DWELLING ENVIRONMENTS IN TAICHUNG, TAIWAN
An Analysis for the Development of Urban Settlements

BY

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Signature of Author... ......
Department of Architecture, May, 1979

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Chairman, Departmental Committee for Graduate Students

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Dwelling Environments in Taichung, Taiwan

An Analysis for the Development of Urban Settlements

By

Albert Chih-Chieh Yang

Submitted to the Department of Architecture
on May 11, 1979 in partial fulfillment of the requirements
for the degree of Master of Architecture in Advanced Studies

Abstract

This study/analysis presents a comparison of low-income settlements in different locations in the Taichung Area, Taiwan. It provides data and recommendations to formulate, evaluate and implement the development of urban settlements especially in residential land utilizations.

Thesis Supervisor: .................................................. 
Horacio Caminos 
Professor of Architecture

Title:
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ACKNOWLEDGEMENTS

I gratefully acknowledge the support, guidance and advice of Professor Horacio Caminos, whose direction was invaluable in the preparation of this work. I am also indebted to Reinhard Goethert for his personal assistance.

I also wish to acknowledge Prof. Yu Yuen-Chen, Chairman of Acropolis Associates; Virginia H. The lin, research associate of Environmental Research Center, Tunghai University; Hwang Nan-Yuen, Deputy Director of the Department of Public Works, Taipei; and C.I. E.C.D., Taichung Municipal Government, Department of Architecture at Tunghai University for their assistance on the acquisition of necessary materials. I would also like to give recognition to all the dwellers for their cooperation during the field survey.

Finally, I am very grateful to my parents for their encouragement and support all through these years and to my wife, Su Ching, for her care and assistance on the final typing.
INTRODUCTION

CONTENTS

This research describes and analyzes dwelling environments of the lower income group in Taichung area. The following is included: A summarized national context and its regional indexes; a brief introduction of the Taichung Region developments; a description of the urban context; five case studies which deal with the lower income settlements in different stages and a comparative evaluation and analysis in pattern, land utilization, urban matrix and a recommendation of residential land developments. In each case studied, the materials include: a brief context; locality plan, land use pattern, circulation pattern, segment plan, block land utilization; typical dwelling; physical data related to dwelling and land; and socio-economic data related to users.

OBJECTIVES

The detailed studies indicate the problems existing in the physical environment of lower income settlements which is the focus of current public housing policy.

Some existing urban layouts are not entirely carried out as it was planned. Uncontrollable developments which ignore the commands of rational planning lead to a random circulation pattern or a unsystematic infrastructure network results in difficult technical problems and higher costs.

It is fact that every dwelling is expanding disregarding the Building Codes in order to lodge more people in the inadequate space or to obtain better living conditions in an enlarged unit. In the case of small lots for lower income groups, the workable alternative is to expand the dwelling space on the group without requiring a multi-story structure.

The maximum lot coverage requirements cannot be enforced.

The ambiguity of control and who is responsible in some "no-man's area" which include small alley, fire lane, and undefined open space, creates the deterioration of the surrounding environment.

Confronting these problems, the study attempts to propose an alternate recommendation to the housing developments of the lower income group. The analysis and evaluation of existing situations intends to identify the physical structure of urban living environments and residential land utilization as well as to illustrate land/dwelling systems in different stages of urbanization. These can serve as a reference guideline to stimulate the on-going project "The Development of Taichung Harbor Special District".

APPLICATION

The analysis provides a sequential framework of low income settlements and urban environments ranging from existing government housings and private developments. The materials are arranged so they can be viewed individually or comparably in order to "capture and tackle" the physical reality. The recommendation offers alternate planning guidelines and design norms for the development of urban settlements in the Taichung Harbor Special District.

DATA

This study is derived from field research carried out by author during the summer of 1977 and 1978, complemented by maps, photographs and various reference studies. The case study analysis is based on the format developed in the Urban Settlement Design Program in order to be comparably perceived with hundreds of different cases in other developing countries around the world which are available at the Massachusetts Institute of Technology.
NATIONAL CONTEXT

TAIWAN
REPUBLIC OF CHINA

PRIMARY INFORMATION: Taiwan, which is also known as Formosa, is an island situated off the southeastern coast of the mainland of China, latitude 21°45’-25°37’ north, longitude 119°18’-122°6’ east. The north-south central mountain range divides the island into a rocky, rugged strip of land of the east and the fertile plains of the west. Because of the mountainous terrain, less than one-third of the island can be considered arable. High forested mountains cover most of the land. The climate is sub-tropical in the north and tropical in the south with an average temperature 75°F. Hot, humid summer lasts from May to October and winter is chilly. Occasional earthquakes cause little damage, but Typhoon (tropical hurricane) which usually comes with heavy rainfall brings serious floods on agricultural and even urban land in the late summer.

HISTORY: The aborigines of Taiwan are believed to be of Polynesian Stock. The Chinese crossed the Taiwan Straits from the Provinces of Fukien and Kwangtung as early as the 12th Century. From 1624 to 1646, Taiwan was under Spanish and Dutch domination, population was 30,000. In 1661, the Dutch were ousted by a patriot of Ming Dynasty, General Cheng Chen-Kung (Koxinga), who held out from Chinese mainland after the Manchus and made a prefecture of Fukien in 1644. Large-scale immigration began and by 1810, the population had reached 2,000,000. The Manchu government made Taiwan a province in 1885. In 1895, Taiwan was ceded to Japan at the conclusion of the First Sino-Japanese War. In 1945, after World War II, Taiwan returned to China as a result of the Cairo Agreement. But since 1949, Taiwan has become the effective territory of the Republic of China. Taipei is the temporary Capital.

GOVERNMENT: The Taiwan Provincial Government as well as Taipei Special Municipality are under the jurisdiction of the Executive Yuan of the Central Government which usually comes with heavy rainfall brings serious floods on agricultural and even urban land in the late summer.

ECONOMY: In 1976, per capita income stood at $US14,732 (World Bank estimate: US$1,070) the gross domestic product was US$14,732 billion and the growth rate recorded a 11.7%. In average, the economic growth between 1953 and 1976, was about 7% per annum. Official foreign exchange rate in the end of 1976 was one U.S. dollar to 36.05 new Taiwan dollars, now the rate is floating.

DEMOGRAPHY: At the end of 1976, total population was 16,508,190. The gross density was 458.79 persons per square kilometer., among the highest in the world. About 98% of the population is made of Han origin from mainland China and less than 2% are aborigines.

SOCIO-CULTURAL: There were 3,916,600 households at the end of 1976 with an average family size of 5.28 persons. Adult literacy rate was 93% in 1976. Life expectancy of male is 67.1 yrs. and female is 72.5 yrs. Though the official national language in Mandarin, local dialects as Taiwanese, Fukienese and Hakka are also being used.

SOCIO-ECONOMIC: The lowest income sectors are concentrated in rural areas. The rate of urbanization is very high. 5.9% of the total area is urbanized and inhabited by 59.7% of the total population in 1976. Regional and urban development data are listed in the chart below.

REGIONAL DEVELOPMENT DATA

<table>
<thead>
<tr>
<th>REGION</th>
<th>CENTER</th>
<th>POPULATION</th>
<th>AREA</th>
<th>PERCENTAGE OF URBANIZED AREA</th>
<th>PERCENTAGE OF URBAN POPULATION</th>
<th>TOTAL POPULATION INCREASE RATE</th>
<th>PER CAPITA INCOME</th>
<th>HOUSING DEMAND</th>
<th>AVERAGE FLOOR AREA PER CAPITA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(person)</td>
<td>(km²)</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
<td>($US)</td>
<td>(No. of units)</td>
<td>(m²/person)</td>
</tr>
<tr>
<td>Northern R.</td>
<td>Taipei</td>
<td>5,085,496</td>
<td>3,678</td>
<td>23.0</td>
<td>85.3</td>
<td>+3.73</td>
<td>1140</td>
<td>1,604,000</td>
<td>14.16</td>
</tr>
<tr>
<td>Ilan R.</td>
<td>Ilan</td>
<td>432,291</td>
<td>2,328</td>
<td>2.2</td>
<td>47.0</td>
<td>+0.76</td>
<td>747</td>
<td>69,600</td>
<td>12.58</td>
</tr>
<tr>
<td>Hsinchu-Miaoli R.</td>
<td>Hsinchu</td>
<td>1,165,432</td>
<td>3,353</td>
<td>2.7</td>
<td>52.2</td>
<td>+0.52</td>
<td>668</td>
<td>226,900</td>
<td>7.48</td>
</tr>
<tr>
<td>Central R.</td>
<td>Taichung</td>
<td>3,084,161</td>
<td>7,398</td>
<td>5.5</td>
<td>45.7</td>
<td>+1.66</td>
<td>522</td>
<td>671,300</td>
<td>12.00</td>
</tr>
<tr>
<td>Chiayi-Yunlin R.</td>
<td>Chiayi</td>
<td>1,644,251</td>
<td>3,242</td>
<td>5.0</td>
<td>31.9</td>
<td>-0.01</td>
<td>856</td>
<td>329,200</td>
<td>9.68</td>
</tr>
<tr>
<td>Southern R.</td>
<td>Kaohsiung</td>
<td>4,458,184</td>
<td>8,040</td>
<td>6.0</td>
<td>59.0</td>
<td>+1.68</td>
<td>628</td>
<td>910,200</td>
<td>11.49</td>
</tr>
<tr>
<td>Eastern R.</td>
<td>Hualien</td>
<td>639,375</td>
<td>8,144</td>
<td>1.1</td>
<td>44.6</td>
<td>+0.40</td>
<td>571</td>
<td>105,400</td>
<td>11.22</td>
</tr>
<tr>
<td>TAIWAN</td>
<td></td>
<td>16,508,190</td>
<td>35,962km²</td>
<td>5.9%</td>
<td>59.7%</td>
<td>+1.96%</td>
<td>US$849</td>
<td>3,916,600</td>
<td>12.32m²</td>
</tr>
</tbody>
</table>
Central Region, which includes Taichung Municipality and Taichung, Chang Hwa, Nan Tou prefectures, is essentially developed in agriculture basis. Compared with the Northern and Southern Region in terms of their growth rate, it shows an unbalanced urbanization in Taiwan. In order to stimulate its development, a new international port, Taichung Harbor, with adjacent industrial zones which is one of the big ten national economic development projects carried out in Taiwan is under construction since 1972 and is scheduled to be finished within 20 years.

The Taichung Harbor Special District (THSD) is an affiliated urban development which is expected to have a severe change in land use, population, facilities and transportation. In 1972, the provincial government developed a preliminary sketch plan for the THSD. The area is defined by the Tachia River on the north, Tatu River on the south, Tatu Mountain on the east and Taiwan Strait on the west with a total area of 17,092.55 hectares. The planning area encloses three existing small towns; Ching Shui, Sha Lu, Wu Chi and the rest, including Lung Ching, are agricultural lands separated by small rural settlements. According to the official report, the target population is 500,000 persons (160,000 persons existing) and 12,636 hectares is set aside for a city which will integrate those existing towns in 20 years. In conjunction with the construction of the new harbor, the urban development is divided into five stages and the first stage is planned to be finished in 1980.

REGIONAL CONTEXT SOURCES

Map: (Accurate) Taichung Regional Plan, 1970
General: (Accurate) IBID
(Accurate) Taichung Harbor Special District Plan, 1972
(Accurate) Urban and Regional Development Statistics, 1976
(Approximate) Field Survey, Author 1978
TAICHUNG

Population: 561,071 persons
Urban population: 442,019 persons
Area: 16,340 Ha.
Urbanized area: 4,190 Ha.
Population growth rate: 3.33 %
Annual income: US$ 672 per capita
US$3199 per household
Average family size: 4.76
Floor area per capita: 14.80 m²
Literacy rate (over 6): 91.2 %
Dependency ratio: 60.9 %

Taichung ("T'ai-Ch'ung")
Taichung, located in an alluvial basin midway along Taiwan's western coastal plains, is the island's third largest city. It is the complex product of a distinctive history-born as a small Chinese farming village; nurtured in infancy by Ch'ing Dynasty officials; pushed into adolescence by a centralized Japanese colonial regime; and matured under Republican China. A combination of new and old cultural, economic, and administrative forces and institutions shape its form and influence its contemporary functions. Now, it has been a major regional centre in the activation of the central government's strategy for economic development of the island which includes the construction of Taichung Harbor and the urban development of its adjacent area: "Taichung Harbor Special District".

GOVERNMENT
On the hierarchy of administration, Taichung Municipality is coequal with Taichung Prefecture, directly under the jurisdiction of Taiwan Provincial Government. The administration unit consists of eight districts: central, and north, east, south, west around the CBD, and Peitun, Situn, Nantun in the suburb.

URBAN CONTEXT SOURCES

General
(Accurate) Taichung Master Plan June 1971
(Accurate) Taichung, Taiwan: Structure and Function 1973
(Accurate) Taichung Master Plan June 1971
(Accurate) IBID
(Accurate) IBID
(Accurate) IBID
(Accurate) IBID
(Accurate) The Statistical Abstract of Taichung Municipality 1976
(Accurate) Taichung Master Plan June 1971
The Taichung Basin, in which Taichung City is located, lies between two of Taiwan's major rivers—the Tachia River and the Ta-tu River. It is 48 kilometers long (north to south) and about 14 kilometers wide (east-to-west) and encompasses more than 600 square kilometers. Taichung City, as an administrative entity, today stretches 21 kilometers from east to west across the basin and about 12 kilometers from north to south at its widest point. Ground-shaped, the city lies roughly along an east-west axis and stretches from the western periphery of the Central Mountain divide atop Tatu Mountain. Tatu Mountain is a smooth, gently-rising ridge on the city's western flank. The city's highest elevation is 859 meters above sea level on its mountainous eastern border, and the low point in the basin is 37 meters above sea level at a point in South Bivouac District (Nantun District).

**URBAN LAND USE PATTERN**

Within the Municipal limit, only 25% is urbanized, 53% is agricultural and the rest is unusable. The major commercial district is centralized in the old area around the railroad station and linear commercial strips which stretch along the major roads out to the suburban area. Situn, the largest sub-center, encloses approximately one-sixth of the total population. It is located on the Taichung Harbor Road about 6 kilometers west from the center. The current development trend is to integrate the Situn District. The zoning ordinance in Taiwan allow certain minor commercial uses in the residential area which is about 8% of the urbanized land.

**URBAN INCOME PATERN**

In 1976, the average income per household in Taichung City was estimated to US$ 3,199 per year and 80% of the total population concentrated in the urban area. Upper income people located around the city periphery of the highly centralized urban area in detached or semi-detached houses which were built during the late Japanese-Dominated Period and the Post-War Period 15 years later; higher ownership of automobiles and motorcycles as well as prosperous real estate development encouraged many upper income people to move outward to the suburb or even to the exurban region. The low and very low income group is located in the old squatter settlement.
near the city center and along the two canals: "Lu Chuan, Liu Chuan" which were called the "Aggravated Appendix" in Taichung.

**URBAN GROWTH PATTERN**

The urban growth history of Taichung City can be divided into 3 stages: Ming/Ching Period, Japanese-dominated Period and Post-war Period.

**Ming/Ching Period**

Archeological evidence indicates the existence in the late 17th century of aboriginal settlements along the rivers in the southwest section of central Taichung basin. Because of the large-scale immigration from Mainland China, natives moved eastward into the mountain region and the whole area was dominated by the Han-Chinese in 1801. Taichung was once selected as the administrative capital for the island of Taiwan by governor Liu, Min-Chuan when Manchu made Taiwan a province in 1886. Though it lasted for only five prosperous years, the fundamental urban form which included 364 Ha. had been developed. The population was estimated at less than 10,000.

**Japanese-Dominated Period**

Preliminary urban plans which became the basis for the current development was undertaking by the Japanese since 1908. The streets, railroad, infrastructure network, parks have been planned and constructed in an area of 516 Ha. with a target saturated population of 50,000 persons. The official name, Taichung City, was given at that time. During the next 36 years, the urban area sprawled rapidly and the population increased to over 100,000 persons, which necessitated the enlargement of the planning area to 1801 Ha. in 1931. The second obstruction to the urban growth was the Pacific War which finally ended the Japanese domination.

**Post-War Period**

Because of the Chinese Civil War, Taiwan became the effective territory of the Republic of China. The provincial government moved back to the central region while Taipei became the temporary capital. Implementation of the National Economic development in Taiwan revitalized Taichung City. In 1976, the total population reached 561,070 persons, and the centralized urban area expanded to 4,189 Ha.
CASE STUDIES

<table>
<thead>
<tr>
<th>CASE</th>
<th>LOCATION</th>
<th>DEVELOPER</th>
<th>TYPE OF DEVELOPMENT</th>
<th>DWELLING TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHIEN-KOU MARKET HOUSING</td>
<td>URBAN, City center</td>
<td>PUBLIC</td>
<td>INSTANT</td>
<td>APARTMENT, 1-2 Fl.: shops, 3-4 Fl.: Apt. units</td>
</tr>
<tr>
<td>LIU-CHUAN CANAL-BANK SETTLEMENTS</td>
<td>URBAN, City center</td>
<td>PRIVATE</td>
<td>PROGRESSIVE</td>
<td>GROUP HOUSES, brick/wood/shanty</td>
</tr>
<tr>
<td>HWEI-LAI MILITARY HOUSING</td>
<td>SUB-URBAN, near sub-center</td>
<td>PUBLIC</td>
<td>INSTANT</td>
<td>ROW HOUSES, one story</td>
</tr>
<tr>
<td>SI-TUN PRIVATE DEVELOPMENTS</td>
<td>SUB-URBAN, near sub-center</td>
<td>PRIVATE</td>
<td>INSTANT</td>
<td>ROW HOUSES, 2-4 stories</td>
</tr>
<tr>
<td>LU-LIAO SEMI-URBAN SETTLEMENTS</td>
<td>EX-URBAN</td>
<td>PRIVATE</td>
<td>PROGRESSIVE</td>
<td>FARM HOUSES, one story</td>
</tr>
</tbody>
</table>
1 CHIEN KOU MARKET HOUSING

It is the policy of the provincial government to provide new housing for squatters before their shacks are cleared away. The Chien Kou Market Housing is a typical case which relocated the squatter settlements along the Lü Chuan Canal. It is centrally located in the city center near Taichung terminal station and only a few blocks from the site of the residents' former homes which now have been planted with trees and flowers to form a kind of "strip park".

2 LIU CHUAN CANAL-BANK SETTLEMENT

There are several concrete-sided canals, actually small rivers, which wind their way through the city of Taichung. In the central business district, the banks of these canals are closely lined with squatter settlements which are typical cases of progressive developments of low income groups. As shown in the case 1, Lü Chuan has been cleared away and relocated to the Chien Kou Market Housing. Residents of Lü Chuan settlements are waiting for their demolition.
LOCALITY LAND USE PATTERN

1. CHIEN KOU
   MARKET
   HOUSING

2. LIU CHUAN
   CANAL-BANK
   SETTLEMENT

AREAS
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- OPEN SPACES

KEY
- Pb Parking
- P Police
- F Fire Department
- T Terminal: Bus, Train
- S School
- Ch Church
- R Recreation
- L Library
- U University
- H Health
- PO Post Office
- SS Social Services
- M Market
- C Cemetery

1:10000
CASE STUDY: CHIEN KOU/LIU-CHUAN

LOCALITY CIRCULATION PATTERN

KEY

- VEHICULAR
- PEDLSTRIAN

0 100 500m

1:10000

TO PREVIOUS PAGE
URBAN DWELLING ENVIRONMENTS

ICHEN KOU MARKET HOUSING

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Type</th>
<th>0%</th>
<th>100%</th>
</tr>
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<tbody>
<tr>
<td>Shack</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud/Wattle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LOCALITY UTILITIES AND SERVICES

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

LOCALITY COMMUNITY FACILITIES

<table>
<thead>
<tr>
<th>Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Police</td>
</tr>
<tr>
<td>Fire Protection</td>
</tr>
<tr>
<td>Health</td>
</tr>
<tr>
<td>Schools, Playgrounds</td>
</tr>
<tr>
<td>Recreation, Open Spaces</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: Accurate
This project is in the form of a large, four story building which occupies almost an entire block. On the ground level and in the center part of the second floor, a retail market is included which contains 20 shops along the side of the street and 369 stands inside the building. On both wings of the second floor, are standard shops along the center corridor. The third and fourth floor are filled with 190 apartment units.

This form of structure/complex recognizes the fact that most of the residents formerly had commercial or industrial operations in their homes, and need a place to carry on their business in the new location.

Under the municipal housing program's usual loan plan, all the units are rental and dwelling units are so called "usufruct" but some of them have been sublet by paying "key money". The life style of the residents of this new market housing is similar to their former settlements. But the center corridor which is not exposed to sunshine directly (the third floor corridors are particularly dark, with light coming only through a few small skylights in the fourth floor corridors) is defined as a public area, i.e., it is "no man's land" in the sense of control and responsibility. Clothes are hung to dry, vegetables are washed, garbage is stacked and used furniture is stored here. In the dwelling unit, most of the residents built mezzanines in order to expand their space which is under the minimum standard.
PHYSICAL DATA
(relevant to dwelling and land)

DWELLING UNIT
- type: Apartment
- area (sq m): 36m²
- tenure: Private

LAND/LOT
- utilisation: Public
- area (sq m): -
- tenure: Public/usufruct

DWELLING
- location: City centre
- type: Walk-up
- number of floors: 4
- utilisation: Multiple
- physical state: Crowded, dirty

DWELLING DEVELOPMENT
- mode: Instant
- developer: Public
- construction type: R.C.
- year of construction: 7 years

MATERIALS
- foundation: R.C.
- floors: R.C./slab
- walls: Brick/R.C.
- roof: R.C.

DWELLING FACILITIES
- wc: 1
- shower: -
- kitchen: 1
- rooms: 3
- other: 1

SOCIO-ECONOMIC DATA
(relevant to user)

GENERAL: SOCIAL
- user's ethnic origin: Taiwan
- place of birth: Taichung
- education level: Primary school

NUMBER OF USERS
- married: 2
- single: 3
- children: 1
- total: 6

MIGRATION PATTERN
- number of moves: 1
- rural - urban: 0
- urban - rural: 0
- why came to urban area: Living

GENERAL: ECONOMIC
- user's income group: Low
- employment: Self
- distance to work: 9
- mode of travel: Walk

COSTS
- dwelling unit: 8000-10000
- land - market value: -

DWELLING UNIT PAYMENTS
- financing: Public subsidies
- rent/mortgage: */ income for rent/mortgage: 2/3
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

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

Quality of information: Approximate
LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>Categories</th>
<th>Total Area</th>
<th>Number</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>54</td>
<td>.587</td>
<td>92</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>63</td>
<td>.587</td>
<td>107</td>
</tr>
<tr>
<td>People</td>
<td>378</td>
<td>.587</td>
<td>644</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>.243</td>
<td>41%</td>
</tr>
<tr>
<td>Semi-public (schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Private (dwellings, shops)</td>
<td>.299</td>
<td>51%</td>
</tr>
<tr>
<td>Semi-private (cluster courts)</td>
<td>.045</td>
<td>8%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>.587</td>
<td>100%</td>
</tr>
</tbody>
</table>

Network Efficiency:
- Network length (streets, walkways) = 217 m/ha
- Areas served (total area) = 1090 persons/ha

Local area statistics:
- Average area, dimensions = 45-57 m²
It is located in the city center around Chung Hwa Road where a lively local night market is situated. Some of them contain small shops, or cottage industries, with living quarters at the back, above, or below. The commercialized units which are located close to main street show a fair degree of affluence and style, and those farther removed from the center of commercial activity appear poorer. The settlements are typically one-story, but some have rudimentary second storys built over the first, or underneath down on the bank. The construction materials vary from wood shanty to masonry/concrete multi-story houses. The occupants pre-dominately stem from two areas. Some of them are natives of the Taichung Prefecture who moved into the urban area for work and settled on the open area adjacent to the river (canal) which was already in a semi-rural stage and on the periphery of old urban area. Another are "mainlander" families who fled to Taiwan in 1949 and who erected emergency shelters along the canal. Most of them have lived here ever since. Through these years, both develop their environment progressively. Public outdoor water pumps and toilets are frequently seen in this area. Some of the waste is disposed directly into the canal, undoubtedly contributing to the great pollution of these streams which are called the "Aggravated Appendix" in the city of Taichung.
**PHYSICAL DATA**

<table>
<thead>
<tr>
<th>Dwelling Unit</th>
<th>Dwelling Development</th>
<th>Materials</th>
<th>Dwelling Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>type: Group house</td>
<td>mode: Progressive</td>
<td>foundation: Concrete/masonry</td>
<td>water: 1</td>
</tr>
<tr>
<td>area (sq m): 60m²</td>
<td>developer: Private/popular</td>
<td>floors: Wood</td>
<td>showers: 1</td>
</tr>
<tr>
<td>tenure: Private</td>
<td>builder: Self's contractor</td>
<td>walls: Brick</td>
<td>kitchen: 1</td>
</tr>
<tr>
<td>Land/Lot</td>
<td>construction type: Brick masonry</td>
<td>roof: Wood</td>
<td>rooms: 4</td>
</tr>
<tr>
<td>utilization: Public</td>
<td>year of construction: 54 years</td>
<td></td>
<td>other:</td>
</tr>
</tbody>
</table>

**SOCIO-ECONOMIC DATA**

<table>
<thead>
<tr>
<th>General: Social</th>
<th>socio-economic data</th>
<th>costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>user's ethnic origin: Taichung county</td>
<td></td>
<td>dwelling unit: 3000-6000</td>
</tr>
<tr>
<td>place of birth: Taichung</td>
<td></td>
<td>land - market value: -</td>
</tr>
<tr>
<td>education level: High school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Users</td>
<td></td>
<td></td>
</tr>
<tr>
<td>married: 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>single: -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>children: 4-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total: 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migration Pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>number of moves: 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rural - urban: 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>urban - rural: 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>why came to urban area: Convenience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General: Economic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>user's income group: Low/middle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>employment: Self</td>
<td></td>
<td></td>
</tr>
<tr>
<td>distance to work: 1/2km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mode of travel: Walk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwelling Unit Payments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>financing: Self</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rent/mortgage: -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% income for rent/mortgage: 22%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CASE STUDY SOURCES**

- Typical Dwelling: (Approximate) Field Survey, Author, 1979
- Physical Data: (Approximate) Field Survey, Author, 1979
- Socio-Economic Data: (Approximate) Field Survey, Author, 1979
- Photographs: Author, 1978
- General Information: Field Survey, Author 1978, Good Life, 1976
HWEI LAI MILITARY HOUSING

After World War II, Taiwan was returned to China and at the end of its Japanese domination. Central government administrators and military troops were the first group which arrived to take over the island. The most urgent problem in the first few years was the provision of dwellings for their families. In the vicinity of Taichung there are several army and air force bases which generated a large dwelling demand. Hwei Lai Housing, which was constructed near a military storage area is one of those developments established by the military authority.

SI TUN PRIVATE DEVELOPMENTS

The prosperous private housing development is Situn District is annexing the area which was just released for commercial and residential uses in the Taichung Enlarged Urban Planning, 1978. The existing local center and other separated small dwelling groups which includes the military housings, the Teachers' New Village, Tamo Ha and Hwei Lai, are expected to be integrated gradually. The case study was constructed with government incentives for middle-low income local workers by the private sector in 1971.
LOCALITY LAND USE PATTERN

AREAS

- Residential
- Commercial
- Industrial
- Open Spaces

KEY

- Parking
- Police
- Fire Department
- School
- Airport
- Terminal: Bus, Train
- Church
- Recreation
- Library
- University
- Health
- Post Office
- Social Services
- Market
- Cemetery
- Bus

1:10000
CASE STUDY: HWEI-LAI/SITUN
LOCALITY CIRCULATION PATTERN

KEY

VEHICULAR

PEDSTRIAN

1:10000

TO CENTRAL BUSINESS DISTRICT

KEY

VEHICULAR

PEDSTRIAN

1:10000
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
LAND UTILIZATION DIAGRAMS

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

CASE STUDY: HWEI-LAI/SITUN

LOCALITY BLOCK LAND UTILIZATION

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th></th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENSITIES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOTS</td>
<td>11</td>
<td>0.1</td>
<td>110</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>11</td>
<td>0.1</td>
<td>110</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>58</td>
<td>0.1</td>
<td>580</td>
</tr>
<tr>
<td>AREAS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUBLIC (streets, walkways)</td>
<td>0.0203</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.0797</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.1</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY
Network length (streets, walkways) = 750 m/ha.
Areas served (total area) = 1 hectare

Average area, dimensions = 43 m²

1 Hectare

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th></th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENSITIES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOTS</td>
<td>20</td>
<td>0.117</td>
<td>170</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>20</td>
<td>0.117</td>
<td>170</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>83</td>
<td>0.117</td>
<td>707</td>
</tr>
<tr>
<td>AREAS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUBLIC (streets, walkways)</td>
<td>0.032</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.085</td>
<td>72%</td>
<td></td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.117</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY
Network length (streets, walkways) = 649 m/ha.
Areas served (total area) = 1 hectare

Average area, dimensions = 42 m²

1 Hectare
The dwellings were built in masonry and concrete. Initially, each unit contained only three rooms of 42 square meters and a toilet which has located in the backyard shared by the rowhouse residents. Similar to Case 2, dwellings expand through these years. The rigid configuration of the row house restricts the expansion of the building on the front and backyards. On the plan shown, the addition to the rear has already reached its limits.
**PHYSICAL DATA**
(relating to dwelling and land)

**DWELLING UNIT**
- type: Row-house
- area (sq m): 58.2
- tenure: Public

**LAND/LOT**
- utilization: Public
- area (sq m): 72.5
- tenure: Public/Usufruct

**DWELLING**
- location: Sub/urb
- type: Row-house
- number of floors: 1
- physical state: Single

**DWELLING DEVELOPMENT**
- mode: Instant/incremental
- developer: Public
- construction type: Brick/wood
- year of construction: 25

**MATERIALS**
- foundation: Brick/concrete
- floors: Concrete
- walls: Brick
- roof: Wood

**SWELLING FACILITIES**
- wc: 1
- shower: 1
- kitchen: 1
- rooms: 4
- other: 

**SOCIODEMOMIC DATA**
(relating to users)

**GENERAL:**
- social
  - user's ethnic origin: Ho-nan Province
  - place of birth: Ho-nan
  - education level: Military officer

**NUMBER OF USERS**
- married: 2
- single: -
- children: 5
- total: 7

**MIGRATION PATTERN**
- number of moves: 1
- rural - urban: 0
- urban - urban: 1
- urban - rural: -
- why came to urban area: -

**GENERAL:**
- economic
  - user's income group: Middle
  - employment: Government
  - distance to work: 5-10Km
  - mode of travel: Bus/motorcycle

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

**DWELLING UNIT PAYMENTS**
- financing: Government
- % income for rent/mortgage: -

**CASE STUDY SOURCES**
- Land Use Pattern: (Accurate) Taichung Master Plan, 1972
- (Accurate) Taichung Municipal Government, 1978
- Circulation Pattern: (Accurate) IBID
- Locality Segment Plan: (Accurate) Taichung Municipal Government
- Locality Block Plan: (Approximate) IBID
- Block Land Utilization: (Approximate) Field Survey, Author, 1978
- Typical Dwelling: (Approximate) IBID
- Physical Data: (Approximate) IBID
- Socio-Economic Data: (Approximate) IBID
- Photographs: Author, 1978
- General Information: Field Survey, Author, 1978
SECTION

SECOND FLOOR

GROUND FLOOR

ELEVATION

KEY

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

1:200
PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
- Type: Row-house
- Area (sq m): 67m²
- Tenure: Private

LAND/LOT
- Utilization: Private
- Area (sq m): 42m²
- Tenure: Private

DWELLING
- Location: Sub-urban
- Type: Row-house
- Number of floors: 2
- Utilization: Single
- Physical state: Good

DWELLING DEVELOPMENT
- Mode: Instant
- Developer: Private
- Builder: Small contractor
- Construction type: Concrete
- Year of construction: —

MATERIALS
- Foundation: R.C.
- Floors: R.C.
- Walls: Brick
- Roof: R.C.

DWELLING FACILITIES
- WC: 2
- Shower: 1
- Kitchen: 1
- Rooms: 3
- Other: 1

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
- User's ethnic origin: Taiwan
- Place of birth: Taichung
- Education level: High school

NUMBER OF USERS
- Married: 2
- Single: —
- Children: 2
- Total: 4

MIGRATION PATTERN
- Number of moves: 3
- Rural - urban: 1
- Urban - rural: —
- Why came to urban area: Employment

GENERAL: ECONOMIC
- User's income group: Middle-low
- Employment: Worker
- Distance to work: 4km
- Mode of travel: Bus/motorcycle

COSTS
- Dwelling unit: US$10000
- Land - market value: —

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

CASE STUDY SOURCES
- Land Use Pattern: (Accurate) Taichung Master Plan, 1971
- (Accurate) Taichung Municipal Government, 1978
- (Approximate) Taichung Municipal Government
- (Approximate) IBID
- Circulation Pattern: (Accurate) 1970
- (Approximate) 1970
- Locality Segment Plan: (Accurate) Taichung Municipal Government
- (Approximate) IBID
- Locality Block Plan: (Accurate) Field Survey, Author, 1978
- (Approximate) IBID
- Block Land Utilization: (Approximate) 1970
- (Approximate) IBID
- Typical Dwelling: (Approximate) 1970
- (Approximate) 1970
- Physical Data: (Approximate) 1970
- (Approximate) IBID
- Social-Economic Data: (Approximate) 1970
- (Approximate) IBID
- Photographs: (Approximate) 1970
- (Approximate) IBID
- General Information: Field Survey, Author, 1978

A residential street: The cul-de-sac circulation layout and the lot arrangement discourage commercial activities.

A commercially oriented alley: The steel "roll-up" doors allow the convenient opening of small shops.

At the rear of the dwelling: The reserved open space which was mandated by the building code during the construction is covered and becomes an extra room.
This case is selected in the periphery of the Taichung Harbor Special District. It is located between Ching Shui and Sha Lu, adjacent to the main north-south coast line arterial. A rural settlement was developed here approximately 80 years ago. Since then, the growth of Ching Shui, Sha Lu and the west coast plain, especially the on-going THSD development, have experienced a severe change. The inhabitants no longer farm.

Most inhabitants have lived there ever since their parents' first arrived. Since this area has been identified for residential land use in the future, the inhabitants anticipate an unexpected fortune from the increase of land values. Under the circumstances, all the dwelling still remain as they were without any improvement.

Based on the survey data, a few houses are rented to the construction workers of local contractors or the Harbor Bureau for their temporary residence. Because the only public transportation available is the highway bus, a number of them own bicycles or motorcycles.

Though the condition and facilities of the dwellings are not "up to date", the rural style layout provides a good living environment. The enclosed open spaces where there used to be the grain-drying yard has become the children's playground and outdoor common space. Since the settlement is adjacent to the Tatu Mountain to the rear, there is little public through traffic. Most of the surrounding environment, although it is sometimes mud, is maintained by these groups of people, except the north boundary which is a drainage and sewer ditch and considered to be a part of adjacent newly built houses.
5 LU LIAO
SEMI-RURAL
SETTLEMENT

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shack</td>
<td>0%</td>
</tr>
<tr>
<td>Mud/Wattle</td>
<td>10%</td>
</tr>
<tr>
<td>Wood</td>
<td>5%</td>
</tr>
<tr>
<td>Masonry Wood</td>
<td>20%</td>
</tr>
<tr>
<td>Masonry Concrete</td>
<td>30%</td>
</tr>
<tr>
<td>Concrete</td>
<td>40%</td>
</tr>
</tbody>
</table>

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

LOCALITY SEGMENT PLAN

1:2500
LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>.67</td>
<td>57%</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>.16</td>
<td>13%</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>.28</td>
<td>26%</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>.04</td>
<td>4%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1.15</td>
<td>100%</td>
</tr>
</tbody>
</table>

DENSITIES

<table>
<thead>
<tr>
<th>LOTS</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density H/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
<td>1.15</td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dwelling Units</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density H/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
<td>1.15</td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density H/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>97</td>
<td>1.15</td>
<td>85</td>
</tr>
</tbody>
</table>

NETWORK EFFICIENCY

Network length (streets, walkways) = 670 m/Ha.
Areas served (total area)

LOTS

Average area, dimensions = 206 m²
## CASE STUDY: LU-LIAO

### PHYSICAL DATA

(related to dwelling and land)

<table>
<thead>
<tr>
<th>DWELLING UNIT</th>
<th>TYPE: Group house</th>
<th>AREA (sq m): 39</th>
<th>TENURE: Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND/LOT</td>
<td>UTILIZATION: Private</td>
<td>AREA (sq m): -</td>
<td>TENURE: Private</td>
</tr>
<tr>
<td>DWELLING LOCATION</td>
<td>TYPE: Ex-urban</td>
<td>NUMBER OF FLOORS: 1</td>
<td>UTILIZATION: Poor</td>
</tr>
<tr>
<td>DWELLING DEVELOPMENT</td>
<td>MODE: Progressive</td>
<td>NUMBER OF USERS: 2</td>
<td>WHY CAME TO URBAN AREA: -</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>FOUNDATION: Concrete</td>
<td>MATERIALS (SOCIO-ECONOMIC DATA)</td>
<td>COSTS: Dwelling unit: -</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>WALLS: Bricks</td>
<td>COSTS (MATERIALS)</td>
<td>COSTS (DWELLING UNIT PAYMENTS): FINANCING: Private</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>ROOF: Wood</td>
<td>PAYMENTS: INCOME FOR RENT/MORTGAGE: -</td>
<td></td>
</tr>
</tbody>
</table>

### SOCIO-ECONOMIC DATA

(related to user)

<table>
<thead>
<tr>
<th>GENERAL: SOCIAL</th>
<th>USER'S ETHNIC ORIGIN: Taichung</th>
<th>PLACE OF BIRTH: Taichung</th>
<th>EDUCATION LEVEL: Junior high school</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF USERS</td>
<td>MARRIED: 2</td>
<td>SINGLES: -</td>
<td>CHILDREN: 2</td>
</tr>
<tr>
<td>MIGRATION PATTERN</td>
<td>NUMBER OF MOVES: 0</td>
<td>RURAL - URBAN: -</td>
<td>URBAN - URBAN: -</td>
</tr>
<tr>
<td>WHY CAME TO URBAN AREA: -</td>
<td>MIGRATION PATTERN (NUMBER OF MOVES): 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USER'S INCOME GROUP: Low</td>
<td>EMPLOYMENT: Construction worker</td>
<td>DISTANCE TO WORK: 5km</td>
<td></td>
</tr>
<tr>
<td>MODE OF TRAVEL: Motorcycle</td>
<td>COSTS (LAND): MARKET VALUE: -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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(TOP LEFT) Enclosed semi-private space: Children are playing under the watchful eye of the parents.

(TOP RIGHT) A neighborhood lane without public trespassing: It serves as a semi-private area where children can play.

### CASE STUDY SOURCES

Land Use Pattern: (Accurate) Taichung Harbor Area Land Use Survey, 1977
Circulation Pattern: (Accurate) IBID
Locality Segment Plan: (Approximate) IBID
Locality Block Plan: (Accurate) Field Survey, Author 1978
Block Land Utilization: (Approximate) Field Survey, Author 1978
Typical Dwelling: (Approximate) Field Survey, Author 1978
Physical Data: (Approximate) Field Survey, Author 1978
Socio-Economic Data: (Approximate) Field Survey, Author 1978
Photographs: Author, 1978
General Information: Field Survey, Author 1978
The EVALUATION AND ANALYSIS consists of three parts:

LAND UTILIZATION: A graphic comparison of Patterns, Percentages, Network Efficiencies and Densities:

PATTERN: A selected typical layout in "100x100" grid: It shows the lot configuration, block shape and its circulation layout.

PERCENTAGE: The proportion of public and private area: It implies the land utilization in urban layouts; e.g. a large percentage of land for circulation results in high costs of installation per person and extensive maintenance for the public sector.

NETWORK EFFICIENCY: A calculation of total public circulation length (streets, lanes, path) in an unit area. It represents the actual circulation intensity, the initial investment on infrastructure of the public sector, and the indication of the private controllable or area of responsibility.

DENSITY: Number of persons per hectare. This determines the intensity of land use; e.g. low density means higher cost of development per person.

PHYSICAL DATA MATRIX: A comparison of the five case studies in terms of the user, dwelling, land and its developments.

LAND UTILIZATION ANALYSIS: This is an analysis of existing residential land utilization with the purpose of defining their responsible domains.
LAND UTILIZATION PATTERNS, PERCENTAGES, NETWORK EFFICIENCIES, AND DENSITIES

1. CHIEN KOU MARKET HOUSING
- 4-story apartment
- Instant
- City center

2. LIU CHUAN CANAL-BANK SETTLEMENT
- 1-3 story group houses
- Progressive
- City center

3. HWEI LAI MILITARY HOUSING
- 1-story row houses
- Instant
- Suburban

4. SI TUN PRIVATE DEVELOPMENTS
- 2-4 story row houses
- Instant
- Suburban

5. LU LIAO SEMI-RURAL SETTLEMENT
- 1-story farm houses
- Progressive
- Exurban

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

PERCENTAGES
- Streets/Walkways: 43%
- Playgrounds: 16%
- Cluster Courts: 8%
- Dwellings/Lots: 20%

NETWORK EFFICIENCIES
- 331 m/ha.
- 217 m/ha.
- 750 m/ha.
- 849 m/ha.
- 670 m/ha.

DENSITIES
- 20 Persons
- Net: 1579
- Persons/Hectare
- Gross: 892

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The physical data of the five case studies which illustrates a sequential urban dwelling development in Taichung area, is summarized in this matrix in order to have a spectrum of urbanization and provide a comparison and determination of trend and patterns.
LOCATION: Cases are chosen in three different types of localities: City center, suburban, periphery, in order to represent a sequence of urban environments and the variation of different physical conditions.

USER INCOME GROUP: The study is focused on the low income group. It shows that the range is wider as one approaches the city center.

DENSITY: Population densities are intended as indicators for different cases and locations. The current walk-up apartment provided by the government has a relatively high density.

YEAR OF CONSTRUCTION: It gives an index of the relationship between the development of settlements and the implication of urban planning and building codes. The 5th case was developed in a rural state about 80 years ago.

DEVELOPER: Government provides 4-5 story walk-up apartments in urban areas and 2 story row housing in the periphery for the low income. Private developments with government incentives follow the current policy.

BUILDER: The survey data is based on the existing condition which includes those dwelling additions expanded by the users. Almost all the cases have more than one type of builder. The only exception is the walk-up apartment built by the public sector.

MODE: Progressive mode is only used by very low income and old developments. All current public housing are instant developments.

CONSTRUCTION TYPES: Masonry and concrete is the most common material used in contemporary dwelling construction. Reinforced concrete is used only in multi-story apartments. In addition, masonry/wood construction is often used for small annexes in popular progressive developments.

AVERAGE DWELLING SIZE: The public housing provides inadequate space and the inhabitants have no alternative in expanding their room in the apartment unit. The mezzanine becomes the only solution after they have optimized the crowded space by removing the unnecessary items out to the public corridor.

AVERAGE LOT SIZE: The complicated, irregular land subdivision exists in the old settlements which either has developed before there were urban planning or where there was agricultural land initially.

ACTUAL LOT COVERAGE: Government enforces the maximum lot coverage requirement only during the construction of dwellings. It is common that actual coverage is higher than it was, even in middle-income group.

TENURE: Rental-rooms exist in almost all occasions in order to increase the owner's income. Tenements house students and workers. As to the public housing, some of the units were occupied by sublessee.

UTILIZATION: In old settlements, traditional multi-family styles still exists. The low percentage show the trend of single family living.

DwELLING TYPE: High-rises for the low income have not been used. Group row houses are the most common types in Taichung, built by the private sector.

NUMBER OF FLOORS: The low income dwellers expand their room by building mezzanines or other simply structured upper level, and sometimes even extended over the canal (case 2). There is no empty area left.

AVERAGE BUILD-UP AREA: This is from the actual survey data which shows the existing stage of housing expansion.

AVERAGE LOT SIZE: Some settlements are in an unstable situation because the land which they occupied has been determined for other uses by local planning authorities. It will be demolished when the date of execution comes.
<table>
<thead>
<tr>
<th>STREET FUNCTION</th>
<th>PRIVATE PLANNED LANE FUNCTION</th>
<th>FIRE LANE FUNCTION</th>
<th>LOT FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Circulation</td>
<td>-Access</td>
<td>-Emergency Access</td>
<td>-Dwelling</td>
</tr>
<tr>
<td>-Access</td>
<td>-Circulation</td>
<td>-Fire isolation</td>
<td>-Private</td>
</tr>
<tr>
<td>OWNERSHIP</td>
<td>-Public</td>
<td>-Private</td>
<td>-Private</td>
</tr>
<tr>
<td>USER</td>
<td>-Crowd</td>
<td>-Private</td>
<td>-Private</td>
</tr>
<tr>
<td>-Unlimited number</td>
<td>-Crowd/group limited number</td>
<td>-Limited number</td>
<td>-Owners</td>
</tr>
<tr>
<td>-Anybody</td>
<td>-Anybody</td>
<td>-Anybody</td>
<td>-Individual</td>
</tr>
<tr>
<td>RESPONSIBLE AGENT</td>
<td>-Public sector</td>
<td>-Co-users</td>
<td>-Individual</td>
</tr>
<tr>
<td>CONTROL</td>
<td>-Minimum (legal)</td>
<td>-Partially (legal/physical)</td>
<td>-Users</td>
</tr>
<tr>
<td>EXISTING SITUATION</td>
<td>-No encroachment</td>
<td>-No significant encroachment</td>
<td>-Dwelling additions build on front/back yard</td>
</tr>
<tr>
<td>-Public sector maintenance</td>
<td>-Co-users</td>
<td>-Lack of maintenance</td>
<td>-Lack of maintenance</td>
</tr>
<tr>
<td>-Provision of infrastructure</td>
<td>-Cost of infrastructure shared by co-users</td>
<td>-By-pass, &quot;short cut&quot; used by anybody</td>
<td>-By-pass, &quot;short cut&quot; used by anybody</td>
</tr>
<tr>
<td>CURRENT POLICIES</td>
<td>-Existing bylaw provides government services and control</td>
<td>-Government acquisition after urban replanning</td>
<td>-Maximum lot coverage is enforced in all new developments disregarding the size of lots</td>
</tr>
<tr>
<td>RECOMMENDED CHANGES</td>
<td>-Lower government's initial investment on infrastructure in new development by improving block/configuration and minimizing circulation length</td>
<td>-Encourage private lanes owned in condominium</td>
<td>-End bylaw requirement of maximum lot coverage for small lots</td>
</tr>
<tr>
<td></td>
<td>-Use proper layout to encourage group control</td>
<td>-Re-adjust bylaw of fire lane requirement for small lots</td>
<td>-Provide semi-private condominium space combined with private lane</td>
</tr>
</tbody>
</table>
This analysis of dwelling environment is classified into four categories which indicates the existing land utilization in a residential block or segment. Commercial facilities as offices, shops; public facilities as police, government administrations; are considered as private property. Community facilities as parks and schools are considered as semi-public land which is not included in this analysis.

STREET:

It is public land which includes roads, lanes, and pedestrian paths providing for access to private lots and the circulation of vehicles and pedestrian. In the urban scale, it acts as a basic network which divides land into blocks. As a residential scale, it gives private dwellings/ lots a boundary in sense of control and responsibility. Commercial activities occur along the street in different locations.

PRIVATE PLANNED LANE:

It is a piece of land proposed by a private developer for access to those private lots that are not adjacent to any public street. It happens usually in the case of small lots, large blocks, or developments which differ from the original detailed plan proposed by planning authorities. Initially, the government has no obligation in providing utilities and services but it still has the right to prevent illegal encroachments based on the site plan submitted by the private sector before development, and construction. Co-users have to pay for the expenses of any extension of infrastructure and land tax. These lanes sometimes are winding and in various widths in some old settlements which either developed illegally or had developed progressively before there was urban planning. Through the removal or "bulldozer" policy during urban replanning, local governments acquired some of these lanes by civil law, straightened them, made them all a standard width.

FIRE LANE:

It is a compulsorily reserved private land on the back or on either side of lots based on the fire regulations in the building codes. Since it is used for emergency exit/access and prevention of fire spread, the configuration has to be open to the public land without any obstruction and at least 3m in width. Because of the ambiguity of control, it becomes a "no-man's" area in which flourishes the problem of garbage disposal, sewer gas and even crimes. In the case of small lots, dwellers encroach on these lands and exert their control over this area with fences or even construction in order to expand their inadequate dwelling space. Because of this situation, the practical use of the fire lane is doubtful. The awareness of a fire depends on the specific area concerned, i.e., in the case of small lot, there would be sufficient time to escape. In addition, fire spread can be retarded by using fireproof materials as in the wall/fence separation of lots.

LOT:

It is private land which is totally dominated by individual owners with complete legal and physical control. Maximum lot coverage is strictly enforced in the building codes, but generally only during the construction of the dwelling units on the lots. This is not workable in the case of small lots because the most usual alternative for expansion of small dwellings is in building on the private front and back yards which were initially open spaces. Eventually, the lot is almost completely covered and the residents, both old and young, start using the street or land for outdoor activities.
GLOSSARY

The criteria for the preparation of the definitions have been as follows:

- SECOND PREFERENCE: definitions from technical dictionaries.
- THIRD PREFERENCE: definitions from the Urban Soil Improvement Design Program (U.S.D.P.) Files. They are used when existing sources were not quite appropriate/satisfactory.

Words included for specificity and to focus on a particular context are indicated in parenthesis. Definitions are indicated in parenthesis. (See also: REFERENCES).
PO: the government or non-profit organizations involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is performed by the Private Sector for profit (non-profit or subsidized housing). The Public Sector is responsible for the overall planning, implementation, and enforcement of the process to the formal financial, administrative, legal, technical, social, and political aspects. The housing process (promotion, financing, construction, operation) is performed by the Private Sector for profit.

Dwelling Environments

Urban

Device to measure flow of water.

FLOW: An example, a dwelling with or without bath, kitchen, etc. (U.S.D.P.)

VALVE TOILET: A tile with self-closing valve for flushing the toilet. With cold water.

VALVE TOILET: A tile with self-closing valve for flushing the toilet. With cold water.

Apartment: A group of rooms with or without bath, kitchen, etc. (U.S.D.P.)

Single-phase: A single-phase electrical system (for heavy equipment, large electrical devices).

Electric Ground: A device used in the connection of electrical systems for consumption.

Electrical Distribution: A device used to measure flow of water.

Electrical Wires: A device used to measure flow of water.

Electrical Wire: A device used to measure flow of water.

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Electrical Wire: A device used to measure flow of water.
GLO^SSARY

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

INCULGATION. A material or body that is a poor conductor of electricity, heat, or sound. (Merriam-Webster, 1971)

INTERIOR CIRCULATION NETWORK (SITE PLANNING). The pedestrian or vehicular circulation system inside the site. It should be designed based upon the exterior circulation arrangements and land development requirements. (U.S.D.P.)

INTERVAL. A space of time (or distance) between the occurrences of similar conditions or states. (Merriam-Webster, 1971)

KILOWATT hour. (1000 watts). A convenient manner of expressing large wattages. Kilowatt hours (kwh) measure the quantity of energy consumed in a given time. One kwh represents the use of an average of 1 kilowatt of energy for a period of 1 hour. (U.S.C. 45-7, 1953)

LAMPHOLE. A vertical pipe or shaft leading from the surface of the ground to a sewer, for admitting light for purposes of inspection. (U.S.D.P.)

LAND COST. Price: the amount of money given or set as the amount to be given as consideration for the sale of a specific thing (the site). (Merriam-Webster, 1971)

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

LAND LEASE. The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (Merriam-Webster, 1971)

LAND-MARKET VALUE. Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax basis of value of the land; or 3) the present commercial value of the land. (U.S.D.P.)

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

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

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

LAND UTILIZATION. A qualification of the land around a dwelling in relation to user, physical controls and regulations. (U.S.D.P.)

LUMINAIRE. A device consisting of a light source, plus a globe, reflector, refractor, housing and such support as is integral with the housing. (DePina, 1972)

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

LOW PRESSURE. A state of some sort that is not highly developed or intensely active. (Merriam-Webster, 1971)

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

LUMP CLUSTER. A group of lots (owned individually) around a common, public court (owned in common). (Us.D.P.)

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

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

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

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

LUMINAL. In highway lighting, a complete lighting device consisting of a luminaire, a reflector, refractor, housing and such support as is integral with the housing. (U.S.D.P.)

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

MATCH OF BASIC REFERENCE MODELS. A set of models of urban layouts arranged in rows and columns. (Merriam-Webster, 1971)

MASTER PLAN. A comprehensive, long range plan intended to cover the growth and development of a city, town, or region, expressing official contemptations on the course of development, housing and community facilities should take, and making proposals for industrial, commercial, institutional and other aspects of growth and development. (Abrams, 1972)

MEDIAN BARRIER. A double-faced guard rail in the median or island dividing two adjacent roadways. (De Pina, 1972)

MESSING BOUNDARIES. Characterized by continuing, homogenously expressed tangible and intangible lines; property lines, public or municipal divisions, main streets, etc.; areas, similar residential uses, compatible uses (as parks with residential). (Merriam-Webster, 1971)

MICROCLIMATE. The local climate of a given site or habitat taking in site from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)

MODE OF TRAVEL. Manner of moving from one place (the site) to another (other parts of the urban context). (U.S.D.P.)

MODEL (OF URBAN LAYOUT). A representation of an urban residential area illustrating circulation, land utilization, streets, and utility network of a specific layout and lot. (U.S.D.P.)

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

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

NATURAL UNDISTURBED SOIL. Soils that have not been disturbed by man for many thousands of years. (Merriam-Webster, 1971)

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

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

NEUTRAL WIRE. Wire carrying no voltage between itself and a ground. (U.S.C. 45-7, 1953)

NOISE. Any sound (that is undesired) that is produced by: traffic, airports, industry, etc. (Merriam-Webster, 1971)

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

OWNERSHIP (SITE PLANNING). A specific plan or development undertaken; a specific plan or de-
SITE AND SERVICES. The subdivision of urban land and the provision of services for residential use and commercial development. Needed services and spaces that are aimed to improve the housing conditions for the low-income groups of the population by providing: A)The access to a place of land where people can build their own dwellings; B) SERVICES: the opportunities for convenient use, enjoyment, utilities, services and community facilities, financing and communication between the outside lines of the site. SITE. Physical magnitude or extent of the site, relative or proportionate dimensions of the site. (Merriam-Webster, 1971)

SLOPE. Degree or extent of deviation of the land surface from the horizontal. (Merriam-Webster, 1971)

SMOKE. The gaseous products of burning combustible materials made visible by the presence of carbon particles and/or soot. (Merriam-Webster, 1973)

SOIL. Soil structure: the arrangement of soil particles in various aggregates differing in size, shape, stability, and degree of cohesion to one another. (Merriam-Webster, 1971)

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 chart. SOIL MAP. It is used to reveal obvious limitations/restrictions/consequences for early planning consideration. (U.S.D.P.)

STACK. The vertical pipe in a dwelling of the soil, vent, or vent-pipe systems. (ROC ST 45-7, 1953)

STANDARD. 1) Something that is established by authority, convention, or custom as a model or example to be followed. 2) Something that is set up and established as a basis of reference or comparison to be a rule for the measure of quantity, weight, extent, value or quality. (Merriam-Webster, 1971)

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

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

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

SUBGROUPS. Depopulations governing the development of man land for residential or other purposes. (Abrams, 1972)

SUBURB. The layer of natural soil or fill (compacted soil) upon which the pavement structure is constructed. (DePina, 1972)

SUBURBAN OR BRANCH SEWER. A collector pipe receiving sewages from lateral sewer only. (U.S.D.P.)

SUBWAY. A government of immunity. Use of land for the provision of utilities. Rights-of-way may be shared (as streets; complementary commercial use. Site and services projects are aimed to improve the housing conditions for the low-income groups of the population by providing: A) The access to a place of land where people can build their own dwellings; B) SERVICES: the opportunities for convenient use, enjoyment, utilities, services and community facilities, financing and communication between the outside lines of the site. SITE. Physical magnitude or extent of the site, relative or proportionate dimensions of the site. (Merriam-Webster, 1971)

TAX EXEMPTION. A grant by a government of immunity from taxes; (a ten-year tax exemption on new housing for projects that received the grant). (Abrams, 1966)

TAX INCENTIVE. Favorable tax treatment to induce the building of a structure that he would not otherwise be likely to do. (U.S.D.P.)

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

TELEPHONE. An electronic voice communication network interconnecting the individuals and/or the lot/land are considered: LEGAL: the access to a piece of land where people can build their own dwellings; semi-detached housing. SITE and services projects are aimed to improve the housing conditions for the low-income groups of the population by providing: A) The access to a place of land where people can build their own dwellings; B) SERVICES: the opportunities for convenient use, enjoyment, utilities, services and community facilities, financing and communication between the outside lines of the site. SITE. Physical magnitude or extent of the site, relative or proportionate dimensions of the site. (Merriam-Webster, 1971)

TREATMENT WORKS. Filtration plant, reservoirs, and often wastewater treatment processes. (U.S.D.P.)

TRASH. A fitting that provides a water seal to prevent sewer gases from being discharged through fixtures. (ROC ST 45-7, 1953)

TREATMENT WORKS. Filtration plant, reservoirs, and all other construction required for the treatment of a water supply. (ROC ST 45-7, 1953)

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

URBANIZATION. The configuration of a (land) surface including its relief, vegetation, water supply distribution component which supplies water to the household (U.S.D.P.)

WASTE PIPE. A pipe opening to the atmosphere, which provides ventilation for a drainage system and prevents quivering or trembling motion (such as that produced by: heavy traffic, industry, aircraft, etc. in the city, town or locality. (Merriam-Webster, 1971)

WASTEWATER. The change area or drainage basin from which the waters of a stream or stream system are drawn. (Merriam-Webster, 1971)

WATERMETERS. 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)

WATT. Watts (W) measure the power of the flow of electric current through a conductor. Watts is the product of volts times amperes. Both watts and horsepower denote the rate of work being done. 746 = 1hp. (ROC ST 45-7, 1953)

WATER Employee. The organization and/or infrastructure for meeting the general need (as for water supply, wastewater removal, electricity, etc.) in the public interest. (U.S.D.P.)

WATER SUPPLY. A water supply distribution component which provides water to the household. (U.S.D.P.)

WATER PIPE. A pipe (in a dwelling) which carries water from wash basins, sinks, and similar fixtures. (ROTS ST 45-7, 1953)

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 tank in which the organic solid material from human excreta is stored and retained until it is disintegrated by anaerobic bacteria. (Merriam-Webster, 1971)

WATERSHED. The non-urban context). (Merriam-Webster, 1971)

WEIGHT. The instrument (as a dead weight) that constitutes a legal monetary reference of (land) surfaces/districts and the establishment of continuous flow sewage is deposited and retained until it is disintegrated by anaerobic bacteria. (Merriam-Webster, 1971)

WHEEL-UP. Dwelling units grouped in two to five stories with stairs for vertical circulation possession. (U.S.D.P.)

WATERFRONT. A quivering or trembling motion (such as that produced by: heavy traffic, industry, aircraft, etc. in the city, town or locality. (Merriam-Webster, 1971)

WEIGHT. That which is revealed to the vision or can be seen from the site. (Merriam-Webster, 1971)

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BIBLIOGRAPHY

ANNUAL REVIEW OF GOVERNMENT ADMINISTRATION, Research Development and Evaluation Corporation, Executive Yuan, Republic of China 1977


BUILDING CODES AND URBAN PLANNING ORDINANCES, Dept. of Interior, Republic of China, Aug. 1977

THE GOOD LIFE, Living Environmental Preference of Low-Income People in Taichung City, environmental Research Center, Tunghai University, Taichung, Taiwan Republic of China, Jan. 1975

GUIDE FOR SURVEY-EVALUATION OF URBAN DWELLING ENVIRONMENT, J. Baldwin, U.S.E.P. MIT, Cambridge, MA, USA 1974


HOUSING PLANNING ORDINANCE, ministry of the Interior, Taiwan Republic of China 1975


MASTER PLAN OF TAIChUNG SPECIAL DISTRICT, Bureau, Taiwan Provincial Construction Government, 1973


RENTAL MARKET OF TAIChUNG CHINESE-CHINESE MARKET HOUSING, 1967

THE STATISTICAL ABSTRACT OF TAIChUNG MUNICIPALITY, office of municipal government of Taichung, Taiwan, office of accounting and statistics, Taiwan Republic of China 1976

TAICHUNG HARBOUR URBAN PLAN STUDY, Report on Present Land Use Survey I, Li Hsiao Ling environmental research center Tunghai University, Taichung, Taiwan, Republic of China, April 1976

THE TAICHUNG NEW HARBOR AREA, Present Land Use Survey II, Li Hsiao Ling environmental Research center Tunghai University, Taichung, Taiwan Republic of China 1977

TAICHUNG REGION PRELIMINARY PLAN, C.I.E.C.D. Taiwan, March 1970


URBAN LIVING DENSITY STUDY, C.I.E.C.D. Taiwan Republic of China, April 1977

QUALITY OF INFORMATION
The quality of information given in the drawings, charts, and descriptions have been qualified in the following manner:

Accurate: When taken from reliable or actual sources.

Approximate: When deducted from different and/or not completely reliable sources.

Tentative: When based upon rough estimations of limited sources.

QUALITY OF SERVICES, FACILITIES AND UTILITIES
Adequate: When the existence of services, facilities and utilities are available in/to a locality.

Limited: When the existence of services, facilities and utilities are available in/to a locality in a limited manner due to proximity.

None: When the existence of services, facilities and utilities are unavailable in/to a locality.

METRIC SYSTEM EQUIVALENCES
Linear Measures

1 centimeter = 0.3937 inches
1 meter = 100 centimeters = 39.37 inches or 3.28 feet
1 kilometer = 1,000 meters = 3,280.83 feet or 0.62137 miles
1 inch = 2.54 centimeters
1 foot = 0.3048 meters
1 mile = 1.60935 kilometers

Square Measures

1 square meter = 1.550 square inches
1 square foot = 0.0929 square meters
1 acre = 0.4047 hectares
1 hectare = 0.4047 acres

DOLLAR EQUIVALENTS
All income, cost and rent/mortgage data have been expressed in terms of the U.S. equivalent:
1 N.T. dollar = 36.05 N.T. dollars (1978) (Existing Rate: Floating)