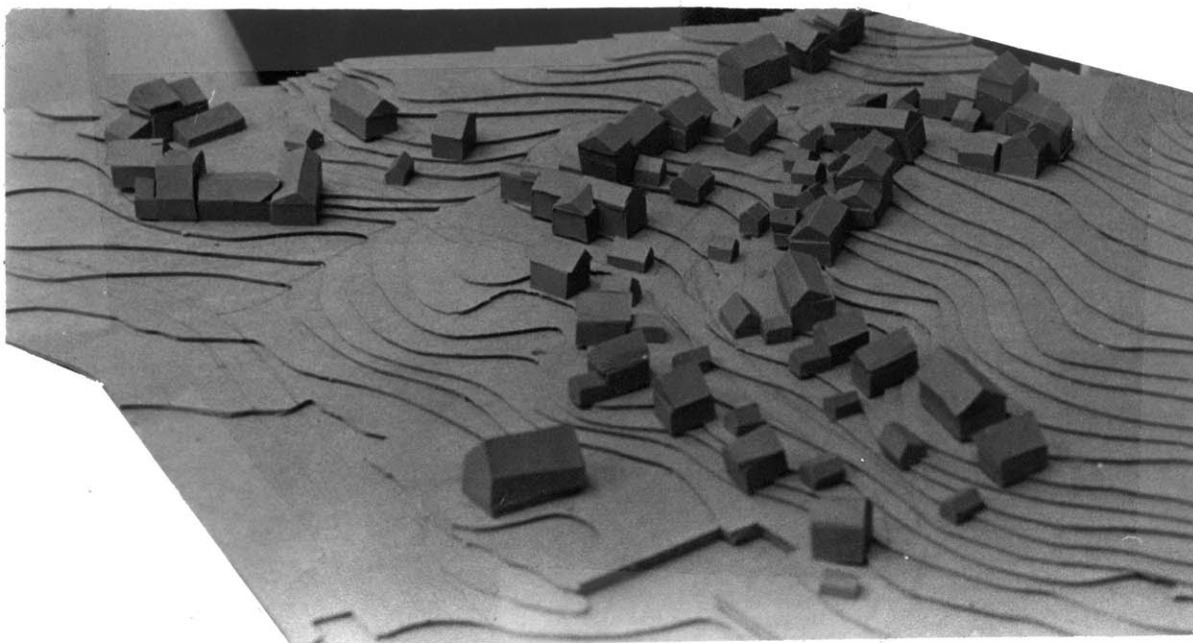




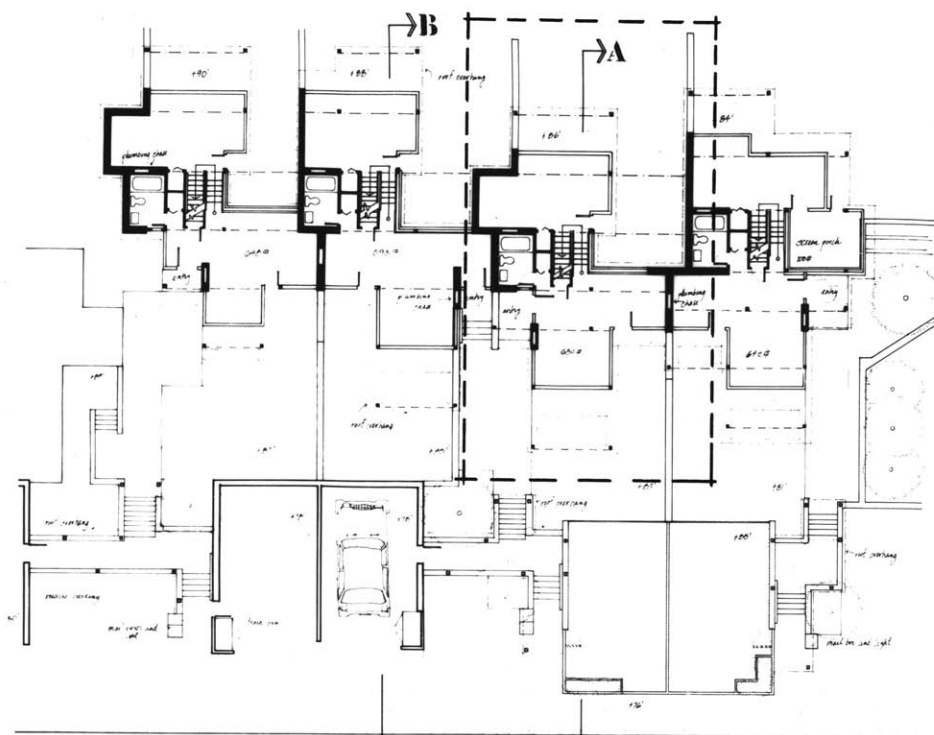
EARLY 1/16" SCALE STUDY



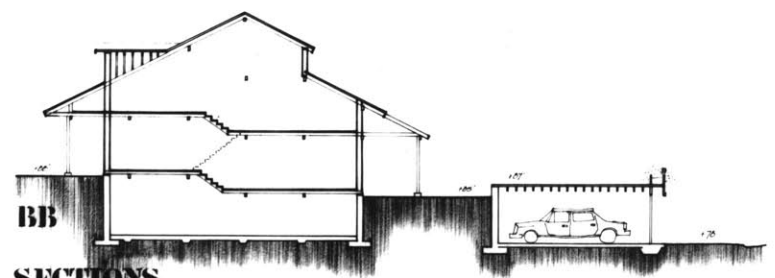
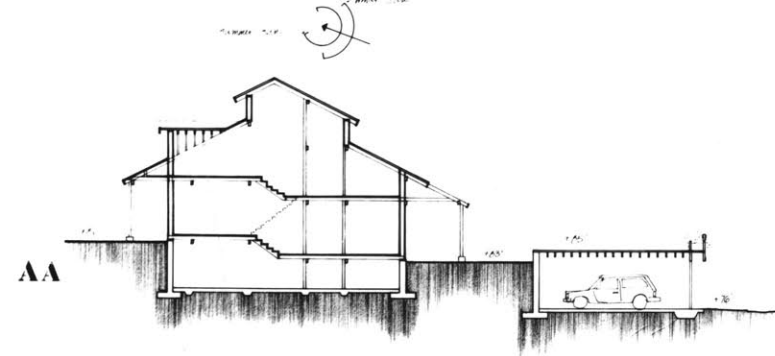
roof plan



*Working Model*

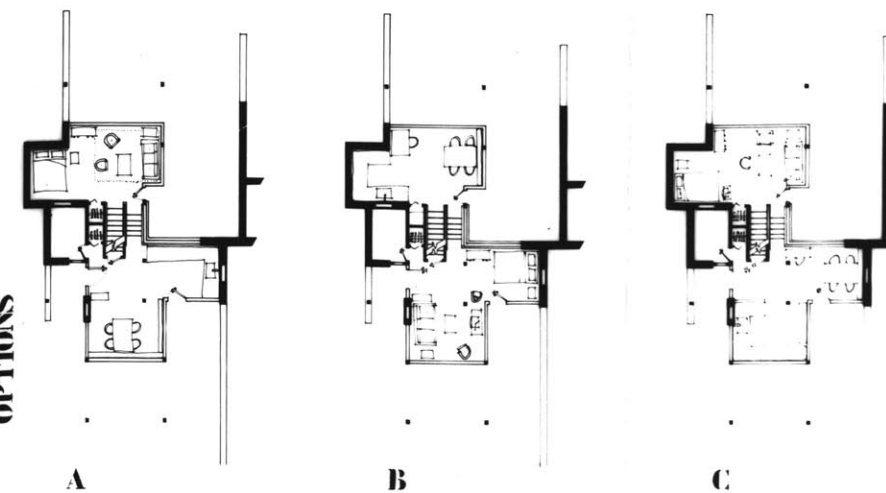


FRAMEWORK

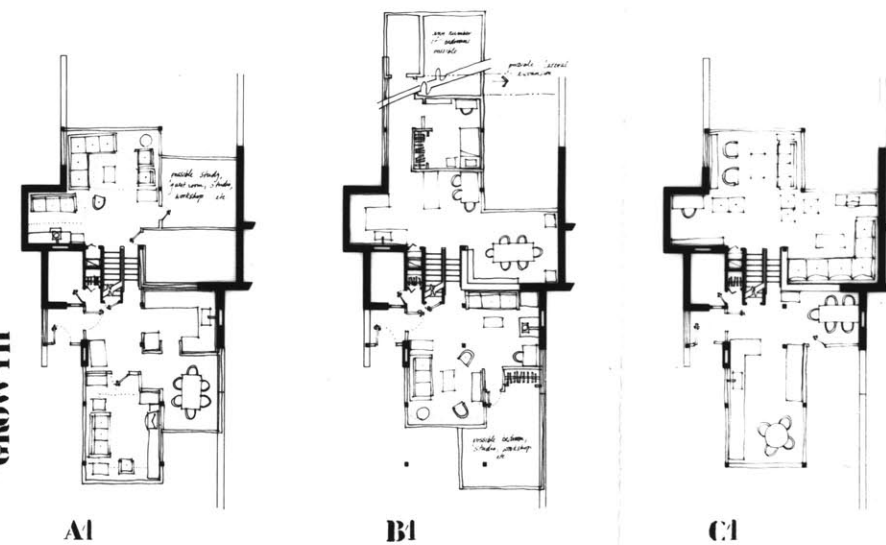


SECTIONS

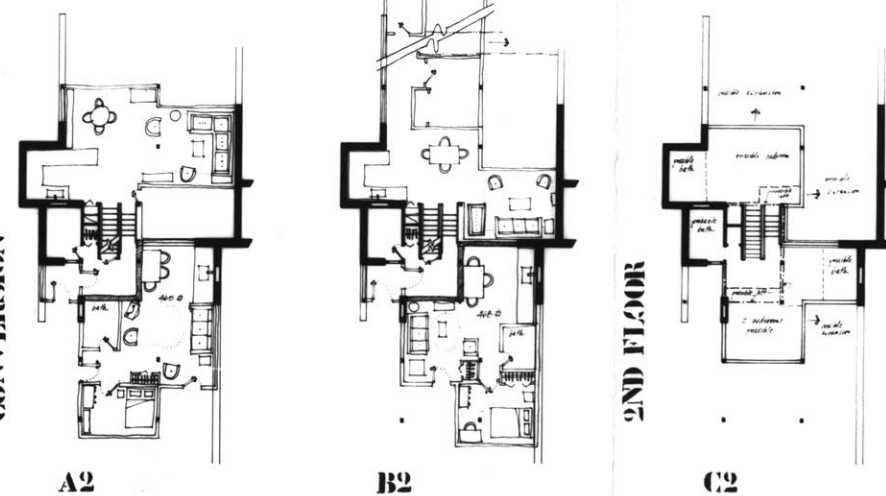
OPTIONS



GROWTH



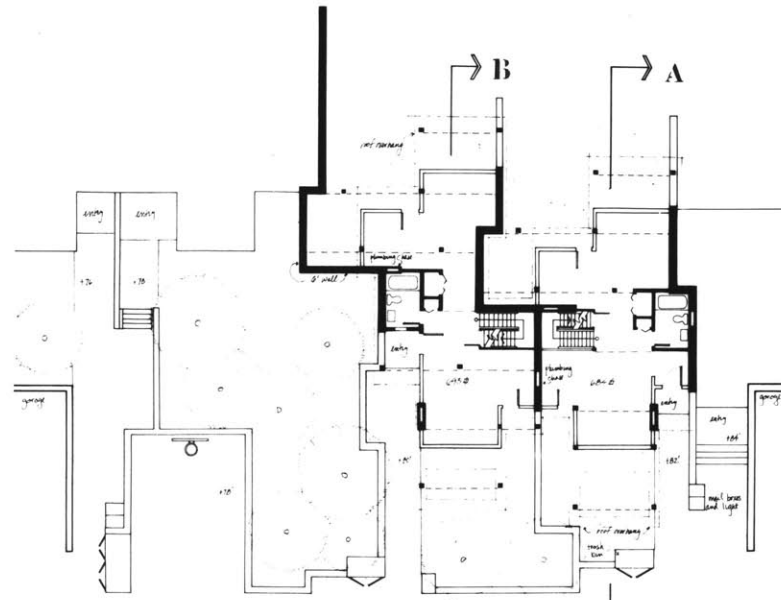
CONVERSION



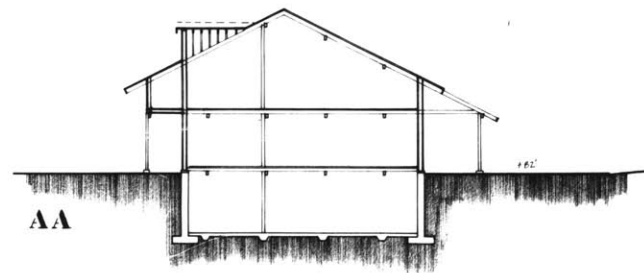
2ND FLOOR

**ROW HOUSE / GARAGE**

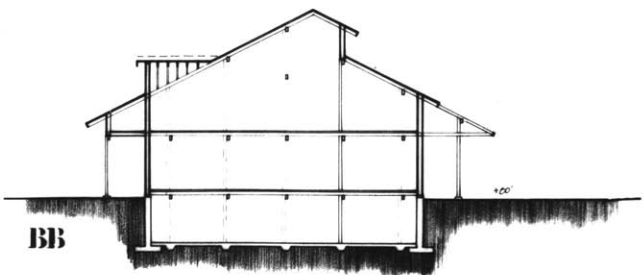




FRAMEWORK



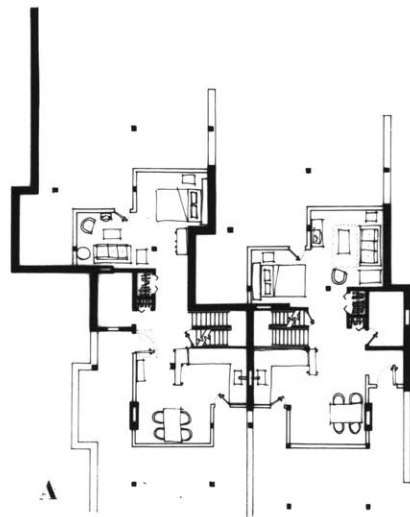
AA



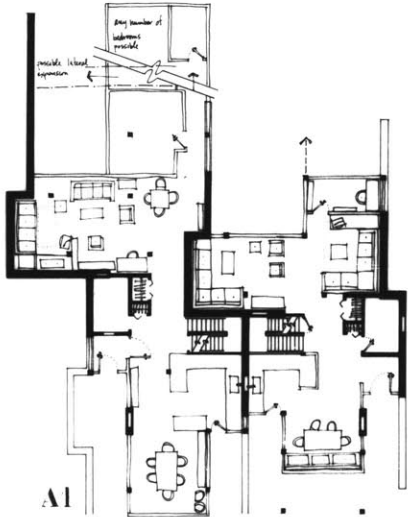
BB  
SECTIONS

# ROW HOUSE

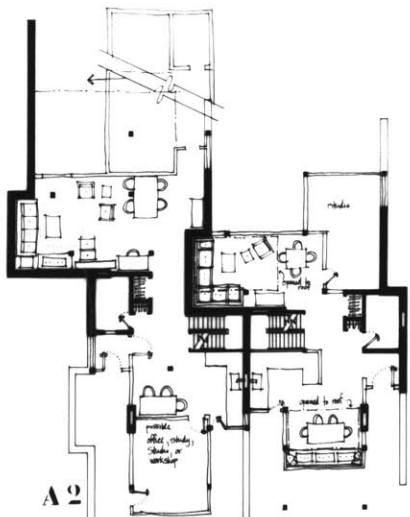
OPTIONS



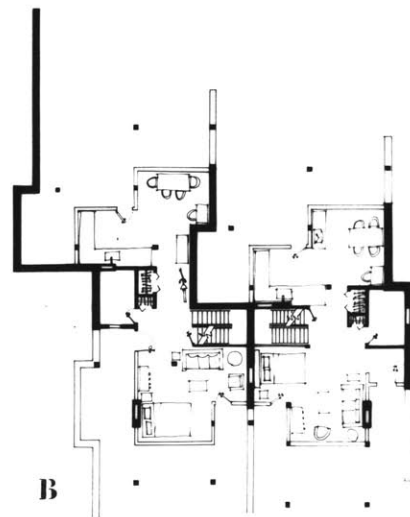
GROWTH



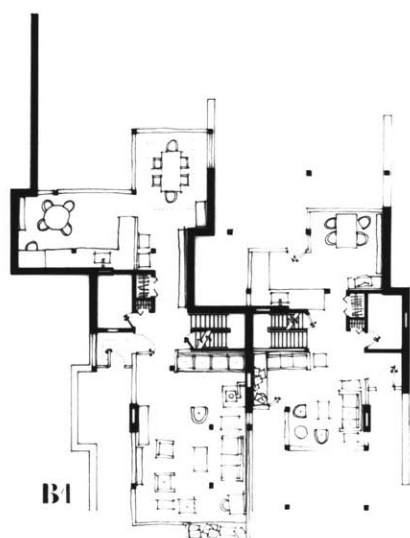
CONVERSION



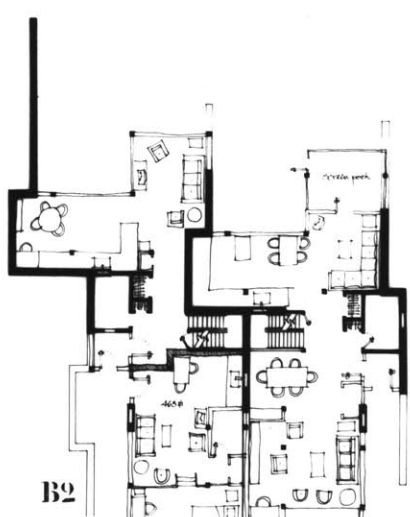
B



B1



B2



2ND FLOOR

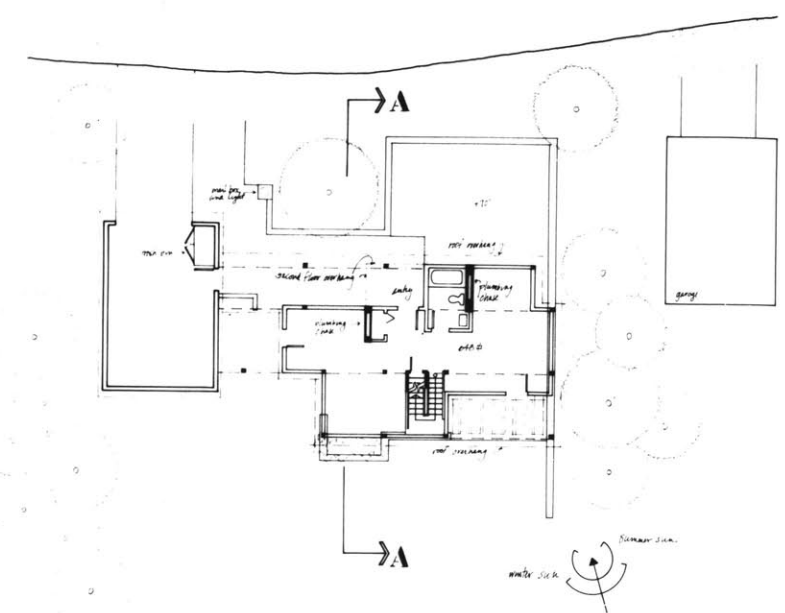


C1

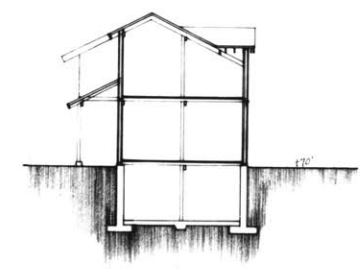


C



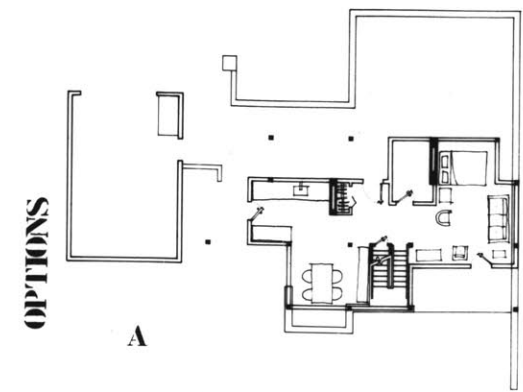


**FRAMEWORK**



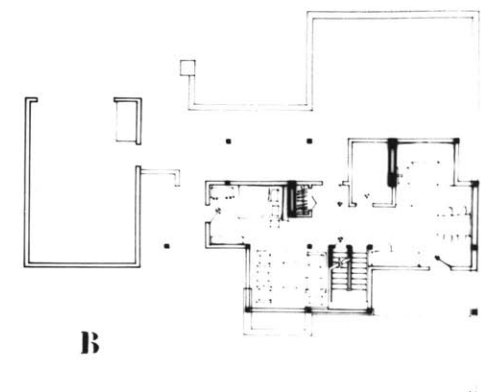
**AA**

**SECTION**

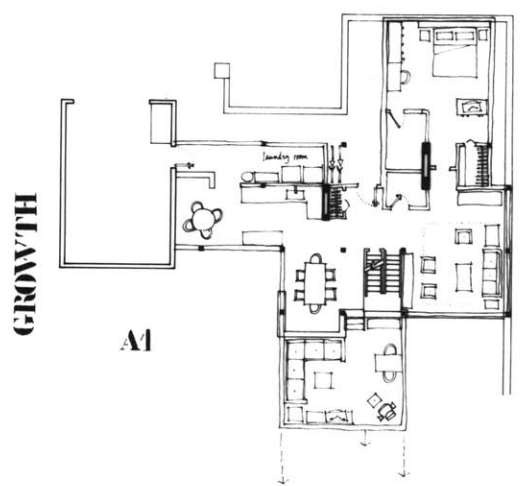


**OPTIONS**

**A**

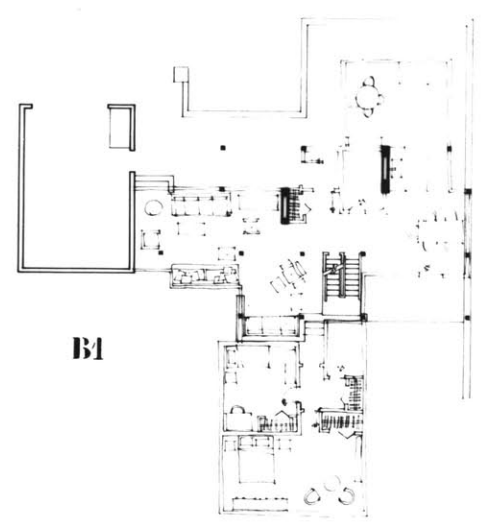


**B**

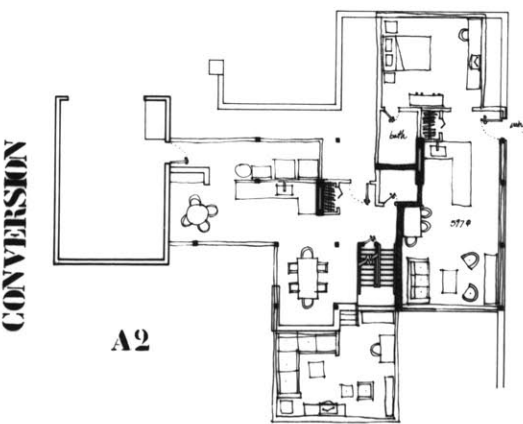


**GROWTH**

**A1**

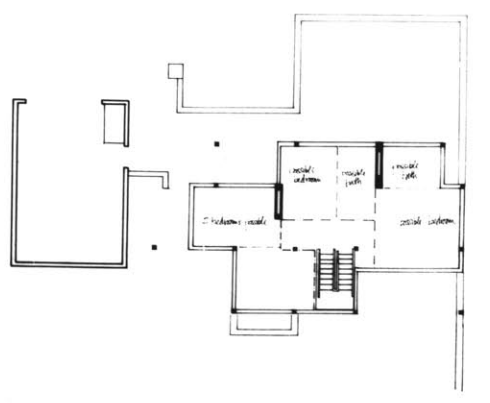


**B1**



**CONVERSION**

**A2**

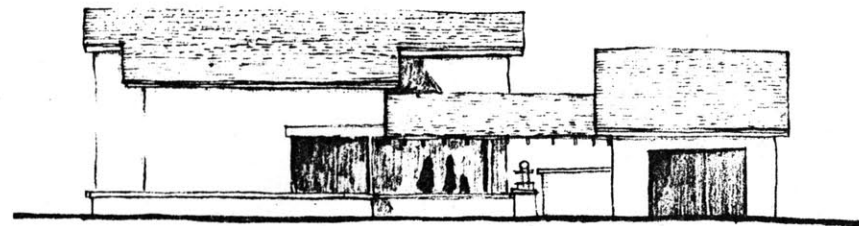


**2ND FLOOR**

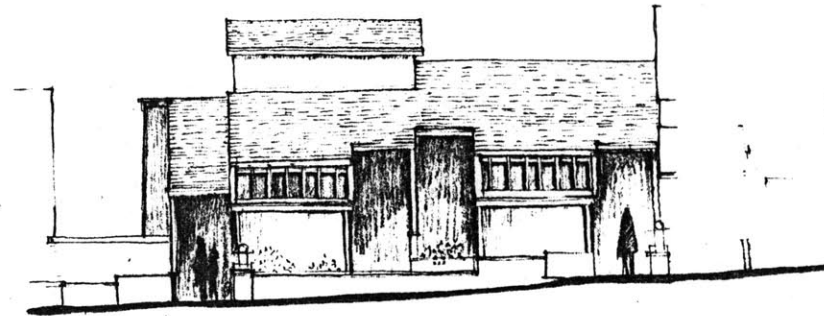
**DETACHED HOUSE**

A scale bar showing measurements from 0 to 20 units, with intermediate markings at 4, 8, and 16. To the right of the scale bar is a north arrow pointing towards the top right.

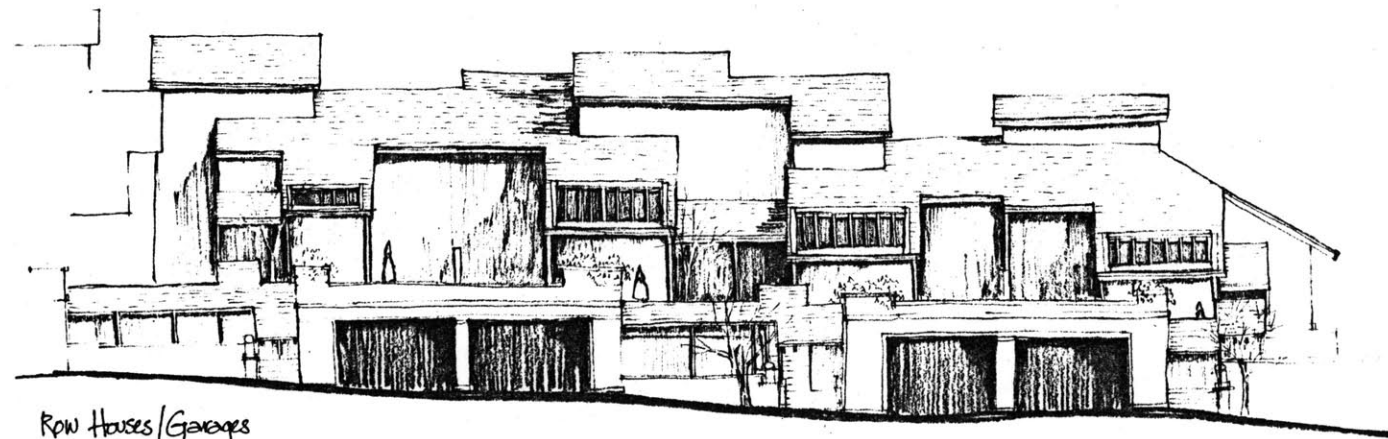




Detached House



Row Houses

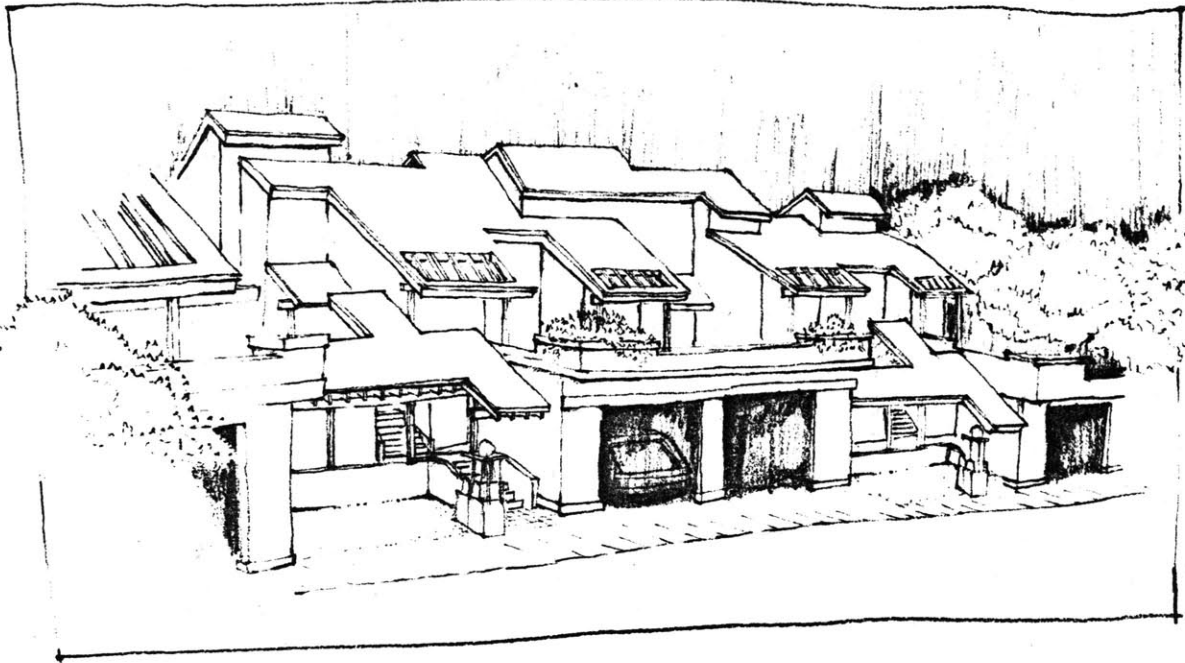


Row Houses/Garages

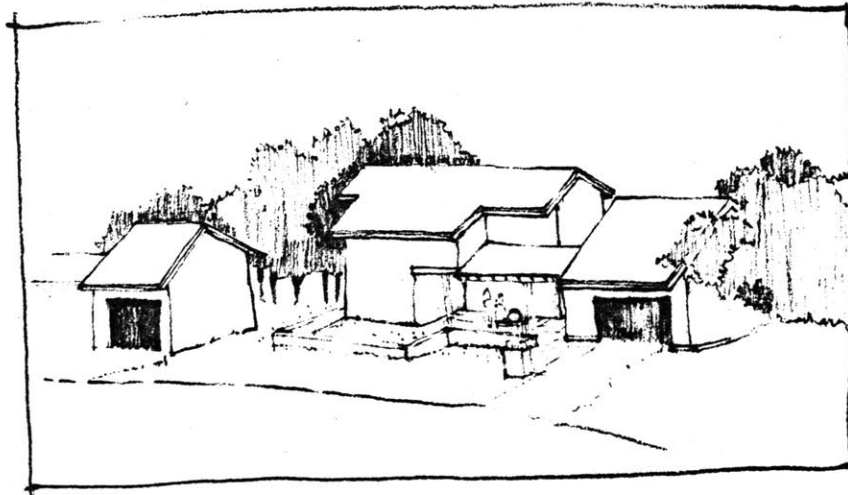
STREET ELEVATIONS







View of Row Houses/Garages



View of Detached House

(drawings done from photographs of models)

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