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IDENTIFYING THE LEVEL OF FLEXIBILITY A SINGLE-FAMILY HOME MAY REQUIRE IN ORDER TO MEET CHANGING NEEDS DURING THE FAMILY LIFE CYCLE WITH SPECIAL REFERENCE TO SENIORS

A Thesis Submitted

to the Faculty of Graduate Studies and Research

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for the Degree of Master of Architecture

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LONG-TERM ADAPTABILITY OF SINGLE-FAMILY HOUSING

ABSTRACT

Flexibility in housing has been studied and implemented both in Europe and North America. However, there is a need for more research on which spaces in the home and which elements in those spaces require flexibility to accommodate all phases of the family life cycle. The particular spaces in a single-family home requiring this flexibility were determined in five case studies covering a minimum span of 15 years of the family life cycle. The spaces that underwent changes most frequently were dens, studies and recreation rooms. Bedrooms changed frequently only when there were crowded conditions or when residents were unhappy with the status quo. Through a review of the physical limitations of the elderly, it was determined that a sensitive application of accessibility standards in all homes would extend the usefulness of the homes as the occupants enter the final stage of the life cycle.

RÉSUMÉ

On a étudié en Europe et en Amérique du Nord des principes de souplesse en matière d'habitation que l'on a mis en practique par la suite. Cependant, on doit effectuer des recherches complémentaires en ce domaines, notamment à quelles pièces, et à quels éléments de ces pièces, il convient d'appliquer certains principes de souplesse afin de répondre aux besoins des diverses étapes du cycle de vie d'une famille. Cinque études de cas, réparties sur 15 années du cycle de vie familial, ont permis de déterminer quelles pièces d'une maison unifamiliale nécessitent une certaine souplesse. Il appert que le coin détente, le cabinet de travail, et la salle de jeux font l'objet des changements les plus fréquents. Ceux que l'on apporte aux chambres à coucher résultent soit de l'encombrement, soit de l'insatisfaction des résidents. Un examen approfondi des infirmitiés physiques chez les personnes âgées a souligné que l'application bien comprise des normes d'accessibilité dans les foyers en rehausserait la destination utilitaire au cours de l'ultime étape du cycle de vie des occupants.

ACKNOWLEDGEMENTS

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I would also like to thank my good friend and neighbour, Dr. Carman Bickerton. By writing a serendipitous recommendation, he inspired me to go back to school when I was at an impasse in my career, and his sage advice has helped me to attain my goal.

Particular thanks are due the family members of the five case studies, who contributed their time and energy to remember "how things were" as well as providing building plans where available. Without them this thesis could not have been written.

Finally, I acknowledge the support and patience of my family, especially my wife Vicki, and the adjustment that each of them made when, after twenty-five years, I left home to return to school.

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CHAPTER ONE: INTRODUCTION

1.1 - RATIONALE FOR THE STUDY

Stupp (1970, 1.7) suggests that the life cycle of traditional families begins with a young, childless couple, progresses to a "Growing Family", and then becomes a "Static Family". The family then shrinks to become smaller in size as the children start to leave home to form their own households. The couple returns to a static state and finally the single widowed adult is left alone[1]. In Canada, some of these families live in three and four bedroom houses; these are bungalows, two-storey or split-level houses which were built without provision for functional flexibility (Denhez 1989, 17-21). With the demands for space varying dramatically during the family life cycle, the typical single-family house is not flexible enough to meet the changing demands for space placed upon it (Levenson 1979, 19).

In addition, in Canada families move on average every six years in order to satisfy changes in employment, to up-grade their social status, or to meet the increasing demands for space of their growing families (CMHC 1981). The investment required to modify the house is too high but it can be lowered by designing for future flexibility.

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[1] Stupp (1970, 1.7) summarizes family development in three stages:

.1 **The Growing Family:** Consists of a couple who are at the age of fertility and has a reasonable chance of increasing in the future, whether they have children or not.

.2 **The Static Family:** Can be characterized by the two following examples:

.1 Consists of two parents who are not likely to increase the family in the future: who choose to remain childless or whose children are too young to live independently.

.2 Consists of parents who are past the age of fertility and whose children have left the parental home.

.3 **The Shrinking Family:** Children in these families are adolescent or adult and are in the process of leaving to establish their own households.

After the children leave the family home, many North American "empty nesters" move into smaller accommodation. However, about 67% prefer to remain in their family home in order to accommodate any unexpected space requirements (Divic 1983, vii). The home may be much too big for their needs or beyond their financial means, but many memories dwell in those under-utilized rooms. In all of these cases the reason for moving or for coping with constraining conditions is that the home is not flexible enough to meet the ever-changing needs of a family. The author believes that it will become more evident which spaces in the home need to be more flexible in order to meet those changing needs and which spaces basically retain their functions throughout a lifetime of use. This will be accomplished by studying each space in the home, by determining what functions or activities take place in those spaces and by observing how those activities change over the life cycle of a family.

Rabeneck (1974, 698-727) suggests that flexibility in housing has been studied primarily in multi-family and not single-family housing. For the most part, flexibility in terms of custom fit-up has been available only at the time of initial construction and occupancy. This satisfies the needs of the occupants only at a specific point in time and not necessarily for the remainder of their family life cycle. **The purpose of this research will be to identify the need for flexibility in the single-family home throughout the family life cycle and to suggest which spaces or elements should be designed to accommodate changing family needs.**

1.2 - RESEARCH QUESTION

The author's interest in housing for the elderly led to the question of why present housing does not meet the particular needs of seniors in their later years. On further inquiry it became evident that present housing does not have the flexibility to meet the spacial and functional needs of families during various stages of the family life cycle. With this in mind, the question became:

What spaces or elements in single-family housing can be designed to accommodate changing family needs during the family life cycle, with special reference to senior adulthood?

1.3 - OBJECTIVES

The objectives of this thesis are:

.1 To outline the dynamic process of human interaction in the family setting during the family life cycle.

.2 To determine which spaces and elements in the family home undergo changes in demand or function during the family life cycle.

.3 Through five case studies, to examine how flexibility in a home could be used throughout a family life cycle.

.4 To demonstrate how these functional changes can allow the elderly to remain in their family homes as long as possible.

1.4 - SCOPE OF STUDY

.1 The study will examine the function and use of the indoor spaces of single-family houses occupied by traditional families in the Canadian context[2]. The five case study homes are located in the Toronto and Ottawa areas.

.2 The "elements" to be studied will be those that are typically fixed in a single-family home (e.g. clothes closets, room partitions, electrical/mechanical distribution, built-in cabinet work and other privacy and storage related elements).

.3 Flexible elements developed for housing (e.g. movable partitions, adjustable counter heights, ergonomically designed electrical and plumbing hardware) will be reviewed and their adaptability to single-family housing considered.

1.5 - METHODOLOGY

Research was carried out through the use of primary and secondary sources of literature to define the terms, to describe how they are applicable to the basic research on flexibility and to establish the traditional functions of spaces and elements in the home. Through five case studies it was determined how demand for space in the home changes or modifies the use of those spaces and functions within the single-family home. The case studies were selected for their suitability as an environment for the entire family life cycle, the time the occupants had lived in the house, and the condition that the occupants composed a traditional family[3].

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2 The author realizes that, at present, the traditional Canadian family may not be statistically considered in the majority, but most people have lived in a traditional family situation at one point in their lives.

3 The **traditional family** is defined by the author as a married male and female adult couple with children.

1.6 - OUTLINE

The paper is organized into five chapters. In the **INTRODUCTION** the author explains why the topic was chosen, what literature exists to support the research and how the research was carried out. The objectives and parameters of the research are also outlined.

In the second chapter, the **FAMILY LIFE CYCLE AND THE HOME ENVIRONMENT** the social and physical concerns of the home are established with the support of relevant literature. In addition, the third chapter on **FLEXIBILITY AND THE HOME** reviews literature on flexibility and its relevance to single-family housing. These chapters are used to define all terms and conditions in order to have a base line from which the Case Studies and Conclusions could be carried out and analyzed.

The chapter entitled **CASE STUDIES** includes the development of a questionnaire and the interviews with five households in order to document the use of functional spaces in their homes over a period of fifteen years or longer. This led to identifying areas in the homes that either changed function over time, or resulted in modifications to the homes in order to meet the various demands for space by members of those households.

In his **CONCLUSIONS** the author uses observations from the case studies and technical and architectural innovations described in the literature to identify areas where spaces and elements in the home would benefit from flexibility. In doing so, the author identifies elements in the home where flexibility would benefit people at all stages of the life cycle, especially individuals in their senior years.

CHAPTER TWO: THE FAMILY LIFE CYCLE AND THE HOME ENVIRONMENT

This chapter is devoted to reviewing scholarly sources on one of the two themes of this thesis. It reviews two components: the family life cycle and how it creates changes in demand for space, and the limitations brought on by old age and how these infirmities affect the ability of the elderly to live in an independent housing environment.

2.1 - THE FAMILY LIFE CYCLE AND THE DEMAND ON SPACE IN THE HOME

Keiser (1978, 32-33) suggests that the traditional **Family Life Cycle** begins with the formation of a household by a young couple; is followed by an increase in household size with the birth of their children, continues with the departure of grown-up children to form their own households, leaving the older couple alone once more; and draws to a close with the death of one partner and then of the surviving spouse (Figure 2.1).

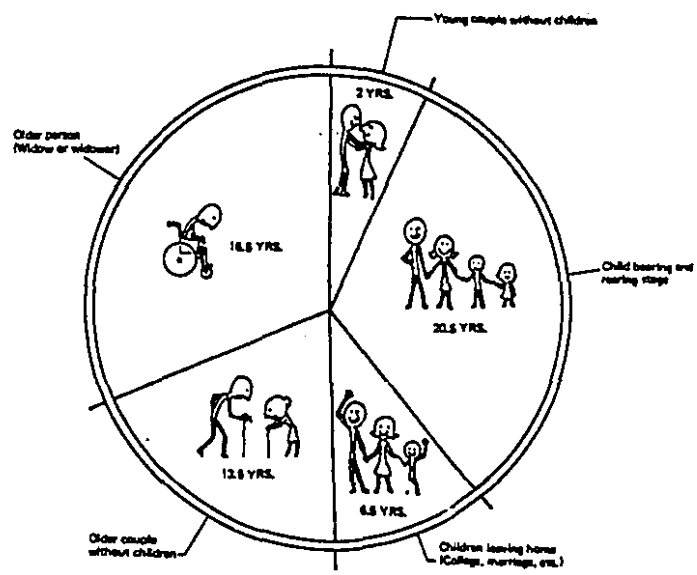

FIGURE 2.1 - TYPICAL TIME PERIODS IN THE FAMILY LIFE CYCLE
source: Keiser, 1978

The family life cycle has been broken down by Fallis (1983) into eight stages. This division assists in determining at which point in the cycle there are certain pressures on space in the home, and is particularly useful in the analysis of the case studies. Stages 1 and 8 are for never-married (1) or widowed (8) individuals. Stages 2 through 7 are various stages during a married couple's life together (Figure 2.2).

LIFE CYCLE STAGE	AGE	MARITAL STATUS	CHILDREN
1	young	not married	none
2	young	married	none
3	young	married	young children
4	young	married	older children
5	middle-aged	married	older children
6	middle-aged	married	none
7	old	married	none
8	old	widowed	none

AGE OF HOUSEHOLD HEAD		AGE OF CHILDREN	
young	<45	young	at least one child < 5
middle-aged	45-64	older	at least one child 5-15
old	65>	none	no children at living at home

FIGURE 2.2 - FAMILY LIFE CYCLE STAGES
source: Fallis, 1983

Historically, the traditional family was commonly composed of a male breadwinner, a female homemaker and their children. However, statistics show that the traditional family makes up only 18% of the household population and is therefore no longer the norm in North America (Figure 2.3). To-day a majority of families are dual-headed but, due to economic necessity, in over 23% of this group both heads of families are working. Single parent households constitute another 12% of the Canadian population and almost 24% of all households are people who live alone.

Socio-economic changes have also resulted in an increased

HOUSEHOLD TYPE	PERCENT
Dual-headed family	63.86
Only husband employed	18.15
Husband and wife employed	23.47
Single-headed family	12.38
Female-headed	10.36
Male-headed	2.02
Primary	23.75
Female	14.38
Male	9.37

FIGURE 2.3 - HOUSEHOLD STRUCTURE IN USA, 1978
source: Stapleton, 1979

number of childless couples in recent years, as pointed out by Schoenauer (1981, 41):

> "The conjugal family with two or three children is no longer the norm. Census statisticians indicate that forty percent of new household formations are no longer child-oriented and this should be reflected in future housing."

The resulting change in family composition points out the need for a different life cycle model than the traditional one used by Keiser. A model developed by Stapleton (1979, 1109) is more appropriate to the present reality. As well as dual-headed families, it takes into account single-headed families which are a result of separation, divorce, lack of opportunity, or choice, and also the single person household (Figure 2.4).

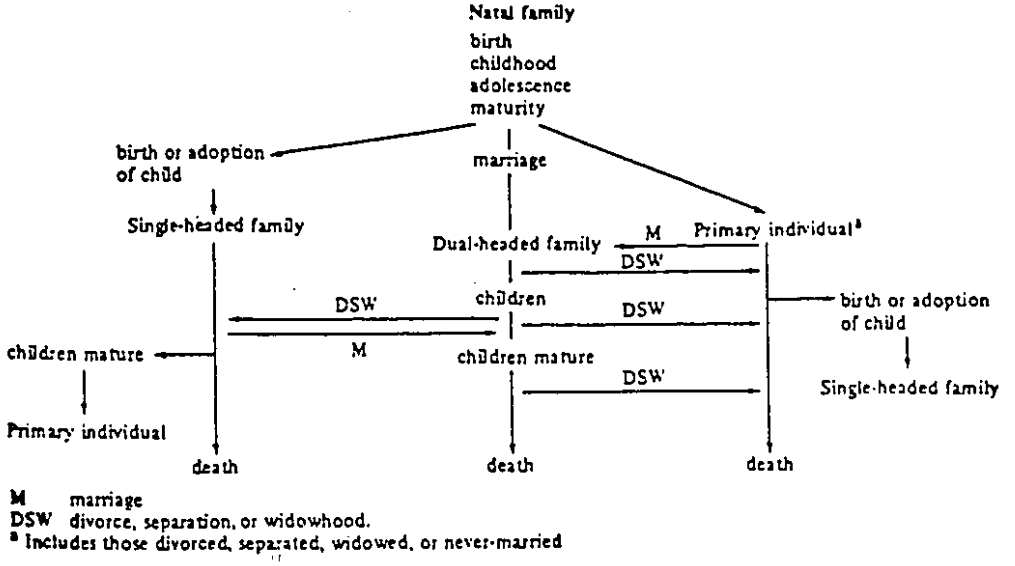

FIGURE 2.4 - AN EXPANDED LIFE-CYCLE MODEL
source: Stapleton, 1979

An increase in elderly households has also been significant and will continue to be important for decades to come. The percentage of the population over the age of 65 is increasing at a rate of 1% every 4 years (CMHC 1985, 90). There will be, therefore, an increase in percentage of households owned by seniors, who have different space requirements than those of growing families. The number of households comprised of occupants over 65 is estimated to increase at a rate of 1% every 5 years (Foot 1982, 127) which is demonstated in Figure 2.5.

YEAR	% POP'N. 65+	RATIO	% HOUSEHOLDS 65+
1971	8.1	2.0	16.2
1981	9.1	1.9	17.0
1991	11.5	1.6	18.2
2001	12.3	1.5	18.5
2011	13.5	1.4	18.9
2021	17.3	1.3	22.5
2031	21.2	1.2	25.4

FIGURE 2.5 - POPULATION OVER 65, HOUSEHOLDS OVER 65
source: Canadian Housing Statistics 1985. Ottawa: CMHC
Canada's Population Outlook. Foot, D.K., 1982

It is therefore evident that present housing does not meet the demands of the variety of users in the marketplace. In general, housing needs and the demands on space are determined by the type of family unit. In the case of the traditional family, changes occur as the family moves through the stages of the family life cycle. The lack of flexibility inherent in present housing may result in a series of moves as illustrated by Rossi (Figure 2.6).

AGE	STAGE	MOVE	AGE	STAGE	MOVE
0	Birth		40		
				Children	
10	Child	1	50	mature	
	Adolescent				1
20	Maturity	1	60		
	Marriage	1		Retirement	
30	Children	1	70		
				Death	
40			80		

FIGURE 2.6 - MOBILITY DURING THE TRADITIONAL LIFE CYCLE
after: Rossi, 1955

Young couples without children, with limited responsibilities and limited income, have rather simple needs that are easily satisfied by an apartment or "starter" home, since many of their activities take place outside the home (e.g. dining out, sports, visiting friends). With the birth of a child, there is an increased demand for space. When additional children are born and grow, space requirements for play areas and sleeping quarters increase as well as the desire for increased private space for both parents and children (Keiser 1978, 43). At the same time, as income and status of the family increases, there may be a further impetus to up-grade their housing to a socially better neighbourhood with better support facilities.

During the pre-school age children welcome the company of siblings for play and companionship, but during the children's school years there is an increased need for privacy, especially as they become teenagers. They have a need for their own private bedrooms, a space of their own to entertain their friends, and the casual use of semi-public spaces for use as alternate work spaces, such as the kitchen or dining room table for homework. It is at this time in the family life cycle, in the "Static" Family stage, that demand for space is at its highest (Keiser 1978, 43).

At the end of the static stage the young-adult children start to leave home for work, college or formation of their own households. The transition period may take several years, especially if children are attending college. The author has observed in his youth and with his own children that the demand for privacy initially increases because of the intermittent nature of interaction with parents, but then decreases after the children are out on their own, since they can then relate to

their parents more as adult peers than as child to parent. Even when children continue to live at home after they start working, there is a change in attitude that makes living with parents a little more relaxed. As well, the interests of the children are outside the home, which takes pressure off the demand for space in the home.

Dluhosch (1974, 42) shows how the demand for space changes throughout the family life cycle (Figure 2.7). However, this graph fails to point out that when the children leave, the demand for space does not return to the requirements of a young couple. The older couple has acquired considerable possessions over a life-time. They have also developed a life-style which is in keeping with their financial and social status, which they will want to maintain (Deilmann 1973, 13). In addition, the older couple wish to retain space so that their children and grandchildren have a place to stay when they come home to visit.

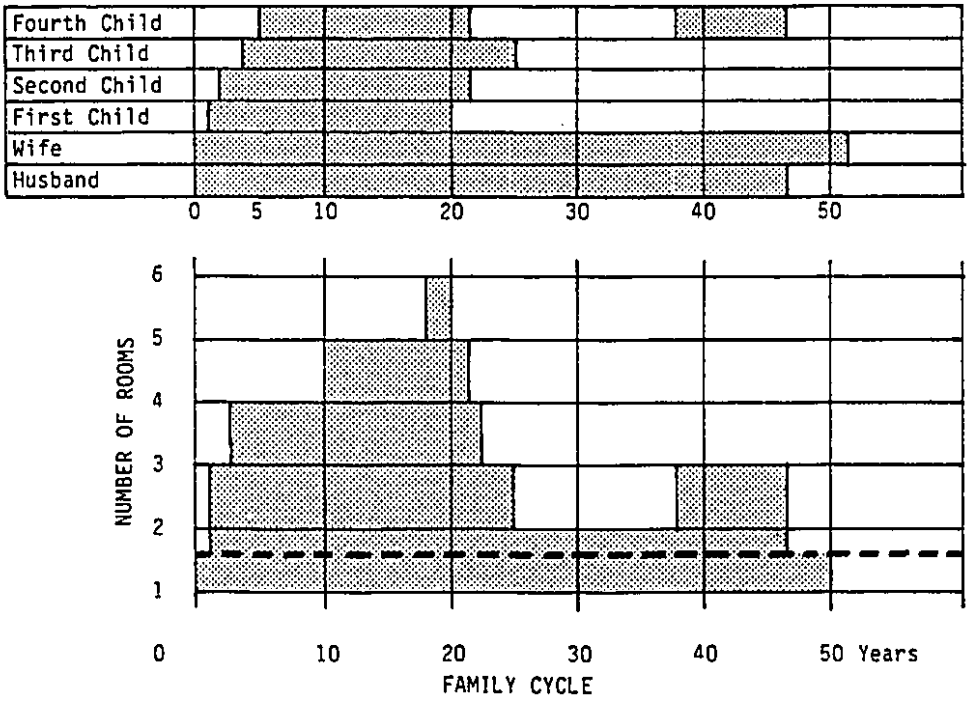

FIGURE 2.7 - RELATIONSHIP BETWEEN FAMILY LIFE CYCLE AND SPACE NEEDS
YEARLY DYNAMIC PROCESSES
source: Dluhosch, 1974

The demand for space is also influenced by the interaction between family members during the family life cycle. As Deilmann (1973, 24) shows, in traditional single income families there is considerable interaction between parent and child from birth and it gradually tapers off as the child becomes more independent (Figure 2.8).

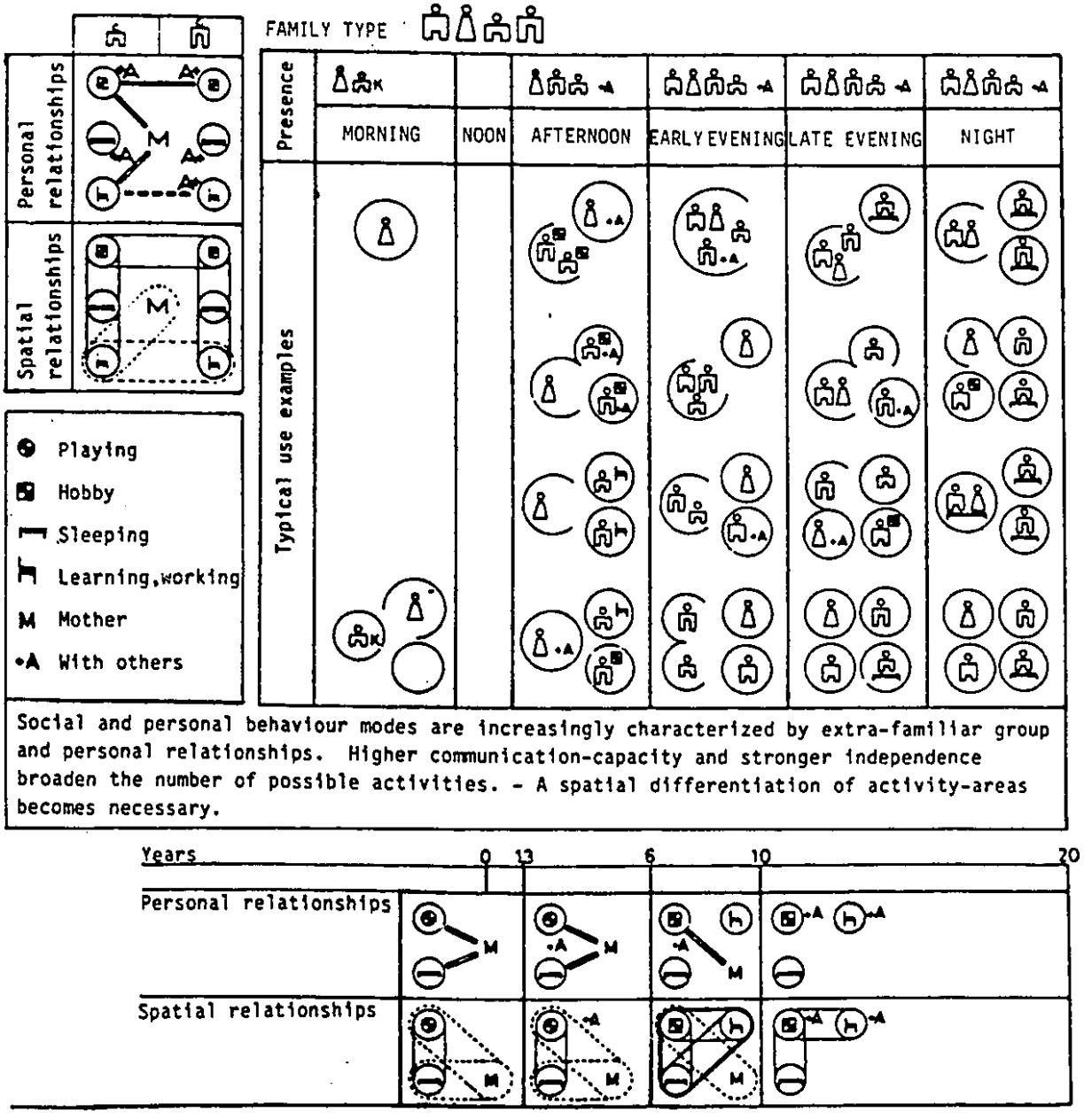

FIGURE 2.8 - THE DAILY DYNAMIC PROCESS OF DUAL-HEADED FAMILY
source: Deilmann, 1973

When children begin to attend school, they develop their own social network. The family interaction slowly drops off to a low point when the children are in their mid-teens. However, when children begin to feel they are adult peers interaction increases, even though their interests are mostly outside the home. When children move away to form their own households interaction becomes intermittent, although it increases with the birth of grandchildren. As the parents become elderly, depending on financial status and/or cultural background, interaction again increases as the children feel obliged to assist their parents with seasonal or even daily activities (Marshall 1987, 473-483).

Dluhosch (1974, 42) shows how the interaction pattern and the need for space varies throughout the family life cycle (Figure 2.9). He suggests that once the older couple or the sole survivor is over 80 years old the need for space declines. In addition, the need for space to accommodate all the furniture and to provide for visiting children and grandchildren is no longer a priority.

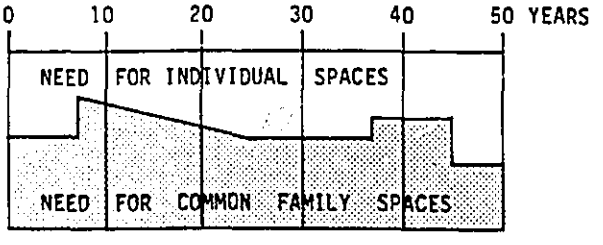

FIGURE 2.9 - INTERACTION PATTERN DURING VARIOUS STAGES OF FAMILY LIFE CYCLE
source: Dluhosch, 1974

In summary, it is evident that the demands for space change during the family life cycle. It may increase with a Growing Family and continue to do so in a Static Family throughout the adolescent years. During the Shrinking Family stage the demand for space declines although not to the same level as that of a young couple[1]. The need for space

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[1] Description of a Growing, Static and Shrinking Family can be found on page 1.

declines further when the couple becomes physically limited in their senior years, or when one of the partners dies. Spaces pass through the exclusive use of various family members during the family life cycle, as well as change in function. This will be illustrated in the Case Studies chapter.

2.2 - HOUSING CONSIDERATIONS FOR SENIORS

2.2.1 - INTRODUCTION

Keiser (1978, 44) suggests that a majority of seniors prefer to stay in their traditional family home as long as possible. They are choosing to live by themselves rather than with relatives or with other people in the house (Miron 1981, 15). This is because these people are familiar with their house and with their neighbourhood and have established informal support services that allow them to remain there (Marshall 1987, 371-383). In addition, a study on seniors over seventy years old concluded that they did not like to make changes to their homes in order to accommodate any disability; 85% of those surveyed spent little or no time contemplating changes to their homes (Wister 1989, 279). In spite of increasing limitations, older people may stay in their homes beyond their ability to function competently or within a reasonable degree of comfort. They adapt to their environment or modify it to suit their limitations (Wister 1989, 279: Figure 2.10). In order to defer premature moving from the family home new housing should be designed to be as barrier-free as possible. It should also provide the infrastructure that allows the home to be easily adapted to accommodate older people as they become increasingly physically frail[1].

[1] The design criteria to meet these objectives can be found in APPENDIX I.

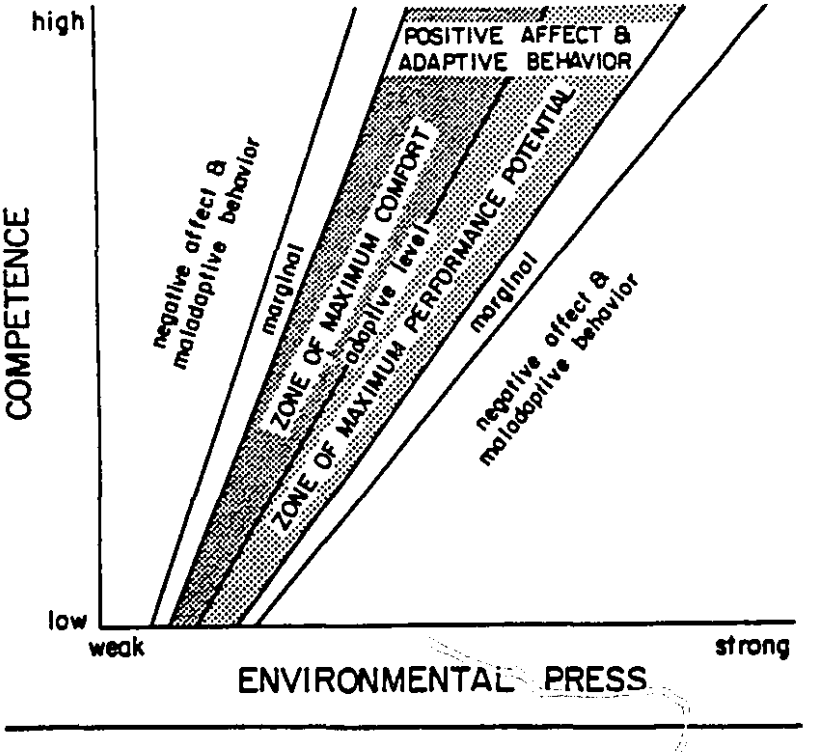


FIGURE 2.10 - ECOLOGICAL MODEL OF AGING
source: Wister, 1989

2.2.2 - PHYSICAL LIMITATIONS OF THE ELDERLY

The majority of people who reach retirement age are physically capable of functioning independently with little or no inconvenience. Approximately 36% have physical problems brought on by heart disease, hypertension, arthritis and diabetes (Marshall 1987, 411). Over 65% of these people live in single or semi-detached housing (Simon 1987, 3).

It is not until the age of 75 years that a significant number of seniors begin to lose the physical capability to carry out all daily activities without difficulty. Marshall (1987, 24) notes that almost 40% of those over 65 are in fact over 75 years old. The many activities that start to become difficult accumulate slowly over the ensuing years until certain daily activities become a major problem for these people.

At 85 years almost 22% have found it necessary to enter retirement facilities (Marshall 1987, 414). Even though these people have difficulty, 92% would prefer to remain in their familiar surroundings rather than being forced to move to retirement homes where they can obtain the necessary assistance (Dixon 1989, 8). Over 66% of those people over 85 are female and over 79% of these women are single or widowed and have had to rely on their own resources to maintain themselves (Marshall 1987, 528).

The Office for Disabled Persons of Ontario (1990, 2,3) outlines examples of the functions that diminish over time:

MOBILITY: Limited ability to work, move from room to room, carry an object for 10m, or stand for long periods.

AGILITY: Limited ability to bend, dress or undress oneself, get in and out of bed, cut toenails, use fingers to grasp or handle objects, reach or cut one's own food.

SEEING: Limited ability to read ordinary newsprint or see someone from 4m, even when wearing glasses.

HEARING: Limited ability to hear what is being said in conversation with one other person or two or more persons, even when wearing a hearing aid.

SPEAKING: Limited ability to speak and be understood.

Specifically relating to the housing environment the following observations have been made:

MOBILITY and AGILITY: The elderly gradually lose strength in their hands and limbs. Simple tasks become difficult or impossible: turning door knobs, opening bottles and jars, carrying not-so-heavy objects, climbing stairs, using certain types of light switches,

climbing in and out of bathtubs, sitting on low seats including toilets, bending over and picking up things off the floor, washing in sinks, kneading and cutting over kitchen counters, passing through cramped spaces, turning keys in locks and opening and closing heavy doors (Maltais 1988, 20-23).

LOSS OF BALANCE: The balancing mechanisms of the body slowly deteriorate leading to increased incidence in falls. A number of environmental factors in a home contribute to such incidences: poor lighting, poorly defined stairs, crowded room conditions, climbing to reach high storage, carrying objects such as laundry up and down stairs, and hurrying to answer telephones or door bells (Maltais 1988, 21).

2.2.3 - CONCLUSIONS

In conclusion, the need for flexibility of spaces in the home has become apparent as a result of the changing demand for space, which increases and then decreases over the period of the family life cycle. The function of spaces in the home changes as well during the family life cycle, often due to the family pressure brought to bear on those spaces at a given point in time. This change in demand on space could be due to an increasing or a decreasing demand. How members of the family are able to function in those spaces during the various stages of their lives is important in how they are able to cope with the house as a whole. The house has to remain "user friendly" throughout all stages of life if it is to accommodate people at all stages of the family life cycle. Some examples by which this can be accomplished are outlined in APPENDIX I (DESIGN AIDS FOR THE ELDERLY).

CHAPTER THREE: SPACES AND FLEXIBILITY IN THE HOME

This chapter is devoted to the review of literature on the physical and environmental aspects of the home. It reviews the traditional "spaces" and "elements" in a single-family home and how they are used by the occupants. It then reviews how their function and use change during the family life cycle and how flexibility in the home has been utilized in housing both in North America and abroad.

3.1 - SPACES IN THE HOME

3.1.1 - INTRODUCTION

In order to understand how the various spaces in the home are utilized, it is important first to determine their traditional use and configuration and secondly the need for flexibility in them[1]. Case studies are then used (Chapter 4) to see how the spaces are actually used by different families. Keiser (1978, 207-216) divides the house into zones: Public, Operative, Semi-Private, Transitional and Private (Figure 3.1).

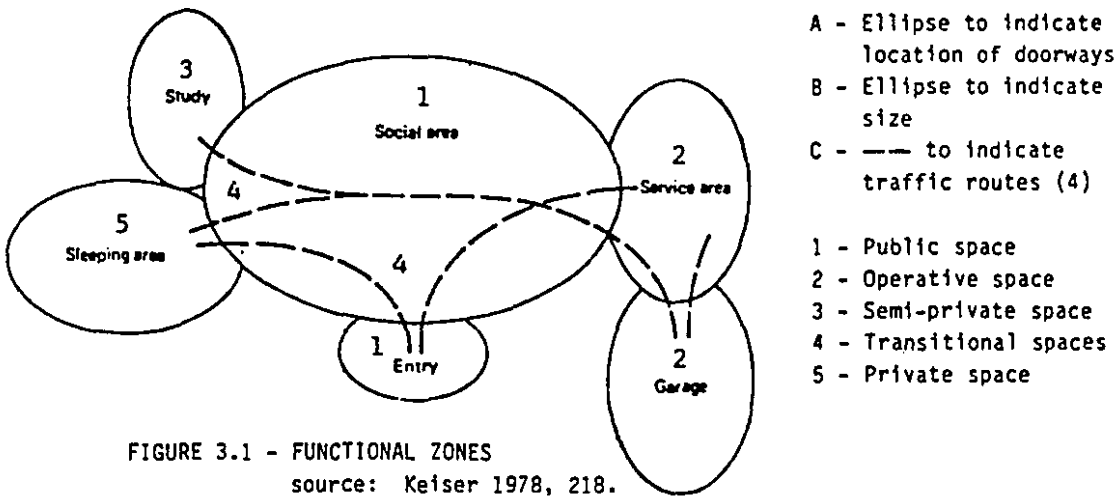


FIGURE 3.1 - FUNCTIONAL ZONES
source: Keiser 1978, 218.

[1] The traditional use of spaces in the home is considered to be that proposed by the designers of the homes, ie: living, dining, kitchen, bedrooms, bathrooms.

Public Spaces include areas open to guests and include points of entry, living and dining rooms and family rooms. **Operative Zones** include the kitchen, laundry, work and hobby rooms and storage areas. **Semi-Private Spaces** include private spaces used in common, such as bathrooms, washrooms, studies and possibly a convalescent room. **Transitional Zones** include hallways and other circulation space. **Private Spaces** include bedrooms, dressing areas and personal en-suite washrooms. The cultural function of spaces has changed over time, such as bathrooms and kitchens assuming showcase status, but the basic function remains the same.

Even though public and private spaces are usually separated by transitional spaces, there is an inter-relationship between them as illustrated by Chermayeff and Alexander (Figure 3.2). Here the importance of having separate zones of privacy for adults and children is aptly shown. Chermayeff indicates a need for "locks" between the three main functions that surround the family meeting space. Those three functional spaces are the public "community" side and private space both for the parents and for the children. This sense of total privacy is fundamental to the well-being of the household, especially as children reach adolescence. However, it is just as essential to have a communal space where the diversity of family interests can meet and mix.

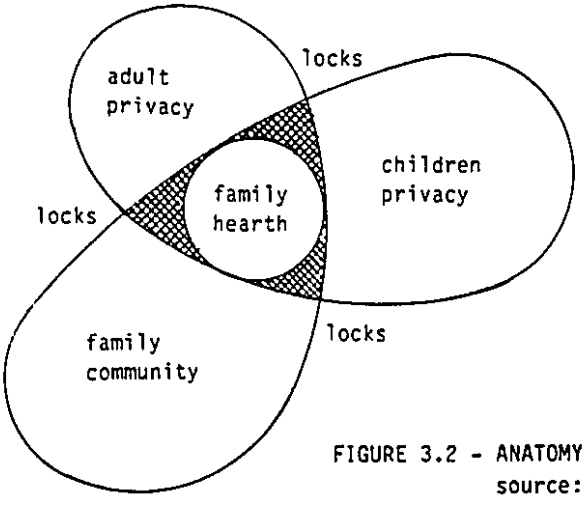


FIGURE 3.2 - ANATOMY OF DWELLING: PEOPLE
source: Chermayeff, Alexander 1963, 210.

Alexander (1977) aptly sums up space and privacy in the North American context:

> Unless the spaces in a building are arranged in a sequence which corresponds to their degrees of privateness, the visits made by strangers, friends, guests, clients, family, will always be a little awkward (Alexander 1977, 610).

Locks act as a transition point between these major zones and ensure privacy at each hierarchical level (Chermayeff, Alexander 1963, 213-218).

The function of each space needs to be defined in order to determine its proper identification throughout the family life cycle, since some spaces in the home change function as demand on space changes during the cycle. The description of spaces is outlined in APPENDIX II.

3.1.2 - ZONES IN THE HOME

Keiser (1978, 199-214) has divided the home into zones and along with Sayegh (1987, 395-399) has described the traditional spaces in the North-American home and their uses. Based on the works of Keiser and Sayegh each functional zone is described as follows:

.1 - PUBLIC ZONE: The public spaces are those that are used to receive and formally entertain people from outside the home (including extended family, friends, neighbours, business associates, and sales representatives). The public zone acts as a buffer between the outside world and the occupants. It is also the "showplace" of the house and includes the front entrance, living room and dining room. Teasdale, Wexler (1986, 214) observe that the public zone is least often affected by family pressure on space since it is the formal portion of the home, although the

dining room can be used for many other functions such as hobbies, studying and the home office.

.2 - OPERATIVE ZONE: The operative zone includes the various work areas of the household. This includes the kitchen, laundry, work room, storage areas and garage. The operative zone is often a multi-purpose work space. Many chores are performed in these areas during the period of a week or a month. Over the family life cycle, these chores may change in frequency or in character due to changing family activities (Teasdale, Wexler 1986, 124,128).

.3 - SEMI-PRIVATE ZONE: The semi-private zone includes the family room, den/office, main floor washroom and a convalescent space. It is useful for accommodating overnight guests (e.g. den, family room), for informal entertaining of close friends and family and for care giving. During the family life cycle, this is the zone upon which the family's demand for space has the greatest impact. Teasdale, Wexler (1986, 68,76) observe that in basement spaces, these are also the first spaces that become private office space or an older child's private bedroom.

.4 - CIRCULATION: Halls, corridors and stairs are transitional spaces between functional areas. These spaces should be wide enough to allow movement of large furniture such as tables, mattresses and couches through them. They are also spaces that can double as access to shared family storage or operative spaces. If large enough, they can be spaces for furniture for these purposes as Rabeneck (1974, 105) further explains:

> The circulation space within the unit should be treated, as far as possible, as a room between rooms and not as an access link only.

.5 - PRIVATE ZONE: These are spaces that are devoted to personal activities characterized by the need for privacy, such as personal hygiene, resting, sleeping, dressing and lovemaking. The total area of this zone amounts to approximately one-third of the house (Sayegh 1987, 395). Alexander (1977, 669) is very adamant about the importance of privacy and sums it up with the following: "No one can be close to others, without also having frequent opportunities to be alone". Although these spaces are for the exclusive use of each family member, the greatest pressure is for greater privacy, especially with adolescents. When the children leave home, these spaces often are converted to other uses (e.g. taken over by a younger sibling, used by a parent for a hobby room or office) rather than being left for the exclusive use of the departed occupant (Teasdale, Wexler 1986, 93-97). Alexander (1977, 650) sums up space and privacy thus:

> Make a special part of the house distinct from the common areas and all the children's rooms, where the man and woman of the house can be together in private. Give this place a quick path to the children's rooms, but at all costs, make it a distinctly separate realm.

3.1.3 - CONCLUSIONS

Having defined the spaces in the home, the author will now be able to determine if the spaces in the case study homes are being used in a traditional manner. The next section deals with how flexibility has been developed and used in housing in the recent past and present and how the housing market and the retail furniture and hardware trades have responded to the changing trends.

3.2 - FLEXIBILITY IN THE HOME

3.2.1 - FLEXIBILITY IN HOUSING: AN OVERVIEW OF PROJECTS AND THEORIES

The idea of flexible housing in Europe and North America is not a new concept. Architectural pattern books produced by well-known architects of the nineteenth century in the United States proposed rooms of a generous size (e.g. 4.0m X 5.0m for a bed chamber) that could have been used for various purposes (Rabeneck 1973, 698). Since architects were more interested in the effect on aesthetics, flexibility was unconsciously part of their strategy for attaining good spacial relationships. As Downing (1873, 7) remarked: "It is far better to substitute wardrobes, or movable closets, than to sacrifice all space and elegance of arrangement to convenience". This observation was made about house plans with too many closets causing rooms to become too small. At that time homes were often designed for specific users rather than for the mass market which is a major factor in modern housing design (Gedion 1963, 364).

Flexibility as a design feature did not appear in modern architecture until 1927 when architect Mies Van der Rohe developed his steel framed apartment house for the Weissenhofsiedlung exhibition at Stuttgart, Germany. The interior partitions were plywood panels that could be installed wherever the tenant chose, giving the tenant an infinite choice of room layouts within his $70m^2$ of space (Gedion 1963, 552-3).

It was not until after the Second World War that flexibility in housing was studied systematically in Europe. This was an attempt to

humanize the post-war public housing that proved to be a social failure. Its regimented "International" style and infinite repetition resulted from the industrialization of the housing process (Rabeneck 1973, 698-699). Two concepts of flexibility evolved. The initial concept was that of design for **pre-occupancy flexibility**, which meant that units were adjusted to the occupants' life-style prior to their moving in. This was followed by the concept of design for **post-occupancy flexibility**, which meant that the units could be adjusted after the occupants had moved in. Changes in life-style experienced during the family life cycle were better accommodated by the latter approach. Five examples of units developed for **pre-occupancy flexibility** are described below.

Les frères Arsène-Henri, architectes, devised movable partitions over a continuous floor finish in 1955 in Rheims, France. As a result of their experience with this project the brothers developed three principles for housing (Rabeneck 1973, 703-4):

.1 Everyone should be able to fit out his own home as he wishes, including the right to make mistakes.
.2 His home should be personalizable.
.3 Each person should be able to make a creative act by organizing his space, based on the context within which he finds himself.

The S.A.R. (Stichting Architecten Research) methodology developed by Habraken of Holland in 1965 was characterized by non-structural "Infill" assembled by the proposed occupant in "Zones and Margins" within a general "Support" structure. The facades varied according to internal development. Habraken divided the dwelling unit into parallel zones or living areas, separated by margins which allowed for variability in the zones. The margins were the linear areas in

which services would be located (Figure 3.3). In order to assist users in planning their unit, the plan of the dwelling unit was over-laid with a 100mm X 200mm tartan grid. Interior walls were kept within the 100mm grid pattern so that they would fit the walls, storage units and bathroom modules, which Habraken called "detachable units" (Dirisamer 1976, 11-16).

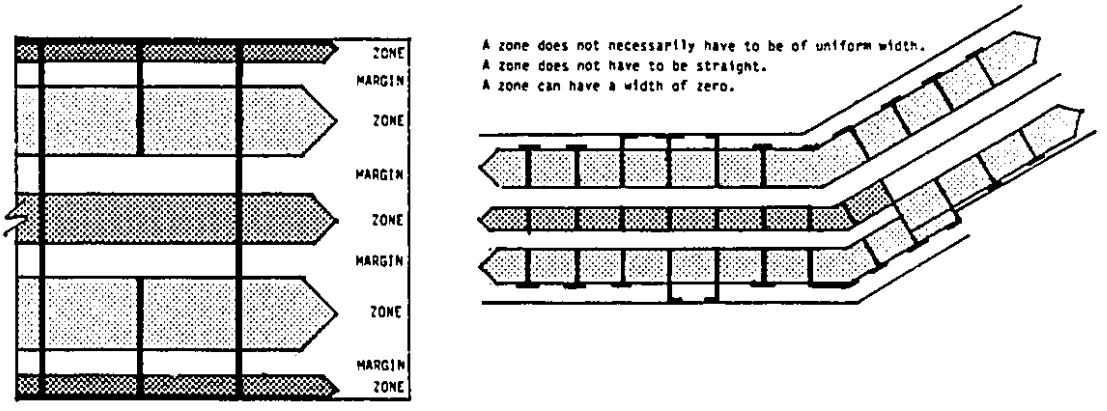
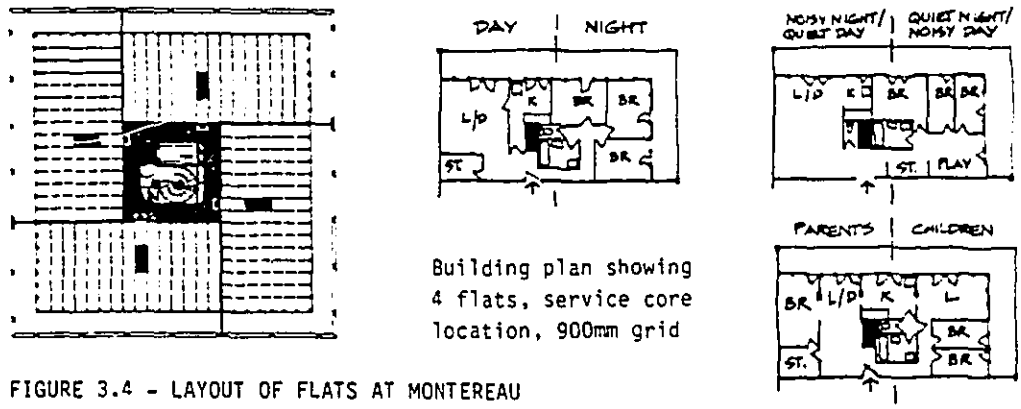


FIGURE 3.3 - ZONE DISTRIBUTION, S.A.R. METHODOLOGY
source: Habraken 1972, 55:

France, Germany and Sweden have been in the forefront of flexible housing design since the early seventies. In France, the impetus for the development of flexible housing were housing programs "Plan Construction" launched in 1971 and "Programme Architecture nouvelle" begun in 1972. Some significant developments resulted from these programs. In Montereau, France les frères Arsène-Henri built a 37 unit apartment with four flats per floor. The tenants were able to design their own units, based on their particular needs. They were guided by an architect who initially suggested ways of zoning the apartment space. There were movable partitions based on a 900mm module including wall, window and door units (Rabeneck 1973, 704, Figure 3.4). However, the results of a study by Martel and Ignazi (1974, 59-64) showed that the quality of

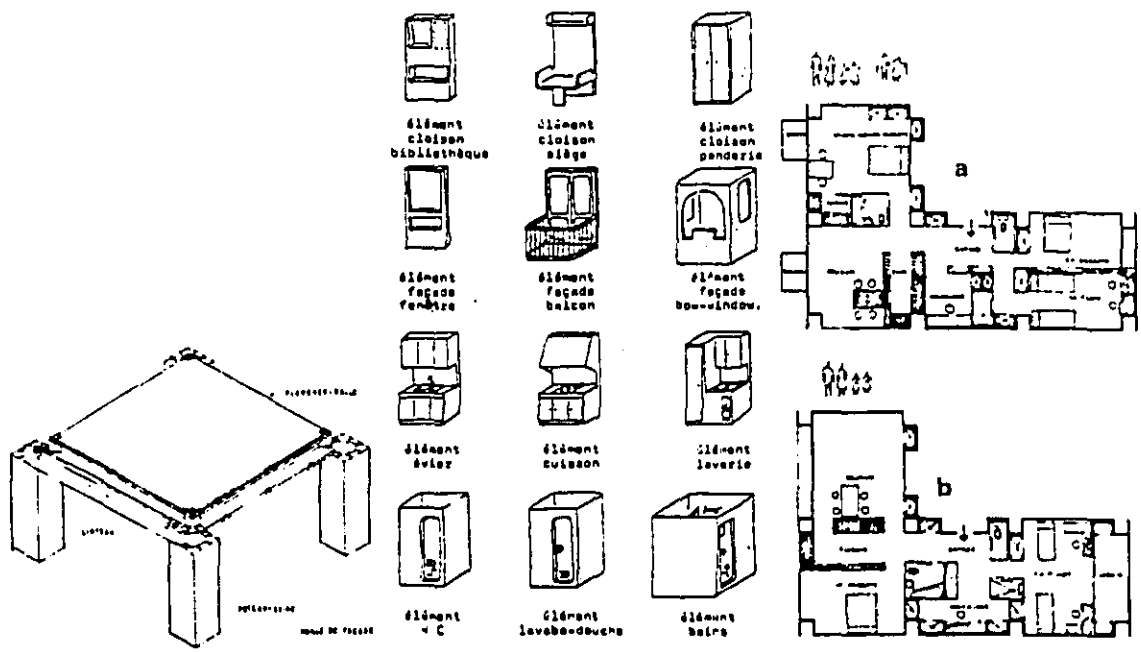


Building plan showing 4 flats, service core location, 900mm grid

Variety of zoning within flats

FIGURE 3.4 - LAYOUT OF FLATS AT MONTEREAU
source: Rabeneck 1973.

space was not up to the standard expected by well-to-do tenants and that low income tenants could not afford the rent. In addition, because there was a high turnover of tenants it was difficult to evaluate the true value of the flexibility of the units. A number of projects, all for multiple-unit dwellings, were built under these two programs. One other project of interest was in Val d'Yerres where 100 units were built using 15m^2 "space parcels"; these had modules for built-in furniture, kitchen and bathroom services which were interchangeable. Examples are found in Figure 3.5 (Rabeneck 1973, 707).



Construction principles of 15m^2 space parcels

Catalogue of interchangeable internal elements

Plans by occupants:
a) couple with 2 girls of 5 and 7 years
b) Same family with studio for their grandparents

FIGURE 3.5 - INTERCHANGEABLE COMPONENTS AT VAL D'YERRES
source: Rabeneck 1973.

In Sweden flexible housing has been promoted to the greatest degree by the housing cooperative HSB, founded in 1923. Typical of those developments are apartments at Gothenburg, built in 1954, and at Uppsala, built in 1964. Surveys by Olsson and Nilsson have concluded the following (Rabeneck 1973, 709):

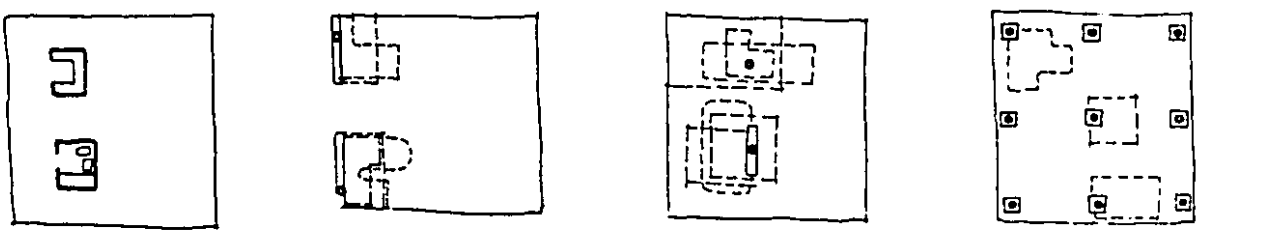
> "the results of the study support the assumption that the potential adaptability provided by movable walls and fixtures is popular with the tenants and that the mere knowledge that the layout of the dwelling can be altered, if so desired, has a positive effect on residents' satisfaction with their accommodation".

In Germany, as mentioned earlier, flexible housing got its start in 1927 at the Stuttgart exhibition with projects by Van der Rohe, Rading and Le Corbusier. It was not until 1971 however, that there was a serious pursuit of innovative designs. The 1971 contest, "Flexible Floor Plans" promoted centralized service cores and movable partitions as a means of creating flexibility for tenant users. A number of successful designs resulted from this competition. The second competition in 1972 called "Elementa" expanded the terms of reference. They included industrialized building systems for accommodating different unit types such as the apartments designed by architects Jourdan, Peterman and Posenenske which were built in Bonn. The third competition in 1973 was called "Integra". Industrialized modular building systems were used to create communities integrating industry and commerce with housing (Rabeneck 1973, 717,18). These three competitions expanded the concept of flexible industrialized housing to a community-wide scale.

Post-occupancy flexibility was demonstrated in the following two examples. In Switzerland, at Zug, a twelve unit apartment building by architects Kamm and Kundig used a system of standarized methods of

construction rather than an industrialized process. This allowed for changes to the dwelling unit throughout a family life cycle since infinite alterations were possible within the unit. All utilities were placed over the floor slab and a false floor was placed on top. The utilities were within the users' domain and responsibility and therefore could be changed to suit whatever layout they wished for their unit (Rabeneck 1973, 722).

A 1963 competition in Britain explored the possibilities of extendable housing, through add-on, add-in and adaptable scenarios. The adaptable house was promoted in the Ideal Home Exhibition, both in 1962 and 1964 and emphasized core facilities (Figure 3.6), open plans and movable partitions which incorporated storage (Rabeneck 1973, 723. 1974 A, 83-85).



Core Type: alteration of kitchen is difficult and access predetermined

Fixed Wet Wall: offers wider choice of kitchen & bath design & relationships to adjacent spaces

Fixed Stack: wide choice of kitchen and bathroom layout.

Choice of Stack: offers very wide choice but depends on duplicating expensive services

FIGURE 3.6 - FLEXIBLE DWELLING BY SERVICE CORE TYPE
source: Rabeneck 1974 A.

Another proposal was to make the dwelling unit more adaptable by providing spaces of more or less the same size with generous openings between spaces, which would allow "occupant choice through ambiguity" (Rabeneck 1974 A, 90). In combination with some flexible elements such as movable storage, this would provide the necessary choice for the user (Figure 3.7).

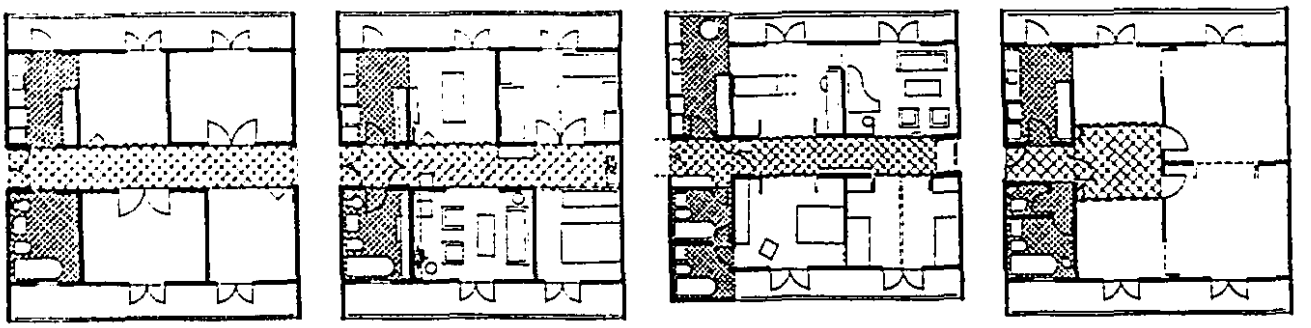


FIGURE 3.7 - ADAPTABLE HOUSING, ALTERNATE LAYOUTS
source: Rabeneck 1974 B, 106-107.

It was pointed out that this was the way dwellings used to be built prior to the need to economize on space and the necessity for the "fine tuning" of rooms to meet functional needs exactly. "Fine tuning" has resulted in purpose-designed spaces that satisfy a particular function. While these are useful during a particular period of the family life cycle, such spaces are difficult to adapt to changing needs or to other functional uses.

Most of this post-World War Two housing has been multiple-family units designed and built for public or cooperative housing authorities. Prefabricated modular wall/window/door/utility systems have been used to attain flexibility, while in others the tenant has had the freedom to create his own home within the parameters of four walls. A majority of units have been designed to satisfy the need for the users' participation in the layout of their own dwellings. The main drawbacks have been the high cost of modular systems, or the fact that because the systems are often technically complicated users have felt incapable of handling changes themselves. An additional factor is that a majority of users do not stay long enough in their units to benefit from their custom layout or from its flexibility (Rabeneck 1973, 701). In some cases, the housing authorities have not allowed the users to

make any changes on their own, and in addition, they have had a policy of not making changes until they had a new tenant (Ravetz 1980, 437). Rabeneck further points out that enclosing generous spaces in a basic manner is much cheaper than creating smaller function-specific spaces (Figure 3.7). The adaptable approach emphasizes planning and layout rather than construction technique or services distribution. Generous spaces and openings between spaces minimize expression of room function and allow for greater adaptability (Rabeneck 1974 B, 107).

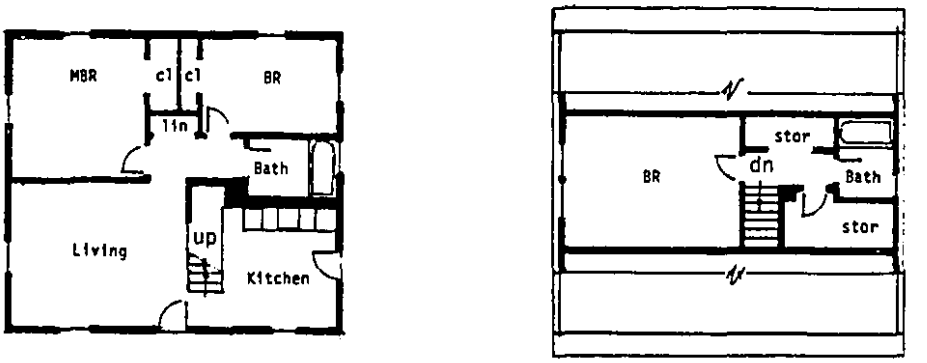
In conclusion, the European experience in providing flexibility in the home has not been an overall success. The quality of finishes have not been equal to those of more permanent and traditional finishes. The dwellings have been largely multiple-family in nature and of a minimal size. Although Canadian housing construction practices are far behind those of the United States and Europe (primarily because they rely on in-situ construction methods) the quality of finish and of space is equal or better. Some of the European methods of providing flexibility, such as movable walls and modular wall/furniture systems, can be adapted to Canadian housing, but they would have to provide distinct advantages over the traditional housing configurations in order to sell in the Canadian housing market.

3.2.2 - FLEXIBILITY IN HOUSING: THE NORTH AMERICAN CONTEXT

In the North American context, single-family housing and many forms of multiple-family housing are wood-frame stick-built. With the invention and production of the drywall partition system after the Second World War, there were many proposals for flexible and expandable single-family housing. Drywall systems allowed lightweight

partitions to be built that had the same quality finish as plastered walls. In addition, plywood was commonly used and the proliferation of wood veneers for plywood made it a popular finishing material. It was also used in movable partitions and closet room dividers. It is much easier to change drywall on wood or metal stud framing than the largely all-masonry building systems found in Europe.

In North America the expandable home became the popular means of allowing flexibility in the development of the home during the family life cycle. An example of expandable housing that became almost universal after the Second World War was the Cape Cod 1-1/2 storey house developed by Alfred Levitt for Levittown, N.Y. It was a small ($70m^2$) single-family house with a $32m^2$ unfinished attic which allowed the owners to expand their living space as their family grew (Figure 3.8).



First Floor

Second Floor

FIGURE 3.8 - THE EXPANSION ATTIC HOUSE
source: House + Home 1954, February, 123.

In Canada, thousands of similar units were built after the war to accommodate returning war veterans and their young families (Lawson 1947, 89, Figure 3.9).

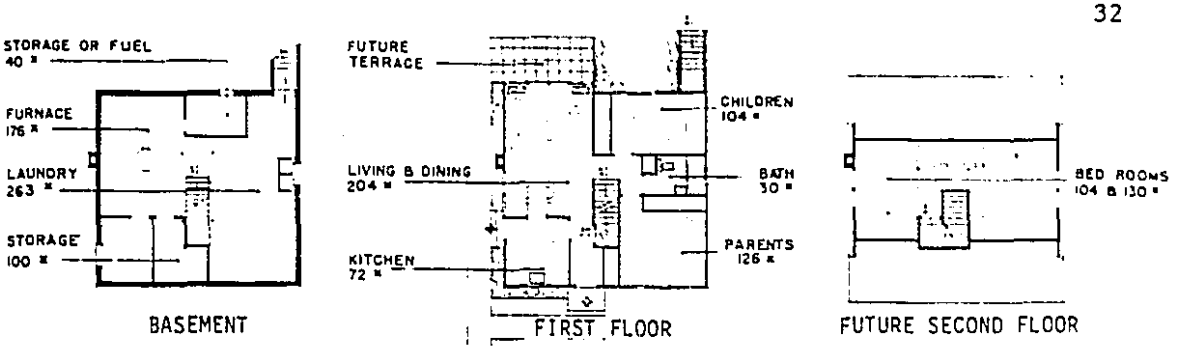


FIGURE 3.9 - THE EXPANDABLE HOUSE IN POST-WAR CANADA
source: Lawson 1947.

One of the most significant flexible houses was developed by architect Haydn Philips. In response to interviews with residents of Levittown, New York he proposed housing of 78m^2 with a minimum of fixed elements allowing maximum flexiblity throughout the family life cycle (Philips 1950, 128). The kitchen counters and the bathroom were fixed elements. All other spaces were created using modular closets and folding partitions. Two such layouts are illustrated in Figure 3.10.

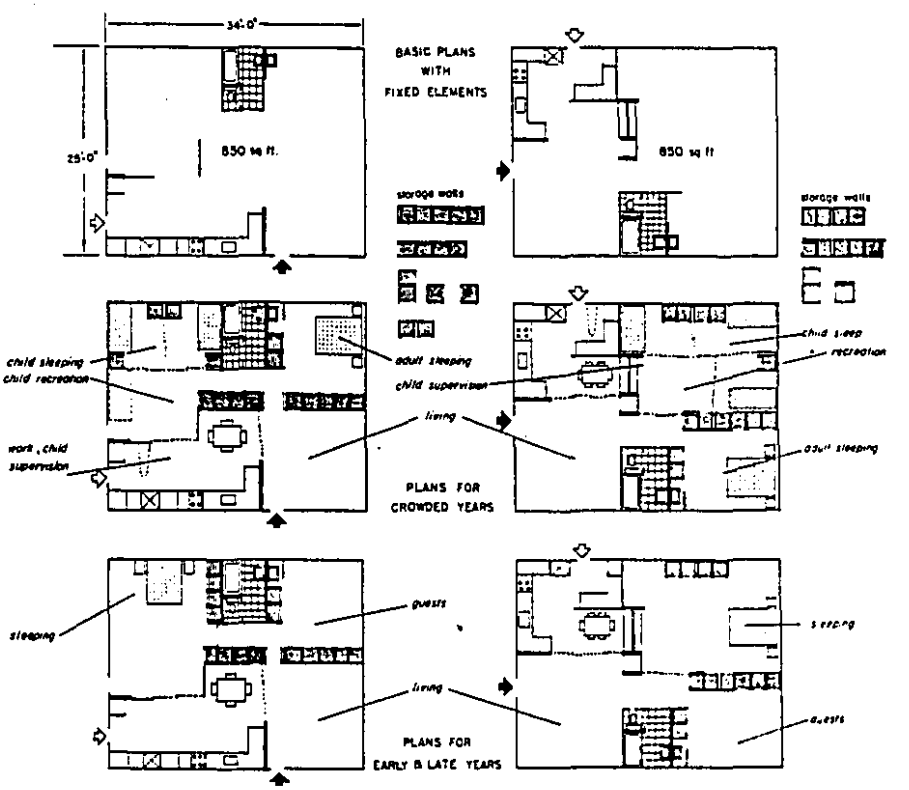


FIGURE 3.10 - FLEXIBLE FLOOR PLANS
source: A.F. 1950, April, 129.

Another design was developed by a Texan builder in 1952. Frank Robertson and his architect son, Frank Jr., developed and built a single-family house with stackable wall partitions and storage wall dividers (Luce 1952, 114-116). This allowed the owner to subdivide the house according to his needs during the family life cycle, including the creation of a separate apartment for tenants in the excess space. The main core of the house including the kitchen and dining room was fixed, but there was a space 18.3m X 3.6m with a bathroom at each end that could be divided 72 different ways using stackable partitions and storage walls (Figure 3.11).

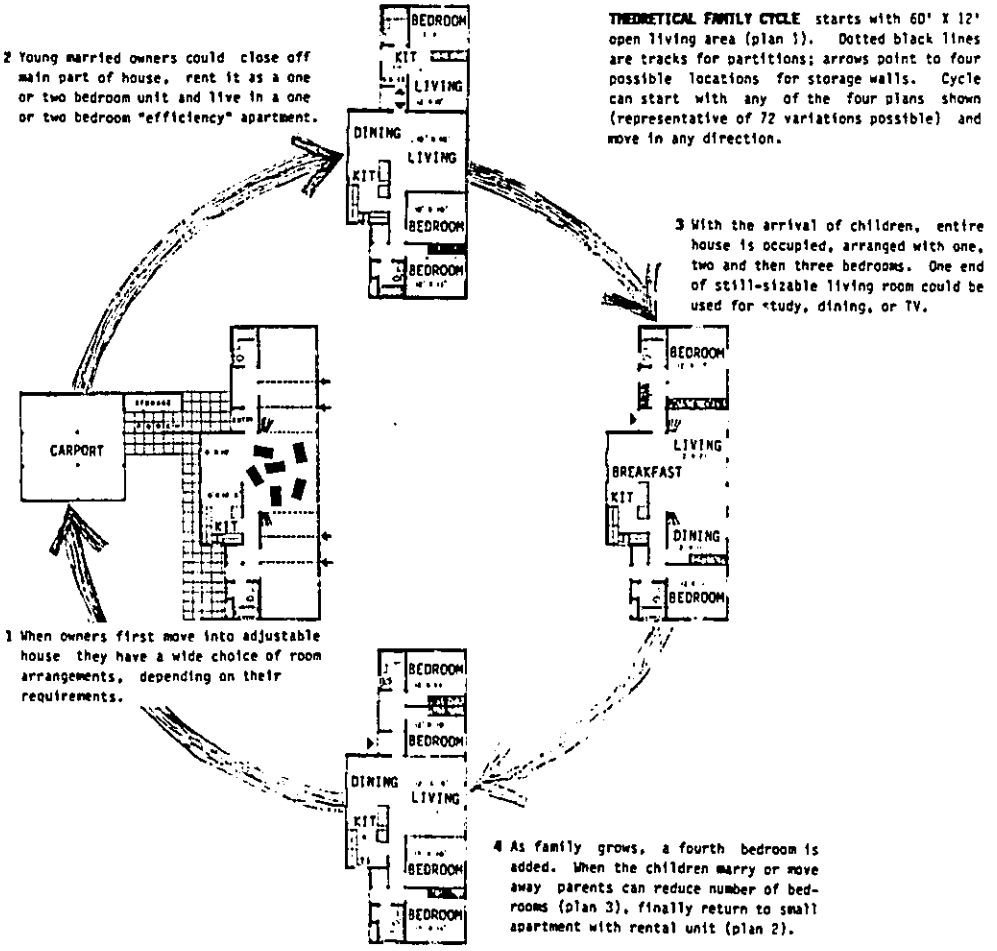


FIGURE 3.11 - ADJUSTABLE HOUSE, AS IT ADAPTS TO THE FAMILY LIFE CYCLE
source: House + Home 1952, December, 115:

In Canada, there has been little progress in the development of flexible housing beyond the marketing of minimally upgraded "loft" type apartments. Unlike Europe, where a major portion of the housing is public or cooperative, most of the housing in Canada is developed by the private sector. The housing market has traditionally supplied houses that have a fixed layout and are completely finished in permanent materials to emphasize their quality of construction (Levenson 1979, 29-30). Although there have been experiments in marketing like the adaptable house in Texas (Luce 1952, 116), the overwhelming majority of builders have remained very conservative in their housing offerings. They prefer to build proven designs rather than gamble on new concepts. Another consideration is that the Canadian consumer generally expects the homes to be completely finished and ready for occupancy.

Levenson (1979, 5) argued that flexible housing would provide more freedom of control for the user, create greater user satisfaction and reduce the necessity for major renovation to existing housing stock. He pointed out that the cost of flexible housing versus conventional construction was, at the most, 10% more and in some cases the same (Levenson 1979, 71). Harvey's critique of Levenson's proposal on flexible housing pointed out that there will be relatively little new housing in the future and that consumers will be recycling existing stock. Furthermore, elderly people will constitute a significant portion of the market with their own special needs. We now need to determine if flexible technologies would be cost effective and of any benefit to the consumer (Harvey 1980, 16-17).

Warshaw (1974, 1.1) points out that, depending on the stage of the life cycle and life style of the occupants, the use of spaces in the

home can be very different. Warshaw states: "We should be able to modify the relative surface of the areas allocated to any activity and even the topology of the housing unit itself". There can be intervention at various stages in the development of a home. It can be at the "Planning Stage", the "Selecting of Components Stage" or at the "Implementation Stage". He indicates that by separating the building envelope from the interior components the developer can control the quality of the building envelope, while allowing the occupants control over the quality of the interior components. These would be installed in accordance with their financial ability and life style (Warshaw 1974, 1.3,1.11) and would allow the occupants to install a variety of traditional or non-traditional layouts within the same building envelope. Warshaw outlines basic design criteria for the design of flexible housing (Warshaw 1974, 3.68-4.27):

.1 Components including partitions should be independent of the housing envelope, simple to use, easy to manoevre, adaptable, interchangeable, compatible and at various cost and quality levels.

.2 Storage should be regarded as furniture so that it is mobile, accessible, design specific, independent of location, sized to use and available at various costs and qualities.

.3 Other components within the home should be systematized or made interchangeable so that they can be moved, deleted or otherwise modified to suit the life style of the occupant.

Warshaw (1976, 1.5) further develops these criteria by systemizing the functions and components of a dwelling. The elements that comprise

the interior of the home are divided into nine categories:

.1 PARTITIONS: All elements used to separate the interior spaces.

.2 STORAGE: All elements that serve as storage units for objects found in the home.

.3 FINISH AND DECORATION: All elements used to create change to a surface or volume.

.4 SUPPLY SYSTEMS: Electrical and mechanical systems.

.5 KITCHEN EQUIPMENT: All equipment used in storage preparation and distribution of food.

.6 HYGIENE EQUIPMENT: All elements used for personal hygiene.

.7 MECHANICAL AND ELECTRICAL EQUIPMENT: All equipment used to maintain the interior atmosphere and for cleaning and housekeeping purposes.

.8 FUNCTIONAL FURNITURE AND EQUIPMENT: All other furnishings not previously described.

.9 JOINTS AND FASTENERS: All elements used to install or to combine other elements.

The components then can be broken down into classes of level of assembly:

.1 MATERIALS AND PRIMARY PRODUCTS: All elements that can be used to make up a product, system, or assembly.

.2 PRODUCT: Elements usable by themselves.

.3 SYSTEM: Groups of elements which can be assembled into different combinations.

.4 ASSEMBLY: Self-contained units utilizing several products in a relatively fixed combination.

The components then have to be evaluated to determine if they are compatible with the concept of flexibility: they may be compatible or acceptable, modifiable, problematic, or unacceptable. Warshaw further reiterates that any flexible system has to be usable by consumers with limited technical comprehension or management skills in planning for and modifying such a system (Warshaw 1976, 1.5-1.12). He concludes that flexibility can be accommodated by the Canadian building industry but must be done in context with the existing building trades and practices (Warshaw 1976, 1.1. Friedman 1987, 30).

In conclusion, the Canadian housing consumer has not been exposed to the concept of the truly flexible home. Most single-family housing is designed for the growing family with little ability to expand or contract functional spaces within the building shell, although the type of construction is relatively easy to modify by skilled tradesmen. The Canadian consumer is also very jealous of his privacy and many of the components used to provide flexibility do not furnish adequate noise separation. The conservative nature of the housing industry, as well as that of the consumer, has delayed the introduction of flexibility into the housing market.

3.2.3 - RECENT TRENDS IN FLEXIBILITY FOR THE HOME

Standards for detailing the elements in houses such as light switches, door knobs and counter tops have been developed over the years through gradual improvements as well as evolutionary change. Conversion of homes to electricity, a revolutionary change, was accomplished by modifying existing gas lighting fixtures without changing the appearance of the lighting appliance significantly. This

same analogy can be applied to the design of the spaces and function of the home. For some decades, the home was specifically designed to accommodate young families and families in other stages of the family life cycle, leaving non-traditional users to adapt themselves to the standard home (Denhez, 1989, 17). Presently, the marketing of new homes has diversified to include for many non-traditional families, such as childless couples, retirees and single parent families that now make up a significant segment of the housing market (Figure 3.12).

HOUSEHOLD TYPE	1941 (%)	1951 (%)	1961 (%)	1971 (%)	1981 (%)
FAMILIES:					
- maintaining dwelling	92	90	94	97	97
- living alone	—	—	79	84	88
INDIVIDUALS:					
- in families	86	87	88	87	85
- non-family	14	13	12	13	15
- non-family living alone	—	14	20	20	47
PRIVATE HOUSEHOLDS					
- with lodgers	—	—	19	16	12

FIGURE 3.12 - INDICATORS OF UNDOUBLING, CANADA - 1941-81
sources: CMHC, 1987 Housing.

A fast growing segment of the market is housing for retirees and the young elderly. This has resulted in the production of different forms of housing, such as single-storey row-house condominiums and two-storey family homes that have provision for a main floor bedroom and an elevator[1]. Homes are being designed to accommodate the physically handicapped in order to permit the elderly to stay in their family home as long as possible, even when they have physical limitations that would make it impossible to stay in the traditional family home[2]. The

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1 "The Landmark of Hunt Club" - is an example of a condominium housing development designed specifically for "empty nesters" by Tamarack Developments Corporation, Ottawa: 1990.

2 The following sources indicate that the retail market is starting to respond to providing greater flexibility in housing and home furnishings and fitments and is responding to those who have physical limitations.

demonstration home built by the American National Association of Home Builders included modifications to the height of electrical outlets, from 300mm to 550mm, all doorways a minimum of 915mm wide, a built-in space for a future elevator, the laundry on the same level as the bedrooms and a den/bedroom on the main floor[3] (Figure 3.13).

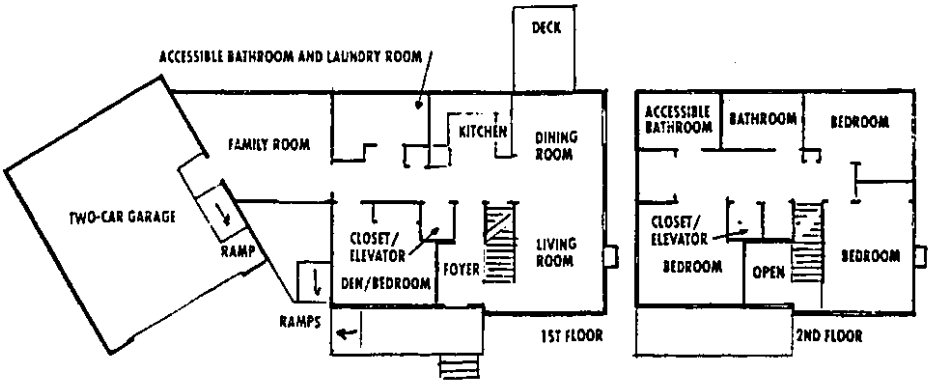

FIGURE 3.13 - ACCESSIBLE HOUSE BY NAHB RESEARCH CENTER
source: Popular Science 1990, September, 51-54.

More flexibility can now be built into the home by using movable partitions, recently introduced from Sweden, which give the user more freedom to modify spaces as demand during the family life cycle requires[4] (Figure 3.14). There are a number of commercially used partition systems available in the market that, with minor modifications, could be used residentially. Most have a strong modular appearance that would be difficult for homeowners to accept aesthetically. The need for systems to be simple and require only simple tools eliminates many existing systems, though minor modifications to suit the residential market could make many systems viable and cost competitive (Yamin 1989, 161-168).

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3 DiChristina, M., 1990, "Anytime House, Home Newsfront." Popular Science. New York: September, 51-54.

4 Lusk, F., 1990, "A House for all Seasons." Popular Science. New York: April, 94,95.

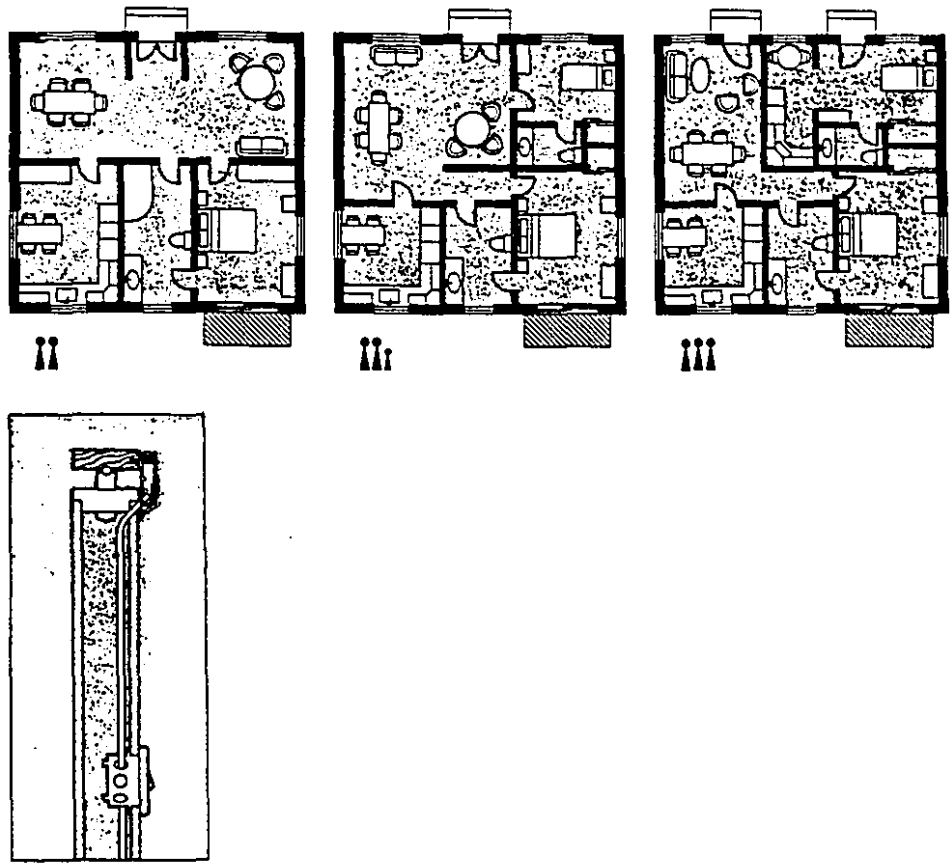

FIGURE 3.14 - DEMOUNTABLE PARTITIONS BY SKARNE SYSTEMS DEVELOPMENT
source: Popular Science 1990, April, 94,95.

The Freedom Kitchen, sponsored by Canadian Living has made the kitchen more accessible to both the handicapped and the elderly who are physically limited[5]. The variable-height counters are also more comfortable for people who are short or tall who previously have had to adapt themselves to the standard counter height of 915mm. There are many other elements in the Freedom Kitchen that are now being used to assist those with limited physical ability. These elements also are easier for the physically fit to use as well. They include above-counter ovens, 'D' handles on all doors and drawers, lever handles on faucets, and storage cabinets on wheels so they can be moved closer to the work station (Figure 3,15).

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5 Jennings, L., 1990, "The Freedom Kitchen." Canadian Living. Toronto: April, 156-159.

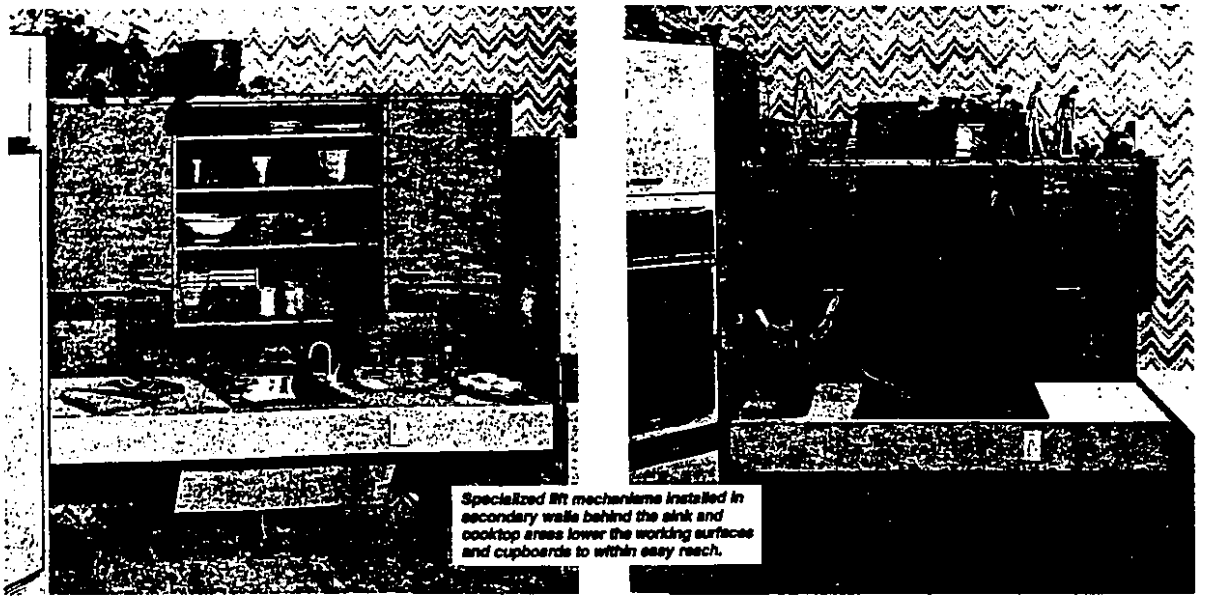

FIGURE 3.15 - FREEDOM KITCHEN - MOVABLE COUNTERS
source: Canadian Living 1990, April, 158:

Many other items are commercially available or are gaining renewed popularity because they extend the use of elements in the home over a wider segment of the population. These include garage door openers, larger light switches, door-operated light switches for closets, light timers, lever-style door handles, stylish grab bars for bathrooms, bathtubs with seats, bedroom furniture suites with matching wardrobes (Figure 3.16)[6].

As Rabeneck (1974 A, 90) pointed out earlier, homes can be more adaptable if the rooms are slightly larger and very basic in fitments. Functions such as storage can be accommodated in portable units rather than built-in elements which permits the storage to be put where it is needed and in a more efficient form. This allows for easier adaption of spaces to diverse functions to meet the changing demands during the family life cycle. Built-in storage, because of its fixed nature,

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6 As an illustration, the following catalogues list assistive devices for the physically limited and portable storage in furniture form.
Value Guide '90. Canadian Tire Corporation Limited, Toronto: 163.
IKEA 1990. inter IKEA Systems B.V., Richmond, B.C.: 94-114.
SEARS Fall and Winter '90. Sears Canada Inc., Toronto: 356,357. 694-697.

either has to be used as-constructed and is therefore less efficient than portable purpose-specific storage, or must be modified at some expense to adapt it to a specific use (Figure 3.16).

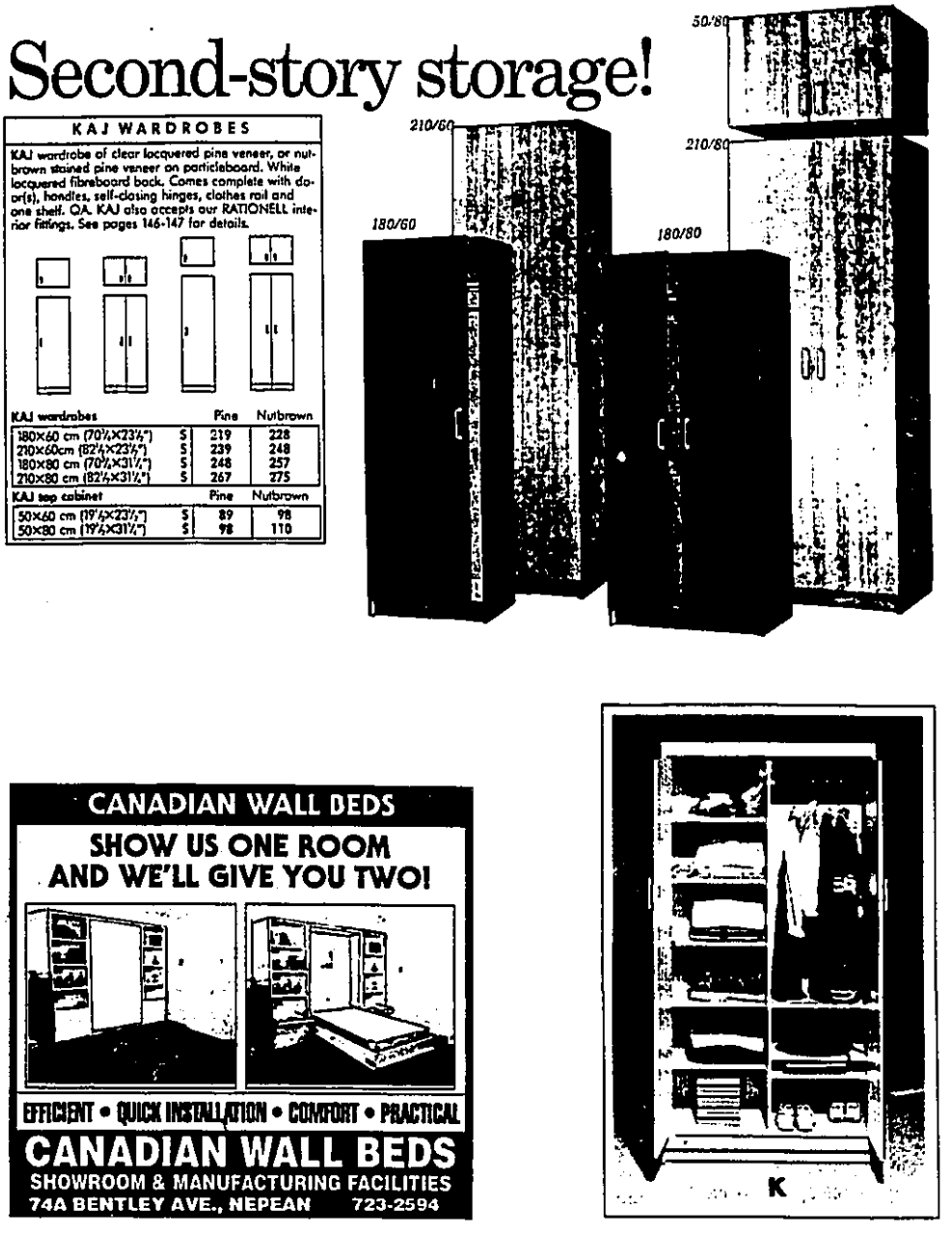


FIGURE 3.16 - MOVABLE STORAGE UNITS
source: Various Catalogues, see footnote 6

3.2.4 - CONCLUSIONS

Though there have been many experiments in both pre-occupancy and post-occupancy flexibility in Europe, Rabeneck (1974B) implies that many of these flexible systems, though having a certain intellectual appeal, have proven to be relatively expensive compared to stud and drywall systems, unattractive in that they are unavoidably modular in appearance and complicated to change for the average consumer. North Americans prefer more substantial and permanent looking finishes than flexible systems can emulate. The expandable home has provided the flexibility to growing families, especially since the Second World War. Though in more affluent times this type of home was seldom offered it is gaining popularity in present times as a starter home. However, the expandable home does not address the needs of families in the latter stages of the family life cycle. Once the space is developed for the growing family it becomes surplus to the needs of "empty nesters" in the latter stages of the family life cycle.

The housing market has to respond to changing family compositions other than the traditional family which is now in the minority. Building in greater flexibility and adaptability would make the housing attractive to a wider market segment.

Flexibility should not be restricted to concepts of movable partitions or storage systems or unfinished space. The home should also be adaptable to people of different heights and physical capabilities. Adjustable counters and appliances that can be modified to suit the user are important as well. Building into each home the capability to make the home environment barrier-free should be a requirement regardless of the target user.

CHAPTER FOUR: CASE STUDIES

4.1 - INTRODUCTION TO CASE STUDIES

The purpose of the case studies is to find out what areas and components of the house undergo changes or have different demands for use during the family life cycle. The single-family home was chosen because it has remained the main North American form of housing. Alexander (1977, 393) suggested that the majority of families ultimately prefer to own and maintain their place of residence.

> People cannot be genuinely comfortable and healthy in a house which is not theirs. All forms of rental - whether from private landlords or public housing agencies - work against the natural processes which allow people to form stable, self-healing communities.

The case study houses were chosen as examples of single-family housing that would be considered the preferential form of family housing in Canada. Miron (1986, 6) states that 57% of housing in Canada is single-family. This form of housing should better reflect trends in living preferences for the population as a whole, "since living preferences are reflected in the social status of economically better placed families, their homes and furnishings" (Deilmann 1973, 13).

4.2 - STUDY PARAMETERS AND METHODOLOGY

The five case studies were families known to the author for most of the time period studied. The common parameters were the following:

.1 Single-family bungalow;

.2 Traditional family of mother, father and at least two children;

.3 The family lived in the house for at least fifteen years;

.4 The house is the second or third home lived in by the family.

The means by which the five case studies were presented was to break down the observations and findings into six areas in the following order:

.1 A summary of the questionnaire for each residence.

.2 Floor plans illustrating events and changes occurring over a period of at least fifteen years.

.3 A summary of changes that occurred to each residence in table form.

.4 An analysis of the factors that created changes in the households for each residence.

.5 A discussion on how greater flexibility in the design and fitting out of each residence could improve the compatibility of the house with its occupants during subsequent stages of the family life cycle.

.6 Floor plans illustrating how flexibility could be implemented in each residence to extend the use of the home for the remaining stages of the life cycle for each particular family.

To assist in the comparative analysis, other data was collected as background information:

.1 The ages of the parents and children at the time of moving in were established for each family in order to determine its stage in the family life cycle. This would allow comparative analysis at various stages of the family life cycle with regard to the demands on space by each household.

.2 The reasons for moving into the house were determined.

.3 The parents were asked if they had any input into the design of the house at the time of purchase.

.4 The parents were also asked if there were any features of the house that they particularly liked or disliked. If there were features that they disliked, they were asked if they had changed them in subsequent years.

.5 If changes were made, the parents were asked how those changes were made and who helped them in both the planning and implementation stages.

.6 The parents were interviewed to see if there were changes to the house they would like to make in the near future to correct perceived deficiencies or to add life-style conveniences they would like to have. This was done to evaluate whether the house would continue to provide the type of environment necessary to continue to live in their present home.

.7 All changes in the use of rooms and layout of furniture during the period of occupancy of each house were traced during interviews with the owners.

.8 A floor plan of each house was drawn up, including both the main floor and the basement. If there were renovations to the house, these were added to the floor plans. Furniture layouts and the use of each room were plotted for each major renovation or major family event. The drawings begin with the initial layout and conclude with either the present arrangement or the final layout prior to moving out of the residence.

A questionnaire was designed in order to ensure that comparative information was collected (APPENDIX III). Using copies of the floor plans of their house, each household was asked to indicate where each member of the family resided after any major renovation, or between major family events. They were also questioned on the use of other semi-public or public spaces in the home during each interval.

The case studies demonstrated how spaces in the home changed use or function when pressure from family members was exerted on those spaces during the family life cycle. This included personal space, common spaces that took on multiple functions, spaces that changed in use, and new spaces that were created either by utilization of existing unfinished space, or by additions to the house. The information that was collected in the interviews also helped to determine which spaces underwent the most changes during the family life cycle and whether the rooms were appropriately furnished for the various functions they served.

4.3 - KEY TO FLOOR PLANS AND HOUSEHOLD CONFIGURATION

The rooms are labelled according to use. The major user of semi-private spaces at the time of each layout is also indicated. The following labels are used:

VES	= Vestibule	BATH	= Bathroom
LIV	= Living Room	WC	= Washroom and Shower
DIN	= Dining Room	cl	= Clothes Closet
EAT	= Eating Area	BED	= Bedroom
KIT	= Kitchen	P	= Parents: H = Husband, W = Wife
REC	= Recreation Room	1-4	= Children: in order of birth
DEN	= Study / Den	G	= Guest or Relative
WORK	= Work / Hobby Room	T	= Tenant
LAU	= Laundry	UNEX	= Unexcavated
lin	= Linen Closet	GAR	= Garage

The furniture is labelled according to type and area of primary use, where applicable:

ac = Arm Chair	dy = Dryer	sb = Side Board
be = Bed	fr = Freezer	se = Sewing Centre
bn = Bench	fu = Furnace	sh = Shelving
bs = Book Shelf	hw = Hot Water Tank	si = Sink
ce = Cedar Chest	kc = Kitchen Chair	st = Storage
ch = Chair	kt = Kitchen Table	t = Table
co = Couch	nt = Night Table	tv = Television
cr = Crib	pe = Play Pen	wa = Washer
ct = Coffee Table	pi = Piano	wb = Work Bench
de = Desk	pl = Plant	wh = Wood Heater
dc = Dining Chair	pu = Water Pump	wr = Wardrobe
dr = Dresser	rc = Rocking Chair	ws = Water Softener
dt = Dining Table	re = Refrigerator	va = Vanity

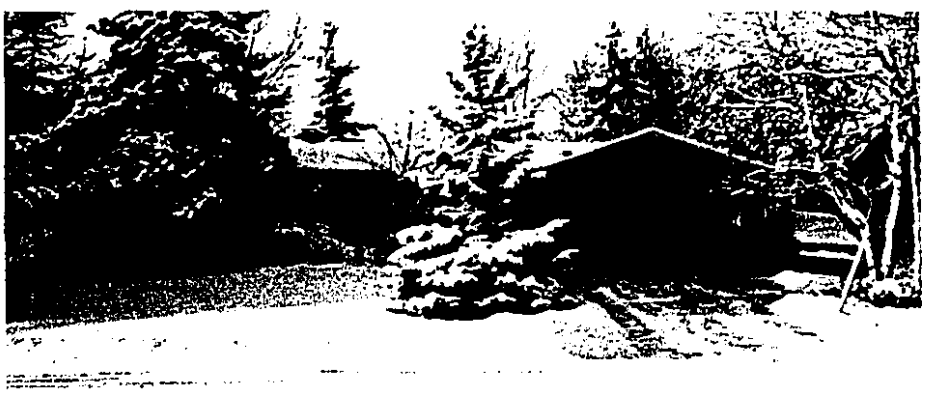
The families are identified as to age and composition. The stage in the family life cycle is indicated with a number as illustrated in Figure 2.2 on page 7. This appears on the drawings in the left hand corner of the title block as "LCS" followed by the life stage number.

SYMBOL	DESCRIPTION	AGE
	Mother-Father	<45
	Mother-Father	45-64
	Mother-Father	65>
	Child	<1
	Child	1-5
	Child	6-15
	Child	16>
	Relative	<45
		45-64
	Tenant	65>

4.4 - FAMILY HISTORY OF CASE STUDY HOUSES

Five homes were studied:

The first home, built in 1965, has been occupied by the same family from 1974 until the present. The family is comprised of two adults and two children. The children have been in the home since infancy and are now in their late teens, with the elder away at university during the school year.



The second home has been occupied by the same family since it was built in 1959. The initial family structure was two adults and four children. The children all left the family home during the late 60's and 70's and the parents presently occupy the home by themselves.

The third home was occupied by the same family for 17 years. It was purchased when it was built in 1953, while the two children were in their teens. After the children left home their parents sold the home in 1971, to move into an apartment.

The fourth home, built in 1964, has been occupied by the same family from 1969 until the present. The family is comprised of two adults and three children. The three children are now young adults and occupy the house only when home from university studies.

The fifth home was designed, built and occupied by the present owners in 1972. There are two children, both in their late teens.

4.5.1 - QUESTIONNAIRE SUMMARY AND FLOOR PLANS FOR RESIDENCE NO.1

Date of Construction.....1965

Date of Occupancy.....1974-06

Family Composition.....Father.....31.....Professional Consultant

Mother.....30.....Homemaker

1-Son.....3

2-Daughter...6 mos.

Reasons for Move.....Liked community

Wanted waterfront lot.

Input into House Design...None; bought house as second owner.

Features Best Liked upon

Occupancy.....Waterfront lot

Picture windows in LIV-DIN overlooking river

Cathedral ceiling in LIV-DIN

Space for expansion.

Able to put LAU next to KIT

Features Found Wanting....No Laundry facility

No visitor accommodation

Master Bedroom small

Disliked baseboard heating

Insufficient garage / storage space

Insufficient privacy between public and private areas of the house

Design for Changes by.....Self

Changes executed by.....Self and general contractor.

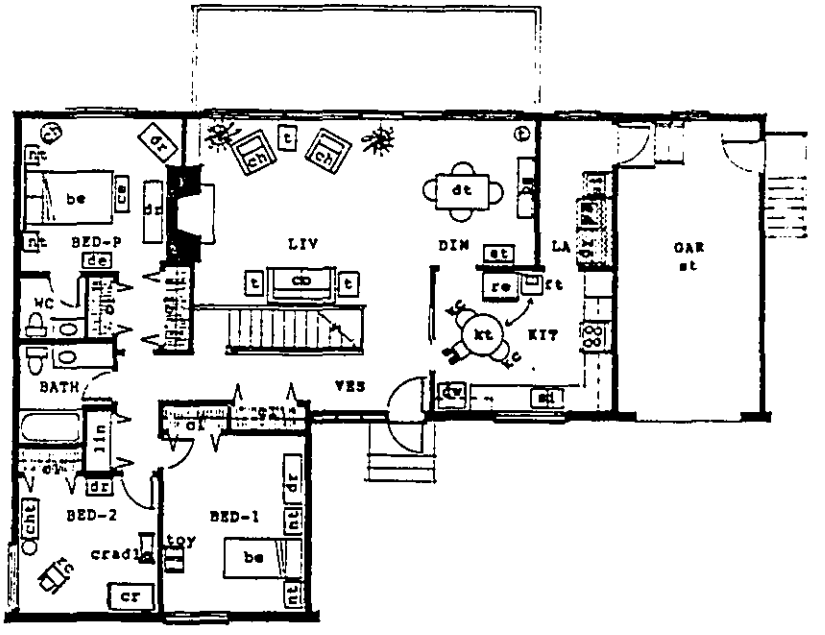
Deficiencies Rectified....1974 - Added LAU to Mud Room when moved in

Defic's Rectified Cont'd..1975 - Added Guest BED, BATH and BAR
Installed electric central heating
1977 - Enlarged BED-P, added STUDY and STOR at lower level for boats
1983 - Added 2-car GAR
1988 - Added bifold door in HALL between BED wing and VES
1990 - Added lockable door to create apartment for rent

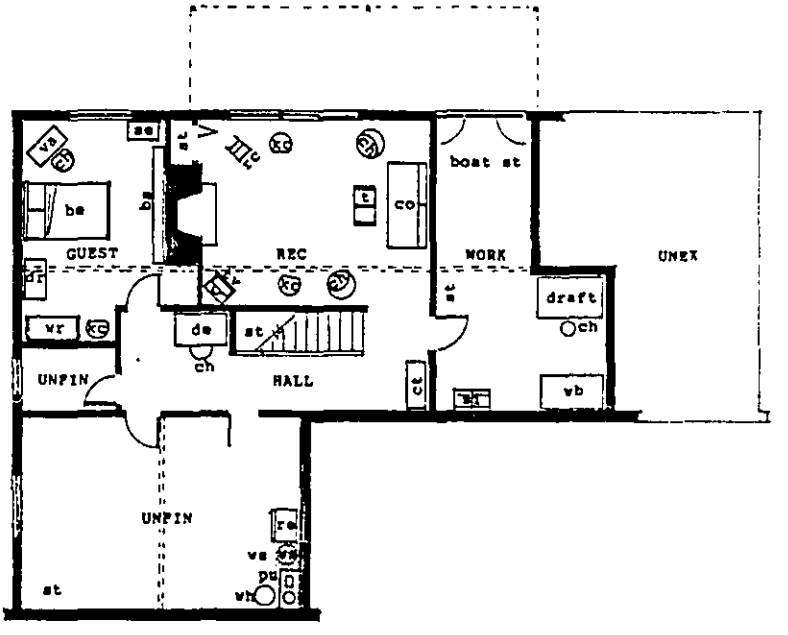
Present Household.....Father.....48.....Professional Public Servant
Mother.....47.....Professional Public Servant
1-Son*.....19.....Attending university
2-Daughter..17
* 1-Son home only during summer work period

Features Being Considered.Enlarging BED-2 and making space more flexible
Putting ensuite BATH and cl in STUDY
Enlarging main BATH and updating
Updating KIT including skylight over EAT area
Installing French doors in DEN/GUEST for future use as APT.
Installing movable partition between children's Bedrooms to make space more flexible, especially after they move out.
Removing Closets and using Wardrobes for greater flexibility in children's Bedrooms.

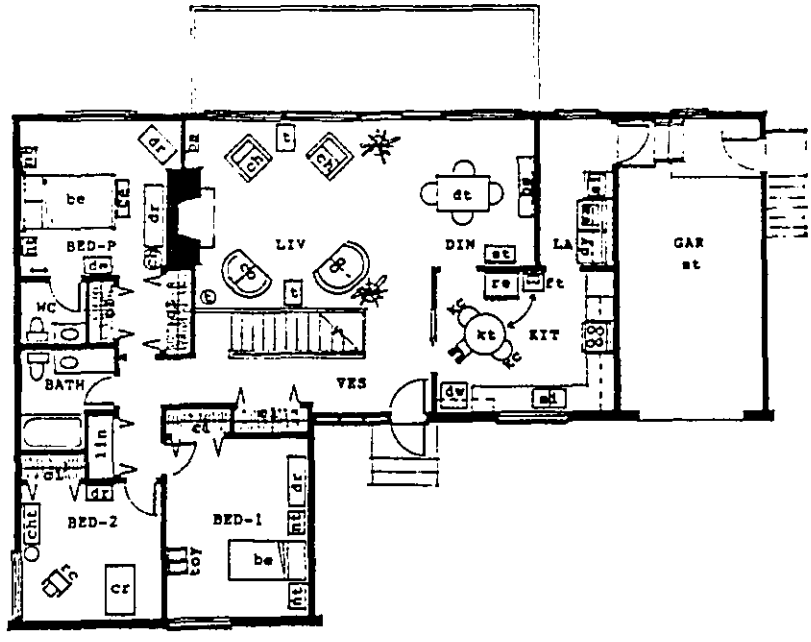
The following plans illustrate the changes that occurred in Residence Number One over the period of sixteen years.



EVENT CHANGES	No Laundry hook-up. Added Laundry to Mud Room when moved in.	RESIDENCE # 1 LEVEL MAIN YEAR 1974 SCALE 1:175
LCS 3		

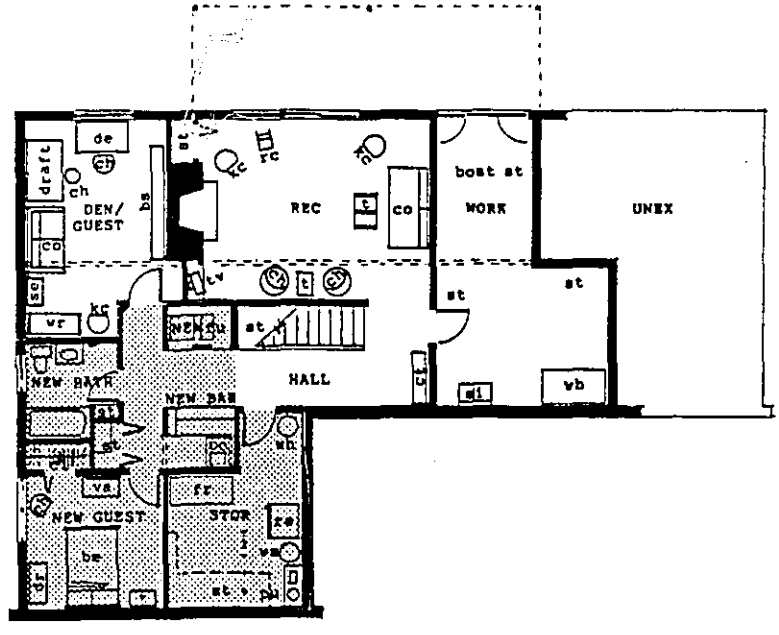


EVENT CHANGES	Water too hard for washing. Added Water Softener when moved in.	RESIDENCE # 1 LEVEL BASEMENT YEAR 1974 SCALE 1:175



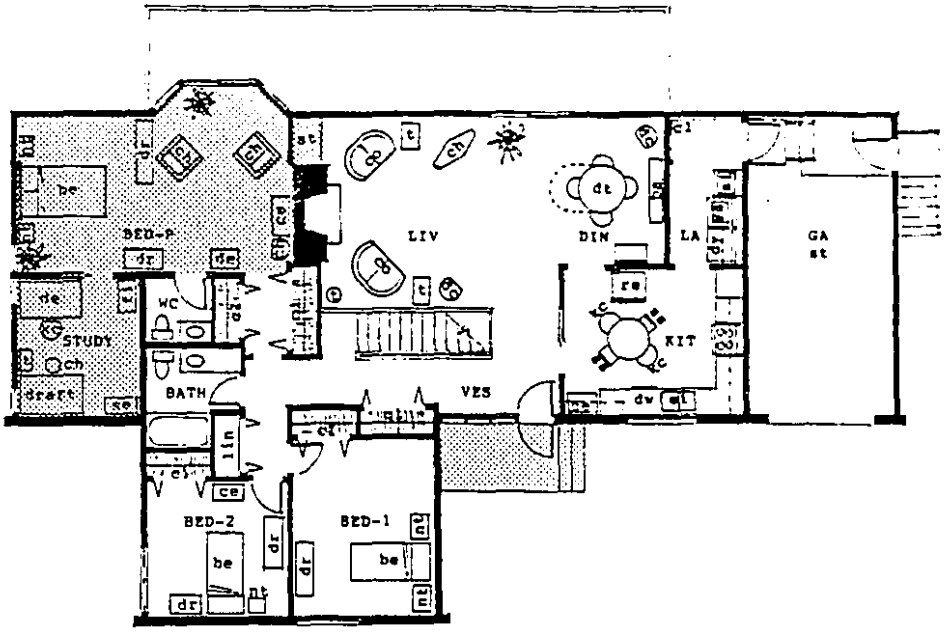
EVENT CHANGES: Parents finding BED-P too small for their furniture and no private place to relax away from small children.

RESIDENCE # 1
LEVEL MAIN
YEAR 1975
SCALE 1:175



EVENT CHANGES: Both Parents' extended families lived in another city. Built guest quarters in Basement including: Bathroom, Den/Guest Room, Bar, Guest Bedroom. Did not like baseboard heating. Installed forced air furnace. Relocated hot water tank in Storeroom.

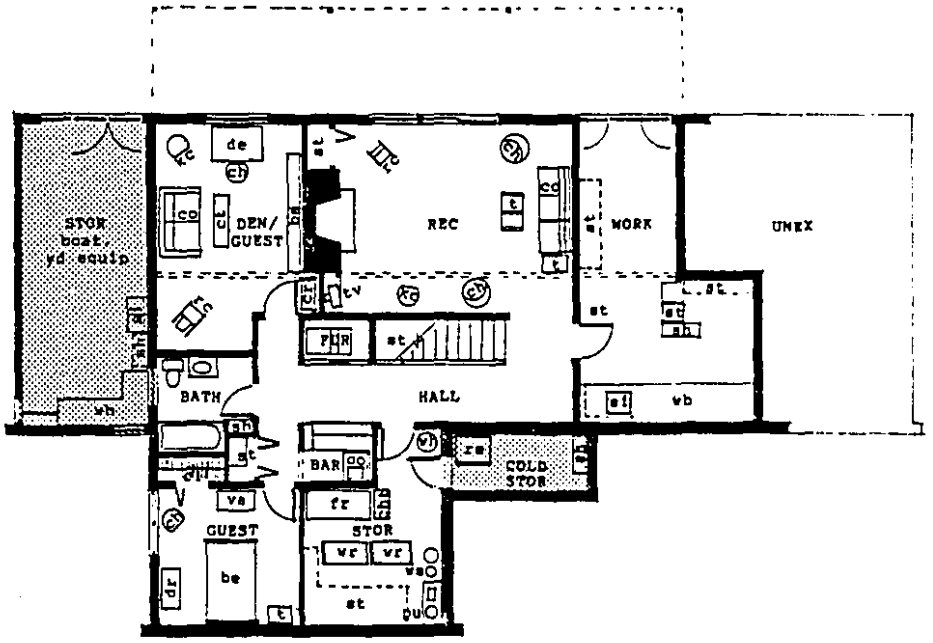
RESIDENCE # 1
LEVEL BASEMENT
YEAR 1975
SCALE 1:175



EVENT CHANGES: Enlarged Master Bedroom to give Parents more privacy. Also added Study for Husband's business. Added bay window in BED-P for view from sitting area. Put BED-P window in Garage so better match to others in house.

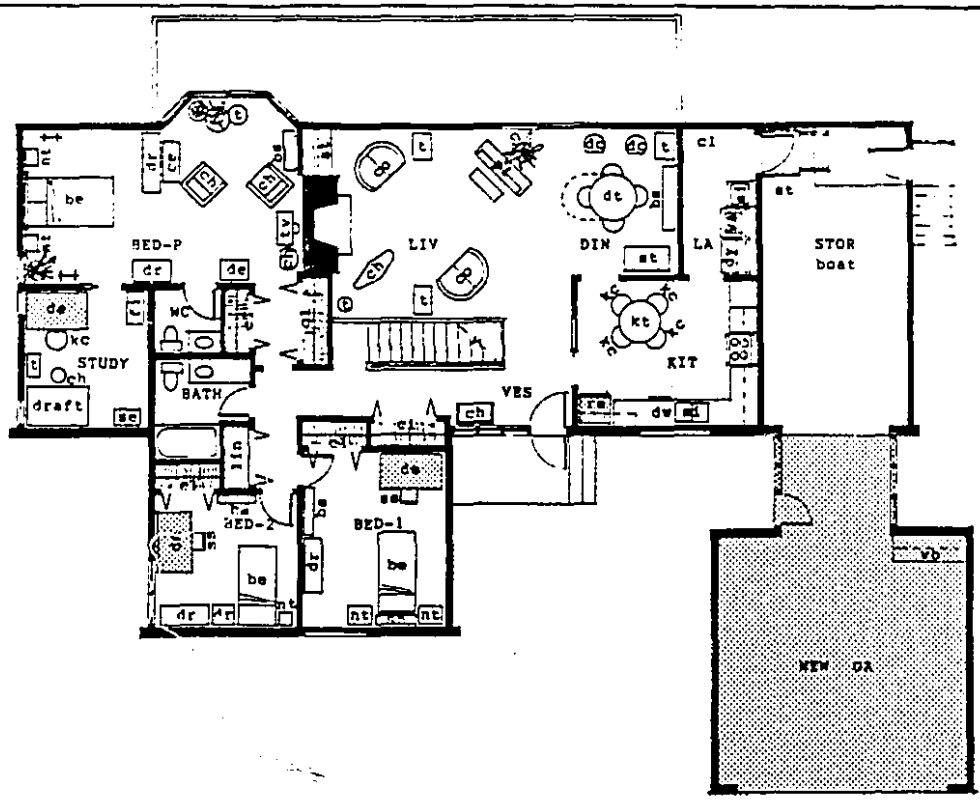
LCS 4

RESIDENCE # 1
LEVEL MAIN
YEAR 1977
SCALE 1:175



EVENT CHANGES: Built Storage Garage under new BED-P for boats and yard equipment. Added Cold Cellar under front stoop to store gardening produce.

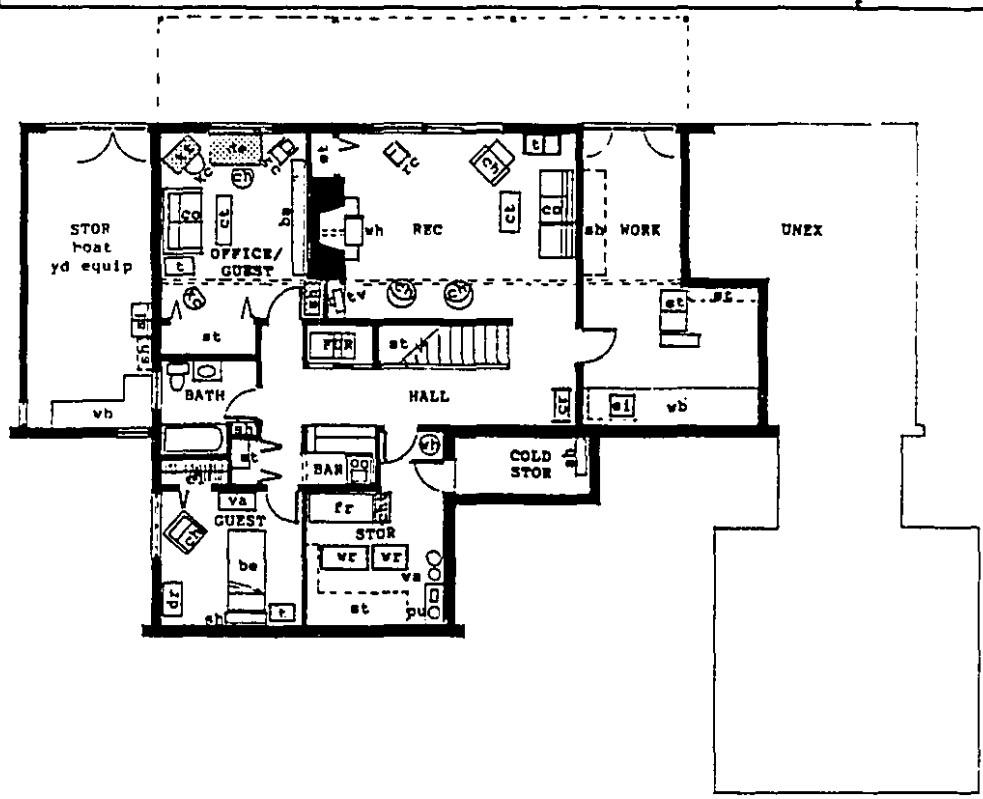
RESIDENCE # 1
LEVEL BASEMENT
YEAR 1977
SCALE 1:175



EVENT CHANGES: Needed more boat storage. Built new Garage for cars. Old Garage became boat storage. Wife shared Study as Sewing Room. Children acquired desks to do their schoolwork. Sold large refrig., used one from cold cellar.

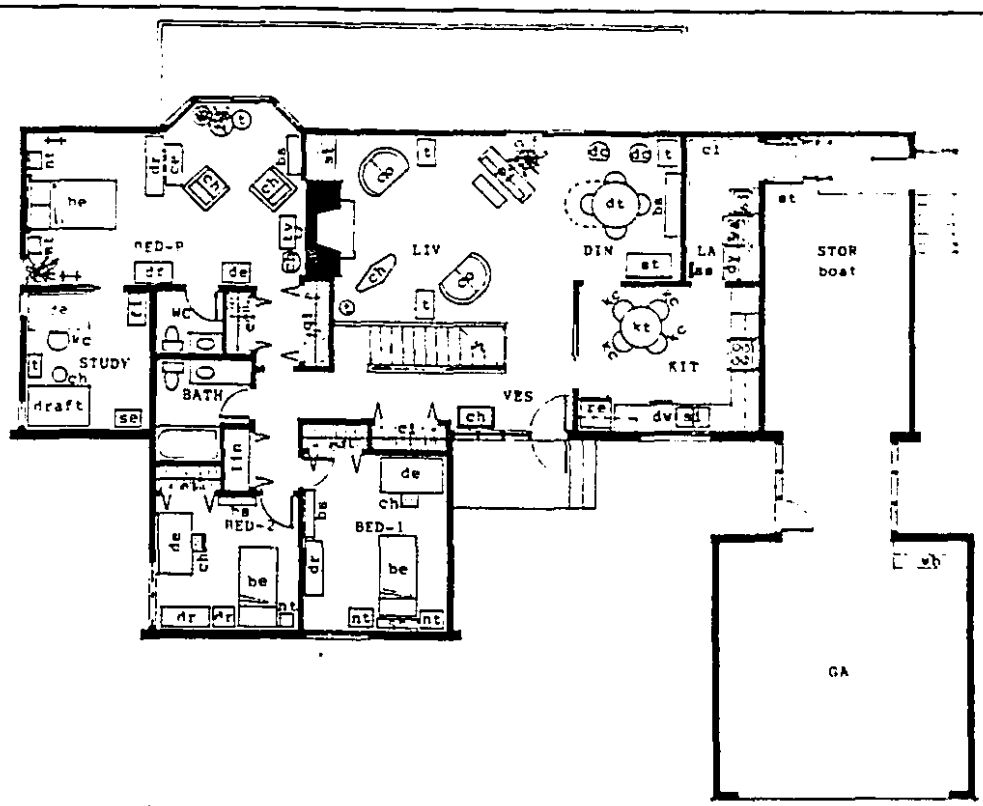
LCS 4

RESIDENCE # 1
LEVEL MAIN
YEAR 1983
SCALE 1:175



EVENT CHANGES: Wife started own business. Used Den for Office as well as for Guest Room

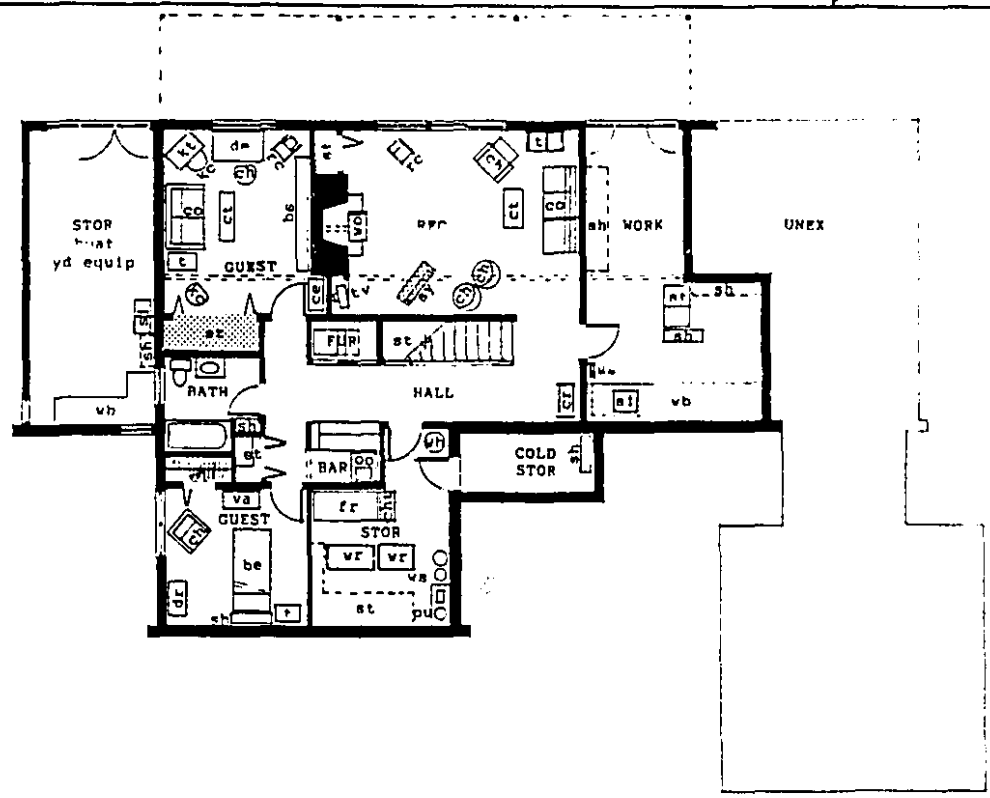
RESIDENCE # 1
LEVEL BASEMENT
YEAR 1983
SCALE 1:175



EVENT CHANGES: No significant changes.

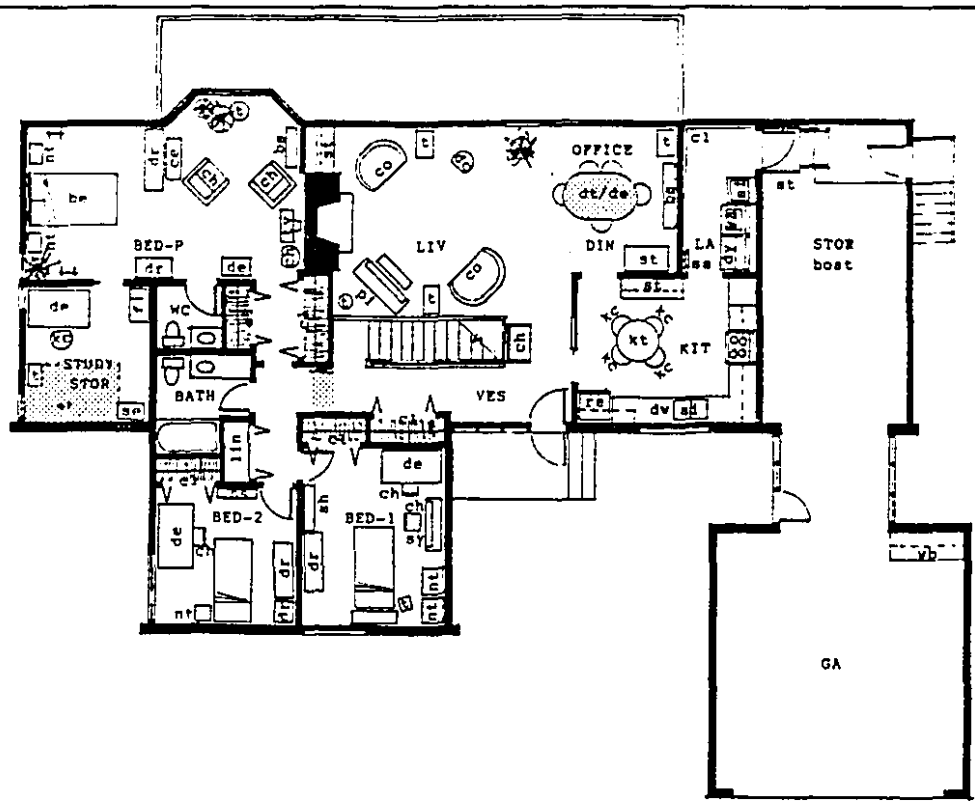
LCS S

RESIDENCE # 1
LEVEL MAIN
YEAR 1988
SCALE 1:175



EVENT CHANGES: Wife sold business. Office moved out of Den/Guest. Added bifolds to ST in Guest. Child-1 used REC for music practice, sometimes included whole band, including set of drums.

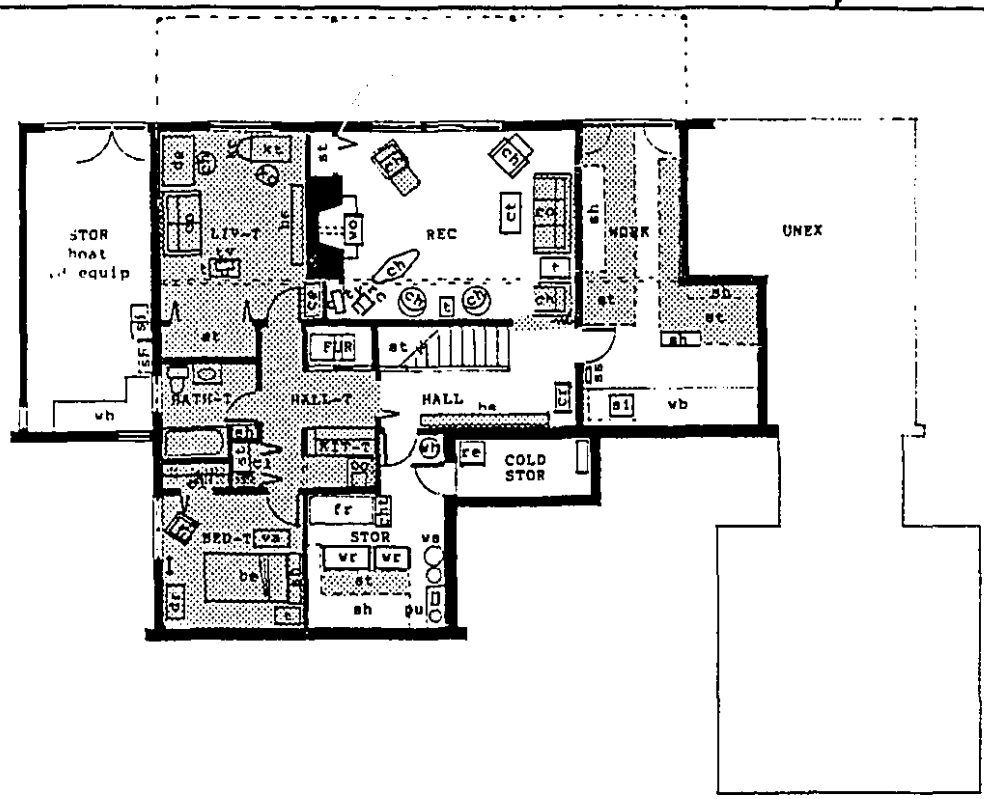
RESIDENCE # 1
LEVEL BASEMENT
YEAR 1988
SCALE 1:175



EVENT CHANGES: Husband went back to university out of town, took drafting equip. and some furniture with him for Apt. Child -1 moved music back to BED-1. Installed bifold door in front hall for privacy. Wife used DIN as Office.

LCS 5

RESIDENCE # 1
LEVEL MAIN
YEAR 1990
SCALE 1:175



EVENT CHANGES: Converted Guest Area to One Bedroom Apt., took in Tenant. Added partition and door for Tenant's privacy. Added folding door to Rec-room for family privacy. Additional furniture from relatives For REC. Many items put into storage in Workroom during Tenant's stay.

RESIDENCE # 1
LEVEL BASEMENT
YEAR 1990
SCALE 1:175

4.5.2 - SUMMARY AND ANALYSIS OF FINDINGS: RESIDENCE NO.1

WHEN	WHERE	WHAT	WHY CHANGE	BY WHOM	WHY
1974	MUD	Changed to LAU	No hook-up in house	Contractor	H too busy
	Base	Added ws	Water too hard for wash	Contractor	H too busy
1975	Unfin Base	Added Guest BED, BATH, BAR	All relatives lived out of town in distant city	Husband	Cost, need to recycle fin. materials
	All	Central heat., air cond. & air cleaner	Family prone to allergies	Contractor & Husband	Elect. too complicated Ducts by self
1977	BED-P	Enlarged & added Study off BED-P	P wanted more space & privacy from children	General Contractor & Husband	Too much to do by self did finishing
	Base	Added STOR under BED-P	Needed addn'l storage for boat & garden equip.	General Contractor	Major Construction
1983	DEN	Wife used as office	Required space for new business	H & W	Move only
	GAR	Added GAR for cars	More boat storage required	Husband & Concrete Contractor	Superstructure by self, slab by Contractor
1988	Hall	Added door bet. Hall & BED wing	Wanted more privacy between Public & Private zones	Carpenter & Husband	made doors Installed by self
	REC	Used by 1-Son as Music Room	Needed space for teen band practice	1-Son	Equipment only
1990	STUDY WORK	Used as STOR	Needed space to store items moved to accom. Tenant. H Office Equip. moved to out-of-town apartment	H & W	Move only
	Base	Added door to create Apt.	Needed more income, so rented part of Basement. Husband back at School	Husband	Materials in stock

The partially finished basement was a major factor in purchasing this house, since it was possible to convert it into a guest apartment for relatives of both parents, all of whom lived in another city. Subsequently, the owner finished the basement creating a bar/kitchenette, bathroom, bedroom and storage, in addition to the existing den and recreation room. Initially the den was used as a guest bedroom and the rec room was used by younger relatives as a guest bedroom. Local friends of the children often used the rec room as a place to sleep when staying overnight.

The house, designed in the early 1960's, had small bedrooms that required changes to meet the privacy demands of this family. The master bedroom was enlarged to make it into a bed-sitting room for the parents. The bedroom for 1-Son, though quite large ($14m^2$), became inadequate in his late teens as his demands for space spilled out into the living room and especially the rec room. 2-Daughter's bedroom was always considered small ($9m^2$) and care was taken with colour to ensure an airy spacious feeling. The parents are planning to increase its perceived size by installing a bay window with a window seat in 1991. 2-Daughter has often used the kitchen for doing her school work and watches television in the master bedroom rather than downstairs in the rec room even though 1-Son is away at university.

Office space for both parents has moved around the house. The husband has used the workroom as a drafting room prior to the addition to the master bedroom was made. He then moved his drafting equipment to the new study adjacent to the enlarged master bedroom. Following his return from school in another city he has set up his office in the den, which also still functions as a guest bedroom. The wife used the den as

her office when she first set up her own business. While there was a tenant in the basement, the wife's favourite spot was the dining room for office work. After the tenant came, the study became a storage room and its status has not changed with both partners back at work outside the home.

The basement guest area was easily converted to an apartment in 1990 by adding a removable partition with a lockable door. The partition can be removed and stored if so desired. Access to the apartment could be made more private by replacing the existing window with a set of French doors into the den for a direct outside entry.

If the parents were to stay in the house after the children leave to form their own households, the house could be modified to make the children's bedrooms into one large room with a movable divider. This would allow the young families of their children to use the space, when visiting, as a single room so that their infants could be monitored more easily. Later the room could be divided again for privacy as the grandchildren get older. The larger room might also be more useful for hobbies or other activities enjoyed by the parents when they were alone in the house. These changes are illustrated on the following floor plans.

4.5.3 - HOW GREATER FLEXIBILITY COULD IMPROVE RESIDENCE NO.1

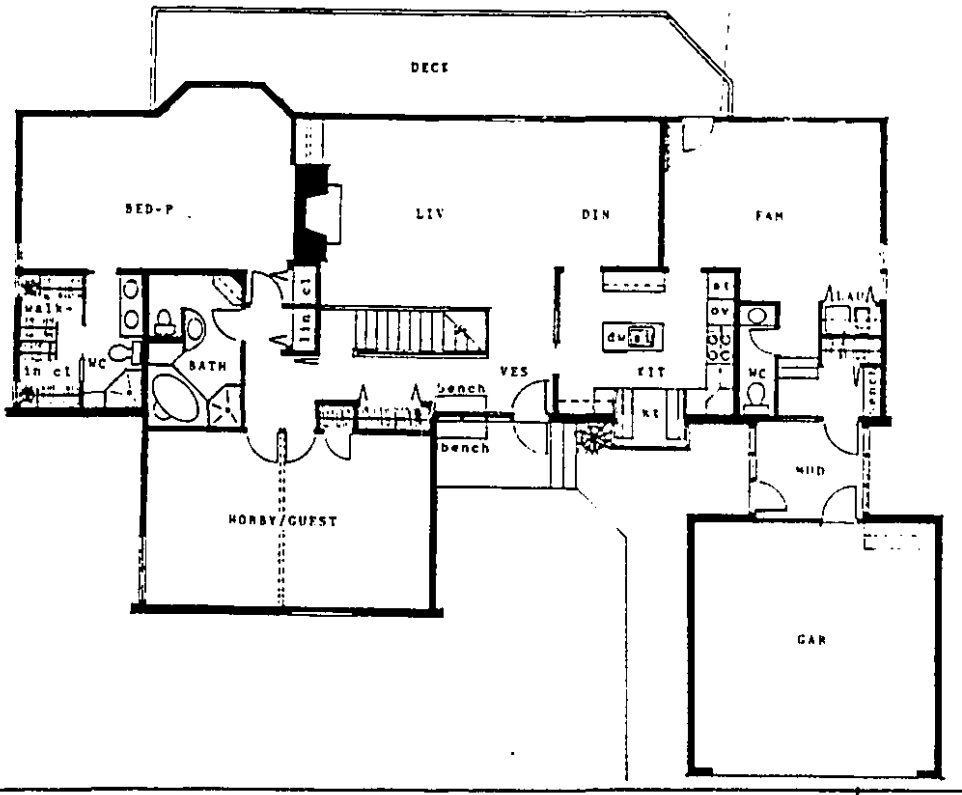
The house would have greater flexibility over the family life cycle if the following modifications were included in the design of the house:

.1 Make the children's bedrooms a similar size of at least $11m^2$. This would provide equal and adequate space for children in all stages of growing up. The use of a movable partition between the two bedrooms would allow the children to be together during the infant and young child stages and separated as they reached pre-puberty. When the children grow up and leave home, the bedrooms could be more easily adapted to hobby rooms for the parents.

.2 Make the stairs to the basement adjacent to an outside door that could be separated easily from the rest of the house. It would then be possible to provide an entrance to the basement apartment which did not go through the living area of the main dwelling. This would provide more privacy for a landlord/tenant situation.

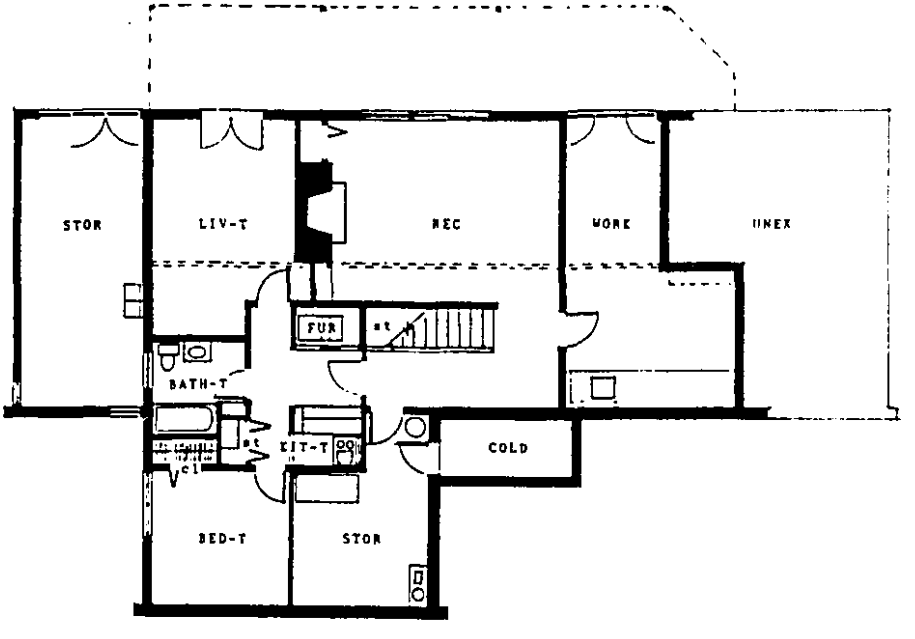
.3 Provide for better organized storage in portable storage units. This would allow greater freedom of choice in the use of living spaces as alternate activity spaces instead of as storage. The portable storage units would allow the storage to be adjacent to the point of use.

The following plans illustrate how Residence Number One could be changed to accommodate the parents into Life Cycle Stage 6.



FUTURE CHANGES
Benches inside & outside front Entry for parcels & putting on & removing outer wear.
Movable partition between children's BED for greater flexibility.
Upgrade BATH, move door for greater privacy from Public Zone.
Upgrade WC & walk-in cl for Master BED.
Upgrade KIT with eye-level ov, small appliance GAR on counter, built-in kt for lower work counter space.
Change GAR to main level FAM, add WC by side Entry, relocate LAU using stacked unit for greater convenience.

RESIDENCE # 1
LEVEL MAIN
SCALE 1:175



FUTURE CHANGES
Create 43m^2 1-BED apartment by installing lockable entry at KIT and new Entry in LIV to back yard.

RESIDENCE # 1
LEVEL BASEMENT
SCALE 1:175

4.6.1 - QUESTIONNAIRE SUMMARY AND FLOOR PLANS FOR RESIDENCE NO.2

Date of Construction.....1958-12

Date of Occupancy.....1959-01

Family Composition.....Father.....47.....Physician

Mother.....43.....Homemaker

1-Daughter..15

2-Daughter..13

3-Son.....11

4-Son.....9

Reasons for Move.....Wanted larger house to accommodate family

Input into House Design...Chose floor tile and counter tops

Added WC and shower to basement MUD.

Features Best Liked upon

Occupancy.....4 BED

Double GAR

Rear entrance direct to Basement MUD

Good separation of public and private areas

Southern exposure of rear yard

Large KIT

Features Found Wanting....Disliked planter between LIV and VES

Some poorly placed heat registers

Poor cross-ventilation in DIN

LAU in Basement no longer convenient (1990)

Design for Changes.....Self and Relative (Carpenter)

Changes Executed by.....Self and Relative

Deficiencies Rectified....1959 - Built laundry chute to basement in lin

Defic's Rectified cont'd..1961 - Removed planter, installed folding door between LIV and VES, built st cabinet for LIV

1981 - Added heat register to BATH

Present Occupancy.....Father.....79.....Retired Physician

Mother.....75.....Retired Physician

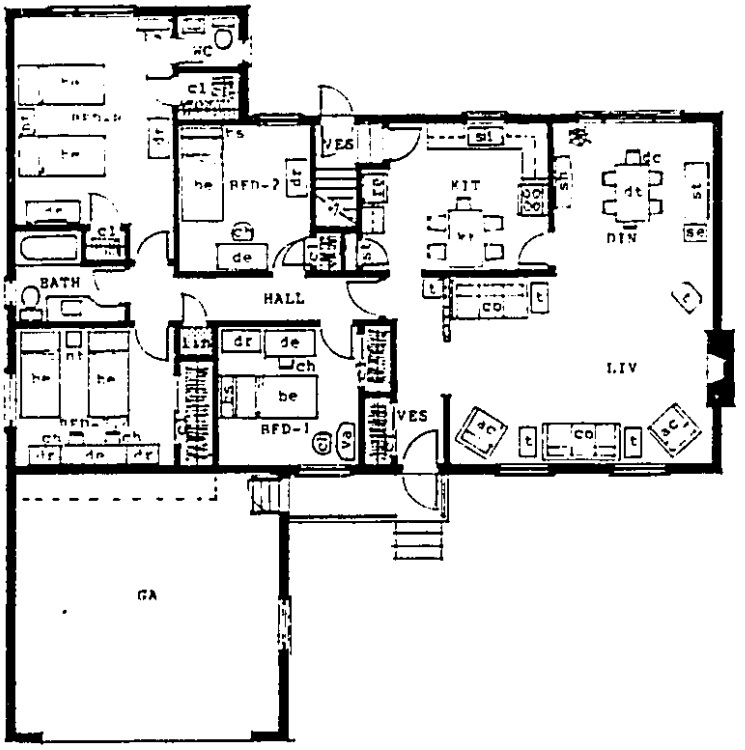
Features Being Considered Lever handles on doors

Move LAU to main floor into DIN closet

Add Shower in BATH using cl from BED-H

Note: Changes not likely to happen since couple could not cope with the disruption caused by the construction.

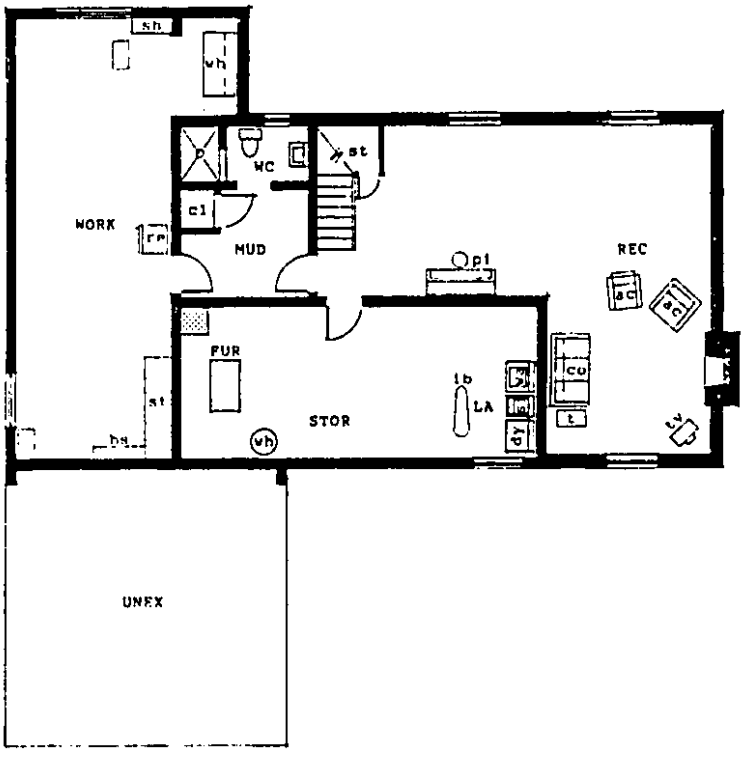
The following plans illustrate the changes that occurred in Residence Number Two over the period of thirty-one years.



EVENT CHANGES: Added Drop-chute to Basement in bottom of LIN for laundry

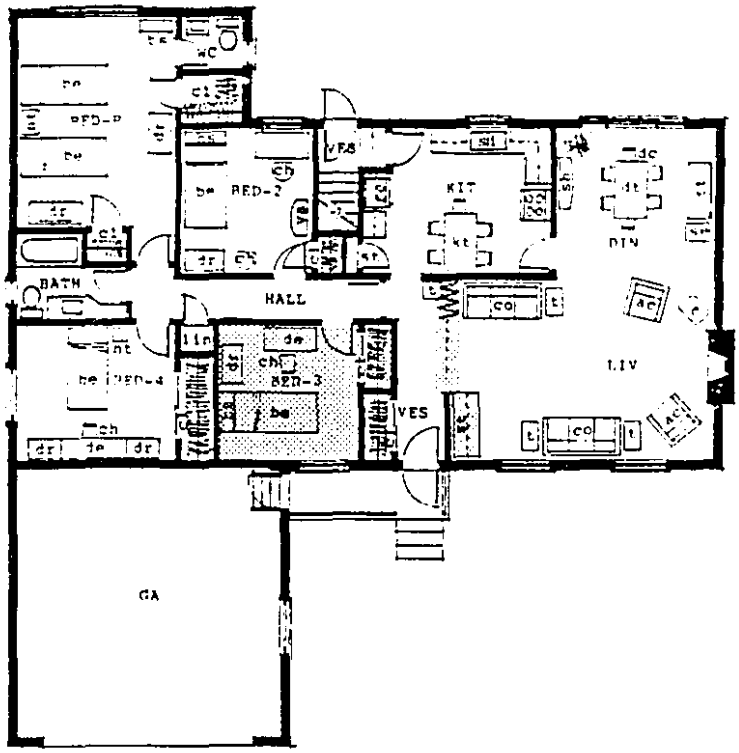
LCS 5

RESIDENCE # 2
LEVEL MAIN
YEAR 1959
SCALE 1:175



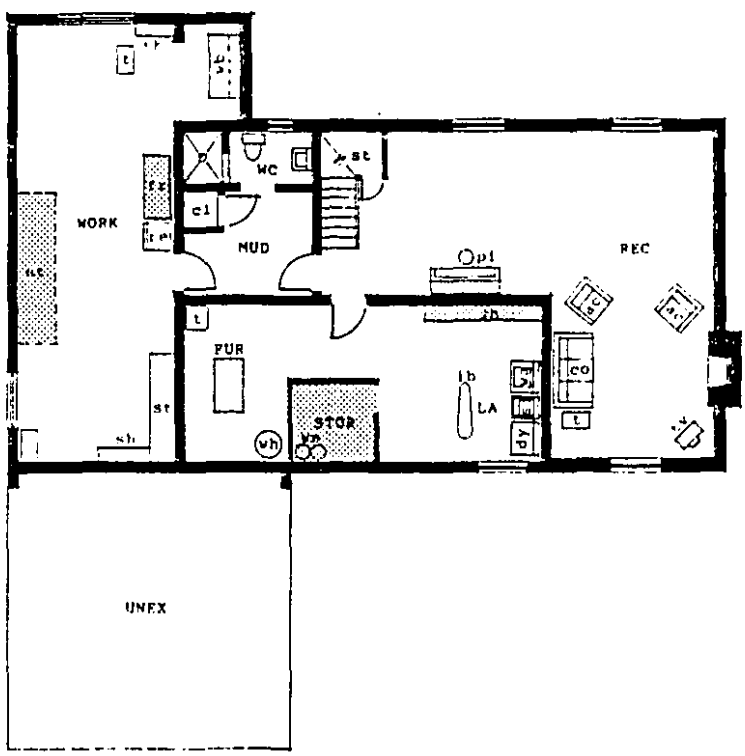
EVENT CHANGES: Table in Furnace area to catch laundry

RESIDENCE # 2
LEVEL BASEMENT
YEAR 1959
SCALE 1:175



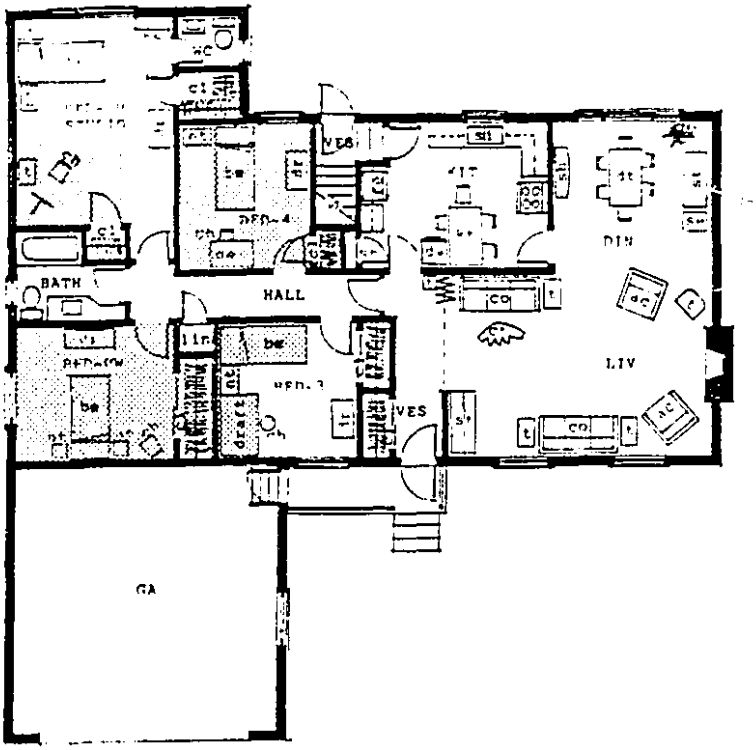
EVENT CHANGES: 1-Daughter marries and leaves home. 3-Son takes over Bedroom. Some furnishings of 1-Daughter go to 2-Daughter. 4-Son has Bedroom to self. Planter between LIV and VES removed in 1961 and replaced by set of folding doors. Large Breakfront storage cabinet custom-made for LIV.

RESIDENCE # 2
LEVEL MAIN
YEAR 1965
SCALE 1:175

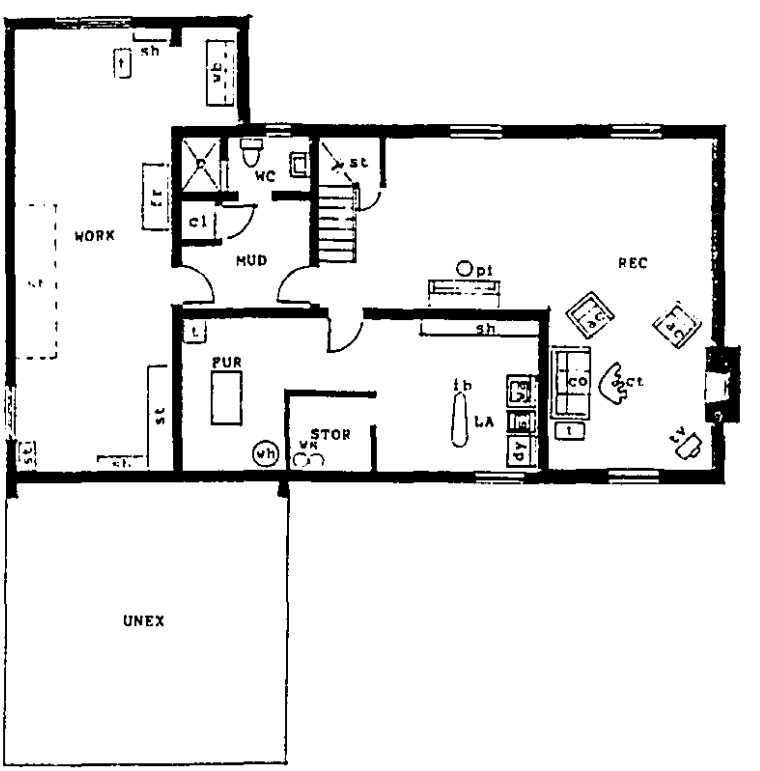


EVENT CHANGES: Storage cabinets, rooms and shelving made for Basement. Freezer bought for food storage.

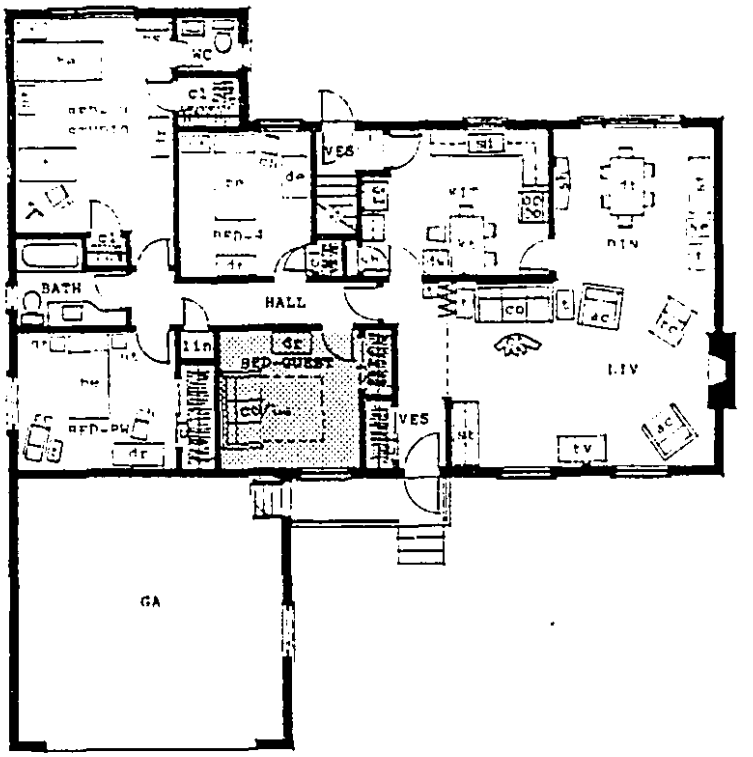
RESIDENCE # 2
LEVEL BASEMENT
YEAR 1965
SCALE 1:175



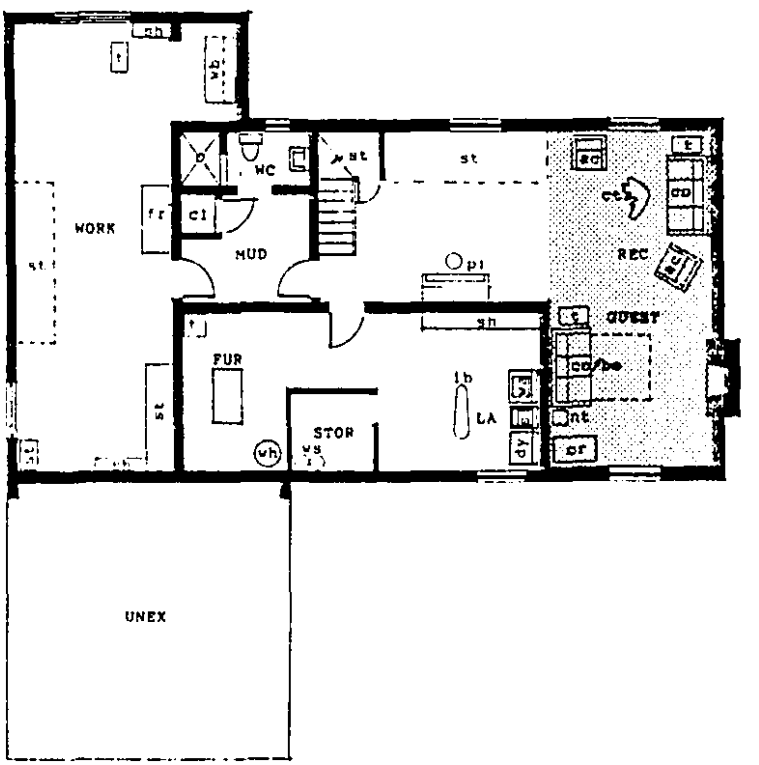
EVENT CHANGES	2-Daughter marries and leaves home. 4-Son takes over Bedroom. Wife takes over BED-4 and Husband establishes art Studio in BED-P 3-Son builds own Bedroom furniture and drafting board.	RESIDENCE # 2 LEVEL MAIN YEAR 1968 SCALE 1:175
LCS 5		



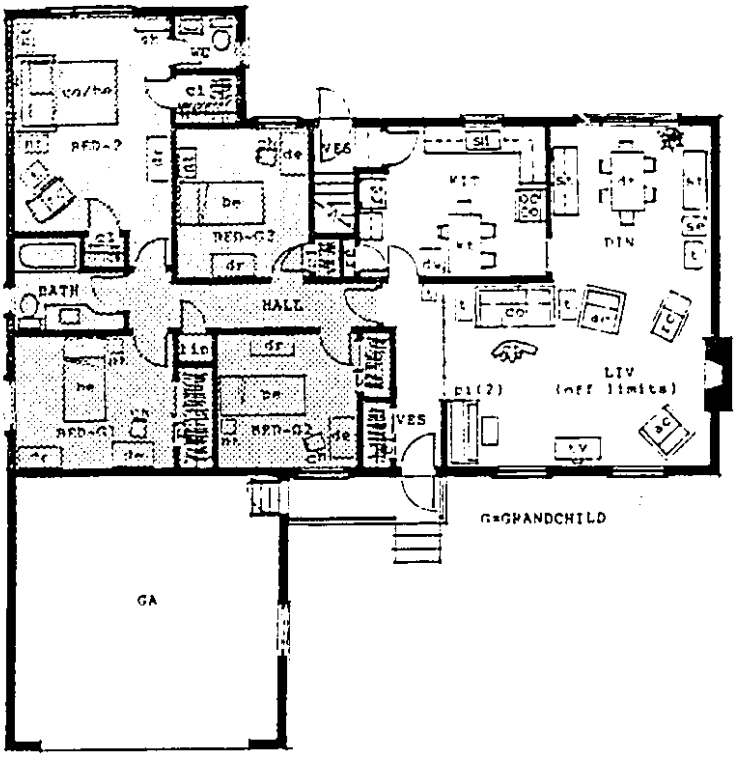
EVENT CHANGES	No changes in Basement.	RESIDENCE # 2 LEVEL BASEMENT YEAR 1968 SCALE 1:175



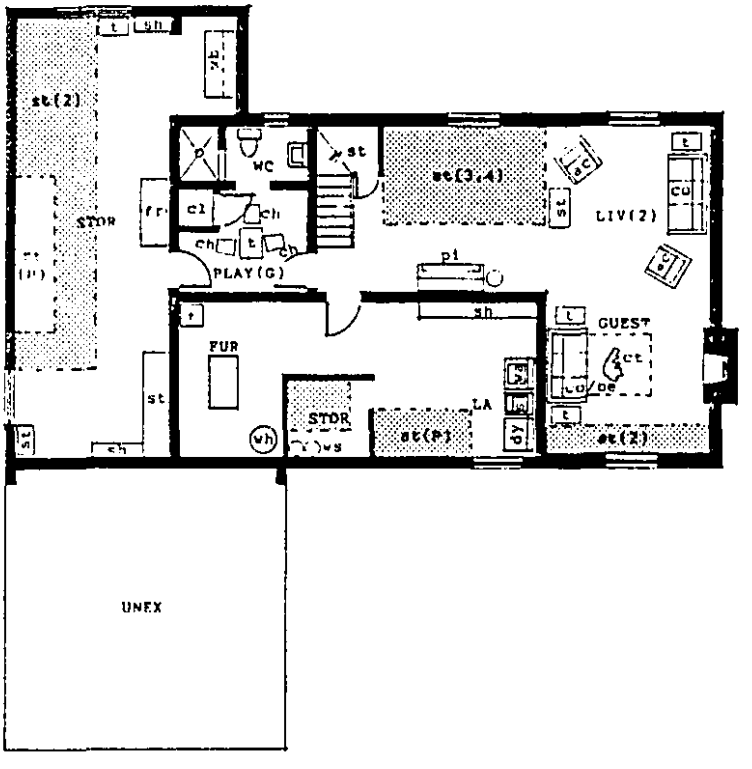
EVENT CHANGES	3-Son marries and leaves home. His BED is turned into Guestroom for married children coming home to visit.	RESIDENCE # 2 LEVEL MAIN YEAR 1972 SCALE 1:175



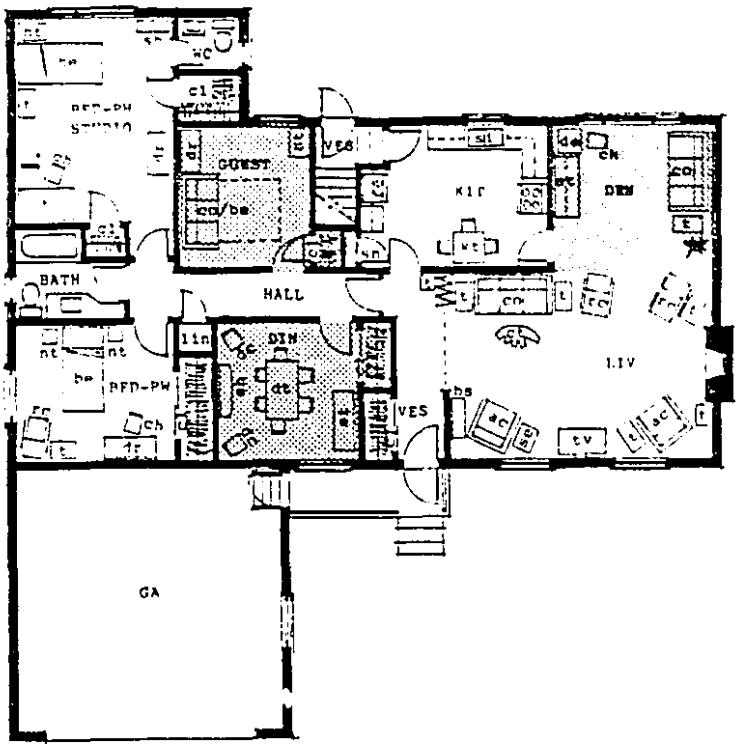
EVENT CHANGES	REC is also equipped as a Guestroom. 2-Daughter, her Husband and Baby lived in REC one summer between moves.	RESIDENCE # 2 LEVEL BASEMENT YEAR 1972 SCALE 1:175



EVENT CHANGES	2-Daughter separates from Husband, moves home with three children for six months, taking over house while Parents house-sit friends' apartment.	RESIDENCE # 2 LEVEL MAIN YEAR 1979 SCALE 1:175



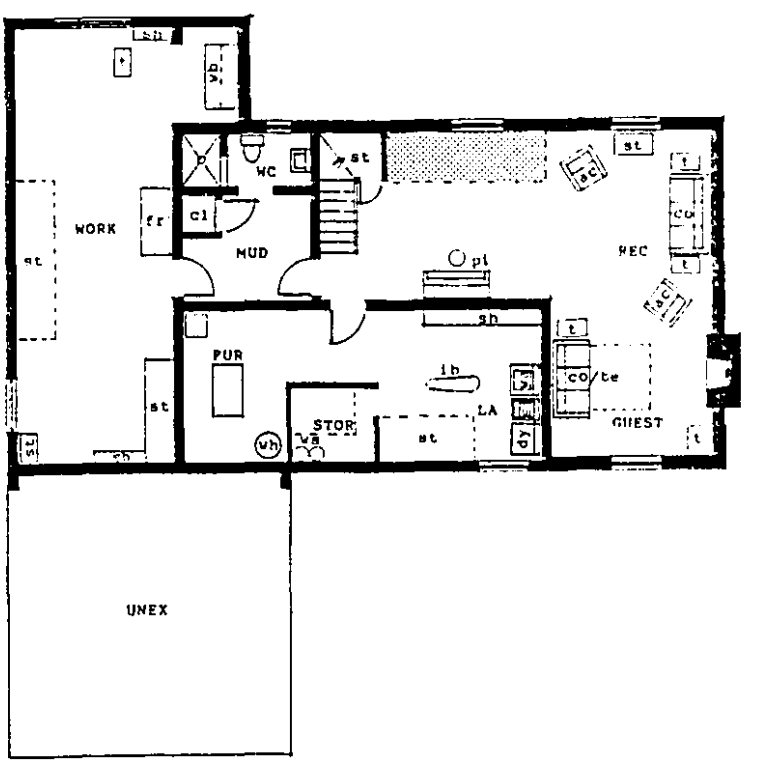
EVENT CHANGES	Much of Basement is used for storing personal belongings of children and Parents' belongings that they did not want left out exposed to the Grandchildren.	RESIDENCE # 2 LEVEL BASEMENT YEAR 1979 SCALE 1:175



EVENT CHANGES: 4-Son finally moves out belongings. 2-Daughter re-established in own home. Front BED turned into DIN since Wife wanted traditional DIN for Sitting Room (DEN). Guestroom moved into BED-4.

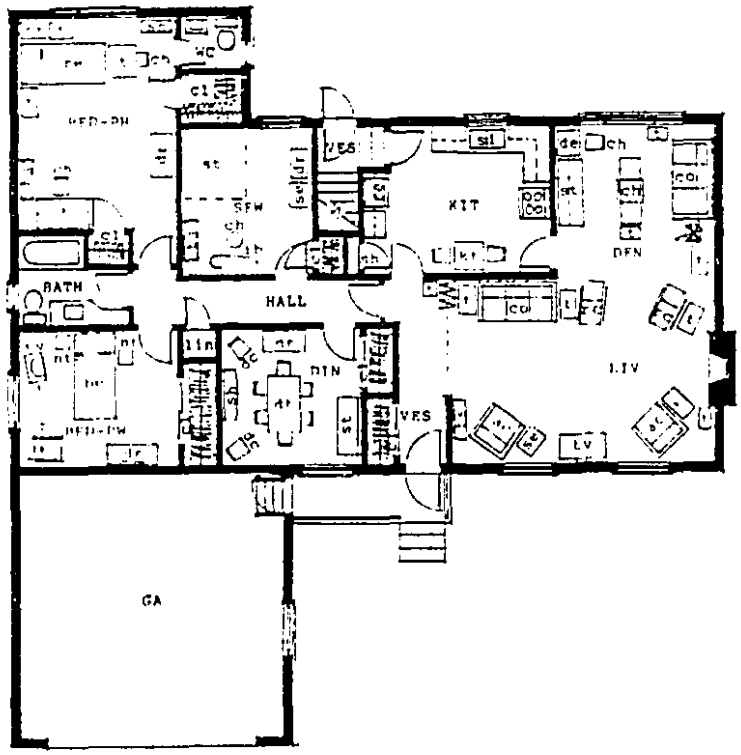
LCS 7

RESIDENCE # 2
LEVEL MAIN
YEAR 1980
SCALE 1:175



EVENT CHANGES: 4-Son still has belongings stored in REC. Some furnishings given to children.

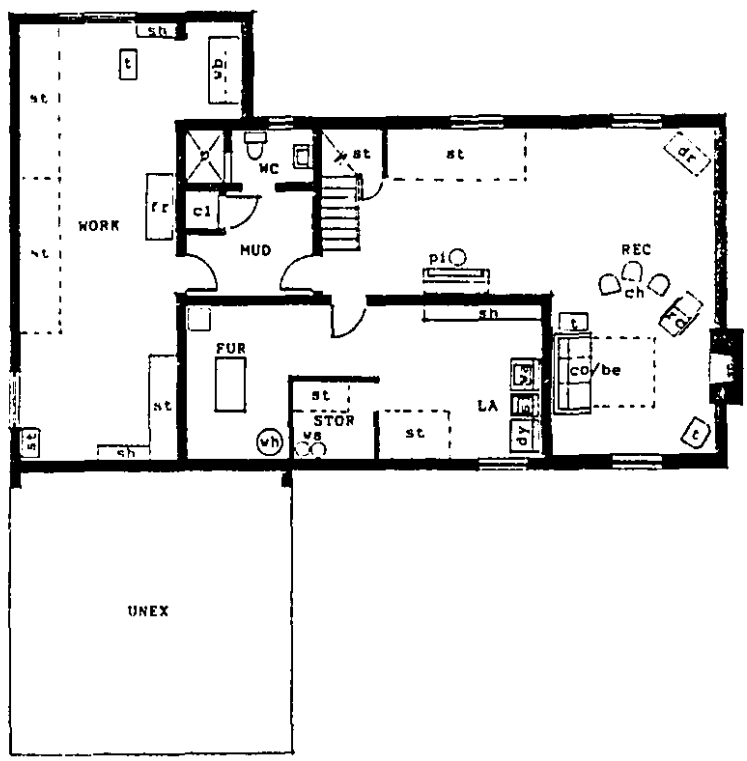
RESIDENCE # 2
LEVEL BASEMENT
YEAR 1980
SCALE 1:175



EVENT CHANGES: Physical limitations of Parents result in non-traditional placement of furniture, for easier use and convenience.

LCS 7

RESIDENCE # 2
LEVEL MAIN
YEAR 1990
SCALE 1:175



EVENT CHANGES: Extra furnishings slowly been given to children.

RESIDENCE # 2
LEVEL BASEMENT
YEAR 1990
SCALE 1:175

4.6.2 - SUMMARY AND ANALYSIS OF FINDINGS: RESIDENCE NO.2

WHEN	WHERE	WHAT	WHY CHANGE	BY WHOM	WHY
1959	1in	Added LAU chute to 1in	More convenient way to get lau to Basement	Husband	Small job
1961	VES/ LIV	Remove planter Added bifolds	Wanted more privacy in LIV from VES	Uncle & Husband	Small job
	Base	Added STOR	Required to organize storage	Uncle & Husband	Small job
1965	BED-1	3-Son moved in	1-Daughter left home	3-Son	Move only
1968	BED-2	4-Son moved in	2-Daughter left home	4-Son	Move only
	BED-4	Wife moved in	Wife wanted own BED	Wife	Move only
	BED-3	3-Son made own furniture	Studying to be architect needed drafting board	3-Son	Wanted to do it himself
	BED-P	H set up Art Studio	Moved hobby from Basemt because space available & better light	Husband	Move only
1972	BED-3	Changed to Guest BED	3-Son left home	Wife	Move only
	REC	Set up as Guest BED	Family back for frequent visits	Wife	Move only
1979	All	2-Daughter took over house	2-Daughter separated from spouse, needed temporary housing	P-H,W & 2-Daughter	Move only
	Base	Much area used for Storage	Parents & children all required Stor	All	Move only
1980	BED-4	Set up as Guest BED	4-Son left home	4-Son	Move only
	BED-G	Set up as DIN	Space available, wife wanted DIN as Sunroom	Wife	Move only
	DIN	Changed to Sun Room (DEN)	Wife liked sunny spot for study & relaxation	Wife	Move only
	Base	Stored goods removed	Children gradually moved belongings to own homes	Children	Move only
1988	All	Furnishings in non-trad. placements	Physical limitations necessitate relocation for easier use	Parents	Move only

This home is a prime example of the latter half of the family life cycle, from Stage 5 to Stage 7. The children were in their early to middle teens when they moved in and they aptly illustrate how younger siblings take over space vacated by older ones. In homes where there is adequate space often the rooms stay nominally in the possession of the departed user for some time after they move out. In this case however, alternate members of the family and functional uses quickly changed the ownership and use patterns in the bedrooms of this home. The bedrooms are of a generous size ($10m^2$ - $18m^2$) allowing flexibility for change into non-traditional uses. The bedroom closest to the public zone in the home became a dining room. After all the children moved out, the other vacated bedrooms became all, or in part, hobby rooms. Storage of furnishings and family personal possessions has taken up much of the unused space in the home over the last 20 years. This accumulation has become an unsolvable problem as the parents have become physically less capable and have less energy to cope with the task of dealing with organizing and disposing of the unused items. They are at the stage in life when they must make a decision about staying in their home: the house has become more of a burden to maintain, and the wife especially is at a point where she will need more support services. Her physical condition is limiting her ability to perform the normal household duties and the husband has only limited energy. These are very private people, so any partitioning or sharing of the house is not an option.

The parents could continue to stay in the home if a few changes were made to make the house more accessible to the wife and if outside support services were found to assist in the home making. These would include Meals on Wheels, house cleaning services and a handyman for property maintenance.

4.6.3 - HOW GREATER FLEXIBILITY COULD IMPROVE RESIDENCE NO.2

The house would have greater flexibility over the family life cycle if the following modifications were included in the design of the house:

.1 Delete the permanent closets in the Bedrooms. If portable storage units, such as wardrobes were used, younger siblings could take them along when they changed rooms following the departure of older brothers or sisters. In addition, these rooms could be more easily adapted to other uses after the children had left the home.

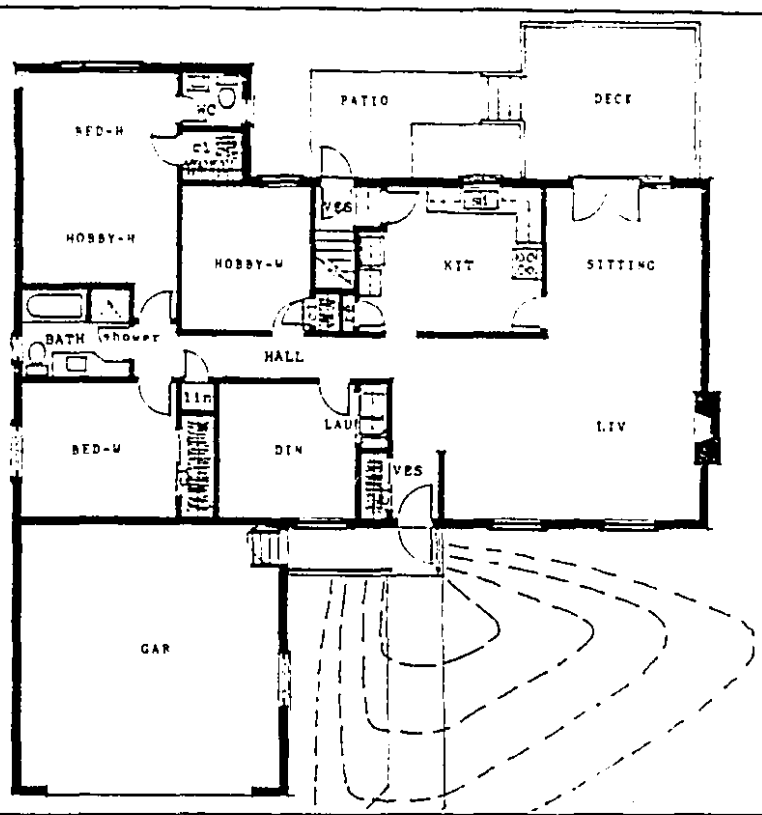
.2 Include both a bath and a walk-in shower in main bathrooms. As a marketing tool, this would accommodate people who like baths as well as those that like showers. The preference for one or the other changes during the life cycle, and as one becomes elderly physical limitations may govern which facility is used.

.3 Locate laundry facilities on the same floor as the largest generator of dirty clothes, either in the bedroom wing or adjacent to the kitchen. This would save working energy over the family life cycle and make laundry a much easier task for the physically limited elderly.

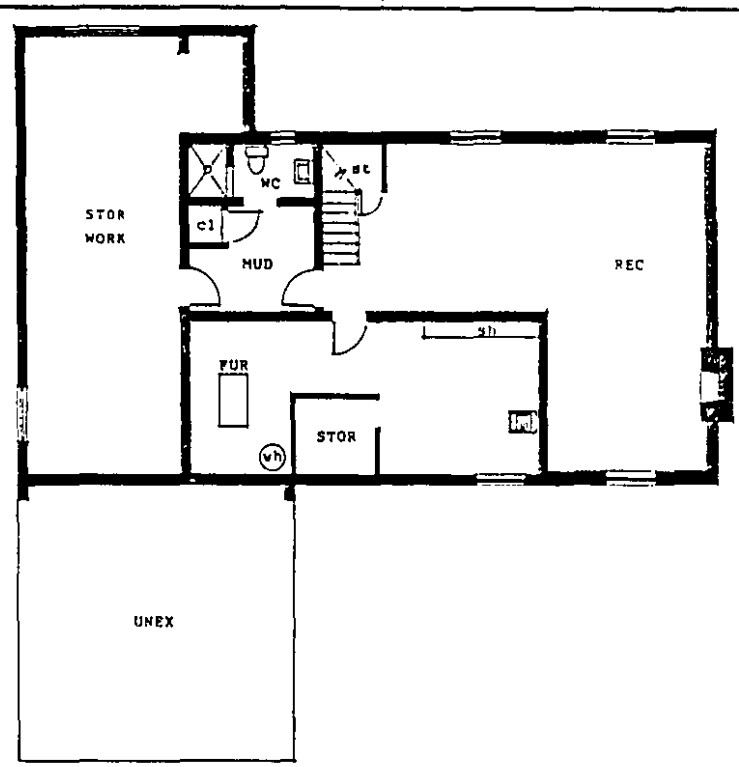
.4 Provide design elements to accommodate the physically limited by specifying the following: lever door handles on all doors, "D" handles on drawers, electrical outlets at switch height in hallways and service areas to make house cleaning easier, vertically movable Kitchen counters to

assist in more comfortable food preparation, at-grade entrance to house for easier access. Zoned heating systems could also be installed, allowing parts of the house not in use to be kept at a minimum heat and other areas in active use to be kept warmer.

The following plans illustrate how Residence Number Two could be changed to accommodate the owners into the late Life Cycle Stage 7.



FUTURE CHANGES	Move LAU to cl in DIN to be on same level as BED wing. Add walk-in shower to BATH for Wife since she is unable to bath without assistance. Regrade front walk to eliminate steps at front Entry. Install French doors in Sitting Room to outside Deck for floor level access to outside & to provide cross-ventilation	RESIDENCE # 2 LEVEL MAIN SCALE 1:175



FUTURE CHANGES	Remove LAU No other changes since Basement is primarily for storage.	RESIDENCE # 2 LEVEL BASEMENT SCALE 1:175

4.7.1 - QUESTIONNAIRE SUMMARY AND FLOOR PLANS FOR RESIDENCE NO.3

Date of Construction.....1953-04

Date of Occupancy.....1953-07

Family Composition.....Father.....42.....Engineer/Executive

Mother.....41.....Homemaker

1-Son.....17

2-Son.....11

Reasons for Move.....Wanted to change location: traffic too heavy at old location

Liked design of house

Input into House Design...None; house completed before purchase.

Features Best Liked upon Occupancy.....Picture window in LIV

Sunken LIV

Large KIT with centre island

Large REC

Features found Wanting....REC unfinished; book shelves, storage required

Basement floor needed tiling

Design for Changes by.....Self

Changes Executed by.....General Contractor

Deficiencies rectified....1956 - Finished REC with shelving, storage counter, floor tiled

1958 - Added built-in dw and changed stove

1960 - Added central air conditioning

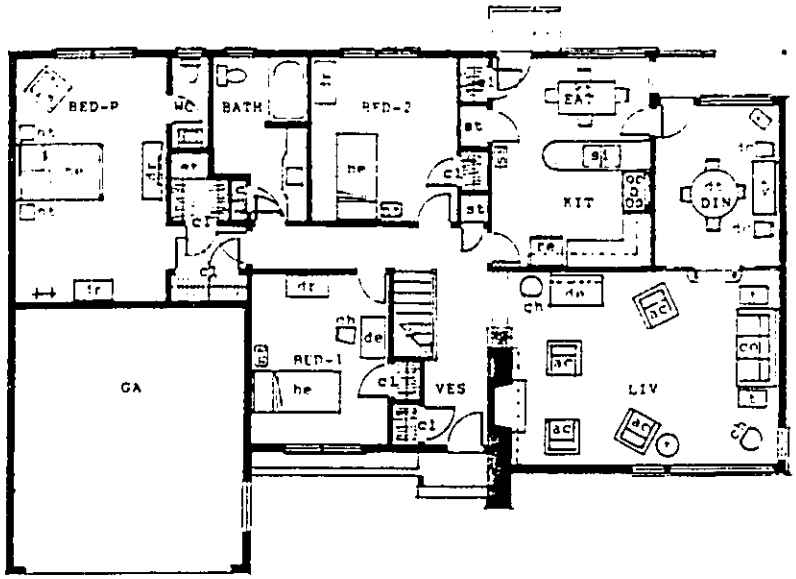
Present Occupancy.....House sold in 1971

Occupancy at Time of Move Father.....61.....Engineer/Executive

Mother.....60.....Teacher

Reasons for Moving.....Retiring within three years; would be away 6 months of the year and felt an apartment would be more suitable housing.

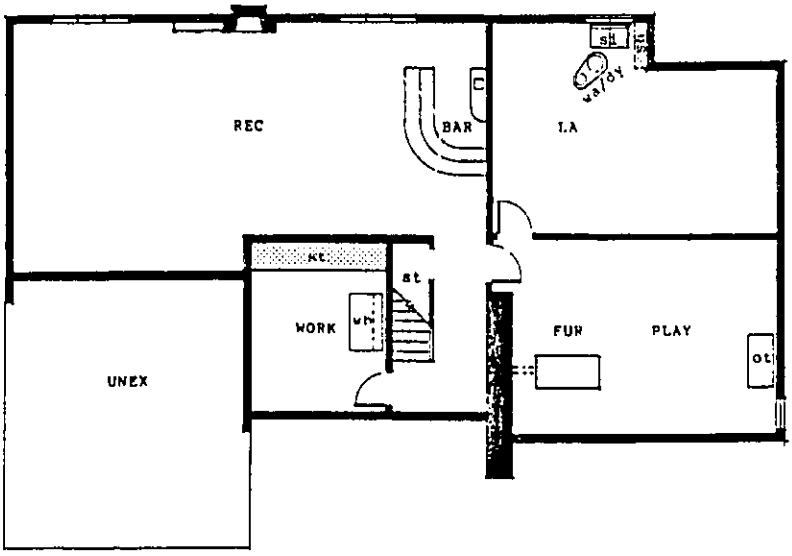
The following plans illustrate the changes that occurred in Residence Number Three over the period of eighteen years.



EVENT CHANGES: Moved in, July 1953.

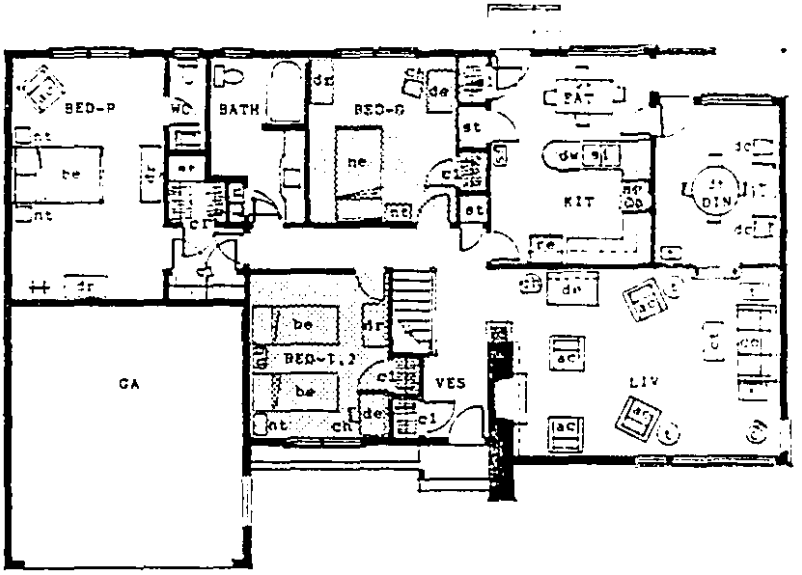
LCS 4

RESIDENCE # 3
LEVEL MAIN
YEAR 1953
SCALE 1:175

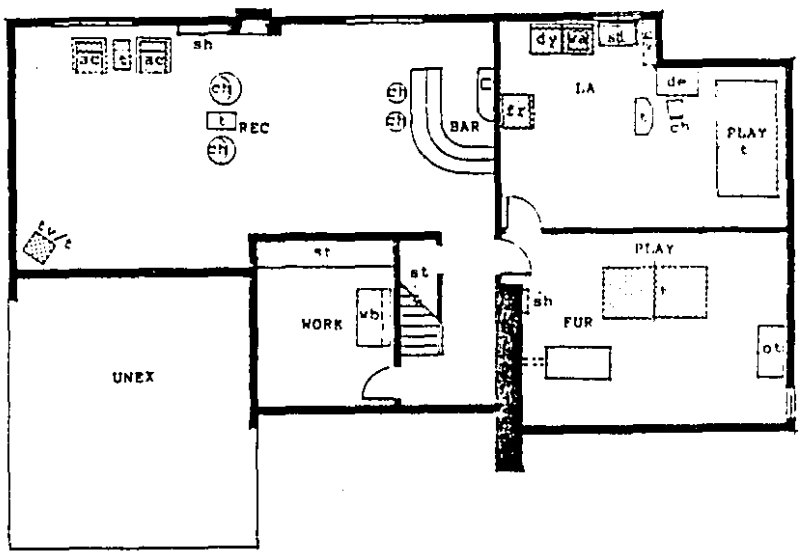


EVENT CHANGES: Father built storage cupboard for tools and Workroom supplies and shelving in Laundry.

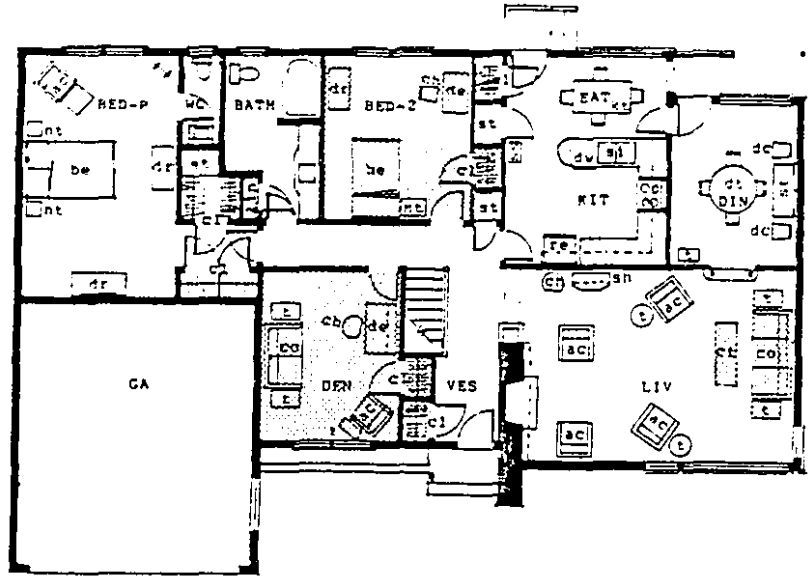
RESIDENCE # 3
LEVEL BASEMENT
YEAR 1953
SCALE 1:175



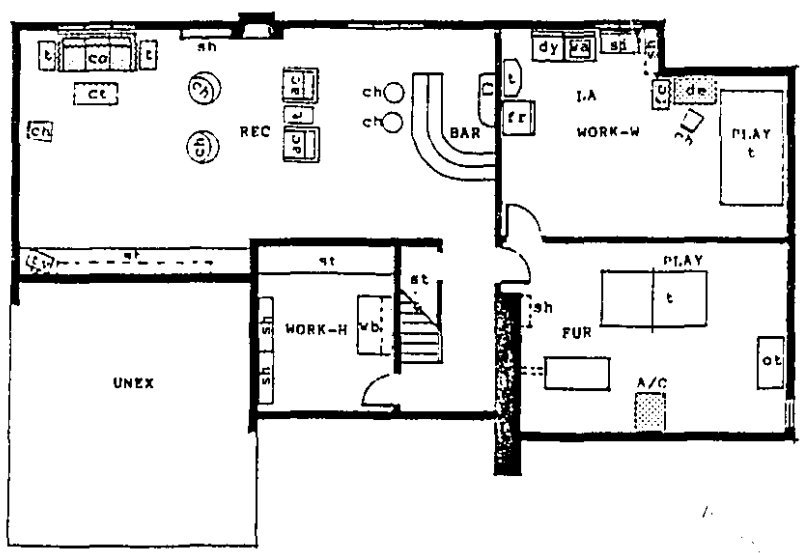
EVENT CHANGES	Maternal Grandmother moved in with family. 2-Son moved in with 1-Son. Large range replaced with standard 760mm model. Dishwasher also installed in KIT.	RESIDENCE # 2 LEVEL MAIN YEAR 1958 SCALE 1:175
LDS 5		



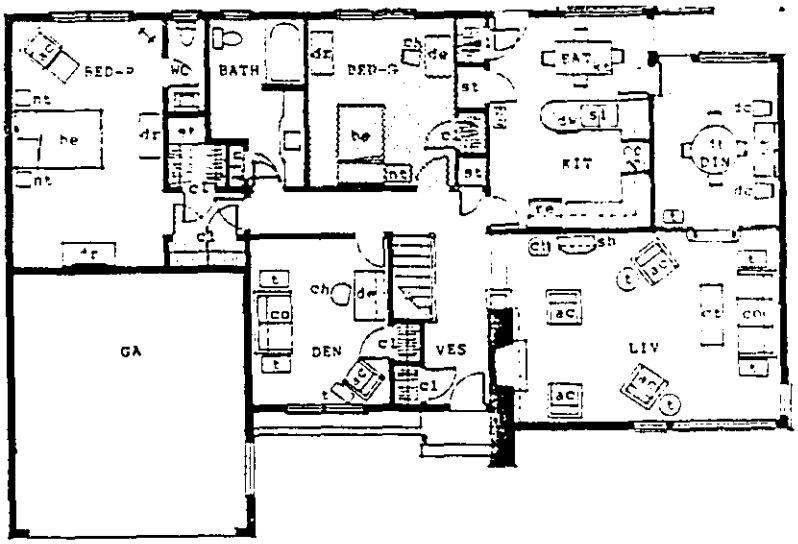
EVENT CHANGES	Play table set up in LAU for 2-Son train set. Ping-pong table in FUR for family. New TV and some of Grandmother's Furniture in REC. New washer, dryer, freezer in LAU.	RESIDENCE # 3 LEVEL BASEMENT YEAR 1958 SCALE 1:175



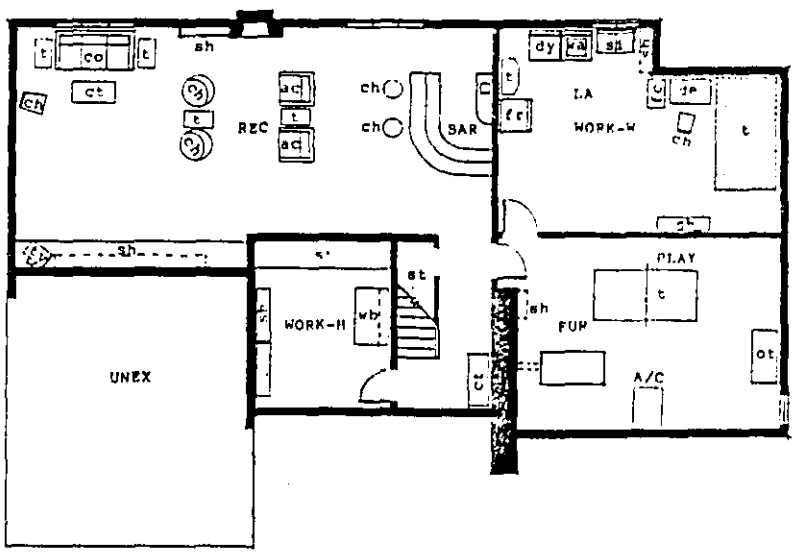
EVENT CHANGES	Both Grandmother and 1-Son move out. 2-Son moves into Grandmother's BED and BED-1,2 Turned into DEN. New furniture for LIV.	RESIDENCE # 3 LEVEL MAIN YEAR 1961 SCALE 1:175
LCS 5		



EVENT CHANGES	Old Living Room furniture put in REC. New storage counter and book shelves built in REC. Central A/C added to FUR. Mother using LAU for Office for post-graduate studies.	RESIDENCE # 3 LEVEL BASEMENT YEAR 1961 SCALE 1:175



EVENT CHANGES	2-Son marries and moves out. BED-2 turned into Guest Bedroom. Main Level remains same for remainder of stay to 1971.	RESIDENCE # 3 LEVEL MAIN YEAR 1966 SCALE 1:175
LOC 5		



EVENT CHANGES	Train table in LAU stripped and used by Mother for various hobbies. Basement remains same for remainder of stay to 1971.	RESIDENCE # 3 LEVEL BASEMENT YEAR 1966 SCALE 1:175

4.7.2 - SUMMARY AND ANALYSIS OF FINDINGS: RESIDENCE NO.3

WHEN	WHERE	WHAT	WHY CHANGE	BY WHOM	WHY
1953	Base	Built Stor in Work & LAU	To organize work & hobby items	Husband	Small job
1958	BED-1	2-Son moved in with 1-Son	Grandmother came to live with family	All	Move only
	BED-2	Grandmother took over	Grandmother moved in	All	Move only
	REC	Furniture added	Grandmother brought some of her own furniture	All	Move only
	LAU	Appliances added	New labour-saving with additional person	Merchant	New delivery
1961	BED-1	Changed to DEN	1-Son & Grandmother moved out	All	Move only
	BED-2	2-Son moved in	Wife wanted DEN in freed-up space	2-Son	Move only
	LIV	New furniture added	Wife upgraded furnishings	Merchant	New delivery
	REC	Furniture added	Recycled furniture from LIV to REC	All	Move only
	LAU	Desk added	Wife needed Office for studies	Wife	Move only
1966	BED-2	Became Guest BED	2-Son moved out	2-Son	Move only
	LAU	Became Wife's Office	2-Son moved out. Wife needed Office for teaching job	2-Son	Move only

Although there were periods when this house was crowded, the rooms always kept their traditional uses. The one exception was the den which was used as a bedroom for a period of eight years while the 1-Son and the maternal grandmother were living in the home. After they moved out, the den reverted to its traditional use. Even though 1-Son was officially in residence, from 1958 he was often not home for extended periods of time due to his occupation. 1-Son was married in 1961 and officially moved out at that time. From 1961, 2-Son was also away at university, although often home on weekends. The guest bedroom was used by 1-Son and his wife in 1961 while they sought out accommodation. 2-Son and his wife used the guest bedroom also in 1966 while awaiting for rental accommodation to become available. The only time there was pressure on space in the home was when the grandmother was living with the family and the two teenaged sons had to share a bedroom. The space that was under the most pressure was the bathroom since it was shared at times by four people. There was always plenty of space in the large basement. The laundry room was shared by the Wife and 2-Son almost the entire time 2-Son lived in the house.

When the Parents sold the house in 1971, they moved into a two-bedroom apartment which proved to be adequate for their needs.

4.7.3 - HOW GREATER FLEXIBILITY COULD IMPROVE RESIDENCE NO.3

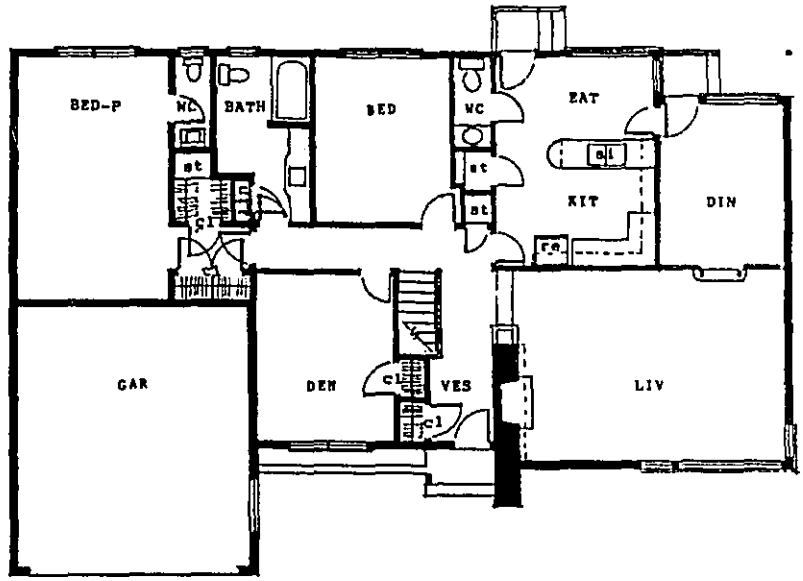
The house would have greater flexibility over the family life cycle if the following modifications were included in the design of the house.

.1 Add a washroom, possibly off the kitchen. This would help relieve pressure on the main bathroom during the period when the grandmother was in residence.

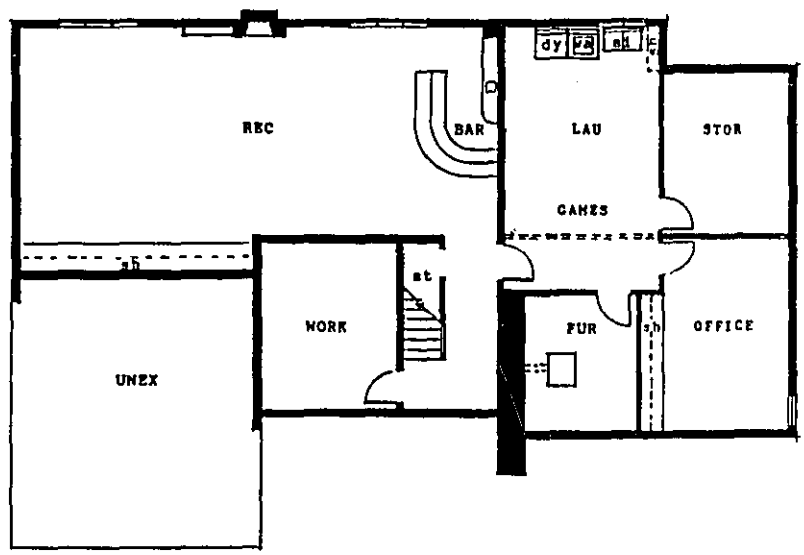
.2 Use portable storage units such as wardrobes. Such units would make it easier to relocate in the house and would make the den and bedrooms more spacious and versatile.

.3 Use wood stud and drywall partitions in the basement rather than all-masonry walls. The large rooms ($28m^2$) could be more easily subdivided to make more usable spaces for each individual's hobby or work area.

The following plans illustrate how Residence Number Three could have been changed to provide more flexible space for hobby and work areas and to accommodate three generations under one roof with less friction.



FUTURE CHANGES	Add WC in KIT for Guests & convenience to back door, by removing cl from BED & KIT. Retain KIT st. Use wardrobe in BED for more flexibility.	RESIDENCE # 3 LEVEL MAIN SCALE 1:175



FUTURE CHANGES	Replace centre wall with beam & stud wall between LAU & FUR. Add partitions to create more usable spaces.	RESIDENCE # 3 LEVEL BASEMENT SCALE 1:175

4.8.1 - QUESTIONNAIRE SUMMARY AND FLOOR PLANS FOR RESIDENCE NO.4

Date of Construction.....1964-08

Date of Occupancy.....1969-09

Family Composition.....Maternal Grandfather..69.....Retired Farmer

Father.....39.....University Professor

Mother.....35.....Homemaker

1-Daughter...5

2-Son.....2

3-Son.....9mos

Reasons for Move.....To look after Grandfather following death of spouse.

Input into House Design...None; subsequently bought house from grandfather in 1976.

Features Best Liked.....Liked location

Open plan in public areas, generous VES with glass partition

With 3 generations, liked 2 1/2 BATH

Large cold cellar and boat storage

Features found Wanting....Not enough electrical outlets

Not enough BED on main level for all children

No MUD with WC by GAR entrance, a desirable feature for children.

Shortage of cl space.

Single-car GAR

Design for Changes by.....Self with Draftsman

Changes Executed by.....General Contractor, Relative (Carpenter)

Deficiencies Rectified....1970 - Electrical outlets increased.

1972 - Grandfather's DEN became BED-1. This led to conflict, since Grandfather lost some privacy.

1973 - 1-Daughter moved out of DEN

Basement BED-3 became satisfactory when 3-Son became adolescent.

1977 - Built new Study and BED-1.

1987 - Built new carport

Present Occupancy.....Father.....60.....University Professor

Mother.....56.....Retail Entrepreneur

1-Daughter*.26.....Attending university

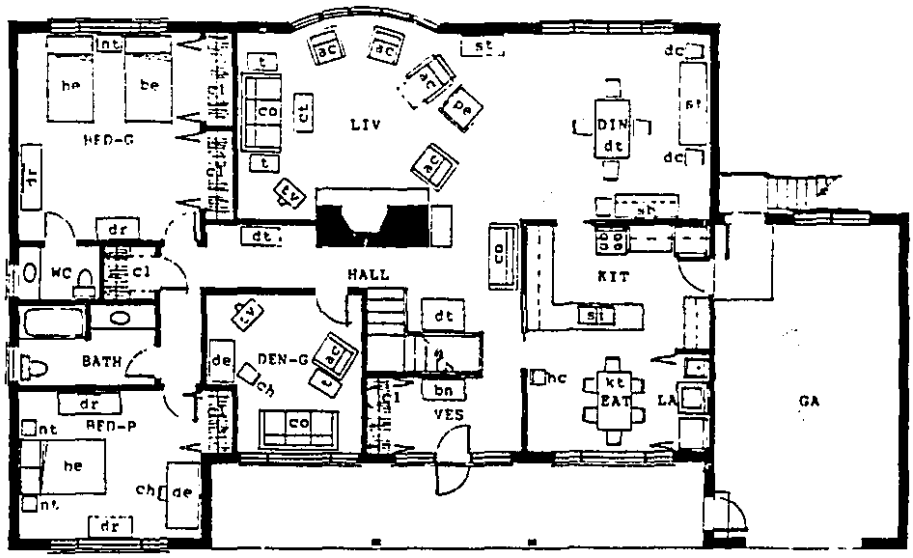
2-Son*.....23.....Attending university

3-Son*.....21.....Attending university

* Children only home during summer work period

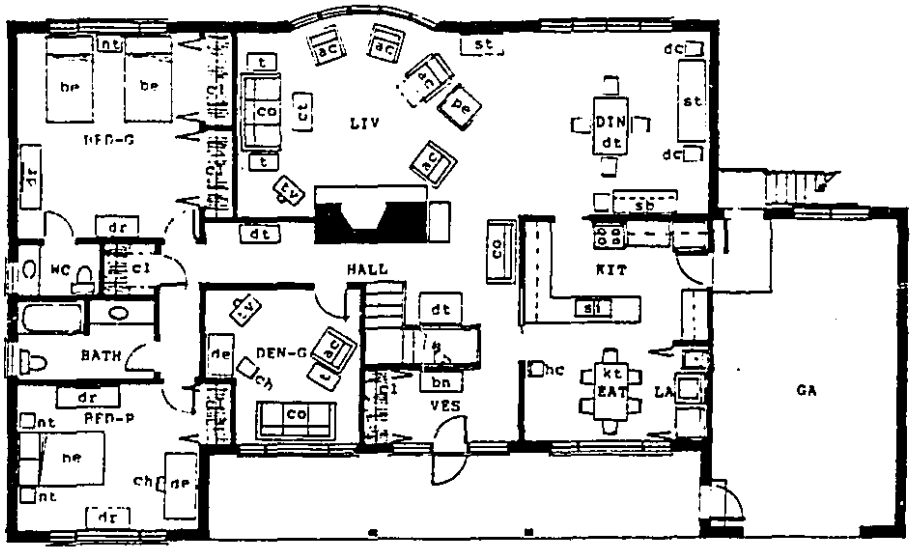
Features Being Considered.Add greenhouse with hot tub. Not likely to happen, since plan to move into city prior to retirement within next 3 years.

The following plans illustrate the changes that occurred in Residence Number Four over the period of twenty-one years.



EVENT CHANGES	Family moved in with recently widowed maternal Grandfather. Furnishings were blended. G stayed in Master BED while Parents used former Guest BED. Parents felt crowded and were unhappy that the Children were all bedded in the Basement, especially 3-Son.	RESIDENCE # 4 LEVEL MAIN YEAR 1969 SCALE 1:175
LCS 3		

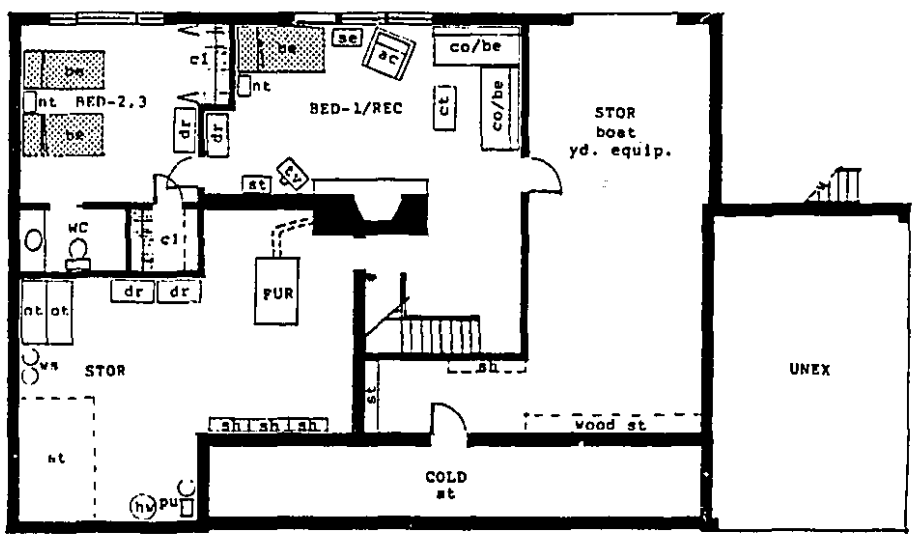
EVENT CHANGES	Crib for 3-Son at foot of stairs so could be heard at night.	RESIDENCE # 4 LEVEL BASEMENT YEAR 1969 SCALE 1:175



EVENT CHANGES: No changes to Main Level.

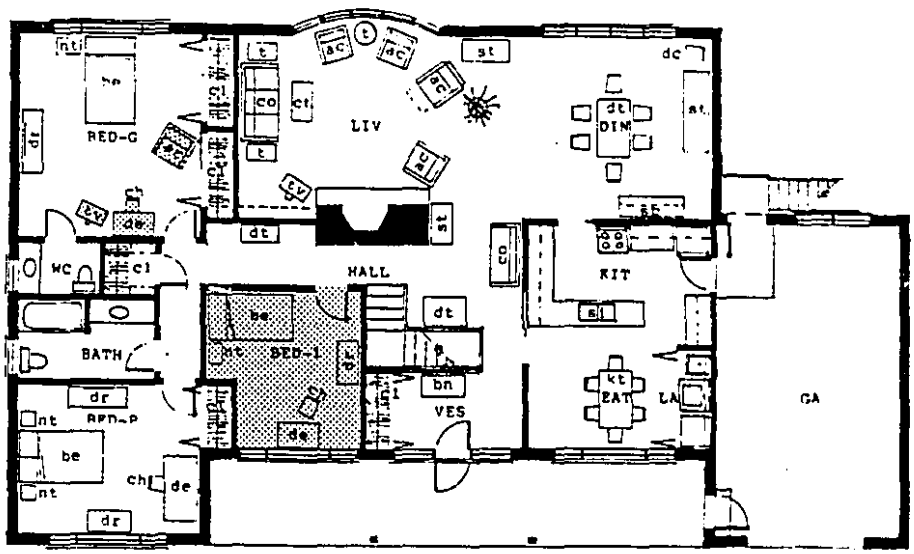
LCS 4

RESIDENCE # 4
LEVEL MAIN
YEAR 1971
SCALE 1:175

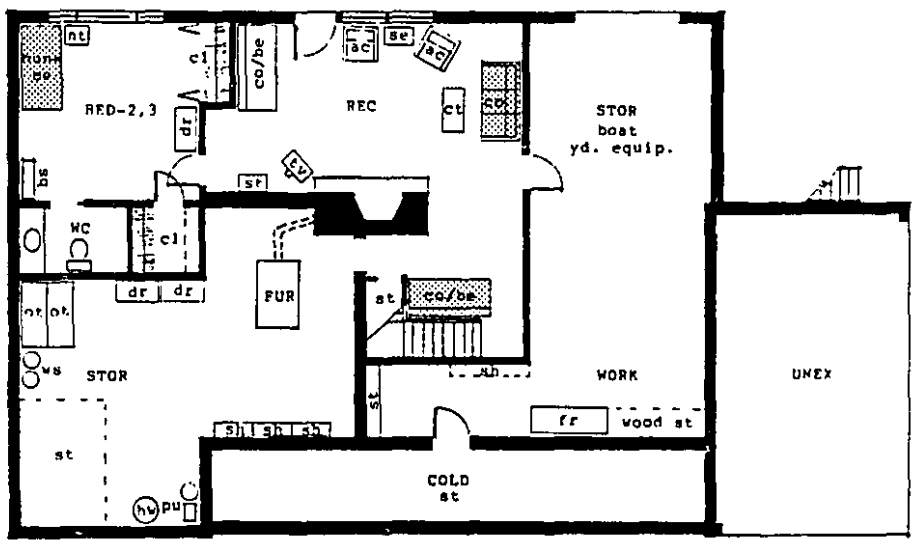


EVENT CHANGES: Both boys occupy BED and 1-Daughter moved to REC. House remains crowded for two younger generations.

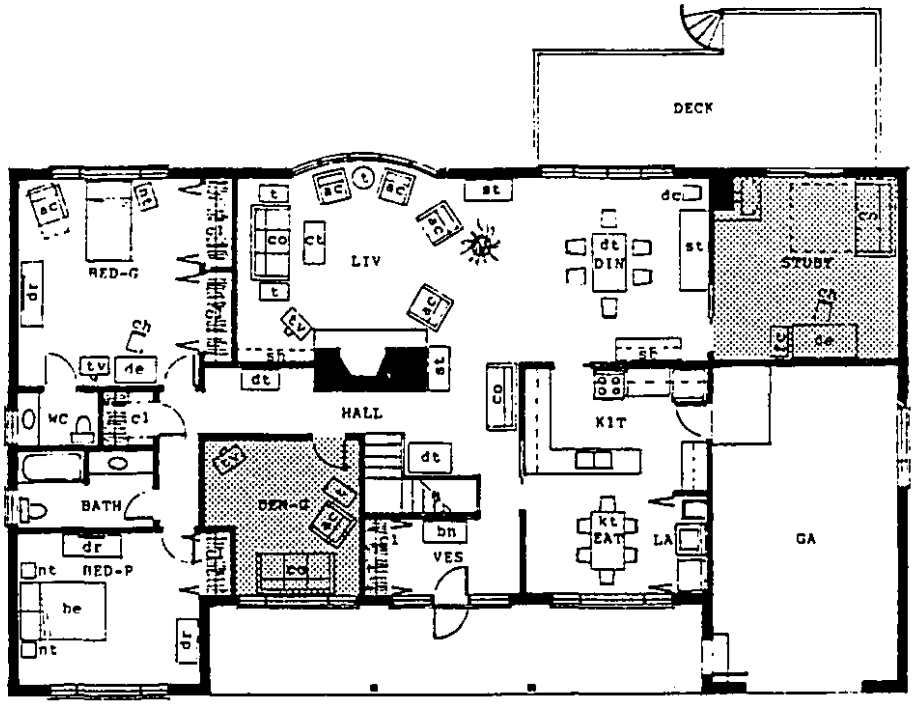
RESIDENCE # 4
LEVEL BASEMENT
YEAR 1971
SCALE 1:175



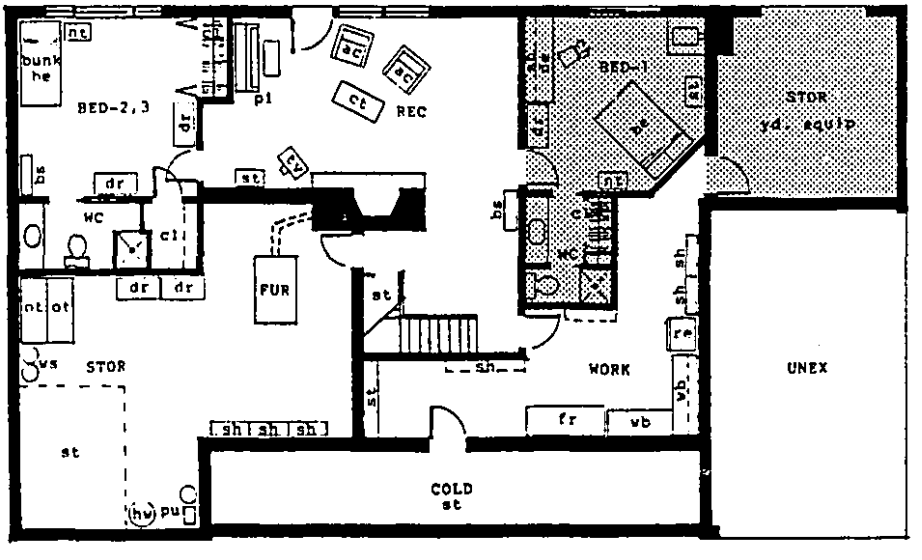
EVENT CHANGES	Grandfather gives up DEN so 1-Daughter may have own BED, moves most of DEN furnishings into BED-G and spare be goes to 1-Daughter	RESIDENCE # 4 LEVEL MAIN YEAR 1972 SCALE 1:175
LCS 4		



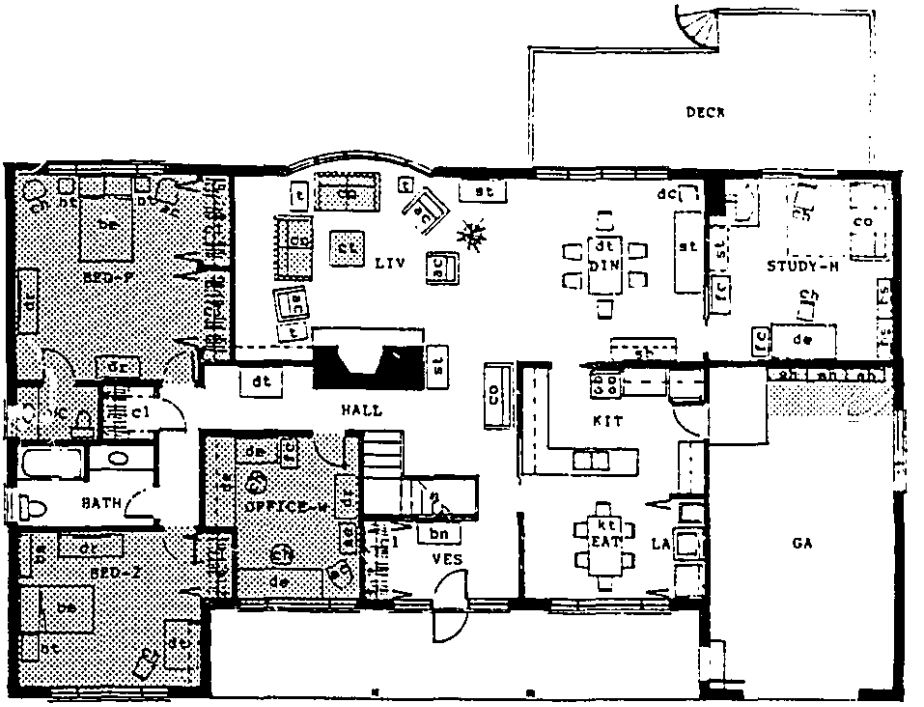
EVENT CHANGES	Couch from DEN to REC. Co/be put at foot of stairs for Husband can rest, due to health problem. Boys get Bunk Beds.	RESIDENCE # 4 LEVEL BASEMENT YEAR 1972 SCALE 1:175



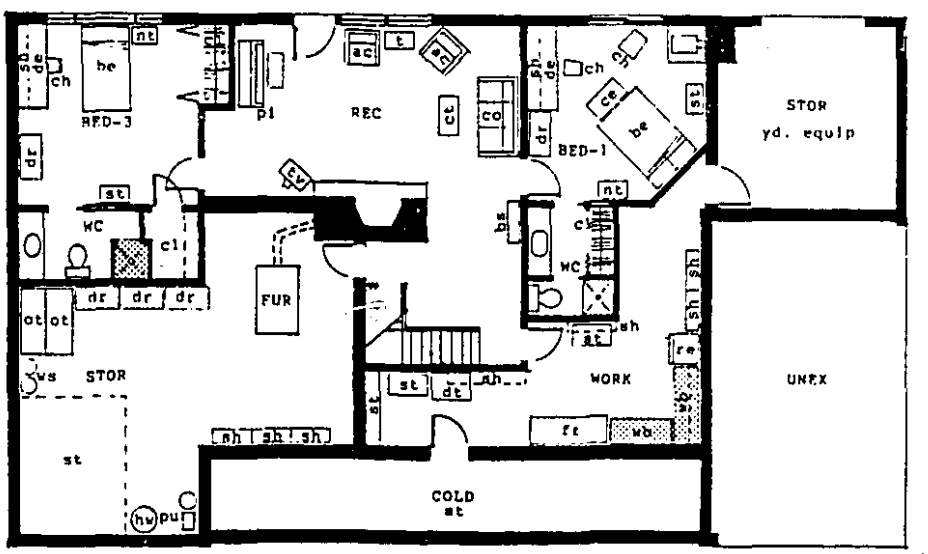
EVENT CHANGES	Addition put on house to provide more space for two younger generations. Study mainly office for Husband. DEN returned to use by Grandfather.	RESIDENCE # 4 LEVEL MAIN YEAR 1977 SCALE 1:175
LCS 5		



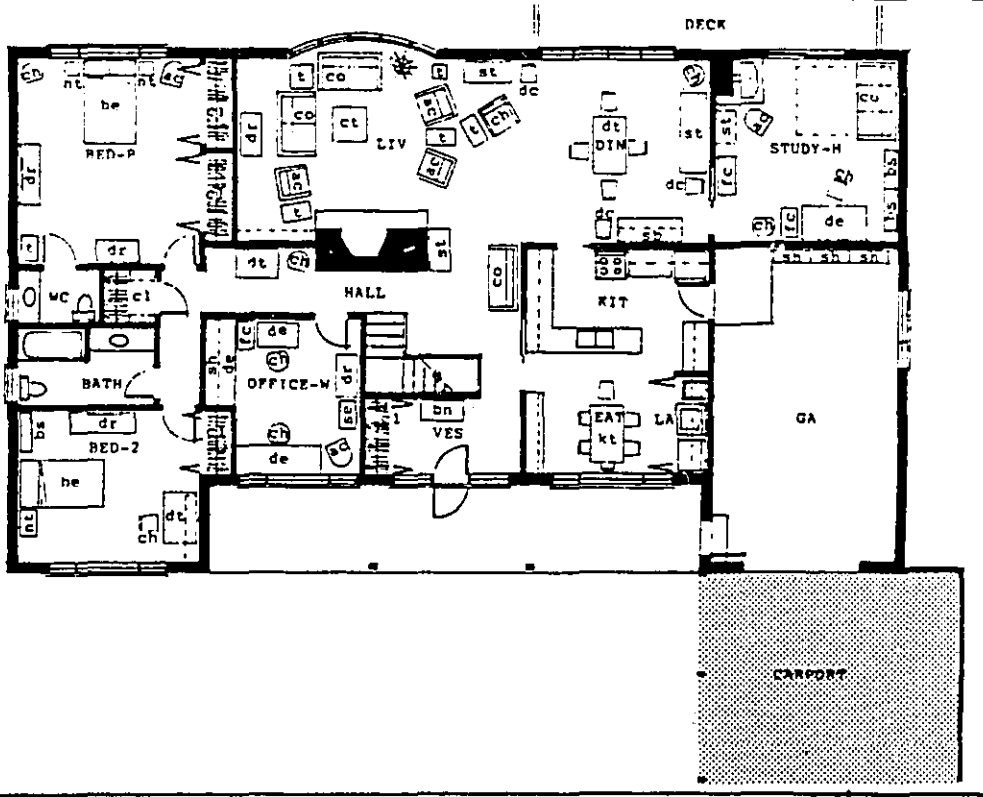
EVENT CHANGES	1-Daughter moved into new BED. Some furniture went to new cottage.	RESIDENCE # 4 LEVEL BASEMENT YEAR 1977 SCALE 1:175



EVENT CHANGES LCS 5	Grandfather died in 1979. House gradually re-organized to make use of freed-up space. Parents moved into Master BED, Wife took over DEN in which she ran newly established business. GAR used for business equipment. Study used exclusively by Husband. 2-Son takes over parent's BED. New furniture in LIV.	RESIDENCE # 4 LEVEL MAIN YEAR 1980 SCALE 1:175



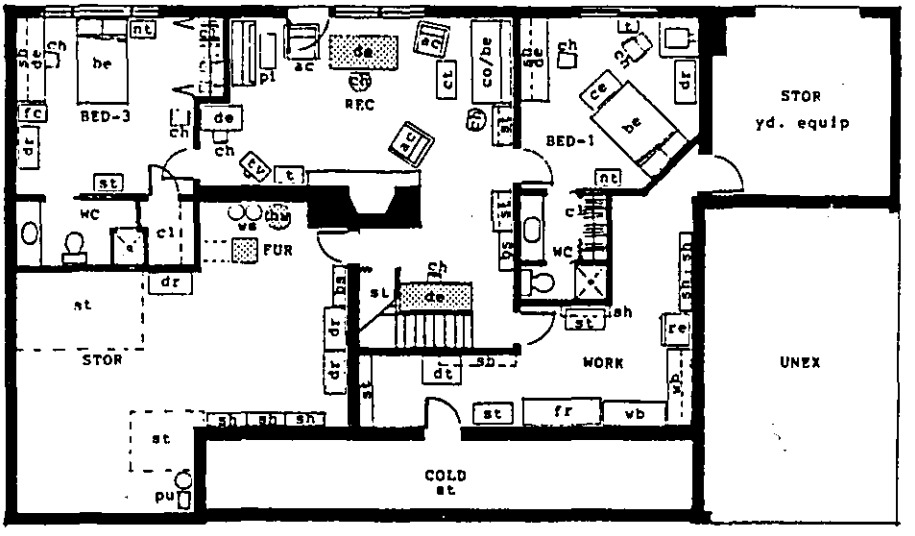
EVENT CHANGES	3-Son has exclusive use of BED. Husband builds Work Benches for Work Room. 1-Daughter away at University. Shower added to WC. for 3-Son's convenience and privacy.	RESIDENCE # 4 LEVEL BASEMENT YEAR 1980 SCALE 1:175



EVENT CHANGES: Added Carport since GAR used for wife's business. 2-Son away at University. House has remained the same up to 1990.

LCS 5

RESIDENCE # 4
LEVEL MAIN
YEAR 1985
SCALE 1:175



EVENT CHANGES: Husband sets up alternate Study in REC. and at foot of stairs. Oil furnace and electric hw replaced by gas fired units. House has remained same up to 1990.

RESIDENCE # 4
LEVEL BASEMENT
YEAR 1985
SCALE 1:175

4.8.2 - SUMMARY AND ANALYSIS OF FINDINGS: RESIDENCE NO.4

WHEN	WHERE	WHAT	WHY CHANGE	BY WHOM	WHY
1969	All	Family moved in to home	Grandfather recently widowed, had heart condition	Movers	Major move
1971	REC	1-Daughter used it as BED	3-Son moved in with 2-Son, to separate sexes	Parents	Move only
1972	DEN-G	1-Daughter used it as BED	1-Daughter needed privacy not afforded by REC	Parents	Move only
	BED-G	Grandfather's Desk, TV added	Grandfather gave up use of DEN so 1-Daughter could have own BED	Parents	Move only
	REC	Added Furniture from DEN-G	To make room for bed furniture in DEN-G	Parents	Move only
	BED-2	Added bunk beds	Gave more room for boys' play space	Parents	Move only
1977	DEN-G	DEN furniture returned	Addition provided new BED for 1-Daughter	General Contractor	Major addition
	STUDY	New addition	Provided Office for Husband & Guest BED	General Contractor	Major addition
	BED-P	Desk moved out to new Study	BED-P too crowded with Office furniture	Parents	Move only
	STOR	New addition	Old STOR changed to BED-1, WC, & cl	General Contractor	Major addition
1980	BED-G	Parents took over for BED	Grandfather died	Parents	Move Only
	BED-P	2-Son took over for BED	Vacated by Parents	2-Son	Move only
	BED-2	3-Son retained sole use	Vacated by 2-Son	nil	nil
	DEN-G	Wife took over as Office	Grandfather died	Wife	Move only

WHEN	WHERE	WHAT	WHY CHANGE	BY WHOM	WHY
1985	CARP	New addition	GAR being used more for business stor & wanted shelter for cars	Carpenter	Provide employment for Relative
	REC	Used as Study by Husband	Husband found STUDY too distracting. Used as thoroughfare to deck in summer months	Husband	Move only

The family moved in with the grandfather in 1969 because he had recently suffered a heart attack and, shortly afterwards, lost his wife. The family moved from another single-family home with all of their accumulated furnishings. Finding space for it all in a fully furnished house proved to be a problem. In order not to disturb the grandfather's life-style too drastically, they let him retain the master bedroom and the den since these were his own private spaces. This meant the family was put in the undesirable position of having young children bedded in the basement, especially the youngest child who was initially only 9 months old. The parents also had to crowd into a small bedroom ($11m^2$) with their bedroom and office furniture. The children did not have their own bedrooms until after an addition was made to the house in 1977 and the grandfather died in 1979. 1-Daughter shared a bedroom with 2-Son for two years and then had to use the recreation room until the grandfather gave up the den in 1972. She got her own bedroom when the addition was put on in 1977. This has remained her bedroom until present. The two boys shared the basement bedroom until after the grandfather died in 1979. 2-Son then took over the bedroom vacated by the parents, who moved into the master bedroom. The family bedrooms have not changed since, indicating that there can be periods of

stability once a status quo is reached. It also shows that bedrooms often change ownership until a satisfactory arrangement is achieved.

Another area of interest in this home is the evolution of office or study space that has occurred. When the family first moved in, the office space was confined to the parents' bedroom, in order to keep important papers away from small children and to avoid annoying the grandfather with any disorder. When the addition was built, a study for the husband was part of the construction. The new study proved to be unsatisfactory because it was the means of access to a new deck which was built outside. The function of the room was disrupted by family circulation through it to the deck. Subsequently, the husband relocated his study to the basement recreation room since that room had less traffic through it. The wife took over the den for her business after the death of her father and has run her business affairs from that office since that time.

The garage was used by the wife's business for tool storage and maintenance. This meant that the garage was no longer available for car shelter, and necessitated the addition of a carport in 1985.

The parents do not expect to stay much longer in this house, since all of the children are establishing their own households in the nearby city. However, there are certain luxury items they would like to install. A hot tub, for example, would be a useful display of one of the products the wife markets. This is illustrated in the accompanying floor plans.

4.8.3 - HOW GREATER FLEXIBILITY COULD IMPROVE RESIDENCE NO.4

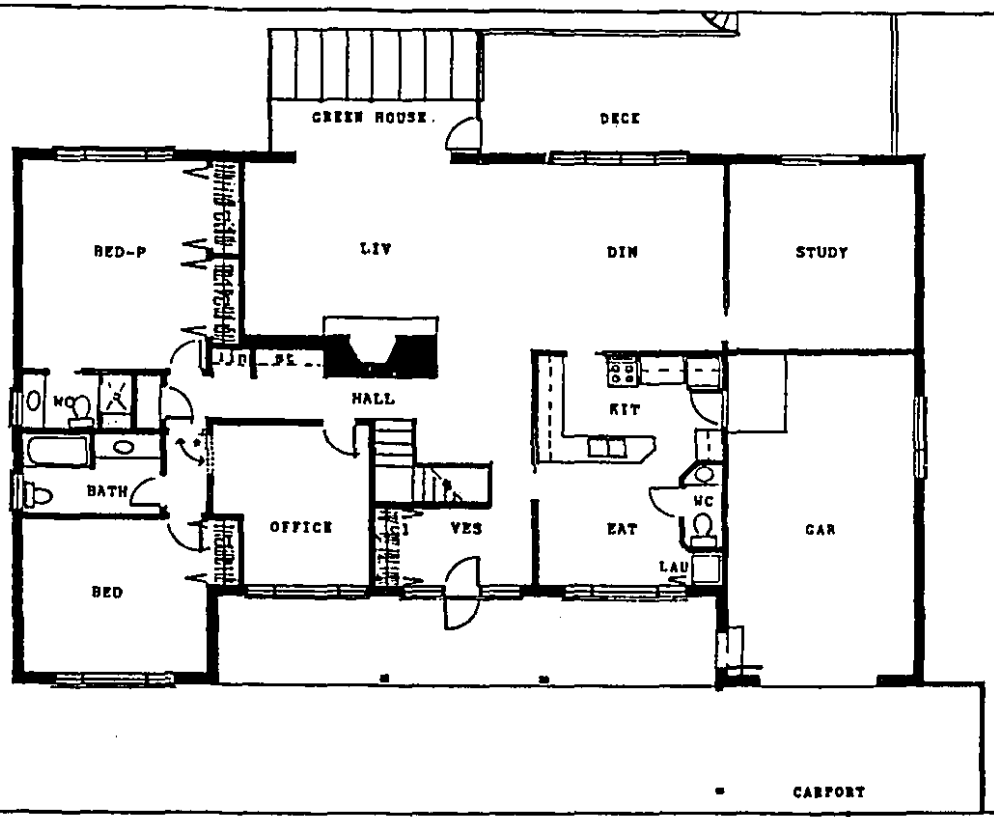
In this house greater flexibility over the family life cycle would result if the following modifications were included in the design of the house.

.1 Use demountable walls. The family could then create an apartment for the grandfather using the front bedroom, the main bathroom and the den by separating them from the hallway to the master bedroom and interconnecting the three rooms. The master bedroom is large enough to accommodate an infant until the child was old enough to sleep downstairs. The existing ensuite washroom could be modified to include either a bath or a shower. The washroom in the basement eventually had a shower added for the user.

.2 Use demountable partitions in the basement. These would allow for further partitioning to provide adequate privacy for the children in their younger years.

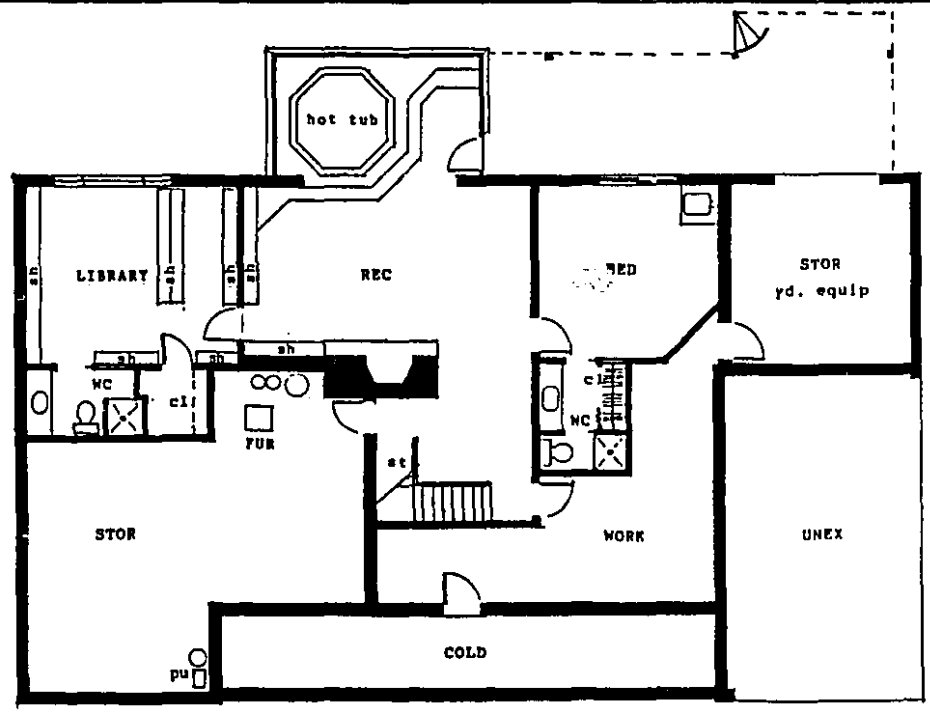
.3 Plan access to the rear deck from the living or dining rooms. This would alieviate the circulation problem through the new study and keep it in a semi-private zone rather than a public zone.

The following plans illustrate how Residence Number Four could be changed to accommodate the parents into Life Cycle Stage 6.



FUTURE CHANGES
Provide interchangeable door/wall section to create private apt. of front BED, Office & Bath.*
Add sitz-bath to Master BED WC.
Replace window in LIV with Green House. Extend Deck to provide access from LIV.
Install WC in KIT by door to GAR. Use stacked fixtures in LAU.

RESIDENCE # 4
LEVEL MAIN
SCALE 1:175



FUTURE CHANGES
Install hot tub in bottom of Green House using REC as support space.
Turn BED into Library for Husband's research reference material.

RESIDENCE # 4
LEVEL BASEMENT
SCALE 1:175

4.9.1 - QUESTIONNAIRE SUMMARY AND FLOOR PLANS FOR RESIDENCE NO.5

Date of Construction.....1972-12

Date of Occupancy.....1972-12

Family Composition.....Father.....33.....University Professor

Mother.....29.....Homemaker

1-Daughter...9mos.

Reasons for Move.....New job in another city

Input into House Design...Self and had house built by General Contractor

Features Best Liked.....Small efficient KIT, EAT in Family Room next to KIT.

Ample cl space.

Hallways narrow, put space in rooms.

Side VES from GAR as MUD and direct access to KIT.

Features found Wanting....Side VES too small

Main VES too much cl and too small

LIV/DIN too long and narrow

Main BATH had no window and was too small

Wanted GUEST on main level

After birth of 2-Daughter, H needed Office

Design for Changes by.....Self

Changes Executed by.....General Contractor

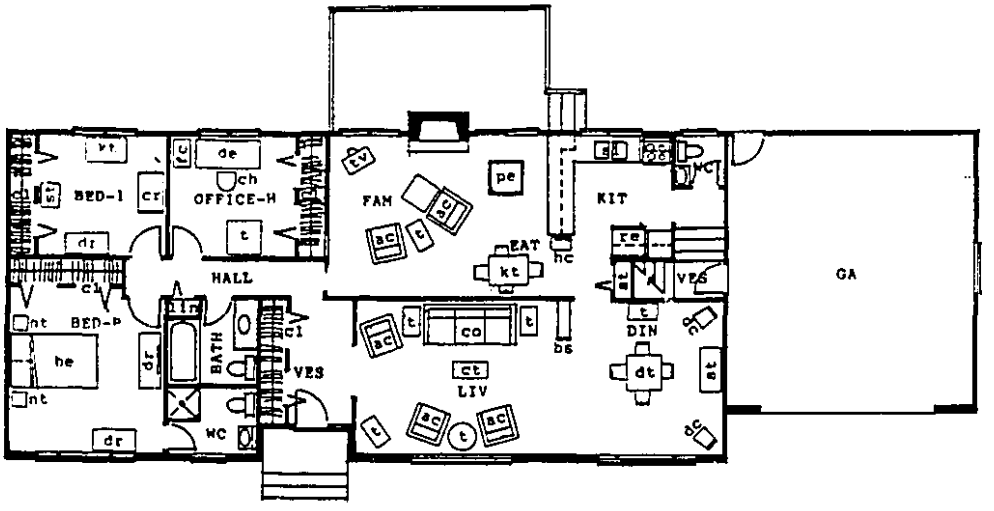
Deficiencies Rectified....1976 - Finished Basement to provide LAU, FUR, REC with partially finished KIT, WORK, and Office for H.

Defic's Rectified cont'd..1988 - Added bay window to LIV
Made additions to enlarge BATH, BED-P, added DEN/GUEST, enlarged children's BED, added windows to BATH and WC-P, replaced front door and upgraded front VES

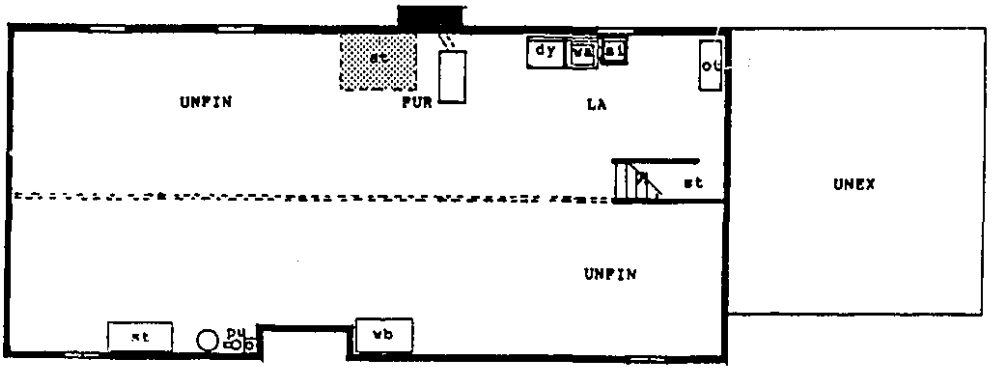
Present Occupancy.....Father.....52.....Un. Professor, Consultant
Mother.....48.....Teacher, Beauty Consultant
1-Daughter..19
2-Daughter..17

Features Being Considered.None; planning to move back to city when 2-Daughter graduates from high school next year. If family were to stay, they would consider modifying basement to provide an apartment to rent to a single person.

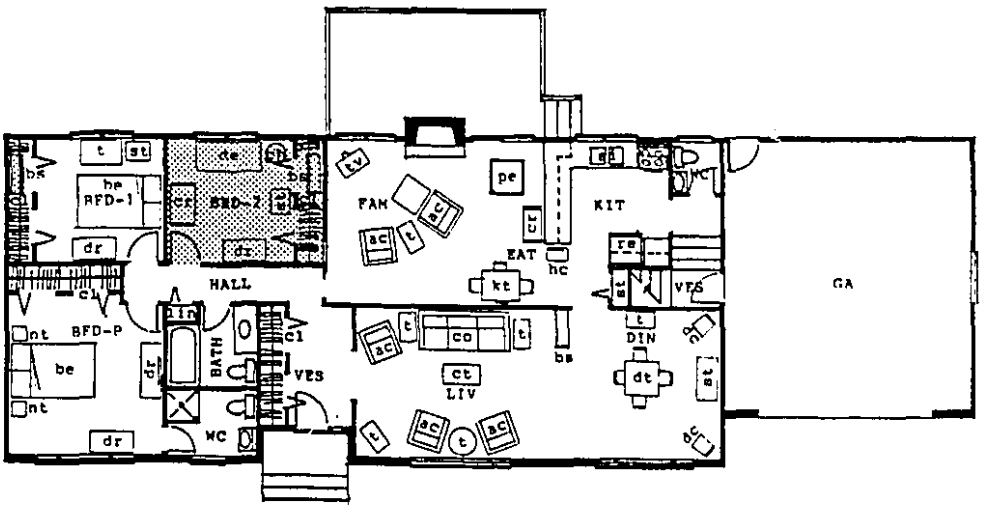
The following plans illustrate the changes that occurred in Residence Number Five over a period of eighteen years.



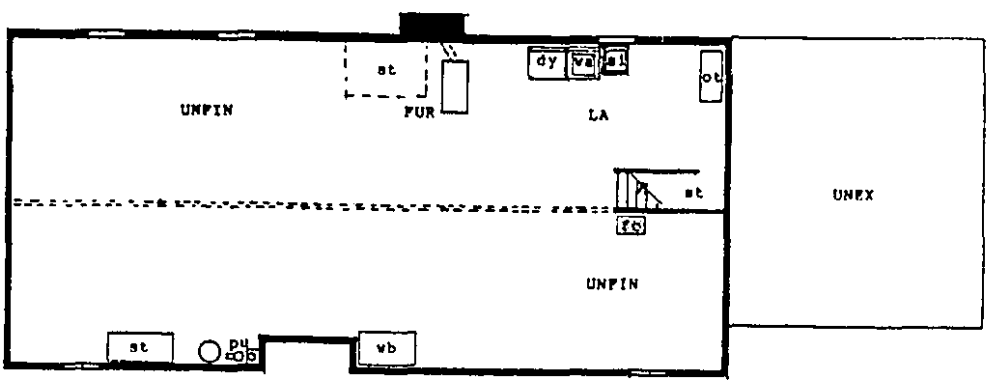
EVENT CHANGES	Moved into house with one infant.	RESIDENCE # 5 LEVEL MAIN YEAR 1972 SCALE 1:175
LCS 3		



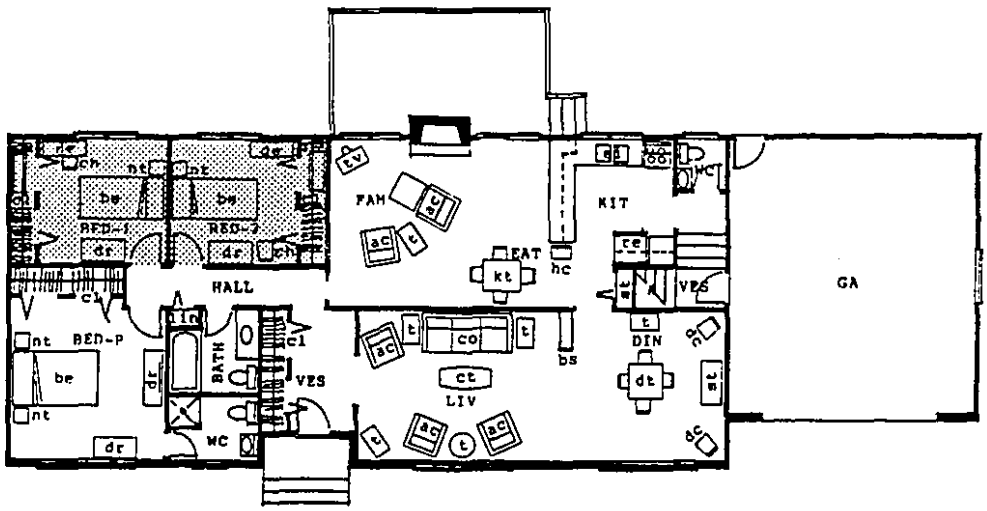
EVENT CHANGES	Basement used only for minor storage.	RESIDENCE # 5 LEVEL BASEMENT YEAR 1972 SCALE 1:175



EVENT CHANGES	2-Daughter born. Husband's Office turned into BED-2, though still used as Office. Husband builds book shelves for Office and Daughters' BED.	RESIDENCE # 5 LEVEL MAIN YEAR 1974 SCALE 1:175
LCS 3		



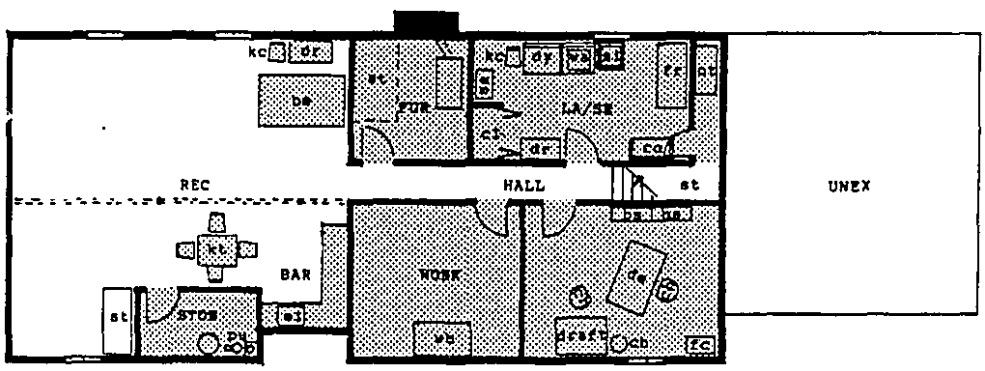
EVENT CHANGES	Filing cabinet moved to Basement.	RESIDENCE # 5 LEVEL BASEMENT YEAR 1974 SCALE 1:175



EVENT CHANGES: Children both receive new bedroom suites.

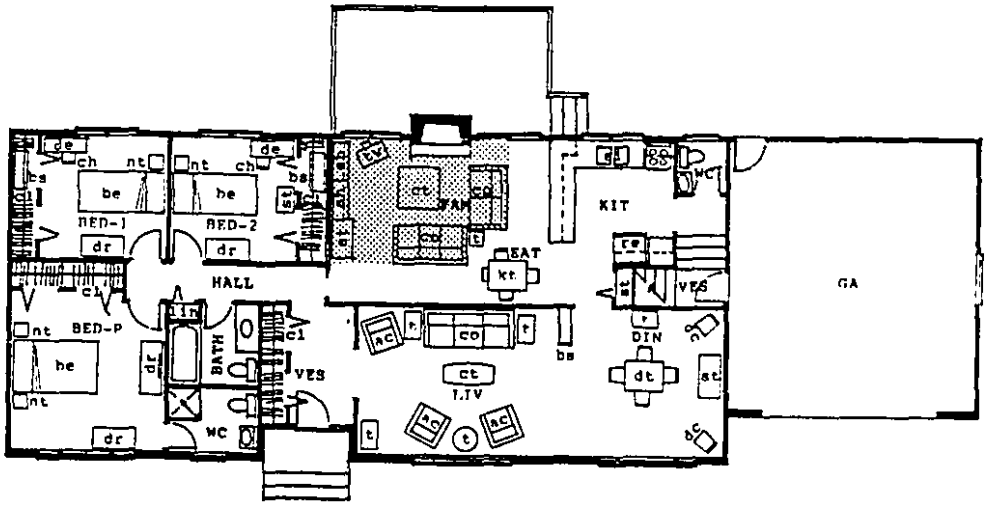
LCS 4

RESIDENCE # 5
LEVEL MAIN
YEAR 1976
SCALE 1:175

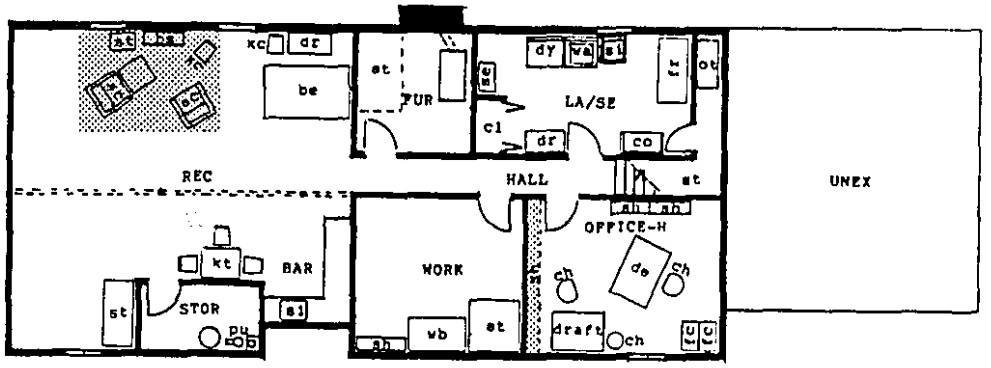


EVENT CHANGES: Basement partitioned into 6 functional spaces. Laundry/sewing area formalized. Office and Work for Husband. REC storing old furniture and used as a Play Room by the children.

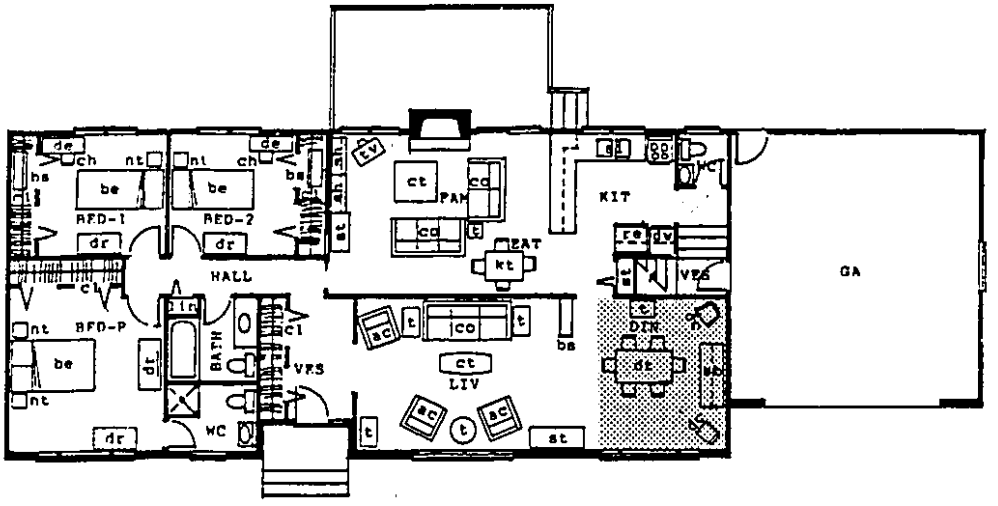
RESIDENCE # 5
LEVEL BASEMENT
YEAR 1976
SCALE 1:175



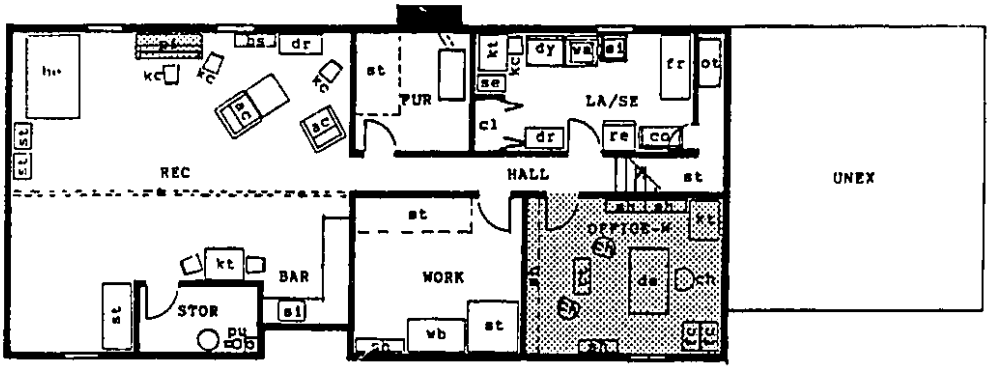
EVENT CHANGES	RESIDENCE # 5
New furniture acquired for FAM.	LEVEL MAIN
LCS 3	YEAR 1980
	SCALE 1:175



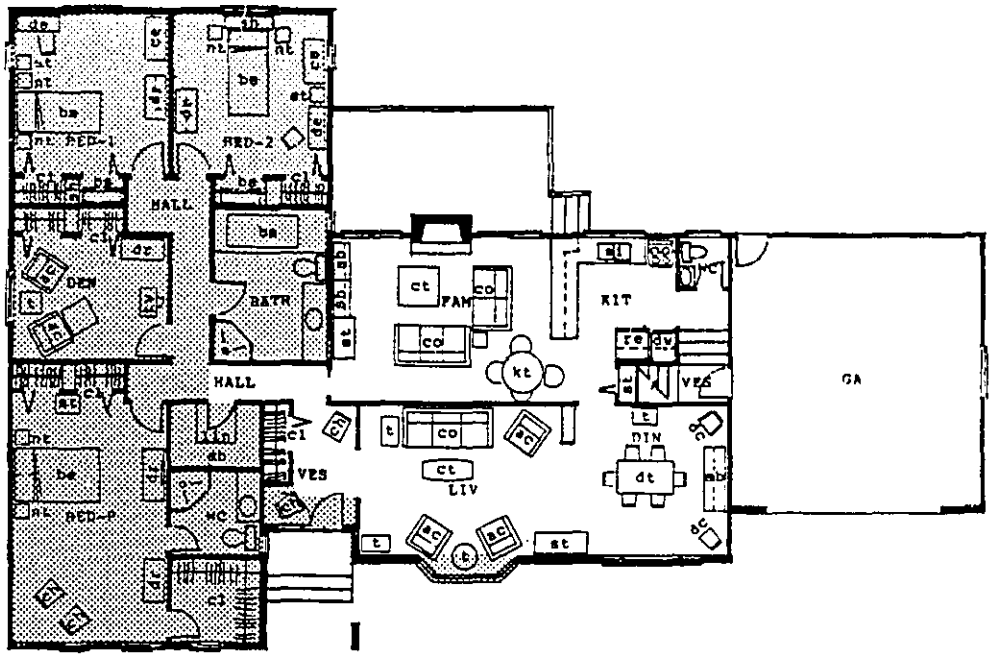
EVENT CHANGES	RESIDENCE # 5
New furniture acquired for FAM. Old furniture retired to REC. Custom-built shelving added to Husband's Office as consulting business grows.	LEVEL BASEMENT
	YEAR 1980
	SCALE 1:175



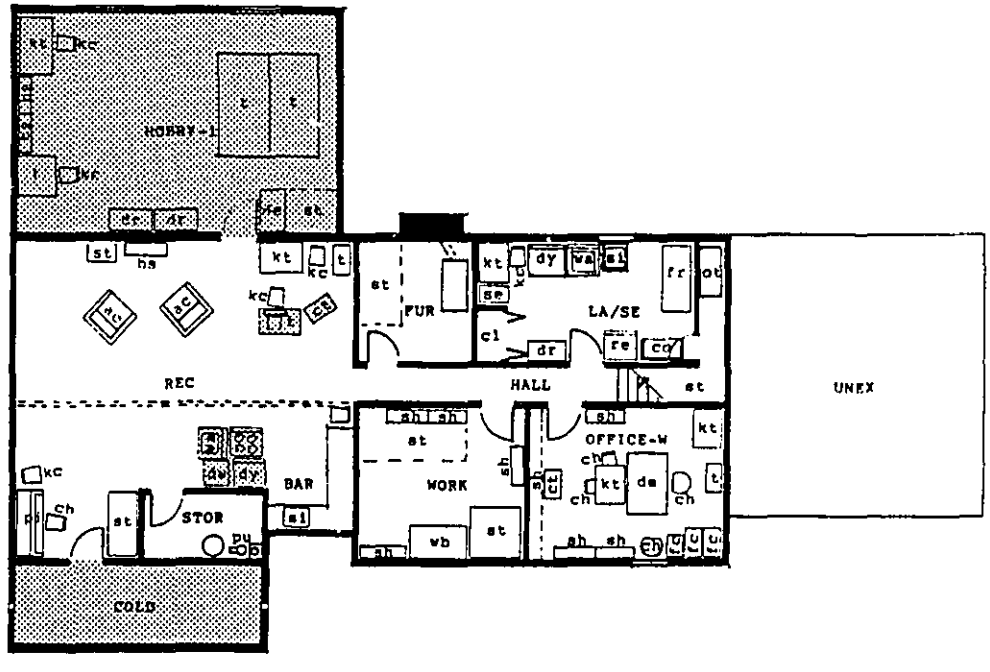
EVENT CHANGES	New furniture acquired for DIN. Dishwasher installed in KIT.	RESIDENCE # 5 LEVEL MAIN YEAR 1985 SCALE 1:175
LCS 5		



EVENT CHANGES	Piano placed in REC for 2-Daughter to practice lessons. Husband moves Office out to commercial space. Wife starts own business and takes over Office.	RESIDENCE # 5 LEVEL BASEMENT YEAR 1985 SCALE 1:175



EVENT CHANGES LCS 5	All BED found to be too small and no Guest. Major additions to house satisfy these shortcomings and provide more modern BATH. House has remained the same up to 1990.	RESIDENCE # 5 LEVEL MAIN YEAR 1988 SCALE 1:175



EVENT CHANGES	1-Daughter takes over additional space for a Hobby Room. Front addition developed as Cold Storage. Replacement of all major appliances results in storage of old units in REC., which is no longer being actively used.for play. Computer set up for school work. House has remained the same up to 1990.	RESIDENCE # 5 LEVEL BASEMENT YEAR 1988 SCALE 1:175

4.9.2 - SUMMARY AND ANALYSIS OF FINDINGS: RESIDENCE NO.5

WHEN	WHERE	WHAT	WHY CHANGE	BY WHOM	WHY
1974	Off-H	Changed to BED-2	New baby	Parents	Move only
1976	BED-1	New furniture	1-Daughter out-grew baby furniture	Merchant	New delivery
	BED-2	New furniture	Bought at same time as for 1-Daughter	Merchant	New delivery
	Base	Finished Base FUR, LAU, St, Work, Office	Needed for Office for Husband	Contractor	Husband too busy
1980	FAM	New furniture	For family comfort	Merchant	New delivery
	REC	Relocated FAM furniture	Reading area in REC for children	Parents	Move only
	Off-H	Installed new shelving	Husband required sh for business reference mat.	Husband	Easily assembled
1985	DIN	New furniture	Upgraded quality of Din. furniture	Merchant	New delivery
	OFF-H	Taken over by Wife	Husband moved Office to Commercial space	Parents	Move only
	REC	Piano placed	2-Daughter wanted piano lessons	Merchant	New delivery
1988	BED wing	Complete reno-vation	Wanted more space in BED, BATH & extra BED for Guests (DEN)	General Contractor	Major addition
	Base	Added HOBBY & COLD	Needed space for Children's hobbies & st	General Contractor	Major addition

Since this home was custom-built by the owner, there were few needs for change other than finishing the basement to accommodate additional functional requirements as the family grew and matured. The family found that the bedrooms were undersized for their life-style and the bathroom did not meet their changing life-style needs.

Other than office space, the demand for space in the home did not create pressure for change. When the basement was finished in 1976, the need for office space was satisfied. When the wife started her own business, the husband vacated the basement office and relocated to commercial space, thereby relieving the pressure for additional or shared office space in the home. The recreation room was never furnished, since the main floor family room satisfied the need for family activities. The children used the recreation room as a playroom for boisterous in-door play during their younger days, but it has remained under-utilized for most of the family life cycle.

The additions in 1988 were made primarily to satisfy life-style demands rather than a physical need for additional space. The new den is seldom used as a guest bedroom since the grandparents on both sides of the family are now too old to travel and visit. 1-Daughter has taken over part of the new basement for her hobbies (model building, model trains), but 2-Daughter is content with the space of her own bedroom. The girls use the den as an alternate television viewing room to the family room.

4.9.3 - HOW GREATER FLEXIBILITY COULD IMPROVE RESIDENCE NO.5

The house would have greater flexibility over the family life cycle if the following modifications were included in the design of the house:

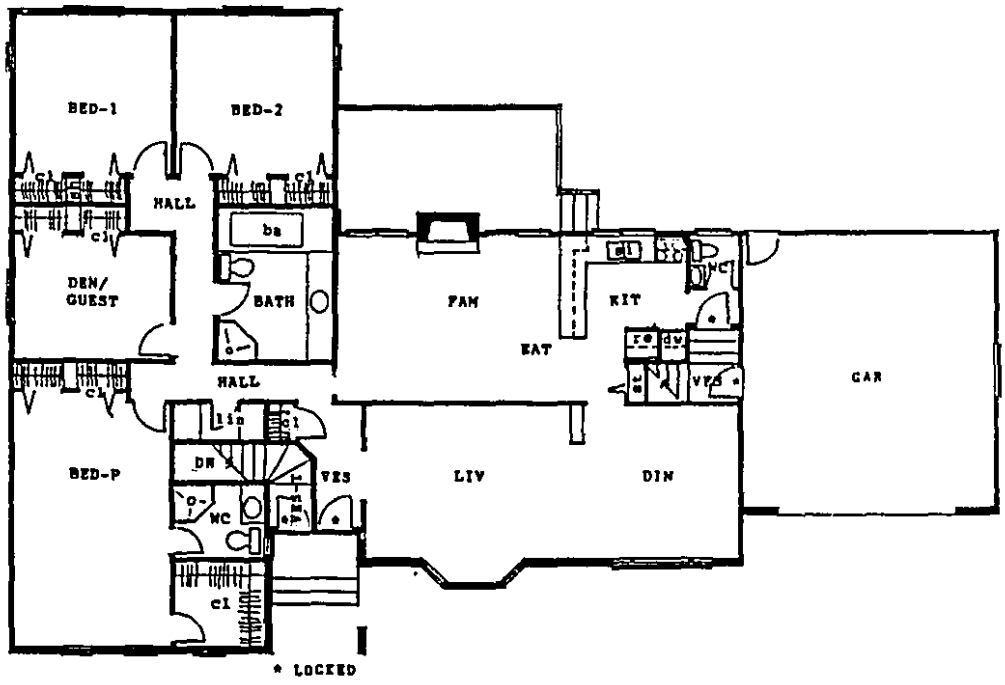
.1 Design a more generous vestibule with access to the basement. This would make converting the basement into an apartment much easier.

.2 Use wardrobes for storage in the bedrooms. The necessity to enlarge the rooms might be avoided, since the bedrooms would appear more spacious and be more versatile.

.3 Design wider hallways. Although the designer deliberately made the hallways narrow, their width contributed to the tight feeling of the bedroom wing. A slightly more generous hall width would have given a better sense of arrival to the private zones of the house.

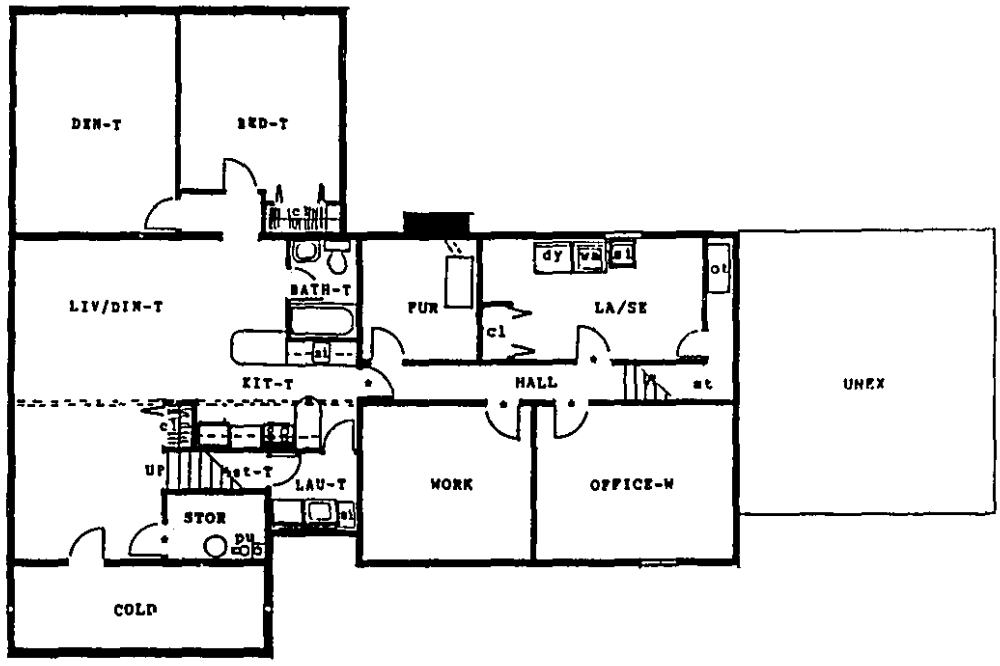
.4 Locate the laundry on the main level. This provides long term convenience at all stages of the family life cycle.

The following plans illustrate how Residence Number Five could be changed to accommodate the parents into Life Cycle Stage 6.



FUTURE CHANGES: Provide second Entry to Basement Apartment by reducing size of lin, cl in VES, WC in Master BED.
Provide lockable Entry in KIT to Entry from GAR.

RESIDENCE # 5
LEVEL MAIN
SCALE 1:175



FUTURE CHANGES: In place of REC & Hobby, build 95m^2, 2-BED apartment with LAU & Bath. Provide alternate access to GAR through Basement.

RESIDENCE # 5
LEVEL BASEMENT
SCALE 1:175

CHAPTER FIVE: CONCLUSIONS

5.1 - INTRODUCTION TO CONCLUSIONS

Through the use of case studies the author has determined which spaces in the home go through changes in user or function during the family life cycle. The combined case studies have provided an overview of over 50 years covering Stage 3 to Stage 7 of the family life cycle. By looking at what those functions are and by comparing the changes between the case study residences, certain trends or common occurrences may indicate areas where flexibility could be built into the homes in order that they remain usable throughout the family life cycle.

5.2 - CHANGES TO THE HOME DURING THE FAMILY LIFE CYCLE: CASE STUDIES

The following observations were common to all the case study subject homes. Examples of each observation are given by citing specific homes, and exceptions are also identified. Initially, with the exception of Residence No.4, the homes were large enough to accommodate the needs of the families. This was evident in that all members of each family had their own bedroom or at least shared a bedroom with a sibling as young children. Where space or function were perceived as inadequate, the homes were enlarged or modified to meet those needs.

The greatest pressure on the use of space in the home occurred when the children were in their late teens and still living at home, or when an additional person other than the immediate family was living in the home. In Residence No.1 the loss of part of the basement to a tenant put

increased pressure on the remaining space in the home as well as the need to be more careful about privacy and behaviour in the public spaces of the home. In Residence No.3 the maternal grandmother lived in the home for two years, requiring the two sons to share a bedroom at an age when they would have liked the privacy of their own rooms. In Residence No.4 the family had to use spaces in the home in less desirable ways in order to accommodate the incumbent grandfather. Since the home was initially the grandfather's, the family had to minimize disruption to his accustomed life-style.

All residences experienced the pressure of children in their late teens on space in the home. The reaction to this pressure was most often expansion of functional space in the home. Residence No.1 expanded the master bedroom into a bed-sitting room to give the parents more opportunity for privacy. Residence No.3 used the den as a bedroom to give the children more privacy. Residence No.4 expanded the house to provide more bedroom space and thence more privacy to their children. Residence No.5 expanded the house to provide larger bedrooms so they would be more comfortable as private spaces for both parents and children.

To date, only Residence No.2 has demonstrated the effects of children leaving to form their own family units while the parents remained in the residence. Even so, the children came back to visit often in the initial years (1966-1980). One child came back with her children and lived in the house temporarily for six months. Since 1980 there have been few over-night or weekend visits. The children began to stay with their siblings as their parents experienced periods of ill-health and found the visits added additional stress. The parts of the

house formerly used as guest space have been put to alternate uses, but they have been mostly used for storage. This inefficient use of livable space indicates the house is too large for use by two elderly people and not flexible enough to allow for easy alternate uses. The declining energy and physical abilities of the resident couple preclude any major changes to the status-quo.

Residence No.4 has adult children coming home to live in the house each summer. Although the children are at home, their interests are outside the home and the parents feel they are running a "hotel" for their children rather than enjoying the atmosphere of family life that existed in pre-university days. The pressures on spaces in the home become intermittent, rather than constant, which is more irritating to the parents. Residences No.1 and No.5 are just coming into this stage of the family life cycle and therefore have not experienced dealing with adult children yet. Adult children, even though they are home only part of the year, demand even more space than teenagers. The parents are no longer responsible for their children's actions, making social readjustment in the parent-child relationship difficult, and this demands more "space" between the two generations. The ability of a house to provide a separate apartment for the adult children would satisfy that demand. Most of the case study houses could provide a separate apartment, but only Residence No.1 adapted the basement for that purpose. Although the tenant had to pass through the public spaces of the main floor of the house, this residence shows the possibilities of developing a separate private space for adult children. So far in Residence No.1, the children have not expressed a desire to take over the apartment in order to have greater independence from their parents.

In summary, **the spaces that underwent changes most frequently were dens, studies and recreation rooms. Bedrooms changed frequently only when there were crowded conditions or when residents were not happy with the status-quo.** Dining rooms and kitchens often were used as temporary offices or studies, but this did not pre-empt their prime function of dining and food preparation. The living room in all cases retained that function throughout the history of the households. Workrooms changed only if the type of hobby pursued there changed.

5.3 - CHANGES TO THE FUNCTION OF SPACES IN RELATION TO THE LIFE CYCLE STAGES

The house can be divided into two basic areas:

.1 Areas that do not change use;

.2 Areas that have frequent changes of user or function.

5.2.1 - AREAS THAT DO NOT CHANGE USE

The first category can be divided into Public, Operative, and Private spaces. The **Public Spaces** include areas that are set aside for formal entertaining in the home, or act as public or reception areas. In all five case studies the vestibule and/or front hall did not change use. The living and dining rooms all remained in the public domain. In residence No.2 the dining room became functionally part of the living room and a bedroom became the dining room; in the remaining houses the dining room retained that function throughout the study period.

The **Operative Spaces** that remained stable throughout the family life cycle are those that require a high capital cost to change such as the

kitchen and laundry rooms. The **Private Spaces** that remained stable throughout the family life cycle are those that require major capital cost to change as well, such as bathrooms and washrooms. In addition, the master bedroom retained its prime function in all cases.

These spaces (eg: vestibule, living, dining, kitchen, laundry, bath, washroom and master bedroom) are considered to be the basic functional spaces in a North American home and therefore, as part of the family lifestyle, are maintained as is, or at most, improved upon in situ, throughout the family life cycle.

5.2.2 - AREAS THAT HAVE FREQUENT CHANGE OF USER OR FUNCTION

The spaces that undergo change throughout the family life cycle are spaces that are dedicated to an individual's personal use and are generally **Private**, or **Semi-private Spaces**, such as bedrooms, studies, dens and hobby rooms. As Teasdale (1986, 94) points out, spaces used by elder siblings will be taken over by younger siblings when the elder sibling relinquishes use by moving out or when additional space allows them to relocate. This is evident in both Residence No.2, where older siblings left home and the space was promptly taken over by the younger siblings, and in Residence No.4, where additions to the house and the death of one occupant resulted in a complete re-organization of private spaces in the home.

Bedrooms and recreation rooms remain the most frequently changed spaces. Bedrooms change hands between family members who use them as sleeping spaces, play rooms, studies, offices, hobby rooms and television rooms. These spaces often do double duty as guest rooms for occasional visitors if surplus to the family's sleeping spaces. Storage

areas in the basement are often used as hobby rooms or developed as guest rooms, offices, dens, and other functions similar to bedrooms.

When buying a home, families like to have undeveloped space in the home in reserve for future expansion. It is evident from nearly all the homes in the case studies that this space will be developed for family activities and guest facilities over the time of the family life cycle. These spaces are mostly used while the family is in Life Cycle Stage 5, when teenage children are at home and need extra space for their activities and their parents need space for hobbies. The space becomes under-utilized when the parents are "empty-nesters" in Life Cycle Stage 6 and they do not need as much space for their activities. The demand on space further declines as they become less active in Life Cycle Stages 7 and 8.

The frequency of change for each room in relation to its functional zone is illustrated in Figure 5.1.

RESIDENCE NO.		1	2	3	4	5
ZONE	ROOM					
PUBLIC	LIV	0	0	0	0	0
	DIN	2	1	0	1	0
	FAM	NA	NA	NA	NA	1
	REC	1	3	1	4	2
OPERATIVE	KIT	1	0	1	1	0
	WORK	0	2	0	1	0
SEMI-PRIVATE	DEN	3	NA	3	4	1
	STUDY	2	NA	2	1	2
PRIVATE	BED-P	1	2	0	1	1
	BED-1	0	4	3	2	1
	BED-2	0	3	NA	3	1
	BED-3	2	3	NA	3	NA

FIGURE 5.1 - FREQUENCY OF CHANGES IN USE OR FUNCTION OF ROOMS IN CASE STUDY HOUSES

5.4 - HOW FLEXIBILITY CAN BE INTRODUCED TO ACCOMMODATE CHANGES

Based on the case studies illustrated in Figure 5.1 the two prime areas in the home that need to remain flexible are the bedroom wing and the basement. Most housing developers leave the basement unfinished to save money and to allow for the homeowner to plan and construct the additional spaces and functions he desires. In the bedroom wing, however, the rooms are constructed and completely finished by the builder. Although the Canadian housing consumer often demands finished spaces, there are some fundamental changes that could be made in construction techniques:

.1 Make all floor and ceiling finishes continuous throughout the bedroom wing, so that partitions can be moved in future without the added expense of repairing these surfaces.

.2 Bring all electrical services into inside partitions from outside walls rather than through the floor or ceiling. This allows the movement of partitions without major repairs to services or ceiling and wall surfaces.

.3 Delete clothes closets in all bedrooms but the master bedroom in favour of movable wardrobes. This would facilitate changing room function and ownership, since the storage units could be moved wherever they are required. Since the master bedroom retains its primary function, built-in storage remains viable there throughout the family life cycle.

.4 Ensure that all bedrooms are large enough to be suitable for other functions (Rabineck 1974, 108). A room 3.5m X 3.5m is the minimum size for a multiple of uses, such as a den, dining room, study, or office (Time Saver Standards, 151-163).

.5 Consider using demountable partitions between adjacent secondary bedrooms. Include demountable door/wall sections that would allow the reconfiguring of bedrooms into fewer or more rooms, or into a separate apartment.

5.5 - HOW FLEXIBILITY OF ELEMENTS IN THE HOME ENSURES SUITABILITY OF THE HOME ENVIRONMENT FOR ELDERLY OCCUPANTS

Although flexibility of spaces and their functions make a home more useful throughout the family life cycle, there are many elements in the design of a house that require modification if elderly occupants are to remain in their homes as long as they may wish. These items assist people with physical limitations to continue to function much longer than they can in housing as it is presently designed. A full description of the changes proposed is outlined in APPENDIX I (DESIGN AIDS FOR THE ELDERLY). The point is that these changes would benefit people of all ages since they provide either easier access or greater safety. A brief outline of the most significant changes follows:

.1 Design single-storey dwellings for the best long-term home environment.

.2 Make all interior doors a minimum of 810mm wide.

.3 Use lever handles on doors and 'D' handles on cupboards.

.4 Raise electrical outlets to 550mm off the floor in most rooms and to 1250mm off the floor in hallways.

.5 Provide a section of counter top in the kitchen that can be adjusted between 810mm and 915mm off the floor.

.6 Design storage so that, in general, above 915mm from the floor is shelving and below 915mm is drawers.

.7 Ensure that all spaces in the home will accommodate the turning radius of a wheelchair.

.8 Provide in the bathroom a 600mm wide floor space beside the toilet and a seat at one end of the bathtub. A height-adjustable sink would be useful at all ages.

.9 Install the laundry on the same level as the bedrooms either in the bedroom wing or adjacent to the kitchen.

.10 Use single-lever handled faucets on sinks, baths and showers.

.11 Ensure that there is adequate provision for good lighting in halls and stairways even if not installed initially.

These items are basic to good design and ensure the flexibility required to allow seniors to remain in their homes as long as possible. Not everyone will eventually be confined to a wheelchair or develop arthritis. However, designing for that possibility will help to ensure that no seniors will be forced to vacate their homes before they want to because these features are lacking. It should be noted that these proposed changes would benefit families with young children as well. The flexibility would provide greater safety and earlier independence for the very young.

5.6 - FUTURE CONSIDERATIONS

The author suggests that designers should change their focus in housing design. Instead of designing housing for a specific point in the family life cycle they should aim to satisfy their clients' needs over the period of the entire cycle. This would entail paying attention to the increasing and decreasing demand on space, the functional changing of the use of space, and young children's increasing ability and the elderly's decreasing ability to function competently within the home environment. The flexibility of housing should encompass all of these factors as part of the design criteria. The research question that comes to mind is: **How can new single-family housing be designed to accommodate all stages of the family life cycle?**

Subsequent studies might determine how these factors could be adapted to existing housing stock, since most of the housing required for the next number of decades already exists. This gives rise to a further research question of: **How can existing single-family housing be economically adapted to accommodate all stages of the family life cycle?**

Finally, a study of how people physically use appliances and elements in the home would benefit the elderly as they become physically less capable. This inspires a third research question of: **How can ergonomics assist in the design of appliances and elements in the home to extend their usefulness to all stages of the family life cycle?**

Most of the changes would be minor and would not appreciably increase the cost of constructing new homes. The changing of existing housing stock would be much more of a challenge and would prove to be an interesting research study.

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APPENDICES

The appendices include the following:

APPENDIX I

DESIGN AIDS FOR THE ELDERLY

There are a number of elements that could be modified in a home to facilitate the stay of the elderly longer in their homes.

GENERAL: Ensure all doors are a minimum 810mm wide to allow the passing of a wheelchair. There should be a space beside the latch side of the swing side of a door to accommodate people with ambulatory difficulties or in a wheel chair (Henning 1985, 6). Lever-type handles on doors, which are easier to operate both for young children and the elderly, especially those stricken with arthritis, can also be provided (Simon 1987, 80).

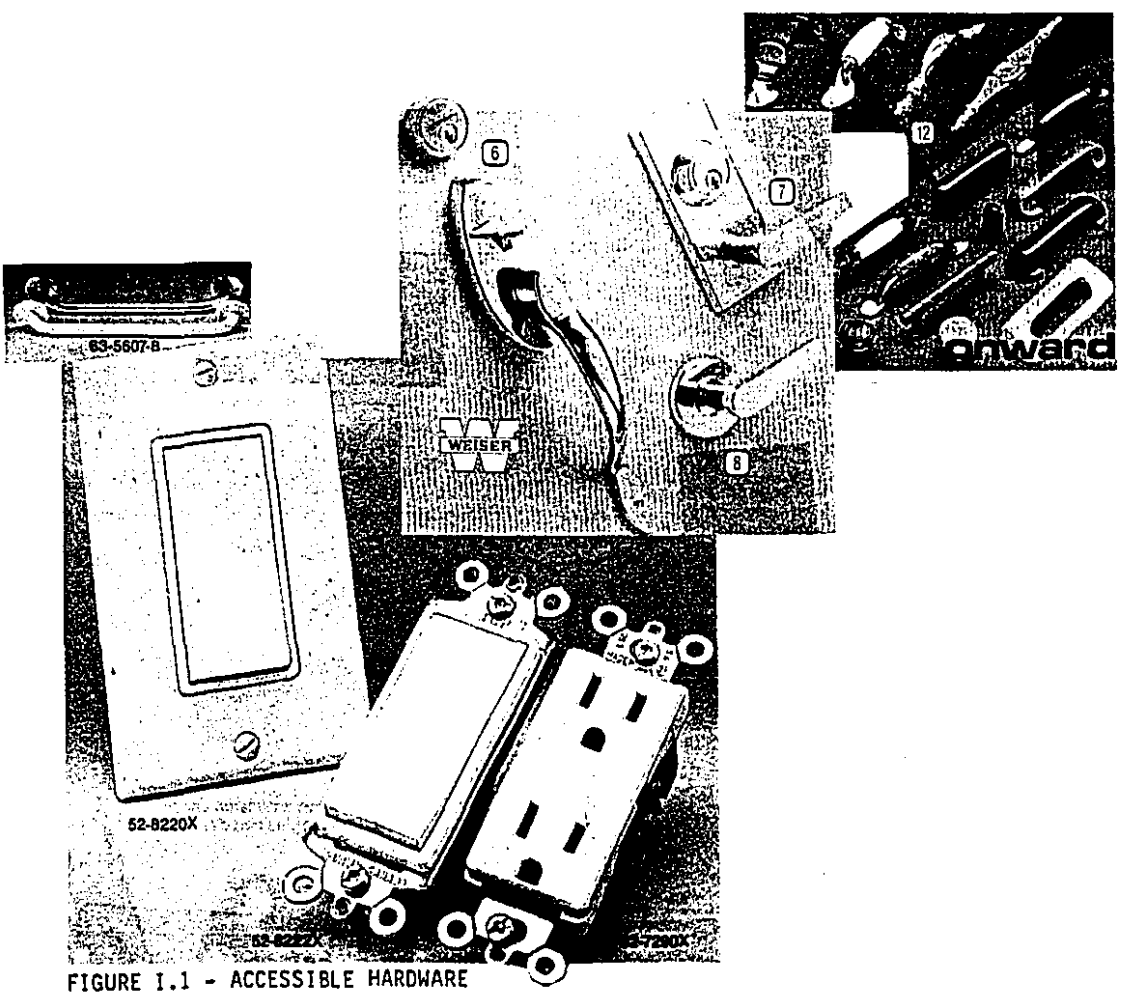

FIGURE I.1 - ACCESSIBLE HARDWARE
source: Various Retail Catalogues, 1990

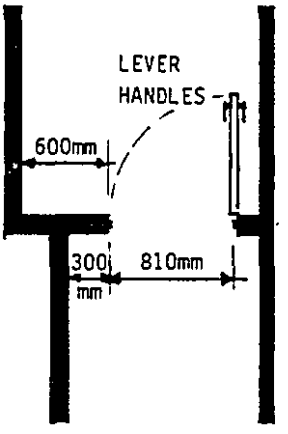

FIGURE I-2 - CLEARANCES AT DOOR FOR WHEELCHAIR ACCESS
source: Henning, 1985

It is possible to provide adequate lighting in hallways and other circulation spaces and allow for re-lamping to improve light levels (Regnier 1987, 359). Electrical outlets, such as those in hallways, would better be at switch height instead of 300mm off the floor; this is more convenient for seniors and out of reach of infants. Other outlets could be raised to 550mm above the floor in rooms other than the living room. Use large rocker-type light switches, which are the easiest to operate (Simon 1987, 80). Simon (1987, 76) also suggests

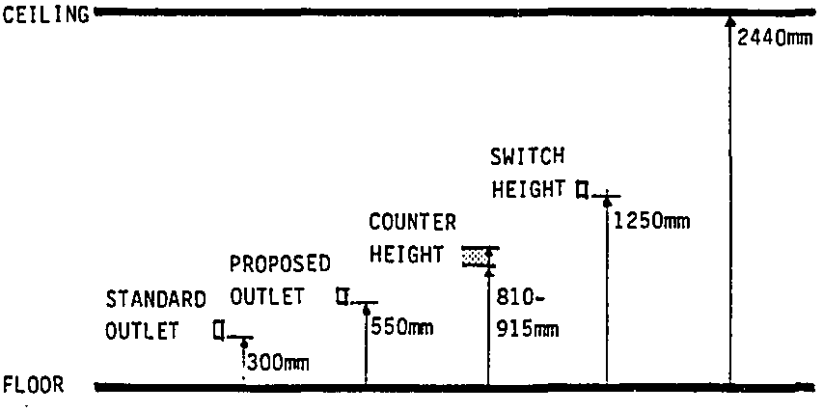

FIGURE I-3 - SWITCH AND OUTLET HEIGHTS
source: Proposed by Author

that the type of window used in the home can be critical and those that operate with a crank mechanism are the easiest for seniors.

ENTRANCE: It is necessary to provide high level of lighting in this area with visual contact to the outside for security reasons and ensure that there is an at-grade entrance into the dwelling for easy access (Dixon 1989, 90-91). Provide a shelf inside and outside of the door for resting packages while opening the door, a convenience all ages would enjoy (Simon 1987, 27). Use non-slip flooring to minimize falls. Intercoms are an invaluable tool that allow the elderly to communicate with people outside the house without having to rush to the front door, as well as being excellent from a security point of view (Simon 1987, 82).

KITCHEN: Simon (1987, 80) recommends the use of "D" handles on cupboards, which are easier to use than knob styles. Provide adjustable counter heights for a portion of the counter space (Simon 1987, 68-71). As the elderly person loses physical capacity and often becomes reduced in actual physical stature, there is a need for lower counters to do cutting, chopping and other down-pressure chores. The author suggests raising the height of the kick space under counters to 350mm in order to raise the under-counter shelving height. The elderly lose their ability to bend over and reach down comfortably. The kick space then can be

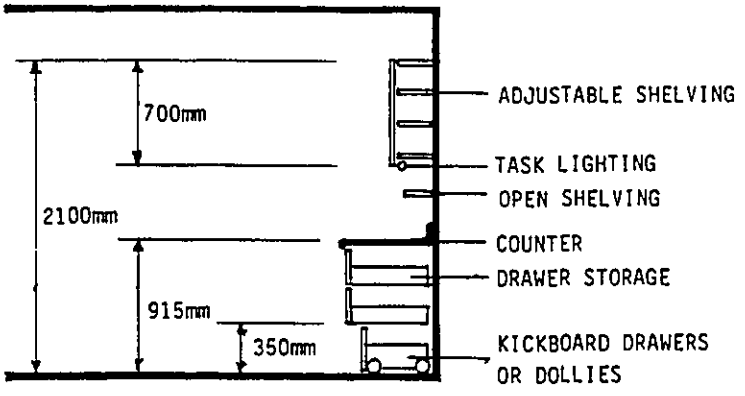

FIGURE I.4 - KITCHEN CUPBOARD MODIFICATIONS
source: Proposed by Author, 1990

converted to drawers for occasional-use storage. Getting items out of drawers is easier than out of 600mm deep shelving that is only 150mm off the floor (Simon 1987, 70). As well, in early stages of the family life cycle, infants can use them for their toys while playing in the kitchen.

Provide ovens at counter height rather than below the stove top, for the same reason as the previous item. The counter height ovens are also out of reach of infants (Keiser 1978, 163). Controls for stove tops should be at the front or side. Although this is not as good for infants, it would minimize burn accidents for seniors and pre-teens (CMHC 1989, Specific 22). Provision for microwave ovens should be made again at above-counter height. They are extremely useful at both ends of the family life cycle when servings are small enough to take advantage of their range of maximum efficiency. Specify double-basin kitchen sinks, which are more convenient for the elderly and encourage proper food preparation habits.

It is recommended to provide open shelving and racks under above counter cupboards for storing frequently used cooking items. This improves cooking efficiency for all age groups and is especially good for the elderly because it minimizes awkward reaching into cupboards (Maltais 1988, 21). Also, provide a high level of lighting, since task lighting under cupboards and over counters is especially good for seniors as their eyesight grows weaker (Simon 1987, 71).

Use a refrigerator-freezer with the freezer at the bottom. Although this style is not as energy-efficient as the reverse, the benefits of not having to bend over to get at frequently used items in the refrigerator far outweigh the additional energy requirements.

The kitchen should include eating space since the kitchen table

is the main centre for social activity at all ages in our society (Keiser 1978, 220).

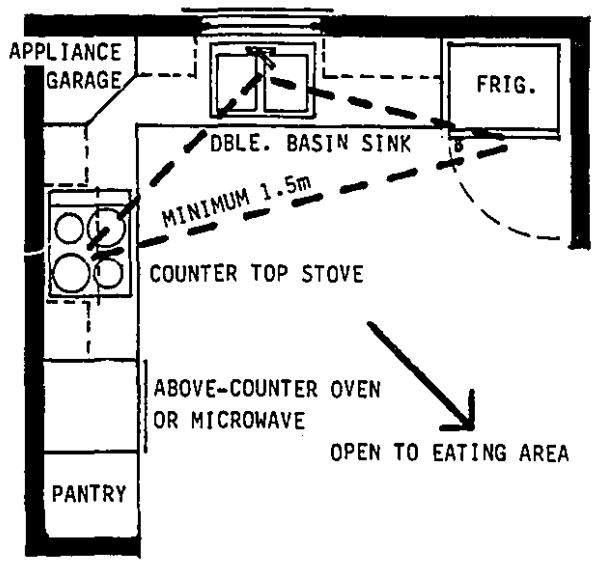

FIGURE I.5 - KITCHEN LAYOUT
source: Keiser 1978
Suggestions by Author 1990

An efficiently designed kitchen has a minimum distance between the three major work centres of 1.5m and a minimum aisle width of 1.5m. This is important for seniors if there is ever a need to use a wheelchair or walker (Keiser 1978, 159). Galley kitchens are not considered a good design for seniors since the narrow 1.2m alley is too cramped for easy manoeuvring. As well social aspects are restricted in a galley kitchen (Keiser 1978, 218).

BATHROOMS: The bathroom is the next most important room in the house and probably has the least amount of flexibility of all the spaces. Therefore, all houses should try to accommodate all the life stages in this room with particular attention to the needs of the elderly.

Toilets should have a space on one side of 600mm to allow for a wheelchair or for a second person to assist the user (Dixon 1989, 70).

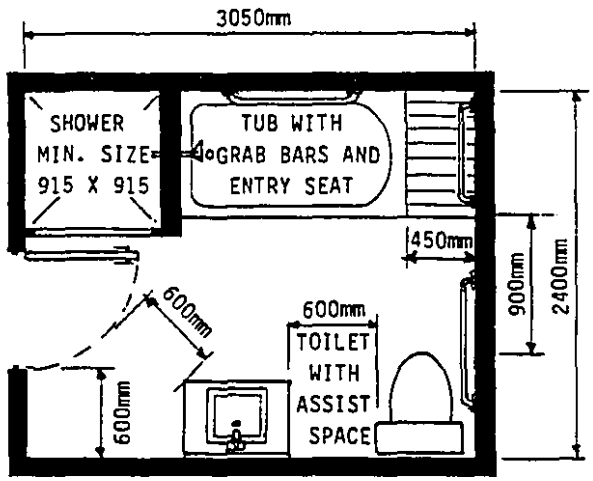

FIGURE I.6 - BATHROOM LAYOUT
source: Proposed by Author 1990

There should be provision for both a bathtub and a shower, although not necessarily in the same bathroom. As people advance in age, getting in and out of a bathtub without assistance gets progressively more difficult (Maltais 1988, 21). Grab bars eventually are required, and then the assistance of a second person. During construction, if the tile surround is backed with 19mm plywood instead of drywall the grab bars can be added when required. Hand-held showers are an accessory useful for rinsing at all ages. The elderly find that showers are easier to take than baths, which is why they become a necessity. Plywood-backed walls in showers allow for installation of grab bars and shower seats, if they become required (Simon 1987, 64-67).

Adjustable height counter tops on vanities would be useful, since as seniors get older, it becomes harder to bend over to the height of a standard sink and counter (Maltais 1988, 21). Drawers instead of closed shelving are more convenient for storage. Medicine cabinets at head height (1500mm) are important at all stages of the family life cycle. This prevents access to them by infants and they are easier to see into for the elderly (Maltais 1988, 21). Faucets for both bathtubs and sinks should have either lever handles or be of single lever design.

However, The lever handle manufactured by Moen Faucets is difficult to operate because it requires a finely controlled, lifting action.

LAUNDRY: With the availability of stackable washer-dryers, or even the conventional units, the facilities should be located close to the source of most of the laundry: the bedrooms (Keiser 1988, 218). These units could be put into a closet in the bedroom hallway. Provide shelving for cleaning supplies, laundry baskets and ironing equipment. Additional task lighting to supplement the hall lighting is required (Regnier 1987, 299). Electrical outlets should be at switch height to provide easy access for adults and to be out of reach of infants.

STAIRS: The elderly are best in a bungalow because its living space is all on one level. Stairs are the greatest source of frustration and danger for seniors (Regnier 1987, 300). If the home is two-storey, there should be a den on the main living level for possible use as a bedroom if elderly persons get to the point where they are unable to climb stairs (Simon 1987, 63). If stairs are a straight run seat lifts are a reasonable alternative (Dixon 1989, 92). Stairs should be well lit and the rise and run of the stairs should be different colours for better visibility (Regnier 1987, 300). Open risers are not recommended for young children or for seniors. Split-level houses are not a recommended house form due to the necessity of climbing stairs each time one wants to move from one functional area to another. They also are nearly impossible to modify so that an elderly person can live on one level.

LIVING AND DINING AREAS: Ensure that there are electrical outlets wired to lighted switches at the entry to the living room so that lights can beturned on upon entry. Direct access from the kitchen

to the dining room is a good design feature at any stage of life (Keiser 1978, 217).

BEDROOMS: The two major problems with bedrooms in modern houses have been entry access and size (CMHC 1989, Specific, 22-23). Doors should be a minimum of 810mm wide. The rooms should be large enough to accommodate normal furniture and someone in a wheelchair. If the bedrooms were a generous size, 3.5m X 3.5m for example, their versatility would increase for other uses such as dens, hobby rooms, offices and dining rooms (Rabeneck 1974, 105).

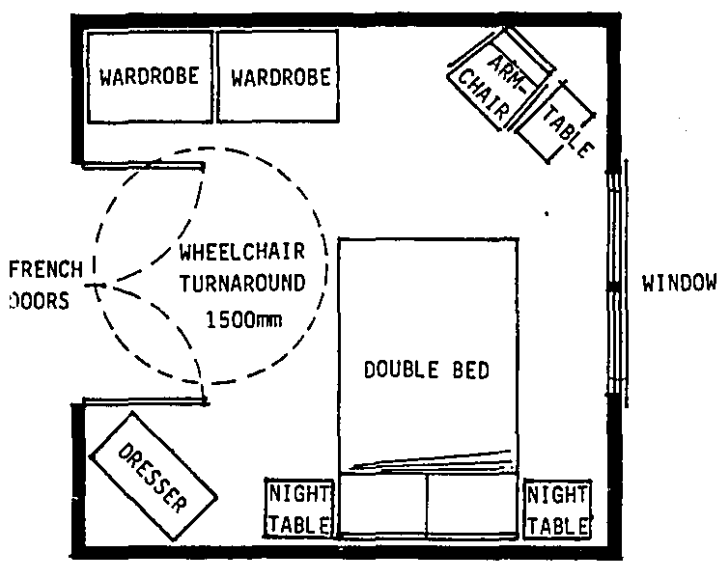

FIGURE I.7 - FLEXIBLE USE ROOM - 3.5m X 3.5m
source: Rabeneck 1974 plus suggestions from Author

CLOTHES CLOSETS: They should have full-width openings for easy access. Sliding doors are slightly easier to operate than bifolds, but bifolds provide better access. Shelving and rods should be adjustable to accommodate all stages of life (Regnier 1987, 298). Provide automatic light switches on doors to closets for convenient illumination of these potentially dark spaces. Rather than having fixed closets, another possibility is to use movable wardrobes. This would allow for

more versatility during the family life cycle for alternate uses of bedrooms (Rabeneck 1974, 105). Seniors, as empty-nesters, use bedrooms for many day-time uses that may require different types of storage than clothes closets can provide.

FAMILY ROOMS: The family room has become the centre of informal entertainment in many North American households. Throughout the family life cycle this space becomes the informal meeting place for family and friends, especially if it is adjacent to the kitchen (Keiser 1978, 218). In later years, it is also a good spot to entertain grandchildren in a house that is no longer "child-proof", as constant supervision can be maintained in conjunction with food preparation activities.

Often the family room is the connection to outdoor activities via a patio or deck, which ideally should be level with the inside. Fireplaces should be designed to have a raised hearth for easier cleaning and better viewing.

STORAGE: Storage facilities should be convenient to the area where the items are going to be used. Items used most often should be stored at counter height (915mm) while those items used less often can be placed at higher or lower levels. Drawers at lower levels make it easier to retrieve things than shelving (Regnier 1987, 297). Storage at higher levels should encourage placement of lighter items rather than heavier ones. If storage is movable rather than fixed it is easier to move the storage to the most convenient spot for its use (Rabeneck 1974, 108).

APPENDIX II

SPACES IN THE HOME

The following is a description of the various types of spaces found in single-family houses. Often, a number of spaces will be found combined in one space, such as, a den, study, convalescent room and office, but in order to have a base line as to what functions are found in a home, they have been described separately.

PUBLIC ZONE

FRONT ENTRANCE: This is the area where people enter the home. It should be visible from the driveway and or the street. In modern homes, the driveway is the prime entrance to the property, with a pedestrian walk to the front door. Where there is no driveway, the front walk should have direct access from the street to the front door. In the Canadian climate, the front entrance should be given overhead protection. Once inside, the entrance vestibule should be isolated from the rest of the house by a second doorway in order to moderate the extremes of the weather outside. The vestibule should contain a clothes closet for outdoor garments and boots. The front entrance should provide a visual contact with the outside, either with a peep hole, or a window (Keiser 1978, 200). For security, as well, there should be a high level of lighting on both sides of the front door (Regnier & Pynoos 1987, 299). A shelf for parcels on either side of the door would be welcome, especially by seniors (Dixon 1989, 88).

LIVING ROOM: This is the formal entertainment space of the house. Often it is used to display family possessions of importance and contains the best furniture of the home (Teasdale, Wexler 1986, 214). It is not often used for daily living activities, but only on special occasions. The room should be spacious, allowing an arrangement of furniture that encourages conversation and social interaction (Keiser 1978, 193). There should be direct access to the front entrance and to the other public space, the dining room (Keiser 1978, 217).

DINING ROOM: In many homes this room is used only for formal entertainment, but in houses with small kitchens that contain no space for a dining table, the dining room is used for all meals. The dining room is one space that often becomes a multi-purpose space, such as an office, study area, hobby room and a gift-wrapping place when not needed as a space for formal entertainment. Often it has a convenient large table in it, which makes it inviting for such uses. The dining room should be located between the living room and the kitchen.

OPERATIVE ZONE

KITCHEN: The kitchen is the hub of daily activity for meals and an informal meeting place for family and friends (Sayegh 1987, 397). Its main function is as a food processing and storage plant for the household (Keiser 1978, 150), although it often includes other activties such as socializing. There are three prime work centres: 1) food storage/refrigeration, 2) food preparation, 3) food cooking. There are many ways to lay out kitchen kitchen work areas, but the most efficient are either L-shaped or U-shaped (Sayegh 1987, 397-398).

LAUNDRY: The laundry is where clothes are washed, dried, ironed and folded in preparation for putting into storage in each person's room. There should be space for an automatic washer, dryer, a laundry tub, storage for cleaning supplies, laundry baskets and mending supplies, a counter for folding and mending clothes and a place for storing and using an ironing board or table. The laundry should be close to the source of dirty clothes: the bedrooms (Keiser 1978, 219), or alternately, the kitchen, where the laundry could be done in conjunction with kitchen chores (Sayegh 1987, 398).

BUSINESS CENTRE: The business centre is for looking after the home finances and more often now, a business run out of the home. Space is required for a desk and telephone, storage for documentation, a typewriter or personal computor table. The business centre is often part of the kitchen, family room, or put in a spare bedroom which is then called a den or office (Keiser 1978, 182).

SEWING CENTRE: This activity could be organized to be in a closet (Keiser 1978, 191) as part of the kitchen, family room, or den where the implements can be spread out and a large table is available for pattern cutting. Good lighting is also imperative.

WORK ROOM: This could be as simple as a tool box stored in the kitchen or as elaborate as a fully equipped machine shop that takes up most of the basement. Depending on the family members' hobbies, there could be more than one work room, including a photographic darkroom, workbench in the garage for cars, machine shop for metal work or cabinetry, electronics shop for appliance building and repair, a room for processing wine and many more activities. Many specialized hobbies require their own space that are not compatible with other activities.

STORAGE AREAS: Storage areas for out-of-season clothes or paraphernalia, hobbies, luggage, maintenance equipment and other items should be stored close to where they are to be used, whether in hobby or work rooms, in the basement, garage, bedrooms or kitchen. The types of items often change in character at different times of the family life cycle.

SEMI-PRIVATE ZONE

FAMILY ROOM: Often associated with the kitchen, the family room is the main space for a family gathering or for entertaining close friends. Usually, the main television for the home is located there. Being adjacent to the kitchen is important since informal gatherings involve snacks prepared in the kitchen. When the kitchen is adjacent to the family room the person preparing the snacks can remain part of the conversation (Keiser 1978, 217). The family room is also a multi-purpose space in that it is used for hobbies, doing homework, house-related tasks, office work, overflow kitchen duties and other intermittent activities (Sayegh 1987, 397). The family room is often adjacent to outdoor entertainment areas, such as a patio or deck.

CONVALESCENT SPACE: This space should be located near the other work centres where the homemaker can keep an eye on the patient while going about other chores. The space should also be near a washroom for the patient's use. The idea is to minimize the energy required to look after the patient. One could use a main floor den or the family room (Keiser 1978, 208).

WASHROOM: Often there is a washroom that is handy to the front or side doors, the kitchen or living room that can be used by guests or

by children playing outside, so that they do not have to go through the private areas of the house.

PRIVATE ZONE

BEDROOM: The bedroom is an important private space for every member of the family. It is the one space that children can call their own. It is the only territory in the home that children do not have to share with other family members. After the age of ten, children should have a room of their own in our culture, since privacy becomes extremely important as they become teenagers. For parents, the bedroom is the only space they can retreat from the family activities and then be able to share intimate moments with each other (Keiser 1978, 213). The en-suite bathroom has become an important adjunct to the master bedroom where parents can perform personal hygiene and dress in privacy.

BATHROOM: The bathroom is where the family performs personal hygiene and should be away from view from the public zones of the house and adjacent to the bedrooms. Modern life-style now demands one bathroom shared by the children and another used exclusively by the parents. The bathrooms traditionally contain a wash basin, toilet, combination bath tub/shower and storage for linen, personal hygiene appliances and consumables. Modern marketing has introduced separate showers, whirlpool bath tubs, double sink vanities and bidets that have increased the demands for space for bathrooms to be equal to that of a bedroom.

APPENDIX III

QUESTIONNAIRE:

1) HOUSEHOLD #___

2) Date of Construction.....___ ___ ___

3) Number of Bedrooms.....___

4) Number of Levels and Type of House.....___..._____

5) Date of occupancy.....___ ___ ___

6) Ages of family members at date of occupancy.Father ___

Mother ___

Child#1 ___

Child#2 ___

Child#3 ___

Child#4 ___

7) Number of homes previously owned/occupied.....___

8) Reasons for moving to subject house.._____

_____

_____

9) At any time, were there any persons other than the immediate family, living in the house.._____ If yes, what relation.._____ Between what dates.__ __ __ to __ __ __. Reason.._____

_____

10) When you purchased the house, did you have any input into the design of the subject house.._____ If yes, what areas of design.._____

_____

11) Were there features of the house that you particularly liked when you decided to purchase the house.._____
If yes, what were they.._____

_____

_____

12) Were there deficiencies in the design of the house that you are aware of: Have you lived with them..._____
Are you contemplating changing them._____
When..___ ___ ___ How.._____

_____

_____

_____
Have you corrected them.....When..___ ___ ___
How.._____

_____

_____

_____

13) If you made changes, who helped you make the design decisions..Self____, Family Members____, Contractor____ Professional____.

14) Who executed the changes.....Self____, General Contractor____, Tradesmen under your direction____.

15) Which trades were involved in the changes.....None____ Carpenter____, Drywaller____, Electrician____, Plumber ____, Painter____, Cabinet Maker____, Tile Layer____, Carpet Layer____, Other (specify)_____

16) What was the range of cost for the changes..Date_____ Under $1000____, Between $1000-$5000____, Between $5000 -$10,000____, Over $10,000____.

17) Are there other improvements that you would like to make in regards to modernization or life-style.._____
If yes, what improvements.._____

_____

_____ When..___ ___ ___

18) During your period of occupation, was there any time you felt cramped, or short of space.._____ If yes, describe the circumstances and what space was inadequate.._____

_____

_____

What did you do about it.._____

_____

_____

Does the problem still exist.._____ If not, when did it change..___ ___ ___

19) Do you feel there is adequate separation between public and private spaces in the home.._____ What changes would you make in order to improve the situation.._____

_____

_____

20) What major family events have occurred during occupancy and what affect did they have on the use of space on the home..

Date Event Change

_____

_____

_____

Date	Event	Change

21) What were the changes that occurred in each room of the house during each five year interval, or at a major family event..

Room	Year	Change
Entry		
Living		
Dining		
Sewing		

Room	Year	Change
Kitchen		
Family		
Bathroom 1		
Bathroom 2		
Bathroom 3		
Laundry		

Room	Year	Change
Bedroom 1		
Bedroom 2		
Bedroom 3		
Bedroom 4		
Bedroom 5		

Room Year Change

Work Room

Storage

Garage

Other

22) Are you planning any other changes in the future.._____

23) Do you plan to stay in this house.._____ For how long.

___ years.

24) For what reason would you move in the future.._____