AN ENERGY-CONSCIOUS HOUSING PROPOSAL
TAMARIND VILLAGE
Apartment Housing


The design goals, process, and solution of the Tamarind Village housing project are contained in this book. The following pages log the nine months spent developing a design methodology which is somewhat abstracted from a real life experience. Also, the presentation of this book is the first step towards the realization of the housing project which is to be developed and built by Don Scharer Masonry.
ACKNOWLEDGMENTS

My fellow students of the 1980 graduation class should be the first to be recognized if this is to be a true acknowledgement of those persons who aided me in times of trouble and frustration during the performance of my thesis. To them I am thankful for making the late night studio hours somewhat reasonable with their ingredients of humor and consultation. And thanks for giving valid criticism that wasn't always boring, sometimes positive, given even if not asked for, and given even if I wasn't there. I would especially like to thank those students who worked hard, sweat out a good design, and met dead lines developing what they thought was the essence of their project. These people are the next movers of the profession and will forward credit for our college in the future.

The professional attitude of my thesis professor, Alvin E. Palmer had an intimidating air that was a prime motivator for developing skills. Sonny pushes for graphics, but it always came second to good design. Because of this, I feel that my graphic abilities have improved greatly.
Robert J. Koester, my outside thesis critic and passive energy consultant, was a strong motivator for developing concepts and their complexity. His ideas about design and design methodology made me look at possibilities for solutions in different ways, which finally led to a design control.

The site solution and land planning ideas could not have reached the level of development which they now contain without the involvement of Dean Rundell, landscape critic and visiting professor. I felt comfortable working with Dean because of his "give and take" attitude during critics.

To Jill, who hung in there when the going was tough I will always be indebted. Your putting up with me made the whole project worthwhile.

Lastly, to my parents, Don and Penny, I owe everything from braces to college. Without their moral and financial support my six years of college development would not have been possible. To the two that always wanted me to do what I wanted to do, thank-you.

Mark R. Scharer
CONTENTS

1 INTRODUCTION
    Design Attitude  2
    Design Goals  3
    Book Intention  4

2 DEFINITION
    Project Proposal  5
    Site Analysis  6
    Building Type Analysis  7
    Program Synthesis  23
    Concept Definition  32

3 DESIGN
    Concept Testing  35
    Preliminary Design  36
    Design Development  41

4 SOLUTION
    Final Concepts  46
    Site Presentation  51
    Building Type A  52
    Building Type B  54
    Building Type C  58

5 APPENDIX
    Program  63
    Bibliography  66

6 INDEX
1 INTRODUCTION
The design attitude is focused on providing upper-middle income, apartment living which takes advantage of all the natural amenities the site has to offer. In every decision that was made thought was given to how man, the building, and the land will experience one another. Harmony of these three elements is the essence of what this project entails.
DESIGN GOALS

First, this is an undergraduate thesis project. Second, it is a housing proposal to be developed and actually built. Taking these two criteria into consideration and that I had 9 months to develop a housing project from research to solution to book form, along with other classes, I had to have definite guide lines for the accomplishment of my goals. The guide lines and goals changed frequently. As the intensity grew, and we approached the end of the design stage, the final presentation came into focus. One final site development and three different building types, individually developed, made up the final solution. The goals were to establish a strong site and building concept and to carry both to as far a level of detail and complexity as possible, without losing site of good design.
The intention of this book is two fold. First, it serves as a record of the development of my design methodology, my knowledge of housing, and my graphic ability. And second, the book serves as a proposal for a housing project which is to be developed and owned by my parents.
2 DEFINITION
The proposal of this project is for 100 apartment units. Some units are to be for rent and others are to be sold. The units proposed are designed to conserve energy and blend well with the natural elements of the site. The Tamaring Village is for upper to middle income types, and it is hoped that construction can begin in time to supply housing for the new families moving into this area that are seeking jobs with the new Caterpillar plant.
LOCATION OF THE SITE

The site is located in Tippecanoe Township in Tippecanoe County. It is located approximately five miles north of West Lafayette, Indiana and is on the south corner of State Road 43 North and Soldiers' Home Road. Access to West Lafayette and Purdue University is possible along Soldiers' Home Road as well as State Road 43 North. Either road will provide access to the city in approximately seven minutes.

The site also has easy access to I-65, which is about a two minute drive away along State Road 43. Battle Ground can also be reached along this route in a very short time.
GEOGRAPHY

LOCATION 5 miles north of W. Lafayette on the east side of State Road 43 N.

TOTAL AREA 15.56 acres

ELEVATIONS 540-590'
ORIENTATION

The orientation of site is very good. The elongated section of the site is orientated in the East-West direction which allows long hours of solar exposure. The site is somewhat in a valley, being bordered on opposite sides (east and west) by hills. The hills on the west end are quiet high and coupled with heavy, mature vegetation; blocking out winter winds from the north west.
ENVIRONMENT

Physical: The region near the site is very "country" because of the heavily wooded areas, the nearness of the Wabash River, and its 4.5 mile distance from the urban areas. The drive to the site from state road 43 north is for the most part, along the Wabash River, and somewhat in a valley because of the hill on the adjacent side which slopes up steeply.

Social-Economical: The majority of the residence in the near-by area are middle class working people. There are two one-story apartment complexes near the site, one is within a mile and the other is adjacent to the site on the south edge. Purdue students and Purdue faculty live in near-by houses on a rental basis.
VIEWS

Into the site: The site is completely surrounded by vegetation on all four sides but is exposed for a view by motorists that cross the site driving on 43 north. Entrance onto the site from the west displays the site as rolling planes as the central portion rolls down into a slight valley and returns by rolling up into a hillside and plateau in the far background.

From the site: Views from the site are mostly into woods and ravines: 1) Looking west you see highway 43 north and immediately behind it rises a steep hill with heavy foliage. 2) Looking north you look down a steep hill into heavily wooded bottoms which has a small creek running through it occupied with water only 6 to 12 times per year. 3) Looking east you see hills and trees until just past the site the terrain falls steeply into a heavily wooded ravine adjacent to a large, lightly wooded field with more trees in the background. 4) Looking south you see a combination of deciduous and coniferous trees with some residential spaces being partially viewed in the distance.
Looking west across the open field.

Looking north from the south-east corner of the site on the upper ridge.

The creek bottoms.

Looking west, across the open field from on top of the ridge.
EDGE CONDITIONS

All of the edge conditions of the site are soft and quite enclosed because of the heavy foliage hills, and ravines. The areas probably most sensitive to build on would be the south edge because there is some exposure to existing residence and also on the short piece of ground on or exposed to highway 43 north.

TOPOGRAPHY

The topography of a site often indicates many aesthetic values on the site. It determines areas which would be suitable for roads and buildings. It even determines the surface water drainage on the site.

The topography of this site varies from very flat, 0-3% to over 30% slope. The difference in elevation high point on the site to low point is 62 feet.

A 0-3% slope will have fewer construction problems. There may be some problems, however with drainage off the site. Standard housing plans may be used to build in this area.

The 3-10% slopes will also have very few problems. Drainage will be good going off the site and general contractors can come in and build these homes with very few problems with the site.
Homes built on slopes on 10-30% are recommended to be architecturally designed for each specific site. There will be many problems with drainage and erosion control. These homes will also be the most unique and psychologically sensitive to the site.

Slopes of over 30% are not recommended for building. Any loss of vegetation on these slopes will result in extreme erosion followed by continual loss of more vegetation. Erosion control during building would be essential and extremely expensive, however building on these slopes is not entirely impossible. The extra expense put out by the owner may well be worth the unique living experience it creates.

Slopes over 30% are also not recommended for the construction of roads. The roads are meant to be pathways through the site for means of reaching each individual lot. Roads placed on slopes of over 30% will require a tremendous cut of land which not only destroys the vegetation under the road but also the vegetation for many feet on either side of it, until the existing grade is met.

It is possible, however, to build roads on small sections of slope over 30% if retaining walls are used. Retaining walls will allow the existing grade to be reached much quicker with little loss of extra vegetation.

INGRESS/EGRESS

The only location for the public to enter or leave the site, by car, is where highway 43 intersects the site.
CLIMATOLOGY

Thunderstorms are common and winds of hurricane velocity strike occasionally late in the summer, however, the site location exists in a valley which serves as a protection from high winds.

The microclimate is as important as the regional climatic conditions, and varies greatly throughout the site. The ravines are cooler than the ridges. They hold the snow better as well as being more pleasant during the summer. The north-east facing slopes are also the coldest, while the southwest slopes are warmer.

The area that is wooded is also more protected from the winds. The wooded area would then be warmer in the winter than the open area and cooler in the summer, under the canopy of leaves.

The sun's angle in the sky is very important to know in calculating where the shade will fall around buildings and even on the roads. The sun angles can determine where there will be excessive snow and ice in the winter.

A weather chart for Tippecanoe County is on the following page.
VEGETATION

The vegetation on the site is extremely important particularly when the character of the site is dependent on it.

The vegetation not only develops a strong visual and psychological impact but it is closely related to soils, microclimate, hydrology and topography.

On a site such as this the vegetation's major function is for protection of the soil on the steep grades. Since a good portion of the site has over 30% slopes, it is important to keep vegetation growing in these areas. The vegetation slows down the surface water runoff allowing the soil to remain in place.

The majority of the site is a beech-maple plant association. Some of the major trees in this association located on the site are beech, sugar maple, elm, sassafras, black cherry, tulip poplar and walnut. The understory includes some redbud and dogwood and some larger shrubs such as green briar and elderberry.

Some other plants found in the area are rue anemone, jack-in-the-pulpit, spring beauty, may apple, wild ginger, and false soloman's seal.

There are also a few hickory trees throughout the site with a large abundance on the southwest corner of the site on the ridge top. It appears that an oak-hickory plant association is moving out and the beech-maple is moving in. The floor of this area is covered with maple seedlings and are so thick it is impossible to see the ground. The dogwoods seem to grow only along the ravine areas where it is well drained and protected.
CONTIGUOUS LAND USE

The site is now zoned R-3. The land adjacent to the site on the north and west is zoned R-1. The land to the south of the site but north of Soldiers' Home Road is also zoned R-1. Unless the adjacent areas are rezoned, there should be no problems with mixing the uses of the adjacent land with the proposed use of the site.

A chicken farm is located on the east side of State Road 43 North. There is low visibility from the site across State Road 43 because of the vegetation, so the farm will have little impact on the siting of homes in the subdivision. It is possible for the new development to bring in more business and interest to the farm because of an increase in traffic along State Road 43.

The land to the northeast, south, and southwest of the site is spotted with single-family detached housing. This use will work well with the proposed use. The proposed use will increase the density of the neighborhood, and the traffic along the roads. It will also increase property values in the neighborhood.

The area to the northwest is old farm land, including an old orchard. This land has also been left to return to a natural stage of succession. There will be no major impact on this land from the proposed development. The land to the north, adjacent to State Road 43, however, is wooded land and is part of the woods located on the site. If the vegetation along this edge of the property line is destroyed it may also destroy vegetation on the adjacent land. It is very important, then, to protect this border line of vegetation so that the vegetation off the site may stay as it now is.

The addition of new homes in this area will not only increase population of the neighborhood but also the community in general, including the schools, Harrison High School, and Battle Ground Elementary School.

UTILITIES

Since the soils will not permit septic systems, it is necessary to hook-up with the West Lafayette sanitary sewer lines. Sanitary sewer lines go from
West Lafayette to Soldiers' Home on Soldiers' Home Road and State Road 43 North. Lines can be hooked up from either direction near the site.

It could be possible to hook-up to the West Lafayette Water Company which will be expensive because their lines do not come this far out of West Lafayette at this time. The other possibility would be to drill wells which would supply the water for the subdivision.

Electricity can be hooked up on any of the existing lines in that area.

---

**GENERAL DRAINAGE ON THE SITE**

One of the important aspects of a housing design of this sort is to maintain the natural character of the site. In order to do this, the topography and vegetation on the site must remain relatively unchanged. Since the vegetation and topography is interrelated and dependant on the hydrological system of the site and surrounding area, it is necessary to maintain, as much as possible, the natural drainage of the site.

---

**AREA DRAINAGE**

A study of the general area surrounding the site indicates that the major ridge on the site is also a general ridge which divides the water shed areas in the vicinity. The majority of the water which runs across the site is basically only surface water from the site itself. A small amount of area between the two ridges runs surface water along an intermittent stream on the site. If this stream is unhampered by the design, there should be no problem of the site handling the area's surface water run-off.
EMBARCADERO TOWNHOUSES
Newport, Oregon

Project Information

Architects: Cambell-Yost-Grube
Scheme: Stacked row housing
Project size: 185 units
Unit Size: 1200 square feet and smaller
Building Heights: Three and four stories
Building Material: Wood
Structure: Timber Frame
Exterior Skin: Cedar shingles
Image: That of a sea-side village and boating community
SITE SCHEME

The stacked row housing units take advantage of the site by utilizing solar penetration, water-front views, and privacy. It is also advantageous from a developers point of view by obtaining a density ratio to meet economical requirements.

The orientation of the row building scheme relates well with the benched land form which slopes sharply up away from the bay. Occupants not directly on the water-front are given excellent views of the bay by using this scheme.
BUILDING SCHEME

The units are built into the sloping terrain, stacked back away from the water's edge. The sloped roofs allow maximum solar penetration into each unit while relating well in a sculptural way to the existing trees and sloped terrain.

The orientation of the rowed units would work well with a solar energy facility, although solar energy has not been incorporated.

Each unit has its own separate entry connected to a system of boardwalks. The variety of floor plans exists in a one or two level scheme.

UNIT 1

UNIT 2

South-facing patio.
SEA GARDENS
Atlantic Beach, Florida

Project Information

Architects: William Morgan, Architects
Scheme: Small clusters staggered in one large cluster
Project Size: 15 units
Unit Size: 1500 square feet
Building Heights: Two and three levels
Building Material: Wood frame, wall bearing
Exterior Skin: Diagonal wood siding
Image: It has a natural sea-coast resort atmosphere
SITE SCHEME

The small building clusters help define the character of each unit's identity, while respecting the nature of the site, preserving major trees and undisturbing the natural setting of the dune environment.

The major vehicular node enhances the entrance into the project while side avenues provide a more practical and private sense of entry for pedestrians.

The orientation of the units is sensible in an energy efficient manner in that natural light penetrated the units from the north and southern rays are able to enter the units when deciduous trees loose their leaves in the winter.
BUILDING SCHEME

Repetitive wood-frame structures were utilized to keep construction costs down although the square plans are turned to provide variety.

The wood siding and pitched roofs enforce the residential look acquired in Morgan's project and at the same time blends with the natural setting in a sculptural way. A third bedroom occupies a crow's nest position in a third level loft which affords itself to an excellent view, adds character to the building section, and is small enough to keep from detracting views from neighboring occupants.
BUILDING ORGANIZATION

PIECE

STAGGERED

PINWHEEL
Tamarind Village is an energy conscious, upper-middle income housing proposal which consists of 100 units, a club house, pool, and tennis courts. The units own a two car, unattached garage. Different building types were developed for buyers and for renters. The units vary from one to two levels and can either be a ground unit or upper unit.

The owner/builder is Don Scharer Masonry. The structure and veneer will be comprised of masonry and the other exterior covering will be natural in color. Most of the existing building will remain on the site, but will be altered in minor ways to accommodate the project's office and maintenance facilities, a manager's apartment/pool, and a
guest apartment. Proper barriers will be installed to keep the support facilities fairly private from the proposed 100 units. Two parking spaces per unit plus 5% over-load parking for guests are provided on the public side of the units. Public pathways will be developed between building clusters to provide access to the hills and woods.

All units have kitchen facilities on the south side and most of the units will contain greenhouses which are optional. Lower units have an open atrium at the entry to allow light and heat deep into the apartment while the upper units have a terrace/sun deck combination which also allows for the entry of maximum light and heat. All of the units have patios or balconies on their private sides as do most of the bedrooms. Active and passive zones are kept distinct and are in congruence with public and private zones.
The major concepts deal mainly with the integration of the buildings with the terrain so that man experiences the natural amenities of the site in as many ways possible. Seeking harmony of man, building, and site is the major theme. This theme, or concept, governs the location of the buildings on the site, their relationship to the ground, their orientation, the material usage, the building forms, the entering and blocking of light and air, the entries of each unit, the active and passive zones, the location of the recreational facilities, and the location of the support facilities. If the project concepts are to be utilized successfully they must have some influence in every design decision.
3 DESIGN
CONCEPT TESTING

Merging from the woods and into the hill.
The major excitement of the site is the mixture of the different natural elements: the sloped ridges, the open field, and the very dense woods. The obvious design decision for me was to build into the hillsides. The hillsides mediate between the woods and the open field. So, by building into the hillside the persons occupying the units would first experience the hill by living in it, and second, experience both the open field and woods by having them on both sides of their living spaces.

Site sections were important in order to study the different types of slopes and their relationship to one another.

The next design concept dealt with deciding how the building would relate to the slopes.

"No house should ever be on any hill or on anything. It should be of the hill, belonging to it, so hill and house could live together each the happier for the other."

Frank Lloyd Wright
Designing the site scheme and building scheme together was an important rule I had to keep in mind. The organization of the buildings on the site would lead me to discover how the building would work in section and elevation. The idea was to let the natural flow of the hillside determine the flow of the different units against one another, thus breaking up the facades by moving the units back and forth in section.

Putting the units along the ridge.

Merging of the building into the woods and hill by studying sections.
At one time a mid-rise was being considered as rental apartments that would be developed on the flat portion of the site. This type of building being mixed with the more residential hillside unit had interesting parameters. It would not only strongly increase the density of the project, but it would act as a social identity distinction also. The concept was abandoned mainly because of the time constraint of the project.

Passive energy concepts dealt, in large part, with an elongated unit form oriented north and south, greenhouses, earth berming, and developing atriums and clear spans to get sunlight deep into the units in the winter and blocking the sun in the summer.
Entry into the units was a major design consideration to be dealt with. The front door shakes hands with the people entering through it. The entry also serves as an identification separation.
The preliminary design was preceded by six weeks of research and two weeks of design. Concepts and programming were well established and now the real designing could begin.
The vehicular circulation was a major key.
The vehicular circulation took many forms before evolving into a successful solution. To deal with the problem of the arteries becoming too long a large turn-around was developed. With 200 cars soon to be put on the site the circulation had to flow very easily. Upon entering the site, the road swings up to the edge of the hillside and then back towards the center of the site where the driver would be looking directly into the clubhouse and open field. The entrance and drive around the site should be as eventful as possible so that one can experience the site without having to work at it.

The orientation of the buildings finally took shape. I did the sensible thing and oriented everything north and south. Then spaces between the buildings and each cluster became important in order to develop a complexity and variety within the neighborhood. This would help the identity of individual clusters and keep the site from becoming monotonous.
By making the decision to orient the buildings all north and south, it only made sense to develop as successfully as possible an energy sensitive building unit. As the long narrow units formed into the hillside the balconies moved out into the trees and even began to take the shape of the tree trunks. In section is where I developed most the passive energy techniques. Using large overhangs, open interior atriums, greenhouses, and sun decks I only began to understand the possibilities.
Elevation and material studies then began to make the buildings more real. In keeping with the natural elements of the site I wished to put as natural materials as possible on the facade. Knowing that there would be a lot of masonry on the building I looked at using it, also, in a very natural way. That being first of all structural and second to use it near the ground because of its' heaviness and natural colors which would relate well to the ground. As the building grew out of the ground I then over-hung the masonry with the wooden veneered upper portion of the building. The wooden upper portion seemed to be the answer for a way of mixing the building with the trees. However, on the front the facade is mostly comprised of brick for a "front" presentation.

Roof lines were sloped toward the street in a fashion that would give them a very residential look. The breaking up of the roof tops as the units move back and forth in the hillside helps to give identity and provides boundaries to individual units. The unit identity was also developed by making level changes in the earth and providing overhead trellis entrances.
Lastly, vegetation and landscaping became important in developing privacy, yards, passive energy goals, and character. The name Tamarind means "fruit of an Indian tree". Long ago, Indians settled in the valley of which the site belongs. So, the name originated from an idea which Sonny had given me. Which was to plant different types of fruit trees in front of each of the different buildings. He suggested this when I was trying to find ways to develop individual building identity. By doing this, the spring colors of the blossoms all take on their own identity, as they would in the summer when bearing different fruits, and in the fall when the leaves turn different colors.
BUILDING TYPE A
BUILDING TYPE B
BUILDING TYPE C
SECTION TYPE C
NORTH ENTRY
5 APPENDIX
A. INTRODUCTION

The Lafayette and West Lafayette area is growing at a rate of 83.4 persons per month. Due to this growth, housing construction has been growing. Even though, it can not keep up with the population. Housing in this area is now at zero vacancy. Worse yet, good housing is even more scarce due to developers taking advantage of the shortage. The new Caterpillar plant now being built in West Lafayette will employ 2,000 persons by 1983 and is expected to grow to an employment of 3,000 to 5,000 persons. A new sugar refinery is be developed 2 miles from the proposed site, and is projected to employ 300 to 500 persons.

Including Purdue University's enrollment the Lafayette, West Lafayette population is 117,000 people. As the city grows, more people will be seeking homes where they can retreat to a natural setting away from the parking lots, buildings, crowded spaces, and automobiles. The development of the Tamarind Village is for those families seeking homes in the country. The site for the proposed project is 5 miles north of the city's border on state road 43 north. The 10 minute drive is flanked on one side by the Wabash River and protected on its opposite side by 30 to 40 foot hills of heavily forested terrain.

The Tamarind Village unit is designed to take advantage of passive energy facilities and techniques in order to compete with rising energy costs. These facilities and techniques include solar greenhouses, cross convection currents, earth berming, winter/summer sun control, and planned vegetation. Proper considerations are made to take full advantage of the natural amenities which include gradual and steeply sloped hills, heavy woods, a large open field, and a small creek.

The typical buyer of a Tamarind unit will make over $25,000 per year and have 3 children. However, the units range from 1 to 4 bedrooms, with the possibility of a 5 bedroom unit with a loft option. A feeling of spaciousness is an important factor in the development of these country townhouses. This design guideline is built upon the reasoning that the typical buyer will be moving out of a traditional unattached house and will be
conditioned to larger spaces than apartment living usually affords. Throughout the design of the Tamarind Townhouses care and thought should be given to develop a sense of individual identity for the user/occupant. This design criteria had to be conscious in the design of individual units, and more importantly, in the ways adjacent units were attached. First, the passive and active zones were developed surrounding individual buildings. Next, these zones were further broken down by the use of man-made and natural barriers, which further identify individual units, their entity's, and personality. Each unit's personality will be given even further identified by the final touches put on by the owner/user when occupancy occurs.
B. SPACE REQUIREMENTS

I. GOALS/USES/ACTIVITIES

1. Common considerations to buy/build
   - units can be owned or rented
   - maintenance free units
   - better security than a typical residence
   - recreational facilities
   - location affords quick sales turnover

2. Unique goals
   - passive energy facilities
   - existing natural amenities
   - plug-on options
   - a sense of spaciousness
   - a sense of identity

3. Typical buyer
   - annual income is $25,000+
   - average family size is 5

4. Main activities and zones
   - public/private zones
   - automobile/pedestrian zones
   - recreational zones (tennis, club house, swimming)
   - passive support zone (woods, creek)
   - active support zone (maintenance, trash collection, mail)

5. Basic unit plan
   - unattached garage, one or two car
   - kitchen and accompanying appliances
   - family breakfast dining adjacent to the kitchen
   - formal dining
   - option for a "great room"
   - spacious entry and adjacent closet
   - living space
   - master suite with bath and walk-in closet
   - bedroom/den with separate closets and shared bath
   - laundry and utility spaces

6. Plug-in options
   - two separate bedrooms with a shared bath, laundry, and utilities
   - living area added to family space to develop a "great room"
   - upper level left with bedroom and private sun deck

II. USER AND USER ACTIVITIES

1. Primary user: the tenants are the primary users of any housing project, so their needs are the major design concerns
   - the majority work from 8 a.m. to 5 p.m., 5 days a week
   - the majority shop every-other day
   - the majority want reserved parking
   - need exterior spaces for private activities
   - need exterior spaces for public activities
   - need interior spaces for private activities
   - need interior spaces for public activities
- need play areas for children which afford security
- need adult recreation spaces
- need mail box service
- need trash drop-off

2. Secondary users: these are all persons that work on the site, including management, maintenance, and on-off site deliveries

- management services and sales
- maintenance services of recreational facilities and natural amenities
- lawn and unit services
- trash pick-up services
- mail service

3. Tertiary users: these are visitors or persons that are on the site as guests of a tenant/owner

- need parking spaces, either street or drive
- need graphic information or unit coding

III. SPACE PERFORMANCE

1. King size bed, 2 night stands, and dresser, with table and chairs optional on balconies.

2. Generous closets and storage spaces.

3. Formal dining for 6-8 persons.


5. Breakfast dining for 4-6 persons.

6. One or two car garage plus storage.

7. One to four bedroom units.

8. Number of occupants per unit:
   - one bedroom  1-3 persons
   - two bedroom  3-4 persons
   - three bedroom 4-6 persons
   - four bedroom  6-8 persons
### IV. SPACE STANDARD

<table>
<thead>
<tr>
<th>Basic Unit</th>
<th>One Bed/Den or Two Bed</th>
<th>Three Bed</th>
<th>Four Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garage</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Living/Dining</td>
<td>210</td>
<td>230</td>
<td>250</td>
</tr>
<tr>
<td>Living/Dining/Kitchen</td>
<td>270</td>
<td>300</td>
<td>330</td>
</tr>
<tr>
<td>Kitchen/Dining</td>
<td>120</td>
<td>140</td>
<td>160</td>
</tr>
<tr>
<td>Living</td>
<td>160</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>Dining</td>
<td>100</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td>Master Bed</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Bed</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td><strong>Total Bed</strong></td>
<td>200</td>
<td>280</td>
<td>360</td>
</tr>
<tr>
<td>Master Bath</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Master Closet</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Laundry</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Guest Bath</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Loft Bed</td>
<td>160</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>Entry/Stairs</td>
<td>130</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>Utility</td>
<td>190</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td><strong>Unit Module</strong></td>
<td>1280</td>
<td>1360</td>
<td>1440</td>
</tr>
<tr>
<td><strong>Unit with Loft</strong></td>
<td>1440</td>
<td>1528</td>
<td>1600</td>
</tr>
</tbody>
</table>

40 one bed/den or two bedroom units = 51,200 square feet
40 three bedroom units = 54,400 square feet
20 four bedroom units = 28,800 square feet

Total net square feet (exc. loft) = 134,400 square feet
Total gross square feet (exc. loft) = 168,000 square feet
C. SPACE SUMMARY

I. SQUARE FOOTAGE:  

<table>
<thead>
<tr>
<th>Type</th>
<th>One bed/Den</th>
<th>Two bed</th>
<th>Three bed</th>
<th>Four bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Unit</td>
<td>1280</td>
<td>1360</td>
<td>1440</td>
<td></td>
</tr>
<tr>
<td>Basic Unit with loft</td>
<td>1440</td>
<td></td>
<td>1520</td>
<td>1600</td>
</tr>
<tr>
<td>Number of Units</td>
<td>40</td>
<td>40</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Total net square feet (exc. loft) 134,400 square feet  
Total gross square feet (exc. loft) 168,000 square feet

II. BUILDING OCCUPANCY:  

<table>
<thead>
<tr>
<th>Type</th>
<th>Adults</th>
<th>Children</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>One bed/Den Two bed</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Three bed</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Four bed</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

III. TOTAL OCCUPANTS:  

<table>
<thead>
<tr>
<th>Type</th>
<th>Occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>One bed/Den</td>
<td>(3 x 40) = 120</td>
</tr>
<tr>
<td>Three bed</td>
<td>(4 x 40) = 160</td>
</tr>
<tr>
<td>Four bed</td>
<td>(5 x 20) = 100</td>
</tr>
<tr>
<td>Total</td>
<td>380</td>
</tr>
</tbody>
</table>

IV. PARKING  

2 cars per unit  2 x 100 = 200 parking spaces  
25% garage parking = 25 two-car garages  
18 clubhouse and recreation parking spaces
D. SPACE RELATIONSHIPS

1. UNIT PIECES

GARAGE 320 S.F. LIVING 160 S.F.
BATH 50 S.F. DINING 100 S.F.
BED 80 S.F. MASTER BED 120 S.F.
STAIR 80 S.F. ENTRY KIT./DIN. 120 S.F.
II. UNIT ORGANIZATION

END UNITS (one level)

CENTRAL UNITS (two level)
E. EXTERIOR CRITERIA

I. CIRCULATION & ACCESS

1. Have direct pathways to building entrances.
2. Have pathways connect to streets that surround the site.
3. Streets on the site should discourage through traffic.
4. Streets must be wide enough to accommodate all of the site traffic.
5. Avoid conflicts between vehicles and pedestrians.

II. SAFETY

1. Pathways and roadways must be easily cleaned of snow and ice.
2. Level changes must be clearly marked.
3. Minimize the number of crossings between pedestrian and vehicular traffic.
4. Level changes over one half meter must have a handrail.

III. IDENTIFICATION

1. Have all entrances clearly marked.
2. Have all outdoor activity areas clearly marked.
3. Unit identification must be clear for drivers and pedestrians.

IV. LIGHTING

1. Electrical lighting must be provided in all parking areas.
2. Pathways to unit entrances must have adequate lighting.

V. UTILITIES

1. Sewage treatment facility must be provided on the site.
2. Electric substations must be provided on the site.
3. Connection to any public utilities must be done in a manner so that normal use is not impaired at any time.
4. Utility connections must be independent for the site.

VI. PRIVACY

1. Arrange the buildings so that no person can get within 2.5 meters of where it would be possible to look directly into a window, balcony or private area of any dwelling unit.
2. Dwelling units should have windows, openings or balconies further than 6 meters away from a point where it would be possible to look directly in from other windows, balconies or private areas.
VII. PROTECTION

1. Have all indoor activity areas enclosed so that non-residents cannot gain access without permission from a resident.

2. Have all outdoor fixtures made in a way to prevent removal, breakage or defacement.

3. All public activity areas must be visible to public safety officers.

VIII. MAINTENANCE

1. Trash collection must be made at least once a week.

2. Collection areas shall be far enough away to prevent offensive odors and sights.

3. The exterior of the buildings and the grounds shall be kept neat by a permanent staff of workers.

IX. NATURAL FEATURES

1. Plant material used on the site shall be kept in scale with the buildings.

2. Plant material shall be selected to enhance the natural beauty of the site.

3. Plant material selection shall be made on the basis of its:
   - Color
   - Shape
   - Size
   - Texture
   - Adaptability to the site
   - Winter characteristics
F. BUILDING CRITERIA

I. CIRCULATION & ACCESS

1. Entrance doors must be large enough to allow furniture and other items to be moved in and out easily. 1 meter min.

2. Doors must not interfere with the activities within the space they are in.

3. Public halls must be large enough for people to pass without bumping. 1.8 meter min.

II. PRIVACY

1. Dwelling units must be able to be closed off from the view of people outside whenever desired.

2. Strong entrance doors with viewing devices must be used.

3. Bathrooms must not be visible to other activity areas.

4. Sleeping areas should be capable of being closed off from activity areas when desired.

5. Balconies must provide visual privacy for its users from other units and the ground.

III. STORAGE

1. Storage for coats at the entrance door.

2. Storage areas in bedrooms for clothes of person(s) in that room.

3. Household storage.


5. Storage for bicycles, tricycles, baby carriages, etc.

IV. LIGHT AND AIR

1. Operable windows for ventilation.

2. Exhaust fans in bathrooms and kitchen.

3. Design for natural air flow in summer, but also provide A.C.

4. Use insect screens on all openings.

V. SOUND

1. Insulate against all sound which would interfere with normal conversation or sleep.

VI. GARBAGE

1. Space to store normal amount of garbage within the unit for 24 hours.

2. Have garbage collection space easily accessible to people in the units.
VII. DELIVERIES

1. Mailbox area.

2. One entrance which can be easily reached by delivery trucks, mail vehicles, fire engines, moving vans or an ambulance.

VIII. MAINTENANCE

1. Use windows that can be easily cleaned.

2. Make hatchways for removal of large equipment.

3. Place access panels in strategic positions for replacement of worn parts.
G. GENERAL CRITERIA

Each unit must relate to the function of everyday life. That is, public must be kept separate from private. Circulation zones will act as the buffer between these two, so the logical unit form shall be long and narrow with the main circulation zone running the length with public on one side and private on the other. This should be the form to follow for the second level and lower level so plumbing cores can be kept in a general relation to one another.

Security is a major problem and concern in today's society. Because of this, each unit shall have its own system. Points of entry for each unit is recessed into the unit, thereby creating a protected semi-enclosed space that is public but could give a criminal a "cornered" feeling once he has entered this area.

General landscaping for the project should include mounding, vegetation, and trees to limit sound and views into the semi-private areas of the individual units. This can be carried a step farther according to each owner within his exterior boundaries. Landscaping should also be used to protect metering systems for water, electric, solar, and telephone systems that will be located, along with guest parking, in the common green areas. The use of landscaping to help protect the pedestrian walks that occur in the vicinity of streets and thoroughfares should also be taken into consideration.
BIBLIOGRAPHY

"Architectural Record Houses of 1977."

Bloomer, Kent and Moore, Charles, Body
Memory, and Architecture, Yale Uni-
versity Press, New Haven and London,
1977.

Clegg, Peter, Energy for the Home,
Garden Way Publishing, Charlotte,
Vermont, 1976.

"Design for Energy Conservation."
Professional Builder, (May 1975),
p. 174.

"Designs for Wooded Sites." Profes-

Engel, Heinrich, The Japanese House,
A tradition for Contemporary Archi-
tecture, Charles E. Tuttle Co.,
publishers, Rutland, Vermont/Tokyo,
Japan, 1964.

"House VI." Progressive Architecture,
(June 1977), p. 57.

"How to Civilize the Automobile in
Medium Density Projects." (Jan. '75),

Ishimoto, Tatsuo and Kiyoko, A Tra-
dition for Contemporary Architecture,
Charles E. Tuttle Co., publishers,
Rutland, Vermont/Tokyo, Japan, 1964.

Jones, Gerre, How to Prepare Profes-
sional Design Brochures, McGraw-
Hill Book Co., publishers, New York,

Leavitt, Allison, Scharerdon Subdi-
vision, A Planned Development, a
thesis project for a Landscape
Architecture senior at Purdue
University under the supervision of
Professor Greg Pierceall.

Macsai, John, Housing, John Wiley and
Sons, publishers, New York, New York,
1976.

Moore, Charles, The Place of Houses,
Holt Rinehart Winston, publishers,

Morris, Edward S., Japanese Homes and
Their Surroundings, Dover Publica-
tions, Inc., New York, New York,
1961.

Sherwood, Roger, Modern Housing
Prototypes, Harvard University Press,

"The Attached Solar Greenhouse."
80-5.

"Townhouses: Creative Planning Gets
21 Units on Tiny Urban Site."
Professional Builder, (Sept. 1978),
p. 111.