

URBAN SETTLEMENT DESIGN, SEOUL, KOREA: A Comparative
Study for Low-Income Housing.

by
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Submitted to the Department of Architecture on May 7, 1982, in partial fulfillment of the requirements for the degree of Master of Science in Architecture Studies.

ABSTRACT

The study proposes an alternative design approach for urban dwelling environments of the low-income sectors in Seoul, Korea, based upon a comparative evaluation of the physical and socio-economic performance of the existing dwelling environments.

Most existing settlements have significant problems in land utilization and circulation efficiency. Despite narrow streets, almost 30% of land is allotted for public circulation due to gridiron layouts having small blocks. The circulation area is little utilized or it is sometimes misutilized as semi-private and semi-public areas. In case of current walk-up apartment projects, the provision of unutilized open spaces results in a waste of land and services. Moreover, "instant" housing developments increase initial costs and discourage the utilization of individual resources.

The focus of the study is on the provision of affordable and appropriate dwelling environments by minimizing initial costs and improving land utilization and circulation efficiency. The study proposes the maximization of private and semi-private land, the grid layout system and progressive housing development.

Thesis Supervisor: Horacio Caminos
Title: Professor of Architecture

CONTENTS

ACKNOWLEDGEMENTS	6
PREFACE	7
INTRODUCTION	8
PROBLEMS OF CURRENT HOUSING DEVELOPMENTS	10
PROPOSED PROJECT	12
ASSUMPTIONS OF AFFORDABILITY	13
EXAMPLES OF LAND UTILIZATION IMPROVEMENT	14
SITE DATA	16
PROJECT PROGRAM	18
COMPARISON OF EXISTING AND PROPOSED PROJECTS	19
EXISTING/PROPOSED SITE PLAN	20
EXISTING/PROPOSED LAND USE PATTERN	22
EXISTING/PROPOSED BLOCK PLAN	24
COMPARATIVE EVALUATION OF PROJECTS	27
CONCLUSIONS	32
APPENDIX	33
NATIONAL/URBAN CONTEXT	34
CASE STUDIES	39
1) CHUNGRYUNGRI	40
2) SANGGAEDONG	46
3) JAMSIL	52
4) GALHYUNDONG	58
COMPARATIVE SUMMARY	64
GLOSSARY	66
BIBLIOGRAPHY/EXPLANATORY NOTES	70

ACKNOWLEDGEMENTS

The study is derived from fieldwork conducted during the summers of 1980 and 1981 in Seoul. Physical and socio-economic surveys were carried out, which provided the basis for the case studies in the thesis. Additional information, including maps, reports and documents were mainly collected from various governmental organizations and institutes. The case study analysis is based upon the methodology developed in the Urban Settlement Design Program under the direction of Professor Horacio Caminos.

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PREFACE

Today, the majority of people in Seoul are living in deteriorated housing conditions. The housing shortage is so great that they usually live in tenements or are squatters; both have poorly provided services. Also, most settlements have serious problems of misutilization and underutilization of land and services due to uncontrolled and/or awkward urban developments. To make things worse, the future housing situation seems to be exacerbated due to continued urbanization and scarce resources of land, materials and capital.

In this context, recent housing developments waste land and services on a large scale and only benefit a small part of the population by providing limited numbers of high-standard housing. Theories and guidelines from developed countries do not help in the improvement of the overall housing situation, and in fact they make the situation worse. New housing should be tailored to real needs of today. The focus should be on the low-income majority of the population who are most severely affected by the deteriorated housing conditions.

Thus, this thesis proposes guidelines for a low-income housing development based upon the performance of existing dwelling environments. The thesis includes the following sections:

- 1) Current housing problems are illustrated after a brief description of the housing situation and policies.
- 2) An approach toward low-income housing projects is proposed by redesigning an existing prototypical housing project. The emphasis is on providing affordable housing and sound dwelling environments by increasing population density and by improving land utilization efficiency. Both the basic assumptions of affordability and the performance evaluation of dwelling environments are included in this section.
- 3) The appendix includes the urban context and case studies which provide the basis for the evaluation of the housing situation as well as the proposal. Each case study is analyzed in terms of physical and socio-economic data.

INTRODUCTION

URBANIZATION: Recently, Seoul as well as major cities in Korea suffer from rapid population growth. The population of Seoul was 8.11 million in 1979. It increased more than 5 times in the 24 year period since 1955. The growth has mainly resulted from migration from rural areas and small cities. Rural population has continuously moved to Seoul in search of employment, because Seoul has been the center of commercial, industrial and educational activities. The existing large population as well as the rapid migration results in serious housing problems in Seoul.

HOUSING SITUATION: Seoul, populated by about 1.6 million households, has only 931,000 dwelling units. In other words, 42% of the total households have inadequate housing and share overpopulated dwelling units and overburdened sanitary facilities. About one fourth of the existing housing stock is considered to be delinquent by the government. More than two thirds of the delinquent housing are squatter settlements, which are illegally built on public land. These squatter settlers are low-income groups and live in deteriorated conditions. Public services in these areas are so poor that the basic infrastructure such as water supply, storm drainage and sewage disposal is rarely provided. Moreover, the future installation of the infrastructure is hardly expected, because most squatters are located in

hazardous areas such as steep hillsides and areas prone to flooding.

HOUSING DEVELOPMENTS AND POLICIES: 1955-1969: Land subdivision projects were prevalent at this time, and some walk-up apartments were also developed. The land subdivision projects for detached housing developments were very expensive because of the inefficient design of lots and services. Most lots were not sold, and it took a long time for housing to develop. In addition to the high cost and slow development, the inefficient layouts resulted in misutilization and underutilization of streets, because streets designed for vehicular circulation were seldom used as such and generally used by pedestrians, children playing, and communal activities. Two different types of walk-up apartments were usually provided for low-income groups on the sites where squatters houses were demolished, and finished walk-ups were built for higher-income groups on new sites.

At that time, there were two unfortunate events which prevented further low-income housing development. One of them was the failure of the "Sunnam Relocation Project". This site and services project was planned for 50,000 lots in Sunnam, 25 km from the city center of Seoul. The project fascinated low-income groups, be-

cause they were supposed to receive both housing and employment. Since industrial areas were not developed promptly, they could not earn their living nor could they have houses. At last, a large group of people revolted against the government and demanded employment. The revolt resulted in serious political and social problems. Since that project, the government has never planned another large scale low-income housing project.

The other event was the collapse of walk-ups at Wawoo in Seoul. This unfinished apartment project also fascinated low-income groups, because they were able to afford the housing. However the political and social problems after the collapse resulted in the termination of the whole project.

The failure was not in the low-income housing development, but in the poor design and social programs of the projects. In case of the relocation project, poor services, inconvenient transportation, and unemployment were major problems. In the case of the apartment project, corrupt developers built them unsoundly to make illicit gains. Both of the project should have continued after analyzing the real problems, because advantages were apparent due to their affordability by low-income groups.

Since 1971, housing activities have been concentrated on

instant housing developments. Policy makers and bureaucrats have tried to avoid social and political problems by not providing low-income housing because of the previous events. Only high-standard instant housing has been built, and only a limited population gets benefits from the new housing developments. Recently, in addition to the high-standard dwelling units regulations require large open spaces and a lower dwelling density. For example, in the case of row house projects, minimum open space and maximum floor area are set at 70% and 100% of the site area respectively. In the case of walk-up apartment projects, they are set at 80% and 180% respectively. These instant housing developments with large open spaces result in questions of affordability and land utilization.

Despite that US\$4.86 billion was invested in Korea for housing development in 1979, the housing shortage among low-income groups did not decrease. The least expensive new housing unit in Seoul was US\$12,700 and the maximum loan available was US\$3500. Therefore, people had to pay at least US\$9200 for a minimum housing unit. In addition to the initial expense, they had to pay maintenance cost and monthly payment. However, more than a half of the households in Seoul had incomes of less than US\$300 a month and they were not able to afford even the least expensive housing.

PROBLEMS OF CURRENT HOUSING DEVELOPMENTS

Despite the great expenditure in housing development as a whole, the housing situation for low-income groups has not improved. In fact, the demand for low-income housing is much greater in the low-income sectors than in middle and high-income sectors. The main reasons are:

- 1) The majority of low-income groups in Seoul live in tenements or are squatters, in both cases where adequate services are not provided.
- 2) The government continues slum clearance policies and demolishes large portions of the existing housing stock.
- 3) Population increase, particularly increase of the low-income population is very high from the result of immigration and natural growth.
- 4) A large part of the existing housing stock is considered to be substandard and requires improvement or redevelopment.

Needless to say, low-income housing developments are important in order to alleviate overall housing problems. However, low-income groups cannot afford current housing developments because of expensive development and maintenance costs. For the provision of affordable housing

to these groups, economic utilization of land and services must be achieved. In addition, the individual resources of the groups should be utilized. What follows are the issues which need to be considered for low-income housing developments.

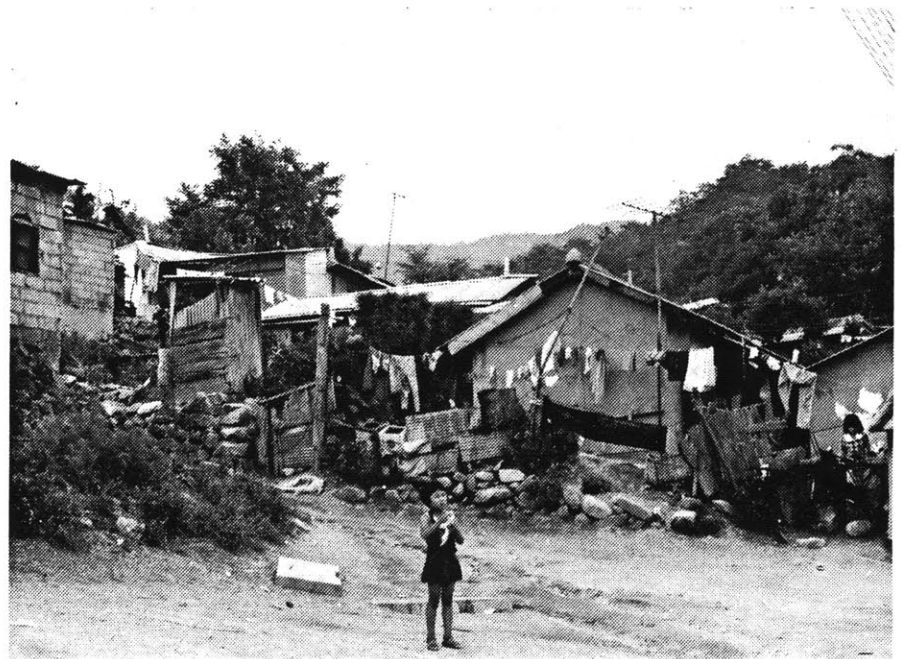
AFFORDABILITY: It is apparent that low-income groups cannot afford the current housing developments of walk-up and high-rise apartments with large open spaces. The open spaces are usually underutilized and result in a waste of land and services. These underutilized open spaces prevent high density housing developments which are necessary to minimize costs. In addition, instant housing developments have high initial costs, because individual resources of low-income groups are not utilized. The resources, such as labor and some materials, can be fully utilized if dwelling units are progressively built or finished after the provision of basic services and/or structures at an initial stage.

LAND UTILIZATION: Land utilization is an important factor, particularly when high density low-income housing is developed. However, current housing developments have serious problems in terms of land utilization. Large

portions of land are allocated to streets and open spaces which are usually misutilized and/or underutilized. Streets designed for extensive vehicular circulation only serve few pedestrians. Open spaces are usually not utilized, or sometimes utilized as playgrounds. In addition to the inefficient utilization, the unclear relationship between land utilization and ownership results in public use of private land and vice versa. In order to make the relationship clear, circulation systems and shared land size within a condominium need to be changed to encourage efficient control and appropriate utilization of the streets and open spaces.

CODES AND REGULATIONS: The large amount of open spaces which are required by current codes and regulations do not allow high density housing developments and lead to poor land utilization. Since affordability and land utilization are important related issues for the provision of low-income housing, codes and regulations should be changed. In addition, the unrealistic regulations for parking should also be changed, because the areas for parking are hardly utilized and result in a waste of land and services.

PHOTOGRAPHS: (TOP) A typical recent housing development in Seoul; note empty parking lots and the children playing. (BOTTOM) Squatter settlement at a periphery of Seoul, where services are poorly provided.



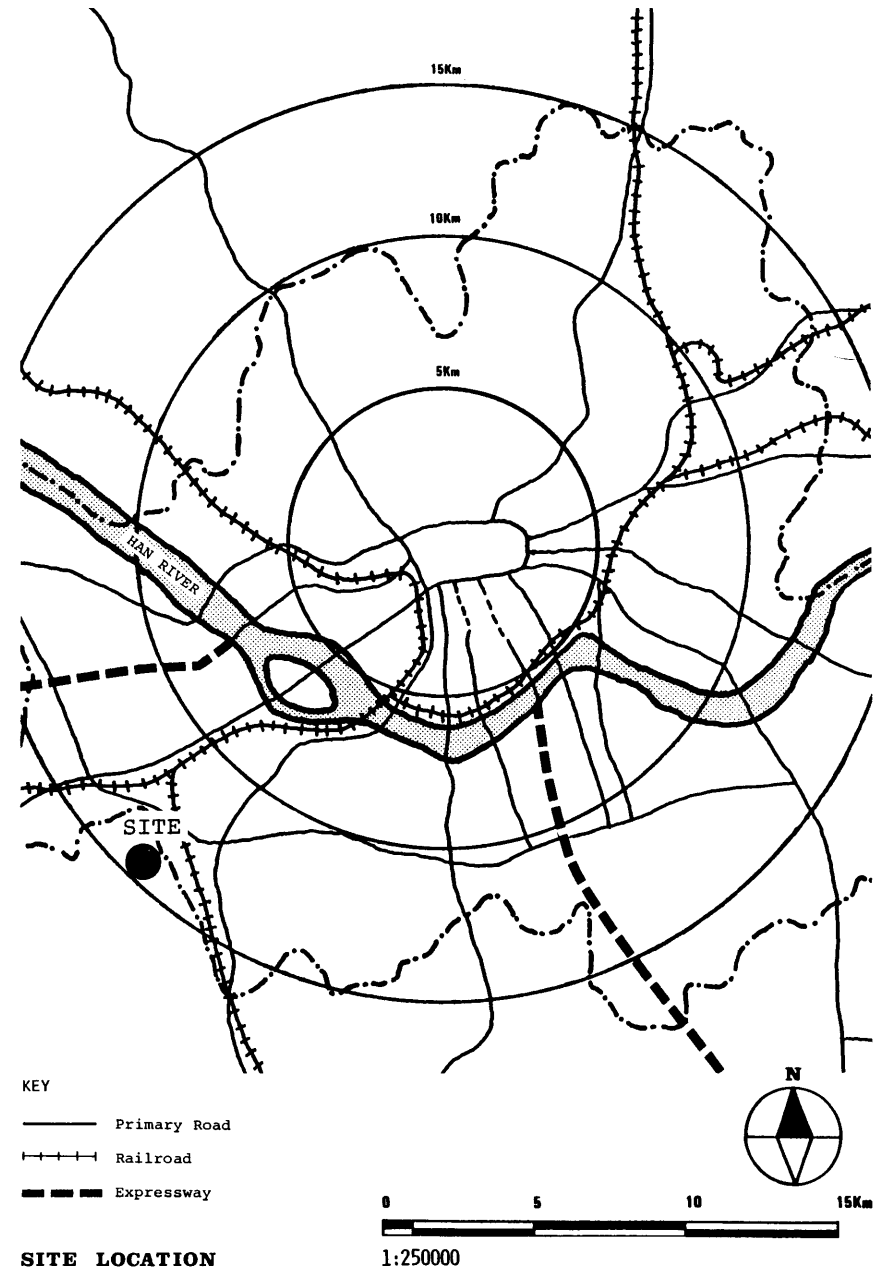
PROPOSED PROJECT

This project is a proposal for low-income housing based on the redesign of an existing project. The proposal will be a guide for future low-income housing developments throughout the urban areas.

The site was selected because it has a relatively low land cost and is in close proximity to the major industries in Seoul. The nearby industrial area is the largest in Seoul and provides a major source of employment for low-income groups. Most of the workers in the industries are living in deteriorated housing, usually by renting rooms in the surrounding communities.

The existing project, intended for low-income housing, has been confronted with serious problems by not considering the socio-economic characters of low-income groups. The economic levels of the groups cannot afford complete instant housing and necessary maintenance expenses, neither of which were considered in the existing project. Thus, the new proposal is intended to provide not only adequate housing which they can afford, but also an appropriate dwelling environment which lends itself to low maintenance efforts. The emphasis in the new proposal is on the minimization of initial housing costs as well as the maximization of individual and group initiatives and responsibilities in maintenance and further development.

What follows is the analysis and evaluation of the existing and proposed design in terms of land utilization, circulation efficiency, and development methods, all of which are important factors for low-income housing developments. As the context, basic assumptions of affordability, examples of land utilization improvement, site data, and programs are included.



ASSUMPTIONS OF AFFORDABILITY

According to the Chulsan Development Planning (1979), prepared by Korea Housing Corporation, the development cost of the total area is US\$299 million. The cost consists of land (11.5%), land development (26.5%), and housing development (62.0%). The following is the analysis of four alternative proposals for providing affordable housing.

ALTERNATIVE 1: Provides 30% more dwelling units without changing housing standards and infrastructure costs. The cost per unit in this case will be 91% of the original cost.

ALTERNATIVE 2: Provides 50% unfinished units instead of fully finished dwelling units without changing infrastructure costs. The cost per unit in this case will be 60% of the original cost.

ALTERNATIVE 3: Provides improved layouts in order to save 20% of infrastructure costs without changing housing standards. The cost per unit in this case will be 95% of the original cost.

ALTERNATIVE 4: The combination of the above three alternatives. The cost per unit in this case will be 56% of the original cost.

The fourth option indicates that almost 180% of people can be immediately housed with the same amount of initial investment. The option requires high density housing and a minimum initial investment.

EXISTING DEVELOPMENT COST (1979)

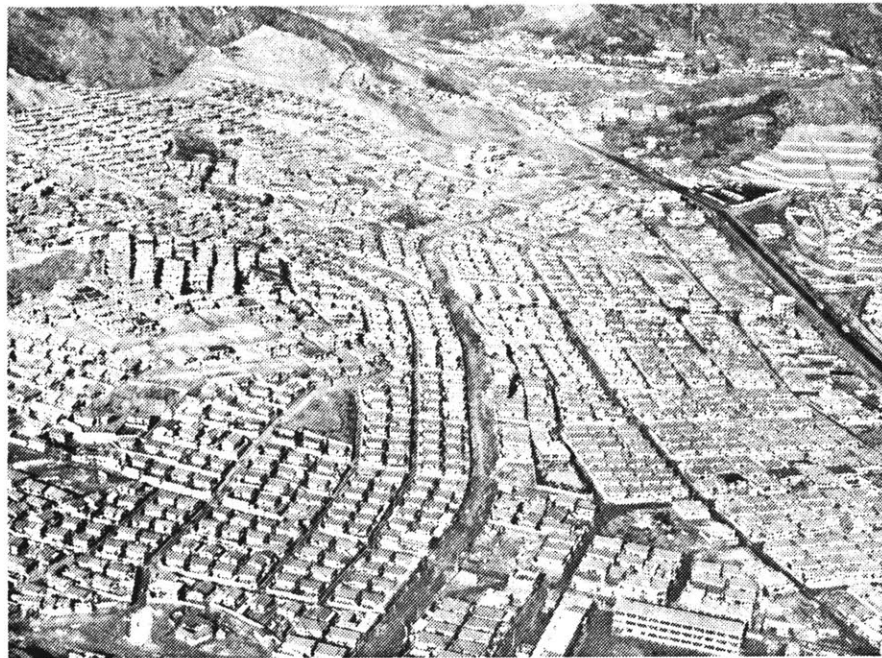
	US\$ million	%
land cost	34.5	11.5
land development cost	79.5	26.5
housing development cost	<u>185.0</u>	<u>62.0</u>
total	299.0	100.0

COMPARISON OF ALTERNATIVES

ALTERNATIVES	relative cost per unit
Existing project	100
Alternative 1	$((62 \times 1.3) + 26.5 + 11.5) / 1.3 = 91$
Alternative 2	$(62 \times 0.5) + 26.5 + 11.5 = 69$
Alternative 3	$62 + (26.5 \times 0.8) + 11.5 = 95$
Alternative 4	$((62 \times 1.3 \times 0.5) + (26.5 \times 0.8) + 11.5) / 1.3 = 56$

The example of the comparative cost analysis is based upon the following assumptions.

- 1) For the rough comparison, infrastructure costs do not increase to meet the higher demand for more dwelling units.
- 2) The unfinished dwelling units could be designed to save up to 50% of the cost of the fully finished units.
- 3) The increased dwelling units do not affect the cost per unit.
- 4) The improved layout efficiency and the progressive infrastructure development can save up to 20% of the initial costs.
- 5) The alternatives modify current building codes and regulations in some cases.



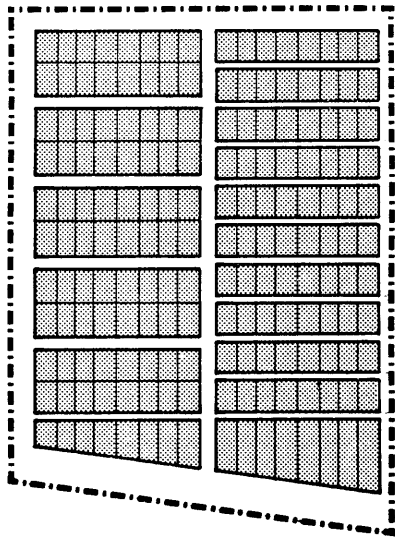
EXAMPLES OF LAND UTILIZATION IMPROVEMENT

Two typical existing layouts of residential areas are chosen as the examples on which the improvement of land utilization and circulation systems is suggested. These examples of the improvement will be applied to the proposed project at next section. The improved layouts are designed to have the same numbers and sizes of lots as the existing layouts. However, the major difference is that underutilized streets in the existing layouts are replaced by courtyards which can be semi-privately utilized for children's play and communal activities. Therefore, the court areas can be efficiently utilized and controlled by courtyard inhabitants. In addition to the efficient utilization, the minimized length and area of public circulation decrease public costs in development and maintenance, because more land comes under private and semi-private control. The following drawings and charts present the comparison between existing and proposed layouts in terms of land utilization and circulation efficiency.

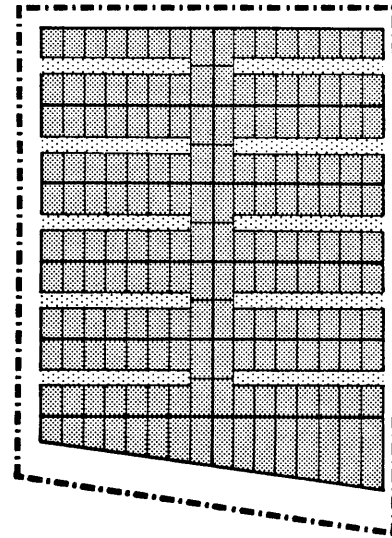
PHOTOGRAPHS: (TOP) A bird's eye view of the 'CHUNG-RYONGRI ROW HOUSING PROJECT'. (BOTTOM) A bird's eye view of the 'GALHYUNDONG DETACHED HOUSING PROJECT'.

1) LOCATION: CHUNGRYUNGRI

EXISTING



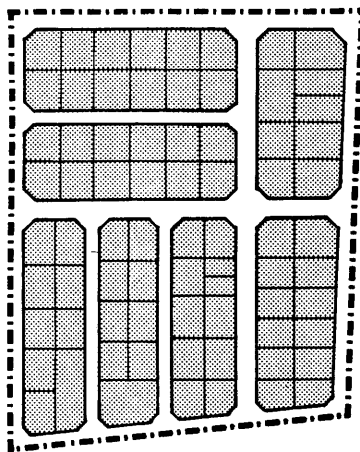
PROPOSED



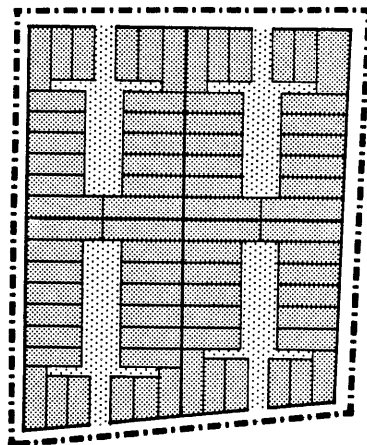
LAND UTILIZATION	Existing (A)		Proposed (A)	
	Ha	(%)	Ha	(%)
Public	0.72	(35)	0.43	(21)
Private	1.30	(65)	1.30	(65)
Semi-private	-		0.29	(14)
Total	2.02	(100)	2.02	(100)
Number of lots	176		176	
Average lot size	74 m ²		74 m ²	
Prv. & semi-prv./dw.	74 m ²		90 m ²	
PUBLIC CIRCULATION				
Length	600 m/Ha		288 m/Ha	

2) LOCATION: GALHYUNDONG



EXISTING

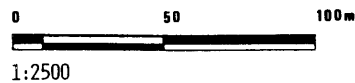


PROPOSED



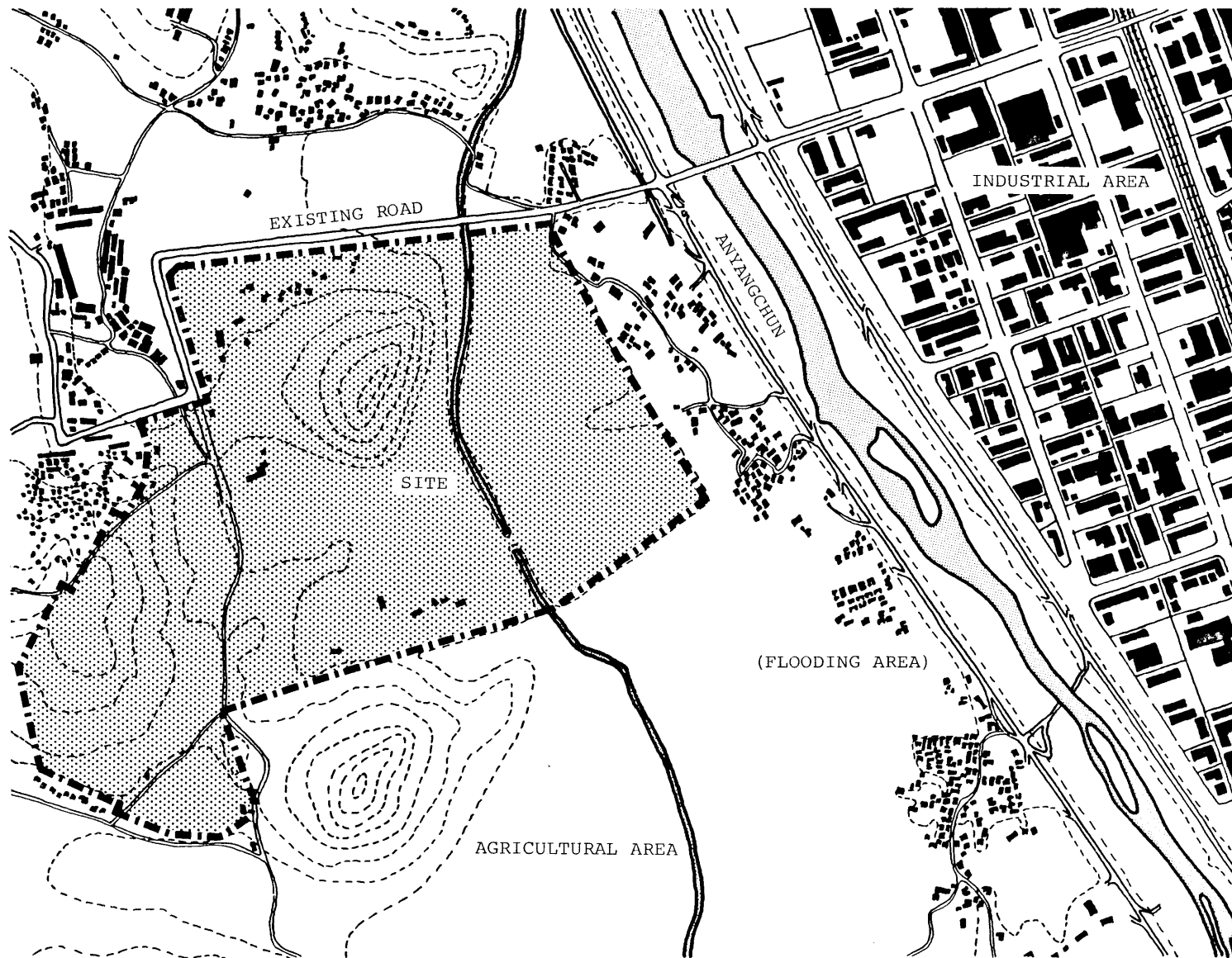
LAND UTILIZATION	Existing (B)		Proposed (B)	
	Ha	(%)	Ha	(%)
Public	0.48	(31)	0.24	(16)
Private	1.07	(69)	1.04	(67)
Semi-private	-		0.27	(17)
Total	1.54	(100)	1.54	(100)
Number of lots	74		74	
Average lot size	145 m ²		141 m ²	
Prv. & semi-prv./dw.	145 m ²		177 m ²	
PUBLIC CIRCULATION				
Length	440 m/Ha		130 m/Ha	

 semi-private
 private



SITE DATA

LOCATION	Chulsan, Kwangmyungsi, Korea 15 km from the city center of Seoul	CLIMATE	winter; temperature-low (cold) humidity-low (dry) summer; temperature-high (hot) humidity-high (rainy)
LAND UTILIZATION	agricultural area	BOUNDARIES	north-existing road south-agricultural area east-agricultural area, residential area west-hills
LAND COST PATTERN	relatively low	VIEWES	positive; hills, river
INFRASTRUCTURE	water supply, storm drainage, sewage disposal, electricity, refuse collection -feasible	FLOODING	inside floodway (eastern part of the site)
COMMUNITY FACILITIES	primary schools, churches, markets at surrounding area	SMOKE, NOISES, FIRE	none
SOURCES OF EMPLOYMENT	nearby industries (expected)	HAZARDS	
APPROACHES	Yongdungpo-Guro-Garibong-Site -Guro-Gaebong -Site	ZONING RESTRICTIONS	agricultural area (changeable to residential area)
ACCESSES	major-through a eastern bridge minor-through western hills	LAND TENURE	Korea Housing Coperation (public housing agency)
TRANSPORTATION	buses, subway	LAND COST ('78 price)	land cost-US\$200,000/Ha. land development-US\$180,000/Ha. market value of developed land -US\$650,000/Ha.
SIZE	66.4 hectares		
SHAPE	irregular		
TOPOGRAPHY	maximum slope-30% minimum slope- 2%		
SOIL	sloped site-compact flat site-filled		



LOCALITY PLAN

0 100 500m
1:10000



PROJECT PROGRAM

	EXISTING	PROPOSED
TOTAL AREA	66.40 Ha.	66.40 Ha.
POPULATION	22,000 P.	33,000 P.
GROSS DENSITY	331 P./Ha.	497 P./Ha.
LAND UTILIZATION		
PUBLIC (streets, * ¹ open spaces)	41.68 Ha. (62.8%)	12.95 Ha. (19.5%)
SEMI-PUBLIC (open spaces, schools, community centers)	19.15 Ha. (28.8%)	15.48 Ha. (23.3%)
PRIVATE & SEMI-PRIVATE (dwellings, shops, factories, lots, cluster courts)	5.57 Ha. (8.4%)	37.97 Ha. (57.2%)
TOTAL	66.40 Ha. (100.0%)	66.40 Ha. (100.0%)
RESIDENTIAL AREA		
NUMBERS & TYPES OF DWELLINGS	6,280 units/5 story walk-ups	2,852 units/2 story row houses 2,121 units/3 story row houses 3,457 units/5 story walk-ups
TYPICAL LOT SIZE	-	6m x 15m
INDUSTRIAL AREA		
NUMBERS OF LOTS	-	137 lots
TYPICAL LOT SIZE	-	12m x 20m
INCOME GROUPS	low/middle	low
COMMUNITY FACILITIES	primary school, high school, kindergarten, hospital, post office, churches, markets, park, playgrounds, parking lots, social services (administration office, management office), fire and police department,	primary school, high school, hospital, post office, churches, markets, park, social services (administration office, management office), fire and police department
DEVELOPMENT METHODS	instant development, 2 stages	* ² progressive development, 3 stages

*1. open spaces which belong to the public or are not utilized, e.g. hills, rivers, left over spaces

*2. progressive development after provision of lots, services and basic dwelling structures

COMPARISON OF EXISTING AND PROPOSED PROJECTS

EXISTING SITE PLAN

The whole site is developed for 5 story walk-ups. There are basically four communities, and each of them has concentrated communal facilities. A hospital, a park, and a welfare center divide the site into two separate residential areas. The design does not allow extensive connections within the communities nor to other adjacent areas. Regardless of the characteristics of income groups, locations, and topography, the site has only one type of housing.

PROPOSED SITE PLAN

Three different housing types will be offered. The location of the different types is based upon the consideration of transportation and topography. Two story row houses are located on the hillsides, and 3 story row houses and 5 story walk-ups are located in the flat areas where transportation is convenient. At the initial stage, lots, services, and basic dwelling units will be provided. The standard of services and dwellings will be determined by the consideration of affordability. The site will be developed in three stages. The first stage will be an experimental development. In addition to residential lots, industrial lots for small light-industries are designed to increase employment.

EXISTING LAND USE AND CIRCULATION

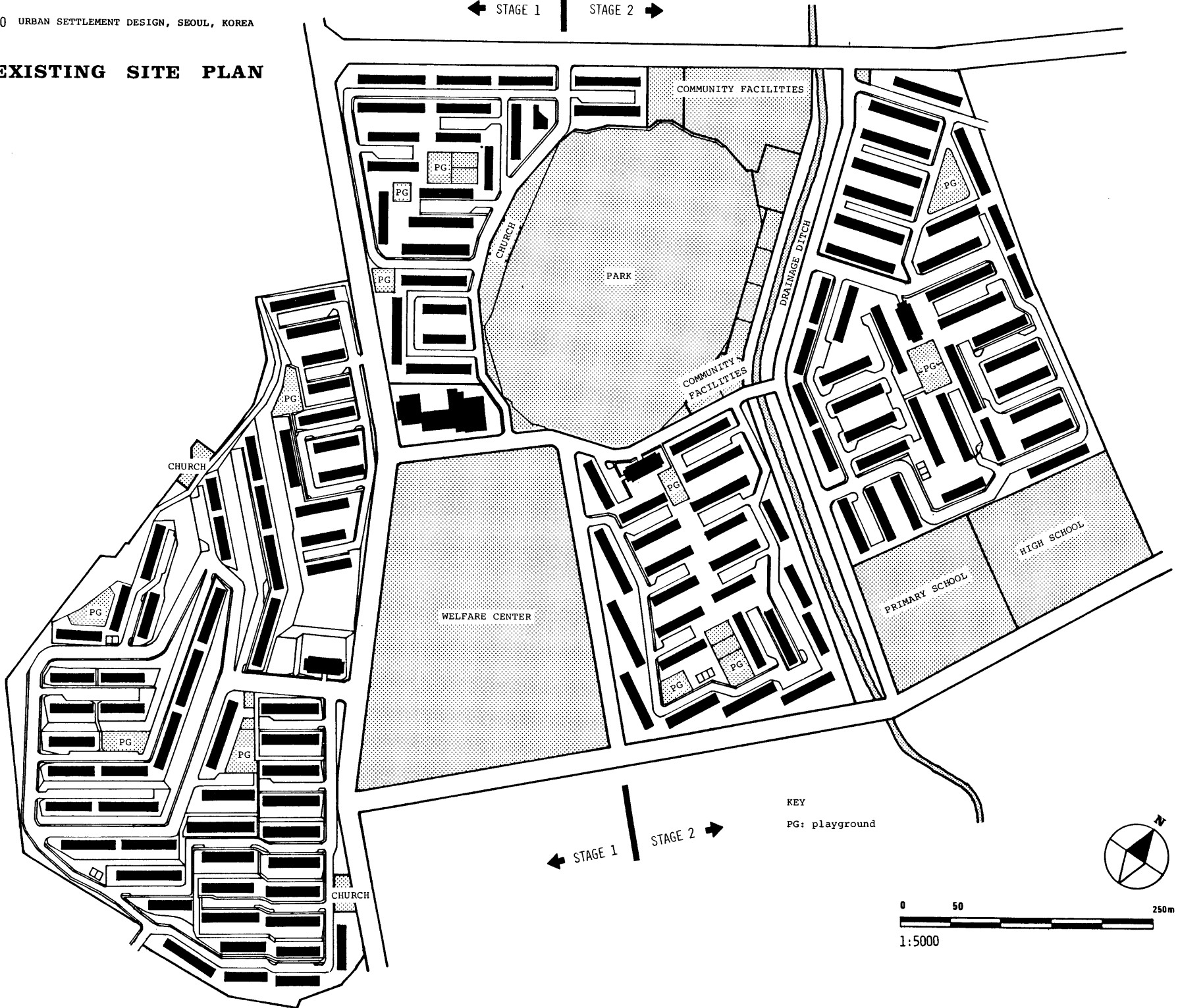
In addition to predominant residential areas, some areas are reserved for schools, markets, a welfare center, and a park. The locations of the reserved areas are not proper in terms of convenience and flexibility of land use. The location of schools is too remote to serve the whole site. The area for a welfare center is mislocated, because it will mainly serve the workers at the nearby industries. The location interrupts the integration of residential areas. In addition, commercial areas are so much concentrated that inhabitants become inconvenient and commercial activities are apt to be monopolized. All the streets are designed for vehicular circulation, but the circulation is usually very rare except for major streets. The layout based upon extensive vehicular circulation results in wasteful land and services.

PROPOSED LAND USE AND CIRCULATION

The areas reserved for schools and a welfare center are relocated at the middle and at the northeast of the site, respectively. The relocation leads convenient school attendance and strong integration of residential areas. The location of the park is not changed, because the hill cannot be developed for other uses because of the steep topography. Two centers are designed for extensive communal and commercial activities, but any lots facing the streets can be used for commercial activities. In addition to the main street in front of major commercial areas, the street connecting the two centers will be progressively developed for commercial areas. Playgrounds at the existing plan do not exist here, because children can play at a courtyard in each cluster. Public circulation is minimized, so that private and semi-private land control and utilization can be maximized.

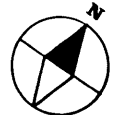
← STAGE 1 | STAGE 2 →

EXISTING SITE PLAN



KEY
PG: playground

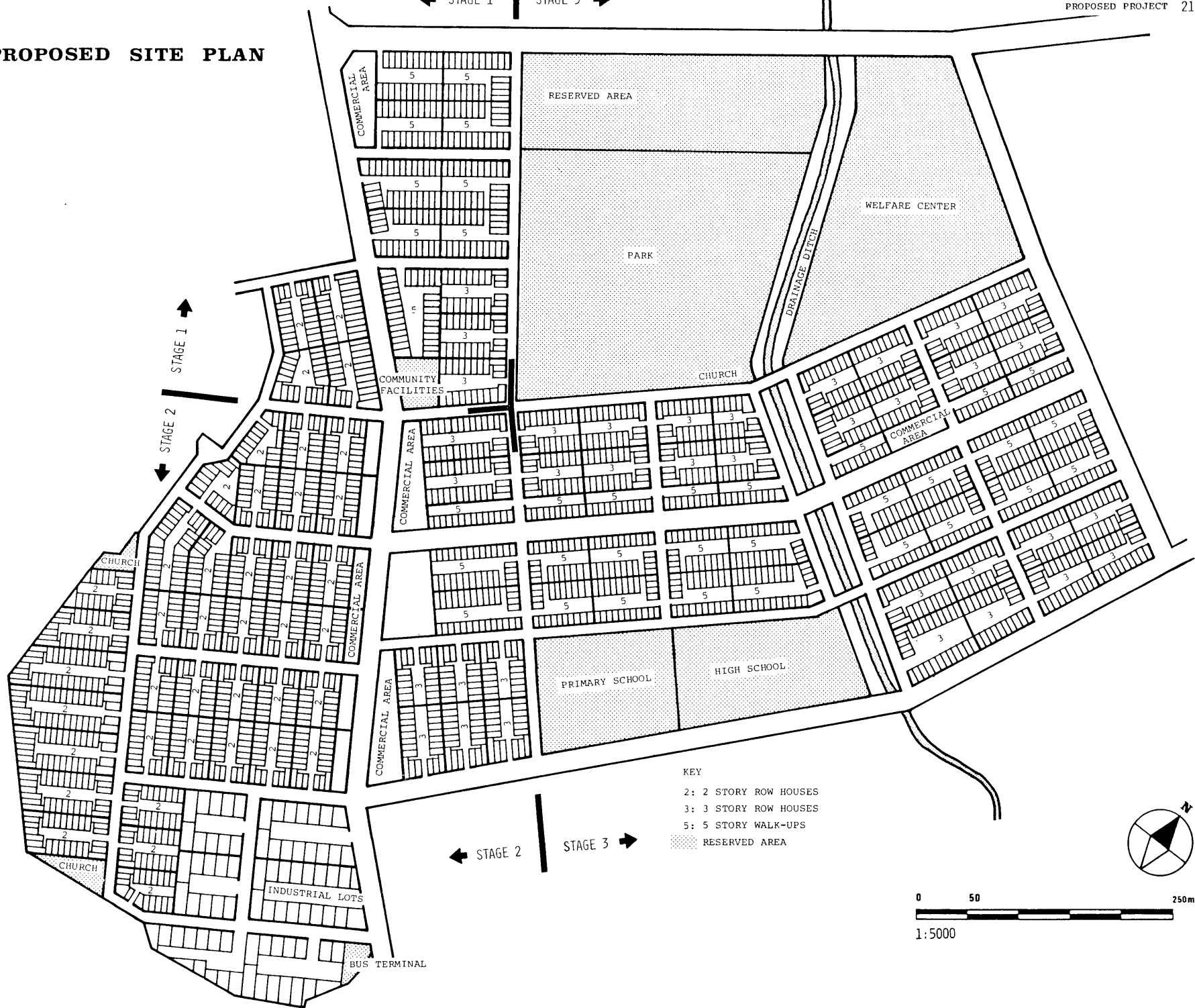
← STAGE 1 | STAGE 2 →



1:5000

PROPOSED SITE PLAN





← STAGE 1 | STAGE 3 →



**EXISTING
LAND USE PATTERN**

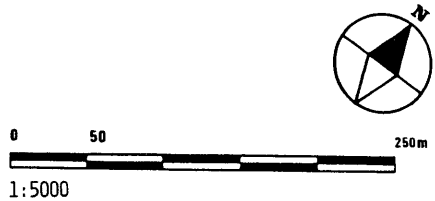


AREAS

	RESIDENTIAL
	COMMERTIAL
	INDUSTRIAL
	RESERVED/OPEN SPACES

KEY

B	Bus Terminal
Ch	Church
F	Fire Department
H	Health
HS	High School
Pa	Park
Pg	Playground
P	Police
PO	Post Office
PS	Primary School
SS	Social Services
WC	Welfare Center



**PROPOSED
LAND USE PATTERN**



AREAS

	RESIDENTIAL
	COMMERTIAL
	INDUSTRIAL
	RESERVED/OPEN SPACES

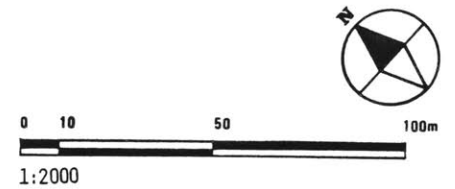
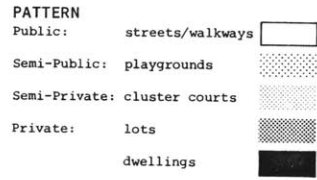
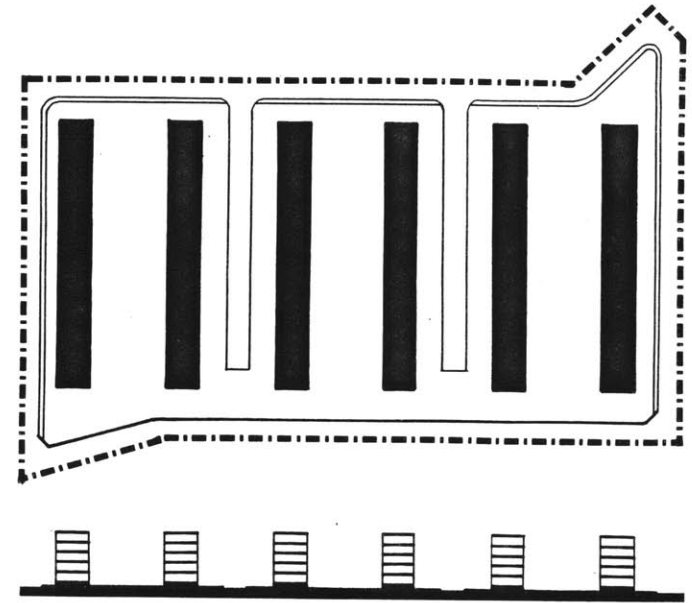
KEY

B	Bus Terminal
Ch	Church
F	Fire Department
H	Health
HS	High School
Pa	Park
P	Police
PO	Post Office
PS	Primary School
SS	Social Services
WC	Welfare Center



EXISTING BLOCK PLAN

This block has six 5 story walk-ups, open spaces, and streets. Land utilization of the block has proven to be totally inefficient, because most land within a condominium is designed not to be utilized. In addition to the inefficient utilization, the area can be misutilized, because public utilization of the area cannot be controlled by inhabitants. When they are not able to afford the expenses for the control and maintenance, the area will deteriorate. This project of 5 story walk-ups has produced underutilized and misutilized open spaces without increasing population density.



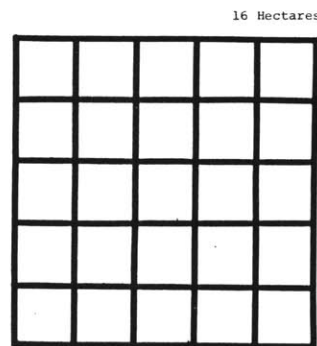
LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	-	-
DWELLING UNITS	300	1.69	178
PEOPLE	1,050	1.69	621
AREAS			
		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		1.39	82
SEMI-PUBLIC (open spaces, schools, community centers)		-	-
PRIVATE (dwellings, shops, factories, lots)		0.30	18
SEMI-PRIVATE (cluster courts)		-	-
TOTAL		1.69	100

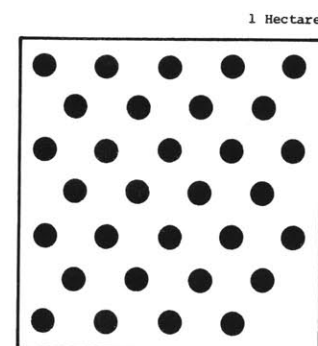
NETWORK EFFICIENCY
 Network length (streets, walkways) = 259 m/Ha
 Areas served (total area)

LOTS
 Average area, dimensions = -

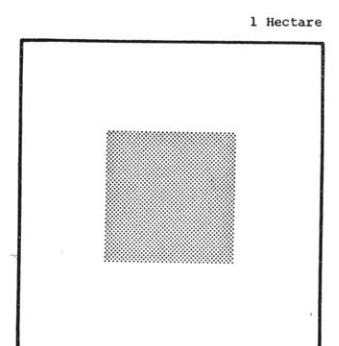
LAND UTILIZATION DIAGRAMS



CIRCULATION EFFICIENCY
 Meters/Hectare 259



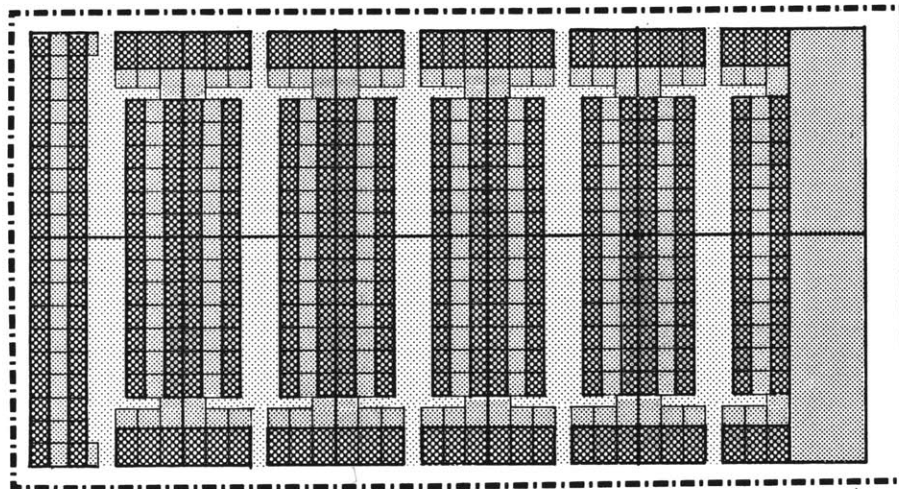
DENSITY Persons/Hectare 621
 20 Persons



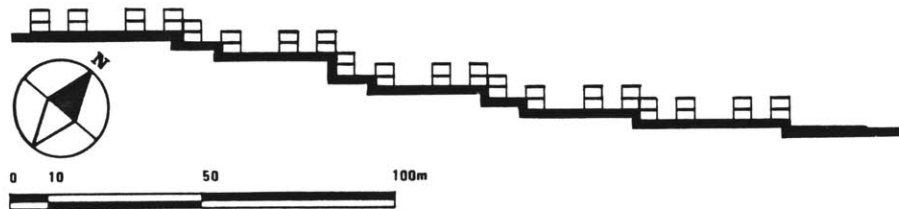
PERCENTAGES

Streets/Walkways	82
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	18

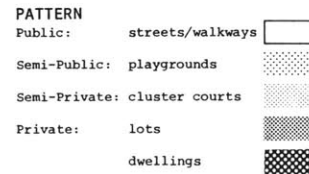
PROPOSED BLOCK PLAN I



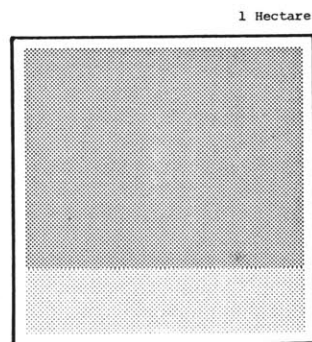
The block layout encourages inhabitants to assume maintenance responsibility. A cluster court, surrounded by lots, will be controlled by inhabitants, and will be utilized for children's play and communal activities. Each lot, intended for two families, will be utilized for family activities and future extensions. The ground floor inhabitants at lots facing the streets can open shops. This will be convenient to the community and beneficial to shop owners. The minimized public circulation helps to increase private and semi-private land which can be efficiently utilized.



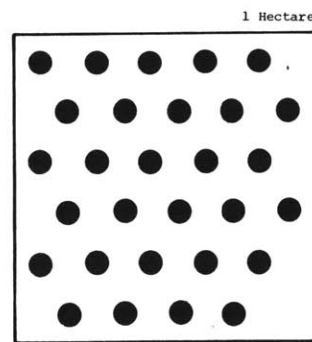
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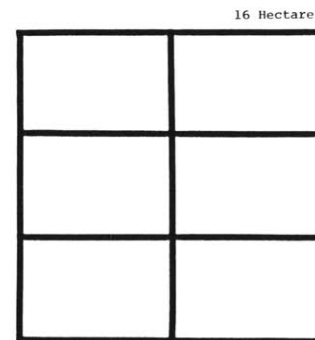
LAND UTILIZATION DIAGRAMS



PERCENTAGES	Streets/Walkways	14
	Playgrounds	-
	Cluster Courts	20
	Dwellings/Lots	66



DENSITY	Persons/Hectare	588
	20 Persons	



CIRCULATION EFFICIENCY	Meters/Hectare	123
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LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	192	2.91	66
DWELLING UNITS	380	2.91	131
PEOPLE	1,710	2.91	588

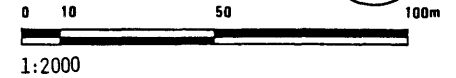
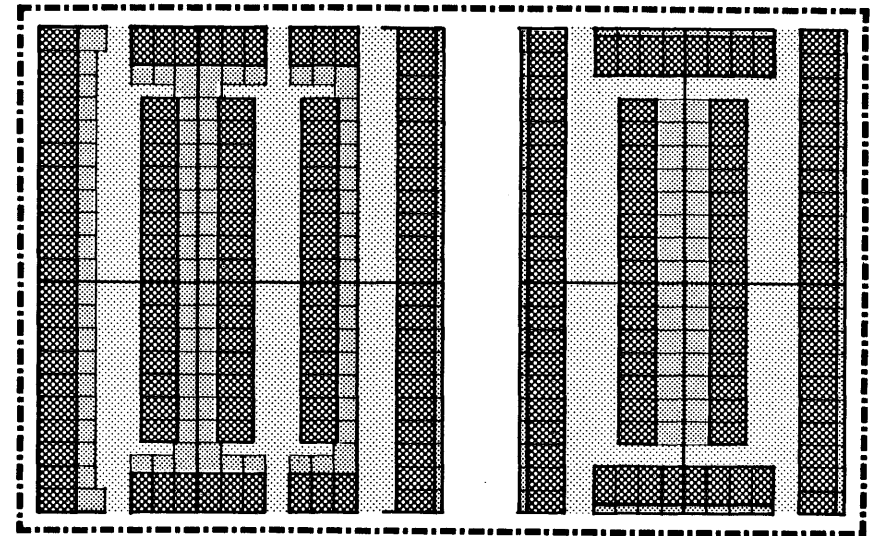
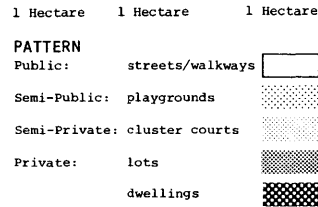
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.40	14
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	1.94	66
SEMI-PRIVATE (cluster courts)	0.57	20
TOTAL	2.91	100

NETWORK EFFICIENCY
 Network length (streets, walkways) = 123 m/Ha
 Areas served (total area)

LOTS
 Average area, dimensions = 101 m²

PROPOSED BLOCK PLAN II

The blocks will be developed for 5 story walk-ups and 3 story row-houses. The basic concept of land utilization and circulation in Block Plan II is the same as in Block Plan I. The provision of 5 story walk-ups increases population density where transportation is convenient. Open spaces at lots will be utilized by the first floor inhabitants. Small plots facing streets can be utilized when first floor inhabitants open shops.



LOCALITY BLOCK LAND UTILIZATION DATA

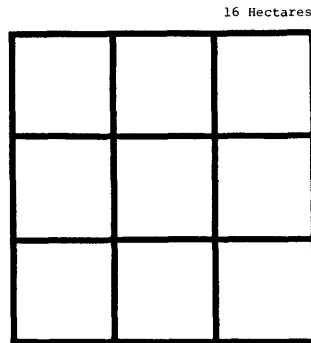
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	173	3.05	57
DWELLING UNITS	793	3.05	261
PEOPLE	2,776	3.05	910

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.60	20
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	1.66	54
SEMI-PRIVATE (cluster courts)	0.79	26
TOTAL	3.05	100

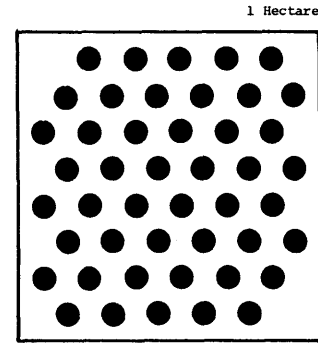
NETWORK EFFICIENCY
 Network length (streets, walkways) = 163 m/Ha
 Areas served (total area)

LOTS
 Average area, dimensions = 96 m²

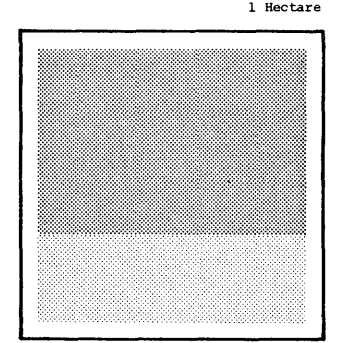
LAND UTILIZATION DIAGRAMS



CIRCULATION EFFICIENCY
 Meters/Hectare 163



DENSITY Persons/Hectare 910
 ● 20 Persons



PERCENTAGES

Streets/Walkways	20
Playgrounds	-
Cluster Courts	26
Dwellings/Lots	54

COMPARATIVE EVALUATION

Three types of housing developments are evaluated in terms of land utilization, circulation efficiency, maintenance responsibility, development methods, income groups, and social integration. What follows is the definition and evaluation of the developments.

DEFINITION

1. EXISTING DEVELOPMENTS

(previous projects, mainly developed before 1970)

- Housing types: detached, few row-houses.
- Land utilization: private, public.
- Circulation systems: gridiron layout.
- Land tenure: private ownership.

2. NEW DEVELOPMENTS

(current typical housing projects)

- Housing types: 5-story and high-rise apartments.
- Land utilization: public, semi-public.
- Circulation systems: grid, gridiron layout.
- Land tenure: condominium ownership.

3. PROPOSED DEVELOPMENT

(proposed project in this thesis)

- Housing types: row-houses, walk-ups.
- Land utilization: private, semi-private, public, semi-public.
- Circulation system: grid layout.
- Land tenure: condominium ownership.

EVALUATION

1. LAND UTILIZATION

-EXISTING DEVELOPMENTS: Private lots are efficiently utilized for family activities such as clothes drying, food and fuel storage, and children's play areas. In the case of informal housing, streets are very narrow and often utilized for extensions of family activities. In the case of public housing developments, all streets are generously designed for vehicular circulation, but they are underutilized.

-NEW DEVELOPMENTS: New projects usually have large, undefined open spaces which are hardly utilized. In addition to the undefined open spaces between buildings, large areas are allocated for vehicular circulation and parking. These areas are usually used as playgrounds instead of the intended parking and circulation. The large areas of open spaces and streets lead to the underutilization and misutilization of land.

-PROPOSED DEVELOPMENT: Lots in the proposed project will be utilized for future extensions and family activities. A cluster court surrounded by lots will be utilized as a children's playground and communal activities. The utilization of the courtyard is not interrupted by public uses, because the physical layout prevents public passage and intrusion. The concurrence between land utilization and ownership leads to efficient land control.

2. CIRCULATION EFFICIENCY

-EXISTING DEVELOPMENTS: Basic circulation systems

in existing developments are grid layout oriented. Since lot areas and ratios are small, the area and length of streets become excessive. Consequently, circulation systems are inefficient, infrastructure costs become expensive, and less land can be utilizable.

-NEW DEVELOPMENTS: New developments usually have shorter unit circulation lengths than existing developments. However, too much land is allocated to vehicular circulation. In fact, streets are utilized for children's play areas rather than vehicular circulation. The inefficient circulation system results in a waste of land and services.

-PROPOSED DEVELOPMENT: Circulation systems in the proposed development consist of transit and access streets, which serve the public and cluster inhabitants respectively. The access streets are replaced by cluster courts which are controlled and utilized by inhabitants. Consequently, street lengths and areas are not excessive. More land can be controlled and utilized by inhabitants.

3. MAINTENANCE RESPONSIBILITY

-EXISTING DEVELOPMENTS: Private areas are usually well maintained. Inhabitants immediately respond to any problems of services in the private area. However, public areas are not well maintained, because public sectors are usually not as responsible as the private sectors in maintenance. Sometimes, neighbors participate in street cleaning, but their efforts diminish when circulation becomes heavy.

-NEW DEVELOPMENTS: Since most new developments are condominiums, inhabitants pay all the expenses for the maintenance and control of streets and open spaces within a condominium. In the case of middle and high-income communities, open spaces and streets are well maintained, because inhabitants pay high maintenance expenses. However, low-income communities are not well maintained, because low-income inhabitants are not able to pay the high expenses. Moreover, the open spaces and streets are not able to be maintained by the inhabitants themselves, not only because public intrusion into their private land is not controlled, but also because the inhabitants share excessively large pieces of land.

-PROPOSED DEVELOPMENT: The maintenance responsibility of open spaces is an important issue in the proposed project. Since low-income inhabitants are not able to afford high maintenance expenses, the proposed project is designed to encourage the inhabitants to be responsible for the maintenance of their own environments. First, public areas are minimized, because public efforts for the maintenance are usually minimum. Second, land is subdivided into sizes which can be controlled and maintained by the inhabitants themselves. They have private and semi-private land, which will be maintained by an individual family and a small group of inhabitants.

4. DEVELOPMENT METHODS

-EXISTING DEVELOPMENTS: Most previous housing has progressively developed and transformed to meet

social and economic changes. The improvement of the economic level has led to the progressive improvement of dwellings and infrastructure. People also have built extensions or changed partitions to allow more rooms for their children or tenants.

-NEW DEVELOPMENTS: Most new projects have been instant housing developments. The developments become so expensive that the low-income sectors who are actually suffering from deteriorated housing conditions cannot afford the new housing. Currently, large numbers of new housing units are not even occupied after the new developments. This indicates, in part, that the new housing is so expensive that the majority of people cannot afford it.

-PROPOSED DEVELOPMENT: The proposed project intends to minimize initial costs and consider the affordability of low-income groups. After the acquisition of lots, services, and basic dwelling units at an initial stage, inhabitants will improve or finish their dwelling units and some communal facilities. The improvement will be done progressively by utilizing individual efforts. The purpose of this type of development is to lower initial costs as well as to mobilize individual resources.

5. INCOME GROUPS

-EXISTING DEVELOPMENTS: Since existing communities have developed progressively, income groups within a community are mixed. Some low-income households open shops or work for higher-income families in the same community. Thus, the income group mixture

has led to a self-sustainable community, and it has been beneficial to both income groups.

-NEW DEVELOPMENTS: The provision of the same housing units on a big site has resulted in a homogeneous income group. The income level within a community is so similar that inhabitants usually do not work for each other. Consequently, a community becomes so dependent on other communities that people have to commute long distances. Moreover, income groups cannot be mixed even in the future, because individual changes and improvement of dwelling units are not allowed. The new projects, therefore, result in the strong segregation of income groups.

-PROPOSED DEVELOPMENT: The proposed project primarily serves low-income groups. At the initial stage, however, different types of housing will serve different income groups within the low-income sectors. Moreover, when the community continues to develop progressively, the income level of each household will vary like in the case of existing developments.

6. SOCIAL INTEGRATION

-EXISTING DEVELOPMENTS: Social integration in existing communities is so poor that inhabitants do not know each other and are not organized. One of the reasons for the poor integration is that a community does not have any places to share and any issues to deal with. The poor integration results in no responsibility for the control and

improvement of their surroundings.

-NEW DEVELOPMENTS: Inhabitants in an apartment building are usually well organized. Despite the strong organization, they usually do nothing for the improvement and control of their community. The reason is that the community size is too big to be controlled by themselves.

-PROPOSED DEVELOPMENT: Inhabitants in each cluster will be a basic social organization. Since the cluster courts will be shared by a small group of inhabitants who own the area, social integration can be very strong and active. Consequently, this integration leads to sound environments which can be controlled and maintained efficiently, even though the population density is very high.

SUMMARY OF COMPARATIVE EVALUATION

	EXISTING DEVELOPMENTS	NEW DEVELOPMENTS	PROPOSED DEVELOPMENTS
LAND UTILIZATION ^{*1}			
public area	poor (misutilized, underutilized)	poor (misutilized, underutilized)	good (minimized, efficient)
semi-public area	almost none	fair (sometimes underutilized)	good
private area	good (fully utilized)	none	good (fully utilized)
semi-private area	none	none	good (fully utilized)
CIRCULATION EFFICIENCY	poor (long)	fair (medium)	good (short)
MAINTENANCE RESPONSIBILITY			
public area	public sectors	co-users	public sectors
semi-public area	-	co-users	responsible organization
private area	individual	-	individual
semi-private area	-	-	co-users
MAINTENANCE COSTS ^{*2}	low	high	low
DEVELOPMENT METHODS	progressive/instant	instant	progressive
INITIAL DEVELOPMENT COSTS	medium	high	low
INCOME GROUPS	mixed	middle or high	low
SOCIAL INTEGRATION	poor	fair	good

*1. the land utilization of open spaces and streets

*2. the maintenance costs for inhabitants

CONCLUSIONS

The housing situation in Seoul will not improve without the provision of adequate housing for the low-income groups, because they are the majority of population suffering from deteriorated dwelling conditions. The economical utilization of land and services and the consideration of affordability are imperative for the adequate housing developments.

Most existing settlements have significant problems in land utilization and circulation efficiency. Despite narrow streets, large portions of land are allotted for public circulation due to small blocks having gridiron layouts. Consequently, land is not efficiently utilized or it is sometimes misutilized as semi-private and semi-public areas. In case of current walk-up apartment projects, the provision of unutilized open spaces results in a waste of land and services. Moreover, instant housing developments increase initial costs and discourage the utilization of individual resources.

What follows is the bases for the proposed project in this thesis and should also be considered for future low-income housing developments.

First, efficient land utilization is essential, particularly when population density is high. Private and semi-private areas should be maximized to increase land utilization efficiency and maintenance responsibility. Public areas should be minimized except for essential public circulation. Open spaces should be designed to be controlled by inhabitants themselves, so that the area can be extensively utilized and maintained.

Second, circulation systems are important, not only because circulation length determines the economy of infrastructure layouts, but also because efficient land utilization depends on circulation patterns. Circulation length can be minimized when block sizes are big and lots are deep. Grid layouts have advantages that dead-end streets can be replaced by courtyards, when they are properly designed. Courtyards become open spaces which can be utilized as playgrounds and serve as accesses to each dwelling.

Third, the consideration of affordability is also important for the provision of low-income housing. As the public housing finance is minimum, initial costs should be minimized. High density housing is also necessary in order to decrease per capita cost of land and services. Thus, it is desirable to provide lots, services and basic dwelling structures at the initial stage. Inhabitants will progressively improve their dwelling units according to the changes of economic levels. The details of the initial services and structures will be determined by the consideration of the affordability of target income groups.

APPENDIX

This section provides complementary references which have been used as the basis for the analysis and evaluation of the low-income dwelling environments in Seoul and the design of the proposed project.

The section consists of the following four parts:

- 1) NATIONAL CONTEXT: KOREA
- 2) URBAN CONTEXT: SEOUL
- 3) CASE STUDIES: FOUR LOCATIONS IN SEOUL
- 4) COMPARATIVE SUMMARY

NATIONAL CONTEXT

KOREA

PRIMARY INFORMATION: Korea is on a peninsula situated in the Far East, between Japan and China, latitude between 33° 06' and 43° 11', longitude between 124° 11' and 130° 52'. The country is mountainous, with a rugged east coast. The west and south coasts are deeply indented, with many islands and harbors. The climate has distinctive four seasons, with hot and rainy summers lasting from June to August, and with cold and dry winters lasting from December to February. In the late summer, typhoons come with heavy rainfall and cause serious floods on agricultural and urban areas.

HISTORY: A homogenous ethnic group settled in the Korean Peninsula 5,000 years ago. However, the recorded history dates back to 1st century B.C. The country was united in a kingdom under the Silla Dynasty in 668 AD. The Koryo and Yi Dynasties succeeded the kingdom in 918 AD and in 1392 AD, respectively. The Yi Dynasty was taken over by Japan in 1910, and remained under its control for 36 years. At the Potsdam Conference in 1945, the 38th parallel was designated as the line dividing the Soviet and American occupation. The South Koreans founded the Republic of Korea in 1948 with Seoul as the capital. In 1950, the North Korean army initiated the Korean War and tried to conquer the South. After 3 years of fighting, a cease-fire was proclaimed.

GOVERNMENT: Korea is a democratic republic. The government consists of executive, legislative, and judicial branches. There are 9 provinces and 4 special cities which form municipal governments. Power is highly concentrated in the central government whose control of housing and urban developments have been important and effective.

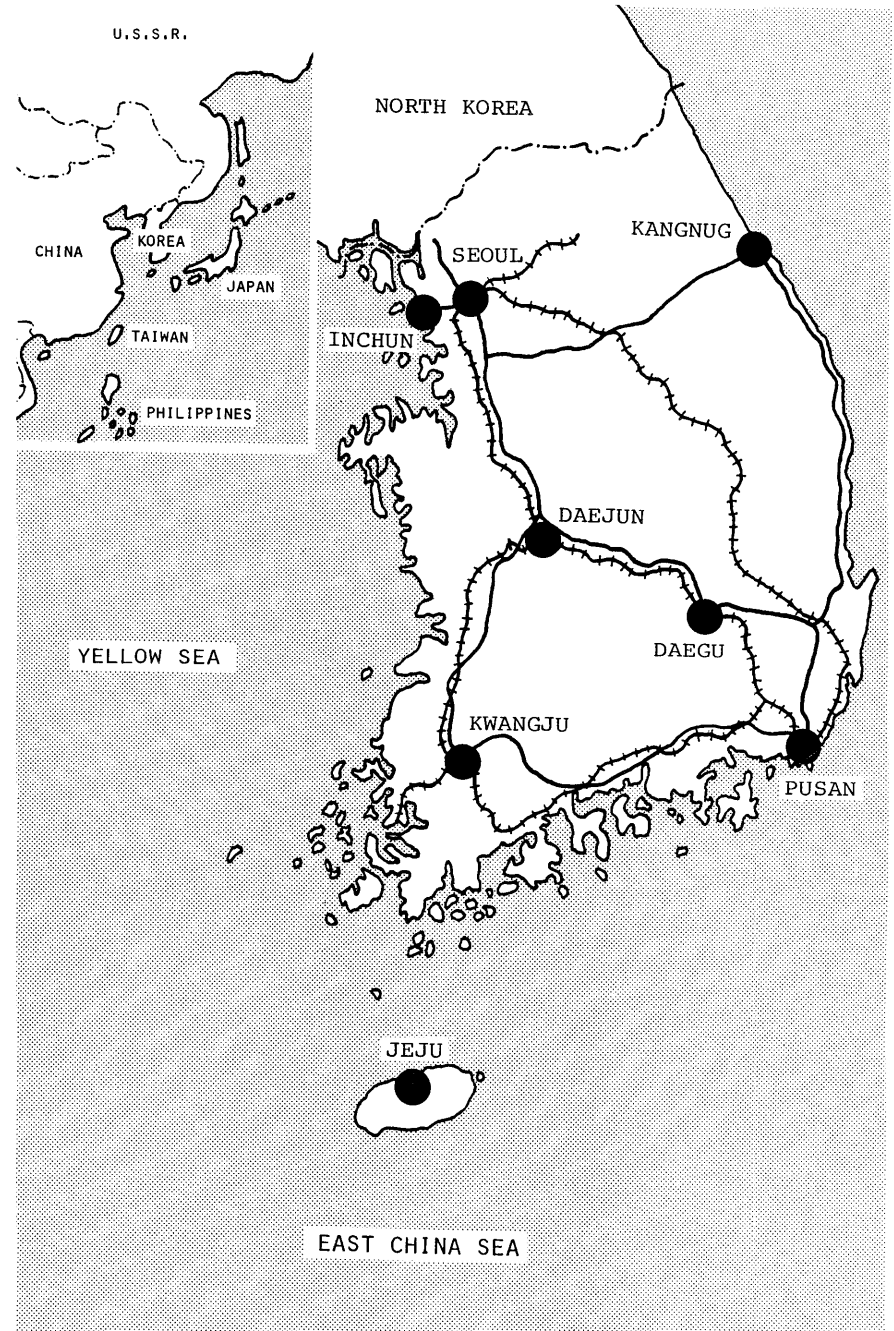
ECONOMY: In 1978, per capita GNP stood at US \$1,160, with the annual growth rate of 7.6%, and the gross domestic product, US \$42.5 billion. Growth has been remarkable, due in part to comprehensive economic development planning since 1962. As natural resources are scarce, labor intensive industries are prevalent. Major industries produce electronics, textile goods, ships, cars, rubber, oil products and steel.

DEMOGRAPHY: In 1978, the population was about 37 million with an annual growth rate of 1.6%. Population density was about 380 persons per square kilometer. Recently the growth rate has slowed, but the urban population has still increased very rapidly. In 1978, approximately one half of the population was in urban areas.

SOCIO CULTURAL: The population basically consists of a homogenous ethnic group. Buddhism and Confucianism are the major religions. 16% of the population are Christians. The literacy rate in 1977 was 91%. People are generally well disciplined and have a strong social integration.

SOCIO ECONOMIC: The lowest income groups are concentrated in rural areas and in the informal settlements in urban areas. 43% of the population relies on agriculture, and 21% of them on manufacturing in 1978.

HOUSING: In 1978, about 5.24 million dwelling units were shared by about 6.23 million households. Housing investment was US \$3.3 billion, almost 6% of GNP. The investment continuously increased since national housing development plans were proclaimed in 1961. The housing shortage has been concentrated in the major cities due to rapid urbanization.



URBAN CONTEXT SEOUL

PRIMARY INFORMATION: Seoul is located at the lower course of the Han River, at latitude 37° 37' and longitude 127°. It is situated within 50 kilometers from the Yellow Sea and North Korea. The city is surrounded by mountains, flat areas are scarce. The climate in Seoul is rigorous in winter, and hot and rainy in summer. The average temperature is -2.8°C in January, and 25.5°C in August. 70% of the annual precipitation is concentrated in the summer.

HISTORY: Seoul has been the capital since it was founded by the Yi Dynasty in 1394. The city did not grow very fast until it became the center of modern industrial and commercial development in the 20th century. It was devastated during the Korean War between 1950 and 1953. After the war, it was rebuilt and became the center of highly centralized political, commercial, industrial, and educational activities. Since most facilities and activities are concentrated in Seoul, the city attracts people from rural areas and the smaller cities.

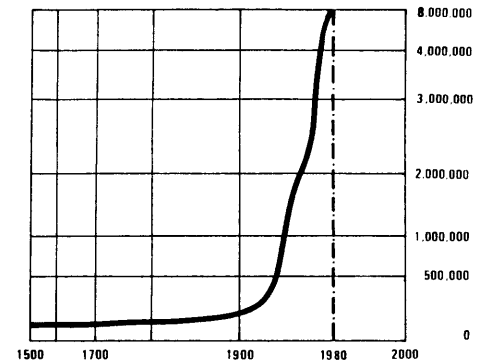
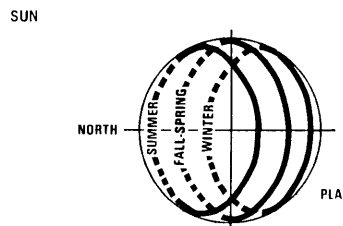
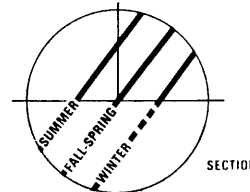
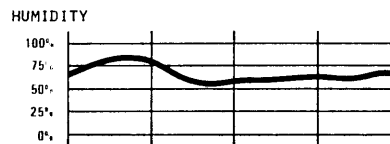
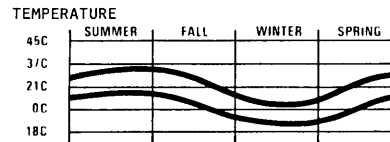
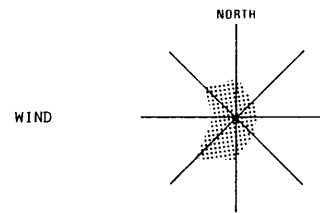
ECONOMY: Since the government role of the economy has been important, Seoul as the capital city has been the center of commerce and industry. Main offices of most financial in-

stitutes and large industries are located here. Major industries in the metropolitan area produce consumer goods such as electronics, clothes, cars, and steel products. In 1978, the average household income in Seoul was estimated at US \$3,960.

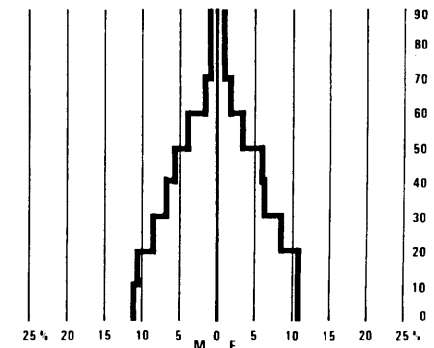
DEMOGRAPHY: In 1978, the population in Seoul was about 7.82 million with the annual growth rate of 3.85%. The metropolitan population approached 12 million, almost one third of the national population. The population growth has been enormous since 1955, when the population barely reached 1.57 million. The time when the growth rate slowed down from its highest point, 9.81% in 1970, but it is still much higher than the national growth rate of 1.6%. The high growth rate mainly results from migration from rural areas and small cities.

GOVERNMENT: The Seoul Municipal Government consists of 14 district offices. The municipality and district offices plan and control urban and housing developments in the metropolitan area. Most large projects are strictly controlled by the Municipal Government. The municipality is the only institute that is in charge of low-income housing development and slum clearance projects.

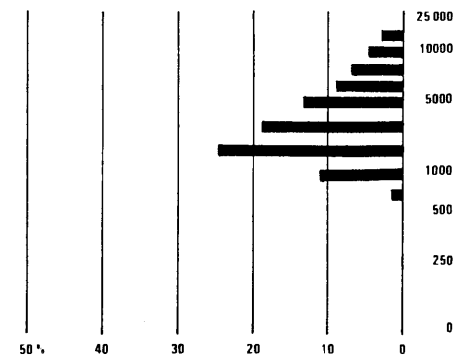
SEOUL LATITUDE 37° 37'



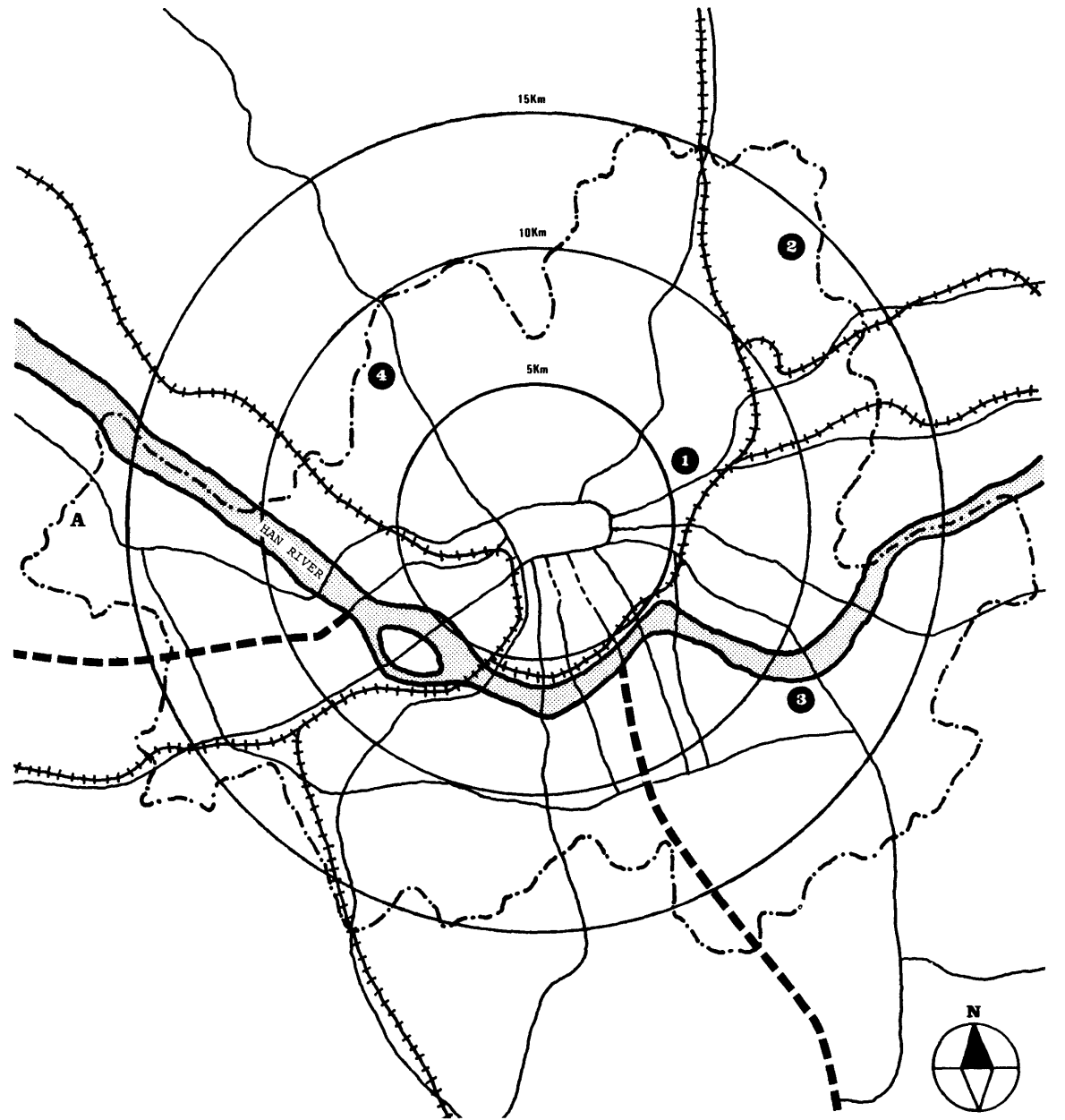
URBAN POPULATION GROWTH
horizontal: dates vertical: population
Source: Seoul Special City, THE HOUSING WHITE BOOK, 1979



URBAN POPULATION DISTRIBUTION
horizontal: percentages vertical: ages
males: M females: F
Source: Planning Board, A HOUSING MODEL STUDY
Seoul, 1979



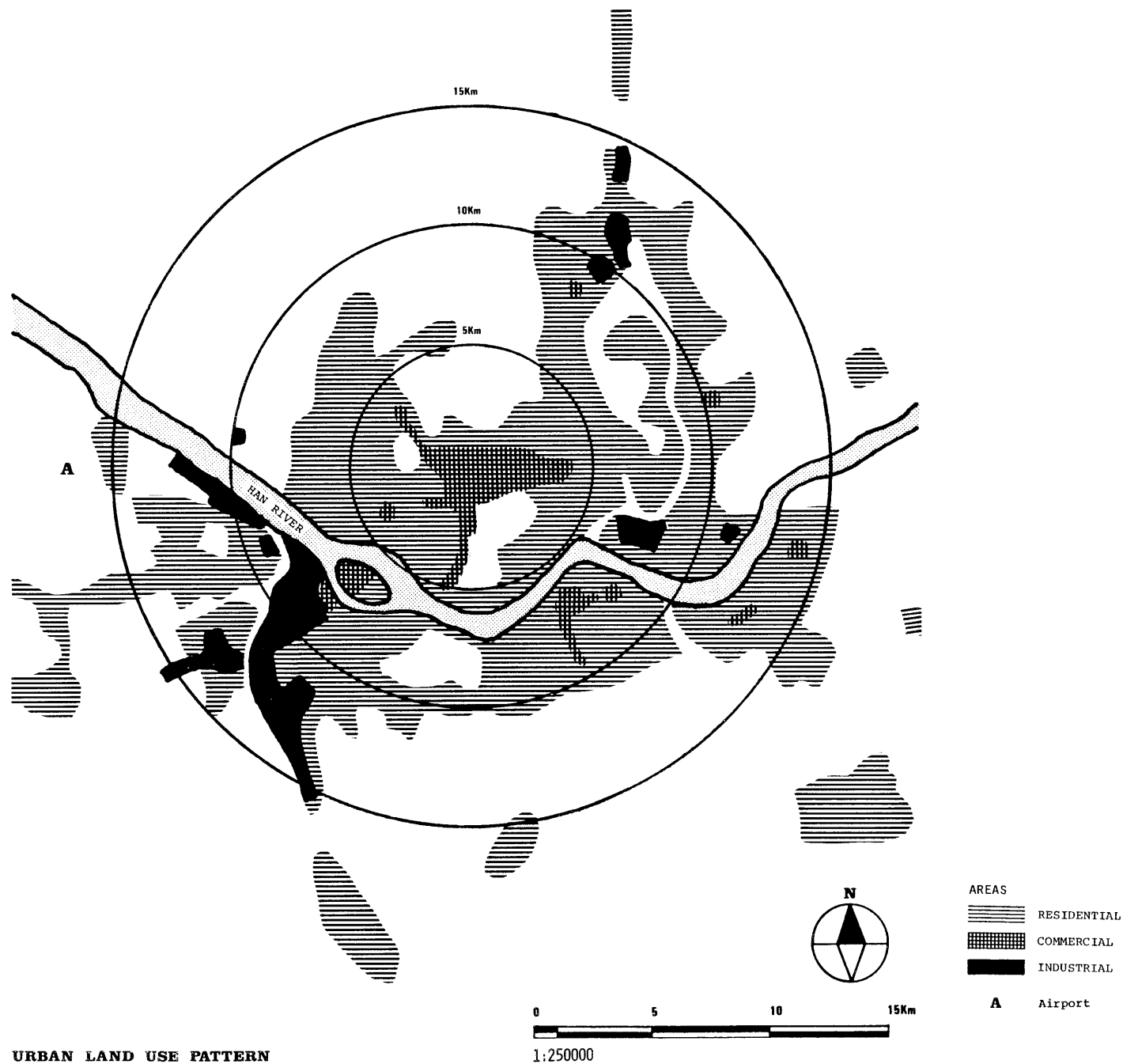
URBAN ANNUAL INCOME DISTRIBUTION
horizontal: percentages vertical: dollars
Source: National Bureau of Statistics, Korea, 1979



- KEY
- A** Airport
 - Primary Road
 - +—+— Railroad
 - — — — Expressway
 - ① Chunryungri
 - ② Sanggaedong
 - ③ Jamsil
 - ④ Galhyundong

URBAN CIRCULATION







CASE STUDIES

The following section contains case studies of selected dwelling environments within the city of Seoul. The case studies have been selected on the basis of income group, housing type and location. The selected case studies are representative of the major dwelling systems of the low and moderate-income groups. 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 proposed 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).

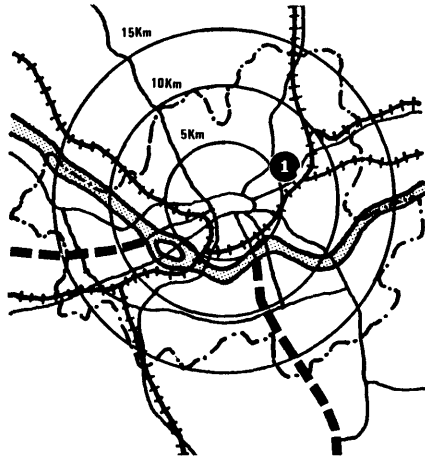
DWELLING UNIT: A typical self-contained unit for an individual, a family or a group is selected in each locality segment.

The case studies are arranged as follows:

- 1) CHUNGRYUNGRI: ROW HOUSES, LOW-INCOME
- 2) SANGGAEDONG: SQUATTERS, LOW/VERY LOW-INCOME
- 3) JAMSIL: WALK-UP APARTMENT, LOW/MODERATE INCOME
- 4) GALHYUNDONG: DETACHED HOUSES, MODERATE-INCOME

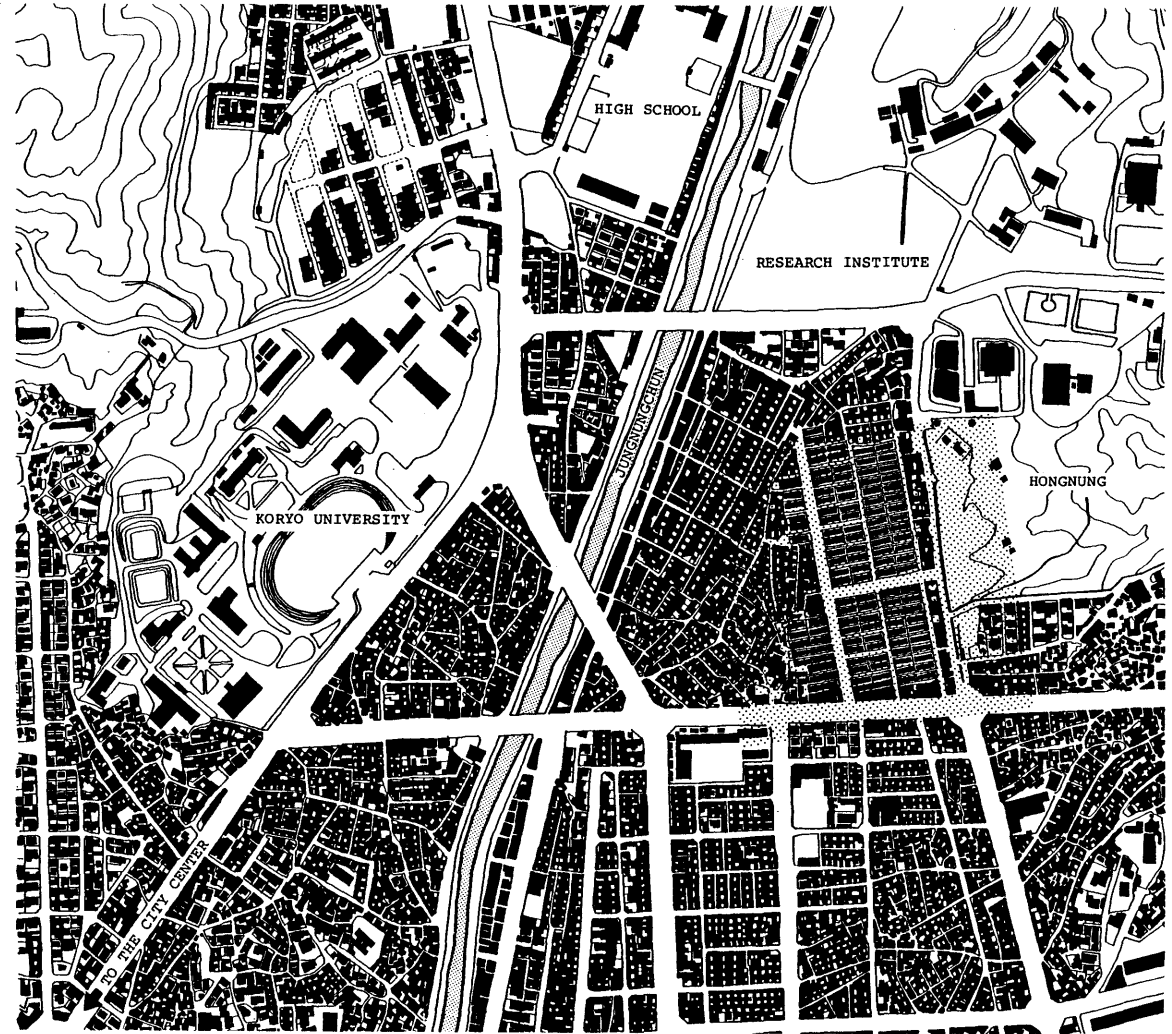
1 CHUNGRYUNGRI

LOW-INCOME, ROW HOUSES

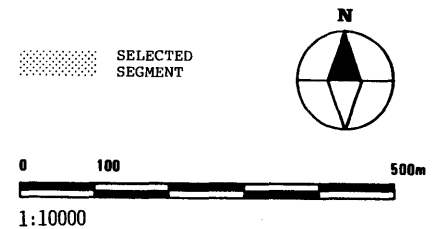


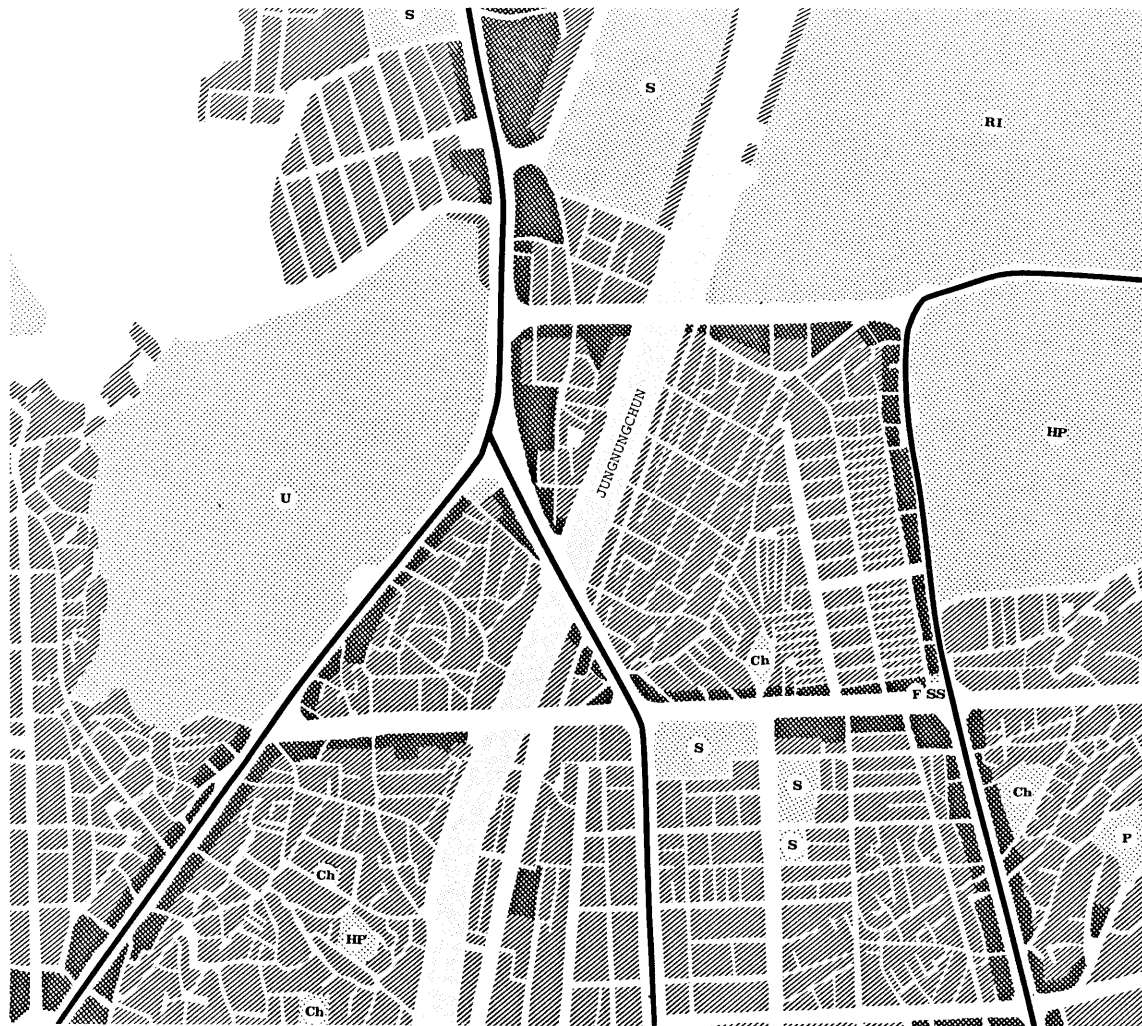
LOCATION: The area is located in the inner-ring of the city. It is adjacent to the eastern center of the city where a railroad station, bus terminals, and major markets are located.





ORIGIN: Chungryungri row housing project was built by the Korean Housing Corporation in 1957. 238 dwelling units were developed in 2 stages to alleviate the severe housing shortage resulting from the devastation during the Korean War. At that time, the area was a periphery of the city with surrounding of agricultural areas. The area developed fast, because east and south bound transportation originated from this area. Recently, the area became highly populated because of convenient transportation and intensive commercial activities.



LOCALITY PLAN





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

LOCALITY LAND USE PATTERN





LAYOUT: Residential areas are bounded by a research institute and a high school to the north, a historical place to the east, a university campus and hills to the northwest. A deep ditch in the middle of the area divides the residential areas. Since the area has developed both formally and informally, layout patterns are diverse. Major streets were recently widened and reconstructed for extensive vehicular circulation. The layout of most secondary streets is very irregular, therefore circulation is not efficient. Sometimes, even emergency vehicles have no access into the area.

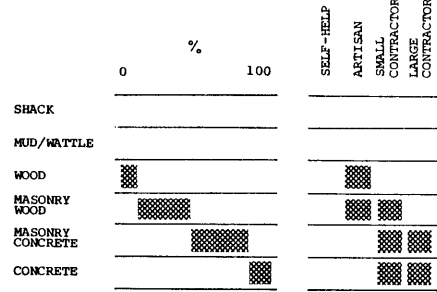
LAND USE: Residential areas are surrounded by public and semi-public facilities. The residential areas mainly serve the people working at the nearby market places. In addition to the market places, commercial areas are located along major streets. Small retail stores and shops are found throughout the residential areas.

CIRCULATION: Vehicular circulation is concentrated in the major streets. Secondary streets usually serve only pedestrians. Circulation in the secondary streets is extremely difficult, because the streets are very narrow and sometimes utilized as playgrounds.

KEY

- Pk** Parking
- P** Police
- F** Fire Department
- S** School
- Ch** Church
- RI** Research Institute
- L** Library
- U** University
- H** Health
- PO** Post Office
- SS** Social Services
- M** Market
- HP** Historical Place
-  Bus
-  Rapid Transit

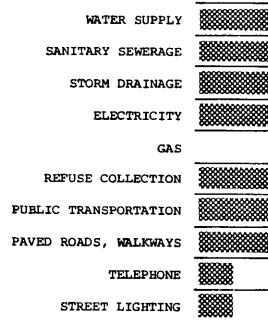
LOCALITY CONSTRUCTION TYPES



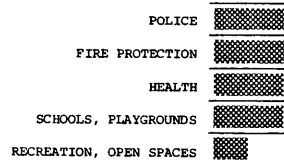
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



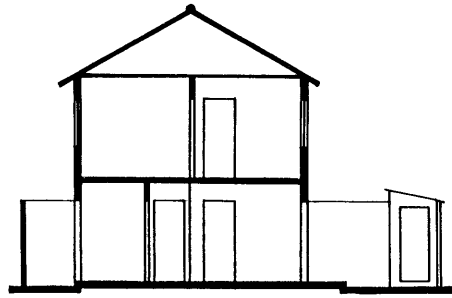
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

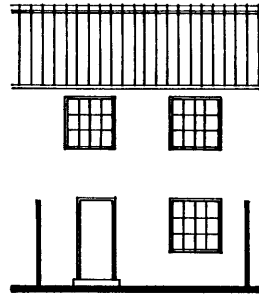


LOCALITY SEGMENT PLAN

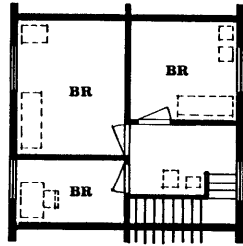
1:2500



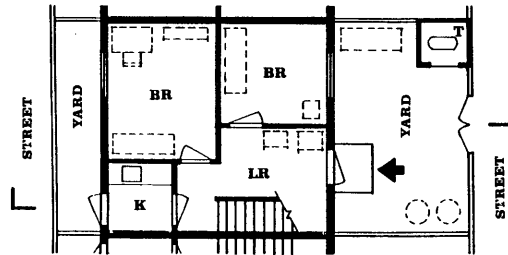
SECTION



ELEVATION



SECOND FLOOR PLAN

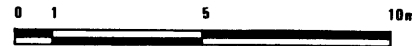


GROUND FLOOR PLAN

TYPICAL DWELLING

KEY

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



1:200

CASE STUDY SOURCES:

- Locality plan: (accurate) Seoul City Government
- Land Use Pattern: (approximate) City Master Plan, Survey by Author, 1981
- Locality Segment Plan: (accurate) Seoul City Government
- Locality Block Plan: (accurate) IBID
- Block Land Utilization: (accurate) Survey by Author, 1981
- Typical Dwelling: (approximate) IBID
- Socio-economic Data: (approximate) IBID
- Photographs: Author, 1981
- General Information: Survey by Author, 1981

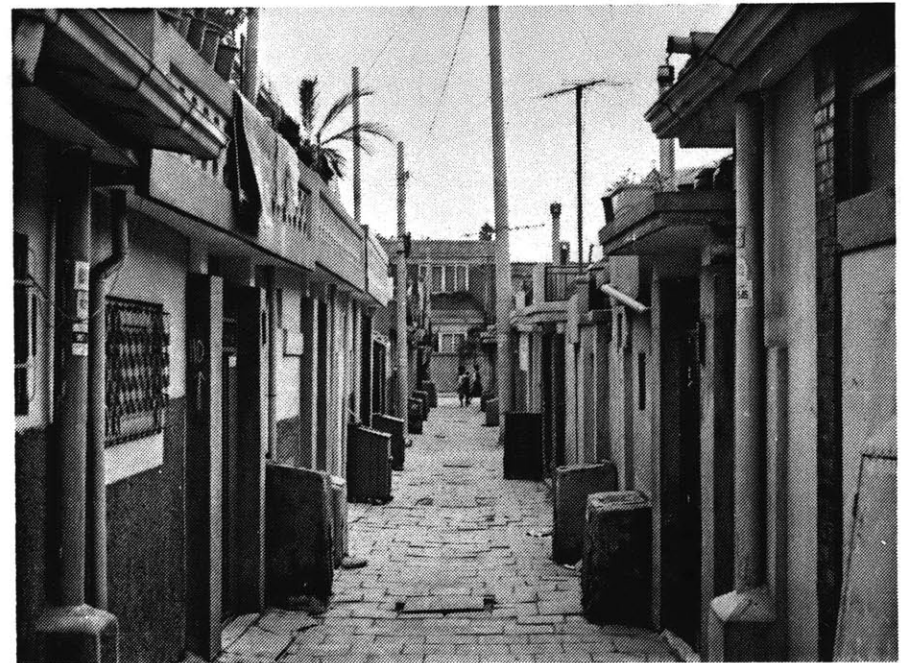
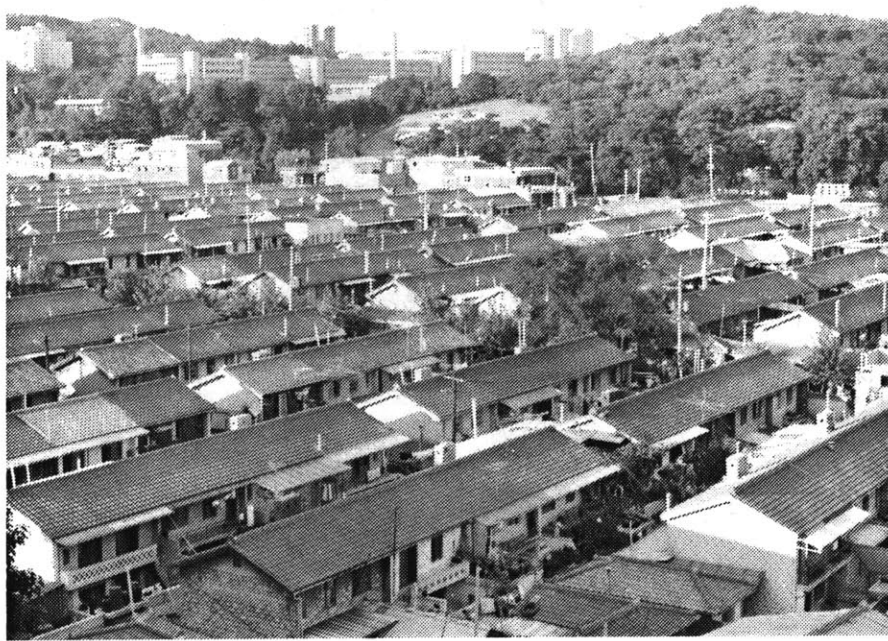
PHOTOGRAPHS: (OPPOSITE PAGE, CLOCKWISE FROM TOP LEFT)
 1. General view of the 'CHUNGRYUNGRI ROW HOUSING PROJECT'; note extensions, particularly on the ground floors. 2. Street, usually utilized as playground rather than circulation. 3. A narrow walkway, with very little public circulation. 4. Private utilization of the street, which became a storage space of shops and dwellings.

PHYSICAL DATA
 (related to dwelling and land)

- DWELLING UNIT
 - type: HOUSE
 - area (sq m): 68
 - tenure: LEGAL OWNERSHIP
- LAND/LOT
 - utilization: PRIVATE
 - area (sq m): 60
 - tenure: LEGAL OWNERSHIP
- DWELLING
 - location: INNER RING
 - type: ROW
 - number of floors: 2
 - utilization: MULTIPLE
 - physical state: FAIR
- DWELLING DEVELOPMENT
 - mode: INSTANT
 - developer: PUBLIC
 - builder: LARGE CONTRACTOR
 - construction type: MASONRY-CONCRETE
 - year of construction: 1957
- MATERIALS
 - foundation: CONCRETE
 - floors: MUD/STONE/WOOD
 - walls: BRICK
 - roof: WOOD/ROOF TILE
- DWELLING FACILITIES
 - wc: 1
 - shower: -
 - kitchen: 1
 - rooms: 5
 - other: -

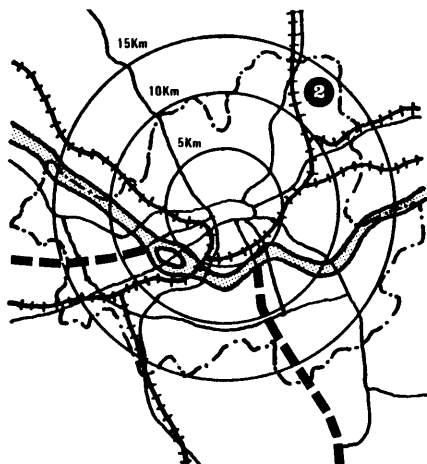
SOCIO-ECONOMIC DATA
 (related to user)

- GENERAL: SOCIAL
 - user's ethnic origin: KOREA
 - place of birth: SEOUL
 - education level: HIGH SCHOOL
- NUMBER OF USERS
 - married: 2
 - single: -
 - children: 4
 - total: 6
- MIGRATION PATTERN
 - number of moves: 2
 - rural - urban: -
 - urban - urban: 1968, 1975
 - urban - rural: -
 - why came to urban area: -
- GENERAL: ECONOMIC
 - user's income group: MODERATE
 - employment: OFFICE WORKER
 - distance to work: 12 km
 - mode of travel: BUS
- COSTS
 - dwelling unit: -
 - land - market value: \$1,300,000
- DWELLING UNIT PAYMENTS
 - financing: PRIVATE
 - rent/mortgage: -
 - % income for rent/mortgage: -



2 SANGGAEDONG

VERY LOW-INCOME, SQUATTERS

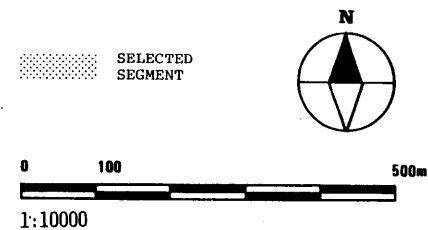


LOCATION: The area is located at the periphery of Seoul, 14km from the city center, situated in a valley between the mountain ranges.

ORIGIN: The area was developed during the 1960's by the municipal government. Squatter settlements in the city center were demolished, and the inhabitants were relocated to this area. After acquiring small plots, they built dwelling units by self and mutual-help methods. Services in this area have improved progressively, but still the inhabitants suffer from poor provision. Most lots are still not transferred to individuals from the municipality, because all utilities must be installed before the transfer. The area has become a reception center for migrants from rural areas who stay temporarily by renting rooms. Small light industries, mainly making clothes, provide employment to the low-income inhabitants, but they are considered to be illegal by the government. The area has been remarkably upgraded since the initial development.






LOCALITY PLAN





AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  INDUSTRIAL
-  OPEN SPACES

LOCALITY LAND USE PATTERN





LAYOUT: Residential areas are located in a valley. Major streets run parallel to the contours. The street pattern at the southern part is regular, but the pattern at the northern part is very irregular because of the hilly topography. Deep ditches in the middle of the residential areas prevent connection between the areas.

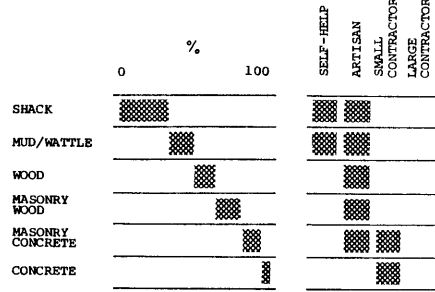
LAND USE: The area is predominantly utilized as residential. Markets and bus terminals are located at the middle of the area, and form the community center. Some hillside areas are utilized as orchards. Small shops are located along main streets, which are utilized for public transportation and major commercial activities. Development around the surrounding areas is restricted to prevent the growth of squatter settlements.

CIRCULATION: A street in the center of the valley is the main approach to this area. The basic circulation system is gridiron. Secondary streets are dominated by pedestrian circulation.

KEY

- Pk** Parking
- P** Police
- F** Fire Department
- S** School
- Ch** Church
- R** Recreation
- L** Library
- U** University
- H** Health
- PO** Post Office
- SS** Social Services
- M** Market
- C** Cemetery
-  Bus
-  Rapid Transit

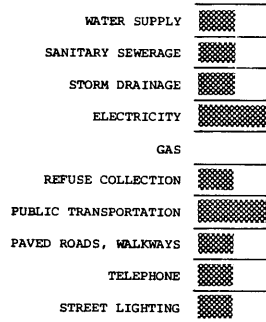
LOCALITY CONSTRUCTION TYPES



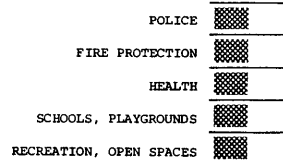
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



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

Quality of information: Approximate

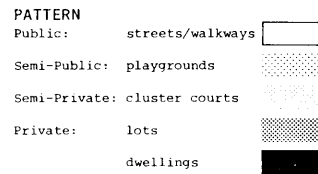
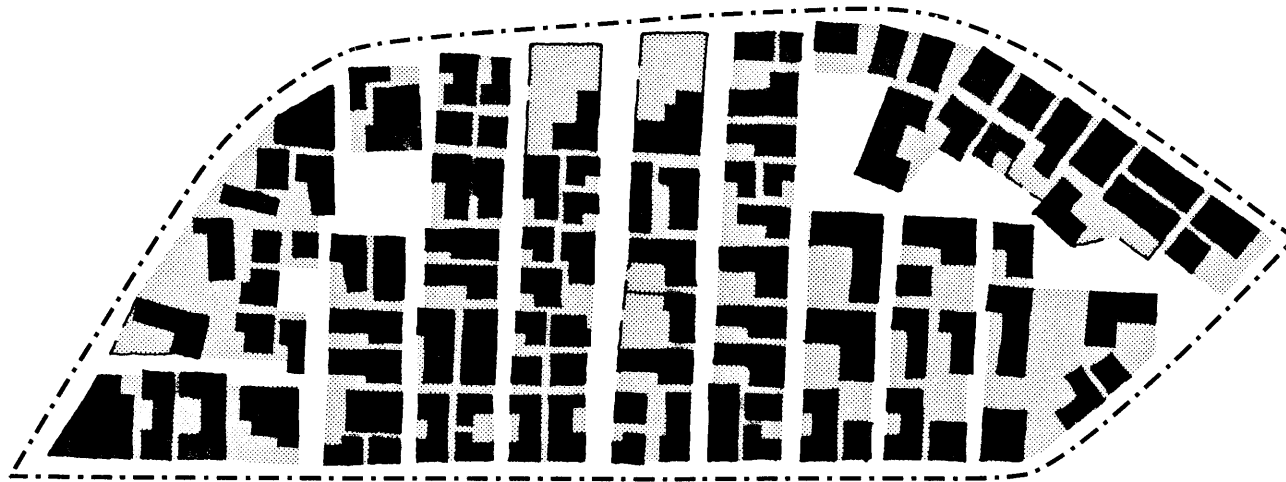


LOCALITY SEGMENT PLAN

0 50 100 150m

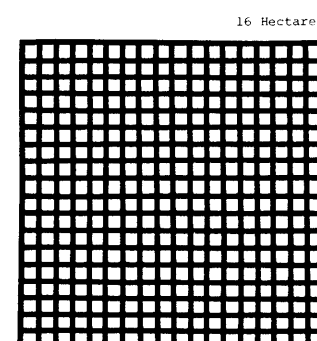
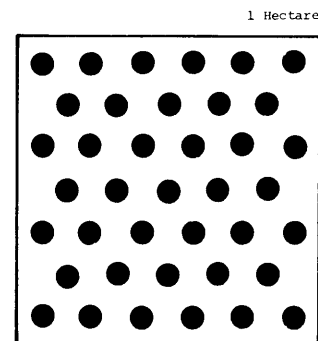
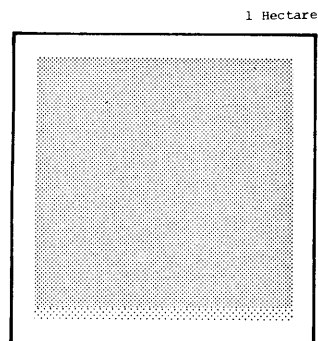
1:2500





LOCALITY BLOCK PLAN

LAND UTILIZATION DIAGRAMS



PERCENTAGES

Streets/Walkways	28
Playgrounds	3
Cluster Courts	-
Dwellings/Lots	69

DENSITY

Persons/Hectare	778
-----------------	-----

● 20 Persons

CIRCULATION EFFICIENCY

Meters/Hectare	901
----------------	-----

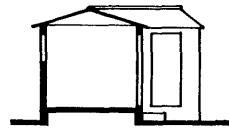
LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	103	0.78	132
DWELLING UNITS	103	0.78	132
PEOPLE	607	0.78	778
AREAS			
		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		0.22	28
SEMI-PUBLIC (open spaces, schools, community centers)		0.02	3
PRIVATE (dwellings, shops, factories, lots)		0.54	69
SEMI-PRIVATE (cluster courts)	-	-	-
TOTAL		0.78	100

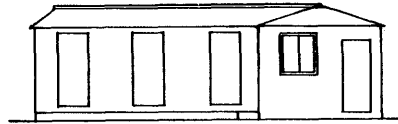
NETWORK EFFICIENCY
 Network length (streets, walkways) / Areas served (total area) = 901 m/Ha

LOTS
 Average area, dimensions = 51 m²

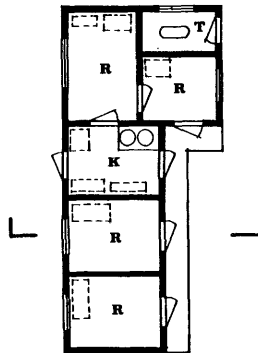
BLOCK PLAN: Squatter settlements are built in these blocks. Streets are very narrow and steep and serve only pedestrians. Vehicular circulation is only noted on the peripheral streets. There are few open spaces utilized as playgrounds. Both streets and open spaces are not well maintained. Public efforts for maintenance, particularly in this low-income community, are minimum, and even inhabitants are not responsive to maintenance. Circulation efficiency in this area is very poor, and public circulation approaches 28% of the total area. The unit circulation length is very high because of small lots and their square shape, resulting in a development that requires much land for streets and a higher cost for the installation of infrastructure.



SECTION

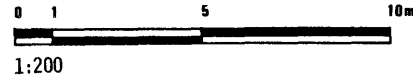


ELEVATION



PLAN

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



1:200

CASE STUDY SOURCES:

Locality plan: (accurate) Seoul City Government
 Land Use Pattern: (approximate) City Master Plan, Survey by Author, 1981
 Locality Segment Plan: (accurate) Seoul City Government
 Locality Block Plan: (accurate) IBID
 Block Land Utilization: (accurate) Survey by Author, 1981
 Typical Dwelling: (approximate) IBID
 Socio-economic Data: (approximate) IBID
 Photographs: Author, 1981
 General Information: Survey by Author, 1981

PHOTOGRAPHS: (OPPOSITE PAGE, CLOCKWISE FROM TOP LEFT)
 1. General view of the 'SANGAEDONG SQUATTER SETTLEMENT', built on a hillside. 2. Shops along a main street.
 3. A narrow walkway, recently paved by mutual-help.
 4. Extensions of the squatter settlement along a creek.

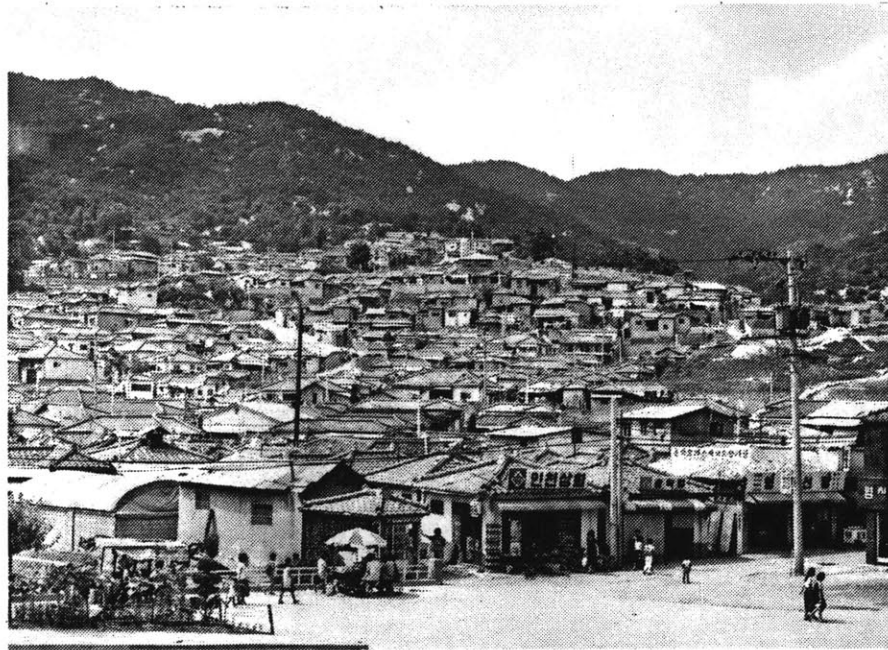
PHYSICAL DATA
 (related to dwelling and land)

DWELLING UNIT
 type: HOUSE
 area (sq m): 27
 tenure: EXTRALEGAL OWNERSHIP
 LAND/LOT
 utilization: PRIVATE
 area (sq m): 50
 tenure: EXTRALEGAL OWNERSHIP
 DWELLING
 location: PERIPHERY
 type: DETACHED
 number of floors: 1
 utilization: MULTIPLE
 physical state: BAD
 DWELLING DEVELOPMENT
 mode: INCREMENTAL
 developer: POPULAR
 builder: SELF-HELP/ARTISAN
 construction type: SHACK
 year of construction: 1964
 MATERIALS
 foundation: STONE
 floors: MUD/STONE
 walls: WOOD/MUD/BRICK
 roof: WOOD/ROOF TILE
 DWELLING FACILITIES
 wc: 1
 shower: -
 kitchen: 1
 rooms: 4
 other: -

SOCIO-ECONOMIC DATA
 (related to user)

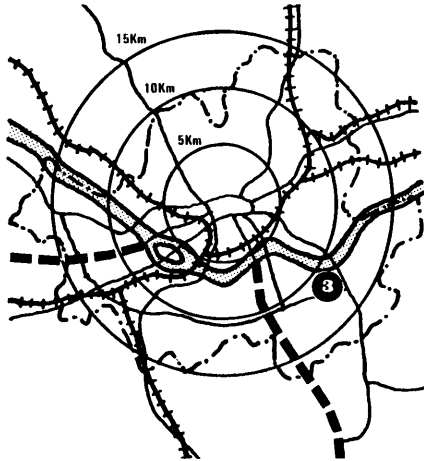
GENERAL: SOCIAL
 user's ethnic origin: KOREA
 place of birth: RURAL AREA
 education level: PRIMARY SCHOOL
 NUMBER OF USERS
 married: 2
 single: 1
 children: 3
 total: 6
 MIGRATION PATTERN
 number of moves: 1
 rural - urban: 1974
 urban - urban: -
 urban - rural: -
 why came to urban area: EMPLOYMENT
 GENERAL: ECONOMIC
 user's income group: VERY LOW
 employment: VENDOR
 distance to work: 8 km
 mode of travel: BUS
 COSTS
 dwelling unit: -
 land - market value: -
 DWELLING UNIT PAYMENTS
 financing: PRIVATE
 rent/mortgage: -
 % income for rent/mortgage: -

TYPICAL DWELLING



3 JAMSIL

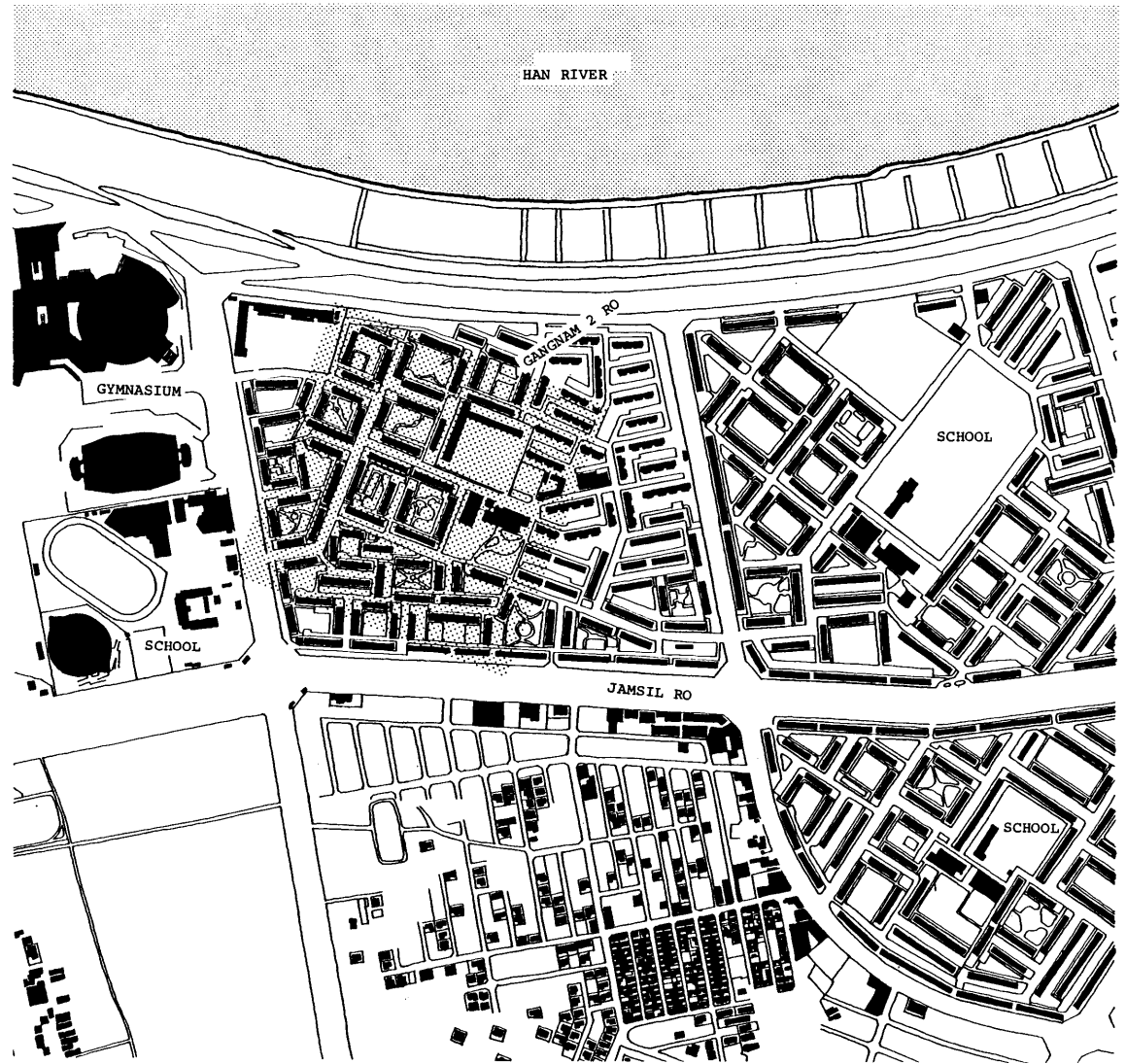
LOW/MODERATE-INCOME, APARTMENTS



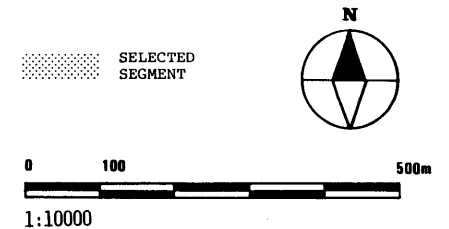
LOCATION: The area is located to the south of the Han River, about 12km from the city center. Recently, this area became a center for new housing developments.

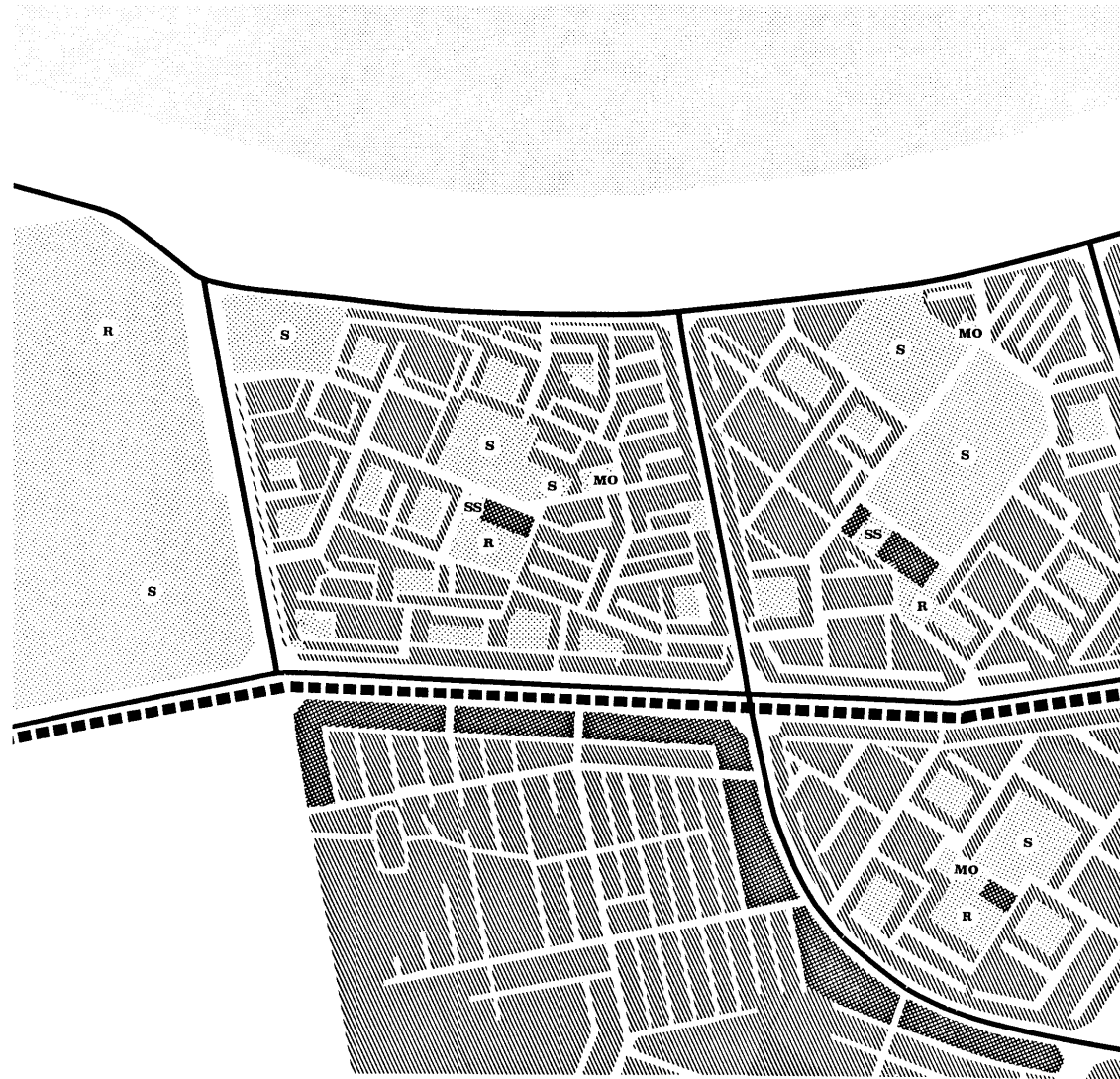
ORIGIN: During the early 1970's, a large housing development was built in the filled swamp area to the south of the Han River. The Korean Housing Corporation, the public housing agency, initially intended to build rental apartments for low-income groups from the demolished squatter areas in the city center. However, the initial plan was changed to build condominiums instead of the rental apartments due to funding shortages. After about 25,000 dwelling units were built, the area became one of the largest new housing developments in Seoul. The entire development was built in one stage where markets, shops and schools were also provided in addition to the housing. Recently, a subway was finished, which provides convenient access to the city center.

LAYOUT: The area is bounded by the Han River to the north and by an athletic complex and schools to the west. A street running from west to east in the middle of the residential area is the major access to this area. The area has several residential communities which are bounded by the major streets. Each community has about



LOCALITY PLAN





- AREAS
- RESIDENTIAL
 - COMMERCIAL
 - INDUSTRIAL
 - OPEN SPACES

LOCALITY LAND USE PATTERN



5,000 households which share the large area of the super block. The street pattern within the block is complicated and irregular, and the southwestern part of the area is now under development for detached houses.

LAND USE: The area is predominantly residential, primarily for walk-up apartments. The area is divided into several communities which are bounded by major streets. Each community has communal facilities such as markets and schools at the center of a super block. The areas for walk-up apartments have large open spaces which occupy a large portion of land. The open spaces are hardly utilized except for a few playgrounds.

In addition to walk-up apartments, the area has blocks for detached houses at the southern and southwestern sections. The blocks have commercial lots in the areas which face major streets.

CIRCULATION: Major streets around super blocks allow for extensive vehicular circulation and are the routes for public transportation. The street having a subway route is a major access for this area. Secondary streets are located in the super blocks bounded by the major streets. A large portion of land is allotted to the secondary streets for vehicular circulation, but the streets are dominated by pedestrians. However, the pedestrian circulation is not heavy, and some of the streets are even utilized for children playing.

KEY

- Pk Parking
- P Police
- F Fire Department
- S School
- Ch Church
- R Recreation
- L Library
- U University
- H Health
- PO Post Office
- SS Social Services
- M Market
- MO Management Office
- Bus
- Rapid Transit

LOCALITY CONSTRUCTION TYPES

	0	100	SELF-HELP	ARTISAN	SMALL CONTRACTOR	LARGE CONTRACTOR
SHACK	_____	_____	_____	_____	_____	_____
MUD/WATTLE	_____	_____	_____	_____	_____	_____
WOOD	_____	_____	_____	_____	_____	_____
MASONRY WOOD	_____	_____	_____	_____	_____	_____
MASONRY CONCRETE	_____	_____	_____	_____	_____	_____
CONCRETE	_____	_____	_____	_____	_____	_____

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

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES

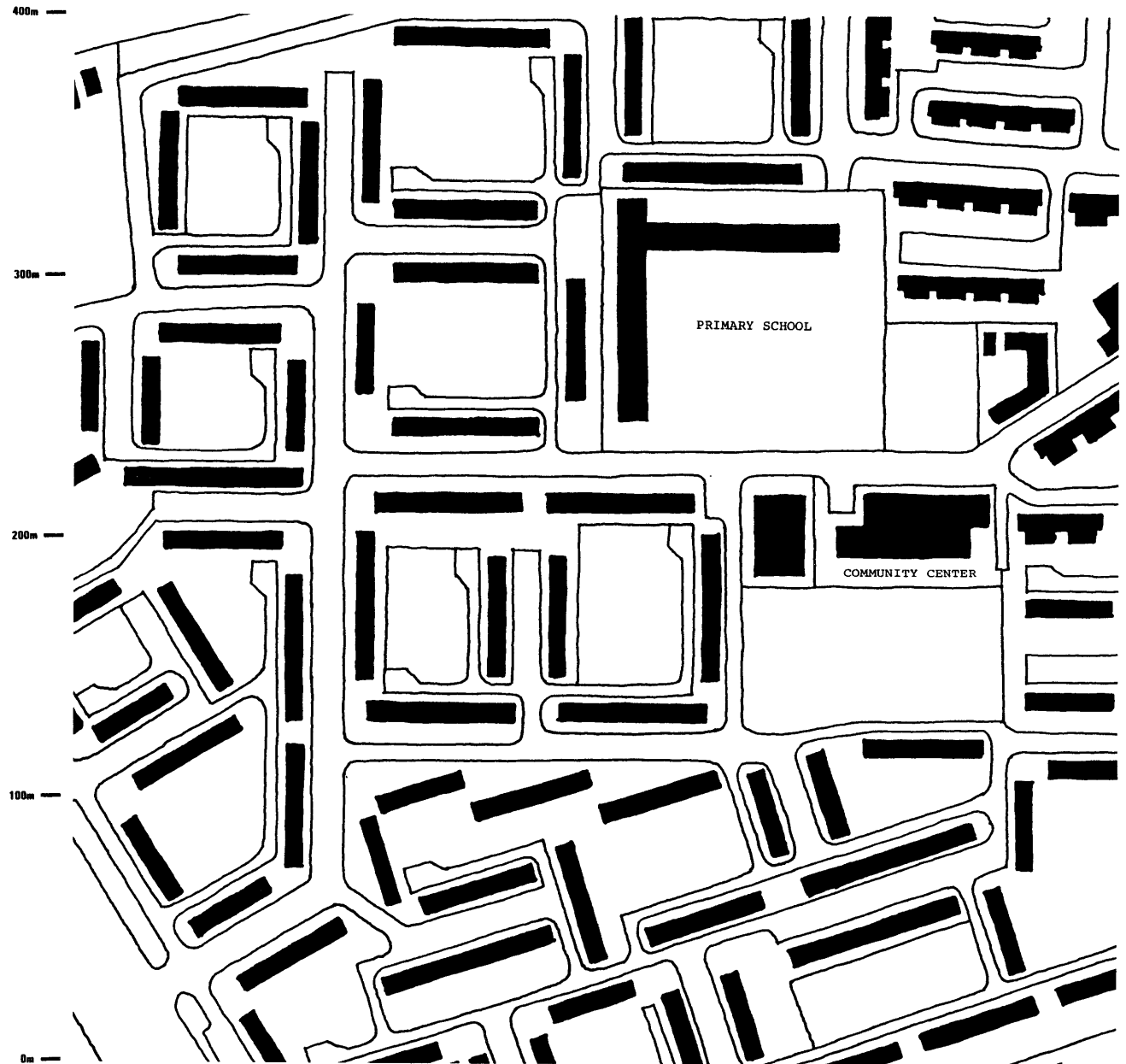
WATER SUPPLY	_____
SANITARY SEWERAGE	_____
STORM DRAINAGE	_____
ELECTRICITY	_____
GAS	_____
REFUSE COLLECTION	_____
PUBLIC TRANSPORTATION	_____
PAVED ROADS, WALKWAYS	_____
TELEPHONE	_____
STREET LIGHTING	_____

LOCALITY COMMUNITY FACILITIES

POLICE	_____
FIRE PROTECTION	_____
HEALTH	_____
SCHOOLS, PLAYGROUNDS	_____
RECREATION, OPEN SPACES	_____

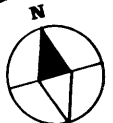
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

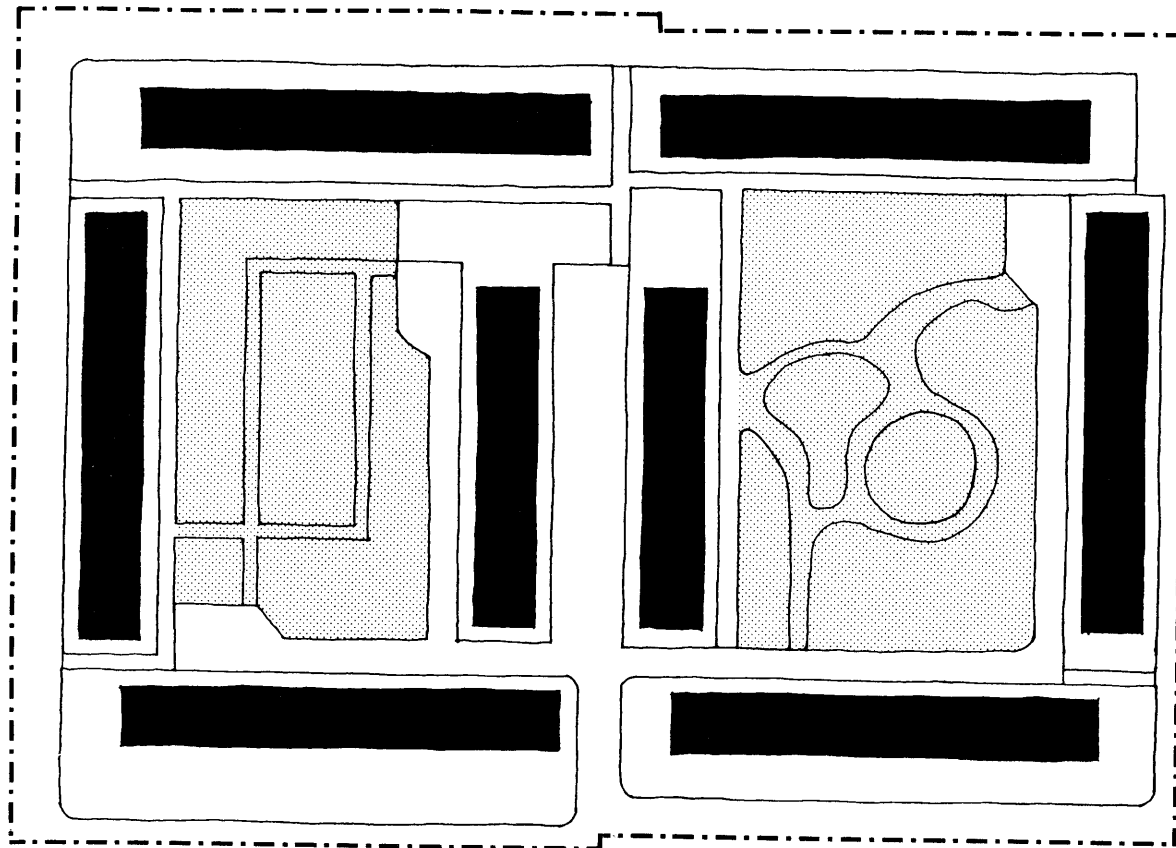
Quality of information: Approximate



LOCALITY SEGMENT PLAN

0 50 100 150m
1:2500

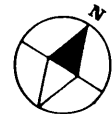




BLOCK PLAN: The block has large open spaces, streets and walkways for children playing, vehicular and pedestrian circulation. The utilization of the open spaces and streets is not efficient. Playgrounds are sometimes utilized for individual clothes drying, and parking lots are usually empty. Inhabitants want to have private or semi-private land for individual or group utilization. However, they cannot utilize the open spaces for private or semi-private purposes, because the area is uncontrollable. Population density of this area is not higher than the density of popular housing.

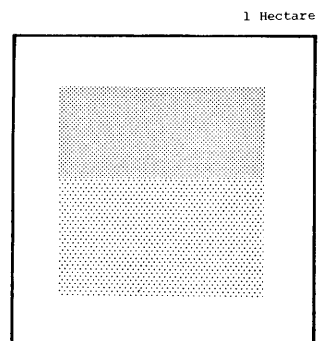
PATTERN

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

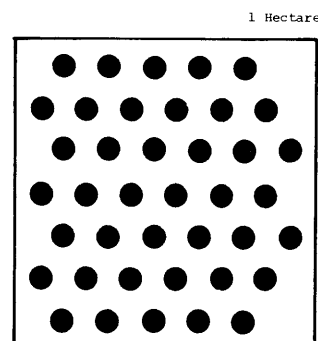


LOCALITY BLOCK PLAN

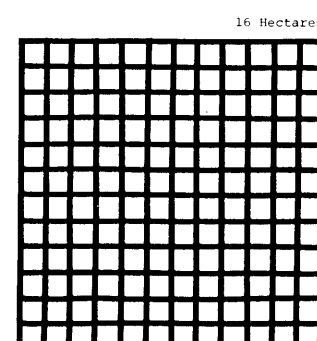
LAND UTILIZATION DIAGRAMS



PERCENTAGES	Streets/Walkways	56
	Playgrounds	24
	Cluster Courts	-
	Dwellings/Lots	20



DENSITY	Persons/Hectare	801
	20 Persons	



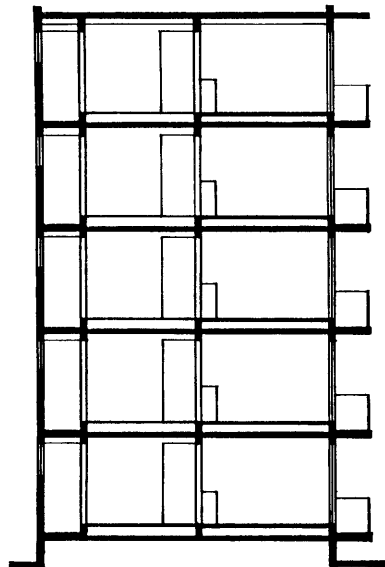
CIRCULATION EFFICIENCY	Meters/Hectare	555
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LOCALITY BLOCK LAND UTILIZATION DATA

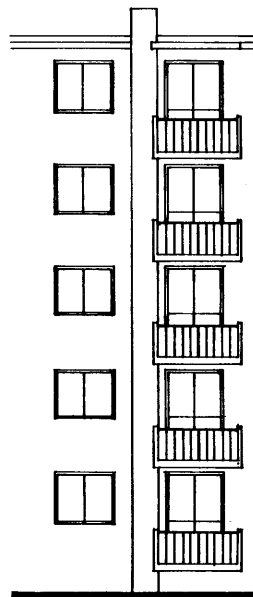
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	-	-	-
DWELLING UNITS	380	1.66	229
PEOPLE	1,330	1.66	801
AREAS		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		0.93	56
SEMI-PUBLIC (open spaces, schools, community centers)		0.40	24
PRIVATE (dwellings, shops, factories, lots)		0.33	20
SEMI-PRIVATE (cluster courts)		-	-
TOTAL		1.66	100

NETWORK EFFICIENCY
 Network length (streets, walkways) = 555 m/Ha
 Areas served (total area)

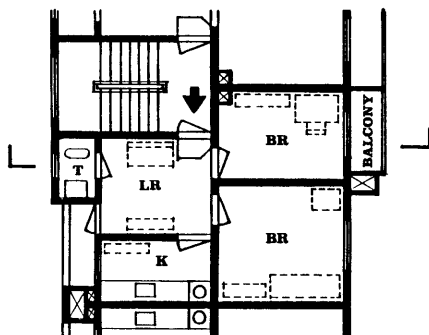
LOTS
 Average area, dimensions = -



SECTION



ELEVATION

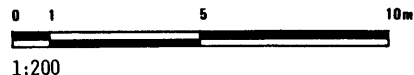


PLAN

KEY

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

TYPICAL DWELLING



CASE STUDY SOURCES:

- Locality plan: (accurate) Seoul City Government
- Land Use Pattern: (approximate) City Master Plan, Survey by Author, 1981
- Locality Segment Plan: (accurate) Seoul City Government
- Locality Block Plan: (accurate) IBID
- Block Land Utilization: (accurate) Survey by Author, 1981
- Typical Dwelling: (approximate) IBID
- Socio-economic Data: (approximate) IBID
- Photographs: Author, 1981
- General Information: Survey by Author, 1981

PHOTOGRAPHS: (OPPOSITE PAGE, CLOCKWISE FROM TOP LEFT)
 1. A bird's eye view of the 'JAMSIL APARTMENT HOUSING PROJECT'. 2. An open space utilized for clothes drying. 3. Streets in the condominium are utilized for public circulation. 4. Open spaces and interior streets are usually empty and sometimes utilized as playgrounds.

PHYSICAL DATA
(related to dwelling and land)

- DWELLING UNIT
 - type: APARTMENT
 - area (sq m): 43
 - tenure: LEGAL OWNERSHIP
- LAND/LOT
 - utilization: PUBLIC/SEMI-PUBLIC
 - area (sq m): -
 - tenure: LEGAL OWNERSHIP
- DWELLING
 - location: PERIPHERY
 - type: WALK-UP
 - number of floors: 5
 - utilization: MULTIPLE
 - physical state: GOOD
- DWELLING DEVELOPMENT
 - mode: INSTANT
 - developer: PUBLIC
 - builder: LARGE CONTRACTOR
 - construction type: CONCRETE
 - year of construction: 1975
- MATERIALS
 - foundation: CONCRETE
 - floors: CONCRETE
 - walls: BRICK
 - roof: CONCRETE
- DWELLING FACILITIES
 - wc: 1
 - shower: -
 - kitchen: 1
 - rooms: 1
 - other: -

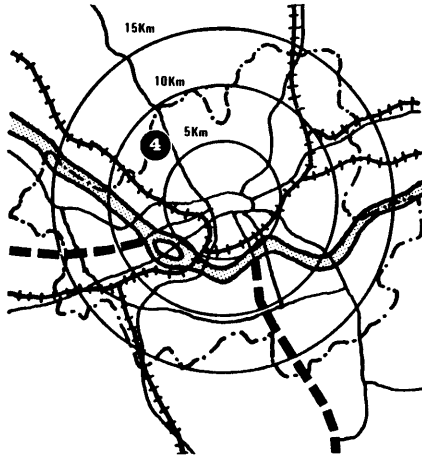
SOCIO-ECONOMIC DATA
(related to user)

- GENERAL: SOCIAL
- user's ethnic origin: KOREA
- place of birth: SMALL CITY
- education level: HIGH SCHOOL
- NUMBER OF USERS
 - married: 2
 - single: -
 - children: 2
 - total: 4
- MIGRATION PATTERN
 - number of moves: 2
 - rural - urban: 1976
 - urban - urban: 1978
 - urban - rural: -
- why came to urban area: EMPLOYMENT
- GENERAL: ECONOMIC
- user's income group: MODERATE
- employment: TAXI-DRIVER
- distance to work: 5 km
- mode of travel: SUBWAY
- COSTS
 - dwelling unit: \$15,000
 - land - market value: -
- DWELLING UNIT PAYMENTS
 - financing: PRIVATE
 - rent/mortgage: -
 - % income for rent/mortgage: -



4 GALHYUNDONG

MODERATE-INCOME, DETACHED HOUSES



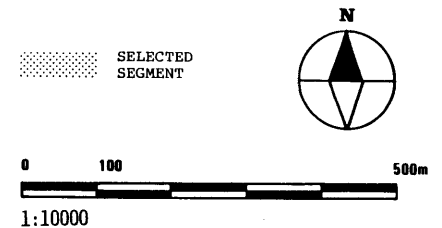
LOCATION: The area is located on the northwestern periphery of the city, about 8km from the city center. The area is one of the largest residential areas developed for detached houses in the city.

ORIGIN: In the middle of the 1960's, a detached housing project was built on the agricultural area by the Korean Housing Corporation. After this project, the surrounding areas were developed by the private sector. At the initial stage, the area had few types of detached houses, but around half of them have had extensions or have been demolished for the developments of middle and high-income houses. In addition, lots facing major streets have changed to have small shops. This area is now inhabited by various income groups. The transportation to the city center will become very convenient after the completion of subway construction.

LAYOUT: The area is bounded by hills on the northwest and the northeast. The area has a typical gridiron layout system which is usually found in public residential developments throughout the city. Most street patterns are rectangular, except for the hilly area on the eastern part of the area. Block sizes are very small and lots are square.







LOCALITY PLAN



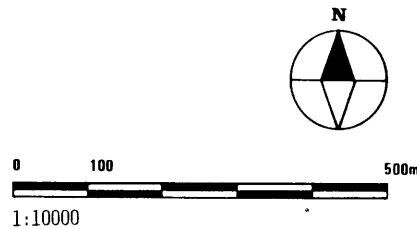




LAND USE: The area is basically residential. Some areas along the major streets are commercial. The area surrounding a square located at the center, is utilized for extensive commercial and communal activities.

CIRCULATION: The main approach to this area is the street running north. The street at the middle of the area serves extensive vehicular circulation including buses to the city center. Secondary streets branch from the main street and mainly serve pedestrians. Circulation systems are basically gridiron and unit circulation is high due to the small block layout.

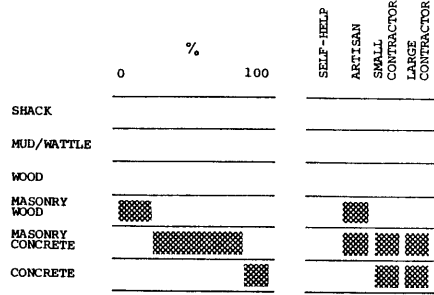
- AREAS
-  RESIDENTIAL
 -  COMMERCIAL
 -  INDUSTRIAL
 -  OPEN SPACES

LOCALITY LAND USE PATTERN



- KEY
- Pk** Parking
 - P** Police
 - F** Fire Department
 - S** School
 - Ch** Church
 - R** Recreation
 - L** Library
 - U** University
 - H** Health
 - PO** Post Office
 - SS** Social Services
 - M** Market
 - C** Cemetery
 -  Bus
 -  Rapid Transit

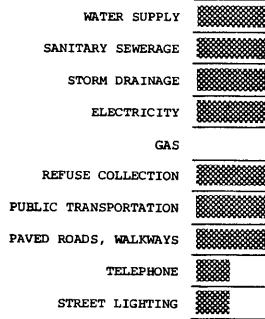
LOCALITY CONSTRUCTION TYPES



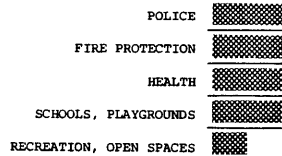
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



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

Quality of information: Approximate

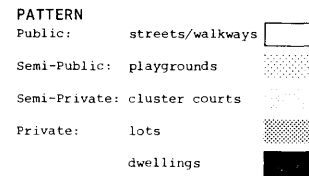
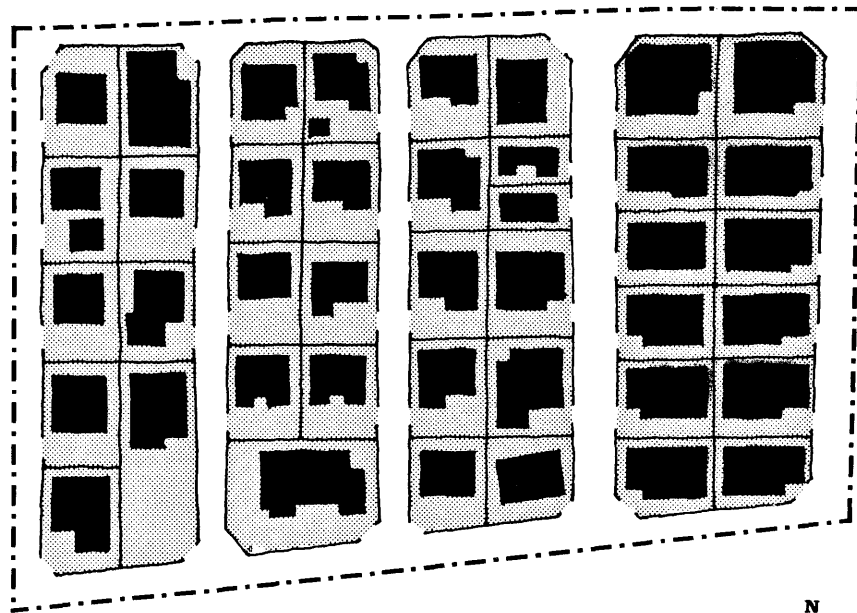


LOCALITY SEGMENT PLAN

0 50 100 150m

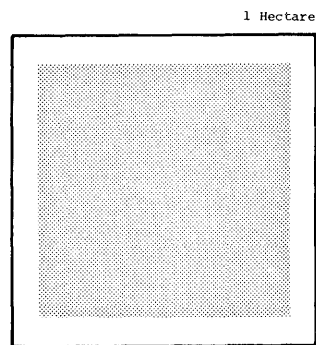
1:2500



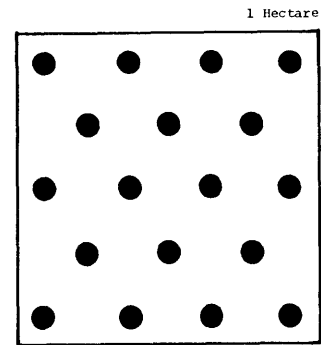


LOCALITY BLOCK PLAN

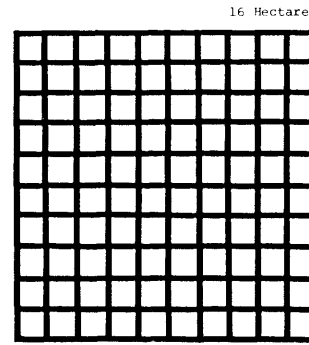
LAND UTILIZATION DIAGRAMS



PERCENTAGES	Streets/Walkways	29
	Playgrounds	-
	Cluster Courts	-
	Dwellings/Lots	71



DENSITY	Persons/Hectare	353
●	20 Persons	



CIRCULATION EFFICIENCY	Meters/Hectare	503
------------------------	----------------	-----

BLOCK PLAN: These blocks are the typical residential pattern with a gridiron layout system. Block sizes are very small and each of them has less than 12 lots. In addition to small blocks, lots are short. Consequently, unit circulation length is very high and the street area is almost 30% of the total area. The large portion of land is utilized for children playing rather than circulation. Thus, the block layout has resulted in misutilization of land. Population density in these blocks is relatively low because of the low built-up area.

LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/ha
LOTS	41	0.80	51
DWELLING UNITS	41	0.80	51
PEOPLE	282	0.80	353

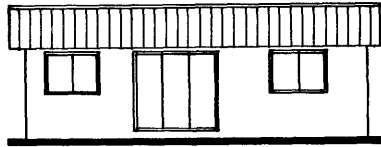
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.23	29
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.57	71
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.80	100

NETWORK EFFICIENCY
 Network length (streets, walkways) = 503 m/ha
 Area served (total area)

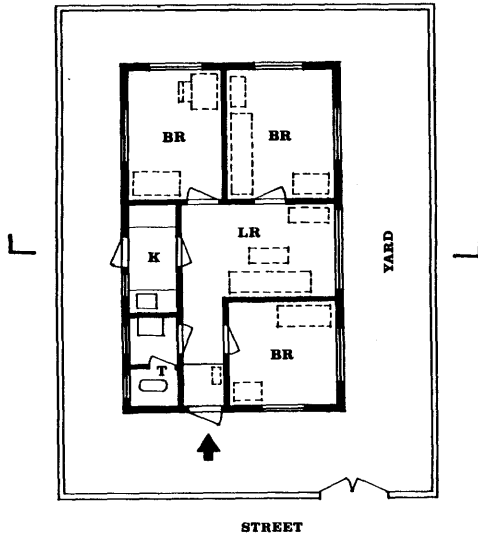
LOTS
 Average area, dimensions = 140 m²



SECTION

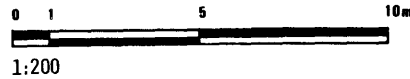


ELEVATION



PLAN

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



CASE STUDY SOURCES:

- Locality plan: (accurate) Seoul City Government
- Land Use Pattern: (approximate) City Master Plan, Survey by Author, 1981
- Locality Segment Plan: (accurate) Seoul City Government
- Locality Block Plan: (accurate) IBID
- Block Land Utilization: (accurate) Survey by Author, 1981
- Typical Dwelling: (approximate) IBID
- Socio-economic Data: (approximate) IBID
- Photographs: Author, 1981
- General Information: Survey by Author, 1981

PHOTOGRAPHS: (OPPOSITE PAGE, CLOCKWISE FROM TOP LEFT)
 1. A bird's eye view of the 'GALHYUNDONG DETACHED HOUSING PROJECT', at the front and right. 2. A typical dwelling unit built in 1965, note added rooms behind walls and new roofs. 3. Interior streets are usually empty and occasionally utilized. 4. Most houses have been newly built after the demolition of the original dwellings; note expansion of shops into the street.

TYPICAL DWELLING

PHYSICAL DATA
 (related to dwelling and land)

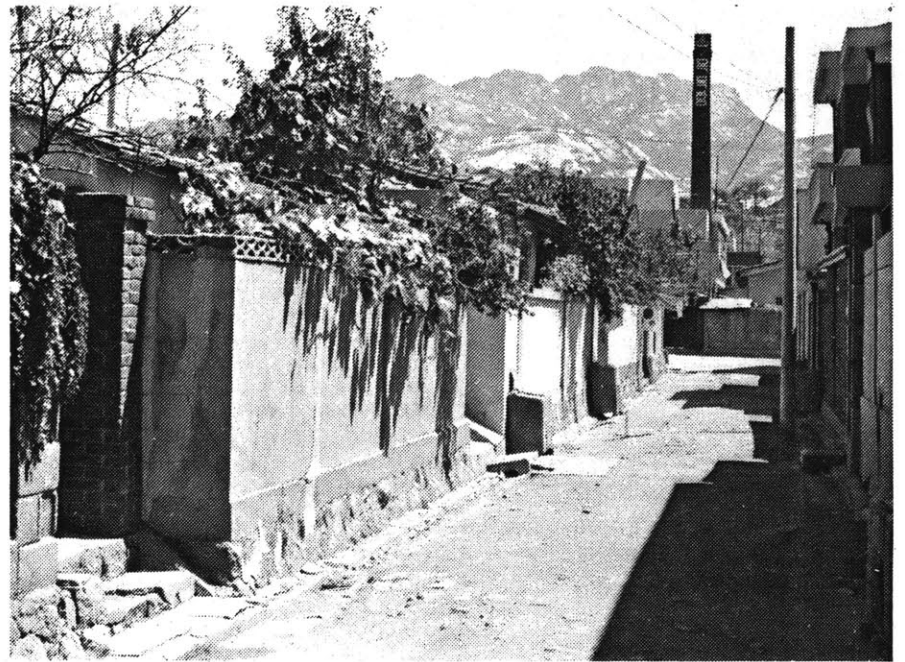
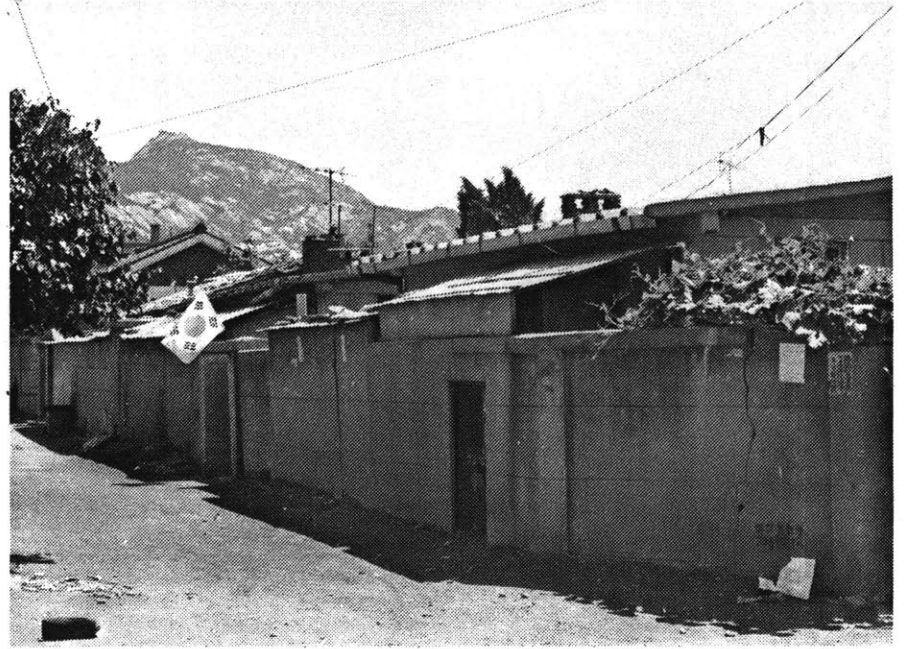
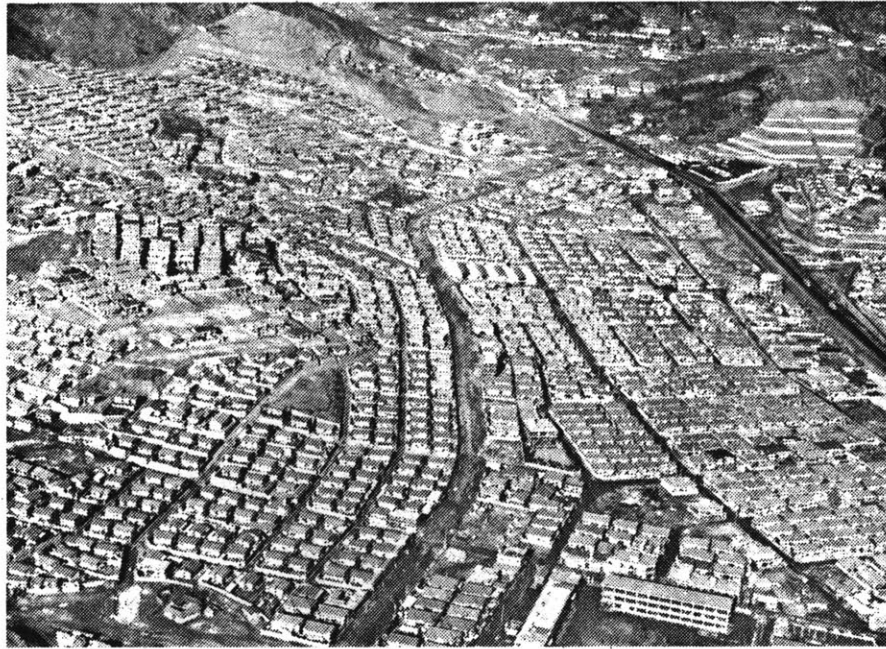
- DWELLING UNIT
 - type: HOUSE
 - area (sq m): 50
 - tenure: LEGAL OWNERSHIP
- LAND/LOT
 - utilization: PRIVATE
 - area (sq m): 130
 - tenure: LEGAL OWNERSHIP
- DWELLING
 - location: PERIPHERY
 - type: DETACHED
 - number of floors: 1
 - utilization: SINGLE
 - physical state: GOOD
- DWELLING DEVELOPMENT
 - mode: INSTANT
 - developer: PUBLIC
 - builder: LARGE CONTRACTOR
 - construction type: MASONRY-WOOD
 - year of construction: 1965
- MATERIALS
 - foundation: CONCRETE
 - floors: MUD/STONE
 - walls: BRICK
 - roof: WOOD/ROOF TILE
- DWELLING FACILITIES
 - wc: 1
 - shower: 1
 - kitchen: 1
 - rooms: 4
 - other: -

SOCIO-ECONOMIC DATA
 (related to user)

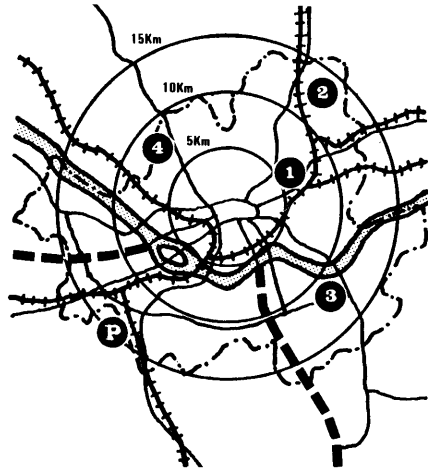
- GENERAL: SOCIAL
 - user's ethnic origin: KOREA
 - place of birth: SMALL CITY
 - education level: RIMARY SCHOOL
- NUMBER OF USERS
 - married: 4
 - single: 1
 - children: 5
 - total: 10
- MIGRATION PATTERN
 - number of moves: 2
 - rural - urban: 1968
 - urban - urban: 1975
 - urban - rural: -
- why came to urban area: EMPLOYMENT
- GENERAL: ECONOMIC
 - user's income group: LOW
 - employment: VENDOR
 - distance to work: 2 km
 - mode of travel: WALK

- COSTS
 - dwelling unit: -
 - land - market value: \$1,700,000

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

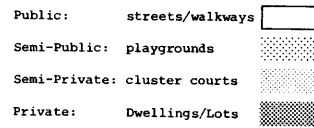


COMPARATIVE SUMMARY



LAND UTILIZATION

The proportion of public and private land is an indicator in determining user responsibility of maintenance and control, and functional efficiency of layouts; the higher the percentage of private (and semi-private) land, the more efficient is the land utilization.



POPULATION DENSITY

The number of persons per hectare determines the economy of development and utilization; the higher the density, the less expensive is the development and maintenance costs per person.

CIRCULATION EFFICIENCY

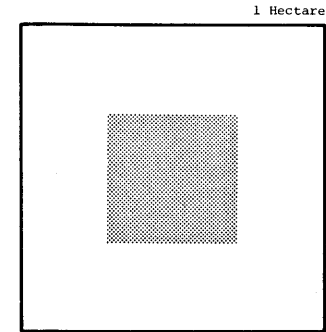
A ratio between public circulation lengths and the area served indicated the network efficiency; the higher the ratio, the higher is the capital investment and maintenance costs per unit area.

- 1 CHUNGRYUNGRI
- 2 SANGGAEDONG
- 3 JAMSIL
- 4 GALHYUNDONG
- P CHULSAN (proposed project)

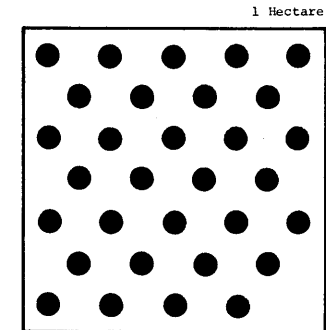
COMPARATIVE PROJECTS

EXISTING

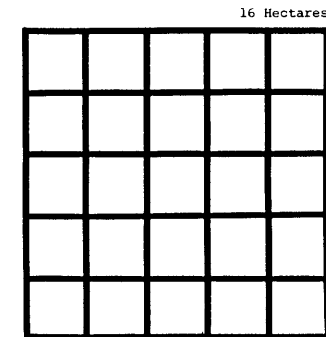
LOW/MODERATE-INCOME, APARTMENTS



PERCENTAGES	Streets/Walkways	82
	Playgrounds	-
	Cluster Courts	-
	Dwellings/Lots	18



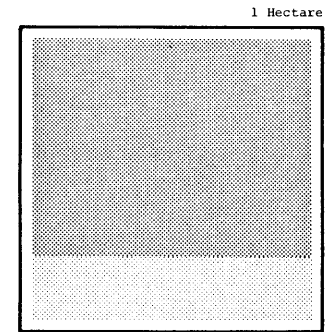
DENSITY	Persons/Hectare	621
		20 Persons



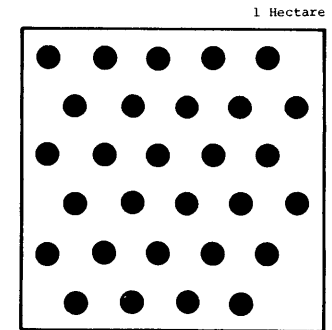
CIRCULATION EFFICIENCY	Meters/Hectare	259
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PROPOSED I

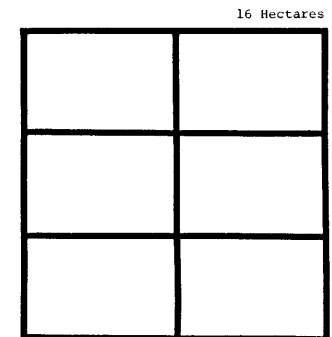
LOW-INCOME, ROW HOUSES



PERCENTAGES	Streets/Walkways	14
	Playgrounds	-
	Cluster Courts	20
	Dwellings/Lots	66



DENSITY	Persons/Hectare	588
		20 Persons



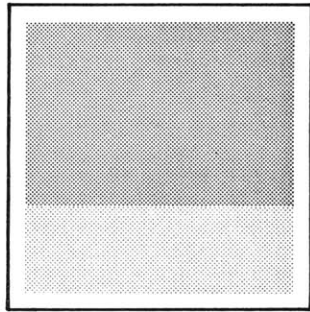
CIRCULATION EFFICIENCY	Meters/Hectare	123
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CASE STUDIES

PROPOSED II

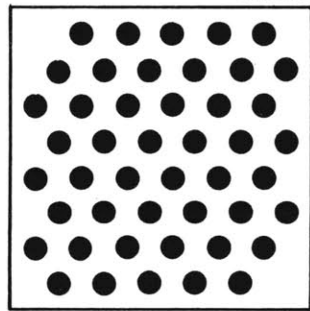
LOW-INCOME, ROW HOUSES/APARTMENTS

1 Hectare



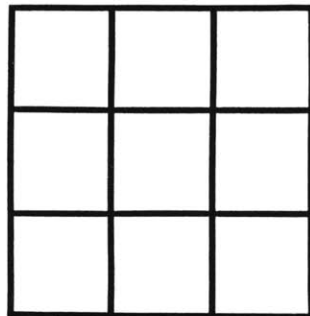
PERCENTAGES	
Streets/Walkways	20
Playgrounds	-
Cluster Courts	26
Dwellings/Lots	54

1 Hectare



DENSITY	
Persons/Hectare	910
●	20 Persons

16 Hectares

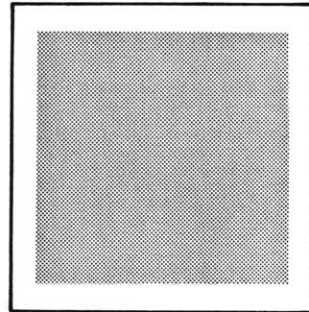


CIRCULATION EFFICIENCY	
Meters/Hectare	163

CHUNGRYUNGRI

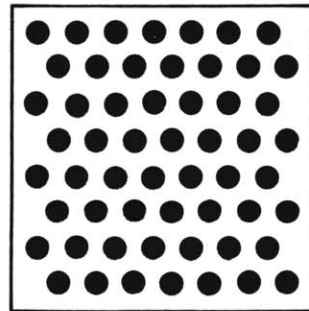
LOW-INCOME, ROW HOUSES

1 Hectare



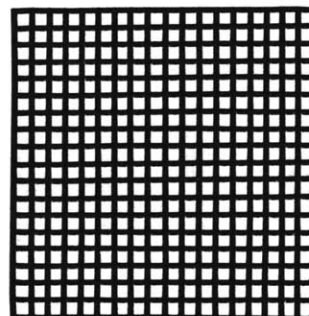
PERCENTAGES	
Streets/Walkways	29
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	71

1 Hectare



DENSITY	
Persons/Hectare	1,128
●	20 Persons

16 Hectares

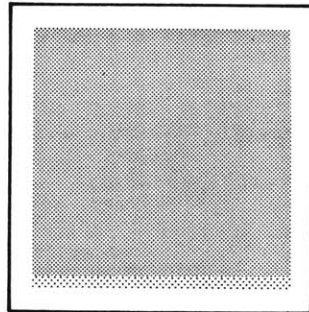


CIRCULATION EFFICIENCY	
Meters/Hectare	918

SANGGAEDONG

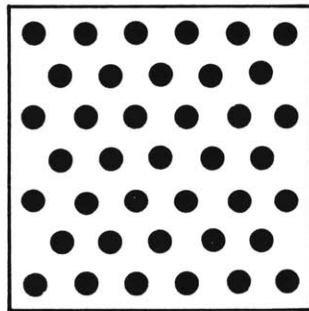
VERY LOW-INCOME, SQUATTERS

1 Hectare



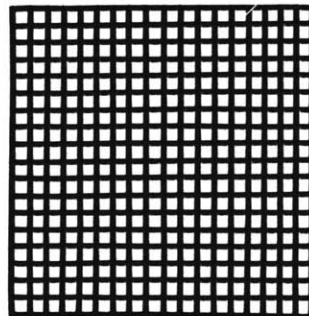
PERCENTAGES	
Streets/Walkways	28
Playgrounds	3
Cluster Courts	-
Dwellings/Lots	69

1 Hectare



DENSITY	
Persons/Hectare	778
●	20 Persons

16 Hectares

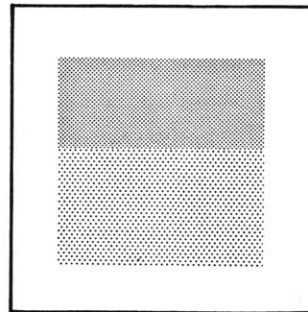


CIRCULATION EFFICIENCY	
Meters/Hectare	901

JAMSIL

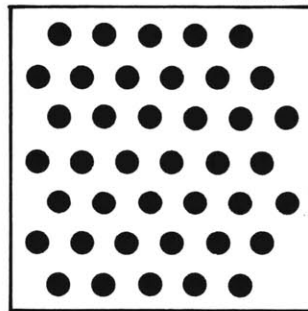
LOW/MODERATE-INCOME, APARTMENTS

1 Hectare



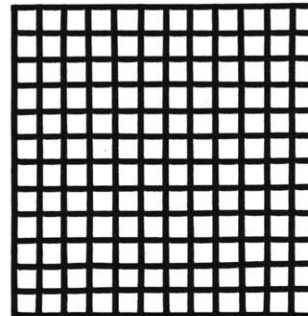
PERCENTAGES	
Streets/Walkways	56
Playgrounds	24
Cluster Courts	-
Dwellings/Lots	20

1 Hectare



DENSITY	
Persons/Hectare	801
●	20 Persons

16 Hectares

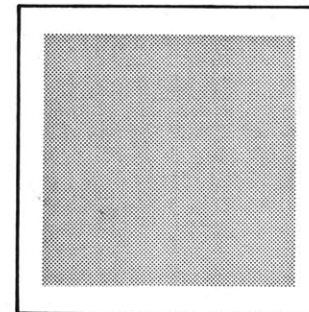


CIRCULATION EFFICIENCY	
Meters/Hectare	555

GALHYUNDONG

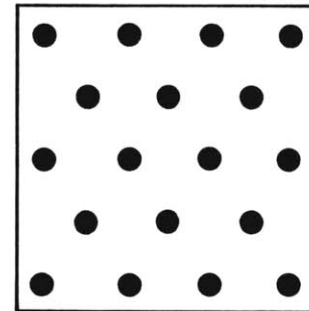
MODERATE-INCOME, DETACHED HOUSES

1 Hectare



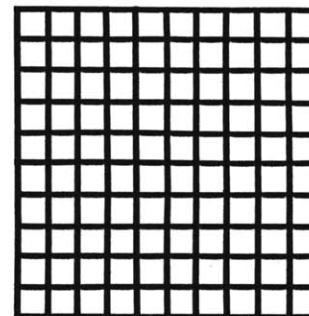
PERCENTAGES	
Streets/Walkways	29
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	71

1 Hectare



DENSITY	
Persons/Hectare	353
●	20 Persons

16 Hectares



CIRCULATION EFFICIENCY	
Meters/Hectare	503

L

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. (Keyes, 1971)
- ASSESSMENT.** The valuation of property for the purpose of levying a tax or the amount of the tax levied. (Keyes, 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 illumination 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 odorless 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. **SEMIPUBLIC** (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 median 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: **LINEs**: property lines, political or municipal divisions, main streets, etc.; **AREAs**: 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-, water-, 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)

VIENS. 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 10.7649 square feet
 1 hectare = 10,000 square meters = 2.4711 acres
 1 square foot = 0.0929 square meters
 1 acre = 0.4087 hectares