AN ADAPTABLE URBAN DWELLING

by

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ABSTRACT

Adaptability in this Thesis refers to the inherent capacity of a dwelling to accomodate changing spatial and economic requirements over time. The adaptable dwelling is intended to respond to change as a fundamental condition of the human life-cycle, and offers choices to its inhabitants when changes occur. The adaptable dwelling is intended to provide an alternative to either moving as a result of change or to tolerating a space/need mis-match.

Adaptability inevitably requires some overprovision of space and/or services within the dwelling which, in turn, requires increased expenditures. Thus, a major obstacle to providing adaptable housing - quite aside from strictly architectural concerns - is an economic one. A major contention of this Thesis is that adaptability will be realized only when it is built within an economic framework that will support/justify the necessary overprovision of space and/or services.

The proposed economic framework in this Thesis is based on the notion of income-generation. The dwelling is conceived as a collection of areas that the inhabitants can combine - and continuously recombine - in a variety of ways such that the inhabitants can rent to others those areas which they do not need for themselves at any given time. In this way, overprovided space and/or services can generate operating income for the inhabitant which can offset the additional expenditures required for adaptability.

The architectural intent of this Thesis is to design prototypical adaptable dwellings based on these social and economic notions. The adaptable dwelling is designed to function usefully as a residence for one, two or three families - at the option of the controlling inhabitant. A dwelling conceived and designed in this manner has a significant potential for adaptability within a supportive economic framework.

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Chapter Seven: Prototypical Designs Of Four Adaptable Townhouses(Continued):

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Chapter Seven: Prototypical Designs of Four Adaptable Townhouses (Continued):

> "The traditional once-and-for-all house has an initial investment of capital related to a life-span or a write-off period. Through its concept, the once-and-for-all house is not designed for adaptation, and may be totally unsuited to receive new inputs . . . Thus, the once-and-for-all concept has within it a great potential for the misuse of investment and resource."[1]

The intent of this Thesis is to design an adaptable urban dwelling. It was prepared in response to a series of notions, some of which are architectural, some social, and some economic. It concerns itself with housing as a non-fixed element, wherein the relationship between dwelling and dwellers is active and changing, where continuity of neighborhoods need not be disrupted, and where the use of resources is, in the deepest sense of the word, conservative.

I am proposing a flexible dwelling, one that functions usefully as a dwelling for one, two or three families and one that maximizes the powers of inhabitation.

1. Landau, Royston, "Evolutionary Housing: Notes On The Context And The Problem" Architectural Design, Sept., 1971

> "With the greatly increased rate of social and economic change, the adaptable house is becoming a national necessity. Not only would it be valuable for the family staying in one house for most of its life; it would be a much easier and perhaps more satisfactory adaptation to the changing general needs."[2]

Adaptable housing is defined herein as housing that has an inherent capacity to accomodate changing spatial and economic needs over time.

Adaptability is simply accepted in this Thesis as a desirable goal - without lengthy explication - for these reasons: adaptability increases the choices available to inhabitants, responds to changing spatial and economic needs, provides for stronger neighborhood continuities, and makes wise use of limited resources (spatially and financially). Adaptability suggests that both the dweller and the dwelling are performers - with the dwelling equipped to follow the dweller's lead.

There are varying levels or adaptability. Most all housing contains a minimal level of adaptability - different furniture arrangements might be accomodated, for example. Some housing may have a level of adaptability that allows a use-swap between rooms - the dining room becomes

2. Rabeneck, Andrew et al, "Housing Flexibility" Architectural Design, Nov., 1973

a bedroom or vice-versa - while others may be large enough to subdivide one large room into two smaller rooms.

In this Thesis, adaptability refers to a level of responsiveness in the dwelling that allows the inhabitant to choose to increase (or decrease) the number of privacies (bedrooms, primarily) within the dwelling without sacrificing comfort levels in the dwelling. The basic increment for adaptability is thus one room.

Adaptability is a function of spatial configuration, dimension, structure and economics. An overview of past and current attempts at creating adaptable housing - while often quite different in approach - reveals that there is at least one common denominator - namely, that adaptability requires some overprovision of space and/or services. Such overprovisions are necessary for a dwelling to perform in more than one proscribed (and hence time-bound) manner.

Adaptability and "tight-fit" architecture are accordingly incompatible, an incompatibility which thus far has unfortunately resulted in proliferation of "tight-fit" architecture and in very little adaptability. Why

is this? It must be assumed that the lack of responsiveness in our housing is due to something other than mere lack of recognition of need.

A key to this proliferation of "tight-fit" architecture is that it responds to an essentially economic formulation, whereas adaptability responds to an essentially social formulation. The economic formulation goes roughly as follows:

> Since buildable land is becoming increasingly scarce, land costs are rising; and since construction costs have been steadily rising, the cost of housing has been increasing; and since it is important to build affordable housing; therefore:
>
> 1. Intensify land use by building at higher densities. This will reduce land cost per dwelling.
>
> 2. Decrease the size of the dwelling so that higher densities can be achieved and construction cost increases can be at least partially offset by building less area.
>
> 3. Build in volume and build repetitiously because mass production reduces cost per unit.

4. Build by corporation because volume building requires the amassing of substantial capital, far in excess of what would normally be available to an individual.

Compare this economic formulation with an equivalent socio-architectural one:

1. Deintensify land use so that there will be more open space and less crowding, or selectively intensify land use (making neighborhoods) and retain large areas of open space adjacent to and within areas of concentration.

2. Build dwellings that are large enough to accomodate changing needs (adaptability).

3. Custom build each dwelling, as "symbol of self", as unique as self. Don't build by volume.

4. Build with the inhabitant and not by corporation.

Unfortunately, in most instances when economic and social policy are in conflict, economics usually dictates. This certainly has been true in housing.

The contention in this Thesis is that meaningful adaptability - the ability to choose privacies - will be realized only when it is built within an economic framework that will support/justify the necessary overprovision of spaces and services. Stated in another way, space and services must be overprovided in a way that they result in an appreciable benefit equal to or greater than their cost.

A primary architectural task would thus be to seek ways of optimally deploying excess space/services so that they produce for the inhabitant a satisfactory social, architectural and economic "return" on investment.

CHAPTER TWO: PROPOSAL AND METHOD - AN APPROACH TO ADAPTABILITY

The intent of this Thesis is to present a Proposal - an approach to adaptability combining architectural design and economics - and to then explore implications of this Proposal through the architectural design and evaluation of adaptable housing prototypes (method).

The Proposal has as a backdrop eight interrelated propositions as follows:

1. Adaptability is desirable because it enables a dwelling to respond to the changing spatial requirements of an inhabitant's life-cycle and therefore enables an evolutionary relationship between inhabitant and dwelling,

and

2. Adaptability is meaningful to the extent that it enables an inhabitant to continuously choose and change the number of private spaces within the dwelling without decreasing comfort levels,

and therefore,

3. Adaptability will involve some overprovision of space and services - either the initial space is large enough to allow subdivision into smaller but still comfortable spaces, or additional space is available to grow into as space needs increase,

but,

4. The economics of housing weighs heavily against overprovision of any space or services for the simple reason that most people cannot afford excess space (let alone afford even minimal space),

and therefore,

5. Assuming that the statements in items 2, 3, and 4 are reasonably accurate, it is highly unlikely that adaptable housing (in the manner described in items 1 and 2, at least) will be built, and the discussions concerning adaptability will remain largely academic ones.

It would seem then that an approach to adaptability should address these economic issues and should provide for an economic framework that supports the requirements for adaptability. Thus, the backdrop for this Proposal goes on to include some basic economic propositions:

6. Construction costs per square foot of new housing decreases as the size of the dwelling increases (once foundations, roofs, mechanical systems and primary public use space have been provided, the cost of any additional use space is relatively inexpensive). It is therefore less expensive to build one 2,000 s.f. dwelling than it is to build two 1,000 s.f. dwellings.

7. Housing rental rates are determined more by market conditions than by construction cost (inexpensive but equal quality additional space in a dwelling could be rented at the same amrket rates as equal quality expensive space).

8. Traditionally, it has been advantageous to control income generating space to offset homeownership cost. In

> most instances, one can live in 1,000 s.f. (for example) less expensively if they own 2,000 s.f. and rent the remaining 1,000 s.f. to others than they can if they only own 1,000 s.f. with no rental income.

The Proposal - phrased as a question - is this: Why not design a dwelling that combines the requirements for adaptability with the benefits of income generation by overproviding space and services in such a way that some or all of these excesses can be rented to others when not needed by the inhabitant of the dwelling or can be used by the inhabitant when space needs increase?

This is by no means a new proposal. The traditional duplex and "triple-decker" built at the turn of this century - while not addressing the issue of adaptability directly - were based on the concept of supporting home-ownership through the overprovision of space for those who might not otherwise be able to afford their own home. In these instances, the intent was primarily an economic one and the additional space was not intended for use by the building's owner/occupant (although it often served the function of housing an extended family). However, over time these buildings have, in fact, adapted and there are currently numerous examples of the restructuring of spaces within the duplex/triple-decker to enable larger or smaller dwelling configurations. There is also a small but discernible trend towards building new townhouses that contain within them small income-generating apartments (townhouses on Erie Street and Kirkland Street in Cambridge, for example).

Why not take the income-generation concept one step further and introduce it into the socio-architectural concern for a responsive adaptable housing stock?

This Proposal for an adaptable dwelling invites at least one immediate objection: If the excess space is used by the inhabitant - and therefore is not used to generate income - the economic framework supposedly supporting adaptability is negated and the proposal is not as effective one. This is a valid argument assuming that the dwelling presents an all-or-nothing opportunity - that is, an inhabitant either occupies none or occupies all of the excess space.

However, this argument becomes less clear if the dwelling provides for a range of occupancy patterns which enables an inhabitant to occupy none, some or all of the excess space at any given time. Presumably there would be a point in that range beyond which the economic support system disappears - at least for short run economics - but, as time passes, that point may move further and further towards enabling occupancy of the entire dwelling because of the nature of housing finance.

Thus, the proposal is modified and restated to address the above argument: The adaptable dwelling should provide excess space in such a way that its relationship to the primary dwelling space enables a range of occupancy patterns and consequently a range of choices to the inhabitant.

**** **** **** ****

This Proposal needs "reality testing" to discover its true implications. Since the Proposal is essentially a conceptual one, the architectural method used to study the Proposal is the design of adaptable dwelling prototypes.

Prototype design has been selected as a method because it makes possible a systematic examination of the impact of key variables upon a given system and provides a useful basis for analyzing a concept. Prototype design is most instructive in identifying those general conditions needed in specific sites and in specific design solutions to make a concept workable (for instance, what minimum lot sizes are needed, what parking solutions seem most workable, what spatial configurations most lend themselves to dwelling subdivision, etc.). The assumption is that some solutions won't work anywhere, and that those that will work all involve trade-offs between different components of design. Prototype design helps to identify the nature of these trade-offs at the outset.

However, prototype design does have limitations which are acknowledged here. First, since a specific site is not used, the prototype design cannot be informed by the many specific site conditions that would shape site-planning decisions - such as sun orientation, adjacent building types and uses, neighborhood character, street type, etc. Second,

specific zoning regulations are not available and decisions regarding density, set-backs, parking, etc. must be generalized, decisions which could seriously effect the transisition from prototype to specific site conditions. Third, prototype design makes exterior elevation studies inconclusive and perhaps meaningless, again because of the lack of site and neighborhood specifics.

Despite these limitations, prototype design has been selected as the basic method for exploration because of the primary need to understand the nature and impact of these variables. This study is just the first step in moving from theory to practice. The information gathered from prototype designs should be useful in ultimately applying this adaptable housing concept to a specific site resolution.

Thus, the core of this Thesis is the annotated set of four different prototypical adaptable dwelling designs included in Chapter Seven. The framework on which these designs are based is set forth in Chapters Three through Six, as follows:

Chapter Three: Performance Standards and Guidelines For an Adaptable Urban Dwelling.

Chapter Four: Building Typology.

Chapter Five: Circulation/Entry Systems.

Chapter Six: Parking Solutions.

While the material in these Chapters is rather tedious at times (both to write and to read), an understanding of this information is essential to an understanding of issues relating to adaptability.

CHAPTER THREE: PERFORMANCE STANDARDS AND GUIDELINES FOR ADAPTABLE DWELLINGS

This chapter sets forth the rules-of-the-game for the prototypical adaptable dwelling designs in Chapter Seven. In certain respects, the concept of the adaptable dwelling suggests that both the inhabitant and the dwelling are performers - they both must have the ability to act. As such, the adaptable dwelling needs to be programmed to define the scope of its possibilities and its limitations - architecturally, economically and socially.

I. GENERAL CONDITIONS FOR ADAPTABILITY

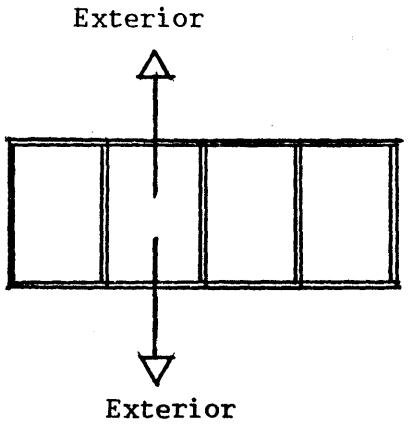
1. Intent: to provide the primary inhabitant with the continuing ability to choose and change the amount of space inhabited within the dwelling, coupled with the ability to rent to others those spaces within the dwelling which the primary inhabitant does not choose to inhabit.

2. Occupancy Range & Choice: Each dwelling must provide an occupancy range enabling the primary inhabitant to live in the public domain of the dwelling plus one bedroom minimum and plus five bedrooms maximum.

3. Changeability: Changes from one occupancy phase to another must be able to occur with an absolute minimum of effort and cost, and must be able to be accomplished by the inhabitant without altering the structural or mechanical support systems of the dwelling.

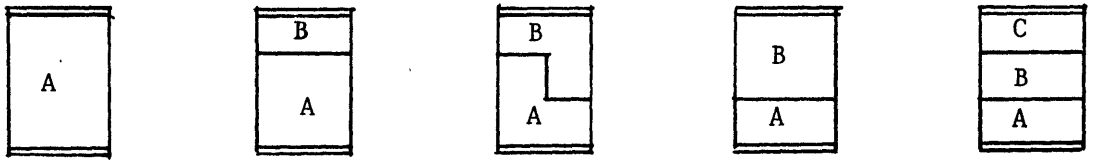
II. BUILDING TYPOLOGY

1. Density: The building type must result in a medium density, and thus the dwelling must be able to "close-pack" with other dwellings.



2. Exterior Walls: The building type - in order to "close-pack" - must enable dwellings that can function with only front and rear exterior walls. Side walls will separate one dwelling from the next, and thus are not exterior and provide no light or visual access.

3. Spatial Configurations: The building type must enable a dwelling to subdivide into component areas in a way that allows each of these component areas to function as an independent sub-dwelling within the total dwelling, as in this diagram:

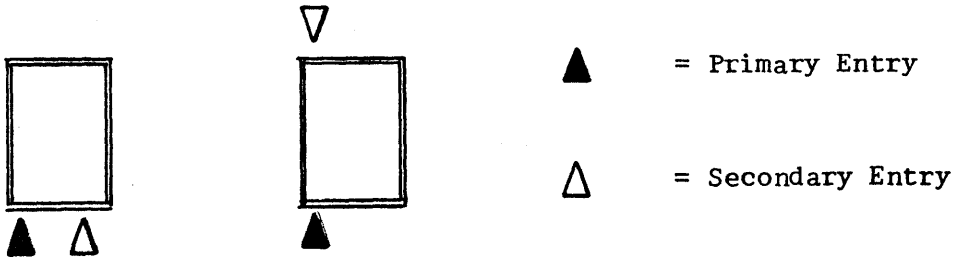


4. Home-Identity: The building type should be conducive to home-ownership in that it should, among other things, allow each adaptable dwelling to have its own identity even when built within a cluster of other dwellings. In particular, this suggests (although it does not necessarily require) that there should be some direct ground connection and ground claim for each adaptable dwelling.

III. CIRCULATION

1. Entry: Each adaptable dwelling must have provisions for two separate entries - one for the primary inhabitants and one for rental inhabitants. These two entries should be designed and located in such a way that potential outdoor privacy conflicts are eliminated or at least are minimized.

2. Access: Each potential dwelling within the total dwelling (when more than one) must have its own private access from the street, i.e., no inhabitant must pass through another inhabitant's space in order to reach their dwelling.



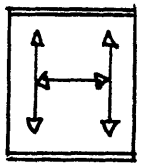
3. Stairs: Each total dwelling must have two separate stair systems:

a) Primary Stairs: stair system that provides the primary inhabitant with access to the entire dwelling without passing through space occupied by others.

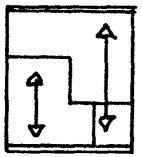
b) Secondary Stairs: Each adaptable dwelling must also contain, in addition to the primary stair system, a secondary

III. CIRCULATION (Continued)

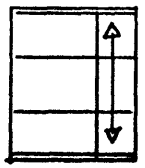
stair system accessible directly from the secondary entry which enables access to any floor without using the primary stairs and without intruding on another occupant's space.



In the event that the primary inhabitant chooses to occupy the entire dwelling, the secondary stair system should integrate usefully into the primary inhabitant's circulation system.



In the event that the primary inhabitant chooses to sublet some space to one other family, the secondary stair system should be used exclusively by the other family and - building codes permitting - should be able to be an open (or partially open) stair system.



In the event that the primary inhabitant chooses to sublet space within the dwelling to two other families, the secondary stair system should function as a closed system shared by the two families.

In all events, both stair systems (primary and secondary) should be accessible in the event of fire to all occupants of the dwelling.

IV. AREAS AND DIMENSIONS

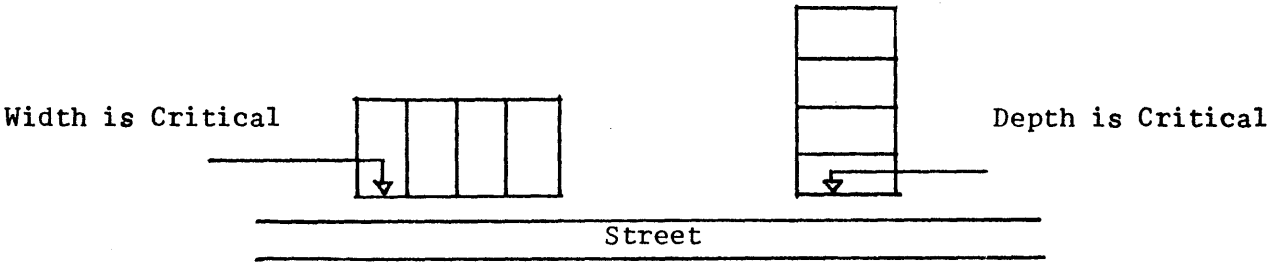
1. Total Floor Area: The total dwelling should be large enough to subdivide into 3 small dwellings or into 2 dwellings of varying size, but not be too large to function usefully as a single family residence. While the total floor area needed to accomodate this program needs to be discovered through actual design, the following represents an approximation of area range based on standard ranges of dwelling sizes:

Occupancy Phase	Dwelling #1	#2	#3	Total Area
Three Family: (3 - 1 BR apts.)	600 - 800 s.f.	600 - 800 s.f.	600-800 s.f.	1,800-2,400 s.f.
Two Family:				
a) 1 - 4 BR apt. 1 - Eff.(Single Room)	1,600-2,000 s.f.	200 - 400 s.f.	-	1,800-2,400 s.f.
b) 1 - 3 BR apt. 1 - 2 BR apt.	1,200-1,600 s.f.	600 - 800 s.f.	-	1,800-2,400 s.f.
c) 2 - 2 BR apts.	900-1,200 s.f.	900-1,200 s.f.	-	1,800-2,400 s.f.
Single Family: (5 BR House)	1,800-2,400 s.f.	-	-	1,800-2,400 s.f.

The total floor area for the adaptable dwelling should therefore be in the range of 1,800 - 2,400 s.f. For obvious reasons of density and cost, the adaptable dwelling should achieve its program with the minimum possible floor area.

IV. AREAS AND DIMENSIONS (Continued)

2. Exterior Dimensions: Ground coverage should be minimized, for reasons of density. Accordingly, one dimension - width or depth - should be minimized depending on which dimension most effects density. For example, when the buildings face the street the critical dimension is building width. However, when the buildings have their side to the street, the critical dimension may be building depth. These two building orientations are illustrated here:



3. Interior Dimensions: Interior spaces should be dimensioned such that they are as non-function specific as possible, in order for each space to function in a variety of capacities. For the purposes of this section, space within the dwelling is divided into two categories:

a) Primary Space - that space which is always devoted to use by the primary inhabitant, regardless of the occupancy phase. This space is least likely to change.

IV. AREAS AND DIMENSIONS (Continued)

b) Secondary Space - that space which is available within the dwelling, some or all of which is available to either the primary inhabitant or for other occupants. This space is most subject to adaptation.

These spaces are fully described below.

PRIMARY SPACE: Regardless of the occupancy phase, this space will always be used by the primary inhabitant and should be large enough to accomodate the following:

-Entry area/vestibule: with at least 6'0" of coat/storage closet, a table, and standing area for four persons.

-Living Room, with no dimension less than 12'0" and total area of not less than 200 s.f., with a capacity for two sofas, 4 easy chairs, two side tables, one coffee table, 12 linear feet of shelves, wood stove and piano (upright, at least). This area must be adjacent to at least one exterior wall.

-Dining Area with no dimension less than 10'0" and an area of not less than 120 s.f. with a capacity for a table seating 6 - 8

IV. AREAS AND DIMENSIONS (Continued)

persons, buffet sideboard, and 8 chairs. This area also must be adjacent to at least one exterior wall.

-Kitchen Area with no dimension less than 3'0" and an area of not less than 100 s.f. if enclosed and not less than 64 s.f. if it is open to the dining area, with the capacity for 20 linear feet of counter space (including sink, range, and refrigerator), 12 linear feet of cabinet/shelf space, and broom closet. This area may, if necessary, be located on an interior wall (though less desirable) if it has some visual access through another area to an exterior wall.

-1/2 Bathroom containing at least a sink and toilet with sufficient adjacent area for a bathtub/shower.

-Sleeping Area: In the event that the primary inhabitant chooses a three dwelling occupancy phase, the dining area (or possibly part or all of the living room area) may need to be enclosable to function as a sleeping area with no dimension less than 10'0".

SECONDARY SPACE: The secondary space contains all areas in the adaptable dwelling other than those spaces included in the primary space.

IV. AREAS AND DIMENSIONS (Continued)

There shall be two areas within the secondary space which are sufficiently dimensioned such that each is capable of accomodating the following:

-Food preparation area: containing a minimum of 16 linear feet of counter space (including sink, range and refrigerator) and 10 linear feet of cabinet/shelves.

-Living/Dining Area: adjacent to food preparation area and adjacent to al least one exterior wall with a capacity for at least:

-dining table for four persons.
-sitting area containing at least one sofa, table, 2 large chairs, and two regular chairs.
-entry area with coat/storage closet with minimum width of 4'0".
-8 linear feet of bookshelves.

Each of these two areas shall have the ability to privately connect with at least one other area in the secondary space which is dimensioned to function as a sleeping area with a capacity for:

IV. AREAS AND DIMENSIONS (Continued)

-one double bed or two twin beds.
-6'0" closet space.
-4'0" dresser.
-side table.
-desk or table and chair.
-4'0" shelves minimum.

Each of these two areas shall also have private access to at least one bathroom containing a toilet, sink and bathtub/shower and linen closet (either inside or immediately adjacent to the bathroom).

The secondary spaces described above anticipate use by non-primary inhabitants. When the primary inhabitant chooses to occupy some or all of the secondary space, their function will change but their dimensions and facilities remain constant. These areas would presumably be used as bedrooms by the primary inhabitant, and thus their size should not be less than that required to accomodate the functions described above but should not be greater than a usefully-sized master bedroom.

V. PARKING

1. Number: The adaptable dwelling must have at least 2 off-street parking spaces.

2. Relationship to Dwelling: At least one of these two parking spaces shall be located under the dwelling or immediately adjacent to the dwelling, with direct internal stair access to the first level of the dwelling when the parking space is under the dwelling.

3. Land Use/Density: Plans for parking should be based on the following criteria:

a) Minimum use of open space.
b) Minimum disruption of street edge (i.e., minimum curb cuts).
c) Minimum impact on density.
d) Minimum exposure and danger to pedestrians.

VI. MATERIALS AND FURNISHINGS

1. General: Materials and furnishings for the dwelling will largely be determined by the intent/desires of its initial inhabitant, who will choose a particular occupancy pattern. The initial inhabitant will have the choice prior to completion of construction as to how many future detailed provisions for adaptability should be included in the initial financing. However, there are numerous considerations and provisions - which add little cost if incorporated initially - which will greatly simplify future adaptations.

2. Specificity: As a general rule, materials and furnishings should be as non-specific as possible, and should be treated separately from structure so that changes can be made without effecting structure.

3. Wall Partitions:

a) To Be Added At Later Date: Where a wall partition is anticipated at a later date, the top plate of this partition should be built into the ceiling at the outset. Ceiling finishes should butt up to - but not cover - the top plate.

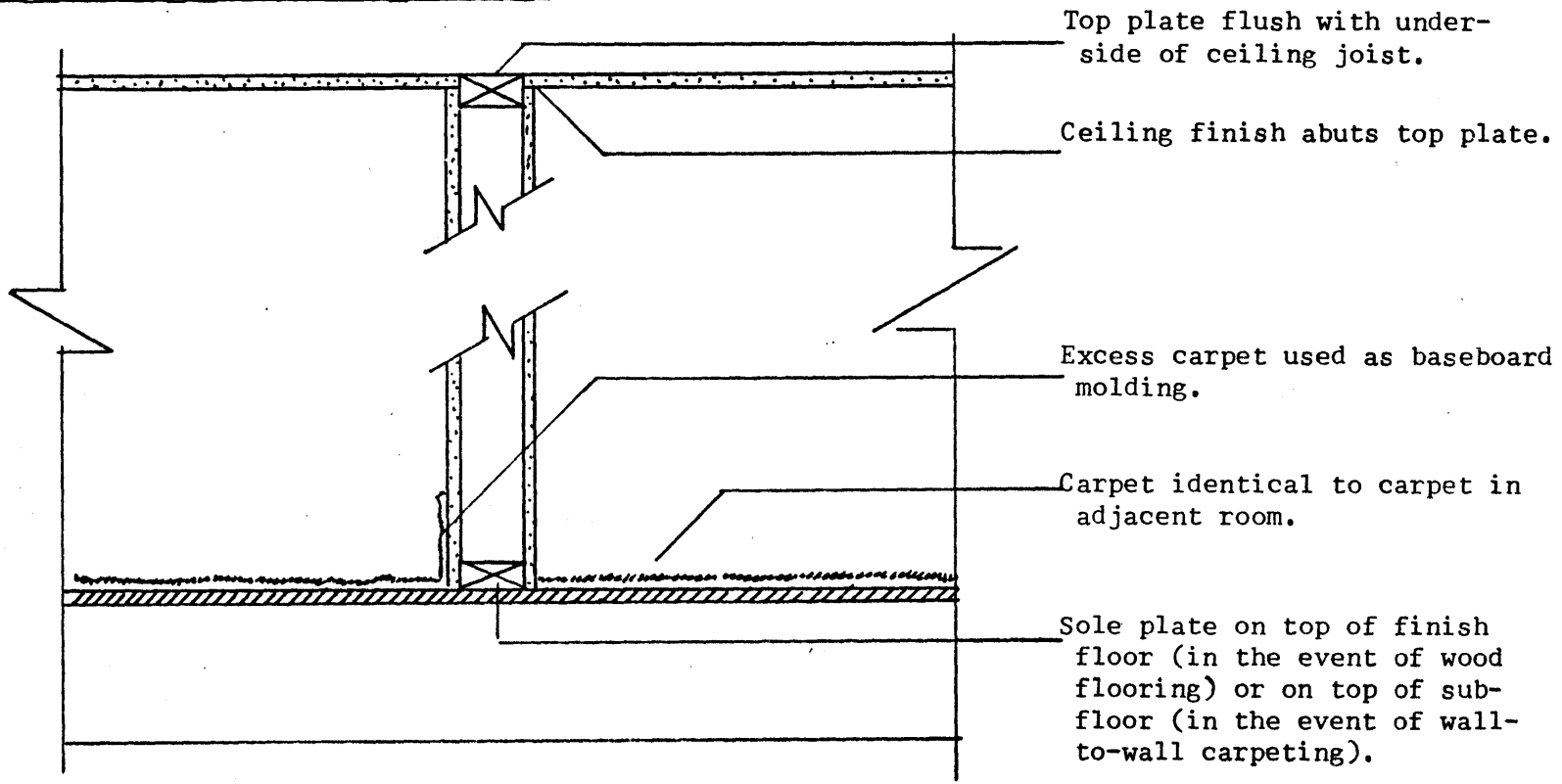
b) To Be Removed At A Later Date: Top plates should be installed as described above. Sole plates for partitions that may be removed at a later date should be installed over the finished floor, such that

VI. MATERIALS AND FURNISHINGS (Continued)

there will not be a channel in the floor if and when the partition is removed. Ceiling finish should butt up to the top plate, with the wall finish applied after the ceiling finish and butting up to the underside of the ceiling finish. In this way, removal of the wall will not disrupt the ceiling finish.

In the event of wall-to-wall carpeting, carpeting in adjacent rooms that may become one larger one at some future date should be identical and should be cut in one room at least 4-1/2" longer than the room, with the excess used as baseboard molding along the partition that may be removed. In this way, if and when the partition is removed, this excess carpeting will cover the space left by the removed partition. The following drawing illustrates these concepts.

VI. MATERIALS AND FURNISHINGS (Continued)



4. Special Use Flooring: In areas which are programmed to be both general use and specific use - depending on the nature of any chosen occupancy phase - the flooring material shall reflect the special use requirements. This refers primarily to those areas which may at some time function as kitchens. In this instance, for example, the flooring should reflect kitchen requirements (probably either sheet vinyl or tiles) at the outset and should remain so regardless

VI. MATERIALS AND FURNISHINGS (Continued)

of the use of that area.

5. Closets: Closets should be built independently of structure and should be movable. Closets should be located in or adjacent to areas that are programmed to function as entry vestibules under certain occupancy conditions. Closets should be placed over finished flooring.

6. Counters: For areas other than the primary kitchen which are programmed to function as kitchen areas, counters with drop-in sinks should be installed at the outset but should be built independent of cabinet support systems. Counter height should be adjustable such that it can function as a stand-up kitchen counter or as a sit-down dressing table.

7. Cabinets/Shelves: For areas other than the primary kitchen which are programmed to function as kitchen areas under certain occupancy conditions, wall cabinets or shelves should be installed at the outset that can function usefully for kitchen storage requirements or for general storage requirements (probably in bedrooms).

VII. STRUCTURAL SYSTEMS

1. General: The adaptable dwelling must be subdividable without altering the structural support system. Openings or closures required to effect an occupancy change must be of a simple enough nature to allow the reconstruction to be accomplished by the inhabitant.

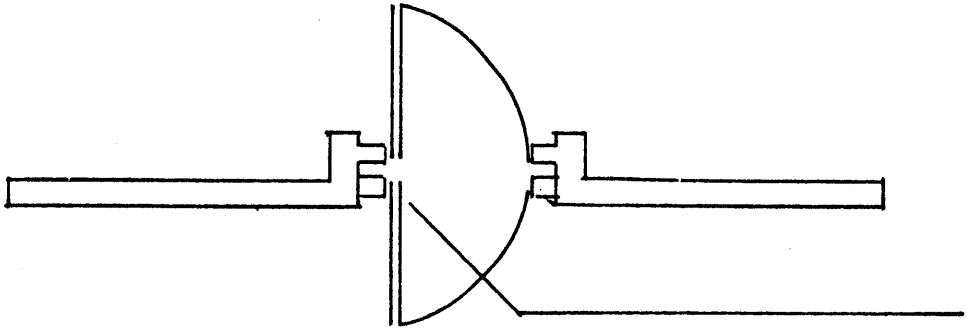
2. Construction Type: The dwelling may be built with any appropriate structural system, although it is anticipated that it will most likely be wood-frame construction - either conventional stud wall framing or Post-and-Beam, or a combination of the two - with the possibility of brick or block party walls.

3. Windows: Windows shall be sized and located such that all rooms in all occupancy phases are properly lit, and shall not have to be altered in any way to effect changed occupancy conditions.

4. Doors: Doorways shall be located whenever possible in such a way that their simple closure is all that is required for a change of occupancy condition. Doorways that will be used for occupancy closure should be sized such that a second door can be installed,

VII. STRUCTURAL SYSTEMS (Continued)

swinging in the opposite direction from the first door. These doors shall be solid core doors - wood or possibly metal.



5. Acoustic Separation: All walls, floors and ceilings that form potential boundaries for an occupancy condition shall be equipped at the outset with extra sound absorbent provisions - insulation, acoustic channels, acoustic tiles, double layer gypsum board, etc.

VIII. MECHANICAL SYSTEMS

1. General: Mechanical systems (plumbing, wiring, and heating) represent a major cost of housing construction. While the mechanical systems for the adaptable dwelling could be designed to reflect independent control systems for each occupancy phase, the capital cost of such overprovisions would be prohibitive and the energy operating costs would be inefficient. Since the use of single mechanical systems can be shared without impairing the privacy needs of the various occupancy phases, and since agreements can be reached between primary and secondary inhabitants, the mechanical systems will be designed to reflect single occupancy, with the following additional provisions:

2. Plumbing:

a) Rough plumbing for water and waste line hook-ups will be installed in all areas scheduled to receive plumbing fixtures in any of the planned occupancy phases.

b) By-Pass valves and piping will be installed enabling some or all of the secondary spaces to be connected to a second hot water heater at some future date, if desired.

3. Heating:

a) Baseboard heating systems throughout - either gas/oil fired forced hot water, or electric (the cost and area requirements for

VIII. MECHANICAL SYSTEMS (Continued)

ducted forced hot air systems would be prohibitive).

b) For gas/oil fired hot water baseboard heating, by-pass valves and piping will be installed to enable some or all of heating for the secondary spaces to be connected to a separately metered furnace at some future date.

4. Electric:

a) Sufficient electric capacity should be installed to enable three family occupancy with electric kitchen applicances (most likely).

b) Wiring to some or all of the secondary spaces should be capable of being separately metered from wiring for the primary spaces.

CHAPTER FOUR: BUILDING TYPOLOGY: HUMAN LIFE CYCLE REQUIREMENTS AND URBAN LAND ECONOMICS

The preparation of the Performance Standards and of preliminary designs for adaptable dwellings consistently identified three critical variables that most influence design results, as follows:

1. Choice of Building Typology: What building type(s) most lend themselves to the adaptable dwelling as conceived in this Thesis?

2. Choice of Circulation/Entry Systems: How can private access best be achieved to areas within the adaptable dwelling? What impact does this provision have on dimensioning, site planning, density and inhabitant privacy?

3. Choice of Parking Solutions: How can at least two off-street parking spaces per adaptable dwelling best be achieved? What impact does this provision have on use of outdoor space, dwelling exterior, dimensions and density?

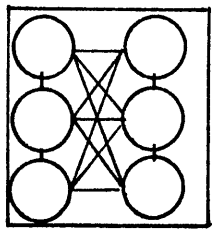
Because of the importance of this material, a separate chapter has been devoted to each issue to present the range and impact of choices to establish a reference framework for the prototypical adaptable dwelling designs in Chapter Seven.

**** **** **** ****

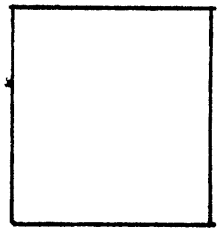
BUILDING TYPOLOGY: The pairing of the concepts of adaptability and income-generation does not in itself imply a particular building typology. It could occur theoretically in various building types. However, given the scope and time-framework for the Thesis, it seemed preferable to focus on variations in one building type and explore it in depth rather than compare characteristics of differing building types.
The task in this Thesis, then, is to select one generic building type that would at least appear to be - if not in fact be - most responsive to adaptability and income generation requirements. The criteria for selecting the building type are:

1. Subdivisibility.
2. Urban Land Economics.

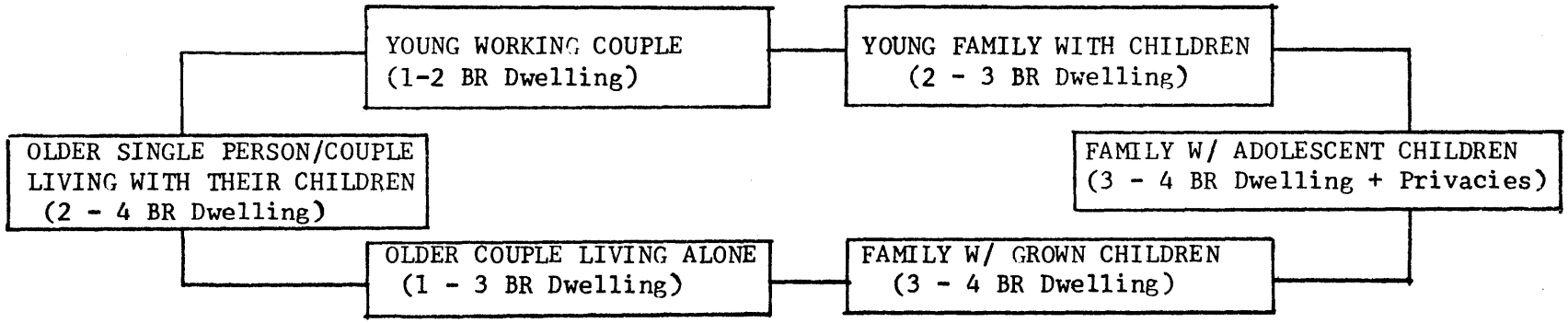
1. SUBDIVISIBILITY: The adaptable dwelling must have the ability to subdivide into component areas as well as function as an entirety, and, further, these areas must subdivide in a variety of combinations to maximize occupancy range potential. The following diagram illustrates this concept:



as opposed to



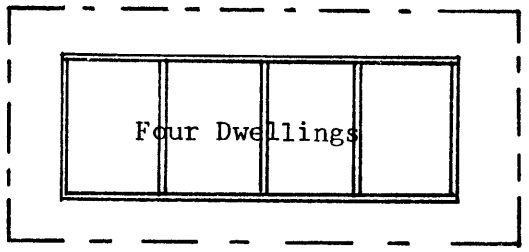
The main reason for conceiving of a dwelling that can subdivide is that the typical human life-cycle inherently requires differing amounts and configurations of space. While a small space may not be made larger (unless added onto), a large space may be made smaller very simply. The intent of the adaptable dwelling is to provide inhabitants with control of a large enough space such that the spacial requirements of any stage in their life-cycle can be accomodated. For example, a simplistic description of one family's life-cycle might be as follows:



In a certain sense, the adaptable dwelling must function like a machine in that it performs varying tasks, but above all else it must provide a comfortable home environment. Thus its ability to subdivide - to life cycle - must be accompanied by a sense of home identity at all times.

2. URBAN LAND ECONOMICS: The combination of high land cost and small lot size in urban areas strongly suggests building types that enable high density. High density , subdivisibility and home identity may conflict, and the adaptable dwelling should attempt resolution of these factors.

Land values generally reflect what the market and zoning regulations will maximally allow to be built on any given parcel of land. For example, if a particular parcel of land is zoned to allow four dwellings, the land cost will usually be set at the highest marketable value that four dwellings can absorb:



Land Cost Per Dwelling = X
Land Cost = 4X

If only one dwelling is built on this same parcel of land (to use an extreme comparison), the total land cost will still be 4x but the land cost per dwelling will be 4x instead of x, an increase of 3x.

Land cost in the Cambridge-Boston area currently represents 10% - 20% of the total dwelling cost for new construction built to maximum allowable densities:

$$X = 10\% - 20\% \; Y$$

where X = Land cost per dwelling.
Y = Total Dwelling Cost.

$$X_{average} = 15\% \; Y$$

Thus, the total dwelling cost (Y') for the single dwelling built on the parcel that allows four dwellings will be:

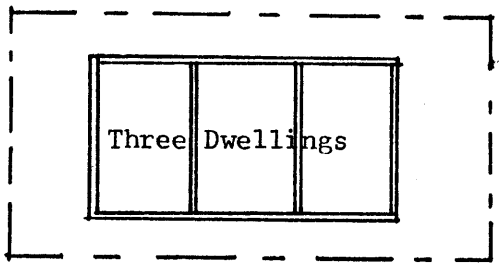
$$Y' = Y + 3X$$
$$= Y + (3)(15\%Y)$$
$$= 1.45 \; Y$$

where Y' = Total single dwelling cost
Y = Total dwelling cost when built as a four unit cluster.
3X = Additional Land Cost due to decreased density.

Put in more concrete terms, if a dwelling built as part of a four unit cluster costs say $60,000, then the exact same dwelling built as a single dwelling on the same parcel would cost 45% more, or $87,000!!

To put this density/cost relationship into a framework that can be used to evaluate the prototypical adaptable dwelling designs in Chapter Seven, the following analysis demonstrates increased cost of a density loss of one dwelling:

Taking the above example of a parcel of land that allows four dwellings, and comparing land cost per dwelling when only three dwellings are placed on this parcel of land:



Total Land Cost = 4x
Land Cost Per Dwelling = 4/3x

Thus, for each one dwelling reduction in density the land cost per dwelling will increase by 1/3x (4/3x - x).

Assuming that:

$X_{average}$ = 15% Y (see above)

Then:

$Y' = Y + 1/3x$
$= Y + (1/3)(15\% Y)$
$Y' = 1.05 Y$

where Y' = Total dwelling cost when built as a cluster of three dwellings.
Y = Total dwelling cost when built as a cluster of four dwellings.
1/3x = Additional land cost due to decreased density.

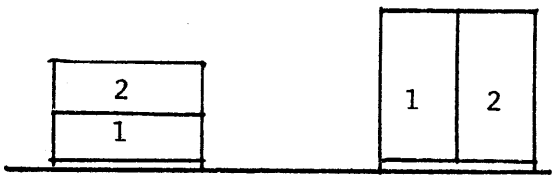
Thus, for each one dwelling reduction in density, the total dwelling cost for each dwelling built will increase by 5%!

This illustrates in simple terms the economic impact of density in high land cost urban areas. It is safe to assume that the adaptable dwelling - since it will most likely be somewhat larger than other dwellings and since it will most likely require two parking spaces - will most likely result in lower density solutions. Thus, density becomes one of the potentially significant costs of adaptability.

The following building types were considered in light of those qualities cited above - namely subdivisibility, life-cycle requirements, home identity and urban land economics:

1. Single Family House: This type characteristically produces the highest sense of home identity but also produces the lowest density. While it certainly can accomodate any dwelling size and is easily subdividable, its high land cost in most areas make it unsuitable for prototypical design.

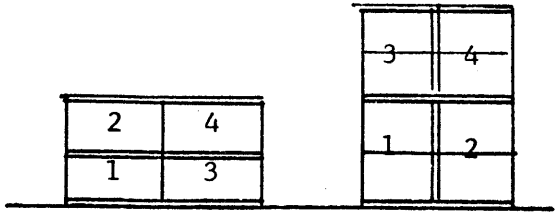
2. Detached Duplex: This type maintains (to a somewhat lesser degree) the sense of single family home-identity and subdividability in that both dwellings have immediate access and claim to the ground. While it produces a higher density than single family, it



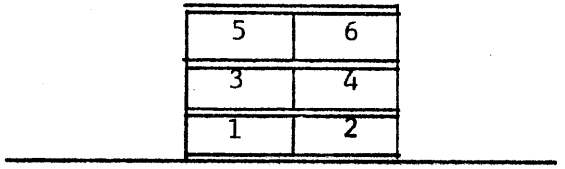
Detached Duplex

will probably not produce sufficient density to merit a prototypical design solution.

3. Detached Four - Six Plex: This type of housing begins to confuse the sense of home identity because two or more dwellings are not immediately ground connected. In addition, its ability to subdivide dwellings becomes more complicated for reasons of access. However, it can produce a relatively high density and might be appropriate on small urban lots. Assuming an adaptable dwelling size of 2,000 s.f., ground coverage for a fourplex would be 1,000 s.f. per dwelling and 667 s.f. per dwelling for a six-plex. The major disadvantage of this type is that it places one dwelling over another and that it does not permit a continuous row/fabric of housing without eliminating side walls as exterior walls. Such an alteration transforms this type into a different building typology - the Townhouse/rowhouse or the stacked duplex/rowhouse.

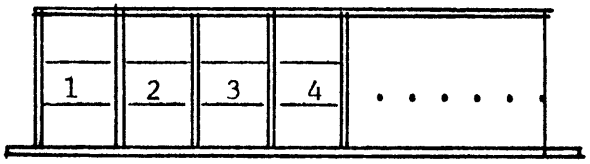


Fourplex



Sixplex

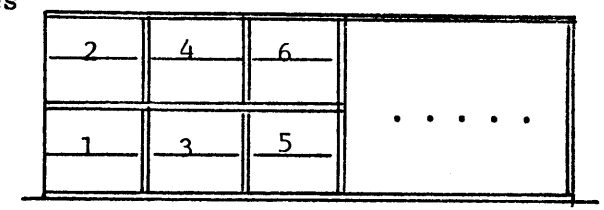
4. Townhouse/Rowhouse: This type of housing adapts the concept of single family or duplex housing with higher density situations. The townhouse provides for direct ground connection/claim in front and rear - providing for potential subdivision access - but it does forfeit side walls and side yards as ground related items (except for townhouses on ends or rows). The townhouse avoids the subdivision problems of placing one dwelling over another. The



Townhouse/Rowhouse

townhouse most synthesizes the requirements of home-identy and density. Assuming again a 2,000 s.f. dwelling, a townhouse spreads its area over 2-1/2 to 3 floors, resulting in a ground coverage of approximately 667 s.f. per townhouse. This compares favorable with the fourplex (1,000 s.f./dwelling) and is equal to the six-plex ground coverage (667 s.f./dwelling).
The townhouse has the additional advantage of functioning as part of a row of dwellings (because it does not rely on side walls for exterior exposure) and can thus in effect be a duplec, four-plex, six-plex or multi-plex. As such, prototypical design analysis of the townhouse would be applicable to a variety of building types.

5. Stacked Duplex/Rowhouse: This type synthesizes the townhouse with the four-six plex, in that it can function in rows and places one dwelling over another. The stacked duplex produces a higher density than townhouses, but not to the extent that it might first appear.



Stacked Duplex/Rowhouse

The townhouse can contain its 2,000 s.f. on three floors, resulting in ground coverage of 667 s.f. per dwelling (2,000 - 3), or 1,350 s.f. for 2 dwellings.

The stacked duplex can contain at most 2 floors per dwelling, and the stacked duplex will thus contain at most a total of 4 floors

to accomodate 4,000 s.f. (2,000 x 2 dwellings), or 1,000 s.f. ground coverage (4,000 s.f. - 4) for 2 dwellings (compared to 1,350 s.f. ground coverage for 2 townhouses).

However, this increase in density must be weighed against the circulation/access complications it poses for subdivision of the upper dwelling. Since the upper dwelling will be 2-1/2 - 4 full stories above grade, adaptability will be difficult to achieve. Additional stair systems extending from the ground to the fourth floor will be needed, unless the primary stairs to the upper dwelling are shared by all occupants. This would detract from the overall effectiveness of the upper dwelling. Even if this were done, it is unlikely that municipal codes would allow independent dwellings on the fourth floor of a building without elevators and without entirely first class construction (completely fire-resistant).

One solution to these complications would be to build the stacked duplex on three floors instead of four. However, in this instance the density advantage is lost, because the ground coverage would be 1,334 s.f. per dwelling, or the near equivalent of the townhouse ground coverage!

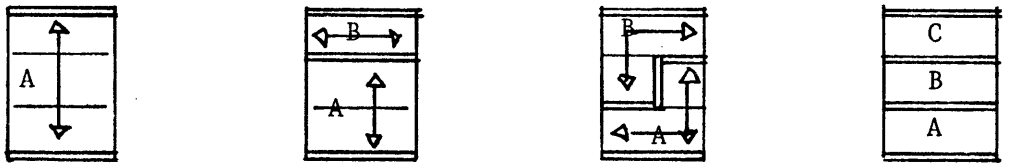
6. Multi-Family (Garden apartments and high rise): These types obviously produce the highest density of all types considered when building four or more floors and, not coincidentally, create the least sense of home-identity and the most difficulty for subdivision of the dwelling space.

Dwellings in these building have little or no ground connection (except for the first and possibly second floors) and rely on shared internal circulation systems for access. Dwellings typically exist on only one level and have only one exterior wall (for either single or double loaded corridor solutions) unless numerous vertical corridors (elevators) are substituted for horizontal corridors, at great expense. Building 2,000 s.f. on a single level with only one exterior wall would probably not be considered.

The density generated by these building types would compound the already demanding parking problems and in most instances high density solutions would not be capable of supporting 2 cars per dwelling.

Of the building typologies considered, the Townhouse most inherently lends itself to the requirements for adaptability and would appear to have the widest range of applications (from a duplex to a multi-plex). Accordingly, the prototypical adaptable dwelling designs in Chapter Seven use this building typology, and hereafter the term "adaptable townhouse" will be used in place of "adaptable dwelling".

The adaptable townhouse will be programmed to provide a range of occupancy patterns. In order for this to occur, each potential dwelling within the townhouse must have its own private access. This provision automatically requires two stair systems within a townhouse typology - the primary stairs for interconnecting all levels of the townhouse, and secondary stairs that enable separate connection to each combination of areas.



In all instances, access to B needs to pass by but not through A, and access to C when present needs to pass by but not through both A and B. The only instances in which a single stair system would suffice would be:

1. When the entire townhouse was used as one residence.

2. When the townhouse was used as three separate dwellings only, with one dwelling per level (A,B,C). In this case, there could be just one stair system shared by B anc C, with A accessed directly from the grouns.

3. When the top two levels (B+C) were used as a single dwelling and A was used as a separate dwelling.

These instances are mutually exclusive and restriction to any one of these instances would in effect render the Townhouse unadaptable and therefore are not acceptable.

Therefore, two stair systems are essential for adaptability within the townhouse typology.

The provision of two stair systems did not at first appear problemmatic. However, preliminary design explorations revealed that when coupled with other requirements (such as parking and narrow dimensioning for density purposes) this provision would be not only problemmatic but would shape the overall design. The questions raised were:

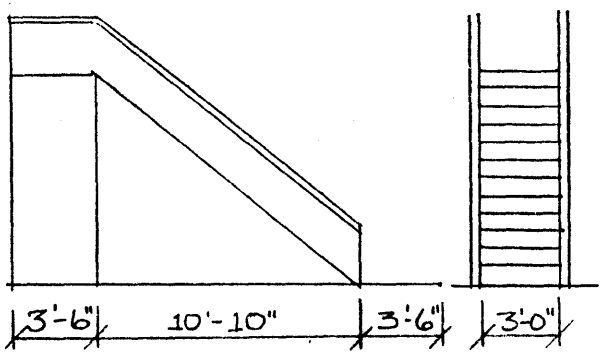
1. Where is the optimum location(s) for the two stair systems?
2. Can there and should there be a relationship between the primary and secondary stair systems, and if so, what should the nature of that relationship be?
3. How can a secondary stair system integrate into the townhouse when it is being occupied as a single residence?
4. How will entry from the ground to the secondary stair system impact on the privacy of other occupants?

In this section, these dimensional and locational aspects of circulation will be diagrammatically analyzed to demonstrate their impact and to serve as a basis for selecting particular alternatives for use in the prototype designs in Chapter Seven.

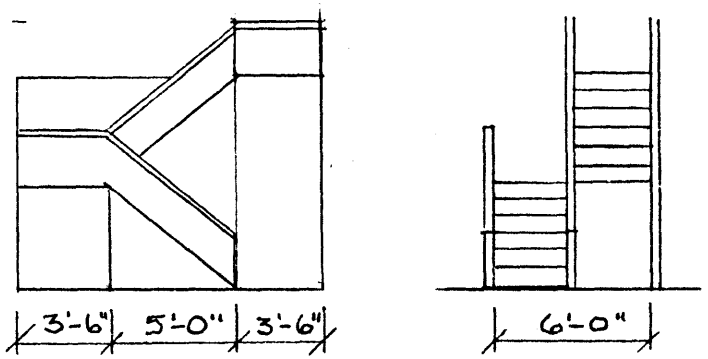
CIRCULATION/ENTRY SYSTEMS

I. STAIR DIMENSIONS

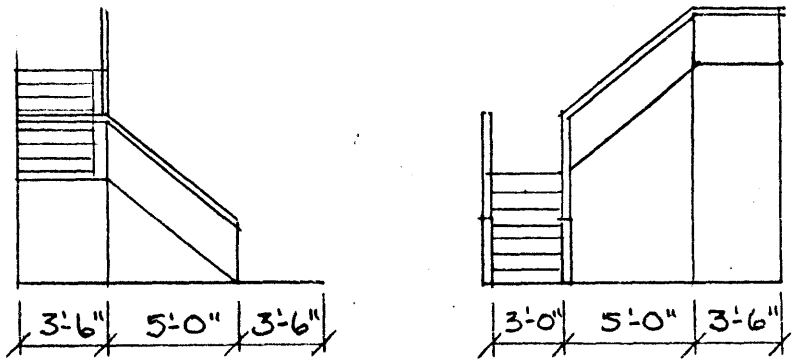
1. Straight Stairs



2. Fold-Back Stairs



3. Right-Angle Stairs



II. SECONDARY CIRCULATION/ENTRY LOCATIONS:

Using the basic stair system types shown in the previous page, the following alternative locations for secondary stairs will be explored here:

I. External - Front

II. External - Rear

III. Internal - Front Edge

IV. Internal - Rear Edge

V. Internal - Center

(The reader will note that each of these secondary systems are intended for one townhouse only. An alternative approach would be to provide for shared use of these stairs by adjacent townhouse inhabitants. Shared stairs would reduce the amount of floor area in each townhouse needed for secondary circulation, and would reduce the cost of these stairs by one-half for each townhouse owner. However, shared stairs become a "no-man's" land since they are not controlled by one owner. They thus are permanently separate from either Townhouse. In addition, shared stairs tend to emphasize the multiple-occupancy features of the adaptable townhouse

at the expense of home-identity.

Having considered the advantages and disadvantages of shared stairs, I decided to preclude their use for prototypical design but would recommend consideration if economic feasibility hinged on their benefits or if communality were an intended goal.)

I. EXTERNAL - FRONT

1. Straight Stairs (Fig. 1-a,b):

Fig. 1(a): This approach adds too much length to the townhouse to function well on small lots, and would be unsightly.

Fig. 1(b): This solution uses up too much exterior wall space.

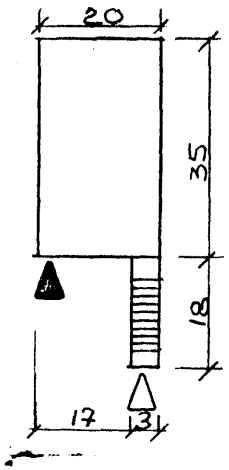


Fig. 1(a)

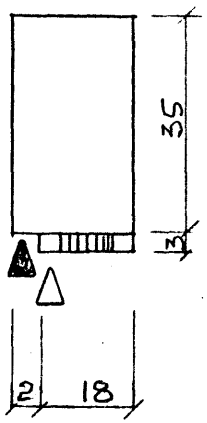


Fig. 1(b)

2. Fold-Back Stairs (Fig. 2-a,b):

Fig. 2(a): This approach is possible.

Fig. 2(b): This approach uses too much exterior wall space.

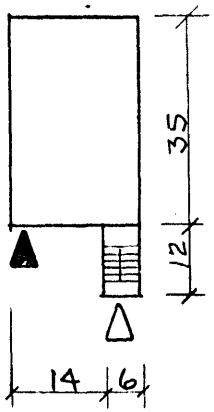


Fig. 2(a)

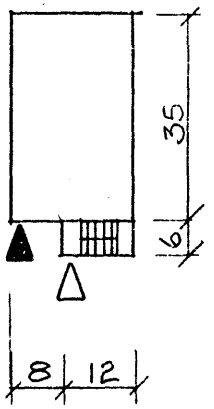


Fig. 2(b)

3. Right Angle Stairs (Fig. 3-a,b):

Fig. 3(a): This approach presents interesting possibilities, in that it places entry to second floor over the entry to first floor.

Fig. 3(b): This approach has no advantages over 3(a), and is less likely.

(Both 3(a) and 3(b) are interesting approaches for movement between two levels, but are unlikely when moving to a third level. This suggests an internal stair system between upper levels.)

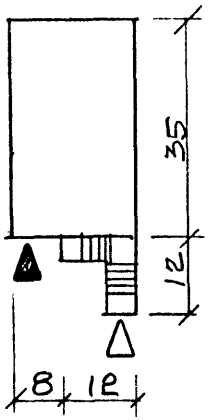


Fig. 3(a)

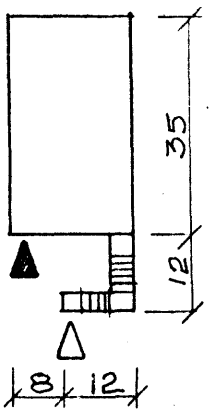


Fig. 3(b)

II. EXTERNAL - REAR:

(Diagrams for external stair systems in the rear of the townhouse would be the same as for the front, but would obviously separate the primary entry-which always remains in the front - from the secondary entry. This is an important consideration for privacy conflict mitigation.)

III. INTERNAL EDGE - FRONT

1. Straight Stairs (Figures 4-a,b):

Fig. 4(a): This approach would be most reasonable for movement between 2 levels, but would have to either fold back or create hallway on upper floors to work.

Fig. 4(b): This approach uses too much of the exterior wall surface.

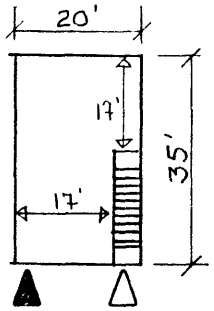


Fig. 4(a)

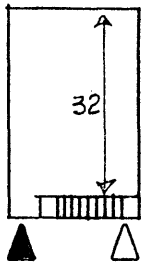


Fig. 4(b)

2. Fold-Back Stairs (Fig. 5-a,b):

Fig. 5(a): This approach is most likely because it enables continuous movement between any number of levels, and enables natural lighting at the landings. Its main disadvantage when compared to Fig. 4(a) is that it requires twice as much wall space and slightly more floor area.

Fig. 5(b): This approach uses too much exterior wall surface.

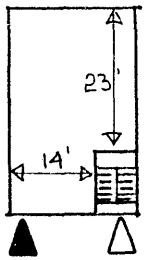


Fig. 5(a)

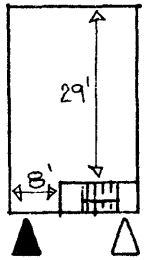


Fig. 5(b)

3. Right-Angle Stairs

Fig. 6(a) - Very unlikely.

Fig. 6(b) - Very unlikely.

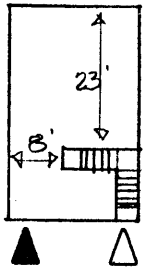


Fig. 6(a)

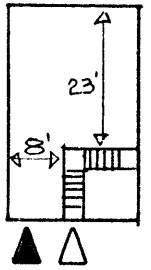


Fig. 6(b)

IV. INTERNAL EDGE - REAR:

(Diagrams for these conditions would be the same as shown in Figures 4-6, except the primary and secondary entries would occur on opposite faces of the townhouse.)

V. INTERNAL - CENTER

1. Straight Stairs (Fig. 7-a,b):

Fig. 7(a): This approach has no advantage over 4(a) with the disadvantage of requiring relatively long linear movement before reaching next level.

Fig. 7(b): Very unlikely.

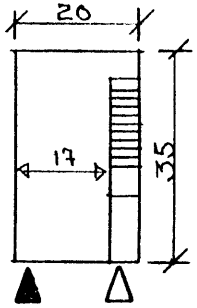


Fig. 7(a)

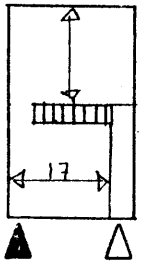


Fig. 7(b)

2. Fold-Back Stairs (Fig. 8-a,b):

Fig. 8(a): This approach proved most useful because it does not use exterior wall surface (except on entry level) and easily integrates into the entire townhouse. However, its location usurps the most likely location for the primary stairs.

Fig. 8(b): Same advantages and disadvantages as 8(a), but less useful.

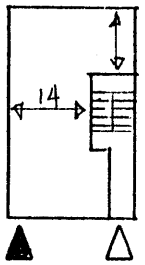


Fig. 8(a)

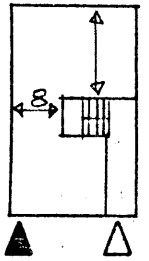


Fig. 8(b)

3. Right-Angle Stairs (Fig. 9-a,b):

Fig. 9(a): This approach combines 7(a) and 7(b) and does not present any significant advantages.

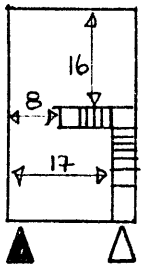


Fig. 9(a)

General Comments on Secondary Stair Systems:

Exterior Stairs:

1. Exterior stairs are advantageous in that they do not use valuable interior floor area, but by the same token, they do use valuable outdoor space, and present privacy conflicts with outdoor uses.

2. Exterior stairs create problems for any design solutions that place parking under the townhouse (which is a very likely possibility). With parking underneath, the townhouse is raised at least 1/2 level above grade, and at least 10' of frontage is devoted to parking. Entry(s) must occur on the remaining frontage. Given a demand for narrowness due to density considerations, the placing of stairs in such a narrow dimension would be difficult to do well.

3. Perhaps most disadvantageous is that exterior stairs will draw permanent attention to the multi-occupancy aspects of the townhouse even though it is under single ownership and may not always be used for multiple occupancy.

Internal Stairs:

1. Internal stairs' main disadvantage is obviously their use of floor space.

2. Internal stairs' main advantage is that they are capable of being useful at all times and yet do not draw attention to the multi-occupancy potential of the townhouse.

3. Of the internal stair approaches, the most likely are Fig. 4(a) and 5(a). Of these two, the fold-back stairs are the more advantageous because of their ability to connect any number of levels, and also because they enable direct natural lighting and visual connection to the street.

4. The centrally located internal stairs offer many advantages and yet they occur in the most likely location for the primary stairs.

Based on this analysis, the internal edge fold-back stair system (Fig. 5(a)) was selected for further study through incorporation into the prototype designs in Chapter Seven. These designs test the impact of varying the location of the secondary stair system in relation to the location of primary entry and parking.

Zoning regulations for most municipalities now require 1 off-street parking space per dwelling unit. On small urban lots, integrating cars with medium density housing in a way that does not destroy an otherwise decent site plan can be exceedingly difficult.

The adaptable townhouse as proposed will have the capacity for a range of occupancy patterns. How will zoning codes characterize this type of residence? Will one, two or possible three parking spaces be required since the townhouse may over time have one,two or three separate dwellings within it?

If three spaces were required, it is doubtful that a sufficient built density could be achieved to make this housing competitive/feasible, and even if it were feasible, a decent site plan would be extremely unlikely. One need only look at townhouse complexes currently being built to see the effect of just one car per dwelling!

It is not unreasonable to assume that at least two off-street parking spaces per adaptable townhouse will be required, and accordingly the parking analysis in this section will include this provision.

In order to focus on parking alone, other variables have been kept constant here for this exercise only, as follows:

1. Townhouse dimension: 20' x 35'.

2. Set-Backs: 10' on front and sides, and 20' in rear, with parking/driveways allowed in the set-back areas.

3. Size of Cluster: 4 adaptable townhouses.

I. TOWNHOUSE FACING THE STREET: PARKING TWO CARS ON GRADE IN FRONT

Fig. 1(a): This variation enables the smallest lot size for all alternatives, but completly destroys the street edge because of the one long curb cut and because it places the townhouse at least 28' from the street sidewalk.

Fig. 1(b): Demonstrates the same variation applied to conventional townhouses. Density is the same, but the street edge is less damaged.

Fig. 2(a): This variation attempts to better preserve the street edge by placing parking at either side, enabling two smaller curb cuts and enabling the townhouses to directly address the street. However, this variation requires the longest street frontage, and therefore lowers density substantially.

Fig. 2(b): Demonstrates the same variation applied to conventional townhouses on same lot size. Density is 5/4th higher than adaptable townhouse density.

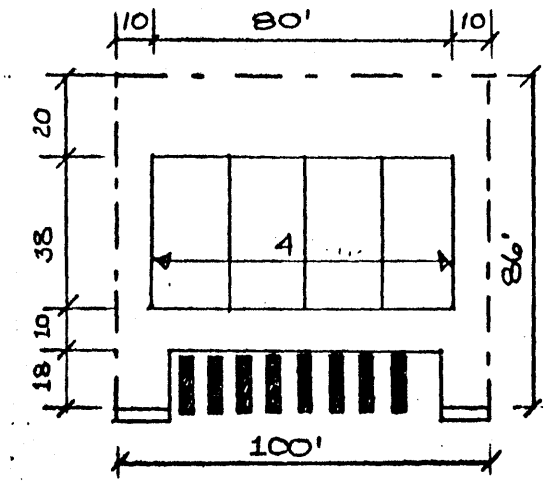


Fig. 1(a)

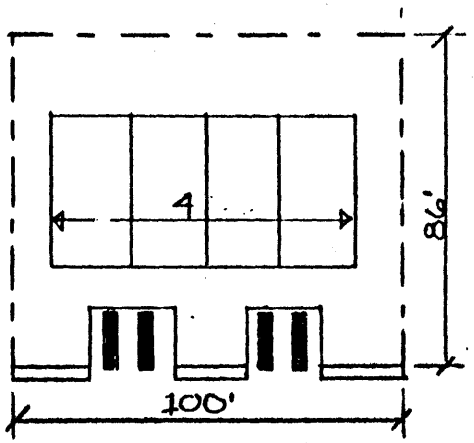


Fig. 1(b)

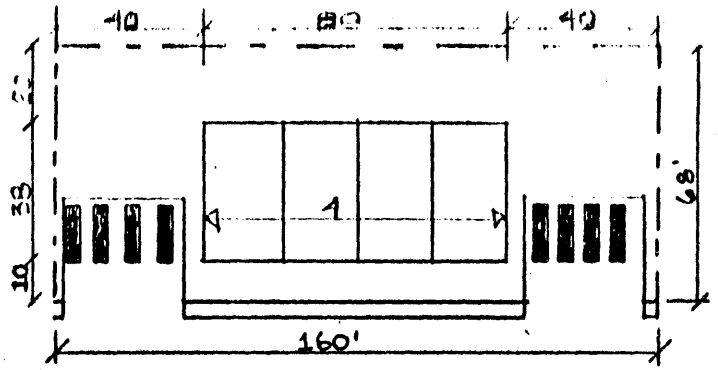


Fig. 2(a)

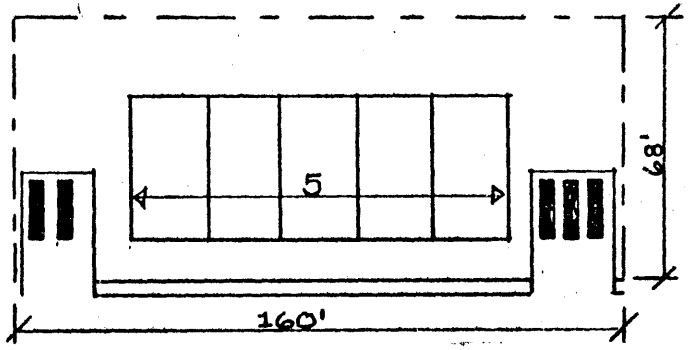


Fig. 2(b)

Fig. 3(a): This variation synthesizes 1(a) and 2(a), maintaining some decent street edge but requiring that Townhouses be set back at least 28' by a parking buffer. Density is still low.

Fig. 3(b): Demonstrates the same variation applied to conventional townhouses on same lot size. Density is 5/4th higher.

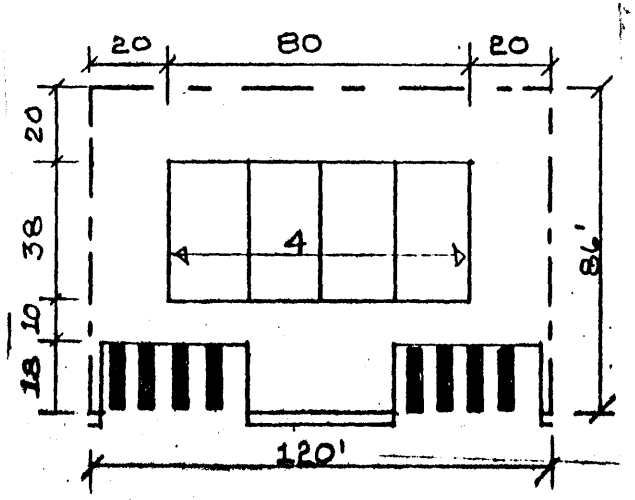


Fig. 3(a)

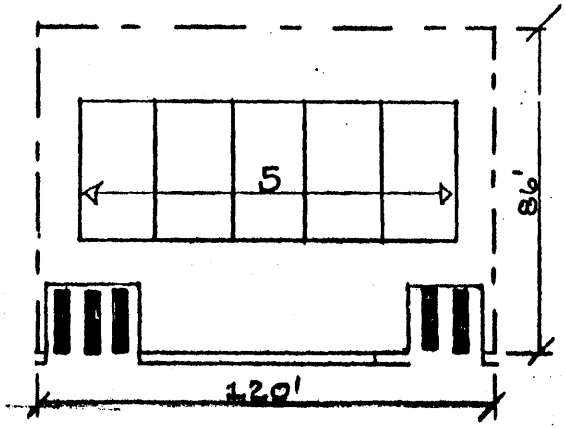


Fig. 3(b)

II. TOWNHOUSE FACING THE STREET: PARKING 2 CARS ON GRADE IN REAR

Fig. 4(a): This variation preserves the street edge - requiring only one driveway width curb cut - and requires a relatively small minimum lot size. However, usable open space in the rear is entirely devoted to parking.

Fig. 4(b): Demonstrates the same alternative applied to conventional townhouses on same lot size. While same density results, much of the usable open space in the rear is retained.

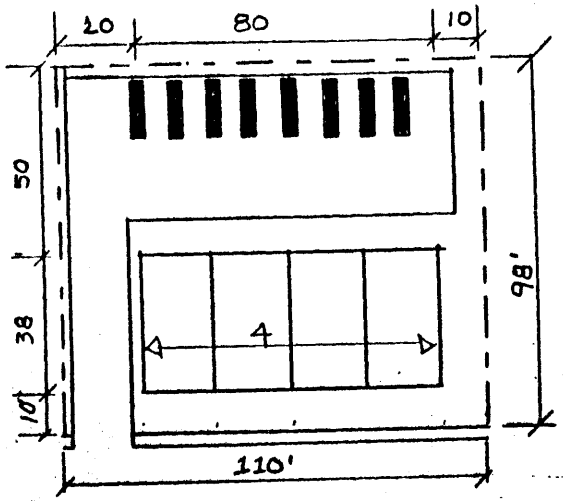


Fig. 4(a)

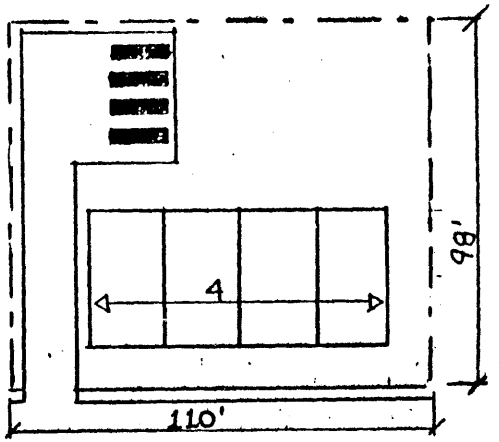


Fig. 4(b)

III. TOWNHOUSE FACING THE STREET: PARKING 1 CAR UNDER TOWNHOUSE AND 1 CAR ON GRADE

Fig. 5(a): This variation requires that the first level of the townhouse be raised at least 1/2 level above grade, and perhaps a full level. The street frontage required is the same as 3(a) (the most likely variation in that category).

Fig. 5(b): Demonstrates the same alternative applied to conventional townhouses on same minimum lot size. While characteristics are the same, 1 5/4th higher density is achieved.

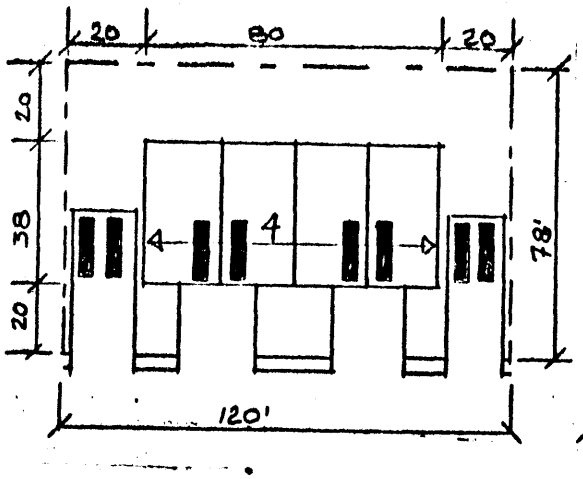


Fig. 5(a)

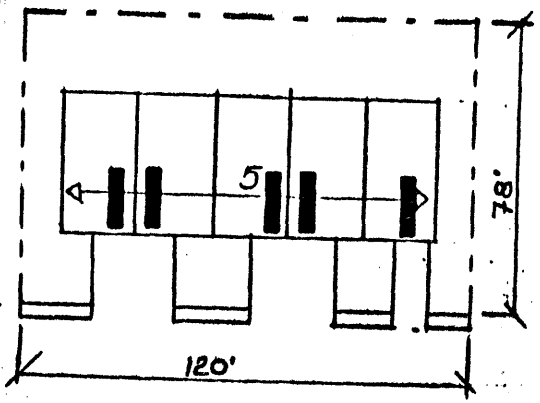


Fig. 5(b)

IV. TOWNHOUSE FACING THE STREET: PARKING 1 CAR UNDER TOWNHOUSE AND 1 CAR ON GRADE

Fig. 6(a): This variation requires less frontage than 5(a) or 3(a) and retains a decent street edge. However, like 4(a), it uses most open space in rear for parking.

Fig. 6(b): Demonstrates the same variation applied to conventional townhouses. In this instance density and land use are the same.

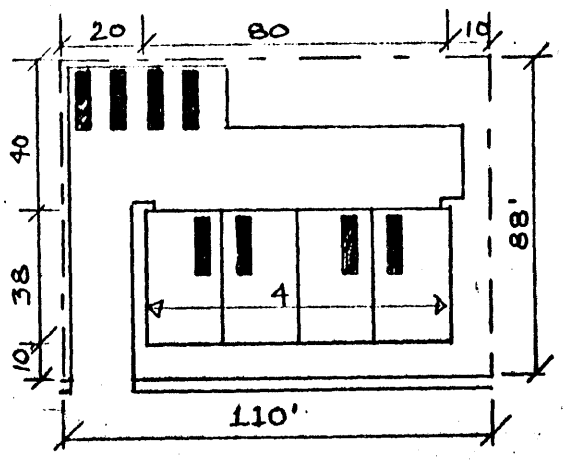


Fig. 6(a)

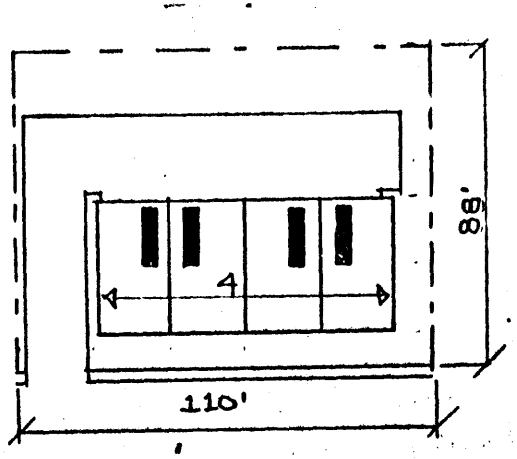


Fig. 6(b)

V. TOWNHOUSE FACING THE STREET: PARKING 2 CARS UNDER TOWNHOUSE IN FRONT

Fig. 7(a): This variation requires wider adaptable townhouses to accomodate 2 cars underneath them (width is increased to 25' and depth decreased to 30'). This variation is similar to Fig. 3(a) with the advantage of locating townhouses closer to the street edge, if desired.

Fig. 7(b): Since conventional townhouses don't require 2 cars per townhouse, this variation is the came as 5(b) and also produces a 5/4th higher density.

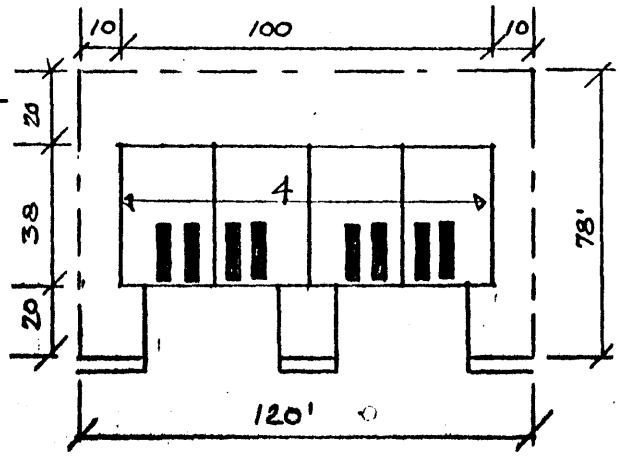


Fig. 7(a)

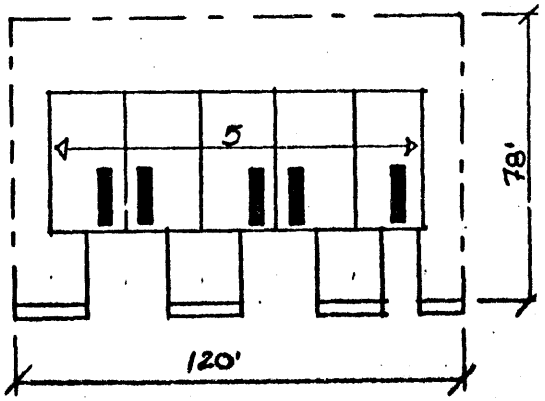


Fig. 7(b)

VI. TOWNHOUSE FACING THE STREET: PARKING 2 CARS UNDER TOWNHOUSE IN REAR

Fig. 8(a): This variation again requires wider townhouse, but preserves the street edge. It uses most all open space in the rear for parking.

Fig. 8(b): Demonstrates the same variation applied to conventional townhouses on same lot size, and has same characteristics as 8(a) except that it achieves a 5/4th higher density.

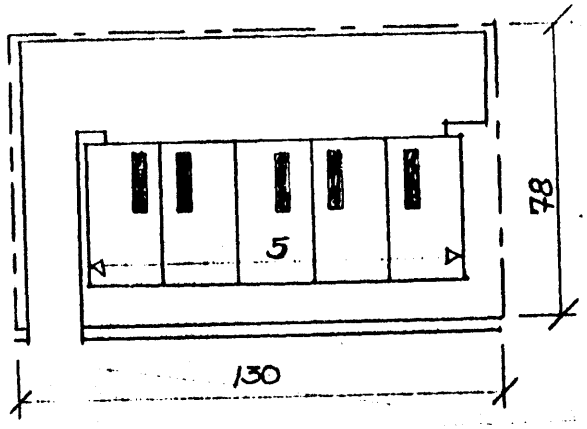


Fig. 8(a)

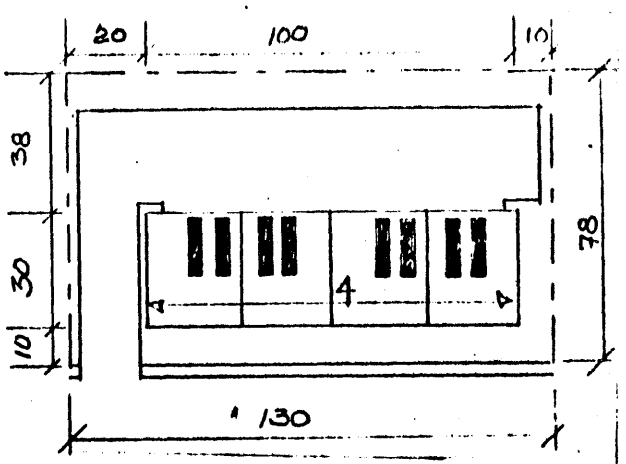


Fig. 8(b)

VII. TOWNHOUSE WITH SIDE TO STREET: PARKING 2 CARS ON GRADE

Fig. 9(a): This variation requires less frontage than Variations shown in Figures 1-8, and requires only one curb cut.

Fig. 9(b): Demonstrates the same variation applied to conventional townhouses, and requires less frontage than 9(a), and retains more usable open space.

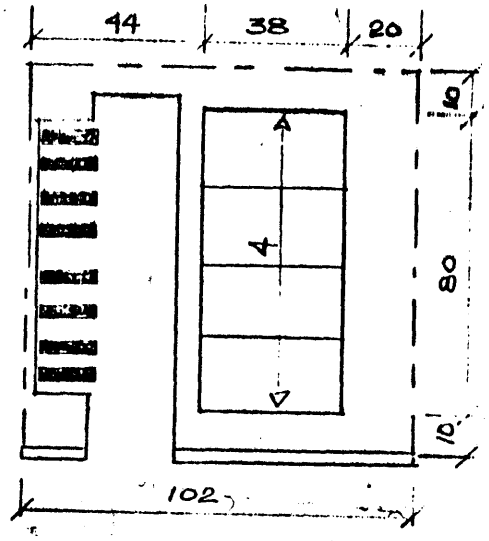


Fig. 9(a)

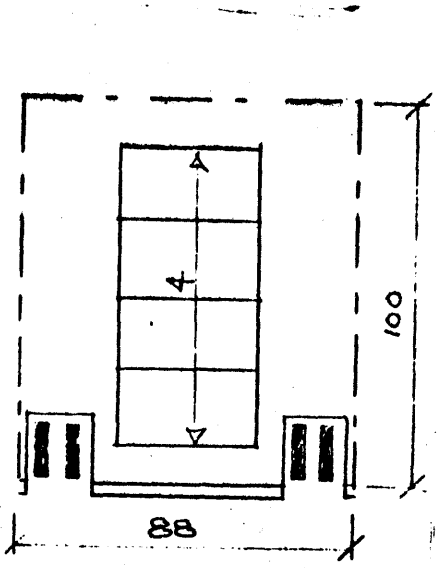


Fig. 9(b)

VIII. TOWNHOUSE WITH SIDE TO STREET: PARKING 1 CAR UNDER TOWNHOUSE AND 1 CAR ON GRADE

Fig. 10(a): This variation requires less frontage than previous variation and requires only one curb cut.

Fig. 10(b): Demonstrates same variation applied to conventional townhouses, with similar results, using less frontage.

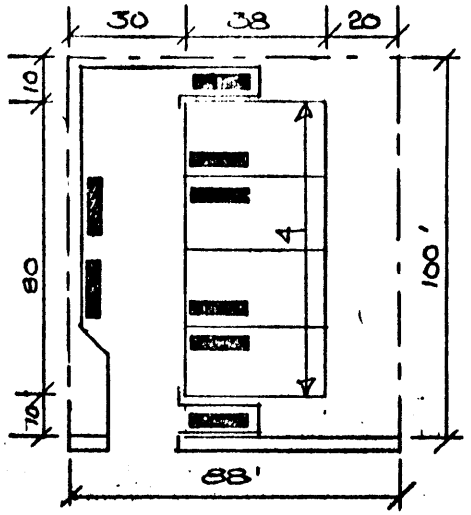


Fig. 10(a)

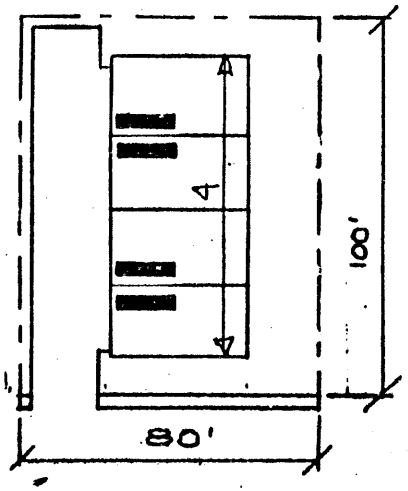


Fig. 10(b)

IX. TOWNHOUSE WITH SIDE TO STREET: PARKING 2 CARS UNDER TOWNHOUSE

Fig. 11(a): This variation requires an increased adaptable townhouse width (25') and decreased adaptable townhouse depth (30'). It results in the least frontage requirements for all variations.

Fig. 11(b): Demonstrates the same variation applied to conventional townhouses, with similar results, except that a 5/4th higher density is achieved.

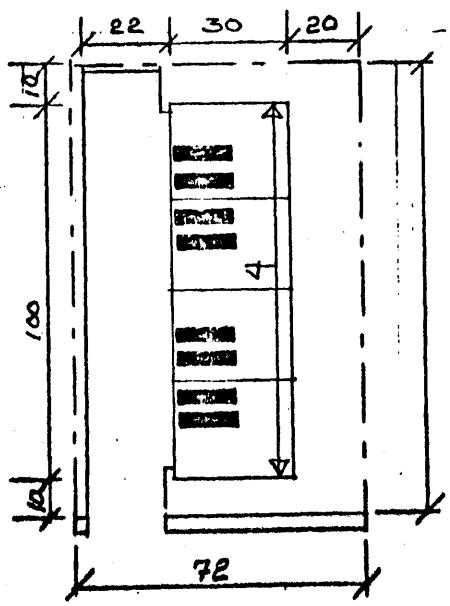


Fig. 11(a)

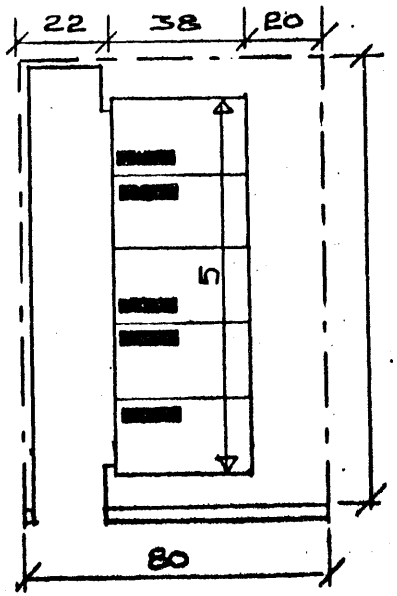


Fig. 11(b)

CHAPTER SEVEN: PROTOTYPICAL DESIGNS OF FOUR ADAPTABLE TOWNHOUSES

The content of this Chapter represents the main goal of this Thesis - the design of adaptable urban dwellings. The preceeding six chapters have stated the Proposal and provided the essential theory, framework and ground rules on which these designs have been based.

As stated in Chapter Two, the **Prototype Design has been** selected as the method to put a series of concepts through a rigorous reality - testing in order to determine which combination of critical variables produce the most promising results. Toward this end, four complete adaptable dwelling prototypes have been designed, characterized as follows:

	TOWNHOUSE ORIENTATION	DIMENSION	CIRCULATION	PARKING
PROTOTYPE I	Side-To-Street	Wide & Shallow (28' x 33')	1 Entry Front/Side 1 Entry Rear/Side	2 Cars Under The Townhouse
PROTOTYPE II	Side-To-Street	Narrow & Deep (22' x 38')	1 Entry Front/Side 1 Entry Rear/Side	1 Car Under Townhouse 1 Car On Grade
PROTOTYPE III	Facing Street	Wide & Shallow (28' x 33')	2 Entries On Front	2 Cars Under Townhouse
PROTOTYPE IV	Facing Street	Narrow & Deep (22' x 38')	2 Entries On Front	1 Car Under Townhouse 1 Car On Grade

(See Chapters 4-6 for analysis of these variables.)

The reader will note that two potential variables have been kept constant:

1) Building Typology: The Townhouse is used as the basic building typology for all four prototypes. The resulting Building Sections for each prototype appear to be quite similar (particularly at the reduced size required for incorporation into the Thesis), although choice of other variables produce different level relationships and different primary circulation systems.

2) Range of Adaptability: In order to compare results to determine favorable conditions, each Prototype has been programmed to provide an identical - and a most demanding - range of adaptability, as described below.

Each Prototypical adaptable dwelling is programmed to subdivide in five different area combinations, referred to as Occupancy Phases, as follows:

Occupancy Phase A: Adaptable townhouse inhabited by one family as a single family residence as shown in this diagram.

Occupancy Phase B: Adaptable townhouse inhabited as essentially a single family residence, with one component area sub-let as as "efficiency apartment", as shown in this diagram.

Occupancy Phase C: Adaptable townhouse inhabited as a two family residence, with one residence on the first two floors and one residence on the top floor, as shown in this diagram.

Occupancy Phase D: Adaptable dwelling inhabited as a two family residence of approximately equal size, as shown in this diagram.

Occupancy Phase E: Adaptable dwelling inhabited as a three family residence of approximately equal size, as shown in this diagram.

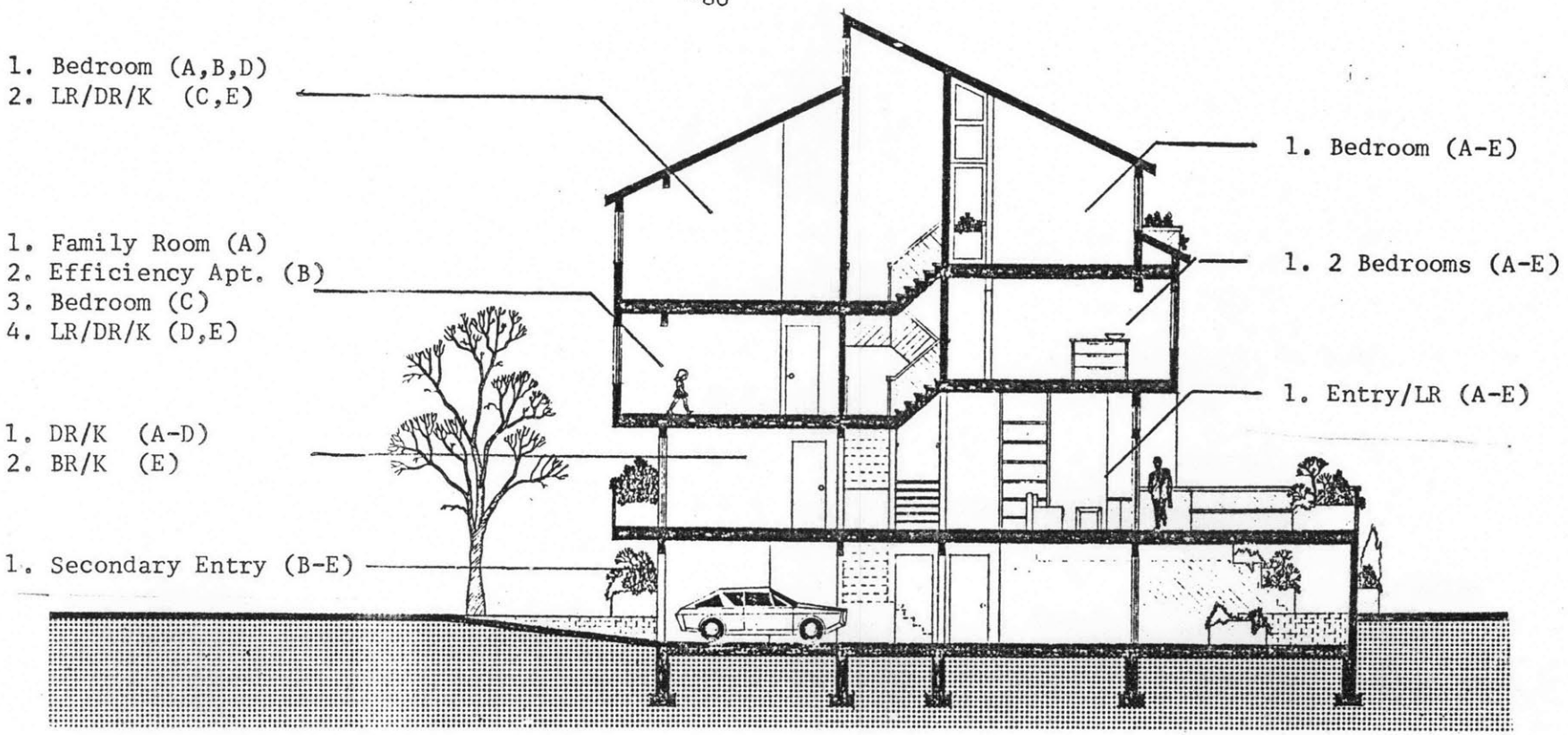
(The reader should note that these Occupancy Phases may occur in any order.)

Each Prototype Design is presented with the following drawings:

1. Site Plan: To demonstrate the impact of chosen variables on site planning and on minimum lot size required for a cluster of four adaptable dwellings of the particular prototype design.

2. Section: To demonstrate vertical relationships of areas within the adaptable dwelling and identify their varying functions.

3. Furnished Floor Plans For Each Of The Five Occupancy Phases: To identify area sizes and uses, the range of adaptability and the scope of changes required to adapt.



PROTOTYPE I - SECTION

[Note: Letters in parentheses ( ) refers to Occupancy Phase]

Identification: Site Plan - Prototype I.

Variables Selection:

1. Townhouse Orientation: Side to the street.
2. Parking Plan: Two cars parked under each townhouse.
3. Entry Location: Entries located on opposite sides of the townhouse.
4. Critical Dimension: Townhouse depth is to be minimized.

Resulting Dimensions:

1. Townhouse Outside Dimensions: Depth (critical): 33'-0"; Width: 28'-0"
2. Minimum Lot Dimensions: Width (frontage): 84'-0"; Depth: 132'-0"
3. Townhouse Gross Floor Area: 2,439 s.f.
4. Minimum Lot Area: 11,088 s.f.
5. Floor Area Ratio (F.A.R.): 0.88

Comparative Density: The same minimum lot size and dimension would permit:

- 5 conventional townhouses @ 20' width/townhouse.
- 6 conventional townhouses @ 18' width/townhouse.
- 7 conventional townhouses @ 16' width/townhouse.

Excess Adaptable Townhouse Cost Due To Density: Conventional townhouses will achieve a 5/4th - 7/4th higher density than this adaptable townhouse prototype. Therefore, this adaptable townhouse will carry a 25% - 75% higher land cost, resulting in a 5% - 15% higher total cost for each townhouse.

General Comments: This site plan was designed to demonstrate the minimum lot size required for Prototype I and to demonstrate the impact of the Variables Selection. This site plan takes advantage of the townhouse orientation which makes available two sides of the townhouse for parking and entry purposes. The central features are:

1. Separation of primary inhabitant pedestrian circulation from vehicular circulation. A "pedestrian street" is planned on one side of the townhouses.

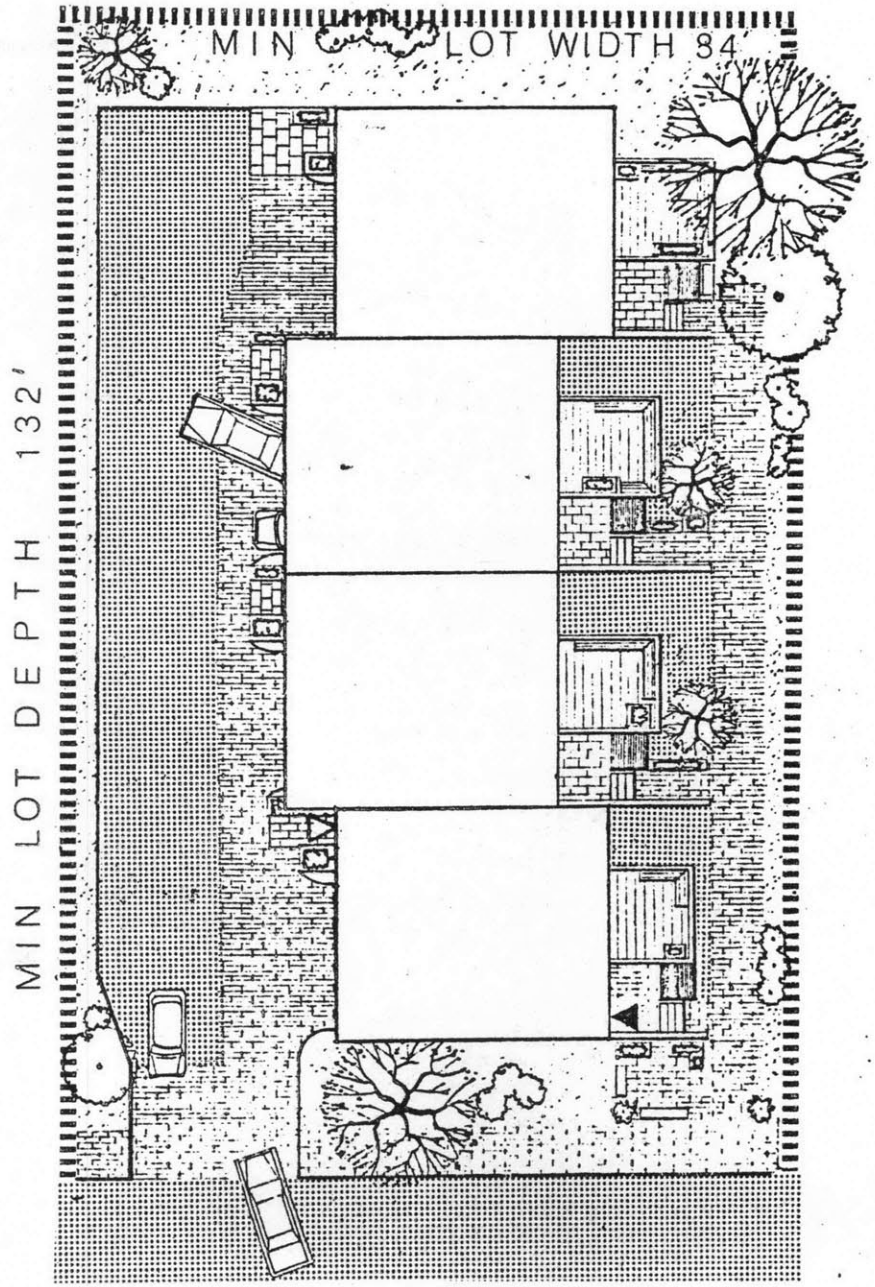
2. Separation of primary entries from secondary entries by combining pedestrian and vehicular circulation on the side opposit the pedestrian street. Since minimum lot sizes are used, the driveway is to be paved with two separate materials for distinction between vehicular and secondary pedestrian circulation. Secondary entries are further denoted by use of third ground material and by planters.

3. Clear differentiation between primary and secondary outdoor privacies. The primary inhabitant is provided with outdoor patio/deck privacies partially removed from the street and totally removed from parking and secondary entries.

4. The townhouse orientation necessitates only one curb cut and minimizes impact on street edge and danger to pedestrians and vehicles along the street.

The major disadvantage of this site plan is:

1. Townhouse orientation does not permit a continuous rowhouse fabric along the street.



SITE PLAN - PROTOTYPE I

PROTOTYPE I - OCCUPANCY PHASE A (Floor plans on opposite page).

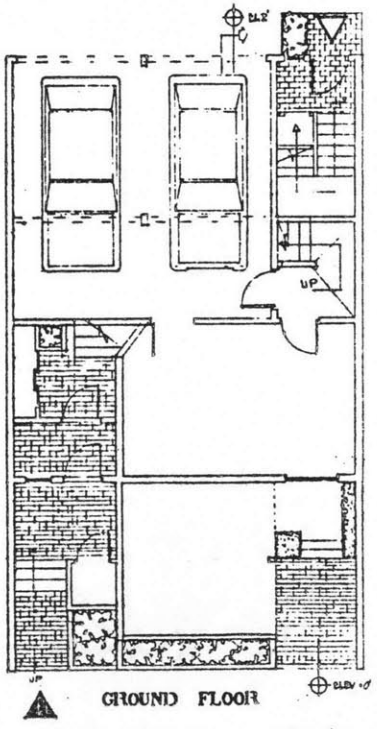
Total Floor Area: 2,439 s.f.

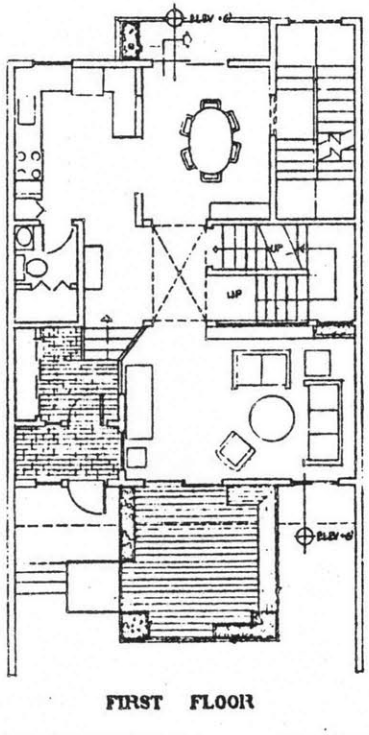
Characteristics:	Dwelling #1 (Total Townhouse)	#2	#3
1. Entry Area:	8' x 12'	-	-
2. Living Room:	12' x 18'	-	-
3. Dining Area:	10' x 12'	-	-
4. Kitchen Area:	10' x 12'	-	-
5. Family/Play Area:	12' x 15' (+8'x12')	-	-
6. Bedroom #1 (Master BR):	12' x 20'	-	-
7. Bedroom #2:	11' x 15'	-	-
8. Bedroom #3:	11' x 12'	-	-
9. Bedroom #4:	12' x 14'	-	-
10. Bathroom(s):	5' x 8' (3-1/2)	-	-
Area Sub-Total:	1,693 s.f.		
11. Primary Circulation:	496 s.f.		
12. Secondary Circulation:	250 s.f.		
Area Sub-Total:	746 s.f.		
Area Total:	2,439 s.f.		
13. Circulation as % of Total:	30%		

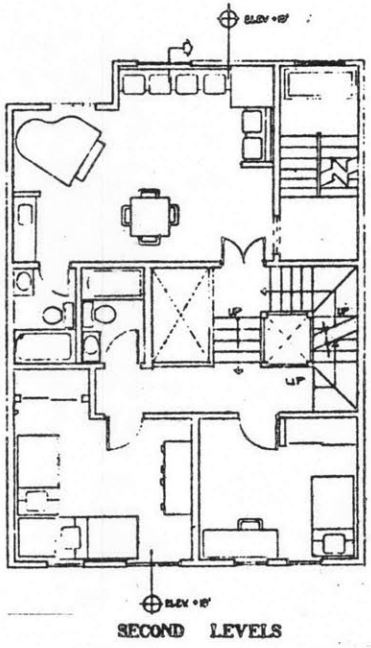
***** ***** ***** ***** ***** ***** ***** ***** *****

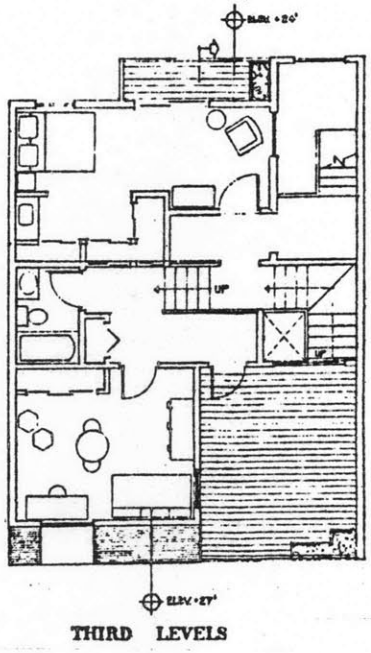
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

-None-





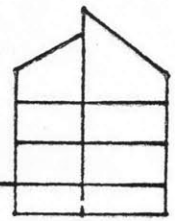




PROTOTYPE: I
VARIATION: Occupancy Phase A

DWELLING # 1 2,439 s.f.
DWELLING # 2 - s.f.
DWELLING # 3 - s.f.

TOTAL 2,439 s.f.



PROTOTYPE I - OCCUPANCY PHASE B (Floor plans on opposite page).

Total Floor Area: 2,439 s.f.

Characteristics:	Dwelling #1 [1st, 2nd (front), 3rd]	#2 [2nd floor (rear)]	#3
1. Entry Area:	8' x 12'	-	-
2. Living Room:	12' x 18'	12' x 15'	
3. Dining Area:	10' x 12'	Incl. in LR.	-
4. Kitchen Area:	10' x 12'	8' x 12'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	11' x 15'	Incl. in LR.	-
7. Bedroom #2:	11' x 12'	-	-
8. Bedroom #3:	12' x 20'	-	-
9. Bedroom #4:	12' x 14'	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,377 s.f.	316 s.f.	
11. Primary Circulation:	496 s.f.	-	
12. Secondary Circulation:	-	250 s.f.	
Area Sub-Total:	496 s.f.	250 s.f.	
Area Total:	1,873 s.f.	566 s.f.	
13. Circulation as % of Total:	26%	44%	

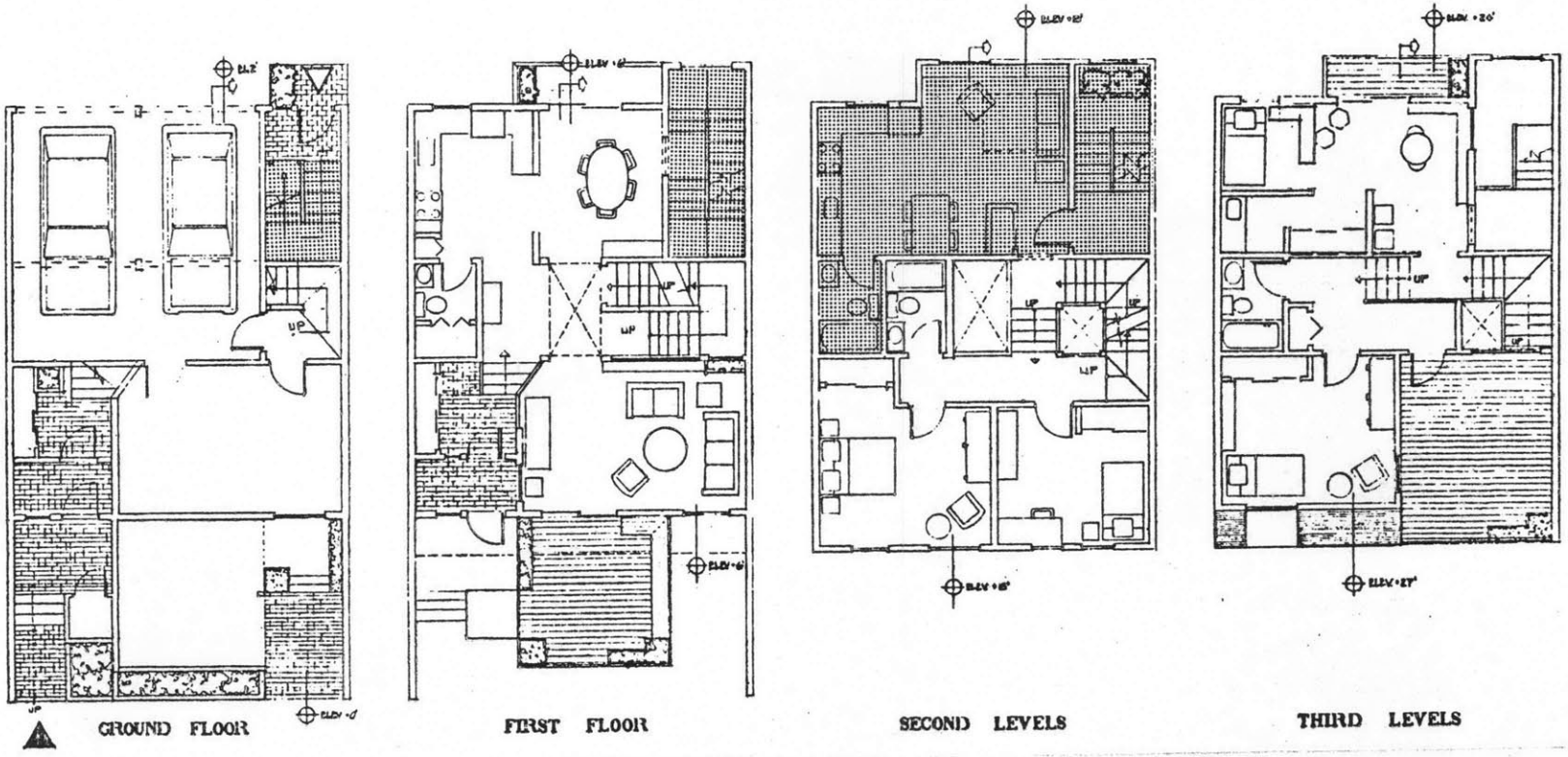
***** ***** ***** ***** ***** ***** ***** ***** *****

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

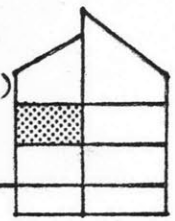
Second Level - Install second door in entry to family room to enclose separate dwelling; Install range, refrigerator and 8 linear feet of counter.

Third Level - None.



PROTOTYPE: I
VARIATION: Occupancy Phase B

DWELLING # 1	1,873	s.f.(unshaded)
DWELLING # 2	566	s.f.(shaded)
DWELLING # 3	-	s.f.
TOTAL	2,439	s.f.



PROTOTYPE I - OCCUPANCY PHASE C (Floor plans on opposite page).

Total Floor Area: 2,439 s.f.

Characteristics:	Dwelling #1 (1st,2nd Floors)	#2 (3rd Floor)	#3
1. Entry Area:	8' x 12'	-	-
2. Living Room:	12' x 18'	14' x 16'	-
3. Dining Area:	10' x 12'	Incl. in LR.	-
4. Kitchen Area:	10' x 12'	6' x 12'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	12' x 15'	12' x 14'	-
7. Bedroom #2:	11' x 15'	-	-
8. Bedroom #3:	11' x 12'	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,245 s.f.	448 s.f.	
11. Primary Circulation:	344 s.f.	152 s.f.	
12. Secondary Circulation:	-	250 s.f.	
Area Sub-Total:	344 s.f.	402 s.f.	
Area Total:	1,589 s.f.	850 s.f.	
13. Circulation as % of Total:	22%	47%	

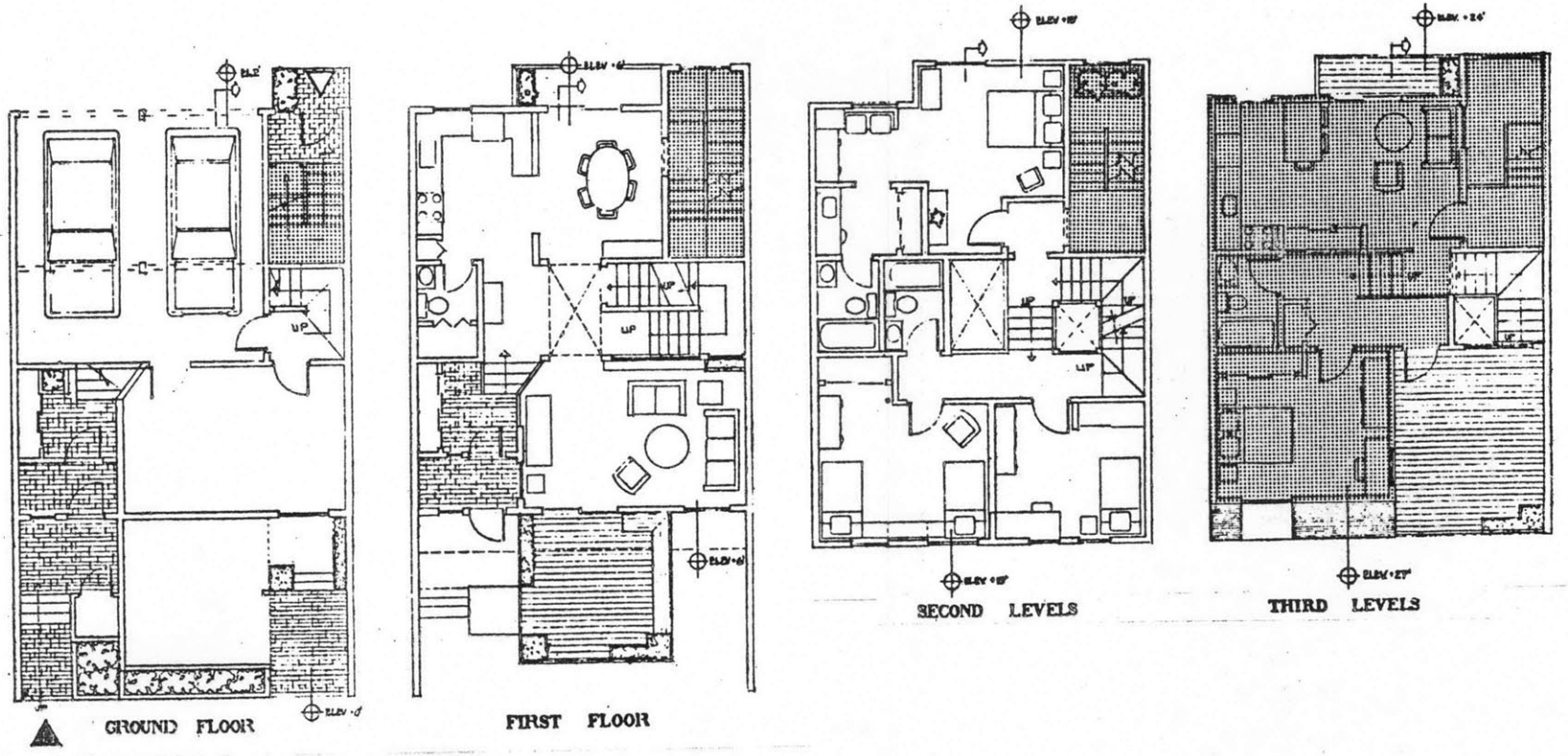
***** ***** ***** ***** ***** ***** ***** ***** *****

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

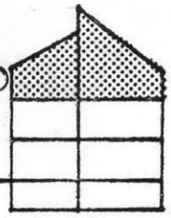
Second Level - None.

Third Level - Install range, refrigerator, and 8 linear feet of counter; Remove 10 linear foot partition wall; Install door at landing of primary stairs.



PROTOTYPE: I
VARIATION: Occupancy Phase C

DWELLING # 1	1,589	s.f.(unshaded)
DWELLING # 2	850	s.f.(shaded)
DWELLING # 3	-	s.f.
TOTAL	2,439	s.f.



PROTOTYPE I - OCCUPANCY PHASE D (Floor Plans on opposite page).

Total Floor Area: 2,439 s.f.

Characteristics:	Dwelling #1 [1st,2nd (front) floors]	#2 [2nd (rear),3rd floors]	#3
1. Entry Area:	8' x 12'	-	-
2. Living Room:	12' x 18'	12' x 15'	-
3. Dining Area:	10' x 12'	Incl. in LR.	-
4. Kitchen Area:	10' x 12'	8' x 12'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	11' x 15'	12' x 20'	-
7. Bedroom #2:	11' x 12'	12' x 14'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (1-1/2)	5' x 8' (2)	-
Area Sub-Total:	929 s.f.	764 s.f.	
11. Primary Circulation:	344 s.f.	152 s.f.	
12. Secondary Circulation:	-	250 s.f.	
Area Sub-Total:	344 s.f.	402 s.f.	
Area Total:	1,273 s.f.	1.166 s.f.	
13. Circulation as % of Total:	27%	34%	

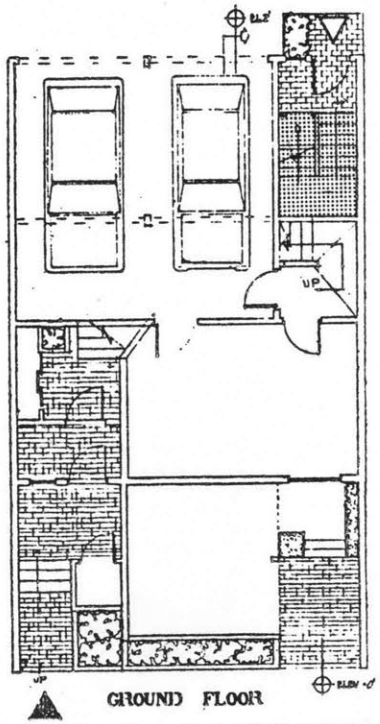
***** ***** ***** ***** ***** ***** ***** ***** *****

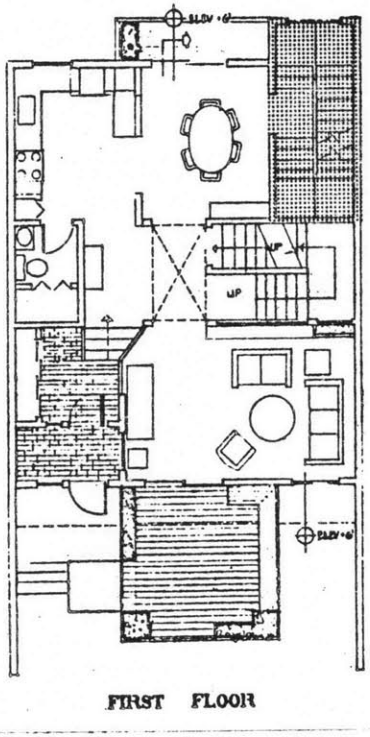
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

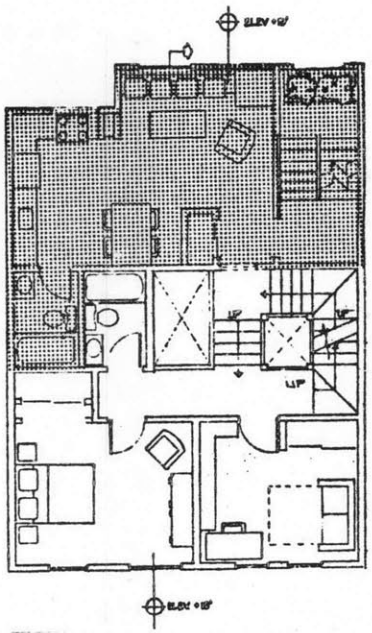
First Level - None.

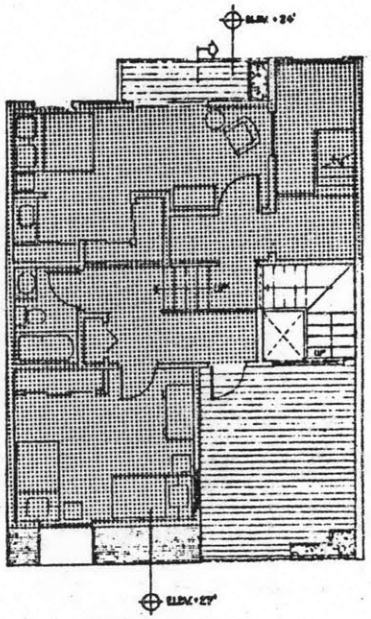
Second Level - Install second door in entry to family room to enclose separate dwelling; Open secondary stairs (optional) by converting 6 linear feet of full wall to half wall; Install range, refrigerator and 8 linear feet of counter.

Third Level - Install door at top of primary stairs.





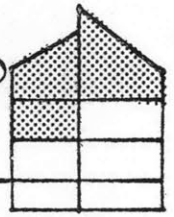




PROTOTYPE: I
VARIATION: Occupancy Phase D

DWELLING # 1 1,273 s.f.(unshaded)
DWELLING # 2 1,166 s.f.(shaded)
DWELLING # 3 - s.f.

TOTAL 2,439 s.f.



PROTOTYPE I - OCCUPANCY PHASE E (Floor plans on opposite page).

Total Floor Area: 2,439 s.f.

Characteristics:	Dwelling #1 (First Floor)	#2 (Second Floor)	#3 (Third Floor)
1. Entry Area:	8' x 12'	-	-
2. Living Room:	12' x 18'	12' x 15'	12' x 14'
3. Dining Area:	10' x 12'	Incl. in LR.	Incl. in LR.
4. Kitchen Area:	Incl. in DR.	8' x 12'	6' x 12'
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	10' x 12'	11' x 15'	12' x 14'
7. Bedroom #2:	-	11' x 12'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (1)	5' x 8' (2)	5' x 8' (1)
Area Sub-Total:	592 s.f.	653 s.f.	448 s.f.
11. Primary Circulation:	168 s.f.	176 s.f.	152 s.f.
12. Secondary Circulation:	-	125 s.f.	125 s.f.
Area Sub-Total:	168 s.f.	301 s.f.	277 s.f.
Area Total:	760 s.f.	954 s.f.	725 s.f.
13. Circulation as % of Total:	22%	32%	38%

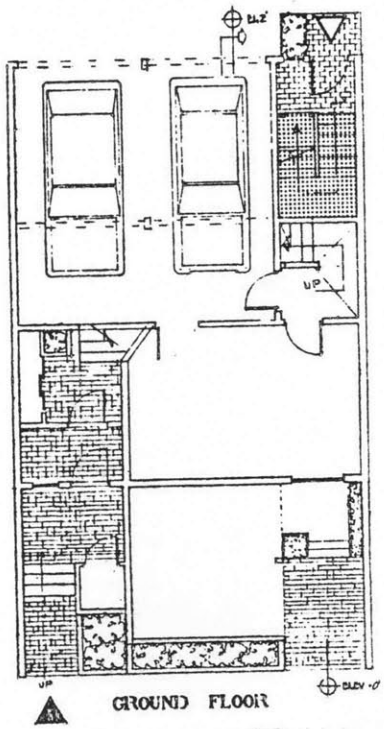
***** ***** ***** ***** ***** ***** ***** ***** *****

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

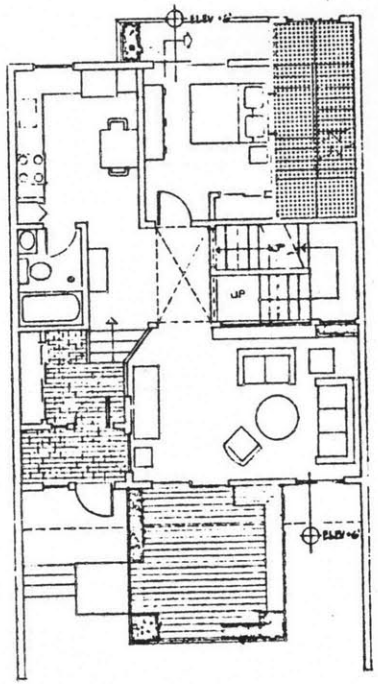
First Level - Install 10 linear foot partition wall including doorway to enclose dining room for use as bedroom; Install shower/tub in place of closet.

Second Level - Enclose light well (solid and/or translucent glass).; Install door at landing of primary stairs; Install range, refrigerator and 8 linear feet of counter; Install additional closet in family room.

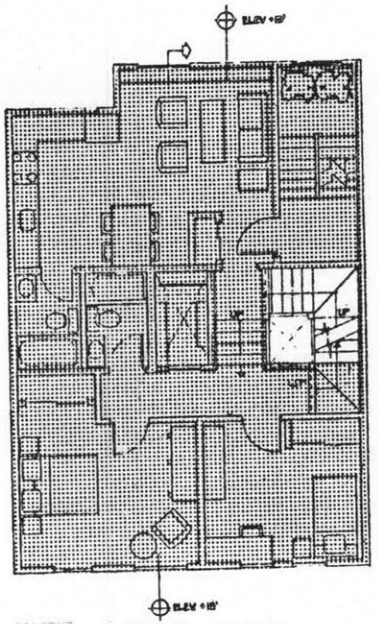
Third Level - Relocate closet in master bedroom; Remove 8 linear foot partition wall; Install range, refrigerator and 8 linear feet of counter; Install door at top of primary stairs.



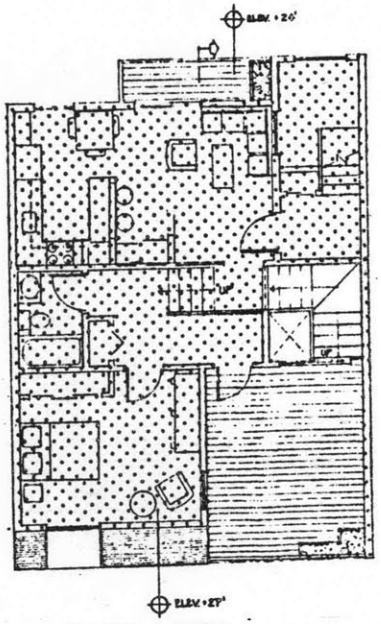
GROUND FLOOR



FIRST FLOOR

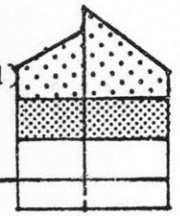


SECOND LEVELS

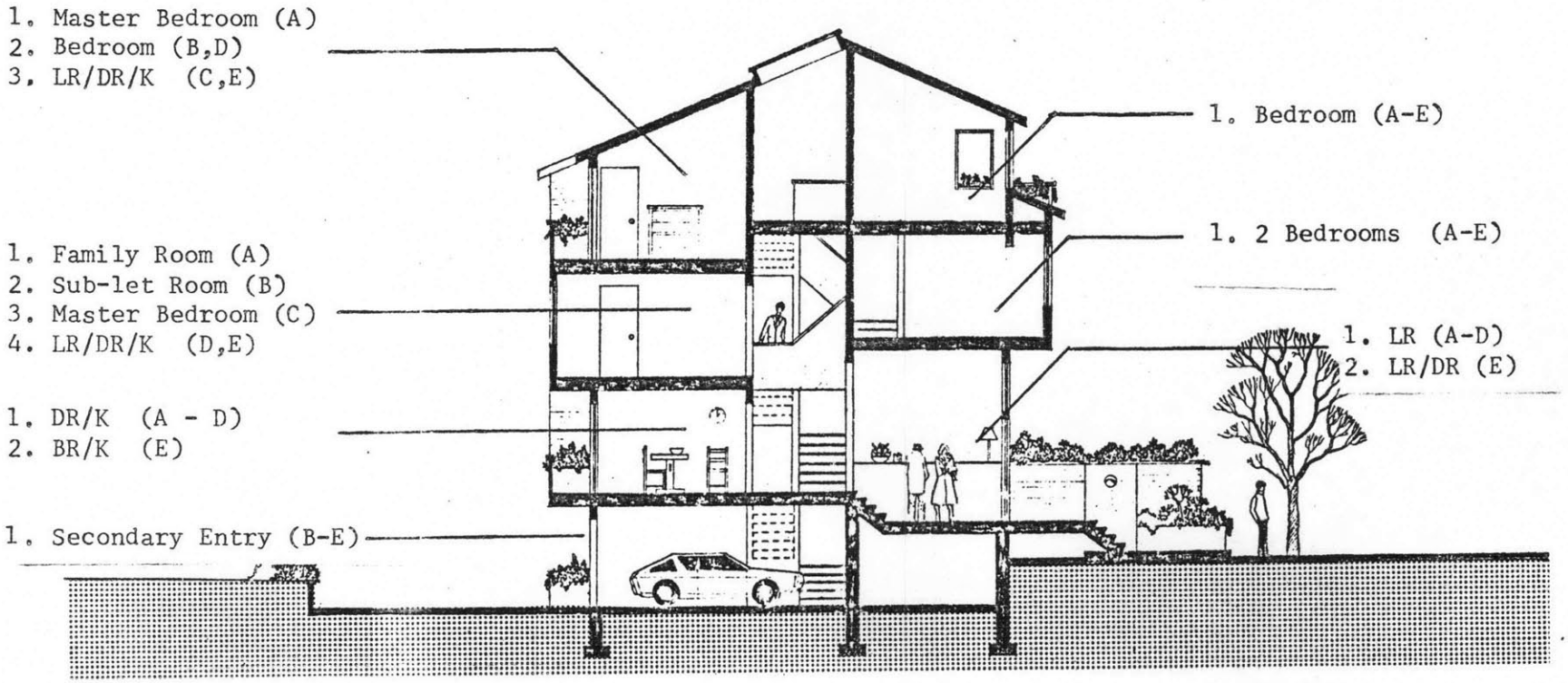


THIRD LEVELS

PROTOTYPE: I
VARIATION: Occupancy Phase E



DWELLING # 1	760	s.f.(unshaded)
DWELLING # 2	954	s.f.(shaded)
DWELLING # 3	725	s.f.(dotted)
TOTAL	2,439	s.f.



PROTOTYPE II - SECTION

[Note: Letters in parentheses ( ) refer to Occupancy Phase]

Identification: Site Plan - Prototype II.

Variables Selection:

1.	Townhouse Orientation:	Side to the street.
2.	Parking Plan:	One car on grade, one car under the townhouse.
3.	Entry Location:	Entries located on opposite sides of the townhouse.
4.	Critical Dimension:	Townhouse width is to be minimized.

Resulting Dimensions:

1.	Townhouse Outside Dimensions:	Width (critical):	22'-0"
		Depth:	38'-0"
2.	Minimum Lot Dimensions:	Width (frontage):	90'-0"
		Depth:	108'-0"
3.	Townhouse Gross Floor Area:	2,247 s.f.	
4.	Minimum Lot Area:	9,720 s.f.	
5.	Floor Area Ratio (F.A.R.):	0.92	

Comparative Density: The same minimum lot size and dimension would permit:

- 4 conventional townhouses @ 22' width/townhouse.
- 5 conventional townhouses @ 16' width/townhouse.

Excess Adaptable Townhouse Cost Due To Density: Conventional townhouses will achieve a 4/4th - 5/4th higher density than this adaptable townhouse prototype. Therefore, this adaptable townhouse will carry a 0% - 25% higher land cost, resulting in a 0% - 5% higher total cost. (See Chapter Four)

General Comments: This site plan was designed to demonstrate the minimum lot size required for Prototype II and to demonstrate the impact of the Variables Selection. This site plan has essentially the same features as Prototype I, as follows:

1. Separation of primary inhabitant pedestrian circulation from vehicular circulation through planning for a "pedestrian street" along one side of the townhouses.

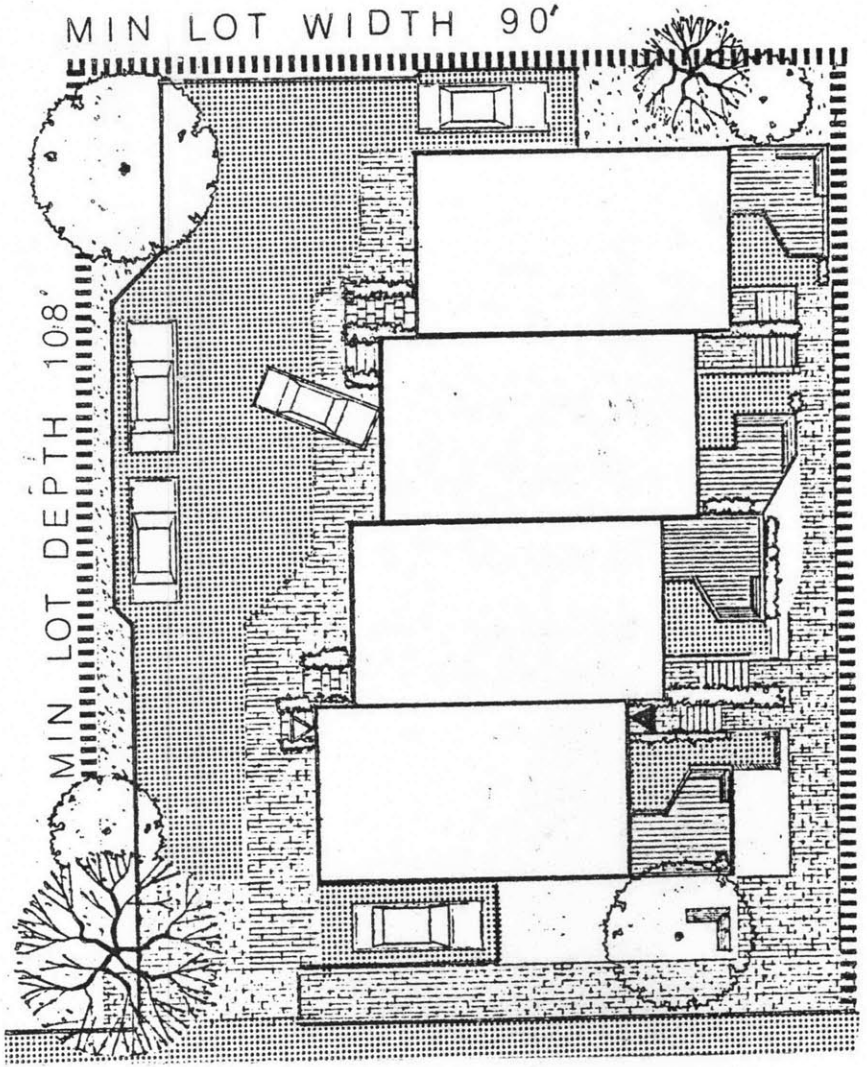
2. Separation of primary entry from secondary entry by combining pedestrian and vehicular circulation on the side opposite the pedestrian street.

3. Clear distinction between primary and secondary outdoor privacies. The primary inhabitant is provided with outdoor patio/deck privacies partially removed from the street and totally removed from parking and secondary entries.

4. The townhouse orientation necessitates only one curb cut and consequently does minimum damage to the street edge, and minimizes danger to pesetrian and vehicular circulation along the street.

The major disadvantages of this site plan are:

1. The townhouse orientation does not provide for a continuous rowhouse fabric along the street.



SITE PLAN - PROTOTYPE II

PROTOTYPE II - OCCUPANCY PHASE A (Floor plans on opposite page).

Total Floor Area: 2,247 s.f.

Characteristics:	Dwelling #1 (Total Townhouse)	#2	#3
1. Entry Area:	6' x 14'	-	-
2. Living Room:	15' x 15'	-	-
3. Dining Area:	9' x 14'	-	-
4. Kitchen Area:	8' x 10'	-	-
5. Family/Play Area:	15' x 18'	-	-
6. Bedroom #1 (Master BR):	15' x 18'	-	-
7. Bedroom #2:	12' x 14'	-	-
8. Bedroom #3:	9' x 14'	-	-
9. Bedroom #4:	12' x 12'	-	-
10. Bathroom(s):	5' x 8' (3-1/2)	-	-
Area Sub-Total:	1,676 s.f.		
11. Primary Circulation:	355 s.f.		
12. Secondary Circulation:	216 s.f.		
Area Sub-Total:	571 s.f.		
Area Total:	2,247 s.f.		
13. Circulation as % of Total:	25%		

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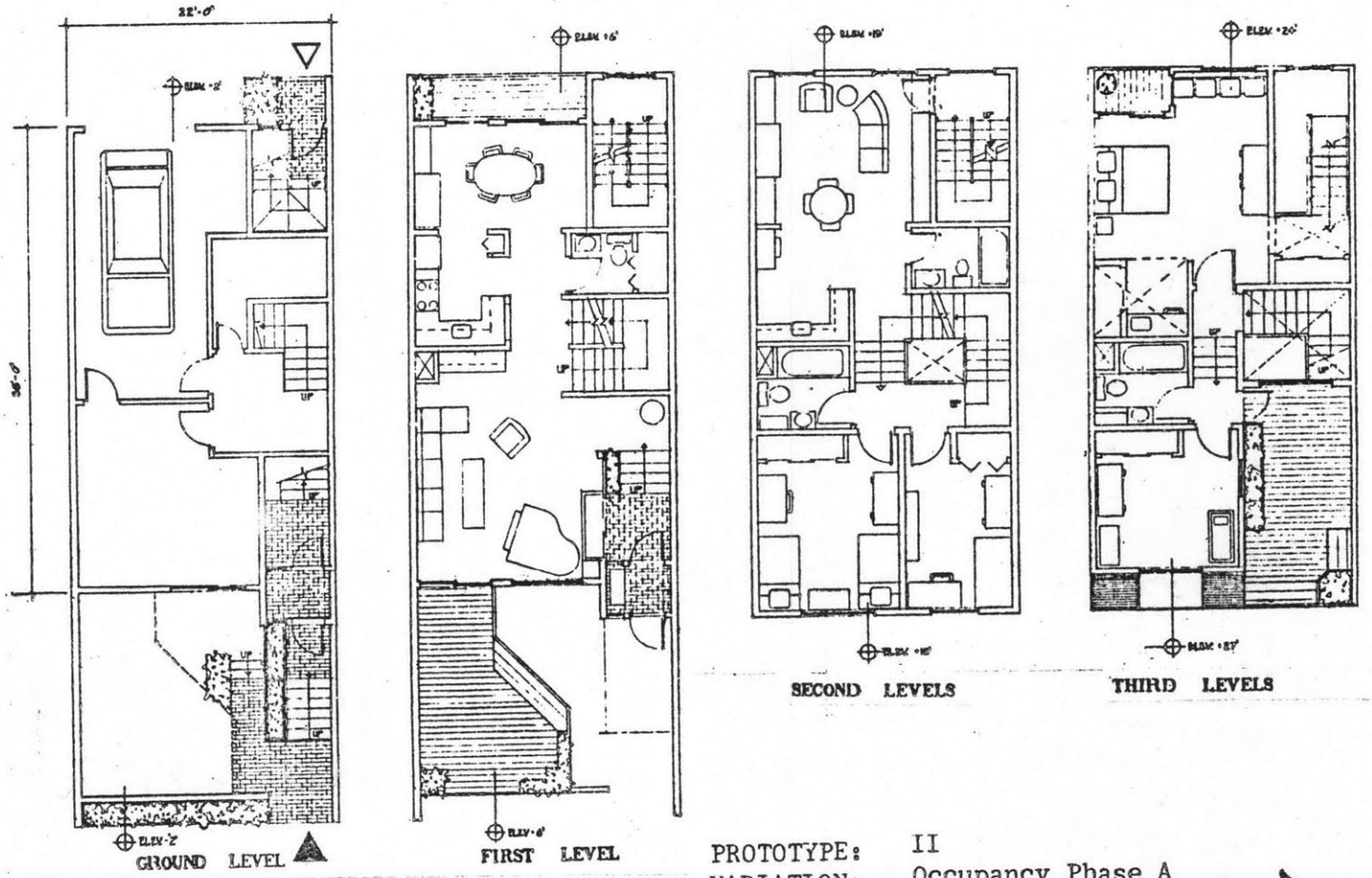
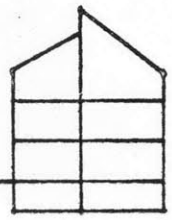
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

-None-



PROTOTYPE: II
VARIATION: Occupancy Phase A

DWELLING # 1	2,247s.f.
DWELLING # 2	- s.f.
DWELLING # 3	- s.f.
TOTAL	2,247s.f.



PROTOTYPE II - OCCUPANCY PHASE B (Floor plans on opposite page).

Total Floor Area: 2,247 s.f.

Characteristics:	Dwelling #1 [1st,2nd(front),3rd]	#2 [2nd Floor (rear)]	#3
1. Entry Area:	6' x 14'	-	-
2. Living Room:	15' x 15'	12' x 15'	-
3. Dining Area:	9' x 14'	Incl. in LR.	-
4. Kitchen Area:	8' x 10'	8' x 10'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	12' x 14'	Incl. in LR.	-
7. Bedroom #2:	9' x 14'	-	-
8. Bedroom #3:	15' x 18'	-	-
9. Bedroom #4:	12' x 12'	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,360 s.f.	316 s.f.	
11. Primary Circulation:	355 s.f.	-	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	355 s.f.	216 s.f.	
Area Total:	1,715 s.f.	532 s.f.	
13. Circulation as % of Total:	21%	40%	

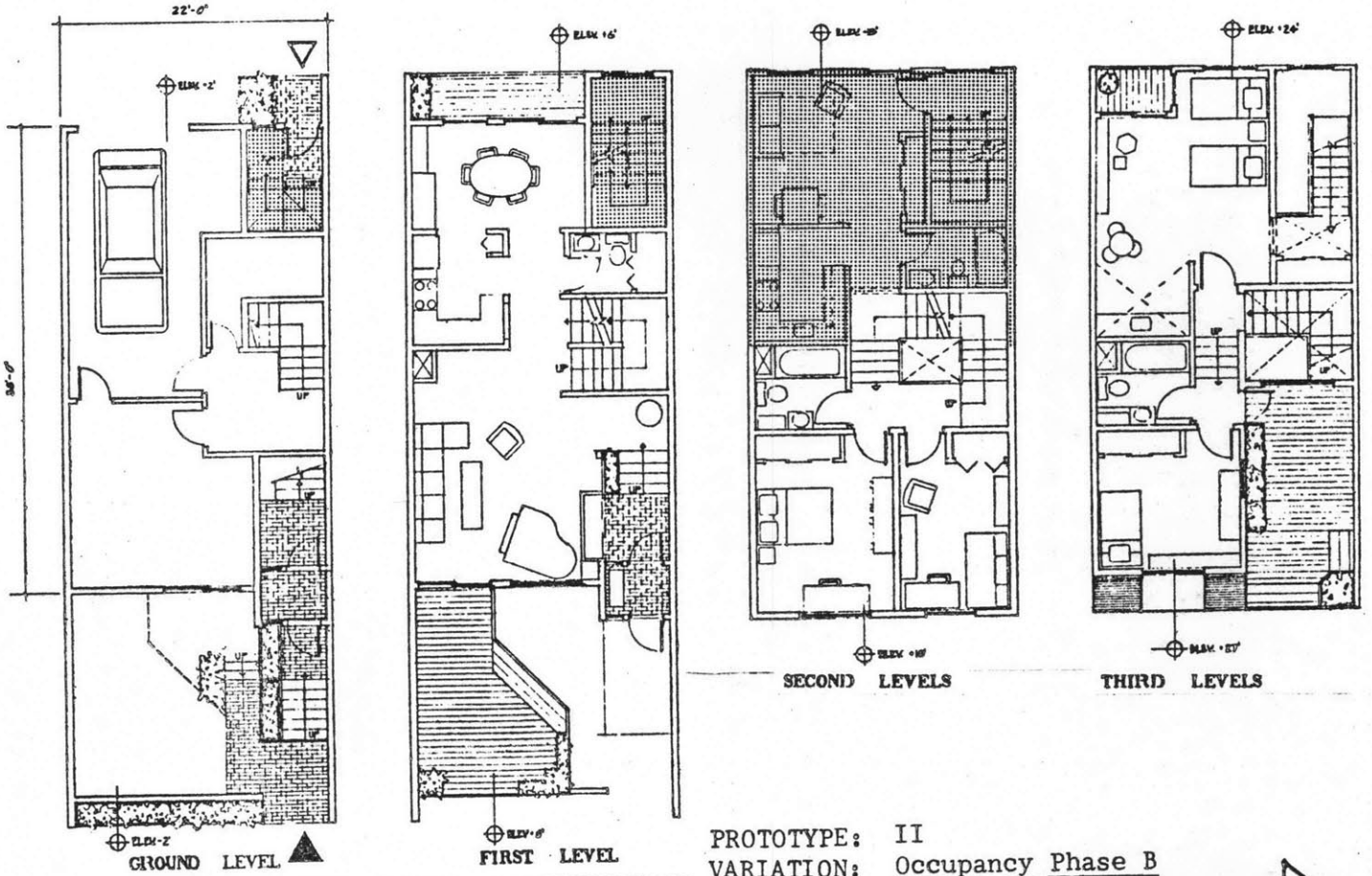
****** ****** ****** ****** ****** ****** ****** ****** ******

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

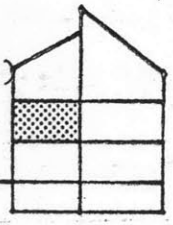
Second Level - Install second door in entry to family room to enclose separate dwelling; Install range, refrigerator and 8 linear feet of counter.

Third Level - None.



PROTOTYPE: II
VARIATION: Occupancy Phase B

DWELLING # 1	1,715	s.f.(unshaded)
DWELLING # 2	532	s.f.(shaded)
DWELLING # 3	-	s.f.
TOTAL	2,247	s.f.



PROTOTYPE II - OCCUPANCY PHASE C (Floor Plans on opposite page).

Total Floor Area: 2,247 s.f.

Characteristics:	Dwelling #1 (1st,2nd Floors)	#2 (3rd Floor)	#3
1. Entry Area:	6' x 14'	-	-
2. Living Room:	15' x 15'	14' x 16'	-
3. Dining Area:	9' x 14'	Incl. in LR.	-
4. Kitchen Area:	8' x 10'	8' x 8'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	15' x 18'	12' x 12'	-
7. Bedroom #2:	12' x 14'	-	-
8. Bedroom #3:	9' x 14'	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,216 s.f.	460 s.f.	
11. Primary Circulation:	259 s.f.	96 s.f.	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	259 s.f.	312 s.f.	
Area Total:	1,475 s.f.	772 s.f.	
13. Circulation as % of Total:	18%	40%	

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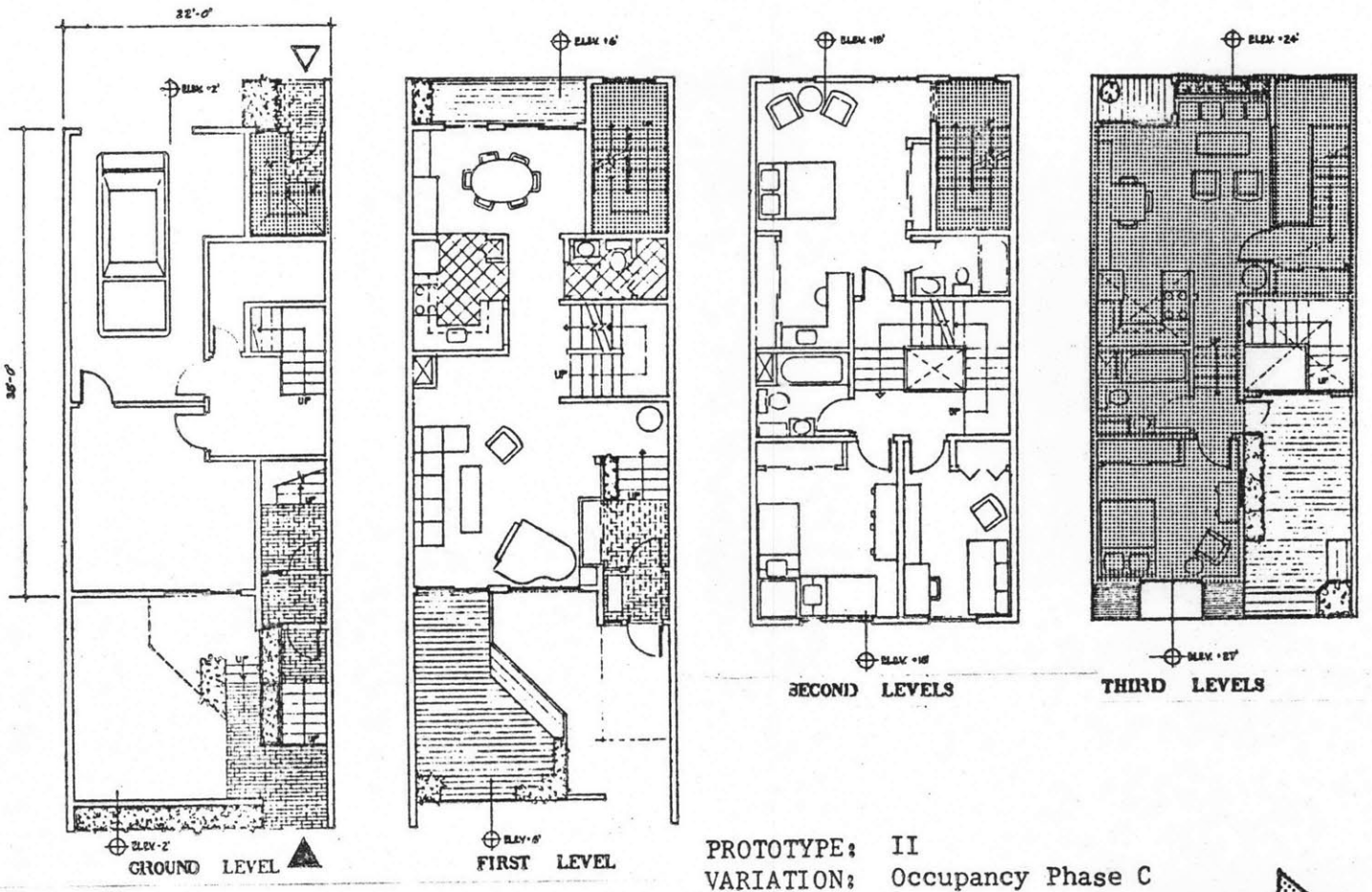
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

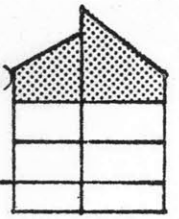
Second Level - None.

Third Level - Install door at landing of primary stairs; Install range, refrigerator and 8 linear feet of counter.



PROTOTYPE: II
VARIATION: Occupancy Phase C

DWELLING # 1	1,475	s.f.(unshaded)
DWELLING # 2	772	s.f.(shaded)
DWELLING # 3	-	s.f.
TOTAL	2,247	s.f.



PROTOTYPE II - OCCUPANCY PHASE D (Floor plans on opposite page).

Total Floor Area: 2,247 s.f.

Characteristics:	Dwelling #1 [1st, 2nd (front) Floors]	#2 [2nd (rear),3rd Floors]	#3
1. Entry Area:	6' x 14'	-	-
2. Living Room:	15' x 15'	12' x 15'	-
3. Dining Area:	9' x 14'	Incl. in LR.	-
4. Kitchen Area:	8' x 10'	8' x 10'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	12' x 14'	14' x 18'	-
7. Bedroom #2:	9' x 14'	12' x 12'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8'(1-1/2)	5' x 8' (2)	-
Area Sub-Total:	924 s.f	752 s.f.	
11. Primary Circulation:	259 s.f.	96 s.f.	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	259 s.f.	312 s.f.	
Area Total:	1,183 s.f.	1,064 s.f.	
13. Circulation as % of Total:	22%	29%	

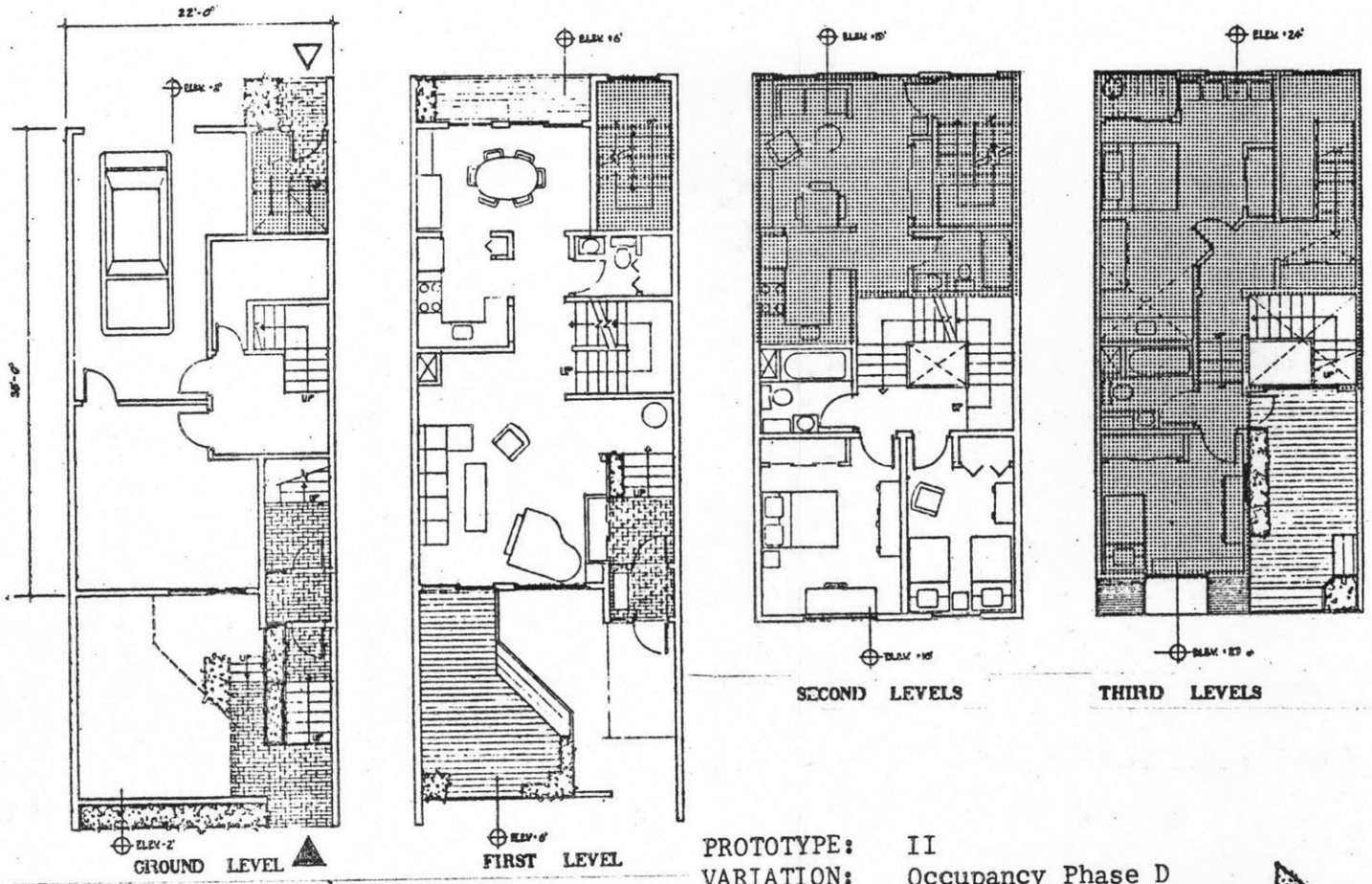
****** ****** ****** ****** ****** ****** ****** ****** ******

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

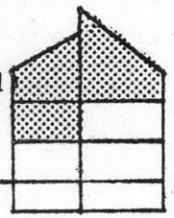
Second Level - Install second door in entry to family room to enclose separate dwelling; Install range, refrigerator and 8 linear feet of counter.

Third Level - Install door at landing of primary stairs; Install 6 linear foot partition wall with doorway.



PROTOTYPE: II
VARIATION: Occupancy Phase D

DWELLING # 1	1,183	s.f. (unshaded
DWELLING # 2	1,064	s.f. (shaded)
DWELLING # 3	-	s.f.
TOTAL	2,247	s.f.



PROTOTYPE II - OCCUPANCY PHASE E (FIoor plans on opposite page).

Total Floor Area: 2,247 s.f.

Characteristics:	Dwelling #1 (First Floor)	#2 (Second Floor)	#3 (Third Floor)
1. Entry Area:	6' x 14'	-	-
2. Living Room:	15' x 15'	12' x 15'	14' x 16'
3. Dining Area:	Incl. in LR.	Incl. in LR.	Incl. in LR.
4. Kitchen Area:	8' x 10'	8' x 10'	8' x 8'
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	9' x 14'	12' x 14'	12' x 12'
7. Bedroom #2:	-	9' x 14'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (1)	5' x 8' (2)	5' x 8' (1)
Area Sub-Total:	590 s.f.	626 s.f.	460 s.f.
11. Primary Circulation:	116 s.f.	143 s.f.	96 s.f.
12. Secondary Circulation:	-	108 s.f.	108 s.f.
Area Sub-Total:	116 s.f.	251 s.f.	204 s.f.
Area Total:	706 s.f.	877 s.f.	664 s.f.
13. Circulation as % of Total:	16%	29%	31%

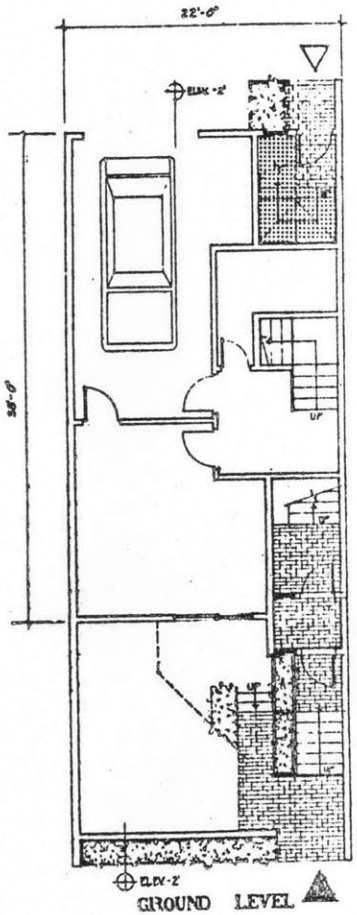
****** ****** ****** ****** ****** ****** ****** ****** ******

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

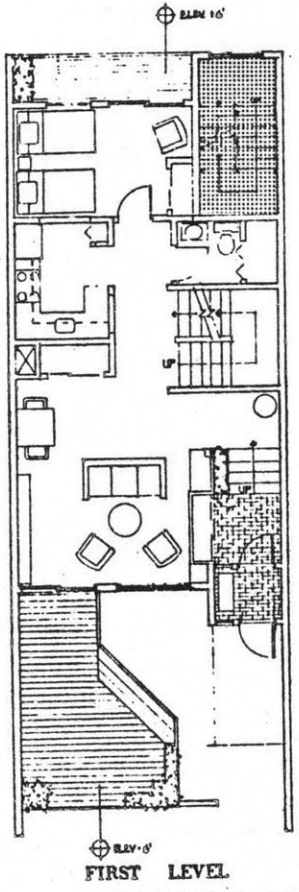
First Level - Install 4 linear foot partition wall to enclose dining room as sleeping area.

Second Level - Install door at landing of primary stairs; Install range, refrigerator and 8 linear feet of counter; Enclose light well (solid and/or translucent glass).

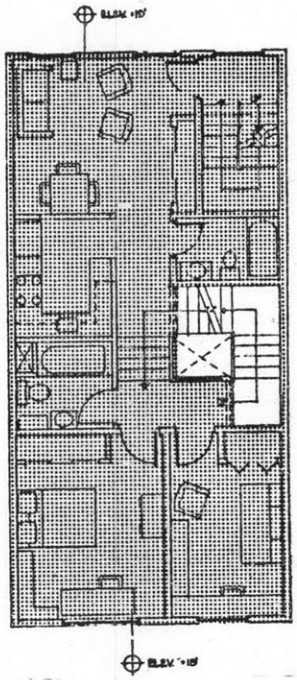
Third Level - Install door at landing of primary stairs; Install range, refrigerator and 8 linear feet of counter.



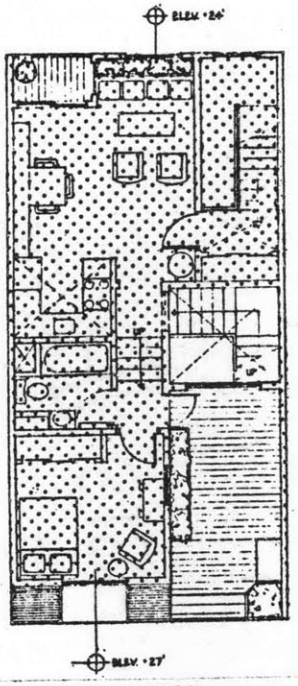
GROUND LEVEL



FIRST LEVEL



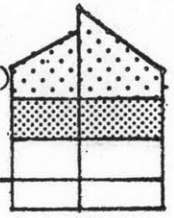
SECOND LEVELS

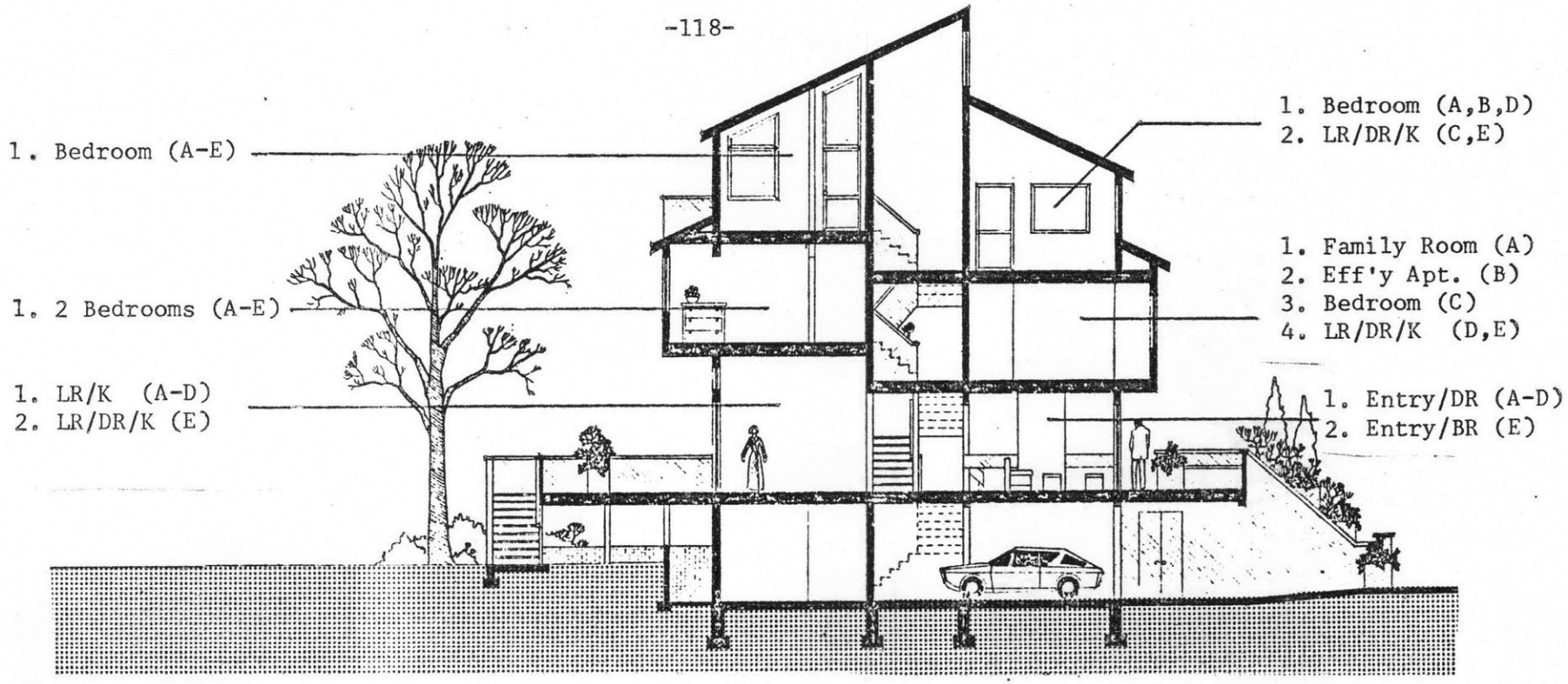


THIRD LEVELS

PROTOTYPE: II
VARIATION: Occupancy Phase E

DWELLING # 1	706	s.f.(unshaded)
DWELLING # 2	877	s.f.(shaded)
DWELLING # 3	664	s.f.(dotted)
TOTAL	2,247	s.f.





PROTOTYPE III - SECTION

[Note: Letters in parentheses ( ) refer to Occupancy Phase]

Identification: Site Plan - Prototype III.

Variables Selection:

1. Townhouse Orientation:	Facing the street.
2. Parking Plan:	Two cars parked under each townhouse.
3. Entry Location:	Both entries located on front of townhouse.
4. Critical Dimension:	Townhouse depth is to be minimized.

Resulting Dimensions:

1. Townhouse Outside Dimensions:	Depth (critical):	33'-0"
	Width:	28'-0"
2. Minimum Lot Dimensions:	Width (frontage):	132'-0"
	Depth:	72'-0"
3. Townhouse Gross Floor Area:	2,448 s.f.	
4. Minimum Lot Area:	9,504 s.f.	
5. Floor Area Ratio (F.A.R.):	1.03	

Comparative Density: The same minimum lot size and lot dimension would permit:

- 5 conventional townhouses @ 22' width/townhouse.
- 6 conventional townhouses @ 18' width/townhouse.
- 7 conventional townhouses @ 16' width/townhouse.

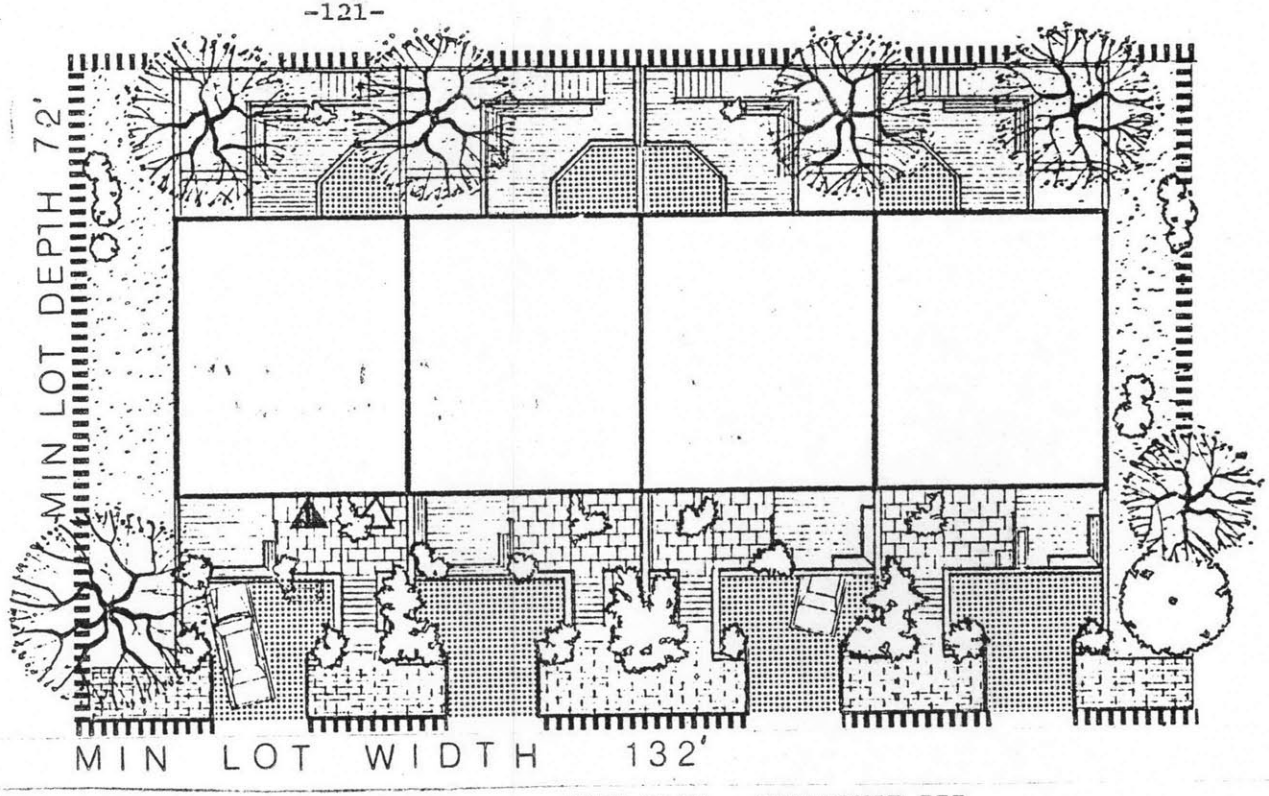
Excess Adaptable Townhouse Cost Due To Density: Conventional townhouses will achieve a a 5/4th - 7/4th higher density than this adaptable townhouse prototype. Therefore, this adaptable townhouse will carry a 25% - 75% higher land cost, resulting in a 5% - 15% higher total cost. (See Chapter Four)

General Comments:

This site plan was designed to demonstrate the minimum lot size required for Prototype III and to demonstrate the impact of the Variables Selection.

This site plan attempts to integrate parking and two entries on the front face of the townhouse - necessitated by townhouse orientation. The central features of the site plan are:

1. The primary inhabitant has private outdoor space in the rear of the townhouse - removed from the street, parking and entries.



SITE PLAN - PROTOTYPE III

2. The primary inhabitant also has a semi-private deck over the parking area. This deck is functionally useful and also diminishes the parking impact. While the townhouse is set back to allow depressed parking underneath, the deck helps to maintain a firm street edge.

3. Parking of two cars under the townhouse justifies a wider townhouse, which in turn permits an easier spearation of primary entry from secondary entry.

4. The townhouse orientation permits a continuous rowhouse fabric along the street.

The major disadvantages are:

1. The townhouse orientation necessitates one 2-car curb cut per townhouse, disrupting the street edge and posing some danger to pedestrians and vehicles along the street.

2. The townhouse orientation requires all movement to occur on the same face of the townhouse, and thus it is difficult to maintain distinctions between primary, secondary and vehicular circulation systems.

PROTOTYPE III - OCCUPANCY PHASE A (Floor plans on opposite page).

Total Floor Area: 2,448 s.f.

Characteristics:	Dwelling #1 (Total townhouse)	#2	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 22'	-	-
3. Dining Area:	12' x 12'	-	-
4. Kitchen Area:	8' x 8'	-	-
5. Family/Play Area:	12' x 20' (+8'x8')	-	-
6. Bedroom #1 (Master BR):	12' x 20' (+8'x8')	-	-
7. Bedroom #2:	11' x 16'	-	-
8. Bedroom #3:	10' x 12'	-	-
9. Bedroom #4:	12' x 14'	-	-
10. Bathroom(s):	5' x 8' (3-1/2)	-	-
Area Sub-Total:	1,752 s.f.		
11. Primary Circulation:	480 s.f.		
12. Secondary Circulation:	216 s.f.		
Area Sub-Total:	696 s.f.		
Area Total:	2,448 s.f.		
13. Circulation as % of Total:	28%		

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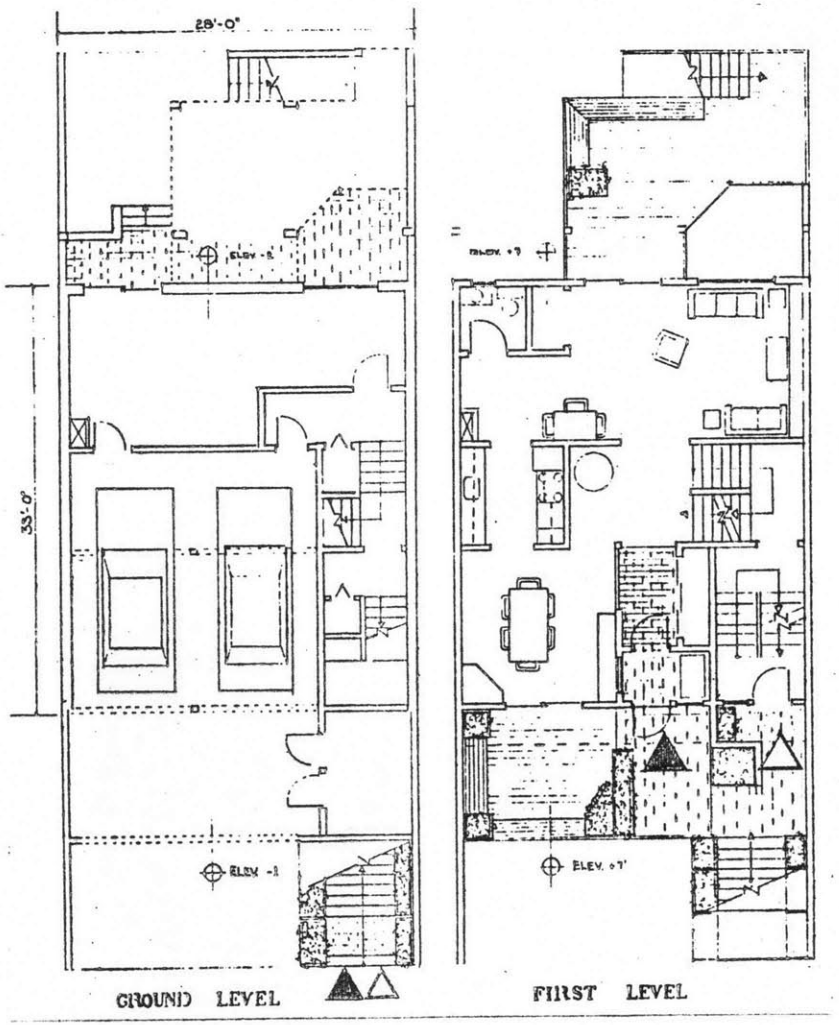
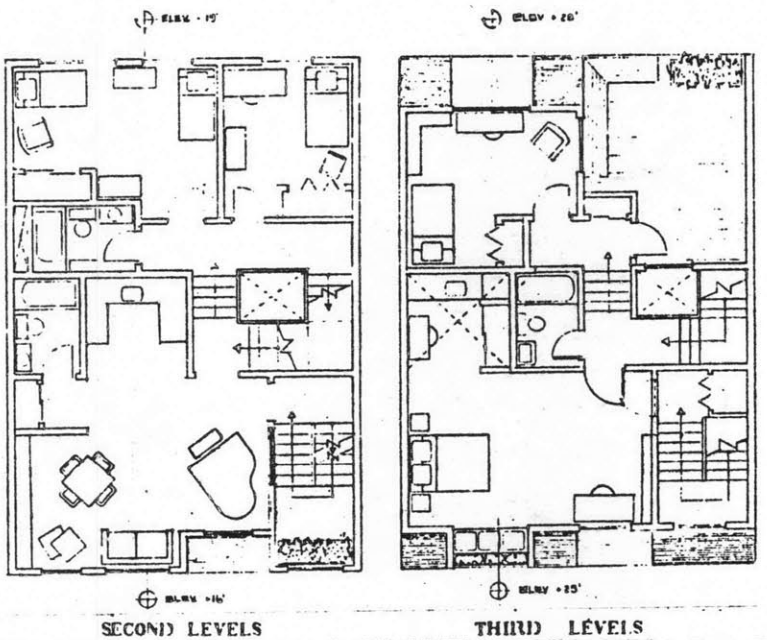
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

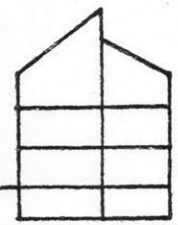
-None-





PROTOTYPE: III
VARIATION: Occupancy Phase A

DWELLING # 1	2,448	s.f.
DWELLING # 2	-	s.f.
DWELLING # 3	-	s.f.
TOTAL	2,448	s.f.



PROTOTYPE III - OCCUPANCY PHASE B (Floor plans on opposite page).

Total Floor Area: 2,448 s.f.

Characteristics:	Dwelling #1 [1st,2nd (rear),3rd]	#2 [2nd (front) Floor]	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 22'	12' x 20'	-
3. Dining Area:	12' x 12'	Incl. in LR.	-
4. Kitchen Area:	8' x 8'	8' x 8'	-
5. Family/Play Area:	9' x 12'	-	-
6. Bedroom #1 (Master BR):	11' x 16'	Incl. in LR.	-
7. Bedroom #2:	10' x 12'	-	-
8. Bedroom #3:	12' x 14'	-	-
9. Bedroom #4:	9' x 13'	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,440 s.f.	384 s.f.	
11. Primary Circulation:	408 s.f.	-	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	408 s.f.	216 s.f.	
Area Total:	1,848 s.f.	600 s.f.	
13. Circulation as % of Total:	22%	36%	

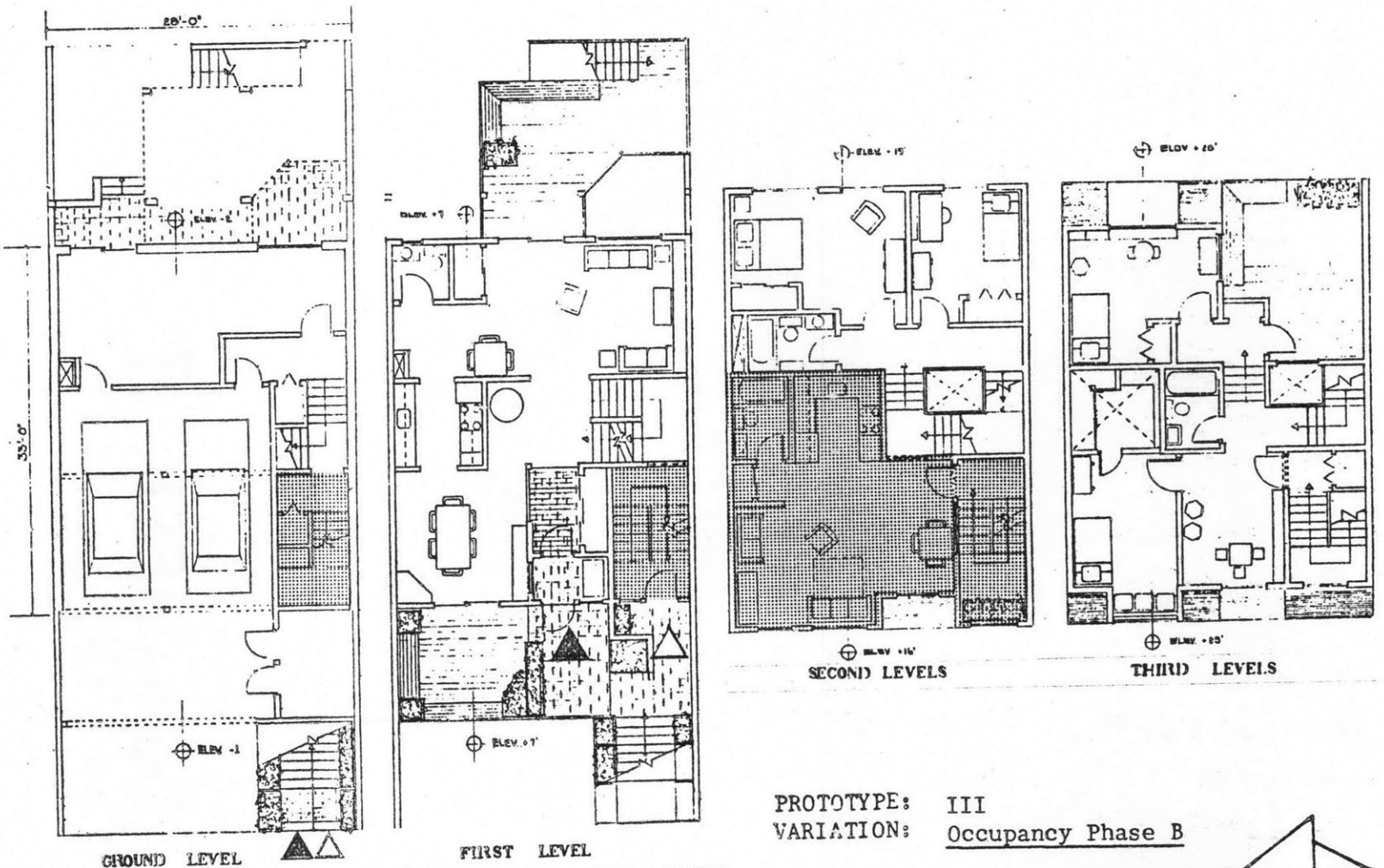
****** ****** ****** ****** ****** ****** ****** ****** ******

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

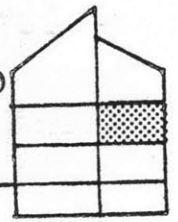
Second Level - Install second door to family room to enclose as separate dwelling; install range and refrigerator.

Third Level - Install 12'linear foot partition wall with doorway to make child's bedroom and common play area.



PROTOTYPE: III
VARIATION: Occupancy Phase B

DWELLING # 1	1,848	s.f. (unshaded)
DWELLING # 2	600	s.f. (shaded)
DWELLING # 3	-	s.f.
TOTAL	2,448	s.f.



PROTOTYPE III - OCCUPANCY PHASE C (Floor plans on opposite page).

Total Floor Area:

Characteristics:	Dwelling #1 (1st,2nd floors)	#2 (Third Floor)	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 22'	12' x 20'	-
3. Dining Area:	12' x 12'	Incl. in LR.	-
4. Kitchen Area:	8' x 8'	8' x 8'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	12' x 20'	12' x 14'	-
7. Bedroom #2:	11' x 16'	-	-
8. Bedroom #3:	10' x 12'	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,312 s.f.	512 s.f.	
11. Primary Circulation:	308 s.f.	100 s.f.	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	308 s.f.	316 s.f.	
Area Total:	1,620 s.f.	828 s.f.	
13. Circulation as % of Total:	19%	38%	

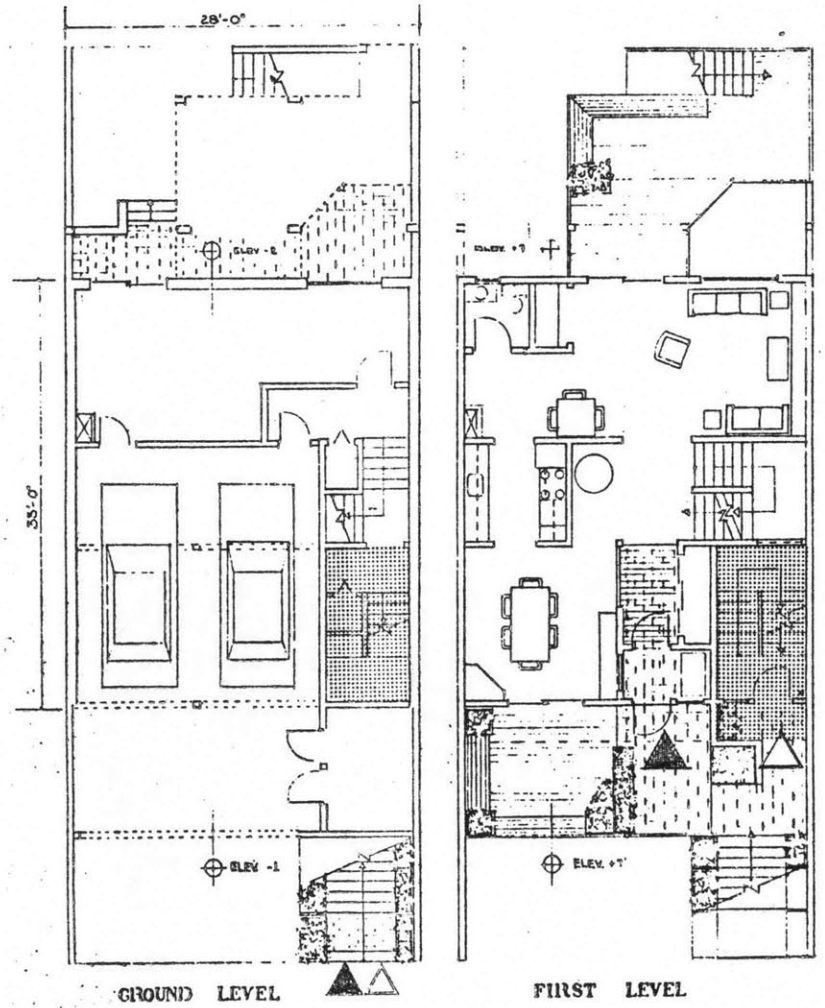
***** ***** ***** ***** ***** ***** ***** ***** *****

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - none.

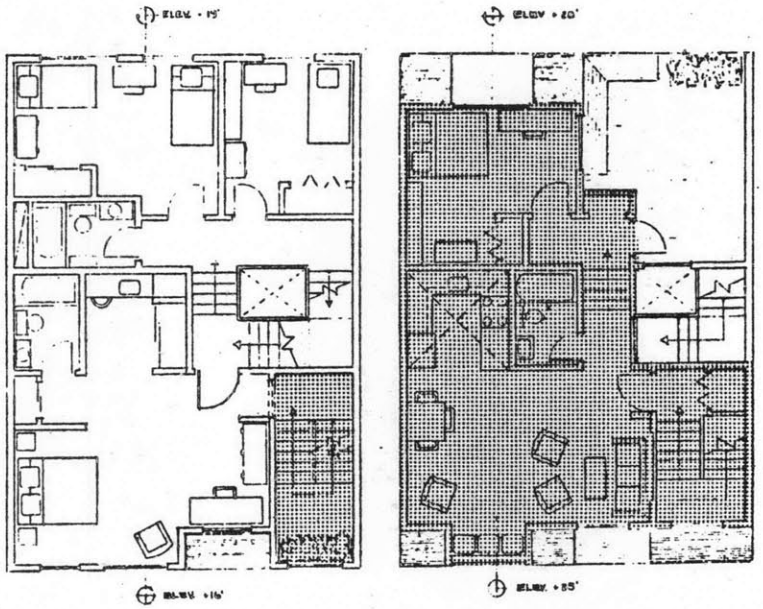
Second Level - none.

Third Level - Install door at landing of primary stairs; install range and refrigerator and 8 linear feet of counter.



GROUND LEVEL

FIRST LEVEL

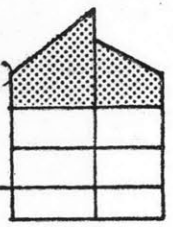


SECOND LEVELS

THIRD LEVELS

PROTOTYPE: III
VARIATION: Occupancy Phase D

DWELLING # 1	1,620	s.f. (unshaded)
DWELLING # 2	828	s.f. (shaded)
DWELLING # 3	-	s.f.
TOTAL	2,448	s.f.



PROTOTYPE III - OCCUPANCY PHASE D (Floor plans on opposite page).

Total Floor Area: 2,448 s.f.

Characteristics:	Dwelling #1 [1st, 2nd (rear) Floor]	#2 [2nd (front), 3rd]	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 22'	12' x 20'	-
3. Dining Area:	12' x 12'	Incl. in LR.	-
4. Kitchen Area:	8' x 8'	8' x 8'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	11' x 16'	12' x 20'	-
7. Bedroom #2:	10' x 12'	12' x 14'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8'(1-1/2)	5' x 8' (2)	
Area Sub-Total:	960 s.f.	864 s.f.	
11. Primary Circulation:	308 s.f.	100 s.f.	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	308 s.f.	316 s.f.	
Area Total:	1,268 s.f.	1,180 s.f.	
13. Circulation as % of Total:	24%	27%	

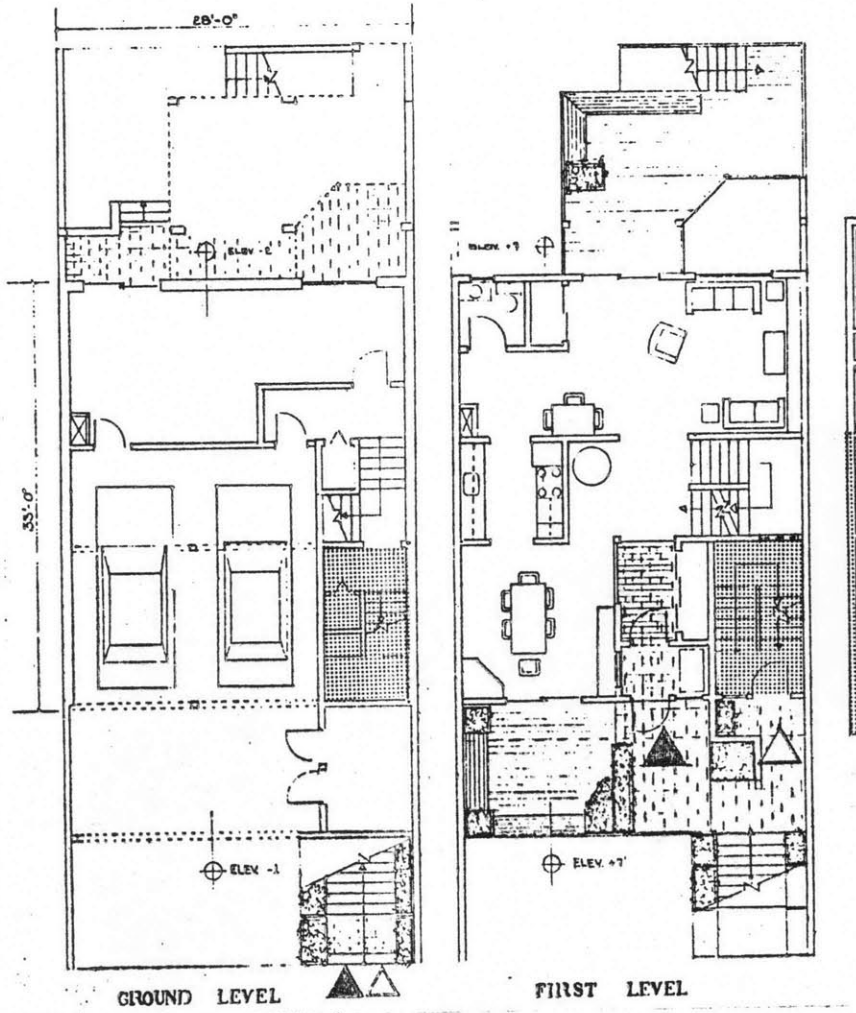
***** ***** ***** ***** ***** ***** ***** ***** *****

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

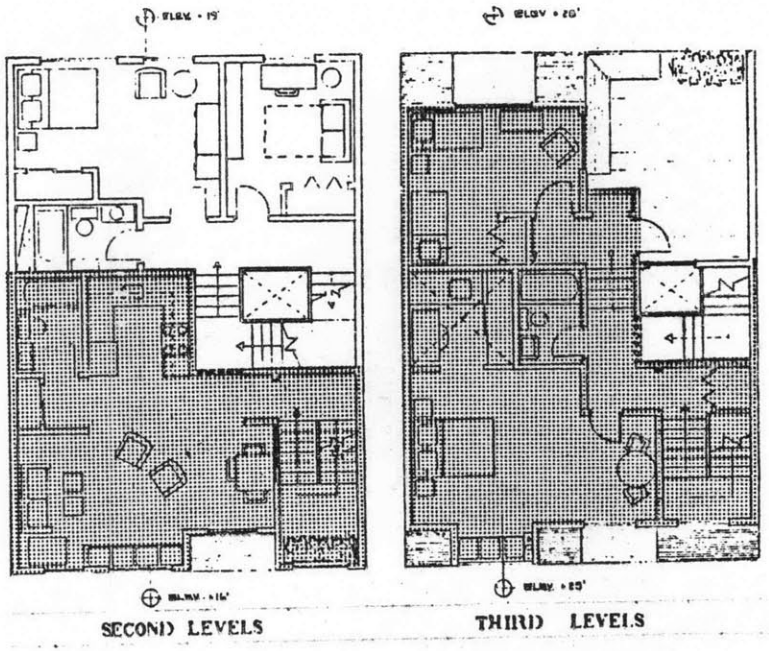
First Level - none.

Second Level - Install second door in entry to family room to enclose separate dwelling; Install range and refrigerator; Install door at landing of primary stairs.

Third Level - Install door at landing of primary stairs; Install range and refrigerator.



GROUND LEVEL FIRST LEVEL

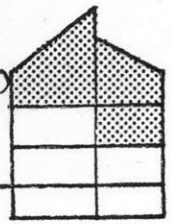


SECOND LEVELS THIRD LEVELS

PROTOTYPE:
VARIATION:

DWELLING # 1 1,268 s.f. (unshaded)
DWELLING # 2 1,180 s.f. (shaded)
DWELLING # 3 s.f.

TOTAL s.f.



PROTOTYPE III - OCCUPANCY PHASE E (Floor plans on opposite page).

Total Floor Area: 2,448 s.f.

Characteristics:	Dwelling #1 (First Floor)	#2 (Second Floor)	#3 (Third Floor)
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 12'	12' x 20'	12' x 20'
3. Dining Area:	9' x 12'	Incl. in LR.	Incl. in LR.
4. Kitchen Area:	8' x 8'	8' x 8'	8' x 8'
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	9' x 12'	11' x 16'	12' x 14'
7. Bedroom #2:	-	10' x 12'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (1)	5' x 8' (2)	5' x 8' (1)
Area Sub-Total:	592 s.f.	720 s.f.	512 s.f.
11. Primary Circulation:	164 s.f.	144 s.f.	100 s.f.
12. Secondary Circulation:	-	108 s.f.	108 s.f.
Area Sub-Total:	164 s.f.	252 s.f.	208 s.f.
Area Total:	756 s.f.	972 s.f.	720 s.f.
13. Circulation as % of Total:	22%	26%	29%

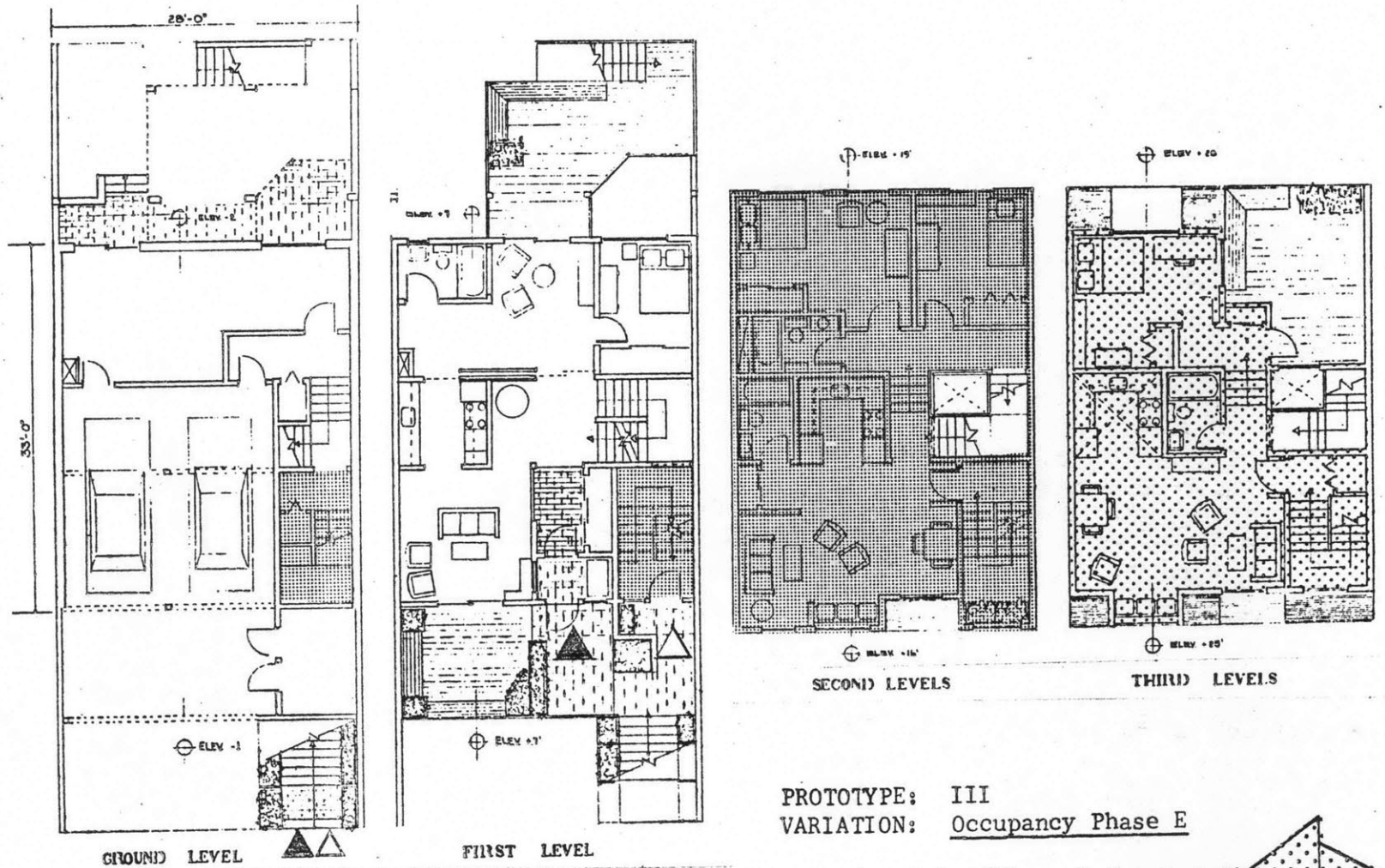
****** ****** ****** ****** ****** ****** ****** ****** ******

Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - Install 12 linear foot partition wall with door to enclose part of living room for sleeping area. (Dining room becomes living room); install shower/tub in bathroom closet.

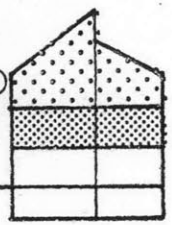
Second Level - Install door at landing of primary stairs; Install range and refrigerator; Enclose light well (solid and/or translucent glass).

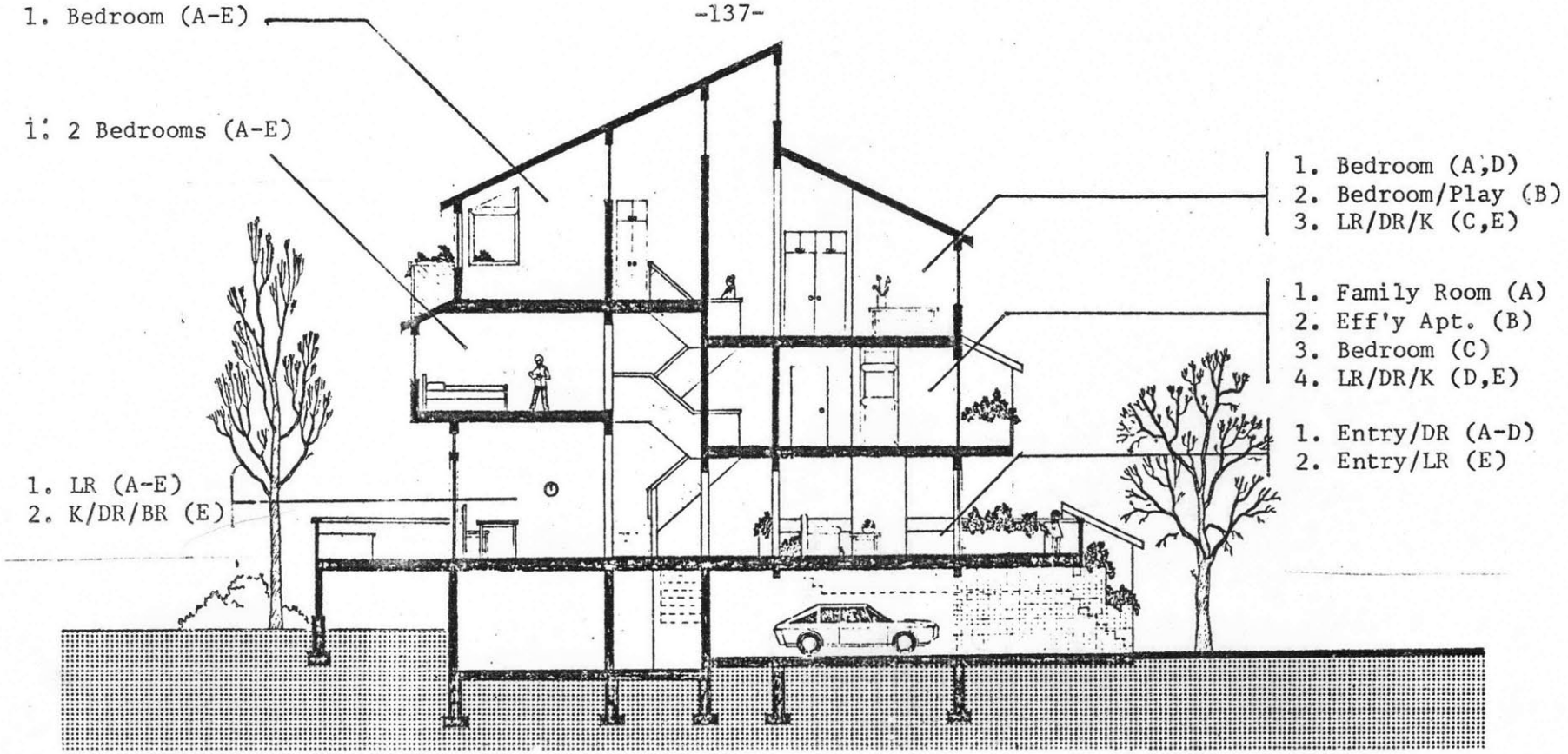
Third Level - Install door at landing of primary stairs; Install range, refrigerator and 8 linear feet of counter.



PROTOTYPE: III
VARIATION: Occupancy Phase E

DWELLING # 1	756	s.f. (unshaded)
DWELLING # 2	972	s.f. (shaded)
DWELLING # 3	720	s.f. (dotted)
TOTAL	2,448	s.f.





PROTOTYPE IV - SECTION

[Note: Letters in parentheses ( ) refer to Occupancy Phase]

Identification: Site Plan - Prototype IV.

Variables Selection:

1.	Townhouse Orientation:	Facing the street.
2.	Parking Plan:	One car on grade, one car under the townhouse.
3.	Entry Location:	Both entries located on front of townhouse.
4.	Critical Dimension:	Townhouse width is to be minimized.

Resulting Dimensions:

1.	Townhouse Outside Dimensions:	Width (critical):	22'-0"
		Depth:	42'-0"
2.	Minimum Lot Dimensions:	Width (frontage):	124'-0"
		Depth:	68'-0"
3.	Townhouse Gross Floor Area:	2,396 s.f.	
4.	Minimum Lot Area:	8,432 s.f.	
5.	Floor Area Ratio (F.A.R.):	1.13	

Comparative Density: The same minimum lot size and dimension would permit:

- 5 conventional townhouses @ 20' width/townhouse.
- 6 conventional townhouses @ 17' width/townhouse.

Excess Adaptable Townhouse Cost Due To Density: Conventional townhouses will achieve a 5/4th - 6/4th higher density than this adaptable townhouse prototype. Therefore, this adaptable townhouse will carry a 25% - 50% higher land cost, resulting in a 5%-10% higher total cost. (See Chapter Four)

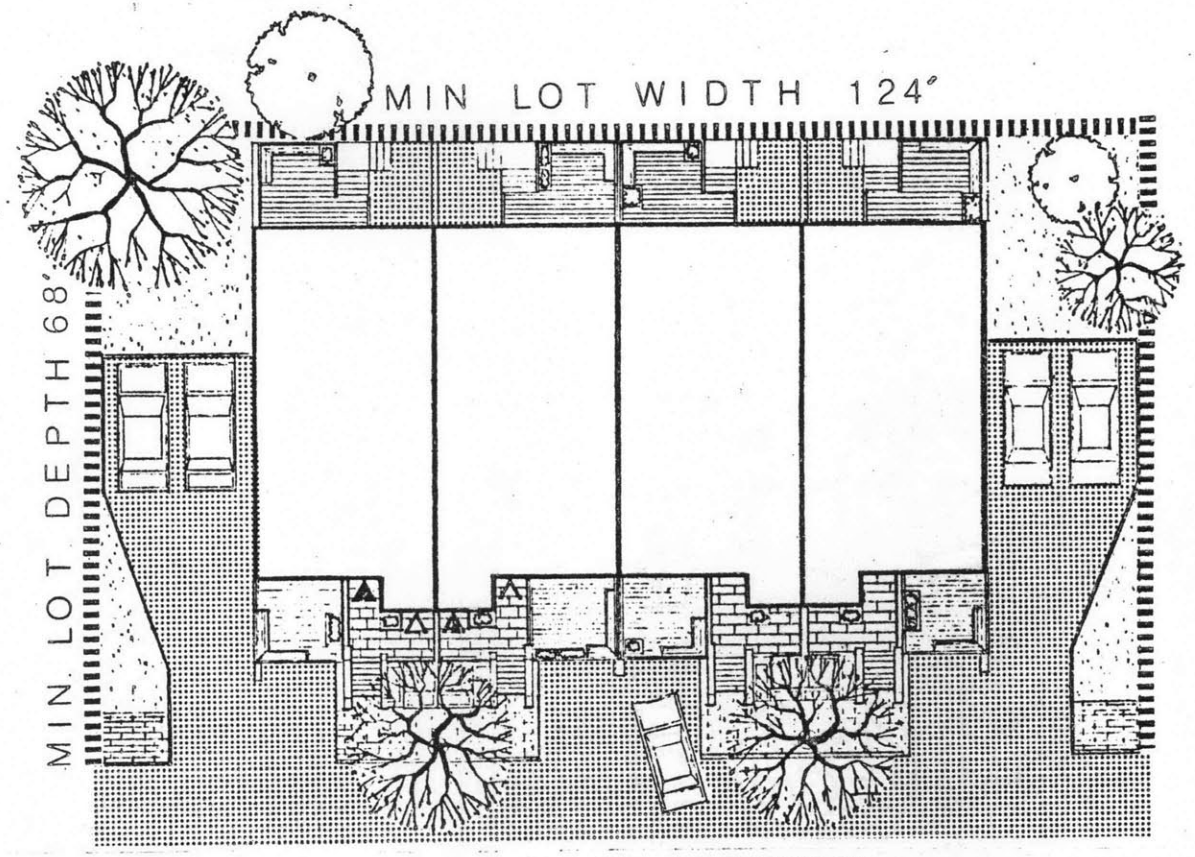
General Comments

This site plan was designed to demonstrate the minimum lot size required for Prototype IV and to demonstrate the impact of the Variables Selection.

Like Prototype III, this Site Plan attempts to integrate parking and two entries on one face of the townhouse - a requirement for townhouses facing the street. The central features are:

1. The primary inhabitant has a private outdoor patio/deck/ground space in the rear of the townhouse, removed from the street and from parking and from secondary entry.

2. The primary inhabitant also has a semi-private deck over the parking entry. The deck is functionally useful and also diminishes the parking impact, While the townhouse is set back to allow for depressed parking underneath, the deck helps to maintain a firm street edge.



SITE PLAN - PROTOTYPE IV

3. The townhouse orientation permits a continuouse rowhouse fabric along the street.

The major disadvantages of this site plan are:

1. This townhouse prototype uses a minimum width, which makes the adjacencies of parking and two entries exceedingly demanding on the street adge and on privacy distinctions.

2. The townhouse orientation requires one curb cut per townhouse, disrupting the street edge and posing some danger to pedestrians and vehicles along the street

PROTOTYPE IV - OCCUPANCY PHASE A (Floor Plans on opposite page).

Total Floor Area: 2,396 s.f.

Characteristics:	Dwelling #1 (Total Dwelling)	#2	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 21'	-	-
3. Dining Area:	10' x 14'	-	-
4. Kitchen Area:	8' x 12'	-	-
5. Family/Play Area:	14' x 20'	-	-
6. Bedroom #1 (Master BR):	14' x 20'	-	-
7. Bedroom #2:	12' x 15'	-	-
8. Bedroom #3:	9' x 15'	-	-
9. Bedroom #4:	12' x 14'	-	-
10. Bathroom(s):	5' x 8' (3-1/2)	-	-
Area Sub-Total:	1,767 s.f.		
11. Primary Circulation:	413 s.f.		
12. Secondary Circulation:	216 s.f.		
Area Sub-Total:	629 s.f.		
Area Total:	2,396 s.f.		
13. Circulation as % of Total:	26%		

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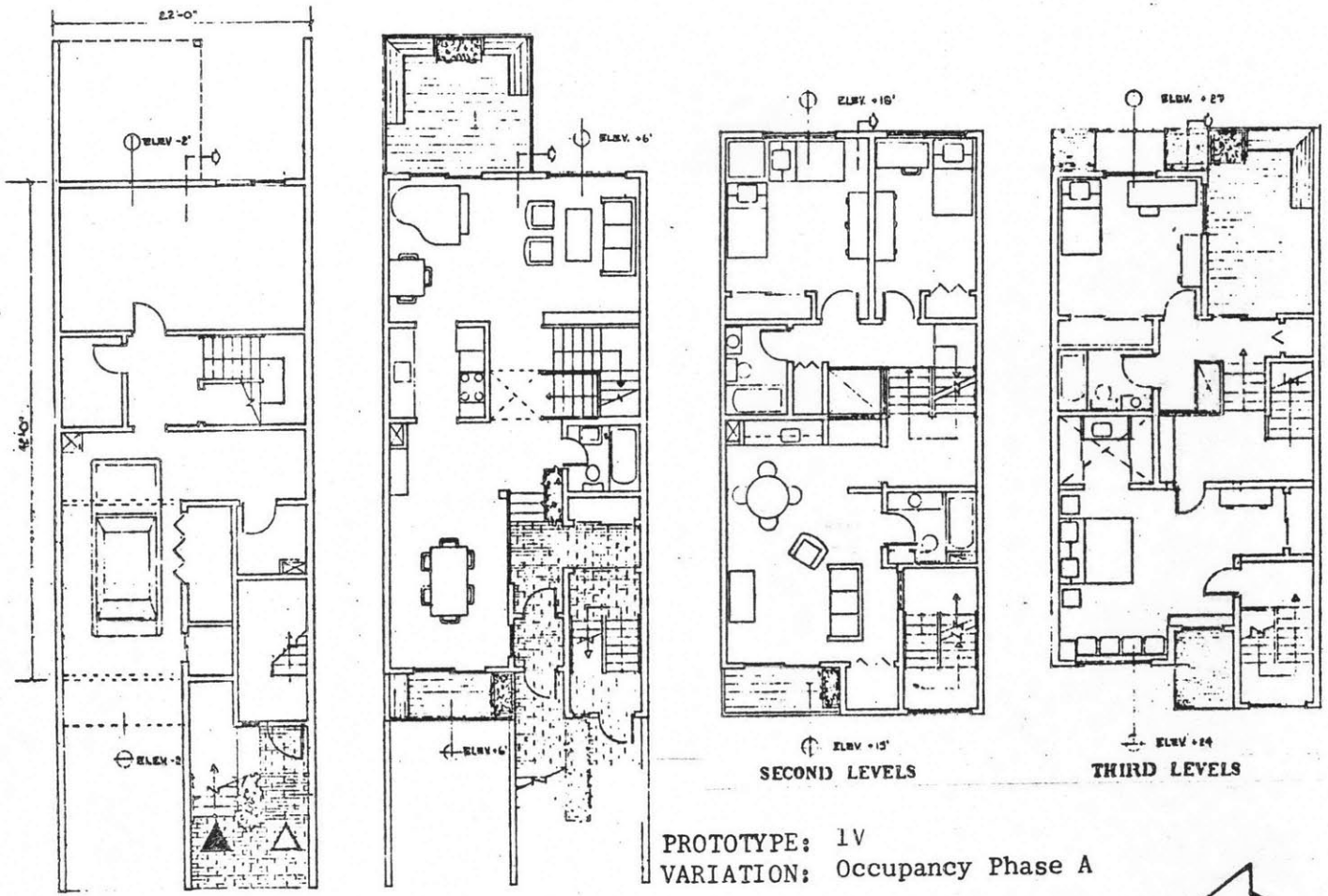
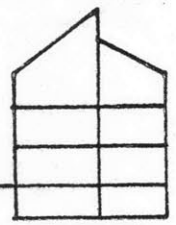
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

-None-



PROTOTYPE: 1V
VARIATION: Occupancy Phase A

DWELLING # 1	2,396	s.f.
DWELLING # 2	-	s.f.
DWELLING # 3	-	s.f.
TOTAL	2,396	s.f.



PROTOTYPE IV - OCCUPANCY PHASE B (Floor Plans on opposite page).

Total Floor Area: 2,396 s.f.

Characteristics:	Dwelling #1 [1st, 2nd(rear),3rd Fl.]	#2 [2nd(front) Fl.]	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 21'	14' x 14'	-
3. Dining Area:	10' x 14'	Incl. in LR.	-
4. Kitchen Area:	8' x 12'	6' x 14'	-
5. Family/Play Area:	6' x 14'	-	-
6. Bedroom #1 (Master BR):	12' x 15'	Incl. in LR/DR	-
7. Bedroom #2:	9' x 15'	-	-
8. Bedroom #3:	14' x 14'	-	-
9. Bedroom #4:	12' x 14'	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,447 s.f.	320 s.f.	
11. Primary Circulation:	413 s.f.	-	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	413 s.f.	216 s.f.	
Area Total:	1,860 s.f.	536 s.f.	
13. Circulation as % of Total:	22%	40%	

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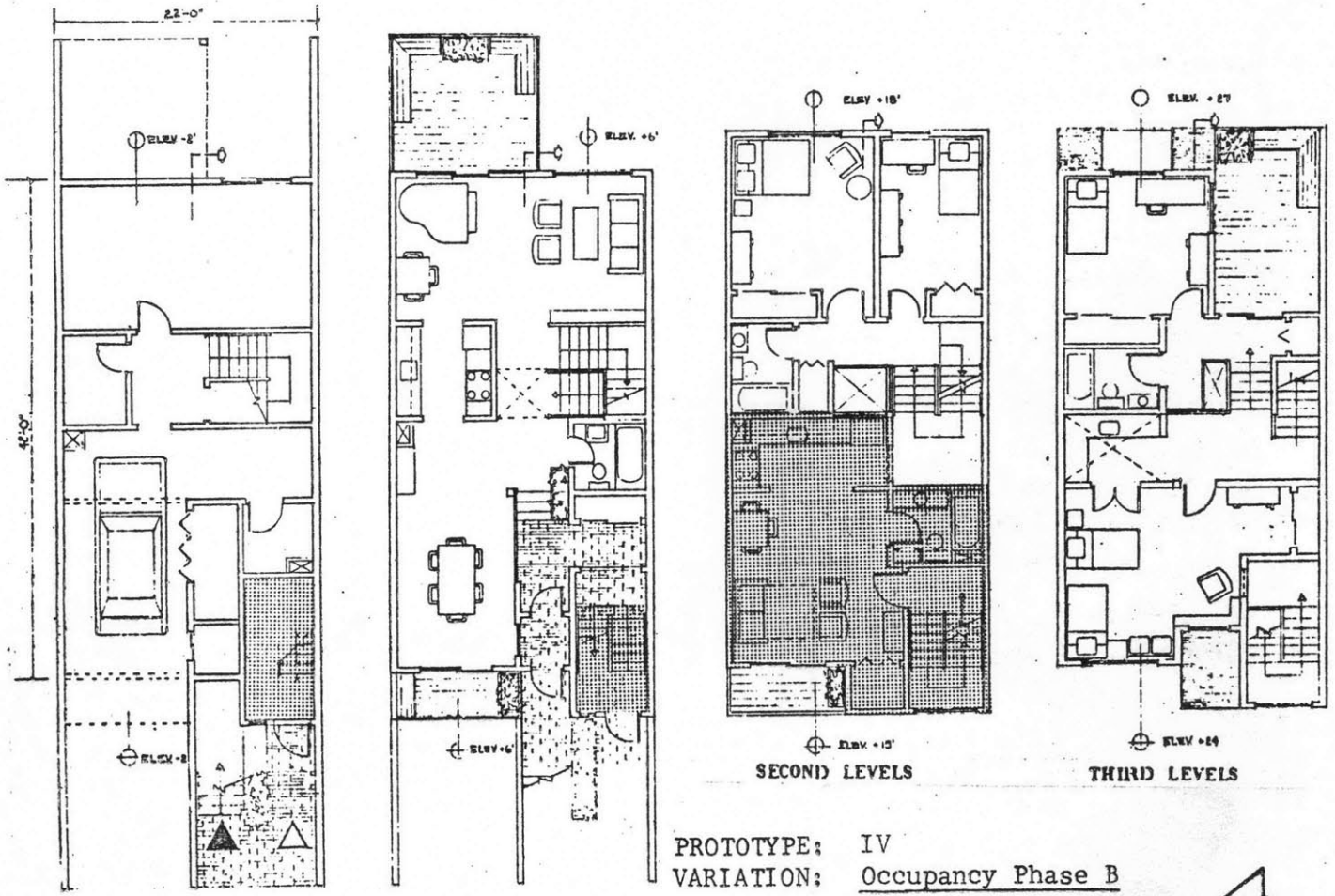
Cnanges To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

Second Level - Install second door in entrance to family room to enclose; enclose one wall of light well (solid and/or translucent glass); Install range and refrigerator.

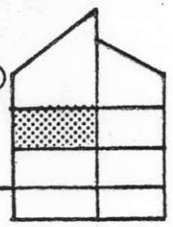
Third Level - Remove 8 linear foot partition wall to make children's play area.



PROTOTYPE: IV
VARIATION: Occupancy Phase B

DWELLING # 1 1,860 s.f. (Unshaded)
DWELLING # 2 536 s.f. (shaded)
DWELLING # 3 - s.f.

TOTAL 2,396 s.f.



PROTOTYPE IV - OCCUPANCY PHASE C (Floor plans on opposite page).

Total Floor Area: 2,396 s.f.

Characteristics:	Dwelling #1 (1st,2nd Floors)	#2 (3rd Floor)	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 21'	14' x 14'	-
3. Dining Area:	10' x 14'	Incl. in LR.	-
4. Kitchen Area:	8' x 12'	6' x 14'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	14' x 20'	12' x 14'	-
7. Bedroom #2:	12' x 15'	-	-
8. Bedroom #3:	9' x 15'	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (2-1/2)	5' x 8' (1)	-
Area Sub-Total:	1,279 s.f.	488 s.f.	
11. Primary Circulation:	245 s.f.	168 s.f.	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	245 s.f.	384 s.f.	
Area Total:	1,524 s.f.	872 s.f.	
13. Circulation as % of Total:	16%	44%	

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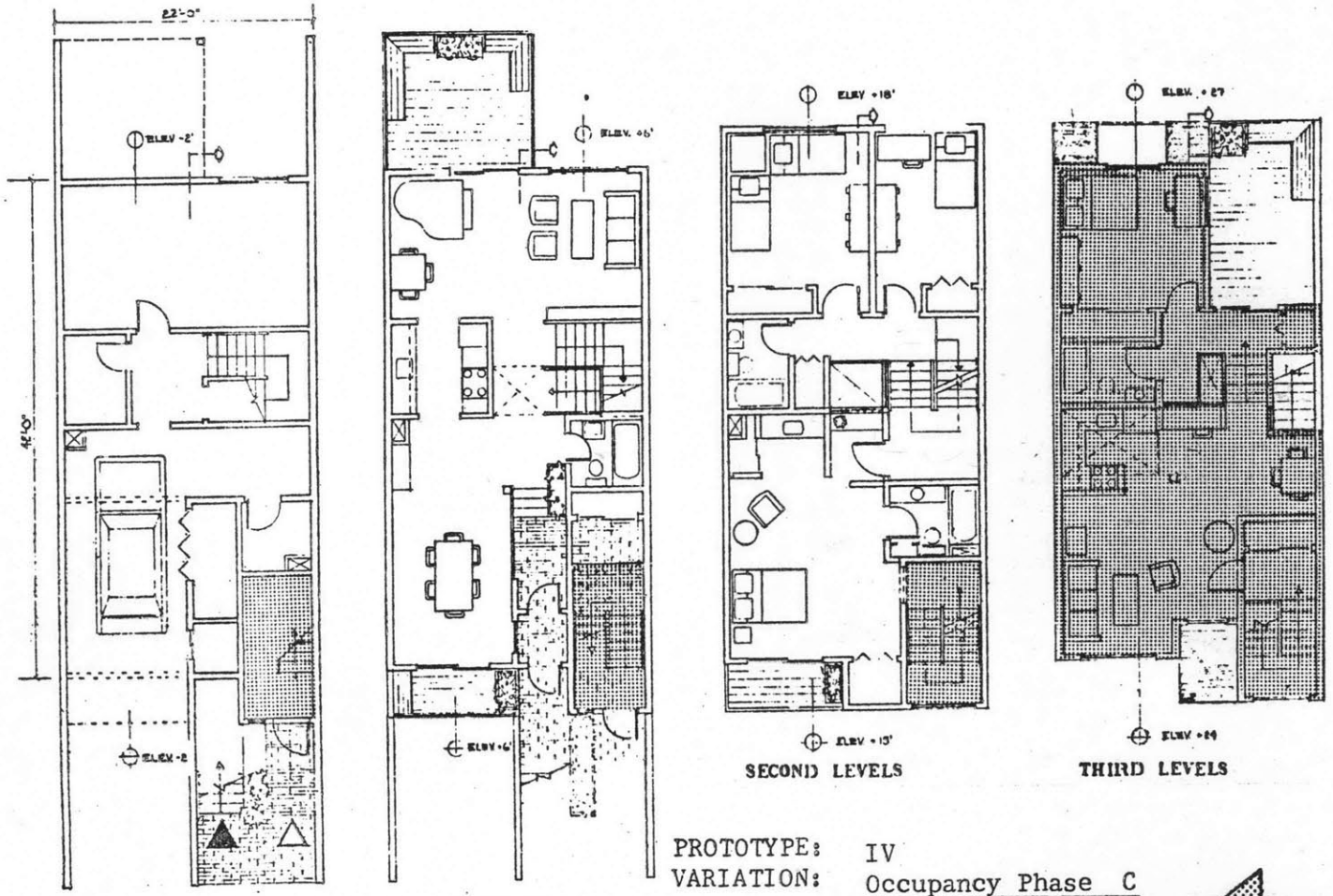
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

First Level - None.

Second Level - Install 6 linear foot partition wall.

Third Level - Remove 18 linear foot partition walls; install range and refirgerator; enclose light well (solid and/or translucent glass); install door at landing of primary stairs.



GROUND LEVEL

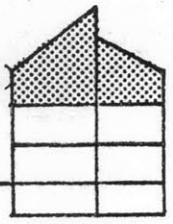
FIRST LEVEL

SECOND LEVELS

THIRD LEVELS

PROTOTYPE: IV
VARIATION: Occupancy Phase C

DWELLING # 1	1,524	s.f. (unshaded)
DWELLING # 2	872	s.f. (shaded)
DWELLING # 3	-	s.f.
TOTAL	2,396	s.f.



PROTOTYPE IV - OCCUPANCY PHASE D (Floor plans on opposite page).

Total Floor Area:

Characteristics:	Dwelling #1 [1st,2nd (rear)floor]	#2 [2nd(front,3rd floor]	#3
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 21'	14' x 14'	-
3. Dining Area:	10' x 14'	Incl. in LR.	-
4. Kitchen Area:	8' x 12'	6' x 14'	-
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	12' x 15'	14' x 15'	-
7. Bedroom #2:	9' x 15'	12' x 14'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (1-1/2)	5' x 8' (2)	-
Area Sub-Total:	959 s.f.	802 s.f.	
11. Primary Circulation:	245 s.f.	174 s.f.	
12. Secondary Circulation:	-	216 s.f.	
Area Sub-Total:	245 s.f.	390 s.f.	
Area Total:	1,204 s.f.	1,192 s.f.	
13. Circulation as % of Total:	20%	33%	

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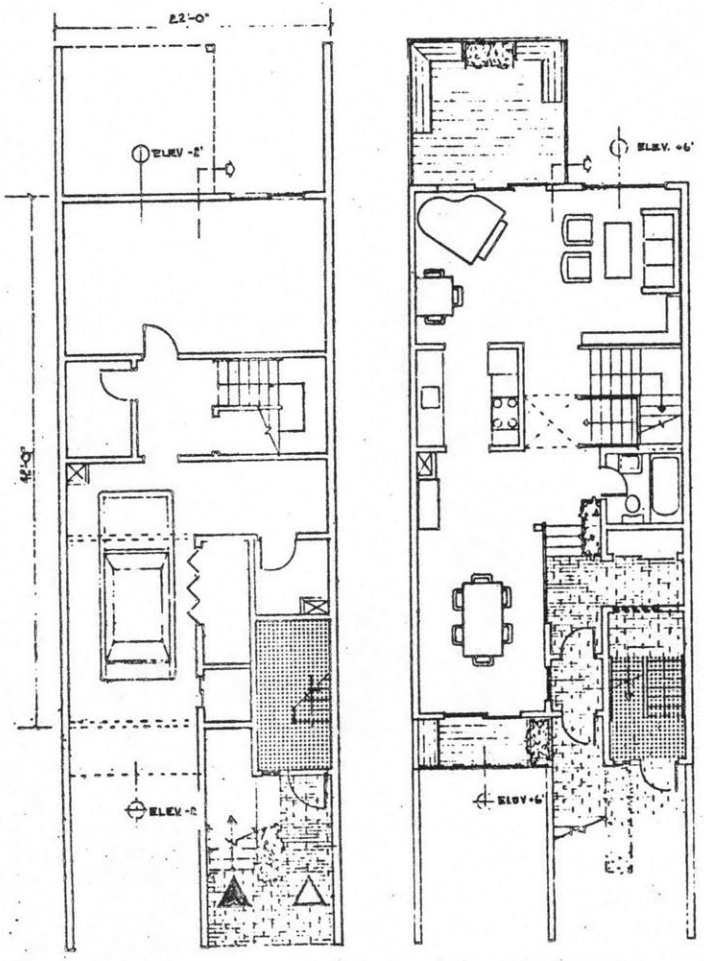
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

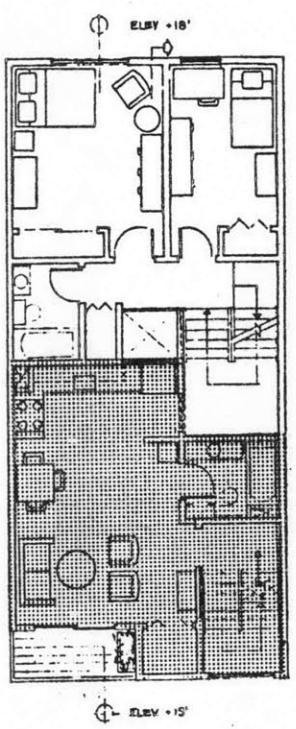
First Level - None.

Second Level - Install second door in entrance to family room to enclose; Enclose one wall of light well (solid and/or translucent glass); Install range and refirgerator; Open secondary stair well by converting 6 linear feet of full wall to half wall.

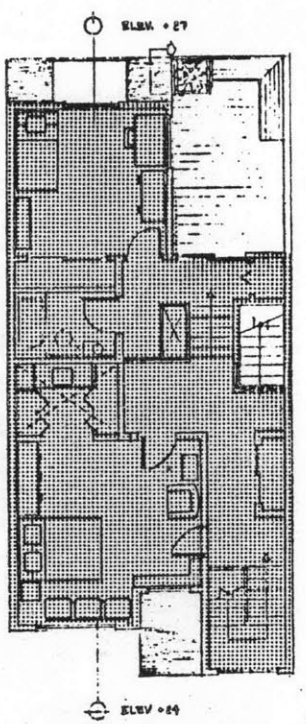
Third Level - Install 6 linear foot partition wall; Open wall at the top of secondary stairs; install door at landing of primary stairs.



GROUND LEVEL FIRST LEVEL



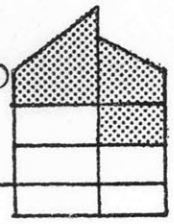
SECOND LEVELS



THIRD LEVELS

PROTOTYPE: IV
VARIATION: Occupancy Phase D

DWELLING # 1	1,204	s.f. (unshaded)
DWELLING # 2	1,192	s.f. (shaded)
DWELLING # 3	-	s.f.
TOTAL	2,396	s.f.



PROTOTYPE IV - OCCUPANCY PHASE E (Floor plans on opposite page).

Total Floor Area: 2,396 s.f.

Characteristics:	Dwelling #1 (First Floor)	#2 (Second Floor)	#3 (Third Floor)
1. Entry Area:	8' x 10'	-	-
2. Living Room:	12' x 21'	14' x 14'	14' x 14'
3. Dining Area:	Incl. in LR.	Incl. in LR.	Incl. in LR.
4. Kitchen Area:	8' x 12'	6' x 14'	6' x 14'
5. Family/Play Area:	-	-	-
6. Bedroom #1 (Master BR):	10' x 14'	12' x 15'	12' x 14'
7. Bedroom #2:	-	9' x 15'	-
8. Bedroom #3:	-	-	-
9. Bedroom #4:	-	-	-
10. Bathroom(s):	5' x 8' (1)	5' x 8' (2)	5' x 8' (1)
Area Sub-Total:	588 s.f.	691 s.f.	538 s.f.
11. Primary Circulation:	120 s.f.	125 s.f.	118 s.f.
12. Secondary Circulation:	-	108 s.f.	108 s.f.
Area Sub-Total:	120 s.f.	233 s.f.	226 s.f.
Area Total:	708 s.f.	924 s.f.	764 s.f.
13. Circulation as % of Total:	17%	25%	30%

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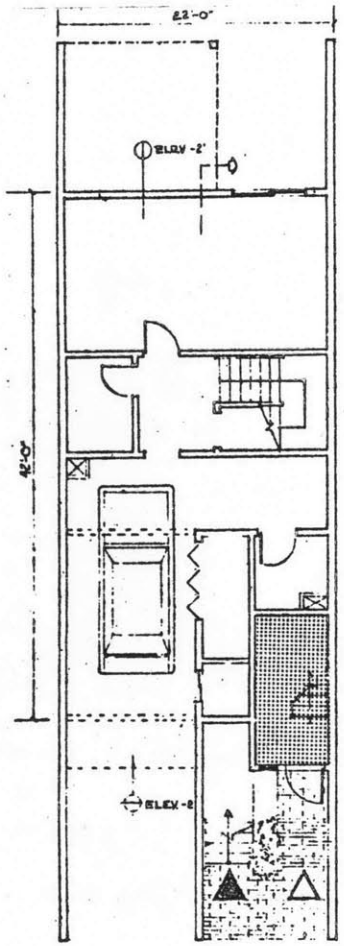
Changes To Dwelling For This Adaptation: (From use as single family to use in this variation)

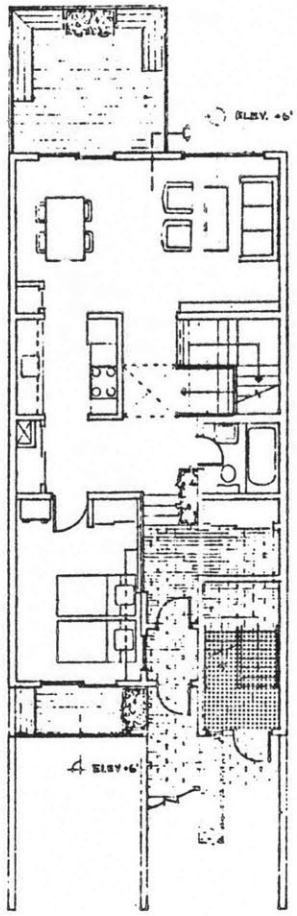
First Level - Install 18 linear foot party wall to enclose dining room for sleeping area.

Second Level - Install range and refrigerator; Install door at top of primary stairs; enclose light well (solid and/or translucent glass).

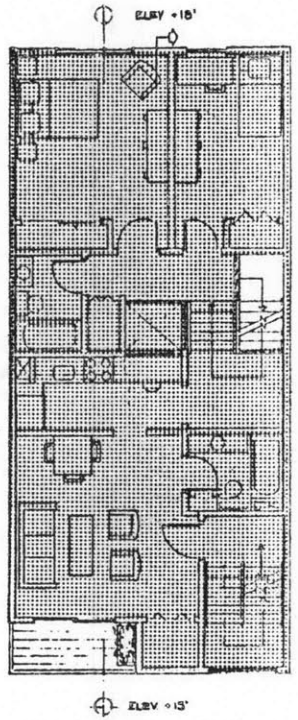
Third Level - Install range and refrigerator; Remove 18 linear feet of partition wall; enclose light well (solid and/or translucent glass); Install door at landing of primary stairs.



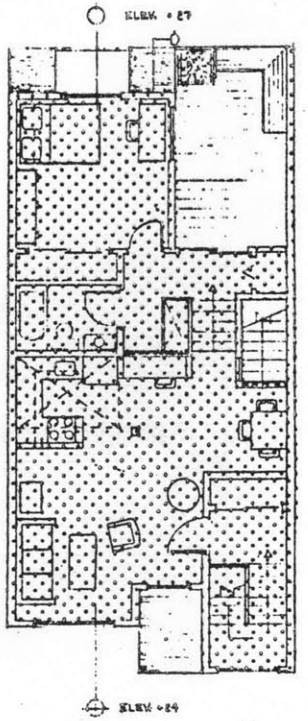
GROUND LEVEL



FIRST LEVEL



SECOND LEVELS



THIRD LEVELS

PROTOTYPE: IV
VARIATION: Occupancy Phase E

DWELLING # 1	708	s.f.(unshaded)
DWELLING # 2	924	s.f.(shaded)
DWELLING # 3	764	s.f.(dotted)
TOTAL	2,396	s.f.