dunescape
beverly shores, indiana

william joseph scheffki
thesis 78/79
abstract

This thesis book is a documentation of the logical sequence of events and supportive information which lead to the final design of a housing development for Beverly Shores, Indiana. With this book I felt it very necessary and important to include retrospective analysis commentary along with the initial process explanation. Hence, text which is denoted by an ° and encased between heavy lines will be important criticism and comments.

The introduction begins with a brief description of the project. Its major focus is on goals, strategies, and priorities which illustrate my attitude toward housing environments.

The Brief presents the important design issues. It contains summaries of the site analysis and the program, and lists the critical issues involved in this project.

The next four sections describe and explain the various design stages.

The Appendix contains the program, the site analysis, the building type study, and miscellaneous information.
acknowledgements

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introduction

PROJECT DESCRIPTION

Dunescape is a multi-family housing development in Beverly Shores, Indiana. The site is a 43.8 acre wooded backdune area along the southeastern shores of Lake Michigan. There will be 307 units, a gross density of 7 units per acre, consisting of one, two, and three bedroom unit types designed for a medium market range. A community center will facilitate the governing body of the development and the development's social affairs. Recreational facilities will include a small open park, playlots, swimming pools, and tennis courts. The project will be completed in five phases.

PROPOSAL/GOALS

This Thesis stems from my appreciation of a unique and beautiful Lake Michigan lakeshore area and from my interest in housing environments.

The land along the southeastern edge of Lake Michigan in Indiana offers wide stretches of sandy beaches, living sand dunes which change from year to year, forested backdunes with both steep and rolling topography, and a variety of wildlife. Yet, a lack of understanding of this area's eco-system has threatened its continuing existence. Development in this area is inevitable and must be accommodated. Uncontrolled growth is inevitably destructive.

I am proposing a small multi-family housing development to become a part of the existing residential community and especially to become a part of the landscape. My initial goal is to provide Beverly Shores with a planned direction of growth, recognizing environmental
and social considerations, so that this beautiful area can be continued to be enjoyed.
By main goal is to provide an enjoyable as well as a functional living environment that enhances human interaction and a feeling of belonging to an identifiable community. Specific goals for this project include:
- To establish a hierarchy of privacy levels, both interior and exterior.
- To create an environment that has a strong relationship with the landscape emphasizing the visual and spatial qualities of the natural setting.
- To utilize passive energy conserving principles such as orientation and massing, as much as possible.

STRATEGIES

There are several design strategies to be incorporated in this project. They are:
- To provide a series of public, semi-public, private, and semi-private spaces.
- To provide a variety of dwelling unit types for different sized families.
- Maximize living spaces in and around the unit.
- To provide added amenities such as interior and exterior storage spaces and washer/dryers in each unit.
- To provide multi-functional community spaces such as a community center and open play fields.

IMPLICATIONS

In most housing developments one aspect is usually sacrificed for another. For example, individual garages are usually sacrificed in order to obtain higher densities, or private exterior space for easier construction methods. The following is a priority list for Dunescape.
- The preservation of the natural sand dunes eco-system.
- Dunescape is planned with the eventual residents functioning in their living environment.
- The living space relationships of each unit type.
- The exterior transitional spaces (public, semi-public, and private).
- Community-neighborhood relationships.

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With this thesis I will be primarily concerned with achieving an architectural solution. Hence, the development of a schematic land usage plan for the entire 42.9 acre site will be the extent of my site development effort. I will be concentrating my design efforts on a small portion of the site consisting of approximately 22 acres and 26 housing units.
brief

This section contains summaries of the site analysis and the program and then presents the critical design issues.

SUMMARY/RECOMMENDATIONS of SITE ANALYSIS

1. Development on the ridges will be restricted allowing only passive recreation and low density development.

2. Development should be concentrated in the wooded and non-wooded flat areas where erosion poses the problem.

3. Areas with unsuitable soils should be left natural and accommodate parks and tennis courts.

4. The proposed roads—Alyce Ave., Oregon Ave., Ohio Ave., New York Ave., and New Hampshire Ave. will not be built.

5. Soils and septic tanks will be prohibited in Danescape. Water supply and sewage disposal service will be assumed to be tied into the Beverly Shores utility runs along Beverly Drive. Gas and electricity are already available.

6. The sensitive forest environment must be handled with care and maintained to prevent erosion.

7. Only plant life indigenous to this area will be used in the landscaping.
1. Density requirements and restricted development on the ridges require the grouping of units into neighborhoods nestled on either side of the ridges.

2. The community center will be located at the top of the southern most ridge making the most of the excellent views, acting as a landmark, and connecting both sides of the ridge.

3. Auto circulation through the site will consist of two main thru-streets off of which will stem the minor streets that feed into the neighborhoods.

4. A "neighborhood" will consist of a variety of unit types to encourage a mix of age groups.

5. Small play lots will be incorporated amongst the neighborhoods acting as a unifying or gathering place.

6. Dunescape will rely on the surrounding cities of Pines and Michigan City for its immediate commercial needs.

7. The eventual residents of Dunescape can be described as being in the middle to upper income bracket and being a highly mobile people.
Site
Unsuitable soil 5.3 acres
Buildable 32.3 acres
Assumed gross density 7 units/acre
Number of units 397

<table>
<thead>
<tr>
<th>Units</th>
<th>Type A</th>
<th>Type B</th>
<th></th>
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</thead>
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<td>30</td>
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<td>2 bedroom</td>
<td>35</td>
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<td>20100</td>
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<tr>
<td>3 bedroom</td>
<td>37</td>
<td>37</td>
<td>19300</td>
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</table>

3% for walls 2810 302490

Parking
1 bedroom 1.5 x 61 x 130 16470
2 bedroom 2 169 x 180 60340
3 bedroom 2 x 77 x 180 22720

Recreation 163110
Community Center 5300
Maintenance 900

Total sq. ft. 515700
CITIGIAL DESIGN ISSUES

Discussion of important issues and their criteria will be separated into three scales, the site, the "neighborhood", and the single unit.

THE SITE

1. The dunes eco-system. Of prime importance is the understanding of the dunes eco-system and respecting its special requirements for survival. Observance of conservation principles can avert destruction and ensure enhancement. Further discussion of the dunes eco-system is in the site analysis.

2. Public space. Efficient planning can yield good amounts of space that are publicly shared. The planning should not stop there. These public spaces should be usable spaces and not just open or left over space. The physical qualities and characteristics should be put to maximum use in accommodating specific purposes and generating spontaneous activity. The placement of open space, its relationship to actual need, intimacy, and human scale are all necessary qualities. Links between these spaces should generate flow and stimulate activity.

3. Parking and Circulation. Auto circulation and storage is a major consideration in site planning. However, its network should not take precedence over the neighborhood or unit. In other words, units should not be worked around parking. The network must be efficient and able to control traffic flow. It must also accommodate service and emergency vehicles.

THE "NEIGHBORHOOD"

Legibility. Kevin Lynch defines legibility as "the ease with which parts can be recognized and can be organized into a coherent pattern". Physical elements provide one means of establishing a neighborhood. The number of units and their massing, streets, vegetation, land forms, etc., all have potential for establishing conditions of edges, boundaries, paths, nodes, etc. which are necessary in a recognizable neighborhood. These elements define zones. The relationship between public zones, (recreation areas, paths, parking, etc.) and private zones (housing units, yards, balconies) is very important. The connection of one zone to another should be through a transitional zone, semi-public or semi-private.

4. Tenant make-up. Consideration should be given to the age of the tenants and their life styles when grouping unit types into a compatible neighborhood. Each neighborhood should have a variety of age groups. However, sensitive placement of similar age groups enhances relationships.

THE UNIT

6. Privacy. Of utmost importance in a housing development is being able to retreat to a private situation. This project should provide privacy from neighbors as well as total privacy within one's room.

7. Orientation/Siting. The orientation of units with their physical elements to take advantage of natural light and ventilation, and to capture good views.
schematic design
The following concepts concentrated on grouping 26 housing units into a recognizable and functional neighborhood which would set a pattern for the rest of the development.

CONCEPT 1

Concept 1 consisted of a series of linear groups of units diagonally oriented on the site. The strips of units formed two types of exterior space - a wide public open space used for parking courts and recreational space, and a narrow semi-public space used for pedestrian circulation which is flanked by semi-private backyards creating an intimate scale. Units could have semi-private transitional spaces on both sides. By using a cross-cross diagonal pattern interesting visual vistas and spaces are created. With this scheme, only a small number of units have the favorable exposure to the green space and the parking courts. Parking courts are difficult to conveniently locate without interrupting the green space.

CONCEPT 2

Concept 2 consists of a number of cross-shaped buildings, which contain four to six units, surrounding a central green space. Surrounding the buildings and weaving between their geometry are parking strips and courts. Each group has an interior court off of which are the entries. The site is more organized and can be broken down into smaller spaces by the geometry of the buildings. All units have exposure on all four sides which is great for views and ventilation but not for energy-wise heating. Privacy is a problem by having the 90-degree relationship between units. Not all units have a view of the parking court and it would be difficult to locate a particular unit by a visitor.
CONCEPT 3

Concept 3 achieves maximum southern exposure for all units by utilizing strips of units which run parallel to the ridge. Staggering groups of units breaks the linear effect and creates an opportunity for interesting transitional spaces to occur. Parking courts and open green areas allow circulation to flow between the two linear strips. This townhouse type arrangement provides the opportunity for each unit to have private exterior spaces at ground level. Auto circulation needs a means of easy ingress and egress.

CONCEPT 4

Concept 4 is a combination of concepts 2 and 3. One story units make up the linear segments and two story units make up the interior court type units. Transition from parking courts to the units is well done through narrow semi-public spaces and the entry courtyard system. The green space of this concept is able to be open and then narrowed down between neighborhoods. However, the open space is not well defined by any transitional space nor is it laid out in any usable fashion. Privacy in some units is almost nil. Not all units have a view of the parking courts.

* In developing these concepts I was trying to avoid the rigid linear arrangement of units which is so predominant today. I was also striving to give an identity to each unit and group of units such that it did not look like the rubber stamped pattern of its neighbor. I initially saw this separate unit/group identity as being achieved through a variety of building types and site layout. That is,
there would be three types of four-plexes, three types of tri-plexes, and three types of du-plexes, with added variety coming from the juxtapositions of these different groupings - of course there would be different floor plans for each unit type and the buildings would all follow a prescribed vocabulary but vary in height, fenestration placement, configuration, etc..

As I progressed along the conceptual stage I became more and more aware of issues that my building type study hadn’t evaluated. Issues such as methods of standardizing floor plans that allow certain elements to be flexible to generate variety. Hence, as I went along I developed my building type study to include these issues.

* Another problem that hindered my concepts was the fact that I tried to develop a site scheme then develop the unit configurations and plans. In order to cope with a project of this nature I needed to work at both scales at the same time. Designing the units and the site plan together or at least jumping back and forth between scales would have increased my understanding of both interior and exterior spaces and how they were or were not working together.

* One other thing which became a big hindrance in developing my concepts was the program’s lack of short concise statements giving qualitative descriptions of the spaces that I wanted to achieve.
preliminary design
In starting my preliminary design phase I still had no definite concept. Also my program was changed to include garages for every unit plus one additional unsheltered space. So I began investigating unit plans on a group scale with attached and detached garages.

In thinking about that determines a "neighborhood" I ran across a statement by William H. Whyte in his book "THE GAME OF CORNERS". He stated, "A neighborhood is created by initiating effective bonds between people. These effective bonds are temporal— they include festivities, special events, and everyday rituals. They are events that bring people together in a shared structure of time that asserts community." He goes on to state, "Places that emphasize these common events can enhance the sense of inhabitation—a parking area shared by several houses that brings neighbors together, porches to spill out onto in the Spring, or a small common for building snow forts and walking the dog."

After thinking about this and observing how a street scene generates this sort of activity, I developed a scheme very similar to concept 3 based on the idea of the street. This layout provided a road to lead from the primary service road through the 26 housing units and then connect back with the service road. This would offer a flow through circulation system which is most efficient for accommodating vehicular traffic, especially service and emergency vehicles.

Since this road serves only 26 units and is to act as an activity generator it combined pedestrian and auto circulation instead of separating the two. Pedestrian circulation could be centrally located and could connect adjoining neighborhoods together, also this combination encouraged friends to casually drive or walk by for a possible visit, and it encouraged car related conversation. A change in surface texture would be the only separation. A central green space or playground.
would occur in the middle of this road in each neighborhood to focus the activity of that neighborhood.

The units were clustered into groups of 3 or 4 units and arranged on either side of the street. Their arrangement was a result of trying to create interesting views, give each unit a face to the street, and to break up the resemblance of a linear scheme.

The negative space created by the arrangement of the units ends up doing nothing for the complex. The positioning of the groups need to squeeze together in some areas and pull apart in other areas to create more defined and usable spaces.

The design of the units provided for the garages and entries to be on the same side of the unit - the street side. The garages then could help form entry courtyards or at least covered entryways. Each unit would be two stories to allow maximum privacy and better separation and control of noise between units. Being two stories also gives each unit the ground level exterior spaces and balcony potential. The zoning of interior spaces places the quiet private functions on the second level.

The structure of the units is a typical wood framing system with wood trusses. The roof form being basically a hip roof to resist and shed the heavy snow loads. Staggering the units made construction more complex and therefore more costly. Hence, the design settled on linear groupings of two, three, or four units. This linear characteristic would be broken down by projections and setbacks of the facade and by giant dormers, which covered the projections. Also roof lines on the other side of the building would be extended to give a shed-like appearance.

The elevations were fairly simple - rectangular boxes with projecting balconies and a
regular patterned fenestration. Variety was created by playing with roof lines and garage placement.

* In working with the floor plans, elevations, and structure I realised another major issue by building type study left out. The developing of modules or bay systems to organize facade systems of articulation, floor plan lay-out systems, and easy construction methods. I think I stayed away from including modules because I thought it would produce or lead to a very repetitive and sterile arrangement of units.
2 Bedroom Type A

3 Bedroom Type B
design development
Major changes and developments occurred at all scales of the project during this phase. These changes and developments included the following:

- Removing the circle idea and straightening out the street a little.

- Situating playgrounds and small open spaces between neighborhoods.

- Reducing the amount of paved surface and simplifying the driveways by combining two garages and giving each a single driveway. These driveways were straight and long enough to provide the extra parking space required.

- Prescribing that all units located north of the street have detached garages to allow a courtyard space to occur in which the sun will reach down into. Conversely, all units south of the street will have attached garages allowing smaller court yards or entry ways to occur. The result is a series of buildings sited to collect sunlight and participate in both faces of the site.

- The units were more standardized. Their floor plans were refined making them more efficient, allowing better circulation, and better wet wall arrangements.

- The elevations were refined. The wood siding was more detailed. The overhangs of the roof were increased. The fenestration system was more pronounced and entries were better defined.
final design
The efforts involved in the final design phase concentrated on the unit floor plans and development of their exterior spaces.

In working with the floor plans a "kit of parts" was developed from previous floor plans to include kitchen/dining/breakfast layouts, stair systems, bathroom layouts, etc. From this "kit of parts" a type A and a type B unit could be designed for the one, two, and three bedroom units. This produced six different plans which could then be combined into groups in different patterns. A diagram of possible combinations is shown on the next page. This standardization made construction easier and more efficient. It also lent itself to creating a variety of shapes due to the different combinations of unit types. The horizontal and vertical circulation systems were refined for both pedestrians and for plumbing runs.

The exterior spaces were developed to incorporate both landscaping and hard surfaces.
3 BEDROOM B

3 BEDROOM A
program
ORGANIZATIONAL DATA

USER DESCRIPTION

Dunescape will be planned to include household types such as: singles, adults with children, families of different sizes, and adults without children. Beverly Shores is currently made up of families with children and retired couples. However, to create a balance in population and to offer access into this area for all ages, Dunescape will provide units for smaller families and introduce one bedroom units. The gross density of 7 units per acre was determined so as not to burden the area's fragile quality. It is assumed that a density of 7 units per acre will assure a reasonable profit to the developer. The site contains 43.8 acres which will yield 307 units. Hence, the projected unit distribution for Dunescape is as follows:

1 Bedroom 25% 77 units
2 Bedroom 55% 169
3 Bedroom 20% 61

MARKET RANGE

Dunescape will be in the medium market range. Each unit type will have two sizes with variations in the plans for each type and size. Being in the medium range, the project will offer larger room sizes, dining and entry alcoves, walk-in closets, interior storage space, and laundry facilities in each unit. A community center and recreational facilities will also be offered.

TYPE OF OCCUPANCY

Residents of Beverly Shores share a strong sense of pride in their community. Their pride stems from having an association with this unique area and sharing in its management. To add a significant increase in population to this community requires the establishing of this same spirit in the new addition. Hence, this project will involve a cooperative. This type of occupancy creates a sense of communal ownership and of belonging to an identifiable group. It encourages participation in the cooperative's operation. It also makes for a stable and more permanent residency. Characteristics of a cooperative type of occupancy are:

- A tenant-owner corporation owns the building or complex.
- Tenants own stock in the building or complex in proportion to the value of their unit.
- Depending upon the lease conditions, a tenant may sell his stock back to the cooperative or to a new tenant when he moves.
- Mortgages, operating, maintenance, and any other costs for the building or complex are paid by the owner-tenant cooperative.

PLANNED GROWTH

Development in this area is inevitable and must be accommodated. Dunescape provides the planned and controlled growth that is necessary in Beverly Shores. It should influence future growth by exemplifying maximum and

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proper land utilization.
Dunescape will be realized through five phases. Phase 1 will involve the construction of the entire system. Phase 2 will be the building of approximately one fifth of the units, the community center, and a proportional amount of the recreational facilities. The next three phases will be the completion of the remaining units and recreational facilities.

**SPECIAL SPACE REQUIREMENTS**

- Each unit should have at least one ground level exterior space. It should be private and be enclosed with walls or plantings.
- Each unit should have an efficient circulation/service layout. It should also have separation of active and passive zones.
- Each unit should have provisions for outdoor storage of toys, tools, lawn furniture, etc..
- Each unit should have its own space for car washing and maintenance.
- Each unit should have sunlight several hours each day.
- Each unit should have a series of exterior transitional spaces to allow a more controlled entry and definition of domain.
- Each unit should have pedestrian access from auto to dwelling involving minimum possible distance and fatigue.
- Each unit should have flow through ventilation.
- Each unit should have at least two places to eat.
- Each unit should have a room that offers an indoor/outdoor potential.
- Each unit should have two separate entries.
- Each unit should be able to be customized by the tenants.
- Each unit should be able to be identified by visitors.
- Each group of units should contribute in defining a recognizable neighborhood. This should be done through its juxtaposition to other groups.
- Each neighborhood should have access to recreation areas.
- Each neighborhood should have a variety of age groups, with similar age groups being located together.

**GENERAL BUILDING REQUIREMENTS**

**UNITS**

Each unit will have its own electric forced air furnace and its own water heater. Each unit will also have its own washer and dryer.

Each unit should be constructed to provide acoustical separation from adjoining units. The structure for each building will be of standard wood stud framing and wood trusses.

The buildings and units will be organized so as to be energy conserving whenever possi-
ible. They should incorporate passive energy techniques such as orientation, ventilation, vegetation, and massing.

BUILDING CODES

An investigation of the Uniform Building Code revealed the following requirements:

1. Windows in bedrooms must have five square feet of glass area with no dimension less than 22 inches.

2. All other habitable rooms require 1/10 of all floor area as a measure for minimum window area, with 10 sq. ft. as a minimum area.

3. All bath and laundry rooms require 1/10 the floor area in ventilation area in the absence of mechanical ventilation.

4. Minimum ceiling height of 7'-6".

5. At least one room must be over 150 SF.

COMMUNITY FACILITIES

Community Center. The community building will be a multi-use center. It should accommodate the social, recreational, educational, and business affairs of the development. The center will be small but flexible to facilitate changes in functions. It should be centrally located and be accessible by walkways and by a service road. The center might serve as office space while the units are initially being sold.

Swimming Pools. Two swimming pools will be located along with the community center.

One pool will be for children and the other for adults.

Tennis courts. Tennis courts will be located at the southern end of the site and will have direct links to the neighborhoods.

Tot Lots. A number of small tot lots will be located throughout the site. Each lot should have at least 1500 sq. ft. and there should be one for every 20-30 units. Each lot should provide seating for adults.

Park. A small open park space for ball playing and rough play will be provided. The park should have at least one acre, and it should be centrally located. This park and the tot lots should be observable from the units around them.

Passive recreation, such as sitting and talking, and walking will be located along with the general circulation around the site. These recreational spaces should give a feeling of accord with the natural terrain.

EXTERIOR CRITERIA

PARKING

Parking will be provided for with the following unit/parking ratios:

<table>
<thead>
<tr>
<th>Units</th>
<th>Parking Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 bedroom</td>
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<tr>
<td>2 bedroom</td>
<td>2</td>
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<tr>
<td>3 bedroom</td>
<td>2</td>
</tr>
</tbody>
</table>

Parking should be located close to the units. At least 50 percent of the spaces should be covered. Separation of tenant and visitor parking is desirable, however, it should be accomplished in an implied manner, such as the uncovered spaces being understood as visitor parking. There should not be more
than 25 cars in any one lot.

CIRCULATION

Automobile circulation must be efficient. It should allow a transitional or slow down zone from the surrounding streets to the site circulation network. Another transitional zone should exist between the circulation network and individual parking areas.

Pedestrian circulation should be laid out to connect neighborhoods together and to provide direct access to the ridges. It should also connect recreational areas.

SPACE SUMMARY

1 Bedroom Type A

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<th>Room</th>
<th>Square Feet</th>
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<tr>
<td>Dining</td>
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<tr>
<td>Kitchen/Laundry</td>
<td>125</td>
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<tr>
<td>Bedroom</td>
<td>168</td>
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<tr>
<td>Bathroom</td>
<td>50</td>
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<tr>
<td>Closet</td>
<td>30</td>
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<td>Foyer</td>
<td>30</td>
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<tr>
<td>Linen closet</td>
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<td>Coat closet</td>
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<td>Mechanical</td>
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2 Bedroom Type B

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<td>Bedroom</td>
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<td>Bathroom</td>
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<td>1/2 Bath</td>
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<td>Linen closet</td>
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<td>Walk-in Closets</td>
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<td>Circ./HVAC/Walls</td>
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<td>25</td>
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<tr>
<td>Closets</td>
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site analysis
LOCATION

Beverly Shores is located in the northwest part of Indiana. It is 31 miles (6 minutes) from Michigan City, 22 miles (10 minutes) from Gary, 20 miles (30 minutes) from Valparaiso, and approximately 1½ - 2 hours from Chicago. The northwestern Indiana counties of Lake, Porter, and LaPorte are part of the Chicago metropolitan region. A region noted for its industrial and high population concentration, Lake Michigan forms the northern boundary for these three counties. The thirty-three miles of shoreline are shared by the nation's largest steel making complex, power generating plants, a major port, privately owned marinas, and the Dunes State and National Lake Shore Parks.

Beverly Shores is one of the small residential sectors sharing the lakeshore. It is made up mostly of single family residences with many houses being located directly on the beach or foredune areas. Severe erosion problems have flared up over the years, the most recent being in 1972, when much of the lake shore and many private houses were lost to the lake's waves.
ACCESSIBILITY

Beverly Shores is within 20 minutes of I-94 and 30 minutes of I-80&90. State roads 12 and 20, the major traffic routes connecting Michigan City and Gary, are from 3 to 10 minutes away. The South Shore railroad line has hourly runs to South Bend and downtown Chicago and has a depot at Tremont which is 5 miles from the site.

The site for Dunescape is surrounded by streets. At the southern edge is Beverly Drive. It is an arterial street which connects directly to U.S. 12. Beverly Drive's speed limit is 40 m.p.h. and having access to it directly from the site is not recommended. To the east is Drexwood Avenue, and to the west is Montana Avenue. Both streets are collector streets with speed limits of 20 m.p.h. Access to the site at points along these two roads is highly recommended. To the north is Vera Avenue. It too is a collector street with a 20 m.p.h. speed limit. Access from this road is recommended however it is at a high point of the site.

Currently there are no roads within the boundaries of the site. However, there is a plan of proposed roads, designed for future growth, that run through the site. There are two roads running east/west connecting Drexwood with Montana. One runs along the top of the southern ridge while the other runs parallel to it in the flat area. There are four north/south roads which connect Beverly Drive to the road at the top of the ridge.

The two east/west roads were located with more consideration for the landscape than the four north/south roads and should be seriously considered in the layout for Dunescape.

The winding streets of the Beverly Shores area are also used by the pedestrian as there are no walkways. The site is a five minute walk to the beach.
MAJOR REGIONAL ACTIVITY NODES

Beverly Shores is surrounded by a rich urban context. Major cities surrounding Beverly Shores, which offer employment and shopping centers, include Michigan City, Gary, Valparaiso, Chesterton, and Portage. Besides being a highly industrialized region the area also supports many cultural, commercial, historical, educational, and recreational resources.

On a local scale, the town center of Beverly Shores is about a five minute walk away from the site. The town center of Pines is a small stretch along U.S. 12 about ten minutes away.

CLIMATE

Beverly Shores lies in a humid continental climatic region. Daily and seasonal fluctuations in the weather are quite common. The mean annual precipitation is 36.6 inches. Snow fall ranges from moderate to heavy. The mean annual temperature is 50.6°F with extremes of 102°F and -20°F recorded.

General wind directions are from the northwest during the winter months and from the southwest during the summer months. However, wind directions often originate from any direction at various magnitudes. Beverly Shores, along with the rest of the lake front enjoys a condition called the "Lake effect". Lake Michigan moderates the area's weather pattern. Those areas near the lake are warmed in the winter and cooled during the summer. For example, the normal frost free days ranges between 170-190 days in Beverly Shores compared to those of the Kankakee River Basin, south of Porter county, as being less than 160 days.

DUNES ECO-SYSTEM

A clear understanding of the dunes eco-system is of utmost importance if development is to progress, while at the same time preserving the unique landscape.

The following is a discussion of the physical make-up of a dune and important restrictions and recommendations. A typical sand dune can be broken down into 6 zones (shown in the diagram). These 6 zones are as follows.

The first zone is the beach. This area is composed of the lake itself and the broad stretches of sand. Devoid of vegetation, it is very tolerant to recreational uses such as sailing, swimming, making sand castles, fishing, etc.

The next zone, the Primary Dune, is very different. Physically it is characterized by a series of humps and depressions. It is formed by waves and wind, with dune grasses helping in the formation and stabilization of the primary dune. This zone is absolutely intolerant. It cannot be trampled otherwise the dune grass will die leaving the bare sand hills vulnerable to erosion. Withdrawal of ground water can deplete reservoirs and cause vegetation to die. It must be prohibited to use. No development should be permitted on the primary dune.

Next is the Trough. It is essentially a small valley between primary and secondary dune. Dune grass as well as lom myrtle and beach plum are present in this zone. The trough is protected from waves, wind, and blowing sand by the primary dune. This zone is much more tolerant. Development can occur here. However, care must be taken not to lower the fresh water supply necessary to sustain the existing vegetation. Excessive withdrawals of
this fresh water, through wells, is a major concern.

The next zone is the Inland Dune. It is nearly as vulnerable as the primary dune. It is the same physical make-up as the primary dune with additional low ground cover and cottonwood and sapen trees. It too is intolerant and should not be developed.

Directly behind the inland dune is the Back Dune. Physically it contains rolling hills with some steep slopes. Being behind the blowing and shifting sand of the foredunes it sustains plants such as hazel, sassafras, blueberry, greenbrier, bracken fern, and a variety of flowering plants and trees such as Jack Pine, Sand Cherry, Cottonwood, Black and White Oak, Black Cherry, Red Oak, Basswood, and poplar.

The Back Dune is the most tolerable zone of the dunes structure. It is the environment most suitable for development.

The final zone is the Bay area. This zone is located behind and in some areas between the hills of the back dunes. It is largely wetlands which support a large variety of plant and animal life. This zone is intolerant.

**SOILS**

The soils survey revealed the presence of the Oakville-Tawas Association and the Bono-Maumee-Warners Association.

The Oakville-Tawas Association occurs over most of the site except for a southern tract of land. It is characterized by the pattern of narrow, elongated, parallel ridges and sloughs. Oakville soils make up about 55 percent of the association. They are on the ridges and are excessively drained. Tawas soils make up about 40 percent of the association. They are in the depressional areas between the ridges and are poorly drained. Tawas soils are high in organic matter and have a high available moisture capacity. They have rapid permeability and runoff is ponded.

This association has limitations for sanitary landfill and septic systems. Oakville soil has a hazard of free leachate flow to ground water.

The Bono-Maumee-Warners association lies in the southern extremes of the site. Bono soils make up about 30 percent of the association. They are deep, very poorly drained and clayey throughout. Maumee soils are high in organic matter and have a low available moisture capacity. They have a permeability range of slow to rapid, and runoff is very slow or ponded. This association has severe limitations for sanitary land fill septic systems. There are 5.3 acres of land in the southern part of the site which contain soils unsuitable for building.
TOPOGRAPHY

The site is essentially divided into four linear strips, 2 flat and mostly wooded areas, and 2 heavily wooded hills or ridges. See the site profile below.

DRAINAGE

A look at the site profile reveals the basic drainage pattern. The water runs off the ridges into the flat areas. Being located on the back dune area, erosion is not as severe a problem as in the fore dune and beach area. However, increasing the density past 8 units per acre begins to displace too much vegetation through construction processes and especially through wear and tear from human contact.

The southern open area collects water and has an unsuitable soil for building. The open area between the hills also absorbs some runoff water, however, not as serious as the southern area. These open areas would be ideal recreational areas since the land is already cleared.

EXISTING VEGETATION

There are a number of species of trees throughout the site. Some of the species are: White and Black Oak, Cottonwood, poplar, Jack Pine, Basswood, and Black Cherry. They range in height from 20 to 40 feet tall. Since the open areas aren't too suitable for building and the wooded areas are the living units will be located throughout the tree covered land.

Heavy ground cover exists in the open areas and in some of the wooded areas.

VIEWS

The best views are from the top of the ridge looking down into the flat area. The
streets around the perimeter of the site offer very good views which are framed by vegetation reaching over the roadway. Good views also open up from the flat areas looking toward the ridges.

UTILITIES

There are no utilities which feed directly into the site except electricity. Existing residences to the north of the site are on wells and septic systems and tie into overhead electricity lines. Few of the houses have individual storage tanks for gas.

There are existing utility runs along Beverly Drive. An 8" water main, a gas line, a sewer line, and overhead electric lines, which run along Montana and Drexwood, are the runs. It is assumed that permits to connect to these facilities will be issued. It would be best to route the utilities along Drexwood and Montana and follow the route of the 2 proposed roadways into the site.

LAND USAGE CRITERIA

In order for Dunescape to set an example of environmentally sound planned growth a set of site criteria must be established. This criteria will stress conservation of the dunes eco-system and the compatible merging of housing units with nature.

The criteria is as follows:

- Development will be prohibited on slopes of 25 percent or more.

- A low density development will be allowed on slopes of 10 to 25 percent.

- A high density development will be allowed on slopes of 0 to 10 percent exclusive of the ridge plateaus.

- Recreational facilities will be allowed on the ridge plateaus where the area becomes wide enough.

- There will be no filling in of the low areas. This could cause flooding.

- Minimal destruction of plant life, which sustains the land forms and the variety of wildlife, should be encouraged.

- There must be no disposal of waste into the ground, such as septic tanks, which would pollute the ground water and threaten plant life.

- Preservation of the ground water supply to keep a stable plant life. Significant loss of plant life will let erosion take its course. Individual houses may utilize separate wells, however, multi-family housing must not use a well system.

- Building must not take place in unsuitable soil conditions.
WINTER
NW
SUMMER
SW

PREVAILING WINDS

SUN DIAGRAM

WINDS

VIEW ALONG THE ROAD

VERA AVENUE

GOOD VIEWS

620

620

615

610

GOOD VIEW INTO SITE FROM ROAD

WOODS HAVE A SWEET FRESH SMELL

VERY THICK GROUND COVER IN OPEN AREAS

GOOD VIEWS

620

610

GOOD VIEWS

630

625

VIEWS OPENING UP ALONG THE ROAD

TREE HEIGHTS 20-40 FT
SPEECIES: COTTONWOOD, WHITE AND BLACK OAK, POPLAR, BASSWOOD, JACK PINE, AND BLACK CHERRY. TROUGHOUT SITE.

THICK GROUND COVER IN OPEN AREA

VIEW FROM ROAD IS AIMED AT THE FOREST EDGE

BEVERLY DRIVE

SCALE: 1" = 200'
Slopes

- 0-10 Percent
- 10-25 Percent
- 25-100 Percent
This building type study will look at existing housing developments to provide a survey of the different organizing elements incorporated in the design of living environments.

The study will give a short description of the project then analyze the way in which each project functioned. The analysis will involve the following issues: orientation to site amenities, massing of units, circulation paths (auto and pedestrian), and zoning of living functions.
BAYWOOD NEWPORT BEACH, CALIFORNIA

DESCRIPTION

Apartment and townhouse community designed for a middle income population. There are 320 units on a 20.7 acre site, giving a density of 15 units per acre.

ORIENTATION

Natural divisions of the topography separate the unit types. One and two bedroom apts. for singles and adults with children on the west; two and three bedroom apts. and townhouses for families and adults without children in the center and two and three bedroom apts. for families of different sizes to the east.

CIRCULATION

Auto circulation is accomplished by 2 streets reaching into the development with covered parking lots tucked between clusters. Pedestrian circulation collects in 2 main paths and flows through a central mall to the recreation area.

MASSING

The basic scheme is to cluster a number of bldgs. around parking lots. Each building contains from 2 to 4 units, and is either freestanding or coupled up with another bldg.

ZONING

General zones around units are public (parking and walkways) to semi-public (walkways between buildings and entryways) to private (individual unit).
PALMETTO DUNES HILTON HEAD ISLAND, SOUTH CAROLINA

DESCRIPTION
A low density development that is designed to accommodate a flexibility required by alternate ownership and rental plans. The villas were designed as individual units so they could be sold as condominiums, and their rooms are arranged so they can be rented singly.

CIRCULATION
Auto circulation runs between and separates the different clusters. Parking is notched out along the route of roads. Pedestrian circulation uncontrolled with no definite paths.

GROUPING/MIXING
The three clusters are readily distinguishable from each other. One cluster is a group of units arranged in a circular pattern around a parking lot. Another cluster is a linear arrangement of connected squares with open air courts. The third is a loosely grouped arrangement situated along a lagoon.

ZONING
The cluster with the linear arrangement has a good transition zone between public and private spaces. The court establishes a distinct and controlled semi-public zone.
GREELEY WEST APARTMENTS GREELEY, COLORADO

DESCRIPTION

Designed for low-moderate income levels, these apartments include 1 and 2 bedroom units.

ORIENTATION

This project takes advantage of a small hill by elevating the living units and central open space, with parking on a lower level.

CIRCULATION

Auto circulation and parking are arranged around the perimeter of the site.

MASSING

There are eight 3-story buildings, each with 12 units, grouped around a common open space.

ZONING

Zoning in this project incorporated the added feature of level change to enhance the transition from a public zone to a semi-public zone.
FINEWOOD LAKE  ALEXANDRIA, VIRGINIA

DESCRIPTION

The project was designed for moderate-middle income levels. There are 542 units on 71 acres with a density of 6.

ORIENTATION

The layout has at its center a lake from which linear arrangements of living units spin off. A low wet ground was turned into the lake.

CIRCULATION

The area of street surface is minimal, with the reaching in between the rows, of the cul-de-sacs. Pedestrian circulation is in between rows of units.

ZONING

The lack of transition from a public zone and private zone creates a non usable public zone and infringes on the privacy of the units.
SECOND FLOOR
COURTYARD

FIRST FLOOR
DIN

LIVING

UPPER LEVELS

CIRCULATION PATH
VERTICAL CIRC.

WET CORE

PUBLIC

WET CORE
GIVEN BAYS
A B

CIRCULATION
VERT. CIRC.

STRUCTURAL BAYS
VARIETY IN SETBACKS
PUSH-PULL EFFECT.

77
Developing a building system — creating patterns by using standard pieces.
These pieces could be easily duplicated and used in a variety of mixes to develop many different patterns.
TOWNHOUSE PROBLEMS

1. Living too close together. Complaints came from couples without children, working couples, and non-social couples. One solution is to have separate areas for older people and business couples.

2. Noisy neighbors and especially noisy kids. There are more complaints about children in projects priced at under $30,000 than in more expensive projects. A partial solution is to put townhouses farther from the street (a favorable play area) and to have more small playgrounds.

3. Owners do not like renters. Renters are a major factor in lowering long term property values.

4. Car parking. Townhouse families are larger, have more children, more cars, do more entertaining and need more guest parking. 2 spaces are not enough.

5. Poor construction.

6. Short rows are better than long rows.

7. People like variation (one story mixed with two story), Varied roof lines and setbacks.

8. Closed patios that afford privacy are better than open patios.

9. Long rows of parked cars that fill the road add to the density. The lower the density the higher the satisfaction.

10. Most popular facilities are in the following order: swimming pools, play and recreation areas, tennis courts, and walking or bike paths.

11. Greatest demand for interior design is for more storage space, larger kitchens, separate and more formal dining areas, foyers, fewer stairs, and locating laundries closer to bedrooms.

12. As the price goes higher, people get more for their money and are more satisfied with both living conditions and environment.

FACTORS IMPORTANT TO TOWNHOUSE OWNERS ABOUT DENSITY

1. Space around the building counts most, because it is what the owner sees and uses. Thus open space across the street or behind the house, even if not part of the development, is of great importance. Pleasant views from doors and windows are a great asset.

2. Small neighborhood and small clusters are most popular.
bibliography


Hanke, Byron R., "Land Use Intensity", Urban Land, p. 3-11, November, 1969.


House and Home, "This Scaled-Down PUD could be a milestone in small-project planning p. 65-71, July 1966.


