HOUSING DESIGN ANALYSIS FOR LOW-INCOME FAMILIES IN HONG KONG AND BANGKOK

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CHAPTER I

INTRODUCTION

The house has been not only a protection from the elements, but also a place where other needs of the family are satisfied. As Huge Anthony stated:

> A house is a work of art and a financial investment. It is a tool to be used by its owner, and the unit on which the whole complicated structure of our social system is built. It is a technical achievement and the familiar background of our daily life. It is a place of education for children and of entertainment for friends. It is a treasure house for personal belongings and an exhibition hall of individual taste. But just as 'truth' is more than a sum of facts, a house is more than the total of its physical qualities. It can express all these things and yet fail. It is not also a home. Obviously, it takes more than a good house to make a home, but if a house is merely conceived and poorly built, the creation of a home within it will be a most difficult and discouraging progress. It is in any case no easy task (2, page 6).

Housing is one of the most important basic necessities in life, next only to food. Every family irrespective of its economic status has a right to live in a house which would not only protect them from the sun, wind and rain, but also caters to their spiritual and cultural needs. Unfortunately due to various causes, house building activities have not kept pace with increases of population, as a result that today the cities of Hong Kong and Bangkok are both facing a serious housing crises, particularly in the urban areas.

For more than twenty years ago, the Hong Kong Government has been aware of the housing shortage for the low and moderate income families. Since then, various organizations have been set up to help in solving

the housing shortage problems. The details of these organizations will be discussed in the following chapter. These organizations have been somewhat successful and yet the supply and demand of low-income housing still falls short of a reasonable balance.

In Bangkok, the rapid growth of the population and lack of planning have resulted in deterioration of the environment. Since the advent of the Industrial Revolution, immigration of peasants and refugees into the city in search of work, fortune and a new way of life, has been one of the major forces of progress in the city of Bangkok. But it also has been the major force in creating the worst and the most disastrous of all modes of human habitation - the slum. The slum is not only a disgrace to the city, but also contributes crime and other disasters. In Bangkok and its suburban areas, the slums exist at almost every street corner in the metropolitan area. Klong Toey, the largest slum in Bangkok growing along with the Port of Bangkok, is situated on the land which was owned by the Port Authority. For many years families have moved in from different parts of the country to build their house without the permission of Port Authority. Klong Toey is a "city within the city" of Bangkok where over 30,000 people live on a mere 320 acres of land. The problematic characteristics of this community are: no high-rise towering modern buildings, no paved roads nor street lights and practically no tapped water nor public utilities. The people in this community live in ramshackled, shabby wooden houses, topped by roofs of rusty corrugated iron sheets or nipa palm branches, built along small wooden walkways erected above the swamp. The area has been a symbol of high concentration of social, health, education and housing problems.

The government housing department under the control of the Department of Interior in Bangkok, has not made much progress in dealing with the housing problem. In 1973, the National Housing Authority was set up as an independent agency to issue adequate housing for low and moderate income families, and chose to take Klong Toey as its pilot project in solving the complex housing problem of squatter slums. The first step was to make a house-to-house survey. By September 1973, a report of the findings of this house-to-house survey was issued. Obviously, a variety of plans and design will be required to meet the needs identified by the survey. A design of a Hong Kong low-income housing project might suggest possible solutions for Bangkok.

Statement of the Problem

The rapid influx of low-income families from rural areas into Bangkok in search of employment has resulted in high population density in the urban area. Slums have developed throughout the city and there is a great demand for an increase in the supply of decent low-cost dwelling units to adequately house the ever increasing population. Hong Kong has experienced similar rapid increase in urban population and developed housing organizations to deal with the problem. Bangkok has only recently begun to form housing organizations and is thus considerably behind Hong Kong in dealing with the creation of low-income housing needs.

Purpose of the Study

The purpose of this study was to determine whether or not a low-income unit plan designed for Hong Kong would be applicable for use in

Bangkok. The study compared the similarities and differences between Hong Kong and Bangkok with respect to environmental considerations, social objectives, economic factors and physical features of communities and structures. This study was designed to contribute to the authors future role as a citizen, planner and architect in Thailand.

Procedure for the Study

Information for Hong Kong was collected in a previous study by the author. Based on this information, a design concept for housing low-income families in Hong Kong was developed. From the guidelines of the design concept, basic 4, 5, 6, and 7 person flat unit plans were developed and recommendations were made as to how these units might be grouped into housing blocks.

For this study, information for Bangkok was collected through correspondence with the Department of Interior, Department of Town and Country Planning, the National Housing Authority, research in the library, interviews with Thai students at Oklahoma State University and personal observation in Bangkok during a visit in the summer of 1972.

CHAPTER II

SOCIAL, ECONOMIC AND ENVIRONMENTAL CHARACTERISTICS OF HONG KONG AND BANGKOK

Hong Kong

Topography

The British Colony of Hong Kong is regarded as one of the most densely populated territories in the world. It occupies 398 1/4 square miles of land area on the Southeast coast of China. It is just inside the tropics less than 100 miles south of the Tropic of Cancer and lies between latitudes 22° 9' and 22° 37' N and longitudes 113° 52' and 114° 30' (see Figure 1). The urban area consists of the twin cities of Victoria on Hong Kong island and Kowloon on the mainland (see Figure 2)

Urban Land Use

The extent of the urban area in Hong Kong has been limited by natural topographical features, though a significant addition has been made to the land by extensive reclamations. Between Hong Kong island and the mainland lies Victoria Harbor. Hong Kong island is 11 miles in length from East to West and varies in width from 2 to 5 miles. It rises steeply from the northern shore up shrub and tree covered slopes to a range of hills of volcanic origin where the highest point, Victoria Peak, exceeds 3,000 feet near the western end. Between these

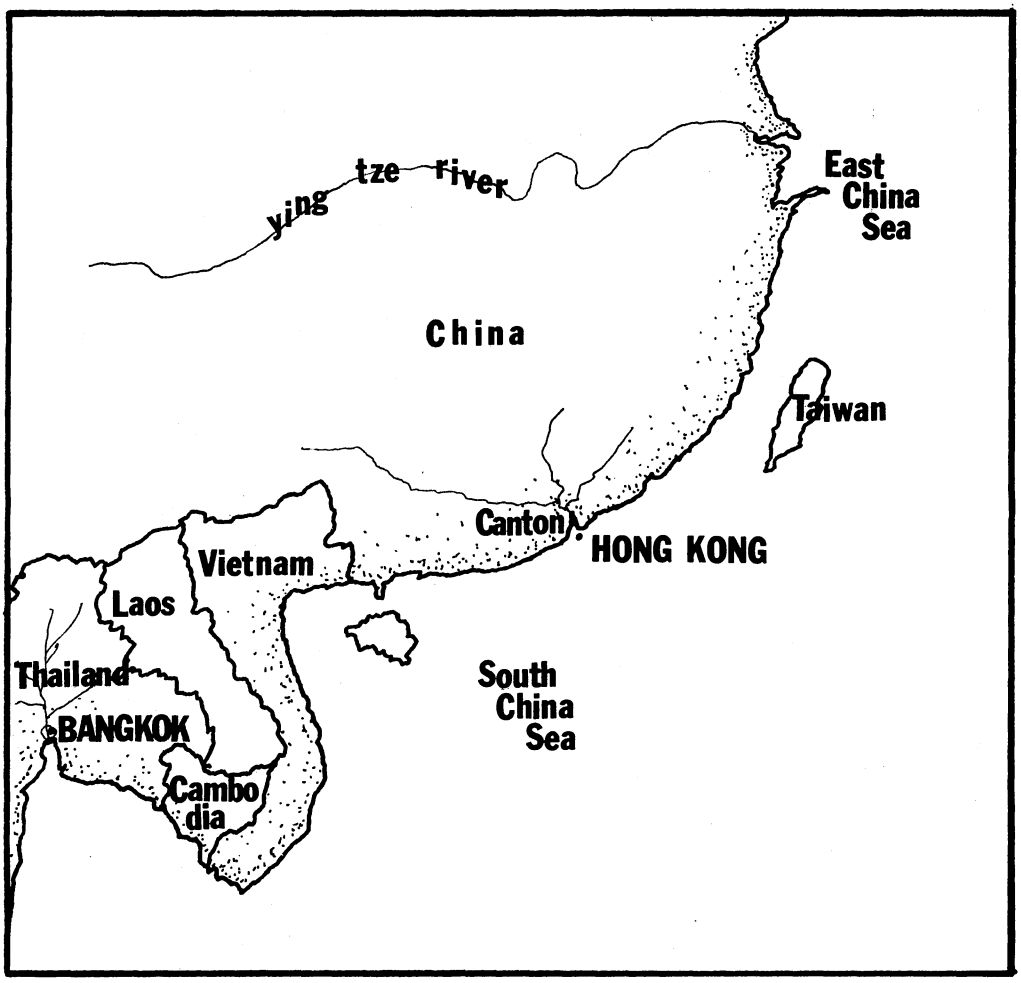


Figure 1. Location of Hong Kong .

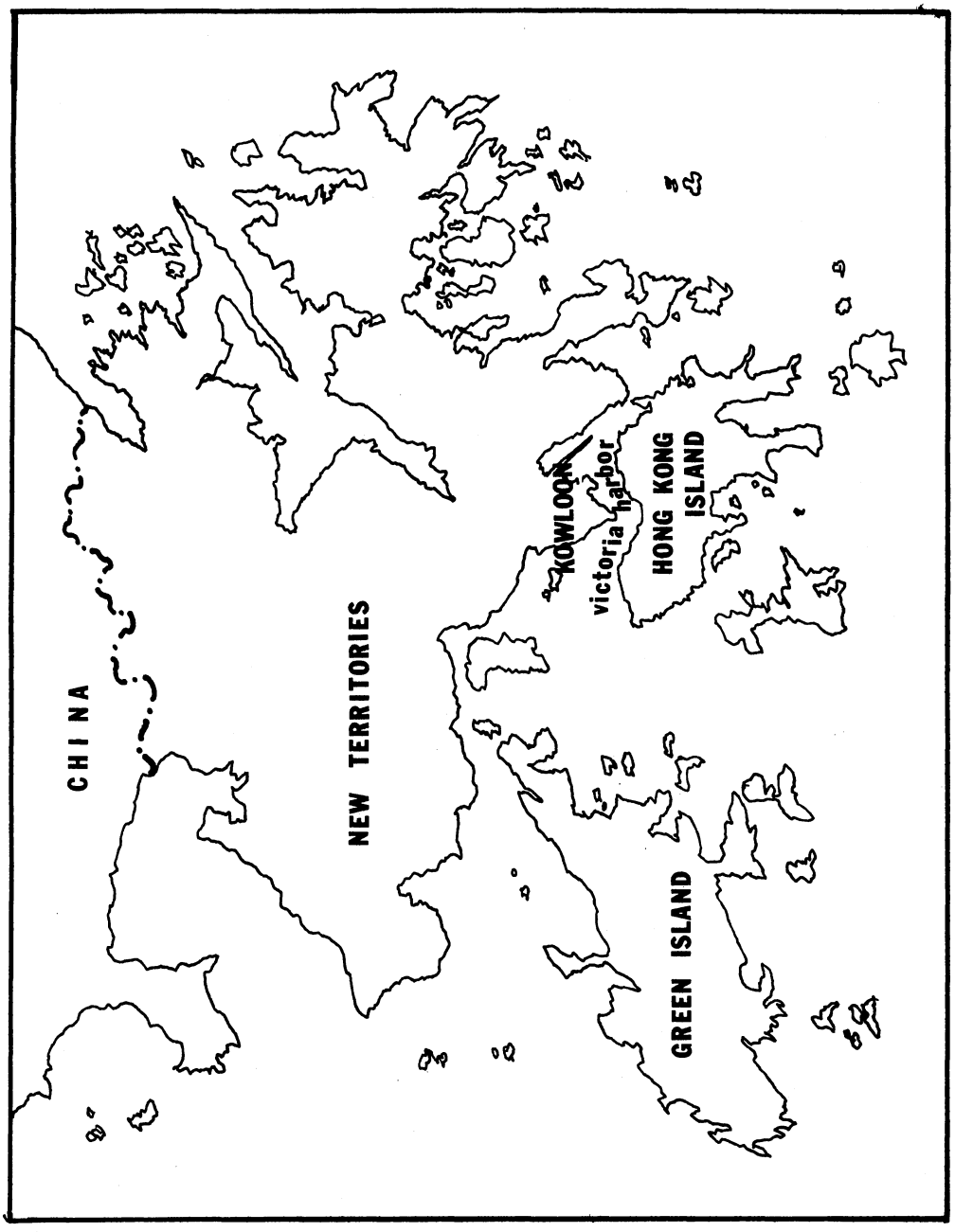


Figure 2. Map of Hong Kong.

hills and the harbor lies the cities of Victoria. The city has grown up the steep hillsides on narrow streets and terraces. The more modern parts of the city stand on a strip of reclaimed land averaging 200-400 yards in width which extend 9 miles along the northern shore.

TABLE I

LAND AREA IN HONG KONG

Land Section	Area
Hong Kong island & a number of small nearby inlets	29 sq. miles
Kowloon & Stonecutters Island	3 3/4 sq. miles
New Territories & 235 islands	365 sq. miles
Total land area of the Colony	398 1/4 sq. miles
Total flat land in urban area	0.04 %
Area of Reclamations (1971)	3100 acres

Soil Condition

The soil generally consists of deeply-weathered granite overlaid in place by post-submergence alluvia. The granite is frequently weathered down to depths of around 200 feet. Weathering was evident at a depth of 250 feet below original ground level or 280 feet below the present ground level (Figure 3).

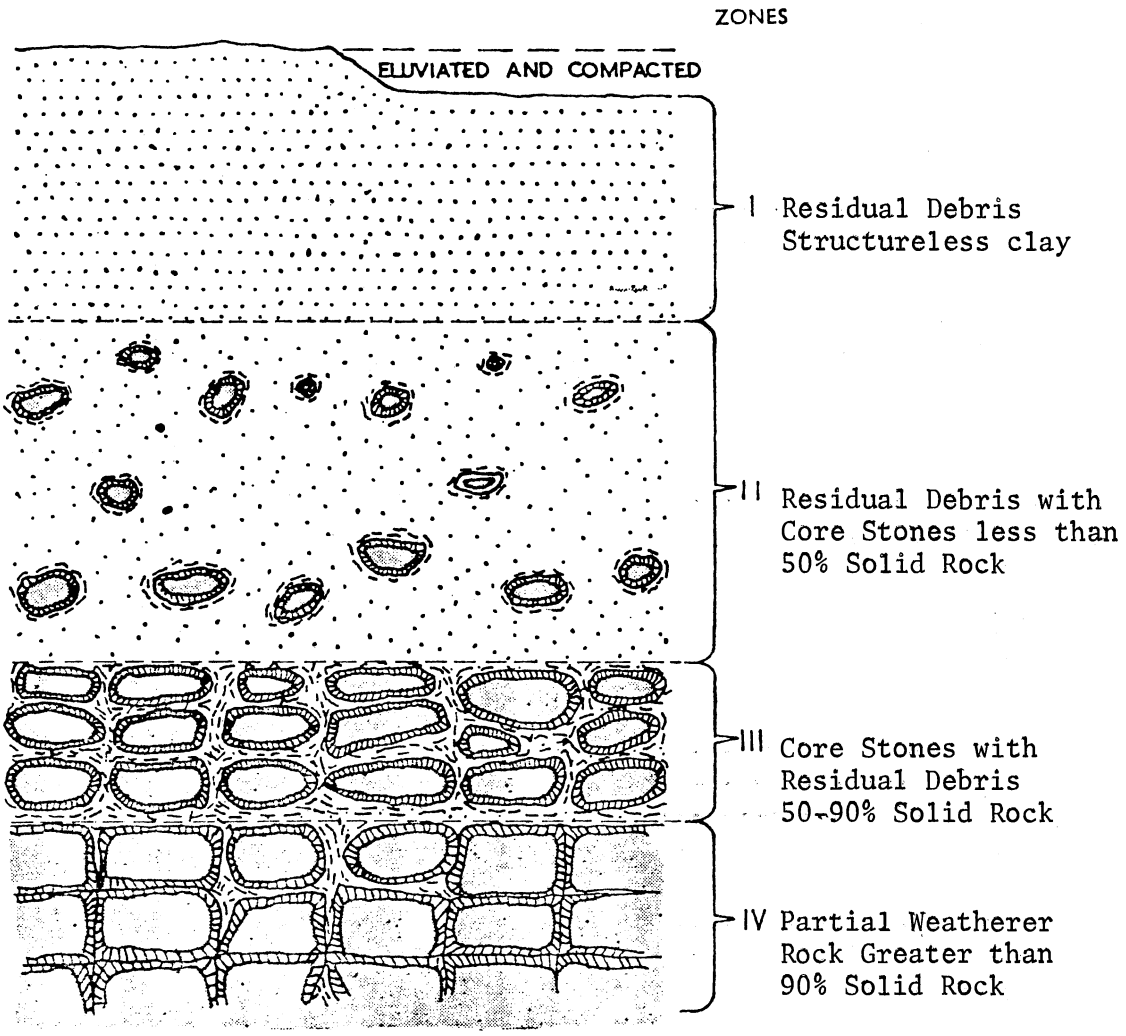


Figure 3. Soil Profile of Hong Kong

Climate

The climate of Hong Kong is governed by the monsoons and although the colony lies within the tropics, it enjoys a variety of weather from season to season. The winter monsoons blow from the northeast and normally begin during September. They prevail until mid-March, but can continue as late as May. Early winter is the most pleasant time of the year when the weather is generally dry and sunny with mean daily temperatures about 70^{o} F to 75^{o} F. After the New Year the sky is more often clouded though rainfall remains slight. Coastal fogs occur from time to time in the early spring (Table II).

Population

When Hong Kong was proclaimed a British colony in 1841, it was declared a free port open to all ships; in these circumstances, the barrenness of Hong Kong became an asset as those who congregated in Hong Kong wished only to trade freely without government restrictions. This has been the pattern of the colony's development ever since.

The total population in 1845 was estimated at 23,817. Since then the colony has acted as a magnet attracting immigrants and refugees from China. A census conducted in 1961 revealed a population of 3.2 million with a natural rate of increase of around 3 percent. With immigration, the overall growth rate at that time was around 5 percent to 6 percent. The data provided by the 1971 Hong Kong census revealed that since 1963, the birthrate has gradually declined probably because of the slow shift towards a higher age of marriage and acceptance of family planning by increasing numbers of the population. At the same time, tight control of the border was exercised by the Chinese. On

TABLE II

CLIMATE DATA OF HONG KONG

Data:
(1) Mean daily temperature 58° F. in February to 82° F. in July. Average for the year is 72° F.
(2) Mean maximum temperature (July) 86.9° F. but the summer temperature often exceeds 90° F.
(3) Mean minimum temperature (February) 55.6° F. but can fall to 45° F.
(4) Mean relative humidity exceeds 80% from mid-February to early September.
(5) Normal annual rainfall is 85 inches.
(6) Average daily duration of bright sunshing varies from 3 hours in March to over 7 hours in mid-July and late October.

Source: Hong Kong Government: Hong Kong Report of the Year 1973: Hong Kong Government Press, 1974.

the basis of a 1966 census, employing a random sample of about 1 per cent of the population, it was projected that the medium population for 1971, 1981, and 1986 would be 4.2 million and 5.2 million and 5.8 million respectively.

While the border with China is now tightly controlled on both sides, it could be overly optimistic to assume that the unpredictable movement of population of the past will not be repeated. Even now there are still 4.4 million people crowded into this small area and

most of them are living in the urban areas.

The result of the rapidly increasing population was that those who could not find conventional housing took to building shack illegally wherever they could find space for them (see Table III).

If one compares Hong Kong with the Metropolitan Statistical Area in the United States, only one-third the Jersey city SMSA, with 21.2 persons per gross acre, had a higher density than in Hong Kong in 1960. Overall density in Hong Kong is 13 persons per gross acre, and individual neighborhoods exceed 2,800. Residential floor space average 155 square feet per household or 35 square feet per occupant.

The most densely populated major American city, New York, reported 38.6 persons per acre within its municipal boundaries in 1960, triple the Hong Kong colony average but far less than the densities in such comparable geographic entities as Victoria or Kowloon. The densities in Hong Kong are considerably higher. In 1961, when the overall average for the colony, excluding boat people, those who live on San Pans in the harbor, was 13 persons per acre, major statistic areas ranged from less than one person per acre (in parts of the New Territories) to 847 (Wan Chai, Victoria) and 963 (Sheun Wan, Victoria). Housing statistics coorborate the impression of high densities and overcrowding in Hong Kong.

The population growth is mainly due to the legal and illegal refugee from China each year, the majority of whom are poor. Land was already scarce, thus with the rapid increase in population, squatters huts popped up like mushrooms, on roof tops, side walks, and on the rocky hillsides.

TABLE III

POPULATION FOR HONG KONG SINCE 1841

Census	Year	Population
	1841	3,000
	1861	119,321
	1921	625,166
First Census	1931	824,751
	1941	1,600,000
		Japanese Occupation
	1945	650,000
	1948	1,800,000
		China War
	1950	2,360,000
Second Census	1961	3,133,131
Third Census	1971	4,424,000
Extension base on medium Projection	1981	7,047,000

Annual increase of birth over death is 100,000 (app.)

Source: Crown Land and Survey Office: Note for Visitor Planner, Public Work Department. May, 1971, p. 16.

Housing Organizations

The Hong Kong Government set up the Resettlement Department under the general control of the Urban Council to: (1) prevent further

squatting, (2) re-settle existing squatters and clean land for development, and (3) manage resettlement (multi-stories) estates, and cottage resettlement areas. Squatter control implied the prevention of any further squatting and in some cases the demolition of new squatter structure without any offer of resettlement.

According to the report in 1970, at the end of March 1970, there were in round figures 1,134,000 people living in resettlement estates and cottage areas, but 380,000 people still remained in squatter areas and rooftops. There were an additional 30,000 living in licensed areas (licensed area means the area where the residents can build their own home in the New Territories district). The two categories: (1) former squatters now resettled and (2) present squatters together made up more than a third of Hong Kong's total population.

Attempts to deal with the squatter problem dated back to 1948, but the Resettlement Department, as such, was not established until 1954. On Christmas Day 1953, the fire broke out in the dense populated squatter area in Shak Kip Mei making more than 53,000 people homeless. Although by no means the first serious fire in a squatter area this was the worst, and it precipitated government action on a large scale. Within weeks temporary two-story buildings were built on the fire site, to be replaced within months by the first multi-story housing blocks. In April 1954, the Resettlement Department was created to look after the new resettlement blocks, to take over the cottage resettlement areas which had been established in an earlier attempt to solve the squatter problem, and to be generally responsible for the control and resettlement of squatters.

By the end of March 1970, the Resettlement Department was managing

twenty-three residentail estates and twenty-two factory blocks, as well as fifteen cottage areas. It was the landlord of well over one million people and had cleared for development over four square miles of land, more than one-hundredth of the colony's total land area.

In retrospect 1969 may be considered as a turning point in the development. For the first fifteen years of the department's life, the emphasis had inevitably been on the urgent need for the clearance of land and the rapid rehousing of large numbers of persons is permanent, inexpensive, accommodation. This necessary emphasis on speed has not been conducive to a gradual buildup of orderly management as reflected in the unsatisfactory conditions now prevailing in those estates. The problems were aggravated by the disturbances of 1967 when the police had more urgent duties to attend to and large numbers of unemployed persons, particularly residents of resettlement estates, turned to hawking for a living. Driven from the main streets, these persons set up shops in the estates, building large tin structures in parking areas and public spaces and often carrying on a large amount of trade in complete defiance of both public health provisions and resettlement rules. A survey in early 1969 showed 12,000 hawkers of various kinds, all operating from structures larger than the permitted size. This added considerably to the problem of the already over-stretched resettlement staff.

In parallel with the program for housing squatters cleared from Crown Land, the government financed two other programs for providing accommodation for residents living in overcrowded and unsatisfactory conditions.

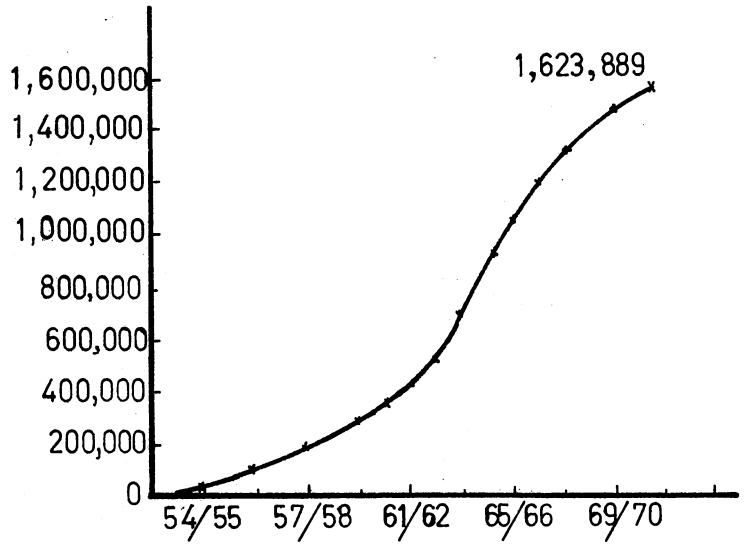
The first one is operated by a statutory body called Hong Kong

Housing Authority which plans, constructs and manages estates designed for families with income ranging from H.K. $400.00 to H.K. $1250.00 per month (note: H.K. 5.00 = U.S. 1.00). The Housing Authority also manages the buildings constructed by the second program called Government Low-Income Housing. This housing provides self-contained flats, of a better standard than resettlement blocks but lower than Housing Authority for families having a monthly income of less than H.K. $500.00 per month and living in overcrowded conditions.

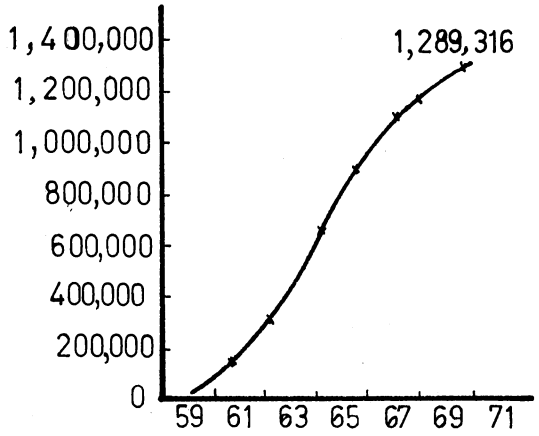
The last program is for the construction between April 1, 1969 and March 1976 of resettlement housing for 300,000 persons and low-income housing for 290,000 persons. This program is based on 6-year targets to be assessed annually. The problem of finding suitable sites becomes progressively more difficult and shortly the situation on Hong Kong island will be that the only squatters who are left will be living on land that is not required or is unsuitable for permanent development. Visitors to Hong Kong are sometimes appalled by the conditions which exist in these squatter areas but so far they have not seemed to constitute a health risk and there seems, therefore, little real justification in using force to move people to remote areas when the people prefer the accessibility and cheapness of their present homes.

Figure 4 indicates what has been achieved and what is planned in the various housing sectors. There are now about 1,620,000 people, or 40 percent of the total population, living in Government aided housing of one type or another and by 1976 these figures will rise to 2,280,000 or 50 percent of the total population.

Most rooms in the resettlement estates have an area of 120 square



A. Public Work Department in Urban Area.



B. Private Developers in Hong Kong Island, Kowloon and New Kowloon.

Figure 4. Domestic Accommodation Completed.

feet to house a family of 4 to 5 adults. However, over the years, standards have improved first with the provision of self-contained flats with private balconies, separate electricity supply, lavatories and water supply and, more recently, by raising the standard of 25 square feet per adult to 35 square feet.

Bangkok

Topography

Bangkok, the capital of Thailand, is located on a flat plane along the left bank of Chao Phya River, about 18 miles north of the Gulf of Siam. It lies at latitude 13° 44' N. and longitude 100° 3' E. (see Figure 5). It was formerly divided into two municipalities, Keung Thep (old name of Bangkok) on the east bank of Chao Phya River and Thon Buri on the west connected by three bridges. In 1971 the two were united as a single city-province with one single municipal government. Now the city of Bangkok has extended its urban area across the Chao Phya River and includes the Thon Buri Province (see Figure 6).

Urban Land Use

Since World War II, Bangkok has grown with unprecedented rapidity; the population doubled between 1960 and 1970 and the area of Krung Thep has been extended three times - in 1942, 1955, and 1965 - to include more than 90 square miles. Extended twice, in 1955 and 1965, Thon Buri now covers 20 square miles. With their union in 1971, the Bangkok-Thon Buri metropolitan area had a total area of 203 square

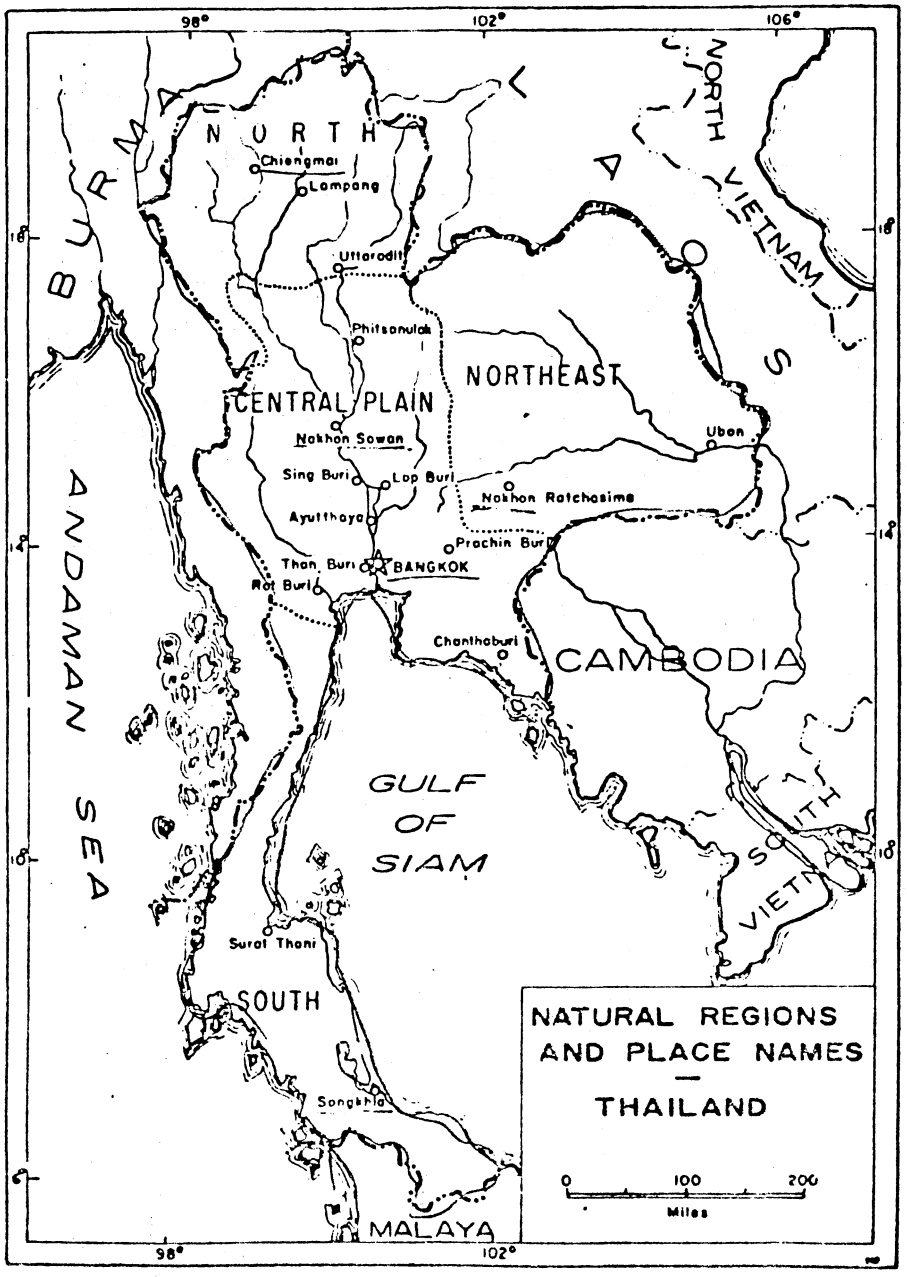


Figure 5. Location of Bangkok.

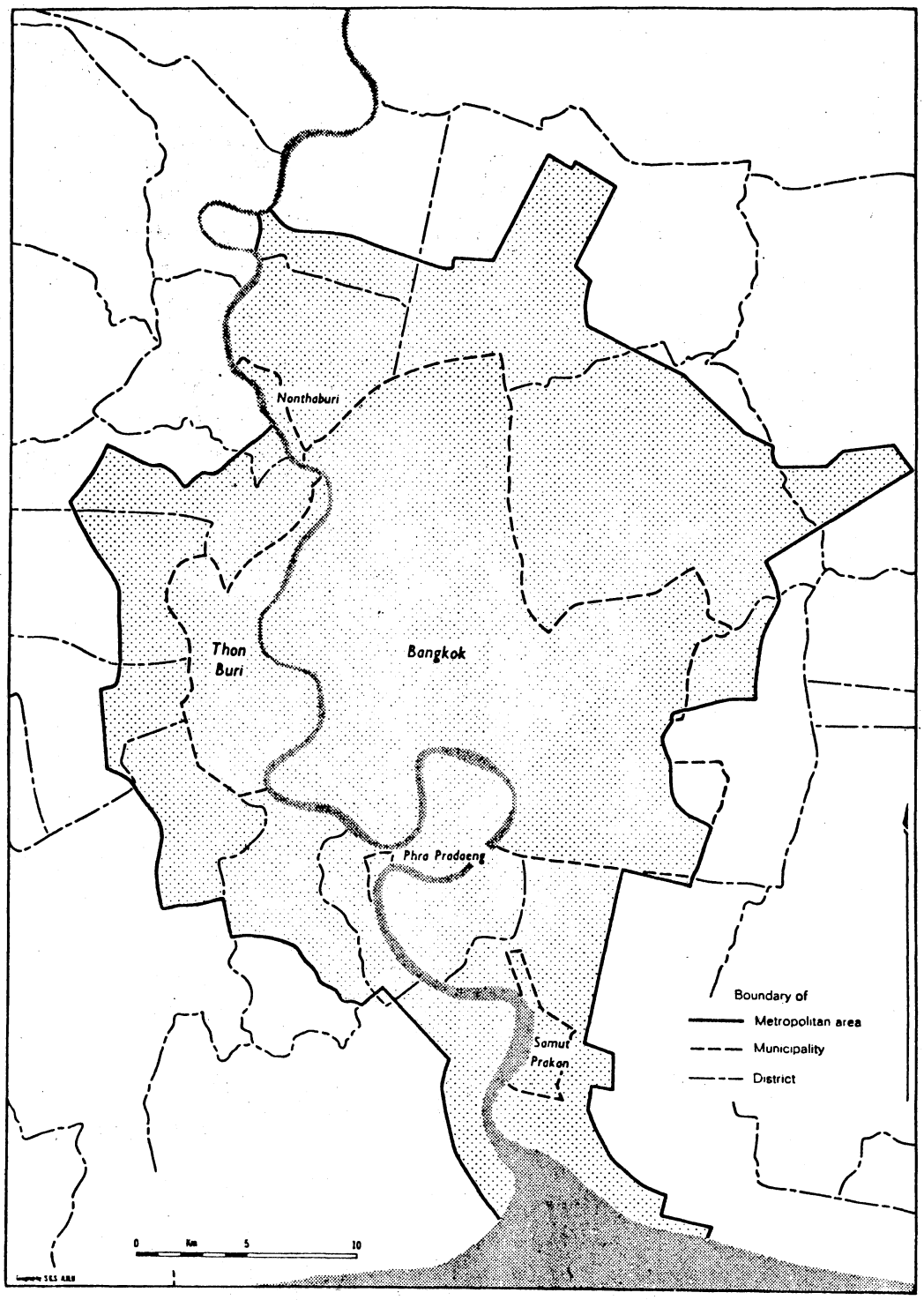


Figure 6. Map of Bangkok.

miles.

Bangkok is not a planned city and is undergoing rapid changes. The city is becoming much more densely populated in the already built-up section and, at the same time, is sprawling outward into the surrounding agricultural areas. Some districts, however, are evolving into functional units as the inner city becomes more definitely used for institutional and commercial governmental activities and the outer city used more for residential and industrial purposes (Figure 7).

Soil Conditions

Bangkok subsoil has developed on the alluvium of the Chao Phraya River combined with that of the coalesced delta of the Mae Klong, Pasak, Prachin and other rivers which have worked together to build the Central Plains. Great quantities of silt are carried down and deposited on the bar at the mouth of the river during the rainy season each year. Numerous sand banks containing sea shells of a recent date are to be found all over the Central Plains. These sand banks were at one time sand bars which guarded the former mouth of the river. The plain has grown from the development of a succession of bars, with the lagoons filling up behind them.

The developed profile in the soil is about 6.6 feet (2 m) deep. The dark grey (nearly black when wet) surface soil is characteristic and is typical of clay soils under alternating seasons of saturation and then intense drying, with deep wide cracking of the surface soil. The dark color does not indicate any considerable quantity of organic matter nor any marked amount of fertility.

The low flat plain of the Bangkok and very slight elevation above

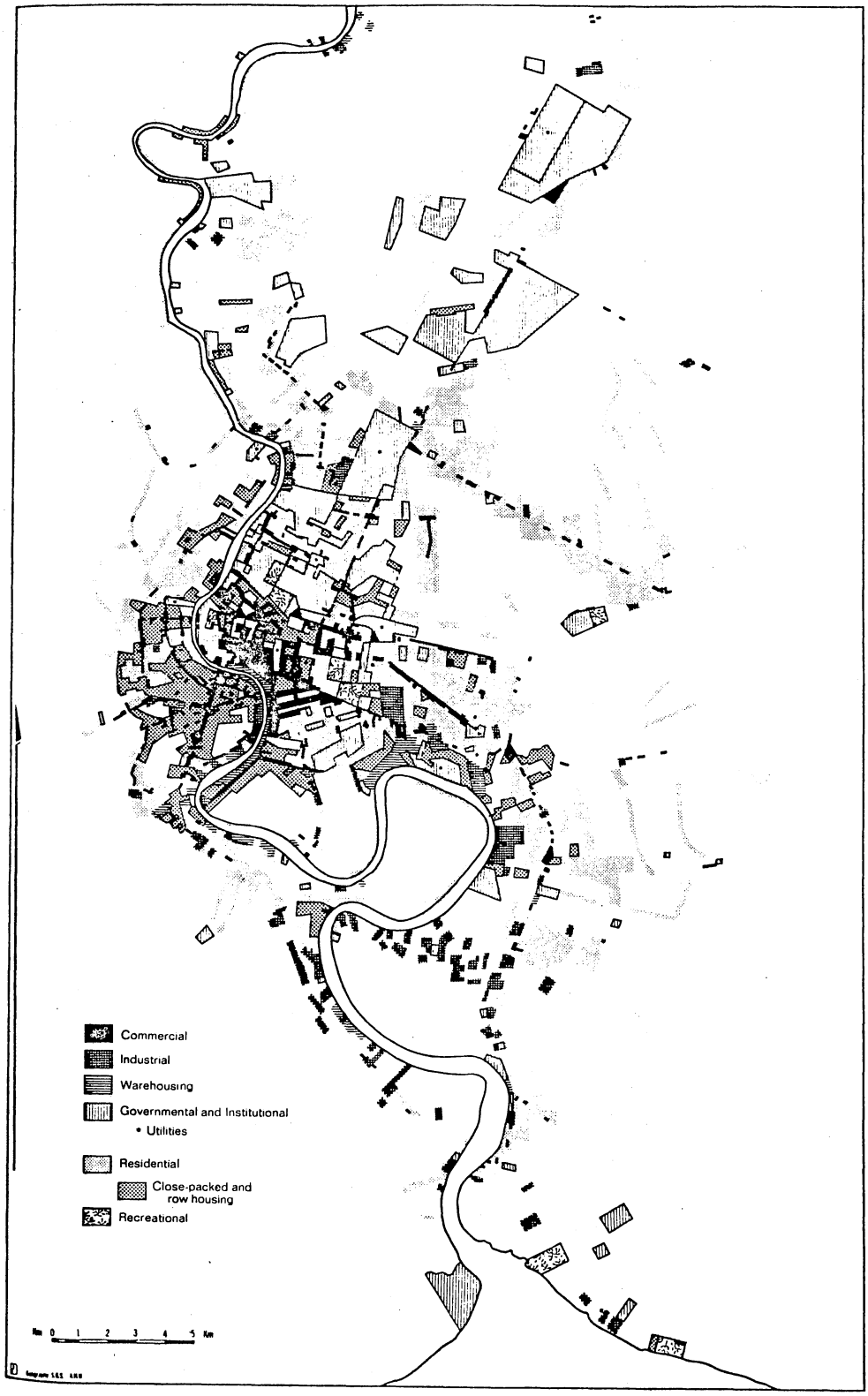


Figure 7. Land Use in Bangkok.

the level means that hardly more than a few meters below the surface the soil is usually permenently saturated: at less than 2 m. depth the undisturbed soil is always saturated with ground water.

A vertical sequence of soil types encountered beneath the ground surface is as follows:

(1) Dark gray or black clay for a depth of about 33 ft. (10 m.).

(2) Light brown to yellow clay for a depth of about 33 ft.

(3) Sandy clay for a depth of 13.2 - 26.4 ft.

(4) Successive layers of sand, clay and gravel and clay of various depths (see Figure 8).

Climate

The climate of Bangkok is hot throughout the year, ranging from 77° F. in the cool season in December to 96° F. at the height of hot season. The cool season lasts from November to February and is known as the Northwest monsoon season, during which the temperature is controlled to a large extent by a generally dry continental air mass. There are three main seasons during the year. The first transitional season, March to mid-May, is the hottest period of the year when the maximum temperature can rise to 96° F. The wet period of the year occurs during the Southwest monsoon season, mid-May to September. The second transitional season - October to March - consists of changeable weather, that is, frequent rains with thunderstorms during the first half of each month and generally dry and cool weather during the second half of the month. Basically, the Northwest monsoons bring cooling breezes and the Southwest monsoons bring torrential rains and storms.

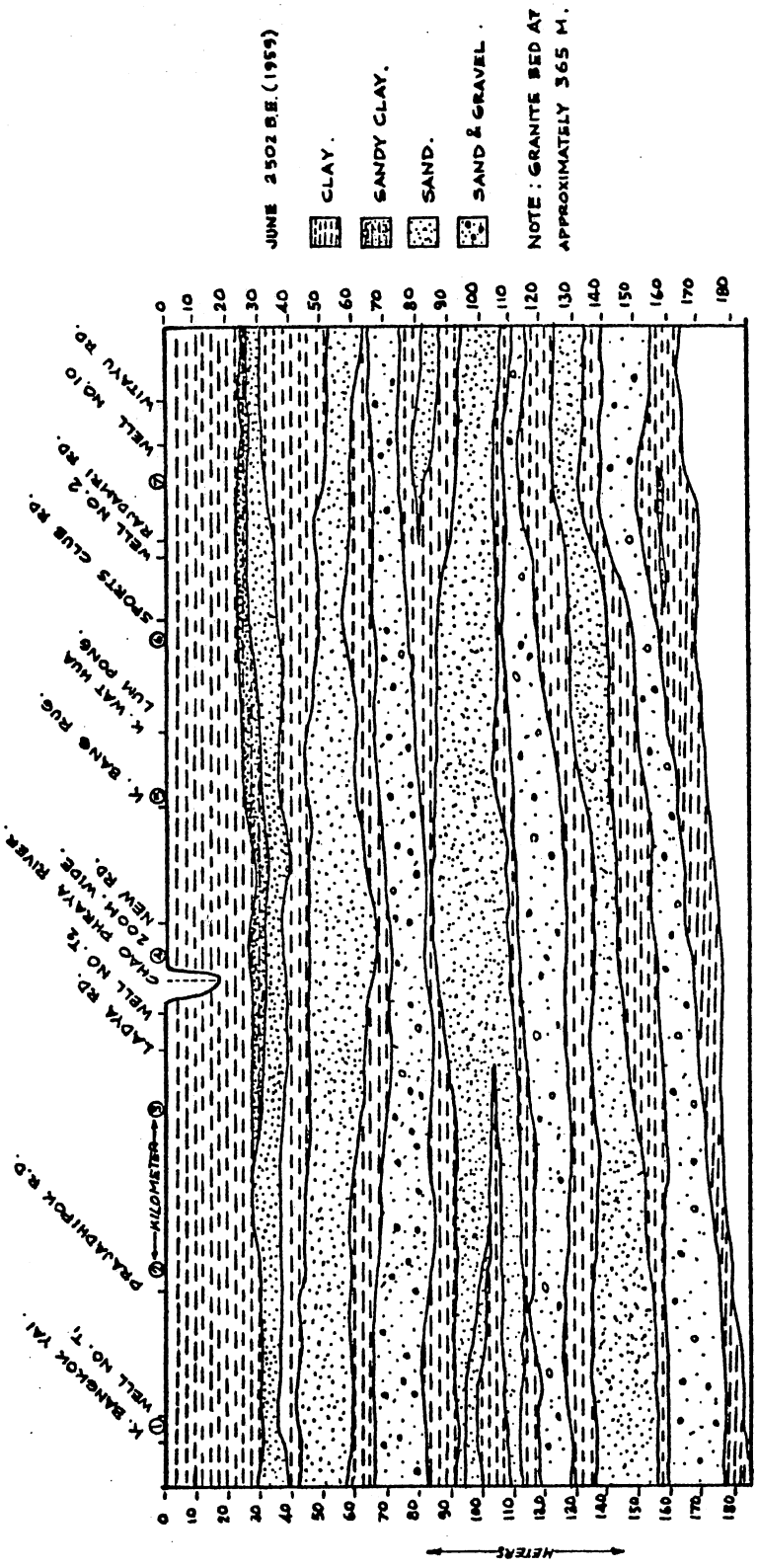


Figure 8. Soil Profile of Bangkok.

Temperatures are generally high especially in the afternoon; even in the cool season. The mean temperature is 71° F., but in the afternoon the mean maximum may rise to 89° F. The factors reducing temperature are sea breezes and rains.

The rainfall is approximately 58 inches in a year, of which over 80% occurs during the Southwest monsoon or the rainy season.

The average relative humidity is high because of the nearness of the sea. The annual average humidity is about 80% with the maximum reading of about 85% in the rainy season and the minimum value of about 75% in the cold season.

Strong surface winds and rainfall occur during the Southwest monsoons, mid-May to September. Winds are generally westerly and southwesterly. In October, variable winds with an easterly tendency prevail and occasional gusts due to thunderstorms will occur in the first half of the month. From November the winds shifts, cool weather sets in gradually, then until February when the winds are mostly from the north and northeast. From March through mid-May, surface winds are again variable with the tendency of southerly direction. However, sea breezes have a considerable effect on the wind direction. It is steady from the southerly directions in the afternoon and most of the time continues blowing until late in the evening.

Population

The population in Bangkok has increased at a much higher rate than in the country as a whole. The present rate of growth of the city of Bangkok is estimated to be over 5 percent annually compared to 3.3 percent for the country as a whole (see Table IV).

In the post-war period, the city of Bangkok grew from 780,000 in 1947 to 2.6 million in 1967 (Table V). In 1957, the population was about 1,200,000 people, or about 5 percent of the total Thailand population. A demographic study of Thailand written in the mid-1960's states that Bangkok could quadruple in population by 1980. At the base of the urban society are the unskilled laborers and street vendors, many of whom are recent Thai migrants from the rural areas. The migrants have helped to increase the population of Bangkok at a much faster rate than elsewhere in the country.

There are two main reasons for the rapid increase in the population of Bangkok. One is reflected in the level of education which is higher in Bangkok than other provinces. Students come to Bangkok from the provinces to further their education each year since most institutions of higher learning are located in Bangkok. Another reason for the rapid population growth is that people come to Bangkok from the provinces in search of work. The younger generation especially can find jobs in the Bangkok factories which provide them with more income than farming. The immigration for education and work along with the natural increase have resulted in densely settled population of slum areas. In these slum areas there are problems with crime, health, sanitation, and traffic.

In Thailand a small minority of the population holds most of the wealth of the country, contrasted with the ever increasing number of low-income families who are unable to obtain housing from the conventional market by their own means, most of whom are already living on the barest subsistance level.

The National Building Research and Development Center estimated

TABLE IV

POPULATION IN THE TEN URBAN PLACES
IN THAILAND BY REGION

Rank	City	Population	Rank	City	Population
1	Bangkok	781,662	1	Bangkok	2,614,356
2	Chiangmai	38,211	2	Chiangmai	81,570
3	Lampang	22,952	3	Korat	73,030
4	Korat	22,317	4	Haadyai	49,327
5	Nakorn Pathri	22,007	5	Udorn Nakoum	46,686
6	Samut Sakorn	20,754	6	Sawan	44,851
7	Phuket	18,550	7	Chonburi	42,141
8	Songkhla	18,662	8	Sangkhla	40,682
9	Ayguthaya	17,671	9	Lampang	50,515
10	Chonburi	17,671	10	Nakorn	39,426

that even with access to the most efficient types of housing finance institutions such as housing banks, building societies and so on, they would be able to help only those with a household income of 2,500 balts (U. S. $125.00) or higher per month in order that the mortgage payments could be met by the household's available monthly housing expenditures in a reasonable period of time, about 15 to 20 years. This leaves 67.1 percent of the total households of the metropolitan area who are too poor to receive loans from commercially viable housing finance institutions, and must therefore find housing through their own resources.

TABLE V

POPULATION GROWTH IN BANGKOK
FROM 1957 THROUGH 1967

Year	Total Population	Natural Growth	Migration Growth
1957	1,524,803	66,044	33,387
1958	1,622,461	64,271	29,165
1959	1,726,386	73,960	00,026
1960	1,800,678	75,066	22,557
1961	1,898,234	74,999	22,686
1962	1,001,698	80,478	22,686
1963	2,106,881	82,971	23,506
1964	2,173,724	81,824	-24,999
1965	2,177,585	84,676	159,285
1966	2,500,227	78,808	13,791
1967	2,614,346	84,988	29,681

Government housing programs are insufficient to meet the growing housing needs. It is estimated that another 100,000 housing units are needed. The government allows squatters temporarily to occupy unused public land, most of which is around the port and near the industrial areas.

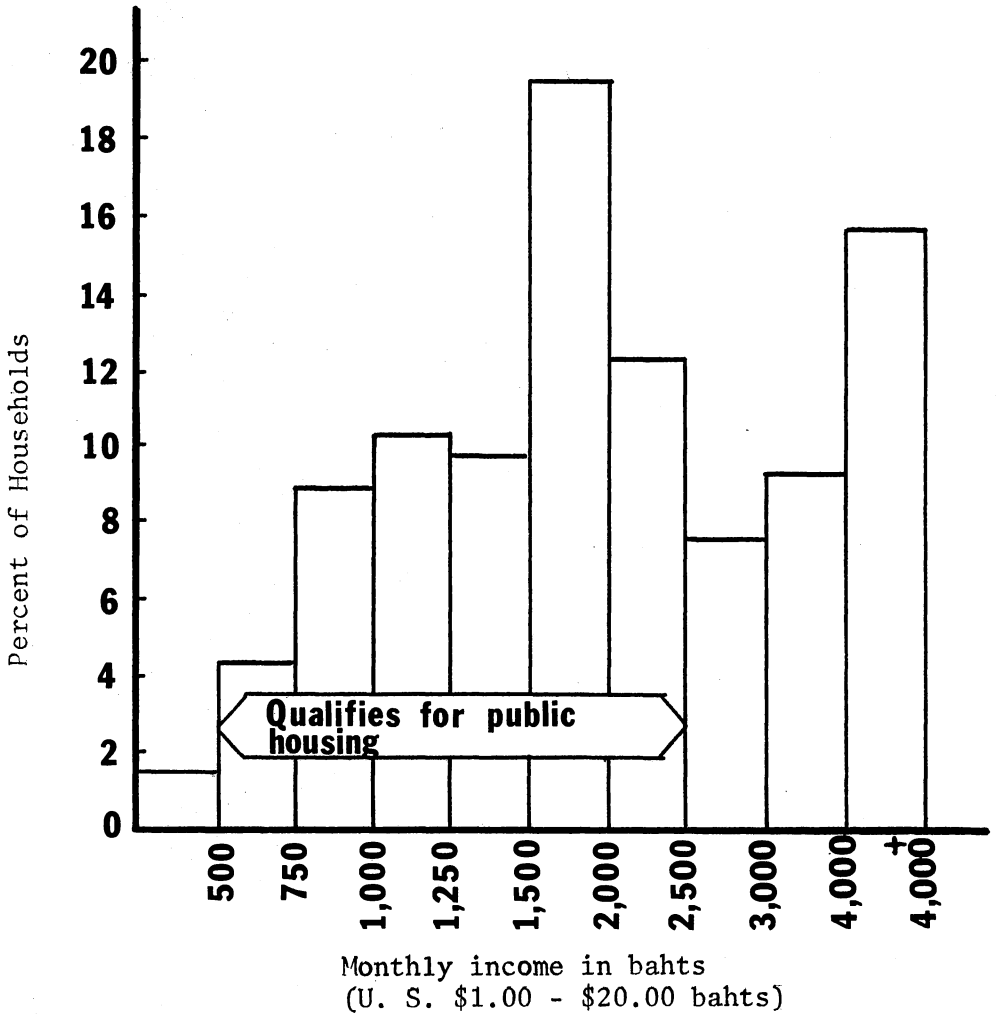
Klong Toey, the largest slum in Bangkok, has over 30,000 people living on a mere 320 acres of land. It is a place where the living conditions are, above everything else, cramped and unhealthy. It is a

community where most of the people live in ramshackle, shabby wooden houses, topped by roofs of rusty corrugated iron sheets or nipa branches, built along small wooden walkways erected above the swamp area. It has no paved roads nor street lights, and practically no tap water nor other public utilities. Nevertheless, lives and activities in the slum community are no different from other places. Residents of the slum have to get up early in the morning and go to work to earn their living. Children walk to nearby schools when their family can afford it, otherwise they scatter around the area (18).

Housing Organization

Since the government began its housing activities in the late 1940's, its agencies have been mostly concerned with building housing for the low-income sector, i.e. those with income less than 2,500 balts (U. S. $125.00) per month. The assumption being that the low-income sector cannot afford more than 20 percent of their monthly income on housing expenditure, so that a subsidized (social rent) rental type of tenantship is inevitable. Figure 9 shows the distribution of income groups and those qualifying for public housing.

Since the late 1940's, there have been two phases of public housing activities. Up to the late 1950's only low-rise timber dwellings were built; while the early 1960's saw a new phase of activity with the introduction of semi-high rise concrete flats. There are 5 story high (no elevator) reinforced concrete buildings, each having 40 apartments. This also coincided with the government producing housing for the medium income sector for hire purchasing; this group also enjoys the assistance of the Housing Promotion Bank which



Source: National Statistical Office, 1968; and Faculty of Society . . . Thammasat University.

Figure 9. Household Income Distribution in Bangkok.

gives loans for housing and purchases lands for sale as housing plots to the public.

TABLE VI

PUBLIC HOUSING FOR THE LOW INCOME GROUP IN BANGKOK

Year	Location	Tenure	Number	Monthly rent in Balts	U. S. Dollars
1963-1971	Dindaong	Rent	3440	100-120	50-60
1966	Dindaong	Rent	190	150	75
1971-1972	Huaykwang	Rent	480	100-120	50-60

Before the National Housing Authority was established in February, 1973, the government, with regard to low-income housing, worked in two ways: (1) through the Ministry of the Interior which directed the Public Department to take charge of the housing program. Construction of houses started in 1948, (2) through the Bank of Housing Welfare, banking operations have functioned since 1953. Carrying out the work of housing welfare, there are three main programs to aid the people:

a. Giving mortgage loans to land owners for construction or renovation of buildings,

b. Providing lands and constructing houses for the hire-purchase system,

c. Constructing houses for rent.

Under this program, the construction of a variety of types of units has increased steadily from year to year. However, the achievement of recent years are far from the ultimate to provide every family with a decent dwelling.

The reason for the establishment of the National Housing Authority is mentioned in the National Executive Council Decree No. 316:

> Where as the National Executive Council has considered that at present a large number of the low and middle income brackets is still without means of housing, and even though there are government agencies, state and organizations which have helped to establish more and more buildings for habitation purpose, such operations have been carried out independently without proper cooperation and coordination. This causes the policy of the state to help the general public to have the general public to have places of habitation to deviate from the target. Therefore, in order to accelerate the performance of the said policy to become fruitful quickly, it is deemed expedient to re-organize agencies concerned with housing or welfare housing by combining the agencies concerned with housing or welfare housing, which are dispersed in various forms into one agency so that efficiency will become increased . . . . (26, p. 2).

The first stage of the Housing Program of the National Housing Authority will cover 10 years of operation. The first period is from 1974 to 1978 and the second stage is from 1979 to 1983. The estimated number of housing units to be developed is 170,000 according to the third National Economic and Social Development Plan (26).

One of the objectives of the National Housing Authority is to encourage private enterprises to invest in the development of satellite towns and to build housing in accordance with urban, regional, and rural development plans and the industrial estimated programs by giving appropriate priority to each project.

CHAPTER III

DESIGN CONCEPT FOR UNIT PLAN FOR HONG KONG LOW-INCOME FAMILIES

High-rise residential buildings were constructed in Hong Kong because of the shortage of land, and were feasible because of the sub-soil. In the tropical zone, the most important factors to be considered are weather, humidity, rainfall, wind, temperature and sunshine. The criteria of the design concept in relation to the tropical climate depend on the following objectives:

1. Orientation towards the sun - in order to avoid direct sun exposure, and to reduce the heat, wide areas of the building should be located on the south and east side.

2. Orientation with the wind - the longest side of the building should be placed so that the southwest wind will create air-movement and natural ventilation through the living units. The shortest side of the building should be placed so that the northwest wind will not enter the living units (Figure 10).

3. Sun sheltering of the wall - in order to avoid direct exposing of the living unit to the sun, the balconies around the building are needed.

The solution of the housing design for low and moderate income families in Hong Kong provides no air-conditioning nor heating, so the buildings should face south and north for natural ventilation; 85 per-

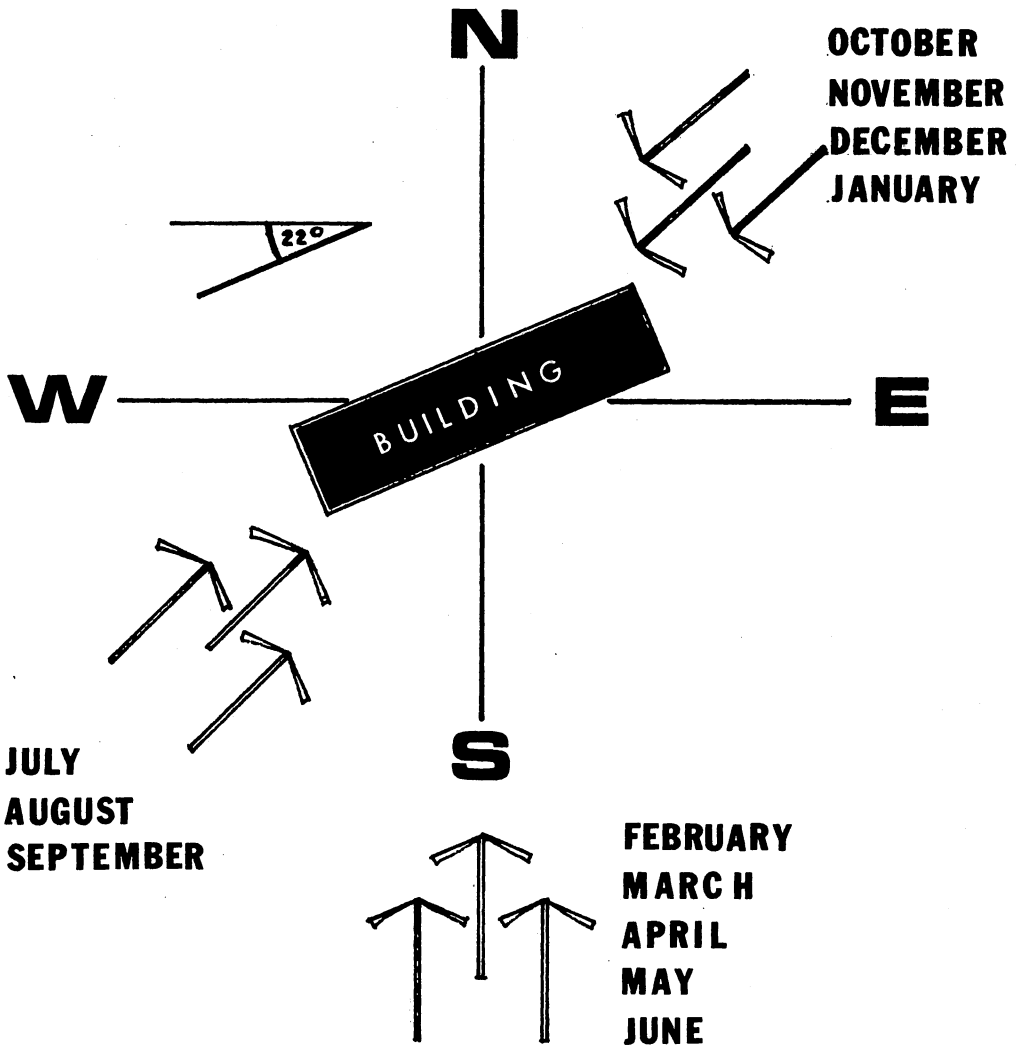


Figure 10. Building Location, Placed at 22° for Maximum Ventilation and Protection from Storms.

cent of the year southwest cross ventilation is essential.

Elements of the building such as, louvers, jalousies and grills are useful to admit air flow and to provide protection from the sun. Walls are used primarily for screening from insects and for their adjustable wind penetration qualities rather than as thermal barriers. In one story housing, folding window-walls are excellent when the roof above functions as a sun protector. A wide overhang is necessary for rain, protection and reduction of sky glare. Typical floor plan provides public space and private spaces as follows:

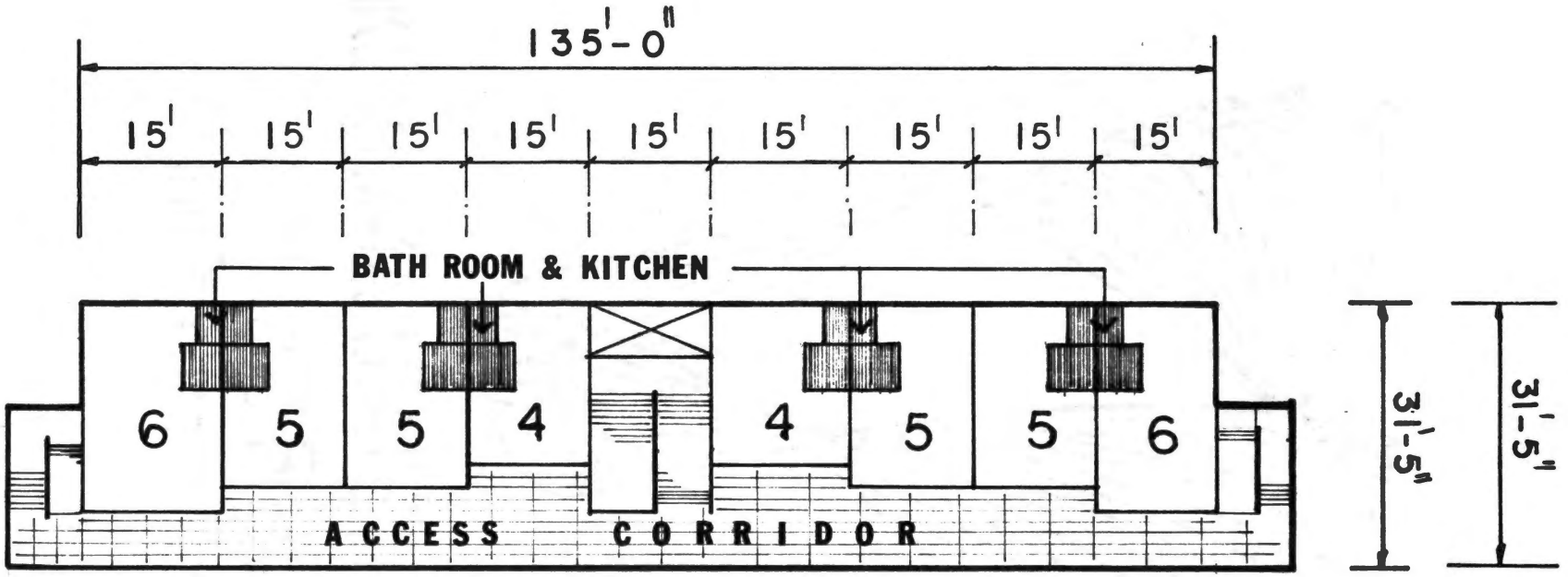
1. Public spaces
    a. Central staircase, and fire escape stairway.
    b. Open central corridor.
    c. Central mechanical space.
    d. Fire hose vertical stand pipe duct between each floor.
2. Private spaces
    a. Living unit should be well located as living and dining area is used as community or multi-purpose space. It is central to the other rooms.
    b. Bedrooms should have low cross ventilation in south-north direction, this can be secured by louvers and door openings to offer both security and privacy and maintain ventilation.
    c. Bathroom, because of the hot and humid weather, the bathroom is frequently used for washing, cleaning and cooling as a necessity and pleasure.
    d. Storage space should be designed to have ventilation to avoid being attacked by moths and, in the rainy season,

mildew. It is necessary to install some form of low-intensity heating as protection during the wet season. Low voltage lamps can be used for this purpose. In any case, occasional exposure to the sun and airing of stored clothes is necessary.

e. Kitchens require extremely good ventilation. This is very important since the Chinese food creates smell and smoke while it is being prepared.

f. Furniture should provide a kind of cool, clean and easy to maintain character. Wood tends to crack owing to shrinking and swelling caused by the humidity and variations in temperature in the tropics. Plywood or a laminated plastic would be better to use.

Based upon the above design considerations, the following plans have been developed for low-income housing projects in Hong Kong (Figures 11 to 22).



BUILDING TYPE : vary from 4-8 storeys
scale : 3/64" = 1'-0"

Figure 11. Floor Plan of a Building Block.

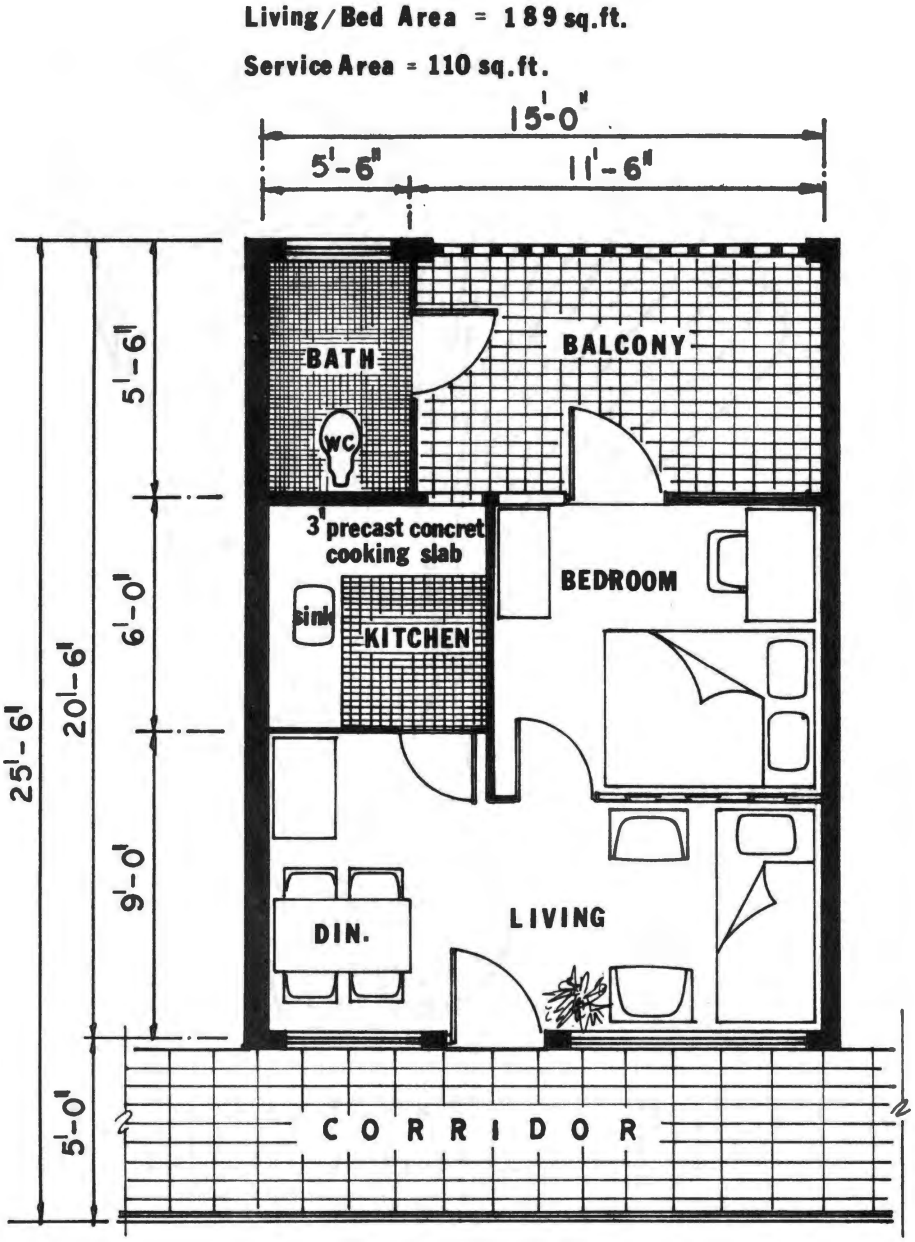


Figure 12. Floor Plan of 4 Person Flat.

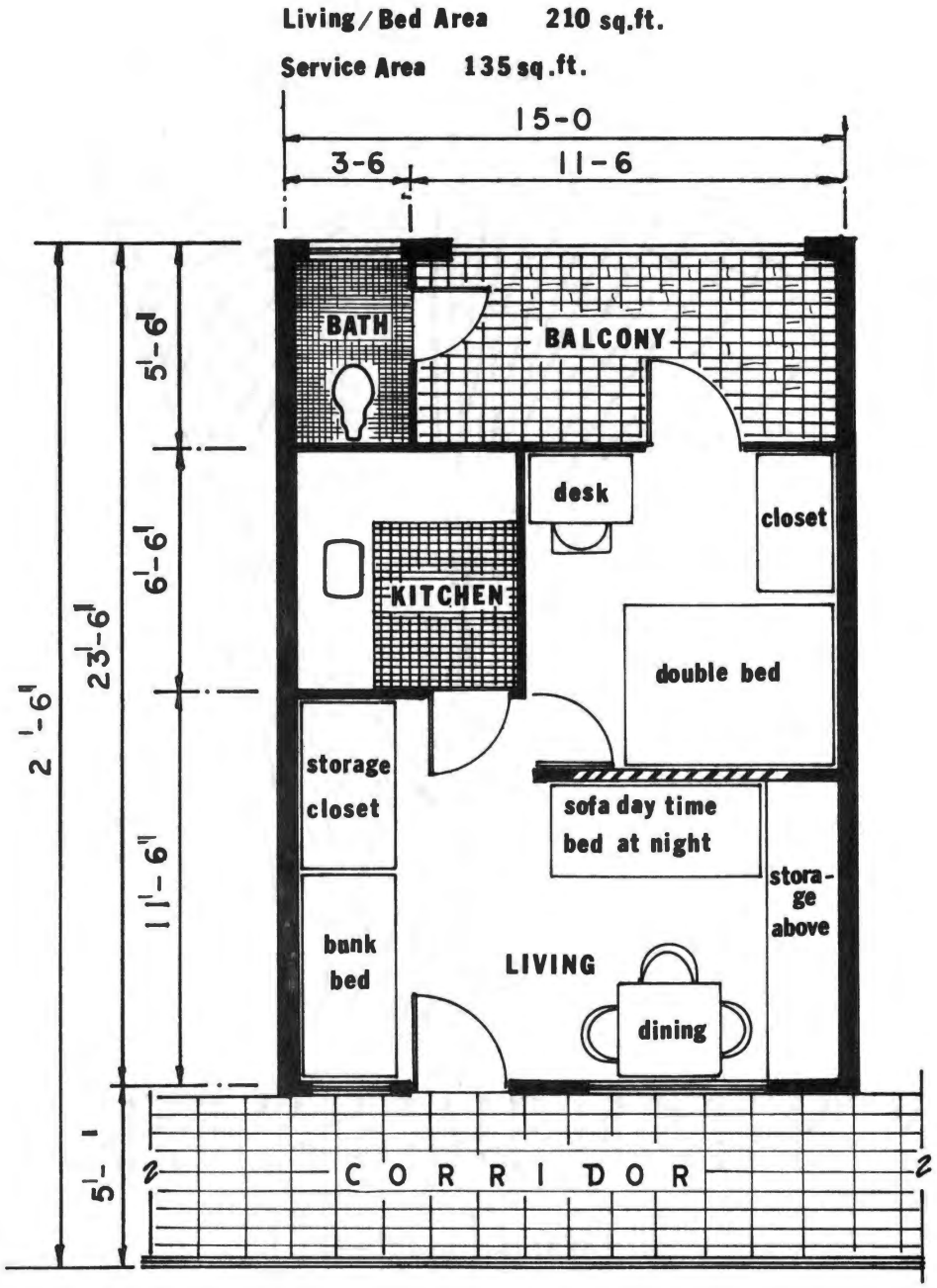


Figure 13. Floor Plan for 5 Person Flat.

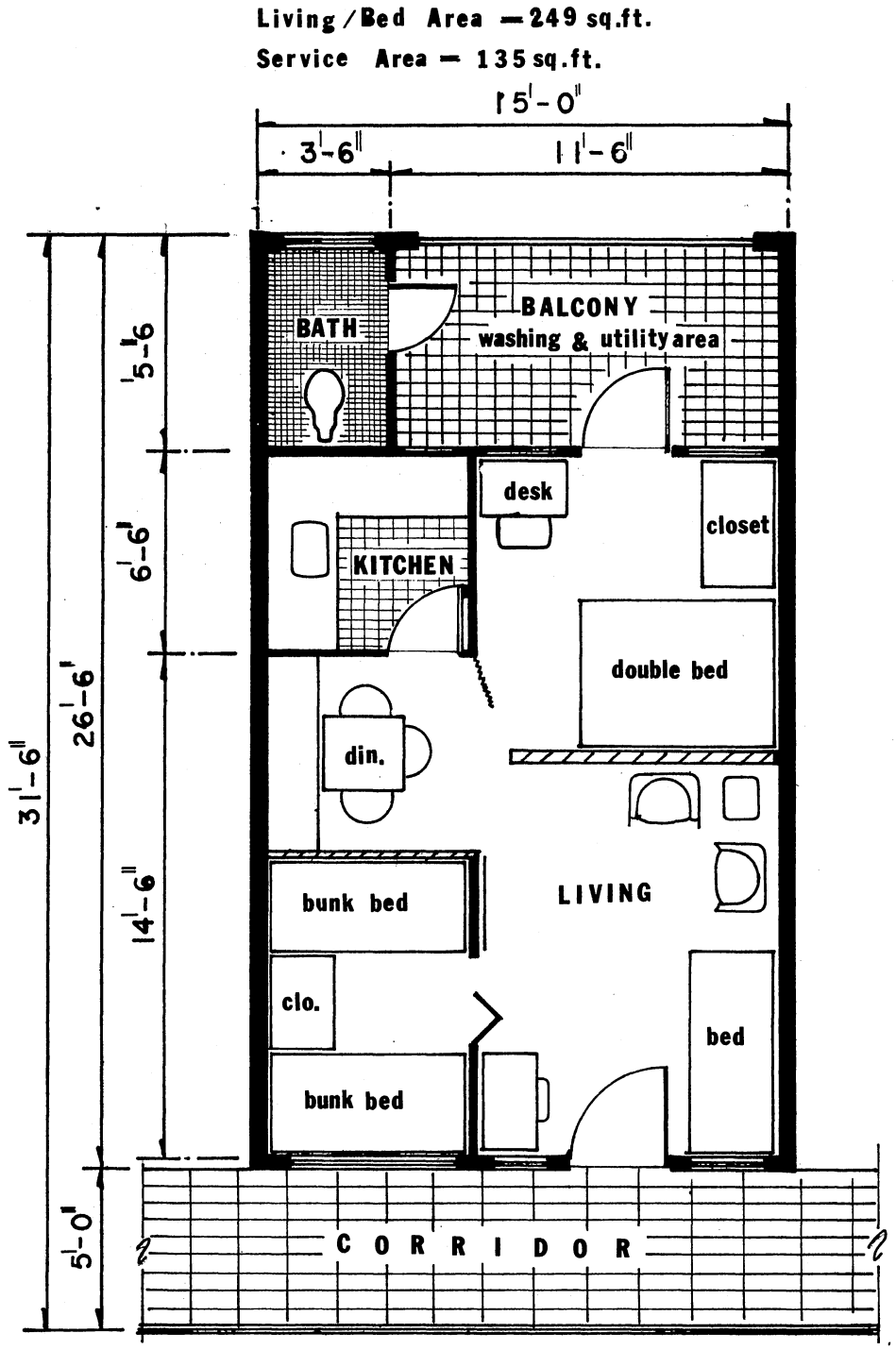


Figure 14. Floor Plan for 6 Person Flat. (A)

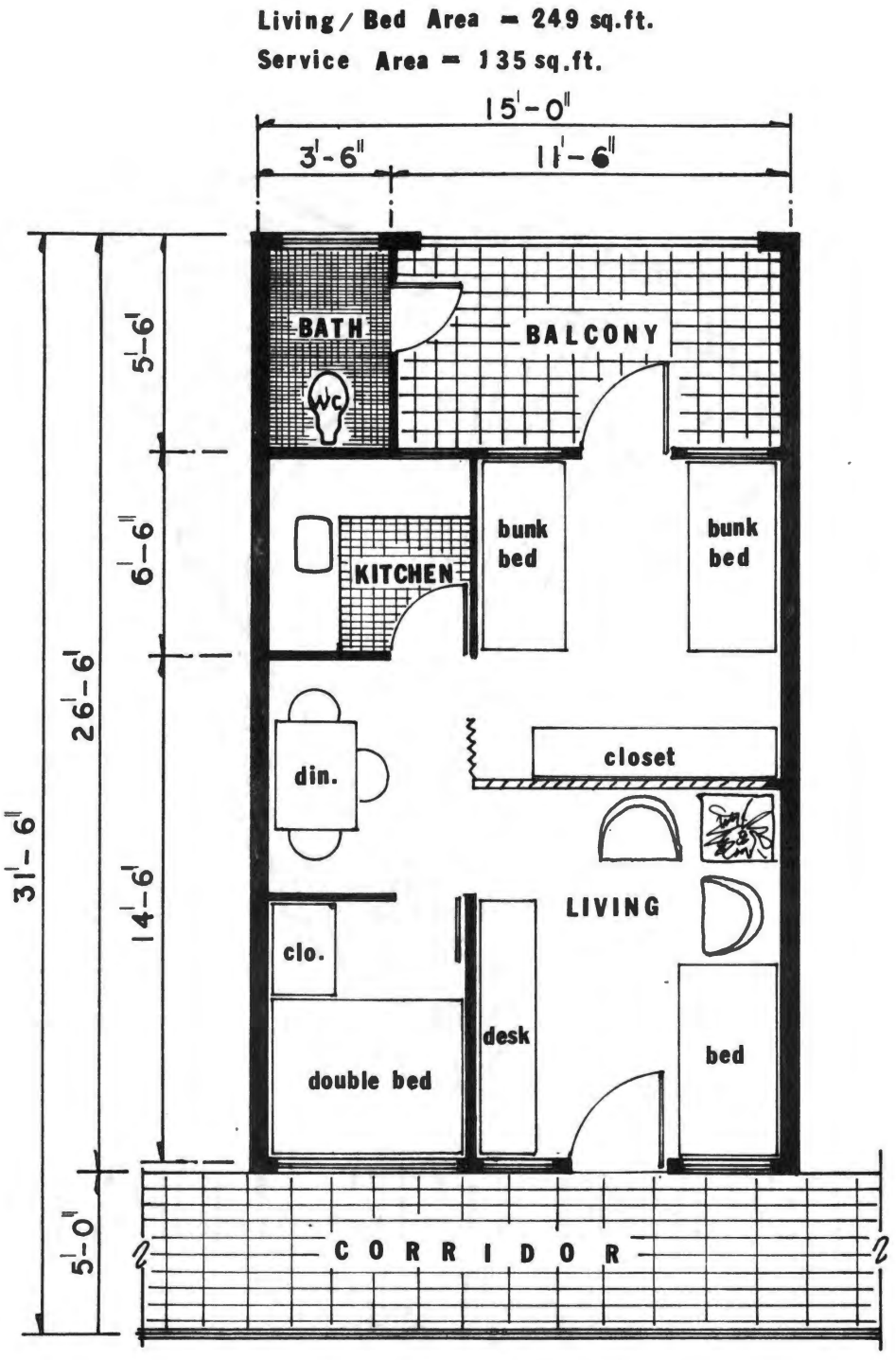


Figure 15. Floor Plan for 6 Person Flat. (B)

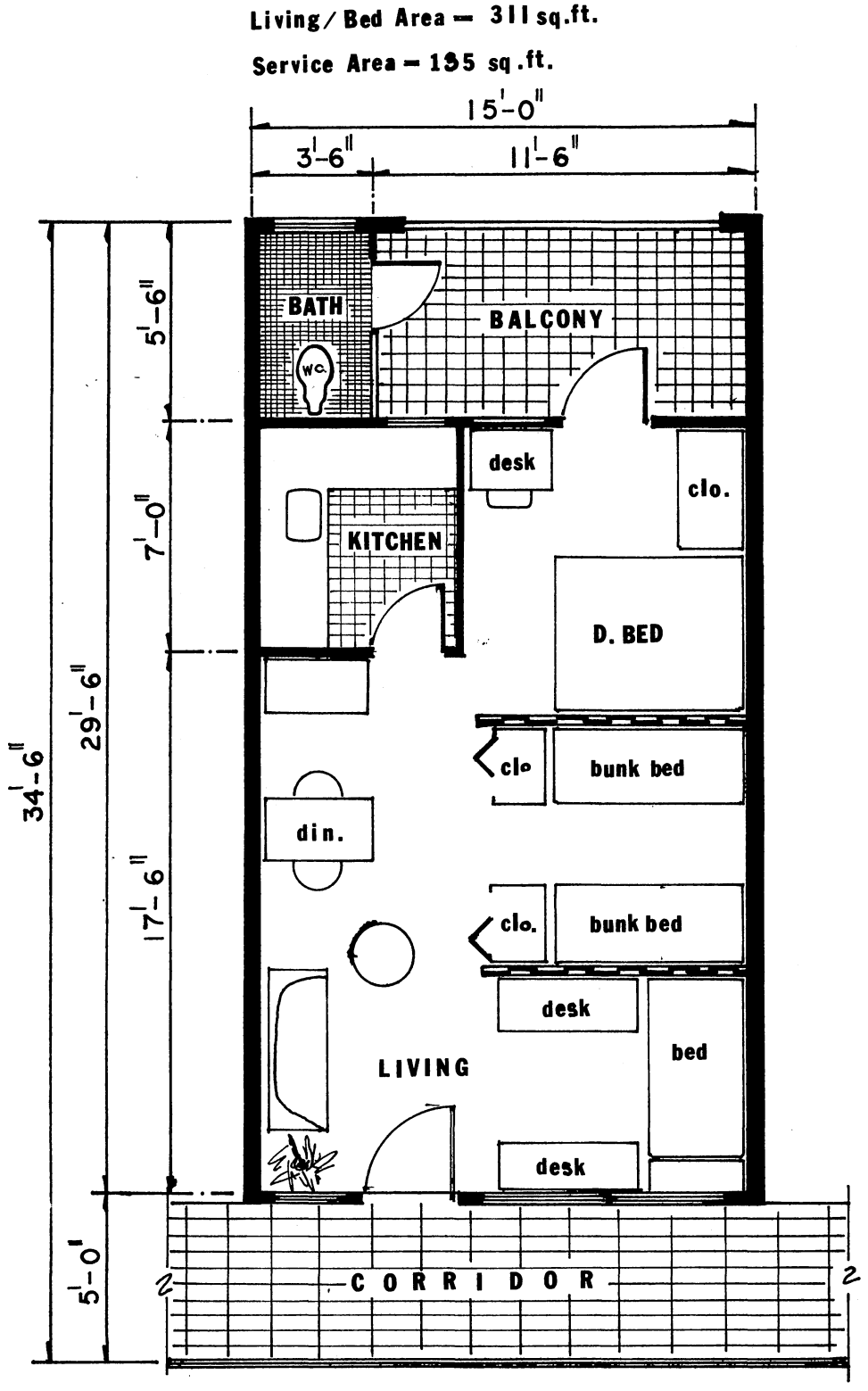


Figure 16. Floor Plan for 7 Person Flat.

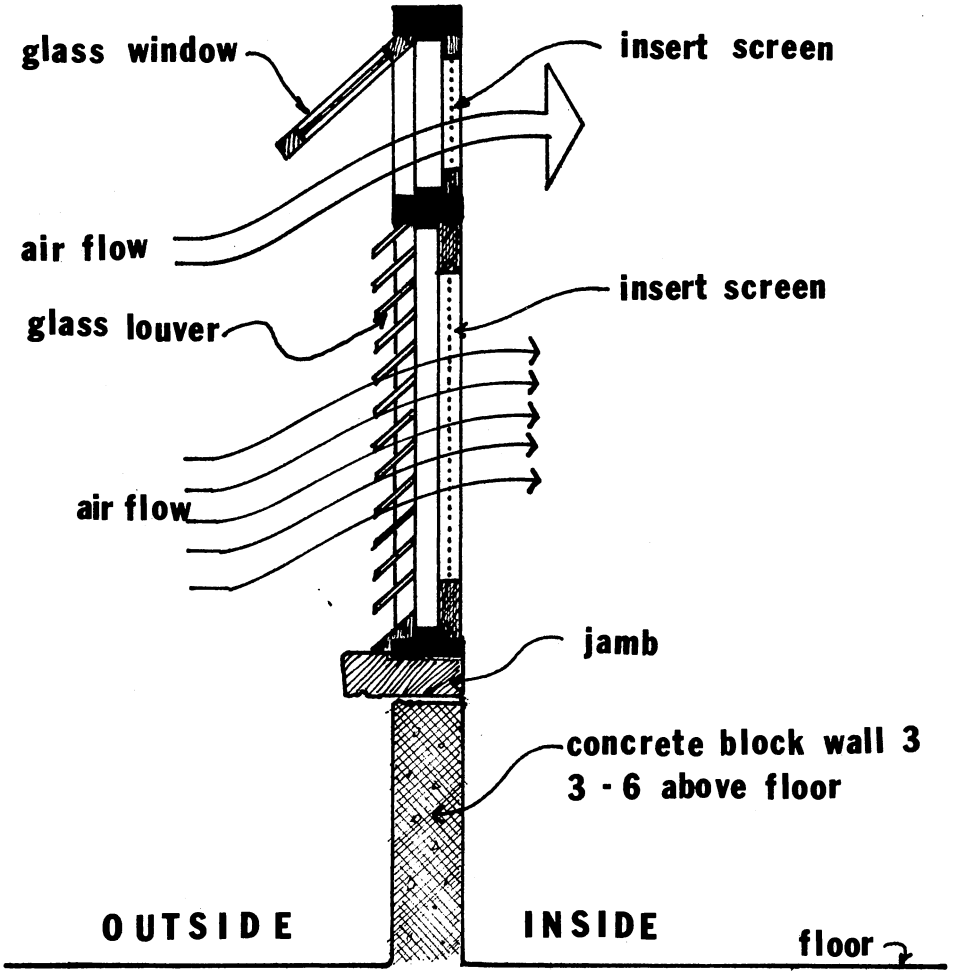


Figure 17. Detail: Window Wall.

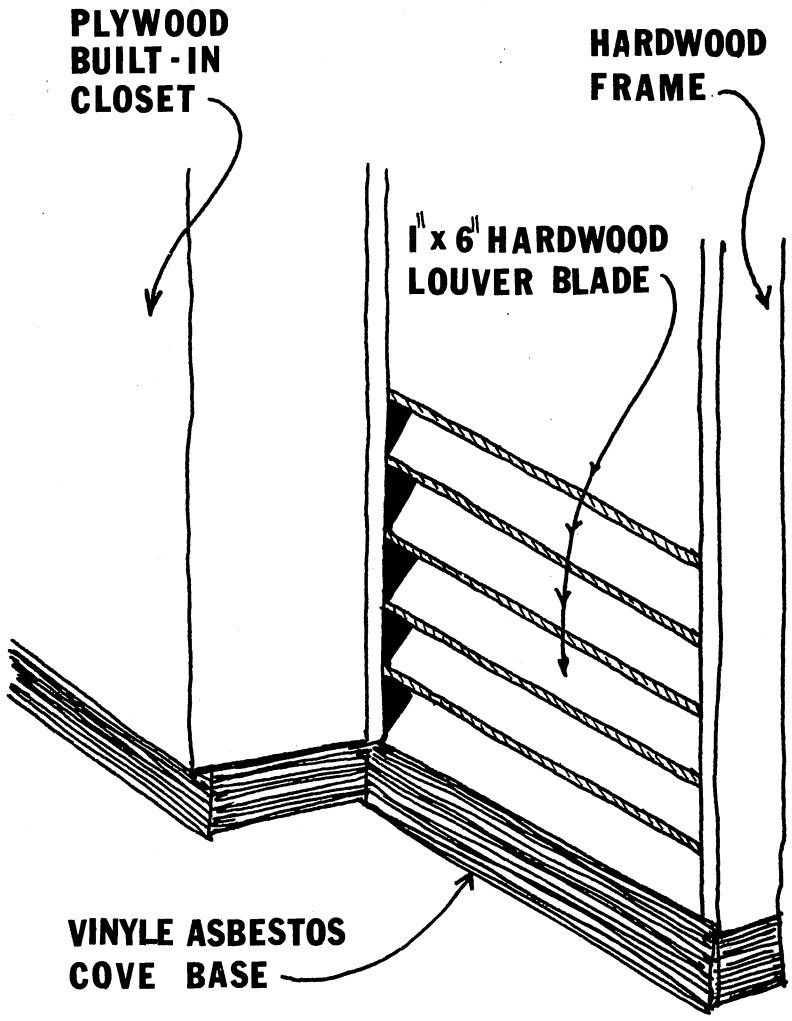


Figure 18. Detail of Partition in the Living Unit.

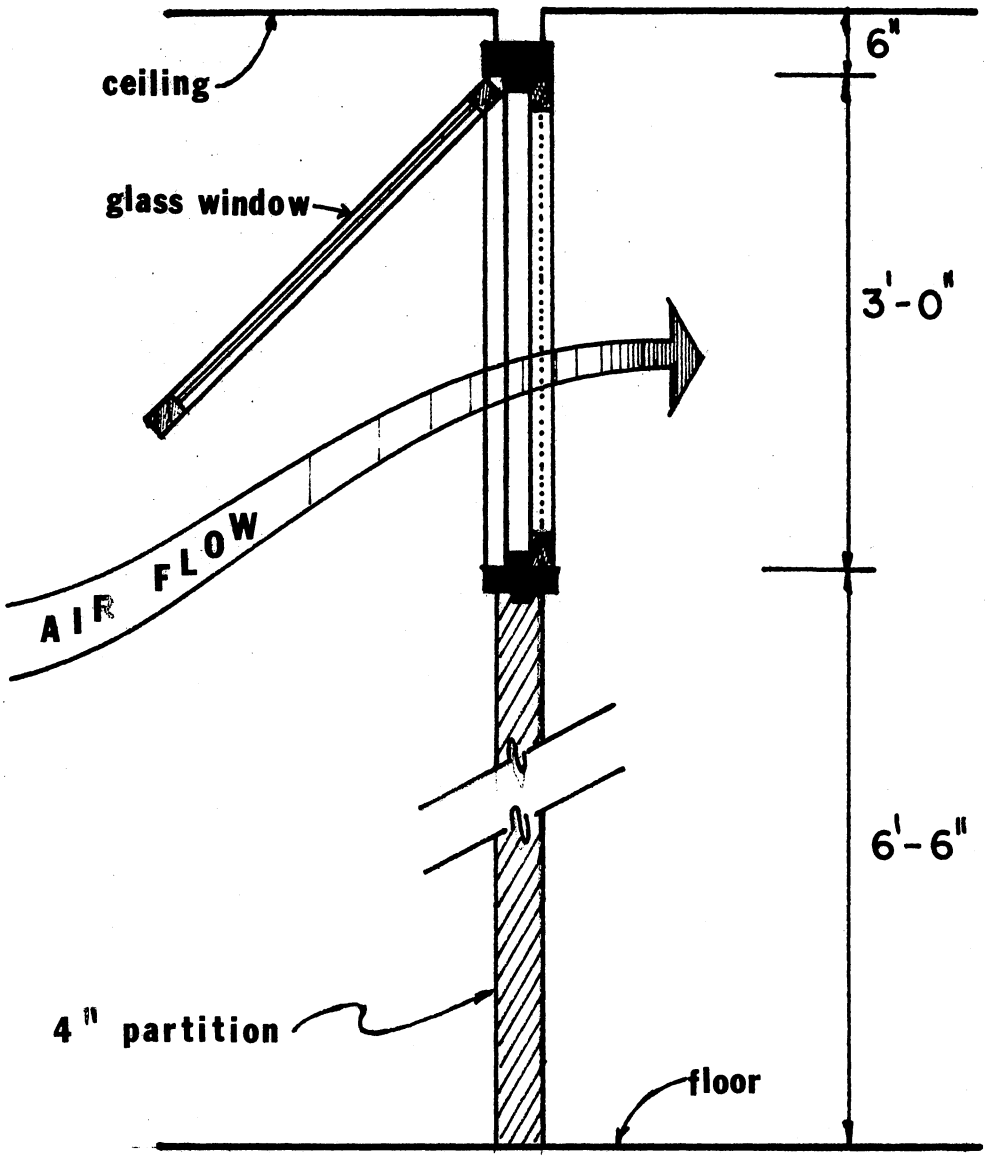
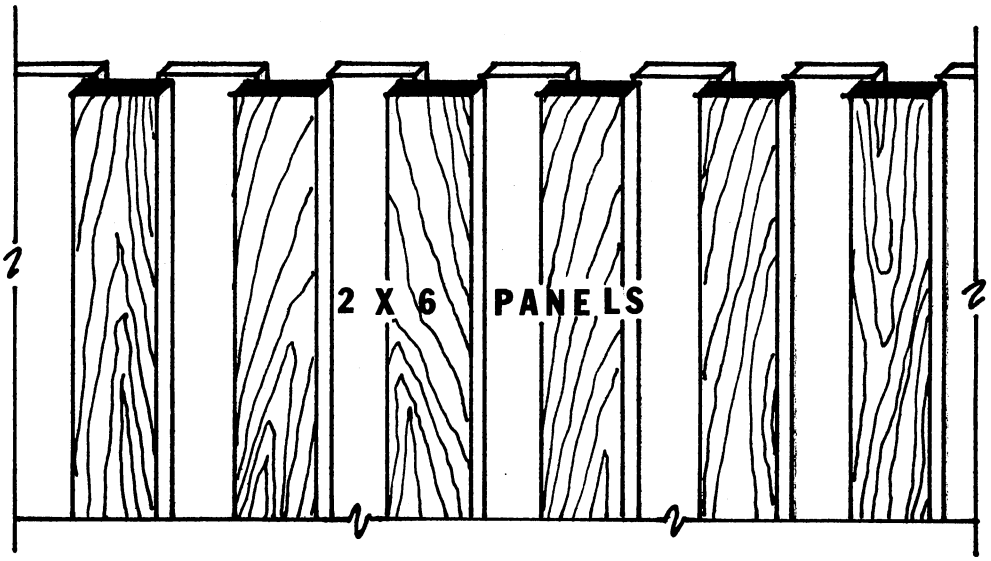


Figure 19. Detail: Kitchen Unit Partition.



ELEVATION

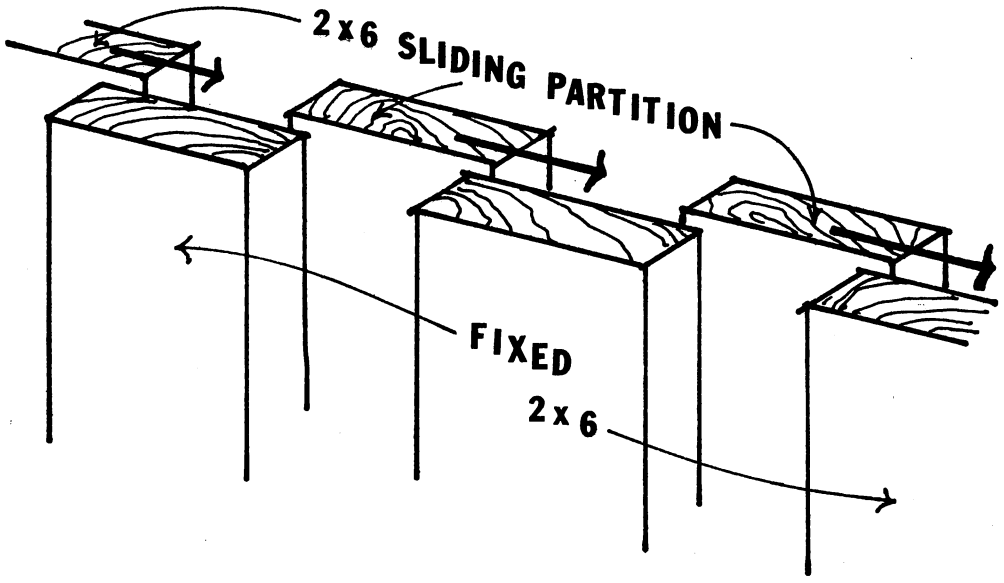


Figure 20. Details of Partition Between Living and Bedroom Areas.

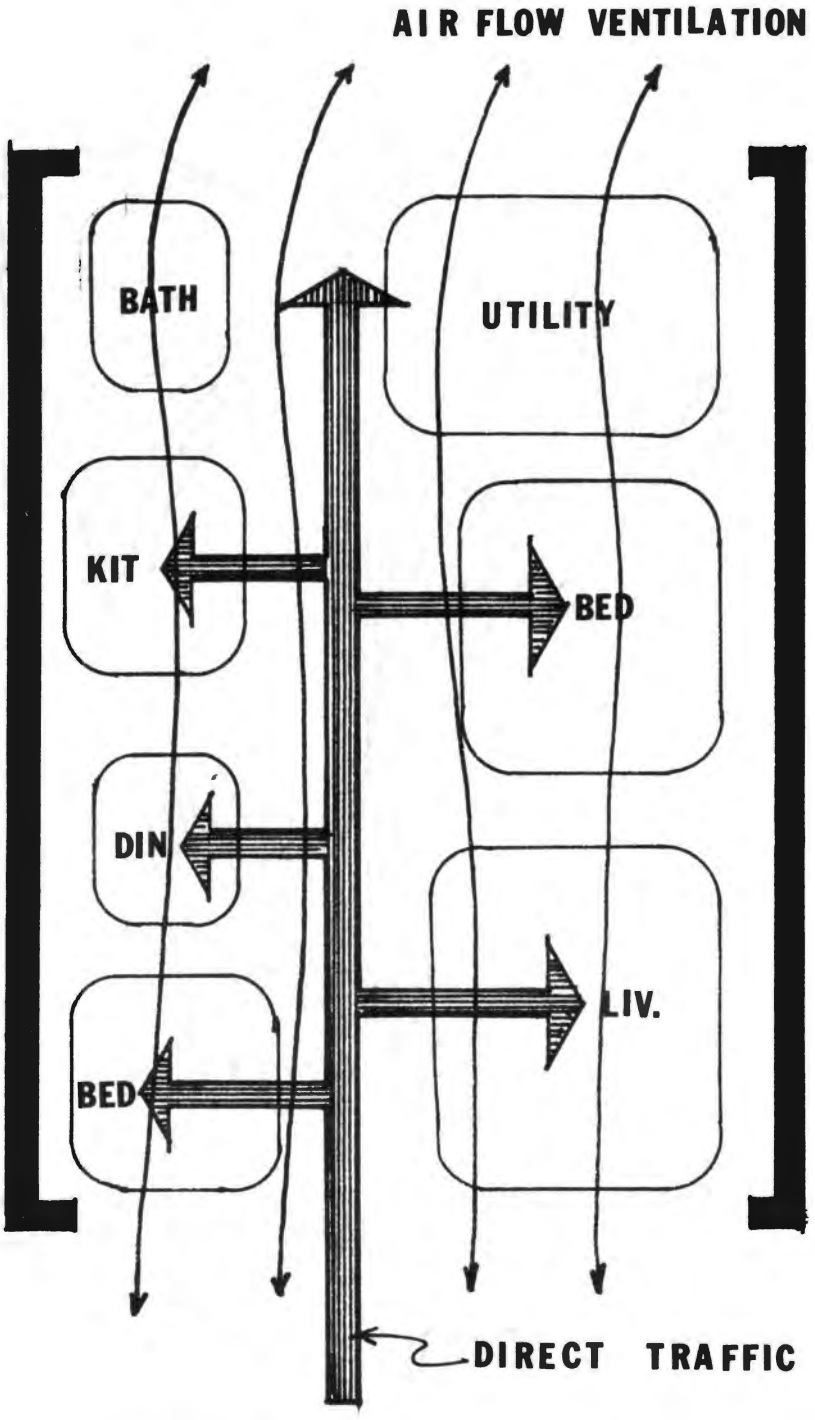


Figure 21. Traffic and Ventilation in a Unit Plan.

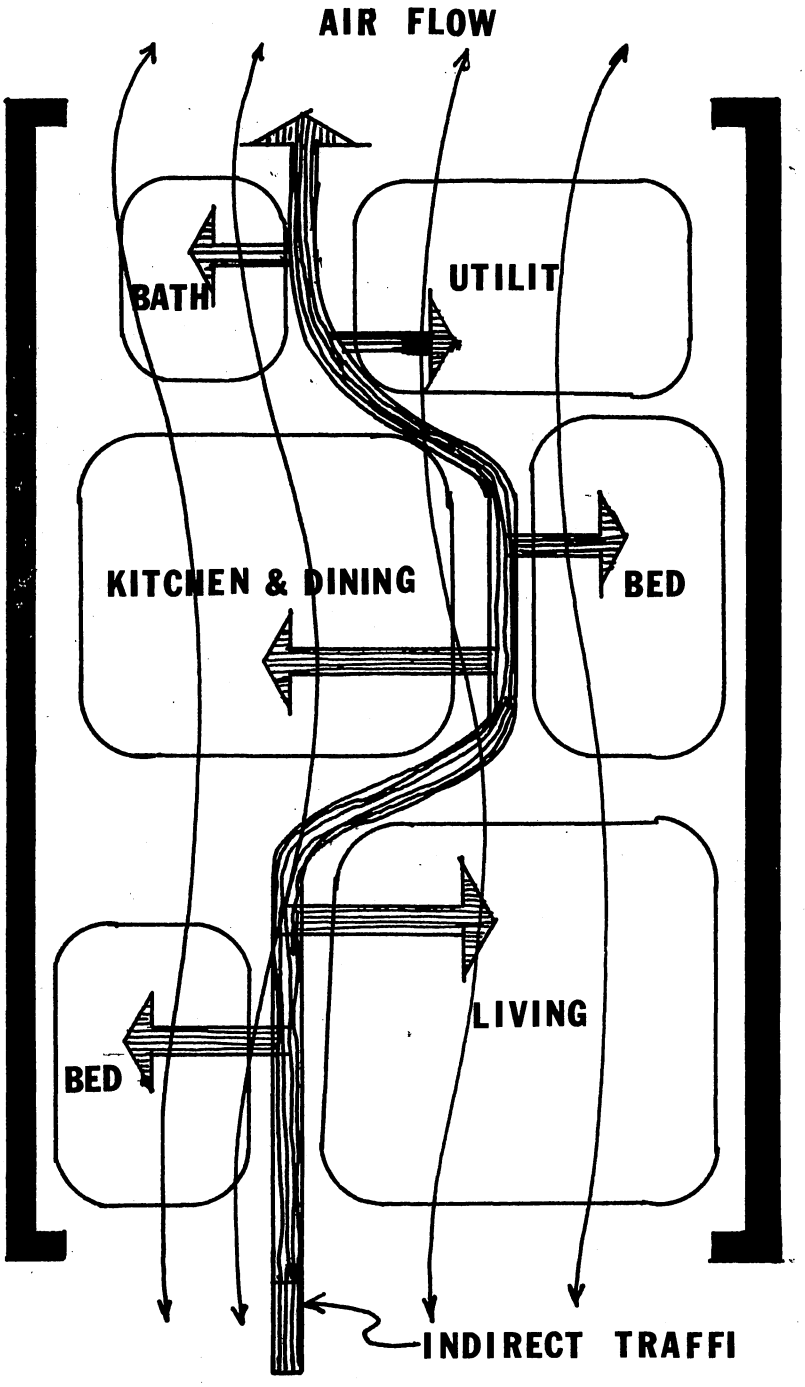


Figure 22. Alternate Traffic Plan in a Unit.

CHAPTER IV

COMPARISON OF HONG KONG AND BANGKOK CHARACTERISTICS RELATED TO HOUSING DESIGN

Hong Kong and Bangkok are both located within the tropical zone in Southeast Asia and both have high population densities. They have similar weather, social environmental and physical structures. The details of each city have been discussed in the previous chapter.

With respect to their environmental differences, Hong Kong weather has greater seasonal changes. In the winter time, the temperature drops to 45° F. but it usually does not last long; for only a few days in a year is the temperature under 50° F. It has a mild season from November to February with a few days when the temperature drops under 60° F. The summer is hot and humid from May to October. April is a wet month with mild temperatures of around 65° - 75° F.

In Bangkok, the weather is more or less the same all through the year. It is hot most of the time especially at noon and in the afternoon, the highest temperature was recorded at 95° F. But often when the sun goes down the heat will decrease because of the natural breeze from the Gulf of Siam. Bangkok also has a cool season but it is not so cold as in Hong Kong nor of so long a duration. Usually the temperature drops to 70° F. in December and January, but at noon it is still very warm, around 80° F. During the wet season, rains at noon or

during the afternoon will reduce the temperatures and result in comfortably cool nights (Figure 23).

The winter monsoons come from Northeast for both Hong Kong and Bangkok so the humidity is high (Table VII).

There are differences in the land structure and soil conditions. Hong Kong is very hilly and only 14 percent of the total urban land areas are flat. Reclamation has been used widely in order to obtain more flat land. But Bangkok is situated on a flat plane, so comparitively, Bangkok has more useful land area than Hong Kong. The scarcity of flat land explains why one sees high-rise buildings everywhere in Hong Kong, even along the hillsides. In Bangkok, the high-rise buildings occur only along the Klong (river) and in the downtown commercial areas. There is still plenty of flat land which can be developed in the suburban areas.

The soil in Hong Kong generally consists of deeply-weathered granite overlaid in place by post-submergence alluvia. The granite is frequently weathered down to a depth of around 200 feet below the present ground level. The soil condition is well suited for the construction of high-rise buildings. In Bangkok, the soil condition is poor for high-rise buildings since it consists of layers of dark clays, with sandy clay, sand and gravel in between them many hundred feet in depth. This has caused the growth of a 'flat' city with vertical punctuations achieved chiefly by pagodos, temples, occasional modern buildings 9 to 23 stories in height. There is no problem in constructing buildings which are 4 to 8 stories high. But above 9 stories, the cost of foundations become very expensive.

Both cities have a need for low and moderate income housing

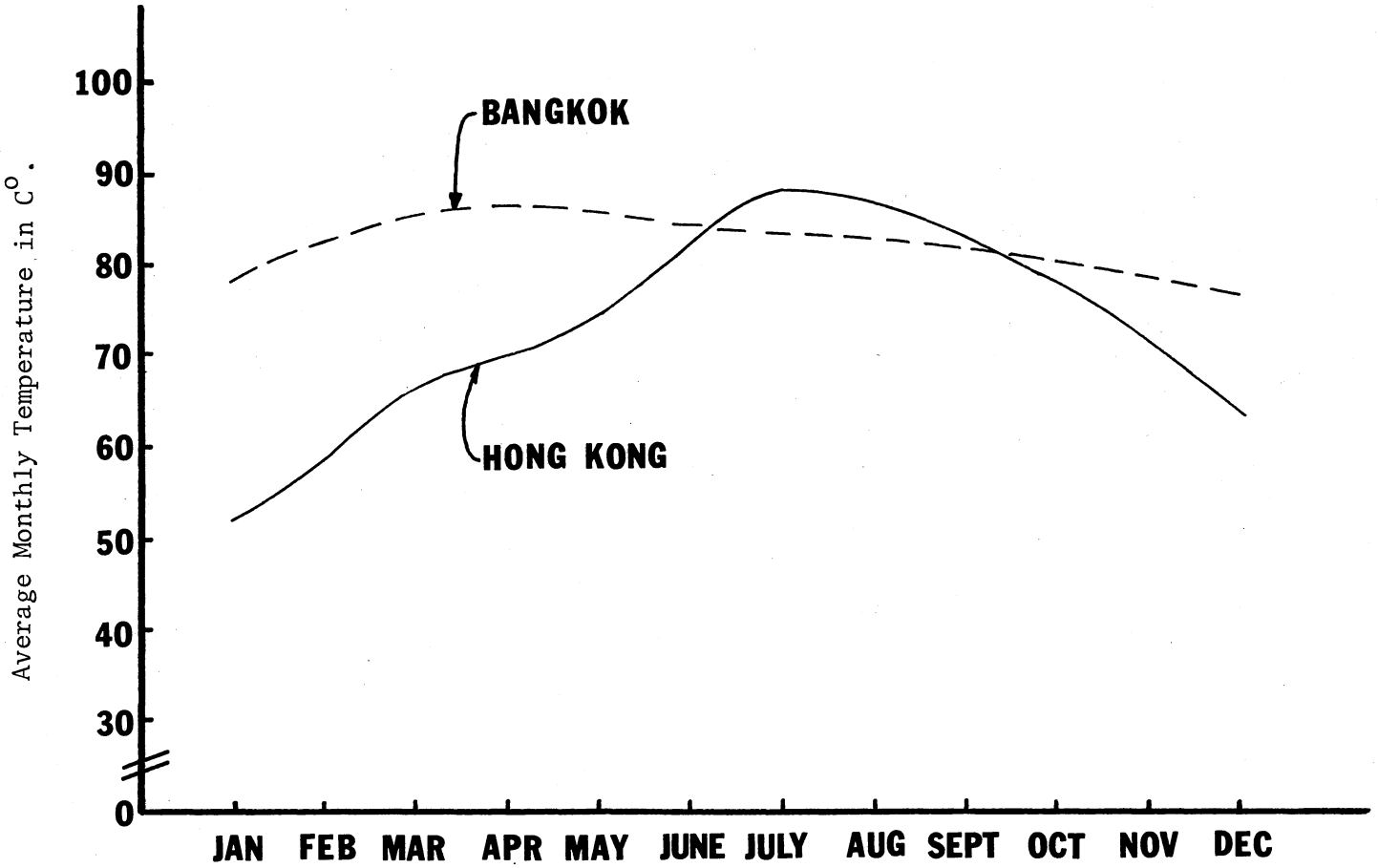


Figure 23. Mean Temperature in Hong Kong and Bangkok.

TABLE VII

DATA SUMMARY OF BANGKOK AND HONG KONG

Data	Bangkok	Hong Kong
Location		
Latitude	13° 44' N	22° 20' N
Longitude	100° 30' E	113° 45' E
Zone	in tropics	in tropics
Area	203 sq. miles	398.25 sq. miles
Total Population	2.6 million	4.6 million
Season: Hot	April - June	June - Sept.
Cold	Nov. - Jan.	Nov. - March
Wet	June - Sept.	April - Oct.
Temperature:		
Highest	95° F. April	94° F. July
Lowest	77° F. Dec.	45° F. Jan.
Year round average	89° F.	75° F.
Annual Rainfall	Avg. 60 inches	Avg. 85 inches
Relative Humidity		
High	85%	80%
Low	75%	50%
Winter Monsoon	From N. E.	From N. E.
Land Structure	Flat land	Hilly, Reclamation

located near the industrial areas. People will tolerate bad housing condition rather than move to the outlying areas where better housing exists, so when choosing a site, it is very important to consider its location. The site should be located; (1) near the industrial area where the residents would be only a few minutes from their place of employment or, (2) near an exit on the main road or public transportation center.

Thailand is a very religious country. Wats, buddist Temple, are scattered throughout in the Bangkok metropolitan area. After the Industrial Revolution, farmers and refugees crowded into Bangkok in search of work and higher wages. Students came from the rural areas for higher education. Lacking a plan and lacking pertinent legislation and regulations the development in Bangkok has been based on individual and incohesive decisions. Business and commercial establishments have been constructed along major roads and this has resulted in accumulating slums and traffic congestion. The refugees came into the city mostly because of economic reasons. As in Hong Kong, the refugees crowded into the cities are for political reasons, but basically their values are the same. People are seeking freedom, food, and shelter.

CHAPTER V

RESULTS AND CONCLUSION

Application of Hong Kong Housing Concept to Bangkok Housing

After careful study of the Hong Kong low and moderate-income housing projects and the similarities and differences between Hong Kong and Bangkok with respect to their environmental, social and economic conditions, a housing design concept for low and moderate-income families in Bangkok can be established:

1. Environmental design concept developed for Hong Kong in the tropical area can also be used in Bangkok since both are located in the tropical zone.

2. Social objectives: the house should be designed so that it will attract and retain low and moderate-income families. It could also be designed for a mix of social classes in some parts of the project. The housing should not have an appearance of an institution; it must look like a neighborhood of homes, whether the building is low or high-rise. Only if the above is achieved will the better class, economically ambitious low-income families elect to move in and thus produce the desired cross section.

3. Economic factors play an important part in construction systems and labor costs. Economics play a great part in selecting forms, with mass produced prefabricated units and the building process

should be simplified and systemized. Other considerations to be kept in mind are: minimum width of building, lowering labor cost by using local labor, and using suitable systems of both economic and construction processes by organizing for effective management.

4. Physical features: Bangkok has rather hot weather compared with Hong Kong. There is no need of heavy clothing and other household things, such as blankets, or electrical heater, therefore, Bangkok will require less storage space than Hong Kong.

5. Since Bangkok has flat land, the residential areas can be planned in three zones, high density, medium and low density where adequate facilities, including shops and schools, will be provided. High density zone in the urban areas and medium and low density zone in the suburban areas.

6. Kitchen location in Bangkok needs to have maximum ventilation (Figure 24 and 25).

Conclusions

The result of this study comparing Hong Kong and Bangkok in regard to their housing background shows both cities has similar climatic condition, dense population and great need for low-income housing. The individual floor plan design for Hong Kong can be adapted to Bangkok. Space in the living units are very compact but the Thai are by nature adaptable, gregarious and capable of utilizing to the fullest resources to enrich their environment. Population growth in metropolitan areas is already causing major problems, so efficient planning and good design of low-income housing is essential.

In adapting the Hong Kong low-income families housing design to

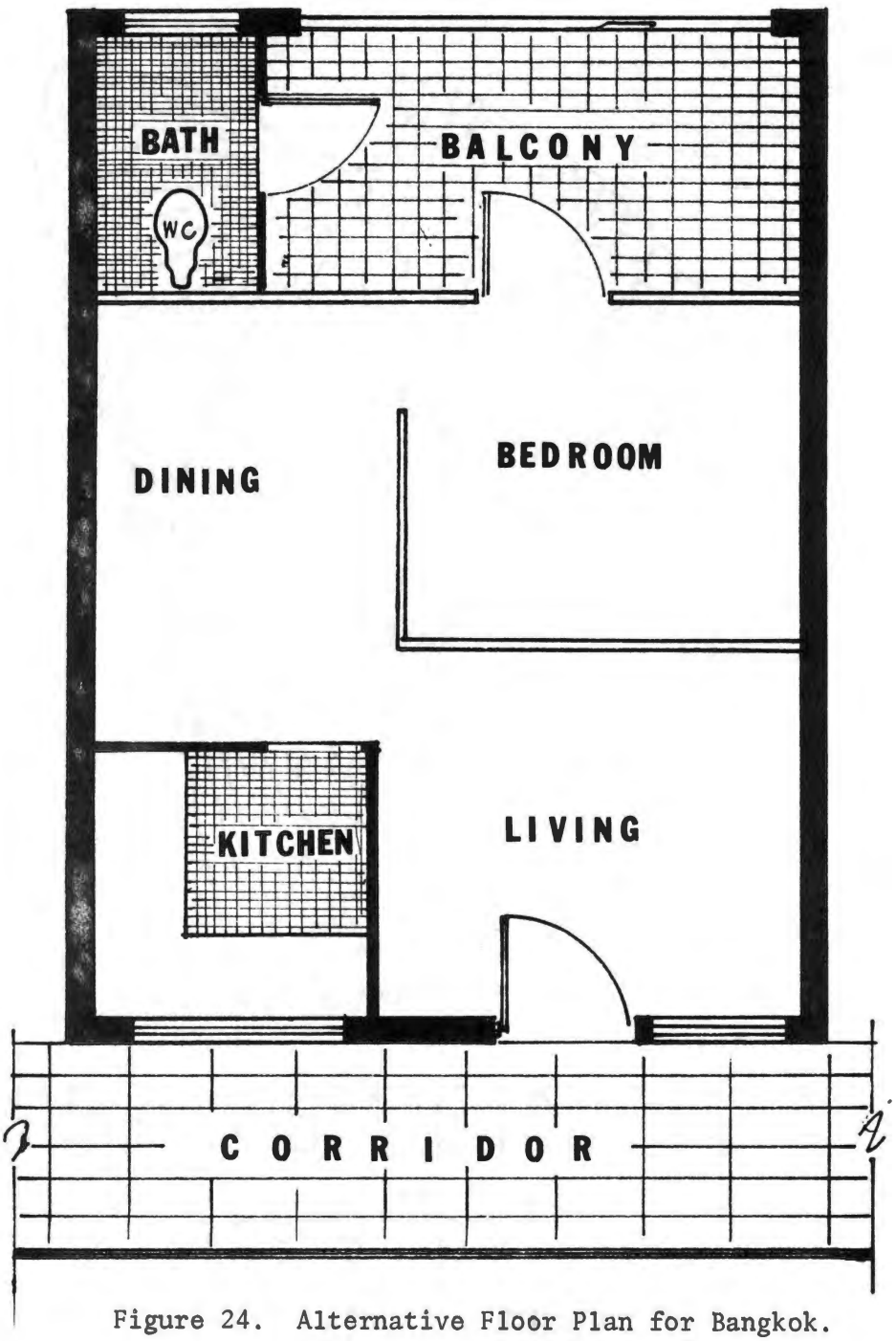


Figure 24. Alternative Floor Plan for Bangkok.

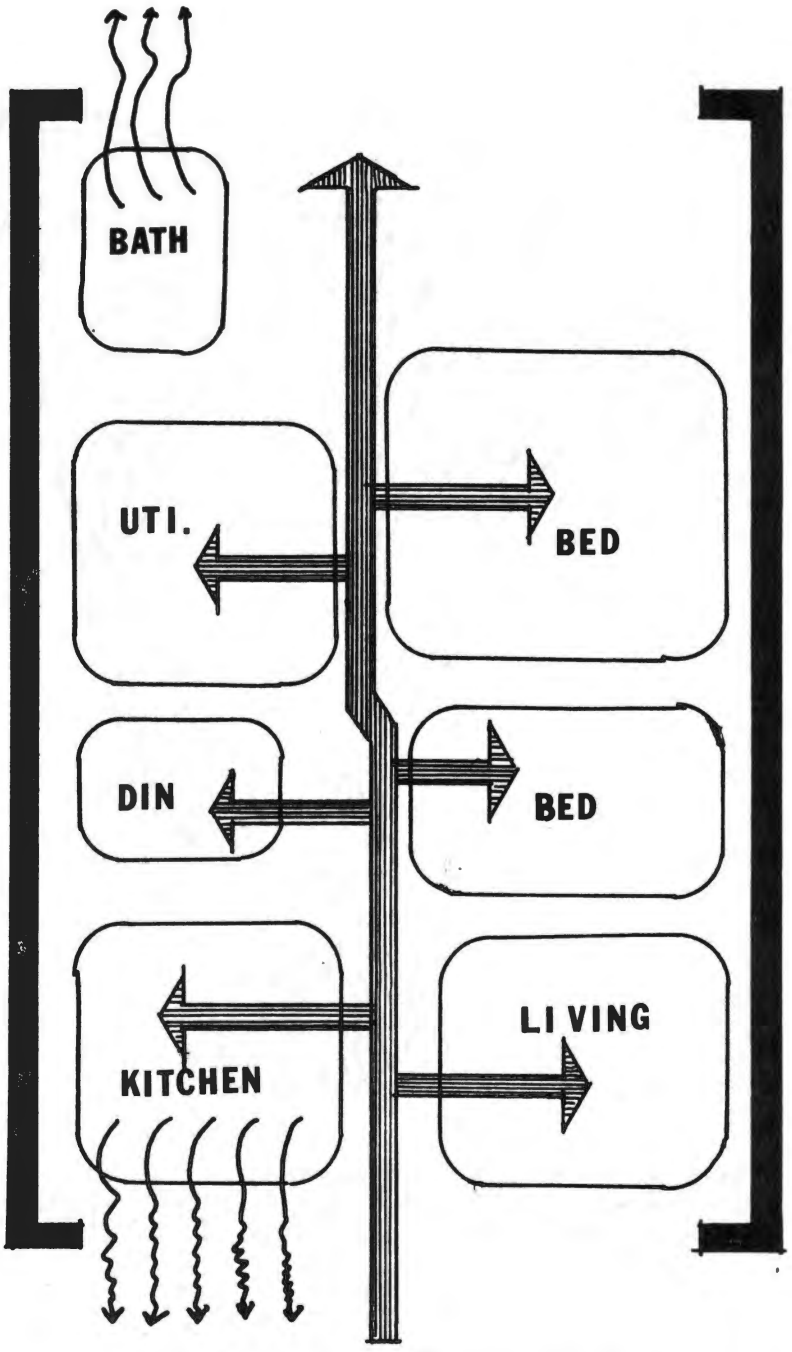


Figure 25. Traffic and Ventilation in the Unit Plan for Bangkok.

Bangkok's need, the only major variation would be to rearrange the flats horizontally for Bangkok. This means, high-rise building in Hong Kong and low-rise building in Bangkok. But considering adapting the Hong Kong design for the metropolitan Klong Toey project, a high-rise building is recommended. Klong Toey located right at the center of the metropolitan area with limited land has to accommodate 30,000 people on 320 acres of land. It is evidently a mature uncontrolled settlement where the majority of the residents have already become deeply rooted socially and economically. In order to clean up the slum at Klong Toey a well designed high-rise will be needed to accommodate 30,000 residents in Klong Toey with special attention to foundation.

The individual unit floor plan can be used and the design criteria applied to a generalized design for any development site in order to illustrate the concepts advanced in this study. It is believed that understanding the local housing background, and the need of low-income housing, are essential prerequisites for coordinating functional design. It is realized that the proposal advanced reflects only one possibility. The study is the first step in the housing research and architectural design of a high density low-income family housing complex and could be followed by more intense and detailed study resulting in specific designs for individual structures and site plans.

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