C.M.H.C.

FLEXIBLE USE AND TENURE STUDY

TECHNICAL REPORT

DECEMBER 1986

THE STARR GROUP INC.

in association with

RICHARD DRDLA ASSOCIATES

JEROME MARKSON ARCHITECTS

THE STARR GROUP
PLANNING & MANAGEMENT
CONSULTANTS

2180 STEELES AVE. W., SUITE 217
CONCORD, ONTARIO L4K 2Z5
TELEPHONE: (416) 738-8985

December 5, 1986

Mr. Fanis Grammenos
The Co-ordinator
Resource and Research Management
Sector Administration Unit
Canada Mortgage and Housing Corporation
Montreal Road
Ottawa, Ontario
K1A 0P7

Dear Mr. Grammenos:

Re: C.R. File No. 6600-15

We are pleased to submit the Stage Four Technical Report for the study on "Combining Flexible Use and Tenure to Increase the Supply of Rental Housing."

We have incorporated the comments received from your office and appreciate the time and effort made to review the draft material. We believe that this Report will make a most important contribution to CMHC's efforts to encourage greater flexibility in housing design in order to help increase the supply of rental housing.

We are currently completing the final document in the study, the brief Stage Five Report, and expect to have this in your hands by Christmas. We wish to thank you for all your help and encouragement and look forward to the opportunity to be of further service in pursuing these and related concepts on your behalf.

Yours truly,

Edward N. Starr
President

cc. Richard Drdla
Jerome Markson
Al Streuber

CONTENTS

1.0 INTRODUCTION

This study is an examination of new housing with a built-in capability of being converted to accommodate an accessory apartment.

The formal title of the study is "Combining Flexible Use and Tenure to Increase the Supply of Rental Housing". It was prepared for the Resource and Research Management Sector Administration Unit of the Canada Mortgage and Housing Corporation. It was undertaken by The Starr Group, in association with Richard Drdla Associates and Jerome Markson Architects.

Contents of the Report

This is a comprehensive "technical" document that reviews all of the work undertaken in the study. The findings are presented in the main body, while the relevant working and background documentation is contained in the attached appendices.

This report represents a consolidation of three interim reports prepared during the course of the study. All of the material in these reports has been re-presented here, excepting only where it is redundant or has been revised. The first and last sections also have been added to provide a summary and overview of the work.

A separate "promotional" report also is to be prepared. This document will highlight the main findings, and include illustrations of the best examples. It will be written for the building and municipal representatives interested in this type of housing.

Purpose of the Study

The objective of the study, as defined in the Terms of Reference, was "to explore the potential for designing and building new residential units in ways that will facilitate their adaptability to meet changing requirements during the life-cycle of a family, or better match changing housing markets".

The study was particularly to examine "the built-in capability of a housing unit to accommodate ... a self-contained rental unit at any stage of its occupancy ... and to demonstrate that it can be achieved with minimum disruption and at cost which make the conversion an economically viable proposition".

The work process was essentially to follow these steps:

1) identify any previous examples of made-to-convert housing (see Section 2.0);
2) develop a range of new designs for convertible housing in all of the basic housing forms (see Section 3.0);
3) determine the conversion costs for a selected number of these schemes (see Section 4.0); and
4) assess the economic viability of a selected number from the viewpoint of the cost recoverability and affordability (see Section 5.0).

Summary of the Report

Designs were prepared for 18 made-to-convert housing examples capable of incorporating an accessory apartment -- some in more than one way. (Conversely, these schemes also illustrate houses with an accessory apartment that could be deconverted to a single unit houses.) The designs are for conventional and modestly-sized housing similar to that already being built. Also, they focus on affordable housing with conversions that can be made with as little cost and change as possible.

The study indicates that a wide range of conventional units can be made suitable for conversion without major change and cost. These include detached, semi-detached and townhouses as well as apartments in multi-storey structures.

In general, the ground-related houses offer a greater variety of opportunities than the multi-storey apartments. This reflects the limited range of apartment layouts available on the market rather than any inherent unsuitability for conversion. Also, no walk-up apartments are included because the building code generally prohibits them as a distinct unit type.

Few examples of previous made-to-convert units could be found. Only 3 of the 18 designs are based upon past schemes. Most of the previous work concerned building systems, expandable housing, and accessory apartments in existing homes. This search, nevertheless, was productive in that it revealed a widespread interest in the subject from municipal and building representatives.

Clearly not all units are suitable for conversion. In addition to having sufficient space for the second unit, the key criteria for convertibility are having the space in one usable area that is 1) redundant to the needs of a small family, 2) accessible from the outside without passing through the primary unit, and 3) served readily by plumbing.

Conversion costs estimated for twelve of the schemes range from $5,200 up to $20,800, and averaged $13,900. Although minimum conversion costs are difficult to specify from this limited sample, as a general guide, approximately $10,500 should be budgeted for a unit in finished space (i.e., in an apartment or a house above grade) without a new bathroom, $15,000 for the same unit with a new bathroom. Roughly, an additional $1,500 should be allowed for these conversions in unfinished space like a basement.

The economic analysis indicates a favourable cost recoverability. To be specific, the revenue from these accessory units is more than enough to cover the conversion and the operating costs of the units.

Affordability is more difficult to assess. The estimated house prices and conversion costs indicate that made-to-convert housing is not a low-cost solution. The affordability of the these units, however, is significantly enhanced by the rents that can be charged for the accessory units. As noted, the rents generally are sufficiently large to generate substantial additional income for the homeowner.

Some of the made-to-convert designs are economically more suited to conversion than others. In general, the units in multi-storey apartments proved to cost the least, while generating relatively high rents. Basement and garage conversion proved to be less attractive owing to the higher cost of conversion and the limited rent that can be expected. The remaining above grade units houses generally fall between these two groups.

The building code does not appear to limit the provision of made-to-convert housing units. As noted, the fire egress requirements do appear to rule out convertible walk-up apartments as a unique housing form. The other notable regulations concern the more stringent fire egress and sound and fire separations required in multi-occupancy buildings. With proper planning, these can be met without undue cost or difficulty.

Convertibility must be eventually measured in relation to the potential market. Given its flexibility and income-producing capability, it appears to be well suited to two particular groups: young first-time homebuyers and mature family homeowners.

The units were designed to minimize the physical changes needed, but some improvements appear to be inescapable. For example, all of the conversions required a new kitchen, some repainting, and changes to the electrical system, internal partitions and doors. Some but not all needed changes to closets, flooring, bathrooms, laundries, and windows. New bathrooms were not needed in all cases because many of the units incorporated existing ones.

The front-end construction costs that must be built into these schemes to facilitate convertibility appears to be nominal. The estimates for these range from 0 to $1,850. The major built-in improvements appear to involve the higher standard of sound and fire separations required in multi-occupancy buildings.

The deconversion costs for returning the house back to single occupancy also are relatively small, with most falling in the $2,000-2,500 range.

In order to assess economic viability, purchase prices and apartment rents were estimated for seven of these schemes in the current Toronto housing market. The estimated purchase prices range from $115,000 up to $170,000. As can be seen, these made-to-convert schemes can be characterized as moderately priced, rather than low priced, housing. In large part, this can be attributed to the floorspace required in these units to accommodate both units after conversion.

The anticipated rents for these units range widely. For example, the lowest rent of $375 is for a compact double garage conversion in a suburban location. The highest at $700 is for a more ample two-storey conversion with internal parking also in a suburban location. The rent that can be charged for these units -- and, hence, their financial viability -- depends very much on location.

First-time buyers typically are looking for houses suitable for raising a future family, but have limited financial resources. Made-to-convert housing can make these houses more affordable because the short-term excess space can be converted into an income-generating accessory apartment, and the additional income used to reduce the overall carrying costs.

Mature households in the 50-60 age group typically must plan ahead to retirement and the time when children will be leaving home. While many have the capital to purchase a new house outright, they may be concerned about living on a limited pension. Made-to-convert housing can adapt to their declining space needs, while later generating a rental income that will cover all their shelter costs.

Figure 2.1: Maximizer II

MAXIMIZER II

Flexibility in the home Security in the future

In today's world flexibility in the home is the best security you can have. But conventional house design doesn't belong to today. It belongs to a world where people thought nothing of moving every few years.

With today's house prices and today's energy costs, we all know what the economic facts of life are doing to the way we've always done things. And moving from house to house as the family grows and then goes just isn't as easy as it used to be.

Which is where MAXIMIZER II comes into its own. Whatever your story, MAXIMIZER II is right for *you*. A remarkable new concept in house design, MAXIMIZER II adapts to the changing circumstances in your life. Maximum flexibility. Maximum efficiency. Qualities that every home buyer should be looking for.

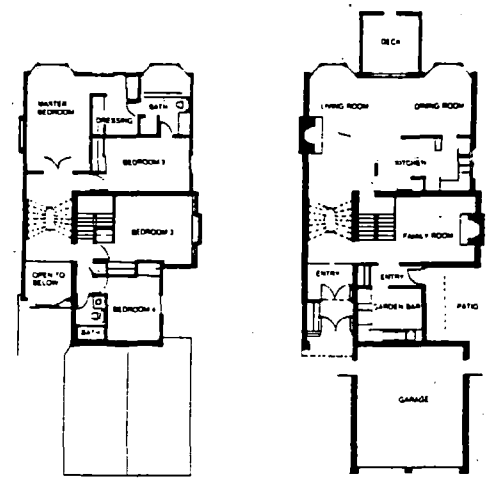
Although MAXIMIZER II has a classic exterior symbolizing the concept of the large 5-bedroom home, the interior design is a step into the future. When you walk through MAXIMIZER II you're walking through two potential homes. MAXIMIZER II can be a spacious 5-bedroom single family dwelling. Or, a multiple family dwelling with a self-contained 2-bedroom, 2 storey apartment complete with separate entrance that's roomy and private.

So whether you're a young couple looking for that first home, parents needing more space for the kids, grandparents left alone in a big expensive house, or simply someone looking for an attractive home with a rentable apartment — the choices are all yours.

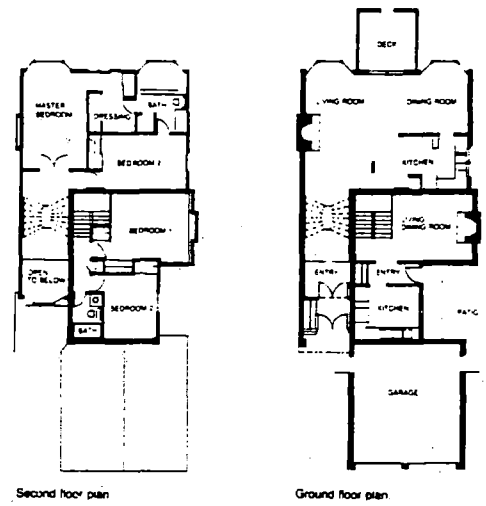
Truly the home of the future. And who knows what that future may do to energy costs? Basic to the MAXIMIZER II's innovative design is the concept of energy conservation. A southern exposure that's mainly windows. Energy-efficient heating and cooling system based on solar orientation. Garage on north wall doubling as further protection. A raised and sun-filled living space at the lower level.

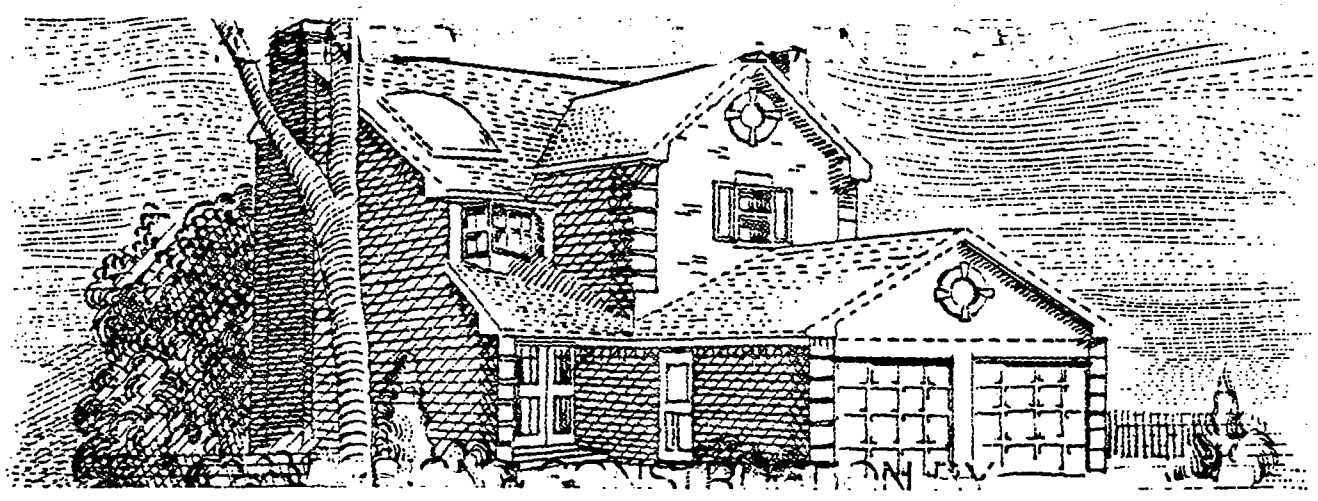
Practical values. Affordable values. *Your* values. And for just $2 here's an opportunity to win a home that gives those values lifelong expression.

Single family dwelling



Multiple family dwelling





2.0 EXAMPLES OF PAST MADE-TO-CONVERT UNITS

This section identifies and reviews previous examples of housing designed and built with a made-to-convert potential to accommodate an accessory apartment.

To identify these examples, a thorough review was made of the current literature as well as various professional and building contacts (see References listed in Appendix C).

The number of relevant examples appears to be relatively limited. Most of the past work and references concerns two related areas: 1) accessory apartments in existing homes, and 2) expandable houses built for growing families. Neither of these are directly relevant to this study.

This literature review, nevertheless, has been a useful exercise. It shows this type of housing has been considered by a number of divergent builders and designers for a number of years. It also has revealed a number of basic design principles and a variety of innovative approaches meriting further consideration. Finally, the review has revealed a widespread interest in the subject by various municipal and professional contacts, who wish to be kept informed about the results of the study.

2.1 Maximizer II

The Maximizer II, designed by Architect Ted Rosen, was sponsored by the Toronto Home Builders Association for the 1982 Toronto Home Show (see Figure 2.1). This unit was raffled at the show, and then built in Scarborough by Heron Homes. No follow-up was undertaken to determine how the unit was used by the owner.

As a single unit, the house incorporates 3120 g.f.a. (290 m^2). It contains five bedrooms with three bathrooms, living room, dining room, kitchen, recreation room, mechanical room, and family room with associated utility room/bar. The recreation room along with a bedroom, bathroom and mechanical room are located in a basement, which is only partially below grade. (There is further unfinished basement area under the front part of the unit.)

The house can be split into these two units:

1) The main unit, with 2135 g.f.a. (200 m^2), incorporating three bedrooms, two baths, kitchen, living room, dining room and recreation room; and

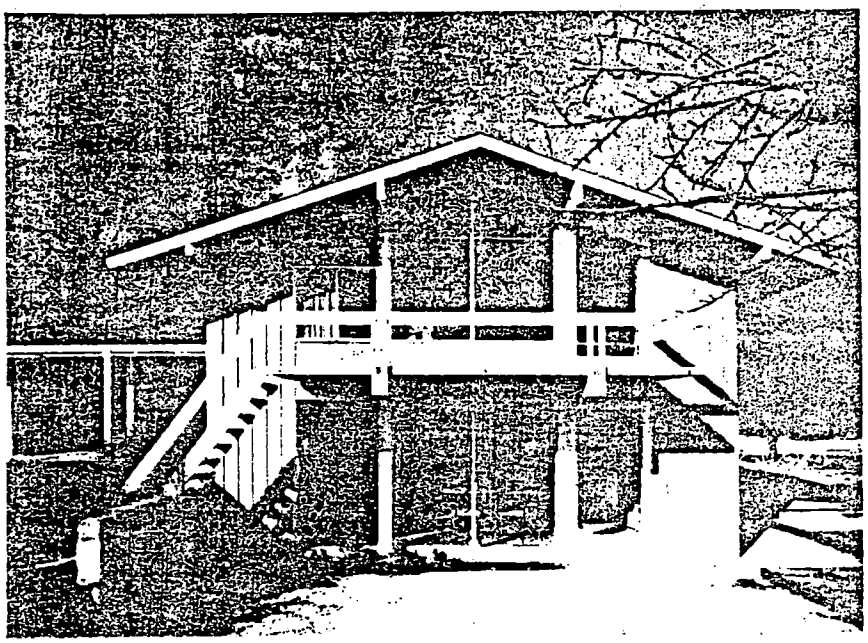
2) The accessory unit, with 985 g.f.a. (90 m^2), incorporating two bedrooms, one bath, kitchen and living/dining room. (The family room and associated utility room are used as a living room and kitchen).

The units are vertically separated. Each has its own entrance at grade and separate stairway. The conversion is made by closing three doors, or more permanently, by framing in and drywalling the doorways. The only other costs would be associated with converting the utility room/bar to a kitchen. The two car garage also could be divided.

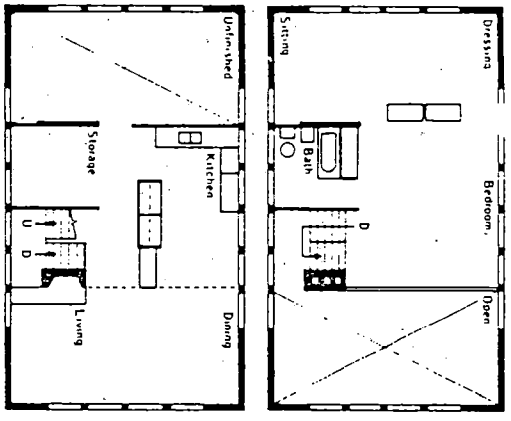
The house is 30.5 ft (9.4 m) wide. Although designed as a detached unit, it could be also built in semi-detached form. Its appearance, whether as a single unit or divided, would be like any other single family house of a similar size.

What is remarkable about this design is the degree of flexibility it incorporates. The key is having two internal stairways, and a half level relation between the two units. This allows for a number of different arrangements. For example, the half-down basement under the primary unit (with its recreation room, bedroom, bathroom and the mechanical room

Figure 2.2: Techbuilt House

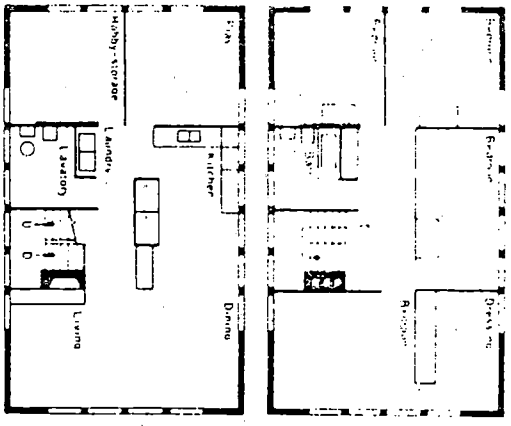


Plan 1

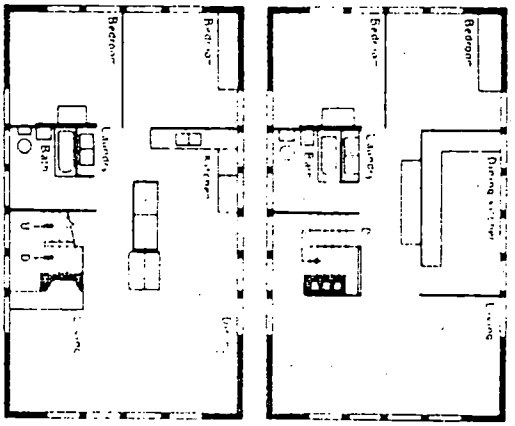


Lower Floor Upper Floor

Plan 3



Plan 4



3) As a divided house, it can accommodate two units with each having two bedrooms, a bathroom, kitchen and living/dining room. (The upper unit also has a second means of access/egress via a balcony and outside stair.)

The fixed features of the house are the foundations, exterior walls, plumbing system, stair and chimney. The interior walls were made of a flexible panelled system that could be moved by the occupants.

Source: Martin Gellen: Accessory Apartments in Single-Family Housing

2.3 Flexabilt House

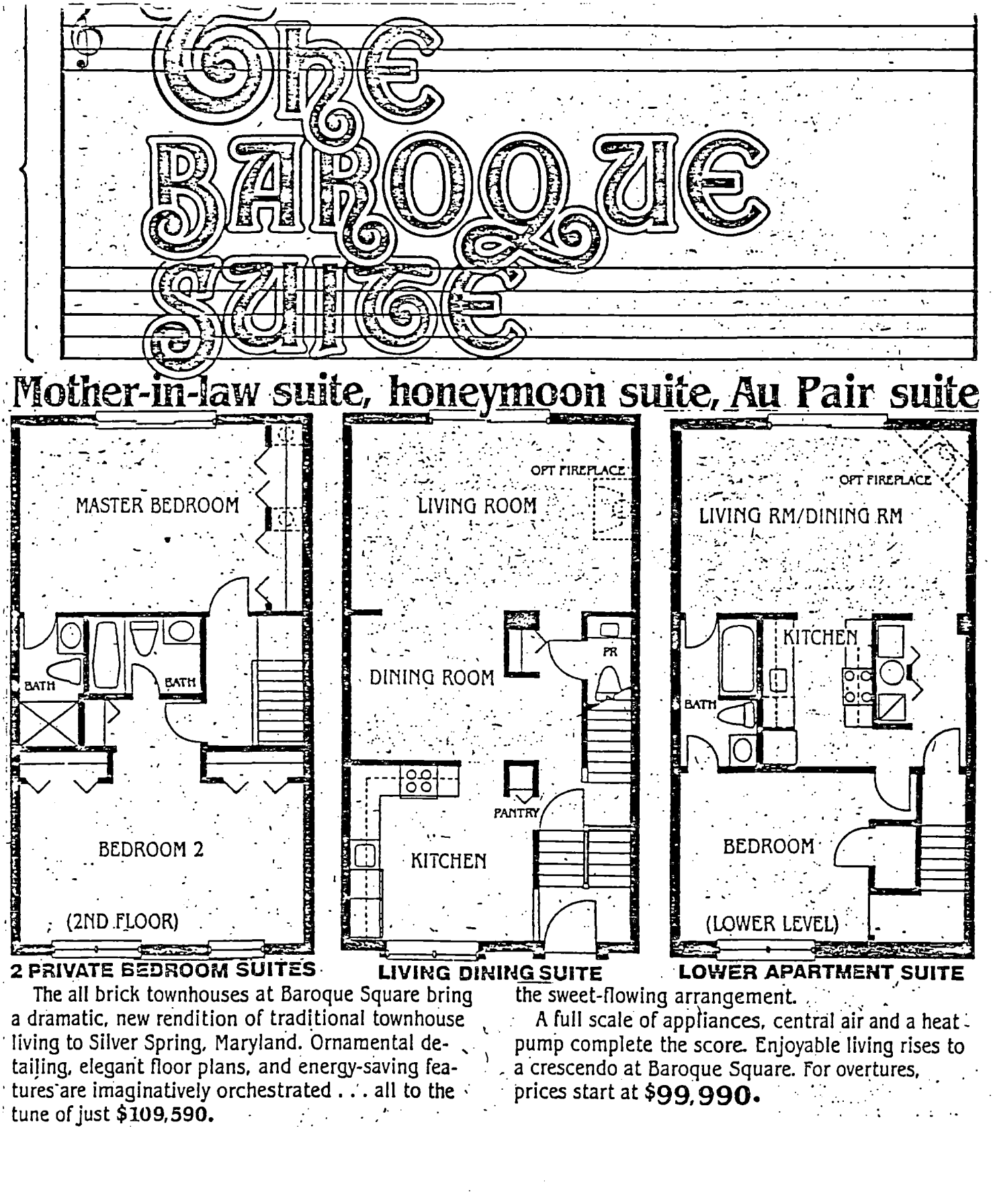
This unit was designed and produced by builder/developer Frank Robertson in the 1950's. Several hundred of these homes were built in and around San Antonio, Texas.

The key feature of this house (see Figure 2.3) was a long 12 x 62 ft (3.6 x 18.9 m) room that could be divided at various places either by flexible "accordian-like" wall panels or by various storage/shelving modules on castors. All of these movable partitions could be installed by the homeowner without any carpentry or special tools. The kitchen with a dining area, two bathrooms, storage areas and the entry are located in a "fixed" zone alongside this flexible room.

This unit allows for these two main options:

1) As a single family home with 1470 g.f.a. (135 m2), it can accommodate various layouts with two-four bedrooms, two bathrooms, kitchen, dining area and living area. The trade-off is between the space allocated to the bedrooms and to the living area.

Figure 2.4: "Baroque Suite"



The all brick townhouses at Baroque Square bring a dramatic, new rendition of traditional townhouse living to Silver Spring, Maryland. Ornamental detailing, elegant floor plans, and energy-saving features are imaginatively orchestrated . . . all to the tune of just **$109,590.**

the sweet-flowing arrangement.

A full scale of appliances, central air and a heat pump complete the score. Enjoyable living rises to a crescendo at Baroque Square. For overtures, prices start at **$99,990.**

converted to a kitchen) could accommodate a third self-contained unit with 670 g.f.a. (60 m^2). Also, this same area could become part of the accessory apartment because it is only a half level down from the living/dining room of this unit. In the same way, each of the upper bedroom floors could be linked to the other unit by the closing of certain doors.

Source: Theodore A. Rosen, Architect, Toronto.

2.2 Techbuilt House

Architect Carl Koch designed in the early 1950's a low-cost adaptable house that could respond to the different stages of the family life cycle. Several hundred of these were built through New England.

The unit as described by the designer is "an attic on top of a basement" (see Figure 2.2). In this case, both are made fully usable. The "basement" was dropped only about 3.5 ft (1.1 m) in the ground to allow for good window exposure. Also, the outside walls of the "attic" were 5 ft (1.5 m) high along the eaves so that this space was available.

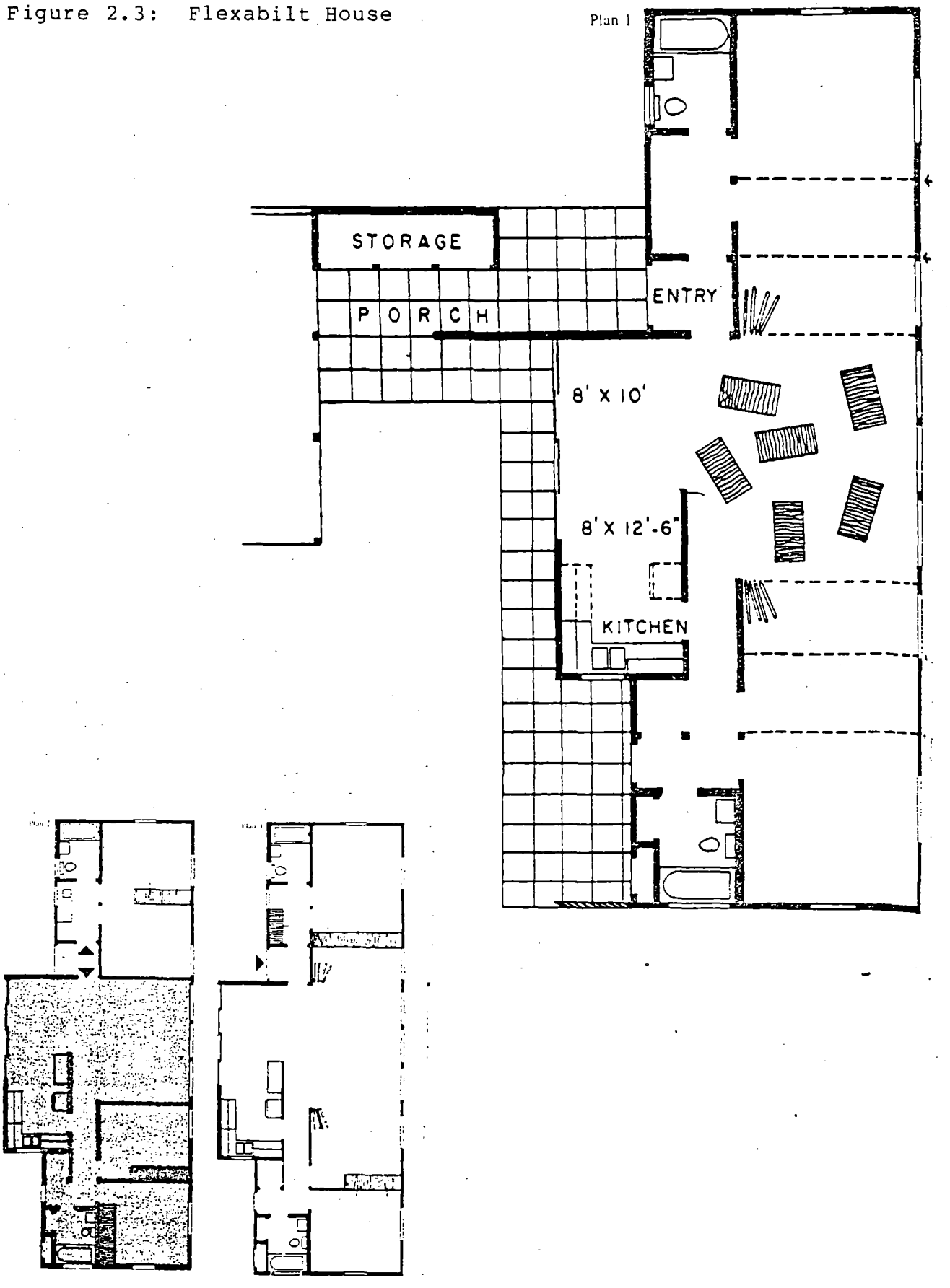
Both floors of this unit measure 24 x 40 ft (7.3 x 12.2 m), providing in total 1920 g.f.a. (178 m^2).

The unit allows for a number of different possibilities, including these three alternatives relevant to the study:

1) As a minimum "starter home", it can accommodate a bedroom/dressing and bathroom suite with a kitchen, living/dining room. The remaining space is unfinished.

2) As a full family home, it can accommodate five bedrooms, two bathrooms, a kitchen, living room, and two other rooms suitable for a dining room, recreation/playroom, study and/or hobby/storage.

Figure 2.3: Flexabilt House



2) As a two-unit home, it can accommodate a primary unit with 1070 g.f.a. (100 m2) including one-two bedrooms, bathroom, kitchen, dining area and living area. The accessory unit with 400 g.f.a. (35 m2) has one bedroom, living/dining area, bathroom and kitchenette. The entry for these units could be either shared or separate.

Source: Martin Gellen: Accessory Apartments in Single-Family Housing

2.4 "Baroque Suite"

This fancifully-named development of about 100 townhouses is located outside of Washington D.C. The initial marketing of the development in 1983 was centred on the accessory apartment concept (see Figure 2.4). It appears that this aspect was downplayed after the first units were sold -- perhaps due to the unclear legal status of the accessory unit.

No information is known about how these units were used, nor if they were built-in or offered as an option. An effort is being made to contact the builders.

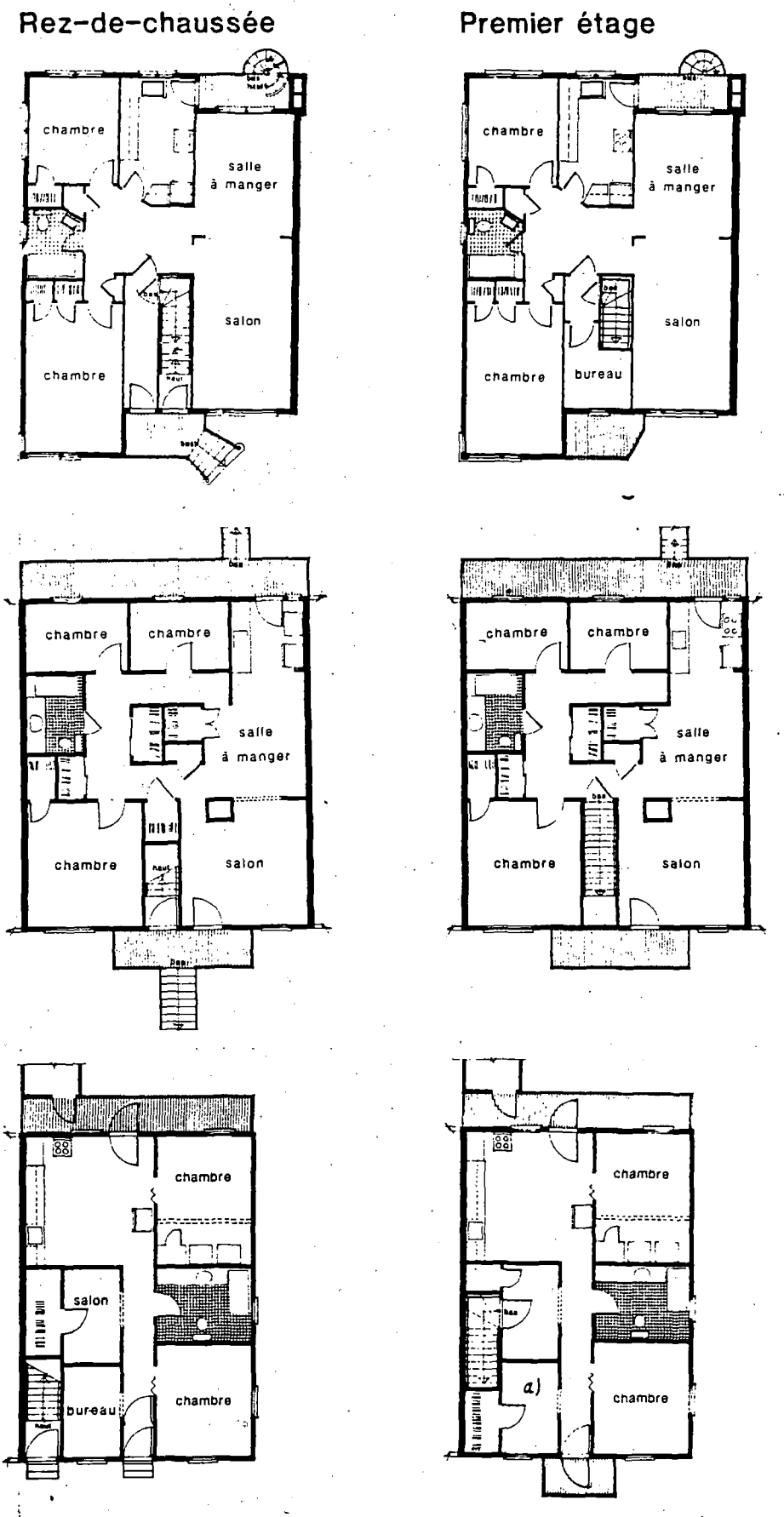
The house can be divided into these two units:

1) The primary unit, with a 1400 g.f.a (130 m2), is located on the ground and second floor. It has two bedrooms, two and half baths, kitchen, dining room and living room.

2) The accessory unit, with 700 g.f.a. (65 m2), is located in the half-down basement. It contains one bedroom, bathroom, kitchen and living/dining room.

The promotions referred to the accessory apartment as "mother-in-law, au pair or honeymoon (sic) suite". The layout also lends itself to other options. Because each bedroom has a private en-suite bathroom, the unit also would be attractive for three singles. Further, the second kitchen and living/dining

Figure 2.5: Montreal Plexes



room in the basement also could be converted to a bedroom with a private bathroom for a fourth single.

The unit is 20 ft (6.1 m) wide and suitable for townhouse development. The only way in which this unit might appear different from a conventional house is that the basement is only a half level below grade, which allows for larger windows for the lower accessory unit.

Source: Patrick H. Hare, Planning and Design Consultant, Washington D.C

2.5 Montreal "Plexes"

In Montreal, the term "plex" is commonly used to refer to a duplex, triplex or other similar stacked housing forms that contain up to eight units. What characterizes this housing is that each floor contains a similar unit or arrangement of units; and each floor has its own private street-related entrance and individual address. The resident landlord typically occupies the ground floor units.

About 40% of Montreal is covered by this type of housing, and it is widely built in new developments. Many different configurations are built, but only three are presented here for reference (see Figure 2.5).

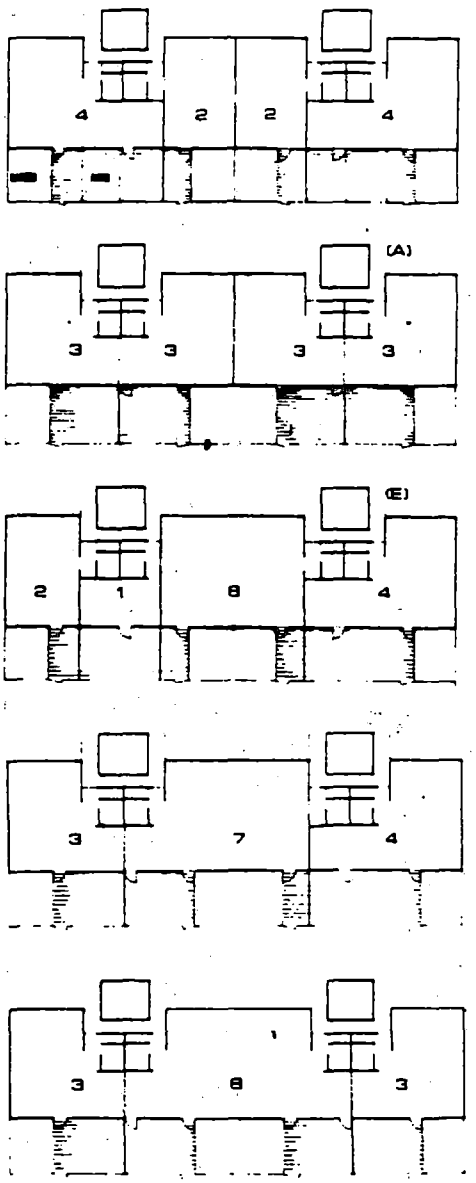
Most households report purchasing plexes for the extra income. Many are also used by relatives, and some are deconverted to single family units.

These units were considered because of their possible potential for deconversion. Upon examination, however, it is clear that they are not relevant to this study because they are designed for multi-occupancy, and generally do not have any built-in flexibility.

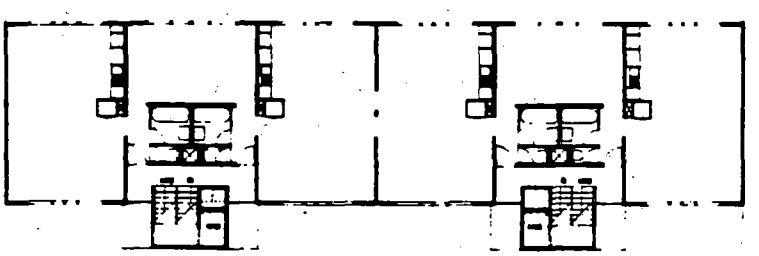
Source: Martin E. Wexler, University of Quebec, Montreal

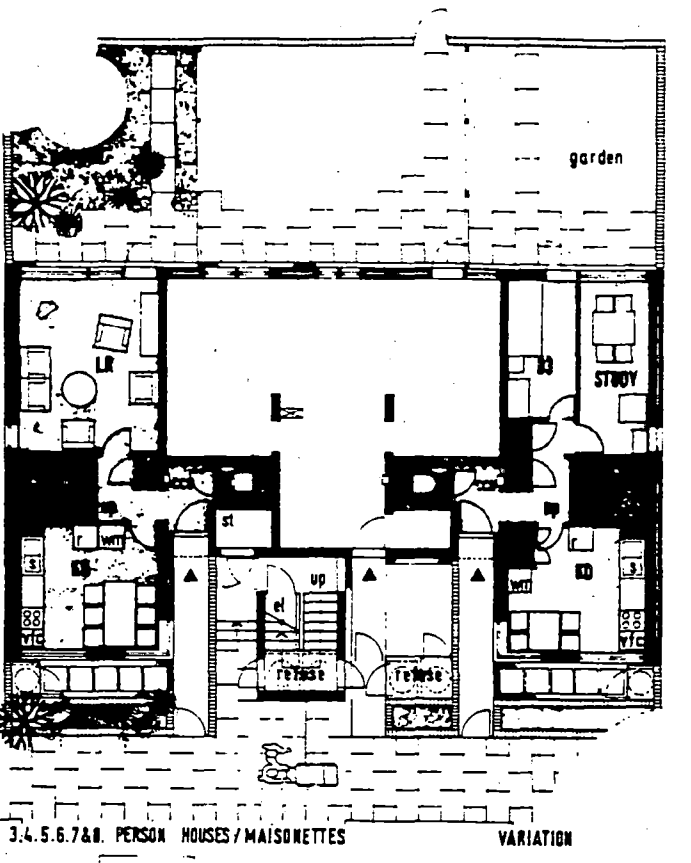
Figure 2.6: PSSHAK Housing System

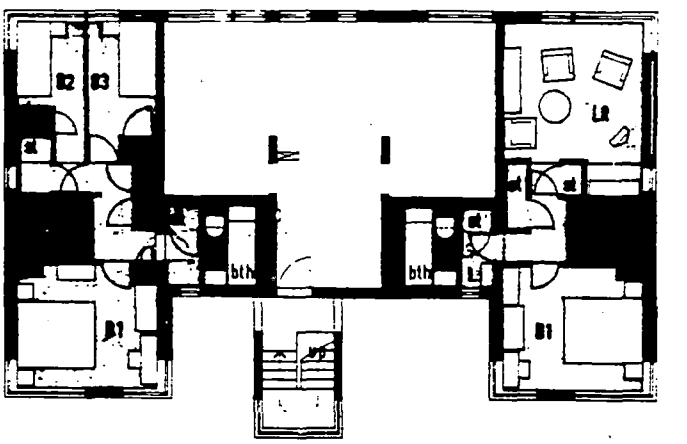
18 PSSHAK. Plans showing options available on dwelling size group.

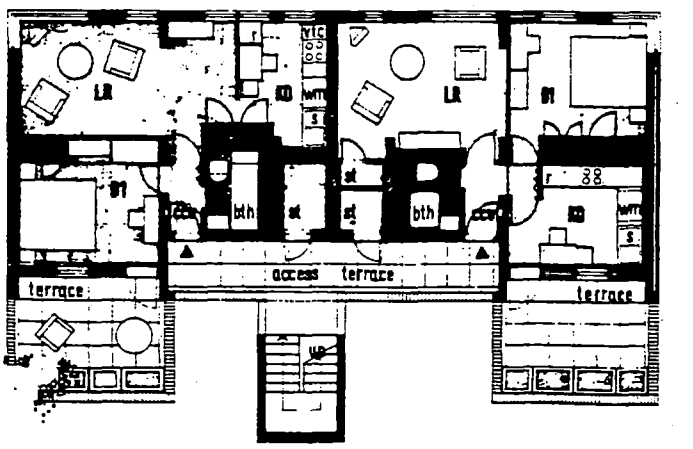


17 PSSHAK flats, Hamdi and Wilkinson and GLC. First floor plan showing basic structure and services. (Maximum capacity 4 dwellings per floor).









2.6 Industrialized Housing Systems

In the 1950's and 60's, a number of industrialized housing systems were developed and used in various European countries. Most of these systems were developed for high-rise apartments, but some could be applied to medium density forms.

The main motivation for developing these systems was to reduce building costs and construction time through the use of rationalized construction methods. Typically, they included long-span structures with non-load bearing internal partitions, and centralized service cores with various alternative pre-planned points of access.

The systems produced a highly regimented building approach that imposed an order on certain aspects of the units, but still left considerable freedom elsewhere. The regular structure along with the service cores and stairways were immutable constraints. However, within these constraints was left large areas of unimpeded space that could be subdivided in many ways. Typically, a large variety of unit types and sizes were developed to fit into the given framework, and choice depended upon the household mix of the particular housing project.

In some systems, thought also was given to incorporating flexibility within the unit, either to guard against built-in obsolescence or allow the occupants to adapt or personalize their space. In the extreme cases, these involved kits of detachable parts, movable partitions, and alternative external infill wall panels.

The English PSSHAK system is one specific example that has the potential for convertible units. (PSSHAK stands for Primary Support Structures and Housing Assemblies Kit.) The system was used in a housing scheme built on Adelaide Road in London by the Greater London Council in 1975 (see Figure 2.6). The housing is

in a series of three storey blocks, each having the same structural shell and containing the primary electrical and mechanical systems at strategic locations. Within this shell, a wide variety of unit types can be accommodated ranging from 2 person to 8 person units. Most of these units can be readily divided into two smaller units without changing the primary structure or services. For example, the eight person unit can be split into 2 three's, the seven into three and two, and six into 2 two's.

One of the lessons that come out of this work is that housing flexibility typically costs more up front. There are additional costs in the open structure, duplicated services, movable partitions and other features. It is not clear from all of this work on building systems that the additional investment was justified by the eventual use.

Source: Andrew Rabeneck: "Housing Flexibility"; Architectural Design, November 1973

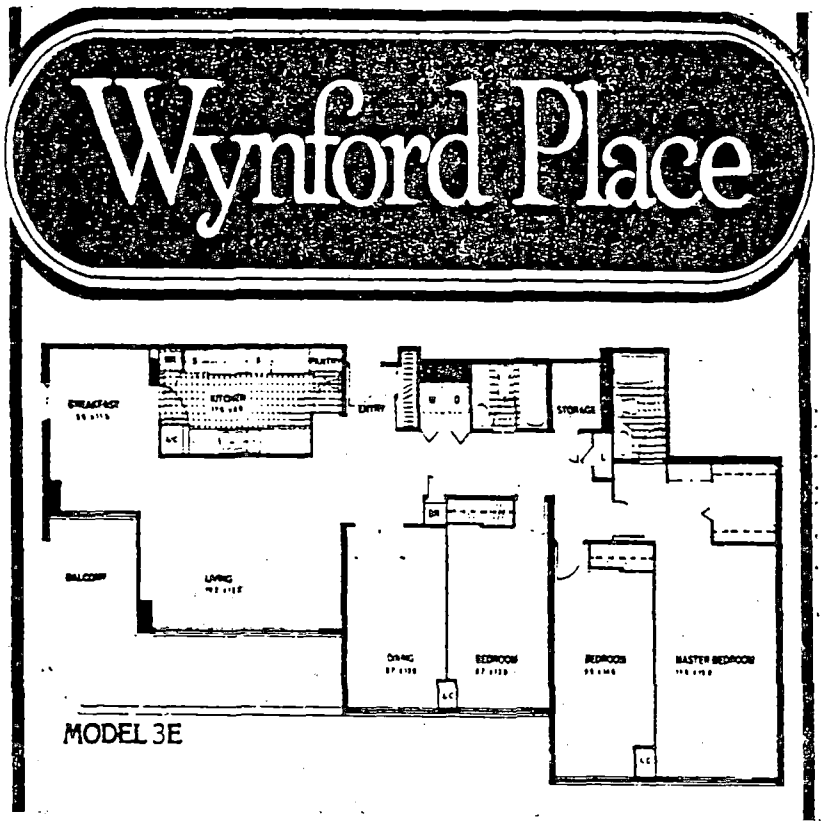
2.7 Other Approaches

The literature review produced other design possibilities. Although specific or suitable examples are not available, these approaches still merit further consideration.

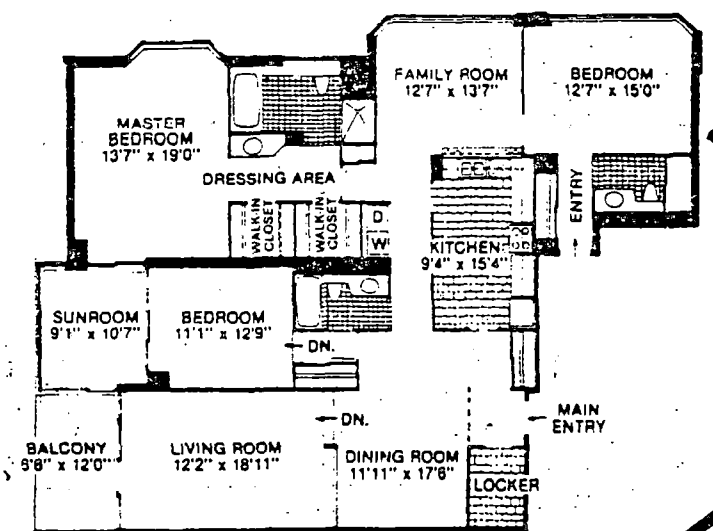
Apartments over garages: Accessory apartments were built as studio units located above the garage in a 23 house development in 1980 in San Leandro outside of San Francisco, California. The project was not successful in the market place. No other information is available.

Source: Patrick H. Hare, Planning and Design Consultant, Washington D.C

Figure 2.7: Conventional Apartments



Potential Accessory Unit



The Terracotta. 2189 Sq. Ft., From $181,000

Ky Park

"Multi-purpose areas": Many post-war houses are built with multi-purpose areas -- a group of rooms typically including a recreation room, bathroom, storage room, and/or utility area. These areas can be easily made convertible into accessory apartments.

Source: Martin Gellen: Accessory Apartments in Single-Family Housing

Garage space: Double garages incorporated in houses can contain enough space for small accessory apartments. The provision of services would need to be considered in advance, as would the alternative parking arrangement.

Source: Martin Gellen: Accessory Apartments in Single-Family Housing

Supplementary units within apartments: No examples were found of accessory apartments within existing high-rise blocks, but various examples were found that approached this possibility. For instance, some units are built with a second entrance and bedroom suite (without kitchen) -- presumably for live-in help. Other units are laid out in a way that a bedroom/bathroom suite could be readily converted to a separate unit by the addition of kitchen and outside door.

Source: Newspaper advertisements

3.0 DESIGNS FOR NEW MADE-TO-CONVERT UNITS

A number of made-to-convert housing schemes were designed for this study. The schemes are for housing units that can be converted to incorporate an accessory apartment. (Conversely, the same schemes also illustrate houses with an accessory apartment that could be deconverted to a single unit houses.)

Consistent with the requirements of the study, these designs focus on conventional units similar to those already available on the housing market. The designs are for modestly-sized units for the reasons of affordability, and present cost-effective conversions that can be made without major changes either at the time of construction or conversion.

The design work by intention did not examine expandable units, experimental solutions, nor low cost and assisted housing.

These designs are individually illustrated and described in the concluding pages of this section. The following pages first provide an overview of the designs.

3.1 Overall Description

The designs include 18 different schemes -- some with more than one way of accommodating an accessory apartment. Three of these are modifications of previous examples of convertible housing (see Section 2.0), and 14 are adaptations of conventional housing built in Ontario (see Appendix D). Only one might be considered innovative because no past example is known, but it also is conventional in layout and appearance.

The units can be generally grouped in two families:

- o Ground-related house units (examples 1 - 12) in conventional detached, semi-detached and townhouses. At the more affordable end of the market, as the lot sizes become smaller, many of these plan types become interchangeable. For example, the same plan type might be built as a semi-detached or detached unit, or as a townhouse or a semi-detached unit.

- o Upper-storey apartment units (examples 14 - 17) in conventional walk-up as well as high-rise apartment structures. For reasons that will be discussed shortly, there is no distinction between these two types of units.

The only example that does fall into either family is the stacked townhouse (example 13). This scheme has a walk-up unit stacked on another ground-related unit.

An attempt was made to include examples of walk-up apartments (i.e., low-rise apartments with their own or shared stairs to grade). The current fire egress requirements of the building code, however, appears to rule out walk-up apartments as a convertible form of housing (see Appendix B). The code does allow walk-up apartments with corridor access, but in this case the units are no different than those used in high-rise schemes. The only other possibility is to provide a separate stair to grade for every unit, but this is economically infeasible as a general rule.

Twelve of these schemes were used in the subsequent analysis of the conversion costs (see Section 4.0). As consequence of this cost examination, minor revisions were made to these schemes in order to eliminate or reduce unneeded conversion work. The other schemes were not taken through this additional stage of refinement (see Table 3.0).

Table 3.0: SUMMARY DESCRIPTION OF THE "MADE-TO-CONVERT" UNITS

Example		Type	Stor-eys	Gross Area (m^2)	Rooms: Bed	Bath
Ground-Related House Units						
1	"Techbuilt" House with Basement Unit	det/semi	1 + b	186	4	2
2	"Maximizer" House w Vert-Split Unit	det/semi	2 + b	198	4	3
3**	"Baroque" Townhouse w Basement Unit	att	2 + b	148	3	1.5
4**	Back-Split House with Basement Unit	det/semi	1 + b	139	3	2
5a*	"Victorian" House with Upper Unit	att/semi	3 + b	200	4	2.5
5b*	"Victorian" House with Basement Unit	"	"	"	"	"
6	"Victorian" House w Vert-Split Unit	att/semi	2 + b	170	3	2
7**	Narrow House with Vert-Split Unit	det/semi	2 + b	170	3	2
8Aa**	2-Storey House with Upper Unit	det/semi	2 + b	134	2	1
8Ab*	2-Storey House with Basement Unit	"	"	"	"	"
8Ba	3-Storey House with Upper Unit	det/semi	3 + b	200	4	2
8Bb	3-Storey House with Bst/1st Fl Unit	"	"	"	"	"
8Bc	3-Storey House with Basement Unit	"	"	"	"	"
9a**	Wide-Front House with Upper Unit	det	2 + b	225	4	2.5
9b	Wide-Front House with Garage Unit	"	"	"	"	"
10	"Cluster" House with Garage Unit	att/semi	2 + b	+	+	+
11*	Townhouse with Integral Garage Unit	att	3	160	3	2.5
12	"T-Shaped" House with 1st Floor Unit	att/semi /det	2 + b	180	4	2.5
13	Stacked Townhouse w 1st Floor Unit	att	3	129	3	1.5
Multi-Storey Apartment Units						
14A	Single-Aspect Apt (4 bays - asym)		1	102	3	2
14B**	Single-Aspect Apt (4 bays - sym)		1	116	3	2
15*	Single-Aspect Apartment (5 bays)		1	146	3	2.5
16**	Double-Aspect Apartment		1	146	3	2.5
17	Triple-Aspect Apartment		1	131	3	2.5

* Design revised and used in the cost analysis
** Design also used in the economic analysis
\+ Unit unaffected by conversion

	Primary Apartment: Gross Space	Location	Bedrms	Level of Disruption	Accessory Apartment: Gross Space	Location	Bedrms
Ground-Related House Units							
1	93	1st	2	minor	93	bst	2
2	113	bst-2nd	2	minor	85	bst-2nd	2
3	148	1st&2nd	3	minor	74	bst	1
4	139	1st	3	minor	58.5	sub-bst	1
5a	115	2nd&3rd	2	moderate	85	1st	1
5b	200	1st-3rd	4	minor	85	bst	1
6	93	1st&2nd (front)	2	major	67	1st&2nd (rear)	1
7	86	1st&2nd (rear)	2	moderate	84	1st&2nd (front)	1
8Aa	133	bst&1st	2	moderate(?)	68	2nd	b
8Ab	133	1st&2nd	2	minor	68	bst	b
8Ba	128	1st&2nd	2	minor	73	3rd	b
8Bb	135	2nd&3rd	2	moderate(?)	133	bst&1st	2
8Bc	200	1st-3rd	4	minor	68	bst	b
9a	109	1st	1	major	116	2nd	1
9b	+	+	+	minor	45	garage	1
10	+	+	+	minor	50	gar	1
11	125	1st-3rd	3	minor	53	1st&gar	1
12	101.5	2nd	2	moderate	78.5	1st	1
13	70	2nd	2	major	59	1st	1
Multi-Storey Apartment Units							
14A	55	-	1	minor	47	-	1
14B	58	-	1	moderate	58	-	1
15	94	-	1	moderate	52	-	1
16	85	-	1	minor	61	-	1
17	65.5	-	1	major	65.5	-	1

minor - little or no work needed to primary unit with no inconvenience
moderate - some work involving short-term inconvenience or possibly vacancy
major - extensive work requiring vacancy

3.2 Unit Sizes

The unconverted schemes range widely in size from 102 m^2 in gross floor space for a three bedroom apartment (example 14A), up to 225 m^2 for a four bedroom house (9). Most of the ground-related units fall in the 180-200 range, while the apartments are typically 130-145 (see Table 3.0).

Knowing the minimum unit sizes is of relevance for future planning. In determining the minimums, it is best to focus on the most representative types because of the diversity of examples. The two most common unit types are these:

- a three-four bedroom house split into a two-bedroom primary unit and a one-bedroom accessory. The smaller examples (3,4 & 11) are 140-160 m^2 in size, but these use basement or garage space not included in original gross floor space calculation because it is not considered habitable space. The reasonable minimum appears to be 180 m^2 (7 & 12).

- a three-bedroom apartment split into two one-bedroom units. The smallest examples here (14A&B) are 100-115, but these may need more internal storage and laundry space. The reasonable minimum is approximately 130 (17).

Looking at just the accessory units, the smallest one-bedroom accessory apartments (10 & 14A) are in the order of 50 m^2. Both of these may be considered too small, and better redesigned as bachelor units. A more reasonable minimum appears to be about 60-65 m^2 (6 & 17) for units containing an internal laundry and storage areas.

The Ontario Building Code does not set minimum sizes for units (see Appendix B), but it does specify minimums for some of the main rooms. Using these minimum room sizes and estimates for the others, approximate minimums can be determined. On this

basis, the minimum size allowed by the code is roughly 59 m^2 for a two bedroom unit, 46 m^2 for one, and 37 m^2 for a bachelor. When added together, approximately 105 m^2 is needed for a house with a two bedroom and an one bedroom apartment, and 96 m^2 for a two bedroom with a bachelor apartment.

As can be seen, the units designed for this study are somewhat larger than the minimums derived from the code. It should be explained that the units were intended to be modest in size, but no attempt was made to design them to the minimum. Nevertheless, this experience also indicates that meeting these minimums in made-to-convert units would be difficult. The reason appears to be that the designs must work in two alternative arrangements.

3.3 Convertibility Criteria

The study indicates that a wide range of conventional units might be made suitable for conversion with a minimum of change and cost. Nevertheless, not all plans clearly are capable of conversion for various reasons.

While it is difficult to fully specify what makes a unit convertible, certain key criteria can be noted. Having sufficient area for two units is an obvious necessary condition. The design work indicates these others:

1) The space used for the accessory apartment must be surplus to the needs of the smaller family.

   Conventional homes potentially will contain space that is needed for a family with children, but then becomes largely unused by the parents when alone. Examples are recreation rooms, second garages, extra bedrooms and basements. The problem here, however, is providing the space in one usable area so that it can incorporated in an accessory apartment without disrupting the house.

2) The space must be accessible from the outside without passing through the primary unit.

   The stairs become an important determinant of convertibility in units having two or more floors. The stairs must be located near the entrance so that access can be made to the above/below-grade unit without isolating part of the usable space. Also, there must be adequate space to accommodate additional partitions, doorways, landings and other requirements set out in the code.

3) The space must have plumbing readily available for the provision of a bathroom and a kitchen.

   Access to plumbing is an important design consideration in laying out these units, but it does not appear to present any major problems. In general, the new kitchen and bathroom facilities can be located without difficulty near a plumbing stack. Where care may be needed is in providing access that minimizes the damage caused during the new installation.

One of the most common areas fulfilling these criteria is recreation or family rooms. These are often associated with extra bathrooms and occasionally have locations with or near external entrances. Nevertheless, these rooms generally do not have sufficient space to accommodate an accessory unit without other additional area.

Other potential areas are garages and basements. These are often under-utilized and readily accessible spaces that can be converted without disrupting the primary unit. On the other hand, they typically are also confined areas that will require extensive improvements. Using garage space also may raise difficulties regarding municipal parking standards.

Extra bedrooms are also prime candidates, especially as they are often associated with their own bathroom suites. Most of the apartment examples take advantage of this space for the accessory unit. In ground-related houses, however, this space is often inaccessibly located on upper floors.

3.4 Building Regulations

The building code appears to affect the design and construction of made-to-convert units in two notable areas.

A number of independent regulations appear to complicate how entrance areas and stairs can be handled in some converted single family homes (see Section B.5). In effect, they require that more space than normal be incorporated in order to accommodate a fire door and a larger vestibule area. If proper provision is not included at the outset, these regulations could complicate some conversions over what is a relatively small amount of space.

The fire and sound separations between the units also must be improved in converted buildings. The improvements needed -- such as, adding another layer of gypsum board on resilient battens -- are not technically difficult. Nevertheless, if undertaken at the time of conversion, they will involve considerable disturbance and a variety of remedial repairs like repainting and adjusting the trim. All of this can be circumvented by providing for the higher standard in the first place at a somewhat lower cost (see Section 4.1.5).

The municipal parking standards also must be considered. Most municipal standards require one parking place per unit. Some of the schemes on smaller lots may not have sufficient yard space for the additional parking place. Others may compound the problem by converting the garage area and removing the existing provision. Unless the municipalities show more flexibility than they have to date, parking regulations may prohibit some of these conversion possibilities.

3.5 Further Work

The designs for these made-to-convert units have been taken only to a schematic level of detail. Therefore, various details regarding services and construction can not be adequately examined. Working drawings will need to be prepared to fully test the schemes. The areas of possible concern involve the electrical, heating and plumbing systems. Further work may be needed here in order to provide clear design advice and to determine the possible cost impact.

Space heating

Most new conventional houses use forced-air heating systems with a gas-fired furnace. The main reason is that, in comparison with electricity, this alternative has higher installation costs but generally lower long-term operating costs.

There are major drawbacks in using furnace-based systems in conversion schemes. A single domestic furnace system can not be operated by separate temperature controls in the two units, nor does it provide a means for measuring the heating energy usage by the tenant. The ducts and vents (or hot water pipes) associated with any furnace-based system also will be relatively costly to adapt. Special precautions particularly must be taken where air ducts pass through and along the prescribed fire separations between the units. For all of these reasons, it is considered likely that the units will be heated by baseboard heaters.

The installation of baseboard heaters will require pre-planning. The additional heating units, especially when coupled with a second electrical clothes dryer and/or oven, are likely to require an upgraded service. The cost of this upgrading will be significant. (In Toronto, to improve a

service from 100 amp to 200 amp, a private contractor can be expected to charge $850 or more for the additional box, breakers and re-wiring.) On the other hand, if installed at the time of construction, this higher level of service can be provided at little additional cost.

All of the ground-related schemes show provision for a furnace, in the case that baseboard heaters are not used. The location of these furnaces must meet the technical service requirements while not unnecessarily restricting convertibility. It is anticipated that furnaces will become less of a problem, as the new equipment is becoming more compact and less dependent upon flues. Nevertheless, this may also merit further consideration.

Electrical services

Toronto Hydro requires that self-contained apartments have an independent wiring system. In other words, no circuit can serve fixtures in two different units.

For reasons of convenience and accountability, it is also desirable for every self-contained unit to have its own separate circuit box. This allows the tenant to have access to the circuit breakers serving the accessory unit. It also allows the landlord to monitor the hydro usage.

Again, if planned ahead of time, these requirements can be met most likely with little additional cost. The separate circuits can be installed and provision made for the second circuit box without substantially affecting the labour or material.

Plumbing

All of the conversion schemes have been designed to expedite the plumbing alterations by locating the kitchens, bathrooms and laundries on a common wall containing the water supply and sanitary drains.

KEY

The floorplans are presented at approximately 1:200 (1'= 1/16").

They use the following explanatory room designations:

L	Living Room
D	Dining Room
L/D	Living/Dining Room
L/B	Bedsitting Room
F	Family or Recreation Room
K	Kitchen
Bk	Breakfast
B	Bedroom
La	Laundry
S	Storage
M	Mechanical or Furnace Room
U	Utility Room
G	Garage
Bal	Balcony
Dk	Deck

The concern here is how to expedite the installations. In the normal course of making the connections, the adjacent floor or wall must be cut open. Afterwards, the opening must be repaired, and the finishes (i.e., tiling and painting) must be re-instated. The subsequent repair work can be more disruptive and costly than the actual plumbing alterations.

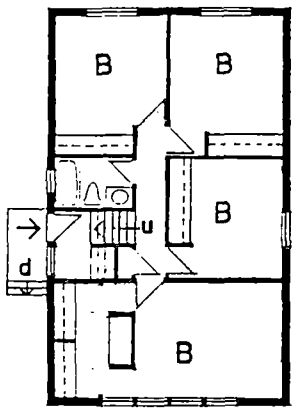
In order to minimize these repair costs, the connections should be capable of being prepared to some extent in advance. What might be entailed and what the cost trade-offs might be, however, is not clear without further investigation.

3.6 Made-to-Convert Schemes

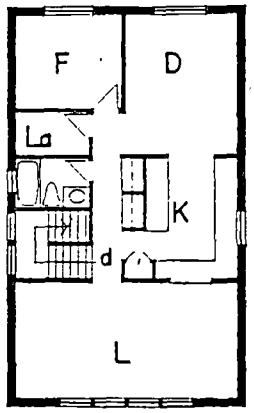
The made-to-convert schemes prepared in this study are presented on following pages. Illustrations are provided for each, together with a description of the scheme, an assessement of its convertibility, and a tabulation of the main statistics and details.

1

UNCONVERTED

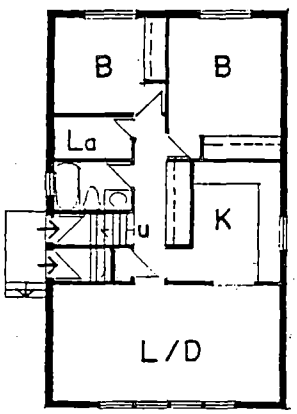


B

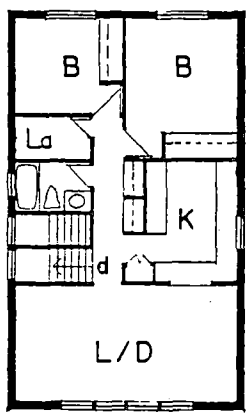


G

CONVERTED



B



G

KEY

The floorplans are presented at approximately 1:200 (1'= 1/16").

They use the following explanatory room designations:

L	Living Room
D	Dining Room
L/D	Living/Dining Room
L/B	Bedsitting Room
F	Family or Recreation Room
K	Kitchen
Bk	Breakfast
B	Bedroom
La	Laundry
S	Storage
M	Mechanical or Furnace Room
U	Utility Room
G	Garage
Bal	Balcony
Dk	Deck

Example 1 - "Techbuilt" House with Basement Unit

Description:

The example is based upon the low-cost and flexible "Techbuilt" house designed by architect Carl Koch and built in northeastern U.S. in 1960's.

The unit is a ground-related two-storey house. It has been designed as a detached house, but could be made into a semi-detached by re-arranging the bedroom floor layout.

As a single unit, it is a two-storey four-bedroom house with the sleeping areas on the lower level, and the living areas on the upper level. (The original design reversed these two floors, but this change has been made to reflect more conventional arrangements.)

In the converted format, it accommodates 2 two-bedroom apartments of identical size on each of the floors. Separate entrances are provided.

Parking must be accommodated separately from the building, presumably in the front part of the lot.

Assessment:

An important feature of this example is the half-down basement. The architect placed living quarters here primarily as a cost-saving measure because it allows for the full use of the constructed space. It also facilitates convertibility because both levels have ready access to grade. Large windows and walk-out patios are used to reduce the sense of living in a basement.

The two levels are virtually interchangeable. Either level can be used for the living and sleeping areas in the single family unit, and either level for the primary and accessory unit when converted.

The conversion can be completed essentially by replacing a bedroom by a kitchen, adding a laundry/storage room, and providing the second entrance for the lower accessory unit. For the upper primary unit, the work involves essentially adding closet space. The conversion can be completed with minor disruption to the primary unit, and probably with only temporary vacancy.

The accessory unit is relatively large. It occupies half of the house, and unlike most of the ground-related examples, it contains two bedrooms. Therefore, the conversion will considerably change the amount of space available to the owner residents.

The entrance of this unit must be redesigned in order to comply with the building code as presently interpreted (see Appendix B.5). It can be handled in a number of ways: widening the stairs, widening the entrance landings only, or making an extension to accommodate an entrance vestibule.

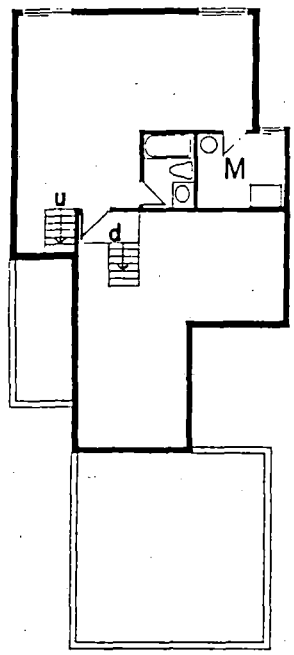
The other main problem with this unit is generally the lack of bulk storage space, especially when compared with typical family houses. The room shown as a family room in the consolidated unit could be allocated to this purpose, but similar space is not available in the converted version.

Details:

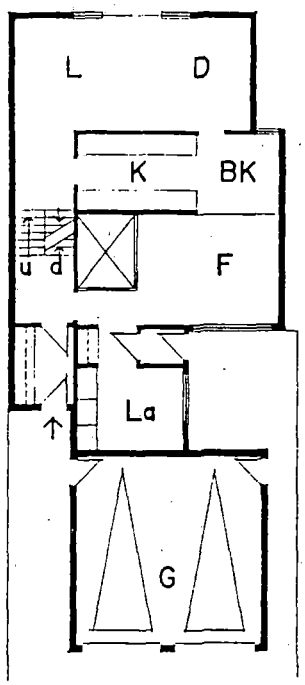
	Combined	Primary	Accessory
Unit Width x Depth - m	7.6 x 12.2	7.6 x 12.2	7.6 x 12.2
- ft	25 x 40	25 x 40	25 x 40
Lot Width - m	10.7		
- ft	35		
Gross Floorspace - m^2	186	93	93
- ft^2	2000	1000	1000
Storeys	2	1	1
Location	1st + bst	1st	bst
Rooms - bedrooms	4	2	2
bathrooms	2	1	1
kitchen	1	1	1
living rm	1	1	1
dining or family rm	1		

2

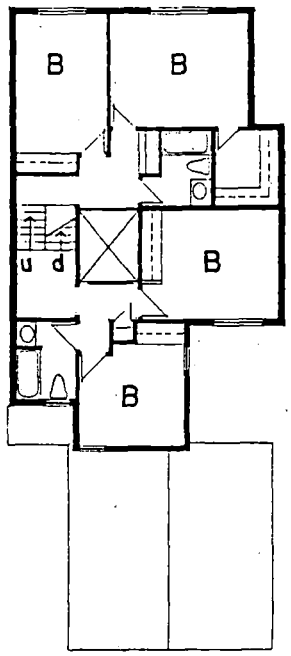
UNCONVERTED



B

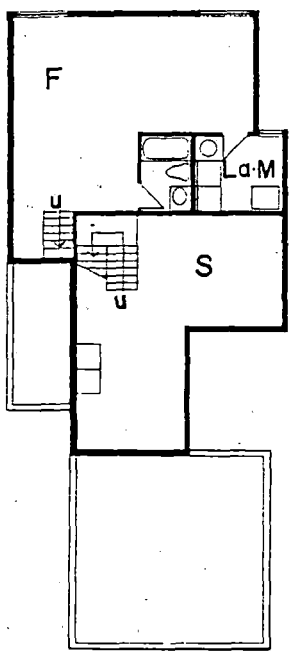


G

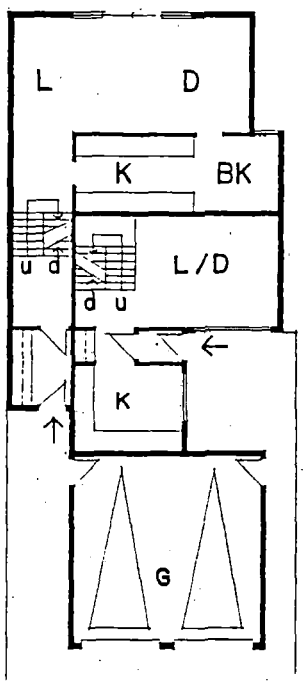


2

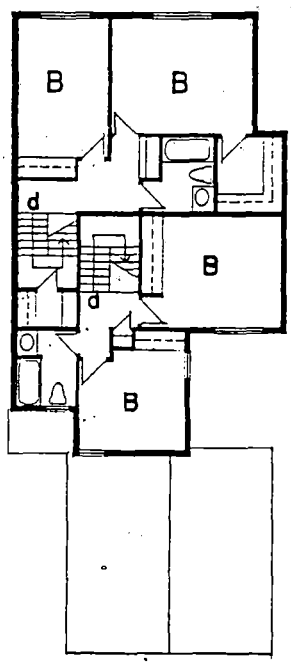
CONVERTED



B



G



2

Example 2 - "Maximizer II" with Vertically-Split Unit

Description:

This example is based upon a model unit called the Maximizer II. It was designed by architect Ted Rosen for the 1982 Toronto Home Show sponsored by the Toronto Home Builders Association. The unit has been modified in order to reduce its size, while maintaining the basic concept and layout.

The unit is essentially a ground-related two-storey house with a basement. It is designed as detached structure, but also could be built as semi-detached unit.

As a single family home, it is a large four bedroom house with an extra family room associated with a utility/laundry room. There is also potential for an additional bedroom and recreation room in a basement level.

The house is designed to be vertically separated into two different two-storey two-bedroom units. Each unit has its separate entrance at grade and internal stairway. The larger primary unit is located to the rear, and accessory unit is located to the front.

A third self-contained one-bedroom unit also could be located in the basement of the primary unit. Access would be from the entrance to the primary unit.

Parking is provided in the attached double garage at the front of the structure.

Assessment:

The units are vertically separated. To make the conversion, the doorway connecting the two units must be closed. Also, the utility/laundry room must be converted to a kitchen, and the additional stair added. (In the original design, this feature was built at the outset.)

The innovative feature in this unit is the dual stairways, coupled with the half-level relation of the floors between the two units. This provides the house with a remarkable degree of flexibility. As noted, the basement also could accommodate a third one-bedroom unit. This same area also could be used for a third bedroom associated with either of the two units. As a final option, the upper four bedrooms could be associated with the primary unit, and the basement bedroom suite linked to the accessory unit -- creating a four-bedroom primary unit and a one-bedroom accessory.

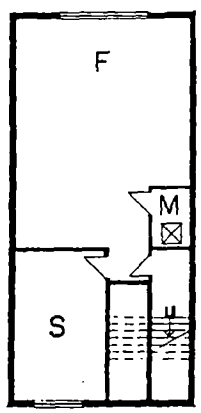
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	8.5 x 13.7	8.5 x 10.0	8.5 x 7.5
- ft	28 x 45	28 x 32.5	28 x 24.5
Lot Width - m	10.7		
- ft	35		
Gross Floorspace - m^2	198	113	85
- ft^2	2130	1215	915
Storeys	2*	2*	2
Location	bst-2nd	bst-2nd (rear)	bst-2nd (front)
Rooms - bedrooms	4*	2*	2
bathrooms	3	2	1
kitchen	1	1	1
living rm	1	1	
living/dining rm			1
family rm	1		
recreation rm	1	1	
utility/laundry rm	1		

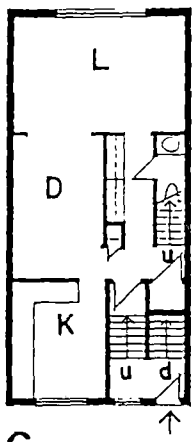
* excludes basement (which could include accommodate additional bedroom suite)

3

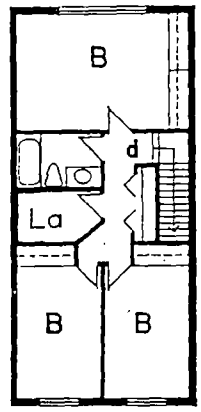
UNCONVERTED



B

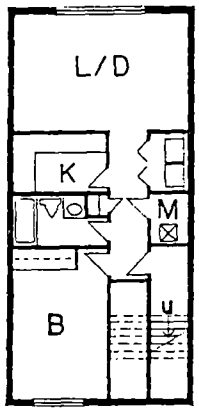


G

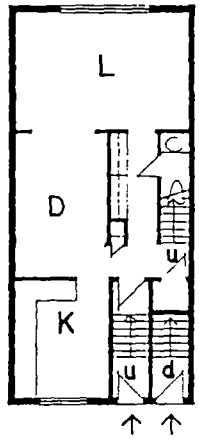


2

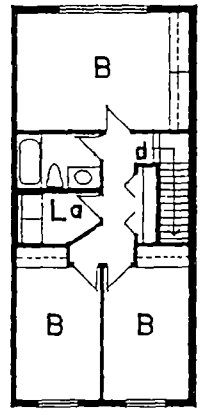
CONVERTED



B



G



2

Example 3 - "Baroque" Townhouse with Basement Unit

Description:

This example is based upon a unit, called the "Baroque Suite", built outside Washington D.C. by a small developer in the early 1980's.

The unit is a ground-related two-storey house with a raised basement. It has been designed as a townhouse, but also could be built as a semi-detached unit.

As a single unit, it is a three-bedroom house. The living spaces are on the ground floor, and the sleeping spaces on the second. The basement contains the laundry and storage, and depending upon need, a recreation room, extra bathroom, and/or fourth bedroom.

As a converted unit, it accommodates a self-contained one-bedroom apartment in the basement. A separate entrance is provided at the front.

Parking must be provided in front of the unit. The lot width is sufficient for two spaces without a separate walkway.

Assessment:

The conversion can be made with little disruption to the primary unit. It requires providing a second front door with fire-rated separation.

Within the basement, the major change involves adding the kitchen and bathroom. The other alterations depend upon the extent of the initial finishing. Essentially, the recreation room is used for the living/dining room and the storage room as a bedroom.

The unique feature of this design that facilitates conversion is the stair arrangement. Locating the stairs at the front of the unit allows for direct access to the upper and lower unit with minimum change. Although the stair to the second floor is displaced to a more central location, the combination still provides an efficient use of space in this tightly designed unit.

1100 cm wide stairs at the entrance have been provided to satisfy the building code for a building with more than one unit. This is 200 cm more than required for a single unit house, and will add marginally to the initial construction costs.

The unit also has a raised basement that allows for more generous windows, and possibly a walk-out patio, in order to reduce sense of living below grade.

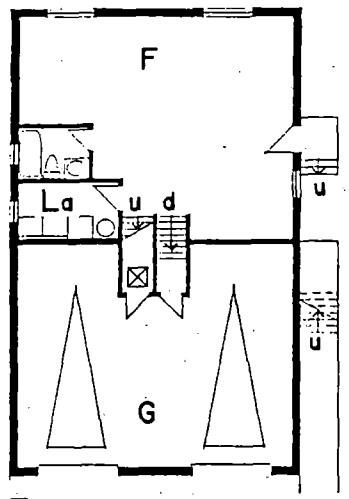
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	6.1 x 12.2	6.1 x 12.2	6.1 x 12.2
- ft	20 x 40	20 x 40	20 x 40
Lot Width - m	6.1		
- ft	20		
Gross Floorspace - m^2	148*	148	74
- ft^2	1600	1600	800
Storeys	2*	2	1
Location	1st & 2nd	1st & 2nd	bst
Rooms - bedrooms	3	3	1
bathrooms	1.5	1.5	1
kitchen	1	1	1
living rm	1	1	
living/dining rm			1
recreation rm	1		

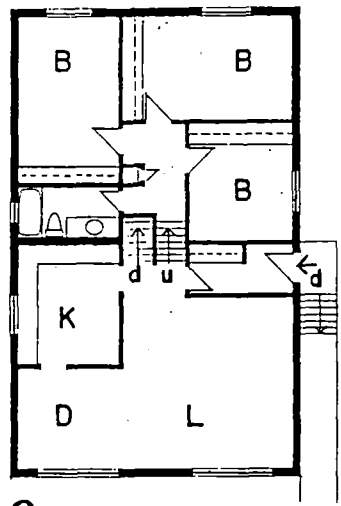
* excluding basement

4

UNCONVERTED

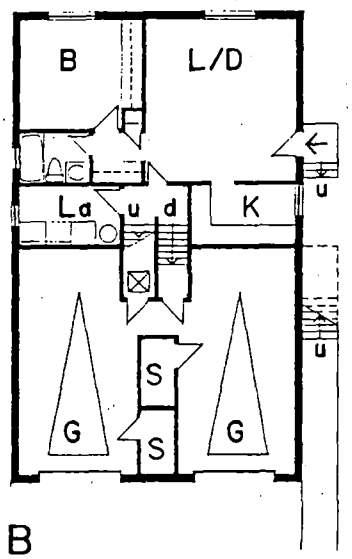


B

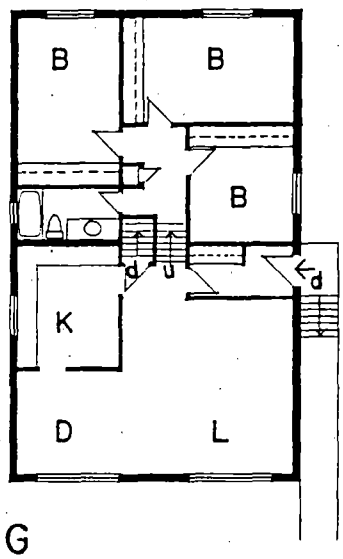


G

CONVERTED



B



G

Example 4 - Back-Split House with Basement Unit

Description:

The unit is based upon a typical ground-related back-split. (The term "back-split" refers to the floors in the front and back sections being offset by a half level from each other.) It has been shown as a detached unit, but is also commonly built semi-detached.

As a single family house, it contains three bedrooms on the rear upper level and the living spaces on the front ground level. The rear lower level is used for a family room, second bathroom and laundry.

The accessory one-bedroom unit is provided in the rear lower level. The separate entrance is located on the side of unit. Access to the shared laundry, storage and parking is by the internal stairs.

Parking for two cars is provided within the structure in the basement level. An alternative is to locate the parking in the front yard (or to the side), and build the lower basement as crawl space only.

Assessment:

The conversion can be made without disruption to the primary unit. The shared laundry facilities and separate entrance are as provided in the original layout.

The changes needed to convert the unit are mainly in adding the new kitchen. Also needed are new partitions around the stairway and other partitions for separating the bedroom and living room.

The feature that makes this unit readily convertible is the lower split-level. Conventionally, this area has a second bathroom, separate entrance as well as ample space for another unit. Depending upon the grading of the site, this area also can have full windows and a walk-out patio.

Another variation of this unit (not illustrated) is a "side-split", created by turning this unit 90°. In this case, the lower level can be used for parking and/or recreation room. This space can be converted in a similar manner to this example.

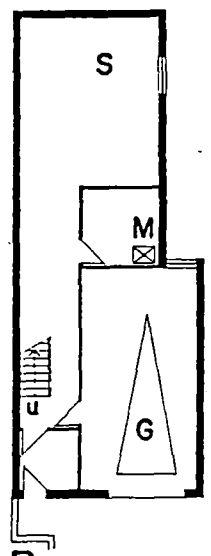
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	9.3 x 15	9.3 x 15	9.3 x 7.5
- ft	30 x 50	30 x 50	30 x 25
Lot Width - m	12.2		
- ft	40		
Gross Floorspace - m^2	139*	139*	58.5
- ft^2	1500	1500	630
Storeys	1*	1*	1
Location	grd	grd	bst
Rooms - bedrooms	3	3	1
bathrooms	2	1	1
kitchen	1	1	1
living rm	1	1	
dining rm	1	1	
living/ dining rm			1
family rm	1		

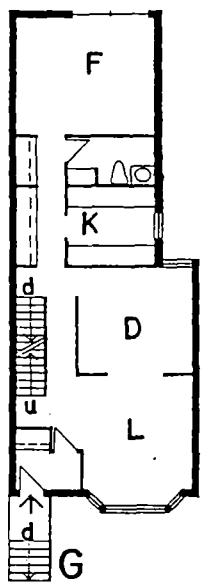
* excludes basement levels

5

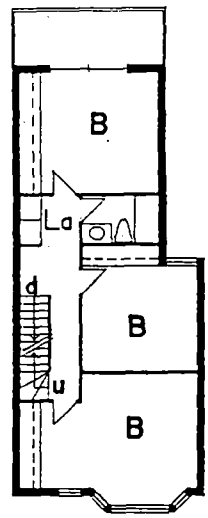
UNCONVERTED



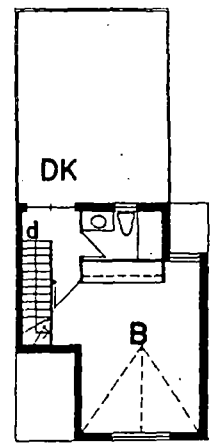
B



G

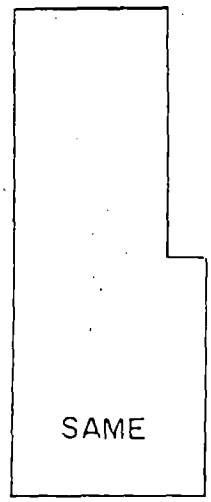


2

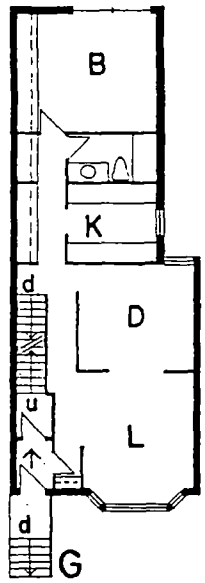


3

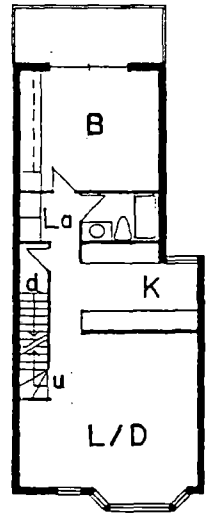
CONVERTED (a)



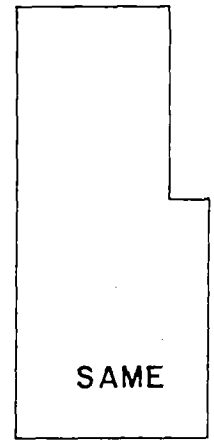
B



G

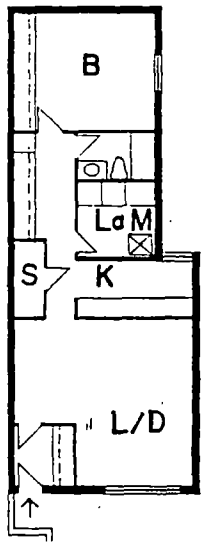


2

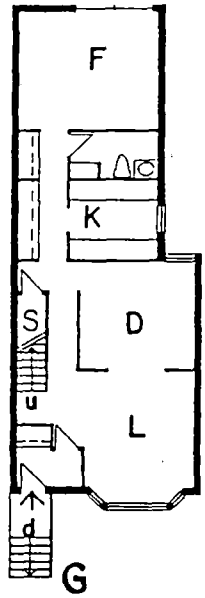


3

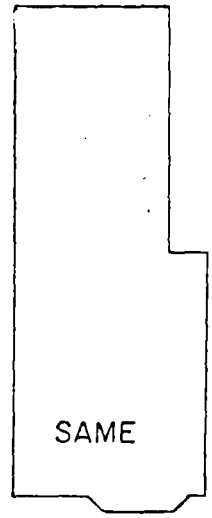
CONVERTED (b)



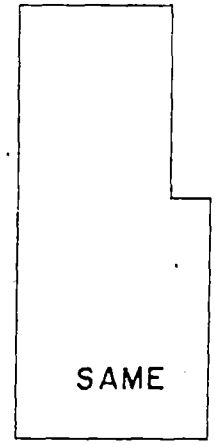
B



G



2



3

Example 5 - "Victorian" House with Two Horizontally-Split Options

Description:

This example is based upon a typical "Victorian" house built around the turn of the century in many downtown areas.The unit can be built either as a two-storey or three-storey house, and as a detached or semi-detached structure. (The illustrations and calculations are based upon the three-storey version.)

As a single family home, it has four-bedrooms on the second and third floors and the living areas of the ground floor. The basement is available for a recreation room, laundry and storage facilities and/or parking for one car.

The unit can accommodate two types of conversion:

a) a one-bedroom accessory unit on the ground floor, and a two-bedroom primary unit on the second and third floors. Both have access from the front entrance. Any parking provided for the additional unit must be provided outside the structure, and presumably, in the front yard.

b) a one-bedroom unit in the basement with a separate entrance. The basement parking would be displaced in this case.

Assessment:

The major change that must be made for the upper story conversion is the addition of the new kitchen on the second floor.

The main drawback associated with this conversion is that the larger and so-called primary unit on the second and third floors does not have internal access to the parking. This could be accommodated by redesigning the original unit to allow for a shared hallway on the ground floor.

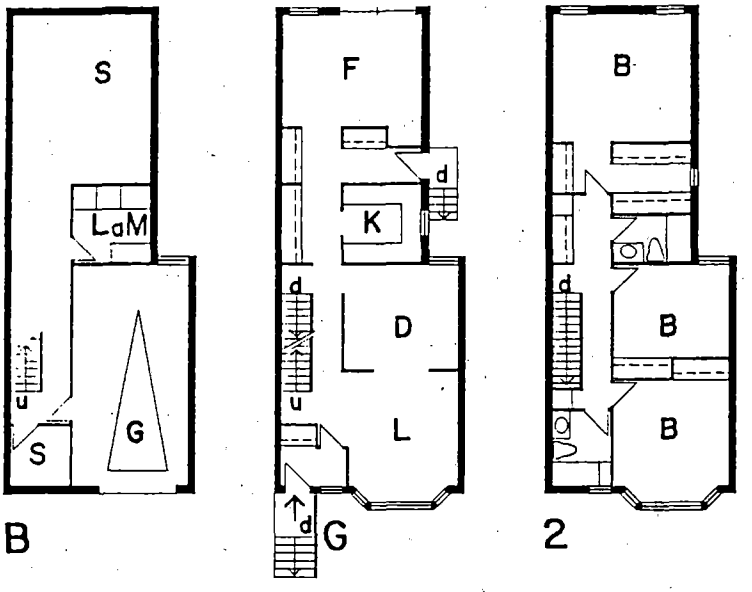
The conversion of the basement requires the provision of a kitchen and bathroom, and presumably, the finishing of the walls, floor and ceiling.

Details:

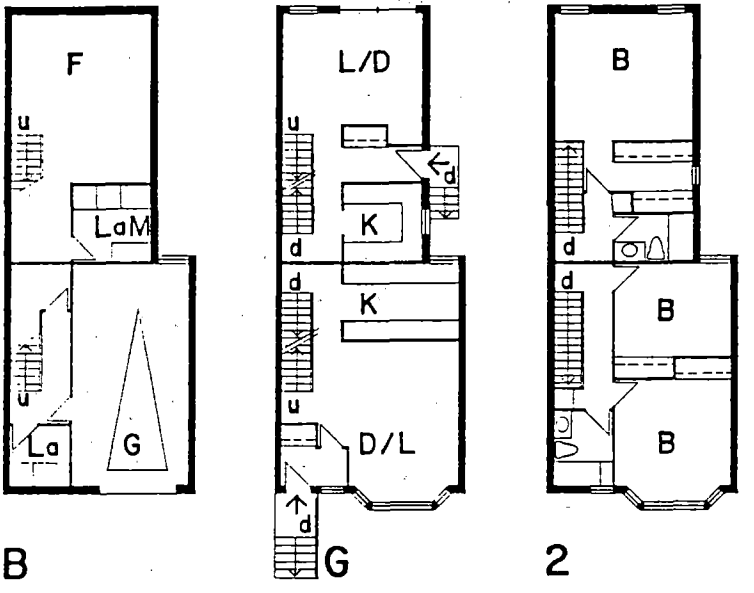
	Combined	Primary	Accessory
Unit Width x Depth - m	6.1 x 15.5	6.1 x 13.7	6.1 x 15.5
- ft	20 x 51	20 x 45	20 x 51
Lot Width - m	7.6		
- ft	25		
Option 5a			
Gross Floorspace - m^2	200	115	85
- ft^2	2150	1235	915
Storeys	3*	2	1
Location	1st-3rd	2nd-3rd	1st
Rooms - bedrooms	4	2	1
bathrooms	2.5	2	1
kitchens	1	1	1
living rm	1		1
dining rm	1		1
living/dining rm		1	
family rm	1		
Option 5b			
Gross Floorspace - m^2	200	200	85
- ft^2	2150	2150	915
Storeys	3*	3	1
Location	1st-3rd	1st-3rd	bst
Rooms - bedrooms	4	4	1
bathrooms	2.5	2.5	1
kitchens	1	1	1
living rm	1	1	
dining rm	1	1	
living/dining rm			1
family rm	1	1	

6

UNCONVERTED



CONVERTED



Example 6 - "Victorian" House with Vertically-Split Unit

Description:

This example, like example 5, is based upon a typical "Victorian" house built around the turn of the century in many downtown areas. These houses often incorporated second stairways, which provide an opportunity for creating two vertically separated units.

The unit is a two-storey house that can be built as either a detached or semi-detached structure. It can also include a third storey, as shown in the previous example.

As a single family home, it has three-bedrooms on the second floor and the living areas on the ground floor. The basement is available for recreation room, laundry and storage facilities and/or parking for one car.

When converted, the house is vertically separated with each unit having its own internal stairway. The primary unit with two bedrooms is to the front, and accessory unit with one bedroom is to the rear. The entrance for the second unit is located to the side of the building. The single parking space could be used by either of the units.

Assessment:

The separation of the units is essentially made by closing the two doorways in the shared wall. A new kitchen must be added to the front unit, and new stair added to the rear unit. These changes would involve major disruptions, making the primary unit uninhabitable for a short period.

This type of conversion depends upon the provision of the additional stair. This is best facilitated by providing the appropriate framing in the structure when originally constructed. However, in the layout shown, this change also could be made with no prior planning and without undue difficulty.

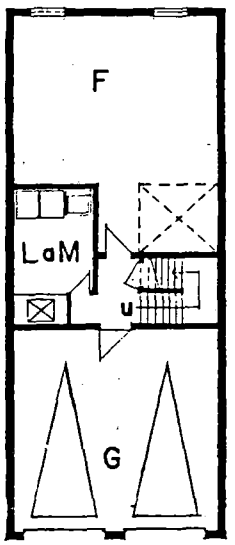
There is a problem in this example in making the space fit both the unconverted and converted unit. The living/dining area in the rear accessory unit is relatively small because of the size of the initial family room. The space for the living/dining area can be increased, but only by making the family room unreasonably large (or by subsequently extending the house).

Details

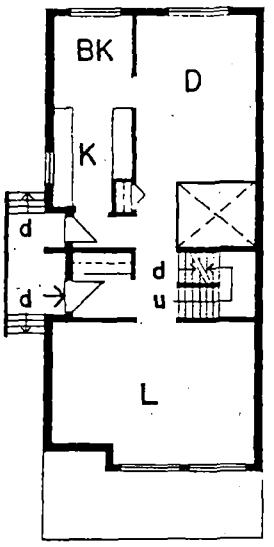
	Combined	Primary	Accessory
Unit Width x Depth - m	6.1 x 15.5	6.1 x 7.6	4.9 x 7.9
- ft	20 x 51	20 x 25	16 x 26
Lot Width - m	7.6		
- ft	25		
Gross Floorspace - m^2	170	93	67
- ft^2	1830	1000	830
Storeys	2	2	2
Location	1st-2nd	1st-2nd (front)	1st-2nd (rear)
Rooms - bedrooms	3	2	1
bathrooms	2	1	1
kitchens	1	1	1
living rm	1		
dining rm	1		
living/dining rm		1	1
family rm	1		

7

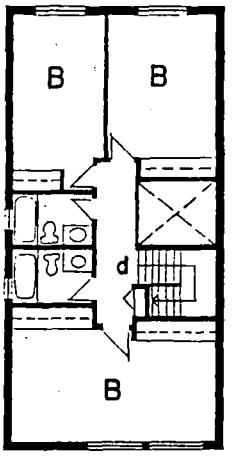
UNCONVERTED



B

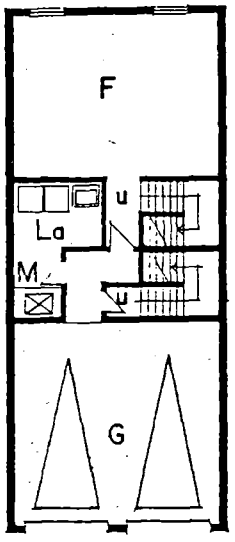


G

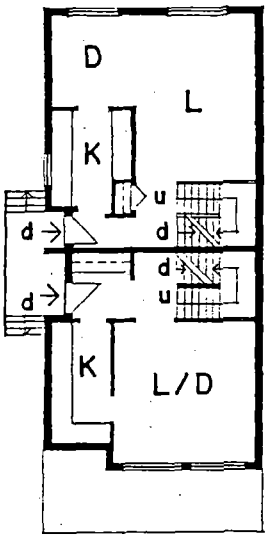


2

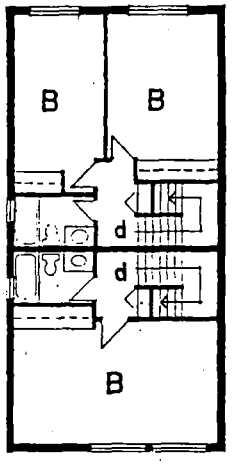
CONVERTED



B



G



2

Example 7 - Narrow House with Vertically-Split Unit

Description:

This example is a ground-related two-storey unit designed as semi-detached unit, but also buildable as a detached house. It might be considered innovative because it is not based upon a known previous example. Nevertheless, with the exception of the provision for the second stair, it is conventional in layout and appearance.

As a single family house, it is a three-bedroom unit with sleeping areas on the second floor and living areas on the ground floor. The basement contains an integral two-car garage, along with tne laundry, storage and family room.

When converted, it becomes two vertically separated units. The larger two-bedroom primary unit is located to the rear and retains access to the basement family room. The accessory unit to the front has one bedroom (or two bedrooms with further alterations). The units have separate entrances at the side of the building. Parking, storage, and a shared laundry are provided in the basement.

Assessment:

This house has been specially designed for conversion into two vertically-separated units. Vertical separation, when compared with horizontal, potentially has a number of advantages: better acoustic privacy, less extensive fire-separations, and direct access to grade for both units.

The key feature of the design is the provision for the second stair. When used as a single family house, the second stairway can be used as an open lightwell from a skylight in the roof through the house and down to the basement.

In the primary unit, the major changes that must be made are the addition of the stairway. A new entrance also must be provided, and the fire-rated partitioning between the two units. This work could be undertaken without requiring vacancy.

In the second unit, the major changes include the provision of a new kitchen, and possibly the additional partition for the splitting the bedroom.

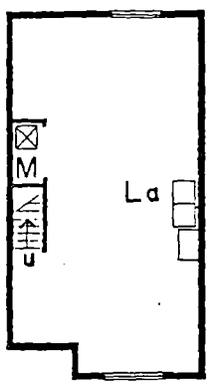
Details

	Combined	Primary	Accessory
Unit Width x Depth - m	6.4 x 13.7	6.4 x 6.7	6.4 x 7.0
- ft	21 x 45	21 x 23	21 x 20
Lot Width - m	7.6		
- ft	25		
Gross Floorspace - m^2	170	86*	84*
- ft^2	1832	924	908
Storeys	2*	2*	2
Location	grd & 2nd	grd & 2nd (rear)	grd & 2nd (front)
Rooms - bedrooms	3	2	1
bathrooms	2	1	1
kitchens	1	1	1
living rm	1		
living/dining rm		1	1
dining rm	1		
family rm	1	1	

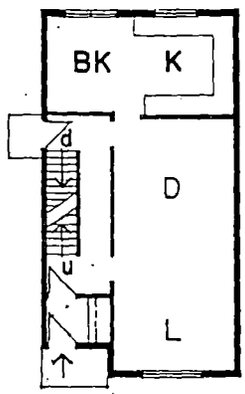
* excluding basement

8A

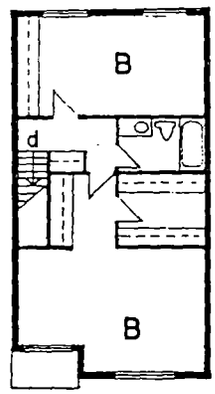
UNCONVERTED



B

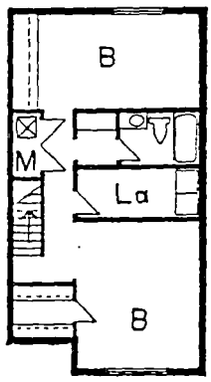


G

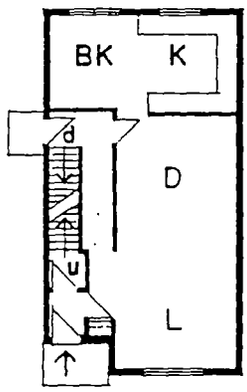


2

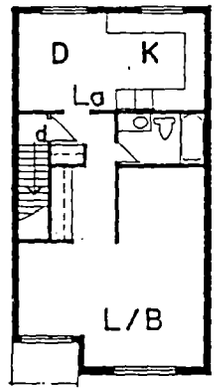
CONVERTED (a)



B

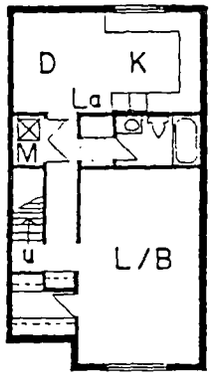


G

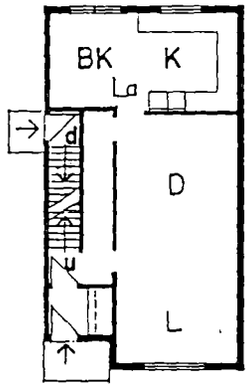


2

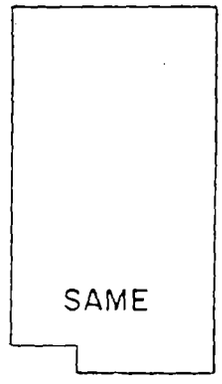
CONVERTED (b)



B



G



2

Example 8A - Two-Storey House with Two Horizontally-Split Options

Description:

This example illustrates a basic unit type that can be built either as a semi-detached or fully detached structure. In this example, it is shown as a two-storey house. In the following example (8B), the same layout is used in a three-storey house.

As a single family two-storey house, it accommodates two bedrooms on the upper floor, with the living areas on the ground floor. Although not shown, as an alternative, parking for one car could be provided in the basement.

When converted, the house can accommodate these two options:

a) an accessory bedsit apartment on the second floor, leaving a two-bedroom primary unit on the ground floor and in the basement. Access to both units is from the existing front door, with the accessory unit using the existing stair to the second floor.

b) an accessory bedsit apartment in the basement, with the remainder of the house essentially unchanged. Access to the accessory apartment is from the side entrance using the existing stairs to the basement. Access to the main unit remains from the front entrance.

Assessment:

To make the conversion in option a, major changes must be made in the basement to add the entire unit including bathroom and kitchen. A kitchen also must added on the top floor, and changes made to the entrance vestibule on the ground floor. The changes are such that the house would not be habitable during conversion.

In option b, the entire basement unit must be provided, including a new kitchen and bathroom. In this case, however, the upper unit is largely unaffected. A connecting doorway must be filled and a laundry added.

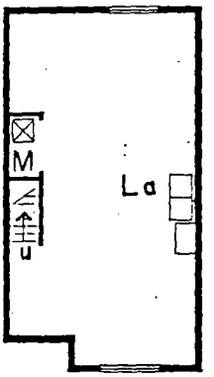
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	6.1 x 11.3	6.1 x 11.3	6.1 x 11.3
- ft	20 x 37	20 x 37	20 x 37
Lot Width - m	7.6		
- ft	25		
Option 8Aa			
Gross Floorspace - m^2	134	133	68
- ft^2	1440	1430	730
Storeys	2*	2	1
Location	1st & 2nd	bst & 1st	2nd
Rooms - bedrooms	2	2	
bathrooms	1	1	1
kitchens	1	1	1
bedsit room			1
living room	1	1	
dining room	1	1	1
Option 8Ab			
Gross Floorspace - m^2	+	133	68
- ft^2	+	1430	730
Storeys	+	2*	1
Location	+	1st & 2nd	bst
Rooms - bedrooms	+	2	
bathrooms	+	1	1
kitchens	+	1	1
living	+	1	
dining rm	+	1	1
bedsit rm			1

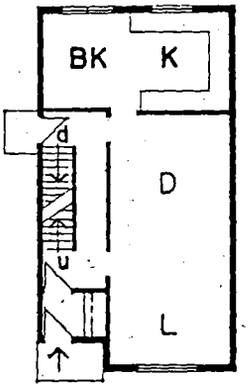
* excluding basement
\+ same as above.

8B

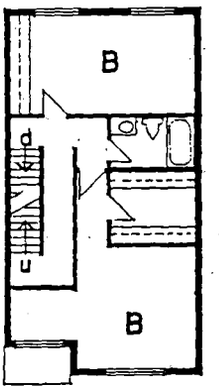
UNCONVERTED



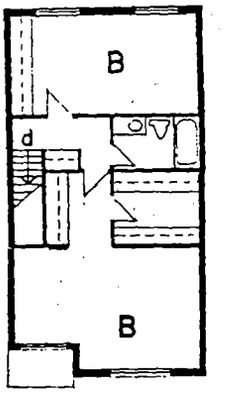
B



G

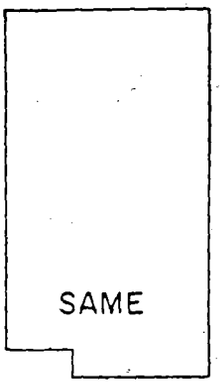


2

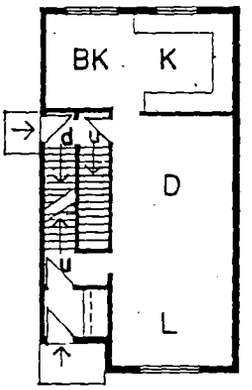


3

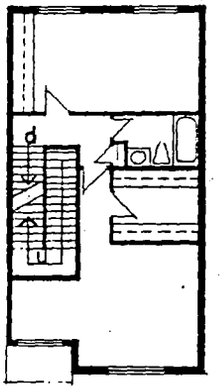
CONVERTED (a)



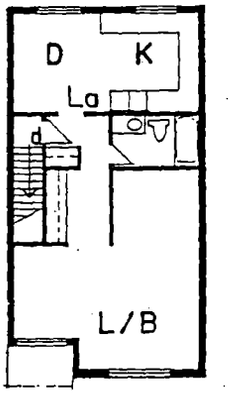
B



G

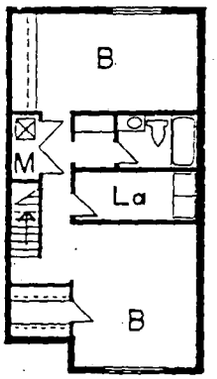


2

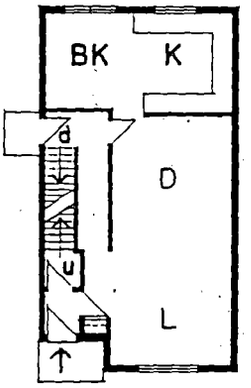


3

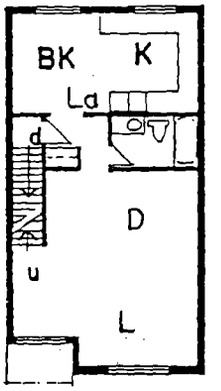
CONVERTED (b)



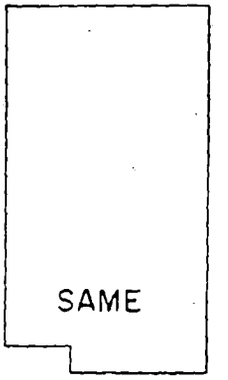
B



G

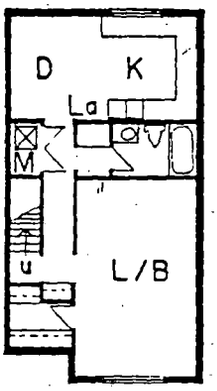


2

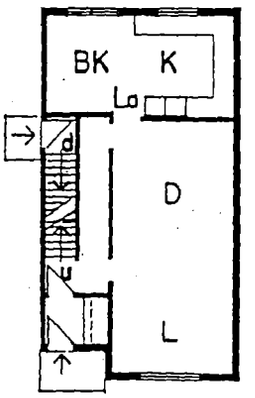


3

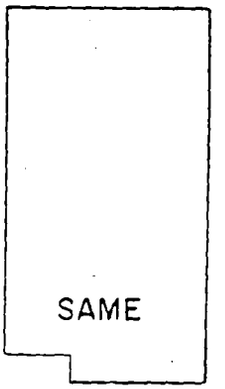
CONVERTED (c)



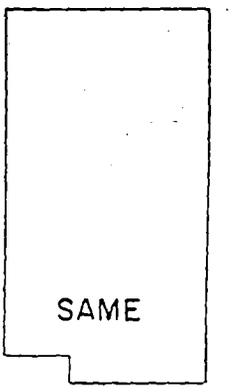
B



G



2



3

Example 8B - Three-Storey House with Three Horizontally-Split Options

Description:

This example illustrates a basic unit type capable of being converted in three different ways. This unit can be built in either a two or three storey version, and as a semi-detached or fully detached structure. The two-storey version is shown in example 8A.

The example was initially designed to solve a particular problem: how to accommodate an accessory unit on the third floor. The solution was found to be capable of taking the other alternatives that are shown.

As a single family three-storey house, it accommodates four bedrooms on the upper two floors, with the living areas on the ground floor. Although not shown, parking for one car could be provided in the basement.

When converted, the three-storey house can accommodate these alternatives:

a) an accessory bedsit apartment on the third floor, leaving a two-bedroom primary unit on the ground and second floors.

   Access to the accessory apartment is from the side entrance. A new stair must be built between the basement and second floor, but the existing stair between the second and third floors is used to the top floor. Access to the primary unit is from the front entrance, and the existing stair is used to the second floor. Both units have access to different parts of the basement.

   Along with the construction of a new stair between the ground and second floors, the major change involved in this conversion is the addition of the kitchen on the top floor. Also, various changes must be made to the internal partitioning, and fire-rated separation added along the lower stairs.

b) a two-bedroom apartment on the second and third floors, with a two-bedroom apartment on the ground floor and in the basement. Because both apartments are some of a similar size, either can be the accessory or primary unit. (The lower unit is identical to the lower unit shown in option b for example 8A).

   The entry for both units is through the front door. The existing stairs are used for internal access.

The major changes involved include adding the second kitchen to the upper unit, and providing the additional bedrooms and bathroom in the basement. Fire-rated partitioning also must provided around the entry stairs, and various changes made to the internal drywall partitions.

c) an accessory bachelor apartment in the basement, with the remainder of the house essentially unchanged. (This unit is identical to the basement unit shown in 8A.)

Access to the accessory apartment is from the side entrance using the existing stairs to the basement. Access to the main unit remains from the front entrance.

The entire basement unit must be provided, including a new kitchen and bathroom. The only change needed to the upper unit is to accommodate new laundry facilities.

Assessment:

The comments regarding the changes required for each option have been made in the above text. With the exception of option c, the changes are such that the house would not be habitable during conversion.

The innovative feature in this example is the interlocking stair used in option a. This was the only means that could be found for reasonably providing access to a third floor unit. The alternative, which is to build a new external but enclosed stair, was not considered practical.

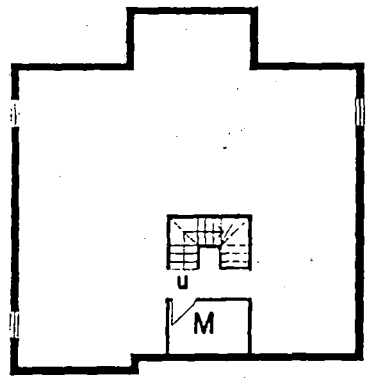
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	6.1 x 11.3	6.1 x 11.3	6.1 x 11.3
- ft	20 x 37	20 x 37	20 x 37
Lot Width - m	7.6		
- ft	25		
Option 8Ba			
Gross Floorspace - m^2	201	128	73
- ft^2	2160	1380	780
Storeys	3*	2	2
Location	1st - 3rd	1st - 2nd	3rd
Rooms - bedrooms	4	2	
bathrooms	2	1	1
kitchens	1	1	1
bedsit room			1
living room	1		
dining rm	1	1	1
Option 8Bb			
Gross Floorspace - m^2	+	135	133
- ft^2	+	1450	1430
Storeys	+	3*	1
Location	+	2nd & 3rd	bst & 1st
Rooms - bedrooms	+	2	2
bathrooms	+	2	1
kitchens	+	1	1
living	+		1
dining rm	+	1	
Option 8Bc			
Gross Floorspace - m^2	+	200	68
- ft^2	+	2150	730
Storeys	+	3	1
Location	+	1st - 3rd	bst
Rooms - bedrooms	+	4	
bedsit room			1
bathrooms	+	2	1
kitchens	+	1	1
living rm	+	1	
dining rm	+	1	1

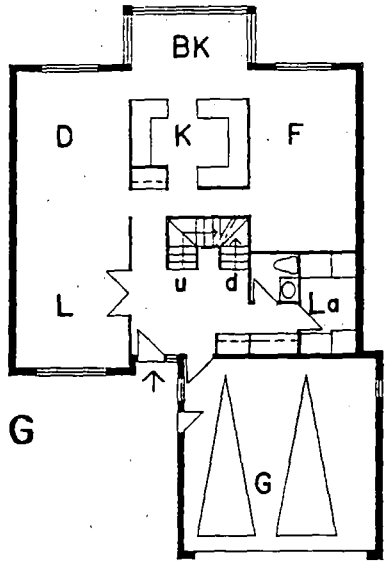
* excluding basement
\+ same as above.

9

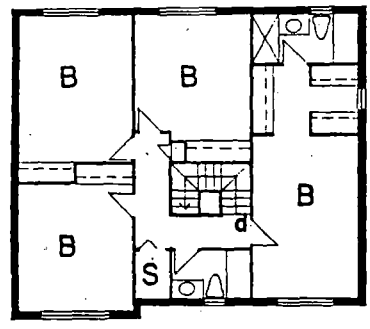
UNCONVERTED



B

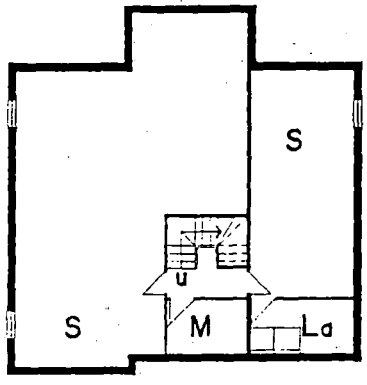


G

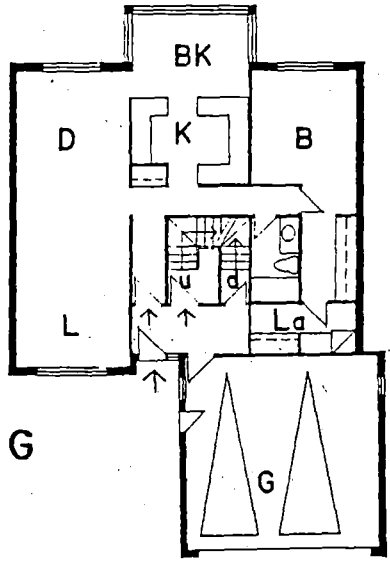


2

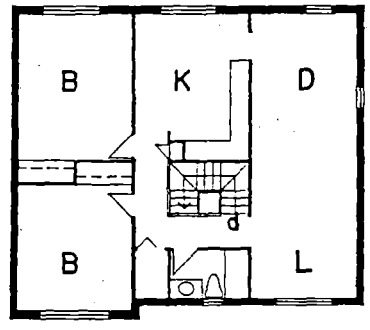
CONVERTED (a)



B

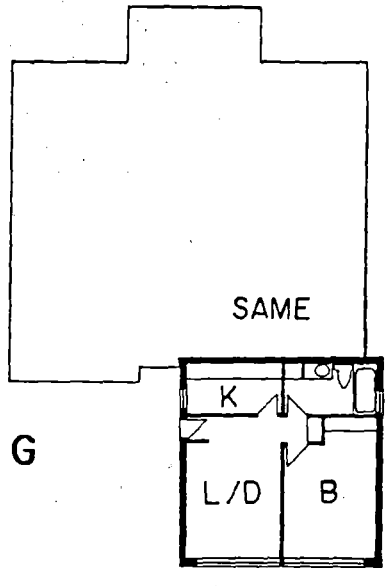


G



2

CONVERTED (b)



G

Example 9 - Wide-Front House with Two Options

Description:

This example is based upon a conventional two-storey wide-front house with an attached double garage. This unit is probably the most common type built in suburban subdivisions with 15 m or wider lots. Many variations in the room arrangements are possible, but they are all characterized by the central entry hall with the grand stair. As a single unit, it is large four-bedroom home.

The house can accommodate two different types of accessory apartments:

a) a one-bedroom unit on the ground floor and a two bedroom unit on the second floor.

b) a one-bedroom apartment in the double garage, leaving the house unchanged.

The double garage can be shared in option a. In the case of option b, space for parking for both units is potentially available on the existing driveway.

Assessment:

This unit, because of its size, can not be considered to fall within the affordable end of the market. It has been included because it is so prevalent in suburban areas.

In option a, the work involved is relatively limited. A kitchen must be added on the second floor, and the bathroom and laundry area adapted on the ground floor. Also, the stairway must be enclosed to provide a fire-rated egress.

To accommodate these changes, the unit has been changed in one small but significant way. Typically, they are built with curved stairs. This was replaced by a more conventional stair that could be more readily enclosed.

While this conversion appears to feasible, the market for this type of accommodation is not clear.

As shown in option b, accommodating a residential unit in a double garage requires extensive improvements. These include the addition of a new kitchen and bathroom, and the provision of finished internal walls, floors and ceilings, as well as complete insulation.

The key feature needed for ready conversion is proximity to plumbing. This can be provided generally by the ground floor bathroom and laundry located on the ground floor of the the primary unit.

The space available within a typical double garage is limited. In this particular scheme, therefore, the living/dining and bedroom spaces are tight, and there is insufficient space for a laundry. An alternative to consider is providing a bachelor unit.

As noted, the primary unit in a conversion of this type would remain essentially unchanged. Only the linking doorway must be closed.

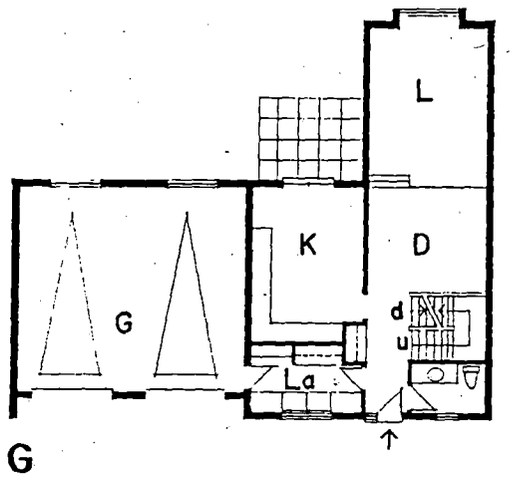
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	11.3 x 11.3		
- ft	37 x 37		
Lot Width - m	15		
- ft	50		
Option 9a			
Gross Floorspace - m^2	225	109	116
- ft^2	2430	1175	1255
Storeys	2	1	1
Location	1st & 2nd	2nd	1st
Rooms - bedrooms	4	2	1
bathrooms	2.5	2	1
kitchen	1	1	1
living rm	1	1	1
dining rm	1	1	1
family rm	1		
Option 9b			
Gross Floorspace - m^2	225	*	45
- ft^2	2430		484
Storeys	2	*	1
Location	1st & 2nd	*	1st
Rooms - bedrooms	4		1
bathrooms	2.5		1
kitchen	1		1
living rm	1		
dining rm	1		
family rm	1		
living/dining rm			1

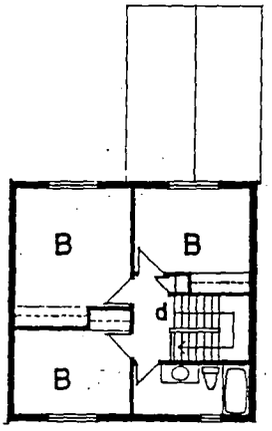
* remains unchanged

10

UNCONVERTED (a)

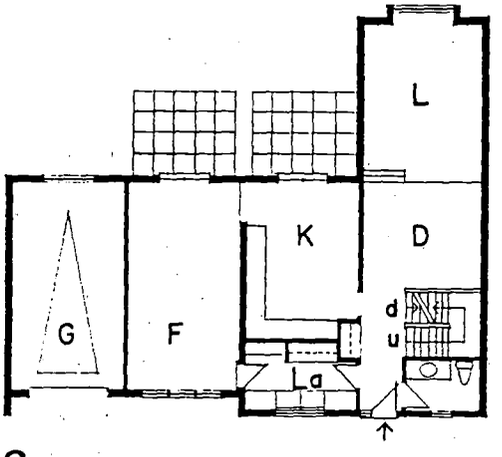


G

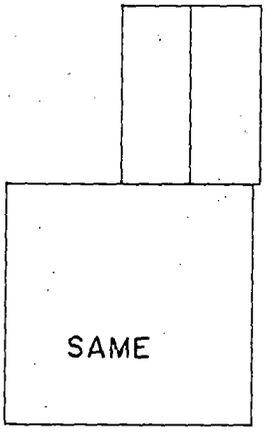


2

UNCONVERTED (b)

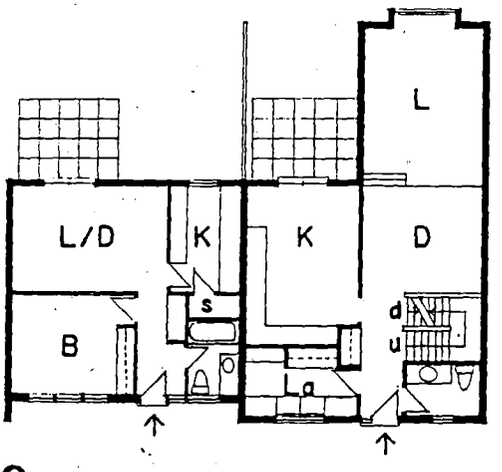


G

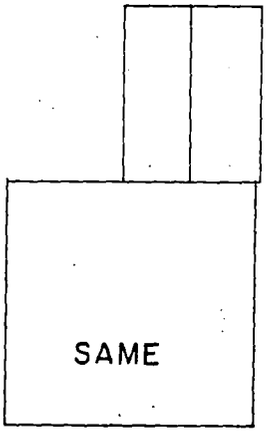


2

CONVERTED



G



2

Example 10 - "Cluster" House with Garage Unit

Description:

This example was developed to show a conventional double garage can be converted to accommodate an accessory apartment. The same scheme also has been used to illustrate another possibility: the conversion of a single garage plus associated family room.

The single family house is a modest two-storey three-bedroom unit. It should be noted that the double garage conversion is not tied to this particular house because it could undertaken in most common house types having a conventional attached double garage.

The accessory unit is a single-storey one-bedroom apartment. It has a separate entrance, and its own storage and laundry facilities.

Assessment:

Accommodating a residential unit in a double garage requires extensive improvements. These include the addition of a new kitchen and bathroom, and the provision of finished internal walls, floors and ceilings, as well as complete insulation.

The key feature needed for ready conversion is access to plumbing. For this reason, the kitchen and bathrooms are located on a plumbing wall. Also, space must be provided elsewhere for the parking, but this should readily possible considering the size of the lot.

The space available within a typical double garage is relatively small. In this particular scheme, both the living/dining room and bedroom are tight. An alternative to consider is providing a bedsit.

As noted, the primary unit in a conversion of this type should remain essentially unchanged.

One of the merits of this particular scheme is that this unit and its lot could be formally subdivided from the main house.

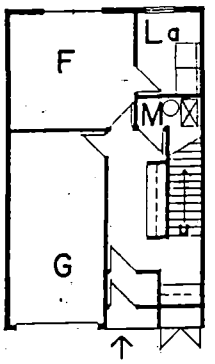
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	*	*	7.3 x 6.9
- ft			24 x 22.5
Lot Width - m			
- ft			
Gross Floorspace - m^2	*	*	50
- ft^2			540
Storeys	*	*	1
Location			1st
Rooms - bedrooms			1
bathrooms			1
kitchen			1
living/dining rm			1

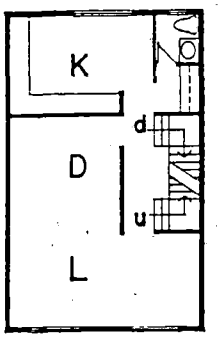
* not relevant

11

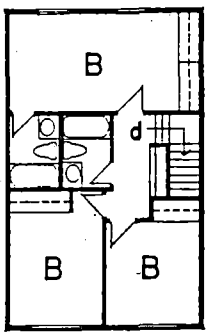
UNCONVERTED



G

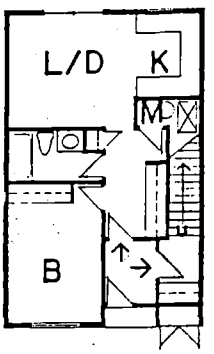


2

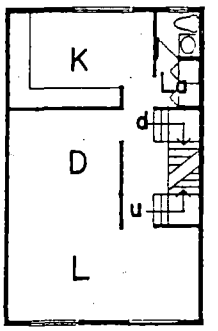


3

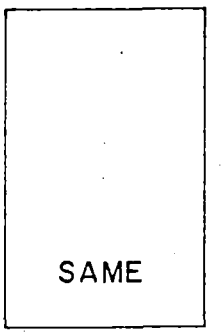
CONVERTED



G



2



3

Example 11 - Townhouse with Integral Garage Unit

Description:

This example is based upon a typical three-storey townhouse incorporating a garage on the ground floor.

As a single family house, it is three-bedroom home with the living areas on the second floor and the sleeping areas on the third. The entrance is located alongside the garage on the ground floor, along with a family room and laundry.

When converted, the primary unit retains the three bedrooms and living spaces on the upper two floors, while the one-bedroom unit is located on part of the ground floor. Both use the existing front entrance. The integral parking is lost in the conversion, and must be provided elsewhere.

Assessments:

In making the conversion, the upper floors remain essentially unchanged, except that new laundry facilities must be provided. Therefore, this unit can remain occupied through the conversion.

Extensive changes, however, are needed on the ground floor to accommodate the accessory unit. A new kitchen and bathroom must be installed. The garage must be insulated and finished, and provided with new windows. Various modifications at the entrance also must be made.

The main problem with this scheme is associated with the parking. Typically, this type of housing is built with a minimum front yard. Only one space can be physically accommodated in the driveway.

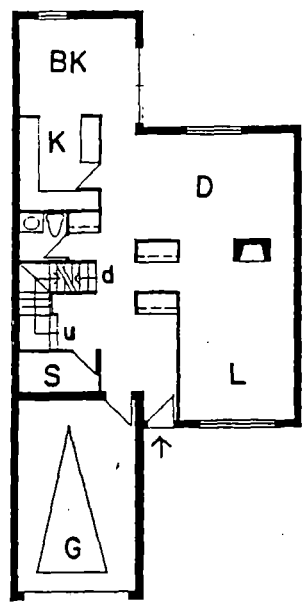
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	6.1 x 9.8	6.1 x 9.8	6.1 x 9.8
- ft	20 x 32	20 x 32	20 x 32
Lot Width - m	6.1		
- ft	20		
Gross Floorspace - m^2	160*	125	53
- ft^2	1720	1350	570
Storeys	3	3	1
Location	1st-3rd	1st-3rd	1st
Rooms - bedrooms	3	3	1
bathrooms	2.5	2.5	1
kitchen	1	1	1
living rm	1		
dining rm	1		
living/dining rm			1
family rm	1		

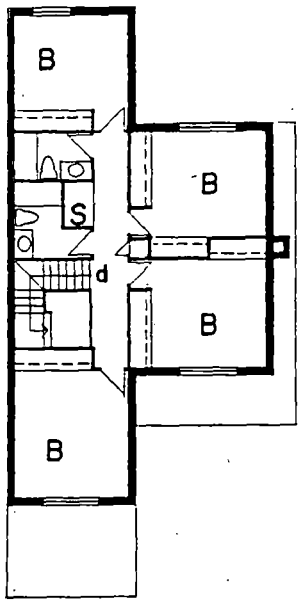
* excluding garage

12

UNCONVERTED

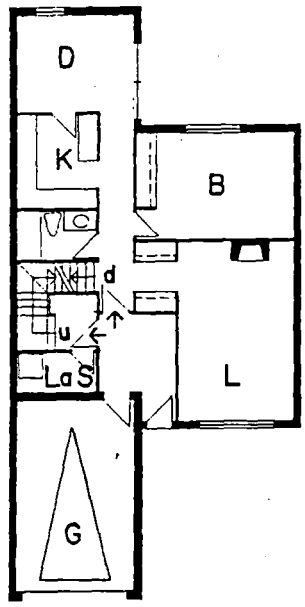


G

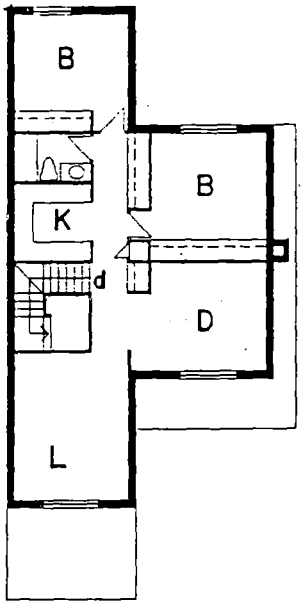


2

CONVERTED



G



2

Example 12 - "T-Shaped" House with Horizontally-Split Unit

Description:

This example is based on a fairly typical two-storey house with an attached garage. It is probably most commonly built as a detached unit, but it also could be a semi-detached house.

The single family house is a four-bedroom unit. When converted, it accommodates a one-bedroom unit on the ground floor, and a two-bedroom unit on the second floor. Only the ground floor unit has access to the basement for laundry and storage. Both units have access to the single car garage.

Assessment:

The key feature that facilitates the conversion is having the stair near the front entrance. Although probably not readily apparent, extra space has been incorporated in order to satisfy the building code.

On the ground floor, the dining room must be enclosed to create the bedroom, and the partial bathroom extended to a full one. On the upper floor, a kitchen must be provided in place of a bathroom, and some changes made to the partitions and closets. Also, the stair between the floors must be enclosed.

The changes are such that the unit probably could not be occupied while the work was undertaken.

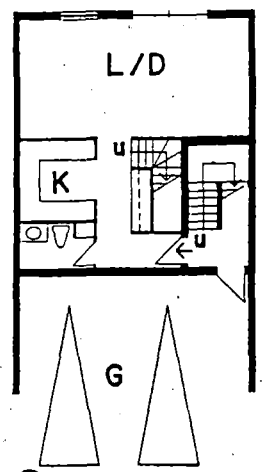
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	8.8 x 15.2	7.9 x 15.2	8.8 x 12.8
- ft	29 x 50	26 x 50	29 x 42
Lot Width - m	10.7		
- ft	35		
Gross Floorspace - m^2	180*	101.5	78.5
- ft^2	1936	1092	844
Storeys	2	1	1
Location	1st-2nd	2nd	1st
Rooms - bedrooms	4	2	1
bathrooms	2.5	1	1
kitchen	1	1	1
living rm	1	1	1
dining rm	1	1	1

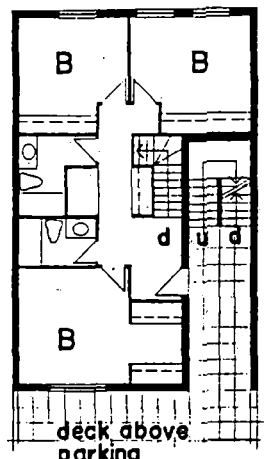
* excluding garage

13

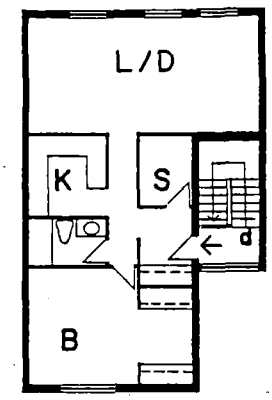
UNCONVERTED



G

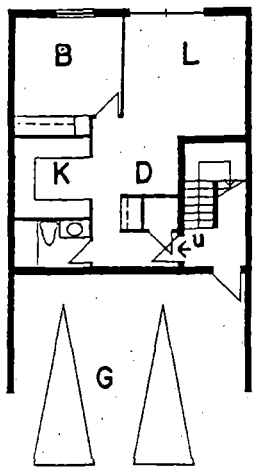


2

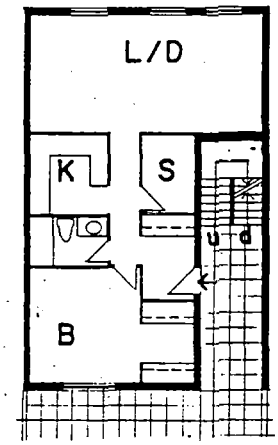


3

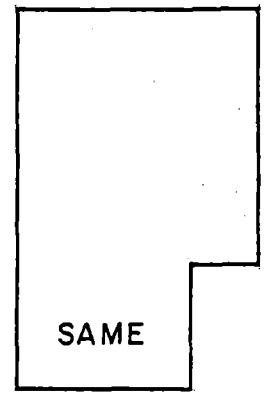
CONVERTED



G



2



3

Example 13 - Stacked Townhouse with Horizontally-Split Unit

Description:

This example is based upon a three-storey stacked townhouse. It has a one-storey one-bedroom unit sitting over a two-storey three-bedroom unit. Both units have access from the second level deck situated over the parking area, and from the covered parking area at ground level.*

The lower townhouse, as a single unit, is a three-bedroom home with the sleeping areas on the second (deck) level and living areas on the ground (parking) level. There is a private patio off the living/dining room at ground level.

When converted, the ground and second floor each accommodate a one bedroom unit. The upper storey remains the same.

Assessment:

The conversion requires the removal of the internal stair. The other major work involves extending the partial bathroom on the ground floor and adding the new kitchen on the second floor. Various changes also must be made to the partitions and closets in both units. Neither unit would be habitable during the work.

Both units, and especially the lower one, are small. Due to the tight space available, neither has its own laundry facilities and the lower one lacks storage. It is possible that in a group of these townhouses, however, these facilities could be provided elsewhere in a common location.

---

* The deck is a public area, generally serving as a central spine to two rows of townhouses. It is a necessary feature for satisfying the building code. As noted in the appendix (see Section B.5), a unit can be located one level above grade provided it has its own stair. The deck in this case is accepted as grade.

There are other types of stacked units using decked parking. These were not pursued because they did not offer any additional opportunities for convertibility.

For example, it is possible to build a two-storey unit over a another two-storey. The upper unit, however, is not convertible because there is no independent means of access to the top floor as required by the code.

Another solution is to provide an external walkway along the third floor, which satisfies the code by providing access to two separate stairs. The resulting units, however, are similar to those illustrated in examples 14A and 14B.

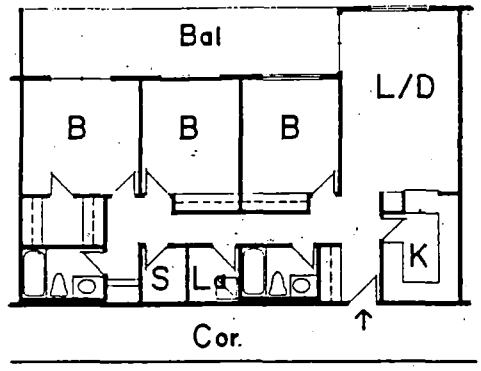
Details**:

	Combined	Primary	Accessory
Unit Width x Depth - m	7.3 x 11.6	7.3 x 11.6	7.3 x 8.1
- ft	24 x 38	24 x 38	24 x 26.5
Lot Width - m	7.3		
- ft	24		
Gross Floorspace - m^2	129*	70	59
- ft^2	1385	750	635
Storeys	2	1	1
Location	1st-2nd	2nd	1st
Rooms - bedrooms	3	2	1
bathrooms	1.5	1	1
kitchen	1	1	1
living/dining rm	1	1	1

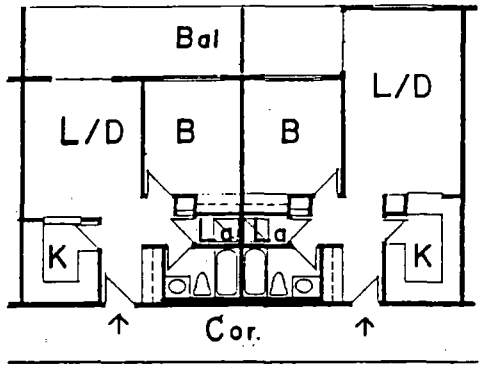
* excluding garage
** excluding top floor unit

14A

UNCONVERTED



CONVERTED



Example 14A - Single-Aspect Apartment (4 bays)

Description:

The example is based upon a conventional small single-aspect high-rise apartment unit located between two other units and served by an internal access corridor on the fourth side. This layout is very common with a number of variations. 14B shows another option.

As a single family unit, it is a three-bedroom apartment on one level. The third bedroom also can be used as a study or family room. As a converted unit, it accommodates two one-bedroom apartments.

Assessment:

The separation is made essentially by closing one doorway in the partywall.

The main cost of the conversion is associated with adding the second kitchen. Other work involves relocating the bathroom in the second apartment, providing new laundries in both, creating the new entrance doorway, altering some of the internal partitions, and adding an external partition on the balcony.

The conversion work would involve minor disturbance to the primary unit without requiring vacancy. The changes needed to the secondary unit are relevantly substantial.

The main problem associated with this conversion is the relatively small living/dining room in the second unit. Also, no bulk storage area and a small laundry room provided in both.

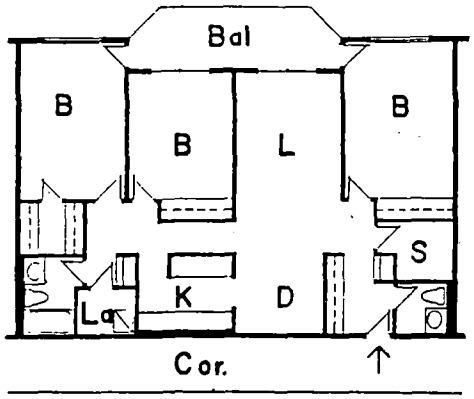
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	13.4 x 9.1	6.7 x 9.1	6.7 x7.0
- ft	44 x 30	22 x 30	22 x 23
Gross Floorspace - m^2	102	55	47
- ft^2	1100	595	505
Storeys	1	1	1
Rooms - bedrooms	2-3*	1	1
bathrooms	2	1	1
kitchen	1	1	1
living/dining rm	1	1	1
study/family rm	0-1*		

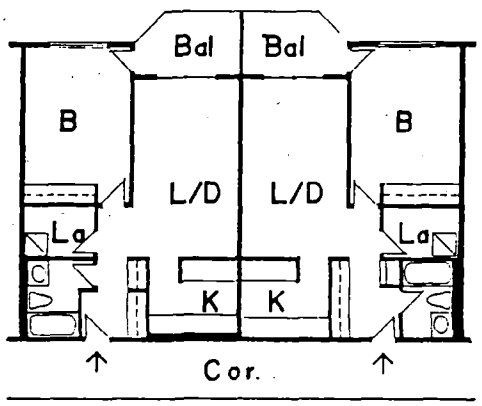
* Third bedroom is usable as study/family room.

14B

UNCONVERTED



CONVERTED



Example 14B - Single-Aspect Apartment (4 bays)

Description:

The example is based upon a conventional small single-aspect high-rise apartment unit.

As a single family unit, it is a three-bedroom apartment on one level. The third bedroom also can be used as a study or family room. As a converted unit, it accommodates two similar one-bedroom apartments.

Assessment:

The separation is made essentially by closing two doorways in the partywall.

The main cost is associated with adding the second kitchen. Other work involves providing the new laundry/storage rooms, creating the second entrance doorway, altering some of the internal partitions, and adding an external partition on the balcony.

The conversion work would involve minor disruption to both units probably requiring temporary vacancy.

The main problem with this conversion is the relatively limited bulk storage area.

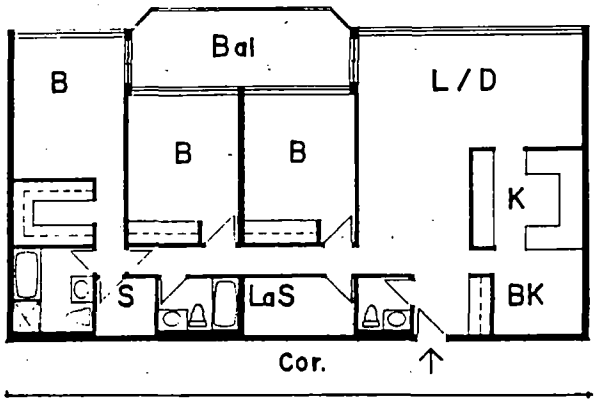
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	13.4 x 9.1	6.7 x 9.1	6.7 x9.1
- ft	44 x 30	22 x 30	22 x 30
Gross Floorspace - m^2	116	58	58
- ft^2	1250	625	625
Storeys	1	1	1
Rooms - bedrooms	2-3*	1	1
bathrooms	2	1	1
kitchen	1	1	1
living rm	1		
dining rm	1		
living/dining rm		1	1
study/family rm	0-1*		

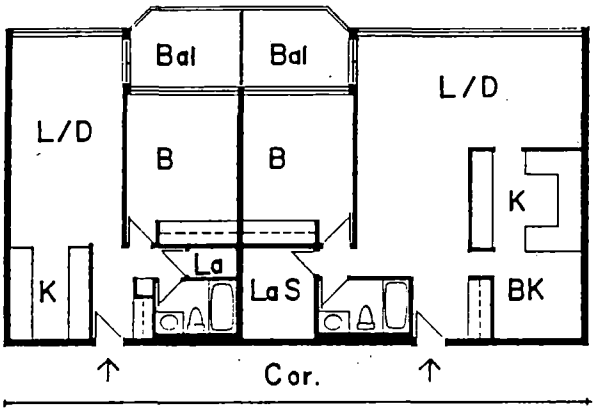
* Third bedroom is usable as study/family room.

15

UNCONVERTED



CONVERTED



Example 15 - Single-Aspect Apartment (5 bays)

Description:

The example is based upon a medium-sized conventional single-aspect high-rise apartment unit located between two other units and served by an access corridor on the fourth side. The example is similar to 14B, except that it is five bays wide rather than four. Again, this layout is very common with a large number of variations.

As a single family unit, it is a three-bedroom apartment on one level. The third bedroom also can be used as a study or family room. As a converted unit, it accommodates a two-bedroom apartment and a second one-bedroom apartment.

Assessment:

The conversion is made essentially by closing a doorway opening in the party wall. The conversion work would cause a minor disruption to the primary unit for a week or less.

The most costly change involves converting the master bathroom into a kitchen. Other changes include extending the bathroom in the primary unit, creating the new entrance doorway, providing the second laundry, modifying various internal partitions, and adding a new external partition on the balcony.

The main problem associated with this conversion is the lack of bulk storage in the second unit.

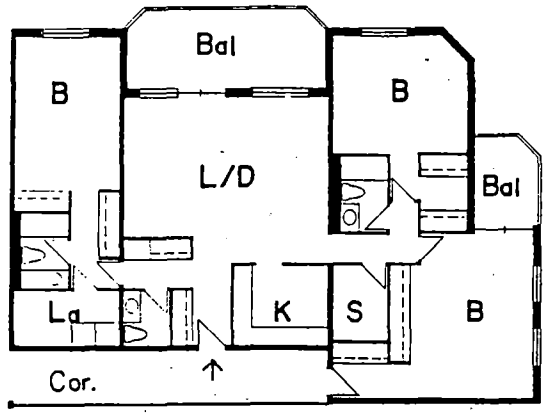
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	16.5 x 9.6	9.8 x 9.6	6.7 x 9.6
- ft	54 x 31.5	32 x 31.5	22 x 31.5
Gross Floorspace - m^2	146	94	52
- ft^2	1570	1010	560
Storeys	1	1	1
Rooms - bedrooms	2-3*	1	1
bathrooms	2.5	1	1
kitchens	1	1	1
living rm	1	1	1
dining rm	1		
living/dining rm			1
study/family rm	0-1*		

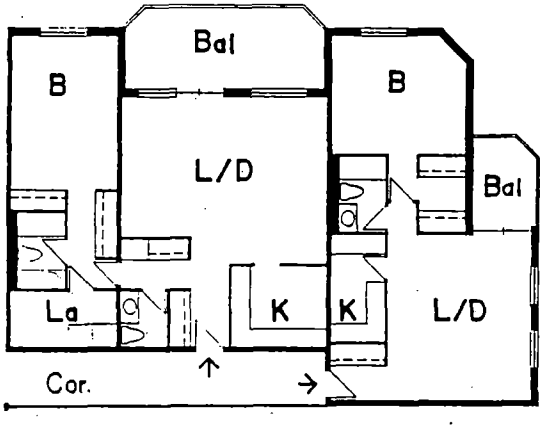
* Third bedroom is usable as study/family room.

16

UNCONVERTED



CONVERTED



Example 16 - Double-Aspect Apartment

Description:

The example is based upon a conventional double-aspect (or corner) high-rise apartment unit. It is located at the end of the access corridor at the corner of the building. This type of unit is less common than the single-aspect examples, but variations are now built -- including ones with a second entrance.

As a single family unit, it is a three-bedroom apartment on one level. It has a second outside door leading to one of the bedrooms, making it suitable for use as a family room, office or an "au paire" suite. A private bathroom could be provided for the office/"au paire" suite in the storage room.

As a converted unit, it accommodates two one-bedroom units.

Assessment:

The separation is made essentially by closing a doorway in the partywall. The main cost is associated with adding the second kitchen.

The conversion work could be undertaken with only only minor disturbance to the primary unit without requiring vacancy.

The main problem with this example is relatively limited space available for the living/dining room in the second unit. This could be overcome only by redesigning the original unit and making the bedroom excessively large.

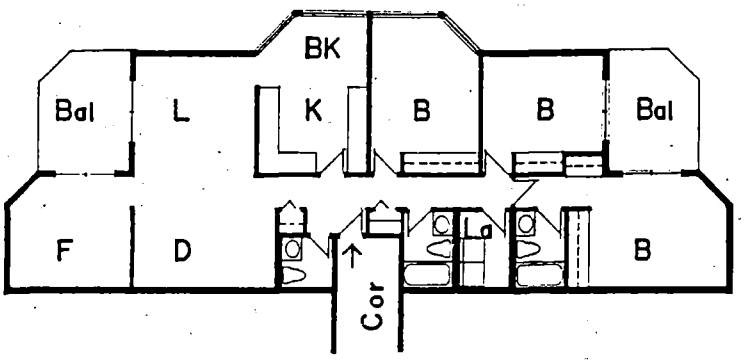
Details:

	Combined	Primary	Accessory
Unit Width x Depth - m	16.1 x 11.4	9.7 x 9.9	6.4 x 11.4
- ft	53 x 37.5	32 x 32.5	21 x 37.5
Gross Floorspace - m^2	146	85	61
- ft^2	1573	920	653
Storeys	1	1	1
Rooms - bedrooms	2-3*	1	1
bathrooms	2.5	1.5	1
kitchen	1	1	1
living/dining rm	1	1	1
study/family rm	0-1*		

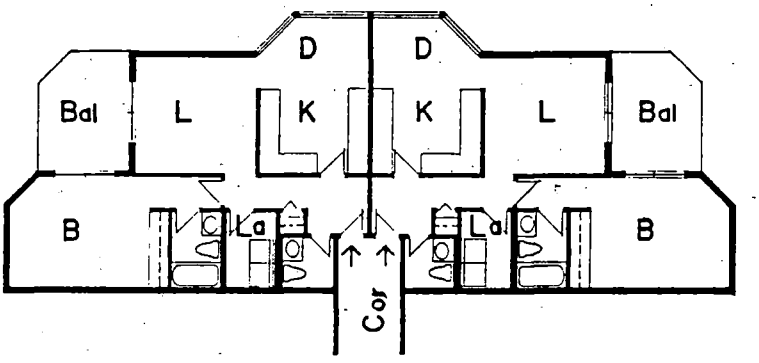
* Third bedroom is usable as den/family room.

17

UNCONVERTED



CONVERTED



4.0 ANALYSIS OF CONVERSION COSTS

Estimates have been prepared for the construction costs associated with each of twelve selected design schemes. These estimates cover the following:

1) Conversion Costs: the cost of converting the single unit into two units.
2) Front-end Costs: the cost of the additional features that must be incorporated in the original construction to allow for the conversion.
3) Deconversion Costs: the cost of deconverting the two units into a single unit.

This section reviews the main findings resulting from this cost analysis. The basis for these estimates are presented in Appendix E.

The results are considered to provide reasonable estimates of the costs associated with conversion. Nevertheless, it should be noted that renovations are difficult to cost for at least two main reasons: the jobs are small with many trades, and they typically involve unexpected problems. Therefore, if these plans were submitted to a number of contractors and estimators, a wide variation could be expected in the results.

These cost estimates are consistent with the schematic nature of the drawings. They do not necessarily reflect the detailed design concerns previously noted (see Section 3.5). To produce more definitive costs will require the preparation of full working drawings for the schemes.

For the conversion cost estimates, 12 schemes were selected out of the original 22 made-to-convert examples designed for this study (see Section 3.0). These twelve were selected to

Table 4.1.1: COST SUMMARY

	Conversion Costs: Total ($)	Gr$_2$Area (m^2)	Cost/Area ($/$m^2$)	Front-End Costs ($)	Deconversion Costs ($)
3	15100	74	204	1600	750
4	10300	58.5	176	1450	
5a	10250	85	121	750	2500
5b	20800	85	245	1200	2500
7	11200	84	133	1850	1500
8a	21600	67	322	1600	2500
8b	18650	67	278	1600	750
9	16450	45	365	650	2000
11	14750	53	278	550	1750
14B	11450	58	197		2500
15	11000	52	212		7250
16	5200	61	60		1500

illustrate a variety of house types. An attempt was made specifically to include housing units suitable for different locations (i.e., downtown vs. suburban) and market groups (i.e., first-time buyers and retirement couples), and to include accessory apartments of different sizes and positions in the house.

4.1 Conversion Costs

The conversion costs, as noted, cover the costs of converting the single unit into two self-contained units.

4.1.1 Overall Costs

The conversion costs range from $5,200 up to $20,800 (see Table 4.1.1), while averaging $13,900. When expressed on an area basis, the costs range from $60 to $365/m2 ($6-34/ft2), with an average of $215/m2 ($20/ft2).

The twelve schemes can be divided broadly into these four groups:

- The multi-storey apartments (examples 14B, 15 and 16) are the least costly conversions at $5,200 to $11,450. The area costs are $86 to $212/m2.

- Those involving the conversion of unfinished basement space (examples 5b, 8a and 8b) are the most costly schemes at $18,650 to $21,600. The area costs here are $245 to $322/m2.

- Those involving essentially finished space (examples 3, 4, 5a, and 7) fall into the intermediate group with costs of $10,250 to $15,050. The area costs are $121 to $204/m2.

- The conversion of the double garage (example 9) cost $16,450, or $365/m2.

Table 4.1.2: COST BREAKDOWN FOR CONVERSION COSTS

	Kit-chen	Bath-room	Laun-dry	Inter nal walls	Exter nal walls	Clo-sets	Doors	Win-dows	Floor ing	Paint ing	Elec-trics	Other	Tota
3	3500	3500	1100	650	2200	500	1050		950	850	750	50	151
4	3950			1950		1300	1550			1000	550		1030
5a	4450		1100	850		500	400		850	1400	450	250	102
5b	2900	3600	1100	1200	3800	2000	750	600	2350	1000	1150	350	2080
7	4200			1400			1000			1000	500	3100	1120
8a	4100	3500	1100	1900	2900	2000	2050		1600	1600	650	200	216
8b	4200	3500	1250	1600	2900	1500	750		950	800	1200	250	1865
9	3200	3500		1300	1600	1050	650	1200	2300	500	1050	1400	164
11	3800	3500	250	750	900	800	1100	600	1300	700	800	250	1475
14B	3600	800	1100	1200		900	850		650	700	550	1100	114
15	3550	450	1200	850		950	950		350	700	700	1300	111
16	3600			200			100		300	500	400	100	520

4.1.2 Cost Breakdown

Although the units were designed to require a minimum physical change, there appears to be certain types of work involved in all or most conversions (see Table 4.1.2). For example, all of the conversions require new kitchens, repainting, and changes to the electrical system, internal partitions and doors.

A list of the major changes, together with the number of schemes affected and the cost of the changes, follows:

- kitchens (12 of the schemes): $2,900-4,450,
- painting (12): $500-1,600,
- electrical system (12): $400-1,200,
- internal partitions (12): $200-1,950,
- doors (12): $100-2,050,
- closets (10): $500-2,000,
- flooring (10): $300-2,350,
- bathrooms (8): $450-3,600,
- laundries (7): $1,100-1,250,
- external walls (6): $900-3,800,
- windows (3): $600-1,200

The most expensive improvements are the kitchen and bathrooms. The new kitchens are estimated to cost $2,900-4,450. The variation depends largely upon the length of the kitchen cabinets required, with some allowance included for the differences in plumbing. The cost of the appliances and fixtures was set at a standard $1,500. As noted, all of the conversions require the addition of a new kitchen.

A standard cost of $3,500 has been used for a basic new bathroom, including plumbing, fixtures, and finishing. Six of the accessory units require the installation of a new bathroom. Two others involve adaptations to existing ones, while the remainder incorporate existing facilities.

The provision of a laundry is considered a minimum desirable standard for these units. Seven of units are supplied with separate laundries, with a base cost of $1000 for the appliances and $100-250 for plumbing. Two others share laundry facilities, while the remaining three are too small to readily accommodate the facilities.

The electrics category includes space heating as well as the basic electrical system.

The "other" category covers a range of miscellaneous changes. Most of this is for removals. Major one-of-a-kind items (like a new stairway for example 7) also are included.

The improvements to the fire and sound separation have been included as a front-end cost (see Section 4.1.5). All nine of the ground-related houses are affected, but none of the multi-storey apartments.

4.1.3 Unit Differences

Some of the variation in the conversion costs can be explained by certain basic differences in the units.

The type of provision available before conversion has a major impact upon the cost. To be specific, some of the conversions are less expensive because they utilize an existing bathroom (saving an estimated $3,500) and/or share or utilize an existing laundry (saving $1,000 or more).

Also, the type of space used also affects the cost. Apartments in basements and garages are more costly because of the need to finish the floors, walls and ceilings. This adds $800-4,500 to the six schemes of this type, or an average of $2,650.

Finally, the size of the unit also has an effect. The multi-storey apartment units have a similar cost on an area basis to many of those in conventional houses, but overall they are less expensive because they are smaller in size. Similarly, although it has the highest cost per area, the overall cost of the garage conversion is relatively favourable because of it is the smallest unit in the sample.

4.1.4 Minimum Costs

The minimum anticipated cost for creating an accessory unit is difficult to specify. This sample of schemes is limited, and the factors affecting the cost are relatively numerous. Nevertheless, it useful to know this type of figure as a starting point for budgeting. While some schemes could be capable of beating these costs (and others could be much higher), realistic minimums can be approximated as initial guidelines for these main types of units:

- one-bedroom unit in finished space and needing new bathroom - $15,000
- one-bedroom unit in finished space and not needing new bathroom - $10,500
- bachelor unit in unfinished space and needing new bathroom - $16,500

The figures for finished space are applicable to accessory units in conventional houses as well as multi-storey apartments. The unfinished space generally refers to both basements and garages.

4.1.5 "Trade-Off" Costs

In general, the required changes can be made at the time of conversion without cost penalty. In other words, there are no

Table 4.1.5: COST COMPARISON FOR SOUND & FIRE IMPROVEMENTS

	Area (m^2)	Conversion Cost ($)*	Front-End Cost ($)**
3	65	1650	600
4	156	3950	1450
5a	83	2100	750
5b	74	1900	700
7	93	2350	850
8a	160	1700	600
8b	67	1700	600
9	14	350	150
11	58	1450	550

* Cost of making the required fire and sound improvements at the time of conversion. It is based upon $\$21.25/m^2$ for additional gypsum board on resilient channels plus $3.75 for re-painting.

** Cost of incorporating the required standards at the time of construction. It is based upon $\$25.25/m^2$ for the fire-rated gypsum board on resilient channels with mineral fibre less the $16.15 for the conventional gypsum board.

savings for building them into the unit at the time of construction. The single notable exception concerns the additional fire and sound separation needed between self-contained units.

The National and Ontario Building Codes set minimum standards for sound transmission and fire spread through the walls and floors separating self-contained units. These standards are not met by conventional building construction in single family homes. Therefore, the standards must be upgraded either at the time of construction or conversion (see Appendix B).

The walls and ceilings of single family homes are conventionally covered by 12.7 mm (1/2") gypsum board. In new construction, the fire and sound standards can be met by replacing this with 15.9 mm (5/8") fire-rated gypsum board, and mounting the board on resilient channels and adding 76 mm (3") of mineral fibre in the cavity. For retrofit improvements, the standards apparently can be achieved most readily by adding another layer of 12.7 mm gypsum board on resilient channels over the existing board.

The subsequent installation of additional gypsum board will be costly as well as disruptive. The estimated retrofit cost for this work along with painting ranges from $350 to $3,950 for the various schemes, while averaging $1,900 (see Table 4.1.5). For reasons of simplicity, these costs exclude the repainting the abutting walls or ceilings. Also overlooked is the possible additional work associated with adjusting trim, molding and electrical fixtures. All of these will add to the expense of retrofitting.

The additional cost of building in the necessary provision at the outset is about $150-1,450 for these schemes. The average cost of $700 is 37% of doing it later.

The question raised here is whether these improvements should be built into the units at the outset or added later when needed. Considering the additional cost and substantial disturbance of doing it later, it is considered likely the necessary improvements should be built into the units. This approach would be consistent with the concept of making these units readily convertible.

4.2 Deconversion Costs

The deconversion costs are for the costs of deconverting the two units into a single-occupancy dwelling. In comparison with the conversion costs, these are relatively small. These range from no cost to a high of $7,250, with $2,000-2,500 being the predominant range (see Table 4.1.1). The single high figure involves adding a new bathroom to replace a kitchen. The no-cost conversion involves only removing a door.

The main reason for the deconversions being less expensive is that they generally do not involve the addition of expensive facilities and features, particularly kitchens and bathrooms. In general, the changes require removing redundant kitchens, refinishing the associated floors, re-arranging entrance doors and vestibules, and making openings in party walls.

The deconversion costs, it should be noted, do not provide for the full re-instatement to a totally unconverted condition. In general, redundant features and facilities have been left unless the space was needed for another use. For example, and this is most extreme case, an extra kitchen in the basement was left on the assumption that it could be used for storage and/or bar associated with a recreation room.

Also, the deconversions cost do not account for the potential resale value of the removed facilities. The redundant kitchen cabinets and the kitchen, bathroom and laundry appliances all will have some value after removal.

4.3 Front-End Costs

The front-end costs identify the costs of the additional features and facilities that must be built into these schemes to make them readily convertible. The estimates for these range from 0 to $1,850 (see Section 4.1.1). The improvements for the higher sound and fire standards, which add $150-1,450 to the conventional houses, represent the largest part of this figure (see Section & Table 4.1.5). The other additional costs are for features like larger or extra windows (examples 3, 8a and 8b), wider stairs (3), additional doorways (5b) and a skylight (7).

Based upon this analysis, given judicious design, the additional features and facilities that must be incorporated into these units at the outset appears to be limited. Therefore, it appears that the additional front-end costs are nominal.

5.0 ANALYSIS OF ECONOMIC IMPACT

This section assesses the economic viability of the made-to-convert housing. It looks particularly at two important aspects: the affordability of these housing units, and the recoverability of the conversion and operating costs of the accessory apartments from the generated rent.

The analysis utilizes seven of the twelve made-to-convert schemes used in the conversion cost analysis. The selected designs depict an array of types appropriate to various locations. The overall intention was to test a number of different solutions appealing to a range of buyers and renters.

The analysis is based upon the Toronto housing market, using current house prices, market rents, construction costs and household profiles (see Appendix for the working assumptions).

Most of these schemes could be built in many locations and in different configurations (i.e., detached, semi-detached or attached). Both of these affect the economics. For this analysis, the schemes were tested for the following specific but representative locations and configurations:

3 Townhouse with a one bedroom basement conversion in an suburban area (Scarborough);
4 Detached house with one bedroom with back-split conversion in suburban area (North York);
7 Semi-detached house with one bedroom vertical-split conversion outside downtown area (City of Toronto);
8a Detached house with bedsit second floor conversion in downtown area (City of Toronto);
9a Detached wide-front house with one bedroom garage conversion in suburban area (Markham);
14b Single-aspect apartment with one bedroom conversion outside downtown area (City of Toronto);
16 Double-aspect apartment with one bedroom conversion outside downtown area (City of Toronto).

5.1 The Economics of Conversion

The economic analysis is presented in detail in Tables 5.1 - 5.5. The associated text highlights the main features and findings.

Table 5.1 shows the estimated purchase price and carrying costs associated with each of the seven schemes as unconverted houses. In the Metropolitan Toronto market, the house prices vary from $115,000 for the townhouse example (#3) in a suburban location to $170,000 for the vertical-split (#7) closer to the city centre. While these costs were somewhat higher than originally expected, this can be attributed to the greater floorspace required to accommodate both the primary and accessory units.

Table 5.1: House Prices and Carrying Costs

Scheme	House Price ($)	Mortgage Principal ($)*	Monthly Carrying Costs: ($) Mort-gage**	Tax	Main-ten-ance***	Total
3	115,000	86,250	900	115	135	1150
4	125,000	93,750	980	135	140	1255
7	170,000	127,500	1340	165	160	1665
8a	155,000	116,250	1220	180	165	1565
9a	165,000	123,750	1300	215	170	1685
14B	120,000	90,000	945	150	250	1345
16	160,000	120,000	1260	175	300	1735

* assumes 25% downpayment
** assumes 12% interest amortized over a 25 year period
*** includes hydro and water charges plus condominium fees where appropriate.

Table 5.2 presents the costs and revenues associated with the accessory apartments. In particular, the table shows how the estimated market rents compare with the total monthly carrying costs, which include the utility and property taxes plus the amortized cost of conversion. Three different loan periods (3, 5 and 25 years) are used in determining the amortized conversion costs.

As can be seen, the cost of converting and operating an accessory apartment in all of the schemes is fully recoverable with long-term financing. The net monthly rental income from the accessory unit ranges from $110 up to $470 in this case. Most of the schemes also have a favourable return for the shorter loans, but some would produce net losses to the homeowner.

Table 5.2: Apartment Costs and Revenues

Scheme	Conversion Cost ($)	Monthly Carrying Costs ($): Amortized Conversion Costs			Utilities & Taxes	Market Rent ($)	Net Monthly Revenue ($)		
		A	B	C			A	B	C
3	15,100	160	335	500	125	600	315	140	-25
4	10,300	105	230	340	115	550	330	205	95
7	11,200	115	250	370	150	700	470	335	215
8a	21,600	225	480	715	115	500	160	-95	-330
9a	16,450	175	370	550	90	375	110	-85	-265
14B	11,450	120	250	380	175	600	305	175	45
16	5,200	55	115	170	185	650	410	350	295

A - amortized at 12% over 25 years.
B - amortized at 12% over 5 years.
C - amortized at 12% over 3 years.

Table 5.3 shows the impact of conversion on homeownership costs for the new house buyer taking out a full mortgage. (The reason for focussing on this group, and the mature homeowner in the next table, is presented in Section 5.2.) It shows particularly how the net monthly income from the accessory apartment reduces the carrying costs of the house after conversion. For example, with a long-term loan, a new homeowner could realize a reduction of 7 to 28% in the carrying costs of the overall house. With a 3-year loan, the rental income reduces the carrying costs in four of the seven examples by 1 to 17%, but increases it in the other three by 2 to 21%.

The net revenue figures presented in this section do not allow for the impact on income tax in order to faciltate comparison (see Section 5.3.1).

Table 5.3: Impact of Conversion on Homeownership Costs: New Homeowner with Full Mortgage

Scheme	Total* Monthly Carrying Costs ($)	Net Monthly** Rental Income from Apt ($):			Net Monthly Carrying Cost with Apt:			Change in Carrying Costs (%):		
		A	B	C	A	B	C	A	B	C
3	1150	315	140	-25	835	1010	1175	-27	-12	2
4	1255	330	205	95	925	1050	1160	-26	-16	-8
7	1665	470	335	215	1195	1330	1450	-28	-20	-13
8a	1565	160	-95	-330	1405	1660	1895	-10	6	21
9	1685	110	-85	-265	1575	1770	1950	-7	5	16
14B	1345	305	175	45	1040	1170	1300	-23	-13	-1
16	1735	410	350	295	1325	1385	1440	-24	-20	-17

* taken from Table 5.1
** taken from Table 5.2

Table 5.4 similarly demonstrates the potential reduction in house carrying costs through conversion available to a mature homeowner without a mortgage. With a long-term amortization period for the conversion costs, a mature homeowner could live cost-free with the net rent obtainable in three of the examples. The other four produce reductions in the carrying costs of 29 to 86%. With a three-year loan, five of the schemes reduce the carrying costs 10 to 66%, while two increase them by 69 to 86%.

Table 5.4: Impact of Conversion on Homeownership Costs: Mature Homeowner with No Mortgage

Scheme	Total* Monthly Carrying Costs ($)	Net Monthly** Rental Income from Apt ($):			Net Monthly Carrying Cost with Apt:			Change (%)		
		A	B	C	A	B	C	A	B	C
3	250	315	140	-25	0	110	275	-126	-56	-10
4	275	330	205	95	0	70	180	-120	-75	-35
7	325	470	335	215	0	0	90	-145	-103	-66
8a	345	160	-95	-330	185	440	675	-46	25	86
9	385	110	-85	-265	275	470	650	-29	22	69
14B	400	305	175	45	95	225	355	-76	-37	-11
16	475	410	350	295	65	125	180	-86	-74	-62

* taken from Table 5.1
** taken from Table 5.2

Table 5.5 shows the financial impact of the net rental revenue from the accessory apartment on the qualifying income required to purchase and maintain each of the made-to-convert dwellings. The qualifying income assumes that no more than 30% of the gross income is spent to purchase and maintain the house. As shown, the annual household income needed to purchase the respective made-to-convert examples before conversion ranges from $46,000 to $69,400. Allowing for the net rental income for the accessory unit, the corresponding incomes range from $33,400 to $63,000. Conversion can assist is reducing qualifying incomes by 6 to 28%, or for an overall average of 20%.

In summary, the results of the economic analysis point favourably to the overall financial feasibility and attractiveness of made-to-convert housing. Based on the amortized cost of conversion for the seven unit examples, it is

Table 5.5: Impact of Conversion on Housing Affordability

Scheme	Total Monthly Carrying Costs ($):		Qualifying Income ($):		
	Before*	After**	Before	After	Change (%)
3	1,150	835	46,000	33,400	-25
4	1,255	925	50,000	37,000	-26
7	1,665	1,195	66,500	47,800	-28
8a	1,565	1,405	62,500	56,200	-10
9a	1,685	1,575	67,000	63,000	- 6
14B	1,345	1,040	53,800	41,600	-23
16	1,735	1,325	69,400	53,000	-24

* taken from Table 5.1

** Based on reduction in carrying costs to homeowner from net rental revenue accruing from the lease of the accessory apartment (assuming a long-term amortization period as shown on Table 5.3)

possible not only to recover the cost of the conversion but also to generate sufficient revenues from the the accessory apartment to offset all or some of the carrying costs of the primary umit.

5.2 Affordability in the Target Markets

At present, the predominance of housing is designed for family households at their peak size. This housing is typically too large and/or expensive for households at the initial and later stages of the family life cycle.

Made-to-convert housing can satisfy the different and changing spatial and financial requirements of both the young and mature households. When unconverted, it can serve as family housing. When converted, the surplus space can used to generate extra income to offset the overall shelter costs.

The marketing of new made-to-convert units, it has been assumed, will focus on these two household groups: namely, the first-time buyers with no or young children, and the mature families with the children about to leave home. As a further test of the economic implications of made-to-convert housing, the ensuing analysis looks at the affordability of these units for these two specific groups.

5.2.1 First-Time Buyers

First-time home buyers are typically younger in age, with minimal space needs in the short term but seeking suitable homes for eventually raising children. Generally lacking capital, their main obstacle to homeownership is finding the money required to purchase and maintain a dwelling.

Income data is not available for first-time buyers. Table 5.6 presents an estimate of the current income breakdown of all households in Toronto. Using this data, Table 5.7 presents the percentage of Toronto households with the qualifying incomes needed to purchase and maintain each of the examples.

Table 5.6: Household Income Breakdown for City of Toronto (1986)

Income Category ($)	Percentage of Households (%)
under 6,500	8.4
6,500 - 12,999	14.3
13,000 - 19,499	14.2
19,500 - 25,999	13.4
26,000 - 32,499	11.8
32,500 - 38,999	9.1
39,000 - 51,999	12.4
over 52,000	16.4

Note: The 1986 household incomes were calculated by applying the Consumer Price Index to 1981 Stats Canada Census Data

This data indicates that 10 to 22% of all households in Toronto could afford to purchase and maintain the made-to-convert schemes. The most affordable units are the townhouse example (#3) with 22% and the back-split (#4) with 18%. Both of these designs are particularly suited as "starter" homes due to their size as well as cost. Conversely, only 11% could the larger and more "suburban-style" wide-front example (9a).

Table 5.7: Impact of Conversion on Affordability for the First-Time Buyer

Scheme	Qualifying Income: ($)		Affordability: (%)		
	Before	After	Before	After	Increase
3	46,000	33,400	22	37	68
4	50,000	37,000	18	30	67
7	66,500	47,800	11	19	73
8a	62,500	56,200	13	15	15
9a	67,000	63,000	11	13	18
14b	53,800	41,600	16	27	69
16	69,400	53,000	10	16	60

The additional income generated by the rental unit substantially increases the proportion of qualifying buyers. In the case of the townhouse, for example, the proportion of qualifying households increases from 22 to 37% when the additional rental income is included. This represents a 68% increase in affordability. Overall, the affordability increases from 15 to 73% across the various schemes.

First-time homebuyers generally have incomes somewhat below average. Therefore, the initial affordability within this market group will also be lower than these figures. Nevertheless, by the same token, the additional revenue generated by the accessory units will have a more dramatic effect in increasing their affordability.

5.2.2 Mature Homeowners

Mature homeowners -- particularly those in the 50-60 age bracket -- face a different set of housing concerns. Typically, as their children leave home, they may find themselves with considerable unused living space. Also, as they near retirement, they may need to prepare for living on a reduced income.

Many couples faced with these prospects may wish to plan ahead for when their space needs and household finances are reduced. Made-to-convert housing could be an attractive possibility, as it could serve to accommodate their present space needs, and yet be converted in the future to help generate additional income.

Unlike the first-time buyers, capital typically will not be the primary concern of this market group because the equity developed from their previous residences can be used to purchase the made-to-convert dwelling. Rather, day-to-day household expenses (like utilities and taxes) will often prove significant to a retired couple living on a fixed pension income.

Table 5.8 indicates the impact of conversion for such a mature homeowner. It assumes that this homeowner has sufficient capital to purchase the house outright but uses a five-year loan to pay off the conversion costs. With one example (#7), it is possible for the homeowner to live virtually cost-free because the net rent will cover all shelter costs even with a five year loan. The others indicate that the homeowner could expect to reduce homeownership costs to 6 to 39% of the average pension income.

Table 5.8: Impact of Conversion on Affordability on the Mature Homeowner

Scheme	Total Monthly Homeownership Cost* ($)	Net Monthly Apartment Revenue** ($)	Net Monthly Homeownership Cost ($)	Percentage of Pension Income*** (%)
3	250	140	110	9
4	275	205	70	6
7	325	335	-	0
8a	345	-95	440	37
9	385	-85	470	39
14b	400	175	225	16
16	475	350	125	10

* Total costs includes monthly property tax and utility charges (see Table 5.1).

** Net revenue equals market rent less operating expenses (see Table 5.2).

*** Pension income is based upon the monthly pension ($1,200) for a retired couple. It includes the Basic Old Age Pension, the Federal Supplement and Provincial Gains "A" Supplement for July 1986.

5.3 Other Economic Considerations

5.3.1 Income Tax

The net rental income (i.e., revenues less expenses) from any accessory apartment will be subject to personal income tax. Thus, depending on the household's tax bracket, the financial benefit of conversion will be reduced to some extent.

Table 5.9 shows the impact of personal taxes on the net revenue, using the back-split example (#4) and an assumed household income of $50,000 income. It shows that when taxes are taken into account the net monthly rental income drops by 9, 23 and 23% for the three respective loan periods.

Table 5.9: Impact of Income Tax on Revenue

	Monthly Costs ($) for Three Loan Periods: A	B	C
Conversion Costs (see Table 5.2)	-105	-230	-340
Utilities and Taxes (")	-115	-115	-115
Total Carrying Costs	-220	-345	-455
Rental Revenue (see Table 5.2)	550	550	550
Net Revenue before Taxes	330	205	95
Tax Deductions for Maintenance*	-70	-70	-70
Net Taxable Income	260	135	25
Additional Income Tax**	-91	-47	-9
Net Revenue after Taxes	239	158	86
Change in Net Revenue	26%	23%	9%

* based upon 50% of maintenance costs of $140.
** based upon a marginal tax rate of 35%.

Table 5.10: Impact of Income Tax on Affordability

	Costs ($) for Three Loan Periods: A	B	C
Total Monthly Carrying Cost			
- unconverted	1,255	1,255	1,255
- converted: before taxes	925	1,050	1,160
after taxes	1,016	1,097	1,169
Qualifying Income			
- unconverted	50,000	50,000	50,000
- converted: before taxes	37,000	42,000	46,400
after taxes	40,640	43,880	46,760
Change in Affordability*			
before taxes	26%	16%	7%
after taxes	19%	12%	6%

* compared with proportion of households that can afford the unconverted unit.

Table 5.10 shows the corresponding impact upon the qualifying income needed to purchase this unit. As indicated, the loss of net revenue reduces the affordability marginally by 1-7% for the three periods.

5.3.2 Resale value

Adding an accessory apartment into a house can be expected to affect the resale value of the property. It is most likely that the resale value will be enhanced, given the income-earning potential and the additional space and flexibility of the dwelling.

In order to assess this impact, comparative data is need on the sales price of converted and non-converted dwellings in similar locations. This data is not available, and such work is beyond the scope and budget of this particular study.

5.4 Case Study Analysis

The economic analysis for each of the seven schemes is reviewed individually in this section. Also included are comments on other relevant aspects, such as design and marketability.

5.4.1 Example 3 - Townhouse

The townhouse is modestly sized (148 m^2) three-bedroom single family house. Located in a built-up urban community like Scarborough, it is expected to sell for $115,000. When converted, it can accommodate a large (74 m^2) one-bedroom apartment in the basement.

A basement conversion like this has a number of merits. The conversion can be completed without reducing the living space of the primary unit. For this reason, it can be completed with virtually no disruption to the occupants of the primary unit. Also, it can be readily converted back when needed by a single family.

The conversion costs are relatively high ($15,100). This is due to the extensive work needed to make the basement habitable and add another bathroom and a second kitchen in the basement.

From an economic perspective, this conversion should represent an attractive financial option for the homeowner. In the assumed location, $600/month could be generated from this accessory unit. This rental revenue is sufficient not only to cover all conversion costs, but also help offset the carrying costs of the primary unit. For example, with long-term financing, the revenue could reduce the housing costs for a new homeowner by 27%. For the mature homeowner with no outstanding mortgage, it could completely offset all housing costs, thereby allowing the homeowner to live cost-free.

As a whole, this unit represents a good made-to-convert scheme. The conversion can be readily completed. Despite conversion costs somewhat higher than the others, the economics are favourable. Because of its modest size and price, it is well-suited as either a starter or retirement home.

5.4.2 Example 4 - Back-Split House

As a single family house, this dwelling is a modest (139 m2) back-split with three bedrooms. Its purchase price when built as a detached unit in North York is estimated at $125,000.

The unit has been designed to accommodate a compact (59 m2) one-bedroom accessory apartment on the lower rear level. It utilizes a recreation/family room and associated bathroom and storage room. The layout allows for shared access to laundry and parking facilities.

The conversion is expected to cost $10,000. It can be made without reducing or disrupting the living space of the primary unit. It creates additional functional and usable living space that can be readily utilized by the homeowner if space needs increase.

Conversion should be financially attractive to the homeowner. The potential rent that could be generated from the accessory apartment is $550. Given the relatively moderate conversion cost, the resulting revenue with long-term financing could cover all conversion costs and reduce a new homeowner's shelter costs by 26%, and enable a mature homeowner with no outstanding mortgage to live cost-free.

As a whole, the back-split design represents a feasible and attractive package from both a design and economic perspective. It is a well-suited as either a starter or retirement home.

5.4.3 Example 7 - Vertical-Split House

This two-storey three-bedroom unit is one of the larger made-to-convert examples (170 m2). As a semi-detached located in a residential area within the City of Toronto, the house price is $170,000.

It represents a somewhat innovative design approach because when converted it is divided into two two-storey vertically separated units: a 86 m2 two-bedroom primary unit and a 84 m2 one-bedroom accessory apartment.

Vertical separation can produce several benefits. First, it can create better acoustic privacy than horizontal conversions. Second, it can provide both units with direct access to grade, and to shared laundry, storage and parking facilities in the basement. Although conversion would cause some disruption to the primary unit, the work could be undertaken without requiring vacancy.

Conversion should represent an attractive financial option to the homeowner. The conversion costs of this unit ($11,200) are relatively modest in comparison to the other designs. Given the potential rent ($700) that could be generated from the large apartment, a homeowner with a 25-year amortization period for the conversion costs could reduce shelter cost by 26%, and the mature homeowner could live cost-free.

Overall, this design is a good example of a functional and viable made-to-convert unit. It should appeal to both market groups. Its major drawback for the young-first time buyer is the relatively high cost, but this is a result of the assumed location. The high rent in part serves to mitigate this.

5.4.4 Example 8a - Basic House

This two-bedroom design is a one of the smaller examples (134 m^2). When converted, the house accommodates a 67 m^2 accessory bedsit apartment on the second floor, and a two bedroom primary unit on the ground floor and in the basement. As a detached house located in the City of Toronto, it is expect to cost $155,000.

This form of conversion is relatively common in older housing stock, but it appears to have some drawbacks in a made-to-convert unit. The cost of this conversion is relatively high ($21,600) due to the extensive work needed in the basement and elsewhere in the house. The work would cause a major disturbance, and probably make the house unhabitable during the conversion.

Given the cost of conversion, this made-to-convert unit is not as financially attractive as the others. The rent that could be expected from this apartment is only $500. The net revenue will cut the housing costs of a new homeowner by 10% with long-term financing, and nearly halve those of a mature homeowner. However, unlike the previous schemes, a shorter loan payment would cause an increase in the overall housing costs.

Because of its compact size and favourable purchase price, this example may prove appealing to either a young or retired couple. However, the economic cost and disruption associated with the conversion make this particular design less practical. It may be financially attractive only in particular areas where high rents can be obtained.

5.4.5 Example 9b - Wide-Front House (Garage Conversion)

This example incorporates a compact (45 m^2) accessory apartment in a double garage. While it is shown with a representative large (225 m^2) detached house prevalent on new wider lots throughout suburban Metro Toronto, it could be undertaken in most dwellings having an attached double garage. This particular house when located in Markham is priced at $165,000.

Garage conversions potentially have many practical advantages. Being separate from the rest of the dwelling, they can produce private accessory apartments. Also, the conversion can be completed with virtually no disruption to the main unit.

The economics of such a conversion are not so favourable. The cost ($16,450) of the conversion is high because of the extensive improvements required. On the other hand, due to it compact size and peripheral location, the rent that could be reasonably be charged is modest ($375/month). A new homeowner under long-term financing could only get 7% of the primary housing costs, and mature homeowner only 29%. Short-term financing will produce net losses for both.

Due to the relatively poor economic performance of this particular example, its marketability is uncertain. It is possible, however, that a double garage conversion associated with another house in more urban location could generate a higher return. This, in turn, could make it more financially attractive.

5.4.6 Example 14B - Single-Aspect Apartment

This unit is based upon a typical single-aspect high-rise apartment layout. As an unconverted unit, it is a modest (116 m^2) three-bedroom apartment, priced at $120,000 outside the downtown area. As a converted unit, it accommodates two similar (58 m^2) one-bedroom apartments.

The conversion can be readily undertaken. The cost has been calculated to be $11,450, the second lowest of the seven examples. Conversion results in only slight disruption to the primary unit.

The economics of conversion are also favourable. It is anticipated that a rent of $600/month could be attained from the accessory apartment. In relation to the conversion cost, this is a significant amount. It can generate sufficent net revenue with long-term financing to pay for 23% of the housing costs of the new owner, and almost all of the mature owner without a mortgage.

While this example represents a functional and viable scheme, it marketability may be questionable. It suits neither of the two market groups identified. For the young first-time buyer, it would be expensive relative to a house, and provide a less suitable place to raise a children. For the mature owner who has equity in an existing house, a one-bedroom apartment after conversion could be considered too small. Therefore, the market for such a unit needs to further examined.

5.4.7 Example 16 - Double Aspect Apartment

Located in the corner of a typical high-rise, this scheme accommodates three bedrooms in 146 m^2 before conversion. Outside of downtown Toronto, it is priced at $160,000.

The distinctive feature of this scheme is the room with separate entrance. It can serve as a family room, bedroom, office or "au paire" suite. (By converting the storage room, a third en-suite bathroom could be provided.)

When converted, the apartment accommodates two one-bedroom apartments of 61 m^2 and 89 m^2. The conversion is made with little disturbance to the primary unit. The cost of the conversion ($5,200) is the lowest of the seven schemes.

The anticipated rent ($650/month) from the accessory apartment is significant relative to the conversion costs. For the new homeowner, the resulting revenue could reduce housing costs by 24% with a long-term loan, and 17% with a three year period. For a mature homeowner without a mortgage, regardless of the financing period, the rent would pay for almost all shelter costs.

This design represents a feasible and attractive made-to-convert package. Nevertheless, for the reason already mentioned with the previous scheme, the marketing aspects must be questioned.

6.0 OVERVIEW OF OPPORTUNITIES AND PROBLEMS

This section covers two particular subjects specified in the terms of reference for the study. The first is an assessment of the potential for convertibility in the various basic housing types. The second is a review of the areas needing further examination in order to better understand the potential for made-to-convert units.

6.1 Assessment of Housing Types

In order to review the potential for convertibility the units can be best grouped in two main families: ground-related house units and upper-storey apartment units.

Ground-related house units

This group includes conventional detached and semi-detached houses as well as townhouses. These are grouped together because at the more affordable end of the market, as the lot sizes become smaller, the basic plan types become more interchangeable. For example, the same plan type might be built as a semi-detached and a detached unit, or as a townhouse and a semi-detached unit.

As a group, in comparison with the upper-storey apartment units, the ground-related houses appear to offer a much wider variety of design possibilities. The options here include basement, garage and upper-storey units, as well as multi-storey units in vertically split houses.

From an economic viewpoint, the purchase price, conversion costs and anticipated rents all cover a wide spread because of this variety. As a broad generalization, the conversion costs

in this group overall tend to be higher and the market rents lower than the apartments -- particularly when expressed on an area basis.

This study did not examine specifically which of the building types within this group are more inherently convertible. Nevertheless, it can be reasoned that townhouses generally have less physical capability for conversion than the others for two main reasons: the more restricted internal space and the more limited egress arrangements (i.e., no side or back doors).

Other factors outside the physical design of the unit may have a greater impact upon the potential for conversion. In the case of townhouses, the main drawback may be parking. Smaller lots are less able to accommodate two parking spaces. Therefore, the parking standards currently used in most municipalities could prohibit conversions of townhouses and other units on narrow lots.

In the case of detached housing, it may be the restrictive municipal attitudes regarding conversions in single family neighbourhoods. These neighbourhoods particularly are typically concerned about the possible encroachment of rental accommodation. Single family zoning and other municipal by-laws used to maintain the homogeneity of the area will effectively rule out the development of any purpose-built convertible housing there.

The marketing of these units has not been examined in any detail in this study. Nevertheless, it appears that this group of units is well-suited to the both of the identified market groups: the first-time buyer and the mature household.

Upper-storey apartment units

This group covers conventional walk-up as well as high-rise apartment structures. For reasons discussed earlier in the

report (see Section 3.1), walk-up apartments are not a distinct unit type in Ontario.

The design options for this group appear to fairly limited. Most apartment plans are variations on a few basic layouts that are allowed within the standard structural bays, corridor access system and single floor levels. Also, these units tend to be more compact than the family houses. Both of these, in turn, restrict the convertible possibilities.

From an economic viewpoint, these units appear to have a good potential for convertibility. While the units are more expensive for their size, the rents are generally higher, and the conversion costs are generally lower.

Despite this favourable assessment, a question must be raised about the market for these types of units. Neither of the two potential market groups identified appears to represent a major demand for this type of unit. The main reasons are these:

a) For typical young first-time buyers, the paramount consideration in purchasing a home typically is to find a home suitable for raising a family. This is a decision taken with a long-term perspective, and in which obtaining the most space for the limited capital resources is critical. High-rise apartments conventionally do not satisfy these needs. Therefore, this potential market group appears much more likely to buy a convertible house.

b) For mature households, apartment accommodation is an attractive form of housing. However, there is no precedent for convertible units in this form. The rationale for convertibility is that mature families with older children will purchase these units, and then, convert when the children decide to leave home. Given the additional costs and hassles related to conversion, it seems more likely that

these families would remain in their present homes until the children leave and, then, purchase smaller apartment units that suit them at that time.

The schemes as designed also may not serve this particular market group because the primary units do not contain a second bedroom, which would be desirable for visiting children. They were designed this way in order to keep the units as small as possible. Adding the potential for the second bedroom would increase the size of the unconverted unit into a four bedroom apartment. This larger apartment, which would be more expensive, is not a common unit type.

There may be a market for a particular type of accessory apartment unit. This is a self-contained suite with separate bathroom, mini-kitchen and bedsitting room, and perhaps linked by a door to the main unit. This unit could be used to accommodate an au paire, elderly parents, older children or a private office. However, this is not a convertible unit as defined in this study.

6.2 Areas for Further Examination

This study can be best described as a "first-cut" at examining the potential for made-to-convert units. When it was started, little information was available on the design, cost or viability of this type of housing. Therefore, an exploratory approach was taken in which a representative sample of convertible designs were developed and assessed in one particular market area.

While the work indicates a positive potential for these units, it also raises a number of unexplored issues in the areas of design, costs, marketing and regulation. The key ones are reviewed here.

Designs

The housing examples in this study were selected through a random examination of the unit types now conventionally built in Toronto. The intent was to select a representative range of unit types that were suitable for conversion. Because of this process, it can not be said that these are the only, the best, nor the least costly solutions available. For the same reasons, it does not cover other design possibilities that may be common elsewhere in the country. To examine these aspects would require a more systematic and exhaustive approach of the full range of house types.

The designs have been taken to a schematic level of detail. This is adequate to illustrate the floorplan and examine the overall economic feasibility. More detail, however, would be needed to fully examine various unconventional aspects, like the details for the additional sound and fire separations, and the servicing systems for electricity, plumbing and heating. This aspect is noted again under the next heading.

Costs

The costs have been determined only for a limited number of examples. While providing a sound indication of the type of costs involved, they do not provide a sufficient data base to advise on such matters as how to minimize costs.

The costs presented in this study are consistent with the schematic level of design detail. As just noted, certain areas can not be assessed without more detailed work. The services for electricity, plumbing, and heating are of particular concern because, if not installed at the outset in a way that facilitates conversion, the subsequent conversion costs could be substantially increased. This will be caused not only by the additional installation problems, but also to the remedial repairs to the damaged floors and walls.

These systems should be examined further in order to determine how best to minimize both the initial and subsequent conversion costs. As part of this examination, particular reference should be given to the merits of using electric baseboards rather than a furnace-based system for heating.

Depending upon the results of this work, it may be considered appropriate to advise builders on how to properly install these services in order to allow for the subsequent conversions. Unless clearly instructed otherwise, they are likely to follow conventional practice because they need not deal with any conversion problems. This advice might include illustrations of sample solutions, and simple lists of "do's and don't's".

Viability

The affordability of these units is one the most difficult aspects to address. As noted, because of the size of these units, made-to-convert housing are not inexpensive. What makes them more affordable in theory, however, is that the rental income can be used to offset the higher purchase price. The drawback is there is no mechanism for translating this income into a capital asset that facilitates purchase. To be more specific, lending institutions conventionally will not use this rental income to lower the qualifying income for purchasing a house. In practice, therefore, incorporating the potential for the accessory unit only makes this housing more expensive and less affordable.

This study dealt only with housing units in the Toronto area. The rental incomes are likely to be lower in smaller communities, as will the development costs due to cheaper land. These will affect the economic performance of the convertible units. Appraisals of these units in a selected range of smaller units would be needed to determine their viability outside of Toronto.

Regulations

Based on work in past studies, municipal by-laws are a major impediment to housing conversions (see Appendix A). The main and most widespread restrictions generally come from the "single-family housing" designations and parking requirements. The primary purpose of these and other similar regulations may be more to protect homogeneous "family" housing areas from urban encroachment rather than to address any legitimate planning problems. Nevertheless, in the face of outspoken neighbourhood resistance, most municipalities have shown themselves very reluctant to open these areas to rental conversions.

The saving feature for new made-to-convert housing is that the more flexible zoning can be enacted in suitable locations before the housing is constructed. The residents buying this housing presumably will be less likely, and less able, to object to the conversions.

Before municipalities consider making suitable zoning provisions, they most likely will need further education about the need for and merits of this type of housing. In addition to the work coming out of this study, it may be helpful to also develop a model zoning/O.P. provision, prepare a checklist of locational criteria for suitable locations, and undertake case studies in a number of sample municipalities to illustrate the possible problems and solutions.

7.0 CONCLUSIONS

The results of the study clearly demonstrate that made-to-convert housing can be both physically feasible and economically attractive.

A wide range of conventional housing schemes were designed that are suitable for conversion without major cost. These made-to-convert schemes are based on commonly built units, which can be made convertible without substantially affecting their cost or appearance.

The made-to-convert examples include conventional ground-related houses as well as multi-storey apartments. In general, the houses appear to offer a much larger variety of design possiblilites and, therefore, to cover a wider economic spectrum. The multi-storey apartments appear to provide more limited choices, but the designs still proved to be cost-effective in terms of rent and cost.

In general, the costs might be higher than perhaps first anticipated. Although the units were designed to minimize the physical changes needed during conversion, they all appear to involve a certain basic level of work. Also, the estimated purchase prices put this housing in the moderate-cost rather than low-cost range. This can be attributed to their size, which is needed to adequately accommodate both units after conversion.

The anticipated rents for the units generate a favourable economic assessment. The revenues from the accessory units generally are sufficient to cover the conversion and operating costs of the units, and also to offset a significant part the household expenses of the primary dwellings. This positive rental return provides for full cost recoverability, while enhancing the affordability of the made-to-convert schemes.

Made-to-convert housing appears to particularly suited to households at the beginning and end of the "family life cycle" -- specifically, the young first-time homebuyer and the mature family homeowner broadly in the 50-60 age-group. Both represent significant house buying potential. Through its flexibility and income-producing capability, this housing can meet the changing space needs and financial circumstances of these households.

This study represents a first look at the design and cost of this type of housing. While are the results are most encouraging, many questions have been raised. Continued research is needed in most aspects, including especially the affordability and marketability of these units. Efforts also must be made in educating the municipalities and building industry on the benefits of made-to-convert housing.

In conclusion, an important opportunity exists for the widespread development of made-to-convert housing. The CMHC should continue in its valuable on-going role in taking this prospect to fruition.

APPENDIX A

LESSONS FROM ADD-A-UNIT EXPERIENCE

APPENDIX A: LESSONS FROM ADD-A-UNIT EXPERIENCE

The Add-A-Unit Program was undertaken by the Ontario Ministry of Housing and Municipal Affairs in 1983 to 1985. It was essentially a research project intended to study the potential for adding a rental unit into an existing single-family home.

In this program, the Ministry provided for a limited period an interest-free loan of $7000 to assist homeowners in adding the unit. The program was open to homeowners in Hamilton, Ottawa, Thunder Bay and Toronto.

Over 100 applications were received for the grant. For a great variety of reasons, however, only 26 of the applicants proceeded to complete the accessory unit.

The consulting team of Richard Drdla Associates, Jerome Markson Architects and The Starr Group were responsible for a lengthy evaluation of this program in 1985. Because much of this unpublished and original work is relevant to this current study, a brief summary is presented here in two parts: the first summarizes the survey responses of the converters and other key informants, and the second describes briefly the accessory apartments that were completed.

Further use will be made of this data source later to assist in identifying the potential market groups and in preparing the economic assessment.

A.1 Summary of Survey

An extensive survey was undertaken of all applicants to the Add-A-Unit Program as well as a similar number of other independent converters. A series of interviews also were held with builders and municipal officials and other key informants. One of the main purposes of this work was to assess the motivations, difficulties and characteristics of the converters.

A.1.1 The Motivation

Extra income was by far the main reason given for adding an accessory unit. Significantly, this response did not vary by income or any other group. This was somewhat surprising because past literature appears to emphasis the various social reasons.

Many other reasons were also identified, but as noted, did not amount statistically to a large number. These included the desire to add space, increase the property value, have assistance with home maintenance, accommodate a family member, and provide for companionship and security.

Only the elderly had a slightly different response. While a majority of those 55 or over still gave extra income as the main reason, a higher proportion emphasised some of the social considerations mentioned above.

This indicates that if this type of housing is to be promoted on a wide scale, then, it must first of all make sound economic sense to the homeowner.

A.1.2 The Impediments

Homeowners are confronted by many obstacles and difficulties in adding accessory units to their houses. Chief among those identified were first the building regulations, followed by

conversion costs. Another was the difficulty in dealing with so many people -- zoning and building permit officers, designers, contractors, inspectors, bank managers, to name a few.

The respondents could not identify the many sources of their difficulty with the building regulations. The impression given is that the homeowners were simply overwhelmed by the number and complexity of the building regulations affecting conversions.

From discussions with the municipal officials as well as many other sources, it is clear that the municipalities use the zoning by-laws to frustrate the creation of accessory apartments. They do this directly by zoning areas exclusively for single family. They also do it indirectly by stringent parking or other regulations. In doing so, they are bowing to the fear of many homeowners about the intrusion of tenants in their neighbourhoods.

Despite these controls, illegally created accessory apartments are widespread in virtually all major urban areas. That this activity continues without municipal approval makes it difficult to monitor and assess. Nevertheless, it is a clear indication of the strong market for this type of accommodation.

The building code generally is not an obstacle to conversion activity. What the code does is add to the costs. Also, it can raise many technical problems that can not be resolved by the homeowner without expert advice.

Contrary to what had been expected, neighbourhood reaction does not appear to constrain conversion activity. The conversions surveyed were undertaken with the very few complaints. One reason for this is clear: the conversions appear to cluster in certain areas. Therefore, similar conversions had been already undertaken widely in the area.

Neither was parking a significant constraint for the respondents. In general, the majority could provide sufficient parking on the property, and those that could not relied on street parking.

These findings indicate that houses with a built-in conversion potential might have a ready market. For the homeowner, these units could reduce the "red tape", conversion costs and general hassles associated with altering existing housing. For the municipalities, having suitable zoning from the outset will sidestep any subsequent neighbourhood resistance to change.

A.1.3 The Converter

Homeowners adding an accessory unit to their homes are a mixed group. Generalizations are difficult. In general, when compared with the overall provincial profile, the converting household is much more likely to be small in size (perhaps, even a single person) with no or few children; under 45 in age, and most probably in the 35-44 age group; have an above average but not necessarily high income; and have employment in a white collar field.

Notable by their absence are two groups -- the elderly and young homeowners. Both were considered important targets, but both were well below their representation in the population at large.

The reasons for their absence were not conclusively determined by the survey. The indications are that the elderly are easily put off by the many difficulties in undertaking conversions. The young homeowners, it appears, do not have the money needed to undertake the conversion and carry the mortgage. For this reason, there is some evidence that the latter group is likely to undertake "do-it-yourself" and illegal conversions.

A number of owners that purchased converted properties also were surveyed. In comparison with the remainder, this group contained very significantly more blue collar workers, as well as more in the lower income groups. It also had substantially more families with children. At the same time, they charged substantially lower rents. One possible explanation for this difference is that this group was dominated by "ethnic" and extended families.

Again, consistent with some of the earlier comments, new housing with potential for conversion appears to be particularly suitable for two important groups -- the elderly and young homebuyer. Both have a particular need for this type of convertible housing that can not be readily satisfied by the existing housing stock.

A.2 Review of Projects

A detailed analysis also was made of the conversions completed under the Add-A-Unit Program using the plans submitted for municipal approval. Out of this analysis came information on the type of units created, and their costs and rents. (Similar information was collected in the survey, but without reference to the plans, it is less definitive. In general, the results of the survey were consistent with the more detailed examination of this limited sample.)

A.2.1 Overall Description

The sample contained 25 conversion projects. 23 were from Toronto, 2 from Hamilton, 1 from Thunder Bay and 1 from Ottawa. 22 provided one additional unit, while the remaining added two. 5 were duplexes before the additional unit was created, while the remainder were single family dwellings.

The accessory units, as would be expected, were relatively small in size. 5 of the new units were bachelors, 22 had one bedroom, and 3 two bedrooms. The average size of these units was 400

ft2 net (37 m2) for a bachelor, 620 (57.5) for one bedroom, and 770 (71.5) for two bedroom. The respective size ranges were 370-540, 430-970 and 700-830 ft2.

13 utilized the basement to provide the additional space. Out of these, 9 of the units were added entirely in the basement, and 4 in the basement and on the first floor.

11 required additions to the house. All of these were to the rear of the building. Most of these were modest in size -- ranging from 110 to 620 ft2 gross (10-57.5 m2) and averaging 265 ft2 (24.5 m2).

A.2.2 Cost Breakdown

The average cost of providing a new unit was $17,120. The averages ranged from $11,360 for a bachelor, to $18,550 for a one bedroom to $19,500 for a two bedroom. These costs include work on the homeowner's unit when it was needed to provide the new unit. (For example, the provision of a new bathroom to replace an existing one taken over by new unit was included.)

The costs covered a very wide range. For example, the least expensive unit was a one bedroom apartment for $3550, followed by a $6900 basement bachelor unit. The most expensive were a one bedroom unit for $35,900, and another one bedroom basement flat for $26,470.

The cost of these units averaged about $28/ft2 ($300/m2). The figure roughly was the same for the bachelors and one bedroom units, and only slightly less at $25/ft2 (270/m2) for the two bedroom units.

The basement units averaged $15,800, or nearly $39/ft2 ($420/m2), while the equivalent figures for non-basement units was $17,900 or $23/ft2 ($250/m2). Some of this difference, but by no means all, can be attributed the excavation costs included in some of the basement examples.

On top of these costs, most converters also took the opportunity to make other improvements to their units that were not necessary to provide the new unit. These additional costs averaged about $7000.

A.2.3 Rent Breakdown

Generalizing about the rents is difficult. The rents are dependent upon many factors -- including the type and quality of the unit, and its location. One significant finding was there was no apparent relation between the rents and costs of renovation.

The average rent expected by the Add-A-Unit group was $515/month, with 64% including all of the utilities. The averages ranged from $340 for a bachelor, $515 for a one bedroom, and $685 for a two bedroom.

The expected rents for basement units averaged $415, while the non-basement units were somewhat higher at $560. This difference may be largely attributable to the basement sample including more bachelors.

(The foregoing deals only with the limited number of Add-A-Unit completions. A wider data base is available through the participants that dropped out of the program, and the independent converters that also were surveyed. This information will be used to provide input for the economic analysis.)

A.2.4 Unit Types

The accessory apartments can be located in a number of places in the house. Various characteristics and problems are typically associated with each.

Basement Units

Units entirely in the basement were the most common type, with 9 examples split between 3 bachelors and 6 one bedroom units. The units tend to be small, averaging 415 ft2 net (38.5 m2) for the bachelors and 570 (53) for the one's.

As noted, the average cost of these units was higher than the above-grade units when compared on an equivalent area basis. Only part of the reason can be attributed to excavation work. The remainder may be due the extensive finishing work required.

The prevalence of basement apartments is readily understandable. It is often considered under-utilized space. Unlike conversions in the other areas, these can be added without disrupting the primary residence. All of the services are readily accessible. Also, access can be provided readily through an existing side or back door.

The layouts of these units, however, tend to be awkward. This was frequently caused by the need to work around an existing bathroom and furnace area. Providing sufficient window area, or locating the rooms to make best use of the existing windows, also is a problem. Finally, handling the access is difficult -- typically it comes directly into a room rather than through a separate vestibule.

The rents from these units, when compared on an equivalent space basis, are somewhat lower that those from at-grade or above-grade units. No doubt this reflects some of the problems just noted. However, it may also indicate a reluctance by some to live below grade.

First Floor Units

The first floor was used for the units in 7 examples. 3 were entirely contained within the existing space, 2 had rear

additions and 3 extended into the basement. All of these were one bedroom units, ranging in size from 550 to 860 ft2 (51-80 m2) and averaging 700 (65).

In all cases, these units also were coupled with improvements to the upper floors. Typically, these involved adding a new kitchen to replace the one on the ground floor, and providing fire-separation around the existing stair.

What these schemes indicate is that the ground floor of many conventional houses can not readily accommodate the additional bedroom and bathroom needed for one bedroom unit. The additional space must be found either in an addition or in the basement.

The schemes utilizing supplementary space in the basement indicate an interesting approach, but they were not successful from a design viewpoint. In general, they provided a bedroom with the main bathroom in the basement. All of them suffer from an awkward and/or inefficient layout, probably caused by the difficulty of providing good vertical access, windows for the bedroom as well as close proximity to the existing plumbing for the bathroom.

The units provided entirely on the ground floor with or without an addition, while generally better laid out, illustrate another typical problem. To save the existing kitchen, the bedroom must be located at the rear of the units with access through the kitchen.

Upper Floors Units

New units were provided on the upper floors in 9 of the projects. The sample contained a great variety of solutions; no typical examples can be selected because every example was in some way different.

The size of the units also was diverse, ranging in size from bachelors to two bedroom units.

Fire egress appears to be a major design consideration. Only one scheme was provided with a new and separated fire stair down the rear of the property. (In this case, the owner's unit took the ground floor and front half of the second including the stair.) None of the accessory units were located exclusively on the third floor. With the exception just noted, all of the units used the existing stair to a fire-exit at the front door.

A.2.5 Other Examples

There were three projects that were unique in this sample, but presented interesting approaches to subdividing space that could be used elsewhere. The projects were these:

- a three storey structure subdivided into three units -- one on the ground floor and basement, and the other two as two-storey units on the front and rear half of the upper two floors. Each of the two upper units had their own internal stairs between the second and third, but shared the existing stair to the fire exit at the front door.

- a two storey structure (with a two storey addition) subdivided into three units -- one on the ground floor, and the other two (both bachelors) on the front and rear half of the second floor.

- a two storey structure subdivided into two units -- one in the basement and half on the ground floor, and the other on the second floor and other half of the ground floor -- joined by the existing stair.

(NOTE: Depending upon how the design analysis proceeds, these examples can be either separately illustrated or incorporated as ideas in new schemes.)

A.2.6 External Changes

A major issue affecting the neighbourhood acceptability of accessory units is the external appearance of the house, and specifically whether the converted house appears to be significantly different from a single family home. The general conclusion from Add-A-Unit is that these houses with accessory apartments need not look different.

The sample indicates that houses can generally accommodate the additional unit without changes to the front facade. Only two out of the sample added a second front door to serve the accessory unit. Other than that no significant changes were made to indicate multi-occupancy.

In general, access was provided to the second unit without the need for a new front entrance. Typically, access to the basement units was provided through an existing door at the side or rear of the house, and access to the upper level units was through a shared front door leading to a entry hall/foyer. In the latter cases, separate doors to the units (sometimes at the foot of the stairs) were then provided from this entry hall, along with the required fire-rated doors and partitions.

A significant number of the conversions did involve additions to the house. All of these were to the rear of the building. Most of these were modest in size. The modest size of the additions, on the one hand, indicates that there is considerable flexibility in conventional houses. Nevertheless, there are certain fundamental groupings of rooms that may be difficult to accommodate in certain circumstances.

Two potential market groups have been identified -- the "mature" household and the first-time homebuyer. The economic data available for these two specific groups appears to be limited. Important information, for example, is missing about their capital assets used in purchasing homes. Further work is needed on their economic status in order to test the affordability of these units, and determine any economic thresholds with regard to cost and income.

Marketability

The success of made-to-convert units ultimately will be measured in how well they sell in the market place. This topic only has been touched upon in this study.

A specific question has been raised about the marketability of the convertible apartments. Despite their favourable economic performance, it might be that few households will wish to undertake this type of conversion. Young households typically do not consider apartments as an acceptable environment for raising a family. Mature households may be more likely to consider purchasing a condo after the children leave home rather than before. Therefore, in neither case is convertibility a marketable consideration.

Because this type of housing is serving a particular and unconventional market, tests of this market may be necessary before developers invest. There are many factors outside the strictly economic that could affect interest in convertibility. For example, past studies have indicated that the elderly have a major potential to convert surplus space into accessory units, but few do so despite the apparent economic benefits. As in the marketing of any product, although the numbers might indicate the potential for a strong demand, other considerations may intervene.

APPENDIX B

REVIEW OF BUILDING CODE REGULATIONS

APPENDIX B: REGULATIONS IN BUILDING CODES

The Ontario and National Building Codes affect the design and construction of convertible housing in a number of ways. The main features found in this study have been summarized in this appendix.

The summary focuses on Section 9 (which deals with residential buildings of three storeys or less) rather than Section 3 (for residential buildings over three floors). Section 9 will have an impact on the potential for convertibility because it contains significantly different regulations for single and multi-unit dwellings. As a consequence, designing a single family unit for conversion under Section 9 will require providing for higher standards. The provisions of section 3, although more stringent than those in Section 9, will not affect the potential for convertibility because the higher standards would have been incorporated already.

While not reviewed here, it should be noted that other regulations may be applicable in certain circumstances. For example, any housing funded by Ontario Housing Corporation must comply with the Technical Guidelines for Family Housing (1980) prepared by the Ministry of Housing.

Four technical notes have been appended to this section regarding interpretations of the code as they affect egress arrangements, walk-up apartments, sound controls, minimum unit sizes.

B.1 Fire Separation

In any building divided into two or more separate units, fire separation must be provided between the units to protect against the spread of fire. To be specific, the walls and ceilings between the units with one storey must have have fire-resistance rating of 3/4 hour (OBC 9.10.9.17 & NBC 9.10.9.18), and units with 2 or more storeys must have a 1 hour rating (OBC 9.10.9.19 & NBC 9.10.9.20).

Single family homes are conventionally built with interior partitions of 38 mm x 89 mm wood studs covered on both sides with 12.7 mm gypsum board. This provides a 3/4 hr f.r.r. (ULC W302). For the 1 hr rating, the standard gypsum board must be replaced by 15.9 mm special fire-resistant board, or alternatively, an additional layer of 11 mm gypsumboard must be installed or both sides (NBC Supplement, Table 2.3.A).

Wood-framed floor assemblies require similar changes, including an extra layer of plywood, mineral fibre in the joist spaces and a fire-resistant ceiling finish (OBC 9.11 & NBC 9.10). (ULC designs L506 & L512 detail the alternative solutions.)

Vertical fire separations must extend through attic spaces to the underside of the roof sheathing. Alternatively, the ceilings of the upper floors in adjacent dwelling units must have a fire-resistance rating (OBC Tables 9.11.2.A & NBC Tables 9.10.3.A).

Masonry party walls and concrete floors also can be used to provide the fire rating, but the costs of these alternatives are generally much higher.

When these dwellings share an access to a fire exit (see section B.5), the access must be fire-rated to the above specification. Also, the doors to the dwellings require self-closing devices and a 1/3 hour fire-rating. The latter is typically achieved by using solid core timber doors (OBC 9.10.14.3 & NBC 9.10.13.3).

B.2 Sound Control

Every dwelling unit must be separated from every other space in tha building where noise might be generated by wall or floor construction providing a sound transmission class rating of at least 45 (OBC 9.11.2.1.). To achieve this in new construction, resilient channels are typically added to one side of the studs and mineral fibre placed in the wall cavity.

The ratings provided by the code do not provide an adequate basis for assessing retrofit improvements. It deals only with standard new construction and provides only broad classifications (see Endnote 1).

Technical data from the Canadian Gypsum Company, however, provides a basis for estimating these ratings. This data indicates that for retrofit improvements the addition of resilient channels on one side plus a layer of fire-rated gypsum board over the existing assembly will meet the code requirements.

B.3 Room Dimensions

All rooms within a dwelling are regulated by minimum dimensions and minimum areas (OBC 9.5.3-9.5.8)(See Table B.3.)

The OBC does not set minimum sizes for dwelling units. The minimum room sizes can not be totalled to set minimums for complete dwellings because they leave out a number of areas. Approximate minimums only can be determined using estimates for these missing areas (see Endnote 2).

Living rooms must have a clear height of 2.3 m over 75% of their area, and a minimum of 2.1 over the remainder. Bedrooms must have a clear height of 2.3 m over 50% of their area, or 2.1 over the entire area. Any part of the floor area having a height of

less than 1.4 m can not form part of the required area. Other rooms within the dwelling must be at least 2.1 m high (OBC 9.5 & NBC 9.5).

Exit stairs in residences must be 900 cm wide measured between the wall faces or guards (OBC 9.8.3.5.). Internal stairs within a dwelling can be 860 cm wide (OBC 9.8.3.6.).

Table B.3: Minimum Room Sizes

	Minimum Area (m^2)	Minimum Dimension (m)
Living room	13.4	3.0
Dining room		
- combined with other space not kitchen	3.3	2.3
- combined with kitchen	3.3	1.7
- not combined	7.0	2.3
Kitchen	4.2	
First bedroom		
- without built-in cabinets	9.8	2.7
- with built-in cabinets	8.8	2.7
Additional bedrooms		
- without built-in cabinets	7.0	2.0
- with built-in cabinets	6.0	2.0
Bedrooms combined with other spaces	4.2	2.0
Hallways		0.9*
Exceptions for bachelor units with combined living, dining and kitchen areas:		
- living area alone	11.1	
- dining area		1.7
- kitchen	3.7	

* 0.7 in certain circumstances.

The minimum width for a corridor used as an exit is specified in various sections, although the ruling dimension remains the same. The minimum width of a corridor or passageway in "an access to exit" is 1100 cm (OBC 9.9.3.4.), as is the minimum width of a public corridor (OBC 9.9.3.5.). The width of a main vestibule also must be at least 1100 cm wide (Residential Standards 5.K.(2) associated with NBC).

B.4 Window Area

Windows must be 10% of the floor area in living rooms and dining rooms, and 5% in bedrooms. No windows are required for kitchens and bathrooms, but mechanical ventilation is required when not provided (OBC 9.7 & NBC 9.7).

B.5 Fire Exits

In multi-occupancy residential buildings, every unit on a floor with more than one unit must have a door directly to ground level, or to an open exterior passageway or enclosed public corridor. In the latter two cases, it must be possible to go in opposite directions to each of two separate exits (NBC 3.3.1.3.(1) & OBC 9.9.7.1.). A unit can exit into a enclosed public corridor or exterior passageway served by only one exit, if the unit has its own second and separate private means of egress (NBC 3.3.4.3.(5) & OBC 9.9.9.4.). For multi-storey units, this provision is of little benefit (see Note 3).

Also, for 1-2 storey multi-occupancy buildings, each floor with more than one unit can be served by one means of exit, provided certain conditions are met regarding floor areas, occupant loads and travel distances (OBC 9.9.8.6.).

In ground-related houses of three storeys or less, different rules apply. In general, it is permissible to travel up or down one storey from a unit to a fire exit at grade (OBC 9.9.9.1). This limit may be exceeded when that floor has direct access to

a balcony (OBC 9.9.9.3.) Also, when there is no other dwelling above the unit, the third floor need not comply provided it has an openable window of sufficient size and located with a sill not more than 1 m above the floor and not more than 7 m above the adjacent ground level (OBC 9.9.9.3.).

A dwelling located on a second floor can be served by a single stair to a door at grade, provided it does not pass through another dwelling. This stair need not be protected by fire-rated separations where it does not share a wall or ceiling (OBC 9.9.9.5). If shared, the dwelling must be provided with a second and separate means of egress (see Note 4).

B.6 Services

Heating

In multi-unit dwellings, a furnace serving more than one unit must be located in a room separated from the other units by a 1 hr f.r.r. This is not required when the furnace serves a 2 storey building with building area of less than 400 m2 (OBC 9.10.10.4-5 & NBC 9.10.10.5-6).

Duct work passing through fire-rated walls must have fire dampers in the plane of the fire separation, and duct work through fire-rated ceilings must have fire stop flaps installed above diffusers (OBC 9.10.14 & NBC 9.10.13).

As alternatives, the dwelling units can be heated by separate furnaces or by electric baseboard heaters.

Plumbing

Most single family dwellings have combustible ABS (i.e., plastic) drains and vents. However, in multiple unit buildings, all plumbing passing through a fire separation must be

non-combustible (OBC 9.10.9.26 & NBC 9.10.9.27). Combustible piping may be used elsewhere within the unit, except in vertical fire-rated shafts.

Electrical

The placement of electrical equipment in fire-rated partitions must maintain the integrity of the wall (OBC 9.10.9.10(.1) & NBC 9.10.9.10). For instance, back-to-back electrical boxes in the same wall must be offset in different stud spaces.

B.7 Other

Although this may appear to be self-evident, the building codes do require that dwelling units have self-contained bathroom and kitchen facilities (OBC 9.34.4 & NBC 9.32.4).

There are also a variety of other alterations not regulated by the code but desirable in conversions. These include individual electrical meters for the units, separate cable TV and telephone services, additional buzzers and intercoms for units above the ground, and extra mailboxes and garbage areas.

SUPPLEMENTARY NOTES FOR APPENDIX B

Note 1: Retrofit Sound Controls

Sound transmission class rating (STC) measures the loss of airbourne transmitted noise through a structure. Sound tests are conducted on assemblies according to standard procedures.

The ratings provided by the Code do not provide an adequate basis for assessing retrofit assemblies. It deals only with standard assemblies and provides only broad classifications. To be specific, it gives only these STC ratings for the following relevant types of construction (Table 9.11.2.A.):

- o interior wood stud (38 mm x 89 mm studs at 400 mm o.c.)
  - with 15.9 mm fire-resistant gypsum board - under 45
  - with mineral fibre and 12.7 mm gypsum board - under 45
  - with mineral fibre, 12.7 mm gypsum board and metal channels on one side - 45-50
- o wood floor joists with 15.5 mm plywood
  - with mineral fibre, resilient channels and fire-resistant gypsum board - 45-50

The Canadian Gypsum Company, in their 1985 Architectural Technical Literature series, provides somewhat more definite and complete information. It provides rating for these assemblies:

1) interior wood-framed wall
   a) with 12.7 mm or 15.9 mm fire-rated gypsum board - 34
   b) with 15.9 mm fire-rated gypsum board and 76 mm insulation batts - 46
   c) with 15.9 mm fire-rated gypsum board and resilient channels one side - 45
   d) with 15.9 mm fire-rated gypsum board, 76 mm insulation batts and resilent channels one side - 50
   e) with two layers 15.9 mm fire-rated gypsum board both sides - 38
   f) with two layers 12.7 mm fire-rated gypsum board both sides and resilient channels one side - 49
   g) with two layers 12.7 mm or 15.9 mm fire-rated gypsum board both sides, resilient channels one side and 75 mm insulation batts - 59

2) wood-framed floors with 12.7 mm plywood subfloor and 15.3 mm plywood finished floor and
   a) with 12.7 or 15.9 mm fire-rated gypsum board on ceiling - 38
   b) 2a with carpet and underlay - 39
   c) 2a with mineral fibre batts - 41
   d) 2a with resilient channels - 47
   e) 2a with batts and resilient channels - 51
   f) with 12.7 or 15.9 mm fire-rated board over resilient channels and 12.7 mm fire-rated board - 49

These ratings do not cover the likely retrofit solutions, but do appear to provide a way for estimating them on the basis of these components:

o	carpet with underpad -	1 (example 2a & 2b)
o	gypsum board one side -	2 (2a & 2e)
o	resilient channels one side -	9 (2a & 2d)
		11 (1a & 1c)
		11 (1e & 1f)
o	batts -	3 (2a & 2c)
		13 (1a & 1b)
		10 (1f & 1g)
o	channels and gypsum one side -	11 (2a & 2f)
o	channels one side & gypsum both sides -	15 (1a & 1g)

Despite some inconsistencies in this data, it seems to clearly show that for a retrofit improvement the addition on one side of resilient channels plus a layer of fire-rated gypsum board over the existing assembly will provide a STC improvement of 11. Considering that the standard wood-framed wall is rated at 34, and the standard ceiling at 38, this should satisfy the requirement of 45.

Note 2: Minimum Unit Sizes

The minimum room sizes set out in the code can not be used to set minimum dwelling sizes because they leave out these areas:

- bathrooms
- interior partitions and exterior walls;
- storage areas; and
- circulation areas like hallways and entrys that are separate from the rooms.

Estimates must be made for these missing areas to approximate the minimum unit sizes based upon the code (see Table B.3a).

For comparison, the Metro Toronto Housing Authority has illustrated prototypical layouts based upon the Code minimums. These indicate an area of 47.7 m^2 gross (44.4 m^2 net) for a one-bedroom unit, and 41.4 gross (38.6 net) for a bachelor.*

Table B.3a: Minimum Unit Sizes derived from the OBC

	Two Bedroom Unit	One Bedroom Unit	Bachelor
Areas set by OBC			
Living and Dining Room	16.7	16.7	20.9
Kitchen	4.2	4.2	4.2
Bedrooms: first	9.8	9.8	
second	7.0		
Total - m^2	40.5	30.7	25.1
Areas not set by OBC			
Bathrooms	3.5	3.5	3.5
Walls and Partitions	4.8	4.0	3.4
Storage	5.0	4.0	2.4
Circulation	5.0	3.4	3.0
TOTAL (Gross) - m^2	58.8	45.6	37.4

Note 3: Walk-Up Apartments

The building code, as confirmed by a recent study for CMHC**, severely limits the design options in low-rise walk-up apartments. The critical regulation is that every apartment unit above the second floor must exit to two separate stairs in the opposite directions. The most economic floorplan due to this regulation, as contained in virtually all Canadian apartments, has single-aspect units located along a central double-loaded corridor and served by exit stairs near the two ends of the building. Because the code makes no distinction between walk-ups and high-rises, this basic layout is used in both.

Many low-rise developments were checked in the course of this exercise. For example, a variety of stacked housing and walk-up apartments were developed in the Toronto area in the 1960's (e.g. Flemington Park, Thistletown and Warden Woods). Most of these, it was found, incorporate shared fire egress arrangements that are no longer acceptable in the current codes.

Walk-up units also have been included recently in more expensive condominium projects (e.g. Oaklands and Bedford Glen). On the upper floors, most of these utilize conventional double-loaded corridor layouts like those in high-rise structures. On the lower floors, they often use unconventional and more elaborate double-height and stacked units on the grade-related levels. Upon examination, none of the latter were found to be convertible because the access arrangements are so particular that they do not have the flexibility to accommodate any additional stairs for the new units.

Note 4: Fire Egress Arrangements

Although subject to interpretation, strictly speaking, this clause is taken to rule out an enclosed egress stair leading to a shared entrance vestibule without a doorway between the stair and the vestibule. Having the door, in turn, leads to other requirements because the stair must then have a landing as deep as it is wide (OBC 9.8.4.1), and 0.3 cm deeper and wider than the door swing (OBC 9.9.6.7.). Furthermore, because this landing can be considered to be a vestibule and/or "an access to exit", it must be at least 1100 cm wide, which is wider than the 900 cm stairs normally provided in houses (see section B.3). All of this, while not difficult to accommodate, may not be possible if not pre-planned.

This complication could be circumvented using Part 11 of the OBC. For renovated buildings, Compliance Alternative B8 of Part 11 also allows connected balconies to be used as an exit (Table 11.2.3.B.). This, in turn, would allow the "shared" egress without the second means of access (OBC 9.9.2.2.). Part 11 applies to renovations of residential buildings more than five years old. It is debatable, however, whether this loophole should be utilized in new "made-to-convert" houses. Also, the NBC does not contain this provision because it has no equivalent residential renovation section.

---

* M.T.H.C.L. Guide: Section B.1, General Planning; Issue 3, 1977.

** Blandford Gates of Fliess Gates McGowan Easton Architects & Paul Sandori of the Department of Architecture at University of Toronto: Fire Safety and the Design of Apartments; prepared for CMHC; 15 March 1985. This report examined the effect of the fire safety regulations on low-rise apartments (up to 8 floors) in Canada and a number of European countries.

APPENDIX C

REFERENCE FOR LITERATURE SEARCH

APPENDIX C: REFERENCES

An extensive search was made for past examples of existing made-to-convert housing. Included were these information sources:

- reference catalogues at these libraries:
  - School of Architecture at the University of Toronto;
  - School of Architecture & Planning at Princeton University;
  - Department of Environmental Studies at York University;
  - Toronto City Hall (which specializes in planning and housing subjects);
  - Ontario Ministry of Housing;

- major guides to periodical literature:
  - Art Index (U.S.) which covers main architecture magazines (i.e., Canadian Architect, Progressive Architecture, Architectural Record, Forum, and others.)
  - Vance Bibliographies: Architectural Series
  - Exchange Bibliography; Council of Planning Librarians (1958-1978)

- editorial staff of these magazines specializing in housing and construction:
  - Canadian Building
  - Builder (U.S.)
  - Professional Builder (U.S.)
  - Canadian Housing
  - Impact (replaced by Canadian Housing)
  - House and Home

- senior staff of the following organizations:
  - Canadian Home Builders Association (formerly HUDAC);
  - Toronto Home Builders Association;
  - National Association of Home Builders (U.S.)
  - American Institute of Architects
  - Canadian Association of Housing and Renewal Officials
  - National Association of Housing Renewal Officers (U.S.)

- housing experts:
  - Patrick H. Hare, Planning and Design Consultant, Washington D.C
  - Sue Corke, Senior Analyzt, Housing Conservation Unit, Ontario Ministry of Housing;
  - Theodore A. Rosen, Architect, Toronto.
  - Martin E. Wexler, University of Quebec, Montreal;
  - Alex Murray, Professor of Environmental Studies, York University, Toronto.

- senior housing planners for these municipalities:
  - Toronto
  - North York
  - Vancouver
  - Burnaby
  - Halifax

- specific publications:
  - Martin Gellen: Accessory Apartments in Single-Family Housing, Centre for Urban Policy Research.
  - Andrew Rabeneck: "Housing Flexibility"; Architectural Design, November 1973, pages 698-727.
  - Andrew Rabeneck: "The New Psshak"; Architectural Design, October 1975, pages 631-635.
  - Reid Levenson: Flexibility in Canadian Housing: A State of the Art Review; CMHC Policy Development Division, December 1979.

APPENDIX D

PRECEDENTS FROM CONVENTIONAL UNITS

APPENDIX D: PRECEDENTS FROM CONVENTIONAL UNITS

The made-to-convert units designed in this study were in most cases based upon conventional units now being built. Floorplans of these conventional units are presented in this appendix.

The precedents for the units based upon previous convertible units (#1-3) are illustrated in the main body of the report (see Section 2.0).

The examples of conventional apartment units (#14-17) are primarily taken from newspaper advertisments appearing in the Toronto Star or Globe & Mail over the last one-two years.

Some of the precedents for the single family units are taken from "Select Home Designs" from the House Design & Decor magazine. This is an annual compilation of houseplans appearing in this monthly magazine, which is directed at small builders and potential homebuyers wishing to build their own home.

The remaining examples are taken from Canadian Architect and from sales brochures provided by builder/developers.

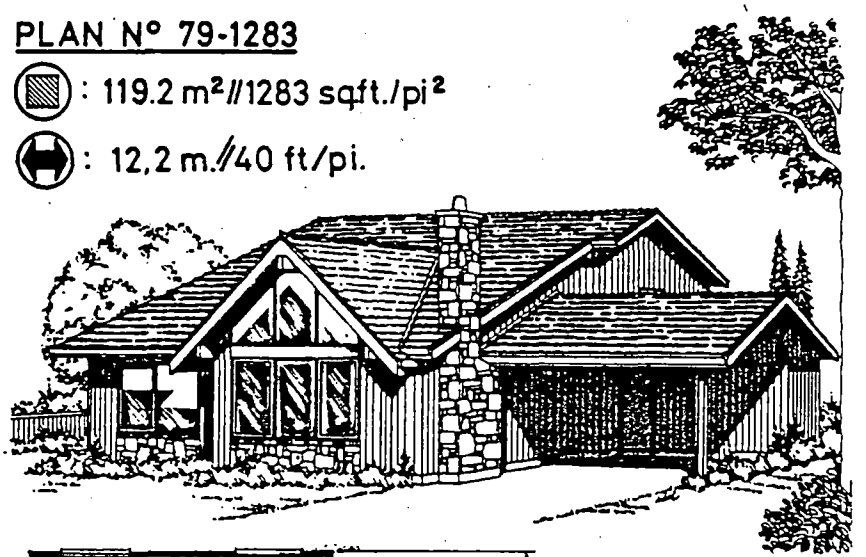
No previous examples are provided for four unit types. The "Victorian" (#5 & 6) houses are a basic types in older downtown areas, and now used in infill projects, but no published examples were found. Similarly, no previous examples are known for #7 and 8, although these units are conventional in layout and appearance.

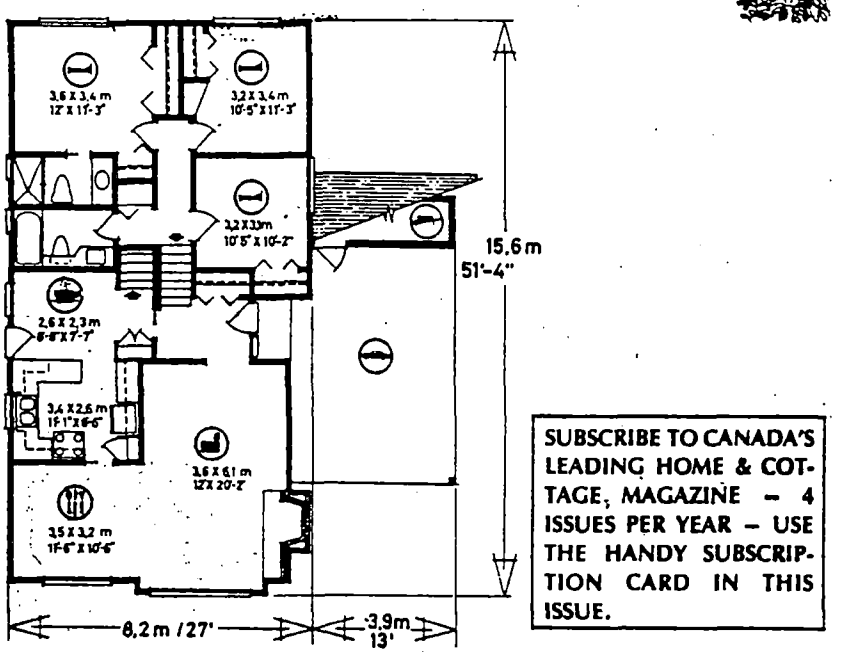
Example 4: Backsplit House
(House Design & Decor -
Select Home Designs; 1981)

PLAN N° 79-1283

: 119.2 m²//1283 sqft./pi²

: 12,2 m.//40 ft/pi.

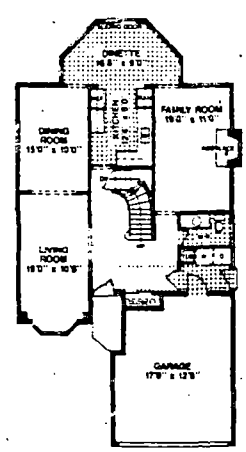




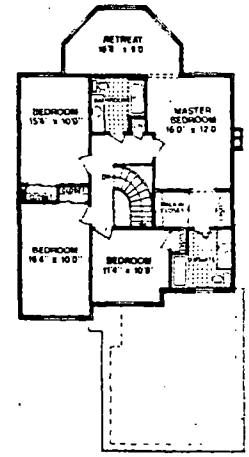
Example 9: Wide-Front House
(Toronto Star; 30 August 1986)

2431 Elev. B $181,990.

Dellbrook proudly announces their new neighbourhood in the unique community of Erin Mills. Discover Series 40 which offers you a wide variety of popular home designs from 1874 sq.ft. to 2431 sq.ft. affordably priced from $166,990. You may prefer Series 46, finely crafted homes ranging in size from 2545 sq.ft to 3164 sq.ft. starting at $191,990. Some models available with basement walkouts and decks or choose a lot which backs onto wooded parkland.

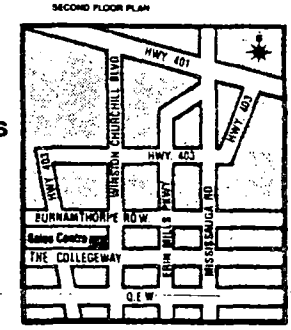


GROUND FLOOR PLAN



SECOND FLOOR PLAN

Visit our sales centre at Winston Churchill Blvd. & The Collegeway and let Dellbrook Homes help you plan your tomorrow – today.



Hours:
Mon. to Fri. - 1 PM. - 8 PM.
Sat., Sun., Hol. - 11 AM. - 6 PM.

Example 9: Wide-Front House
(Sales Material - 1983)

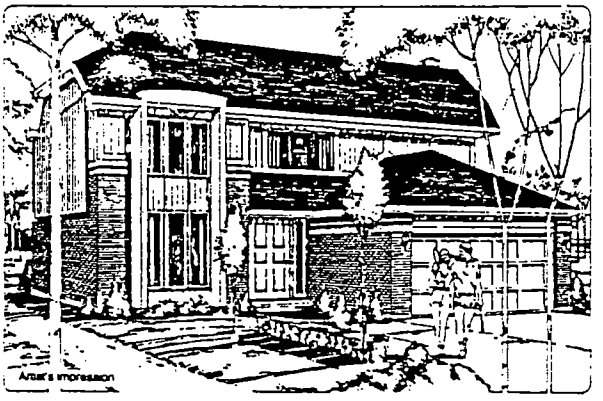
Amberlea Country

The Greenhouse

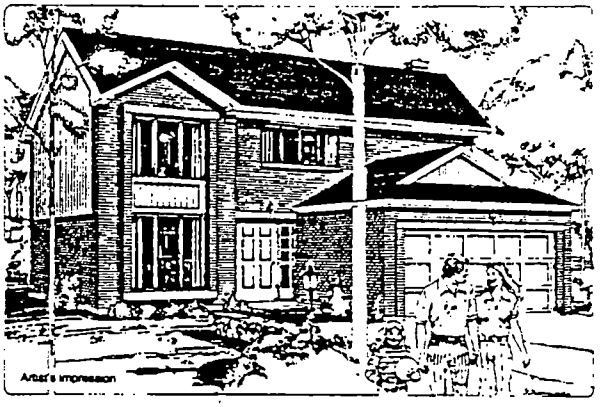
SCARBOROUGH

4 Bedroom Detached 2 Storey Home

The Gourmet kitchen features an adjoining sunroom—perfect as your own greenhouse. Overlooking the kitchen is a family room with fireplace. There is front door entry into a large foyer. And a two car garage. Also, a separate laundry room for convenience and a powder room for elegant entertaining—all on the main floor.
Upstairs is the master bedroom suite with its own walk-in closet and 4-piece ensuite washroom, offering a tub and double sinks. There are 3 more bedrooms and a main washroom for easy family use.

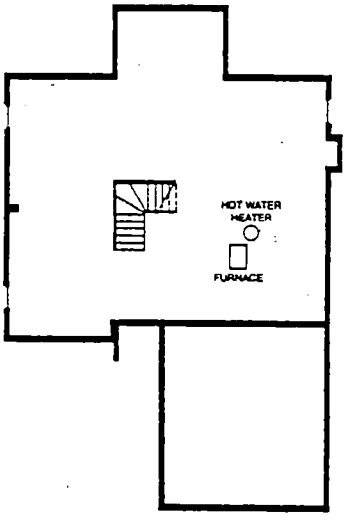


Model DM30a

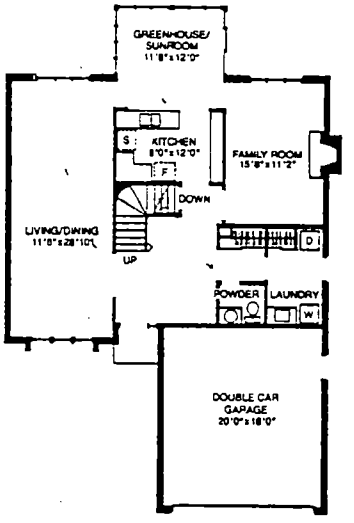


Model DM30b

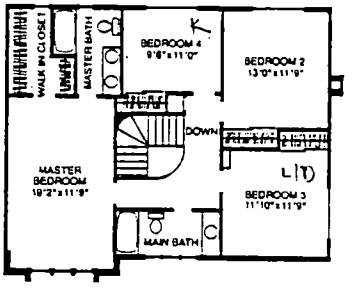
BASEMENT FLOOR PLAN



GROUND FLOOR PLAN



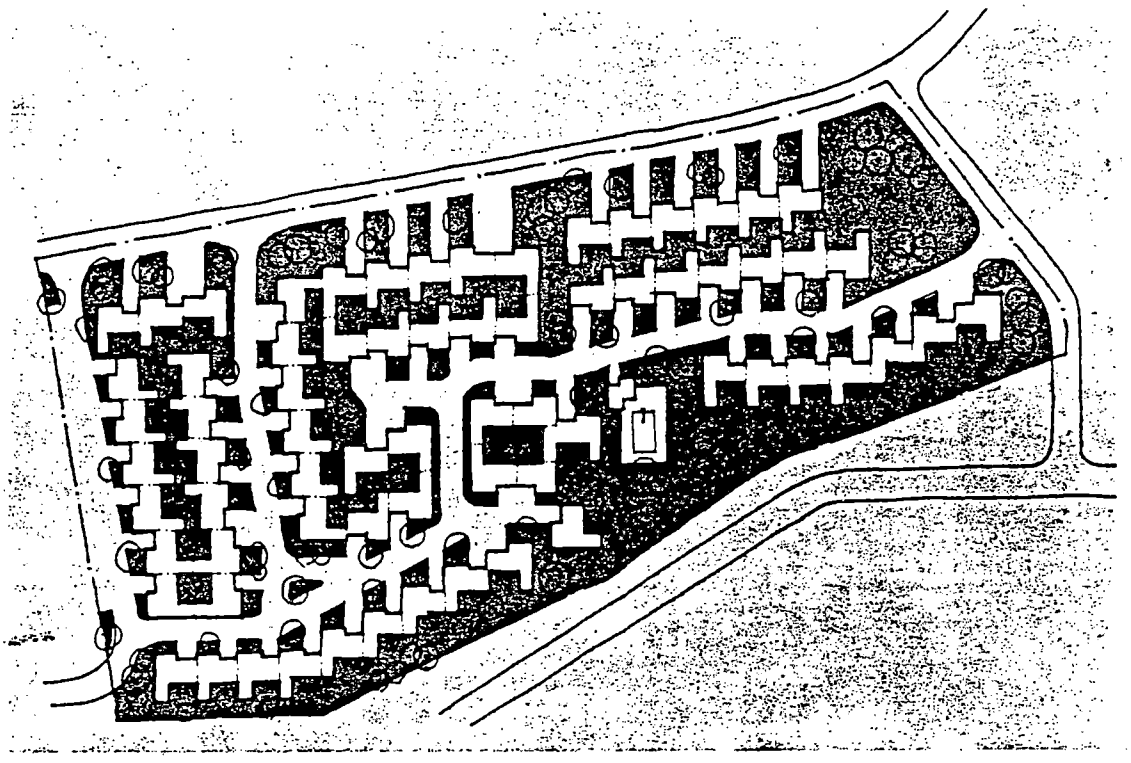
SECOND FLOOR PLAN



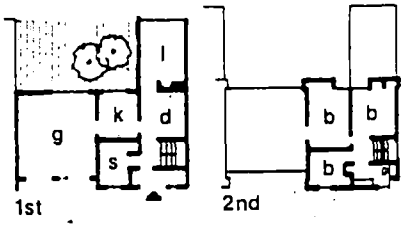
BRAMALEA LIMITED

Note: Room sizes shown may change slightly upon completion of construction

Example 10: House with Double Garage
(Ontario Ministry of Housing: "Site Manning Guidelines for Medium Density Housing;", 1980)



Horizontally Attached Housing
(courtyard houses—all units have garages)

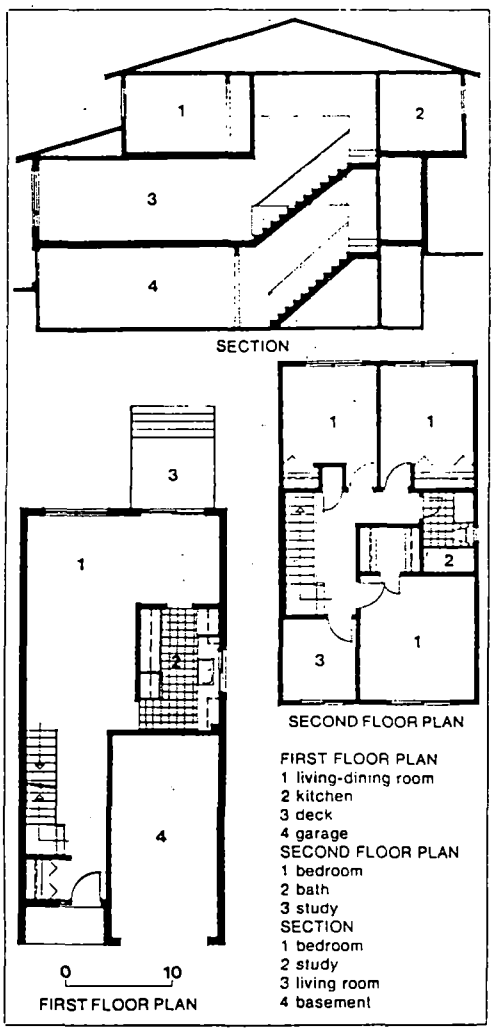


Name: A.Y. Jackson Court
Location: Kanata
Architect: T.M. Gatszegi
Statistics:
Site Area: 3.16 hectares (7.8 acres)
Number of Units: 70 - 3 bedroom units
Density: 22 units per hectare (9 units per acre)
Floor Space Index: 0.27
Parking:
Surface (visitors) 45 Cars
Garages 140 Cars
Private Driveways 70 Cars
Total Parking 255 Cars

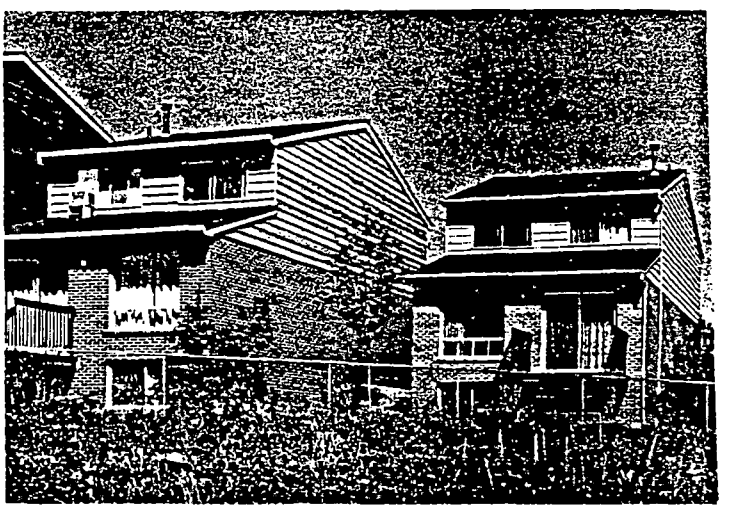
Example 11: Townhouse with Integral Garage
(The Canadian Architect; August 1977)

MILLWAY GATE, MISSISSAUGA, ONTARIO

Architect: James A. Murray



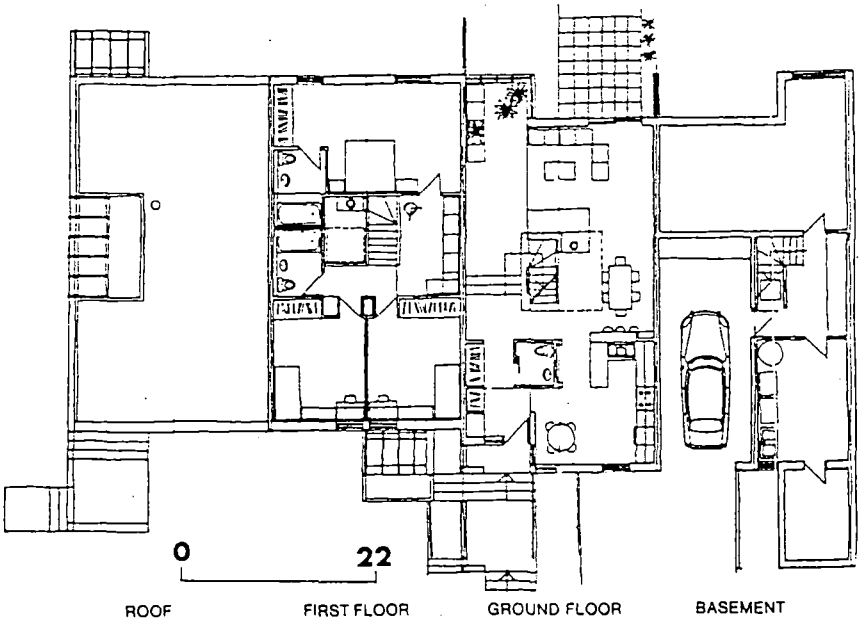
Detached house



Example 11: Townhouse with Integral Garage
(The Canadian Architect; December 1980)

Row Housing, Nuns' Island, Montreal

Architect: Dan Hanganu



Example 12: Single Family House
(Toronto Star; 23 August 1986)

FROM $96,000
TO $115,500
UP TO 1492 SQ. FT.

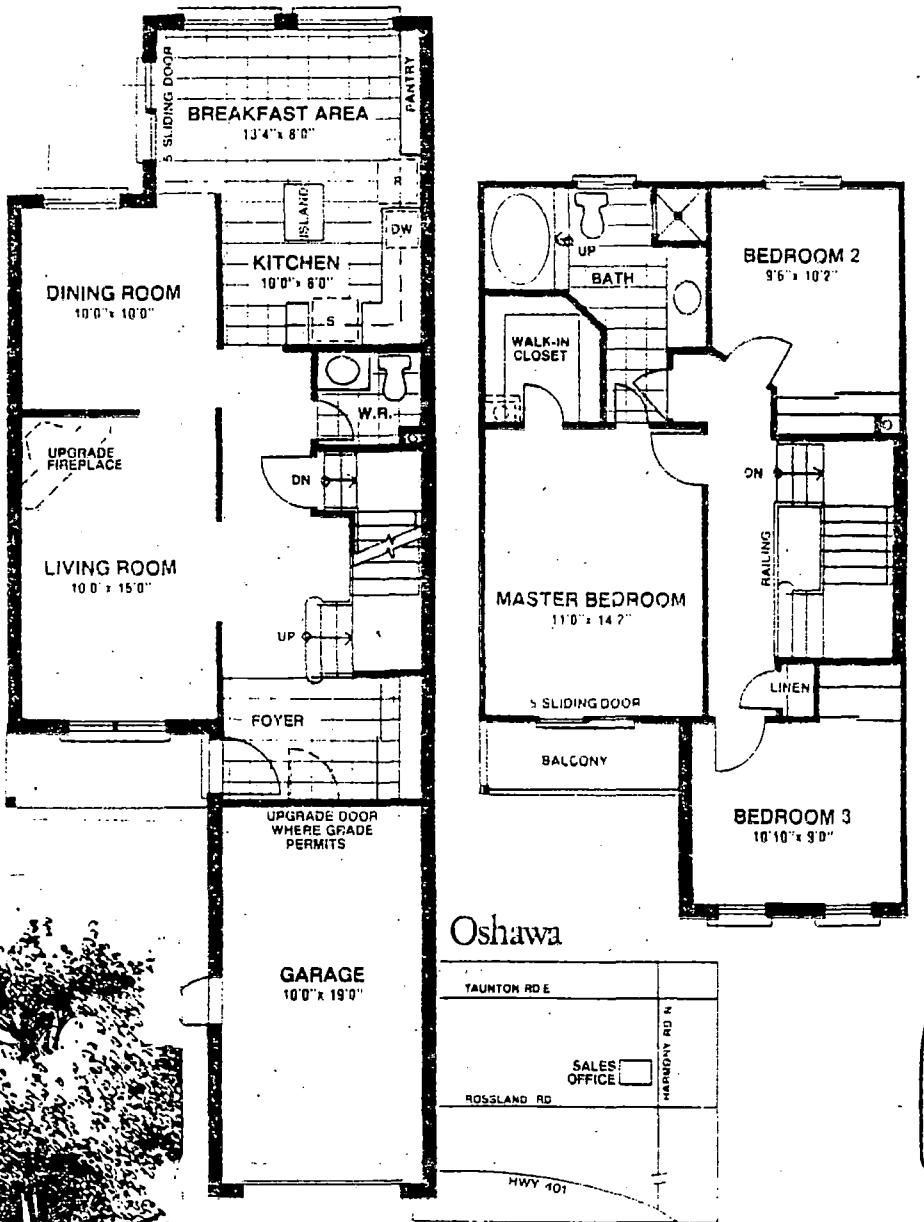
We've hammered down high prices to give you more home for your money. Don't let this unbelievable value pass you by. Act Now! Over 60 homes have been sold in a few short weeks.

Discover fully detached above grade homes with all the "big home" features you've planned for your tomorrow . . . at a price you can afford today. This weekend head for a good deal more. Head for Harmony Heights.

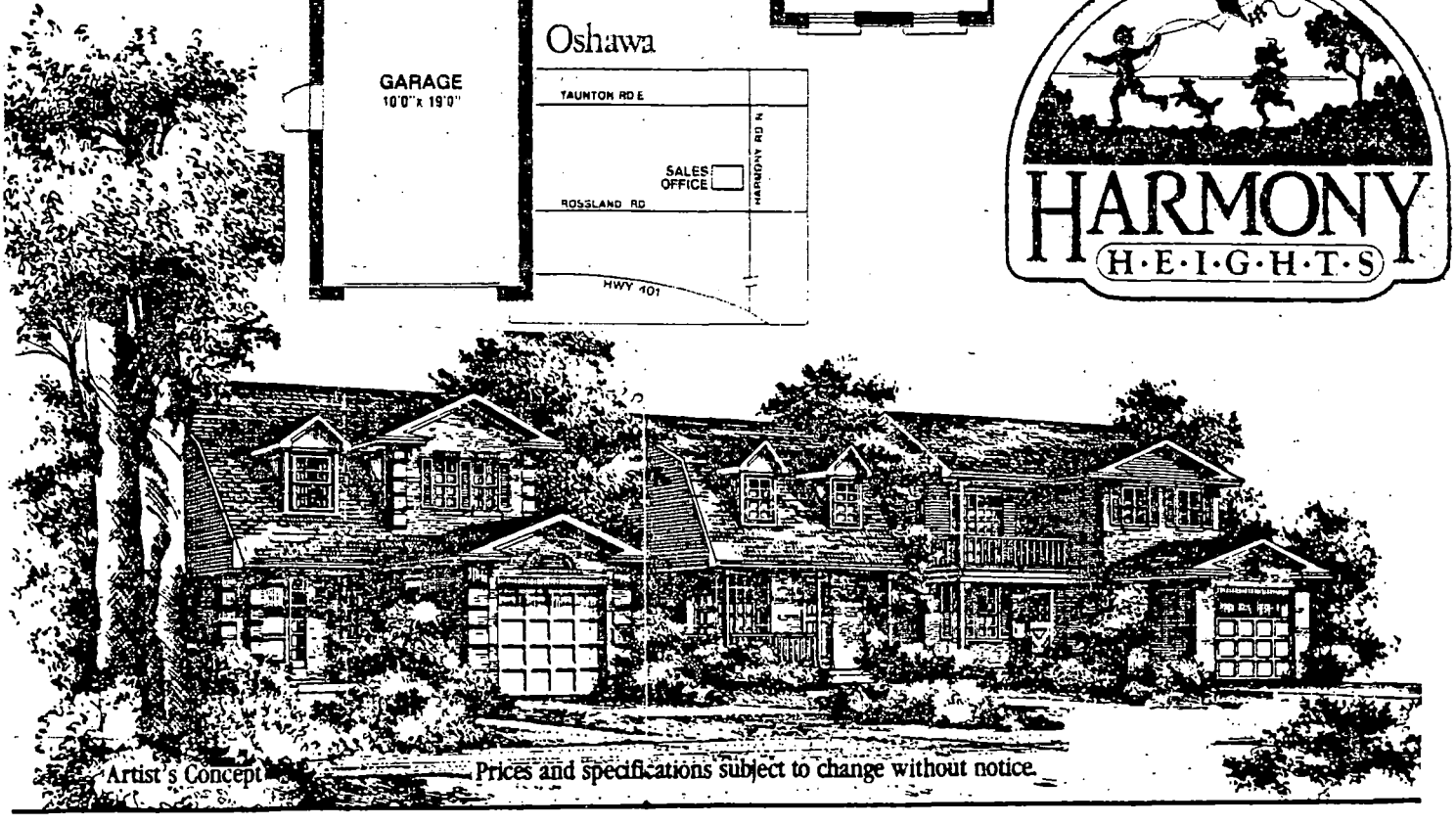
Victoria Wood

TORONTO HOME BUILDERS ASSOCIATION

Our reputation is built around you.



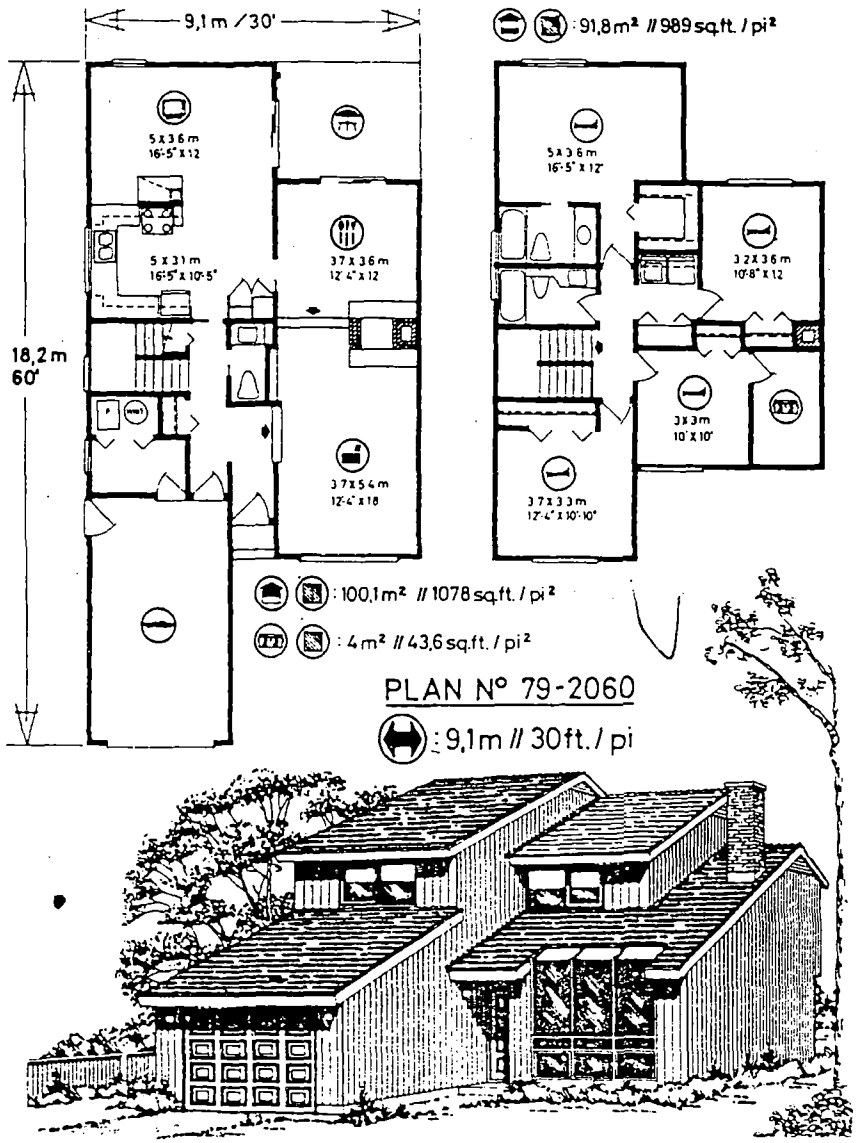
HARMONY
H·E·I·G·H·T·S



Artist's Concept

Prices and specifications subject to change without notice.

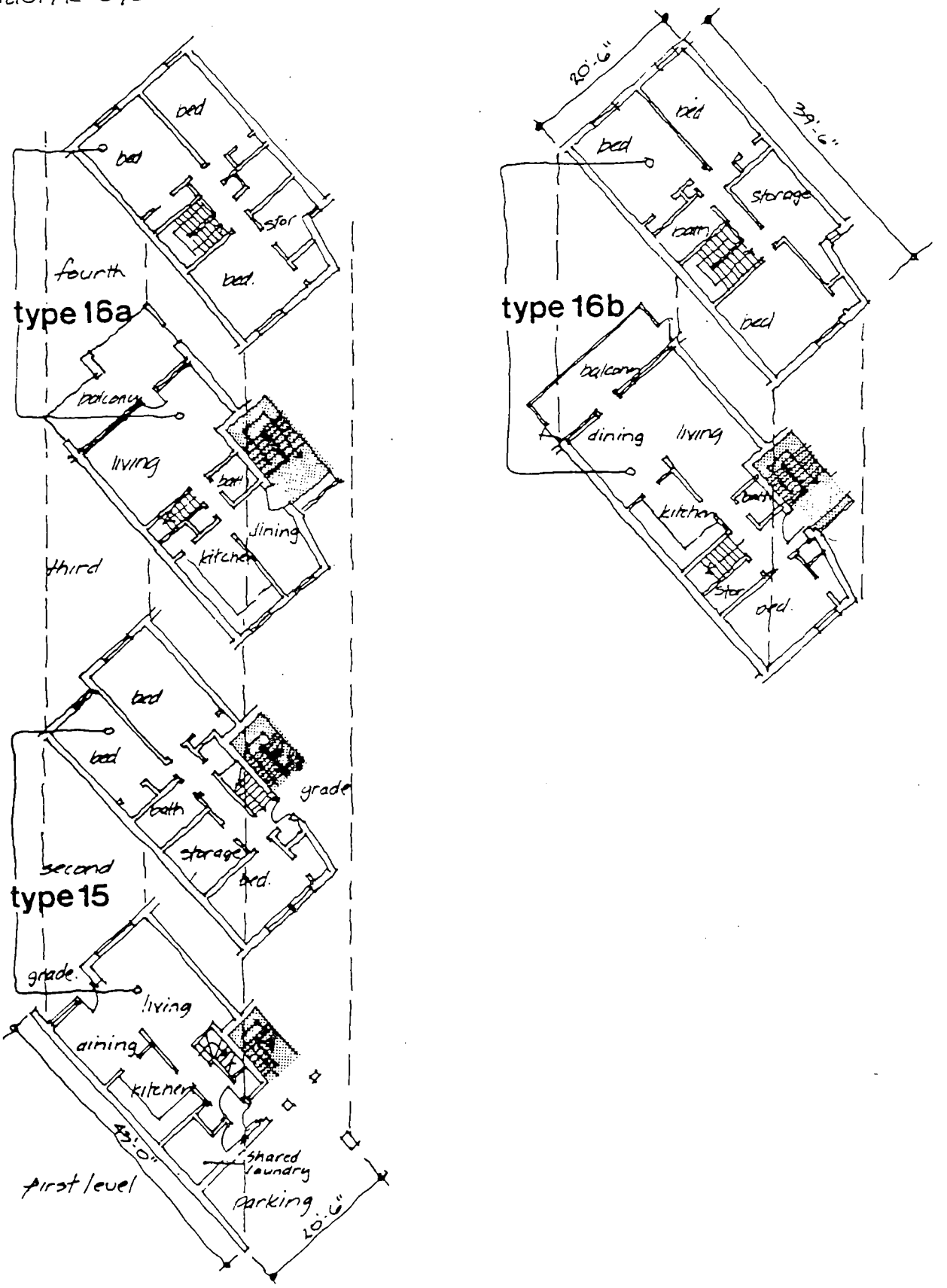
Example 12: Single Family House
(House Design & Decor -
Select Home Designs; 1981)



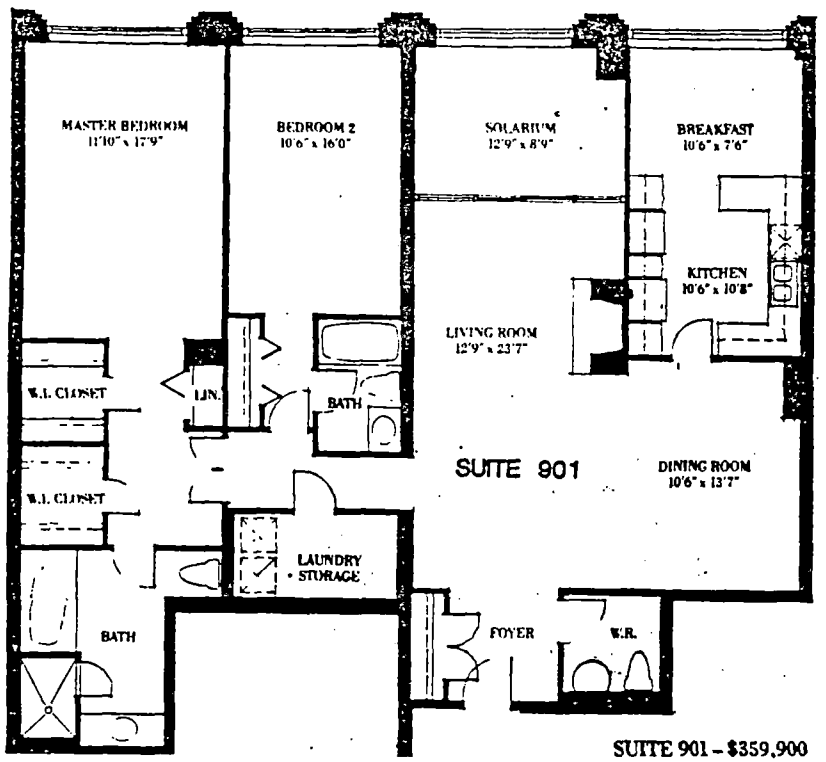
Example 13: Stacked Townhouse
(Peter Barnard Associates: Stacked Housing, 1973)

Flemingdon Park

Vendome 6&8



Example 14: Single Aspect Apartment (4 Bays)
(Local Newspaper - April 1986)



1820 sq. ft.

WITH A SUITE SO UNIQUE, IT'S STRICTLY NOW OR NEVER.

With three new one-of-a-kind suites just introduced at The Residences of Muir Park, there's bound to be a flurry of interested buyers.

Visit our Sales Centre at 3080 Yonge Street, Courtyard Level, NW corner of Yonge and Lawrence. Open Monday-Thursday 11 a.m.-7 p.m.; Friday, Saturday, Sunday & Holidays 11 a.m.-6 p.m. Telephone 482-3497. Prices from $288,900 to $549,900.

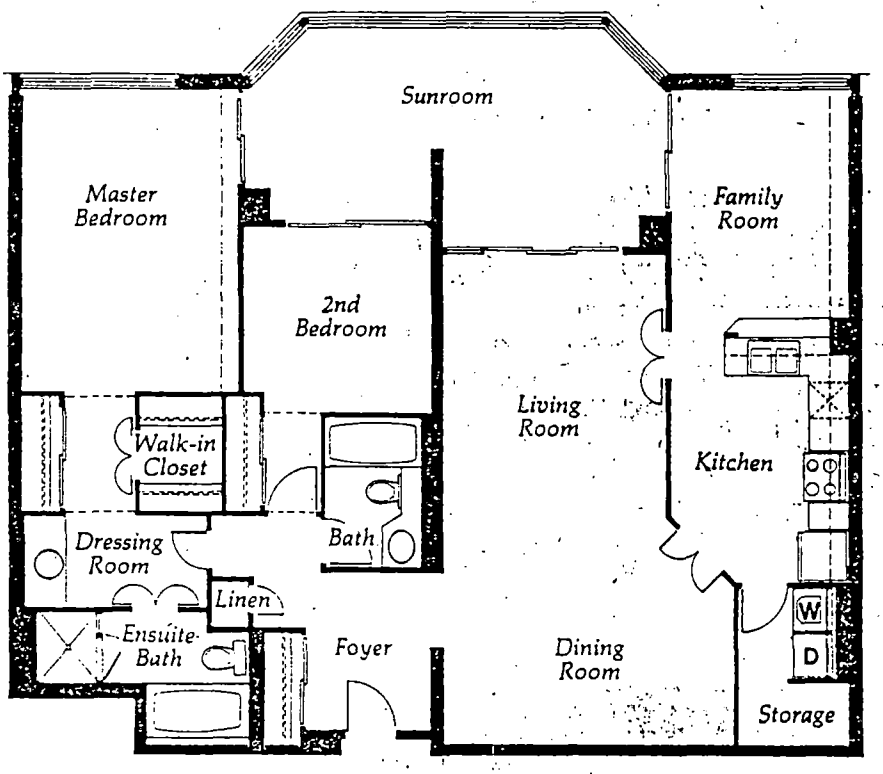
COSTAIN

THE RESIDENCES OF MUIR PARK

BRAND NEW ELEGANCE IN A GRAND OLD

Example 14: Single Aspect Apartment (4 Bays)
(Local Newspaper - November 84)

The Tiffany — 1,665 sq. ft. — from $175,000.



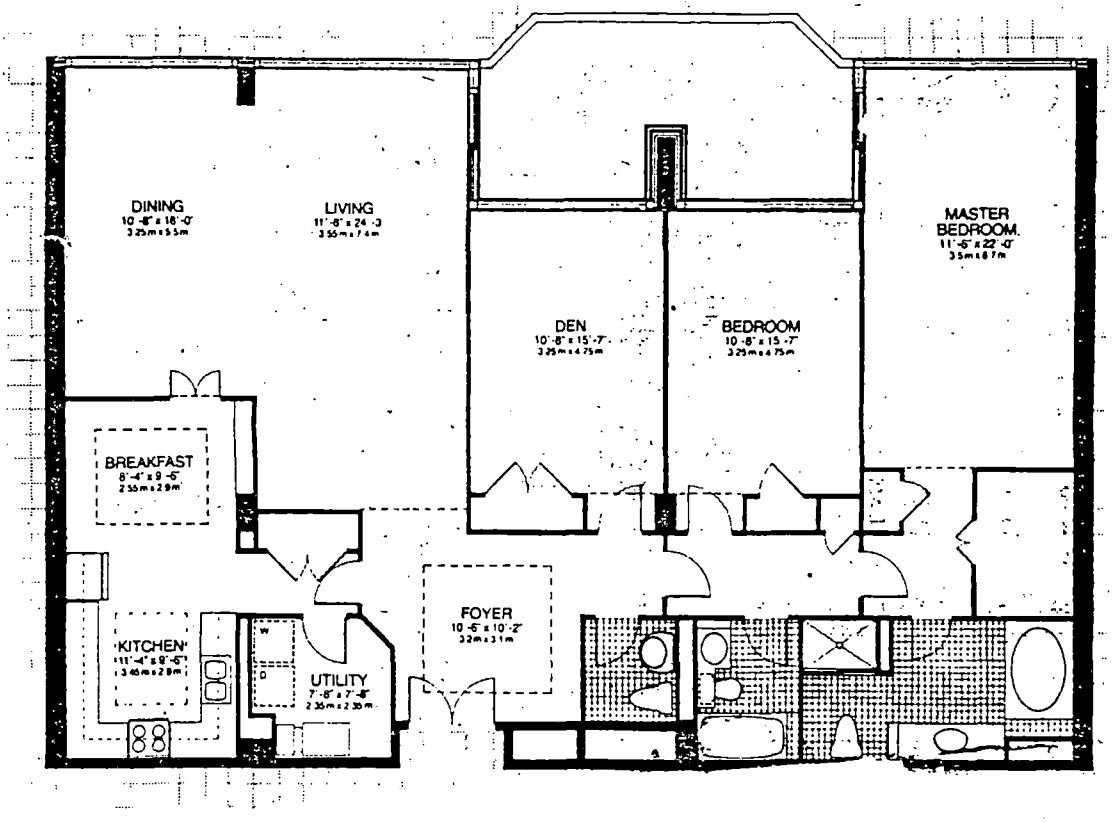
Sky View on Yonge

THE 24 CARAT CONDOMINIUM

WHO ELSE BUT TRIDEL?

From $102,000. to $268,000.
5444 Yonge Street just south of Finch.
Sales Pavilion open Monday to Thursday 10 am. to 8 pm. Friday, Saturday & Sunday 10 am. to 6 pm., (416) 222-1880.

Example 15: Single Aspect Apartment (5 Bays)
(Local Newspaper)



The York Ridge, 2,027 sq. ft.

CELEBRATING SPACE

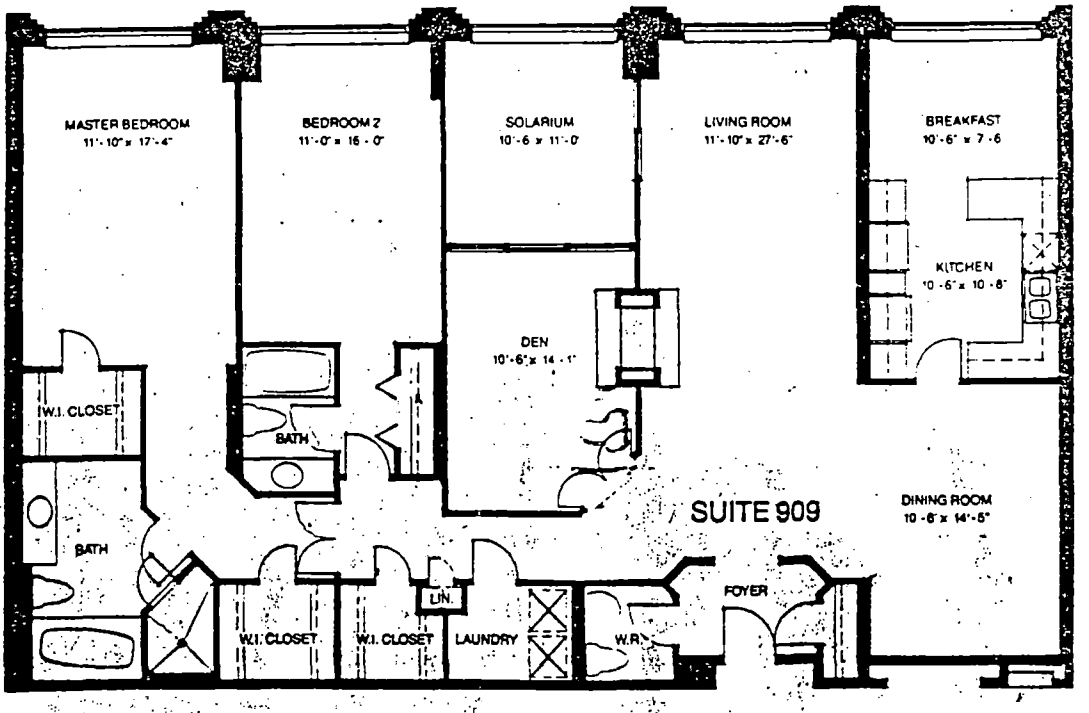
The connoisseur of cosmopolitan living demands a great deal from a Toronto residence. It must be spacious, luxuriously appointed and excellent in every way. To this end we have created York Mills Place.

YORK MILLS PLACE

"Residential Perfection Defined"
3900 Yonge Street

Hours: Monday-Thursday, 10am-8pm, Friday, Saturday & Sunday, 10am-6pm. Appointments recommended. Call 488-3900. Residences $179,000 to $386,000. Prices and specifications subject to change without prior notice.

Example 15: Single Aspect Apartment (5 Bays)
(Local Newspaper - February 1986)



SUITE 909 - $419,900

2,060 sq. ft. suite

WITH A SUITE SO UNIQUE, IT'S STRICTLY NOW OR NEVER.

With four new one-of-a-kind suites just introduced at The Residences of Muir Park, there's bound to be a flurry of interested buyers.

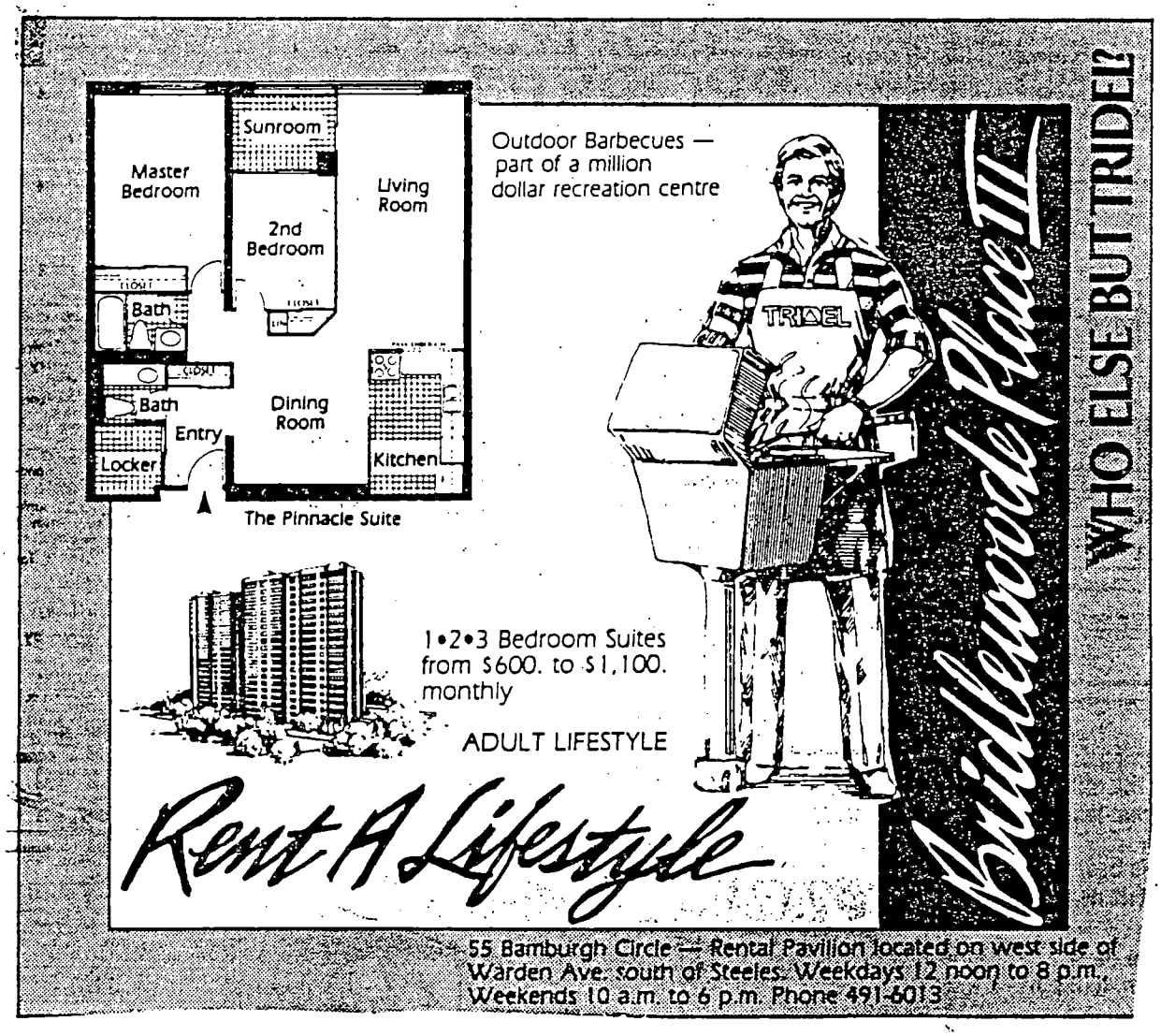
Visit our Sales Centre at 3080 Yonge Street, Courtyard Level, NW corner of Yonge and Lawrence. Open Monday-Thursday 11 a.m.-7 p.m.; Friday, Saturday, Sunday & Holidays 11 a.m.-6 p.m. Telephone 482-3497. Prices in the $267,500 to $549,900 range.

COSTAIN

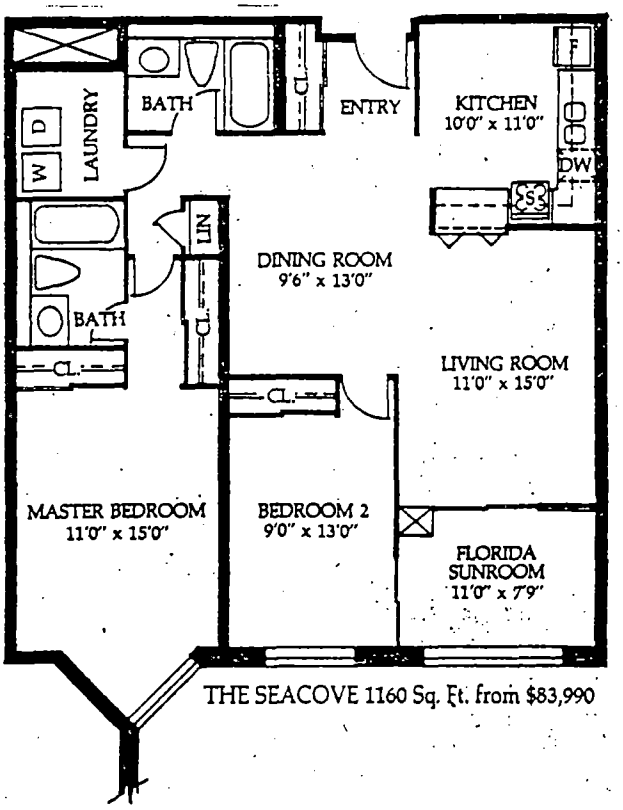
THE RESIDENCES OF MUIR PARK

BRAND NEW ELEGANCE IN A GRAND OLD NEIGHBOURHOOD

Example 15: Single Aspect Apartment (3 Bays)
(Local Newspaper - July 1984)



Example 15: Single Aspect Apartment (3 Bays)
(Local Newspaper - January 1985)



This is the carefree life. Forest Hills Thornhill—Florida sunrooms, sunshine kitchens, ensuite laundry, indoor squash, racquetball and whirlpool, an outdoor pool, a sun-filled solarium lounge—all for your total living pleasure.

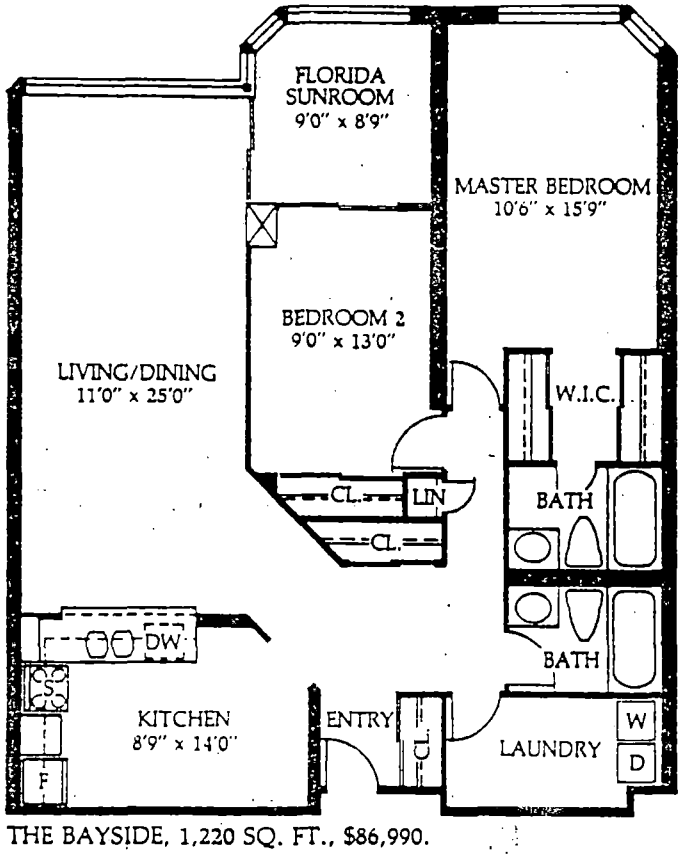
Forest Hills Thornhill—surrounded by lush, landscaped grounds complete with security—24 hour electronic T.V. surveillance, gatehouse, private jogging/walking trail, minutes from major shopping—all in the beautiful community of Thornhill.

Forest Hills Thornhill—built in the Menkes tradition of excellence—all the privacy, pleasure and comfort of this elegant address can be yours.

FOREST·HILLS
THORNHILL
menkes

Sales Centre And Decorated Model
Bathurst, 1 Mile North of Steeles,
Thornhill. 731-3951

Example 15: Single Aspect Apartment (3 Bays)
(Local Newspaper - December 1984)



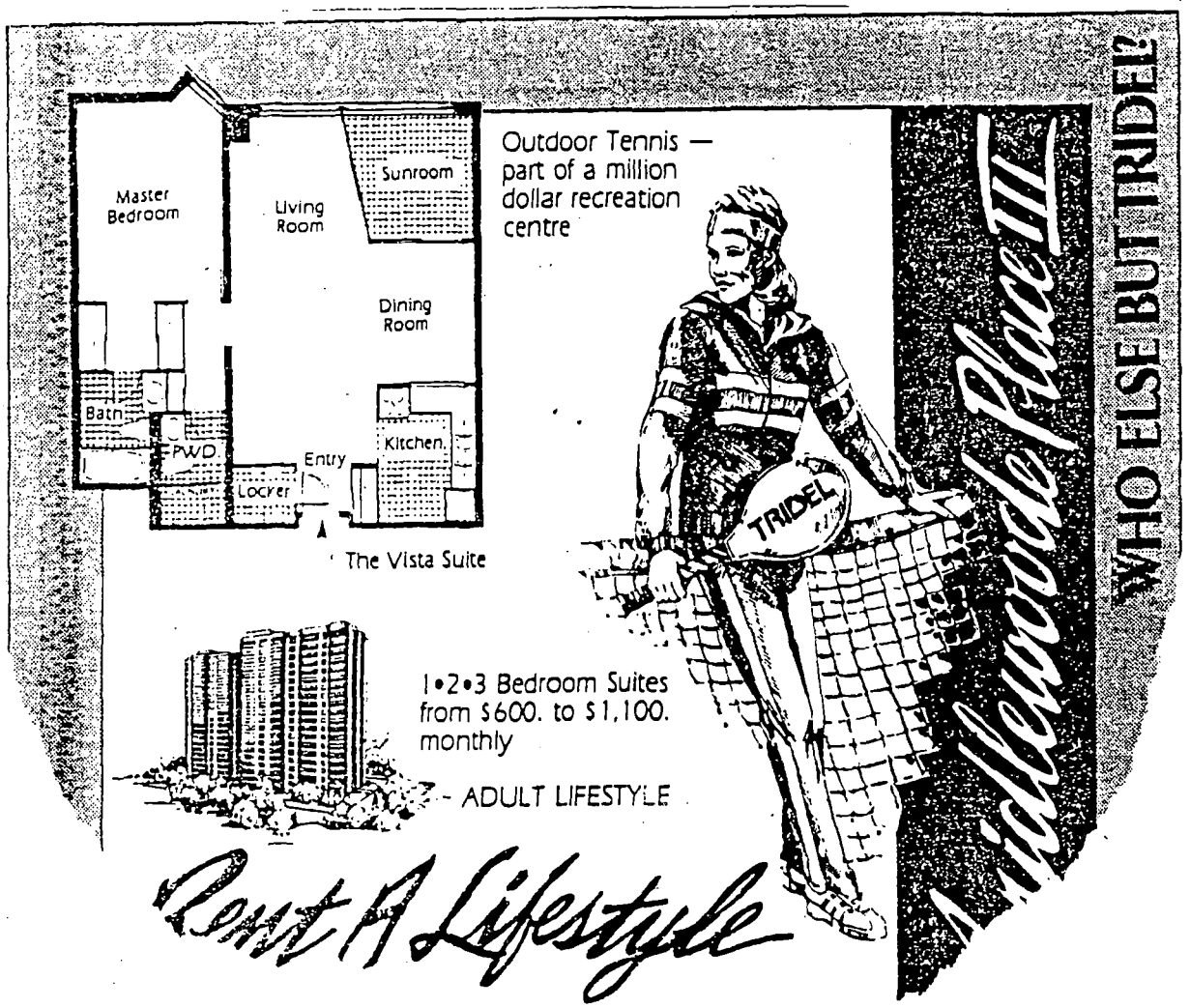
THE BAYSIDE, 1,220 SQ. FT., $86,990.

This is the carefree life.
Forest Hills Thornhill—Florida sunrooms, sunshine kitchens, ensuite laundry, indoor squash, racquetball and whirlpool, an outdoor pool, a sun-filled solarium lounge—all for your total living pleasure.
Forest Hills Thornhill—surrounded by lush, landscaped grounds complete with security—24 hour electronic T.V. surveillance, gatehouse, private jogging/walking trail, minutes from major shopping—all in the beautiful community of Thornhill.
Forest Hills Thornhill—built in the Menkes tradition of excellence—all the privacy, pleasure and comfort of this elegant address can be yours.

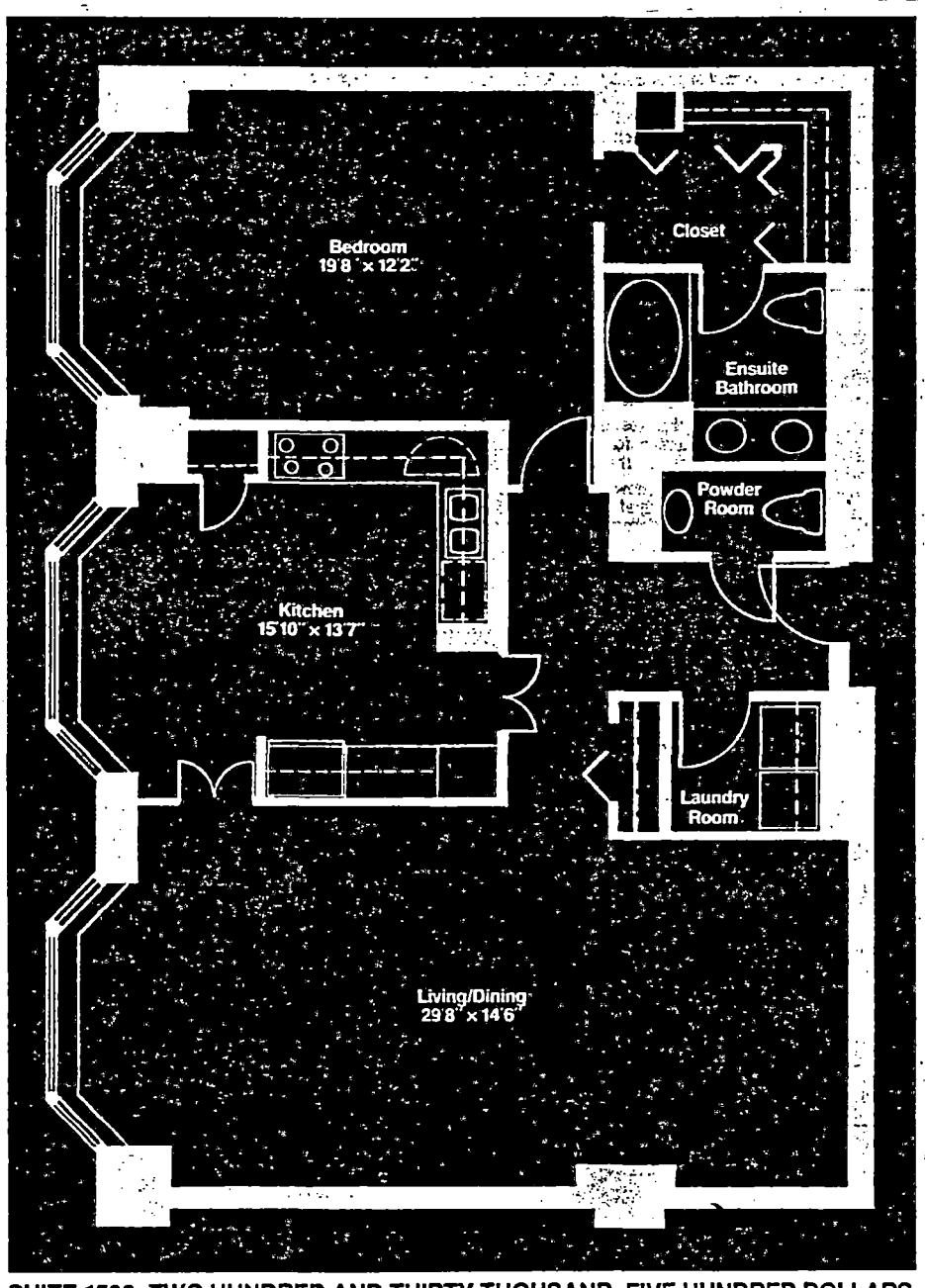
FOREST·HILLS
THORNHILL
menkes

Sales Centre And Decorated Model
Bathurst, 1 Mile North of Steeles,
Thornhill. 731-3951

Example 15: Single Aspect Apartment (3 Bays)
(Local Newspaper - August 1984)



Example 15: Single Aspect Apartment (3 Bays)
(Local Newspaper)



SUITE 1506, TWO HUNDRED AND THIRTY THOUSAND, FIVE HUNDRED DOLLARS.

OTHER ONE BEDROOM HOMES AT RENAISSANCE PLAZA ARE AVAILABLE FROM AN INCREDIBLE ONE HUNDRED. AND EIGHTY-THREE THOUSAND DOLLARS

The Residences at the Top
RENAISSANCE PLAZA

One and two bedroom and two bedroom + den residences on Cumberland across from The Four Seasons Hotel. Starting at $183,000.00 (Subject to availability)

Sales Office and Model Suites:
175 Cumberland St., Toronto, Ontario M5R 3M9 (416) 968-1311
Hours: Mon-Sat: 10-6 Sun: 12-5
Appointments recommended.
Appropriately priced condominium homes at one of the world's finest addresses on Cumberland.

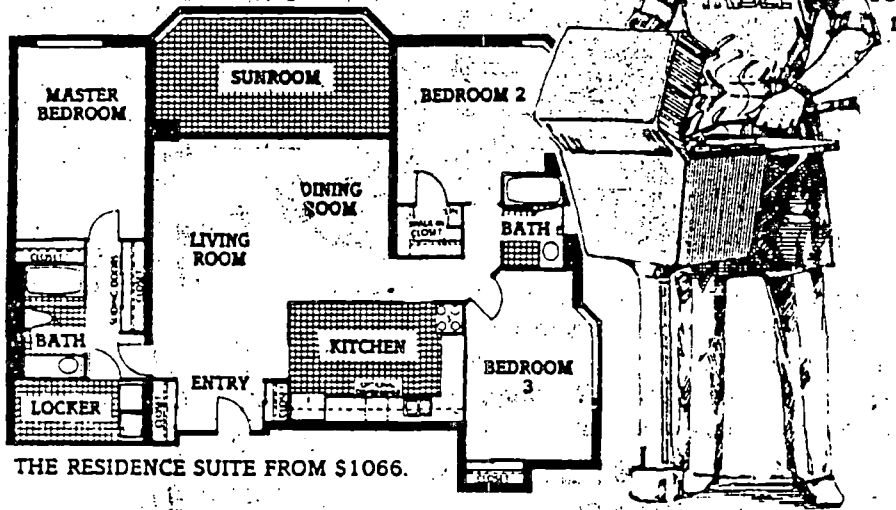
A joint venture of Fidinam Group and Bramalea Limited.

Example 16: Double Aspect (corner) Apartment)
(Local Newspaper - May 1985)

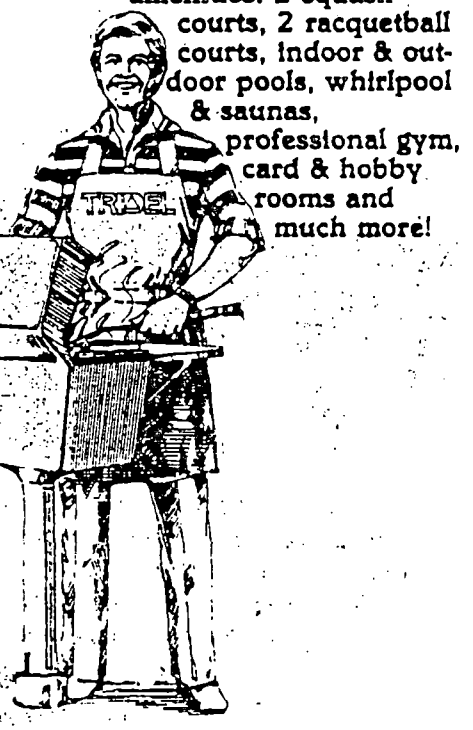
Rent A Lifestyle

2&3 Bedroom Suites from $809 to $1,100 monthly

Residents of Bridlewoode Place enjoy a fabulous array of amenities: 2 squash courts, 2 racquetball courts, indoor & outdoor pools, whirlpool & saunas, professional gym, card & hobby rooms and much more!



THE RESIDENCE SUITE FROM $1066.



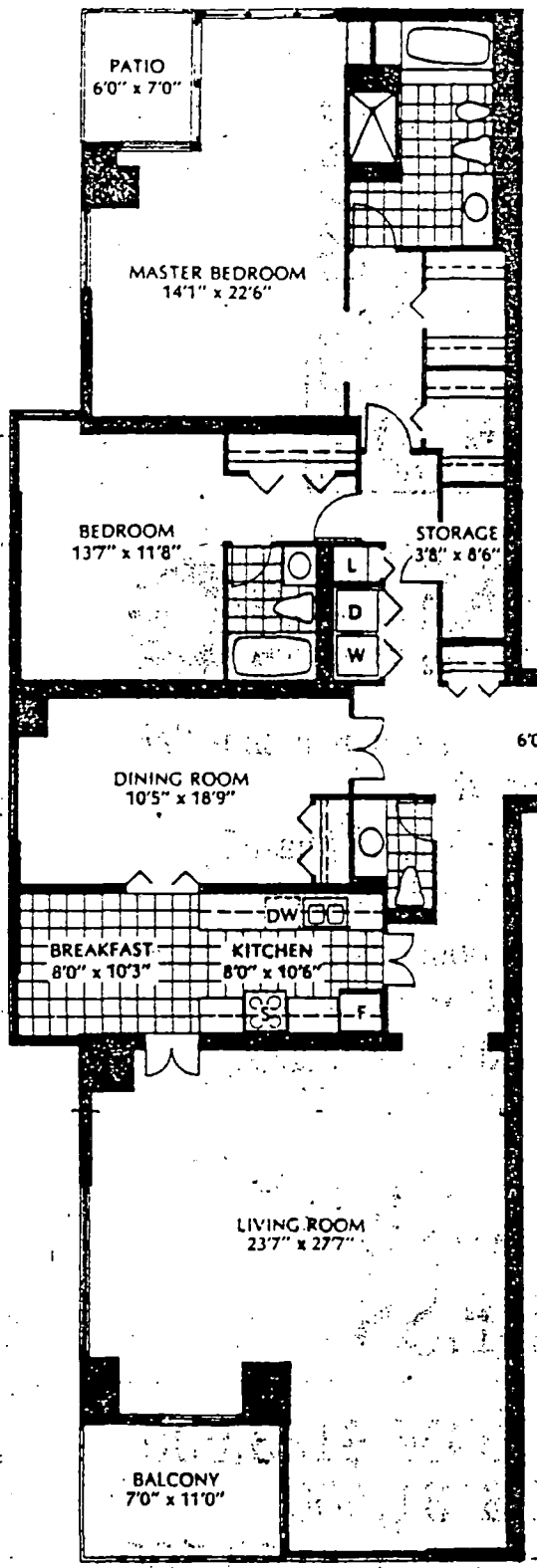
Bridlewoode Place

Adult Lifestyle TRIDEL

Model Suites and Rental Office located at 55 Bamburgh Circle — on west side of Warden Ave. south of Steeles. Weekdays 12 noon to 8 p.m. Weekends 10 a.m. to 6 p.m. Phone 491-6013.

Also, refer to the "SkyPark" example facing page 10 in the main body of the report.

Example 17: Triple Aspect (End) Apartment)
(Local Newspaper - April 1986)

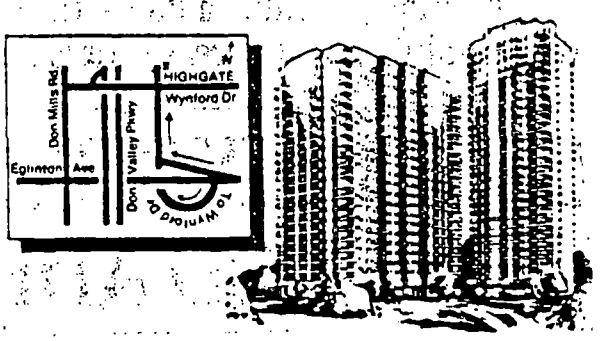


GET MORE SPACE AND BETTER VALUE
WITH IMMEDIATE OCCUPANCY
IN SUPER SPACIOUS SUITES
-FROM 1845 SQ. FT. TO 2260 SQ. FT.

Dinners with friends, formal entertaining, special family gatherings or serving the Thanksgiving turkey, now there's plenty of room for the largest dining room table and buffet. Expand your lifestyle in a luxury residence that offers more space and more value per square foot than any other comparable condominium. Over-sized dining rooms are just one of the features. Enter a world of recreational facilities that include a 50' indoor pool, skylight whirlpool, fully equipped exercise room, hobby and billiard rooms, squash, racquetball and flood-lit tennis courts.

Live life to the fullest in lushly landscaped grounds within the natural beauty of a ravine setting. Huge living areas, generous bedrooms, spacious family rooms and bigger bathrooms all add up to more liveability and an investment that makes more sense.

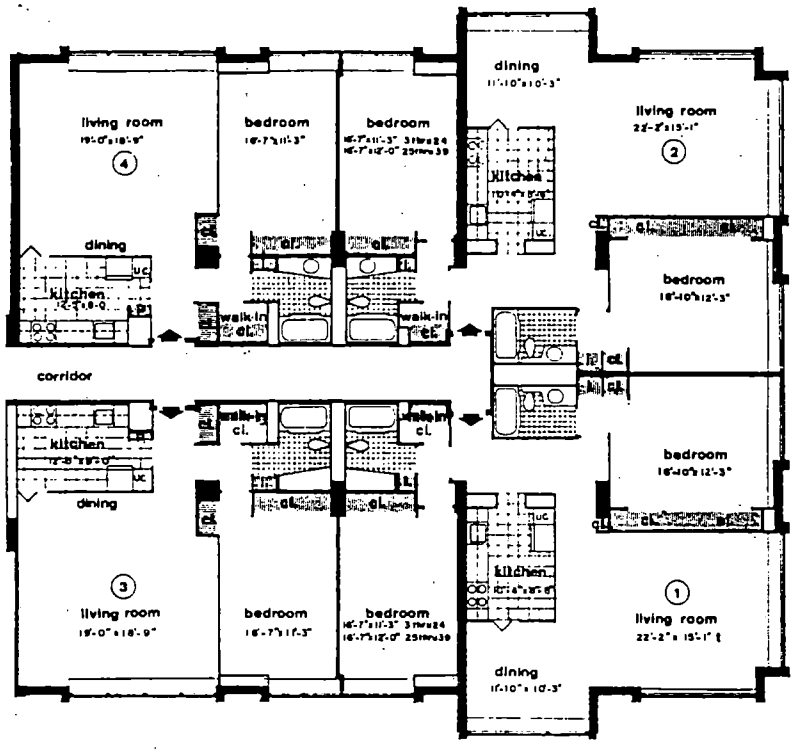
From **$163,000**



Monday-Thursday: 12:00-8:00 p.m.
Friday, Saturday and Sunday: 12:00-6:00 p.m.
(416) 449-1212

HIGHGATE

Examples 15 & 17: Single and Triple Aspect Apartments
(Macsai: Housing; 1976)



Hawthorne House: Chicago, Illinois

APPENDIX E

BASIS FOR CONVERSION COSTS

APPENDIX E: BASIS FOR COST ESTIMATES

The process for determining the conversion followed these steps. First, the modifications needed for each conversion scheme were identified and measured where appropriate. Then, the unit costs were estimated for the main categories of modifications (see Table E.1). Finally, the identified modifications were costed using the appropriate unit costs (see Tables E.2a-1).

When unnecessary changes were found during this process, the designs were revised whenever possible to minimize costs. This means that many of the schemes shown in the previous interim reports have been altered.

The units cost were developed using the experience of the consultants, contacts with specialized contractors, and input from Arthur Hooker, a professional cost consultant. In general, the costs allow for both labour and materiel. They also are intended to reflect the small volumes and special difficulties associated with renovations.

The estimates of the deconversion costs (see Table E.3) and the construction premiums (see Table E.4) followed somewhat the same process. It was less elaborate, however, because the modifications needed were less extensive.

Table E.1: UNIT COSTS

kitchens:	
counters*	$100-175/ft
2 appliances & sink with taps	$1500
plumbing (supply and vent)	$500-1000
bathrooms	
3 pieces with finishing (tiling, mirror, towel rack, etc,)	$3500
laundry	
washer and dryer	$1000
internal partitions	
standard (2"x4" stud framing with 1/2" wallboard for 8' ft high wall)	$30/ft**
fire-rated (2"x4" stud framing with 5/8" wallboard for 8' ft high wall)	$35/ft
fire/sound improvements	$1.50/ft^2
doors (with frame and hardware):	
standard	$250
fire-rated (solid core with closer)	$400
external	$550
closets (with doors and fixtures):	
linen (2 ft)	$400
clothes (4 ft)	$300
(8 ft)	$500
entrance (3 ft)	$300
external walls:	
finishing (insulation (R10), vapour barrier drywalling and strapping)	$3.25/ft^2
infill (stud framing, cladding, insulation, etc.,)	$12-15/ft^2
flooring:	
sub-floor (sleepers, plywood, vapour barrier and insulation)	$4.00/ft^2
tiling	$1.50/ft^2
carpetting	$2.00/ft^2
painting:	
interior	$0.35/ft^2
windows:	$30/ft^2
electrics:	
circuit: 15 amp	$35/box
30 amp	$40/box
fixtures: light	$25
fused outlet for bathroom	$40
30 amp outlet for dryer & oven	$10
service: upgrading to 200 amp	$800
heating: baseboard heater (unit and install)	$85

* 8' = $1400 12' = $1800
9' = $1500 13' = $1900
10' = $1600 15' = $2100
11' = $1700 16' = $2200

** add 25% for small jobs

Table E.2a: CONVERSION COST:
Example 3 - "Baroque" Townhouse with Basement Unit

	Quantity	Cost
1. kitchen:		
counters	9 ft	1500
appliances		1500
plumbing		500
2. bathroom:		
fixtures		3500
finishing		
3. laundry:		
facilities		1000
plumbing		100
4. internal partitions:		
standard	17 ft	500
fire-rated	4 ft	150
5. external walls:		
drywalling, strapping & insulation	860 ft^2	2200
6. closets: clothes	7 ft	500
7. doors		
external	1	550
internal	2	500
8. floor:		
carpetting	330 ft^2	650
tiling	200 "	300
9. painting	2500 ft^2	850
10. electrics:		
service		
heating		150
circuits & fixtures		600
11. removals: panel for external doorway		50
	Total	15100
exc. fire/sound improvements:		
ceiling	630 ft^2	950
wall	70 ft^2	100

Table E.2b: CONVERSION COST:
Example 4 - Back-Split House with Basement Unit

	Quantity	Cost
1. kitchen:		
counters	11 ft	1700
appliances		1500
plumbing		750
2. internal partitions:		
standard	56 ft	1700
fire-rated	7 ft	250
3. closets (doors & fittings)		
clothes	10 ft	550
	5 ft	350
linen	2 ft	400
4. doors (with hardware)		
standard internal	3	750
fire-rated	2	800
5. painting	3000 ft^2	1000
6. electrics:		
service		
heating		100
circuits & fixtures		450
	Total	10300
exc. fire/sound improvements:		
ceiling	1380 ft^2	2050
wall	300 ft^2	450

Table E.2c: CONVERSION COST:
Example 5a - "Victorian" House with Upper Unit

	Quantity	Cost
1. kitchen:		
counters	16 ft	2200
appliances		1500
plumbing		750
2. laundry (basement)		
facilities		1000
plumbing		100
3. internal partitions:		
standard	19 ft	600
fire-rated	7 ft	250
4. closets:		
bedroom	12 ft re-used	500
5. doors:		
fire-rated	1	400
6. painting:	4000 ft^2	1400
7. flooring		
repairs at entrance		150
kitchen floor	50 ft^2	100
carpetting	300 ft^2	600
8. electrics:		
service		
heating		25
circuits & fixtures		425
9. removals		
partitions on second floor		250
bedroom closets (2)		
	Total	10250
exc. fire/sound improvements		
ceiling	850 ft^2	1300
stair partition	40 ft^2	50

Table E.2d: CONVERSION COST:
Example 5b - "Victorian" House with Basement Unit

	Quantity	Cost
1. kitchen:		
counters	8 ft	1400
appliances		1000
plumbing		500
2. bathroom:		
fixtures (3 pieces)		3600
finishing		
3. laundry :		
appliances		1000
plumbing		100
4. internal partitions:		
standard	40 ft	1200
5. external walls:		
strapping, drywalling & insulation	1080 ft^2	3500
infill	25 ft^2	300
6. closets		
clothes	12 + 9 ft	1200
entrance	6 ft	400
linen	2 ft	400
7. doors		
internal	3	750
8. windows: living rm		600
9. floor:		
framing and insulation	260 ft^2	1000
carpetting	600 ft^2	1200
tiling	100 ft^2	150
10. painting:	3000 ft^2	1000
11. electrics:		
heating		250
circuits & fixtures		900
12. removals		
garage doors, stair & garage partition		350
	Total	20800
exc. fire/sound imp'ts: ceiling	800 ft^2	1200

Table E.2e: CONVERSION COST:
Example 7 - Narrow House with Vertical-Split Unit

	Quantity	Cost
1. kitchen:		
counters	12 ft	1800
appliances		1500
plumbing		900
2. internal partitions:		
standard	40 ft	1200
fire-rated	6 ft	200
3. doors (with frame & hardware)		
fire-rated	2	800
internal	2 re-used	200
4. painting:	3000 ft^2	1000
5. electrics:		
service		
circuits & fixtures		500
6. other		
stairway		2500
flooring in new kitchen	40 ft^2	100
linen closet	3 ft	500
	Total	11200
exc. fire/sound improvements		
wall	440 ft^2	650
ceiling	560 ft^2	850

Table E.2f: CONVERSION COST:
Example 8Aa - Two-Storey with Upper Unit

	Quantity	Cost
1. kitchen:		
counters	15 ft	2100
appliances		1500
plumbing		500
laundry facilities		1000
2. bathroom:		
fixtures (3 pieces)		3500
finishing		
laundry hook-up (basement)		100
3. internal partitions:		
standard	55 ft	1650
fire-rated	7 ft	250
4. external walls:		
insulation, drywalling & strapping	900 ft^2	2900
5. closets		
clothes	2 x 7 ft	700
clothes	10 ft	500
entrance	3 ft	300
linen	3 ft	500
6. doors		
fire-rated	2	800
standard	5	1250
7. flooring:		
tiling	400 ft^2	600
carpetting	500 ft^2	1000
8. painting:	4500 ft^2	1600
9. electrics:		
service		
heating		250
circuits & fixtures		400
10. removals:		
walk-in closet and partitions 200		
bedroom closet		
entrance closet and partitions		
	Total	21600
exc. fire/sound improvements		
ceiling	620 ft^2	950
wall	100 ft^2	150

Table E.2g: CONVERSION COST:
Example 8Ab - Two-Storey House with Basement Unit

	Quantity	Cost
1. kitchen:		
counters	15 ft	2100
appliances		1500
plumbing		600
laundry facilities		1000
2. internal partitions:		
standard	50 ft	1500
fire-rated	3 ft	100
3. closets		
clothes	3+6 ft	700
entrance	3 ft	300
linen	3 ft	500
4. doors		
standard	3	750
5. external walls:		
insulation, drywalling & strapping	900 ft^2	2900
6. flooring:		
tiling	300 ft^2	450
carpetting	250	500
7. bathroom:		
fixtures (3 pieces)		3500
finishing		
8. painting:	2500 ft^2	800
9. electrics:		
service		
heating		250
circuits & fixtures		950
10. other		
removal of door and doorway		
plumbing/cabinetwork for upstairs laundry		250
	Total	18650
exc. fire/sound improvements		
ceiling	620 ft^2	950
wall	100 ft^2	150

Table E.2h: CONVERSION COST:
Example 9 - Wide-Front House with Garage Unit

	Quantity	Cost
1. kitchen:		
counters	6 ft	1200
appliances		1500
plumbing		500
2. bathroom		
fixtures (3 pieces) & finishing		3500
3. internal partitions:		
standard	40 ft	1200
partywall	3 ft	100
4. external walls		
drywalling, strapping & insulation	300 ft^2	1000
infill around windows	50 ft^2	600
5. closets (with doors & fittings):		
clothes	5 ft	350
linen	2 ft	400
entrance	3 ft	300
6. doors: internal	2(+1 re-used)	650
7. windows:		
bedroom		600
livingroom		600
8. ceiling:		
insulation & drywalling	400 ft^2	1300
9. flooring:		
built-up	400 ft^2	1600
tiling	140 ft^2	200
carpetting	240 ft^2	500
10. painting:	1500 ft^2	500
11. electrics:		
heating		250
circuits & fixtures		800
12. removals		
garage doors (2)		100
connecting door and frame		
	Total	16450
exc. fire/sound improvem'ts: walls	150 ft^2	200

Table E.2i: CONVERSION COST:
Example 11 - Townhouse with Integral Garage Unit

	Quantity	Cost
1. kitchen:		
counters	12 ft	1800
appliances		1500
plumbing		500
2. bathroom		
fixtures (3 pieces) & finishing		3500
3. internal partitions:		
standard	17 ft	750
fire-rated	2 ft	
4. external walls:		
strapping, drywalling & insulation	180 ft^2	600
infill	25 ft^2	300
5. closets		
linen	2 ft	400
clothes	6 ft	400
6. doors		
fire-rated	2	800
internal (re-used)	3	300
7. windows: bedroom		600
8. floor:		
sleepers and insulation	200 ft^2	800
tiling	60 ft^2	100
carpetting	200 ft^2	400
9. other: plumbing & vent for upstairs laundry		250
10. painting:	2000 ft^2	700
11. electrics:		
heating		175
circuits & fixtures		625
12. removals		
garage door		250
internal partitions and doorways (3)		
storage for laundry		
	Total	14750
exc. sound/fire improvem'ts: ceiling	540 ft^2	800
walls	80 ft^2	100

Table E.2j: CONVERSION COST:
Example 14B - Single-Aspect Apartment (4 bay)

	Quantity	Cost
1. kitchen:		
counters	10 ft	1600
appliances		1500
plumbing		500
2. bathroom		
bathtub		800
plumbing		
finishing		
3. laundry		
facilities		1000
plumbing		100
4. internal partitions:		
standard	32 ft	1200
partywall	3 ft	
5. closets		
clothes (re-used)	2 x 8 ft	500
entrance	5 ft	400
6. doors		
external	1	550
internal (re-used)	3	300
7. other		
balcony partition		700
8. painting:	2000 ft^2	700
9. flooring		
tiling	160 ft^2	250
carpetting	200 ft^2	400
10. electrics:		
service		100
circuits & fixtures		450
11. removals		
walkin-closet		400
entrance door opening		
bedroom closet & wall (2)		
bathroom wall		
	Total	11450

Table E.2k: CONVERSION COST:
Example 15 - Single-Aspect Apartment (5 bay)

	Quantity	Cost
1. kitchen:		
counters	12 ft	1800
appliances		1500
plumbing		250
2. internal partitions:		
standard	22 ft	750
partywall	3 ft	100
3. closets		
entrance	3 ft	300
linen	2 ft	400
bedroom (re-used)	8 ft	250
4. doors		
entrance	1	550
internal (re-used)	4	400
5. other		
balcony partition		700
tiling bathtub etc.		200
6. plumbing		
removals		100
relocated bathtub & sink		250
laundry facilities		1000
laundry hook-up		200
7. flooring		
tiling	100 ft^2	150
carpetting	100 ft^2	200
8. painting	2000 ft^2	700
9. electrics:		
service		100
heating		50
circuits & fixtures		550
10. removals		
walkin-closet, bathroom, bathroom wall, storage room wall, entrance doorway and bedroom closet		500
	Total	11000

Table E.21: CONVERSION COST:
Example 16 - Double-Aspect Apartment

	Quantity	Cost
1. kitchen:		
counters	10 ft	1600
appliances		1500
plumbing		500
2. internal partitions:		
party wall	3 ft	200
standard	2 ft	
3. doors		
internal (re-used)	1	100
4. flooring		
tiling	50 ft^2	100
carpetting	100 ft^2	200
5. painting	1500 ft^2	500
6. electrics:		
service		100
circuits & fixtures		300
7. removals		
closet		100
walls & doorways		
	Total	5200

Table E.3: DECONVERSION COSTS

Example 3: $750

- remove extra entrance door & frame, and fill opening with glazing panel
- make doorway opening between stairways in party wall
- remove door at foot of stairs in basement

Example 4: $0

- remove door at top of stairs on main floor (?)

Example 5a: $2500*

- remove extra entrance door and associated partition
- remove kitchen on second floor and associated partitions and floor
- add bedroom partitions and two doors with frames
- add new flooring in bedroom
- add two bedroom closets (2 x 8 ft)
- remove door one second floor at head of stair

Example 5b: $2500*

- remove kitchen and associated partition
- remove front windows and associated infill panelling
- remove flooring and sub-flooring in garage area
- add stairs to basement
- install garage doors
- add garage partition and associated door

Example 7: $1500*

- make openings in party wall on ground and second floor
- remove extra stairway and add walls/railings as necessary, and remove extra linen closet over stairs
- remove kitchen & associated partitions, replace floor, and add partition at entrance
- remove partition and two doors in basement, and add door with frame

Example 8a: $2500*

- remove kitchen
- add closet (10 ft) and replace floor in back bedroom
- remove extra entrance doorway and associated partition
- complete partition at entrance and change closet (?)
- remove door at head of stairs on second floor
- add walk-in closet

Table E.3 (continued)

Example 8b: $750*

- make opening in wall at top of stairs on ground floor
- remove laundry in ground floor kitchen and add cabinets

Example 9: $2000

- remove bathroom and kitchen
- remove internal partitions and repair ceiling
- remove living and bedroom windows and associated infill panelling
- remove flooring and sub-flooring
- install garage doors
- add door into main entrance area

Example 11: $1750*

- remove bathroom and kitchen (?)
- remove bathroom/bedroom partition and repair ceiling
- remove flooring and sub-flooring in garage area
- remove bedroom window and associated infill panelling
- add new wall and doorway
- remove upstairs laundry and install cabinet
- install garage doors

Example 14B: $2500*

- make opening in party wall
- remove kitchen and extra laundry
- replace flooring in kitchen area
- remove balcony partition
- close extra entrance door opening
- add bedroom partition, two doorways and closet
- add closet for new walk-in closet

Example 15: $7250*

- make opening in party wall
- close extra entrance door opening
- remove kitchen
- add bathroom
- add walk-in closet
- remove two redundant doorways
- add partition for storage room

Example 16: $1500*

- make opening in party wall
- remove kitchen
- add closet, two doorways and associated partitions

---

* excluding value of discarded kitchen cabinets and appliances

Table E.4: CONSTRUCTION PREMIUMS

Example 3	
- wider stairs	200
- larger windows	800
- fire & sound improvements	600
Example 4	
- fire & sound improvements	1450
Example 5a	
- fire & sound improvements	750
Example 5b	
- additional basement doorway	500
- fire & sound improvements	700
Example 7	
- skylight and lightwell	1000
- fire & sound improvements	850
Example 8a	
- larger basement windows	1000
- fire & sound improvements	600
Example 8b	
- larger basement windows	1000
- fire & sound improvements	600
Example 9	
- two windows	500
- fire & sound improvements	150
Example 11	
- fire & sound improvements	550

APPENDIX F

WORKING ASSUMPTIONS FOR
ECONOMIC ANALYSIS

APPENDIX F: WORKING ASSUMPTIONS FOR ECONOMIC ANALYSIS

The economic analysis has been developed by examining in detail the costs of purchasing and converting specific examples of made-to-convert housing in the Toronto market. In total, seven examples of convertible housing were selected for analysis including the following schemes:

3. Townhouse with one bedroom basement conversion

4. Detached (or Semi) Back-Split House with one bedroom at grade (first floor) conversion

7. Semi-Detached (or Detached) House with one bedroom vertical-split (two floor) conversion

8a. Detached Single Family Home with bedsit second floor conversion

9a. Detached Wide-Front House with one bedroom garage conversion

14b. Single Aspect Apartment with one bedroom conversion

16. Double Aspect Apartment with one bedroom conversion.

The selection of these particular designs for the economic analysis was based on several important factors. First, the size and cost of the made-to-convert units had to be more in keeping with CMHC's mandate of providing moderate cost housing. The seven selected designs provide the most preferred combination of size, cost and overall layout characteristics. Second, the selected designs depict an array of housing styles and types common throughout various locations in any given urban area (eg. central versus suburban locations). Third, the accessory apartments associated with each of the selected schemes also vary with respect to size, style, layout and location within the primary unit. The overall intention was to select designs that would show a number of workable solutions and be appealing to a wide range of buyers and renters.

In developing the actual case studies, an attempt was made to keep the cost analysis as thorough and realistic as possible. The analysis utilizes current local housing costs, operating expenses and rent levels in Metropolitan Toronto.

Using the selected examples of convertible dwelling units, typical new house prices for similar housing units in the Toronto housing market were determined by consulting several real estate information sources. These included:

- the Multiple Listing Service to obtain average new house prices for various dwelling types throughout the City;

- o the Royal LePage Survey of Canadian House Prices;
- o new house listings advertised in local newspapers; and,
- o actual new house prices in residential subdivision developments.

These house prices also include the construction premium for the additional features needed to make the dwelling convertible (see Section 4.2). As shown, these construction premiums are relatively small -- ranging from 0.6% to 2.0% of the potential house price. It has therefore been assumed that these premiums would be absorbed in the new house price.

In determining housing affordability, several key assumptions were made once an estimated dwelling price was determined. These are as follows:

1. A dwelling would be purchased with a downpayment equal to 25% of the estimated unit cost.
2. The mortgage principal (equalling 75% of the dwelling cost) would be amortized over a 25 year period at an interest rate of 12%.
3. Monthly maintenance and property tax charges were based on current Toronto hydro, water and property tax charges for similar-sized units. In the case of the condominium apartment schemes, average Toronto maintenance fees common to such accommodation was also included.
4. No more than 30% of gross income would be spent on shelter costs.

Using these assumptions, it became possible to determine both the costs associated with purchasing and operating each of the seven made-to-convert housing examples, as well as the level of income required to purchase and maintain each unit.

In a similar fashion, rents obtainable from the various accessory apartments were determined by consulting:

- o rental listings in local newspapers for similar-sized and styled rental units;
- o the Royal LePage Survey of Canadian House Prices (and rents);
- o Canada Mortgage and Housing Corporation Toronto Rental Market Surveys; and,
- o Statistics Canada (tenant household statistics for Metropolitan Toronto).

The conversion costs utilized in the economic analysis were calculated in Section 4.0. These represent a realistic cost determined by using actual material costs and trades charges necessary to complete a conversion to a basic standard.

The utility costs associated with the respective accessory apartments were calculated on the basis of average hydro and water useage.

According to the Quality Control Section of the Property Assessment Program for the Ontario Ministry of Revenue, a marginal increase in property tax assessment can be expected as a result of the addition of an accessory apartment to an existing residential dwelling. However, using actual property reassessments in Toronto, this will be limited to only a small percentage increase. The property tax component therefore included in the operating expenses of the accessory apartment is based on a proportionate share of the total property tax bill (based on the percentage of floor area of the accessory apartment in relation to the primary unit), plus a marginal increase resulting from the improvement to the dwelling.

Finally, the cost of operating a particular accessory apartment was calculated by combining the amortized cost of completing the conversion with the estimated utility and tax charges for the apartment. Three scenarios were developed in determining the operating costs of the accessory apartment:

1. The full cost of the conversion is amortized over a 25 year period. This would reflect a situation where the conversion is completed during the construction of the primary dwelling and the costs are rolled into the mortgage.

2. The full cost of the conversion is amortized over a five year period. This would reflect the cost of using a medium-term loan to pay for the conversion expenses.

3. The full cost of the conversion is amortized over a three year period. This would reflect the cost of using a short-term loan to pay for the conversion expenses.

APPENDIX G

ACKNOWLEDGEMENTS

APPENDIX G: ACKNOWLEDGEMENTS

The study was directed by Fanis Grammenos, Coordinator, Resource and Research Management, Sector Administration Unit, Canada and Housing Corporation.

The study was undertaken by the following consulting team:

The Starr Group

Ed Starr
Al Streuber

Richard Drdla Associates

Richard Drdla

Jerome Markson Architects

Ernest Hodgson
Nanette Shahinian
Neil Kaplanis
Robert Del Bono

Patrick Hare of Patrick H. Hare Planning & Design in Washington D.C. also provided expert advice and assistance about related experience in the U.S.