URBAN DWELLING ENVIRONMENTS: CHONBURI, THAILAND

by

Kobchai Ocharoen

B.Arch., Chulalongkorn University, Bangkok, Thailand

1974

Submitted in partial fulfillment of the requirements

for the degree of

Master of Architecture in Advanced Studies

at the

Massachusetts Institute of Technology

June, 1976

Signature of Author

Department of Architecture, May 7, 1976

Certified by.

Thesis Supervisor

Accepted by

Chairman, Department Committee on Graduate Students

AUG 16 1976
URBAN DWELLING ENVIRONMENTS: CHONBURI, THAILAND
by Kobchai Ocharoen

Submitted to the Department of Architecture on May 7, 1976, in partial fulfillment of the requirements for the degree of Master of Architecture in Advanced Studies.

ABSTRACT

This is a study of existing urban dwelling environments in Chonburi, Thailand. The study is a reference for understanding the dwelling environments/situations of urban areas and intended as a tool for the formulation of housing policies in Chonburi, Thailand.

The study provides a set of alternative guidelines for identifying the dwelling/land systems in urban areas of Chonburi following a methodology developed in the Urban Settlement Design in Developing Countries Program.

General projections are made through a comparative analysis of four case studies to evolve an urbanization alternative for the future development of an existing site and services project in Chonburi.

Thesis Supervisor: Horacio Caminos
Title: Professor of Architecture
URBAN DWELLING ENVIRONMENTS : CHONBURI, THAILAND
URBAN DWELLING ENVIRONMENTS: CHONBURI, THAILAND

Case Studies, Urbanization Alternative

KOBCHAI OCHAROEN

Education/Research Program:
URBAN SETTLEMENT DESIGN IN DEVELOPING COUNTRIES
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge, Massachusetts
May 1976
ACKNOWLEDGEMENT

I gratefully acknowledge the support, guidance and advice of Professor Horacio Caminos during the two years of this study. I am also indebted to Reinhard Goethert for his critique and assistance and to members of the class 1974-1976 in the program Urban Settlement Design in Developing Countries at the School of Architecture and Planning, M.I.T. for their comments.

I also wish to acknowledge the Royal Thai Survey Department for all the air photographs provided; the City Planning Division, the Ministry of Interior, for all the useful information and especially Nishan Bichajian for his personal assistance in the reproduction of air photographic material.

Finally, the supplying of necessary information and data from my sister Ubonwan is gratefully acknowledged.

Kobchai Ocharoen
Education/Research Program: URBAN SETTLEMENT DESIGN IN DEVELOPING COUNTRIES
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge, Massachusetts
May 1976

COPYRIGHT © 1976, Urban Settlement Design in Developing Countries, M.I.T. All rights reserved; no section may be reproduced by any means without the written permission from the author.
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENTS</td>
<td>1</td>
</tr>
<tr>
<td>PREFACE</td>
<td>2</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>URBAN CONTEXT</td>
<td>6</td>
</tr>
<tr>
<td>CASE STUDIES</td>
<td>12</td>
</tr>
<tr>
<td>1. Bang Sai</td>
<td>14</td>
</tr>
<tr>
<td>2. Ban Khot</td>
<td>22</td>
</tr>
<tr>
<td>3. Makarm Yong</td>
<td>32</td>
</tr>
<tr>
<td>4. Bang Pla Soi</td>
<td>40</td>
</tr>
<tr>
<td>EVALUATIONS</td>
<td>48</td>
</tr>
<tr>
<td>Time/Process Perspective</td>
<td>49</td>
</tr>
<tr>
<td>Physical Data Matrix</td>
<td>50</td>
</tr>
<tr>
<td>Community Facilities, Utilities/Services Matrix</td>
<td>52</td>
</tr>
<tr>
<td>Locality Segment Land Utilization</td>
<td>53</td>
</tr>
<tr>
<td>URBANIZATION ALTERNATIVE</td>
<td>54</td>
</tr>
<tr>
<td>Objective</td>
<td>55</td>
</tr>
<tr>
<td>Sa-Med Site and Services Project</td>
<td>56</td>
</tr>
<tr>
<td>Basic Data of the Site</td>
<td>58</td>
</tr>
<tr>
<td>Existing Site Development</td>
<td>60</td>
</tr>
<tr>
<td>Assumption</td>
<td>62</td>
</tr>
<tr>
<td>Projections</td>
<td>64</td>
</tr>
<tr>
<td>Table of Population and Required Schools</td>
<td>66</td>
</tr>
<tr>
<td>Projection of School Location and Area Served</td>
<td>67</td>
</tr>
<tr>
<td>Land Use</td>
<td>68</td>
</tr>
<tr>
<td>Circulation</td>
<td>70</td>
</tr>
<tr>
<td>Development Mode</td>
<td>72</td>
</tr>
<tr>
<td>GLOSSARY</td>
<td>74</td>
</tr>
<tr>
<td>EXPLANATORY NOTES, BIBLIOGRAPHY</td>
<td>78</td>
</tr>
</tbody>
</table>
CONTENT: This study identifies and analyses different existing dwelling/land situations in Chonburi, Thailand, based upon the basis of a survey, evaluation and comparison of four selected localities.

These localities represent the full range of residential developments in Chonburi from very low to upper middle and high income groups in varying densities.

The physical environments of each of the dwelling systems are described in terms of land utilization, layout, subdivision and provision of utilities and services. The dwelling systems are analyzed at four levels: the locality of that system, a selected 400x400 m. segment within the locality, a selected block of the segment and a typical dwelling unit through drawings, charts, graphs and photographs. Availability/provision and level of services for each dwelling system is presented in a comparative form.

A proposal has been prepared as an alternative model of an existing government site and services project at Tambol Sa-Med, Chonburi, which is presently under construction. The lack of adequate financial support and planning procedures make the project progress with slow pace. An attempt has been made to analyze the basic growth that will be taken place on the site, assumptions, projections, proposed land use plan, circulation plan and initial development plan have been made to serve as an illustration of guidelines for the future development of the project.

PURPOSE: This study attempts to:

a) identify and analyze the physical structure of different housing systems in Chonburi, based on their physical and socioeconomic condition;
b) provide a comparative framework for the analysis, comparison, contrast and evaluation of the physical residential developments;
c) give the guidelines for more realistic and effective physical land utilization policies.

APPLICATION: This study can be used as a reference source and tentative set of guidelines for those concerned with the planning of residential developments in Chonburi, Thailand.

DATA: This study is derived from the field surveys carried by the author during the summers of 1974 and 1975; complemented by maps, air photographs, charts, graphs and mentioned bibliographic material. The case study analysis is based on a methodology developed in the Urban Settlement Design in Developing Countries Program, directed by Professor Horacio Caminos.
At present, Bangkok is the Premier City of the country, it is the centralization of all the most important activities. The existence of the only port of international importance and the only international airport, together with the highway and railway networks radiating from Bangkok make it the hub of the transportation system of the country. Bangkok is the cultural capital having almost all the institutions of higher education, the political capital where decisions are taken regarding the entire country, and also the economic capital where industrialization is proceeding at a rapid pace. In fact, it is the metropolis which acts as a centripetal force for the entire nation. Due to these factors, the growth of Bangkok has increasingly overshadowed those of the other cities in the country. The population has increased at an average of 5.2% a year since 1955, and amounts to over three million at present. The provision of public services, utilities and transport facilities has never been able to keep up with this pace of growth, thus resulting in congestion and severe deficiencies in all amenities.

To relieve pressures from Bangkok, the Greater Bangkok Development Plan 1990 (GBDP), by the City Planning Division, the Ministry of Interior, proposed the establishments of industrial estates in the provinces of Samut Sakorn, Nakorn Pathom and Chonburi, which are the areas of direct influence of Bangkok or zone diffused urbanization. The plan to encourage growth in these three provinces may reduce the number of migrants to Bangkok, thus reducing the burden of overspill.

Chonburi is chosen for this study because of its importance to the eastern region, not only being the recommended industrial estate, but also the location of the first deep-sea port which is proposed by the GBDP to be implemented at Lam Chabang, approximately 30 kilometers to the south of the Municipal City. It is obvious that the new deep-sea port will strengthen the potential of growth which will take place in these parts of the coast, and the influence of the port upon the growth of industries is expected to cover nearly the whole eastern coast of the Gulf of Thailand. This study is intended as a contribution toward a better understanding of the existing dwelling/land situations of various dwelling systems in Chonburi, and to serve as a basic in formulation of future policies for residential development in the City.
The study is presented in sections as follows: Chonburi Urban Context, Case Studies, Evaluations, Site Context and Proposed Development Plan. The following provides an overall view of the contents:

URBAN CONTEXT: This brief section is a contextual reference for the major subject of the study. It will give the reader a quick overview focused on specific pertinent information.

CASE STUDIES: The four selected dwelling environments include the full housing spectrum from very low income to high income groups in varying densities. Each case is summarily described in a similar descriptive manner. Complete localities, selected small subsections and dwellings are examined in detail for each case. The cases provide the material with which to identify basic patterns in different aspects of the housing process, particularly on land utilization and density. The selection of the residential cases were categorized by USER INCOME GROUP to cover very low, low, moderately low, middle and high income sectors.

EVALUATIONS: The cases are compared to focus on specific aspects:

- TIME/PROCESS PERSPECTIVE: All the four cases are grouped into representative models of existing housing situations to illustrate different cases of land utilization.

- PHYSICAL DATA MATRIX: The matrix allows a comprehensive overview and cross-comparison of information from all cases.

- COMMUNITY FACILITIES, UTILITIES/SERVICES: The matrix is a comparative summary of the dwelling indicators related to the facilities, utilities/services provided.

- LAND UTILIZATION: This section provides a simple graphic method of showing land subdivision patterns, land utilization percentages, and densities for each case in order to permit rapid interpretation, comparisons, and evaluations.
URBANIZATION ALTERNATIVE: This section is a comparative study of the existing development of the Sa-Med Site and Services Project in Chonburi, presently under construction. The possibility of comparative analysis is the main reason for this study which focuses on the physical layout and land subdivision.

A comparative study of the existing land development/situations is made through assumptions and projections to serve as a contributing factor to understand the needs of all the factions that relate to the project. Finally, proposed land use, circulation and development plans are made to serve as an urbanization alternative for the future development of the project.

The section in the Urbanization Alternative contains:
- **INTRODUCTION**: Introduction to the existing Sa-Med Site and Services Project in Chonburi.
- **BASIC DATA OF THE SITE**: The physical character and problems of the site.
- **EXISTING SITE DEVELOPMENT**: The physical existing development on the project site.
- **PROJECTIONS**: The assumptions and projections of growths that will be taken place on the site; land use, land value, population density, income groups, basic subdivision, dwelling types, number of population and required schools.
- **LAND USE**: Includes the planning criteria and general outline for the proposed land use plan.
- **CIRCULATION**: Includes the planning criteria and general circulation patterns.
- **DEVELOPMENT MODE**: Includes the development criteria and proposed development stages.
CHONBURI, THAILAND

URBAN CONTEXT

1. PRIMARY INFORMATION: Chonburi is an eastern coastal province, approximately 100 kilometers southeast of Bangkok. It is located at latitude 13°22' north, longitude 100°28' east. The climate is tropical dominated by monsoon. There are 3 seasons: rainy (July-October), cool (November-February), and hot (March-June). The province covers an area of 4,484 square kilometers with a population of 542,000 in 1970. The Chonburi Municipal City itself has an area of 4.5 square kilometers with a population of 55,000 in 1975.

2. HISTORY: Chonburi was founded in 13th century. It was considered as a Third-Class Town during Adutthaya Dynasty. Once, it was called Pla-Soi. It was under the authority of The Ministry of Water Affairs since the reign of King Rama 1 - King Rama 4. It had been changed to be under the authority of the Ministry of Interior since 1895. Chonburi is now an important province for marine trade, agriculture and seaside resort.

3. ECONOMY: Its hinterland relies mainly on agriculture and fishing. The province itself acts as a part of marine trade with Bangkok and the nearby provinces. Its role as a major seaside resort of Thailand has a strong impact on the economic base. The province has had a considerable growth in the industrial sector. It is expected that the industrial growth would be highly accelerated once the proposed project of the deep sea port at Leem Chabang, 30 kilometers to the south of the Municipal City, is implemented. The types of industry recommended to be promoted are: oil refinery, chemical products, manufacturing, ship building, iron melting plant, and other mechanized factories.

4. GOVERNMENT: The Chonburi Municipal City is the Provincial Capital and administration center, under the authority of an appointed Provincial Governor. The province is divided into 8 districts (amphur) which is headed by a District Officer who is directly responsible for district administration. Districts are also divided into 76 communes (tambol) and 534 villages (nu-ban).

5. DEMOGRAPHY: The population in Chonburi Municipal City is approximately 55,000 in 1975, with annual growth rate of 3.36%. The projected population in the year of 1990 is 171,000 people. At present, 68% of the population is under thirty years of age, of which 51% are male.

6. SOCIO-CULTURAL: The majority of the population is of Thai ethnic origin and mainly Buddhist. The rest is Chinese. 43% of the population is labor worker, 33% is in commercial, 11% work for public agencies, the rest are farmers, fishermen or working in light industries.

7. SOCIO-ECONOMIC: In 1969, the annual per capita income of Chonburi was estimated as US. $850. The middle income sectors concentrates in the City Center which is the commercial district. The upper income sectors are dispersed throughout the outskirt of the City. The low income sectors live around the inner ring and periphery.

8. HOUSING: According to the 1970 report of population and housing census of Chonburi, by the National Statistical Office, 80.6% of the houses in Chonburi are made of wood, 40.4% of the dwelling are detached house type, 69% are row-houses. The majority of the houses has 1-2 stories.
URBAN DWELLING ENVIRONMENTS

GULF OF THAILAND

URBAN LAND USE PATTERN

AREAS

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL

PHANAT NIHOM

ANG SILA

BAN BING

SRI RACHA

CHONBURI

10km

15km

15km

10km

0 5 10 15km

1:250000
The following section contains case studies describing selected dwelling environments/situations in Chonburi Municipal City at the present time.

The four cases were selected according to income groups, housing system and population densities.

Each case study is represented at four scales:

**LOCALITY:** A locality is defined as a relatively self-contained residential area in Chonburi Municipal City. In general, it is contained within physical boundaries.

**LOCALITY SEGMENT:** All the localities differ in size and shape. A segment of the same dimension has been taken from each locality for purposes of comparison. The size of the segment is 400 x 400 meters or approximately a six minute walk.

**BLOCK:** Within each locality segment, a typical residential block has been selected to allow comparison of land utilization (patterns, percentages and densities) that are homogeneous.

**DWELLING UNIT:** A typical self-contained unit for an individual, a family, or a group in each locality segment.

The four selected case studies are:

1. **BANG SAI:**
   Private, very low/low income, medium density, farm houses.

2. **BAN KHOT:**
   Private, low/moderately low income, high density, detached/row houses.

3. **MAKARM YONG:**
   Private, middle/high income, high density, row-houses.

4. **BANG PLA SOI:**
   Private, middle/high income, low density, detached houses.
1. BANG SAI

2. BAN KHOT (ON LAND) (OVER WATER)

3. MAKARM YONG

4. BANG PLA SOI
1 BANG SAI
Chonburi
PRIVATE, LOW INCOME, FARM HOUSES

LOCATION: The locality is a predominate duck-farm community. It is located at the north of Chonburi Municipal City. It is the only sanitary district of the City, the others are municipal districts.
(Note: Under the provisions of the Municipality Act, any Sanitary District may be established as a Municipal District in future.)

ORIGIN: The community was established about 40 years ago. It was the community for duck-farms since then. Its production is one of the most important economic goods of the City.

LANDSAT: The locality is situated between Sukhumvit Highway and Gulf of Thailand. The area is bounded to the north and east by Sukhumvit Highway, to the south by local roads and Vajira Prakarn Road, and to the west by Gulf of Thailand. The layout of the locality shows the unplanned development, where a new house is built wherever space can be found.
CASE STUDY: BANG SAI

GULF OF THAILAND

LOCALITY LAND USE PATTERN

- **RESIDENTIAL**
- **COMMERCIAL**
- **INDUSTRIAL**
- **OPEN SPACES**

**KEY**
- F Fire Department
- S School
- T Temple
- SS Social Services
- M Market
- C Cemetery
- B Bus

**LAND USE:** The land use of the locality is for the duck-farm purpose and living quarter. The farm area is usually located at the front yard of the lot. The dwelling unit is very close to the farm, thus it is very unhygienic. The locality has a higher percentage of land devoted to private uses than public/semi-public uses.

**LOCALITY CIRCULATION PATTERN**

**KEY**
- Vehicular
- Pedestrian

**CIRCULATION:** The northern part of the locality is a pedestrian community with small circulation paths only. The locality has an access to Sukhumvit Highway from the east, this is used as the main access from the Highway to the City Center through Vajira-Frakarn Road.
POPULATION: In 1975, there were 1,223 households with the total population of 7,220, of which 4,515 are male and 2,705 are female. The majority of households consist of extended families. Over 50% of the population is under 20 years old.

INCOME: The majority of the households in the locality own a duck farm, each farm consists of about 200 to 2,000 ducks. The production from the farm has a strong impact on the economic base of the City. No income distribution data is available for the locality, but the annual income can be estimated at about $500-$900.

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>385</td>
<td>13</td>
<td>29</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>435</td>
<td>13</td>
<td>33</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>2,175</td>
<td>13</td>
<td>167</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>1.2</td>
<td>9.15</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>11.8</td>
<td>90.85</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>WATER</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

LOCALITY SEGMENT AIR PHOTOGRAPH
CASE STUDY: BANG SAI

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>0%</th>
<th>25%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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 UTILITIES AND SERVICES

<table>
<thead>
<tr>
<th>Utility</th>
<th>None</th>
<th>Limited</th>
<th>Adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanitary Sewerage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storm Drainage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refuse Collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Transportation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paved Roads, Walkways</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Street Lighting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LOCALITY COMMUNITY FACILITIES

<table>
<thead>
<tr>
<th>Facility</th>
<th>None</th>
<th>Limited</th>
<th>Adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Police</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools, Playgrounds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreation, Open Spaces</td>
<td></td>
<td></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 SEGMENT PLAN

1:2500
LOCALITY BLOCK PLAN

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>9</td>
<td>0.57</td>
<td>16</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>16</td>
<td>0.57</td>
<td>28</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>80</td>
<td>0.57</td>
<td>140</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>0.04</td>
<td>7</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>0.53</td>
<td>93</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.57</td>
<td>100</td>
</tr>
</tbody>
</table>
CASE STUDY: BANG SAI

LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Public</th>
<th>Streets/Walkways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-Public</td>
<td>Playgrounds</td>
<td></td>
</tr>
<tr>
<td>Semi-Private</td>
<td>Cluster Courts</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>Lots</td>
<td>Dwellings</td>
</tr>
</tbody>
</table>

PERCENTAGES

- Streets/Walkways: 7%
- Playgrounds: -
- Cluster Courts: -
- Dwellings/Lots: 93%

DESIENCY

- Persons/Hectare: 140

N

0 10 50m

1:1000
TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
- type: HOUSE
- area (sq m): 72
- tenure: LEGAL OWNERSHIP

LAND/LOT
- utilization: PRIVATE
- area (sq m): 375
- tenure: LEGAL OWNERSHIP

DWELLING
- location: PERIPHERY
- type: DETACHED
- number of floors: 1
- utilization: MULTIPLE
- physical state: BAD

DWELLING DEVELOPMENT
- mode: INCREMENTAL
- developer: PRIVATE
- builder: SELF-HELP
- construction type: WATTLE/WOOD
- year of construction: 1940

MATERIALS
- foundation: WOOD
- walls: WOOD
- roof: BAMBOO/COCONUT LEAVES

DWELLING FACILITIES
- wc: 1
- shower: -
- kitchen: 1
- rooms: 5
- other: DUCK FARM

SOCI-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
- user's ethnic origin: THAI/CHINESE
- place of birth: CHONBURI
- education level: GRADE 4

NUMBER OF USERS
- married: 3
- single: -
- children: 3
- total: 6

MIGRATION PATTERN
- number of moves: 1
- rural - urban: 1973
- urban - rural: -
- why came to urban area: EMPLOYMENT

GENERAL: ECONOMIC
- user's income group: LOW
- employment: OWN BUSINESS
- distance to work: -
- mode of travel: -

COSTS
- dwelling unit: $250
- land - market value: $250,000

DWELLING UNIT PAYMENTS
- financing: SELF-FINANCED
- rent/mortgage: -

% income for rent/mortgage: -
BANG SAI, Chonburi: (top left) A view of duck farm yard which is adjacent to the dwelling unit. (1975)

(top right) A farm house with cane wattle fence and coconut-leaves roof covering. (1975)

(bottom) A view of a farm house where a primary school is seen at the side and a temple at the back. (1975)

LOCALITY SOURCES:

Plan: (approximate) Air Photographs, The Royal Thai Survey Department, 1974.

Land Use Pattern: (tentative) IBID.

Circulation Pattern: (tentative) IBID.

Segment Plan: (approximate) IBID.

Block Plan: (approximate) IBID.

Block land utilization: (approximate) IBID.


Physical Data: (approximate) IBID.

Socio-Economic Data: (approximate) IBID.

Photographs: (approximate) IBID.

General Information: Chonburi Municipal Office, Ministry of Interior.
2 BAN KHOT
Chonburi
PRIVATE, LOW INCOME, DETACHED/RON-HOUSES

LOCATION: The locality is situated at the inner ring of Chonburi Municipal City, bounded to the north by the duck-farm community, Bang Sai, to the east by Vajira Prakarn Road, to the south by Tar Ruar Plee Road, and to the west by Gulf of Thailand. The locality is built on the swamp area along the seashore.

ORIGINS: The locality was established about 40 years ago. It was once entirely the community of fishermen, but now it is a squatter community consisting of mixed category of labor.

LAYOUT: The layout of the community shows an accretive unplanned development from Vajira Prakarn Road into the swamp areas along the seashore and even extended into the Gulf of Thailand.
CASE STUDY: BAN KHOT

GULF OF THAILAND

LAND USE: The commercial shops occur along Vajira Prakarn Road which acts as an entrance point to the community. High density residential area can be found throughout the community. Light industries; fish-sauce factory, can be found along the edge of the extended areas into the sea.

CIRCULATION: The Vajira Prakarn Road serves as the only main vehicle circulation route of the entire community. Other pedestrian roads, mostly unpaved, are built/extended into the sea. The longest extended road is Tar Ruar Plee, approximately 1 km., which is the location of several fish-sauce factories and also an important port of Chonburi.
URBAN DWELLING ENVIRONMENTS

POPULATION: In 1975, there were 1,421 households with the total population of 8,320, of which 4,208 are male and 4,112 are female. The family structure is predominantly nuclear. Over 50% of the population is under 20 years old.

INCOME: The majority of people in the locality are low/moderately low, consisting of several categories of labor, the occupation ranges from fishermen to clerical worker. No income distribution data is available, but the annual income can be estimated at about $250-$450.

LOCALITY SEGMENT LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectare</th>
<th>Density N/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>670</td>
<td>15</td>
<td>44</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>930</td>
<td>15</td>
<td>62</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>4,650</td>
<td>15</td>
<td>310</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>1.3</td>
<td>8.7</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PRIVATE (dwelling, shops, factories, lots)</td>
<td>13.7</td>
<td>91.3</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

LOCALITY SEGMENT AIR PHOTOGRAPH
CASE STUDY: BAN KHOT (25)

LOCALITY CONSTRUCTION TYPES

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 UTILITIES AND SERVICES

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

Quality of information: Approximate

LOCALITY SEGMENT PLAN

1:2500
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>28</td>
<td>0.64</td>
<td>44</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>50</td>
<td>0.64</td>
<td>70</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>250</td>
<td>0.64</td>
<td>390</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways,</td>
<td>0.06</td>
<td>9.5</td>
</tr>
<tr>
<td>open spaces)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>schools, community centers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops,</td>
<td>0.28</td>
<td>43.6</td>
</tr>
<tr>
<td>factories, lots)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0.3</td>
<td>46.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.64</td>
<td>100</td>
</tr>
</tbody>
</table>
CASE STUDY: BAN KHOT

LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS

1 Hectare

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

PERCENTAGES
Streets/Walkways 9.5%
Playgrounds -
Cluster Courts 46.9%
Dwellings/ lots 43.6%

1 Hectare

DENSITY
Persons/Hectare 390

0 10 50m
0 10 50m

1:1000
URBAN DWELLING ENVIRONMENTS

PHYSICAL DATA
(related to dwelling and land)

- DWELLING UNIT
  type: HOUSE
  area (sq.m): 28
  tenure: LEGAL OWNERSHIP

- LAND/LOT
  utilization: PRIVATE
  area (sq.m): 28
  tenure: LEGAL RENTAL

- DWELLING
  location: INNER RING
  type: ROW-HOUSE
  number of floors: 2
  utilization: MULTIPLE
  physical state: BAD

- DWELLING DEVELOPMENT
  mode: INSTANT
  developer: PRIVATE
  builder: SMALL CONTRACTOR
  construction type: WOOD
  year of construction: 1944

- MATERIALS
  foundation: WOOD
  floors: WOOD
  walls: WOOD
  roof: GALVANIZED STEEL

- DWELLING FACILITIES
  WC: 1
  shower: -
  kitchen: 1
  rooms: 5
  other: -

SOCIO-ECONOMIC DATA
(related to user)

- GENERAL: SOCIAL
  user’s ethnic origin: THAI
  place of birth: CHONBURI
  education level: GRADE 4

- NUMBER OF USERS
  married: 3
  single: -
  children: 3
  total: 6

- MIGRATION PATTERN
  number of moves: -
  rural - urban: -
  urban - urban: -
  urban - rural: -
  why came to urban area: -

- GENERAL: ECONOMIC
  user’s income group: LOW
  employment: OWN BUSINESS
  distance to work: -
  mode of travel: -

- COSTS
  dwelling unit: $550
  land - market value: $308,000

- DWELLING UNIT PAYMENTS
  financing: SELF-FINANCE
  rent/mortgage: $7
  % income for rent/mortgage: 17 %
CASE STUDY: BAN KHOT; ON LAND

BAN KHOT, Chonburi: (top left) Wooden semi-detached houses with a garage at the side. The second floor balcony is used for drying clothes. Hanging cloth in front of the houses are used as sunshade. (1975)

(top right) Garbage baskets are placed along the curbs. (1975)

(bottom) View from Vajira Prakarn Road. (1975)
PHYSICAL DATA
(refer to dwelling and land)

DWELLING UNIT
- type: HOUSE
- area (sq m): 42
- tenure: LEGAL OWNERSHIP

LAND/LOT
- utilization: PRIVATE
- area (sq m): 42
- tenure: LEGAL RENTAL

DWELLING
- location: INNER RING
- type: DETACHED
- number of floors: 1
- utilization: FAMILY
- physical state: BAD

DWELLING DEVELOPMENT
- mode: INCREMENTAL
- developer: PRIVATE
- builder: ARTISAN
- construction type: WOOD
- year of construction: 1948

MATERIALS
- foundation: WOOD
- floors: WOOD
- walls: WOOD
- roof: GALVANIZED STEEL

DWELLING FACILITIES
- veranda: 1
- shower: 1
- kitchen: 1
- rooms: 2
- other: VERANDAH

SOCIO-ECONOMIC DATA
(refer to user)

KEY
- LR: Living Room
- D: Dining/Eating Area
- BR: Bedroom
- K: Kitchen/Cooking Area
- T: Toilet/Bathroom
- L: Laundry
- C: Closet

GENERAL: SOCIAL
- user's ethnic origin: THAI
- place of birth: CHONBURI
- education level: GRADE 4

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

MIGRATION PATTERN
- number of moves: -
- rural - urban: -
- urban - rural: -
- why came to urban area: -

GENERAL: ECONOMIC
- user's income group: LOW
- employment: FISHERMAN
- distance to work: 1 km.
- mode of travel: WALKING

COSTS
- dwelling unit: $300
- land - market value: $120,000

DWELLING UNIT PAYMENTS
- financing: SELF-FINANCED
- rent/mortgage: $3
- % income for rent/mortgage: 13 %
**CASE STUDY: BAN KHOT, OVER WATER**

**Ban Khot, Chonburi:** (top) A general air view. (1975)

(Bottom left) Cat-walks, serve as pedestrian walkways for the community. (1975)

(Bottom right) Dwellings, cat-walks, electricity poles, water pipe lines and "pollution" are extended into the sea. (1975)

**LOCALITY SOURCES:**

| Plan: | (approximate) Air Photographs, The Royal Thai Survey Department, 1974. |
| Land Use Pattern: | (tentative) IBID. |
| Circulation Pattern: | (tentative) IBID. |
| Segment Plan: | (approximate) IBID. |
| Block Plan: | (tentative) IBID. |
| Block Land Utilisation: | (approximate) IBID. |
| Physical Data: | (approximate) IBID. |
| Socio-Economic Data: | (approximate) IBID. |
| Photographs: | Kobchai Ocharoen, 1975; The Royal Thai Survey Department, 1974 (air photographs). |
| General Information: | Chonburi Municipal Office, Ministry of Interior. |
3 MAKARM YONG
Chonburi
PRIVATE, MIDDLE/HIGH INCOME, ROW-HOUSES

LOCATION: The locality is situated at the city center of Chonburi, bounded to the north by Thai Pracha Road and Surachai Road, to the east by Sukhumwit Highway, to the south by Akhanwat Road, and to the west by Vajira Prakarn Road and the squatter community, Ban Khot. The locality is the central business district of the City.

ORIGINS: The locality was established about 50 years ago, the potential for business had been developed since then. The community was once concentrated only between Vajira Prakarn Road and Jadjun-Nong Road, and later extended towards the by-pass Sukhumwit Highway, connected to Bangkok.

LAYOUT: The layout of the community clearly shows the growth that had been extended from the high density areas within the city center towards the by-pass Sukhumwit Highway, this makes the Highway no more a by-pass.

LAND USE: The commercial row-houses are found along the major streets, while the residential areas are dispersed in the inner parts. A large portion of land has been taken place by public/semi-public uses. Schools, temples and churches can be found throughout the locality. The location and number of temples in the plan reflect the strong religious tradition of people in the City.

CIRCULATION: Pedestrian and vehicles are mixed in the public streets. Traffic congestion occurs along the main streets in the city center, Vajira Prakarn Road and Jadjun-Nong Road, due to the narrow width of the streets which were not original planned to serve the today heavy traffic. Sukhumvit Highway serves as the connecting route to nearby districts and Bangkok.
POPULATION: In 1975, there were 2,706 households with the total population of 11,680, of which 5,410 are male and 6,270 are female. The majority of households consist of extended families. Over 50% of the population is under 20 years old.

INCOME: The majority of people are middle/high income, consisting of several kinds of commercial business. The annual income can be estimated to be ranging from $1,000-$3,000.

LOCALITY SEGMENT LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITY</th>
<th>Total Number</th>
<th>Area Hectare</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOUSES</td>
<td>495</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>1,280</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>6,400</td>
<td>16</td>
<td>400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways)</td>
<td>1.5</td>
<td>9.4</td>
</tr>
<tr>
<td>open spaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces,</td>
<td>5.3</td>
<td>33.1</td>
</tr>
<tr>
<td>schools, community centers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops,</td>
<td>9.2</td>
<td>57.5</td>
</tr>
<tr>
<td>factories, lots)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>100</td>
</tr>
</tbody>
</table>

LOCALITY SEGMENT AIR PHOTOGRAPH

1:2500
CASE STUDY: MAKAM YONG

LOCALITY SEGMENT PLAN

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>CONSTRUCTION TYPE</th>
<th>SELF-HELP</th>
<th>ARTISAN</th>
<th>SMALL</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud/Matle</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 UTILITIES AND SERVICES

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

LOCALITY COMMUNITY FACILITIES

- Police
- Fire Protection
- Health
- Schools, Playgrounds
- Recreation, Open Spaces

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

Quality of information: Approximate

SELECTED BLOCK
### Local Block Plan

**1:1000**

#### Local Block Land Utilization Data

<table>
<thead>
<tr>
<th>Densities</th>
<th>Total Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>1</td>
<td>0.24</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>25</td>
<td>0.24</td>
</tr>
<tr>
<td>People</td>
<td>125</td>
<td>0.24</td>
</tr>
</tbody>
</table>

#### Areas

<table>
<thead>
<tr>
<th>Areas</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>0.096</td>
<td>40</td>
</tr>
<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
<td>0.136</td>
<td>56.6</td>
</tr>
<tr>
<td>Private (dwellings, shops, factories, total)</td>
<td>0.24</td>
<td>100</td>
</tr>
<tr>
<td>Semi-Private (cluster courts)</td>
<td>0.008</td>
<td>3.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.24</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS

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

PERCENTAGES
- Streets/Walkways: 40%
- Playgrounds:
- Cluster Courts: 3.4%
- Dwellings/Lots: 56.6%

DENSITY
- Persons/Hectare: 520

1:1000

1 Hectare
Typical Dwelling

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

- ** Dwelling Unit Type:** House
  - Area (sq m): 48
  - Tenure: Legal Rental
- ** Land/Lot Utilization:** Private
  - Area (sq m): 54
  - Tenure: Legal Rental
- ** Dwelling Location:** City Center
  - Type: Rom-Booie
  - Number of Floors: 3
  - Physical State: Good
- ** Dwelling Development**
  - Mode: Instant
  - Developer: Private
  - Builder: Small Contractor
  - Construction Type: Masonry-Concrete
  - Year of Construction: 1958
- ** Materials**
  - Foundation: Concrete
  - Floors: Concrete
  - Walls: Masonry
  - Roof: Concrete
- ** Dwelling Facilities**
  - WC: 1
  - Shower: 1
  - Kitchen: 1
  - Rooms: 8
  - Other:

**Socio-Economic Data**
(related to user)

- ** General:**
  - User's Ethnic Origin: Chinese
  - Place of Birth: Chonburi
  - Education Level: Grade 4
- ** Number of Users:**
  - Married: 4
  - Single: 7
  - Children: 11
  - Total: 22
- ** Migration Pattern:**
  - Number of Moves:
    - Rural - Urban: 4
    - Urban - Rural: 7
    - Why came to urban area: A
- ** General:**
  - User's Income Group: High
  - Employment: Own Business
  - Distance to Work: A
  - Mode of Travel: A
- ** Costs:**
  - Dwelling Unit: $14,500
  - Land: Market Value: $500,000
- ** Dwelling Unit Payments**
  - Financing: Self-Financed
  - Rent/Mortgage: $25
  - % Income for Rent/Mortgage: 16%
CASE STUDY: MAKARM YONG

MAKARM YONG, Chonburi: (top) A general view of commercial row-houses along Jadum-nong Road. (1975)

(bottom left) A view of the Crown Property Market on Vajira Prakarn Road. (1975)

(bottom right) Two smiling girls are cleaning fishes in front of the Crown Property Live-fishes Market. (1975)

LOCALITY SOURCES:

- Plan: (approximate) Air Photographs, The Royal Thai Survey Department, 1974.
- Land Use Pattern: (tentative) IBID.
- Circulation Pattern: (tentative) IBID.
- Block Plan: (approximate) IBID.
- Block Land Utilization: (approximate) IBID.
- Typical Dwelling: (approximate) IBID.
- Physical Data: (approximate) IBID.
- Socio-Economic Data: (approximate) IBID.
- Photographs: Kobchai Ocharoen, 1975, (approximate) IBID.

General information: Chonburi Municipal Office, Ministry of Interior.
LOCATION: The locality is a district of government offices, situated at the inner ring of the city, bounded to the north by Pasa-Paytra Road and Akhaniwat Road, to the east by Sukhumvit Highway, to the south by the Chonburi Health Center, and to the west by Gulf of Thailand.

ORIGINS: The locality was established about 30 years ago. It was initially a residential area for the middle and high income groups. Due to the lack of land for the increasing number of public buildings, several "filling-up" projects had been done on the swamp areas along the seashore, and most of the recent public buildings were constructed on these areas. This makes Chonburi a model city in filling-up and developing the what was once a waste land.

LAYOUT: The locality is a residential area of low density for middle and high income groups in Chonburi, but also predominately a district of all the government offices and public buildings. It is both the center of local and provincial authorities. The Regional Provincial Police Headquarter, the Central Health Training Center, the Telecommunication Center and many other public facility offices are all located here.

LAND USE: The area is predominately a public use and middle/high income residential area with large size lot and very low density. The extended public area into the swamp areas along the seashore shows the tendency/direction of future growth for the City. An implementation of a New Town for Chonburi has been under construction on a filled-up site, 1 km. to the south of the government district.
CASE STUDY: BANG PLA SOI

LOCALITY LAND USE PATTERN

AREA
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- OPEN SPACES

KEY
- Police Headquarter
- Prison
- School
- Temple
- Library
- Health
- Municipal Office
- Civic Center
- Provincial Center
- Post Office

LOCALITY CIRCULATION PATTERN

KEY
- VEHICULAR
- PEDESTRIAN

CIRCULATION: Pedestrian and vehicles are mixed in public streets, of which Vajira Prakarn Road and Sukhumvit Highway are vehicles dominate, and the other roads are pedestrian dominate.
POPULATION: In 1975, there were 4,667 households with the total population of 27,870, of which 15,034 are male and 12,836 are female. The family structure is predominantly nuclear. Over 50% of the population is under 20 years old.

INCOME: The majority of people are middle/high income, consisting of several categories of labor, the occupation ranges from the government worker to clerical worker. No income distribution data is available, but the annual income can be estimated to be ranging from $1,000 to $2,500.

LOCALITY SEGMENT LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITY</th>
<th>Total Number</th>
<th>Area Hectare</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>185</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>253</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>1,265</td>
<td>16</td>
<td>79</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>2.8</td>
<td>17.5</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>2.4</td>
<td>15</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>10.8</td>
<td>67.5</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>100</td>
</tr>
</tbody>
</table>

LOCALITY SEGMENT AIR PHOTOGRAPH

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
LOCALITY BLOCK PLAN

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>SENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>7</td>
<td>0.62</td>
<td>11</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>23</td>
<td>0.62</td>
<td>40</td>
</tr>
<tr>
<td>People</td>
<td>115</td>
<td>0.62</td>
<td>185</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>0.08</td>
<td>13</td>
</tr>
<tr>
<td>Semi-public (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Private (dwelling, shops, factories, lots)</td>
<td>0.54</td>
<td>87</td>
</tr>
<tr>
<td>Semi-private (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>0.62</td>
<td>100</td>
</tr>
</tbody>
</table>
LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS

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

PERCENTAGE
Streets/Walkways 13 %
Playgrounds –
Cluster Courts –
Dwellings/ lots 87 %

DENSITY
Persons/Hectare 185

1 Hectare

0 10 20 50m
1:1000

CASE STUDY: BANG PLA SOI

(45)
BANG PLA SOI, Chonburi: (top) The Chonburi Provincial office. (1975)
(bottom left) High income detached houses. (1975)
(bottom right) Thai traditional detached houses with multi-use open area at the ground floor and living quarter on the second floor. (1975)
EVALUATIONS

The following sections are contained in the Evaluations:

TIME/PROCESS PERSPECTIVE:
Models relating the case studies to their originating models.

PHYSICAL DATA MATRIX:
A comprehensive summary of the data with comments.

COMMUNITY FACILITIES, UTILITIES, SERVICES MATRIX:
A summary of the availability of facilities.

LOCALITY SEGMENT LAND UTILIZATION:
A cross comparison of patterns, percentages and densities of land utilization in the four selected localities.
### TIME/PROCESS PERSPECTIVE

**EXAMPLES**

#### I FARM HOUSES

<table>
<thead>
<tr>
<th>LOCALITY</th>
<th>BANG SAI</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>Periphery</td>
</tr>
<tr>
<td>URBAN LAYOUT</td>
<td>Accretion</td>
</tr>
<tr>
<td>ORIGIN</td>
<td>Thai Traditional</td>
</tr>
<tr>
<td>USERS</td>
<td>Very Low/Low income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Low</td>
</tr>
<tr>
<td>CONFIGURATION</td>
<td>1 story dwelling unit, storage, farm yard.</td>
</tr>
<tr>
<td>DEVELOPER</td>
<td>Private; Incremental.</td>
</tr>
<tr>
<td>USERS</td>
<td>Very Low/Low income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Low/Medium</td>
</tr>
<tr>
<td>TREND</td>
<td>Decreasing</td>
</tr>
<tr>
<td>USERS</td>
<td>Very Low/Low income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Low/Medium</td>
</tr>
<tr>
<td>TREND</td>
<td>Decreasing</td>
</tr>
</tbody>
</table>

#### II TRADITIONAL DETACHED HOUSES

<table>
<thead>
<tr>
<th>LOCALITY</th>
<th>BAN KHOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>Inner Ring</td>
</tr>
<tr>
<td>URBAN LAYOUT</td>
<td>Accretion</td>
</tr>
<tr>
<td>ORIGIN</td>
<td>Thai Traditional</td>
</tr>
<tr>
<td>USERS</td>
<td>Low/Moderately Low income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Low</td>
</tr>
<tr>
<td>CONFIGURATION</td>
<td>1 story dwelling unit, verandah.</td>
</tr>
<tr>
<td>DEVELOPER</td>
<td>Private; Incremental.</td>
</tr>
<tr>
<td>USERS</td>
<td>Very Low/Low income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Medium</td>
</tr>
<tr>
<td>TREND</td>
<td>Increasing</td>
</tr>
<tr>
<td>USERS</td>
<td>Very Low/Low income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>High</td>
</tr>
<tr>
<td>TREND</td>
<td>Increasing</td>
</tr>
</tbody>
</table>

#### III COMMERCIAL ROW-HOUSES

<table>
<thead>
<tr>
<th>LOCALITY</th>
<th>MAKARM YONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>City Center</td>
</tr>
<tr>
<td>URBAN LAYOUT</td>
<td>Accretion</td>
</tr>
<tr>
<td>ORIGIN</td>
<td>Universal</td>
</tr>
<tr>
<td>USERS</td>
<td>Middle/High income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Medium/High</td>
</tr>
<tr>
<td>CONFIGURATION</td>
<td>2-3 stories row-house, Semi-Public/Private back alley.</td>
</tr>
<tr>
<td>DEVELOPER</td>
<td>Private; Instant.</td>
</tr>
<tr>
<td>USERS</td>
<td>Middle/High income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Medium/High</td>
</tr>
<tr>
<td>TREND</td>
<td>Increasing</td>
</tr>
<tr>
<td>USERS</td>
<td>Middle/High income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>High</td>
</tr>
<tr>
<td>TREND</td>
<td>Increasing</td>
</tr>
</tbody>
</table>

#### IV DETACHED HOUSES

<table>
<thead>
<tr>
<th>LOCALITY</th>
<th>BANG PLA SOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>Inner Ring</td>
</tr>
<tr>
<td>URBAN LAYOUT</td>
<td>Accretion</td>
</tr>
<tr>
<td>ORIGIN</td>
<td>Universal</td>
</tr>
<tr>
<td>USERS</td>
<td>Middle/High income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Low</td>
</tr>
<tr>
<td>CONFIGURATION</td>
<td>2 stories dwelling unit, car port, yard.</td>
</tr>
<tr>
<td>DEVELOPER</td>
<td>Private; Instant.</td>
</tr>
<tr>
<td>USERS</td>
<td>Middle/High income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Low</td>
</tr>
<tr>
<td>TREND</td>
<td>Increasing</td>
</tr>
<tr>
<td>USERS</td>
<td>Middle/High income</td>
</tr>
<tr>
<td>DENSITY</td>
<td>Low</td>
</tr>
<tr>
<td>TREND</td>
<td>Increasing</td>
</tr>
</tbody>
</table>
### PHYSICAL DATA MATRIX

<table>
<thead>
<tr>
<th>Category</th>
<th>Population per Category</th>
<th>% of Total Population</th>
<th>LOCALITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7,220</td>
<td>13.3%</td>
<td>1. Bang Sai</td>
</tr>
<tr>
<td>B</td>
<td>8,320</td>
<td>15.1%</td>
<td>2. Ban Khot (on land)</td>
</tr>
<tr>
<td>C</td>
<td>11,680</td>
<td>21.4%</td>
<td>3. Mak苑-苑g</td>
</tr>
<tr>
<td>D</td>
<td>27,870</td>
<td>50.6%</td>
<td>4. Bang Pla-Soi</td>
</tr>
<tr>
<td>Total</td>
<td>55,090</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>USER</th>
<th>DWELLING UNIT</th>
<th>LAND/LOT</th>
<th>DWELLING DEVELOPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 Income</td>
<td>6 Type</td>
<td>7 Area</td>
</tr>
<tr>
<td>Total</td>
<td>79%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The physical data of the 4 case studies of URBAN DWELLING ENVIRONMENTS existing in Chonburi Municipal City is summarized in the physical data matrix and in the following comments. The matrix permits: a) a comprehensive view of the spectrum of dwelling types; b) a comparison and determination of trends and patterns.

1) CATEGORY
2) POPULATION PER CATEGORY: Number of people
3) PERCENT OF TOTAL POPULATION
4) NONE OF LOCALITY. The 4 case studies have been grouped in 4 categories, identifying different income groups and selected physical characteristics:

- Category/Income: Dwelling Unit Type
- Developer
- A V. Low-Low-M. Low Houses: detached Private
- B V. Low-Low-M. Low Houses: detached Private
- C Middle-High Houses: row 3 story Private
- D Middle-High Houses: detached Private

CATEGORIES A-B include the very low, low and moderately low income groups and represent 28.4% of population. Another 71.6% of the population are middle and high income groups.

5) USER INCOME GROUP: Five income groups are distinguished: Very Low, Low, Moderately Low, Middle, and High. The income level is the basic indicator. Income has a direct relationship to the quality and permanency of the dwelling, the size, and the construction technology involved. The indicators follow an expected pattern: The higher the income, the higher is the level of the indicator.

Physical and financial resources are restricted or made available to the user/occupants as a direct function of the income. The lower in income sectors are directly involved with the provision of shelters, while the middle to high income sectors are relatively uninvolved. The provision of a dwelling and its process become more of a service or a consumable commodity to the high income sectors, while the provision of a dwelling to the low income sectors are more a matter of survival.

6) DWELLING UNIT TYPE: Four types are considered: Shanty, Room, Apartment, House. The pattern is defined in terms of income groups: Shanty: Very low incomes; Room: very low incomes; Apartment: very low and low incomes; House: is identified in two types: 1) 2 stories row-houses: moderately low and middle incomes, 2) 2 stories detached house: moderately low, middle, and high income groups.

7) DWELLING UNIT AREA: Three divisions of areas are considered: a) less than 50 m², b) 50 m² to 100 m², and c) 101 m² or more. The expected pattern is followed: The larger the area, the higher the income.

8) DWELLING UNIT TENURE: Two types are considered: rental and ownership. Rental is predominant for all income groups. Ownership is found in moderately low (Note: Bang Sai) and in middle/high income groups (Note: Bang Pla-Soi).

9) DWELLING UNIT PERCENT INCOME FOR RENT/MORTGAGE: From the case studies, it is apparent that the middle and high income tend to spend a higher proportion of their income on housing. In general, the percentage of income allotted for dwelling payments is around 20-25%. Low income people in public subsidized generally pay 20% of their income toward rent.
10) LAND/LOT UTILIZATION: A rise in income roughly parallels the change from public to private use of land.

The very low/low income, high density, detached houses leave little private open areas (Note: Ban Khot, above water case). The open areas surrounding the units are used for cooking, laundry, play area for children etc, as well as being public pedestrian routes which preclude privacy and individual maintenance and control. The higher income groups have more private areas according to the physical layout (Note: Bang Pla-Soi).

In brief, the very poor are usually crowded in a room or in a shanty. For this reason, the land around the shelter becomes essential as a living area for most of the daily activities. The very poor, despite this essential need of space, have little or no control over the land around the shelter because it is ordinarily a public or semi-public path or alley. On the other extreme, the higher the income, the larger is the area of the dwelling and the larger the private land available. The land, however, is not a necessity for these income groups.

11) LAND/LOT AREA: Lot boundaries were not defined and therefore not measurable in the case of Ban Khot, above water case.

12) LAND/LOT TENURE: The land/lot tenure pattern in Chonburi is predominately legal rental, which is primarily found at low to middle income groups (Note: Ban Khot, Makarm-Yong). Legal ownership are found in the middle and high income groups (Note: Bang Pla-Soi). The extralegal tenure are found in the very low income level (Note: Ban Khot).

13) DWELLING LOCATION: Middle and high income groups are found in the City Center and Inner Ring (Note: Makarm-Yong, Bang Pla-Soi). Very low, low and moderately low income groups are found in the Inner Ring and Periphery (Note: Bang Sai, Ban Khot).

14) DWELLING TYPE: Detached dwelling types are found in the very low, low, middle and high income groups (Note: Bang Sai, Bang Pla-Soi), the differences are the size of land/lot area and the quality of the houses. The detached unit is the most common model in the urban area.

There is a large proportion of Row/Group housing types in the moderately low and middle income groups (Note: Ban Khot, Makarm-Yong), they are used as residential dwelling unit.

15) DWELLING FLOORS: Most dwellings are generally one or two floors units in all income levels, because of the simplicity of construction and the Thai house tradition.

16) DWELLING UTILIZATION: Two situation are considered: Single and Multiple. Single utilization is found in the most of the high income groups (Note: Bang Pla-Soi). Multiple dwelling occupation is generally in the form of row-houses (Note: Ban Khot, Makarm-Yong), and few detached houses (Note: Bang Sai). They are generally occupied by low to middle income groups.

17) DWELLING PHYSICAL STATE: The pattern of physical state is rather consistent:Bad states are found in the very low and low income groups (Note: Bang Sai, Ban Khot); Fair states are found in moderately low and middle income groups (Note: Makarm-Yong); Good states are found in middle and high income groups (Note: Bang Pla-Soi).

The physical state is a subjective qualification that may only be taken as a reference. It is determined by many factors of which the income may not be significant. For example: Social factors: Culture, degree of acculturation, individual/family habits; individual/family characteristics; Economic factors: Income level; Physical factors: Climate, local resources, dwelling/land tenure, dwelling/land utilization.

18) DWELLING DEVELOPMENT MODE: The pattern is very distinctive: Incremental development is found in the very low and low income levels (Note: Bang Sai, Ban Khot); Instant development is used by the middle and high income levels (Note: Makarm-Yong, Bang Pla-Soi).

19) DWELLING DEVELOPER: The expected developer pattern is generally apparent in Chonburi; the popular developer is primarily found in the lowest income groups (Note: Ban Khot, above water case). The private developer is found for the low/middle/high income groups (Note: Ban Sai, Ban Khot, Makarm-Yong, Bang Pla-Soi). The public developer is involved in providing housing only for middle and high income groups (Note: Bang Pla-Soi), it has not involved in providing housing for lower income groups for fear of financial lost or too little profit can be made.

20) DWELLING BUILDER: The generally expected pattern may be seen from the case studies: Self-help methods are employed by the very low income groups to build their own houses (Note: Ban Khot, above water case); most of the low income people generally employ artisan to build their houses (Note: Ban Sai, Ban Khot); small contractors build individualized units for the high income (Note: Bang Pla-Soi); and also group of row-houses for the middle income (Note: Makarm-Yong); large contractors build large scale commercial dwelling for the middle income in the City Center (Note: Makarm-Yong).

21) DWELLING CONSTRUCTION TYPE: The pattern of construction type can be summarized as follows: the lower is the income group, the less permanent is the construction; the higher is the income group, the more permanent is the construction.

In the very low income groups, scrap materials and wood are used in constructing the dwelling units where self-help methods are employed.

Wood and masonry/wood construction types are used in building houses for other income groups. Reinforced concrete and concrete blocks are used in building commercial row-houses.

22) DWELLING DEVELOPMENT-YEAR OF CONSTRUCTION: The oldest case study is Makarm-Yong, the City Business District, located in the City Center and built in 1930's. The latest case study is Bang Pla-Soi, the Government Offices District and middle/high income dwelling, located in the Inner Ring and built in 1950's.

23) DWELLING DEVELOPMENT-DENSITY: Population densities are intended as indicators each dwelling group. Therefore, examples were taken from selected, small, homogeneous areas that include the land of a group of dwellings and their circulation access. The area do not include public land for community services.

There is a clear pattern between density and income group: lower densities characterize high income groups; higher densities characterize low income groups. There is also a clear pattern between density and dwelling unit type: lower densities respond to shanties, row-houses; higher densities respond to shanties, row-houses.
### COMMUNITY FACILITIES, UTILITIES/SERVICES MATRIX

<table>
<thead>
<tr>
<th>Category</th>
<th>Population per Category</th>
<th>% of Total Population</th>
<th>LOCALITIES</th>
<th>COMMUNITY FACILITIES</th>
<th>UTILITIES AND SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7,220</td>
<td>13.3%</td>
<td>1. Bang Sai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>8,320</td>
<td>15.1%</td>
<td>2. Ban Khot (on land)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>11,680</td>
<td>21%</td>
<td>3. Makarm-Yong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>27,870</td>
<td>50.6%</td>
<td>4. Bang Pla-Soi</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>55,090</td>
<td>100%</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The matrix illustrates the approximate availability of community facilities, utilities, and services in the 4 dwelling environments. Three levels are indicated as follows:

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

The matrix clearly indicates that the level of availability is directly related to the income sectors, and/or the physical constraints.

Case 1 rates "limited". This case is from the low and moderate low income sectors who live in the sanitary district of Chonburi, comprising approximately 7,220 or 13.3% of the population in Chonburi.

Case 2 rates "none", "limited" and "adequate". This case is from the very low, low and moderately low income sectors, comprising approximately 8,320 or 15.1% of the population in Chonburi.

Cases 3, 4 rate "adequate". These cases are from the middle and high income sectors, comprising approximately 39,550 or 71.6% of the population in Chonburi.

* No public sewerage. Only pit latrines in Bang Sai, Ban Khot; and septic tanks in Makarm-Yong, Bang Pla-Soi, all provided by users.
LOCALITY SEGMENT LAND UTILIZATION: PATTERNS, PERCENTAGES, DENSITIES

1 BANG SAI
Houses: private ownership

Very low percentage of land for public streets, walkways; no semi-public open areas; high percentage of land for private use. Low population density and poor environmental condition.

PATTERN

PERCENTAGES

Streets/Walkways 9%
Playgrounds -
Cluster Courts -
Dwellings/Lots 91%

DENSITY

Persons/Hectare 147

310 P/Ha

2 BAN KHOT
Houses: private rental/ownership

Very low percentage of land for public streets, walkways; high percentage of open space which is swamp area; the private utilization is the sheltered for dwellers only. High population density and unhealthy area.

PATTERN

PERCENTAGES

Streets/Walkways 8.7%
Playgrounds 48%
Cluster Courts 43.3%
Dwellings/Lots 6.3%

DENSITY

Persons/Hectare 332

340 P/Ha

3 MAKAM YONG
Houses: private rental/ownership

Low percentage of land for public streets, walkways. High percentage of land for semi-public uses: schools, temples, social services, etc. High population density.

PATTERN

PERCENTAGES

Streets/Walkways 9.4%
Playgrounds 33.1%
Cluster Courts 57.5%
Dwellings/Lots -

DENSITY

Persons/Hectare 79

400 P/Ha

4 BANG PLA SOI
Houses: private ownership

High percentage of land for public streets, walkways and semi-public open areas. Low population density, tenants are of the high income sectors.

PATTERN

PERCENTAGES

Streets/Walkways 17.5%
Playgrounds 15%
Cluster Courts 67.5%
Dwellings/Lots -

DENSITY

Persons/Hectare 79

310 P/Ha

400 P/Ha

79 P/Ha

KEY

Public: streets/walkways
Semi-Public: playgrounds
Semi-Private: cluster courts
Private: lots
Dwellings
URBANIZATION ALTERNATIVE
The goal of this study is to provide a framework and a set of alternative guidelines for approaching the incremental planning and design procedure for urbanizing land in Chonburi with a particular emphasis on the New Town Site and Services Project at Tambol Sa-Med.

The area of the above study is a 446.5 hectare site, 1 kilometer to the west of the Chonburi Municipal City, presently under construction. The project was expected to be finished by 1974, but the lack of financial support, the political situation, and inadequate planning procedures continue to push back the date of completion.

Evaluation and revision of the project at this point will allow the government to adapt and adjust the future development.

It should be understood that this study is not a solution to the problem of the existing development, but only an alternative reference/information for various agencies involved in the planning for residential development, and it can be studied in greater depth for the formulation of a specific policy of growth and development of residential areas in both the New Town and Municipal City of Chonburi.

The structuring of the land development processes through staging can reflect the anticipated and un-anticipated changes necessary to future growth. In part, incremental planning and design procedures can provide the 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.

In order to proceed with incremental planning, it is necessary to establish the major determinants. The assumptions that urbanization will take place, land values will rise, population and building densities increase, that commercial growth will naturally follow certain patterns if allowed to, all demand that the land must be structured under specific tenure patterns, which will allow for growth and change as the development matures. This study is directed to this aim.

The text of the study is organized into three categories enabling the reader to synthesize each aspect:

- ASSUMPTION
- CONSEQUENCE
- ACTION

General projections will be made as internal influences on the developing site.
SA-MED SITE AND SERVICES PROJECT

The City Planning Division, Ministry of Interior, estimates that the population of Chonburi Municipal City will reach 171,000 by 1990, and the increase in land use will be three times greater than it is at present. Therefore, the land requirement for future is immense. This together with the existing severe deficiencies in every aspect within the City, implies the need for other schemes to relieve the pressures from the Municipal City as soon as possible.

For this reason, a New Town was proposed to be established at Tambol Sa-Med, 1 kilometer to the west of Chonburi Municipal City. The site appeared to be suitable for development as it was an undeveloped public land, due to this fact, no legal problems or other obstacles for the development of the site were foreseen.

In April 1966, the reservation for all lots in the New Town was open to public, and within 15 days, all 2761 lots and 650 row-houses were reserved. Then, in February 1968, the construction of the New Town was begun, and it is still under construction in 1976.
URBAN DWELLING ENVIRONMENTS

BASIC DATA OF THE SITE

LOCATION:
The site is approximately 1 kilometer from the Chonburi Municipal City. It is an undeveloped public area.

AREA:
Gross area of the site = 446.5 hectare.

BOUNDARIES:
North: Gulf of Thailand
East: Lamu Canal
South: Private farm land
West: Kamoy Canal

ACCESS:
Access road does not exist on site. The nearby circulation routes are Sukhumwit Highway, approximately 1 kilometer to the south, and the highway to Ang Sila, approximately 500 meters to the west.

TOPOGRAPHY:
The site is a marsh/swamp area covered with several kinds of brushwood.

NATURAL DRAINAGE:
There are 6 canals serving as natural drainage of the site.

FLOODING:
The marsh area of the site is prone to frequent flooding.

SOIL CONDITION:
- 1st. level 2-4 m. depth: soft clay
- 2nd. level 4-7.5 m. depth: sand, sea shell
- 3rd. level 7.5 m. depth: sand, hard clay

LAND OWNERSHIP:
The site is a public land preserved for making charcoal since 1928. There are only 29 squat-ter families on the site.

ZONING:
The development of the site is not based on the Master Plan for Chonburi proposed by the City Planning Division, Ministry of Interior. It is based on the availability of public land which has the least legal problems for the imple-mentation of the New Town.
BASIC DATA OF THE SITE

GULF OF THAILAND

THE PROJECT SITE
(446.5 Hectare)

ANG SILA
KAMOV CANAL
LANU CANAL
PRIVATE FARM LAND

KEY
PROPERTY LINE

PLAN OF SITE

1:25000
The local authorities in Chonburi have initiated the implementation of the New Town since 1968, in order to alleviate the growing congestion of population in the existing urban area. The development is subsidized by the local finance. This course of action is indicative of the possibility that in future the local authorities might be able to assume greater responsibility in national development.

Most of the major streets and secondary streets have been completed at the existing site development as follows:

| STREET WIDTH/ PLANNED LENGTH/COMPLETED LENGTH |
|-----------------|-----------------|-----------------|
| 60 m.           | 585             | 585             |
| 30 m.           | 3,968           | 3,968           |
| 20 m.           | 5,926           | 5,446           |
| 15 m.           | 12,142          | 11,642          |
| 10 m.           | 21,218          | 20,718          |

All the streets are compact soil aggregate. The paving of streets will be staged in future.

There is only one existing building on the site, a 32-unit apartment, temporarily used by the constructing firm as the construction headoffice.

Few areas have been filled in (as shown in the plan). A man-made lake has been built in the area where the central park is planned to be located. The precast concrete poles for electricity along the major streets have been installed. The lots have not yet been allocated.
EXISTING SITE DEVELOPMENT

GULF OF THAILAND

KEY
- FILLED AREAS READY FOR DEVELOPMENT
- STREETS PROPOSED TO BE RETAINED
- STREETS PROPOSED TO BE ELIMINATED

EXISTING SITE DEVELOPMENT PLAN

SCALE: 1:25000
ASSUMPTION

The site is partially developed with the layout of streets and filled areas as shown in the opposite page. It is assumed that the future developments will minimize public circulation and retain only the streets that are absolutely necessary.

SA-MED, Chonburi: (top) A general view of the existing site development along the main street, extended from the Government Center. (1975)

(bottom) A 32-unit apartment, temporarily used as the construction headoffice. (1975)

(opposite page) The air photograph of the existing site development. (1974)
LAND COMMERCIAL POTENTIAL/DEMAND PROJECTION

ASSUMPTIONS:

COMMERCIAL GROWTH:
- That predominate commercial activity will develop in linear patterns along major circulation networks and transportation routes: intra-community street, collector street (minor).
- That predominate commercial growth will not occur along: neighborhood street, paths.
- That scattered (neighborhood) convenience commercial will develop in a random pattern within neighborhoods. The location of such is generally on the corner lots or intersections.

RESIDENTIAL GROWTH:
- Surface or spread development.

INDUSTRIAL GROWTH:
- Spot or point development.

EDUCATION GROWTH:
- Spot or point development.

PUBLIC SERVICES (NON-UTILITIES):
- Spot or point development.

CONSEQUENCE:
- Land value and population density can be expected to be highest in the predominate commercial areas.

ACTION:
- Plan these areas in such a manner that they will be able to re-adjust to higher land values and other priorities through incremental planning.

POPULATION DENSITY PROJECTION

ASSUMPTIONS:

COMMERCIAL GROWTH:
- That the process of urbanization will cause land values to rise in relation to demand over a period of time.
- That as a result of commercial growth patterns, land value will be highest in the areas of commercial activity.
- That the land value of seaside areas with good advantage in view will be higher than the inner areas.

CONSEQUENCE:
- Initially, these areas will not command significantly higher purchase prices, but due to intensification of development will command the highest land values.

ACTION:
- Plan these areas in a flexible manner in order that re-adjustment over time to other priorities may be accomplished to reflect these land value projections.

ACTION:
- Allocate land use functions according to priorities, stability, and flexibility for growth from the initial stage to the high density stage.
PROJECTIONS

COMMERCIAL DETACHED

ASSUMPTION:
That the income groups will related to the land value, thus the higher income groups will be found in/near the commercial activity areas where the land value is high.

CONSEQUENCE:
Initially, the development will not be diverse enough to achieve the dispersion of different income groups as shown in the projection, unless the initial use of the land will provide for change through incremental and flexible development of urbanization over time.

ACTION:
Allocate land use functions in a flexible manner that re-adjustment over time may be accomplished to reflect these income groups projection.

ASSUMPTIONS:
- That the location of public sectors will be on the areas where the land value is low, or have the smaller side along the high value land.
- That the location of private sectors will be on the areas where the land value is high or moderately high, due to the economical benefits and initial capital investment.

CONSEQUENCE:
That the location, facilities, provided, and procedures for planning the development will insure the success of the future by allowing for an anticipated and natural growth pattern.

ACTIONS:
- Individual project redesign of circulation networks, block configurations, land use function, and staging for growth.
- The location for the initial stage should be located such that the land deemed most probable to develop into intense commercial activity is not developed initially, but is reserved for growth based on demand.
- The paving of streets must be programmed in stages corresponding to the scale of priorities in the overall concept of development. Initially, it may be possible to pave only the circulation paths with the greatest amount of traffic; the intra-community streets, collector streets, which will probably served as transportation routes. The minor neighborhood streets and paths do not need to be paved initially due to the lack of automobile traffic and lower priority.

ASSUMPTIONS:
- That the dwelling types will reflect the aspects of the previous assumptions: land use, land value, population densities and income groups.
- That the dwelling type for high income groups in the commercial land use function areas where the land value and population densities are high will be grouped in the form of multi-story row-houses along the major streets.
- That the dwelling type for middle income groups will be detached/row house along the minor streets where the land value is moderately low. The number of floor will be 1-2 stories.
- That the dwelling type for low income groups will be 1 story detached house around the inner areas where the land value is low.

CONSEQUENCE:
The subdivision of land should be flexible to meet arising demand of different dwelling types.

ACTION:
A variety of dwelling types should be planned to meet conditions of groups at different economic levels. Each providing a means for incremental growth thereby maximizing flexibility to meet each group's condition. This growth is related to the development of personal resources. From this procedure can come a detailed planning of lots for the best use of the site, and flexibility of shelter use and expansion.
The following table shows:

1. BLOCK:
   - Basic subdivision of land, based on the existing inter-community streets.
2. GROSS AREA:
   - Area of each block.
3. LAND USE:
   - Private and Public uses.
4. BUILDING TYPE:
   - As suggested in the Master Plan for Chonburi, 1988, by the City Planning Division, the Ministry of Interior, for different densities building types.
5. PROJECTED AREA:
   - Based on the existing street layout and previous projections.
6. PERCENTAGE OF LAND:
   - Percentage of each projected area.
7. DENSITY:
8. POPULATION:
   - Number of population in each block.
9. AVERAGE FAMILY SIZE:
10. AVERAGE NUMBER OF PRIMARY SCHOOL:
    - Assumed that every 5,000 people require 1 primary school.
11. AVERAGE NUMBER OF SECONDARY SCHOOL:
    - Assumed that every 10,000 people require 1 secondary school.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 17.5</td>
<td>A) high den.private</td>
<td>A) com-row house</td>
<td>0.8</td>
<td>3.4</td>
<td>250</td>
<td>625</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B) med. den.private</td>
<td>B) semi-Detached</td>
<td>2.2</td>
<td>12.7</td>
<td>375</td>
<td>825</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C) low den.private</td>
<td>C) detached</td>
<td>9.3</td>
<td>53</td>
<td>225</td>
<td>2,090</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D) public/wami-public</td>
<td>D) school</td>
<td>5.7</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>17.5</td>
<td>100</td>
<td>3,540</td>
<td>0.7</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. 15.3</td>
<td>A)</td>
<td>A)</td>
<td>1.4</td>
<td>8.8</td>
<td>785</td>
<td>1,100</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>4.5</td>
<td>26.4</td>
<td>375</td>
<td>1,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>5.4</td>
<td>34.8</td>
<td>225</td>
<td>1,215</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>4.5</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>15.3</td>
<td>100</td>
<td>3,815</td>
<td>0.8</td>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 24</td>
<td>A)</td>
<td>A)</td>
<td>1.8</td>
<td>7.6</td>
<td>785</td>
<td>1,410</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>5.5</td>
<td>23</td>
<td>375</td>
<td>2,060</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>9.5</td>
<td>39.4</td>
<td>225</td>
<td>2,125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>7.2</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>24</td>
<td>100</td>
<td>5,595</td>
<td>1.1</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 15.9</td>
<td>A)</td>
<td>A)</td>
<td>0.8</td>
<td>4.7</td>
<td>785</td>
<td>625</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>2.2</td>
<td>14.1</td>
<td>375</td>
<td>825</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>8.2</td>
<td>51.2</td>
<td>225</td>
<td>1,845</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>8.7</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>15.9</td>
<td>100</td>
<td>3,295</td>
<td>0.6</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. 12.6</td>
<td>A)</td>
<td>A)</td>
<td>0.8</td>
<td>6.3</td>
<td>785</td>
<td>625</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>2.4</td>
<td>19.9</td>
<td>375</td>
<td>900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>5.7</td>
<td>44.8</td>
<td>225</td>
<td>1,280</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>3.7</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>12.6</td>
<td>100</td>
<td>2,805</td>
<td>0.6</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. 11</td>
<td>A)</td>
<td>A)</td>
<td>0.5</td>
<td>4.4</td>
<td>785</td>
<td>375</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>1.4</td>
<td>17</td>
<td>375</td>
<td>675</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>5.8</td>
<td>52.6</td>
<td>225</td>
<td>1,300</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>3.3</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>11</td>
<td>100</td>
<td>2,215</td>
<td>0.4</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. 14</td>
<td>A)</td>
<td>A)</td>
<td>0.6</td>
<td>4.3</td>
<td>785</td>
<td>470</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>1.8</td>
<td>12.7</td>
<td>375</td>
<td>675</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>7.4</td>
<td>53</td>
<td>225</td>
<td>1,665</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>4.2</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>14</td>
<td>100</td>
<td>2,810</td>
<td>0.6</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. 17.5</td>
<td>D)</td>
<td>public offices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. 15</td>
<td>A)</td>
<td>A)</td>
<td>1.3</td>
<td>8.8</td>
<td>785</td>
<td>1,020</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>3.9</td>
<td>26.4</td>
<td>375</td>
<td>1,460</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>5.3</td>
<td>34.8</td>
<td>225</td>
<td>1,100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>4.5</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>15</td>
<td>100</td>
<td>3,670</td>
<td>0.7</td>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. 20</td>
<td>A)</td>
<td>A)</td>
<td>1</td>
<td>5</td>
<td>785</td>
<td>785</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>3</td>
<td>15</td>
<td>375</td>
<td>1,125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>10</td>
<td>50</td>
<td>225</td>
<td>2,250</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>6</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>20</td>
<td>100</td>
<td>4,160</td>
<td>0.8</td>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. 7.5</td>
<td>A)</td>
<td>A)</td>
<td>2.6</td>
<td>35</td>
<td>785</td>
<td>2,040</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>2.6</td>
<td>35</td>
<td>375</td>
<td>975</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>2.6</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>7.5</td>
<td>100</td>
<td>4,015</td>
<td>0.6</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. 9</td>
<td>A)</td>
<td>A)</td>
<td>0.8</td>
<td>8.3</td>
<td>785</td>
<td>625</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>2.2</td>
<td>24.9</td>
<td>375</td>
<td>825</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>3.3</td>
<td>36.8</td>
<td>225</td>
<td>740</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>2.7</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>9</td>
<td>100</td>
<td>2,190</td>
<td>0.4</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. 11.2</td>
<td>C)</td>
<td>C)</td>
<td>7.8</td>
<td>70</td>
<td>225</td>
<td>1,750</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>3.4</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>11.2</td>
<td>100</td>
<td>1,750</td>
<td>0.3</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. 10.7</td>
<td>A)</td>
<td>A)</td>
<td>0.7</td>
<td>7</td>
<td>785</td>
<td>550</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>2.1</td>
<td>19</td>
<td>375</td>
<td>785</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>4.7</td>
<td>44</td>
<td>225</td>
<td>1,055</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>3.2</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>10.7</td>
<td>100</td>
<td>2,390</td>
<td>0.5</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. 9.5</td>
<td>A)</td>
<td>A)</td>
<td>0.4</td>
<td>4.2</td>
<td>785</td>
<td>315</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B)</td>
<td>B)</td>
<td>1.2</td>
<td>12.6</td>
<td>375</td>
<td>450</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C)</td>
<td>C)</td>
<td>5.1</td>
<td>53.2</td>
<td>225</td>
<td>1,445</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D)</td>
<td>D)</td>
<td>2.5</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>9.5</td>
<td>100</td>
<td>1,910</td>
<td>0.4</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE OF POPULATION AND REQUIRED SCHOOLS

**GRAND TOTAL**: 43,168
LAND USE

The proposed plan is intended to show the basic subdivision of land on the existing developing site, based upon the previous assumptions and projections.

PLANNING CRITERIA:
- The major existing intra-community streets are all retained.
- Some existing secondary streets are also retained if advantage can be taken.
- Few streets are proposed to shorten the walking distance.

LAND USE CRITERIA:
- Every subdivision of land will be within walking distance and have/share supporting public services in the form of elementary schools, community center, utilities, transportation facilities, etc.
- The private sector is located on the high/moderately high value land: periphery of block, along intra-community streets.
- The public sector is located on the moderately low value land: center/inner part of block.

CIRCULATION CRITERIA:
- The circulation network will provide a basic framework for the development of the site.
- Pedestrians and vehicles will be mixed in the public streets, but pedestrians will dominate over vehicles.
- The traffic frequency and speed will be controlled by the sizes and layout of the streets.

The proposed plan shows:
- COMMERCIAL AREA: The commercial areas are located along major streets where the land value is high and have good potential for business.
- RESIDENTIAL AREA: The middle income sectors are located near the outer part of block which can easily reach the commercial areas and transportation. The lower income sectors are located around the inner part of block where land value is moderately low.
- SCHOOLS: The schools are located at the center of block and easily accessible to all residents in the same/nearby community. The community center can also be attached to the school so that joint use can be made of playground and other facilities for recreation.
- PUBLIC OFFICES AND PARK: The public offices and park are located at the central part of the site will make it easy to be reached by all residents
- MARKET: The markets are located near the commercial activity area with access easy to transportation.
PROPOSED LAND USE PLAN

GULF OF THAILAND

PROPOSED LAND USE PLAN

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>LAND VALUE</th>
<th>DENSITY</th>
<th>INCOME</th>
<th>DWELLING TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predominate Commercial</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>3 - 4 stories Row - Houses</td>
</tr>
<tr>
<td>Commercial/Residential</td>
<td>Moderate</td>
<td>Medium</td>
<td>Middle</td>
<td>2 - 3 stories Semi-Detached</td>
</tr>
<tr>
<td>Residential</td>
<td>Moderate/ Low</td>
<td>Low</td>
<td>Middle/ Low</td>
<td>1 - 2 stories Detached</td>
</tr>
<tr>
<td>Public/Semi-Public</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

KEY:
- Primary School (PS)
- Secondary School (SS)
- Public Buildings (PB)
- Market (M)
- Recreation (R)
- Existing Streets
- Proposed Streets

Scale: 1:15000
CIRCULATION

The circulation network provides a primary ordering framework around which the site is developed. As well as circulation function, the network provides the utility spine throughout the site. The land which is utilised by the circulation grid is considered to be under public ownership providing for paths of movement of both pedestrian and vehicular access.

CIRCULATION CRITERIA:

The circulation plan is proposed by the following patterns:
- All streets will have access from the east-west and north-south main streets. The connection between each access is to reduce travel distance and speed of the traffic.
- There are 4 accesses:
  - EAST ACCESS: From Chonburi Municipal City.
  - SOUTH ACCESS: From Sukhumwit Highway.
  - WEST ACCESS: From Ang Sila District.
  - NORTH ACCESS: Water way from the nearby seaside resorts.

CIRCULATION MODE:

The following circulation conditions are considered in the plan:
- MODE 1 PEDESTRIAN: Exclusive use by pedestrian. Example: pedestrian walkways, cluster courts, parks.
- MODE 2 PEDESTRIAN/VEHICLES MIXED: Pedestrian dominate over vehicles; control of traffic frequency, character, and speed are mainly established by the street layout and use. Example: secondary roads in residential areas.
- MODE 3 VEHICLES/PEDESTRIAN MIXED: Vehicles dominate but do not control circulation; control are established for the protection of pedestrians, crosswalks, traffic lights. Example: main inter-community streets.

TRANSPORTATION:

Public transport is proposed to be provided by small buses. It will be more effective in achieving the objective for public transport, as more frequent and convenient services as well as closer access to destinations can be provided. It is expected that through the efficiency of small buses, the services can provide an attractive alternative to the use of private cars, thus resulting in a reduced volume of traffic on the streets.
PROPOSED CIRCULATION PLAN

KEY
- EXISTING STREETS
- PROPOSED STREETS

PROPOSED CIRCULATION PLAN

EXISTING STREETS
PROPOSED STREETS

MODE 1. PEDESTRIAN
MODE 2. PEDESTRIAN/VEHICLES
MODE 3. VEHICLES/PEDESTRIAN

GULF OF THAILAND
KAMPU CANAL
TO ANG SILA
TO SUDUM MUNICIPALITY
LAKE

1:15000
DEVELOPMENT MODE

It is both difficult and economically infeasible to develop all the land to meet the needs of a high density population. The site should be incrementally developed to enable commercial and other potential high land value areas to re-adjust to higher land values and other priorities, as the development is intensified.

DEVELOPMENT CRITERIA:

- The site is proposed to be developed in terms of stages, time, population to be settled.
- The initial development will have supporting public and semi-public services and facilities.
- Convenient pedestrian access to public transportation/extension of public transportation.

INITIAL DEVELOPMENT:

- The initial stage is proposed to start along the intersection of the east-west and north-south main inter-community streets.
- The development will include residential, commercial, schools, public facilities, and open areas with basic circulation and infrastructure needed to serve the community.
- In this stage, emphasis should be upon instant process. This will help create an attractive environment and will encourage people to the project.

SUBSEQUENT DEVELOPMENT:

The speed and magnitude of the growth of the site are difficult to forecast. Evaluation or revision of the plan is necessary at this point to improve and adjust the future development according to the needs of the community. However, the plan should enforce/facilitate a compact development instead of a scattered development, and maintain at any stage the consistency between land use/density/commercial potential and intensity of circulation/activities.

MANAGEMENT

It is proposed that a Development Corporation should be appointed by the Ministry of Interior to take the full responsibility for the development of the site. This will be a legal entity with powers to manage the land and other property, to carry out the overall operations, and to carry on any undertaking necessary for the purposes of the development.

The Corporation should be financially supported by the Ministry of Finance or other government's financial institutions. The finance may be by way of advances or loan at a low interest rate, and should be payable over a long period.

Co-operation between the Development Corporation and the local authority will be essential as the provision of many facilities and services required for the developing site; water, electricity, sewage disposal, education, health services, etc., still remain the responsibility of the latter. Where this necessary provision is beyond the technical and financial resources of the local authority, the Corporation may assist by undertaking the works themselves or by making a financial contribution.
PROPOSED INITIAL DEVELOPMENT

KEY

- RESIDENTIAL
- COMMERCIAL
- OPEN SPACES
- PS PRIMARY SCHOOL
- SS SECONDARY SCHOOL
- PB PUBLIC BUILDINGS
- M MARKET
- INITIAL DEVELOPMENT
- FUTURE DEVELOPMENT

GULF OF THAILAND

LAMU CANAL

TO KENYAN PORTS

TO ANG SILA

TO KUNDUZI

TO KOOMI MUNICIPALITY
GLOSSARY

Accesses. The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, or water systems such as: waterways, airlines, etc.)

Actual Land Cost. "The cost of land is...set solely by the level of demand. The price of land is not a function of any cost conditions; it is set by the users themselves in competition." (Furner, 1971)

Adjacent Land. Surrounding land, or land that is directly accessible to the property.

Airport Disturbance. The act or process of destroying or impairing a tranquility, or settled state of the site by the annoyance of airport noise, vibration, hazards, etc. (Merriam-Webster, 1971)

Airport Setbacks. The regulation of the height or type of structures in the path of moving aircraft. (Abrams, 1971)

Alternating Current (A.C.). (Electric) current that reverses its direction of flow at regular intervals. (KOTC ST 45-7, 1953)

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

Amperes. Amps (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 producing the effect applied across a resistance of one ohm. (KOTC ST 45-7, 1953)

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

Approaches. The main routes external to the site (pedestrian/vehicular) by which the site can be 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. (Hayes, 1971)

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

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

Barrier. 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)

Bettement (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.)

Birder Course. A transitional layer of bituminous paving between the crushed stone base and the surface course, if not in direct contact between base and surface course. (Defina, 1972)

Bituminous. A coating of or containing bitumen as asphalt or tar. (Defina, 1972)

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

Borrowy. Something (a line of 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 on limb, health, property, and public welfare by regulating the design, construction, quality of materials, use and occupancy, location and maintenance of structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)

Building Drain. Lowest horizontal piping of the building drainage system that discharges soil, waste, and other drainage pipes. It is connected to the building sewer. (KOTC ST 45-7, 1953)

Building Main. Water-supply pipe and fittings from the building to the street main or other source of supply to the first branch of a public or institutional distribution system of a building. (KOTC ST 45-7, 1953)

Cess Pool. An underground catch basin that is used where there is no sewer and into which household sewage and other liquid waste is drained. (Merriam-Webster, 1971)

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

Clay. A lustrous colloidal substance, plastic when moist (crystalline grains less than 0.002 mm in diameter). (U.S.D.P.)

Cleanout. A plug or similar fitting to permit access to traps or sewer lines. Cleanouts are usually used at turns and other points of collection. (KOTC ST 45-7, 1953)

Climate. The average condition of the weather at a particular place, especially as it appears as exhibited by temperature, wind, precipitation, sun energy, humidity, etc. (Merriam-Webster, 1971)

Collection System. The system of pipes in a sewage network, comprised of house service, collection lines, manholes, laterals, mains. (U.S.D.P.)

Combined Sewer. A sewer that carries both storm water and sanitary or industrial wastes. (Defina, 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, recreation, police, fire, public transportation, commerce, etc. (U.S.D.P.)

Community Recreation Facilities. Facilities for activities voluntarily undertaken for pleasure, fun, relaxation, etc. (Defina, 1972)

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

Condominium. 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: he holds direct legal title to the unit and a proportionate interest in the common land and improvements. As types of condominiums are recognized: horizontal; detached, semi-detached, row/semi-detached types; vertical: walk-up, high-rise. (Merriam-Webster, 1971)

Construction. Materials which allow current to flow such as aluminum, copper, iron. (KOTC ST 45-7, 1953)

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

Conservation Easement. An easement acquired by the public and designed to open privately owned lands for recreation. (KOTC ST 45-7, 1953)

Construction Boring. A subsurface boring done at the planned location of all infrastructure and building foundations and roadway sub-bases for design of foundation systems of a building. (KOTC ST 45-7, 1953)

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

Corporation. A cooperative that provides a number of people. It may include: schools, health, recreation, police, fire, public transportation, commerce, etc. (U.S.D.P.)

Costs of Urbanization. Include the following: CAPITAL COSTS of development: cost of administration, maintenance, etc.; DIRECT; include capital and operating; INDIRECT; include environmental and personal effects. (Merriam-Webster, 1971)

Current (See: Alternating Current, Direct Current). An electric current in 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)

Cycle. One complete performance of a vibration, electric oscillation, current alternation, or other periodic process. (U.S.D.P.)

Datum. A barrier preventing the flow of water: a barrier built across a water course to confine and keep back flood waters. (Merriam-Webster, 1971)

Depreciation Acceleration (Tax). A tax incentive designed to encourage more rapid 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 something which adequately satisfy some need. (Merriam-Webster, 1971)

Detached Dwelling. Individual dwelling unit, separated from others. (U.S.D.P.)

Development. Gradual advance or growth through progressive changes; a developed tract of land (U.S.D.P.)

Development Site. There are two general ranges of situation: 1) any site within an urban area, possibly having some of their utilities, services, and community facilities, 2) any site outside an urban area, other than that for urbanization and can use its supporting utilities, services, and community facilities (U.S.D.P.)

Direct Current (D.C.). An electric current that flows continuously in one direction. (KOTC ST 45-7, 1953)

Discharge (Q). Flow from a culvert, sewer, channel, etc. (Defina, 1972)

Distance. The degree or amount of separation between two points (the site and each other element of the urban context) measured along the shortest path adding the path of travel. (Merriam-Webster, 1971)

Distribution Station. The park of an electric supply that is connected to built power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)

Disturbed Soil. Soils that have been disturbed by artificial process, such as excavation, transport and compaction in fill. (U.S.D.P.)

Drainage. Interception and removal of ground water or surface water by artificial or natural means. (Oe Pina, 1972)

Easement Dist. Fine dry pulverized particles of earth, gravel, refuse, wastes, litter, etc. (Merriam-Webster, 1971)

Dwelling. The general, global designation of a building/shelter in which people live. A dwelling contains one or more dwelling units. (KOTC ST 45-7, 1953)

Dwelling Builder. Four groups are considered: self-help builder, where the dwelling unit is directly built by the user or occupant; builder, where the dwelling unit is totally or partially built by a skilled craftsman, hired by the user or occupant; small contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwellings or simple complexes; large contractor is defined by the scale of operations, financially and materially; the scale reflecting more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a slightly larger complex. (U.S.D.P.)

Dwelling Density. The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density including lots, streets. Net density is the density of the population of complete plots of an area (exc. including only lots). (U.S.D.P.)

Dwelling Developer. Three sectors are considered in the supply of dwellings: 1) the public sector geared for 'self use' and sometimes for profit. U.S.D.P.
ENVIRONMENTS

- Gas network; telephone network; public transportation; police protection; refuse collection, health, schools, playgrounds, parks, open spaces. (U.S.D.P.)

- In the ratio between the population density, land utilization, land subdivision, and utility network of a given urban area (U.S.D.P.)

- MUTUAL OWNERSHIP. Private land ownership shared by two or more persons and their heirs 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 processes. Although natural, they depend greatly upon the local geology, environment, and past geological history of the formations. (U.S.D.P.)

- Network efficiency (layout efficiency). The ratio of the length of the network to the area(s) contained within or tangent to it. (U.S.D.P.)

- Neutral wire. Wire carrying no voltage between itself and a ground. (NCT DT 45-7, 1953)

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

- OODA. A cycle of something that affects the sense of small. (Merriam-Webster, 1971)

- Off-equal. The unit of resistance to the flow of electricity. The higher the number of ohms, the greater the resistance of a circuit. (U.S.D.P.)

- Amperage and wattage are in direct proportion to one another; resistance decreases as the cross-sectional area of the wire increases. (U.S.D.P.)

- The opposition to electrical flow. (Reformulate)

- Radiant energy coming through the glass. (Merriam-Webster, 1971)

- Plane undertaken; a specific plan or design. (U.S.D.P.)

- Project. A plan undertaken; a specific plan or design. (U.S.D.P.)

- Public circulation. The circulation network which is owned, controlled, and maintained by public agencies and is accessible to all members of a community. (U.S.D.P.)

- Public facilities. Facilities such as schools, playgrounds, parks, other facilities accessible to all members of a community which are owned, controlled, and maintained by public agencies. (U.S.D.P.)

- Public services and community facilities. Includes public services and community facilities such as, parks, police protection, refuse collection, health, schools, playgrounds, public transportation, public facilities and utilities, public community facilities, business, commercial, small industries, markets. (U.S.D.P.)

- 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, Minimum Standards, 1966)

- Public utilities. Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telecommunication networks. (U.S.D.P.)

- Pump. A device or machine that raises, transfers, or compresses fluids or that attenuates gases especially by suction or pressure or both. (Merriam-Webster, 1971)

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

- Reuse. Large-scale storage of water; also functions to control fluctuations in supply and pressure. (U.S.D.P.)

- Residential area. An area containing the basic necessities of life - homes, schools, churches, hospitals, stores, shopping centers, educational facilities, recreation, shopping, work. (U.S.D.P.)

- Resistance. The opposition to electrical flow. (Resistance increases as the length of wires increases and decreases as the cross-sectional area of wires is increased). (NCT DT 45-7, 1953)

- Rights-of-way. A legal right of passage over another person's ground (land), the area or way over which one may lawfully use the strip of land devoted to or over which it is built a public road, the land
occupied by a railroad, the land used by a public right-of-way may be leased (as streets, pedestrian walkways, and automobiles) or exclusive (as rapid transit routes; subways; railroads, etc.) (Merriam-Webster, 1971; U.S.D.P.)

ROADWAY (HIGHWAY). A portion of the highway included between the outside lines of "outer or side ditches, interminable ditches, chases, and appurtenant easements necessary to proper drainage, protection, and use. (DePina, 1972)

ROW/GROUPED HOUSING. Dwelling units grouped together having access only from the rear. (U.S.D.P.)

RUNOFF. That part of precipitation carried off from the area upon which it falls. (DePina, 1972)

RUNOFF-RAINFALL RATIO. The percentage (ratio) of streamflow runoff that is not reduced by evaporation, evapotranspiration, surface wetting, soil absorption, and conveyance; with increased rainfall duration, runoff-rainfall ratios increase. (U.S.P. Fair Drainage, 1971)

SAND. Loose, distinguishable grains of quartz/feldspar, mica (ranging from 2mm to 0.02mm in diameter). (U.S.D.P.)

SANITARY SEWERAGE. The system of artificial usually subsurface conduits to carry off sewage composed of: refuse: waste material excluded from the human body; domestic wastes: used water from a home/community containing 0.1% total solids; and industrial wastes, but not water from ground, surface, or storm. (U.S.D.P.)

SEMI-DETACHED DWELLING. Two dwelling units sharing a common wall. (U.S.D.P.)

SEPTIC TANK. A tank in which the organic solid matter produced in a sewage treatment plant is deposited and retained until it has been disintegrated by anaerobic bacteria. (Merriam-Webster, 1971)

SERIES CIRCUIT. A circuit in which all components are connected in series. (U.S.D.P.)

SITE. A piece of land where people can build their own dwellings; opportunity of access to employment, utilities, services and recreational facilities; financing and communication. (U.S.D.P.)

SITE AND SERVICES. The subdivision of urban land and the provision of services for residential use and for commercial purposes. Civil engineering projects are aimed to improve the housing conditions for the low income groups in the United States. a) SITE: the access to a piece of land where people can build their own dwellings; b) SERVICES: the opportunity of access to employment, utilities, services and recreational facilities; financing and communication. (U.S.D.P.)

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. (Merriam-Webster, 1971)

SMOKE. The gaseous products of burning carbonaceous materials released into the air. (Merriam-Webster, 1971; U.S.D.P.)

SOIL. The natural deposits of weathered rock material that constitutes the earth's surface. (U.S.D.P.)

SOIL INVESTIGATION. It is the process to find the soil structure and other characteristics. It may include the following stages: initial soil survey, exploratory boring, construction boring. (U.S.D.P.)

SOIL PIPE. The pipe in a dwelling which carries the pipe discharge from water closets. (U.S.D.P.)

SOIL SURVEY (INITIAL). An on-site examination of surface soil conditions and reference to a soil survey regional map. (U.S.D.P.)

STACK. The vertical pipe in a dwelling of the soil-, water-, or vent-pipe systems. (Merriam-Webster, 1971; U.S.D.P.)

STARCH. A component which provides a water seal to prevent water and waste from lateral sewer only. (Merriam-Webster, 1971; U.S.D.P.)

STANDPIPE. A pipe riser with tap used as a source of water for domestic purposes. (ROTC Standards, 1966)

STORM DRAINAGE. Storm sewer: a sewer (system) designed to carry off surface water, except sewage (exclusively storm water, surface runoff, or street wash). (Merriam-Webster, 1971; U.S.D.P.)

STREET LIGHTING. Illumination to improve vision at night for security and for the extension of activities. (U.S.D.P.)

SUBDIVISION REGULATIONS. Regulations governing the development of raw land for residential or other purposes. (Amer, 1972)

SUBGRADE. The layer of natural soil or fill (completed soil) beneath which the pavement structure including curbs is constructed. (DePina, 1972)

SUBMAIN. The main or branch sewer. A collector pipe receiving sewage from lateral sewer only. (U.S.D.P.)

SUBSIDENCE INCOME. The minimum amount of money required for food and fuel for an average family to survive. (U.S.D.P.)

SULFUR. Drainage or refuse especially from a house, farmhouse, or street. (Merriam-Webster, 1971)

TAP (also FAUCET). A fixture for drawing a liquid from a pipe, cistern, or other vessel. (Merriam-Webster, 1971)

TAX EXEMPTION. A grant by a government of immunity from taxes; (a ten-year tax exemption on new housing units for the low income families/couples). (Abrams, 1972)

TAX INCENTIVE. Favorable tax treatment to induce the beneficiary to do something he would not otherwise be likely to do. (U.S.D.P.)

TAX STRUCTURE - TAXATION. The method by which a nation (state, municipality) decides to transfer resources from the private sector to the public sector. (U.S.D.P.)

TELEPHONE. An electrical voice communication network interconnecting all subscribing individuals and transmitting over wires. (U.S.D.P.)

TEMPERATURE. The instrument (as a deed) that constitutes a property of a parcel of land. (Merriam-Webster, 1971)

TENSION. That part of a tensioned wire, which is subjected to a stress. (DePina, 1972)

TILTED WALL. A wall built with the top tilted to an angle. (DePina, 1972)

TINNITUS. The condition characterized by a continuous ringing in the ears. (DePina, 1972)

TITLE. The instrument (as a deed) that constitutes a property of a parcel of land. (7th Collegiate Merriam-Webster, 1971)

TOILET. A fixture for defecation and urination, especially one that is fixed to the wall. (U.S.D.P.)

TREATMENT WORKS. Filtration plant, reservoirs, and other works necessary for the removal of organic and inorganic materials. (U.S.D.P.)

TRAP. A fitting that provides a water seal to prevent sewer gases from being discharged through fixtures. (Merriam-Webster, 1971)

TREATMENT WORKS. Filtration plant, reservoirs, and all other construction required for the treatment of a city's sewage. (Roger's, 1971)

UNIT. A determinate quantity adopted as a standard of measurement for other quantities of the same kind. (Merriam-Webster, 1971)

URBAN TRANSITATION. Means of conveyance of passengers or goods from one place to another along ways, routes of circulation in a metropolitan context. (U.S.D.P.)

URBANIZATION. The process of an area or community becoming urbanized; to cause to take on urban characteristics. (U.S.D.P.)

VALUE. A water supply distribution component which integrates the supply for maintenance purposes. (U.S.D.P.)

WATER PIPING. A pipe which carries water from water basins, sinks, and other fixtures. (Merriam-Webster, 1971)

WATER SUPPLY. Source, means, or process of supplying water, for a community usually involving reservoirs, pipelines, and often the watershed from which the water is ultimately drawn. (Merriam-Webster, 1971)

WATER TANK. A vessel, cistern, or other vessel. (Merriam-Webster, 1971; U.S.D.P.)

WATER METROLOGY. The whole system of reservoirs, channels, mains, and pumping and purifying equipment by which a water supply is obtained and distributed to consumers. (Merriam-Webster, 1971)

WASTE PIPE. A pipe (in a dwelling) which carries water from water basins, sinks, and other fixtures. (DePina, 1972)

WATERSHED. The catchment area or drainage basin from which the waters of a stream or stream system are drained. (Merriam-Webster, 1971)

WATERFREIGHT. Watershed. The drainage area which includes only the portion of the site that can be utilized for buildings, streets, playgrounds, recreation facilities, gardens, or other structures. (U.S.D.P.)

GLOSPEY (77)
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 to a locality 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

Tentative: when based upon rough estimations of limited sources.
Approximate: when deducted from different and/or not completely reliable sources.
Accurate: when taken from the reliable or actual sources.

METRIC SYSTEM EQUIVALENTS

Linear Measures
1 centimeter = 0.3937 inches
1 meter = 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 = 1.60934 kilometers
1 wa (Thai) = 2.0 meters

Square Measures
1 square meter = 1.550 square inches or 10.7639 square feet
1 hectare = 10,000 square meters = 0.9899 acres
1 square foot = 0.0929 square meters
1 acre = 4,047 hectares
1 rai (Thai) = 1,600 square meters
1 tan (Thai) = 4 square meters

DOLLAR EQUIVALENTS

All income, cost and rent/mortgage data have been expressed in terms of the U.S. equivalent;
1 U.S. dollar = 20 bahts (Thai)

BIBLIOGRAPHY

BASIC PLANNING INFORMATION 1972, Planning Division, office of the City Clerk, The Metropolitan City Municipality, Thailand, 1972.


FIELD SURVEYS, carried out in Chonburi, Thailand, Kobchai Ocharoen, summers of 1974 and 1975.


