URBAN DWELLING ENVIRONMENTS: GOA, INDIA

by

Ravindra Kamat

B. Arch. (Hons.), Indian Institute of Technology, Kharagpur, India

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Signature of Author.......................... Department of Architecture, May 7, 1976

Certified by.................................................. Thesis Supervisor

Accepted by............................................... Chairman, Department Committee on Graduate Students

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URBAN DWELLING ENVIRONMENTS: GOA, INDIA
Case Studies, Urbanization Model

RAVINDRA KAMAT

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Ravindra Kamat
Education/Research Program:
URBAN SETTLEMENT DESIGN IN DEVELOPING COUNTRIES
School of Architecture and Planning, M.I.T.

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</tr>
</tbody>
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CONTENT: This research identifies, analyzes and evaluates different dwelling/land situations existing at the present time in Goa, India. The focus of the study is on 5 selected situations, characterized by user income groups, their physical environments and percentages of urban population housed by them. The following is included: a brief "introduction" of the urbanization process in Goa; a description of Goa's "urban context"; five "case studies" which deal with lower income housing situations; and "dwelling/land evaluations" on the time/process perspectives, physical aspects, utilities and services, land utilization and layout efficiency of the cases presented. Each case is represented at 4 scales: 1) a locality containing that particular case of dwelling/land system; 2) a selected segment within the locality; 3) a selected block within the locality segment and 4) a typical dwelling unit, in similar terms: DRAWINGS: dwelling plan, elevation and section; DESCRIPTIVE DATA: socio-economic and physical; and PHOTOGRAPHS: dwelling and environment. The cases provide firsthand material with which to identify basic patterns in different aspects of the housing process, particularly in the matter of land utilization.

A land utilization model is developed, based on the comparative analysis of these dwelling/land situations and a set of comprehensive planning projections, to provide for the urbanization in a process most adaptable to change in order to accommodate the future urban growth in a most comprehensive manner.

PURPOSE: This study attempts: a) to identify and describe a representative cross-section of housing systems in urban areas of Goa, illustrating the physical and socio-economic environment; b) to organize case studies into a comparative framework to facilitate analysis/evaluations; c) to relate the housing process to issues of land utilization.

APPLICATION: This study provides: a) a reference for the understanding of the housing environment/situation of urban areas, particularly Goa, India; b) a model for the identification of dwelling subsystems in any urban context; c) a reference for policy decisions relating to housing programs; d) a reference for the formulation of urban land policies in the context of rapid urbanization and its consequences.

DATA: This research is based on the field surveys in Goa, carried out by the author during the summer of 1975, complemented by maps and mentioned bibliographic material. The surveys included the physical and socio-economic aspects of selected urban dwelling environments in Goa. The analysis and evaluations were carried out in the Urban Settlement Design Program, School of Architecture and Planning, M.I.T., during the academic years 1974-75 and 1975-76. The case study analysis is based on a methodology developed in the Urban Settlement Design Program, M.I.T.
INTRODUCTION

Post-liberation economic development (since 1962) in Goa is marked with changes in economic and social values; primarily, in patterns of land utilization, household priorities and even interpersonal relationships. Concomitantly, the influx of population from poorer regions, aside from its socio-economic impact, has strained the regional resources. As a result, urban settlements have witnessed tremendous changes in their structure, function and in the overall environment during this period. Poverty, social disintegration and urban sprawl are some of the obvious detrimental changes. These problems call for reassessment of the conventional approaches, particularly in the development of urban settlements.

The basic weakness in the conventional Government approach in the characteristic Goanese situation is the exclusive focus on Government financing for upper class Government employees. The bleak facts of population increase, resource scarcity and of the low levels of personal incomes render this approach hopelessly inadequate in face of the urban deterioration. Given the resource position and the facts of population increase, physical planning has a critical role to play. Economic and social forces at work in shaping the residential pattern have to be further evaluated; and physical planning has to turn these forces to its advantage. Thus, there emerges a clear need for an accurate appraisal of existing dwelling environments of lower income groups.

This study of lower income dwelling environments concentrates on Goa as a case study. It is presented in two sections: 1) Case study analysis in Goa's urban context

2) Urbanization model

In the first section, a clearer differentiation of the main components of urban settlements, namely, urban land, urban utilities, community facilities and shelter is attempted and the various aspects of these settlement components are analysed in isolation to understand their characteristics and relationships with various user income group manifestations/living patterns. An emphasis is placed on the issues of land utilization with a view to relate the housing process in Goa. The existing dwelling/land situations have been further evaluated in an attempt to relate them to their originating models and to see them in a broader time/process perspective, recognizing their value as source of information or reference in formulating comprehensive urban land policies and housing programs.

In the second section, an urbanization model is developed based on analysis of the case studies and a set of basic planning projections of relevance. It is, more properly, a study for the development of a selected site. The proposal focuses on site development in terms of physical layout and land subdivision; and provides a set/framework of related aspects/determinants for comprehensive discussion/evaluation/policy recommendation.
URBAN CONTEXT

1. PRIMARY INFORMATION: Goa, with an area of 3701 km², is a hilly terrain, located on the west coast of India, between the Western Ghats and the Arabian Sea, latitude 15° North and longitude 74° East. The terrain is intersected by a number of rivers, flowing westwards, which provide a network of internal waterways. The physiographic characteristics of the area are rich and varied consisting of verdant hills, forests, coconut groves and rice fields. Situated in the Tropical Monsoon zone, it experiences heavy rainfall with annual average of more than 3600 mm, concentrated over a period from June to September, often accompanied by lightning storms. Recognized seasons are: Summer (March to May), Monsoon (June to October) and Winter (November to February). Concomitant with rainfall is extremely high humidity of 80% which persists throughout. High winds are unknown and temperature range is slight, although its effects are heightened by presence of humidity.

2. HISTORY: The history of Goa is lost in hoary antiquity, spanning over 5000 years, as references to the land occur in Hindu mythological epics like Ramayan and Mahabharat. Strategically situated on the western coast of India, Goa was coveted by the Imperial Powers of olden times and no wonder, it has experienced many vicissitudes of war, conquest and plunder. Thus, it came under the successive sway of various dynasties like the Kadambas, the Silaharas, the Vijayanagar Kings, the Muslims and finally, the Colonial rule of the Portuguese, after which in 1961, it was integrated into the Indian Union. Goa is now a center of rapid industrialization and urbanization.

3. ECONOMY: The Colonial rule had almost completely stagnated the growth of local industry by flooding the local markets with heavy imports of consumer goods, thus badly dampening the local initiative. Soon after the liberation of Goa, a phase of planned economic development was, for the first time, introduced. The production process, whether in agriculture or industry, has been stepped up to a great extent and the potential of economic goods has been augmented, besides providing many social amenities. In 1968, the annual per capita income was estimated at U.S. $90 and the rate of economic growth, at 10% p.a. Primary sectors of economy consist of agriculture, forestry and animal husbandry contributing 36.5% of regional income; mining and quarrying, construction and electricity, constituting secondary sector of the economy account for 25%; Tertiary sector consisting of trade, transport, banking, insurance and other services account for 38.5%.

4. GOVERNMENT: Goa has a status of centrally administered Union territory in the constitutional framework of the Indian Union. It is governed by the President subject to the legislation by Parliament, through an administrator/Governor, appointed by him. The effective executive power is, however, exercised by a council of Ministers headed by Chief Minister and responsible to Legislative Assembly with political party-based representatives elected directly from territorial constituencies. Local self-government consists of Municipality whose authority over urban development is limited to scrutinizing the building permission cases within its jurisdiction. The Town & Country Planning Department established in 1964, is responsible for scrutinizing sub-division and layout cases. Public Works Department looks after public construction and urban services.

5. DEMOGRAPHY: Since the liberation, expansion in Government employment, opening of a large number of educational institutions and a corresponding expansion in the secondary and tertiary sectors of economy, resulted in immigration of population, especially of unskilled labor. The estimated urban population of Goa as per 1971 Census, is 203,243 which is 25.56% of the total population, with a decennial (1961-71) growth rate of 132.7%. The influx of population is a singularly important factor contributing to a higher growth rate. The age group of 15-36 years constitutes 33.6% of the
6. SOCIO-CULTURAL: Diversity of ethnic origins and groups, not tied to income structure is characteristic of this place and is evident from the diversity in living pattern, social customs, festivities etc. Each of these groups has its own hierarchy of defined social strata. There exists very little socio-economic mobility between lowest income level (less than U.S. $90 p.a.) and the skilled wage level (U.S. $2400 p.a.).

7. SOCIO-ECONOMIC: A great number of people have dual incomes, one which is derived from their occupation and the other from land. The consequence of this has been more or less stable conditions, although economic disparities do exist. The very low and low income sectors are concentrated in Mormugao, with some in scattered pockets of squatter settlements in and around Panaji, Mapusa and Margao. Of the total population, only about 7% earn more than U.S. $2400 p.a., whereas people earning between U.S. $1000 p.a. and $2000 p.a. are 12%. Average annual income of 30% of the population is U.S. $590 p.a. and the average household income is U.S. $522. With working population constituting only 32%, much of the lower income population is self-employed. High and upper middle income residential development is located in the westward extension of Panaji, the central Altinho area and Porvorim plateau.

8. HOUSING: A large part of the very low income population of urban Goa lives in dwellings classified as sub-standard or unfit for human habitation. Most of these are self-built dwelling units in squatter settlements. The rest are of traditional types with none or very limited provision of basic utilities. The Government allocation of financial resources in housing sector is very meagre and public housing is limited to only middle/upper class employees in public sector. Private investment in housing, though more than public investment, has so far gone to produce only middle/upper income housing. Poor supply of low income housing in urban areas has resulted in subletting of rooms and consequent overcrowding. Recently founded Goa, Daman & Diu Housing Board has undertaken a few low income public housing projects; most of these have very poor layout efficiency which increases the cost of development. Besides, the only housing option provided consists, mainly, of completed dwelling units in the form of walk-ups or row houses/rooms. This conventional "Packaged-deal" approach increases the basic unit cost, often beyond the economic reach of target income groups.

9. URBANIZATION PROCESS: Until recently, Goa has enjoyed a comparatively slow growth in its population. This has had the basic
URBAN INCOME PATTERN

advantage of not overstraining its natural resources. The relatively stable economic conditions have led to the intransient urge to own a house/apartment in recent years and rather surprisingly, this has been possible without an undue strain on the economic resources of the Government, probably due to a more equitable distribution of land. The Goanese has never considered the city as the only means of survival, but rather, has used it as a means of betterment of his rural existence. However, in the post-liberation era, the emerging pattern is rather contrasting. Population increases and industrial growth have been a singular feature of the decade. The impact of this on towns and, to a lesser extent, villages has altered local life styles and values. This has necessitated change in structure of towns and the region as a whole. The annual growth rate of urban population has been 13.27% during the last decade. Vast areas of urban land, public and private have been subdivided. In absence of proper guidelines and development plans, the fault has not always been of developers. Even the Goa, Daman & Diu Housing Board has been guilty of misuse of its resources. The few rehabilitation projects undertaken by it have been inefficient and poorly conceived layout resulting in wastage of public land. What is even worse, developments have been piecemeal and not only out of context with the existing situation but without a clue of what might come.

URBAN GROWTH PATTERN
GOA, India: (top left) The Panaji city center comprises of, mainly, traditional dwellings standing in sharp contrast with modern multi-storied buildings. Many of traditional 1-2 storied buildings have been demolished in this area, with commercial considerations to make space for new buildings. Traditional mode of travel, namely bicycle, is also seen in contrast with motor vehicles whose number is gradually rising. The view portrays the character of urban areas of Goa; however, areas like this one are in sharp contrast with peripheral squatter areas.

(top right) Low income rural settlements, engulfed in urban periphery, are a common site; like this one at Sadu. Lack of physical controls/responsibility has led to unhealthy living environment in this locality.

(bottom) One of the largest squatter settlements is built along the Baina beach. This area is within 3 kms from the Vasco city center. The squatter settlements are a post-liberation development (since 1962), proliferating at a rapid pace.

URBAN CONTEXT SOURCES
Urban Topography and Circulation: General Information:
Urban Land Use Pattern:
Urban Income Pattern:
Urban Growth Pattern:
Climate:
Photographs:

(accurate) MAP OF GOA, L.S.D., GOA, 1968.
(approximate) IBID.
(approximate) IBID.
METEOROLOGICAL DEPARTMENT, PANAJI, 1975.
Government of India Publications.
The following section contains case studies depicting selected dwelling environments/situations in Goa Urban Area, at the present time. The five cases are selected according to income groups, housing systems and the proportion of population that each system houses. Each case study is represented at four scales:

**LOCALITY:** A relatively self-contained residential area within Goa Urban Area (in general, it is contained within physical boundaries) has been selected to illustrate dwelling/land systems in relation to community environments as well as their extent, composition and layout.

**LOCALITY SEGMENT:** All the localities differ in size and shape. A 400m x 400m segment or a 6 minute walk has been taken from and representing the residential area to allow comparison of land utilization (patterns, percentages and densities) and illustrate dwelling/land systems in relation to pedestrian movement. The locality segment also represents the environment/area around a dwelling, that is cognizable and used by the dwelling occupants because it contains facilities that are accessible by walking, such as school, playground, shops, bus stops, etc.,

**BLOCK:** Within each locality segment, a typical homogeneous residential block has been selected to illustrate subdivision of land and physical controls on it, which indicate its utilization and to facilitate comparison of dwelling/land systems in terms of area, density and network efficiency.

**TYPICAL DWELLING UNIT:** Within each locality segment, a typical self-contained unit for an individual, a family or a group has been selected to describe dwelling/land systems in terms of physical and socio-economic components and illustrate dwellings in relation to lot/land.

1. **BAINA**
   Popular, very low income, squatters
2. **PADRIBHATT-CHIMBEL**
   Public, very low income, serviced plot
3. **SADDA**
   Popular, low income, rooms
4. **FONTAINHAS**
   Private, moderately low income, houses/rooms
5. **PANAJI**
   Private, middle income, shop-cum-home
1. Baina

2. Padribhatt

3. Sadda

4. Fontainhas

5. Panaji
1 BAINA, Mormugão, Goa
POPULAR, VERY LOW INCOME, SQUATTERS

LOCATION: Situated on Baina beach, this locality is approximately 2 km from the Vasco city center as well as Marmagao harbor.

ORIGINS: This locality is fairly recent and came up during the last decade. The expansion of port facilities at Marmagao harbor and the increased industrial activity attracted a large number of unskilled migrants in search of job opportunities. The migrants, predominantly from the neighboring states, provide casual labor at Marmagao harbor and nearby railway terminus and also in ore transportation. With no access to decent housing, the migrants squatted on this area adjoining the Baina beach on public/private land, vacant at the time of occupation. The residents are predominantly very low income and have provided their own housing/shacks. With unstable income and little economic mobility, the settlement is stagnating. The residents lack water taps, sewerage and storm drainage and have limited chances of improving their shelters. The locality is not well served by public facilities. Under the Slum Clearance Act of the Government, this locality is declared illegal and is likely to be torn down due to unhealthy living conditions.

BAINA, Mormugão (Goa) - (top) View of the squatter houses in Baina, built along the beach road. Dweller initiated shops are scattered all over the area. Note the upper income walk-ups in the background.
(Bottom) Aerial photograph shows physical environment of Baina squatter settlement. Note the open space in front of the settlement, being undefined and without any physical controls, the space is unmaintained.
LOCALITY SEGMENT LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>940</td>
<td>6.64</td>
<td>142</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>945</td>
<td>6.64</td>
<td>142</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>2250</td>
<td>6.64</td>
<td>339</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>3.55</td>
<td>53.46</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>3.09</td>
<td>46.54</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>6.64</td>
<td>100.00</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = \text{N/A} \]

\[ \text{AVERAGE LOT AREA} = 32.6 \text{ m}^2 \]

LAYOUT: The locality is a dense conglomeration of deteriorating very low income shacks aligned along the beach. The development is arbitrary with no defined circulation and semi-public areas. In the interior, shacks/huts are scattered all over, with no clear grouping, typical of squatter settlements.

LAND USE: Reflects the concern for accommodating maximum number of people. The locality has mainly only residential development, with dweller initiated shops appearing sporadically along the beach. Being declared illegal by the Government, the locality is devoid of any public areas (besides the existing beach) and utilities.
LAND UTILIZATION DIAGRAMS

PATTERN
Public: streets/walkways
Semi-Public: playgrounds
Semi-Private: cluster courts
Private: lots

PERCENTAGES Streets/Walkways 53%
             Playgrounds
             Cluster Courts
             Dwellings/Lots 47%

DENSITY Persons/Hectare 339

LOCALITY SEGMENT LAND UTILIZATION
1:2500
The road from Vasco city center to Baina beach provides access to this locality. Besides the pedestrian way along the beach, the circulation pattern is totally undefined and pedestrian dominated.
URBAN DWELLING ENVIRONMENTS

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>%</th>
<th>SELF-HELP</th>
<th>ARTISAN</th>
<th>SMALL CONTRACTOR</th>
<th>LARGE CONTRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUD/WATTLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WOOD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MASONRY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONCRETE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES

POLICE
FIRE PROTECTION
HEALTH
SCHOOLS, PLAYGROUNDS
RECREATION, OPEN SPACES

LOCALITY UTILITIES AND SERVICES

WATER SUPPLY
SANITARY SEWERAGE
STORM DRAINAGE
ELECTRICITY
GAS
REFUSE COLLECTION
PUBLIC TRANSPORTATION
PAVED ROADS, WALKWAYS
TELEPHONE
STREET LIGHTING

The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

LOCALITY BLOCK PLAN
**LOCALITY BLOCK LAND UTILIZATION DATA**

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>47</td>
<td>0.21</td>
<td>224</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>56</td>
<td>0.21</td>
<td>267</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>168</td>
<td>0.21</td>
<td>800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.15 71</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.06 29</td>
</tr>
<tr>
<td>PRIVATE (dwelling, shops, factories, lots)</td>
<td>0.21 100</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0.21</td>
</tr>
</tbody>
</table>

**NETWORK EFFICIENCY**

\[
R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = \frac{952}{\text{areas served (circulation, lots)}}
\]

**AVERAGE LOT AREA**

\[
= 13.7 \text{ m}^2
\]

**LOCALITY BLOCK LAND UTILIZATION**
**LOCALITY: BAINA**

**PHYSICAL DATA**
(related to dwelling and land)

**DWELLING UNIT**
- type: Shanty
- area (sq m): 12
- tenure: Legal rental

**LAND/LOT**
- utilisation: Semi public
- area (sq m): 12
- tenure: Extra-legal

**DWELLING**
- location: Periphery
- type: Row/grooved
- number of floors: 1
- utilisation: Multiple: Family
- physical state: Bad

**DWELLING DEVELOPMENT**
- mode: Incremental
- developer: Popular
- builder: Self-help
- construction type: Shack
- year of construction: 1968

**MATERIALS**
- foundation: -
- floors: Mud
- walls: Mud/Acrop wood
- roof: Thatch

**DWELLING FACILITIES**
- wc: -
- shower: -
- kitchen: -
- rooms: 1
- other: -

**SOCIO-ECONOMIC DATA**
(related to user)

**GENERAL: SOCIAL**
- user's ethnic origin: Hindu
- place of birth: Uttar Pradesh
- education level: Nil

**NUMBER OF USERS**
- married: 2
- single: 1
- children: 1
- total: 4

**MIGRATION PATTERN**
- number of moves: 6
- rural - urban: 4
- urban - rural: 1
- why came to urban area: Employment

**GENERAL: ECONOMIC**
- user's income group: Very low
- employment: Labor
- distance to work: 4 km
- mode of travel: On foot

**COSTS**
- dwelling unit: -
- land - market value: -
- DWELLING UNIT PAYMENTS
  - financing: Private
  - rent/mortgage: -
  - % income for rent/mortgage: 20%

**CASE STUDY SOURCES**

Locality Segment Plan: (accurate) MAP OF BAINA, T.C.P.D., Panaji, 1971.
Locality Segment Circulation Plan: (approximate) IBID.
Locality Segment Land Utilisation: (approximate) IBID.
Locality Block Plan: (approximate) IBID.
Locality Block Land Utilisation: (approximate) Field Surveys, 1975.
Typical Dwelling: (approximate) Field Surveys, 1975.
Physical Data: (approximate) IBID.
Socio-economic Data: (approximate) IBID.
Field Surveys, 1975.
2 PADRIBHATT, Chimbel, Goa
PUBLIC, VERY LOW INCOME, SERVICED PLOT

LOCATION: This locality is situated on the periphery of Panaji Standard Urban Area, approximately 5km from the city center.

ORIGINS: The locality originated as a rehabilitation project for the residents of a squatter settlement, cleared from Calicut road in the southern part of Panaji under the Slum Clearance Act of the Government. The trade and commerce activities of Panaji provided good job opportunities for this unskilled labor. Calicut road thus provided a convenient location. The rehabilitation project at Padrribhatt-Chimbel in its initial stage has provided the residents with sites and communal facilities with basic infrastructure. The residents are predominantly very low income groups with unstable income. On the rented sites, the residents have built their shacks. With limited resources and income, they have limited chance to improve their shelters.

Since majority of the people cannot afford to pay the rent of lots occupied and the cost of water and electricity, the utilities, though provided, operate with limited service which has rendered some community facilities unusable, thus giving rise to unhealthy conditions and destroying the very purpose of the project.
project. Very clearly, in the name of slum clearance, only the location of the slum has been shifted since the project has become a Government initiated or planned slum.

LAYOUT: The locality has rectangular grid layout, with major roads spaced at 90m running perpendicular to the approach road. The site has a point access to Chimbel-Morambique-Grande road. Community facilities are centrally located between two groups of blocks. The locality has 26 blocks, each with the shorter side facing the approach road. In the initial stage 719 lots are provided. The block size is 64m x 10m, giving a gross density of about 588 people/ha.

<table>
<thead>
<tr>
<th>LOCALITY SEGMENT LAND UTILIZATION DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DENSITIES</strong></td>
</tr>
<tr>
<td>Total Number</td>
</tr>
<tr>
<td>LOTS</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
</tr>
<tr>
<td>PEOPLE</td>
</tr>
<tr>
<td><strong>AREAS</strong></td>
</tr>
<tr>
<td>Total Hectares</td>
</tr>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots) &amp; SEMI-PRIVATE (cluster courts)</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \frac{\text{network length (circulation)}}{\text{Areas served (circulation, lots)}} \] = 618 n/ha

AVERAGE LOT AREA = 20 n²
LAND UTILIZATION DIAGRAMS

PATTERN
Public: streets/walkways
Semi-Public: playgrounds
Semi-Private: cluster courts
Private: lots

PERCENTAGES
Streets/Walkways 43%
Playgrounds 6%
Cluster Courts 10%
Dwellings/Lots 52%

DENSITY
Persons/Hectare 588

LOCALITY SEGMENT LAND UTILIZATION

1:2500
LOCALITY CONSTRUCTION TYPES

Shack
Mud/Wattle
Wood
Masonry Wood
Masonry Concrete
Concrete

The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES

Police
Fire Protection
Health
Schools, Playgrounds
Recreation, Open Spaces

LOCALITY UTILITIES AND SERVICES

Water Supply
Sanitary Sewerage
Storm Drainage
Electricity
Gas
Refuse Collection
Public Transportation
Paved Roads, Walkways
Telephone
Street Lighting

The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: None, Limited, Adequate.

Quality of information: Approximate
### LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>64</td>
<td>0.21</td>
<td>300</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>64</td>
<td>0.21</td>
<td>300</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>160</td>
<td>0.21</td>
<td>760</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces) &amp; SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.08 38</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots) &amp; SEMI-PRIVATE (cluster courts)</td>
<td>0.13 62</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.21 100</td>
</tr>
</tbody>
</table>

### NETWORK EFFICIENCY

\[
R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = \frac{914 \text{ m/ha}}{1:1000} \\
\text{AVERAGE LOT AREA} = 20 \text{ m}^2
\]
URBAN DWELLING ENVIRONMENTS

SECTION

ELEVATION

PLAN

KEY
LR Living Room
D Dining/Eating Area
BR Bedroom
K Kitchen/Cooking Area
T Toilet/Bathroom
L Laundry
C Closet
S Storage
R Room (multi-use)

TYPICAL DWELLING 1:200

0 1 5 10m

N
**PHYSICAL DATA**  
(related to dwelling and land)

<table>
<thead>
<tr>
<th>Dwelling Unit</th>
<th>Type: Shanty</th>
<th>area (sq m): 12</th>
<th>tenure: Legal rental</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Land/Lot</th>
<th>utilization: Private</th>
<th>area (sq m): 20</th>
<th>tenure: Legal rental</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Dwelling</th>
<th>location: Periphery</th>
<th>type: Row</th>
<th>number of floors: 1</th>
<th>utilization: Multiple: Family</th>
<th>physical state: Bad</th>
</tr>
</thead>
</table>

|----------------------|-------------------|-----------------------------|--------------------|--------------------------|--------------------------|

<table>
<thead>
<tr>
<th>Materials</th>
<th>foundation: -</th>
<th>floors: Mud</th>
<th>walls: Mud/Thatched</th>
<th>roof: Thatched</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Dwelling Facilities</th>
<th>wc: -</th>
<th>shower: -</th>
<th>kitchen: -</th>
<th>rooms: 1</th>
<th>other: -</th>
</tr>
</thead>
</table>

**SOCIO-ECONOMIC DATA**  
(related to user)

**GENERAL:**
- Social:
  - user's ethnic origin: Muslim
  - place of birth: Uttar Pradesh
  - education level: Nil

**NUMBER OF USERS**
- married: 2
- single: -
- children: 1
- total: 3

**MIGRATION PATTERN**
- number of moves: 5
- rural to urban: 4
- urban to rural: -

**why came to urban area:** Employment

**GENERAL:**
- Economic:
  - user's income group: Very low
  - employment: Labor
  - distance to work: 6 km
  - mode of travel: Public transportation

**COSTS**
- dwelling unit: -
- land - market value: -

**Dwelling Unit Payments**
- finances: Public subsidized
  - rent/mortgage: -
- % income for rent/mortgage: 20%

**CASE STUDY SOURCES**

Locality Segment Plans: (approximate) PLAN FOR REHABILITATION OF SHANTY DWELLERS, T.C.P.D., 1974.
Locality Segment Circulation Plan: (approximate) T.C.P.D.
Locality Segment Land Utilization: (approximate) T.C.P.D.
Locality Block Plan: (approximate) T.C.P.D.
Locality Block Land Utilization: (approximate) T.C.P.D.
Typical Dwelling: (approximate) Field Surveys, 1975.
Physical Data: (approximate) T.C.P.D.
Socio-Economic Data: (approximate) T.C.P.D.
Photographs: Ravindra Kamat
3 SADDA,
Mormugão, Goa

LOCATION: This locality is situated midway between Vasco City center and Marmagao harbor, both of which provide employment to great majority of the residents and are within 3 km radius from the locality. It is located adjacent to the National Highway connecting the harbor and the city center to the commercial areas in other urban centers.

ORIGINS: Until 1960, Sadda was one of a few small sporadic nodal developments in the vicinity of the harbor and the city center. After the independence of Goa, the expansion of secondary and tertiary sectors and consequent expansion of port facilities at Marmagao harbor resulted in the influx of population from neighboring states, especially of unskilled labor, who sought employment there. Most immigrants, without any access, preferred to settle down on this conveniently located area of Sadda on public/private lands. At the present, majority of the residents are employed at the harbor and Vasco city center, with relatively stable incomes. The population is predominantly low and very low income. Occupants have either provided their own housing (shack) or rented rooms. They lack water taps, sewerage and storm drainage. Tenants

SADDA, Mormagao (Goa); (top) Houses in this low income locality are semi permanent in character, resembling rural houses and stand in sharp contrast with modern concrete construction in the vicinity.

(bottom) The photograph shows the physical environment of the locality. Note the activities in pedestrian dominated street/open space. Lack of physical controls/ responsibility has led to the unhealthy environment of this area.
have relative stability and limited chances of improving their shelters. The locality is not well served by public facilities but it provides a convenient location for job opportunities.

LAYOUT: The spatial organization of the locality is typical of most other squatter settlements, comprising of houses/shacks grouped in clusters bonded by a circulation pattern which is not organized on a hierarchical basis, however, but provides a range of alternatives which overlap to create a varied and complex spatial structure. The direct access of each house to a small communal space and minimum of functionally specified(zones) area, provides a high degree of spatial elasticity in accommodating various activities.

LAND USE: Development of the site by accretion reflects the site's land use. The main concern was to provide residential land for maximum number of people, with minimum of circulation area and practically nothing for public facilities. Small shops have been developed through the dweller initiative and appear sporadically on the site.

<table>
<thead>
<tr>
<th>SELECTED BLOCK LOCALITY SEGMENT LAND UTILIZATION DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENSITIES</td>
</tr>
<tr>
<td>Total Number</td>
</tr>
<tr>
<td>LOTS</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
</tr>
<tr>
<td>PEOPLE</td>
</tr>
<tr>
<td>AREAS</td>
</tr>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 235.8 \text{ m/H} \]

AVERAGE LOT AREA

= 219.3 \text{ m}^2
LAND UTILIZATION DIAGRAMS

PATTERN
Public: streets/walkways
Semi-Public: playgrounds
Semi-Private: cluster courts
Private: lots
Dwellings

PERCENTAGES
- Streets/Walkways 38%
- Playgrounds -
- Cluster Courts -
- Dwellings/Lots 62%

DENSITY
- 20 persons/ha

LOCALITY SEGMENT LAND UTILIZATION

1:2500
Circulation pattern reflects the informal but intense use of space and consists of five distinct categories: (a) the main service road, which also serves as the main social, commercial and industrial area; (b) secondary spine paths, which provide access from road to the various hutment groups or clusters; (c) the narrow lanes which connect one housing group with another; (d) the small chowks or open spaces which occur at the intersections of paths and often exploit the existence of a small shade tree; and (e) small cul-de-sacs which provide access to self-contained groups of huts.
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type. Quality of information: Approximate

The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE. Quality of information: Approximate
LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>38</td>
<td>0.84</td>
<td>45</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>55</td>
<td>0.84</td>
<td>65</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>319</td>
<td>0.84</td>
<td>319</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces) &amp; SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.39</td>
<td>47</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots) &amp; SEMI-PRIVATE (cluster courts)</td>
<td>0.45</td>
<td>53</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = \frac{1000}{118} \text{ m/ha} \]

AVERAGE LOT AREA = 118 m²
TYPICAL DWELLING

1:200
**SOcio-Economic Data**  (related to user)

**GENERAL:**
- **social**
  - User's ethnic origin: Christian
  - Place of birth: Goa
  - Education level: Primary school

**NUMBER OF USERS**
- Married: 2
- Single: 2
- Children: 1
- Total: 5

**Migration Pattern**
- Number of moves: 1
  - Rural - Urban: 1
  - Urban - Urban: 
  - Urban - Rural: 

- Why came to urban area: Employment

**GENERAL:**
- User's income group: Low
- Employment: Labor
- Distance to work: 4 km
- Mode of travel: On foot

**Costs**
- Dwelling unit: 
- Land - Market value: 

**Dwelling Unit Payments**
- Financing: Private
- Rent/mortgage: 
- % Income for rent/mortgage: 20%

**Physical Data**  (related to dwelling and land)

<table>
<thead>
<tr>
<th>Dwelling Unit</th>
<th>Type: Shanty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (sq m):</td>
<td>25</td>
</tr>
<tr>
<td>Tenure:</td>
<td>Legal rental/ownership</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Land/Lot Utilization</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (sq m):</td>
<td>90</td>
</tr>
<tr>
<td>Tenure:</td>
<td>Legal rental/ownership</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dwelling Location</th>
<th>Periphery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type:</td>
<td>Row/grouped</td>
</tr>
<tr>
<td>Number of floors:</td>
<td>1</td>
</tr>
<tr>
<td>Utilization:</td>
<td>Multiple: Family</td>
</tr>
<tr>
<td>Physical state:</td>
<td>Bad</td>
</tr>
</tbody>
</table>

**Dwelling Development**
- Mode: Incremental
- Developer: Popular
- Builder: Self-help
- Construction type: Masonry/wood
- Year of construction: 1960

**Materials**
- Foundation: Laterite stone
- Floors: Mud
- Walls: Masonry/mud
- Roof: Tiles on wooden purlins

**Dwelling Facilities**
- Wc: -
- Showers: -
- Kitchen(s): 1
- Rooms: 1
- Other: -

---

**Case Study Sources**

Locality Segment Circulation Plan: (Approximate) ibid.
Locality Segment Land Utilization: (Approximate) ibid.
Locality Block Plan: (Approximate) ibid.
Locality Block Land Utilization: (Approximate) ibid.
Physical Data: (Approximate) ibid.
Socio-Economic Data: (Approximate) ibid.
Photographs: Ravindra Kamat.
 LOCATION: Located to the east of Altinho, it constitutes southward extension of oldest part of Panaji. It is situated adjacent to the central business area.

ORIGINS: The northern part of the community was developed along with Panaji and is strikingly similar to it in its layout. It comprises the oldest part of urban area and of the community. After Panaji gained importance as city and began to develop, Fontainhas began to grow by accretion. Early settlers were the upper/middle class people with business/trade interests. The convenient location and relatively low land values attracted the lower-middle class who now dominate the community. The older parts of the community have large 1-2 story multi-family dwellings in European style while the rest of the community has large single-story detached multifamily dwellings in a traditional pattern. The community is confined to one size due to topographical constraints on one hand and high priority given to agriculture on the other which has prevented the conversion of adjacent agricultural land into urban land subdivisions. However, the community has grown to extremely high density due to high room occupancy. (bottom) Traditional one story urban court/detached houses, typical of this locality, frame the upper income and institutional housing on Altinho. The dwellings are aligned along the road that connects the locality to the Panaji city center.
resultant overcrowding. Due to its close proximity to Panaji which provides employment to a majority of the residents, the community now serves as "dormitory" of Panaji.

LAYOUT: The locality is built along the eastward base of Altinho which bounds it in the west, separating it from Panaji, while in the east, it is confined by the West Coast Highway bordering the long stretch of agricultural land. Growth of locality within these boundaries in two stages is reflected in its two distinct patterns/layouts. The northern and the older part of the locality interlocks with oldest part of Panaji with grid iron layout, being merely its southward extension. These are dense compact units of extremely high density. As the locality grew by accretion, the physical and non-physical constraints led to the "string-like" pattern of development, characterized by large, multi-family dwellings flanking the street, connecting the locality to the city center. This street behaves as the spine of the locality circulation and utilities. Oldest part of the locality has all the vitality of natural growth. Houses are almost always grouped in an irregular form and do not always line up as in the more contrived layouts. Inspite of this seemingly haphazard pattern, the houses are held together by a common feature as in ethnic groups or by a common purpose of those who built them and live within. Open spaces and squares, totally different to those created by modern planning methods, are here often created by minor alterations in the width of streets. Narrow lanes or passages extend from the main street towards the inner courts or utility areas somewhat in the manner of service roads. The blocks are approximately 90m x 90m in older parts whereas in other parts, they are not defined. The community has 3 primary schools, a secondary school, a hospital and a few clinics.
LAND USE: The locality is mainly a residential area with dweller-initiated sporadic commercial areas at nodal points. A slight concentration of commercial activity is found along the West Coast Highway bordering the locality in its northern part. The locality has 3 primary schools, a secondary school, a hospital and a few clinics.
CIRCULATION: The West Coast Highway bounds the locality in the east, connecting it with the nearby urban areas. The important locality circulation is along the street that runs the length of the locality, parallel to the Highway. This street also forms the central spine for locality utilities and services and commercial areas. The secondary circulation is along the cross streets. The circulation mode within the locality is mainly pedestrian with vehicular access.
**LOCALITY SEGMENT LAND UTILIZATION DATA**

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density H/Na</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>171</td>
<td>9.12</td>
<td>18</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>204</td>
<td>9.12</td>
<td>22</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>1151</td>
<td>9.12</td>
<td>126</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>3.34</td>
<td>36.62</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.40</td>
<td>4.39</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots) &amp; SEMI-PRIVATE (cluster courts)</td>
<td>5.38</td>
<td>58.99</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9.12</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**NETWORK EFFICIENCY**

\[
R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 270 \, \text{m/Ha}
\]

**AVERAGE LOT AREA**

\[
= 338 \, \text{m}^2
\]
LAND UTILIZATION DIAGRAMS

1 hectare

PATTERN
Public: streets/walkways
Semi-Public: playgrounds
Semi-Private: cluster courts
Private: lots
dwellings

PERCENTAGES
Streets/Walkways 37%
Playgrounds 4%
Cluster Courts 4%
Dwellings/Lots 59%

DENSITY
Persons/Hectare 126
10 persons
URBAN DWELLING ENVIRONMENTS

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>Self-help</th>
<th>Artesian</th>
<th>Small Contractor</th>
<th>Large Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud/Wattle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry Wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry Concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.
Quality of information: Approximate

LOCALITY COMMUNITY FACILITIES

<table>
<thead>
<tr>
<th>Facility</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Police</td>
<td></td>
</tr>
<tr>
<td>Fire Protection</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td></td>
</tr>
<tr>
<td>Schools, Playgrounds</td>
<td></td>
</tr>
<tr>
<td>Recreation, Open Spaces</td>
<td></td>
</tr>
</tbody>
</table>

LOCALITY UTILITIES AND SERVICES

<table>
<thead>
<tr>
<th>Utility/Service</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td></td>
</tr>
<tr>
<td>Sanitary Sewerage</td>
<td></td>
</tr>
<tr>
<td>Storm Drainage</td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
</tr>
<tr>
<td>Refuse Collection</td>
<td></td>
</tr>
<tr>
<td>Public Transportation</td>
<td></td>
</tr>
<tr>
<td>Paved Roads, Walkways</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
</tr>
<tr>
<td>Street Lighting</td>
<td></td>
</tr>
</tbody>
</table>

The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.
Quality of information: Approximate

LOCALITY BLOCK PLAN

0 10 50m 50m
1:1000
LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>21</td>
<td>0.78</td>
<td>27</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>28</td>
<td>0.78</td>
<td>36</td>
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<tr>
<td>PEOPLE</td>
<td>162</td>
<td>0.78</td>
<td>208</td>
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<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces) &amp; SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.21</td>
<td>27</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots) &amp; SEMI-PRIVATE (cluster courts)</td>
<td>0.57</td>
<td>73</td>
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<tr>
<td>TOTAL</td>
<td>0.78</td>
<td>100</td>
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</tbody>
</table>

NETWORK EFFICIENCY

\[ R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} = 650 \text{ n/ha} \]

AVERAGE LOT AREA

\[ = 271 \text{ m}^2 \]
LOCALITY: FONTAINHAS

PHYSICAL DATA

(related to dwelling and land)

**DWELLING UNIT**

- **type:** House
- **area (sq m):** 65
- **tenure:** Legal rental

**LAND/LOT**

- **utilization:** Private
- **area (sq m):** 117
- **tenure:** Legal rental/Ownership

**DWELLING**

- **location:** Inner ring
- **type:** Urban court/detached
- **number of floors:** 1
- **utilization:** Multiple: Family
- **physical state:** Fair

**DWELLING DEVELOPMENT**

- **mode:** Instant
- **developer:** Private
- **builder:** Artisans
- **construction type:** Masonry/wood
- **year of construction:** 1930

**MATERIALS**

- **foundation:** Masonry/concrete
- **floors:** Cement
- **walls:** Masonry
- **roof:** Tiles on wood purlins

**DWELLING FACILITIES**

- **wc:** 1
- **shower:** 1
- **kitchen:** 1
- **rooms:** 3
- **other:** Court

SOCIO-ECONOMIC DATA

(related to user)

**GENERAL:**

- **user's ethnic origin:** Hindu
- **place of birth:** Panaji
- **education level:** University

**NUMBER OF USERS**

- **married:** 6
- **single:** 3
- **total:** 9

**MIGRATION PATTERN**

- **number of moves:** -
- **rural - urban:** -
- **urban - rural:** -
- **why came to urban area:** Employment

**GENERAL: ECONOMIC**

- **user's income group:** Moderately low
- **employment:** Public sector
- **distance to work:** 3 km
- **mode of travel:** Scooter/bicycle

**COSTS**

- **dwelling unit:** -
- **land - market value:** -

**DWELLING UNIT PAYMENTS**

- **financing:** Private
- **rent/mortgage:** -
- **% income for rent/mortgage:** 25%

CASE STUDY SOURCES

- **Locality Plan:** (accurate) MAPA DE CIDADE DE GOA, L.S.B., Goa, 1968.
- **Locality Land Use Pattern:** (approximate) Field Surveys, 1975.
- **Locality Circulation Pattern:** (approximate) Field Surveys, 1975.
- **Locality Segment Plan:** (approximate) MAPA DE CIDADE DE GOA, L.S.B., Goa, 1968.
- **Locality Segment Circulation Plan:** (approximate) Field Surveys, 1975.
- **Locality Segment Land Use:** (approximate) IBID.
- **Locality Block Plan:** (approximate) MAPA DE CIDADE DE GOA, L.S.B., Goa, 1968.
- **Locality Block Land Utilization:** (approximate) IBID.
- **Typical Dwelling:** (approximate) Field Surveys, 1975.
- **Physical Data:** (approximate) IBID.
- **Socio-Economic Data:** (approximate) IBID.
- **Photographs:** Ravindra Kamat
- **General Information:** Field Surveys, 1975.
5 PANAJI, Goa
PRIVATE, MIDDLE INCOME, SHOP-CUM-HOME

LOCATION: Panaji comprises the central business district and the oldest part of Goa Urban Area. Situated at the mouth of Mandovi river, it is well connected to urban areas in its hinterland and the neighbouring towns.

ORIGINS: Formerly a fisher-folk village and later on only a humble ward of nearby parish, Taleigao, for a long time, Panaji gained importance and developed when the then Portuguese Governor, D. Pedro de Mascarenhas shifted his residence there from Old Goa. Later on, on the request of Governor Lopes Lima to the Portuguese Queen, D. Maria II, Panaji which by then had already become a little town, was given the status of a city in 1843 with all civic privileges, rights and immunities enjoyed by Portuguese cities at that time. The community later developed as a commercial centre with residential accommodation. Being a small and poor community, early settlers could ill-afford motorized transportation and predominant pedestrian mode of circulation necessitated residential facilities to be combined with commercial establishments. Out of these necessities and living pattern, evolved the shop-cum-residence dwelling environment. With

PANAJI, Goa: (top) Dwellings with commercial facility on ground floor are typical of this locality. Traditional dwellings standing in sharp contrast with modern ones characterize this locality.

(bottom) Streets in this locality are very wide. Vehicles dominate but do not control the traffic. Shaded streets are common.
more development and consequent increase in land values and dwelling costs, the community has approximately 48% of dwellings that are owned by the occupants and the rest are rented. The poor supply of housing has resulted in overcrowding of dwellings with average room occupancy of 6.4.

LAYOUT: The settlement is built around a central hillock, Altinho, and along the edge of Mandovi river. These boundaries seem to be basic determinants of its typical rectangular grid layout, with the streets running perpendicular to and parallel to the edge of the river. The major through streets are spaced at approximately 200 meters interval. Blocks are small in size, probably conditioned by predominant pedestrian mode of circulation. Average block size is about 80m x 80m. Most blocks have large family dwellings; blocks have large multi-family dwellings. There are on an average 15 lots per block. The gross density is about 118 people/ha, as of 1971.
Land use: Commercial activity is evenly distributed throughout the locality with no significant concentration along the main through-fares or around the principal open spaces. There are 4 primary schools, 3 junior colleges, 3 senior colleges, 3 hospitals and a few clinics, 1 church, a police station. There are public open markets, 2 movie theaters, several hotels and restaurants. Zones are not strongly defined, rendered unnecessary by smallness of the community. But this uniformity integrates the community with nearby smaller communities.
CIRCULATION: West Coast Highway bypasses the community on the west boundary while a minor artery branching off from it runs along the edge of Mandovi river, forming the north and the west boundary. The south side is bounded by the central hillock or Altinho that serves as a meshing line with the adjacent community of Fontainhas. The important locality circulation is along the streets that run parallel to the edge of the river.
### Locality Segment Land Utilization Data

<table>
<thead>
<tr>
<th>Densities</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>155</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>339</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>People</td>
<td>1890</td>
<td>16</td>
<td>110</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Areas</th>
<th>Hectares</th>
<th>Percentages</th>
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</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>6.20</td>
<td>38.75</td>
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<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
<td>2.90</td>
<td>18.12</td>
</tr>
<tr>
<td>Private (dwellings, shops, factories, lots)</td>
<td>6.90</td>
<td>43.13</td>
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<tr>
<td>Semi-Private (cluster courts)</td>
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<td></td>
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<tr>
<td>Total</td>
<td>16.00</td>
<td>100.00</td>
</tr>
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</table>

### Network Efficiency

- \( R = \frac{\text{network length (circulation areas served) \times lots}}{\text{circulation, lots}} \) = 265.5 m/ha
- Average Lot Area = 632.2 m²
LOCALITY: PANAJI

LAND UTILIZATION DIAGRAMS

PATTERN
Public: streets/walkways
Semi-Public: playgrounds
Semi-Private: cluster courts
Private: lots
Dwellings

PERCENTAGES
- Streets/Walkways 39%
- Playgrounds 18%
- Cluster Courts
- Dwellings/Lots 43%

DENSITY
- 118 persons/hectare

LOCALITY SEGMENT LAND UTILIZATION

1:2500
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate
<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.44</td>
<td>33</td>
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<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.89</td>
<td>67</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots) &amp; SEMI-PRIVATE (cluster courts)</td>
<td>1.32</td>
<td>100</td>
</tr>
</tbody>
</table>

**TOTAL**

**NETWORK EFFICIENCY**

\[ R = \frac{\text{network length (circulation)}}{\text{areas served (circulation, lots)}} \]

\[ R = \frac{412 \text{ m/ha}}{\text{areas served (circulation, lots)}} \]

**AVERAGE LOT AREA**

\[ = 403 \text{ m}^2 \]
PANAJI, Goa: (left) Wide streets, shaded and with angular parking facility, are common. Vehicles dominate the locality but do not control the traffic.

(center) Two-storied dwellings with commercial facilities on the ground floor in typical of this middle income locality. Bicycle is a very common mode of travel.

(right) Note the traditional dwellings standing in sharp contrast with the modern dwellings. Due to increased land values, traditional dwellings are being demolished in many parts of Panaji to be replaced by commercial buildings with residential facilities on upper floors.

CASE STUDY SOURCES

Locality Land Use Pattern: (approximate) Field Surveys, 1975.
Locality Circulation Pattern: (approximate) Field Surveys, 1975.
Locality Segment Land Utilization: (approximate) IBID.
Typical Dwelling: (approximate) Field Surveys, 1975.
Physical Data: (approximate) 1929.
Socio-Economic Data: (approximate) 1929.
Photographs: Ravindra Kamat
### Evaluations

#### Physical Data Matrix

<table>
<thead>
<tr>
<th>Category</th>
<th>Population per Category</th>
<th>% of Total Population</th>
<th>TOTAL</th>
<th>LOCALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. Baina</td>
</tr>
<tr>
<td>A</td>
<td>11,500</td>
<td>5.7</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>14,805</td>
<td>7.3</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>159,044</td>
<td>77</td>
<td>100</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>203,345</td>
<td>100</td>
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</tbody>
</table>

#### Dwelling Development

<table>
<thead>
<tr>
<th>Mode</th>
<th>Developer</th>
<th>Total Population</th>
<th>Den.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1965</td>
<td>399</td>
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<tr>
<td></td>
<td></td>
<td>1974</td>
<td>580</td>
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<tr>
<td></td>
<td></td>
<td>1980</td>
<td>219</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1980</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1980</td>
<td>118</td>
</tr>
</tbody>
</table>

#### Dwelling Unit Type

<table>
<thead>
<tr>
<th>Income Group</th>
<th>Dwelling Type</th>
<th>Popularity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>Squatter room</td>
<td>Popular</td>
</tr>
<tr>
<td>Low</td>
<td>Shanty</td>
<td>Popular</td>
</tr>
<tr>
<td>Middle/High</td>
<td>Room/Apt/...</td>
<td>Private</td>
</tr>
</tbody>
</table>

Categories A and B include VERY LOW and LOW INCOME groups and represent 13% of the urban population. Category C includes MODERATELY LOW and MIDDLE INCOME groups, representing the majority of urban population (77%).

#### Dwelling Unit Area

- In LOW and VERY LOW INCOME groups, the dwelling usually consists of one room (Shack/Tenement room). In MODERATELY LOW and MIDDLE INCOME groups, more than a single space is provided. The dwelling unit area ranges from 12m² (Baina-one room) to a high of 110m² (3 bed rooms, family room, kitchen and bathroom).

#### Dwelling Unit Tenure

- Three situations are found among VERY LOW and LOW INCOME groups.
groups a) extralegal ownership/rental, generally a characteristic of fresh migrants in the existing pockets of squatter settlements within the city; b) legal rental; c) legal ownership, both of which require payment in the form of rent to the Government or a private party. In MIDDLE and MODERATELY LOW INCOME groups, only two situations exist: a) legal rental and b) legal ownership; the latter of which is characteristic of MIDDLE/ HIGH INCOME groups whereas the former is found among migrants with stable income and institutional population.

(9) DWELLING UNIT-PERCENT INCOME FOR RENT: A clear trend emerges from the surveys: MODERATELY LOW and MIDDLE INCOME groups pay 20% or more of income for rent while rents vary from 5% of income in case of squatters to 15% in case of LOW INCOME group.

(10) LAND/LOT UTILIZATION: The case studies show very clearly that wherever lot boundary has been defined clearly, the utilization remains private among all income groups. Where lot boundaries are not defined, the utilization is semi public/public, without any user control/responsibility, increasing the land wastage. In squatter settlements, due to very little enclosed area available to accommodate an unusually large family, the dwelling is extended to cover the adjoining space, semi public/public.

(11) LAND/LOT AREA: In case of MODERATELY LOW/MIDDLE INCOME housing, the Land/lot area is not always measurable because it is shared by several dwellers or because it has no physical limits. When measurable, it ranges from 300m² in case of MIDDLE INCOME to 12m² - 20m² in the case of VERY LOW INCOME/SQUATTER Housing.

(12) LAND/LOT TENURE: Extralegal ownership/tenure is found among VERY LOW INCOME people as in case of BAINA. Legal rental is predominant in MODERATELY LOW/LOW INCOME groups (FONTAINHAS and SADDA). Legal ownership is characteristic of MIDDLE/HIGH INCOME groups.

(13) DWELLING LOCATION: The city center is mostly occupied by MIDDLE INCOME groups with shop-cum-home dwellings. The inner ring is occupied by MODERATELY LOW/LOW INCOME groups while on the peripheral functionally marginal land, the VERY LOW INCOME/squatters settlements are situated, with proximity to source of employment. HIGH INCOME population is found in urban periphery/suburbs.

(14) DWELLING TYPES: City center is characterized by shops with combined residential facilities and is an essential feature of the community. Traditional urban detached or court houses and multi-family dwellings are found throughout in MODERATELY LOW/ MIDDLE INCOME settlements. Where extended kinship families are most common. Walk-up apartments are proliferating in MIDDLE INCOME settlements while row/group dwellings are common in LOW INCOME groups.

(15) DWELLING FLOORS: Most dwellings are generally single floor units in all income groups. Walk-up apartments are accepted where high density is desired and land value is high.

(16) DWELLING UTILIZATION: Single occupancy is in the form of squatter houses and public subsidized housing. Multiple dwelling occupation is in the form of traditional urban court/detached housing and urban tenements (FONTAINHAS and PANAJI).

(17) DWELLING PHYSICAL STATE: The pattern of physical state is as follows: Bad state is the visible feature of VERY LOW/LOW INCOME groups, particularly in BAINA, SADDA and PADDRIHBAT-CHIMBEL. No investment is put into dwellings since owners do not have stable incomes. In case of MODERATELY LOW INCOME groups, bad physical state is often due to the fact that tenants do not invest in their dwellings since they do not own them. Pair state is found in some MODERATELY LOW INCOME dwellings and good physical state is typical of MIDDLE/HIGH INCOME groups.

(18) DWELLING DEVELOPMENT MODE: Incremental mode is used by VERY LOW/LOW INCOME groups, particularly in BAINA and SADDA. "Instant" is typical of city center tenements, public housing and bungalows in urban periphery.

(19) DWELLING DEVELOPER: The popular development is generally found in the lowest income groups and particularly in squatter settlements, since they lack financial resources and access to private, commercial or public institutions. The private sector deals only with land subdivisions/housing for MODERATELY LOW/MIDDLE/HIGH INCOME groups and finally the public sector is concerned with provision of "packaged deal" to its workers with LOW/MIDDLE INCOMES.

(20) DWELLING BUILDER: The expected pattern is obvious from the selected case studies: Self-help methods are employed by the VERY LOW INCOME groups to build their own houses (BAINA and PADDRIHBAT-CHIMBEL). This is also true in case of LOW INCOME settlements. Artisans are employed in case of most of MODERATELY LOW INCOME housing. Small contractors are hired by MIDDLE/HIGH INCOME groups to build individual homes. The public sector generally employs large contractors for the construction of MIDDLE INCOME housing.

(21) DWELLING CONSTRUCTION TYPES: Shacks are very common of VERY LOW INCOME groups and represent approximately 1% of the urban dwellings. Masonry/wood is the most common construction material and is typical of traditional urban tenements/detached court houses, covering approximately 75% of the urban dwellings. Masonry-Concrete accounts for about 10% of the dwellings while concrete construction is typical of public projects and represents a small percentage of dwellings, though it is proliferating.

(22) DWELLING DEVELOPMENT: YEAR OF CONSTR.: The oldest case study is PANAJI (shop-cum-home) which accommodates the city center and was built in 1845. This is followed by FONTAINHAS (urban court/detached houses). Shanties such as SADDA developed in the sixties while Shacks (BAINA and PADDRIHBAT) are very recent developments and proliferating.

(23) DWELLING DEVELOPMENT: DENSITY: Population densities are intended as indicators for each dwelling group. Samples were, therefore, taken from selected, homogeneous segments of different localities that include the land of a group of dwellings and their circulation areas. There is a clear pattern of relationship between density and income groups: lower densities characterize MODERATELY LOW/MIDDLE INCOME groups; higher densities characterize VERY LOW/LOW INCOME groups.

There is also a clear relationship between density and dwelling types: lower densities correspond to Houses/Apartments; higher densities correspond to shacks/Walk-up apartments/Tenements.
COMMUNITY FACILITIES, UTILITIES/SERVICES MATRIX

<table>
<thead>
<tr>
<th>LOCALITIES</th>
<th>Police</th>
<th>Fire Protection</th>
<th>Health</th>
<th>Schools, Playgrounds</th>
<th>Recreation</th>
<th>Water</th>
<th>Sewage</th>
<th>Storm Drainage</th>
<th>Electricity</th>
<th>Gas</th>
<th>Refuse Collection</th>
<th>Public Transportation</th>
<th>Public Buses, Trams</th>
<th>Telephone</th>
<th>Street Lighting</th>
</tr>
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<tbody>
<tr>
<td>A 11,500 5.7</td>
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<td>C 159,044 77</td>
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</tr>
</tbody>
</table>

The matrix illustrates the approximate availability of community facilities, utilities and services in the five dwelling environments. Three levels are indicated as follows:

- [ ] No provision at all
- [ ] Limited or occasional
- [ ] Adequate or normal

The population figures correspond to the inhabitants of similar dwelling systems in urban areas of Goa.
The matrix clearly indicates that the level of availability of basic services is directly related to the income level and dwelling location.

Cases '1' rate "none" and "limited". This is a squatter area, a case from VERY LOW INCOME sector and with extra-legal tenure, which explains the non-availability of community facilities and very limited utilities and services.

Cases '2' and '3' rate "HOME" and "LIMITED", except for street lighting which is adequate in both cases. The non-availability of community facilities and limited availability of utilities and services is mainly due to economic infeasibility as well as peripheral location of these areas.

Cases '4' and '5' rate "limited" and "adequate". These areas are from MODERATELY LOW/ MIDDLE INCOME sectors with inner ring and city center locations.

The following observations are made from different case studies and are arranged in terms of income groups.

**VERY LOW/LOW INCOME**: Community facilities such as fire protection, police, health, for these income groups are totally absent, because of their peripheral location and economic inability to accept services of private physicians. Recreation areas are not contemplated for this income sector, deemed infeasible on economic grounds. As a result, adjacent vacant land is left undeveloped and unmaintained for a long period of time until finally, it is invaded by squatters. Schools and playgrounds are inadequate in number. Basic services such as water, street lighting exist in all localities. However, public water supply is grossly inadequate in all cases and is scarcely complemented with natural sources of water, such as wells, springs etc. Sewerage is totally absent and is considered economically infeasible for this income sector with less and less capacity to pay for such services. Electricity is available to those who can afford it except cases with extra-legal tenure such asbasename. Paved roads are absent within the localities and those which form the boundaries of these localities existed even before the settlements came up. Almost in all these localities, circulation areas are undefined and can hardly be differentiated from other semi-public areas. Services such as gas and telephone are not within economic reach of this groups.

Recreation: Cinema is the major form of recreation and cinema houses are scattered in urban areas. Parks and open spaces are adequate in upper income sectors. Seaside beaches adjacent to upper income localities are developed for the tourists while there are undeveloped beautiful beaches adjacent to some VERY LOW INCOME localities.

**WATER**: Public water supply is mainly from taps while tube wells are provided in the LOW INCOME localities. In addition, springs and wells, which are the traditional sources of water supply, are also found in abundance in all localities. Public water supply is limited to 3-4 hours in the morning and the same period in the evening in LOW INCOME localities.

**Sewage**: Water borne sewage network is provided in major urban areas; however, all dwellings systems are not connected to it for economic reasons. Septic tanks and "pig" latrines are most common. VERY LOW/ LOW INCOME localities are devoid of any such facilities.

**Storm drainage**: Storm drainage is found to be inadequate in monsoon season in VERY LOW and LOW INCOME localities. Flooding of these areas is very common. UPPER INCOME localities have adequate storm drainage.

**Electricity**: It is, generally available if land tenure is legal. But being expensive, it is inaccessible to V. LOW INCOME sectors. Majority of this population uses oil lamps.

**Gas**: There is no service network of gas supply for the city. It is supplied in cylinders and is very expensive as cooking fuel and beyond the economic reach of majority of the population. Dry cowdung is the most common substitute.

**Refuse Collection**: For MODERATELY LOW/ MIDDLE INCOME groups, city collects refuse for six days in a week. Since no specific containers for refuse collection are provided by the city, waste is dumped along the roadside to be picked up by Municipality trucks. In LOW INCOME localities, most of the waste that is produced is organic and is burnt from time to time by the individuals.

**Public Transportation**: It is generally adequate in all residential areas.

**Paved Roads**: MIDDLE/MODERATELY LOW INCOME localities have paved roads and walkways. Paved roads normally form boundaries of LOW INCOME localities. But roads within these localities are either not defined or not paved.

**Telephone**: Its supply is so scarce that even the UPPER INCOME groups find it difficult to acquire it.

**Street Lighting**: It is provided in almost all localities, except those with extra-legal tenure.
The five case studies of Goa Urban Area are the representative models of existing housing situations which illustrate different cases of land utilization. There exist, however, other dwelling/land situations which have been proliferating in the post-independence era (since 1962). Though these do not house considerable proportion of population at the present, the trend is towards acceptance of these systems more and more due to their profitability to developers, higher population densities and accessibility to lower income groups.

The case studies and other dwelling/land situations which have not been included in this study have been distributed in the charts in following two pages in an attempt to relate them to their originating models and to see them in a broader time/process perspective.

The existing housing models are the most valuable source of information or reference in formulating urban land policies and housing programs. The models provide a guide to general, yet, basic questions of land use, land distribution and land subdivision. The models also provide a guide to more specific questions: How do they relate to different cultures and values? What range of population densities do they permit? To what income groups are they accessible? How efficient is the land utilization which they permit?

It is important to emphasize that from the seven models described on following pages, only three are Indian models, two are Universal and two are European. Models permit medium/high densities, with the exception of the model VII which provides low/medium density. Two models are accessible to very low income groups while four are accessible to low/moderately low income groups and two are accessible to middle/high income groups. Three models have good land utilization and others have bad land utilization. These models have to be improved in terms of land utilization and safety from disappearance.

### Chart: ORIGINA MODEL

<table>
<thead>
<tr>
<th>Physical Characteristics</th>
<th>Population Density</th>
<th>Land/Layout</th>
<th>Users</th>
<th>Condition</th>
<th>Comments</th>
</tr>
</thead>
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</table>

**Indian Culture:** Permits medium/high densities. Accessible to low/very low income groups. Good land utilization. Provides semi-private space.

Model represents a survival situation that exhibits good land utilization, maximization of small group/private responsibility. Model has potential for economic provision of communal facilities and utilities.

### Chart: TRADITIONAL RURAL/VILLAGE HOUSES

- **Grouped in compounds, 1 story.**
- **MEDIUM/High density.**
- **Social structure/organization is major constraint.**
- **INDIAN traditional model used by "ADIVASIS" or peasant groups.**

Model was developed in India. Inhabited after independence by MIDDLE INCOME groups engaged in trade/commerce.

### Chart: URBAN COURT/DETACHED HOUSES (TRAD.)

- **Aligned in narrow lots, interior courts, 1-2 stories with service alleys.**
- **MEDIUM/High density.**
- **Social structure, people's activities/movement is major constraint.**
- **HINDU traditional model used by MIDDLE INCOME groups.**

Model was developed in India for the then prevalent extended kinship families. Inhabited by MIDDLE INCOME groups engaged in trade/commerce.

### Chart: URBAN SHOP-CUM-HOME

- **Clustered in large lots, 2-3 stories in compact configuration.**
- **MEDIUM/High density.**
- **Economic use of land is major constraint.**
- **Traditional model used by MIDDLE/HIGH INCOME groups.**

Model was developed in India. Inhabited by MIDDLE INCOME groups engaged in trade/commerce, as rental accommodation, original owner having moved out to suburban BUNGALOWS.
SQUATTER HOUSE/CLUSTERED ROOMS
Groups of shanties clustered open space. Single rooms.
High population density.
Social structure/organization is major constraint. Higher densities and shared utilities.
VERY LOW INCOME groups.

Model was developed in India.
Did not exist.
VERY LOW INCOME rural migrants. Exists as an informal solution to deficiency of official planning and housing programs, in open defiance of all planning legislation, to provide acceptable shelter for present needs of urban poor. Found in major urban areas. Proliferating.
BAINA and SADDA.

INDUSTRIAL ROW HOUSE/CHAWLS
Aligned in narrow lots, 1 story.
MEDIUM/HIGH density.
Economic use of land is major constraint.
XIX Century EUROPEAN model used by LOW INCOME industrial labor.
Model was developed in India.
Did not exist.
LOW INCOME industrial labor; developed concurrently with industrial growth as residential facility for LOW INCOME migrants.
Growing by accretion.
Not included.

WALK-UP APARTMENTS
Varied group configuration in shared land, groups of 2-4 apartments/floor, 3-4 stories.
MEDIUM/HIGH density.
Higher density is major constraint.
XIX EUROPEAN, U.S.A. model used originally by MIDDLE INCOME groups at public housing.
Model imported to India in XX Century.
Did not exist.
LOW/MEDIUM to MIDDLE INCOME groups. Developed concurrently with industrial growth as residential facility for LOW INCOME migrants.
Growing by accretion.
Not included.

SMALL URBAN DETACHED/BUNGALOW
Isolated in large piece of land, 1-2 stories.
LOW/MEDIUM density.
Economic use of land is relative constraint.
XIX Century Colonial model used by UPPER INCOME groups.
Model imported to India in XX Century by EUROPEAN.
HIGH INCOME groups but not very common.
Used by MIDDLE/HIGH INCOME professionals and businessmen.
Proliferating.
Not included.

UNIVERSAL
Permits high population density.
Accessible to VERY LOW INCOME groups.
Bad land utilization but provides for extended kinship/nucleated families with appropriate housing tenure; limited facilities/utilities.
Model does not provide private/semi-private space for dwellings and is substandard for that reason. Has potential for gradual upgrading with public and popular initiative.

WESTERN culture.
Permits MEDIUM/HIGH population density.
Accessible to LOW INCOME groups.
Does not provide private/semi-private land for dwellings.
Model is substandard for above reason.

UNIVERSAL
Permits MEDIUM/HIGH population density.
Accessible to MIDDLE/HIGH INCOME groups.
Bad land utilization.
Model should be encouraged with improvement to use land more efficiently, to allow user control and responsibility over shared land.

WESTERN culture.
Permits LOW population density.
Accessible to UPPER MIDDLE/HIGH INCOME groups.
Wasteful land utilization in urban periphery.
Model is proliferating in urban periphery and in suburbs.

LAND USES

THE PAST

THE PRESENT

THE FUTURE
LAND UTILIZATION: PATTERNS, PERCENTAGES, DENSITIES

1 BAINA
Popular Very low income squatters
Percentage of land for streets and walkways not a true representation of land utilization due to undefined lot lines/responsibility. High percentage of public land. Only private land is the sheltered area. Low percentage of dwelling area, very poor living conditions; medium/low density; extra-legality of land/lot tenure, the issue.
R = N/A

2 PADRIBHATT
Public Very low income Serviced plot
High percentage of land for streets and walkways. Only private land is the sheltered area. Medium percentage of land for lots. Medium/high population density. Poor network efficiency.
R = 618 m/ha

3 SADDA
Popular Low income Rooms
Percentage of land for streets and walkways not a true representation of land utilization. Medium percentage of land for lots. Medium/low population density. High percentage of public land due to undefined lot lines and circulation.
R = 236 m/ha

4 FONTAINHAS
Private Moderately low Houses/rooms
High percentage of land for streets and walkways. Medium percentage of land for lots. Low population density. Fontainhas is a burden to Municipality in terms of extension of services, due to its poor layout.
R = 270 m/ha

5 PANAJI
Private Middle income shop-cum-home
R = 266 m/ha

PERCENTAGES

<table>
<thead>
<tr>
<th>Streets/Walkways</th>
<th>Playgrounds</th>
<th>Cluster Courts</th>
<th>Dwellings/Lots</th>
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PERCENTAGES

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DENSITY

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<th>Persons/Hectare</th>
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</tr>
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</table>

20 persons
URBANIZATION MODEL
INTRODUCTION

Until 1960, Goa experienced comparatively a slow growth in its population. This had a basic advantage of not overstraining its natural resources. However, the emerging pattern, in the post-liberation period (since 1962), is rather contrasting. Population increases and industrial growth have been a singular feature of the decade (1965-75). The annual growth rate of the urban population has been 13.27%. Increasing population densities within the urban centers of Goa are causing vacant land and in many cases agricultural land surrounding the urban areas to urbanize. The developments have been piecemeal and not only out of context with the existing situation but also without a clue of what might come, thus hampering comprehensive development. In the absence of proper guidelines and development plans, the fault has not only been of developers. Poorly conceived and inefficient layouts of public projects have resulted in wastage of public land.

The problem is, therefore, to provide for urbanization in a process most adaptable to change in order to accommodate future population growth and social mobility, in a most comprehensive manner. It is necessary to anticipate variety of land use functions initially and allow for accommodation of other land uses in the future, based on new priorities.

As a national priority, agricultural land on the periphery of Panaji should be conserved at any cost, despite mounting pressure to urbanize from increasing population densities. This means the future urban growth of Panaji has to skip the peripheral agricultural land to locate itself on Bambolim-Santan plateau. Due to the location of this area to south, south-east and east of the city center, and the presence of a major circulation network, the selected site and its environs will urbanize as the out-growth of Panaji. The project is intended to develop in a 20-year time-frame.

The intent of this study is:
- to provide a set/framework of related aspects/determinants for comprehensive discussion/evaluation/policy recommendation.
- to develop/define an approach to the problem of low income residential development, recognizing the limitations and resources of low and very low income groups and the public sector.
- to act/serve as catalyst for the various factors essential for a successful comprehensive planning strategy for the land ripe for urbanization.

The project is more properly a study for the development of a selected site. The proposal focuses on the development of the site in terms of physical layout and land subdivision. The overall physical plan, including land use and circulation layout, is the basic element of any settlement. Errors of misconceptions at the level of physical plan will affect all other aspects and details of the project. Layout is also a primary determinant of individual/Governmental responsibility and control within the community and of efficiency in terms of cost and functional viability of a development. Above all, physical layout is the most permanent aspect of a settlement.
BASIC PROJECT DATA

Project
The project is more properly a study for the development of a selected site which is located in Panaji Standard Urban Area which is the projected growth area of Panaji by 1991. This provides the time-frame for the development of the project.

The site
The project site is strongly defined by natural as well as man-made boundaries and therefore should be considered as a whole.

LOCATION:
- Bambolim-Santan Plateau, Panaji Standard Urban Area, Tiswadi taluka in Goa, India.
- Approximately 5 km south-east of Panaji city center, adjacent to Bambolim army camp and Sites & Services Project at Padribhatt-Chimbel.
- Within the area of projected growth of Panaji.

ACCESS:
- Panaji-Santan-Goa Velha Road
- Chimbel-Morambi o Grande Road
  Proposed Ring Road along Bambolim-Santan Plateau, linking West Coast Highway and east-west National Highway.

AREA:
- Defined by topographic as well as man-made barriers/boundaries.
- Approximately 318 hectares

MAIN CHARACTERISTICS:
- Triangular site, flat in centre, steep slopes on boundaries.
- The site is planted with trees, minor structures on site.
- Area of laterite soil suitable for 4-5 story construction.
- Land is privately held by several people but can be acquired by the Government for any public purpose under Land Acquisitions Act 1939.

The plan
INTENDED USE:
- Primarily residential with supporting commercial and community services.

POPULATION:
- 60,000 people at saturation.

LAND-USE
- Private, residential: 60% - 70%
- Public facilities: up to 20%
- Circulation: up to 15%

DEVELOPMENT GOALS:
- To provide the maximum possible opportunity for all classes of people to live within.
- To provide housing and/or sites for very low, low and medium low income groups.
- To provide alternative housing options/lot sizes, recognizing the resources/limitations of low and very low income groups:
  1. Progressive Development Units
  2. Core Units
  3. Tenement Units
  4. Commercial/Residential Units
  5. Serviced Lot-cluster Units

PLANNING ELEMENTS/INNOVATIONS
- The physical plan provides for maximum private responsibility/control in the development and maintenance of the project.
- Flexible planning allows maximum accommodation to change.
- Cluster provides the main residential component.
- The physical plan provides developer with framework of guidelines, thus preventing piece-meal/out-of-context development.
Panaji Standard Urban Area
SITE CONTEXT: LAND USE
**Panaji Standard Urban Area**

**SITE CONTEXT: CIRCULATION**

Panaji Standard Urban Area covers the projected growth area of Panaji by 1991, including the intervening areas that are likely to be urbanized by then. Such an area comprises of scattered urban and agricultural settlements with Panaji city center as its nucleus. The presence of large stretches of agricultural land separate the various settlements, giving rise to the urban sprawl. However, these settlements are well connected to Panaji and to each other by a major circulation network, facilitating easy transportation between them.

The West Coast Highway (Panaji - Agacaim Highway) and the East - West Highway (Ponda - Panaji Road) intersect at Panaji. These are supported by minor arterials like Panaji - Santan - Goa Velha Road. The major and the minor arterials which radiate from Panaji are intersected by a series of collector streets which join up to form a ring road connecting the intervening settlements.

With topographical constraints limiting the continuous growth of Panaji and high national priority given to conservation of agricultural land, the future urban growth of Panaji has to locate itself on Bambolim/Santan plateau which partially encircles Panaji urban agglomeration and forms geographical boundary of Panaji Standard Urban Area, and on Porvorim plateau across the Mandovi river. However, Porvorim plateau has established itself as high income residential development following high land values after the Mandovi river bridge was completed. This leaves Bambolim/Santan plateau as potential low income residential development.

Considering the economic relationship that would develop between the site and Panaji, a ring road along the plateau, connecting the two highways, is proposed to reduce the time - cost distance (effective distance between them. The proposed road will also connect the site to nearby employment sources such as Chimbel mining/quarrying area. The ring road follows quiet closely the existing mud roads/pedestrian paths developed as a result of still existing primitive methods of commodity transportation by manual labor.

The major circulation network connects Panaji Standard Urban Area with urban centers in the vicinity.
The present urban population growth rate for Goa is 13.2% per annum and is escalating. This trend is likely to continue in the foreseeable future. The increasing population densities within the urban areas are causing vacant land and agricultural land surrounding the urban centers to urbanize. The process of urbanization is causing land values in the region to rise in relation to demand over a period of time. Consequently, present land owners in the region have started to subdivide and develop the land in modes most economically beneficial to themselves.

Future land and property holders in these developments, in turn, will eventually subdivide, rent or sell to realize capital gain.

It is, therefore, necessary to incorporate basic planning projections into the study for proposed development of the region.

General projections are made as regional or external (to the site) influences on the developing site and as internal influences on the developing site, based on regional trends and patterns; and identifying the relevant policy issues involved.
LAND USE PROJECTIONS

COMMERCIAL GROWTH: - Predominant commercial growth in the region will continue to develop in linear pattern along major circulation network and transportation routes.
- Predominant commercial growth will not occur along:
  1. Limited access streets
  2. Neighbourhood streets
  3. Paths
- Scattered convenience (neighbourhood) commercial areas will develop in a random pattern within neighbourhood roads, the location of such, generally, being on corner lots or intersections.

RESIDENTIAL GROWTH: - Surface/spread development

LIGHT INDUSTRIAL GROWTH: - Spot/point development

PUBLIC SERVICES (Non-utilities): - Spot/point development

EDUCATIONAL GROWTH: - Spot/point development

ON SITE COMMERCIAL LAND USE PROJECTIONS

Trend: - Predominant commercial activity will develop along circulation modes previously described.
- Areas at the intersections of major transportation routes are the most probable with respect to external forces.

Policy Issues: - Land values and population density can be expected to be highest in these areas over a period of time.
- Initially, these areas will not command significantly higher purchase prices, but with intensification of development over a period of time, they will command the highest land values.

Recommendation: - These areas should be planned in such a manner that they will be able to re-adjust to higher land values and other priorities through incremental planning.
LAND VALUE PROJECTIONS

REGIONAL INFLUENCES

Trend: As commercial and light industrial land use functions develop along the corridors previously described, the initial land purchase prices of individual parcels will rise in relation to demand for growth and expansion.

Policy Issues: Land values on peripheral and adjacent parcels will rise as well.
- Population density can be high in relation to this area.

Recommendations: Peripheral land areas on our site should be planned in a flexible manner in order that re-adjustment over time to other priorities may be accomplished to reflect these external land value projections.
- Land use functions in these peripheral areas must justify corresponding land value.

Presently, nodal commercial activity exists along Panaji - Agacaim Highway and East - West Highway. This can be expected to continue and increase due to the urbanization spotted along and between these corridors.

ON SITE LAND VALUE AND POPULATION DENSITY PROJECTIONS

Trend: As a result of commercial growth patterns, land values and population density will be highest in the areas of commercial activity.
- In urban areas of Goa, it is customary, in low/middle income residential developments, for the place of residence and work with regard to most commercial activities to be synonymous. The highest population density will be found here.

Policy Issues: Initially, the development will not be large enough or diverse enough to attract extensive commercial activity. But unless the use of land permits future expansion of commercial activity and other high priorities, the development can be expected to stagnate or grow in constrained fashion.

Recommendations: Land use functions should be allocated according to priorities, stability and flexibility for growth from initial stage to high density stage.
PLANNING POLICIES/GOALS

PRIMARY USE: DEVELOPMENT OF A RESIDENTIAL COMMUNITY
- The primary use of the site shall be residential.
- The following supporting land uses are implied: schools, playgrounds and parks, commercial facilities and markets, clinics and hospital.
- A commercial cum light industrial zone along the main central spine has been contemplated.

TARGET INCOME GROUPS: PREDOMINANTLY LOW INCOME SECTORS
- The development will aim at a community with predominantly LOW INCOME groups:
  - Middle: U. S. $80 - 200 per month
  - Low : U. S. $40 - 80 per month
  - V. Low: less than U.S. $40 per month

INTENSITIES OF LAND USE: MEDIUM DENSITIES
Range of gross densities planned for: 200 to 300 p/ha
- 200 p/ha assumes predominantly one story construction
- 300 persons per hectare assumes: in reality and over time, densities will be at least 50% higher than above as a result of:
  1. expansion to two or more stories
  2. higher room occupancies as a result of subletting
  3. encroachment into open space

FORMS OF LAND TENURE: PRIVATE OWNERSHIP, CONDOMINIUM OWNERSHIP AND RENTAL
- The development will offer a variety of tenure options which will include, predominantly, rental and private ownership.
- Horizontal cluster condominium will be provided.
- The cluster condominiums will allow flexibility in land sub-division.
- Rental options shall be provided for the very low income sector, which over a period of time could gradually be converted into private ownership properties.

FINANCING GROUPS: BOTH PUBLIC AND PRIVATE
- The magnitude of the proposed development precludes funding from a single source or agency. Both public as well as private funds should be used in the development of the site.
- Public financing is needed to build the residential infrastructure.
- Private investment will be encouraged in construction of dwellings.

CIRCULATION: INTERNAL/EXTERNAL CO-ORDINATION
- The circulation network will provide a basic framework for the development of the site.
- The internal network will be connected to the external network as follows:
  - To Chimbel-Morambio Grande Road in west boundary. Access to east-west highway and Panaji City center services.
  - To Panaji-Santana-Goa Velha Road in south-west boundary. Main access to Panaji City center and west coast highway.
  - To future Ring Road across the site. Main access to highway system and industrial zone.

UTILITIES: CONNECTORS TO EXISTING NETWORK
- All utility systems will be interconnected into existing networks on Bambolim plateau as follows:
  - Water & electricity: into existing networks serving Bambolim plateau residential development and the army camp.
  - Sewer: in the absence of any sewer line, installation of sewer line on the plateau will be proposed.

DEVELOPMENT MODE: INCREMENTAL GROWTH
- The site will be developed incrementally.
- Implementation will be staged into:
  1. Planning Design
  2. Construction, Allocation of Lots
  3. Habitation
  4. Evaluation & Revision
- Progressive improvement of the site and services areas within each stage of project development will take place over a period of time.
THE SITE

AREA:
The site covers an area of approximately 318 ha, all of which is available for residential development and its supporting land uses.

BOUNDARIES:
Site strongly defined by topography and man-made features. South-west: Panaji - Santan - Goa Velha Road On remaining sides, the site is bounded by 10-15% slope.

ACCESSES:
Existing Chimbel - Morambique Grande Road forming cross-link with Panaji - Santan - Goa Velha Road; proposed ring road along the plateau.

LOCATION:
Walking distance to nearest source of employment in Chimbel mining/quarrying area, 5 km from PANAJI city center.

TRANSPORTATION:
Public transportation to city center and major urban areas limited to buses and taxis is available within a 13 minute walking distance on Panaji - Agacaim Highway. Convenient but very limited public transportation is also available along Panaji - Santan - Goa Velha Road.

TOPOGRAPHY/SOIL CONDITIONS:
Triangular, flat in center, steep slopes on boundaries in north and east. Laterite soil/rock.

LAND COSTS:
Compatible for low cost residential development.

UTILITIES: FEASIBLE CONNECTION OF ELECTRICITY & WATER LINES TO EXISTING NETWORKS
- Installation of sewer line is feasible considering the magnitude of the development of the site as well as the existing residential development.

EXISTING STRUCTURES, BASEMENTS, RIGHT OF WAY
- The site has a road cutting across it, forming a cross-link with a minor artery on south-west boundary, thus providing a good access. Except for a few minor structures, site is free of any major structures.

OTHER FACTORS:
VIEWS: Being located on a plateau, site enjoys commanding view of surroundings.
DUST, SMOKE, ODORS: None at the moment.
FLOODING: The site is well drained.
HAZARDS: Lots bordering the steep slope on north-west and south-east boundaries should be fenced to prevent accidents. Overhead power lines should meet public safety requirements.
AIRPORT NOISE: None at the moment.

RECOMMENDED INVESTIGATIONS:
- Estimates of time/cost for removal/clearance of cashew plantations/wild growth.
- Soil conditions should be thoroughly investigated for installation of sewer line.
CIRCULATION PLAN

CIRCULATION PLAN:
Circulation network provides a primary framework around which primary as well as supporting land uses of community are organized. As well as circulation function, circulation network provides utility spine throughout the site. The land that is utilized by the circulation network is considered to be under public ownership providing for movement of both pedestrian and vehicular access. The circulation layout is based upon:

1. It has been determined that the layout that best serves the site is a set of main through streets running transverse to the proposed ring road running along the ridge of the site, with local transverse collector streets.

2. The most direct/immediate access is from Chimbel-Morambim O Grade Road cutting across the site in west boundary and intersecting with Panaji-Santan-Goa-Velha Rd. as well as Panaji-Agacaim Highway (west coast highway), thus providing access and link from north, west and south of the site. The proposed ring road will provide direct access to east-west highway.

3. Recognition of the predominant pedestrian mode of circulation within the residential development.

CIRCULATION MODES: The following circulation conditions are considered in the plan.

MODE I: Exclusive use by pedestrians. Example: pedestrian walkways, within cluster courts.

MODE II: Pedestrian and vehicles mixed; pedestrians dominate over vehicles used mainly as accesses to lots, clusters and community facilities. Example: local streets in residential area.

MODE III: Vehicles and pedestrians mixed; vehicles dominate but do not control circulation; controls are established for the protection of pedestrians:

crosswalks, traffic lights, rails. Example: main commercial street, transverse connectors.

MODE IV: Vehicles and pedestrians: vehicles dominate, relatively high speed, with large volume of traffic flow. Use by pedestrians and cyclists to and from employment centers. Example: proposed ring road, Panaji - Santan - Goa Velha Road
CIRCULATION PLAN

AGRICULTURAL LAND

MODE IV
MODE III
MODE II
MODE I

SITE AREA COMPUTED, CORRESPONDING TO THIS CONTOUR LINE

TO CITY CENTER

PROPOSED RNG ROAD

AGRICULTURAL LAND

Site CIRCULATION

1:20000
LAND USE PLAN

Gross area within boundaries: 318 ha
Available land for development: 318 ha  100%

PUBLIC LAND:
Circulation (total length): 41.76 ha  13.38%
Schools, playgrounds, open areas: 35.63 ha
Other public facilities like markets, community hall, hospital: 19.13 ha  19.11%

PRIVATE LAND:
Residential, commerical, light industrial: 214.85 ha  67.56%

The site has a potential for population of 60,000-90,000 at saturation (time frame: 20 years). This target may seem to be higher than what may be contemplated considering the present growth potential of Panaji S.U.A. However, the site has a geographical identity and should be planned as a whole but developed in stages.

LAND USE PLAN shows the various land uses as follows:

RESIDENTIAL
The site development will be a medium sized town and should be planned accordingly not only in terms of community services but also in terms of: different income groups, diversity of choice in land tenure, diversity in housing programs, public and private developers and funding.

PUBLIC FACILITIES:
Schools and playgrounds have been located at the periphery recognizing their need for future expansion and space requirements. Other public facilities like markets, community halls, etc. have been centrally located for easy accessibility as well as convenient transportation. Open areas within these facilities are also intended to be used occasionally for religious, cultural or other festivities.

COMMERCIAL/LIGHT INDUSTRIAL USES are planned in such a manner that they will be able to re-adjust to higher land values and other priorities through incremental planning. This is because in initial development these areas (along major circulation modes) will not command significantly higher purchase prices but with intensification of development, will command the highest land values.
Site
LAND USE PATTERN
DEVELOPMENT PLAN

The process of urbanization is subjected to the pressures of change over time. In order to allow for flexibility in land developments, it may be necessary to predict:
- Those parcels of land which will have the greatest stability over time...those with the least probability that changes will be necessary in them.
- And those parcels of land that will have the least stability over time...those with the greatest probability that changes will be necessary in them.

One way of accomplishing this is to anticipate a variety of land use functions initially and allow for accommodation of other land-use functions in the future, based on new priorities. The structuring of the land development process through staging can reflect the anticipated and unanticipated changes necessary for future growth. In part, incremental planning can provide a means for development with the least waste of public and private resources and at the same time, allow for the greatest flexibility and efficiency of resources.

INITIAL DEVELOPMENT
The initial development should be located in an area of the site that permits:
- Easiest/direct access from the existing Panaji - Santana - Goa Velha Road and adjacent Chimbel - Morambo Grande area
- Convenient pedestrian access to public transportation or extension of public transportation.
- Immediate utilization of existing/available infrastructure and services - streets, adjacent community facilities, commercial areas and markets, small industries, schools. As a result, costs would be minimized, resources channelized towards higher priorities.

The initial development should include the following:

LAND USE - Residential, commercial, light industries, public facilities, open areas.

CIRCULATION - Pedestrian walkways, local streets and main commercial through street.

INFRASTRUCTURE - Primary networks.
It may be noted that land use, circulation and development are inseparable/interacting systems.

SUBSEQUENT DEVELOPMENT:
Within the scope of this study, only the direction of growth may be anticipated as shown by arrows in the accompanying plan. The growth is proposed to be incremental parallel to PANAJI-SANTANA-GOA VELHA Road and subsequently, along the ridge of the site along proposed ring road in north-east direction.

The plan permits a progressive incorporation of the different land uses, circulation, infrastructure and facilities; a compact development, characteristic of regional settlements.
**BLOCKS, LOTS AND LOT CLUSTERS**

BLOCK is a portion of land bounded and served by lines of public streets.

LOT is a measured parcel of land having fixed boundaries and access to public circulation.

LOT CLUSTER is a group of lots (owned individually) around a semi-private common court (owned in condominium).

CONDOMINIUM is a system of direct ownership of a single unit in a multi-unit structure. The individual owns the unit in much the same manner as if it were a single family dwelling; he holds direct legal title to the unit and joint interest in common areas and underlying ground.

PROPOSED: BLOCK LAND SUBDIVISION/BLOCK, LOTS, LAND CREW:
Characteristics of the proposed layout illustrated above:
- Lots are grouped around a common court that serves as access as well as a semi-private open space. This court is owned in condominium by the lot occupants who control, share the use of, and share the responsibility for the maintenance of the court.
- Minimization of public land per circulation and length of utilities.
- Minimization of public ownership of land to reduce public responsibilities and control for its maintenance.
- Maximization of number of families that can be given a legal land/lot tenure through effective land utilization.
- Minimization of cost of development by adopting dwelling component approach rather than conventional "Packaged Deal" approach.

The average size of block is determined by the anticipated circulation mode with corresponding street widths. An average block is 100m x 150m but varies in size and shape according to the site conditions/limitations.

The block layout proposed is based on the following points:

**MINIMIZATION OF:**
- Public ownership of land
- Lengths of infrastructure per area served
- Government burdens, responsibilities and services

**MAXIMIZATION OF:**
- Private ownership of land
- Private responsibility/control

**PROPOSED LAYOUT PERMITS:**
- Flexibility in land use
- Flexibility in residential densities and housing options within the same lot structure
- Different types of land tenure

Major options provided are horizontal condominium, individual lots and vertical condominiums. The location of these is governed among many factors by land values.

Different lot sizes available are: large lots along major circulation modes, streets (exterior-interior lots) and small sized lots within the periphery formed by large and medium lots (interior lots).

Traditional living pattern emerging out of mutual dependency and reflected in design of lot clusters which constitute a block. Here priorities are ruled by need rather than a style/discele. The physical plan is, thus more properly, a visual expression of the values.
URBANIZATION MODEL:
Blocks, Lots, Lot Clusters

PROPOSED
Block/Lots Land Use

PROPOSED
Block/Lot Circulation

URBANIZATION MODEL LAND UTILIZATION DIAGRAMS

PATTERN
Public: streets/walkways
Semi-Public: playgrounds
Semi-Private: cluster courts
Private: lots
dwellings

PERCENTAGES
Streets/Walkways 13
Playgrounds 19
Cluster Courts 19
Dwellings/Lots 68

DENSITY
Persons/Hectare 200
30 persons
GLOSSARY

The criteria for the preparation of the definitions have been as follows: "Definitions from Webster's Third New International Dictionary," Merriam-Webster, 1971. -SECOND EDITION definitions from The Urban Settlement Design Program (U.S.D.P.) Files. They are used when existing sources were not quite appropriate/satisfactory. Words included for specificity and to focus on a particular context are indicated in parentheses. Sources of definitions are indicated in parenthesis.

ACCESSES. The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, and other systems as: waterways, airlines, etc.) (U.S.D.P.)

ACTUAL LAND COST. "The cost of land..." set solely by the level of demand. The price of land is not a function of any cost conditions; it is set by the laws of supply and demand in competition." (Burner, 1971)

AD VALOREM TAX. A tax based on a property's value: the value taxed by local governments is not always or even generally the market value, but only a valuation for tax purposes. (U.S.D.P.)

AIRPORT DISTURBANCE. The act or process of destroying the rest, tranquility, or settled state of the (site by the annoyance of airport noises, vibration, hazards, etc.) (Merriam-Webster, 1971)

AIRPORT ZONING RESTRICTIONS. The regulation of the height or type or structures in the path of moving aircraft. (Abrams, 1971)

ALTERNATIVE CURRENT (A.C.) (an electric current) that reverses its direction of flow at regular intervals of time.

AMENITY. Something that contributes to physical or material comfort or convenience, or which contributes satisfaction rather than money income to its owner. (Merriam-Webster, 1971)

ANERGIES. Anergies (amp) are a measure of the rate of flow of electricity. It is somewhat comparable to the rate of flow of water (quantity/time). A steady current produced by one volt applied across a resistance of one ohm. (STC 45-7, 1953)

APPROVAL. An estimate and opinion of value, especially one fitted to judge. (Merriam-Webster, 1971)

APPROACH. The main routes external to the site (pedestrian streets, and roads) by which the house is reached from other parts of the urban context. (U.S.D.P.)

ASSESSED VALUE. A valuation placed upon property by a public officer or board as a basis for taxation. (Kays, 1971)

ASSESSMENT. The valuation of property for the purpose of levying a tax or the amount of the tax levied. (Kays, 1971)

BACKFILL. Earth or other material used to replace material removed during construction, such as in culverts, trenches and behind bridge abutments and retaining walls or between an old structure and a new lining. (Wepka, 1972)

BACKFILL. (A boundary) as a topographic feature or a physical or psychological quality that tends to separate or restrict the free movement (to and from the site). (Merriam-Webster, 1971)

BETTERMENT (TAX). A tax on the increment in value accruing to an owner because of development and improvement work carried out by local authorities. (U.S.D.P.)

BINER DRAIN. A transitional layer of bituminous paving between the crushed stone base and the surface course (DePina, 1972)

BITUMINOUS. A coating of or containing bitumin; as asphalt or tar. (Wepka, 1972)

BLOCK. A block is a portion of land bounded and served by lines of public streets. (U.S.D.P.)

BOUNDARY. Something (a line or area) that fixes or indicates a limit or extent (of the site). (Merriam-Webster, 1971)

BUILDING CODE. "A body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating the construction and occupancy of buildings, and the use of private land in order to preserve open space and protect certain natural features and structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)

BUILDING DRAIN. Lowest horizontal piping of the building drainage system that discharges discharge from soil, waste, and other drainage pipes. It is connected to the sewer system. (STC 45-7, 1953)

BUILDING MAIN. Water-supply and fitting from the water main or other source of supply to the first branch of the water-distribution system of a building. (STC 45-7, 1953)

CCESS POOL. An underground catch basin that is used where there is no sewer and into which household sewage or other liquid waste is drained to permit leaching of the liquid into the surrounding soil. (Merriam-Webster, 1971)

CIRCULATION. System(s) of movement/passage of people, goods from place to place: streets, walkways, parking areas. (U.S.D.P.)

CLAY. A malleable colloidal substance, plastic when moist (crystalline grains less than .0002mm in diameter). (Merriam-Webster, 1971)

CLEAROUT. A plug or similar fitting to permit access to traps or sewer lines. Clearouts are usually used at turnouts and other points of collection. (STC 45-7, 1953)

CLIMATE. The average condition of the weather at a particular place for many years as exhibited by temperature, wind, precipitation, sun energy, humidity, etc. (Merriam-Webster, 1971)

COLLECTION SYSTEM. The system of pipes in a sewage network, connecting service, collection lines, manholes, laterals, mains. (U.S.D.P.)

COMMON SEWER. A sewer that carries both storm water and sanitary or industrial wastes. (Wepka, 1972)

COMMUNITY. The people living in a particular place or region and usually linked by common interests: the region itself; any population cluster. (U.S.D.P.)

COMMUNITY FACILITIES/SERVICES. Facilities/services used in common by a number of people. It may include: schools, health, fire, police, public transportation, community center, etc. (U.S.D.P.)

COMMUNITY RECREATION FACILITIES. Facilities for activities voluntarily undertaken for pleasure, fun, relaxation, exercise, and to release from boredom, worry, or tension. (U.S.D.P.)

CONSUMER. A constituent part of the utility network. (U.S.D.P.)

CONDOMINIUM. Condominium is a system of direct ownership of a single unit in a multi-unit whole. The individual owns the unit in much the same manner as if it were a single family dwelling, subject to a legal title to the unit and a proportionate interest in the common areas. Two types of condominiums are recognized: HORIZONTAL: detached, semi-detached, row-building; VERTICAL: walk-up, high-rise dwelling types. (U.S.D.P.)

CONDUCTORS. Materials which allow current to flow such as aluminum, copper, iron. (STC 45-7, 1953)

CONDUIT. A pipe or other opening, buried or above ground, for conveying hydraulic traffic: pipelines, cables, or other utilities. (Wepka, 1972)

CONSERVATION EASEMENT. An easement acquired by the public and designed to open privately owned lands for recreation and enjoyment. Conservation easements are used to preserve private land in order to preserve open space and protect certain natural features and structures within the city. (BOCA, 1967)

CONSTRUCTION BOARING. Subgrade boring done at the planned location of all infrastructure and building footings and roadway sub-fabes for design of foundation systems. (Merriam-Webster, 1971)

CONVERSION. The transfer of ownership (of land). (Merriam-Webster, 1971)

CORPORATION COCK/CORPORATION STOP. A device for connect or disconnect service lines to a consumer. (Merriam-Webster, 1971)

COSTS. OPERATING: costs of administration, maintenance, etc.; INCIDENCE: include environmental and personal effects. (U.S.D.P.)

CURRENT (See: ALTERNATING CURRENT, DIRECT CURRENT). An electric current is a movement of positive or negative electric particles (as electrons) accompanied by such observable effects as the production of heat, of a magnetic field, or of chemical transformation. (Merriam-Webster, 1971)

CURRENT. One complete performance of a vibration. (Merriam-Webster, 1971)

CIRCULATION. System(s) of movement/passage of people, goods from place to place: streets, walkways, parking areas. (U.S.D.P.)

CULTIVATION. System(s) of movement/passage of people, goods from place to place: streets, walkways, parking areas. (U.S.D.P.)

DECARBONIZATION TAX. A tax incentive designed to encourage new construction by allowing a faster write-off during the early life of a building. (U.S.D.P.)

DESIGN. 1) The arrangement of elements that make up a work of art, a machine or other man-made object. 2) The process of selecting the means and contriving the elements, steps, and procedures for producing what will adequately satisfy some need. (Merriam-Webster, 1971)

DETACHED DWELLING. Individual dwelling unit, separate from others. (U.S.D.P.)

DISSOLVED. Dispersed, separated, dissolved, divided, divided, subdivided. (Merriam-Webster, 1971)

DISTRIBUTION (STATION). The part of an electric supply system that connects bulk power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)

DISTRIBUTION SYSTEM. The part of an electric supply system between bulk power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)

DISTURBED SOIL. Soil that has been disturbed by artificial process, such as excavation, transportation, or construction in fill. (U.S.D.P.)

DRAINAGE. Interception and removal of ground water or surface water, by artificial or natural means. (Merriam-Webster, 1971)

DUST/DRIFT. Fine dry polarized particles of earth, grit, refuse, waste, litter, etc. (Merriam-Webster, 1971)

DWELLING. The general, global designation of a building/unit in which people live. A dwelling contains one or more dwelling units. (U.S.D.P.)

DWELLING BUILDERS. Four groups are considered: SELF-HELP DWELLING: where the dwelling unit is directly built by the user or occupant; ARTISAN DWELLING: where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; PAYMENT can be monetary or an exchange of services; SMALL CONTRACTOR DWELLING: where the dwelling unit is totally built by a small organization hired by the user or occupant, or developer; the shortest path is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes; LARGE CONTRACTOR DWELLING: where the dwelling unit is totally or partially built by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a singularly large complex. (U.S.D.P.)

DWELLING DENSITY. The number of dwellings, dwelling units, people or families per area, per city block, per neighborhood area. (Merriam-Webster, 1971)

DWELLING DEVELOPER. Three sectors are considered in the supply of dwellings: Dwellers: the market sector with limited or no access to the formal financial, administrative, legal, technical institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular Sector generally for "self use" and sometimes for profit. (U.S.D.P.)
**URBAN DWELLING ENVIRONMENTS**

**INTERIOR CIRCULATION NETWORK (SITE PLANNING)**. The pedestrian/vehicular circulation system inside the site should be designed based upon the exterior circulation/accesses and land development requirements.

**KILOMETERS (km).** (1000 watts) A convenient manner of expressing large wattages. Kilowatt hours (Kwh) measure the total quantity of energy consumed in a given time period, which represents the use of an average of 1 kilowatt of electrical energy for a period of 1 hour. (IOTC ST 45-7, 1953)

**LAMP POST.** A vertical pole or shaft leading from the surface of the ground to a support for lighting purposes for inspection. (U.S.D.P.)

**LAND COST.** Price: the amount of money given or set as the possession of a parcel of land. (Merriam-Webster, 1971)

**LAND DEVELOPMENT COSTS.** The costs of making raw land ready for development through the provision of utilities, services, access, etc. (U.S.D.P.)

**LAND LEASE.** The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (U.S.D.P.)

**LAND-MARKET VALUE.** Refers to: 1) the present monetary equivalent to replace the land; 2) the present value of the land to someone interested in the commercial market value of the land. (U.S.D.P.)

**LAND OWNERSHIP.** The exclusive right of control and possession of a parcel of land. (U.S.D.P.)

**LAND SUBDIVISION.** The division of the land in blocks, lots and laying out streets. (U.S.D.P.)

**LAND TENANCY.** The temporary holding or mode of holding a parcel of land of another. (U.S.D.P.)

**LAND UTILIZATION.** A qualification of the land around a dwelling in relation to user, physical controls and responsibilities. PUBLIC (streets, walkways, open spaces): user - anyone/unlimited; private (rooms, buildings): user - owner/tenant or squatter; physical controls - complete; responsibility owner. SEMIPRIVATE (cluster courts): user - group of owners and/or tenants; physical controls - partial; responsibility owner. PRIVATE (single homes): user - owner/tenant or squatter; physical controls - complete; responsibility owner. (U.S.D.P.)

**LAND UTILIZATION, PHYSICAL.** The physical/locational methods of directing, regulating, and coordinating the use and maintenance of land by the owners/users. (U.S.D.P.)

**LAND UTILIZATION, RESPONSIBILITY.** The quality/state of the land that is physically responsible for the use and maintenance of land by the owners/users. (U.S.D.P.)

**LATERAL SEWER.** A collector pipe receiving sewage from building connection only. (U.S.D.P.)

**LATRINE.** A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)

**LEVEL.** The plan or design or arrangement of something that is laid out. (Merriam-Webster, 1971)

**LEVELS OF SERVICES.** Two levels are considered: MIN-MIN, the admissible or possible levels below the standard; STANDARD, are levels set up and established by authority, custom or general consent, as a model, example or rule for the measure of quantity, weight, extent, value or quality. (U.S.D.P.)

**LIFT PUMP.** A collection system component that forces sewage in an elevation to avoid deep pipe networks. (U.S.D.P.)

**LOCALITY.** A section of the land or area which may contain one or more dwelling/land systems. (U.S.D.P.)

**LOCALITY SEGMENT.** A 400 x 400 area from and representing the residential character and layout of a locality. (U.S.D.P.)

**LOCATION.** Situation: the way in which something (the site) is placed in relation to its surroundings (the urban context). (Merriam-Webster, 1971)

**LOY.** A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)

**LOT.** A group of lots (owned individually) around or adjacent to a common court (owned in condominium). (U.S.D.P.)

**LOT CLUSTER.** A group of lots owned individually or jointly to a common court (owned in condominium). (U.S.D.P.)

**LOT COVERAGE.** The ratio of building area to the total lot area. (U.S.D.P.)

**LOT PROPORTION.** The ratio of lot width to lot depth. (U.S.D.P.)

**LUMINAIRE.** A complete lighting device consisting of a light source, plus a globe, reflector, and mounting or other accessory support and is integral with the housing. (Owlna, 1972)

**MANHOLE.** An access hole sized for a man to enter, particularly in sewer and storm drainage pipe systems for cleaning, maintenance and inspection. (U.S.D.P.)

**MATRIX OF BASIC REFERENCE MODELS.** A set of models of urban layouts arranged in rows and columns. (U.S.D.P.)

**MASTER PLAN.** A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official contemplates on the course its transportation, housing and community facilities should take, and making proposals for industrial and commercial expansion, and for areas of public service and for other aspects of growth and development. (Afram, 1972)

**MEDIAN BARRIER.** A double-faced guard rail in the median or curbs dividing two adjacent roadways. (Owlna, 1972)

**MEASURING BOUNDARIES.** Characterized by continuing, homogeneous land uses or topography, expressed as LINES: streets, walkways, political or municipal divisions, main streets, etc.; AREAS, such as residential areas, comparable areas used as parks with residential. (U.S.D.P.)

**MICROCLIMATE.** The local climate of a given site or habitation caused by geography and the proximity of an urban area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)

**MODE OF TRAVEL.** Man's means of moving from one place (the site) to another (other parts of the urban context). (Merriam-Webster, 1971)

**MODEL OF URBAN LAYOUT.** A representation of an urban residential area indicating circulation, land utilization, public services, transportation network of a specific layout and lot. (U.S.D.P.)

**MUTUAL OWNERSHIP.** Private land ownership shared by two or more persons and their heir under mutual agreement. (U.S.D.P.)

**NATURAL FEATURES.** Prominent objects in or produced by nature. (U.S.D.P.)

**NATURAL UNDISTURBED SOIL.** Soils that have not been disturbed by artificial process. Although natural, they depend greatly on local conditions, environment, and past geological history of the formations. (U.S.D.P.)

**NEIGHBORHOOD.** A section lived in by neighbors and having distinguishing characteristics. (U.S.D.P.)

**NETWORK EFFICIENCY (LAYOUT EFFICIENCY).** The ratio of the length of the network to the area(s) contained with or tangent to it. (U.S.D.P.)

**NEUTRAL WIRE.** Wire carrying no voltage between itself and a ground. (IOTC ST 45-7, 1953)

**NOISE.** Any sound (affecting the site) that is undesired (such as that produced by traffic, airports, industry, etc.). (Merriam-Webster, 1971)

**ODOR.** A quality of something that affects the sense of smell. (Merriam-Webster, 1971)

**OHMS (electrical).** The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. (Merriam-Webster, 1971)

**OHMS VOLTAGE.** A word for the measure of quantity, weight, extent, value or quality.

**PUBLIC SYSTEM (general).** A system which is owned and operated by a local governmental authority or by an established public utility company which is controlled and regulated by a governmental authority. (HUD/AID, Minnium Standards, 1966)

**PUBLIC UTILITIES.** Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telephone, circulation networks. (U.S.D.P.)

**PUMP.** A device or machine that raises, transfers, or compresses fluids or that attenuates gases especially by means given to them. (Merriam-Webster, 1971)

**REFUSE COLLECTIO.** The service for collection and disposal of all the solid wastes from a community. (U.S.D.P.)

**RESERVOIR.** Large-scale storage of water; also functions for storage: control fluctuations in supply and pressure. (U.S.D.P.)

**RESIDENTIAL AREA.** An area containing the basic needs/requirements for daily life activities: housing and protective superstructure; for disposal of human excreta. (U.S.D.P.)

**RIGHT-OF-WAY.** A legal right of passage over another person's ground (land), the area on or over which one may lawfully use, the strip of land devoted to or over which is built a public road, the land...
GLOSSARY

TAX EXEMPTION. A by-law or local ordinance or state statute that excludes the assessed value of a parcel of land from taxation for a specific purpose or period, such as for religious, educational, or charitable purposes.

TAX INCENTIVE. A financial incentive offered by local governments to encourage the development of land or the construction of buildings, such as tax breaks or property tax abatements.

SITES AND SERVICES. The subdivision of urban land and the provision of services for residential development. Site and services projects are aimed to improve the housing conditions for the lower income strata of the population by providing a range of services such as water, sewerage, and transit (Merriam-Webster, 1971).

SITE. The piece of land where people can build their own dwellings; an area that is accessible to employment, utilities, services and community facilities, financing and communication.

SIZE. Physical magnitude or extent (of the site), relative or proportionate dimensions (of the site).

SLOPE. Degree or extent of deviation (of the land surface) from the horizontal.

SOIL. The mass of mineral or organic particles that have adhered to each other by their own cohesion, and which form the surface layer of the earth.

SOIL PIPE. The pipe in a dwelling which carries the pipe discharge from water closets.

SOIL SURVEY (INITIAL). An on-site examination of surface soil for initial site classification.

SOIL SURVEY (GENERAL). A soil map, bearing the question of major and minor soil factors affecting the development of land for residential or other purposes.

STACK. The vertical pipe in a dwelling of the soil, waste, and vent pipe systems.

STACK PIPE. A pipe riser with tap used as a source of water for domestic purposes.

STANDARD. (1) Something that is established by authority, custom or general consent as a model or example to be followed. (2) Something that is set up and established by authority as a rule for the measure of quantity, weight, extent, value, or quality.

STANDPIPE. A pipe riser with tap used as a source of water for domestic purposes. (Merriam-Webster, 1971).

STANDPIPE FILLER. A pipe riser with tap used as a source of water for domestic purposes.

STATION, the point at which the water is obtained, from which the water is delivered, or at which the water supply is regulated.

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ABBREVIATIONS

REFERENCE ABBREVIATIONS

N.A. Not Available
S.U.A. Standard Urban Area
L.S.D. Land Survey Department
T.C.P.D. Town & Country Planning Department

QUALITY OF SERVICES, FACILITIES AND UTILITIES

None: When the existence of services, facilities and utilities are unavailable to a locality.
Limited: When the existence of services, facilities and utilities are available in a limited manner due to proximity.
Adequate: When the existence of services, facilities and utilities are available in/to a locality.

QUALITY OF INFORMATION

The quality of information given in the drawings have been qualified in the following manner:
Tentative: when based upon rough estimations of limited sources.
Approximate: when deducted from different and/or not completely reliable sources.
Accurate: when taken from reliable or actual sources.

EQUIVALENTS

METRIC SYSTEM EQUIVALENTS

Linear Measures

1 centimeter = 0.3937 inches
1 meter = 100 centimeters = 39.37 inches or 3.28 feet
1 kilometer = 1,000 meters = 3,280.83 feet or 0.62137 miles

1 inch = 2.54 centimeters
1 foot = 0.3048 meters
1 mile = 1.6093 kilometers

Square Measures

1 square meter = 1.196 square yards
1 square kilometer = 1.196 square miles
1 hectare = 10,000 square meters or 2.4712 acres
1 square foot = 0.0929 square meters or 0.0001 acre
1 acre = 0.4047 hectares

DOLLAR EQUIVALENTS

All income, cost, and rent/mortgage data have been expressed in terms of the U.S. equivalents:
1 U.S. dollar = 7.00 Rupees.

ABBREVIATIONS

REFERENCE ABBREVIATIONS

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