

URBAN LAND SUBDIVISION
a case for more practical by-laws, Kaohsiung, Taiwan

By

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1978

SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS OF THE DEGREE OF MASTER OF SCIENCE IN ARCHITECTURE STUDIES
AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

May, 1981

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Signature of author

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ABSTRACT

This thesis, dealing with the land subdivision in urban areas, evaluates inefficiency of the case studies resulting from inadequate and improper existing by-laws in Kaohsiung and provides guidelines for urban development.

The study consists of two parts:

- Case studies and related by-laws: illustrating the existing situation, inefficient land use, misuse of required open spaces, followed by recommended changes.
- Land subdivision models: studying different types of land subdivision models to provide efficient and better urban land subdivision, followed by comparative evaluations.

The material in this study is based upon field surveys carried out by the author during the summer of 1980. The analysis is based on a methodology developed in the Urban Settlement Design Program, under the direction of professor Horacio Caminos.

Thesis Advisor: Horacio Caminos, Professor of Architecture, M.I.T.

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ACKNOWLEDGEMENTS

This study describes and analyzes dwelling environments which point out the general existing problems in urban area of Kaohsiung. The study focuses on a design proposal which will contribute to a primary land subdivision model in urban area.

The study is derived from field research carried out in the summer of 1979 and 1980. The surveys included socio-economic and physical aspects of various existing dwelling environments. Information, such as by-laws, maps and reports has been collected from various governmental organizations. The case study analysis is based on the methodology developed in the Urban Settlement Design for Developing Countries program, under the direction of professor Horacio Caminos.

I gratefully acknowledge the guidance and support of professor Horacio Caminos during the two years (1979-1981) of study. I sincerely appreciate the personal assistance, critique and friendship of Reinhard Geothert during the two years of research, the comments and company of Happy, the friendship and comments of Varin Kiatfuengfoo and Mohamed El-Sioufi, also the classmates of 1970-80 and 1980-81.

My deep appreciation to the members of "Ashdown Group" of Chinese Architects and Planners, for their kind and considerate help, to Chih-Chieh Yang, for his experienced discussions and assistance during my thesis study.

I owe thanks to the Bureau of Construction, Departments of Land Administration and Public Housing, Kaohsiung City Government, for their generous help towards data collection and survey during the summer, 1980. Also, I am grateful to Architect C. G. Hsu and friends of Chung-yuan college, for their friendship and encouragement.

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Finally, to my parents, uncle (Captain C. S. Chiang), and other members of my family, for their love, encouragement, patience and support.

INTRODUCTION

Rapid population growth due to great economic progress and industrial development in recent years, has complicated the government's role in Kaohsiung, Taiwan, particularly land administration. Subdivision of land, transfer of land rights, provision of public facilities and control of illegal developments are important and urgent tasks which must be administered in order to keep pace with the urban growth.

The data from Kaohsiung Government survey shows that, 80% of the construction within the city are considered illegal, which are either illegal developments or the encroachments violating the by-laws. Therefore, controlling the illegal constructions are important issues that must be focused on at this stage, in order to protect the rights and benefits of the people, the society and the city as a whole.

Along with the increasing pressure on urban land, more and more buildings are expanded illegally, either to house more people or to add more space. In this process the rights of the community and the society are often disregarded, causing unhealthy, unsafe living environments.

The complications which become evident in case studies, lie in allocating the functions, ownership and responsibilities of certain spaces such as small alleys, fire lanes, or any undefined spaces. Although privately owned, these areas tend to become public garbage dumps or public circulation.

Inadequate open space for social activities or a large scale no-man's open space is provided instead of more usable, jointly shared courtyards.

By exploring these existing problems, this study attempts to propose alternative models within the constraints of the by-laws. The primary aims, for the alternatives, are to minimize costs and to reduce public responsibility for a better life.

This study is intended to provide a reference and guidelines for the urban development projects in order to obtain high economic returns, to improve the use of urban land and to promote the mutual interests of society.

SUMMARY OF PRIMARY ELEMENTS OF BY-LAWS

This section illustrates by-laws, and explains the current related land subdivision regulations. The basic land subdivision elements are identified in four parts as following:

1. STREET
2. BLOCK
3. LOT
4. BUILDING

Each of the elements will be introduced by definitions, functions and general basic regulations.

Sources;

1. Building Codes and Urban Planning Ordinances, R. O. C., Aug., 1979
2. Public Housing Regulations, R. O. C..
3. City Master Plan of Kaohsiung, Taiwan, R. O. C., 1979
4. Maps, Plans, Case Studies of Kaohsiung, Taiwan, R. O. C.

Translated from Chinese and interpreted by the author.

STREETS

- street, access lane, fire lane

DEFINITIONS

STREET: It is public land for circulation of vehicles and pedestrians.

ACCESS LANE: It is a piece of land privately planned for connecting lot(s) to the street.

FIRE LANE: It is part of the private land either at the back or at the sides of the lot which is required to be kept open for fire-safety according to the fire lane regulations.

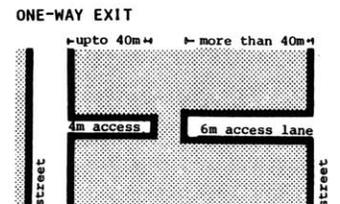
REGULATIONS

STREET CATEGORIES: (in residential area)

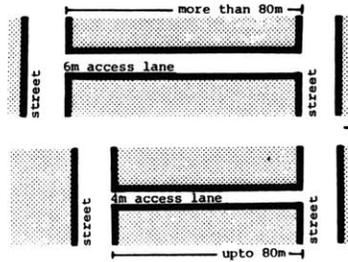
| Type | Width | Function |
|---------------|---------------|---|
| Main st. | more than 15m | to connect secondary st. and the community facilities |
| Secondary st. | 8m to 15m | to connect access lanes to the main st. |
| Access lane | 6m to 8m | to provide access to the lots |

LANE OR ALLEY REGULATIONS:

- For a lane with one exit (not exceeding 40m in length), and two-way exit (not exceeding 80m in length), the building lines for the lots along the lane should be set back until there is 4m distance between the two opposite buildings.



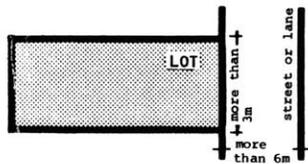
TWO-WAY EXIT



- For other lanes, the building lines should be set back until there is 6m distance between the two opposite buildings.

If the vehicles (cars) are not considered, the minimum width in the former case may be 3m, and the minimum width of the lane in the latter case may be 4m.

STREET VS. LOT;

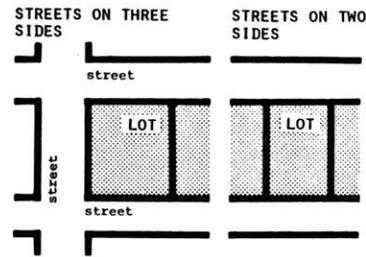


All the lots should be faced to a street wider than 6m, and the adjoining side of the lot should be longer than 3m.

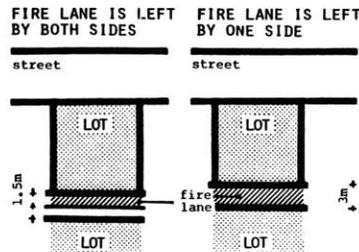
AN ACCESS:

| Type | Max. length | Min. Width |
|-----------------------------------|------------------|------------------------------------|
| serving the lots only on one side | 60m | 3m |
| serving both sides | 30m; if dead end | 3m; if the length less than 10m |
| | | 4m; if it not less than 10m |
| | 60m; if through | 3m; if the length is less than 20m |
| | | 4m; if not less than 20m |

FIRE LANE REGULATIONS:



- The building should be designed with fire lane, except the site with streets on two sides (front and back) or three sides.



- The net width of fire lane should be 3m;
 a) The sites on each side should leave 1.5m each for fire lane.
 b) or, 3m fire lane should be left by one of the lots.

BLOCKS

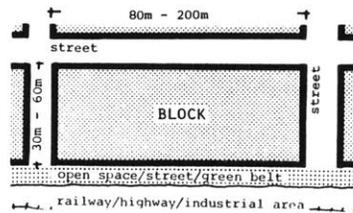
DEFINITION

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

REGULATIONS

SHAPE:

- a) The shape of block should be square or rectangular, if not, the angles of street corners should be larger than 60°.
- b) If block adjoins railway, highway, industrial area, it

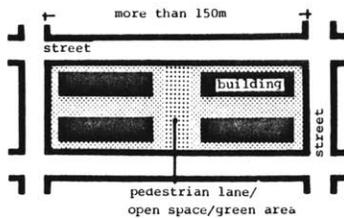


should have open space or street or green belt on the side adjoining the above.

SIZE:

The block size of residential area:

- 80m to 200m length of the long side.
- 30m to 60m length of the short side.



a) The longer side of the block should be between 80m and 150m, if more than 150m, a pedestrian lane or open space or a green area inbetween.

b) It is preferred that the block should be long enough to have two rows of buildings (each building preferred to have not more than 80 dwellings).

BLOCK VS. BUILDING TYPES:

- Row houses: Each row should have not more than 12 dwellings units.
- Multi-family housing: Each building preferred to be not longer than 80m.

LOTS

DEFINITION

It is a parcel of land which provides land for the building itself and for the required open spaces around.

REGULATIONS

MINIMUM LOT SIZE

| | | zone | | | |
|-----------------------|----------|-------------|------------|-----------------------|--|
| | | residential | commercial | industrial and others | |
| width of road | | w x d | w x d | w x d | |
| one side facing st. | 7m | 3x12 | 3.5x12 | 3.5x12 | |
| | 7m-15m | 3.5x14 | 4x15 | 4x16 | |
| | 15m-25m | 4x16 | 4.8x15 | 4.8x17 | |
| | over 25m | 4x16 | 4.8x18 | 4.8x18 | |
| two sides facing sts. | 7m | 6.6x11 | 6.6x11 | 6.6x12 | |
| | 7m-15m | 7.1x15 | 7.1x15 | 7.1x16 | |
| | 15m-25m | 7.6x15 | 7.6x15 | 7.6x17 | |
| | over 25m | 7.6x18 | 7.6x18 | 7.6x18 | |

LOT COVERAGE AND OPEN SPACE REQUIREMENTS:

The lot coverage in residential area should be more than 60%, 80% in commercial area.

i.e, in general case;

% lot coverage -
 $2\% \times (\text{no. of stories} - 5)$
 = % of built up area

For the building which is higher than 15m or 5 stories, with every increase in story after 5 stories or with every 4m increase after 15 m, the open space in the lot should be increased by 2%, until the increment reaches the maximum, 30% (in commercial area) and 20% (in other area).

BUILDINGS

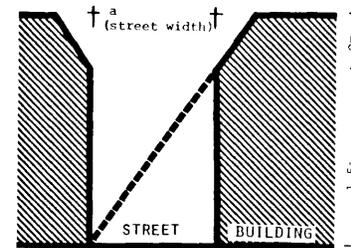
DEFINITION

It is a structure, with roof, columns and walls, for permanent use, as a house, factory, public building, etc..

REGULATIONS

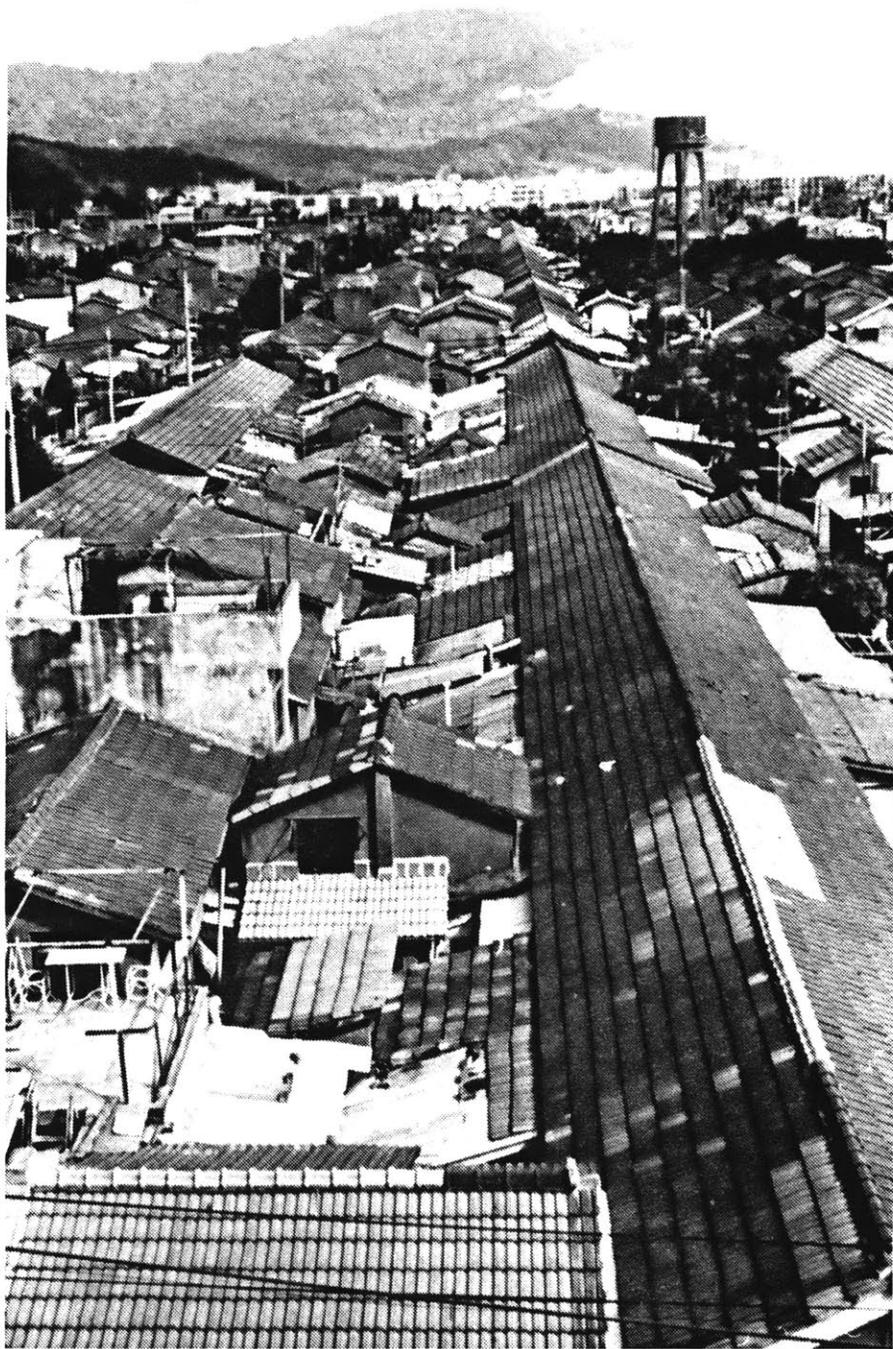
HEIGHT VS. STREET WIDTH:

The ratio of the height of the building to the far end of the street should not exceed 1.5 and the maximum height can



not be more than, $8m + 1.5$ times the width of the street.

Generally, the limit of height in residential area is 20m, except for the multi-family residential buildings and the lots surrounded by broad streets, rivers, squares, parks, open spaces, etc..



CASE STUDY ANALYSIS

Layout examples

This section deals with the utilization of the land in selected localities of Kaohsiung urban area. The purpose is to illustrate some of the general problems in residential areas which result from the existing by-laws and policies, in order to identify matches and mismatches between actual land utilization and rules.

The existing situation of the dwelling systems must be accepted as a starting point for any reasonable program of action and improvement. Four case studies, presenting the different types of development, are selected to illustrate these situations:

- Kuo-mao military housing and Shih-chuan private development present the most common situation of "FIRE LANE ENCROACHMENT".
- Ming-tsu public housing illustrates the situation of "UNDEFINED LAND USE BETWEEN BUILDINGS".
- Tsao-ya squatter settlement explains the situation of "REDUNDANT PUBLIC CIRCULATION".

For the purpose of evaluation, each case is analyzed in terms of land utilization and circulation efficiency by clearly defining the characteristics of user, responsible agent and control.

The basic studies of the cases are presented in the appendix.

PHOTOGRAPH:
 (OPPOSITE PAGE) Fire lane encroachment stages:
 (RIGHT) Transition stage of encroachment, kitchen, facilities or rooms extended partially in the fire lane.
 (LEFT) Completely modified situation - disappearance of fire lane.
 (LEFT) Large open space between the public apartment blocks, intended for semi-private use, became public circulation space due to lack of controls.



FIRE-LANE ENCROACHMENT

1 Kuo-mao military housing

Three separate blocks, part of the same project but in different condition now, are analyzed and presented here under:

1. UNMODIFIED BLOCK - UNTOUCHED FIRE-LANE:

This block is in the same situation when it was built. The fire-lane is intact, without any encroachments, and serves as an emergency exit.

2. PARTIALLY MODIFIED BLOCK - ENCROACHMENT OF FIRE-LANE:

This development shows the transition stage of fire-lane encroachment. The residents have expanded their dwellings, by adding kitchen, toilet, or more rooms, on the fire-lane in order to lodge more people or to obtain more space. The fire-lane has become narrow and irregular in shape, and does not serve the purpose incase of an emergency. It, also has become the place for dumping garbage, and no one to take care of.

3. COMPLETELY MODIFIED BLOCK - DISAPPEARANCE OF FIRE-LANE:

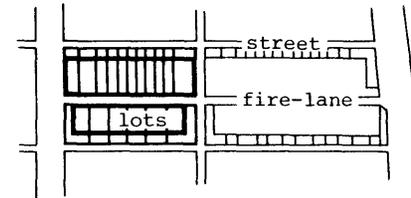
This block represents the final stage where the fire-lane has been completely encroached upon, leaving no signs of the existence of the fire-lane.

2 Shih-chuan private development

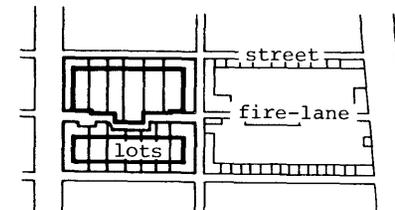
The problem of fire-lane encroachment is also found occuring in private development, which is illustrated by this case study. As seen in the plan, houses in half of the block have encroached upon the fire-lane leaving the ditch in the middle. It is obvious that the fire-lane in the rest of the block will be soon encroached upon.

EXISTING LAYOUT

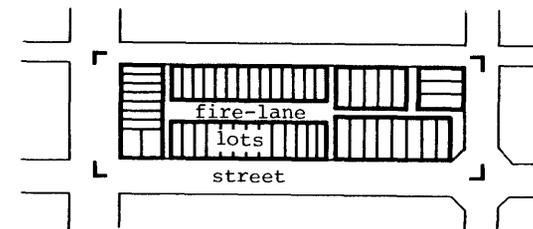
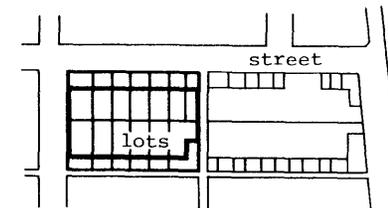
STAGE 1

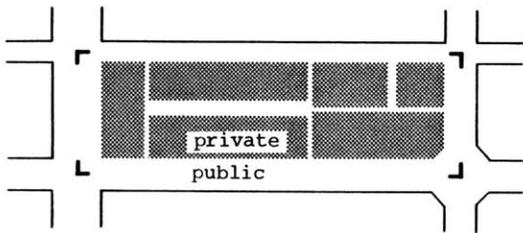
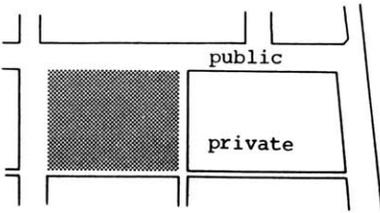
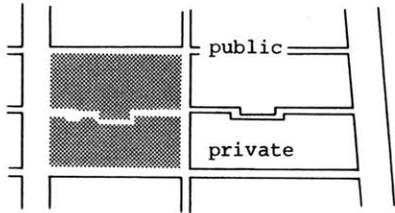
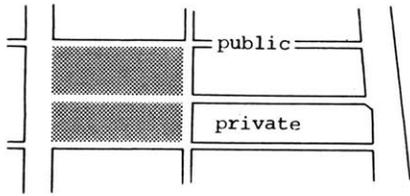


STAGE 2



STAGE 3

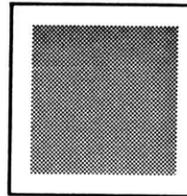




1:2500

LAND UTILIZATION DIAGRAMS

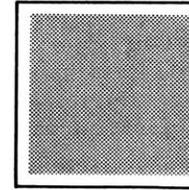
| | |
|---------------|------------------|
| PATTERN | |
| Public: | streets/walkways |
| Semi-Public: | playgrounds |
| Semi-Private: | cluster courts |
| Private: | lots |
| | dwelling |



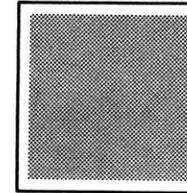
| | |
|------------------|----|
| Streets/Walkways | 39 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 61 |

PERCENTAGES

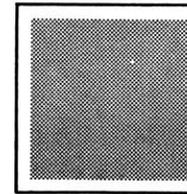
1 Hectare



| | |
|------------------|----|
| Streets/Walkways | 25 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 75 |

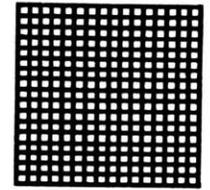


| | |
|------------------|----|
| Streets/Walkways | 21 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 79 |

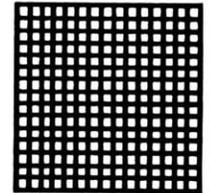


| | |
|------------------|----|
| Streets/Walkways | 28 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 72 |

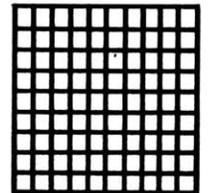
16 Hectares



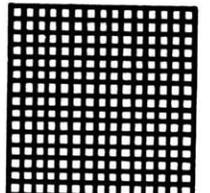
| | |
|-------------|-----|
| Unit Length | 814 |
| m/ha | |



| | |
|-------------|-----|
| Unit Length | 740 |
| m/ha | |



| | |
|-------------|-----|
| Unit Length | 471 |
| m/ha | |



| | |
|-------------|-----|
| Unit Length | 759 |
| m/ha | |

CIRCULATION EFFICIENCY

UNDEFINED LAND BETWEEN BUILDINGS

3 Ming-tsu public housing

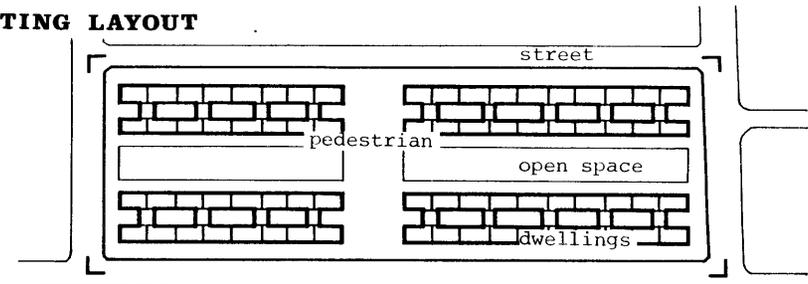
EXISTING LAYOUT:

The layout contains a large portion of open space, in between four building blocks, which becomes a pass-through public circulation, due to the lack of control. Thus the open area, intended for condominium use, becomes semi-public, and its maintenance becomes a burden for the users or the public sector.

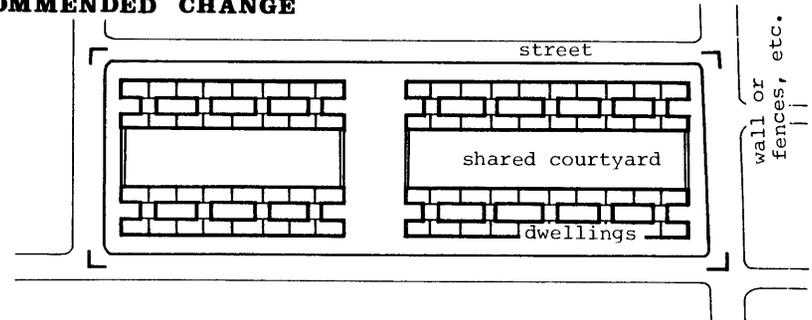
RECOMMENDED CHANGE:

The alternate layout is to change the semi-public land to semi-private courtyard by giving certain controls, such as fences or walls around the semi-private condominium space, so as to encourage group control and to prevent extra public circulation.

EXISTING LAYOUT



RECOMMENDED CHANGE



REDUNDANT PUBLIC CIRCULATION

4 Tsao-ya squatter settlement

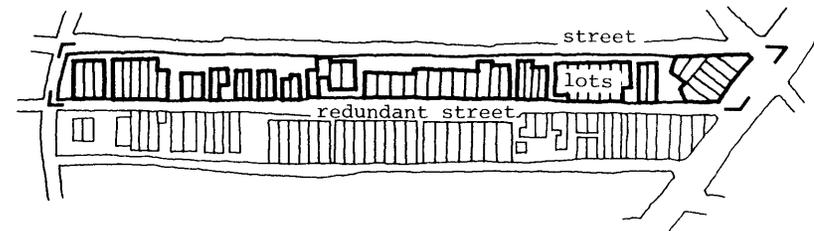
EXISTING LAYOUT:

Compared to the private land, a large proportion of land is used for public circulation. Every dwelling, is served by two streets. In other words, the block is too narrow and therefore inefficient.

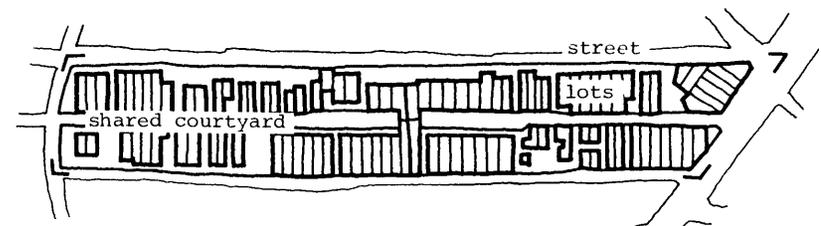
RECOMMENDED CHANGE:

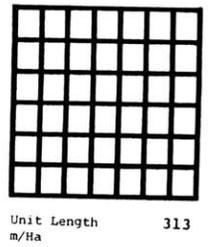
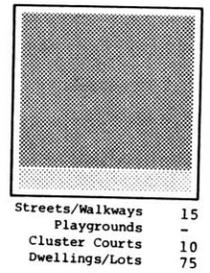
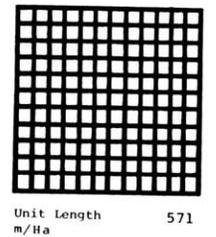
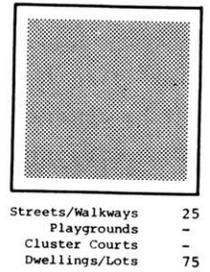
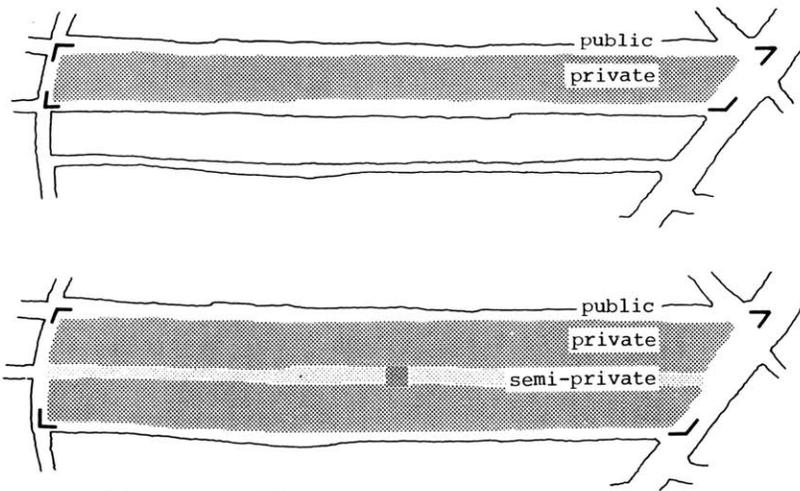
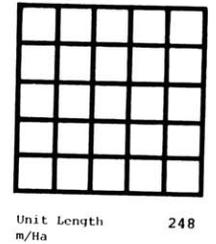
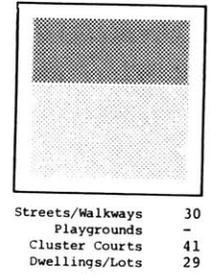
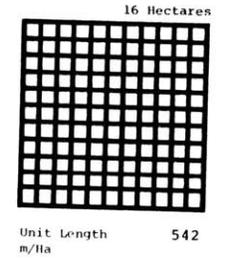
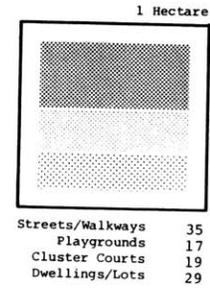
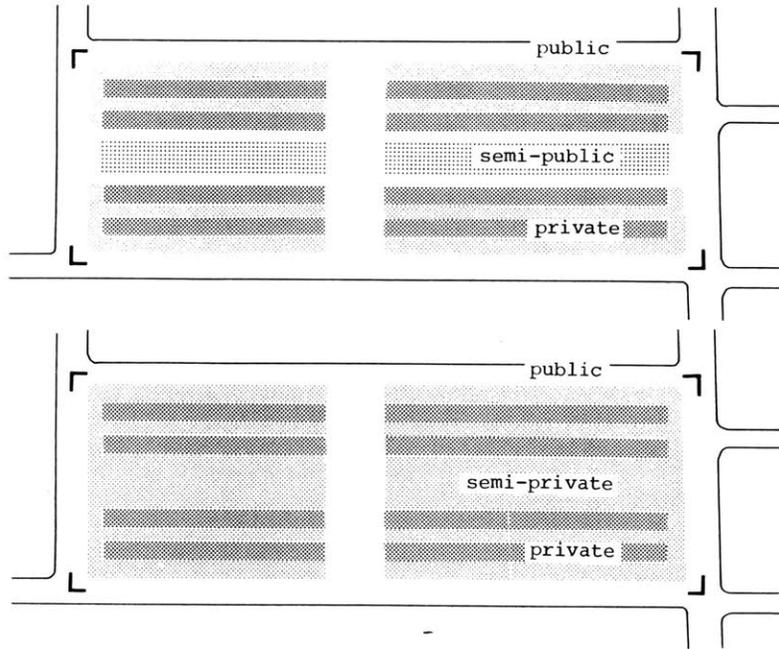
Elimination of redundant circulation. The street in between the two blocks should be changed to semi-private, dead-end courtyard.

EXISTING LAYOUT

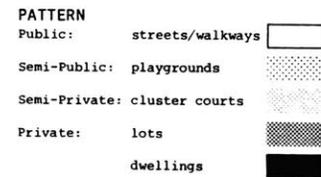


RECOMMENDED CHANGE





LAND UTILIZATION DIAGRAMS



PERCENTAGES

| | |
|------------------|----|
| Streets/Walkways | 15 |
| Playgrounds | - |
| Cluster Courts | 10 |
| Dwellings/Lots | 75 |

CIRCULATION EFFICIENCY

CONCLUSIONS / RECOMMENDATIONS

The layout examples identify the inadequate and inefficient land utilization in Kaohsiung urban area:

- The encroachment of fire lanes, which is the typical consequence of the fire lane requirement of by-laws. It is the result of incongruity among ownership, user, control and responsible agent, such as private ownership of fire lane but public circulation. The result is that the fire lane is either encroached or becomes a garbage dump.

- The land without clear definition of the users, responsible agent and control, invariably becomes wasted land. General trend among public housing agencies as well as private developers, is to provide large "open spaces" without specific use, responsibility and controls, instead of manageable, semi-private courtyards. As a result, the undefined piece of land becomes an extra space used for public thoroughfare which is difficult to maintain.

- The redundancy of streets is also a waste of land. In this case, the public sector has to spend extra money for infrastructure and maintenance, serving less number of people, compared with the cases of lots served by one street.

- The social integration and interaction is neglected in most of the cases. By providing more public land instead of shared courts, there is no place for social communication and for children to play. The development is not only inadequate in terms of safety (as for example, children playing on the street), but it also discourages the social interaction.

The existing problems are going to continue under the present by-laws. Kaohsiung, representing the typical product of by-

laws and policies, is one of many cities in Taiwan, that suffers the same malady. The current regulation efforts so far have been questionable both qualitatively and quantitatively.

"The key to proper and adequate land utilization is a coherent relationship among user, responsibility and physical controls. This coherence should be reflected in the physical plan or layout. The controls should define clearly the extent of the territory, facilitate its specific function and allow users to assume their responsibility in terms of maintenance and operation."*

" The different types of land utilization considered are as follows:

- PUBLIC LAND: Primary purpose is circulation: streets, walkways for vehicles and pedestrians; includes open spaces; responsible agent is the public sector and only minimum legal control can be enforced.
- SEMIPUBLIC LAND: Community utilization includes areas for schools, playgrounds; users are unlimited number of people and these together with the public sector are the responsible agents; partial legal and physical control are possible.
- SEMIPRIVATE LAND: Urban area shared by a group, held in condominium; users are limited in number and are the responsible agents for operation and maintenance partial or complete social, legal and physical control.
- PRIVATE LAND: This includes lots/dwellings for residential, industrial and commercial purposes; very limited number of users and the responsible agent is the individual user; complete legal and physical control."*

* URBANIZATION PRIMER, Horacio Caminos, Reinhard Goethert, MIT Press,

LAND SUBDIVISION MODELS

In an urban layout, the type of land utilization must be identified, the users defined and the individual sector/group responsible for operation and maintenance determined. Finally, all physical controls should be spelt out very clearly for effective implementation. Public land should be minimized to maximize private/semi-private land. Controls should be provided to further maximize private responsibility and minimize public responsibility. Moreover, group control should be encouraged by using proper layout, so as to maximize social integration and interaction.

These principles are transformed into physical layouts in next section in order to be comparable with the case study examples and also among themselves.

This section presents different types of urban land subdivision models which are primarily derived from the by-laws. The purpose is to present recommendations for urban development through basic model layouts.

Three types of block models are included:

STANDARD MODEL - following the by-laws

It is the typical layout which simply follows the by-laws; it represents the most popular type of existing development in Taiwan.

ALTERNATIVE REFERENCE MODELS - following the by-laws

This series of block layouts has been studied within the constraints of the by-laws, but with improved land utilization and efficiency of the land.

ALTERNATIVE REFERENCE MODEL - modification of the by-laws

This alternative presents a more practical layout, especially for small lots, and makes fire lane requirements more realistic.

These models are studied with different layouts and block sizes, but within the following constraints:

- by-laws (except in type 3 which modifies some of the fire lane and block size requirements).
- 15m street width and 4m x 16m minimum residential lot size.
- suitable for 2 to 4 story row houses or apartments which are the most popular housing types in urban areas of Taiwan.

The basic types of land utilization for all the models are clearly defined and based on characteristics of users, responsible agent and control, so as to compare and evaluate the different models in terms of efficiency of land utilization, lot density and circulation length.

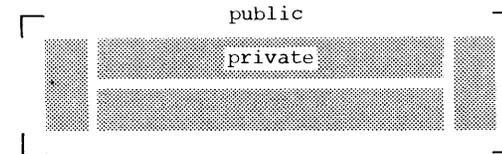
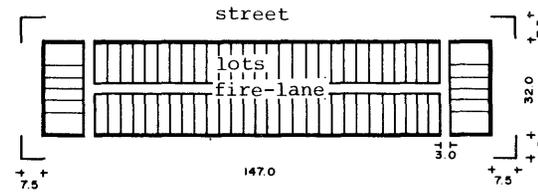
STANDARD MODEL - following the by-laws

The land utilization in this layout is categorized in two parts:

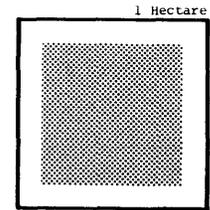
- PUBLIC LAND: It includes streets, access lanes and fire lanes (considering its use for circulation) with the minimum controls.
- PRIVATE LAND: It includes privately owned lots/dwellings, which are used, controlled and responded by the individual owners.

The incongruity of this layout is, as discussed before, the private ownership of fire lane, performing the function of public circulation because of lack of proper controls. It is predictable, therefore, that this space will either be encroached upon or used as a garbage dump.

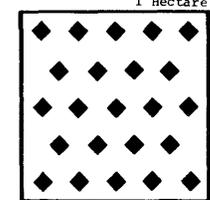
MODEL 1



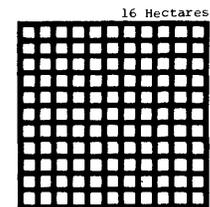
LAND UTILIZATION DIAGRAMS



| PERCENTAGES | |
|------------------|----|
| Streets/Walkways | 45 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 55 |



| LOT DENSITY | |
|--------------|----|
| Lots/Hectare | 89 |
| ◆ 4 Lots | |



| CIRCULATION EFFICIENCY | |
|------------------------|-----|
| Unit Length | 549 |
| m/Ha | |

| TYPE | OWNERSHIP | USER | RESPONSIBLE AGENT | CONTROL |
|-------------------------------|-----------|----------------------------------|-------------------|---------------------------|
| PUBLIC street, access lane | public | crowd, unlimited number, anybody | public sector | minimum (legal) |
| fire-lane | private | crowd, unlimited number, anybody | co-users | minimum (legal) |
| SEMIPUBLIC | - | - | - | - |
| SEMIPRIVATE | - | - | - | - |
| PRIVATE lots, dwellings | private | individual user | individual user | complete (legal physical) |

GOVERNING BY-LAWS:

- Length of this block (147m) corresponds to the maximum length suggested (150m for a block in residential area) by the public housing regulations.
- Fire lane, with 3m width inbetween buildings is required by the building code.

BLOCK LAND UTILIZATION DATA

BLOCK SIZE: 147 x 32 = 4704 m²
 LOT SIZE : 4 x 14.5 = 58 m²
 NO. OF LOTS: 68
 LOT DENSITY: 89 Lots/Ha

| AREAS | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.34 | 45% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.42 | 55% |
| SEMI-PRIVATE (cluster courts) | - | - |
| TOTAL | 0.76 | 100% |

NETWORK EFFICIENCY

Network length (streets, walkways) = 549 m/Ha
 Areas served (total area)

ALTERNATIVE REFERENCE MODELS

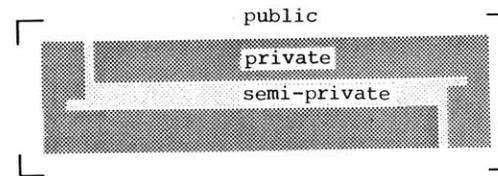
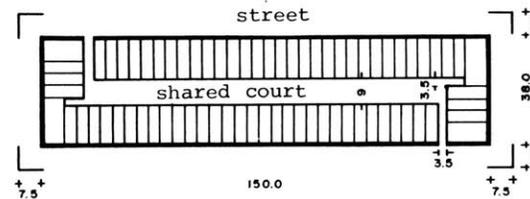
- following the by-laws

The land utilization in these layouts are categorized in three parts:

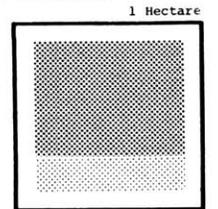
- PUBLIC LAND: The public land in this layout includes streets and access lanes. (fire lane not considered as the public land)
- SEMIPRIVATE LAND: It is a condominium area which serves a group of people as a shared courtyard and also as a fire lane - an emergency exit. It is owned, used and responded by a group of people, with partial or complete control.
- PRIVATE LAND: It includes lots/dwellings, as in the standard model.

The function of the fire lane, in these layouts, has been improved to be more usable condominium courtyard. (compared with serving only as an emergency exit) Also, it allows the congruent relationship among the owner, responsible agent, user and control, so as to prevent it becoming a garbage dump or encroachment.

MODEL 2

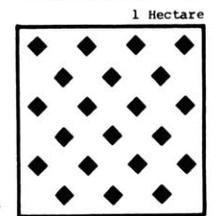


LAND UTILIZATION DIAGRAMS



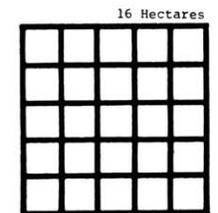
PERCENTAGES

| | |
|------------------|----|
| Streets/Walkways | 35 |
| Playgrounds | - |
| Cluster Courts | 14 |
| Dwellings/Lots | 51 |



LOT DENSITY

| | |
|--------------|----|
| Lots/Hectare | 82 |
| ◆ 4 Lots | 82 |



CIRCULATION EFFICIENCY

| | |
|-------------|-----|
| Unit Length | 249 |
| m/Ha | |

| TYPE | OWNERSHIP | USER | RESPONSIBLE AGENT | CONTROL |
|---|-------------|----------------------------------|-------------------|---|
| PUBLIC street, access lane | public | crowd, unlimited number, anybody | public sector | minimum (legal) |
| SEMI-PUBLIC | - | - | - | - |
| SEMIPRIVATE shared court (fire-lane, access lane) | condominium | co-users | co-users | partial or complete (social, legal, physical) |
| PRIVATE lots, dwellings | private | individual user | individual user | complete (legal, physical) |

GOVERNING BY-LAWS:

- The layout takes the maximum length(150m) of block as suggested by the public housing regulations.
- 3m width fire lane required by the building code, is covered within the shared court.

BLOCK LAND UTILIZATION DATA

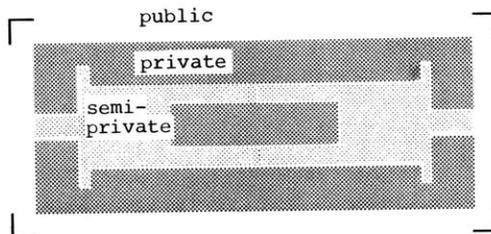
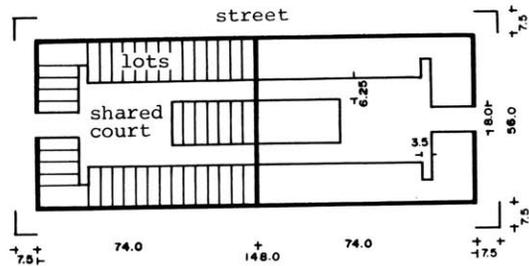
BLOCK SIZE : 150 x 38 = 5700 m²
 LOT SIZE : 4 x 14.5 = 58 m²
 NO. OF LOTS: 72
 LOT DENSITY: 82 Lots/Ha

AREAS

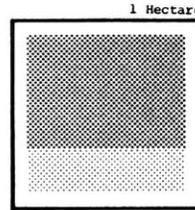
| | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.30 | 35% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.45 | 51% |
| SEMI-PRIVATE (cluster courts) | 0.12 | 14% |
| TOTAL | 0.87 | 100% |

NETWORK EFFICIENCY
 Network length (streets, walkways) = 249 m/Ha
 Areas served (total area)

MODEL 3

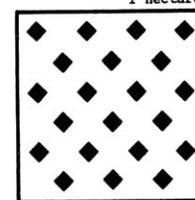


LAND UTILIZATION DIAGRAMS



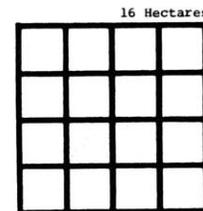
1 Hectare

| | |
|------------------|----|
| Streets/Walkways | 31 |
| Playgrounds | - |
| Cluster Courts | 20 |
| Dwellings/Lots | 49 |



1 Hectare

| | |
|--------------|----|
| LOT DENSITY | |
| Lots/Hectare | 80 |
| ◆ 4 Lots | 80 |



16 Hectares

| | |
|------------------------|-----|
| CIRCULATION EFFICIENCY | |
| Unit Length | 202 |
| m/Ha | |

GOVERNING BY-LAWS:

- The layout nears the maximum length of a block (150m) suggested by the public housing regulations.
- Since each lot in this layout faces at least two streets/access lanes, fire lane is not required according to the building code.
- 6m width of access lane is required by the building code. since it has only one exit and is longer than 40 meters.

BLOCK LAND UTILIZATION DATA

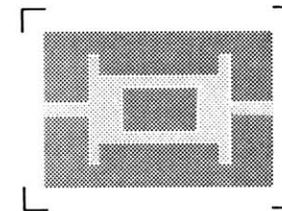
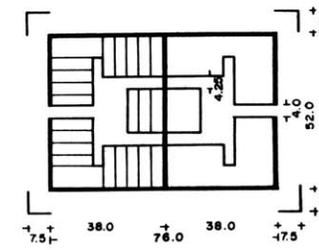
BLOCK SIZE : 148 x 56 = 8288 m²
 LOT SIZE : 4 x 14.5 = 58 m²
 NO. OF LOTS: 92
 LOT DENSITY: 80 Lots/Ha

| AREAS | Hectares | Percentages |
|---|----------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.36 | 31% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.57 | 49% |
| SEMI-PRIVATE (cluster courts) | 0.23 | 20% |
| TOTAL | 1.16 | 100% |

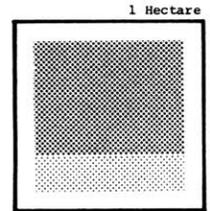
NETWORK EFFICIENCY

$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}} = 202 \text{ m/Ha}$

MODEL 4

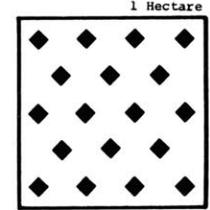


LAND UTILIZATION DIAGRAMS



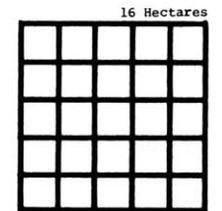
1 Hectare

| | |
|------------------|----|
| Streets/Walkways | 35 |
| Playgrounds | - |
| Cluster Courts | 16 |
| Dwellings/Lots | 49 |



1 Hectare

| | |
|--------------|----|
| LOT DENSITY | |
| Lots/Hectare | 75 |
| ◆ 4 Lots | 75 |



16 Hectares

| | |
|------------------------|-----|
| CIRCULATION EFFICIENCY | |
| Unit Length | 259 |
| m/Ha | |

GOVERNING BY-LAWS:

- The length of this block layout (76m) is kept near the minimum 80m as suggested by the public housing regulations.
- Fire lane is not needed as in model 3.
- 4m width of the access lane is required by the building code, since it has one exit and length less than 40m.

BLOCK LAND UTILIZATION DATA

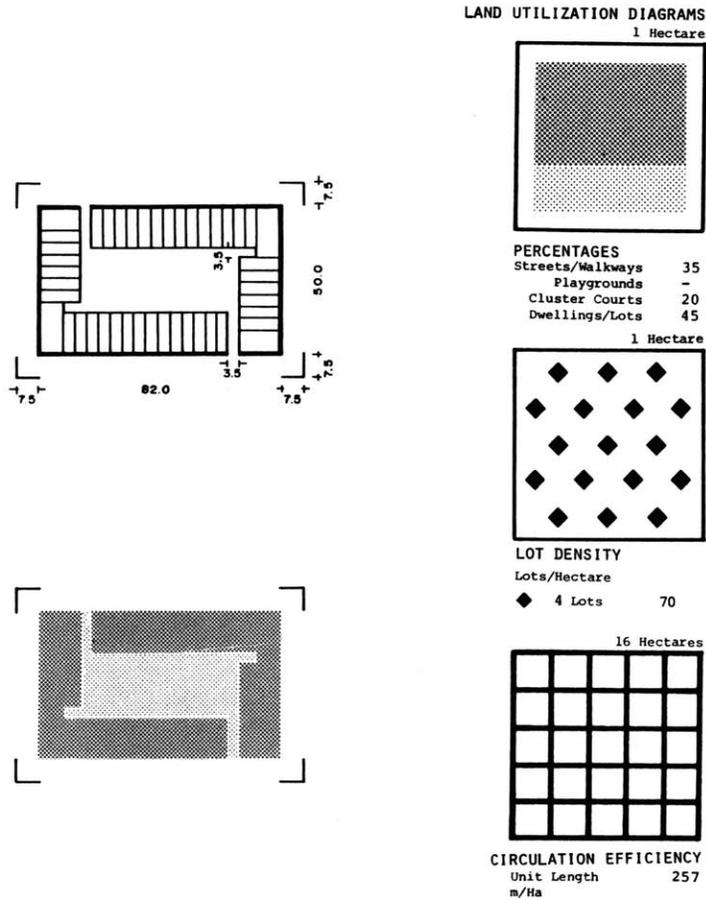
BLOCK SIZE : 76 x 52 = 3952 m²
 LOT SIZE : 4 x 14.5 = 58 m²
 NO. OF LOTS: 46
 LOT DENSITY: 75 Lots/Ha

| AREAS | Hectares | Percentages |
|---|----------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.22 | 35% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.30 | 49% |
| SEMI-PRIVATE (cluster courts) | 0.09 | 16% |
| TOTAL | 0.61 | 100% |

NETWORK EFFICIENCY

$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}} = 259 \text{ m/Ha}$

MODEL 5



GOVERNING BY-LAWS:

- The block takes the minimum length(80m).
- Fire lane is covered within shared court as in model 2.

BLOCK LAND UTILIZATION DATA

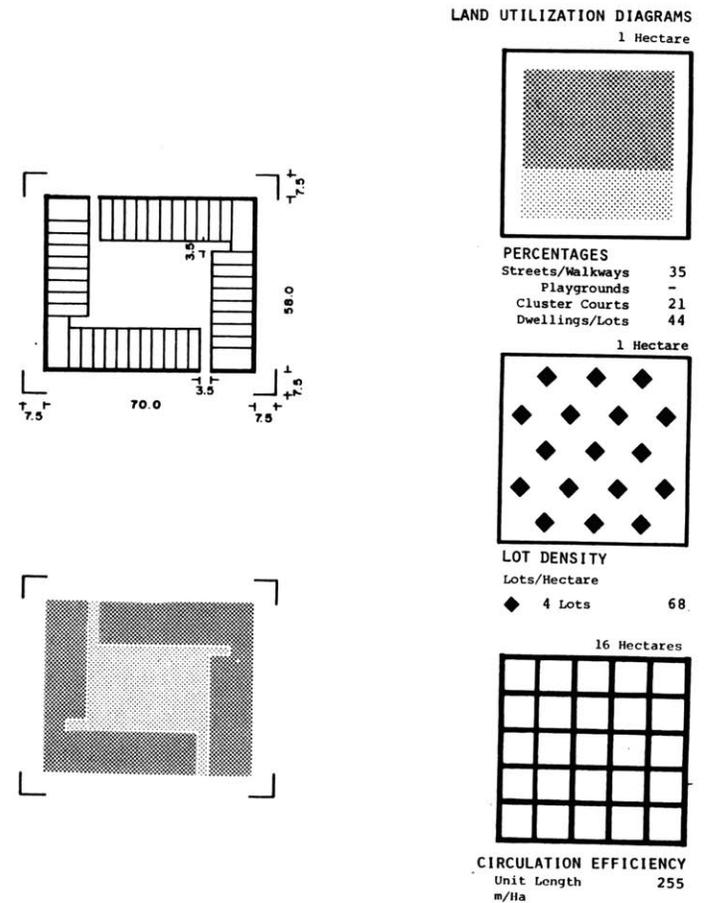
BLOCK SIZE : $82 \times 50 = 4100 \text{ m}^2$
 LOT SIZE : $4 \times 14.5 = 58 \text{ m}^2$
 NO. OF LOTS: 44
 LOT DENSITY: 70 Lots/Ha

| AREAS | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.22 | 35% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.28 | 45% |
| SEMI-PRIVATE (cluster courts) | 0.13 | 20% |
| TOTAL | 0.63 | 100% |

NETWORK EFFICIENCY

$$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}} = 257 \text{ m/Ha}$$

MODEL 6



GOVERNING BY-LAWS:

- The block layout(70m x 56m) is derived from a research report of Kaohsiung City Government.
- The fire lane requirement is covered within shared court as in model 2.

BLOCK LAND UTILIZATION DATA

BLOCK SIZE : $70 \times 56 = 4060 \text{ m}^2$
 LOT SIZE : $4 \times 14.5 = 58 \text{ m}^2$
 NO. OF LOTS: 42
 LOT DENSITY: 68 Lots/Ha

| AREAS | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.22 | 35% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.27 | 44% |
| SEMI-PRIVATE (cluster courts) | 0.13 | 21% |
| TOTAL | 0.62 | 100% |

NETWORK EFFICIENCY

$$\frac{\text{Network length (streets, walkways)}}{\text{Areas served (total area)}} = 255 \text{ m/Ha}$$

ALTERNATIVE REFERENCE MODEL - modification of by-laws

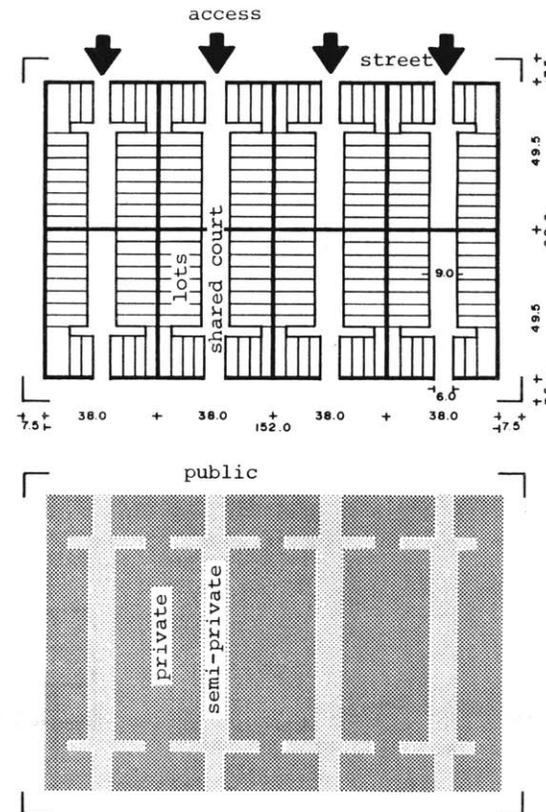
The land utilization in this layout is categorized in three parts:

- PUBLIC LAND: It includes a limited number of streets in this layout. (not including fire lanes and access lanes)
- SEMIPRIVATE LAND: A high percentage of shared courts in this layout, also forms the function of being the access lanes. It has the same characteristics of the semi-private area as in model 2 to 6.
- PRIVATE LAND: It includes lots/dwellings, as in the other models.

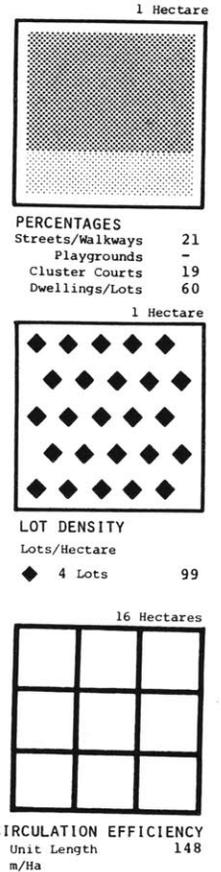
The block layout in this model is divided into clusters. Large number of streets and access lanes are replaced by shared courts. It disregards the fire lane requirements of the present by-laws, for obtaining more practical layout compared to the existing layout examples that have been analyzed before, and tries to present more reasonable land use pattern, especially for the small lots which suffer due to the fire lane requirements of the by-laws.

| TYPE | OWNERSHIP | USER | RESPONSIBLE AGENT | CONTROL |
|---|-------------|----------------------------------|-------------------|---|
| PUBLIC street | public | crowd, unlimited number, anybody | public sector | minimum |
| SEMPUBLIC | - | - | - | - |
| SEMPRIVATE shared court (access lane) | condominium | co-users | co-users | partial or complete (social, legal, physical) |
| PRIVATE lots,dwellings | private | individual user | individual user | complete (legal, physical) |

MODEL 7



LAND UTILIZATION DIAGRAMS



GOVERNING BY-LAWS:

- This layout disregards the fire lane regulation.
- The access lane is 6m wide, according the requirements of the building code.

BLOCK LAND UTILIZATION DATA

BLOCK SIZE : 152 x 99 = 15048 m²
 LOT SIZE : 4 x 14.5 = 58 m²
 NO. OF LOTS: 188
 LOT DENSITY: 99 Lots/Ha

| AREAS | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.40 | 21% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 1.14 | 60% |
| SEMI-PRIVATE (cluster courts) | 0.37 | 19% |
| TOTAL | 1.91 | 100% |

NETWORK EFFICIENCY

Network length (streets, walkways) = 148 m/Ha
 Areas served (total area)

COMPARATIVE EVALUATIONS

The comparative chart on next two pages analyzes and evaluates the quantities of the components, i.e. land utilization, lot density and circulation efficiency, for each of the 7 model layouts. The evaluation process has been facilitated through the summary diagrams and quantitative bars, representing the same.

SUMMARY DIAGRAMS: It comprises the diagrams of land utilization, lot density and circulation efficiency for each model layout.

- **LAND UTILIZATION:** The land utilization of the models is presented in percentages of public land, semi-public land, semi-private land and private land, which are indicators in determining maintenance, responsibility, user control and functional efficiency of a layout.
- **LOT DENSITY:** It is the ratio of the number of lots in the model area to the model area, which includes the residential (lots/shared court) and public circulation. (note; public facilities, as parks and schools considered as semi-public areas are not included in this study)
- **CIRCULATION EFFICIENCY:** A ratio between public circulation length and the area served indicates the direct capital investment and future maintenance costs, for the infrastructure network.

QUANTITATIVE BARS: To facilitate the evaluation process, the comparative summary diagrams are transformed into quantitative bars drawn to scale.

- **PERCENTAGE OF PRIVATE/SEMI-PRIVATE LAND:** Higher percentage of private/semi-private land results in low cost of service installation per lot and reduced maintenance efforts for the public sector, indicating an efficient layout, which is indicated by longer bar in the chart.

- **LOT DENSITY:** The higher the density, the smaller is the land area required for a given number of lots, resulting in lower costs per capita related to land and infrastructure, and is shown by a longer bar in the chart.
- **POPULATION:** Assuming 5 persons per family/lot population density is calculated. The higher the population density, lesser is the land required for a given population, which is represented by a longer bar.
- **CIRCULATION EFFICIENCY:** Shorter unit circulation length, results in less capital investments and maintenance costs. Therefore, the shorter is the circulation length, longer is the bar.

INFERENCES: Concluding comments and inferences are drawn from the chart, based on the analysis of the quantitative chart. Other criteria concerning social issues, more important but not quantifiable, are presented in this column. As for example, the courtyards shared by the dweller groups, has multiple functions; besides serving as a fire lane or access lane, it provides a place for social activities, children's playground, limited parking of vehicles, etc..

| QUANTITATIVE BARS | | | | INFERENCES | MODEL NO. |
|---|--------------------|------------------------|---|---|-----------|
| PERCENTAGE OF PRIVATE/ SEMI-PRIVATE LAND | LOT DENSITY | POPULATION DENSITY | CIRCULATION EFFICIENCY | | |
| 55 | lots/hectare 89 | persons/hectare 445 | 1/unit circul. length $1/549 = 1.8 \times 10^{-3}$ | This layout is POOR because of its characteristics: I. Positive: provides high density of lots and high population. II. Negative: does not provide community semi-private court, low percentage of private/semi-private land, poor circulation efficiency. | 1 |
| 65 | 82 | 410 | $1/249 = 4 \times 10^{-3}$ | This layout is ACCEPTABLE because of its characteristics: I. Positive: provides community semi-private court, a reasonable percentage of private/semi-private land, a reasonable circulation efficiency, a reasonable lot density and population density. II. Negative: - | 2 |
| 69 | 80 | 400 | $1/202 = 5.0 \times 10^{-3}$ | This layout is GOOD because of its characteristics: I. Positive: provides community semi-private court, a large percentage of private/semi-private land, a good circulation efficiency, a reasonable density of lots and a reasonable population density. II. Negative: - | 3 |
| 65 | 75 | 385 | $1/259 = 3.9 \times 10^{-3}$ | This layout is ACCEPTABLE because of its characteristics: I. Positive: provides community semi-private court, a reasonable percentage of private/semi-private land and a reasonable circulation efficiency. II. Negative: low density of lots and low population density. | 4 |
| 65 | 70 | 350 | $1/257 = 3.9 \times 10^{-3}$ | This layout is ACCEPTABLE because of its characteristic: I. Positive: provides community private/semi-private court, a reasonable percentage of private/semi-private land and a reasonable circulation efficiency II. Negative: low density of lots and low population density. | 5 |
| 65 | 68 | 340 | $1/255 = 3.9 \times 10^{-3}$ | This layout is ACCEPTABLE because of its characteristics: I. Positive: provides community semi-private court, a reasonable percentage of private/semi-private land, and a reasonable circulation efficiency. II. Negative: low density of lots and low population density. | 6 |
| 79 | 99 | 495 | $1/148 = 6.7 \times 10^{-3}$ | This layout is GOOD because of its characteristics: I. Positive: provides community semi-private court, a reasonable percentage of private/semi-private land, a good circulation efficiency, high lot density and population density. II. Negative: does not provide fire-lane which is required by the by-law. | 7 |

0 | 100 | 0 | 1,000 | 0 | 1×10^{-2}



APPENDIX

This section provides complementary references and elaborated surveys in Kaohsiung that are used as the basis for the analysis and recommended model studies.

The section comprises three parts as follows:

1. NATIONAL/URBAN CONTEXT: Taiwan, R.O.C./Kaohsiung
2. CASE STUDIES
3. COMPARATIVE SUMMARY

*PHOTOGRAPH: (OPPOSITE PAGE)
General view of the built environment in Kaohsiung -
recently growing highrise buildings amidst two to
four storied residential buildings.*

NATIONAL CONTEXT

TAIWAN, REPUBLIC OF CHINA

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

HISTORY: The aborigines of Taiwan are believed to be of Polynesian stock. The Chinese crossed the Taiwan Strait from the Provinces of Fukien and Kwangtung as early as the 12th century. From 1624 to 1646, Taiwan was under Spanish and Dutch domination, population was 30,000. In 1661, the Dutch were ousted by a patriot of Ming Dynasty, General Cheng Chen-kung (Koxinga), who held out from Chinese mainland after the Manchus and made a prefecture of Fukien in 1684. Large-scale immigration began and by 1810, the population had reached 2,000,000. The Manchu government made Taiwan a province in 1885. In 1895, Taiwan was ceded to Japan at the conclusion of the first Sino-Japanese War. In 1945, after World War II, Taiwan returned to China as a result of the Cairo Agreement. But since 1949, Taiwan has become the effective territory of the Republic of China. Taipei is the temporary capital.

GOVERNMENT: The Taiwan Provincial Government, Taipei Special Municipality and Kaohsiung Special Municipality are under the jurisdiction of the Executive Yuan of the Central Government which is the highest administra-

tion body of the Republic of China. Local governments consist of 16 prefectures and 3 major provincial cities, which includes: Taichung, Tainan and Keelung.

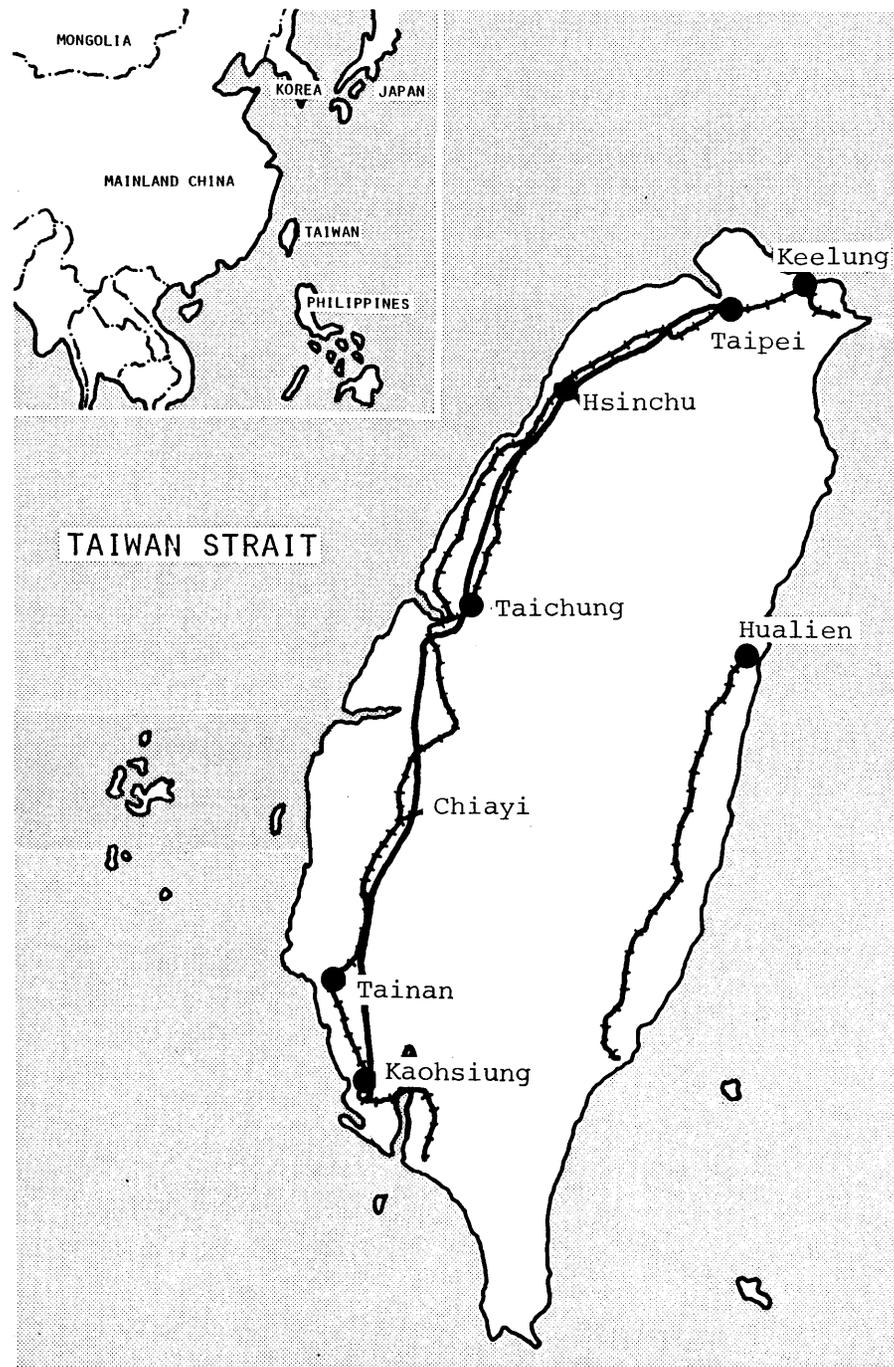
ECONOMY: In 1976, per capita income stood at US\$849, (World Bank estimate US\$1,070) the gross domestic product was US\$14,732 billion and the growth rate recorded a 11.76%. In average, the economic growth between 1953 and 1976, was about 7% per annum. Official foreign exchange rate in the end of 1978 was one U.S. dollar to 36.05 New Taiwan dollars, now the rate is floating.

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

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

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

HOUSING: During the past 15 years the annual housing investment was 2.2% of GNP which was relatively low if compared with other countries. Land is limited due to the high population density, the high, steep mountain geographic feature and the need to balance the use between urbanization and agricultural development. In 1976, the government estimated that the housing demand during the next six years (1976 - 1981) was 600,000 units in Taiwan province.



URBAN CONTEXT

KAOHSIUNG

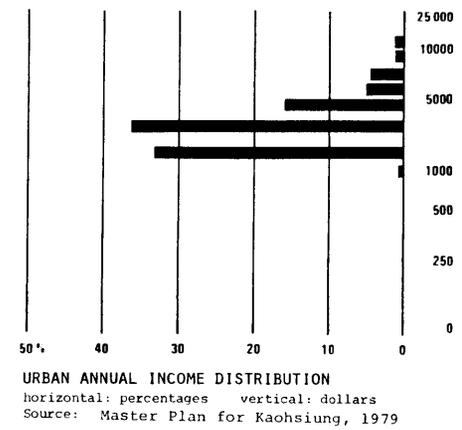
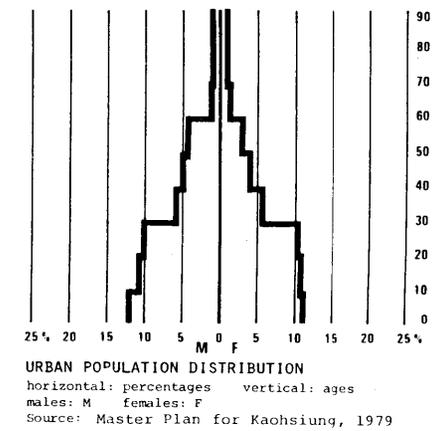
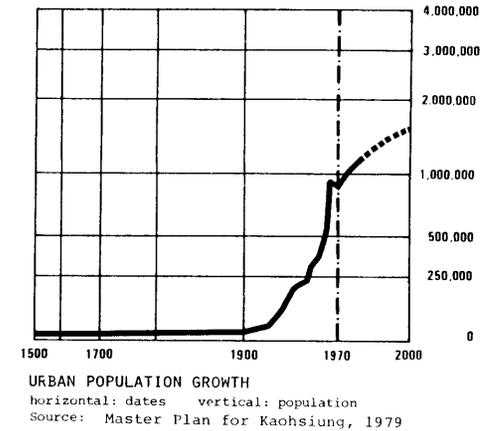
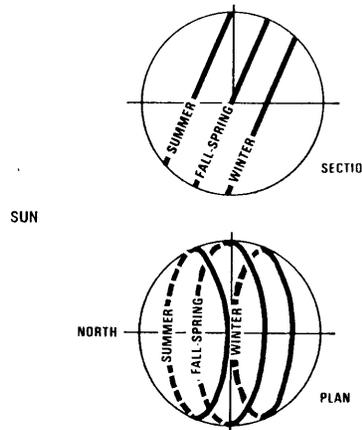
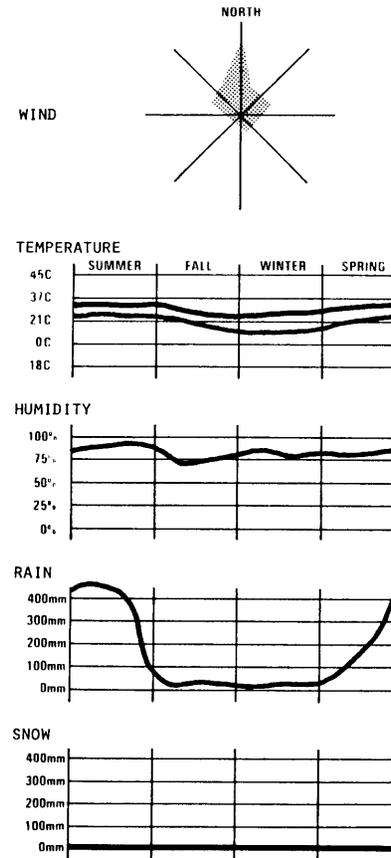
PRIMARY INFORMATION: Kaohsiung is a major industrial city and the second largest in population, but it is the largest port. It is situated in the southwestern part of Taiwan, 225 miles south of Taipei, with an area of 113.7 Km². It is located on a large plain along the western coast of southern Taiwan, latitude 22°35' North, longitude 120°17' East. Mt. Pen-ping and Mt. South-shan both below 350m in height are the only mountains inside the city limits. Hou-ching River and Ren-ai River run through the city. Kaohsiung is located in the tropical zone with an average temperature of 24.3°C, and a mean annual rainfall of about 1,900 mm. The climate is hot, with a long typhoon season during the summer. The four coldest months (Nov. - Feb.) have a minimum temperature of 6°C.

HISTORY: Kaohsiung was originally known as Takou and was named Kaohsiung in 1920. The city development started during the Ming Dynasty when Yu Ta-yu chased pirates up Mt. Takou near Kaohsiung. When the Dutch invaded the island in 1624, the Kaohsiung area was already populated by immigrants from the mainland of China. Fisheries and trade prospered in the area due to its advantageous geographic location. The area has a convenient harbor and large plains nearby which could be developed. After Cheng Chen-kung drove the Dutch out of the island, the Chinese set up Wang-nein county at Pei-tzu Tou (within Tzu-ying district) and stationed troops throughout the city to open the land. It was transferred to the jurisdiction of Fengshan county after the Manchus conquered the island in 1983.

After the Central Government of Republic of China moved to Taiwan, Kaohsiung made rapid progress and became the biggest industrial and commercial harbor in southern Taiwan.

ECONOMY: Kaohsiung is an important industrial and commercial center and the largest port in Taiwan. The large scale industries, which are more than 2,200, include a steel mill, a shipyard, and oil refinery, a petrochemical complex, plywood & cement industries and export processing zones. In 1978, 37% of the city's population was economically active, out of which 27% were females.

DEVELOPMENT: The urban development of Kaohsiung city started during the Ming/Ching Dynasty, while Taiwan was administrated as a province of China. Large scale immigration from mainland China initially developed Kaohsiung as Chinese farming villages. Kaohsiung harbor was originally set up during the Ming Dynasty, which brought in the first commercial activities to the city. During the period of Japanese domination, the fundamental urban form was constructed in the city. The streets, railways, infrastructure network, harbor, etc., were planned and constructed. In 1908, a preliminary urban plan was developed which included a total planned area of 170 hectares with an estimated population of 42,000. The plan was expanded constantly due to the rapid population growth. The harbor and the city center (Yen-chien area) developed at the same time. The city also became an industrial center.

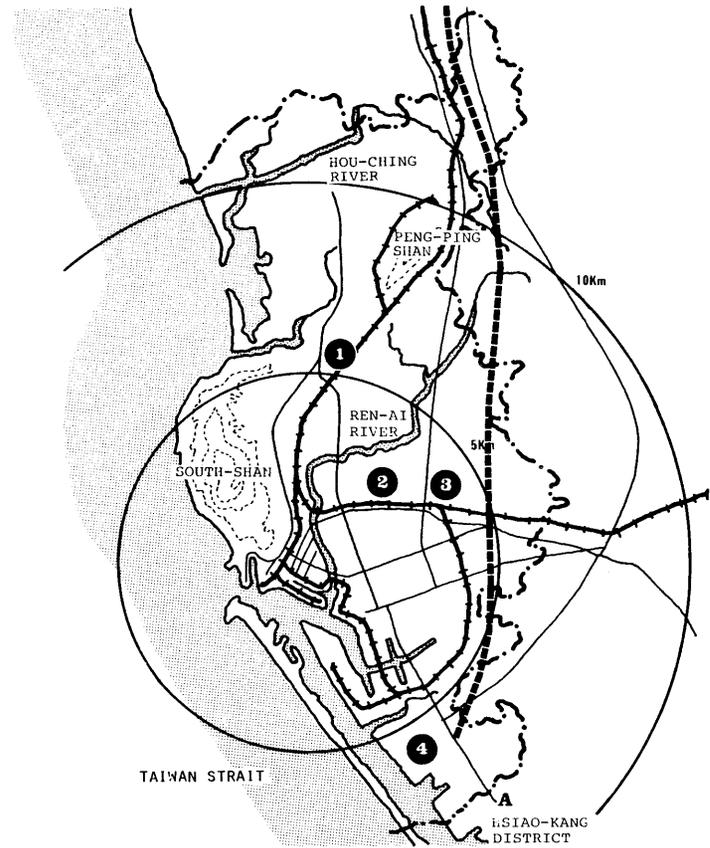


After Taiwan was restored to the Republic of China, and encouraged by government policies over the years, Kaohsiung has undergone a rapid development, characterized by its sprawling factories, businesses and fisheries, and it became the second largest city in Taiwan.

GOVERNMENT: With the rapid increase in population and economic prosperity, Kaohsiung was elevated to a Special Municipality on July 1, 1979. The city is comprised of ten districts: Yen-cheng, Kushan, Tzuo-ying, Nan-tzu, San-ming, Hsin-hsing, Chien-chin, Ling-ya, Chien-chen, Chih-ching. Hsiao-kang district became the 11th after a change in the status of Kaohsiung city.

DEMOGRAPHY: The population of the Kaohsiung urban area was 1,063,797 according to the census at the end of 1978. The annual population increase was 5.22% between 1967 and 1976, and 1.92% from 1976 to 1978. 48% of the population is female. The gross density in this area is 93 persons/ha, which is the highest in Taiwan. Approximately 64% of the existing population migrated from other place. 34.83% of the population in 1978 was aged under 14, 62.2% was aged between 15 - 64, the rest were elderly people.

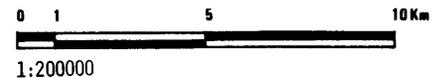
SOCIO-ECONOMIC: In 1978 there were 226,807 households, with an average size of 4.69 persons. Approximately 70% of the households in 1977 had a below average income. The annual income per household was NT\$ 185,368 or US\$ 5,150 (foreign exchange rate was 1 U.S. dollar = 36 New Taiwan dollars) which increased 34.85% from 1977.



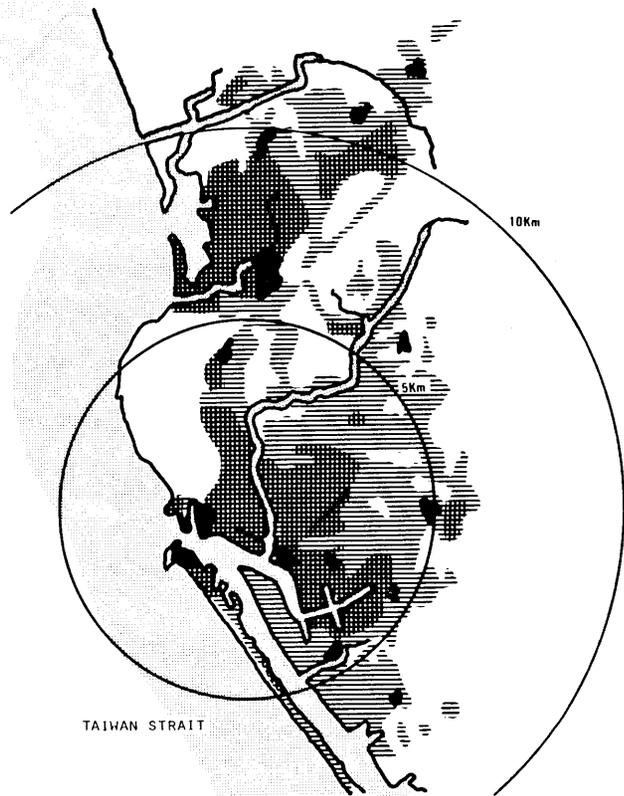
KEY

- A** Airport
- Primary Road
- +—+— Railway
- +—+—+— North-South Freeway

- 1** Kuo-mao Military Housing
- 2** Shih-chuan Private Development
- 3** Ming-tsu Public Housing
- 4** Tsao-ya Squatter Settlement

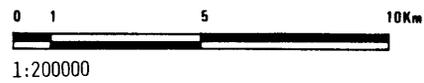


URBAN TOPOGRAPHY AND CIRCULATION

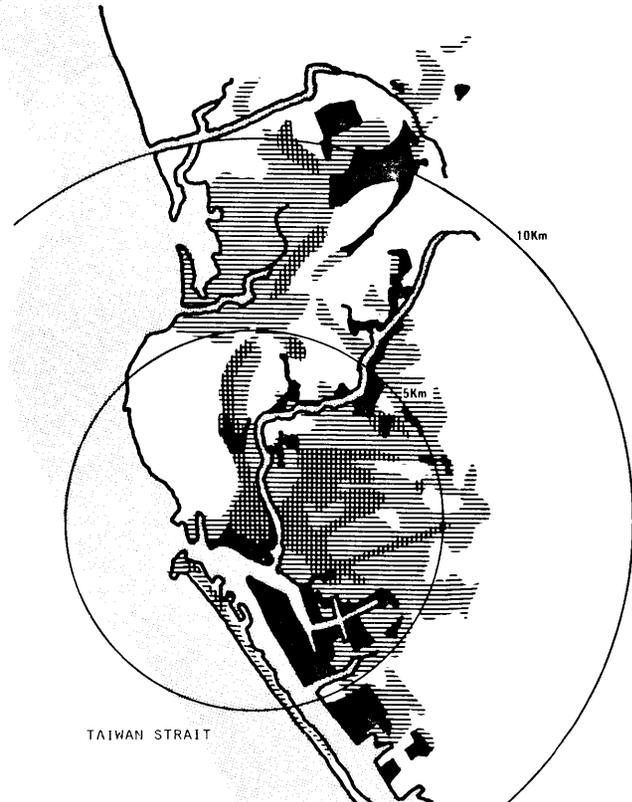


DATES

| | |
|---|------|
| ■ | 1894 |
| ▨ | 1944 |
| ▧ | 1978 |

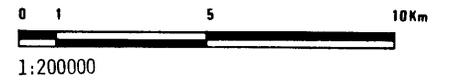


URBAN GROWTH PATTERN

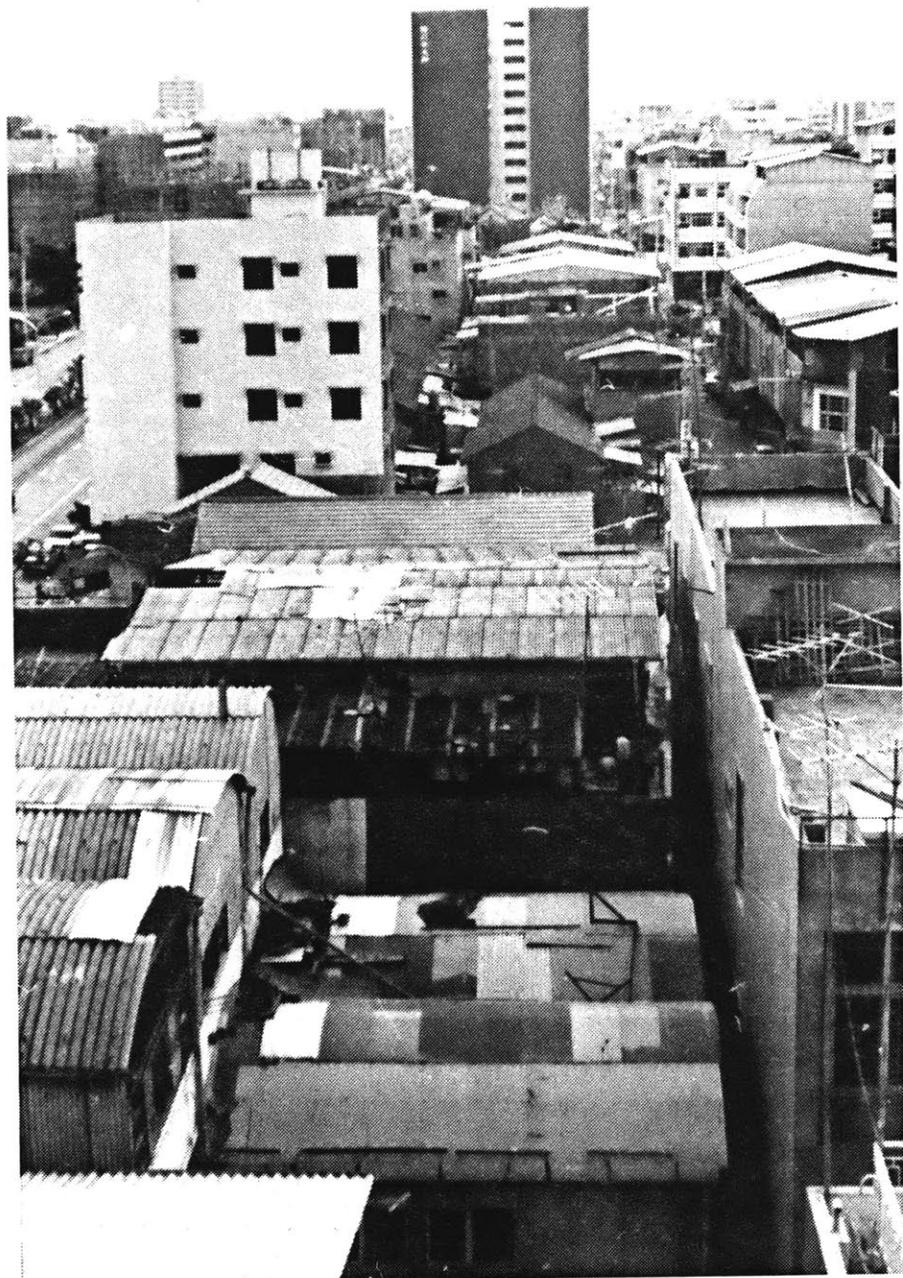
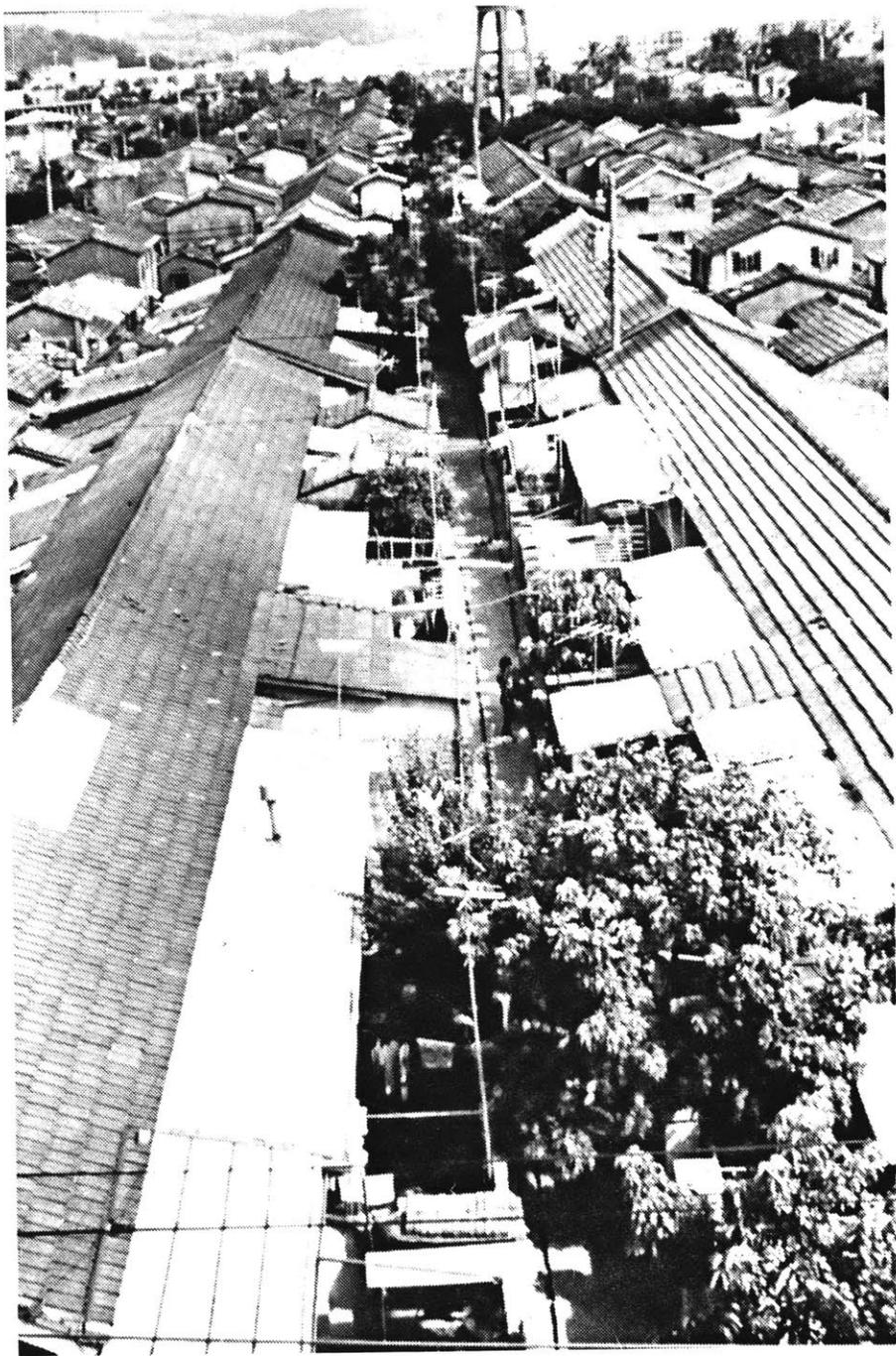


AREAS

| | |
|---|-------------|
| ▨ | RESIDENTIAL |
| ▧ | COMMERCIAL |
| ■ | INDUSTRIAL |



URBAN LAND USE PATTERN



CASE STUDIES

The following section contains case studies of selected dwelling environments within the Kaohsiung city area. The case studies have been selected on the basis of income group, housing type, location, and are representative of all the major dwelling systems of the city. The case studies are represented at four levels:

LOCALITY: A locality is defined as a relatively self-contained area. It is generally confined within physical boundaries.

LOCALITY SEGMENT: All localities differ in size and shape; for purposed of comparison, a segment of 400 meters by 400 meters is taken from each locality.

LOCALITY BLOCK: Within each locality segment, a typical residential block is selected in order to compare land utilization (patterns, percentages, densities and circulation).

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

The case studies are arranged as follows:

1. KUO-MAO MILITARY HOUSING
Public, Row house, Low/Middle income
2. SHIH-CHUAN PRIVATE DEVELOPMENT
Private, Row house, Middle income
3. MING-TSU PUBLIC HOUSING
Public, Apartment, Low/Middle income
4. TSAO-YA SQUATTER SETTLEMENT
Popular/Private, Row house, Low/Middle income

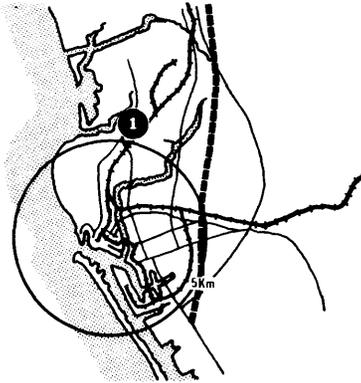
PHOTOGRAPH: (OPPOSITE PAGE)

(LEFT) Rows of one or two storied military housing structures with an access lane running in the middle.

(RIGHT) A number of illegal constructions are seen on the roofs.

1 Kuo-mao military housing

Developer: PUBLIC
 Type of development: INSTANT/INCREMENTAL
 Dwelling type: ROW HOUSE
 1-2 stories
 Income type: LOW/MIDDLE INCOME



LOCATION: The case is located in Tzuoying district along the western side of the main railway line that runs north-south. It is about 4km north from the city.

ORIGIN: Tzuoying district has been developed since 1661. Most of the Chinese people migrated to this area during Ming Dynasty after Cheng Chen-kung had taken over Taiwan from the Dutch. Tzuoying was one of the villages which had developed by these ancient people.

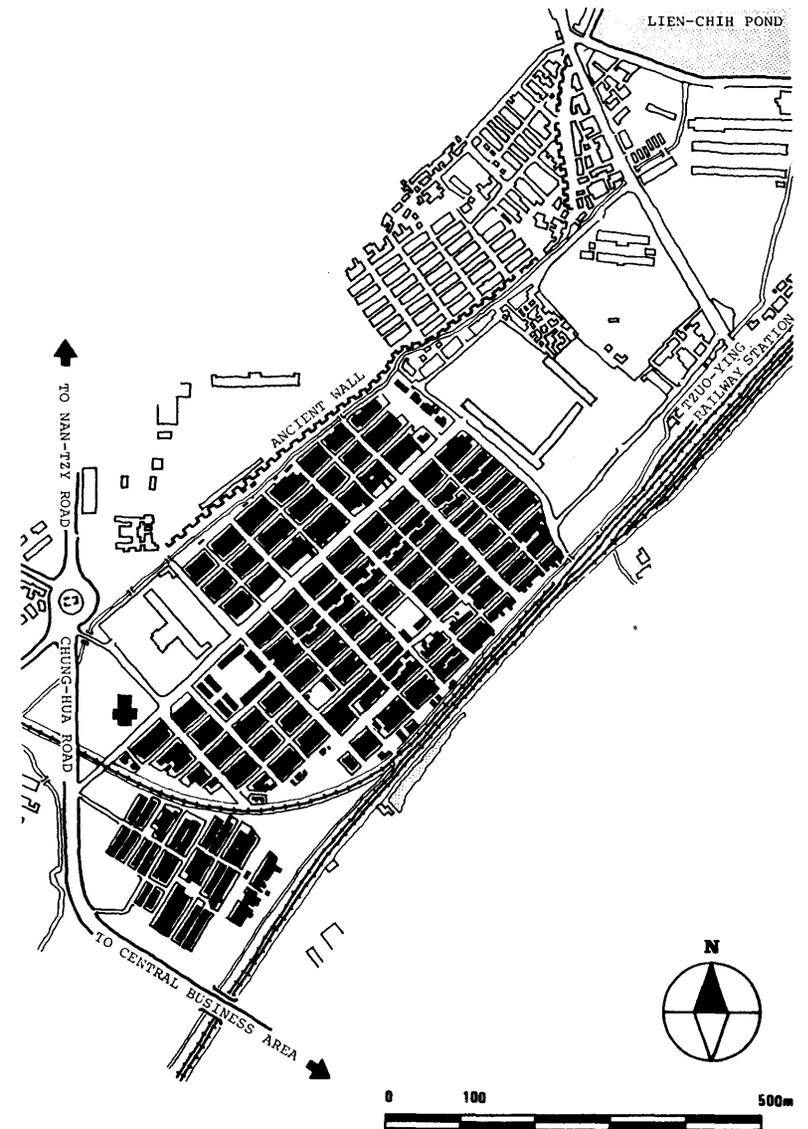
While Japanese controlled Taiwan, Tzuoying had been developed as a harbour military base. After World War II, Taiwan was returned to China and central government recovered the control of this area. A large number of military housing was built with the purpose of settling the soldiers and their families. Kuo-mao military housing was one of these projects. Row houses were built by the public sector in several stages from August, 1960 till November, 1976.

LAYOUT: The locality is bound by the Lien-chih Pond at the north, an ancient wall at the west, and the railway at the west and south. Also, a hilly area is located near the locality on its north-west side. A deep ditch which provides storm drainage, surrounds the site at the east and south boundary along the railway. The layout is based on a grid pattern. Most of the lots are facing the access lanes parallel to the railway line. The back of two lots had access to a fire-lane, that in most cases had been encroached by the expansion of the dwellings.

LAND USE: The area is predominantly residential. Community center, market and limited shops are located along the main street. The recreational area is well organized and mentained by the community committee. Local residents are served by primary and secondary schools located within the area or in the surroundings.

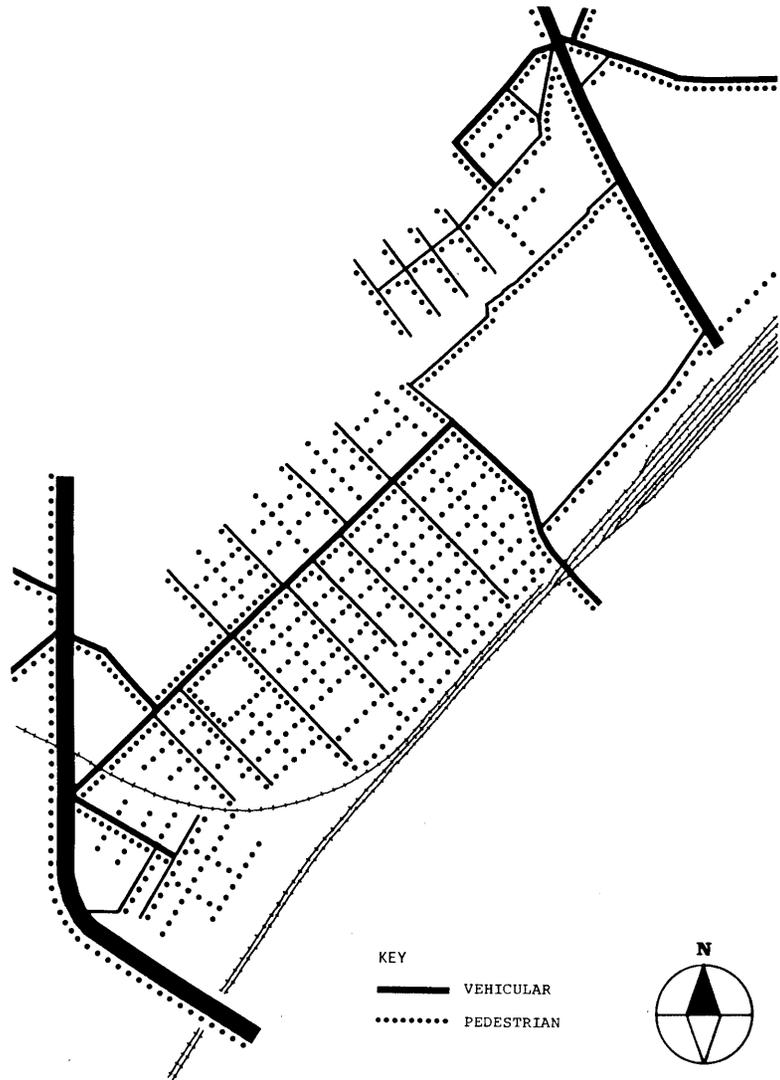
CIRCULATION: Chung-hua Road is the main existing approach to this area from the city center. A road has been proposed along the railway to connect Chung-hua Road and Nan-tzy Road at north and to serve Tzuoying railway station. The internal circulation pattern includes one main street parallel to the railway and collector roads perpendicular to the main street having limited vehicular traffic. Paved pedestrian roads dominate in this area.

POPULATION AND INCOME: This area is inhabited by middle and low income group households. There are 1,747 households living in this area representing 9840 persons. Around 40 percent of the inhabitants are working in the army, 60 percent of them are retired military personnel and working for private business enterprises.



LOCALITY PLAN

1:10000



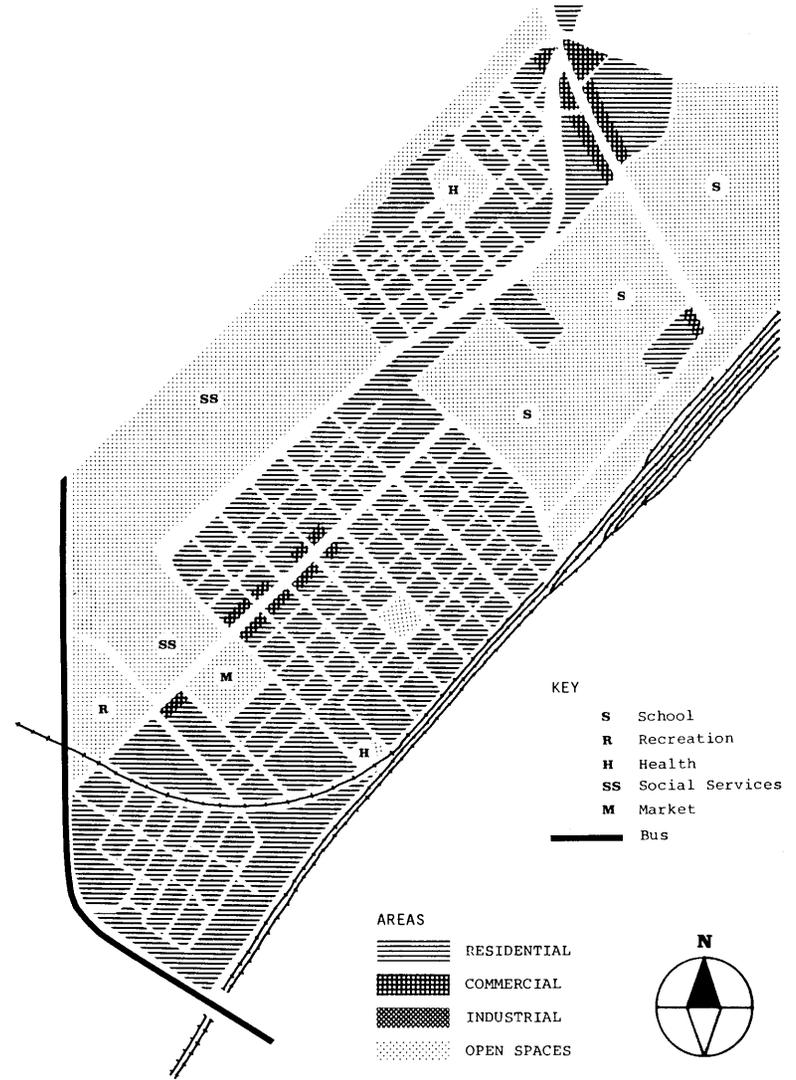
KEY
 ——— VEHICULAR
 PEDESTRIAN



0 100 500m

LOCALITY CIRCULATION PATTERN

1:10000



KEY
 S School
 R Recreation
 H Health
 SS Social Services
 M Market
 ——— Bus

AREAS
 ——— RESIDENTIAL
 [Grid] COMMERCIAL
 [Diagonal] INDUSTRIAL
 [Dotted] OPEN SPACES

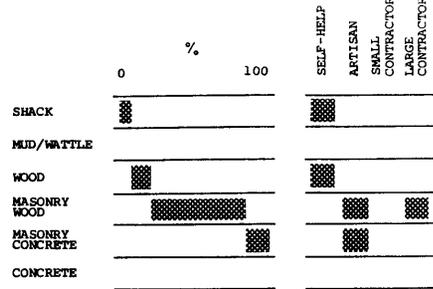


0 100 500m

LOCALITY LAND USE PATTERN

1:10000

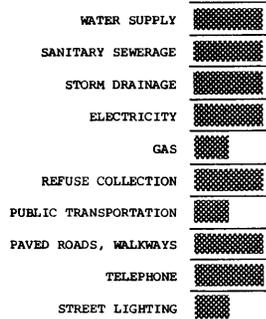
LOCALITY CONSTRUCTION TYPES



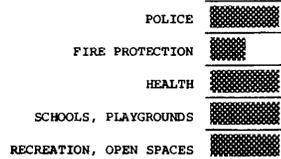
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information:

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



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

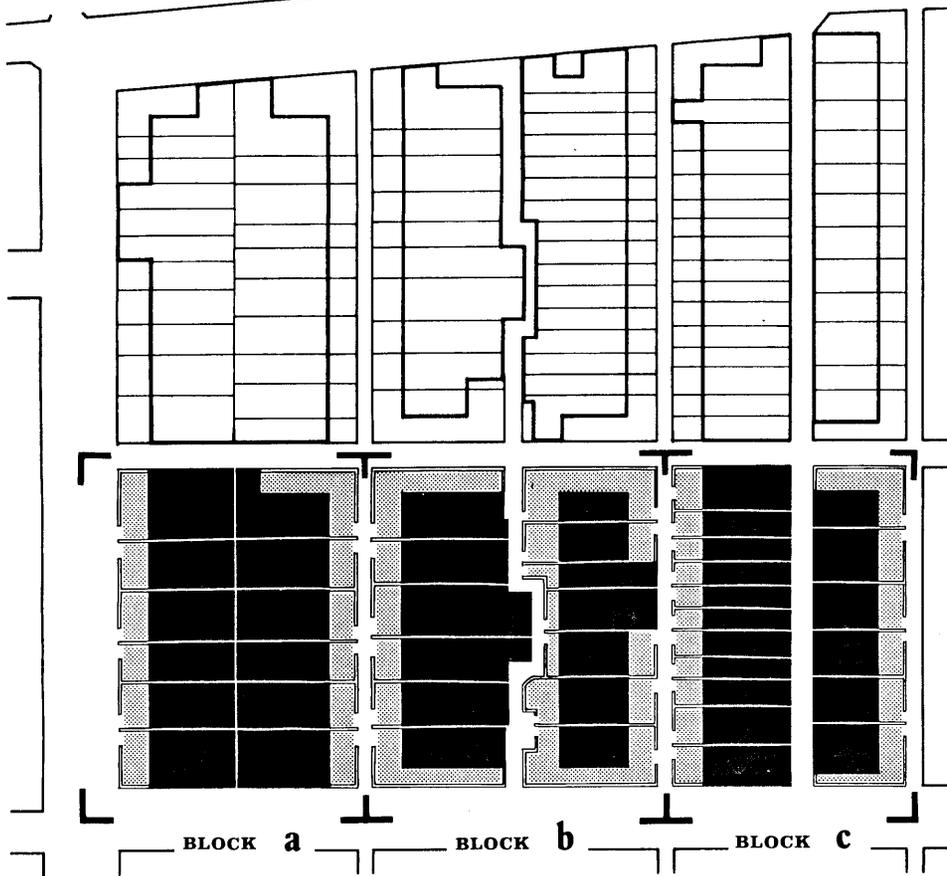
Quality of information:



SELECTED BLOCK

LOCALITY SEGMENT PLAN





1:1000

LOCALITY BLOCK PLAN

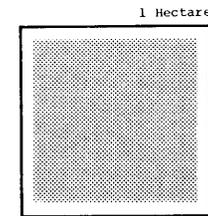
PATTERN

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

LOCALITY BLOCK
LAND UTILIZATION DATA

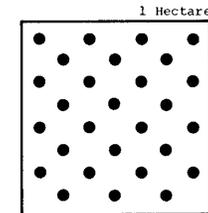
| DENSITIES | Total | Area | Density | Total | Area | Density | Total | Area | Density |
|---|-------------------|----------|-------------|--------------------|----------|-------------|--------------------|----------|-------------|
| | Number | Hectares | N/Ha | | Number | Hectares | | N/Ha | Number |
| LOTS | 17 | 0.16 | 106 | 13 | 0.19 | 68 | 12 | 0.18 | 67 |
| DWELLING UNITS | 17 | 0.16 | 106 | 13 | 0.19 | 68 | 12 | 0.18 | 67 |
| PEOPLE | 92 | 0.14 | 575 | 70 | 0.19 | 368 | 65 | 0.18 | 361 |
| AREAS | | Hectares | Percentages | | Hectares | Percentages | | Hectares | Percentages |
| PUBLIC (streets, walkways, open spaces) | | 0.04 | 25% | | 0.04 | 21% | | 0.05 | 28% |
| SEMI-PUBLIC (open spaces, schools, community centers) | | - | - | | - | - | | - | - |
| PRIVATE (dwellings, shops, factories, lots) | | 0.12 | 75% | | 0.15 | 79% | | 0.13 | 72% |
| SEMI-PRIVATE (cluster courts) | | - | - | | - | - | | - | - |
| TOTAL | | 0.16 | 100% | | 0.19 | 100% | | 0.18 | 100% |
| NETWORK EFFICIENCY | | | | | | | | | |
| Network length (streets, walkways) | = 814 m/Ha | | | = 740 m/Ha | | | = 471 m/Ha | | |
| Areas served (total area) | | | | | | | | | |
| LOTS | | | | | | | | | |
| Average area, dimensions = | 69 m ² | | | 115 m ² | | | 112 m ² | | |

LAND UTILIZATION DIAGRAMS
BLOCK a



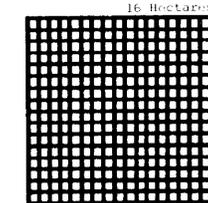
PERCENTAGES

| | |
|------------------|----|
| Streets/Walkways | 25 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 75 |



DENSITY

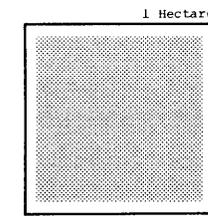
| | | |
|-----------------|------------|-----|
| Persons/Hectare | 20 Persons | 575 |
|-----------------|------------|-----|



CIRCULATION EFFICIENCY

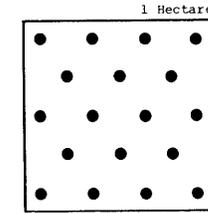
| | |
|----------------|-----|
| Meters/Hectare | 814 |
|----------------|-----|

BLOCK b



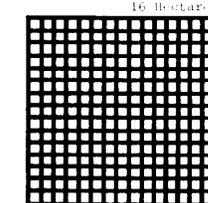
PERCENTAGES

| | |
|------------------|----|
| Streets/Walkways | 21 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 79 |



DENSITY

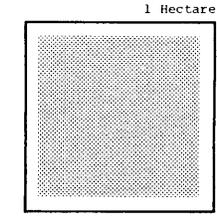
| | | |
|-----------------|------------|-----|
| Persons/Hectare | 20 Persons | 368 |
|-----------------|------------|-----|



CIRCULATION EFFICIENCY

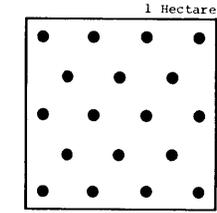
| | |
|----------------|-----|
| Meters/Hectare | 740 |
|----------------|-----|

BLOCK c



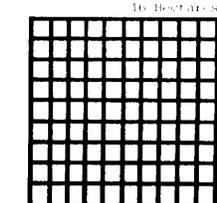
PERCENTAGES

| | |
|------------------|----|
| Streets/Walkways | 28 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 72 |



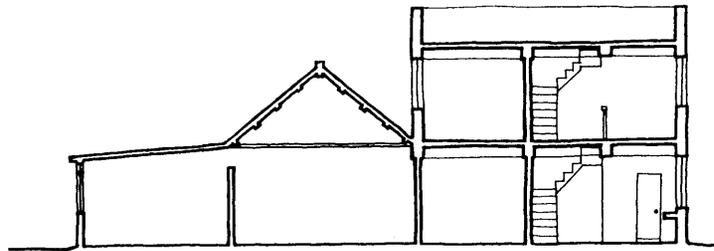
DENSITY

| | | |
|-----------------|------------|-----|
| Persons/Hectare | 20 Persons | 361 |
|-----------------|------------|-----|

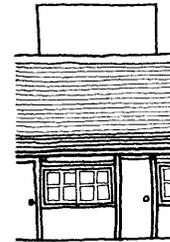


CIRCULATION EFFICIENCY

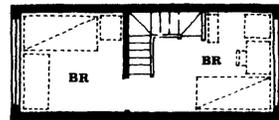
| | |
|----------------|-----|
| Meters/Hectare | 471 |
|----------------|-----|



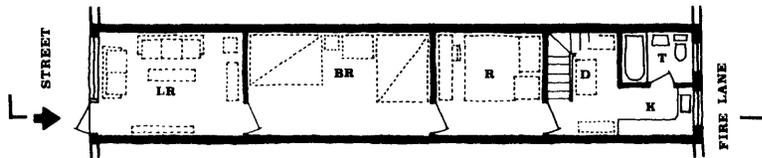
SECTION



ELEVATION



SECOND FLOOR



GROUND FLOOR

LOCALITY SEGMENT/BLOCK: The segment is representative of the existing layout. One story row houses dominate this area. People add more rooms building one or two stories after buying the houses from the public sector. Around 80 percent of the fire-lanes were encroached upon because of added facilities such as kitchen, toilet, etc..

The streets and access lanes are paved with tar and gravel. Secondary streets and access lanes are essentially for pedestrians, and access lanes are used as walkways and open space by the residents. Lots vary in size (80 m², 86 m², 96 m², 112 m²) according to the different ranks of the military employees.

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
 type: ROW-HOUSE
 area (sq m): 69
 tenure: LEGAL OWNERSHIP

LAND/LOT
 utilization: PUBLIC
 area (sq m): 48
 tenure: PUBLIC/USUFRUCT

DWELLING
 location: PERIPHERY
 type: ROW-HOUSE
 number of floors: 2
 utilization: SINGLE FAMILY
 physical state: FAIR

DWELLING DEVELOPMENT
 mode: INSTANT/INCREMENTAL
 developer: PUBLIC
 builder: PUBLIC
 construction type: BRICK/WOOD
 year of construction: 1950

MATERIALS
 foundation: BRICK/CONCRETE
 floors: CONCRETE
 walls: BRICK
 roof: CLAY-TILES/WOOD

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)

DWELLING FACILITIES

- wc: 1
- shower: 1
- kitchen: 1
- rooms: 5
- other: -

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
 user's ethnic origin: ANHWEI PROVINCE
 place of birth: ANHWEI PROVINCE
 education level: MILITARY OFFICER

NUMBER OF USERS

- married: 2
- single: -
- children: 4
- total: 6

MIGRATION PATTERN

number of moves: 1
 rural - urban: 1951
 urban - urban: -
 urban - rural: -
 why came to urban area: MILITARY SERVICE

GENERAL: ECONOMIC

user's income group: MODERATE
 employment: BUS DRIVER
 distance to work: 3 Km
 mode of travel: BUS/MOTORCYCLE

COSTS

dwelling unit: -
 land - market value: -

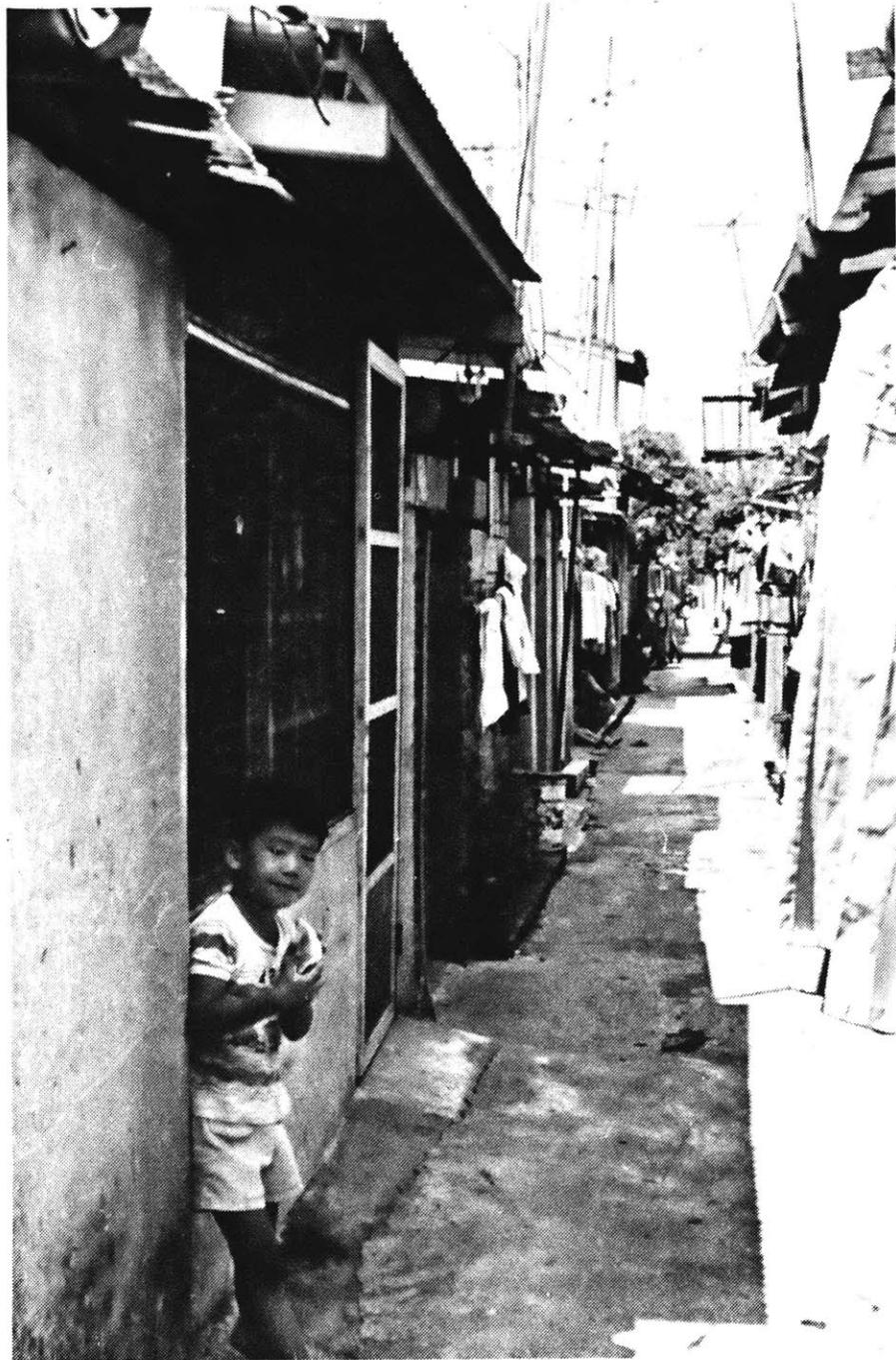
DWELLING UNIT PAYMENTS

financing: GOVERNMENT
 rent/mortgage: -



CASE STUDY SOURCES:

- Locality Plan: (accurate) Kaohsiung City Government.
- Land Use Pattern: (accurate) IBID
- Circulation Pattern: (approximate) City Master Plan, Survey By Author, 1980.
- Locality Segment Plan: (accurate) Kaohsiung City Government.
- Locality Block Plan: (accurate) IBID
- Block Land Utilization: (accurate) Survey By Author, 1980
- Typical Dwelling: (approximate) IBID
- Socio-Economic Data: (approximate) IBID
- Photographs: Author, 1980
- General Information: Survey By Author, 1980 % income for rent/mortgage: -



PHOTOGRAPH:
(LEFT) View of the narrow alley - can only be used by pedestrians.
(TOP) Birds view of this development, land is covered by roofs, only a few narrow alleys are visible.
(BOTTOM) The secondary street; few cars, mainly motor-bike and pedestrian traffic.



2 Shih-chuan private development

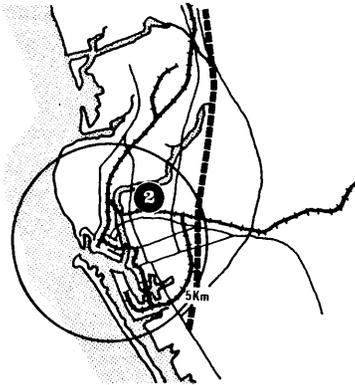
Developer: PRIVATE
 Type of development: PROGRESSIVE
 Dwelling type: ROW HOUSE
 2-4 stories
 Income type: MIDDLE INCOME

ORIGIN: Shih-chuan private development was named San Kuai Tsu, and has been developed since 1690. It was developed as a farm village at the early stage. The railway which runs between north and south of Taiwan was established in 1908. The new station was built at the southern edge of the site in 1936. It attracted commercial firms and small manufacturers into the area. Because of urban expansion, rapid population growth, Kaohsiung city has been facing some serious problems such as insufficient public

facilities, the confusing and vague demarcation of properties, etc.. City government has been carried out land consolidation to solve these problems. San Kuai Tsu (Shih-chuan) was the first development in Kaohsiung city.

LAYOUT: This locality is bounded by the railway at the south, and the station becomes the focus of this area. The urban layout is a grid. The rectangular block of 30m x 110m size is the basic dimension for the intervals

between public circulation network. As a planned development, the locality facilities and utilities such as roads, sewers, parks and bridges had been fully provided to keep pace with the population growth in this area.



LOCATION: This site is located in the north part of the city center and it also is the first stage of the land consolidation in Kaohsiung city. Chou-tsu Road is the main approach to this area. The railway lines on the south become the boundary of this locality.



LOCALITY PLAN



0 100 500m
 1:10000

LAND USE: The area is planned for residential and commercial use. Most of the lots that face the main street are shops and small manufacturers. The lots farther from the streets were initially reserved for residential use, which are now taken over by both the commercial firms and the small manufacturers. Few of the large open spaces have been developed as parks and parking area. Mainly, 6m access roads and the arcade along the streets provide the place for playing and socializing among neighbourhood residents.

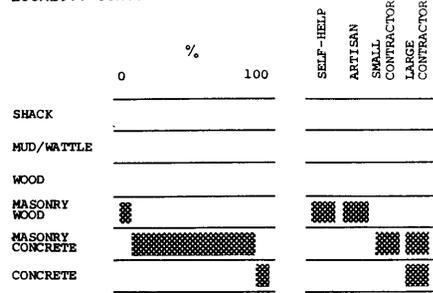
CIRCULATION: Chou-tsu Road and Shih-chuan Road which run parallel to the railway and through the locality are the main traffic lines which connect this area with other parts of the city. Pou-ai Road is the other main street which is perpendicular to the railway and connects the railway station with Chou-tsu Road and Shih-chuan Road. It is also planned to be the future highway which runs north-south through Kaohsiung city.

residents are from the middle income group. Most of the residents settled down after the land consolidation was carried out. Therefore each inhabitant has a different background and occupation. The density of this area is approximate 118 persons/hectare with an increasing rate of 4.76% per annum.

POPULATION AND INCOME: The majority of



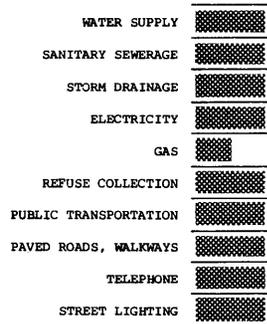
LOCALITY CONSTRUCTION TYPES



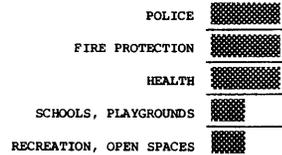
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information:

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



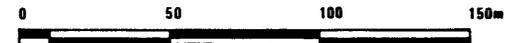
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information:

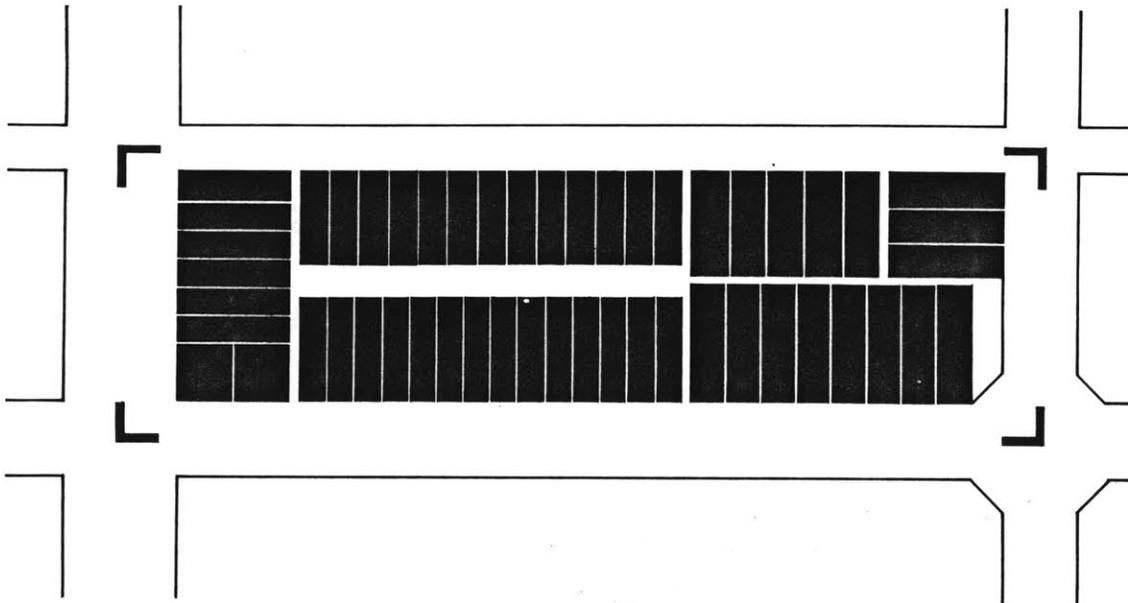


[] SELECTED BLOCK

LOCALITY SEGMENT PLAN



1:2500



LOCALITY SEGMENT/BLOCK: The segment plan clearly shows the typical combination of buildings and streets in this development. Generally, the long sides of the blocks are parallel to the railway. The typical unit is formed by two blocks separated by an access road and surrounded by either a main or secondary streets. Two to four stories reinforced concrete constructions are dominating in this area. A few high rise buildings exist along the main streets.

The typical block plan shows the encroachments on the fire-lane. The building code generally requires a fire-lane between two rows of housing. The fire-lane has disappeared in most of the cases.



LOCALITY BLOCK PLAN

PATTERN

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

LOCALITY BLOCK LAND UTILIZATION DATA

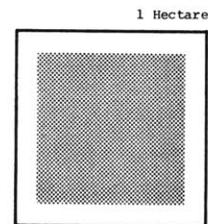
| DENSITIES | Total Number | Area Hectares | Density N/Ha |
|----------------|--------------|---------------|--------------|
| LOTS | 51 | 0.46 | 110 |
| DWELLING UNITS | 51 | 0.46 | 110 |
| PEOPLE | 247 | 0.46 | 537 |

| AREAS | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.18 | 39% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.28 | 61% |
| SEMI-PRIVATE (cluster courts) | - | - |
| TOTAL | 0.46 | 100% |

NETWORK EFFICIENCY
 Network length (streets, walkways) = 759 m/Ha
 Areas served (total area)

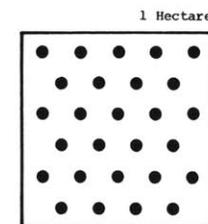
LOTS
 Average area, dimensions = 55 m²

LAND UTILIZATION DIAGRAMS



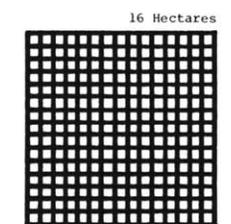
PERCENTAGES

| | |
|------------------|----|
| Streets/Walkways | 39 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 61 |



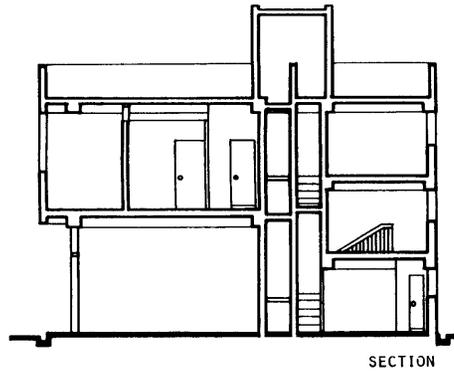
DENSITY

| | |
|-----------------|-----|
| Persons/Hectare | |
| ● 20 Persons | 537 |



CIRCULATION EFFICIENCY

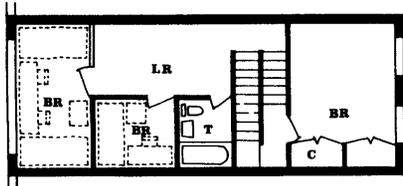
| | |
|------------------|-----|
| Unit Length m/Ha | 759 |
|------------------|-----|



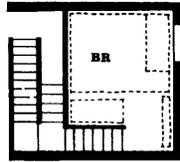
SECTION



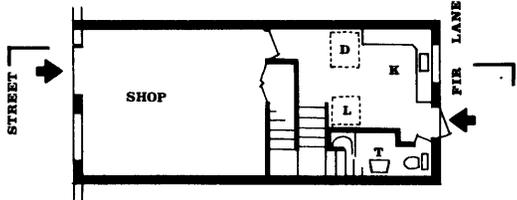
ELEVATION



SECOND FLOOR



MEZZANINE



GROUND FLOOR

PLAN

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
 type: APARTMENT
 area (sq m): 57
 tenure: LEGAL OWNERSHIP

LAND/LOT
 utilization: PUBLIC
 area (sq m): -
 tenure: CONDOMINIUM

DWELLING
 location: INNER RING
 type: WALK-UP
 number of floors: 5/7/11
 utilization: SINGLE FAMILY
 physical state: GOOD

DWELLING DEVELOPMENT
 mode: INSTANT
 developer: PUBLIC
 builder: LARGE CONSTRUCTOR
 construction type: MASONRY/CONCRETE
 year of construction: 1978

MATERIALS
 foundation: R.C.
 floors: R.C.
 walls: BRICK/R.C.
 roof: R.C.

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)

DWELLING FACILITIES

wc: 1
 shower: 1
 kitchen: 1
 rooms: 4
 other: -

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
 user's ethnic origin: KAOHSIUNG, TAIWAN
 place of birth: KAOHSIUNG, TAIWAN
 education level: HIGH SCHOOL

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

MIGRATION PATTERN
 number of moves: 1
 rural - urban: -
 urban - urban: 1978
 urban - rural: -
 why came to urban area: EMPLOYMENT

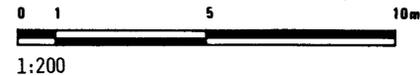
GENERAL: ECONOMIC
 user's income group: MIDDLE
 employment: SELF-EMPLOYMENT
 distance to work: -
 mode of travel: MOTORCYCLE

COSTS
 dwelling unit: US \$ 14,000
 land - market value: -

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

CASE STUDY SOURCES:

Locality Plan: (accurate) Kaohsiung City Government.
 Land Use Pattern: (accurate) IBID
 Circulation Pattern: (approximate) City Master Plan, Survey By Author, 1980.
 Locality Segment Plan: (accurate) Kaohsiung City Government.
 Locality Block Plan: (accurate) IBID
 Block Land Utilization: (accurate) Survey By Author, 1980
 Typical Dwelling: (approximate) IBID
 Socio-Economic Data: (approximate) IBID
 Photographs: Author, 1980
 General Information: Survey By Author, 1980





PHOTOGRAPH:

*(LEFT) Typical dwellings, with access lane in the front, children playing on the street.
(TOP) The main street, with commercial activities, and required arcade along the street.
(BOTTOM) Illegal constructions, people added more rooms on the deck and open spaces which are required by the by-laws*



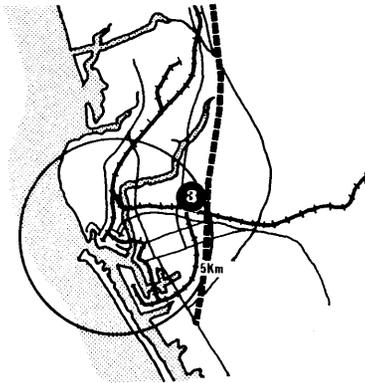
3 Ming-tsu public housing

Developer: PUBLIC
 Type of development: INSTANT
 Dwelling type: APARTMENT
 5,7,11 stories
 Income type: LOW/MIDDLE INCOME

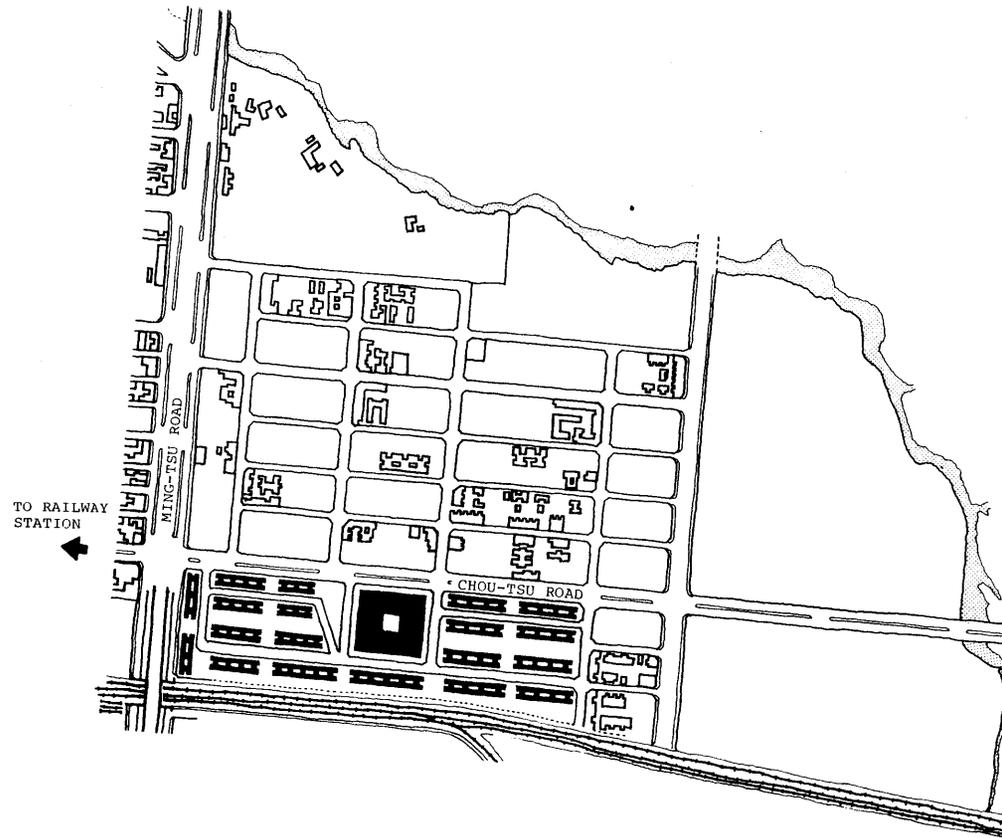
ORIGIN: The land use of the area, which was initially reserved for park and public facilities under the thirteenth land consolidation project, was revised in order to keep pace with the development of industry and commerce in the city. The land for park and public facilities was reduced to half and the other half was marked for residential use. This phase of the land consolidation project was completed in June, 1978. The public housing, built for low income groups, was the result of the project.

LAYOUT: Around 40% of the land is built up with 5,7 or 11 stories buildings. The boundaries of the site are, a railway at south, Ming-tsu Road at west and Chou-tsu Road at north. The site is divided into several parts. Each of them includes rows of apartment buildings and open spaces, such as playgrounds and front yards. The long sides of most of the buildings face the railway. The building blocks are basically composed of four modules. Each module is arranged to contain four dwelling units sharing a central service core.

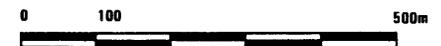
The courtyard, set between every four dwelling units provides natural light to those dwellings.



LOCATION: Ming-tsu public housing is a part of the thirteenth phase land consolidation project. It is situated adjacent to the city center, along the northern side of the railway. Ming-tsu Road, the major route of the city running north-south, links the locality with the city center. The site is accessible by Chou-tsu Road that connects it to the railway station.

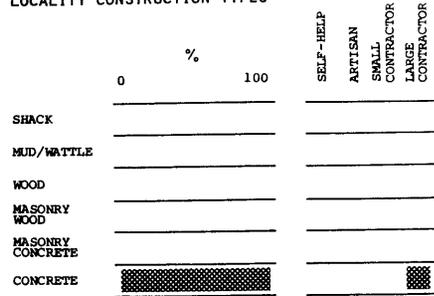


LOCALITY PLAN



1:10000

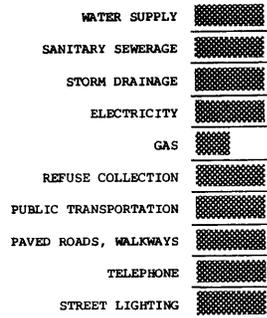
LOCALITY CONSTRUCTION TYPES



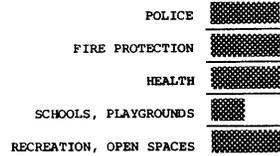
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information:

LOCALITY UTILITIES AND SERVICES

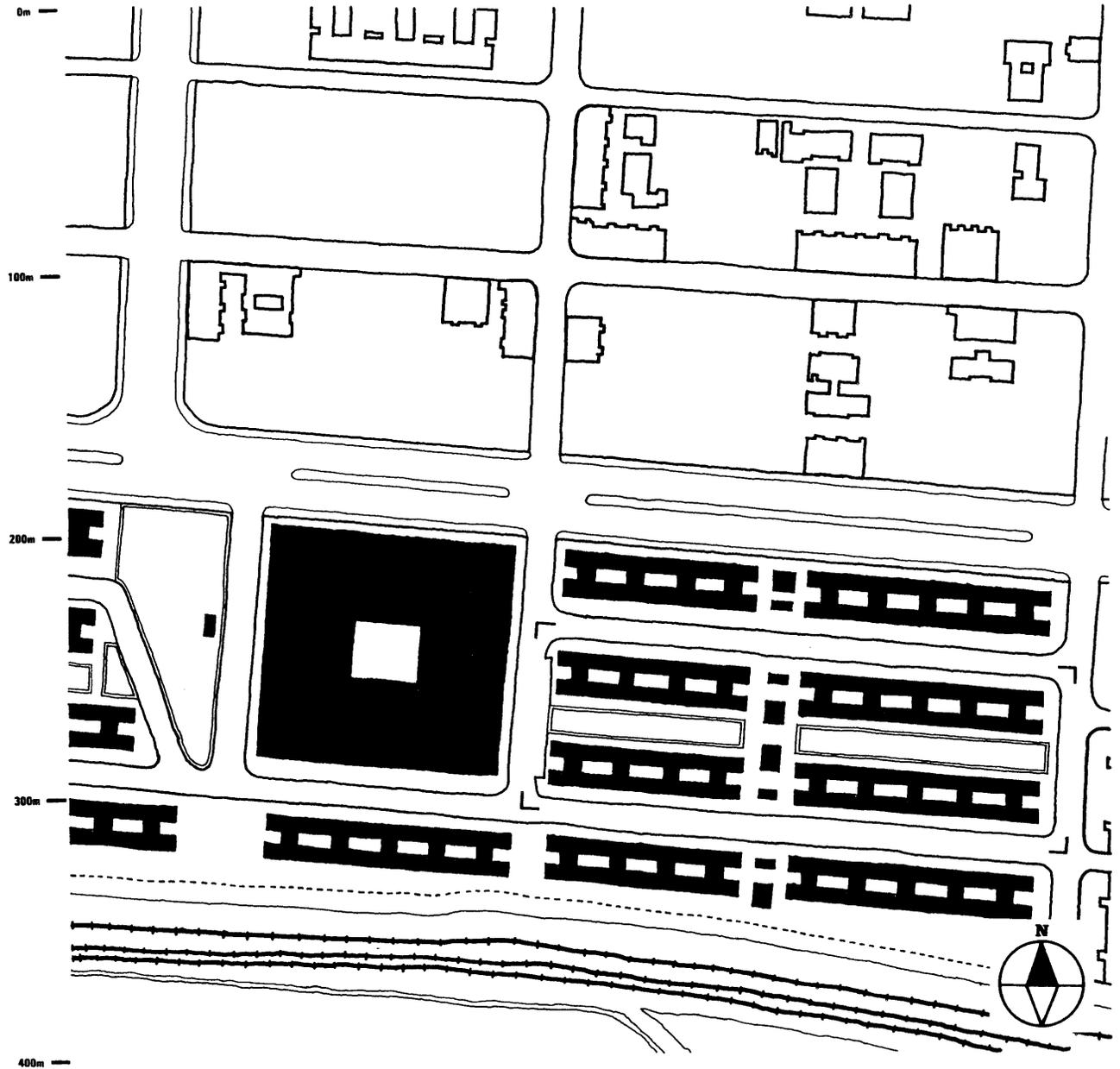


LOCALITY COMMUNITY FACILITIES



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

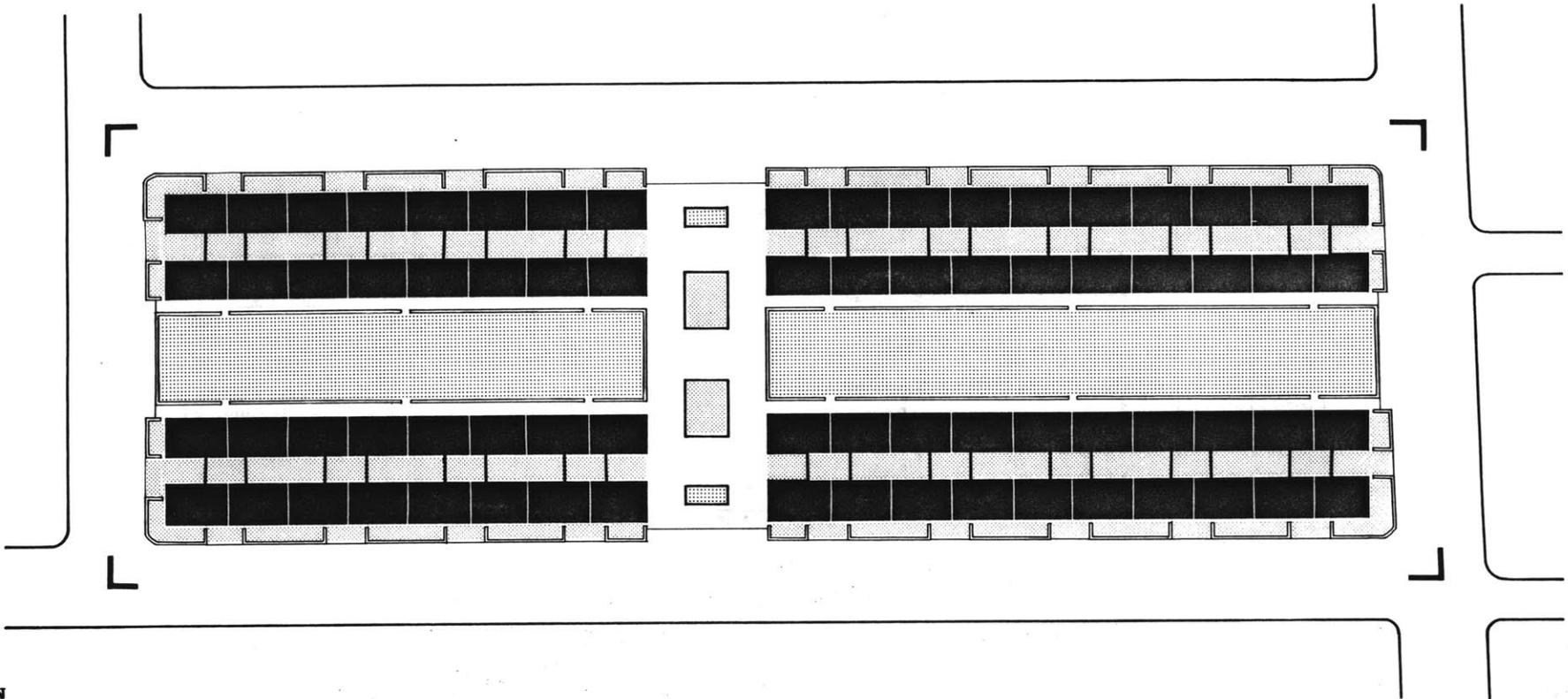
Quality of information:



□ SELECTED BLOCK

LOCALITY SEGMENT PLAN





LOCALITY BLOCK PLAN

PATTERN

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

LOCALITY BLOCK LAND UTILIZATION DATA

| DENSITIES | Total Number | Area Hectares | Density N/Ha |
|----------------|--------------|---------------|--------------|
| LOTS | - | - | - |
| DWELLING UNITS | 360 | 1.35 | 267 |
| PEOPLE | 1740 | 1.35 | 1,293 |

| AREAS | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.47 | 35% |
| SEMI-PUBLIC (open spaces, schools, community centers) | 0.23 | 17% |
| PRIVATE (dwellings, shops, factories, lots) | 0.39 | 29% |
| SEMI-PRIVATE (cluster courts) | 0.26 | 19% |
| TOTAL | 1.35 | 100% |

NETWORK EFFICIENCY
 Network length (streets, walkways) = 542 m/Ha
 Areas served (total area)

LOTS
 Average area, dimensions = -

LAND UTILIZATION DIAGRAMS

1 Hectare

PERCENTAGES

| | |
|------------------|----|
| Streets/Walkways | 35 |
| Playgrounds | 17 |
| Cluster Courts | 19 |
| Dwellings/Lots | 29 |

1 Hectare

DENSITY

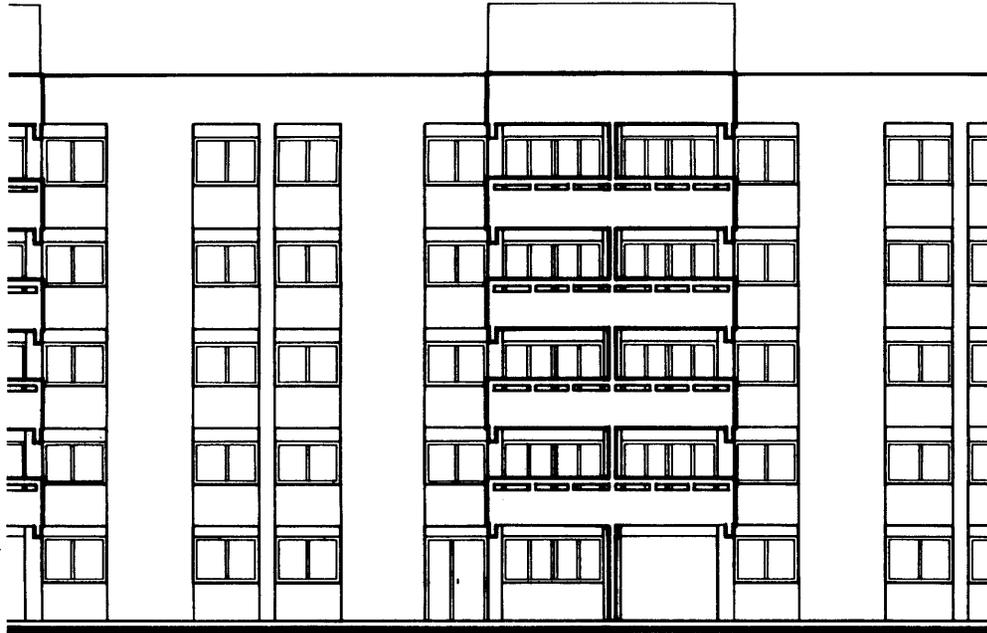
Persons/Hectare

● 20 Persons 1.293

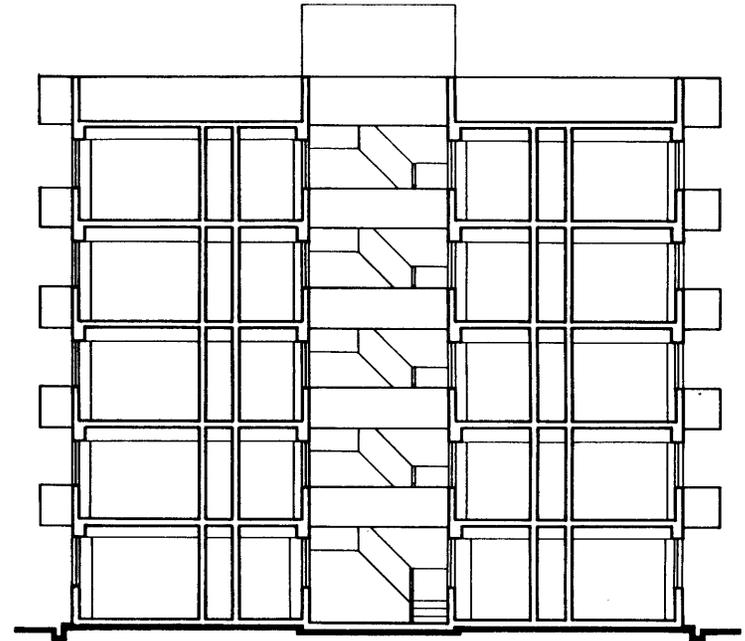
16 Hectares

CIRCULATION EFFICIENCY

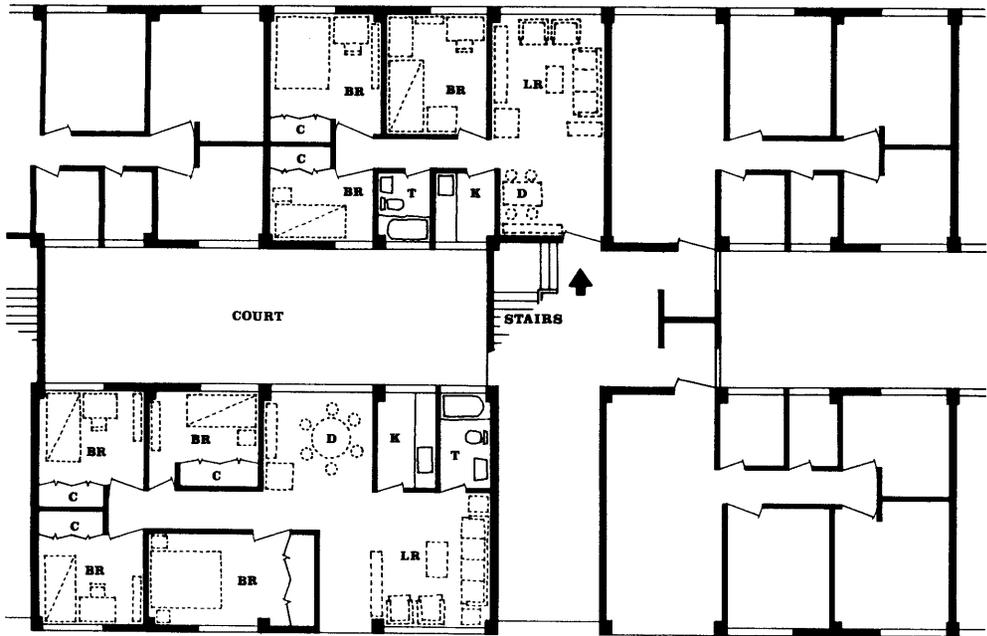
Unit Length 542 m/Ha



ELEVATION

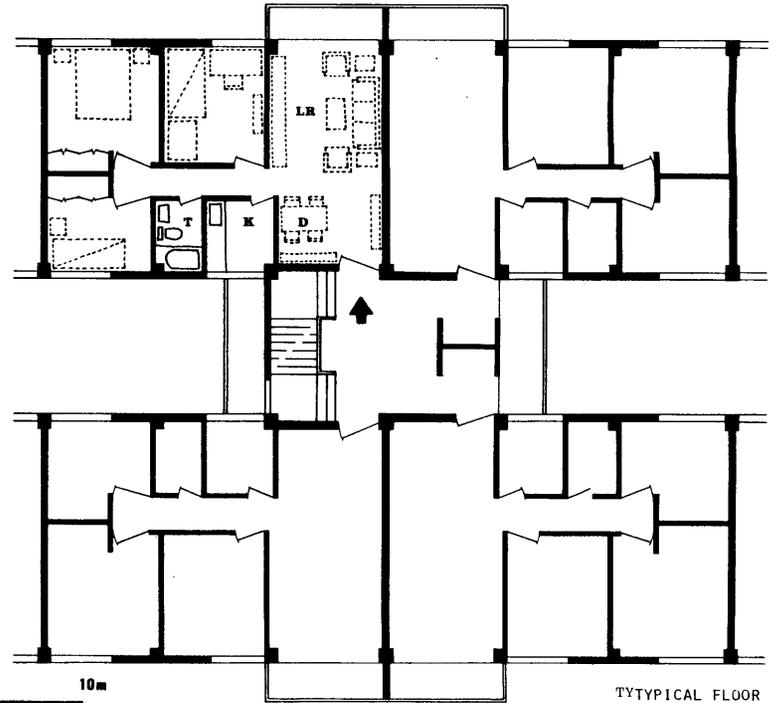
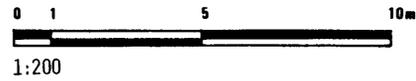


SECTION



TYPICAL DWELLING PLAN

GROUND FLOOR



TYPICAL FLOOR



PHOTOGRAPH: (TOP)
5, 7 storied walk-up apartments surrounded with the large percentage of open space, which is wasteful and is a burden for users or public sector in terms of its maintenance, control and operation.

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)

CASE STUDY SOURCES:

Locality Plan: (accurate) Kaohsiung City Government.
Land Use Pattern: (accurate) IBID
Circulation Pattern: (approximate) City Master Plan, Survey By Author, 1980.
Locality Segment Plan: (accurate) Kaohsiung City Government.
Locality Block Plan: (accurate) IBID
Block Land Utilization: (accurate) Survey By Author, 1980
Typical Dwelling: (accurate) Kaohsiung City Government, Public Housing Section
Socio-Economic Data: (approximate) Survey By Author, 1980
Photographs: Author, 1980
General Information: Survey By Author, 1980

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: ROW-HOUSE
area (sq m): 92
tenure: LEGAL OWNERSHIP

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

DWELLING
location: CITY CENTER
type: ROW-HOUSE
number of floors: 2/3
utilization: SINGLE FAMILY
physical state: GOOD

DWELLING DEVELOPMENT
mode: INCREMENTAL
developer: PRIVATE
builder: SMALL CONTRACTOR
construction type: MASONRY CONCRETE
year of construction: 1971

MATERIALS
foundation: R.C.
floors: R.C.
walls: BRICK/R.C.
roof: R.C.

DWELLING FACILITIES
wc: 2
shower: 2
kitchen: 1
rooms: 4
other: -

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: TAITONG, TAIWAN
place of birth: TAITONG, TAIWAN
education level: PRIMARY SCHOOL

NUMBER OF USERS
married: 2
single: 2
children: 4
total: 8

MIGRATION PATTERN
number of moves: 1
rural - urban: -
urban - urban: 1972
urban - rural: -
why came to urban area: EMPLOYMENT

GENERAL: ECONOMIC
user's income group: MODERATE
employment: SELF (SMALL MANUFACTURER)
distance to work: -
mode of travel: MOTORCYCLE

COSTS
dwelling unit: US \$ 10,000
land - market value: -

DWELLING UNIT PAYMENTS
financing: PRIVATE (SELF-FINANCED)
rent/mortgage: -
% income for rent/mortgage: -

4 Tsao-ya squatter settlement

Developer: POPULAR/PRIVATE
 Type of development: PROGRESSIVE
 Dwelling type: ROW HOUSE
 1-2 stories
 Income type: LOW/MIDDLE INCOME

ORIGIN: Tsao-ya settlement, was developed as a village. As soon as the Kaohsiung Harbour was expanded and Lin-hai Industrial Zone was established, the workers and their families settled down around these centers of employment. Tsao-ya squatter settlement, located at the eastern side of the Industrial Zone provides the convenient for low income migrants. Initially, most of the residents rented the land from city government and built their own houses. But later on, people started to build a large number of houses for renting or selling illegally to the increasing number of workers migrating into the area. Therefore, the squatter settlement grew rapidly. City government planned the Lin-hai Special Area Development Scheme and constructed public housing, roads, bridges, etc. according to the scheme.

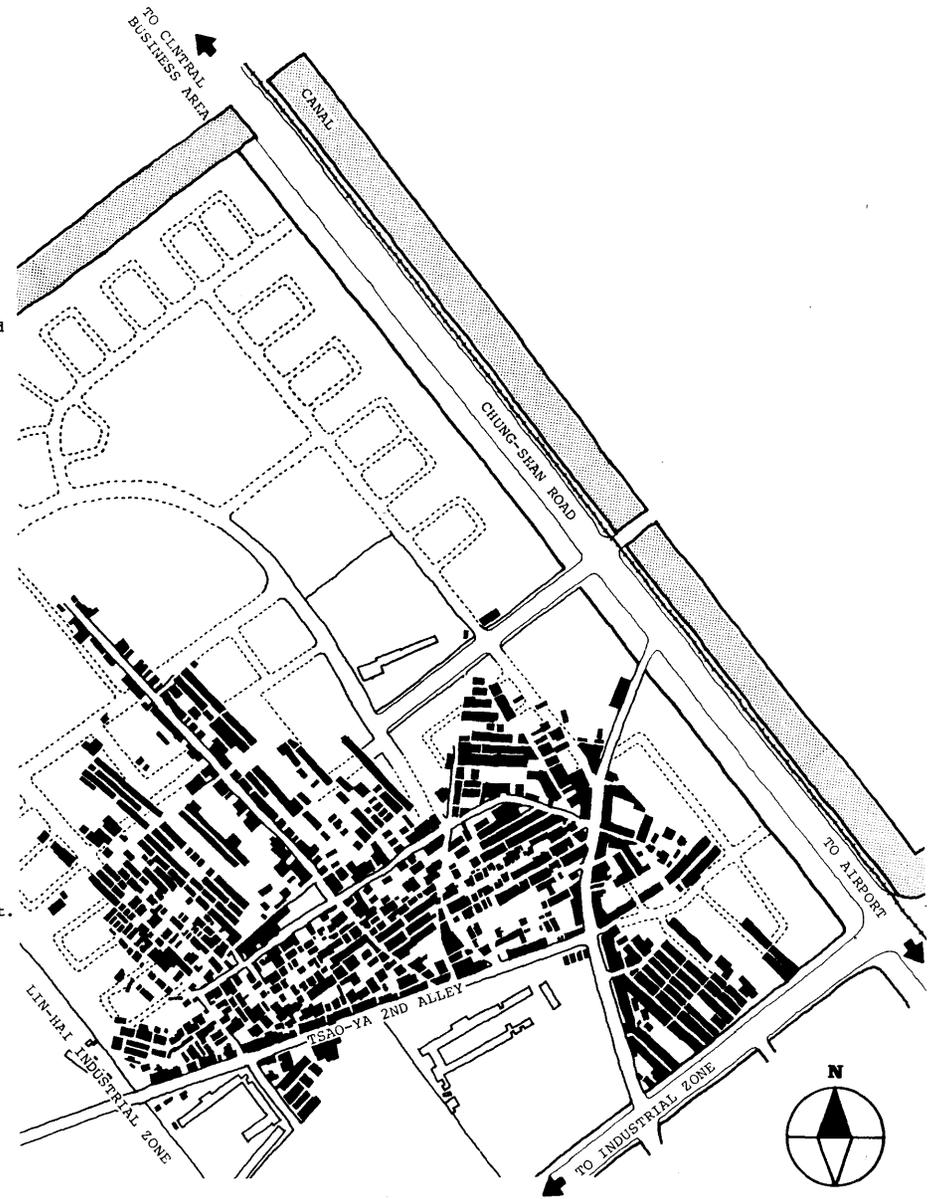
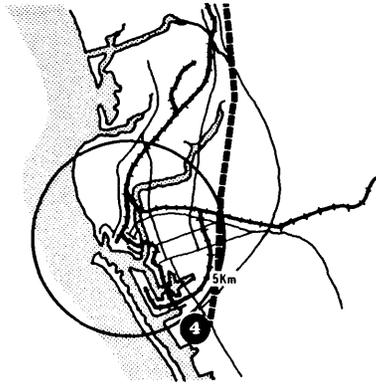
LAYOUT: The locality is surrounded by Chung-shan Road on northern side, schools at south and the Lin-hai Industrial Zone at west. The public housing is built at north where most of the land is vacant. Few markets serve the residents. The only commercial area is along Tsao-ya 2nd Alley, or around markets. Only small portions of streets within the locality were built. A new subdivision of land is still in progress according Lin-hai Special Area Development Scheme.

LAND USE: The locality is planned as residential development. Part of the land is planned to be used for public facilities such as police, fire station, schools, parks, community center, etc.. Some of these facilities have already been built.

CIRCULATION: Chung-shan Road is the primary approach from the city center to the settlement. The internal circulation is mostly pedestrian. The area is insufficiently served by a few streets.

POPULATION AND INCOME: About 30,000 people reside in this area. The residents are mainly low income groups. Some middle income families are also mixed in the locality.

LOCATION: Tsao-ya squatter settlement is located at Chien-chen district, about 4 km south of the city center. Tsao-ya is on the western side of Chung-shan Road, the highway connecting the city center with the Kaohsiung International Airport which is on the south.



LOCALITY PLAN

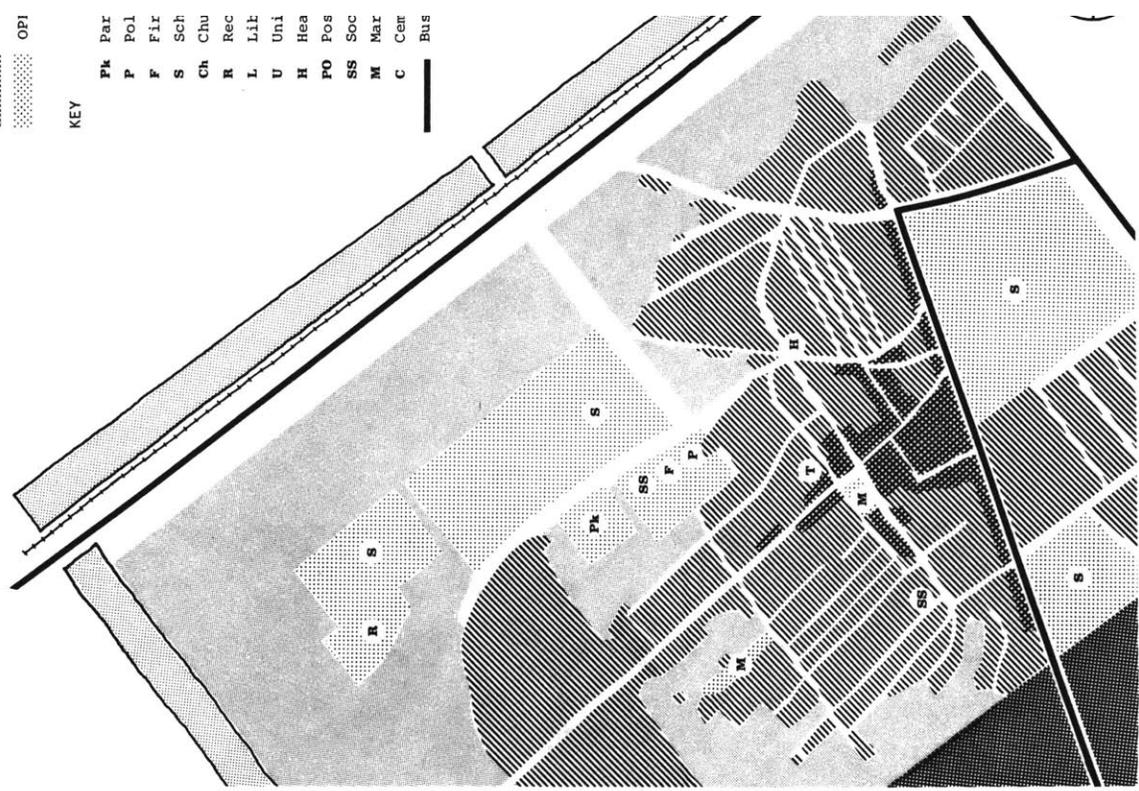
1:10000

CASE STUDY: Tsao-ya squatter :

KEY
 — VEHICULAR
 PEDESTRIAN

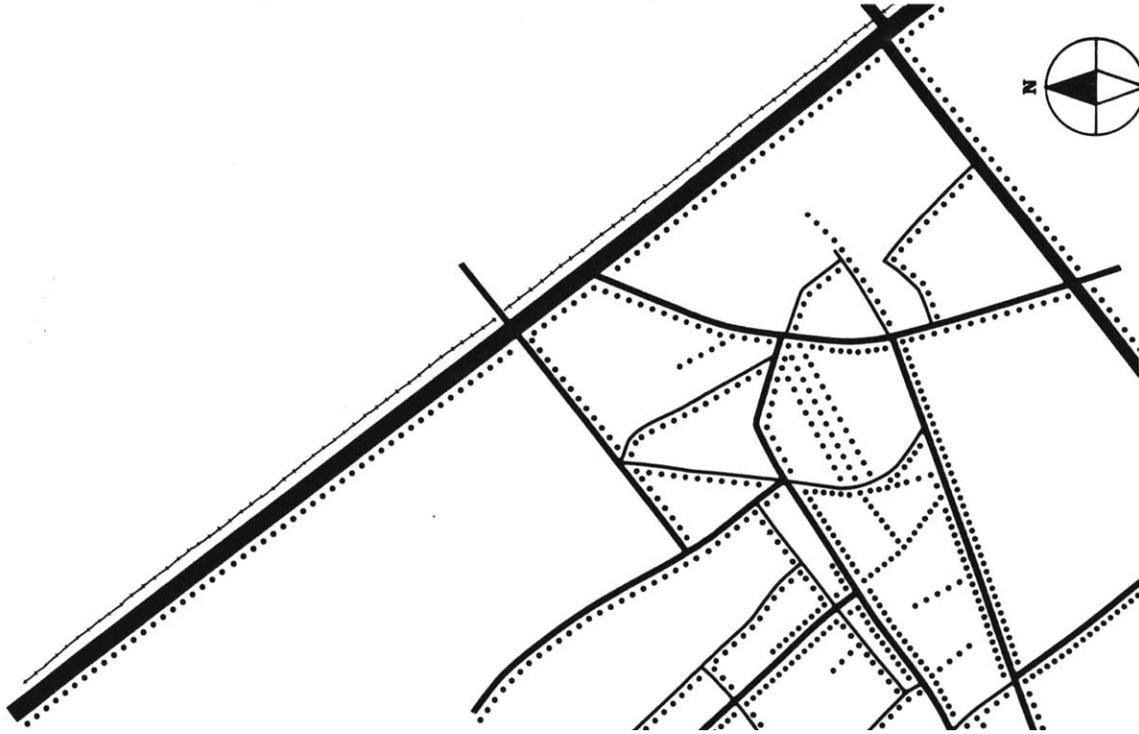
AREAS
 RES
 CON
 INI
 OPI

KEY
 Pk Par
 P Pol
 F Fir
 S Sch
 Ch Chu
 R Rec
 L Lib
 U Uni
 H Hea
 PO Pos
 SS Soc
 M Mar
 C Cen
 Bus



1:10000

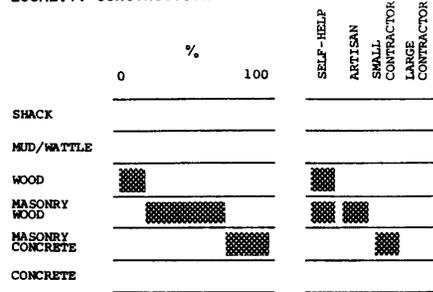
LOCALITY LAND USE PATTERN



1:10000

CIRCULATION PATTERN

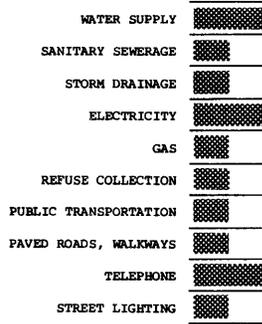
LOCALITY CONSTRUCTION TYPES



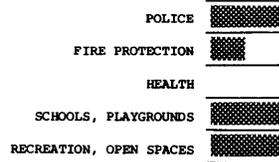
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information:

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



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

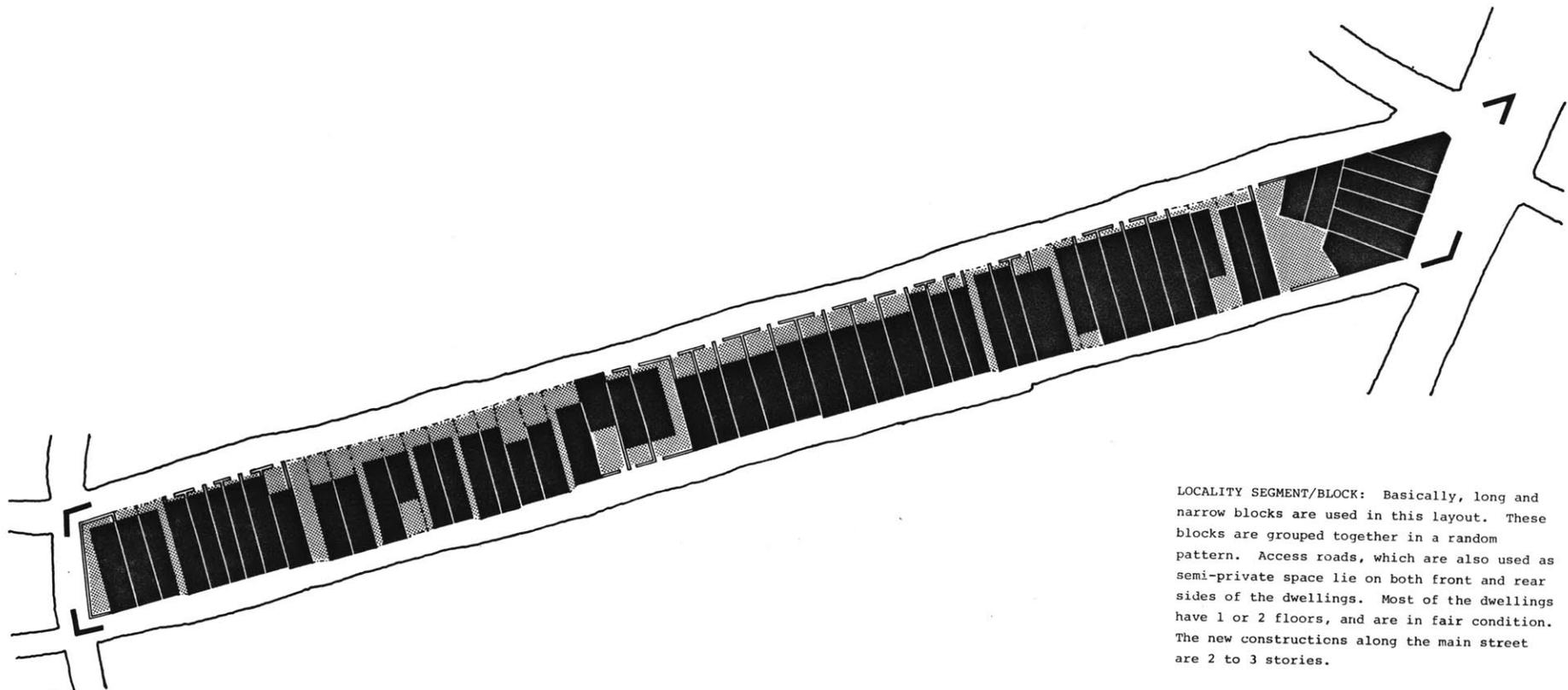
Quality of information:



[] SELECTED BLOCK

LOCALITY SEGMENT PLAN





LOCALITY SEGMENT/BLOCK: Basically, long and narrow blocks are used in this layout. These blocks are grouped together in a random pattern. Access roads, which are also used as semi-private space lie on both front and rear sides of the dwellings. Most of the dwellings have 1 or 2 floors, and are in fair condition. The new constructions along the main street are 2 to 3 stories.



LOCALITY BLOCK PLAN

PATTERN

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

LOCALITY BLOCK LAND UTILIZATION DATA

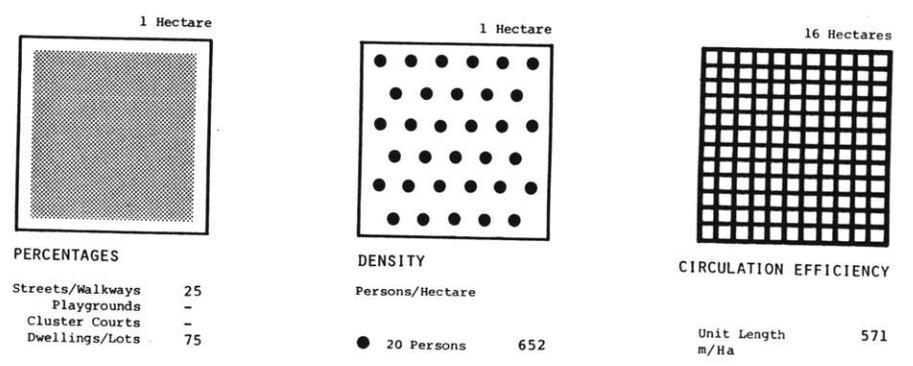
| DENSITIES | Total Number | Area Hectares | Density N/Ha |
|----------------|--------------|---------------|--------------|
| LOTS | 57 | 0.43 | 133 |
| DWELLING UNITS | 56 | 0.43 | 130 |
| PEOPLE | 280 | 0.43 | 652 |

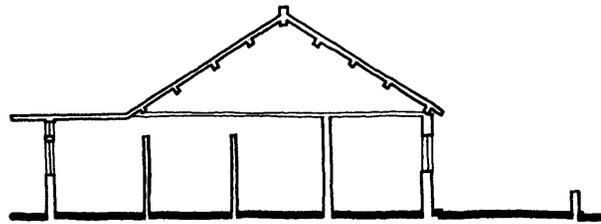
| AREAS | Hectares | Percentages |
|---|-------------|-------------|
| PUBLIC (streets, walkways, open spaces) | 0.11 | 25% |
| SEMI-PUBLIC (open spaces, schools, community centers) | - | - |
| PRIVATE (dwellings, shops, factories, lots) | 0.32 | 75% |
| SEMI-PRIVATE (cluster courts) - | - | - |
| TOTAL | 0.43 | 100% |

NETWORK EFFICIENCY
 Network length (streets, walkways) = 571 m/Ha
 Areas served (total area)

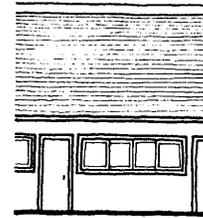
LOTS
 Average area, dimensions = 57 m²

LAND UTILIZATION DIAGRAMS

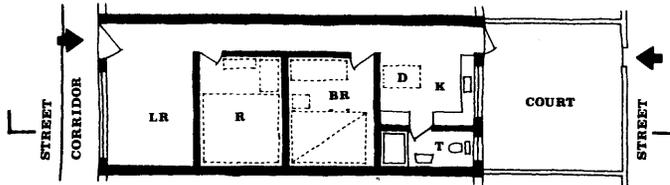




SECTION



ELEVATION



PLAN

PHOTOGRAPH: (OPPOSITE PAGE)
 (TOP) An alley along the front door of the dwellings (left), become the place for communication and playground. on the otherside (right), in the back alley, garbage is thrown and the space is wasted.
 (BOTTOM) Dwellings sharing a small courtyard, which is a space for limited parking, communication and children's playground.

TYPICAL DWELLING

PHYSICAL DATA
 (related to dwelling and land)

DWELLING UNIT
 type: ROW-HOUSE
 area (sq m): 40
 tenure: OWNERSHIP

LAND/LOT
 utilization: PUBLIC
 area (sq m): 60
 tenure: PUBLIC

DWELLING
 location: PERIPHERY
 type: ROW-HOUSE
 number of floors: 1
 utilization: SINGLE FAMILY
 physical state: FAIR

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

MATERIALS
 foundation: BRICK/CONCRETE
 floors: CONCRETE
 walls: BRICK
 roof: CLAY-TILES/WOOD

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)

DWELLING FACILITIES

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

SOCIO-ECONOMIC DATA
 (related to user)

GENERAL: SOCIAL
 user's ethnic origin: KAOHSIUNG, TAIWAN
 place of birth: KAOHSIUNG, TAIWAN
 education level: PRIMARY SCHOOL

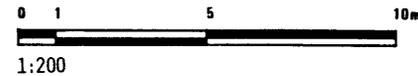
NUMBER OF USERS
 married: 2
 single: -
 children: 3
 total: 5

MIGRATION PATTERN
 number of moves: 00
 rural - urban: -
 urban - urban: -
 urban - rural: -
 why came to urban area: EMPLOYMENT

GENERAL: ECONOMIC
 user's income group: LOW
 employment: WORKER
 distance to work: 2 Km
 mode of travel: MOTORCYCLE

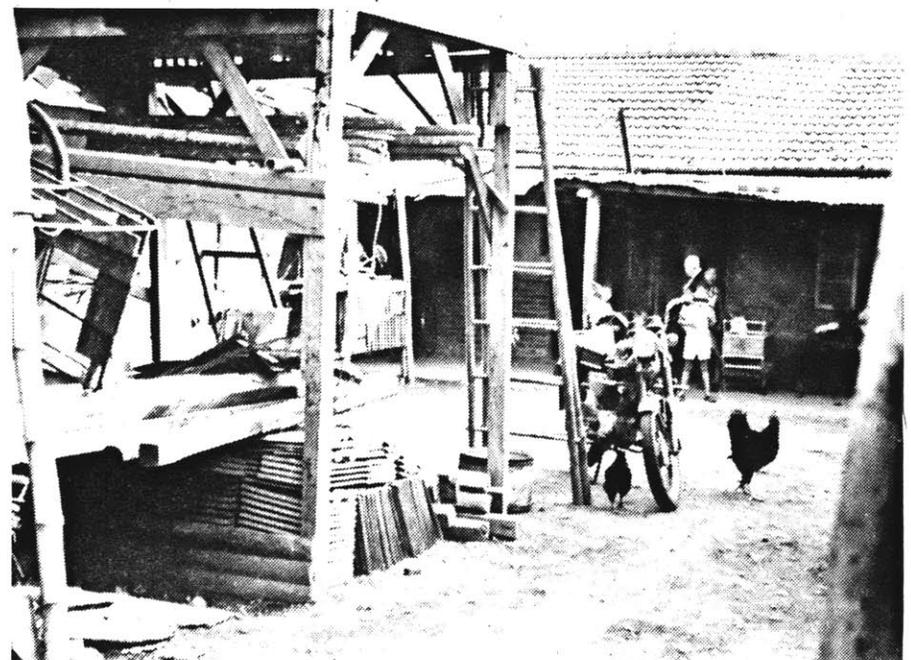
COSTS
 dwelling unit: -
 land - market value: -

DWELLING UNIT PAYMENTS
 financing: PRIVATE
 rent/mortgage: -



CASE STUDY SOURCES:

- Locality Plan: (accurate) Kaohsiung City Government.
- Land Use Pattern: (accurate) IBID
- Circulation Pattern: (approximate) City Master Plan, Survey By Author, 1980.
- Locality Segment Plan: (accurate) Kaohsiung City Government.
- Locality Block Plan: (accurate) IBID
- Block Land Utilization: (accurate) Survey By Author, 1980
- Typical Dwelling: (approximate) IBID
- Socio-Economic Data: (approximate) IBID
- Photographs: Author, 1980
- General Information: Survey By Author, 1980 % income for rent/mortgage: -



COMPARATIVE SUMMARY

LAND UTILIZATION: PATTERNS, PERCENTAGES, DENSITIES, CIRCULATION EFFICIENCY

CASE STUDIES

The case studies are representative of the existing dwelling environments in Kaohsiung. The criteria used in the evaluation of efficiency of physical layouts are:

PATTERN

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

PATTERNS

The layout patterns show lot configuration blocks and circulation, which determine land utilization percentages, circulation lengths and densities.

PERCENTAGES

The proportion of public and private areas determine the extent of users responsibility and control of land/development. It is indicative of the functional efficiency of the layout; e.g., a high percentage of public investment in infrastructure/maintenance.

DENSITY

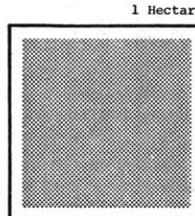
The number of people per hectare determines the intensity of use. Low densities result in higher development costs per person. The figures relate to gross densities.

CIRCULATION EFFICIENCY

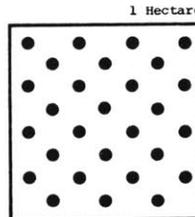
The ratio between public circulation length and the area served indicates the circulation efficiency; higher the ratio, higher the capital investments and maintenance costs.

1a Kuo-mao military housing

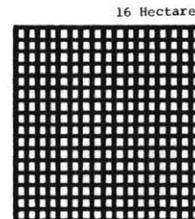
Public, Row houses, Low/Middle income



| | |
|------------------|----|
| Streets/Walkways | 25 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 75 |



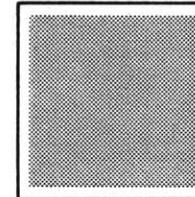
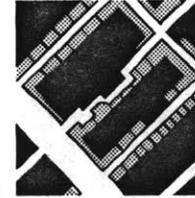
| | |
|-----------------|-----|
| Persons/Hectare | 575 |
| ● 20 Persons | |



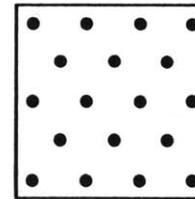
| | |
|-----------------|-----|
| Meters/Hectares | 814 |
|-----------------|-----|

1b

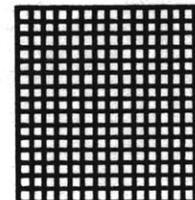
same as 1a



| | |
|------------------|----|
| Streets/Walkways | 21 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 79 |



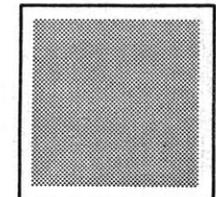
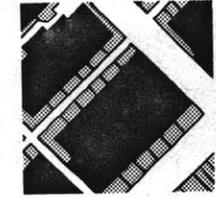
| | |
|-----------------|-----|
| Persons/Hectare | 368 |
| ● 20 Persons | |



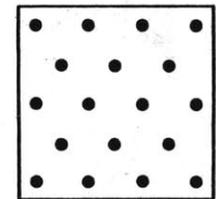
| | |
|----------------|-----|
| Meters/Hectare | 740 |
|----------------|-----|

1c

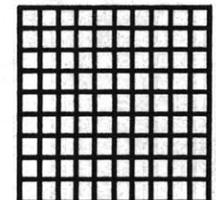
same as 1a



| | |
|------------------|----|
| Streets/Walkways | 28 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 72 |



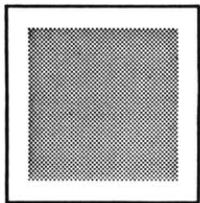
| | |
|-----------------|-----|
| Persons/Hectare | 316 |
| ● 20 Persons | |



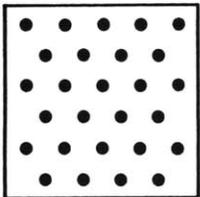
| | |
|----------------|-----|
| Meters/Hectare | 741 |
|----------------|-----|

2 Shih-chuan private development

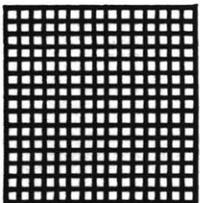
Private, Row houses, Middle income



| | |
|------------------|----|
| Streets/Walkways | 39 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 61 |



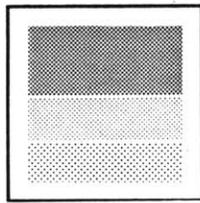
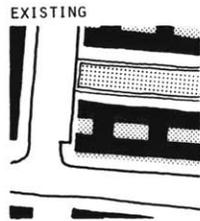
Persons/Hectare 537
● 20 Persons



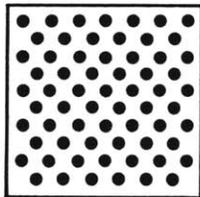
Meters/Hectare 759

3 Ming-tsu public housing

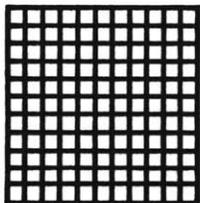
Public, Apartments, Low/Middle income



| | |
|------------------|----|
| Streets/Walkways | 35 |
| Playgrounds | 17 |
| Cluster Courts | 19 |
| Dwellings/Lots | 29 |

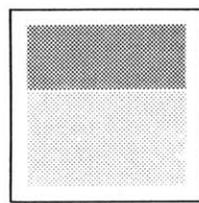
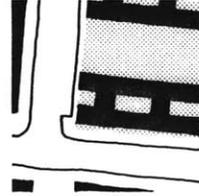


Persons/Hectare 1,293
● 20 Persons



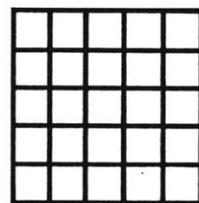
Meters/Hectare 542

RECOMMENDED CHANGE



| | |
|------------------|----|
| Streets/Walkways | 30 |
| Playgrounds | - |
| Cluster Courts | 41 |
| Dwellings/Lots | 29 |

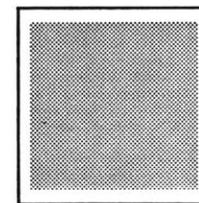
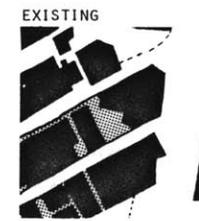
(SAME AS EXISTING)



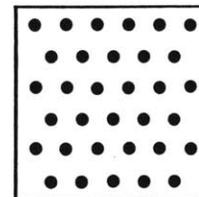
Meters/Hectare 248

4 Tsao-ya squatter settlement

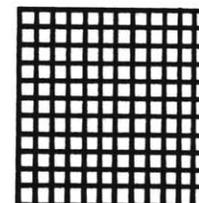
Squatter settlement, Row houses, Low/Middle income



| | |
|------------------|----|
| Streets/Walkways | 25 |
| Playgrounds | - |
| Cluster Courts | - |
| Dwellings/Lots | 75 |

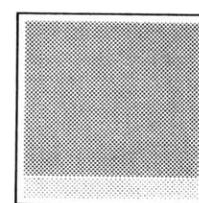
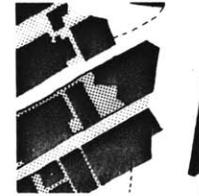


Persons/Hectare 652
● 20 Persons



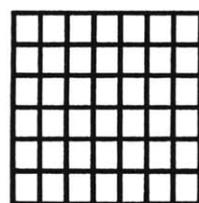
Meters/Hectare 571

RECOMMENDED CHANGE



| | |
|------------------|----|
| Streets/Walkways | 15 |
| Playgrounds | - |
| Cluster Courts | 10 |
| Dwellings/Lots | 75 |

(SAME AS EXISTING)



Meters/Hectare 313

GLOSSARY

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

-FIRST PREFERENCE: definitions from "Webster's Third New International Dictionary", Merriam-Webster, 1971.

-SECOND PREFERENCE: definitions from technical dictionaries, text books, or reference manuals.

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

Words included for specificity and to focus on a particular context are indicated in parenthesis.

Sources of definitions are indicated in parenthesis. (See also: REFERENCES).

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

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

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

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

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

ALTERNATING CURRENT (A.C.) (an electric) current that reverses its direction of flow at regular intervals. (ROTC ST 45-7, 1953)

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

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

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

APPROACHES. The main routes external to the site (pedestrian/vehicular) by which the site can be reached from other parts of the urban context. (U.S.D.P.)

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

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

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

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

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

BINDER COURSE. A transitional layer of bituminous paving between the crushed stone base and the surface course (to increase bond between base and surface course). (DePina, 1972)

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

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

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

BUILDING CODE. "A body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)

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

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

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

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

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

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

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

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

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

COMMUNITY. The people living in a particular place or region and usually linked by common interests: the

region itself; any population cluster. (U.S.D.P.)

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

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

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

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

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

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

CONSERVATION EASEMENT. An easement acquired by the public and designed to open privately owned lands for recreational purposes or to restrict the use of private land in order to preserve open space and protect certain natural resources. (U.S.D.P.)

CONURBATION. Area of large urban communities where towns, etc. have spread and became joined beyond their administrative boundaries. (A.S. Hornby, A.P. Cowie, J. Windsor Lewis, 1975)

CONURBATION. An aggregation or continuous network of urban communities. (Merriam-Webster, 1963)

CORPORATION COCK/CORPORATION STOP. A water or gas cock by means of which utility-company employees connect or disconnect service lines to a consumer. (Merriam-Webster, 1971)

COSTS OF URBANIZATION. Include the following: CAPITAL: cost of land and infrastructure; OPERATING: cost of administration, maintenance, etc.; DIRECT: include capital and operating costs; INDIRECT: include environmental and personal effects. (U.S.D.P.)

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

CYCLE. One complete performance of a vibration, electric oscillation, current alternation, or other periodic process. (Merriam-Webster, 1971)

DAM. A barrier preventing the flow of water; a barrier built across a water course to confine and keep back flowing water. (Merriam-Webster, 1971)

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

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

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

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

DEVELOPMENT SIZE. There are two general ranges of size: LARGE: may be independent communities requiring their own utilities, services, and community facilities; SMALL: generally are part of an adjacent urbanization and can use its supporting utilities, services, and community facilities. (U.S.D.P.)

DIRECT CURRENT (D.C.) (An electric current that) flows continuously in one direction. (ROTC ST 45-7, 1953)

DISCHARGE (Q). Flow from a culvert, sewer, channel, etc. (DePina, 1972)

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

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

DISTURBED SOIL. Soils that have been disturbed by artificial process, such as excavation, transportation, and compaction in fill. (U.S.D.P.)

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

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

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

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

DWELLING DENSITY. The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots, streets). Net density is the density of selected, discrete portions of an area (ex. including only lots). (U.S.D.P.)

DWELLING DEVELOPER. Three sectors are considered in the supply of dwellings: POPULAR SECTOR: the marginal sector with limited or no access to the formal financial, administrative, legal, technical institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular Sector generally for 'self use' and sometimes for profit. PUBLIC SEC-

TOR: the government or non-profit organizations involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Public Sector for service (non-profit or subsidized housing). **PRIVATE SECTOR:** the individuals, groups or societies, who have access to the formal financial, administrative, legal, technical institutions in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Private Sector for profit. (U.S.D.P.)

DWELLING DEVELOPMENT MODE. Two modes are considered: **PROGRESSIVE:** the construction of the dwelling and the development of the local infrastructure to modern standards by stages, often starting with provisional structures and underdeveloped land. This essentially traditional procedure is generally practiced by squatters with de facto security of tenure and an adequate building site. **INSTANT:** the formal development procedure in which all structures and services are completed before occupation. (U.S.D.P.)

DWELLING FLOORS. The following numbers are considered: **ONE:** single story; generally associated with detached, semi-detached and row/group dwelling types. **TWO:** double story; generally associated with detached, semi-detached and row/group dwelling types. **THREE OR MORE:** generally associated with walk-up and high-rise dwelling types. (U.S.D.P.)

DWELLING GROUP. The context of the dwelling in its immediate surroundings. (U.S.D.P.)

DWELLING/LAND SYSTEM: A distinct dwelling environment/housing situation characterized by its users as well as by its physical environment. (U.S.D.P.)

DWELLING LOCATION. Three sectors are considered in single or multi-center urban areas. Sectors are identified by position as well as by the density of buildings as follows: **CENTER:** the area recognized as the business center of the city, generally the most densely built-up sector; **INNER RING:** the area located between the city center and the urban periphery, generally a densely built-up sector; **PERIPHERY:** the area located between the inner ring and the rural areas, generally a scatteredly built-up sector. (U.S.D.P.)

DWELLING PHYSICAL STATE. A qualitative evaluation of the physical condition of the dwelling types: room, apartment, house; the shanty unit is not evaluated. **BAD:** generally poor state of structural stability, weather protection, and maintenance. **FAIR:** generally acceptable state of structural stability, weather protection, and maintenance with some deviation. **GOOD:** generally acceptable state of structural stability, weather protection, and maintenance without deviation. (U.S.D.P.)

DWELLING TYPE. The physical arrangement of the dwelling unit: **DETACHED:** individual dwelling unit, separated from others. **SEMI-DETACHED:** two dwelling units sharing a common wall (duplex). **ROW/GROUPED:** dwelling units grouped together linearly or in clusters. **WALK-UP:** dwelling units grouped in two to five stories with stairs for vertical circulation. **HIGH-RISE:** dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

DWELLING UNIT. A self-contained unit in a dwelling for an individual, a family, or a group. (U.S.D.P.)

DWELLING UNIT AREA. The dwelling unit area (m²) is the built-up, covered area of a dwelling unit. (U.S.D.P.)

DWELLING UNIT COST. The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit. (U.S.D.P.)

DWELLING UNIT TYPE. Four types of dwelling units are considered: **ROOM:** A SINGLE SPACE usually bounded by

partitions and specifically used for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room. **SEVERAL ROOM UNITS** are contained in a building/shelter and share the use of the parcel of land on which they are built (open spaces) as well as common facilities (circulation, toilets, kitchens). **APARTMENT:** A MULTIPLE SPACE (room/set of rooms with bath, kitchen, etc.) **SEVERAL APARTMENT UNITS** are contained in a building and share the use of the parcel of land on which they are built (open spaces) as well as some common facilities (circulation). **HOUSE:** A MULTIPLE SPACE (room/set of rooms with or without bath, kitchen, etc.) **ONE HOUSE UNIT** is contained in a building/shelter and has the private use of the parcel of land on which it is built (open spaces) as well as the facilities available. **SHANTY:** A SINGLE OR MULTIPLE SPACE (small, crudely built). **ONE SHANTY UNIT** is contained in a shelter and shares with other shanties the use of the parcel of land on which they are built (open spaces). (U.S.D.P.)

DWELLING UTILIZATION. The utilization indicates the type of use with respect to the number of inhabitants/families. **SINGLE:** an individual or family inhabiting a dwelling. **MULTIPLE:** a group of individuals or families inhabiting a dwelling. (U.S.D.P.)

EASEMENT. Servitude: a right in respect of an object (as land owned by one person) in virtue of which the object (land) is subject to a specified use or enjoyment by another person or for the benefit of another thing. (Merriam-Webster, 1971)

EFFICIENCY. Capacity to produce desired results with a minimum expenditure of energy, time, money or materials. (Merriam-Webster, 1971)

EFFLUENT. Outflow or discharge from a sewer or sewage treatment equipment. (DePina, 1972)

ELECTRIC FEEDER. That part of the electric distribution system between the transformer and the service drop or drops. (HUD, Mobile Court Guide, 1970)

ELECTRIC SERVICE DROP. That part of the electric distribution system from a feeder to the user's service equipment serving one or more lots. (HUD, Mobile Court Guide, 1970)

ELECTRIC TRANSFORMER. A device which changes the magnitude of alternating voltages and currents; generally from distribution voltages to user voltages; a distribution component that converts power to usable voltage. (TM 5 765 US Army, 1970; U.S.D.P.)

ELECTRICAL CIRCUIT. A closed, complete electrical path with various connected loads. Circuits may either be 'parallel' (voltage constant for all connected loads) or 'series' (voltage divided among connected loads). Parallel circuits are fixtures wired independent of each other, which are used in nearly all building wiring. (U.S.D.P.; ROTC ST 45-7, 1953)

ELECTRICAL FREQUENCY. The number of times an alternating electric current changes direction in a given period of time. Measured in cycles per second: hertz. (ROTC ST 45-7, 1953)

ELECTRIC GROUND. The electrical connection with the earth or other ground. (Merriam-Webster, 1971)

ELECTRICAL NETWORK COMPONENTS. It is composed of the following: **GENERATION:** produces electricity; **TRANSMISSION:** transports energy to user groups; **DISTRIBUTION STATION:** divides power among main user groups; **SUBSTATION:** manipulates power into useful energy levels for consumption; **DISTRIBUTION NETWORKS:** provides electric service to user. (U.S.D.P.)

ELECTRIC PHASE. May be either a single-phase circuit (for small electrical devices) or a three-phase circuit (for heavy equipment, large electrical devices). In single-phase only one current is flowing through

the circuit with the voltage dropping to zero twice in each cycle. In three-phase currents flow through the circuit with the power never dropping to zero. (U.S.D.P.)

ELECTRICAL POWER. The source or means of supplying energy for use; measured in watts. (U.S.D.P.)

ELECTRICAL WIRING SYSTEMS. May either be single-phase or three-phase. **SINGLE-PHASE:** 2 hot wires with 1 neutral wire; **THREE-PHASE:** 3 hot wires with 1 neutral wire. (ROTC ST 45-7, 1953)

ELECTRICITY. Electrification: the process (network) for supplying (the site) with electric power. (Merriam-Webster, 1971)

EMBANKMENT (or FILL). A bank of earth, rock, or other material constructed above the natural ground surface. (DePina, 1972)

EROSION. The general process whereby materials of the earth's crust are worn away and removed by natural agencies including weathering, solution, corrosion, and transportation; (specific) land destruction and simultaneous removal of particles (as of soil) by running water, waves and currents, moving ice, or wind. (Merriam-Webster, 1971)

EXCRETA. Waste matter eliminated from the body. (U.S.D.P.)

EXISTING STRUCTURE. Something constructed or built (on the site). (U.S.D.P.)

EXPLORATORY BORING. Initial subsurface investigations (borings) are done on a grid superimposed on the areas of interest and on areas indicated as limited/restricted/hazard in the initial survey. (U.S.D.P.)

EXTERIOR CIRCULATION/ACCESSES (SITE PLANNING). The existing and proposed circulation system/accesses outside but affecting the site. These include limited access highways as well as meshing access to the surrounding area. Exterior circulation/accesses are generally given conditions. (U.S.D.P.)

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

FINANCING. The process of raising or providing funds. **SELF FINANCED:** provided by own funds; **PRIVATE/PUBLIC FINANCED:** provided by loan; **PUBLIC SUBSIDIZED:** provided by grant or aid. (U.S.D.P.)

FIRE/EXPLOSION HAZARDS. Danger: the state of being exposed to harm; liable to injury, pain, or loss from fire/explosion (at or near the site). (Merriam-Webster, 1971)

FIRE FLOW. The quantity (in time) of water available for fire-protection purposes in excess of that required for other purposes. (Merriam-Webster, 1971)

FIRE HYDRANT. A water tap to which fire hoses are connected in order to smother fires. (U.S.D.P.)

FIRE PROTECTION. Measures and practices for preventing or reducing injury and loss of life or property by fire. (Merriam-Webster, 1971)

FLEXIBLE PAVEMENT. A pavement structure which maintains intimate contact with and distributes loads to the subgrade and depends upon aggregate interlock, particle friction, and cohesion for stability. (DePina, 1972)

FLOODING. A rising and overflowing of a body of water that covers land not usually under water. (U.S.D.P.)

FLOODWAY FRINGE. The floodplain area landward of the natural floodway which would be inundated by low velocity flood waters. (U.S.D.P.)

FLOW METER. A device to measure flow of water. (U.S.D.P.)

FLUSH TANK TOILET. Toilet with storage tank of water used for flushing bowl. (U.S.D.P.)

FLUSH VALVE TOILET. Toilet with self-closing valve which supplies water directly from pipe. It requires adequate pressure for proper functioning. (U.S.D.P.)

FOOT CANDLE. A unit of illuminance on a surface that is everywhere one foot from a uniform point source of light of one candle and equal to one lumen per square foot. (Merriam-Webster, 1971)

FUMES. Gaseous emissions that are usually odorous and sometimes noxious. (Merriam-Webster, 1971)

GAS. A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and individual users. (U.S.D.P.)

GRADE. Profile of the center of a roadway, or the invert of a culvert or sewer. (DePina, 1972)

GRID BLOCKS. The block determined by a convenient public circulation and not by dimensions of lots. In grid blocks some lots have indirect access to public streets. (U.S.D.P.)

GRIDIRON BLOCKS. The blocks determined by the dimensions of the lots. In gridiron blocks all the lots have direct access to public streets. (U.S.D.P.)

GRID LAYOUTS. The urban layouts with grid blocks. (U.S.D.P.)

GRIDIRON LAYOUTS. The urban layouts with gridiron blocks. (U.S.D.P.)

GOVERNMENT/MUNICIPAL REGULATIONS. In urban areas, the development of the physical environment is a process usually controlled by a government/municipality through all or some of the following regulations: Master Plan, Zoning Ordinance, Subdivision Regulations, Building Code. (U.S.D.P.)

HEAD. (Static) The height of water above any plane or point of reference. Head in feet = (lb/sq. in. x 144)/(Density in lb/cu. ft.) For water at 68°F. (DePina, 1972)

HIGH-RISE. Dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

HOT WIRE. Wire carrying voltage between itself and a ground. (ROTC ST 45-7, 1953)

HYDRAULICS. That branch of science or engineering that deals with water or other fluid in motion. (DePina, 1972)

ILLEGAL. That which is contrary to or violating a rule or regulation or something having the force of law. (Merriam-Webster, 1971)

INCOME. The amount (measured in money) of gains from capital or labor. The amount of such gain received by a family per year may be used as an indicator of income groups. (U.S.D.P.)

INCOME GROUPS. A group of people or families within the same range of incomes. (U.S.D.P.)

INCREMENT (TAX). A special tax on the increased value of land, which is due to no labor/expenditure by the owner, but rather to natural causes such as the increase of population, general progress of society, etc. (U.S.D.P.)

INFRASTRUCTURE. The underlying foundation or basic framework for utilities and services: streets; sewage, water network; storm drainage, electrical network;

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

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

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

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

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

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

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

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

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

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

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

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

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

LAND UTILIZATION. A qualification of the land around a dwelling in relation to user, physical controls and responsibility. *PUBLIC* (streets, walkways, open spaces): user -anyone/unlimited; physical controls -minimum; responsibility -public sector. *SEMI-PUBLIC* (open spaces, playgrounds, schools): user -limited group of people; physical controls -partial or complete; responsibility -public sector and user. *PRIVATE* (dwellings, lots): user -owner or tenant or squatter; physical controls -complete; responsibility -user. *SEMI-PRIVATE* (cluster courts): user -group of owners and/or tenants; physical controls -partial or complete; responsibility -user. (U.S.D.P.)

LAND UTILIZATION: PHYSICAL CONTROLS. The physical/legal means or methods of directing, regulating, and coordinating the use and maintenance of land by the owners/users. (U.S.D.P.)

LAND UTILIZATION: RESPONSIBILITY. The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users. (U.S.D.P.)

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

LATRINE. A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or

a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)

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

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

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

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

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

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

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

LOT CLUSTER. A group of lots (owned individually) around a semipublic common court (owned in condominium). (U.S.D.P.)

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

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

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

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

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

MASTER PLAN. A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official contemplations on the course its transportation, housing and community facilities should take, and making proposals for industrial settlement, commerce, population distribution and other aspects of growth and development. (Abrams, 1972).

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

MESHING BOUNDARIES. Characterized by continuing, homogeneous land uses or topography, expressed as: *LINE*s: property lines, political or municipal divisions, main streets, etc.; *AREA*s: similar residential uses, compatible uses (as parks with residential). (U.S.D.P.)

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

MODE OF TRAVEL. Manner of moving from one place (the

site) to another (other parts of the urban context). (U.S.D.P.)

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

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

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

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

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

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

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

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

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

OHMS (electrical). The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. When resistance is constant, amperage (and wattage) are in direct proportion to voltage. Resistance varies inversely with the cross-sectional area of the wire. Ohms = volts/amperes. $R = E/I$. The practical mks unit of 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 or to the resistance in which one watt of power is dissipated when one ampere flows through it and that is taken as standard in the U.S. (U.S.D.P.; ROTC ST 45-7, 1953; Merriam-Webster, 1971)

OPTIMIZE/OPTIMIZE. To bring to a peak of economic efficiency, specially by the use of precise analytical methods. (Merriam-Webster, 1971)

ORGANIC SOILS. Soils composed mostly of plant material. (U.S.D.P.)

OXIDATION POND (LAGOON). A method of sewage treatment using action of bacteria and algae to digest/decompose wastes. (U.S.D.P.)

PERCENT RENT/MORTGAGE. The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income. (U.S.D.P.)

PIT PRIVY/LATRINE. A simple hole in the ground, usually hand dug, covered with slab and protective superstructure; for disposal of human excreta. (U.S.D.P.)

PLANNING. The establishment of goals, policies, and procedures for a social or economic unit, i.e. city. (U.S.D.P.)

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

POLICE PROTECTION. Police force: a body of trained men and women entrusted by a government with the maintenance of public peace and order, enforcement of laws, prevention and detection of crime. (Merriam-

Webster, 1971)

POPULATION DENSITY. It is the ratio between the population of a given area and the area. It is expressed in people per hectare. It can be: *GROSS DENSITY*: includes any kind of land utilization, residential, circulation, public facilities, etc. *NET DENSITY*: includes only the residential land and does not include land for other uses. (U.S.D.P.)

POSITION. The point or area in space actually occupied by a physical object (the site). (Merriam-Webster, 1971)

PRIMER. A small introductory book on a specific subject. (U.S.D.P.)

PRIVATE LAND OWNERSHIP. The absolute tenure of land to a person and his heirs without restriction of time. (U.S.D.P.)

PRIVY. A small, often detached building having a bench with one or more round or oval holes through which the user may defecate or urinate (as into a pit or tub) and ordinarily lacking any means of automatic discharge of the matter deposited. (Merriam-Webster, 1971)

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

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

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

PUBLIC SERVICES AND COMMUNITY FACILITIES. Includes: public transportation, police protection, fire protection, refuse collection, health, schools, and playgrounds, recreation and open spaces, other community facilities, business, commercial, small industries, markets. (U.S.D.P.)

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

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

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

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

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

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

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

RIGHT-OF-WAY. A legal right of passage over another person's ground (land), the area or way over which a right-of-way exists such as: a path or thoroughfare 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 utility. Rights-of-way may be shared (as streets; pedestrians and automobiles) or exclusive (as rapid transit routes; subways, railroads, etc.) (Merriam-Webster, 1971; U.S.D.P.)

ROADWAY (HIGHWAY). Portion of the highway included between the outside lines of gutter or side ditches, including all slopes, ditches, channels, and appurtenances necessary to proper drainage, protection, and use. (DePina, 1972)

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

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

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

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

SANITARY SEWERAGE. The system of artificial usually 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 DWELLING. Two dwelling units sharing a common wall (duplex). (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)

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

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

SEWAGE. The effluent in a sewer network. (U.S.D.P.)

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

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

SEWERAGE. 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.)

SILT. Loose, unconsolidated sedimentary rock particles (ranging from 0.02mm to 0.002mm in diameter). (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 the whole site or the bounded piece of ground. *USABLE 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 services for residential use 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*: the access to a piece of land where people can build their own dwellings; b) *SERVICES*: the opportunity of access to employment, utilities, services and community facilities, financing and communications. (U.S.D.P.)

SIZE. Physical magnitude or extent (of the site), relative or proportionate dimensions (of the site). (Merriam-Webster, 1971)

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

SMOKE. The gaseous products of burning carbonaceous materials made visible by the presence of carbon particles. (Merriam-Webster, 1971)

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

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

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

SOIL SURVEY (INITIAL). An on-site examination of surface soil conditions and reference to a GENERAL SOIL MAP. It is used to reveal obvious limitations/restrictions/hazards for early planning consideration. (U.S.D.P.)

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

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

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

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

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

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

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

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

SUBSISTENCE INCOME. The minimum amount of money required for the purchase of food and fuel 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 FAUCET). A fixture for drawing a liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

TAX EXEMPTION. A grant by a government of immunity from taxes; (a ten-year tax exemption on new housing in New York stimulated new construction in the 1920's; to ease its housing shortage, Turkey granted 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 likely to do. (U.S.D.P.)

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

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

TENURE. Two situations of tenure of the dwelling units and/or the lot/land are considered: *LEGAL*: having formal status derived from law; *EXTRALEGAL*: not regulated or sanctioned by law. Four types of tenure are considered: *RENTAL*: where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/land; *LEASE*: where the users pay a fee for long-term use (generally for a year) for a dwelling unit and/or the lot/land from the owner (an individual, a public agency, or a private organization); *OWNERSHIP*: where the users hold in freehold the dwelling unit and/or the lot/land which the unit occupies; *EMPLOYER-PROVIDED*: where the users are provided a dwelling unit by an employer in exchange for services, i.e. domestic live-in servant. (U.S.D.P.)

TITLE. The instrument (as a deed) that constitutes a legally just cause of exclusive possession (of land, dwellings, or both). (Merriam-Webster, 1971)

TOILET. A fixture for defecation and urination, esp. water closet. (7th Collegiate Webster, 1963)

TOPOGRAPHY. The configuration of a (land) surface including its relief and the position of its natural and man-made features. (Merriam-Webster, 1971)

TRANSPORTATION. Means of conveyance or travel from one place (the site) to another (other parts of the urban context). (Merriam-Webster, 1971)

TRAP. A fitting that provides a water seal to prevent sewer gases and odors being discharged through fixtures. (ROTC ST 45-7, 1953)

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

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

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

URBANIZATION. The quality or state of being or becoming urbanized; to cause to take on urban characteristics. (U.S.D.P.)

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

USER INCOME GROUPS. Based upon the subsistence (minimum wage) income per year, five income groups are distinguished: *VERY LOW (below subsistence level)*: the income group with no household income available for housing, services, or transportation; *LOW (1 x subsistence level)*: the income group that can afford no or very limited subsidized housing; *MODERATE (3 x subsistence level)*: the income group that can afford limited housing and rent only with government assistance; *HIGH (5 x subsistence level)*: the income

group that can afford housing without subsidy, by cash purchase, through mortgage payments, or by rent; *VERY HIGH (10 x subsistence level)*: the income group that represents the most economically mobile sector of the population. (U.S.D.P.)

USUFRUCT. The right to profit from a parcel of land or control of a parcel of land without becoming the owner or formal leasee; legal possession by decree without charge. (U.S.D.P.)

UTILITIES. Include: water supply, sanitary sewerage, storm drainage, electricity, street lighting, gas, telephone. (U.S.D.P.)

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

VALVE. A water supply distribution component which interrupts 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. (ROTC ST 45-7, 1953)

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

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

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

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

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

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

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

WATT. Watts (w) measure the power of the flow of 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. (ROTC ST 45-7, 1953)

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

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EXPLANATORY NOTES

QUALITY OF INFORMATION

The quality of information given in drawings, charts and descriptions has been qualified in the following manner:

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

QUALITY OF SERVICES, FACILITIES AND UTILITIES

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

METRIC SYSTEM EQUIVALENTS

Linear Measures

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

Square Measures

| | |
|-------------------------------|--|
| 1 square meter | = 1,550 square inches or 10.7639 square feet |
| 1 hectare = 10,000 sq. meters | = 2.4711 acres |
| 1 square foot | = 0.0929 square meters |
| 1 acre | = 0.4087 hectares |

DOLLAR EQUIVALENTS

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