URBAN DWELLING ENVIRONMENTS: TAIPEI, TAIWAN

by

CHU-TZU HSU

B.Arch., Tung-Hai University, Taichung, Taiwan
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Signature of Author..............................

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Certified by........................................

Thesis Supervisor

Accepted by........................................

Chairman, Department Committee on Graduate Students

Archives

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CHU-TZU HSU

Education/Research Program:
URBAN SETTLEMENT DESIGN IN DEVELOPING COUNTRIES
School of Architecture and Planning
Massachusetts Institute of Technology
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Finally, I am very grateful to my parents for their encouragement and to my wife, Jin-Hsiao, for typing of the text and support at every stage of this work.

Chu-Tzu Hsu
Education/Research Program:
Urban Settlement Design in Developing Countries
School of Architecture and Planning, M.I.T.
CONTENT: This research describes and evaluates the low income dwelling environment in Taipei City. The focus of this study is on seven selected situations existing at the present time in the metropolitan area. The following is included: a description of "national context"; a description of "urban context"; seven "case studies" which deal with all the low income housing situations (four cases deal with the government housing supply); and "dwelling and land evaluation" on the physical aspects, utilities and services, land utilization and time/process perspectives of the cases presented. Each case is summarily described in similar terms: DRAWINGS: locality segment plan, locality block plan, locality block land utilization, dwelling plan, dwelling facade, and dwelling section; DESCRIPTION DATA: socio-economic and physical; PHOTOGRAPHS: environment and dwelling. The cases provide first-hand material with which to identify basic patterns in different aspects of the housing process, particularly in the matter of land utilization.

PURPOSE: This study attempts to identify and analyse the physical structure of different housing systems in Taipei City, based on low income dwelling types and their environments. The material is intended to stimulate the formulation of policies regarding low income housing. The research provides a comparative framework for the analysis and evaluation of low income housing, including government housing packages.

APPLICATION: This research provides a reference for the understanding of low income housing and its urban environment: the case studies are arranged so they can be viewed isolated or by relating them to different housing systems. It offers a reference base for tackling realistically low income housing, by taking advantage of existing housing and its service infrastructure. It can orient decision makers in optimizing the allocation of financial resources in housing, housing improvement and urban development.

DATA: This study is derived from field research carried out by the author during the summer of 1974 and 1975, complemented by maps, photographs and mentioned bibliographic materials. The case study analysis is based on a methodology developed in the Urban Settlement Design Program, directed by Professor Horacio Caminos.
SUMMARY

Detailed studies indicate that in Taipei City 34 per cent of all housing is rented. Only 46 per cent is owner occupied of which only 1.8 per cent is provided by the government. In Taipei City, an average of 1.6 households live in each dwelling unit, indicating that several families share the dwelling facilities. The seven case studies of this report, however, indicate that rental situations occur in most of the low/middle income dwelling environments. (see physical data matrix)

The case studies also indicate that most of low income dwelling environments do not reach minimum living standards. The quality of existing low income housing, with respect to space, utilities, facilities, and access to light, air, sunshine, is deficient. Most of the government sponsored housing provides dwelling units with a maximum space of 40m². (see cases 4,5) The resultant over-crowded living conditions cause much illegal construction in order to expand the living space. (see particularly case 6)

Most of the low income dwelling environments are also critically deficient in park and recreation space. (see Land Utilization: Patterns, Percentages, Densities) A gross density of more than 1,000 persons per hectare can be found in many dwelling environments, in which the need for parks, playgrounds, and other public open spaces becomes a critical necessity.

I. URBAN POPULATION GROWTH CONTEXT: While urbanization in the entire island of Taiwan is clearly proceeding rapidly, the development of Taipei City is even more dramatic. The total population of Taipei City has increased from 1,224,600 in 1967 to 2,003,600 in 1974. The annual population increase rate, was 4.17 per cent over the period from 1967 to 1971 and 3.2 per cent from 1971 to 1974. Approximately half of the population increase is due to low income migrants from the provincial area. In spite of a recent reduction in the birth, the high proportion of children and young people makes it inevitable that the population must continue to grow for a considerable time before it can be stabilized. This urban population growth will enhance the gap between the demand and supply of housing more serious. Following the present population growth, in 1979, the total population of Taipei City will reach 2,500,000, which is the city's maximum projected population. It is expected that the future population growth must be controlled. Besides the effort on birth reduction, some alternatives must be carried out to control the migration trend. Further population growth must be channelled to existing or new satellite towns having their own industry and other job-providing activities instead of the already over-crowded urban area.

II. URBAN LAND CONTEXT: Among the total 27,214 hectares of Taipei City, an estimated area of only 11,070 hectares are level land which can be developed. The rest of 16,144 hectares are mostly sloped lands and low-lying grounds. According to the Master Plan of Taipei City, only 5,634 hectares are for residential use, representing 20.7 per cent of the city land. High land price is the leading inhibiting
factor making market financed housing unavailable to low and even middle income families. The shortage of urban land leads to high land prices. Furthermore, the problem is aggravated by speculation. Land taxes do not sufficiently penalize holders of vacant or under-utilized land. The doubling and tripling of land prices within two years, especially in the vicinity of recent improved land, is a common occurrence. Unbridled land speculation has forced land prices in Taipei often as high as in Tokyo and New York City. Speculation in vacant land has also made it difficult for public housing to be built in any orderly fashion, and private housing is being built in a scattered uncontrolled pattern with no relation to urban development plans. The public power to control land use in Taipei City should be strengthened. The existing law of condemnation (compulsory purchase) of land needed for carrying out urban development, such as for public housing, should be strengthened and utilized whenever necessary. The city's future dwelling development should not be limited to the Taipei area. The population should be evenly distributed in the region of which Taipei City is an integral part, in order to reduce the population pressure and land costs.

III. URBAN HOUSING POLICIES CONTEXT: Although the low income people are hard-working, thrifty and a considerable amount of savings exist, there is no mechanism other than the government assistance, by which low income families can have access to their dwellings. The gap between the low household income and the high housing cost is by no means small. In fact, without the governmental intervention to bridge the gap, the great majority of families will never be able to acquire decent dwelling unit. It is obvious that the government housing program while making some inroads, has failed to fulfill the need of the growing urban population. The rate of national investment in housing is only 2-2.5 per cent of the GNP compared with 4-5 per cent found in countries which are solving their housing problems through large-scale programs. For many years, the policy of the government of Taipei City has focussed almost entirely on squatter families and government employees. (see cases 3,4,5) Future housing policies should cover all of the low income families. Besides the construction of new public housing, the existing low income dwelling environments should be upgraded.

IV. URBAN PHYSICAL DWELLING DEVELOPMENT CONTEXT: Much wasted land can be found in many low income dwelling environments. Lack of parks and playgrounds is a common problem for most of these areas. Densities in more recently developed areas are extremely high, and may itself be the reason for high land prices. In spite of high land cost, the construction cost of low income public housing is still high and can not be afforded by lower income families. It is clear that gross densities should not be allowed to go beyond 1,000 persons per hectare. Parks, playgrounds, and some other open spaces should be properly provided together with dwelling units. Alternative means of lowering costs of low income housing must be investigated in future developments.
CONTENTS

The following section contains the descriptions of the country and the urban area within which the case studies are surveyed. It includes:

NATIONAL CONTEXT
National Description
National Development Regions

URBAN CONTEXT
Urban Description
Climate Diagrams/Graphs
Urban Population Graphs
Urban Topography and Circulation
Urban Land Use Pattern
Urban Income Pattern
Urban Growth Pattern

TAIWAN, REPUBLIC OF CHINA

NATIONAL CONTEXT

1. PRIMARY INFORMATION: Taiwan, which is also known as Formosa, is an island situated off the southeastern coast of the Chinese mainland, latitude 21°45'-25°37' North, longitude 119°18'-122°6' East. Taiwan is dominated by the Central Mountain Range, which runs from north to south and divides the island into the rocky, rugged regions of the east and the fertile plains of the west. Because of the mountainous terrain, less than one-third of the island's 35,861 square kilometers can be considered arable. High forested mountains cover most of the rest of the island. Taiwan's climate is sub-tropical in the north and tropical in the south with average temperature 22°C. Hot humid summers last from May to October and winters are mild and humid. Occasional earthquakes have caused little or no damage, but typhoons with wind velocity as high as 250 kilometers per hour have been known to bring serious floods and damage to crops and homes in the late summer.

2. HISTORY: The original inhabitants of Taiwan are believed to be of Polynesian stock. The Chinese crossed the Taiwan Straits from the Provinces of Fukien and Kwantung 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 Cheng Chen-Kung who held out from the Chinese mainland after the Manchus and made a prefecture of Fukien. 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, Taiwan returned to China as a result of the Cairo Agreement, but since 1949, Taiwan became the effective territory of the Republic of China. Taipei is the temporary capital.

3. ECONOMY: In 1973, the annual per capita income of Taiwan was approximately US $467 and GNP reached US $9.4 billion. Industry contributes about 37 percent of the GNP compared with 15 percent for agriculture. But agriculture is still the biggest Taiwan employer, it contributes 40 percent of jobs, compared with 15 percent for manufacturing and 28 percent for services. In order to get balanced economic growth, Taiwan is divided into seven development regions.

4. GOVERNMENT: The Taiwan Provincial Government as well as the Taipei Special Municipality are under the jurisdiction of the Executive Yuan of the National Government.

5. DEMOGRAPHY: The population of Taiwan in 1974 was 15,682,000, with an annual growth rate of 2.5 per cent. With a density of 440 persons per square kilometer, the island ranks only after Hong Kong and Singapore among Asia's most densely populated areas.

6. SOCIO-CULTURAL: About 1/5 of the population is made up of the mainland-born or first generation Chinese, with the exception of 200,000 aborigines, the rest are descendants of Chinese who came to Taiwan before 1895. In 1970, there were 2,623,265 households in Taiwan, and the average household size was 5.5 persons. About 40 per cent of households belong to low income sector with annual income less than US $900 and 15 per cent more than US $1,800 (high income).

7. SOCIO-ECONOMIC: The lowest income sectors are concentrated in rural areas and in squatter settlements. Urbanization is progressing in Taiwan at a very rapid rate. Urban population accounted for 51 per cent of the total population in 1961, but rose to 62 per cent in 1975.

8. HOUSING: Land is limited due to the high population density and the fact that much of the island consists of high, steep mountains. In 1973, the government estimated a housing need for as many as 140,000 dwelling units per year, of which only approximately 45,000 units have been constructed. In Taiwan, average floor area is 71 square meters per dwelling unit and 12 square meters per person.
NATIONAL CONTEXT: TAIWAN

REGIONS

I TAIPEI–KEELUNG REGION
II HSINHU REGION
III TAICHUNG REGION
IV CHIAYI REGION
V KAOSIUNG–TAIWAN REGION
VI EAST REGION
VII ILLAN REGION

NATIONAL CONTEXT SOURCES

General Information: (accurate) IBID.
TAIPEI, TAIWAN

URBAN CONTEXT

1. PRIMARY INFORMATION: Taipei is located on a large prehistoric lake basin, at latitude 25° North, longitude 121° East. On the east, south, and north sides are mountains. Tatun and Seven Stars are two peaks, which have an altitude of more than 1,000 meters. On the west, there are three rivers, Tamsui, Hsintien and Keelung. By its northern location Taipei is in the subtropics but the ocean nearby makes its climate balmy, with an annual average temperature of 23° C. The mean annual rainfall is about 2,118 mm. Taipei belongs to seasonal wind weather zone. The period from July to September is typhoon season.

2. HISTORY: Taipei was made a prefecture in 1885, and an area of 441 hectares were laid out as its administrative district. Initial construction started in 1895. The development objectives at that time were primarily farming, irrigation and transportation. In 1895, 4,424 hectares were added to the original district. And in 1937, another 1,833 hectares were added. Taipei was made a provincial city in 1945, when Taiwan was returned to the Republic of China from Japanese occupation. In 1947, Taipei became a special municipality and the city area was expanded to include six surrounding districts, with a total area of 27,714 hectares. The present city plan was drafted after Taipei was made a special municipality. At present, Taipei is the political, cultural and economic center of the Republic of China.

3. ECONOMY: In 1973, the annual per capita income of the metropolitan area was estimated at US $ 497 and represented 10.8 per cent of the GNP. The majority of industries in Taipei are textile, chemical, printing, machine and electronic.

4. GOVERNMENT: Taipei is the temporary capital of the Republic of China. It became a special municipality in 1967 and is coequal with Taiwan province, directly under the jurisdiction of the Executive Yuan. The metropolitan area is divided into 16 districts whose authority over urban development is limited to the administration of land/building ownership. Authorization for subdivisions and issuing of building licenses are made by the Bureau of Public Works of the Taipei City Government.

5. DEMOGRAPHY: The population of Taipei in 1974 was 2,033,600. The annual population increase rate was 4.17 per cent over the period from 1967 to 1971 and 3.2 per cent from 1971 to 1974, approximately half of the increase is due to immigration from provincial areas. About 35 per cent of the metropolitan population is under 14, and 3 per cent are over 65. The ratio of men and women is 116:100.

6. SOCIO-CULTURAL: In 1972, there were 400,890 households in Taipei, with an average size of 5.2 persons. The household increase was about 13,000 every year. In 1972, the annual per capita income of the metropolitan area was US $ 420. About 38 per cent of households belong to low income sector with annual income less than US $ 1,400, and 7.21 per cent more than US $ 4,000 (high income).

7. SOCIO-ECONOMIC: The lowest income sectors are living in the squatter settlements and rural type of dwellings. Walk-up apartments have been the most common type of housing for low and middle income families. The high income sectors are always living in high-rise apartments near downtown, or in detached houses around the city periphery.

8. HOUSING: High population density, limited land and unbridled land speculation has forced land price in Taipei often as high as in Tokyo or New York. High land prices are the leading factor making market financed housing unavailable to low and middle income families. In 1972, there were 215,000 households, representing 52 per cent of households in Taipei, who cannot own a living place. The demand of housing in Taipei is 25,000 annually, of which only approximately 12,000 have been built. In the metropolitan area, average floor area is 40 square meters per dwelling unit and 8.8 square meters per person.
URBAN DWELLING ENVIRONMENTS

KEELUNG CITY

URBAN LAND USE PATTERN

AREAS
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL

SCALE: 1:250000
URBAN DWELLING ENVIRONMENTS

URBAN GROWTH PATTERN

DATES
- 1920
- 1945
- 1974

KEELUNG CITY
TAIPEI, Taiwan: (top left) The apartments located at Min Shen East Road community are typical dwellings for the middle income sector. (1975)

(top right) A mixture of squatter shacks, middle income walk-ups, and high income high-rises are a common view in Taipei City. (1975)

(bottom) From this aerial view, facing the north, one can see the texture of a rapidly sprawling city. Mountains in the background constrain the growth of Taipei City. (1974)

URBAN CONTEXT SOURCES

Income Pattern: (approximate) "The 1975 Taipei Statistics Reference".
Growth Pattern: (accurate) "Preliminary (Sketch) Plan for the City of Taipei", 1964.
Photographs: Author.
The following section contains case studies, describing selected dwelling environments. The seven cases were selected according to income groups and housing systems, representing all the major low income dwelling types in Taipei City.

Case studies are represented at three scales:

LOCALITY SEGMENT: An area of 400 by 400 meters is taken for purposes of comparison.

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

DWELLING UNIT: Within each block, a typical self-contained unit for an individual, a family, or a group has been selected for comparison.

CASE STUDIES SURVEYED:

1. CHU AN: Private, Very Low/Low Income, Traditional Rural House.
2. LU LIU: Private, Very Low/Low Income, Shanties.
3. HWA CHIANG: Public, Low/Moderately Low, 4-6 Stories Walk-Up Apartments.
4. NAN GI CHANG III: Public, Low/Moderately Low, 4-6 Stories Walk-Up Apartments.
5. NAN GI CHANG I: Public, Low/Moderately Low, 4-6 Stories Walk-Up Apartments.
6. CHEN HO: Public, Moderately Low/Middle Income, 2-3 Stories Walk-Up Apartments
7. TZU SHENG: Private, Moderately Low/Middle Income, Brick, Shop-Home.
1 CHU AN, TAIPEI

CASE STUDY

LOCATION: The case is located within Ta An District, in the southern part of the city.

ORIGINS: This area was originally developed for agricultural use in the latter half of nineteenth century by Lin Family those who immigrated from Fu-Kien Province of mainland China. For many years, they lived together as extended family in this place. But, by the influence of industrial age, no longer can the old patriarch dominate this environment. The unrelated or haphazard additions to the original house represent a breakdown of the shared image of the house. Today the house no longer functions as a single unit, many parts are occupied by unrelated strangers. Most parts of the land and dwelling became illegal after the city plan was established.

CHU AN, Taipei: (top left) The traditional rural dwelling environment contrasts with its modern high-rise neighbor.
(top right) This dwelling environment is a burden to the city because of low population density.
(bottom) This shows the original main house and its additions. The buildings in the background are middle income apartments.
CASE STUDY: CHU AN

LOCALITY SEGMENT PLAN

THE CHU AN LOCALITY

A.

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Type</th>
<th>0%</th>
<th>100%</th>
</tr>
</thead>
<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>
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</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 locality block is marked with brackets.
LAND UTILIZATION DIAGRAMS

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

1 Hectare

Percentages:
- Streets/walkways: 9%
- Playgrounds: 11%
- Cluster Courts: 11%
- Dwellings/Lots: 69%

1 Hectare

Density:
- Persons/Hectare: 70

Locality Block Plan

1:1000
CASE STUDY: CHU AN

LOCALITY SEGMENT LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
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<tbody>
<tr>
<td>LOTS</td>
<td>3</td>
<td>11.84</td>
<td></td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>-</td>
<td>11.84</td>
<td></td>
</tr>
<tr>
<td>PEOPLE</td>
<td>825</td>
<td>11.84</td>
<td>70</td>
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</tbody>
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<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares Percentages</th>
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<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>1.07 9</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>1.30 11</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>8.17 69</td>
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<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>1.30 11</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11.84 100</td>
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LOCALITY BLOCK LAND UTILIZATION DATA

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<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
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<td>1.05</td>
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<tr>
<td>DWELLING UNITS</td>
<td>-</td>
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<tr>
<td>PEOPLE</td>
<td>275</td>
<td>1.05</td>
<td>262</td>
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<th>AREAS</th>
<th>Hectares Percentages</th>
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<td>0.10 10</td>
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<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0 0</td>
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<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.58 55</td>
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<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0.37 35</td>
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<tr>
<td>TOTAL</td>
<td>1.05 100</td>
</tr>
</tbody>
</table>
CASE STUDY: CHU AN

PHYSICAL DATA

(related to dwelling and land)

<table>
<thead>
<tr>
<th>DWELLING UNIT</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>HOUSE</td>
<td></td>
</tr>
<tr>
<td>area (sq m)</td>
<td>940</td>
<td></td>
</tr>
<tr>
<td>tenure</td>
<td>LEGAL RENTAL/OWNERSHIP</td>
<td></td>
</tr>
<tr>
<td>LAND/LOT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>utilization</td>
<td>PUBLIC/PRIVATE</td>
<td></td>
</tr>
<tr>
<td>area (sq m)</td>
<td>5400</td>
<td></td>
</tr>
<tr>
<td>tenure</td>
<td>EXTRA LEGAL AND LEGAL RENTAL/OWNERSHIP</td>
<td></td>
</tr>
</tbody>
</table>

DWELLING DEVELOPMENT

| mode            | INCREMENTAL |   |
| developer       | PRIVATE     |   |
| construction type | ARTISAN      |   |
| year of construction | 1977 |   |

MATERIALS

| foundation | CUT STONE  |   |
| floors     | STONE, BRICK |   |
| walls      | WOOD, BRICK  |   |
| roof       | WOOD, TILES  |   |

DWELLING FACILITIES

| wc  | 2 |   |
| shower | 2 |   |
| kitchen | 6 |   |
| rooms | 27 |   |
| other | N/A |   |

SOCIO-ECONOMIC DATA

(related to user)

GENERAL: SOCIAL

| user's ethnic origin | FU KIEN PROVINCE |   |
| place of birth       | TAIWAN          |   |
| education level      | PRIMARY SCHOOL  |   |

NUMBER OF USERS

| married | 21 |   |
| single  | 11 |   |
| children | 15 |   |
| total   | 47 |   |

MIGRATION PATTERNS

| rural - urban: | - |   |
| urban - rural: | - |   |
| why came to urban area: | - |   |

GENERAL: ECONOMIC

| employment | VERY LOW |   |
| distance to work | 1 KM |   |
| mode of travel | WALK |   |

COSTS

- dwelling unit: N.A.
- land - market value: $366/M²

DWELLING UNIT PAYMENTS

| financing     | PRIVATE |   |
| rent/mortgage | $22/MONTH | N/A |
| % income for rent/mortgage | 19% | N/A |

CASE STUDY SOURCES

Locality Block Land Utilization: (accurate) IBID.
Typical Dwelling: (accurate) IBID.
Physical Data: (approximate) Field Surveys, 1975.
Socio-Economic Data: (approximate) IBID.
Author.
Field Surveys, 1975.
LOCATION: The cases are adjacent to the Hua Chiang bridge in the southwestern part of the city, within Shuang Yuan District.

ORIGINS: This area was originally subject to flood, and was just for agriculture use. As urbanization began, it was occupied by squatter's settlements. Thousands of squatter families lived in this area with less utilities and services. They were also threatened by floods during typhoon seasons. In 1963, the City Government rebuilt the surrounding bank which solved the flooding problem. In 1971, the City Government started a renewal program, about 12.7 hectare of land had been planned and redeveloped in this area. The first stage of this program was completed in 1974.

LU LIU, Taipei: (Top) This is an overall view of Lu Liu squatter settlement. It shows that a lot of capital has already been invested in this area.

HUA CHIANG, Taipei: (Bottom) surrounding the rotary are government built walk-up apartments. A mix of commercial and residential development occupies the first two floors.
CASE STUDY: LU LIU/HUA CHIANG

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>%</th>
<th>Self-Help</th>
<th>Artisan</th>
<th>Complex</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shack</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud/Wattle</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry Wood</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry Concrete</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Concrete</td>
<td>0</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 locality blocks are marked with brackets. The block for locality 2 is on the low left, the block for locality 3 is on the upper right.
LAND UTILIZATION DIAGRAMS

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

PERCENTAGES
Streets/Walkways 29%
Playgrounds 6%
Cluster Courts 12%
Dwellings/Lots 53%

DENSITY
Persons/Hectare 715

LOCALITY BLOCK PLAN

1:1000
### Locality Segment Land Utilization Data

<table>
<thead>
<tr>
<th>Densities</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density M/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>726</td>
<td>5.08</td>
<td>143</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>726</td>
<td>5.08</td>
<td>143</td>
</tr>
<tr>
<td>People</td>
<td>3,630</td>
<td>5.08</td>
<td>715</td>
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#### Areas

<table>
<thead>
<tr>
<th>Category</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>1.47</td>
<td>29</td>
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<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
<td>0.31</td>
<td>6</td>
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<tr>
<td>Private (dwellings, shops, factories, lots)</td>
<td>2.69</td>
<td>53</td>
</tr>
<tr>
<td>Semi-Private (cluster courts)</td>
<td>0.61</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>5.08</td>
<td>100</td>
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### Locality Block Land Utilization Data

<table>
<thead>
<tr>
<th>Densities</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density M/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>149</td>
<td>0.84</td>
<td>177</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>149</td>
<td>0.84</td>
<td>177</td>
</tr>
<tr>
<td>People</td>
<td>963</td>
<td>0.84</td>
<td>1,146</td>
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#### Areas

<table>
<thead>
<tr>
<th>Category</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>0.13</td>
<td>15</td>
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<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
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<td>Private (dwellings, shops, factories, lots)</td>
<td>0.63</td>
<td>75</td>
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<tr>
<td>Semi-Private (cluster courts)</td>
<td>0.08</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0.84</td>
<td>100</td>
</tr>
</tbody>
</table>
LAND UTILIZATION DIAGRAMS

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

PERCENTAGES
- Streets/Walkways: 53%
- Playgrounds: 4%
- Cluster Courts: 0%
- Dwellings/Lots: 43%

DENSITY
- Persons/Hectare: 222

LOCALITY BLOCK PLAN 1:1000
### LOCALITY SEGMENT 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>LOTS</td>
<td>7</td>
<td>3.25</td>
<td>-</td>
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<tr>
<td>DWELLING UNITS</td>
<td>473</td>
<td>3.25</td>
<td>146</td>
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<td>PEOPLE</td>
<td>2,996</td>
<td>3.25</td>
<td>922</td>
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<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares Percentages</th>
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</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>1.72</td>
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<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.13</td>
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<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>1.40</td>
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<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0</td>
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<tr>
<td>TOTAL</td>
<td>3.25</td>
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### LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
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<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>2</td>
<td>0.83</td>
<td>-</td>
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<tr>
<td>DWELLING UNITS</td>
<td>178</td>
<td>0.83</td>
<td>214</td>
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<tr>
<td>PEOPLE</td>
<td>890</td>
<td>0.83</td>
<td>1,072</td>
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<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares Percentages</th>
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</thead>
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<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.38</td>
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<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
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<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.45</td>
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<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0</td>
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<tr>
<td>TOTAL</td>
<td>0.83</td>
</tr>
</tbody>
</table>
URBAN DWELLING ENVIRONMENTS

SECTION

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)

FIRST FLOOR PLAN

SECOND FLOOR PLAN

TYPICAL DWELLING
PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
- type: SHANTY
- area (sq m): 36
- tenure: LEGAL RENTAL/OWNERSHIP

LAND/LOT
- utilization: PUBLIC
- area (sq m): 42
- tenure: EXTRA LEGAL RENTAL/OWNERSHIP

DWELLING
- location: CITY CENTER
- type: ROM/GROUVED
- number of floors: 1, 2
- utilization: MULTIPLE
- physical state: BAD

DWELLING DEVELOPMENT
- mode: INCREMENTAL
- developer: PRIVATE
- construction type: WOOD, MASONRY
- year of construction: 1950

MATERIALS
- foundation: BRICK
- floors: BRICK
- walls: WOOD, BRICK
- roof: WOOD, TILE

DWELLING FACILITIES
- wc: 1
- shower: 1
- kitchen: 1
- rooms: 5
- other: NONE

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
- user's ethnic origins: FU KIEN PROVINCE
- place of birth: TAIWAN
- education level: PRIMARY SCHOOL

NUMBER OF USERS
- married: 2
- single: 0
- children: 3
- total: 5

MIGRATION PATTERN
- rural - urban: 1948
- urban - urban: -
- urban - rural: -

why came to urban area: EMPLOYMENT

GENERAL: ECONOMIC
- user's income group: VERY LOW
- employment: LABOR
- distance to work: 5 KM
- mode of travel: PUBLIC TRANSPORTATION

COSTS
- dwelling unit - market value: $1200/ft²
- dwelling unit - market value: $120/ft²
- dwelling unit - market value: $200/ft²

Dwelling UNIT PAYMENTS
- financing: PRIVATE
- rent/mortgage: $15/MONTH

% income for rent/mortgage: 20%

CASE STUDY SOURCES
Locality Block Plan: (approximate) INID.
Locality Block Land Utilization: (approximate) INID.
Typical Dwelling: (approximate) Field Surveys, 1975.
Physical Data: (approximate) INID.
Socio-Economic Data: (approximate) INID.
Photographer: Author
Field Surveys, 1975.
**CASE STUDY: LU LIU/HUA CHIANG**

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

<table>
<thead>
<tr>
<th>DWELLING UNIT</th>
<th>APARTMENT</th>
<th>AREA (SQ M): 84</th>
<th>TENURE: LEGAL OWNERSHIP</th>
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</thead>
<tbody>
<tr>
<td>LAND/LOT UTILIZATION</td>
<td>PRIVATE</td>
<td>AREA (SQ M): 2250</td>
<td>TENURE: LEGAL OWNERSHIP</td>
</tr>
<tr>
<td>DWELLING</td>
<td>CITY CENTER</td>
<td>NUMBER OF FLOORS: 5</td>
<td></td>
</tr>
<tr>
<td>PHYSICAL STATE: GOOD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DWELLING DEVELOPMENT**

| MODE: INSTANT | PUBLIC |
| DEVELOPER: LARGE CONTRACTOR | MASONRY/CONCRETE |
| CONSTRUCTION TYPE: MASONRY/CONCRETE | YEAR OF CONSTRUCTION: 1974 |

**MATERIALS**

| FOUNDATION: CONCRETE | FLOORS: CONCRETE | WALLS: BRICK | ROOF: CONCRETE |

**DWELLING FACILITIES**

| WC: 1 | KITCHEN: 1 | ROOMS: 2 | OTHER: NONE |

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

**GENERAL: SOCIAL**

| USER'S ETHNIC ORIGIN: KIANG SU PROVINCE | PLACE OF BIRTH: MAINLAND CHINA | EDUCATION LEVEL: MIDDLE SCHOOL |
| NUMBER OF USERS | MARRIED: 4 | SINGLE: 0 | CHILDREN: 3 | TOTAL: 7 |

**MIGRATION PATTERN**

| NUMBER OF MOVES: 2 |
| WHY CAME TO URBAN AREA: EMPLOYMENT |

**GENERAL: ECONOMIC**

| USER'S INCOME GROUP: LOW/MODERATELY LOW |
| EMPLOYMENT: LOW/MODERATELY LOW |
| DISTANCE TO WORK: 6 |
| MODE OF TRAVEL: PUBLIC TRANSPORTATION |

**COSTS**

| DWELLING UNIT: $5,800 |
| LAND - MARKET VALUE: $338/SM² |

**DWELLING UNIT PAYMENTS**

| FINANCING: PUBLIC SUBSIDIZED |
| RENT/MORTGAGE: $35/MONTH |
| % INCOME FOR RENT/MORTGAGE: 19% |

**CASE STUDY SOURCES**

- Locality Block Plan: (accurate) Department of Housing, Taipei City Government.
- Locality Block Land Utilization: (approximate) 1970.
- Typical Dwelling: (approximate) 1970.  
- Physical Data: (approximate) Field Surveys, 1971.  
- Socio-Economic Data: (approximate) 1970.  
LOCATION: The cases are within Kuting District, in the southwestern part of the city.

ORIGINS: This area, originally was occupied by the biggest squatter settlement of the city. In 1964, Taipei City Government started its first stage of a renewal program and built eleven five-story apartments to settle squatter families. In 1968, the second stage was completed and a five-story apartment with central court was built. The third stage was completed in 1971, with a design similar to the second stage.
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 locality blocks are marked with brackets. The block for locality 4 is on the upper left, the block for locality 5 is on the lower right.
LAND UTILIZATION DIAGRAMS

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

PERCENTAGES
Streets/Walkways 51%
Playgrounds 12%
Cluster Courts 0%
Dwellings/Lots 37%

DENSITY
Persons/Hectare 1,437

LOCALITY BLOCK PLAN

0 10 50m
1:1000

20 persons
## Locality Segment Land Utilization Data

### Densities

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Number</th>
<th>Area Hectares</th>
<th>Density N/Ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots</td>
<td>13</td>
<td>7.52</td>
<td>-</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>2,105</td>
<td>7.52</td>
<td>280</td>
</tr>
<tr>
<td>People</td>
<td>10,806</td>
<td>7.52</td>
<td>1,437</td>
</tr>
</tbody>
</table>

### Areas

<table>
<thead>
<tr>
<th>Category</th>
<th>Area Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>3.84</td>
<td>51</td>
</tr>
<tr>
<td>Semi-Public (schools, community centers)</td>
<td>0.90</td>
<td>12</td>
</tr>
<tr>
<td>Private (dwellings, shops, factories, lots)</td>
<td>2.78</td>
<td>37</td>
</tr>
<tr>
<td>Semi-Private (cluster courts)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7.52</td>
<td>100</td>
</tr>
</tbody>
</table>

---

### 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>1</td>
<td>0.41</td>
<td>-</td>
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<tr>
<td>Dwelling Units</td>
<td>262</td>
<td>0.41</td>
<td>639</td>
</tr>
<tr>
<td>People</td>
<td>3,310</td>
<td>0.41</td>
<td>3.195</td>
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### Areas

<table>
<thead>
<tr>
<th>Category</th>
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<th>Percentages</th>
</tr>
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<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>0.19</td>
<td>46</td>
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<td>Semi-Public (schools, community centers)</td>
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<tr>
<td>Private (dwellings, shops, factories, lots)</td>
<td>0.22</td>
<td>54</td>
</tr>
<tr>
<td>Semi-Private (cluster courts)</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0.41</td>
<td>100</td>
</tr>
</tbody>
</table>
LAND UTILIZATION DIAGRAMS

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

1 Hectare

PERCENTAGES
Streets/Walkways 51%
Playgrounds 12%
Cluster Courts 0%
Dwellings/Lots 37%

DENSITY
Persons/Hectare 1,437

1:1000

LOCALITY BLOCK PLAN

1:1000
### 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>13</td>
<td>7.52</td>
<td>-</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>2,105</td>
<td>7.52</td>
<td>280</td>
</tr>
<tr>
<td>People</td>
<td>10,806</td>
<td>7.52</td>
<td>1,437</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>3.84</td>
<td>51</td>
</tr>
<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
<td>0.90</td>
<td>12</td>
</tr>
<tr>
<td>Private (dwellings, shops, factories, lots)</td>
<td>2.78</td>
<td>37</td>
</tr>
<tr>
<td>Semi-Private (cluster courts)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>7.52</td>
<td>100</td>
</tr>
</tbody>
</table>

### 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>2</td>
<td>0.32</td>
<td>-</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>158</td>
<td>0.32</td>
<td>494</td>
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<tr>
<td>People</td>
<td>790</td>
<td>0.32</td>
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<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
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</thead>
<tbody>
<tr>
<td>Public (streets, walkways, open spaces)</td>
<td>0.21</td>
<td>65</td>
</tr>
<tr>
<td>Semi-Public (open spaces, schools, community centers)</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Private (dwellings, shops, factories, lots)</td>
<td>0.11</td>
<td>35</td>
</tr>
<tr>
<td>Semi-Private (cluster courts)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0.32</td>
<td>100</td>
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</tbody>
</table>
CASE STUDY: NAN CHI CHANG III/NAN CHI CHANG I

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)

FIRST FLOOR PLAN

SECTION

ELEVATION

SECOND FLOOR PLAN

1:200
**Physical Data**  
(related to dwelling and land)

<table>
<thead>
<tr>
<th>Dwelling Unit</th>
<th>Apartment</th>
<th>Physical Data (related to dwelling and land)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Apartment</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Area (sq m)</td>
<td>33</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Tenure</td>
<td>Legal Rental/Ownership</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Land/Lot</td>
<td>Private</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Area (sq m)</td>
<td>2265</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Tenure</td>
<td>Legal Rental/Ownership</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Dwelling</td>
<td>City Center</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Location</td>
<td>Walk-Up</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Number of Floors</td>
<td>Multiple</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
<tr>
<td>Physical State</td>
<td>Bad</td>
<td>Physical Data (related to dwelling and land)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>General</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>User’s ethnic origin:</td>
<td>Kiang Tung Province</td>
</tr>
<tr>
<td>Place of birth:</td>
<td>Mainland China</td>
</tr>
<tr>
<td>Education level:</td>
<td>Primary School</td>
</tr>
</tbody>
</table>

**Number of Users**
- Married: 2
- Single: 1
- Children: 2
- Total: 5

**Migration Pattern**
- Number of moves: 1
- Rural-to-urban: 1950
- Urban-to-urban: -
- Urban-to-rural: -
- Why came to urban area: Employment

**Employment**
- Mode: Instant
- Developer: Public
- Builder: Large Contractor
- Construction type: Masonry/Concrete
- Year of construction: 1971

**Materials**
- Foundation: Concrete
- Floors: Concrete
- Walls: Brick
- Roof: Concrete

**Dwelling Facilities**
- WC: 1
- Shower: 1
- Kitchen: 1
- Rooms: 1
- Other: None

**Costs**
- Dwelling unit: $2500
- Land - market value: $2400

**Dwelling Unit Payments**
- Financing: Public Subsidized
- Rent/Mortgage: $175/Month
- % Income for Rent/Mortgage: 20%

CASE STUDY SOURCES
- Locality Block Plan: (accurate) Department of Housing, Taipei City Government.
- Field Surveys, 1975.
PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
- type: APARTMENT
- area (sq m): 24
- tenure: LEGAL RENTAL/OWNERSHIP

LAND/LOT
- utilization: PRIVATE
- area (sq m): 550
- tenure: LEGAL RENTAL/OWNERSHIP

DWELLING
- location: CITY CENTER
- type: WALK-UP
- number of floors: 5
- utilization: MULTIPLE
- physical state: BAD

DWELLING DEVELOPMENT
- mode: INSTANT
- developer: PUBLIC
- construction type: LARGE CONTRACTOR
- year of construction: 1964

MATERIALS
- foundation: CONCRETE
- floors: CONCRETE
- walls: BRICK
- roof: CONCRETE

DWELLING FACILITIES
- wc: 1
- shower: 1
- kitchen: 1
- rooms: 3
- other: NONE

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
- user's ethnic origin: FU KIEN
- place of birth: MAINLAND CHINA
- education level: HIGH SCHOOL

NUMBER OF USERS
- married: 2
- single: 0
- children: 3
- total: 5

MIGRATION PATTERN
- number of moves: 3
  - rural - urban: 1950
  - urban - urban: 1959, 1970
  - urban - rural: 

WHY CAME TO URBAN AREA
- employment: LOW
- sales: 0
- PUBLIC TRANSPORTATION

DISTANCE TO WORK
- mode of travel: PUBLIC TRANSPORTATION

COSTS
- dwelling unit: $750
- land - market value: $240/M2
- rent/mortgage: $75/MONTH
- % income for rent/mortgage: 19%

CASE STUDY SOURCES
- Locality Block Plan: (accurate) Department of Housing, Taipei City Government.
- Locality Block Land Utilization: (accurate) TRID.
- Typical Dwelling: (accurate) 1963.
- Field Surveys, 1975.
- Socio-Economic Data: (approximate) TRID.
- Photographs: Author.
- Field Surveys, 1975.
6 CHEN HO, TAIPEI

CASE STUDY

LOCATION: The case is located in front of the Sun Yat Sen Memorial Hall, within Sung Shan District.

ORIGINS: This area was developed in the latter half of this century. Originally, it was only for agricultural and military use. In 1956, when the population pressure began, the City Government with some private firms started a co-operative housing program in this area to build 2-3 stories apartments for low/middle income families. After the construction of Sun Yat Sen Memorial Hall and Chun Shan Park in 1972, this area was considered a decent dwelling environment in the city.

CHEN HO, Taipei: (top left) Not well defined public space between two buildings has been invaded by most families.
(Top right) The entrances facing Hsueh Fu South Road, have been closed by putting chains to limit vehicular domination.
(Bottom) An overall view of Chen Ho Community, with the high-rise buildings in the background implies a revolutionary intensive land use.
CASE STUDY: CHEN HO

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>0%</th>
<th>100%</th>
</tr>
</thead>
<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 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 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 locality block is marked with brackets.
LAND UTILIZATION DIAGRAMS

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

PERCENTAGES
Streets/Walkways 41%
Playgrounds 21%
Cluster Courts 0%
Dwellings/Lots 38%

DENSITY
Persons/Hectare 495

LOCALITY BLOCK PLAN

0 10 50m
1:1000
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>28</td>
<td>5.64</td>
<td>-</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>598</td>
<td>5.64</td>
<td>106</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>2,793</td>
<td>5.64</td>
<td>495</td>
</tr>
</tbody>
</table>

AREAS

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Area Hectares</th>
<th>Hectares Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>2.31</td>
<td>41</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>1.18</td>
<td>21</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>2.15</td>
<td>38</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5.64</td>
<td>100</td>
</tr>
</tbody>
</table>
Case Study: Chen Ho

Physical Data

**Dwelling Unit**
- Type: Apartment
- Area (sq m): 90
- Tenure: Legal Rental/Ownership

**Land/Lot**
- Utilization: Private
- Area (sq m): 620
- Tenure: Legal Rental/Ownership

**Dwelling**
- Location: City Center
- Type: Walk-Up
- Number of Floors: 2
- Utilization: Multiple
- Physical State: Fair

**Dwelling Development**
- Mode: INSTAT
- Developer: Public
- Builder: Large Contractor
- Construction Type: Masonry-Concrete
- Year of Construction: 1956

**Materials**
- Foundation: Concrete
- Floors: Concrete
- Walls: Brick
- Roof: Concrete

**Dwelling Facilities**
- WC: 1
- Shower: 1
- Kitchen: 1
- Rooms: 3
- Other: None

Socio-Economic Data

**General: Social**
- User's Ethnic Origin: An Hwei Province
- Place of Birth: Mainland China
- Education Level: High School

**Number of Users**
- Married: 2
- Single: 0
- Children: 2
- Total: 4

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

**Employment**
- Why Came to Urban Area: Employment

**General: Economic**
- User's Income Group: Moderately Low
- Employment: Public Service
- Distance to Work: 8 km
- Mode of Travel: Public Transportation

**Costs**
- Dwelling Unit: N.A.
- Land - Market Value: $366/m²

**Dwelling Unit Payments**
- Financing: Public Subsidized
- Rent/Mortgage: $50/month
- % Income for Rent/Mortgage: 20%

Chen Ho, Taipei: (left) Two story apartments aligned along street is the main feature of Chen Ho community.

(center) Originally not well defined public area in the back of two buildings is in private and semi-private use.

(right) Combined commercial and residential use is also very common in Chen Ho community.

Case Study Sources


Locality Block Plan: (approximate) IBID.

Locality Block Land Utilization: (approximate) IBID.


Socio-Economic Data: IBID.

Photographs: Author


Field Surveys, 1975.
7 TZU SHENG, TAIPEI

CASE STUDY

LOCATION: The case is located within Yen Ping District in the western part of the city.

ORIGIN: This area was developed in seventeenth century as commercial area. It was originally called Ta Dau Chen, as one of the oldest communities in Taipei City. Through commercial contacts, this area was influenced by Dutch and Spanish cultures. Most of the existing buildings are old brick ones. The name of community was derived from the Tzu Sheng Temple in this area.

TZU SHENG, Taipei: (top left) This shows a typical alley in Tzu Sheng community. A service wedge of pit latrine can even be found along the alley.

(top right) The open space in front of Tzu Sheng Temple provides a very important social function.

(bottom) A mix of commercial and residential development, the facade of buildings was influenced by Dutch culture.
CASE STUDY: TZU SHENG

LOCALITY CONSTRUCTION TYPES

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>SACK</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 WOOD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRICK CONCRETE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONCRETE</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.

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.

Selected locality block is marked with brackets.
LAND UTILIZATION DIAGRAMS

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

PERCENTAGES
- Streets/Walkways: 30%
- Playgrounds: 15%
- Cluster Courts: 6%
- Dwellings/Lots: 49%

DENSITY
- Persons/Hectare: 562
- 20 persons

LOCALITY BLOCK PLAN
### 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>140</td>
<td>3.75</td>
<td>37</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>380</td>
<td>3.75</td>
<td>101</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>2,108</td>
<td>3.75</td>
<td>562</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>1.13 30</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.56 15</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>1.84 49</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0.22 6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3.75 100</td>
</tr>
</tbody>
</table>

### 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>36</td>
<td>1.00</td>
<td>36</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>118</td>
<td>1.00</td>
<td>118</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>892</td>
<td>1.00</td>
<td>892</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.25 25</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0 0</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.67 67</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0.08 8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1.00 100</td>
</tr>
</tbody>
</table>
KEY
LR Living Room
D Dining/Eating Area
BR Bedroom
K Kitchen/Cooking Area
T Toilet/Bathroom
L Laundry
C Closet
S Storage
R Room (multi-use)

TYPICAL DWELLING

FIRST FLOOR PLAN

SECOND FLOOR PLAN

0 1 5 10m
1:200
CASE STUDY: TZU SHENG

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
- type: House
- area (sq m): 55
- tenure: LEGAL RENTAL/OWNERSHIP

LAND/LOT
- utilization: PRIVATE
- area (sq m): 186
- tenure: LEGAL RENTAL/OWNERSHIP

DWELLING DEVELOPMENT
- location: CITY CENTER
- type: ROM/GROUPED
- number of floors: 2, 3
- utilization: MULTIPLE
- physical state: Fair

MATERIALS
- foundation: CUT STONE
- floors: BRICK, WOOD
- walls: BRICK
- roof: TILED

DWELLING FACILITIES
- wc: 2
- shower: 2
- kitchen: 2
- rooms: 6
- other: STORAGE 1

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
- user's ethnic origin: FU KIEN PROVINCE
- place of birth: TAIWAN
- education level: MIDDLE SCHOOL

NUMBER OF USERS
- married: 8
- single: 0
- children: 6
- total: 14

MIGRATION PATTERN
- number of moves: 3
  - rural - urban: 1930
  - urban - urban: -
  - urban - rural: -

why came to urban area: EMPLOYMENT

GENERAL: ECONOMIC
- user's income group: MIDDLE LOW
- employment: TAILER
- distance to work: 0 KM
- mode of travel: PUBLIC TRANSPORTATION

COSTS
- dwelling unit: N.A.
- land - market value: $1,270/M²

DWELLING UNIT PAYMENTS
- financing: PRIVATE
- rent/mortgage: $60/MONTH
- % income for rent/mortgage: 20%

TZU SHENG, Taipei: (left) This shows the facade of a dwelling decorated with commercial signs. (center) Very intensive use of interior space can be found in most of dwellings. (right) The tenants use communal pipe, pit latrine & lab in back court.

CASE STUDY SOURCES
- Locality Block Plan: (approximately) 1975.
- Typical Dwelling: Survey of Tzu Sheng Community in Yen Ping District of Taipei City, Department of Social, Taipei City Government, 1974.
- Photographs: Survey of Tzu Sheng Community in Yen Ping District of Taipei City, Department of Social, Taipei City Government, 1974.
- Field Surveys, 1975.
EVALUATIONS

The following section contains evaluations of:

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

PHYSICAL DATA MATRIX, a comprehensive summary of the data with comments.

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

LAND UTILIZATION: patterns, percentages, densities, a graphic comparison of land utilization.

LAND UTILIZATION: OPTIMUM RANGES, a cross comparison of densities and percentages of land utilization.
### COMMUNITY FACILITIES, UTILITIES/SERVICES MATRIX

<table>
<thead>
<tr>
<th>Category</th>
<th>Population per Category</th>
<th>A of Total Population</th>
<th>LOCALITIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>118,561</td>
<td>6.7</td>
<td>1. CHU AN</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>447,701</td>
<td>25.3</td>
<td>2. LU LIU</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>399,922</td>
<td>22.6</td>
<td>3. HUA CHIANG</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>233,583</td>
<td>13.2</td>
<td>4. NAN CHI CHANG III</td>
<td>4</td>
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<tr>
<td>E</td>
<td>254,817</td>
<td>14.4</td>
<td>5. NAN CHI CHANG I</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1,454,584</td>
<td>82.2</td>
<td>6. CHEN HO</td>
<td>6</td>
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<tr>
<td></td>
<td>314,984</td>
<td>17.8</td>
<td>7. TEU SHENG</td>
<td>7</td>
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<tr>
<td></td>
<td>1,769,568</td>
<td>100.6</td>
<td>TOTAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OTHER (MIDDLE - HIGH INCOME)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL POPULATION</td>
<td></td>
</tr>
</tbody>
</table>

The matrix illustrates the approximate availability of community facilities, utilities, and services in the 7 dwelling environments. Three levels are indicated as follows:

- No provision at all
- Limited or occasional
- Adequate or normal
The physical data of the 7 case studies of dwelling environments existing in Taipei 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.
EVALUATION: PHYSICAL DATA MATRIX

The seven case studies have been grouped in five categories, identifying different income groups, housing systems and selected physical characteristics. The five categories shown were identified as follows:

<table>
<thead>
<tr>
<th>Category/income</th>
<th>Housing System</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Very Low/Low</td>
<td>Traditional Rural House</td>
</tr>
<tr>
<td>B Very Low/Low</td>
<td>Shanty</td>
</tr>
<tr>
<td>C Low/M. Low/Middle</td>
<td>4-6 Stories Apt.</td>
</tr>
<tr>
<td>D M. Low/Middle</td>
<td>2-3 Stories Apt.</td>
</tr>
<tr>
<td>E M. Low/Middle</td>
<td>Brick, Shop-House</td>
</tr>
</tbody>
</table>

The total categories include low/middle income groups and represent the majority of the population (82.2%).

(5) USER INCOME GROUP: The income level is the basic indicator in the expected pattern: The higher the income, the higher is the level of the indicator. The process of housing for the low income groups is a matter of survival whereas in the higher income group is a service or a commodity.

(6) DWELLING UNIT TYPE: A pattern is defined in terms of income groups: SHANTY: very low income; ROOM: moderately low income tenements; APARTMENT: low, moderately low and middle income groups; HOUSE: very low, low, moderately low and middle income groups.

(7) DWELLING UNIT AREA: With exception of the traditional rural house for the extended families, the dwelling units are very small for low/middle income groups. The government provides an area ranging from 26 m² to 40 m² in most of the public housing projects.

(8) DWELLING UNIT TENURE: Rental situation can be found in most of the cases. Due to the risk of profit, housing for rent does not exist in the city.

(9) PERCENTAGE OF INCOME FOR RENT: A clear trend emerges from the case studies: 20% or less of income is paid by all income groups.

(10) LAND/LOT UTILIZATION: It is clear that the lower income groups (very low/low) are always occupying public land. Other groups have complete control of their land.

(11) LAND/LOT AREA: Lot boundaries were defined by the physical use of dwelling and land. In some cases, although the land/lot is shared by several dwellers, it is still a unique lot.

(12) LAND/LOT TENURE: Extralegal tenure is found only in lower income groups. Rental situation is common in most of the cases.

(13) DWELLING LOCATION: All the cases are located at city center. There is no distinguished relationship between income level and dwelling location in the metropolitan city.

(14) DWELLING TYPES: Walk-up apartments became the most accessible dwelling type for the low/middle income groups, after 1960. With exception of remained traditional houses, the detached, semi-detached and high rise dwelling types are only accessible for high income group.

(15) DWELLING FLOORS: Due to extremely high land price, most of recent built dwellings for low/middle income groups are 4-6 stories walk-up apartments.

(16) DWELLING UTILIZATION: Single occupancy can only be found in traditional rural houses among the cases.

(17) DWELLING PHYSICAL STATE: Bad states are found in all lower income groups. Due to limited dwelling unit space, some public housing became instant slum with very bad physical condition.

(18) DWELLING DEVELOPMENT MODE: Incremental mode is only used by very low/low income groups.

(19) DWELLING DEVELOPER: Large scale development for low/middle income housing is rarely found in the city. In the urban area, land is already subdivided by the City Government.

(20) DWELLING BUILDER: Self-help methods are employed by the very low income squatter sectors. The government generally employs large contractors for the construction of public housing.
The seven case studies of Taipei City are representative models of existing low/middle income situations which illustrate different cases of land utilization.

The case studies have been distributed in the chart in an attempt to relate them to their originating models and to see them in a broader time/process perspective.

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

SHANTIES
Groups of shanties aligned along a narrow alley or clustered in courts. 1-2 stories.
MEDIUM density
Layout provides minimum utilities, services, and facilities is major constraint.
UNIVERSAL/TRADITIONAL MODEL used by low and very low income migrants.
Model was developed in Taipei in the latter half of twentieth century, widely shown in squatters' settlements with minimum utilities and facilities.
Model is used by low and very low income migrants from provincial area for employment.

BRICK, SHOP-HOME
Row houses aligned along streets with commercial space in front, and living space in back or upper floors. 1-3 stories.
MEDIUM density
Economic use of land is constraint.
DUTCH/TRADITIONAL MODEL used by low/middle income groups.
Model was influenced by Dutch culture, and developed in Taipei after seventeenth century.
Model is used by low/middle income groups with small business.

2-3 STORIES WALK-UP APARTMENTS
Apartments aligned along streets, concrete-masonry built, 2-3 stories.
MEDIUM density
Economic use of land is relative constraint.
DUTCH/TRADITIONAL MODEL used by low/middle income groups.
Model was imported to Taipei in 1950's, as the population pressure just began.
Model is used by low and middle income nuclear families.

4-6 STORIES WALK-UP APARTMENTS
Apartments aligned along streets, concrete-masonry built, 4-6 stories.
HIGH density
Higher densities, not economic use of land, is major constraint.
UNIVERSAL MODEL used by middle income groups.
Model was imported to Taipei in 1960's, as the population pressure became more serious.
Model is used by low and middle income nuclear families.

4. HUA CHIANG

5. HUAN CHI CHANG I

6. CHEN HO

UNIVERSAL.
Permits MEDIUM/HIGH population densities. Accessible to LOW/HIGH income groups. Not efficient land utilization. (See case studies 3, 4, 5).
Model should be improved to use land more efficiently to maximize users' control and responsibility over some wasteful public space. The model, as public housing became unlivable when certain population ranges are exceeded.

7. YEH SHENG

DUTCH/CHINESE culture.
Permits MEDIUM population densities. Accessible to LOW/LOW income groups. Efficient land utilization. (See case study).
Models as built can be up-graded in terms of dwelling utilities and facilities.

3. HUA CHIANG 4. HUAN CHI CHANG III 5. HAN CHI CHANG I

UNIVERSAL.
Permits MEDIUM/HIGH population densities. Accessible to MEDIUM/LOW income groups. Not efficient land utilization. (See case study 7).
Models as built can be easily up-graded by maximize users' control and responsibility over some wasteful public space.
LAND UTILIZATION:
PATTERNS, PERCENTAGES, DENSITIES

1 CHU AN
Private Very Low Income Houses
Very low percentage of land for streets and walkways; high percentage of land for lots; private owned open land used as semi-private space. Land utilization had little basis in physical function, but in traditional ideas of family, religion, and society.

2 LU LIU
Private Very Low Income Shanties
All the land with private utilization is the sheltered area. Medium percentages of land for streets, walkways, and open spaces; low percentage of land for playgrounds; organic land developments; medium population density.

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

PERCENTAGES
Streets/Walkways 9%
Playgrounds 11%
Cluster Courts 11%
Dwellings/Lots 69%

DENSITIES
Persons/Hectare 70

PATTERNS

PATTERNS

PATTERNS

PATTERNS
3 HUA CHIANG
Private Low Income Apartments
High percentage of land for streets and walkways; low percentage of land for playgrounds. All the land with private utilization is the sheltered area. High population density.

4 NAN CHI CHANG III
Private Low Income Apartments
High percentage of land for streets and walkways. All the land with private utilization is the sheltered area. Not efficient land use; extremely high population density.

5 NAN CHI CHANG I
Private Low Income Apartments
High percentage of land for streets and walkways. All the land with private utilization is the sheltered area. Not efficient land use; extremely high population density.

6 CHEN HO
Private M. Low Income Apartments
High percentage of land for streets and walkways; high percentage of land for playgrounds and open space; poor layout with not well defined public space results in illegal private invasion. Medium density.

7 TZU SHENG
Private M. Low Income Houses
Medium percentage of land for streets, walkways, and open spaces. Most of the land with private utilization is the sheltered area. Medium population density; very good land utilization.
LAND UTILIZATION: OPTIMUM RANGES

The range of desired/acceptable densities is 440 persons per Ha to 880 persons per Ha, assuming that the dwelling development in Taipei City is of 3-6 stories. This range is derived from densities in relation to assumptions of specific physical characteristics, based upon case studies and accepted zoning standards in different urban contexts in developing countries.

LAND UTILIZATION: Circulation 20%; Somi-public 15% (open 12% + building 3%); Private 65% (open 43% + covered 22%).

Dwellings: rooms in tenements, apartments, houses, row and groups; Land coverage 1/3 of private land; Dwelling area per person 12m²; Shop and miscellaneous area per person 3m²; Open area per person 10m².

NUMBER OF FLOORS:

1 2 3 4 5 6

GROSS DENSITY (p/Ha): 147 294 441 588 735 882

KEY

VERTICAL SCALE: Land utilization percentages (0 to 100%).
HORIZONTAL SCALE: Residential population density (0 to 2,000 persons per Ha shown on logarithmic scale).
CURVE: Range of optimum land utilization percentages (optimum values vary for different densities based upon case studies and accepted zoning standards in different contexts).
SHAPED AREA: Desired/optimum efficiency of land utilization (the intersection of desired/accepted residential population densities and desired/accepted land utilization percentages).
NUMBER DOTS: case studies

PUBLIC: streets, walkways, open spaces. Areas within an urban layout used for pedestrian and vehicular circulation. The land has minimum physical controls and maximum public responsibility in initial purchase, development and maintenance. The CURVE shows: optimum area percentages for streets, walkways and open spaces. (20-30%, based upon case studies in Latin America and in the U.S.A.) The percentage of street and walkway areas varies slightly with density.

SEMI-PUBLIC: open spaces. Areas within an urban layout used for supporting facilities and services. (Open spaces-playgrounds are only considered since the percentages are based upon a small sector). The land has partial or complete physical controls and public/user responsibility in development and maintenance. The CURVE shows: optimum area percentages for open spaces. (3-31%, based upon case studies in Latin America and in U.S.A.) The percentage of open spaces varies considerably with density.

SEMI-PRIVATE: cluster courts. Areas within an urban layout used by group of owners and/or tenants. The land has complete physical controls and user responsibility in development and maintenance.

PRIVATE: dwellings, lots. Areas within an urban layout used for residential and commercial use. The land has maximum physical controls and owner/tenant/user responsibility in development and maintenance.

The CURVE shows: optimum area percentages for dwellings and lots. (The range of optimum percentages of land for public areas is 20-30% with 3-31% for semi-public areas; therefore, the remaining 77-38% of land is for private use).
GLOSSARY

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

- SECOND PREFERENCE: definitions from technical dictionaries, encyclopedias, and reference manuals.
- THIRD PREFERENCE: definitions from the Urban Setting 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. Sources of definitions are indicated in parenthesis. (See also: REFERENCES).
URBAN DWELLING ENVIRONMENTS

Dwelling groups: A distinct dwelling environment consisting of a number of single-family dwellings, or a group of dwellings, or a group of dwellings designed specifically for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room.

Dwelling group: The context of the dwelling in its immediate surroundings.

Dwelling: A self-contained unit in a dwelling system.

Dwelling unit: A single-family dwelling unit, separated from others. It may include a garage and a separate entrance.

Dwelling unit area: The area occupied by a dwelling unit.

Dwelling unit cost: The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit.

Dwelling unit type: Four types of dwelling units are considered.

PART: A space used for consumption; measured in cubic feet (U.S.D.P.).

FOOT: A unit of illuminance on a surface that receives one foot-candle of illuminance (U.S.D.P.).

INCOME: A tax on the income derived from property or activities.

INCREMENT (TAX): A special tax on the increased value of land or improvements.

DEVELOPMENT MODE: Two modes are considered: PROGRESSIVE; the development of the local infrastructure to modern standards by stages, often with provisional services; and TRANSITIONAL, the development procedure in which all structures and services are eventually developed by succession.

Dwelling/masses: SEVERAL ROOM UNITS are contained in a building/shelter which are built (open spaces) as well as common facilities (circulation, toilets, kitchens).

Dwelling/energy: Energy for use; measured in watts.

Dwelling/lighting: ELECTRIC SERVICE DROP. That part of the electric distribution system from a feeder to the user's service equipment serving one or more lots.

Dwelling/home: The private dwelling/room, or the parcel of land on which it is located.

Dwelling/ground: DWELLING/LAND SYSTEM.

Dwelling/location: The number of times an alternating current flows through the circuit with the voltage dropping to zero twice in one cycle. In single-phase only one current is flowing through the circuit with the voltage dropping to zero twice in one cycle.

Dwelling/network: ELECTRICAL CIRCUIT. A device which changes the magnitude of alternating voltages and currents; it is composed of distribution voltages from user to user; a distribution component that converts power to usable voltages. (M W 7 65 US Army, 1970; U.S.D.P.)

Dwelling/power: ELECTRICAL CIRCUIT. A device which changes the magnitude of alternating voltages and currents; it is composed of distribution voltages from user to user; a distribution component that converts power to usable voltages. (M W 7 65 US Army, 1970; U.S.D.P.)

Dwelling/room: A space used for consumption; measured in cubic feet (U.S.D.P.).

Dwelling/service: ELECTRIC SERVICE DROP. That part of the electric distribution system from a feeder to the user's service equipment serving one or more lots.

Dwelling/system: DISTRIBUTION NETWORKS: the group of people or families within a dwelling.

Dwelling/transformer: ELECTRICAL TRANSFORMER. A device which changes the magnitude of alternating voltages and currents; it is composed of distribution voltages from user to user; a distribution component that converts power to usable voltages. (M W 7 65 US Army, 1970; U.S.D.P.)

Dwelling/unit: A self-contained unit in a dwelling, usually associated with the family and/or the group of rooms it contains.

Dwelling/units: DWELLING UNIT.
GLOSSARY

WEBSTER, to another (other parts of the urban as in a camp) containing such a receptacle.
schools, playgrounds, parks, open spaces.
PORT MODEL (OF URBAN LAYOUT). A representation of an urban layout includes any kind of land utilization, residential, circulation, public facilities, etc.

MUTUAL OWNERSHIP. Private land ownership shared by two or more persons and their heirs under mutual agreement.

PUBLIC CIRCULATION. The circulation network which is owned, controlled, and maintained by public agencies and is accessible to all members of a community.

PUBLIC FACILITIES. Facilities such as schools, play-grounds, parks, other facilities accessible to all members of a community which are owned, controlled, and maintained by public agencies.

PUBLIC SERVICES AND COMMUNITY FACILITIES. Includes: public roads, public sanitation, fire protection, refuse collection, health, schools, and playgrounds, recreation and open space, other communal facilities, housing, commercial, small industries, markets, etc.

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.

MEANING. A group of lots (owned individually) around a semipublic common court (owned in condominium).

LATERAL SEWER. A collector pipe receiving sewage from building connections only.

LAYOUT. The plan or design of something that is laid out.

LEVELS OF SERVICES. Two levels are considered: MINIMUM, are admissible or permissible levels below the standard; STANDARD, are levels set and established by authority, custom of general consent, as a model, example or rule for the measure of quantity, weight, extent, value or quality.

LIFT PUMP. A component system that forces sewage to a level of elevation to avoid deep pipe networks.

LOCALITY. A place or section lived in or residence.

LOCATION. The point or area in space actually occupied by a person and his heirs without restriction of time.

LOCAL SYSTEM. The water distribution system which is served by the water distribution system of a governmental authority.

LOAN. The amount of money given or set as consideration for the sale of a specific thing (the site).

LAND DEVELOPMENT COSTS. The costs of making raw land ready for development through the process of utilities, services, access, etc.

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.

LAND-MARKET VALUE. Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax value of the land; or 3) the present commercial market value of the land.

LAND OWNERSHIP. The exclusive right of control and possession of a parcel of land.

LAND SUBDIVISION. The division of the land in blocks, lots, streets or streets.

LAND TENANCY. The temporary holding or mode of holding a parcel of land of another.

LAND UTILIZATION. A qualification of the land around a dwelling in relation to user, physical controls and responsibilities (streets, walkways, open spaces): user-anyone/unlimited; physical controls "right"-possibility-public sector. ZONING (open spaces, playgrounds, schools): user-limited group of people; physical controls "partial" or "complete" responsibility-public sector and user. PRIVATIZATION (private lots): user-owner or tenant or squatter; physical controls "complete" responsibility-user. ZONING (cluster courts): user-group of owners and users; physical controls "partial" or "complete": responsibility-user.

LAND UTILIZATION: PHYSICAL CONTROLS. The physical/legal restrictions on land use and development including, and coordinating the use and maintenance of land by the owners/users.

LAND UTILIZATION: RESPONSIBILITY. The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users.

LANDSCAPE. A collector pipe receiving sewage from building connections only.

LATTICE. A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or a room (as in a barracks or hospital) for enclosure of a group of people living or working in such a receptacle.

LAYOUT. The plan or design or arrangement of something that is laid out.

LEVELS OF SERVICES. Two levels are considered: MINIMUM, are admissible or permissible levels below the standard; STANDARD, are levels set and established by authority, custom of general consent, as a model, example or rule for the measure of quantity, weight, extent, value or quality.

LIFT PUMP. A component system that forces sewage to a level of elevation to avoid deep pipe networks.

LOCALITY. A relatively self-contained residential area (community) and neighborhood settlement within an urban area which may contain one or more dwelling/land systems.

LOCALITY SECT. A 400 x 400 area from and representing the residential character and layout of a locality.

LOCATION. The way in which something (the site) is placed in relation to its surroundings (the urban context).

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

LOT CLUSTER. A group of lots (owned individually) around a common court (owned in condominium).

LOT COVERAGE. The ratio of building area to the total lot area.

LOT PROPORION. The ratio of lot width to lot depth.

LUMINARIA. In highway lighting, a complete lighting device consisting of a light source, plus a globe, reflector, reflector-housing and such support as is required to support the light source.

MANHOLE. An access hole sized for a man to enter, particularly in sewer and storm drainage pipe systems for cleaning, maintenance and inspection.

MATHEMATICAL REFERENCE MODELS. A set of models of urban layouts arranged in rows and columns.

MASTER PLAN. A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official intentions on the course of its transportation, housing and community facilities should take, and making proposals for industrial and community development, population distribution and other aspects of growth and development.

MEDIUM BARRIER. A two-faced guardrail in the median or island dividing two adjacent roadways.

MESHING BOUNDARIES. Characterized by continuing, homogeneous land uses or topography, expressed as follows: LINES: property lines, political or municipal divisions, main streets, etc.; AREAS: similar residential uses, similar commercial uses (as parks with residential).

MICROCLIMATE. The local climate of a given site or habitat varying from a tiny cove to a large land area, but being usually characterized by uniformity of climate.

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 area in the categories of land utilization, land subdivision, and utility network of a specified layout.

NEIGHBORHOOD. A section lived in by neighbors and having distinguishing characteristics.

NETWORK EFFICIENCY. The ratio of the length of the network to the area(s) contained within or to or over which it is laid.

NEUTRAL WIRE. Wire carrying no voltage between itself and a ground. (U.S.D.P.)

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

ODEL. A quality of something that affects the sense of smell.

OKIWARD (kw). A method of sewage treatment expressing large wattages. Kilowatt hours (kwh) measure the total quantity of energy consumed in a given time. It represents the use of average of 1 kilowatt of electrical energy for a period of 1 hour.

OHMS (electrical). The unit of resistance to the voltage. Resistance varies inversely with the cross-section area of the wire. Ohm = volts/amperes.

OILFIELD. A term generally used in electrical resistance that is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere, expressed in ohms.

OFFICE. A place or section lived in or residence.

PUBLIC HOUSING. The building of homes or apartments for and by the community.

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.

PUBLIC UTILITIES. Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telephone, circulation networks.

PUMP. A device or machine that raises, transfers or compresses fluids or that attenuates gases especially by suction or pressure or both.

REFUSE COLLECTION. The service for collection and disposal of all the solid wastes from a community.

RESERVOIR. Large-scale storage of water; also function as control fluctuations in supply and pressure.

RESIDENTIAL AREA. An area containing the basic needs/requirements for daily living activities: housing, recreation, shopping, work. (U.S.D.P.)

RESISTANCE. The opposition to electrical flow. (Resistance increases as the length of wire is increased and decreases as the cross-sectional area of wire is increased.)

RIGHT-OF-WAY. A legal right of passage over another person's ground (the land), the area or way over which a right-of-way exists such as: a path or thorough-fare which one may lawfully use, the strip of land devoted to or over which is built a public road, the land...
occupied by a railroad, the land used by a public school, rights-of-way may be shared (as streets, sidewalks for pedestrians and automobiles) or exclusive (as rapid transit systems, railroads, etc.) (Merriam-Webster, 1971; U.S.D.P.)

ROADWAY (HIGHWAY). Portion of the highway included within the outside lines of gutter or side ditches, including all structures, widths, and appurtenances necessary to proper drainage, protection, and use. (Defin.)

ROW/GROUPED HOUSING. Dwelling units grouped together linearly or in clusters. (U.S.D.P.)

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

RUNDOWN-RAINFALL RATIO. The percentage (ratio) of stormwater that is not reduced by evaporation, depression storage, surface wetting, and percolation; with reduced evaporation, runoff cell ratios rise increasing runoff flow. (U.S.D.P.)

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

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

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

SEPTIC TANK. A tank in which the organic solid matter of continuously flowing sewage is deposited and retained until it has been disintegrated by anaerobic bacteria. (Merriam-Webster, 1971; U.S.D.P.)

SERIES CIRCUIT. Fixtures connected in a circuit by a single wire. When one fixture is cut, the circuit is broken. Fixtures having different amperages cannot be used efficiently in the same circuit. (I.E.C. ST 45-7, 1953)

SETTLEMENT. Occupation by settlers to establish a residence or colony. (U.S.D.P.)

SETBACK. The setback of a wall or other solid. (U.S.D.P.)

SHELL. The conduit in a subterranean network used to carry off water and waste material. (U.S.D.P.)

SIXER BUILDING CONNECTION. The pipe connecting the dwelling with the sewer network. (U.S.D.P.)

SINGLE-ZONE. Sewerage system: the system of sewers in a city, town or locality. (Merriam-Webster, 1971)

SHAPE. Form/configuration of the site surface as defined by its perimeter/boundaries. (U.S.D.P.)

SHOPPING. (Facilities for) searching for, inspecting, or buying available goods or services. (U.S.D.P.)

SITE. Land (that could be) made suitable for building purposes by dividing into lots, laying out streets and providing facilities. (Merriam-Webster, 1971)

SITE AREAS. Two types are considered: GROSS AREA: includes only the portion of the site that can be fully utilized for buildings, streets, playgrounds, recreation facilities, gardens, or other structures. (U.S.D.P.)

SITE AND SERVICES. The subdivision of urban land and the provision of public facilities with such necessary and 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) SITE: access to a piece of land where people can build their own dwellings; b) SERVICES: the opportunity of access to employment, utilities, services and community facilities, financing and communications. (U.S.D.P.)

SIZE. Physical magnitude or extent (of the site), relative to other 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 carbonaceous particles. (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 general soil map. (Facilities for) searching for, inspecting, or buying available goods or services. (U.S.D.P.)

STACK. The vertical pipe in a dwelling of the soil, water, or gas system that is set up to establish a channel by authority as a rule for the measure of volume, weight, extent, value or quantity. (Merriam-Webster, 1971)

STANDPIPE. A pipe riser with tap used as a source of water for domestic purposes. (U.S.D.P.)

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. (I.E.C. ST 45-7, 1953)

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

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

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

SUMP. A collector pipe receiving sewage from lateral sewer only. (U.S.D.P.)

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

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

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

TAX EXEMPTION. A grant by a government of immunity from tax; the amount of property tax in New York stimulated new construction in the 1920's; it was eventually used as a tool in a ten-year tax exemption on new buildings. (Abrams, 1966)

TAX INCENTIVE. Favorable tax treatment to induce the beneficiary to do something he would not otherwise be inclined to do. Professional services for a charitable corporation. (U.S.D.P.)

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

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

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

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

VENT. A pipe opening to the atmosphere, which provides ventilation for a drainage system and prevents trap siphonage or back pressure. (I.E.C. ST 45-7, 1953)

VERTICAL. A guillemot or trembling motion (as that produced by: heavy traffic, industry, aircraft, etc. (Merriam-Webster, 1971)

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

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

WATER PIPE. A pipe in a dwelling which carries water from water storage basins, sinks, and similar fixtures. (Merriam-Webster, 1971)

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

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

WASTE PUMP. A pipe carrying sewage to an outside collection point. (I.E.C. ST 45-7, 1953)

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

WASTE PIPE. A pipe in a dwelling which carries water from wash basins, sinks, and similar fixtures. (Merriam-Webster, 1971)

WEATHER SEARCH. Source, mean, or process of supplying water, as for a community usually involving reservoir pipelines, and often the watershed from which the water is ultimately drawn. (Merriam-Webster, 1971)

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

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

WATTS. Watts (w) measure the power of the flow of energy through a circuit. Wattage is the product of volts times amperes. Both watts and horsepower denote the rate of work being done. 746w = 1hp. (I.E.C. ST 45-7, 1953)

ZONE ORGANIZATION. The decimation of a city by ordination into zones (areas/districts) and the establishment of regulations to govern the use of land and the location, bulk, height, shape, uses, population density, and coverage of structures within each zone. (U.S.D.P.)

USE TAX. The tax on land priced primarily at enforcing its use or improvement. (U.S.D.P.)

USER INCOME GROUPS. Based upon the subsistence (minimum wages) income per year, five income groups are distinguished: (I.E.C. ST 45-7, 1953)

A. The income group with no household income available for housing, services, or transportation; LOW (i.e. the subsistence level); the income group that can afford no or very limited service; B. LOW (i.e., the subsistence level); the income group that can afford limited housing and rent only with government assistance; MED (i.e., the subsistence level); the income group that can afford housing without subsidy, by cash, through government, or by no means whatsoever without assistance; very HIGH (i.e., the subsistence level); the income group that can support the most physically mobile sector of the public.
EXPLANATORY NOTES

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 deduced from different and/or not completely reliable sources.
- Tentative: when based upon rough estimations of limited sources.
- Adequate: when the existence of services, facilities and utilities are available to a locality.
- Limited: when the existence of services, facilities and utilities are available to locality in a limited manner due to proximity.
- None: when the existence of services, facilities and utilities are unavailable to a locality.

QUALITY OF SERVICES, FACILITIES AND UTILITIES

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 = 1,609.34 kilometers

**Square Measures**
- 1 square meter = 1.550 square inches
- 10.7639 square feet
- 1 hectare = 10,000 sq meters
- 1 square foot = 0.0929 square meters
- 1 acre = 4047 hectares

**DOLLAR EQUIVALENCES**

All income, cost and rent/mortgage data have been expressed in terms of the U.S. equivalent.
- 1 U.S. dollar = 38.00 N.T. dollars (May, 1976)

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