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

by

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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
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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.

I gratefully acknowledge the guidance and support of Professor Horacio Caminos during the two years of my study. I appreciate his realistic and practical ideas which I would like to apply in my further research and practice. I also sincerely appreciate the kind assistance and suggestions of Reinhard Goethert who has always helped me when I was badly in need. My warm thanks to the class members of 1980-82; Yousef Alohal, Aminul Khan, Nora Aristizabal, Hsin-pao Lin, Rajagopalan Palamadai and Chih-Chien Wang for their company and comments.

I am obliged to Professor Chong Won Chu for his kind and considerate help in providing useful information. I am also thankful to many people at the Seoul City Government, Korea Housing Corporation and Korea Institute of Science and Technology for their help in data collection. Also, I am grateful to Gi Woong Kim, Young Kun Park, Goo Hang Kim, Suh Hwan Lim and Chun goo Kang who helped me in gathering information.

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Finally, I want to express my deep appreciation to Jungnam, my wife, for her understanding, care and encouragement; and to my parents and family members for their love and support.
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 "Sungnam Relocation Project". This site and services project was planned for 50,000 lots in Sungnam, 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)

<table>
<thead>
<tr>
<th></th>
<th>US$ million</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>land cost</td>
<td>34.5</td>
<td>11.5</td>
</tr>
<tr>
<td>land development cost</td>
<td>79.5</td>
<td>26.5</td>
</tr>
<tr>
<td>housing development</td>
<td>185.0</td>
<td>62.0</td>
</tr>
<tr>
<td>total</td>
<td>299.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

COMPARISON OF ALTERNATIVES

<table>
<thead>
<tr>
<th>ALTERNATIVES</th>
<th>relative cost per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing project</td>
<td>100</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>((62x1.3)+26.5+11.5)/1.3=91</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>(62x.5)+26.5+11.5=69</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>62+(26.5x.8)+11.5=95</td>
</tr>
<tr>
<td>Alternative 4</td>
<td>((62x1.3x.5)+(26.5x.8)+11.5)/1.3=56</td>
</tr>
</tbody>
</table>

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.
1) LOCATION: CHUNGRYUNGRI

EXISTING

PROPOSED

LAND UTILIZATION

<table>
<thead>
<tr>
<th></th>
<th>Existing (A)</th>
<th>Proposed (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ha (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>0.72 (35)</td>
<td>0.43 (21)</td>
</tr>
<tr>
<td>Private</td>
<td>1.30 (65)</td>
<td>1.30 (65)</td>
</tr>
<tr>
<td>Semi-private</td>
<td>-</td>
<td>0.29 (14)</td>
</tr>
<tr>
<td>Total</td>
<td>2.02 (100)</td>
<td>2.02 (100)</td>
</tr>
</tbody>
</table>

Number of lots 176
Average lot size 74 m²
Prv. & semi-prv./dw. 74 m²

PUBLIC CIRCULATION
Length 600 m/Ha

2) LOCATION: GALHYUNDONG

EXISTING

PROPOSED

LAND UTILIZATION

<table>
<thead>
<tr>
<th></th>
<th>Existing (B)</th>
<th>Proposed (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ha (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>0.48 (31)</td>
<td>0.24 (16)</td>
</tr>
<tr>
<td>Private</td>
<td>1.07 (69)</td>
<td>1.04 (67)</td>
</tr>
<tr>
<td>Semi-private</td>
<td>-</td>
<td>0.27 (17)</td>
</tr>
<tr>
<td>Total</td>
<td>1.54 (100)</td>
<td>1.54 (100)</td>
</tr>
</tbody>
</table>

Number of lots 74
Average lot size 145 m²
Prv. & semi-prv./dw. 145 m²

PUBLIC CIRCULATION
Length 440 m/Ha

Legend:
- semi-private
- private

1:2500
### SITE DATA

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

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

*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.
EXISTING SITE PLAN

KEY
PG: playground
PROPOSED SITE PLAN

KEY
2: 2 STORY ROW HOUSES
3: 3 STORY ROW HOUSES
5: 5 STORY WALK-UPS
\[\text{RESERVED AREA}\]
EXISTING
LAND USE PATTERN
PROPOSED
LAND USE PATTERN

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

AREAS
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
RESERVED/OPEN SPACES
EXISTING BLOCK PLAN

This block has six 5 story walk-ups, open spaces, and streets. Land utilization of the block has proven 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.
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.

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

**LAND UTILIZATION DATA**

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.40</td>
<td>14</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>1.94</td>
<td>66</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>0.57</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.91</td>
<td>100</td>
</tr>
</tbody>
</table>

**CIRCULATION EFFICIENCY**
- Network length (streets, walkways) = 123 m/Ha
- Lots served (total area) = 101 m²
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.
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.
   - 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 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

<table>
<thead>
<tr>
<th>LAND UTILIZATION</th>
<th>EXISTING DEVELOPMENTS</th>
<th>NEW DEVELOPMENTS</th>
<th>PROPOSED DEVELOPMENTS</th>
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<tr>
<td>public area</td>
<td>poor (misutilized, underutilized)</td>
<td>poor (misutilized, underutilized)</td>
<td>good (minimized, efficient)</td>
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<td>semi-public area</td>
<td>almost none</td>
<td>fair (sometimes underutilized)</td>
<td>good</td>
</tr>
<tr>
<td>private area</td>
<td>good (fully utilized)</td>
<td>none</td>
<td>good (fully utilized)</td>
</tr>
<tr>
<td>semi-private area</td>
<td>none</td>
<td>none</td>
<td>good (fully utilized)</td>
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<th>NEW DEVELOPMENTS</th>
<th>PROPOSED DEVELOPMENTS</th>
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<td>fair (medium)</td>
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<td>co-users</td>
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<td>responsible organization</td>
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<td>semi-private area</td>
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<tr>
<td>middle or high</td>
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<th>INCOME GROUPS</th>
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<th>SOCIAL INTEGRATION</th>
<th>EXISTING DEVELOPMENTS</th>
<th>NEW DEVELOPMENTS</th>
<th>PROPOSED DEVELOPMENTS</th>
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</thead>
<tbody>
<tr>
<td>poor</td>
<td></td>
<td></td>
<td>good</td>
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*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
APPENDIX

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 reamined 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 institutions 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 1.43 million. 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.
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-
ing 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 shor-
tage resulting from the devastation during
the Korean War. At that time, the area was a
periphery of the city with surrounding of ag-
gricultural 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 acti-
vities.
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.
## Appendix

### Locality Construction Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Self-Help</th>
<th>Artisanal</th>
<th>Contractor</th>
<th>Large Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud/Wattle</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Wood</td>
<td></td>
<td></td>
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<tr>
<td>Masonry Wood</td>
<td></td>
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<tr>
<td>Masonry</td>
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<tr>
<td>Concrete</td>
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</tbody>
</table>

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

### Locality Utilities and Services

- Water Supply
- Sanitary Sewerage
- Storm Drainage
- Electricity
- Gas
- Refuse Collection
- Public Transportation
- Paved Roads, sidewalks
- 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.
BLOCK PLAN: The blocks are mainly utilized as residential areas. All the lots in the blocks had front and back yards at the initial stage of the development, but most yards eventually contain extensions of the dwelling units. The inhabitants built the extensions to rent rooms or to open shops. Streets between blocks are very narrow, and they are just utilized as accesses to dwellings rather than public circulation. Despite the narrow width, the street area is very large due to the long circulation length.
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: -

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 Utilisation: (accurate) Survey by Author, 1981
Typical Dwelling: (approximate) IBID
Socio-economic Data: (approximate) IBID
General Information: Survey by Author, 1981

PHOTOGRAPHS: (OPPOSITE PAGE, CLOCKWISE FROM TOP LEFT)
1. General view of the 'CHENGSHANG 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.
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.
CASE STUDY: SANGGAEDONG

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.
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
**CASE STUDY: SANGGAEDONG**

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 minimal, 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.

**LOCALITY BLOCK PLAN**

**LAND UTILIZATION DATA**

<table>
<thead>
<tr>
<th>DENSITIES</th>
<th>Total Area</th>
<th>Density</th>
<th>N/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>103</td>
<td>0.78</td>
<td>132</td>
</tr>
<tr>
<td>DWELLING UNITS</td>
<td>103</td>
<td>0.78</td>
<td>132</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>607</td>
<td>0.78</td>
<td>778</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.22</td>
<td>28</td>
</tr>
<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.02</td>
<td>3</td>
</tr>
<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.54</td>
<td>69</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0.78</td>
<td>100</td>
</tr>
</tbody>
</table>

**NETWORK EFFICIENCY**

<table>
<thead>
<tr>
<th></th>
<th>Length (streets, walkways)</th>
<th>901 m/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOTS</td>
<td>Area served (total area)</td>
<td>51 m²</td>
</tr>
</tbody>
</table>

**PATTERN**

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

**LOCALITY BLOCK LAND UTILIZATION DATA**

- **DENSITIES**
  - LOTS: 103, 0.78, 132
  - DWELLING UNITS: 103, 0.78, 132
  - PEOPLE: 607, 0.78, 778

- **AREAS**
  - 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%
  - TOTAL: 0.78, 100%

- **NETWORK EFFICIENCY**
  - Length (streets, walkways): 901 m/ha
  - Average area, dimensions: 51 m²
APPENDIX

PHYSICAL DATA (related to dwelling and land)

DWELLING UNIT
- Type: HOUSE
- Area (sq m): 27
- Tenure: EXTRALEGAL OWNERSHIP

LAND/LOT
- Utilisation: PRIVATE
- Area (sq m): 50
- Tenure: EXTRALEGAL OWNERSHIP

DWELLING
- Location: PERIPHERY
- Type: DETACHED
- Number of floors: 1
- Utilisation: MULTIPLE
- Physical state: BAD

DWELLING DEVELOPMENT
- Mode: INCREMENTAL
- Developer: POPULAR
- Builder: SELF-HELP/ARTISAN
- 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: 6 km
- Mode of travel: BUS

COSTS
- Dwelling unit: -
- Land - Market value: -

DWELLING UNIT PAYMENTS
- Financing: PRIVATE
- Rent/Mortgage: -
- % Income for rent/mortgage: -

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 Utilisation: (accurate) IBID
- 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.

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...
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
- Parking
- Police
- Fire Department
- School
- Church
- Recreation
- Library
- University
- Health
- Post Office
- Social Services
- Market
- Management Office
- Bus
- Rapid Transit
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

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

Quality of information: Approximate
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.

LOCALITY BLOCK PLAN

LOCALITY BLOCK LAND UTILIZATION DATA

<table>
<thead>
<tr>
<th>AREAS</th>
<th>Hectares</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC (streets, walkways, open spaces)</td>
<td>0.93</td>
<td>56</td>
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<tr>
<td>SEMI-PUBLIC (open spaces, schools, community centers)</td>
<td>0.40</td>
<td>24</td>
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<tr>
<td>PRIVATE (dwellings, shops, factories, lots)</td>
<td>0.33</td>
<td>20</td>
</tr>
<tr>
<td>SEMI-PRIVATE (cluster courts)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1.66</td>
<td>100</td>
</tr>
</tbody>
</table>

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

DENSITIES  Total  Area  Density
LOTS       -      -   -
PEOPLE     1,330  1.66  801

PERCENTAGES

<table>
<thead>
<tr>
<th>PERCENTAGES</th>
<th>Streets/Walkways</th>
<th>Playgrounds</th>
<th>Cluster Courts</th>
<th>Dwellings/Lots</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>56</td>
<td>24</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

DENSITY  Persons/Hectare  801

CIRCULATION EFFICIENCY  Meters/Hectare  555
**PHYSICAL DATA**
(related to dwelling and land)

**DWELLING UNIT**
- **type:** APARTMENT
- **area (sq m):** 43
- **tenure:** LEGAL OWNERSHIP

**LAND/LOT**
- **utilisation:** PUBLIC/SEMI-PUBLIC
- **area (sq m):** -
- **tenure:** LEGAL OWNERSHIP

**DWELLING**
- **location:** PERIPHERY
- **type:** WALL-UP
- **number of floors:** 5
- **utilisation:** 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**
- **shower:** 1
- **kitchen:** 1
- **rooms:** 1
- **other:** -

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

**GENERAL**
- **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 - rural: -
- **why came to urban area:** EMPLOYMENT

**GENERAL**
- **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:** -

---

**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 Utilisation:** (accurate) Survey by Author, 1981
- **Typical Dwelling:** (approximate) IBID
- **Socio-economic Data:** (approximate) IBID
- **Photographs:** Author, 1981

**GENERAL**
- **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 - rural: -
- **why came to urban area:** EMPLOYMENT

**GENERAL**
- **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:** -
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.
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.
APPENDIX

LOCALITY CONSTRUCTION TYPES

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

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

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES

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

LOCALITY COMMUNITY FACILITIES

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

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

Quality of information: Approximate

LOCALITY SEGMENT PLAN

1:2500
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 PLAN

LAND UTILIZATION DIAGRAMS

PERCENTAGES

1 Hectare

DENSITY

Persons/Hectare

20 Persons

353

CIRCULATION EFFICIENCY

Meters/Hectare

503

LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES

Total

Area

Persons

Density

Hectares

Persons/Ha

LOTS

41

0.80

51

SWELLING 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

ARES served (total area)

LOTS

Average area, dimensions = 140 m²
PHYSICAL DATA

(dwellings 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

(relevant to user)

GENERAL: SOCIAL
- user's ethnic origin: KOREA
- place of birth: SMALL CITY
- education level: PRIMARY SCHOOL

NUMBER OF USERS
- married: 4
- single: 1
- children: 5
- total: 10

MIGRATION PATTERN
- number of moves: 2
- rural - urban: 1968
- 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: -

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, CLOSERWISE 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.
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.

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

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.

EXISTING
LOW/MODERATE-INCOME, APARTMENTS

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

DENSITY Persons/Hectare 621
20 Persons
16 Hectares

PROPOSED I
LOW-INCOME, ROW HOUSES

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

DENSITY Persons/Hectare 588
20 Persons
16 Hectares

CHUNGRYUNGRi
SANGGAEDONG
JAMSIL
GALHYUNDONG
P CHULSAN (proposed project)
CASE STUDIES

PROPOSED II
LOW-INCOME, ROW HOUSES/APARTMENTS

CHUNGRYUNGRI
LOW-INCOME, LOW HOUSES

SANGGAEDONG
VERY LOW-INCOME, SQUATTERS

JAMSIL
LOW/MODERATE-INCOME, APARTMENTS

GALHYUNDONG
MODERATE-INCOME, DETACHED HOUSES

<table>
<thead>
<tr>
<th></th>
<th>PROPOSED II</th>
<th>CHUNGRYUNGRI</th>
<th>SANGGAEDONG</th>
<th>JAMSIL</th>
<th>GALHYUNDONG</th>
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<td>PERCENTAGES</td>
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<tr>
<td>Streets/Walkways</td>
<td>20</td>
<td>29</td>
<td>28</td>
<td>56</td>
<td>29</td>
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<tr>
<td>Playgrounds</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>24</td>
<td>-</td>
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<tr>
<td>Cluster Courts</td>
<td>26</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Dwellings/Lots</td>
<td>54</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Hectare</td>
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<td>DENSITY</td>
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<tr>
<td>Persons/Hectare</td>
<td>910</td>
<td>1,128</td>
<td>778</td>
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<td>353</td>
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<td>20 Persons</td>
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<tr>
<td></td>
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<td>16 Hectares</td>
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<tr>
<td>CIRCULATION EFFICIENCY</td>
<td>163</td>
<td>918</td>
<td>901</td>
<td>555</td>
<td>503</td>
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COMPARATIVE SUMMARY
GLOSSARY

The criteria for the preparation of the definitions were as follows: first, definitions from "Webster's Third New International Dictionary," (Merriam-Webster, 1971); second preference, definitions from technical dictionaries, textbooks, 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 agreeable or satisfactory.

Words included for specificity and to focus on a particular context are indicated in parenthesis. Words are indicated in parenthesis. (See also: REFERENCES."

ACCESSORIES. The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation system, and other systems such as: highways, airplanes, 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)

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

AIRPORT DISTURBANCE. The act or process of destroying or damaging or settling of (in site by the airport noise, vibration, hazards, etc.) (Merriam-Webster, 1971)

AIRPORT ZONING RESTRICTIONS. The regulation of the height, types, or zoning of the paths in the moving aircraft. (Aerodrome, 1971)

ALTERNATING CURRENT (A.C.) (an electric) current that changes its direction of flow at regular intervals. (MTC 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. Ampires (amp) are a measure of the rate of flow of electrical current; one ampere is equal to the amount of current produced by one volt applied across a resistance of one ohm. (MTC ST 45-7, 1953)

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

APPROACHES. The main routes external to the site (pedestrian/vehicular) that form the approach to the site, and which 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. (Kays, 1971)

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

BACKFILL. Earth or other material used to replace material removed during construction, such as in culverts, sewers, and other underground utilities. (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). (DePina, 1972)

BETRAYAL (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 (its increase between base and surface course). (DePina, 1972)

BITUMINOUS. A coating of or containing bitumen; an 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.)

BONUSARY. Something (a line or area) that frame a site or limits an area 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 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 the building, sewer, and waste and other drainage pipes. It is connected to the building sewer. (U.S.D.P.)

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. (MTC ST 45-7, 1953)

CAGE POOL. An underground catch basin that is used where there is a sewer and into which household sewage or other liquid waste is drained to prevent the leaching of the liquid into the surrounding soil. (Merriam-Webster, 1971)

CIRCULATION. System(s) of movement/passage of people, goods for delivery, or goods for display; 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 located at turns and other points of collection. (MTC ST 45-7, 1953)

CLIMATE. The average condition of the weather at a particular place over a period of years as exhibited by temperature, precipitation, evaporation, sun, 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)

COMMON. 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.)

COMMUNITIES. 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, etc., by the public. (DePina, 1972)

COMPONENT. A constituent part of the utility network. (Merriam-Webster, 1971)

CONCENTRATION. A condition or process of development and improvement work carried out by local authorities. (U.S.D.P.)

CONDURATION. An aggregation or continuous network of urban communities. (Merriam-Webster, 1961)

CONSTRUCTION CONTRACTOR (or company).  Construction firm that builds or constructs a building/building site. (Merriam-Webster, 1971)

CONSTRUCTION CO/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 ORGANIZATION. Including the following: CAPITAL cost; cost of infrastructure; OPERATING cost of administration; maintenance, etc.; DIRECT, includes capital and operating costs; INDIRECT, includes environmental and personal costs. (U.S.D.P.)

CURRENT (SEE: ALTERNATING CURRENT, DIRECT CURRENT). An electric current is a movement of positive or negative electric particles, or a flow of electricity as 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, electrical oscillation, current alternation, or other periodic process. (Merriam-Webster, 1971)

DAY. A barrier preventing the flow of water; a barrier built with a slow-release mechanism and steep back flowing water. (Merriam-Webster, 1971)

DEPRESSION ACCELERATION (TAX). A tax incentive designed to encourage the rate of improvement and also allowing a faster writeoff 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 sector of the whole 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)

DISTRICT CURRENT (D.C.). An electric current that flows continuously in one direction. (MTC 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 or things. (DePina, 1972)

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

DUST/DIRT. Fine dry pulverized particles of earth, dust, 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 BUILDERS. Four groups are considered: SELF-HELP WUB: Where the dwelling unit is totally built by the user or occupant; work is done by the user or occupant; the dwelling unit is totally built by a small organization hired by the user or occupant; 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 dwellings or small single complexes; LARGEST: Where the dwelling unit is constructed by a major organization hired by the developer and consists in part of operations of scales of operations, financially and materially; the scale reflecting a more comprehensive and larger scale of operations encompassing the building of large quantities of similar units, or a singularly large complex.

DWELLING DENSITY. The number of dwellings, dwelling units, people or families per unit hectare. Gross density (the density of persons, excluding lote, streets). Net density is the density of selected, discrete portions of an area (ex. including lote, streets).

DWELLING DEVELOPER. Three sectors are considered in the supply of dwellings: SECTORIAL: The marginal sector that is limited only to housing, sales, etc. SECTORIAL, administrative, legal, technical institutions involved in the provision of dwellings. The housing provision (financing, construction, operating) is carried out by the Sectorial Popular sector for "self-use" and sometimes for profit. PUBLIC SEC-
GLOSSARY

The circuit with the voltage dropping to zero twice in device to measure flow of water.

Example: a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room.

A multiple space (row/ set of rooms) that includes a kitchen, etc. A MOUSE 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. A GRANULAR SPACE (seem 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).

Glossary

The number of buildings, detached, semi-detached and row/group dwelling types.

Single or apartment: an individual or family inhabiting one dwelling.

Three sectors are considered in the urban layout: center, up, and down. This essentially is everywhere one foot from one another.

A device for measuring flow of water, usually odorous and sometimes noxious.

A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and individual users.

Profile of the center of a roadway, or the invert of a culvert or sewer.

This block is determined by a convenient public circulation and not by dimensions of lots. In grid blocks some lots have indirect access to public streets.

The urban layouts with grid blocks.

The urban layouts with grid blocks, blocks, or plots.

Government/municipal regulations. In urban areas, the development of the physical environment is a process usually controlled by some governmental body through all or some of the following regulations: master plan, zoning, subdivision regulations, building code.

(TAB) The height of water above any plan or point of reference. Read in feet = (lb/ft^2). In h/ft (Density in lb/cu. ft.) For water at 60°F.

High-rise, dwelling units grouped in five or more stories with stairs and lifts for vertical circulation.

Hot wire. Carrier of current (as of soil) running or reducing injury and loss of life or property by fire.

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.

Flexible floor. A rising and overflowing of a body of water; a sudden rise in level of a lake, etc., that is not under water.

Flooding fringe. The floodplain area landward of the natural floodway fringe.

Flow meter. A device to measure flow of water.

Flush tank toilet. Toilet with storage tank of water used for flushing bowl.

Flush valve toilet. Toilet with self-closing valve which supplies water directly from pipe. It requires adequate pressure for proper functioning.

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 one square foot.

Tones. Gasous emissions that are usually odorous and sometimes noxious.

Gas. A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and individual users.

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Water meter. A device to measure flow of water.

Waste matter eliminated from the body.

Efficiency. Capacity to produce desired results with a minimum use of time, money or materials.

Effluent. Outflow or discharge from a sewer or sewage treatment equipment.

Electric feeder. That part of the electric distribution system from a substation to the electric service equipment serving one or more lots.

Electric service group. That part of the electric distribution system from a substation to the electric service equipment serving one or more lots.

Electric transformer. A device which changes the magnitude of the electrical energy from one state (e.g., voltage, frequency) to another state (e.g., voltage, frequency). It is used to change power from one level to another level.

Electric circuit. A complete, closed path by which electric current can flow. A circuit must have either be "parallel" (voltage constant for all connected loads) or "series" (voltage divided among connected loads). A circuit in parallel is set up to serve as a source of electrical energy to the same range of incomes.

Electric circuit. The general process whereby materials of the earth's crust are worn away by natural forces as wind, water, waves, ice, and wind.

Electrification. The process (network) for delivering electricity (network) with electric power.

Emergencies for FILLI. A bank of earth, rock, or other material constructed above the natural ground surface, and having direct access to public streets.

Emergence. The process whereby materials of the earth's crust are worn away by natural forces as wind, water, waves, ice, and wind.

Excava. Waste matter eliminated from the body.

Existing structure. Something constructed or built for another use.

Existing structure. Something constructed or built of interest and on areas indicated in limited/res-stricted/hazard in the initial survey.

Exterior circulation/accesses (site planning). The existing and proposed circulation system/accesses outside but sometimes intersecting the site. These include land access highways as well as access to the surrounding areas. Ring or circular facilities are generally well defined.

Facade (also TAF). A fixture for drawing liquid from a pipe, cask, or other vessel.

Financing. The process of raising or providing funds. SELF FINANCED: provided by own funds; PRIVATE/PRIVATE FINANCED: provided by loans; PUBLIC DISTRICTED: provided by grant or aid.

Fire/Explosion Hazards. Damage to the state of being exposed to harm, liable to injury, pain, or loss from fire or explosion (at or near the site).

Fire flow. The quantity (in time) of water available for fire-fighting purposes in excess of that required for other purposes.

Fire hydrant. A water tap to which fire hoses are connected in order to another fire hydrant.

Fire protection. Measures and practices for preventing or reducing injury and loss of life or property by fire.

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APPENDIX

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SITE (or parts of the urban context). It is expressed in terms of the site's ownership, control, and maintenance; responsibility -public sector and user.

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 building with respect to the use to which it may be put; the relationship to user, physical controls, and responsibility. Public streets, walkways, open spaces, parks and plazas, other facilities accessible to the public. (Merriam-Webster, 1971)

LAND TENURE. The period or area in space actually occupied by a person or his heirs without restriction of time. (U.S.D.P.)

PRIMEIR. 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.)

PUBLIC UTILITIES. Includes: public transportation, police protection, public schools, parks, recreation, and open spaces, others serving a community.

PUBLIC SERVICES AND COMMUNITY FACILITIES. Includes: public transportation, police protection, public schools, parks, recreation, and open spaces, others serving a community.

PUBLIC SYSTEM (general). A system which is owned and operated by a local governmental authority or by an established public utility company which is controlled and regulated by a governmental authority.

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

RESERVE. 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 services and facilities necessary to a community's daily life, including housing, education, recreation, shopping, work. (U.S.D.P.)

RESISTANCE. The opposition to electrical flow. (Resistance increases as the length of wire is increased.) (U.S.D.P.)

RIGHT-OF-WAY. A legal right of passage over another person's ground (land), the area or way over which a person may lawfully pass.

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

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

LOCATION. The position of a site or area as actually occupied by a person or his heirs without restriction of time. (U.S.D.P.)

LAYOUT. The plan or design of arrangement of some object, system, or pattern, showing the layout of the land, road, and utility networks of a specific layout and lot. (U.S.D.P.)

LAND REFERENCES. A set of models of urban layouts arranged in rows and columns. (U.S.D.P.)

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

LATERAL SEWER. A system of pipes, wires, etc., laid in the earth or a manhole, the area or way over which one may lawfully pass.

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GLOSSARY

SERVICES, by a public that can afford housing without subsidy, group utility, Rights-of-way may be shared (as streets; the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; b) SERVICE: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; c) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; d) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; e) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; f) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; g) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; h) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; i) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; j) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; k) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; l) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; m) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; n) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; o) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; p) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; q) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; r) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; s) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; t) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; u) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; v) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; w) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; x) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; y) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings; z) SUBSIDY: the provision of services for residential use and complementary commercial use, the access to a piece of land where people can build their own dwellings;
BIBLIOGRAPHY


Caminos, Horacio; Goethert Reinhard, URBANIZATION PRIMER, MIT Press, Cambridge, USA, 1978


Chu, chong Won, ISSUES ON HOUSING AND URBAN DEVELOPMENT IN SEOUL, Seoul National University, Seoul, Korea, 1980

Economic Planning Board, POPULATION AND HOUSING CENSUS, Seoul, Korea, 1975

Korea Housing Corporation, A HANDBOOK OF HOUSING STATISTICS, Seoul, Korea, 1979


Korea Housing Corporation, THE CHULSAN DEVELOPMENT PLANNING, Seoul, Korea, 1979

Korea Housing Corporation, THE GWACHUN DEVELOPMENT PLANNING, Seoul, Korea, 1979

Korea Institute of Science and Technology, A STUDY ON LOTS AND BLOCKS FOR LOW-INCOME HOUSING, Seoul, Korea, 1980

Korea Institute of Science and Technology, MULTIFAMILY LIVING IN SINGLE-DETACHED HOUSES IN KOREA: ITS PROBLEMS AND POSSIBILITIES, Seoul, Korea, 1980


Planning Board, A HOUSING MODEL STUDY FOR THE NEW CAPITAL CITY, Seoul, Korea, 1978

Seoul Special City, STATISTICAL YEARBOOK, Seoul, Korea, 1979

Seoul Special City, THE HOUSING WHITE BOOK, Seoul, Korea, 1979

Kim, Woo-Sung, URBAN HOUSING POLICIES AND PHYSICAL PROTOTYPES FOR THE LOW-INCOME SECTOR IN METROPOLITAN SEOUL, KOREA, MIT Thesis, 1972


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 10.764 square feet
1 hectare = 10,000 square meters = 2.4711 acres
1 square foot = 0.0929 square meters
1 acre = 0.4047 hectares