A DESIGN APPROACH TO URBAN RESIDENTIAL SETTLEMENT
PROCEDURES AND PATTERNS IN DEVELOPING COUNTRIES

by

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Certified by

Thesis Supervisor

Accepted by

Chairman, Departmental Committee on Graduate Students

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ABSTRACT

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Brooks Cavin, III

Submitted to the Department of Architecture on June 17, 1968, in partial fulfillment of the requirements for the degree of Master of Architecture.

Two principal problems confronting urban residential settlement in developing countries are resource allocation policies and physical pattern designs. This thesis attempts to generate policy and design procedures; propose a general settlement pattern; and project this scheme upon the urbanizing area north of Lima, Peru.

The first part tries to formulate assumptions for land development policy through general analysis of present procedures and also three specific cases in Lima, Peru. This assumed policy of land allocation, technical aid, and self-help tries to: maximize all available social, economic, political and physical resources; coincide with the people's own priorities when feasible; and provide flexibility for growth and change.

The second part tries to study aspects of physical pattern design. The process of determining appropriate patterns for urban residential settlement must: allow for diverse component densities; consider efficiencies and appropriateness of various geometrical patterns; incorporate various circulation networks and land use frequencies into a systematic grid which covers a plane; establish a hierarchy of circulation systems; provide for various boundary conditions; assume initial access from the center city; propose alternate growth possibilities; and allow for flexibility and change through each stage in time and at each scale in space. This study of patterns will place minimum emphasis upon topography and orientation except at boundary conditions.

The third part proposes a pattern for urban settlement in developing countries. This pattern is studied at scales; the metropolitan and district scale; the sector scale which comprises a maximum of 8,000 dwelling units within the 1,800 x 1,600 m (2,880,000 m²) sector; and the 200 m square block scale. Primary consideration is placed on circulation and flexibility.

The final portion of this thesis applies the proposed scheme to the urbanizing area north of Lima, Peru.

Thesis Supervisor: Horacio Caminos
Title: Professor of Architecture
Acknowledgement

I would like to thank Horacio Caminos and John Turner for their stimulation and criticism during this past year.
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The frantic pace of world urbanization has outstripped the ability, and usually the commitment, to house the exploding populations as they surge into the cities. The homeless must sleep in the streets (as many do), endure already overcrowded slums, or appropriate land since neither the government nor the market mechanism has satisfactorily handled the problem. Squatter settlements usually have the public image of chaotic squalor or of being inhabited by the discouraged and desperate of the underdeveloped world. Often this is true; the chaotic, animal crowding, lack of light, air and utilities in these settlements surpass the blight of their public images and offer little hope for the future. Occasionally, however, the dirt and poverty conceal very different actual physical patterns and potentials. In these settlements the plan provides for health and safety, prepares for economical installation of utilities and affords a structure for orderly growth and change. These positive features often foster social-political stability through confidence by the people in their community and its healthy development.

"Two outstanding features characterize housing in most developing countries: an extraordinary determination and initiative on the part of the common people to house themselves and the failure of the public and commercial sectors to meet the popular demand for cheap accommodation and
The formation of spontaneous popular squatter settlements often succeeds because the people ignore the building codes, taxes, regulations, etc., which often confine traditional development. They need not wait for the red tape to unsnarl in the bureaucracies of government since they operate outside of its control. They need not wait for plans to be checked because they do not receive loans, and they ignore building codes. This, however, often means that the physical forms contain the deficiencies which the codes and regulations were drafted to prevent. These settlements result from a laissez-faire urban development policy. The flagrant neglect of sensible planning usually results from unorganized growth without direction by a group with vested interest or an agency concerned with the coordination of popular initiative. Planned "slums" may not provide ideal housing immediately, but at least they provide for change while the completely autonomous settlements do not. A guided development pattern is sometimes initially more expensive than traditional patterns, but because of its sound basis it invites private confidence and investment and also provides long range economies. Unless squatter "slums'" basic patterns can adapt practically to change, they will have to be eradicated and rebuilt. The utility, circulation and ownership patterns are very difficult to change as are the social and political attitudes. For many years to come, renewal will be a "luxury" which most developing countries cannot afford.
"Government should not provide houses but the tools for house building—land, facilities and services, credits and technical assistance—the elements on which household and community security depend. Then, the maximum possible number of dwellings will be built and in ways that the public authorities can control."³ The vast resource of popular indignation and hope can often be guided during early stages of settlement at relatively little cost and with little decrease of initiative. The major expenses of implementing sound plans are for acquiring land and for distributing it along with technical aid. Since regulation is the most tempting power of the government because it entails no budgetary outlays, it must be used cautiously because it can cripple incentive and investment if used to excess. ⁴ It is at least partially over zealous regulation which aggravates the housing shortage in the first place. Rent controls, for instance, are to control landlords from overcharging the poor; but if rents are kept too low, private investment will wither, and less rental housing will be built.

If the regulations are blind to the realities of popular conditions, they will be effective only in the minds of the administrators. This sort of short-sightedness has allowed the squatters to make such an unplanned impact upon the cities of Latin America. Unless the governments of developing countries adopt policies which consider the pressures of urbanization, the squatting, the homelessness and the revolts will continue. When housing and land are not available to the urban lower classes, squatting and
street-sleeping will result unless government policies provide for controlled squatting in urban homestead programs. These should be combined with modified building codes, regulations, financing, incentives and technical aid.

If we are to improve current urban residential patterns and development policies, it seems reasonable that we should first try to understand present government and popular practices; we should be able to observe different housing patterns and qualities when guidelines, regulations, codes, etc., differ. This is indeed the case as can be seen by comparing areas of a city which have grown under different regulations.

Three separate barriada settlements near Lima, Peru have different physical forms due to different regulating influences. El Augustino grew without guidance; Cuevas provided some self-guidance; and Conde Villa Senor was government sponsored.

When a group within the popular sector is forced to begin a settlement outside of the regulations of the establishment, as in El Augustino (hill portion), disorganized patterns often result. El Augustino exemplifies growth by accretion without guidance, planning or regulation. Indeed, it is this lack of establishment influence which made this settlement possible. The lack of planning and the steep terrain produced a very random pattern controlled only by the topography.

Guidance from the people themselves through their organizations often occurs when squatters must form a strong
organization merely to invade land. The group must be well organized for initial efficiency—long range benefits of material efficiency for utilities and circulation and preserved open spaces are extra dividends. Such a squatter settlement is Cuevas, outside of Lima. "With the exception of the hillside margins, Cuevas is regularly laid out with orthodox plot and block sizes and with normal street widths. With few exceptions, plots are 8 meters wide by 16 meters deep (1300 square feet) providing an adequate and economical building site for a two- or three-storey dwelling to modern standards. . . . public open space has been provided at suitable intervals for recreation and sites assigned for community facilities such as schools." Even though the Cuevas organization was able to establish an ordered community plan, the unit plans are "often of sadly poor layout and design". This probably is because guidance on house planning was not offered to the homeowners at an early stage and the fact that they followed no building code. Instead, they usually follow plan types they have experienced, such as compounds in rural areas, barrack dwellings in company towns or city slums. Presently, water is supplied by truck, and there is no sewer system.

Conde Villa Senor barriada was sponsored by the government. This seemingly ironic situation was provided for under provisions of the Ley e Barrios Marginales of 1961, which allowed the government agency to resettle residents of "unimprovable barriadas" onto government acquired land. Since
the agency was to be financially self-perpetuating, and since the people to be resettled were poorer than most, the land, shelter and services provided by the agency to the people had to be an absolute minimum. The 160 square meter lot with a provisional shelter provided was within the financial means of almost all of the families. Water was supplied at public standpipes, but there were no electricity, road or sewer systems.

Although the planning is better for the government project than the settlements that had no guidance, the sequence of development is very similar to that of the autonomous settlements: 1. allocation of land (access to land and title), 2. occupancy of lots, 3. rudimentary shelters and enclosures built, 4. schools, 5. beginning of substantial dwelling units, 6. some utilities and services provided, 7. paving, 8. completion of dwelling units. "Thus, the future owner obtains three important advantages: his financial obligations are kept within his means as he can limit his expenditure to the essentials in order of priority, his investments are kept within economic limits through technical assistance, and their ultimate value is guaranteed by the planning and controls exercised by the agency." When housing money is limited, this kind of land-allocation-technical-aid-self-help policy provides a positive alternative to unplanned squatting.
### AREAS OF RESPONSIBILITY IN A LAND-ALLOCATION-TECHNICAL-AID-SELF-HELP POLICY

| GOVERNMENT | Planning  
|            | metropolitan  
|            | district  
|            | sector  
|            | block  
|            | lot  
|            | Land Allocation in which tenure and security are established  
| MINIMUM COMMON UTILITIES | Water standpipes  
|                       | Sanitary facilities  
|                       | Electricity  
|                       | Street lights  
|                       | Showers  
|                       | Laundry  
| GOVERNMENT AND/OR COMMUNITY SELF-HELP | Provisional shelters  
|                       | Schools  
|                       | Community centers  
|                       | Paving  
|                       | Loans  
| INDIVIDUAL SELF-HELP | Residential construction  
|                       | Minimum shelter  
|                       | Durable shelter  
|                       | Utilities  
|                       | Growth  
|                       | Change  

-7-
Component Frequencies

Determining the physical pattern of urban residential settlement requires an integration of two separate factors: component frequencies and network geometries. Component frequencies are non-continuous patterns such as residential density, schools, recreation areas, utilities, commercial areas and other institutional uses. Networks are continuous patterns such as circulation, utilities and sometimes open spaces.

Once residential density is determined, school frequency is set by current local education standards and resources as well as considerations for future expansion. Civic service frequencies, e.g., police, fire department, libraries, etc., also stem from residential densities and local standards. The frequency of cottage industry, recreation and commerce will reflect current and future local demand. Utility frequencies are determined by current standards and resources with consideration given to growth and change.

The actual configuration of these components will depend upon the structuring networks, which will be the major factor in determining the physical plan of urban development. Although the networks must provide for the components and can determine their configurations to a large extent, the networks' geometries are largely independent of the components within limits of scale.

An example of this is the stipulation that children should not cross a major mechanical circulation network.
between their homes and nursery of elementary school. This means that the major circulation network must have a big enough module to contain an elementary school within the smallest residential quarter; however, the geometry of the network and the upper dimensional limits are not set. Just because 1,000 dwelling units support an elementary school does not mean that this same group is the right size to support a recreation unit or a commercial unit. By having each school neighborhood served by several schools, functional independence can add flexibility to an otherwise inflexible type of design. 10
## Component Frequency and Distance Standards

<table>
<thead>
<tr>
<th>Dwelling Units Served</th>
<th>Max. Distance from d.u.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>corner store</td>
<td>24-32</td>
</tr>
<tr>
<td>major shopping</td>
<td>2,000+</td>
</tr>
<tr>
<td>Schools</td>
<td></td>
</tr>
<tr>
<td>nursery</td>
<td>192-256</td>
</tr>
<tr>
<td>elementary school</td>
<td>768-1024</td>
</tr>
<tr>
<td>secondary or trade</td>
<td>2,000</td>
</tr>
<tr>
<td>junior college</td>
<td></td>
</tr>
<tr>
<td>university</td>
<td></td>
</tr>
<tr>
<td>Circulation</td>
<td></td>
</tr>
<tr>
<td>mass transportation</td>
<td></td>
</tr>
<tr>
<td>auto routes</td>
<td></td>
</tr>
<tr>
<td>auto parking</td>
<td>1 space/du</td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
</tr>
<tr>
<td>tot lot</td>
<td></td>
</tr>
<tr>
<td>play field</td>
<td></td>
</tr>
<tr>
<td>sports field</td>
<td></td>
</tr>
<tr>
<td>Civic Services</td>
<td></td>
</tr>
<tr>
<td>police</td>
<td></td>
</tr>
<tr>
<td>fire</td>
<td></td>
</tr>
<tr>
<td>library</td>
<td></td>
</tr>
<tr>
<td>religious</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td></td>
</tr>
<tr>
<td>standpipes</td>
<td>22 du/standpipe</td>
</tr>
<tr>
<td>sanitary facilities</td>
<td>6 du/pit of 8</td>
</tr>
<tr>
<td>showers</td>
<td>12</td>
</tr>
<tr>
<td>laundry tubs</td>
<td>12</td>
</tr>
<tr>
<td>trash</td>
<td></td>
</tr>
<tr>
<td>collection area</td>
<td>24</td>
</tr>
<tr>
<td>street lights</td>
<td>20</td>
</tr>
</tbody>
</table>

* U. S. AID Standards for squatter settlements

** "Supermanza" study by Horacio Caminos

# Author's projections
## Dimensional Standards

<table>
<thead>
<tr>
<th></th>
<th>*</th>
<th>**</th>
<th>#</th>
<th>*</th>
<th>**</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum Right of Way</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>Maximum Dead End</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Circulation</strong></td>
<td></td>
<td></td>
<td></td>
<td>path</td>
<td>3 m</td>
<td>4 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>service street</td>
<td>10 m</td>
<td>10 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>collector street</td>
<td>15 m</td>
<td>16 m</td>
</tr>
<tr>
<td><strong>Minimum Area</strong></td>
<td></td>
<td></td>
<td></td>
<td>Lots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>detached</td>
<td>220 m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.2 m</td>
</tr>
<tr>
<td>semi-detached</td>
<td>150 m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.1 m</td>
</tr>
<tr>
<td>row</td>
<td>100 m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.0 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.4 m</td>
</tr>
<tr>
<td><strong>Minimum Frontage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Minimum Site Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nursery</td>
<td>14 m²/child</td>
<td>1,400 m²</td>
<td></td>
<td></td>
<td>4 m²/child</td>
<td>400 m²</td>
</tr>
<tr>
<td>elementary</td>
<td>14 m²/child</td>
<td>14,000 m²</td>
<td></td>
<td></td>
<td>4 m²/child</td>
<td>4,000 m²</td>
</tr>
<tr>
<td>secondary</td>
<td>14 m²/student</td>
<td>28,000 m²</td>
<td></td>
<td></td>
<td>4 m²/student</td>
<td>8,000 m²</td>
</tr>
</tbody>
</table>
Network Configurations

"Systems are a means to an end. They are a means to achieve more for less. But systems are a design tool as well. They are a way of approaching the environment as a total, complex organism, of discovering an order which, once established, would preserve those aspects of the environment which we consider essential."\(^{13}\)

Searching for an appropriate, systematic network configuration requires an inquiry into various aspects of geometric efficiency:

1. With respect to a given area, relative efficiencies among triangular, hexagonal and quadrilateral geometries can be studied by evaluating minimum boundary length \((l_t)\), minimum proximity from boundary \((p_m)\), and minimum proximity from vertex \((p_m')\).\(^{14}\)

2. Evaluation of network continuities of triangular, hexagonal and quadrilateral geometries.\(^{15}\)

3. Possible variations of triangular, hexagonal and quadrilateral geometries.\(^{16}\)

4. Consideration of network forms which can be a part of each of the three geometries.

5. Land use configurations of active-commercial areas and reserved areas at the sector scale.

6. In addition, consideration must be given to geometric relevance with regard to furniture, auto and lot shapes; standardization and prefabrication of building components; and regular construction materials.
7. The urban form must be able to respond positively to the persistent growth and urbanization of the population. "Beginnings and ends are ambiguous; final and perfect states become irrelevant." The city is a process continuously developing toward an open-ended equilibrium. The structuring of movement patterns, such as mass transit, can provide directional spines of activity. These spines will create unbalance to which the urban form must react.
TRIANGULAR GEOMETRY
If \( L = 1 \), then:
\[
A = (H)L/2 = (L/2 \cdot 3)L/2 = L^2 \cdot 3/4 = 0.433
\]
\[
P_m = (L/2 \times 1/3)(1/3) 3 = 0.0964
\]
\[
P_m' = 2/3(1/3) = 0.385
\]
\[
L_t = 3
\]

SQUARE GEOMETRY
Area = 0.433
\[
L = 0.433 = 0.658
\]
\[
P_m = L/2 (1/3) = 0.11
\]
\[
P_m' = L/2 (1/2) = 0.230
\]
\[
L_t = 2.64
\]

HEXAGONAL GEOMETRY
Area = \( 6/4 \cdot (L^2) \cot 30^\circ = 0.433 \)
\[
6/4 \cdot (L^2) \cdot 1.73 = 2.6 \cdot L^2
\]
\[
L = 0.433/2.6 = 0.408
\]
\[
P_m = L/2 \cdot 3 = 0.12
\]
\[
P_m' = 2P_m \cdot 3 = 0.136
\]
\[
L_t = 2.45
\]

COMPARISON OF GEOMETRIES FOR A GIVEN AREA

<table>
<thead>
<tr>
<th>Minimize boundary length</th>
<th>( L_t )</th>
<th>3</th>
<th>2.6</th>
<th>2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize mean proximity from boundary</td>
<td>( P_m )</td>
<td>0.096</td>
<td>0.11</td>
<td>0.12</td>
</tr>
<tr>
<td>Minimize mean proximity from vertex</td>
<td>( P_m' )</td>
<td>0.39</td>
<td>0.23</td>
<td>0.14</td>
</tr>
</tbody>
</table>

EVALUATION OF NETWORK GEOMETRIES
TRIANGULAR geometry is most complete in terms of network, but it may be redundant. Triangular element is most efficient in terms of Pm and least efficient in terms of Lt and Pm'.

HEXAGONAL geometry is similar to triangular in terms of network characteristics but with less efficiency. Hexagonal element is most efficient in terms of Lt and least efficient in terms of Pm.

SQUARE geometry is most efficient in terms of a network. The square element is a compromise between the triangular and hexagonal elements in terms of Lt, Pm and Pm'. For these reasons, I will develop a square residential settlement pattern.

EVALUATION OF NETWORK GEOMETRIES

-15-
TRIANGULAR NETWORKS
QUADRILATERAL NETWORKS
QUADRILATERAL NETWORKS

-18-
HEXAGONAL NETWORKS

HEXAGONAL NETWORKS$^{22}$
LINEAR—often associated with movement and growth

CUL DE SAC

LOOP—more efficient service, utility and emergency circulation than cul de sac

GRID—good circulation continuity

CONCENTRIC

RADIAL

RADIO-CONCENTRIC

NETWORK FORMS
ACTIVE AREA CONFIGURATIONS
LINEAR

RADIAL

DIRECTIONAL GRID

MULTI-CENTRIC

GROWTH FORMS
Design Assumptions

In the development of the residential urbanization pattern proposed in this thesis, I have assumed:

1. Lots will average $160 \text{ m}^2$ (This is compatible with what squatters in Lima often provide when they lay out settlement areas for themselves, and lots of this average provide for a variety of house plans.).

2. There will be one elementary school age child per lot; i.e., there will be an average of six people per lot and one sixth of the population will be of elementary school age.

3. The maximum elementary school enrollment will be one thousand children.

4. There will be population to support eight elementary schools per sector to maintain the commercial, buffer, by-pass travel, reserved area, etc., associated with the sector.

5. Privately-owned land will be about 50 percent of the gross area.

6. $160 \text{ m}^2 \times 8,000 \text{ lots} = 1,280,000 \text{ m}^2$ in private ownership.

7. $2 \times 1,280,000 \text{ m}^2 = 2,560,000 \text{ m}^2$ or $1,600 \text{ m} \times 1,600 \text{ m}$.

8. I have adopted a square (or nearly so) geometry for the district, sector and block scales because of considerations discussed in the previous section.

9. To achieve two distinct axes I have made the sector $1,600 \text{ m} \times 1,800 \text{ m}$ or $2,880,000 \text{ m}^2$. This provides
differentiation between the active-commercial and the reserved axes. Placing these axes perpendicular to each other provides a maximum variety of interaction between the two.
Metropolitan and District Pattern

"The hierarchic structure of our city, integrated and enhanced by the particular topography and greater landscape, is the first prerequisite for a sense of location in our environment. Here too, this hierarchy of variety should be determined by the larger structures of the city organism, the network of transportation and communication, the relationship of the various systems of movement to each other, the relationship between the various centers of activity and the possibility of the city form for growth."\(^\text{23}\)

A. District boundaries are determined by topography, circulation barriers and non-residential land uses such as industry or open areas.

B. The sector boundary grid of 1,800 m x 1,600 m is reserved for possible by-pass travel routes such as railroad, auto or even pedestrian. Another grid of reserved area strips 1,600 m apart perpendicular to active-commercial strips 1,800 m apart overlays the travel grid.

C. The active-commercial strips provide corridors of growth.

D. Discontinuities within the grid are possible for topography, regional open spaces, light industry, reserved areas, colleges, etc.
1:50,000  
DISTRICT TRAVEL GRID
1: 50,000  
DISTRICT BOUNDARY CONDITIONS

RESERVED
ACTIVE - COMMERCIAL
NON-RESIDENTIAL: OPEN, PONDS, MOUNTAINS, LIGHT INDUSTRY, ETC.
Sector Pattern

A. Boundaries are formed by a 1,800 m x 1,600 grid reserved for by-pass travel routes and buffer strips. Open sports areas are located at the corners. The reserved area is a 200-meter wide strip along the long axis. The sector is quartered by the active-commercial strip perpendicular to the reserved area strip. Each quarter supports eight nursery schools and two elementary schools because it was decided that a sector of only four elementary schools would be too small to support the commercial activity, the open buffer, the reserved area, the by-pass travel routes, etc. The buffer, circulation, reserved areas and school sites are in public ownership. The remaining blocks are put into private tenure for residential and commercial use as soon as possible. Some of the reserved area may pass into private ownership in the future.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>reserved areas</td>
<td>304,000 m²</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>buffer, parks</td>
<td>457,500</td>
<td>15.9</td>
<td></td>
</tr>
<tr>
<td>schools</td>
<td>176,800</td>
<td>6.1</td>
<td></td>
</tr>
<tr>
<td>auto circulation</td>
<td>361,000</td>
<td>12.5</td>
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<tr>
<td>pedestrian circulation</td>
<td>287,700</td>
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</tr>
<tr>
<td>Public</td>
<td>1,587,000 m²</td>
<td>55</td>
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</tr>
<tr>
<td>lots</td>
<td>1,293,000</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>1,293,000</td>
<td>45</td>
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<tr>
<td>TOTAL</td>
<td>2,880,000 m²</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
B. The block module of 200 m x 200 m on center roughly corresponds to the supporting population of a nursery school. Where roads do not exist on the 200 m grid, a corresponding right of way will be maintained for future circulation, utilities and flexibility.
8,000 DU
48,000 PEOPLE
- 32 NURS
- 8 ELEM
- 7 PLAYFIELDS
- 2-4 HIGH SCHOOLS
- 4-6 SPORTS FIELDS

OPEN - BUFFER
ACTIVE - COMMERCIAL
RESERVED

2,880,000 m²

1:10,000

URBAN SECTOR
8,000 DU
48,000 PEOPLE
- 32 NURS
- 8 ELEM
- 7 PLAYFIELDS
- 2-4 HIGH SCHOOLS
- 4-6 SPORTS FIELDS

1:10,000

OPEN - BUFFER
ACTIVE - COMMERCIAL
RESERVED

2,880,000 m²

URBAN SECTOR
Block Pattern

A. The boundaries are formed by a 16-meter wide right of way in a 200 m square grid.

B. The 200 m module affords greater flexibility than smaller basic block modules, especially for high-density residential and large-scale commercial projects; yet, no lot is more than 100 m from main circulation. Flexibility within the block stems from areas allotted for standpipes, sanitary facilities, showers and laundry tubs which will presumably be available when/if parking or other areas are needed in the future. Additional community areas are in the 16-meter right of ways which are not roadway. (Block drawings show these flexible areas as parking.)

C. Initially distributed lots average 160 m² and will be primarily row houses. The number of eight-meter wide lots per block can vary from less than 120 in three double rows to 200 in five double rows.

D. Block patterns range from directional to non-directional depending upon where in the sector the block is located.

E. An elementary school with its play field is easily accommodated within a single block.
URBAN BLOCK

1:2000
DNN

1:2000 URBAN BLOCK

200 m

N
Application of Proposed Settlement Pattern to Urbanizing Area
North of Lima, Peru

To test the application of this scheme in a simplistic manner, I have projected it upon the urbanizing area north of Lima, Peru. The primary, initial access is from the center of Lima so the active-commercial spines run northwest from the center of the city. Perpendicular to these, the reserved areas run in a northeast-southwest direction. The Pan American Highway and an industrial area on the east, the coastal road on the west, the Rio Chillon on the north and the airport and existing residential areas on the south form the boundaries of this district. This area is virtually flat--sloping only slightly toward the Pacific Ocean--with only a few small hills interrupting the plain.
ACTIVE GROWTH SPINES
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Footnotes


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