# HIGH DENSITY LOW COST HOUSING DEVELOPMENTS IN HONG KONG

by

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# TABLE OF CONTENTS

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# LIST OF ILLUSTRATIONS

When dollars are quoted in this thesis, they are, unless otherwise stated, Hong Kong dollars. The official rate for conversion to U.S. dollars is H.K. $5.714 = U.S. $1.00.

# INTRODUCTION.

"... Hong Kong's problems have to be seen in the light of one simple but staggering fact. A few years ago, due to an influx of refugees, the population more than doubled in less than twelve months. It is almost impossible - even, I think, for people in Hong Kong itself - to take stock of this extraordinary event. One has only to think what would happen had London, with its population of about ten millions, found itself in less than a year trying to find living room for twenty millions. Even with the best of governments and the most responsible and orderly of people, the result could hardly have been anything other than chaos. Yet an increase of population on this scale was what took place in Hong Kong in 1949, and although the experience was extremely uncomfortable, producing appalling housing conditions and a desperate inadequacy of hospital accommodation, schools, water and other public services, the result has been very far from chaotic. Hong Kong has absorbed this amazing infusion of population, and has since striven tirelessly to assimilate it, and provide for it the best conditions that are possible in the circumstances. ...."

From a broadcast message on August 1955, by the Secretary of State for the Colonies, the Rt. Hon. Alan Lennox-Boyd.

Because of its grave implication within the economic and social development of a community, inadequate housing constitutes one of the most serious problems of modern society. Much has been written about this problem and many plans have been devised to attack it, but seldom, if ever, have studies been made on housing situations as unique as that which faces Hong Kong to-day.

Hong Kong's "problem of people" is well known; seen from another angle it is also a "problem of land". In the last decade and a half its population has quintupled and is steadily rising. This sharp increase in people led, of course, to a corresponding increase of needs for housing and those amenities which are essential for the existence of a healthy community. All these demands require land, and it is land that Hong Kong lacks. To-day this tiny British colony in the Far East is regarded as one of the most densely populated cities in the world. Densities of over two thousand persons per acre - ten times the maximum for London - are common place. Four fifths of the population has a monthly family income of less than three hundred dollars (equivalent to approximately fifty-five Canadian dollars). There is little doubt that low cost high density housing is the most important challenge which the community has to face in the social and economic field; and much has been done,

though the problem is far from solved.

This thesis is written with these facts in mind. It is not intended to be a comprehensive study of all aspects of low cost and high density housing developments of the Colony, nor is it an attempt to provide a solution, for such involves social, economic, political as well as physical investigation which is beyond the scope and ability of a single person. It is consequently limited to a broader study of the problem, the Colony's reaction and its methods of tackling the problem.

The events leading to the present housing condition will be traced through the Colony's history, with a geographic description of the land problem. The thesis will then give a review of the development of housing types in the Colony followed by an analysis of contemporary low-cost housing developments of Hong Kong. A brief survey of housing in Europe and North America is then made with a discussion of present concepts. The thesis will conclude with observations on the present needs of Hong Kong.

# PART I.

## CHAPTER 1.

## A BRIEF HISTORY OF HONG KONG.

## ESTABLISHMENT OF THE COLONY.

The establishment of Hong Kong as a crown colony in 1841 was the response of the Government of Great Britain to the demands of British merchants and traders for a settlement on the South China coast from which they might trade freely and in safety with South China.

As early as 1557 the Portuguese had already established themselves at Macau, which provided the only reliable point of contact between China and the West. The bulk of trade then was with Canton under strict restrictions by the Chinese Government. As the volume of trade between China and the West continued to grow throughout the eighteenth century, the various restrictions imposed on Western traders by the Chinese Government became, in European eyes, steadily less realistic and less endurable. Several attempts by the British Government, between 1793 and 1834 to improve trading conditions at Canton and Macau failed.

Meanwhile, the Chinese became seriously concerned about the trade in opium by the British and American traders. In 1838 Lin-Tse-Hiu was appointed Imperial High Commissioner to stamp out the opium trade, and this led to hostility between the British and the Chinese Government.

Backed by a powerful British expeditionary force, Captain Charles Elliot, then the Superintendent of British Trade, under instruction to

effect:- "either the cession of an island to the British Crown or a treaty allowing British traders the rights normally enjoyed by foreigners in civilized countries" - demanded the cession of the island of Hong Kong. The Chinese Government was forced to agree. On January 20, 1841 the preliminaries of a Sino-British treaty, the Convention of Chuenpi, were announced, and on the 26th, the island was formally occupied. Its cession was confirmed by the Treaty of Nanking, August 29, 1842, and it was created a Crown Colony by Royal Charter on April 5, 1843.

A proclamation was issued by Elliott declaring that Chinese residing in the Colony "shall be governed according to the law and customs of China" and promised them the free exercise of religious rites, social customs, and private rights. Though steps were taken later to bring the Colony under its own law, based on English laws, many aspects of Chinese domestic life continued to be regulated by Chinese customary law.

This respect of Chinese customs had in the past helped to attract a large flow of Chinese into Hong Kong, seeking the security and sanctuary of the Colony. Curiously enough the same respect of customs also hindered the urban development of some areas, especially in the New Territories, as will be pointed out in a later chapter.

The Convention of Peking, 1860, ended the hostility of the second Anglo-Chinese War. Under it, Kowloon Peninsula as far as the present day Boundary Street was ceded to the British and became part of the Colony, together with Stonecutter Island. This addition was considered essential, mainly on military grounds, to the further development of the Colony, enabling the British to control both sides of the central harbour, and providing better opportunities for defence.

As a result of the rivalry of the Western powers over concessions in China, the Colony was again extended by the Convention of Peking, 1898. "Proper defence and protection of the Colony" was cited as the main factor making more land necessary. A substantial stretch of mainland north of Kowloon, and a group of islands in the immediate vicinity of Hong Kong was acquired under a ninety-nine year lease. This leased area became known as the New Territories.

The three stages in the possession and expansion of the Colony, which took more than half a century, in conjunction with the physical differences of the land, are clearly reflected in the urban development of the Colony. The island itself, being the first developed, was the most densely populated. Kowloon's urban expansion was accelerated only in the last two decades, though its population now exceeded those of the island. Meanwhile the New Territories remained virtually "undeveloped" when compared with the island and Kowloon.

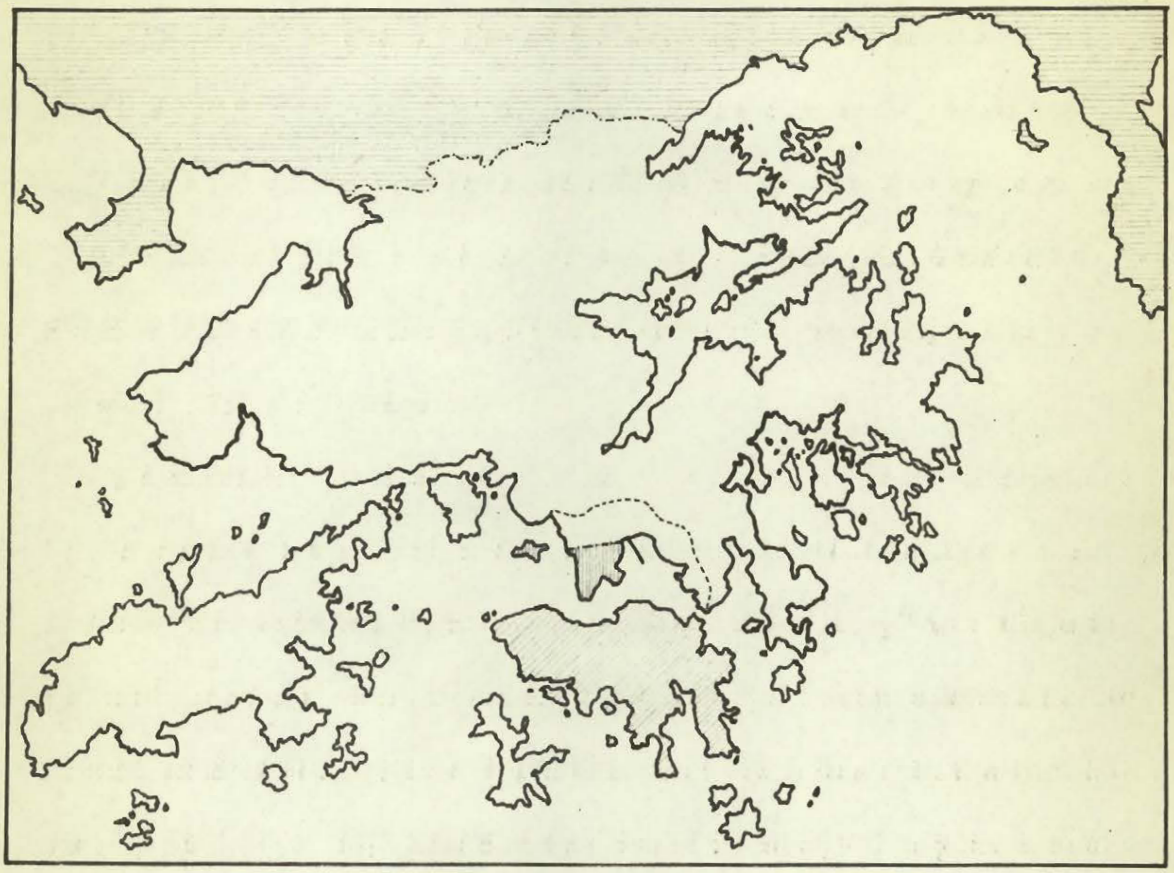



Fig. 1. The Territorial Growth of the Colony.

## CONTACT WITH THE WESTERN WORLD.

Hong Kong in its early days provided a place where trade could be carried on between European and Chinese merchants. Here two civilizations met. The Western manner of conducting business had to be learned by the Chinese, and in the same way, Westerners had to become familiar with Chinese procedure and practice.

In the very early stages difficulties were experienced in communication between the two groups. In course of time some Chinese acquired a knowledge of English in local schools, and this gave them an advantage from which quite a few of them did well in business. This encouraged the study of English.

Slowly but steadily Chinese businessmen began to take interest in Western ways and enterprises. They established shipping lines, built wharves and warehouses, erected department stores, set up factories of every kind. They formed banks and insurance companies along Western lines and established import and export houses.

As trade became world-wide, Western influences became more apparent. Most business was transacted completely in the Western manner. Any Western businessman to-day would find himself at home in any firm in the Colony.

Until the Chinese in large numbers began to accept Western education, there was little Chinese participation in the Government, Western firms, banks or in any Western institution . European

and Chinese merchants each pursued their own course largely independent of the other, linked by the precarious medium of pidgin English. Only by removing this language barrier could the gap be closed.

Missionary Schools, both Roman Catholic and Protestant, were the earliest educational foundations, soon followed by Government schools. Most of them were conducted, as far as practicable, along Western lines. Provision was made to encourage Chinese students to acquire a knowledge of English to equip themselves to take an increased part of the life of the Colony. As soon as these students started graduating from school their rise to influential positions in what had hitherto been a European dominated community was ensured. Others witnessing their success encouraged their children to take up western education.

Although the East is always in evidence, urban development in the Colony has adopted as its model western standards. The majority of the population, especially the intellectuals, discarded more and more their old traditional way of living, replacing it with that of the West.

Aware that they lagged far behind in science and technical progress the Chinese, in order to compete with other countries, began to replace handicrafts with machinery, home industries, with

westernized factories, and trained their workers in western techniques and methods of administration.

In the building field this was even more apparent. The traditional Chinese construction was no longer adaptable to tall multistorey buildings. Reinforced concrete and other western techniques had to be adopted. To-day few contractors, if any, are able to build according to the traditional Chinese canons and methods. Nor did this westernization stop merely at construction. In planning and external appearances, from luxurious flats to lowly abodes, buildings of Hong Kong to-day will not feel out of place if transplanted in any European city.

## COSMOPOLITAN CENTRE.

Hong Kong has long been regarded as the "gateway to China", and from the Chinese standpoint the Colony has always been important as a link with the "Overseas" - i.e. the whole region of Southern Asia and the South Seas.

Because of its centrality, Hong Kong had early significance as the focal point of major shipping routes coming from Europe through Singapore and across the Pacific Ocean from America, and later attracted to itself more local shipping routes from the neighbouring countries grouped around the South China Sea. In its siting, Hong Kong forms not only the nodal point of South China but also of Viet Nam, Thailand, Indonesia, Borneo, the Philippines, and Formosa. It was after these and other countries of South East Asia grew in economic importance that this nodility of Hong Kong was sharply defined in relation to its function as a transhipment terminus. As the most economical means of transporting bulk materials, shipping still holds first place. Hong Kong's unique harbour along a thousand miles of coast continues to be a focal point, attracting regular shipping lines. This colony developed therefore into a depot for the purchase and despatch to Europe and America of China's products, and as the emporium for the sale of western manufactured goods in the Far East.

Through the long history of warfare and uncertainty in China, Hong Kong had to rely more and more upon the rest of the world for trade, and has now succeeded to a stronger position in international trade. The recent trend in industrialization, the advent of air transport, and the booming of tourist trade have further emphasized its geographical position, not only in its relation to countries surrounding the South China Sea, but to all countries around the World. Truly, this tiny British territory in the Far East has succeeded in becoming one of the busiest cosmopolitan centres of the World.

## THE POPULATION GROWTH AND THE REFUGEE INFLUX.

The political security of the British Colony, when recognized by the Chinese, soon attracted a steady flow of immigrants. As the prosperity of Hong Kong increased, the tide of immigrants also increased, responding to the magnet of a higher standard of living. The free movement of Chinese to and from the Colony has always been permitted and was emphasized in the Treaty of Peking in 1898. Only in 1940 when the influx of refugees fleeing from the Japanese reached such great numbers as to threaten the resources of the Colony to support them, was a light immigration control enforced. Whenever civil strife or famine occurred in China, it was followed by immigrants flocking over the border from Kwangtung Province, the majority of whom returned to their native villages when the situation in their homeland had become more normal.

Ever since the establishment of this tiny colony fate seems to have decreed that it should be constantly plagued with a housing shortage due to migration and refugee influx.

Shortly after the foundation of the Colony, a great wave of emigration of Chinese took place, mainly to the Straits Settlement, Thailand and Java, and Hong Kong was the chief port of emigration. Then followed the rush of Chinese to the goldfields of California. When gold was discovered in Australia not long afterwards, and

thousands emigrated to Sydney, Hong Kong became their stepping stone. In the year 1852 alone over thirty thousand Chinese emigrants passed through Hong Kong. The problem of housing such vast numbers presented severe problems to the Government of that day.

In 1850, Taiping Rebellion broke out in Kwangsi Province and gradually spread throughout South China. This was the first instance where unsettled conditions on the mainland of China brought to Hong Kong thousands of Chinese refugees of every social class and occupation. In 1855 the population of Hong Kong was estimated at 72,000 and by 1861 it had risen to 120,000.

The constantly recurring situation in which the Colony has found itself, almost without warning, of providing accommodation, food, water and other facilities for thousands of new arrivals - people with no local attachments and whose period of stay may be no more than a few years, perhaps even months - has presented successive governors of Hong Kong with problems that are unique and of exceptional difficulty. The word "squatter" can be found in Government correspondence from the first year of the Colony's existence.

Following the establishment of the Chinese republic in 1911, came a long period of unrest in China. Once again large numbers of refugees, mainly from the southern provinces, made their way to the

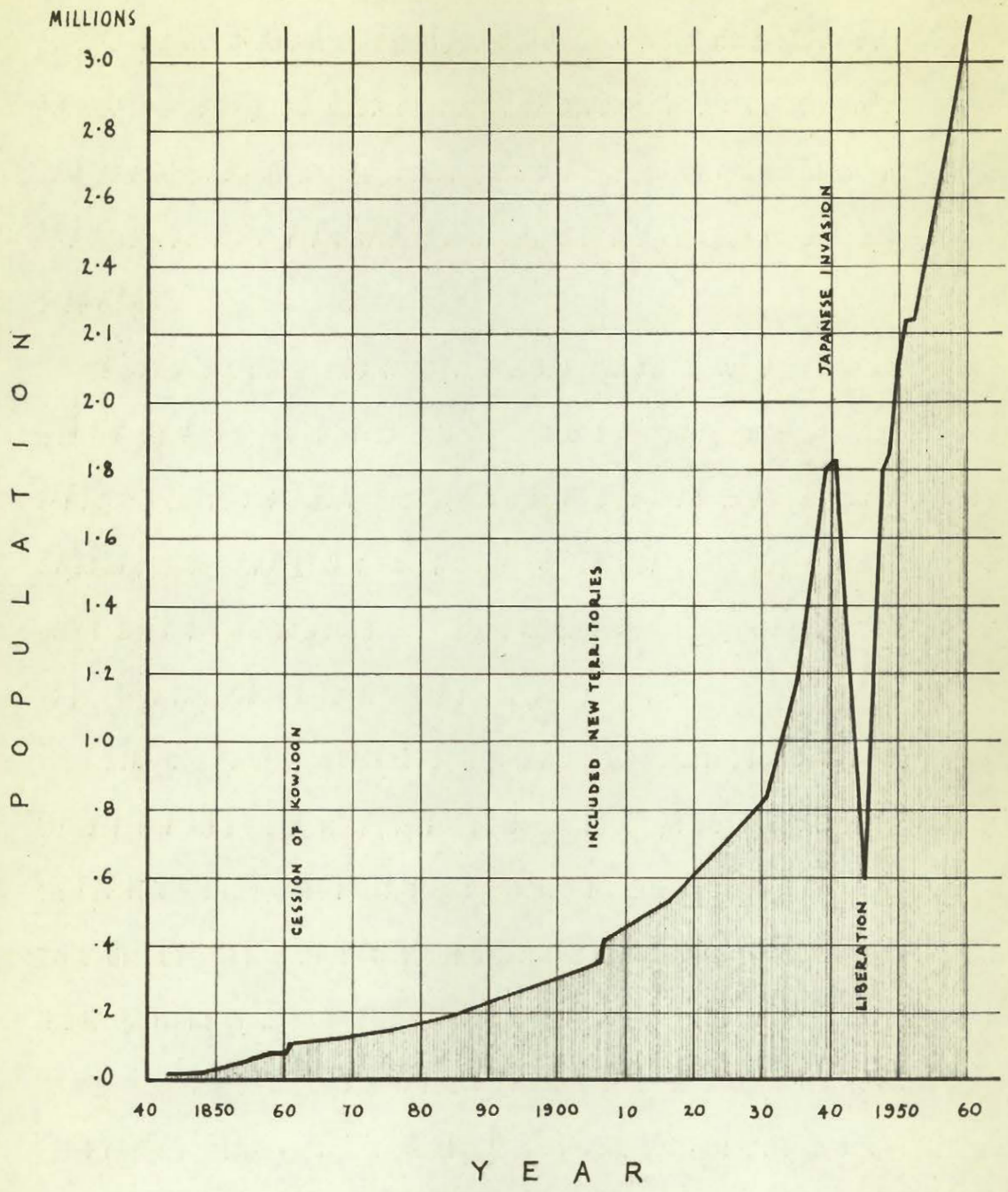



Fig. 2. The Population Growth.

Colony and, their arrival coinciding with a commercial boom which occurred during the First World War, many of them made their permanent home in Hong Kong.

In 1937 the Japanese began a general invasion of China. As the Japanese armies pressed southwards towards Canton, which was taken in 1938, Hong Kong experienced the greatest influx of refugees it had seen till then. It is estimated 750,000 entered in 1937, bringing the Colony's population to about 1,600,000. At the height of the influx, there was thought to be over half-a-million people sleeping in the streets.

The only period that Hong Kong experienced any substantial decrease in population was during the Japanese occupation. Towards the latter part of the occupation, the Japanese, unable to obtain food for the existing population, organized mass deportations from Hong Kong. In August, 1945 when the Colony was liberated the population had been reduced to 600,000. Eighteen months later at least 1,000,000 people had returned, and the population continued to rise because of the civil war in China. At the close of 1947, Hong Kong held about 1,800,000 people, with once again an acute housing problem. New buildings had not caught up with those that had been damaged or were in serious condition of neglect during the Japanese occupation.

As the Nationalist Government retreated and disintegrated before the Communists, a refugee influx surpassing all others took place, these refugees being in many cases well-to-do merchants and their families from Shanghai and other commercial centres. The highest point was reached in April 1950, when it was estimated that the Colony held about 2,360,000.

The Central People's Government was established in October, 1949. During the latter part of 1950, with the promise of more settled conditions in China and the departure of many of the wealthier refugees, the Colony's population fell for the first time since the war until by the end of 1950 it was thought to be around 2,060,000.

But this decline was shortlived. Soon more refugees were flocking in again, seeking refuge from Communist persecution. This, together with the high rate of natural increase - 110,667 in 1960 - has meant another steady rise, bringing the population to 3,014,000 at the end of 1960.

## THE CHANGING FUNCTION.

As previously pointed out, Hong Kong's possession and occupation was, of necessity, largely military in nature, to provide a colony where British merchants might trade in safety. As her trade with the East increased, Britain found it necessary to develop the Colony into her Far East military base, and this function was fulfilled until the Japanese invasion. After the liberation its importance as a military base gradually dwindled. To-day few visitors to the Colony will remember it as once having been one of the strongest naval bases in the Far East; instead they will only be impressed by its trade and industry.

In its early years the Colony existed purely as a trading centre, where the products of Europe were exchanged for the raw goods of China. The port, with its shipping facilities, was the central feature of Hong Kong's value. Its confirmed policy of free trade, its strategic location and stability combined with political security joined together to establish the Colony as an entrepot of great importance.

Throughout the nineteenth century the Colony's trade was almost exclusively concerned with China, but a steady widening in the scope of its neighbouring foreign trade has changed this. Hong Kong soon found itself the nodal point of trade with South China and South East Asia. Its trade now spread to the distant corners of the globe.

While this function as a port and transhipment terminus still plays an important part in the Colony's existence, other factors, while not ousting the position of the harbour's importance, cannot be neglected. The establishment of banks, shipping and insurance companies and commercial businesses, especially the development of local industries, have to-day an importance of their own.

Industry in Hong Kong received its first stimulus during the period of First World War, when industrial output in Europe was diverted from its normal channels. Not only was there a local market that needed satisfying but foreign markets that could be supplied as well. These favourable conditions presented themselves not only to increase existing products but to begin new industries. This enlargement and development of manufacture continued strongly, until the fall of the Colony in 1941. Until then, industry played a minor role in the Colony's economics; only in the last decade did industry begin to assume a predominant role.

The trade of the Colony had always been closely integrated with that of the mainland, but inflation and political chaos in China brought about a slump in trade. It was then clear that industry should play an increasingly important part in the Colony's economy. Aided by heavy investment on the part of wealthy refugees from the industrial northern part of China, especially

those from Shanghai, and by the influx of skilled labourers, factories sprang up overnight.

This industrial expansion was encouraged by the Government, especially after the embargo of a very wide range of goods - anything that could be interpreted as having military value to Communist China in accordance with the resolution of the United Nations during the Korean War, practically causing all trade with China to cease to exist, and the balanced economy of the Colony was greatly jeopardized. Local manufacturers, spurred on by these external events, spared no effort to establish themselves in world markets, and in this they have been very successful.

The industrial boom helped to ease much of the refugee problem, but it was followed by an increasing demand for skilled and semi-skilled workers, and wages began to rise. As the general earning power increased there was a great demand for better living conditions. Housing for low-income workers has since created a serious problem for both industrial management and the Government.

Side by side with the industrial boom, came the sharp increase in tourist trade. In 1959 alone, one hundred and fifty thousand United States tourists passed through Hong Kong. Attracted by tax-free imported and local goods, low expenses, and magnificent scenery,

tourists visiting Hong Kong exceeded those visiting Japan, the second strongest attraction, by one half. Hotels and other facilities related to the tourist trade again taxed the already exhausted land resources.

One of the most unique functions fulfilled by the Colony in recent years is that of a refugee camp. In the last decade the influx of refugees has almost tripled the Colony's population. Every means has been tried by the Government to effect the absorption of the refugees into the Colony's existing community. In this it has proved itself quite capable, though the problem is far from solved.

# CHAPTER 2.

# A GEOGRAPHICAL DESCRIPTION OF HONG KONG.

## PHYSICAL FEATURES.

The Colony of Hong Kong is situated on the South-east coast of China next to the province of Kwangtung. It is just inside the tropical zone, less than one hundred miles south of the Tropic of Cancer. The total land area of the Colony is 398 1/4 square miles, made up as follows:

(a) Hong Kong island, on which is situated the capital city of Victoria, including a number of small adjacent islets having an area of 29 square miles, with a population of one million and fifty thousand.

(b) The ceded territory of Kowloon and Stonecutters Island, having a total area of 3 3/4 square miles with 1.6 million inhabitants.

(c) The New Territories, with a population of approximately half a million, lying behind Kowloon, consisting of a substantial section of the mainland, together with 235 islands (a total of $365\frac{1}{2}$ square miles) comprising the territory leased from China on 1st July, 1898 for 99 years.

Roughly one quarter of the Colony is made up of islands, and a large proportion of its land mass is a steep and unproductive hillside, rendering it unsuitable for cultivation or urban development.

Hong Kong Island is extremely irregular in outline. It is

eleven miles long from east to west and, in breadth, it varies from two to five miles. Broken in shape and extremely hilly, it rises steeply from the northern shore to a range of treeless hills of volcanic rock of which the highest point is Victoria peak (1,805 ft.) near the western end. Between these hills and the harbour lies the city of Victoria. The old part of the urban area runs up the steep hillside for hundreds of yards in narrow stepped streets and terraces, but the modern town stands mostly on a strip of reclaimed land averaging two hundred to four hundred yards wide which extends nine miles along the northern coast of the island. Because of its hilly nature, and difficulty in communication, and its seaward exposure without protection against strong typhoons, very little development took place on the southern part of the island.

The ceded territory of Kowloon originally consisted of a number of low dry foothills running southwards from the escarpment of the Kowloon hills in a V-shaped peninsular two miles long and nowhere more than two miles wide. Most of these foothills have now been levelled and the soil used to extend the area by reclamation. The town of Kowloon now covers the whole of this peninsula and a part of the leased territory to the north of it known officially as New Kowloon. It contains the Colony's main industrial area, and a large residential suburb. Its population now overtakes that of

Hong Kong island and this has happened as a result of additional space available for development. The Kowloon hills, as precipitous as those of the island, form a barrier between Kowloon and the leased territory lying behind these hills.

A large part of the New Territories, both islands and mainland, is steep and barren. The highest point is the mountain Taimoshan (3,142 ft.) which lies seven miles northwest of Kowloon. To the north west of this mountain and extending to the marshes on the verge of Deep Bay stretches the Colony's largest area of cultivable land. The eastern half of the New Territories' mainland is covered by irregular mountain masses deeply indented by arms of the sea and narrow valleys.

The adjacent islands are mostly waterless and uninhabited.

## THE LAND PROBLEM.

Land shortage was felt as early as the first decade of the Colony's existence. The early development of the residential and commercial centre of Victoria was to a large extent dictated by the topography of the north side of the island. For the most part the hills ran down steeply to the shore with little or no coastal flat. Although this side of the island had the advantage of deep water close inshore, it was correspondingly difficult to build there. Three possible lines of development lay open to the early colonialists of Hong Kong. Construction could expand upwards and inland, a very difficult process; it could extend along the narrow lowland strip of the north coast; it could move outward and seaward by means of land reclamation. All three courses were followed. But construction in reclaimed land was by far the most significant, and the best in alleviating the acute land shortage. Building has since spread along the coast on both sides of the harbour.

Records show that as early as 1841 - the first year of the Colony's existence - nine acres of reclaimed land were sold. Ever since, reclamation has been continuous. Its tempo increased rapidly within the last decade, as refugee influx, increase in natural birthrate, rapid expansion of commerce, trade and industry taxed the Colony's land resources to the limit.

Reclamation alone could not solve the land problem. The

Fig. 3. Wanchai 1890.

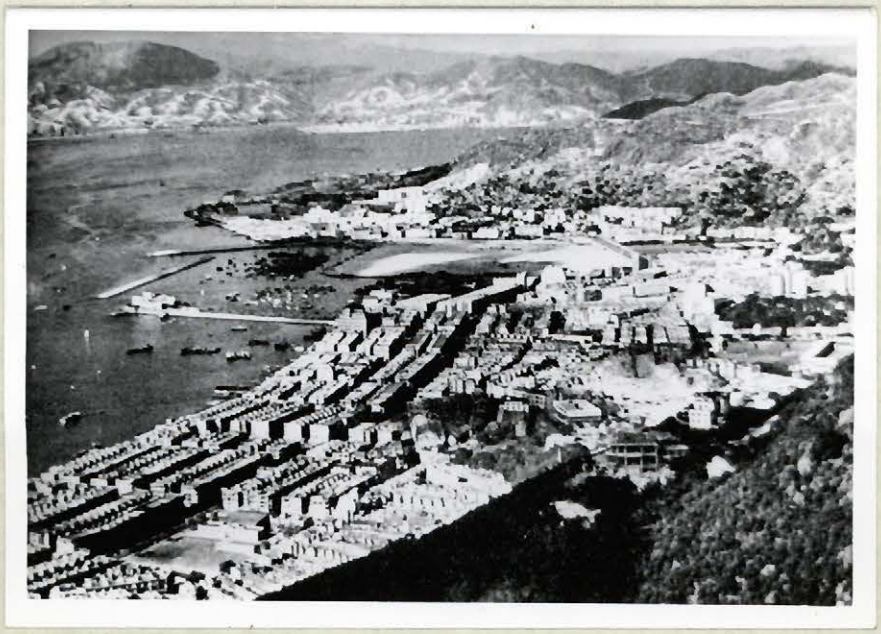


Fig. 4. Wanchai 1954.

Government exerted every effort to utilize all possible land. Low-lying hills were levelled, irregular valleys were filled, the network of roads was expanded to make more land accessible. The building of satellite towns has since proceeded at a great speed.

## CLIMATIC CONDITIONS.

Although the Colony lies within the tropics it enjoys a variety of weather from season to season which is unusual for tropical countries. This is largely because of the monsoon type of climate. The winter monsoon normally begins during September and lasts until about mid-March. Early winter is the most pleasant time of the year, for the weather is generally dry and sunny. After the New Year the sky is more often clouded, though rainfall remains slight. Dull overcast days with a chilly wind are frequent. Coastal fogs occur from time to time in early spring during breaks in the monsoon, when warm southeasterly winds may temporarily displace the cool north-easterlies.

Summer is the rainy season. The weather during summer is almost continuously hot and humid night and day, and if often cloudy and showery with occasional thunderstorms. It is usually most unpleasant from early June to early August.

The mean monthly temperature ranges from about 58°F. in February to over 82°F. in July. The temperature very rarely rises above 95°F. in summer, or falls below 40°F. in winter.

The mean relative humidity is generally over 80 per cent from early March until the end of August but in early winter it may occasionally

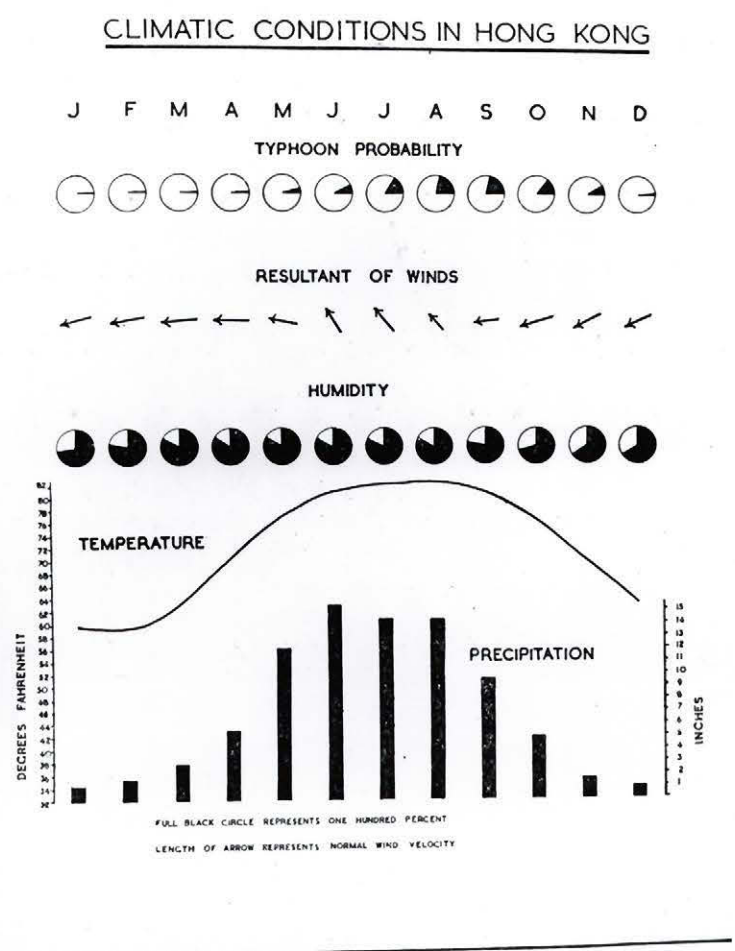



Fig. 7. A diagrammatic representation of average monthly climatic conditions. The monthly resultants of winds and precipitation columns are not typically true-monsoon in arrangement.

Fig. 5. Climatic Conditions in Hong Kong.

fall to as low as 20 per cent. High humidity, experienced for most of the year, has had much to do with the Colony's reputation as having a trying and unhealthy climate. Moderately high temperatures coupled with high humidity are more enervating and exhausting than high temperatures with low humidity, and, in Hong Kong, low temperatures are accentuated by high humidity.

In Hong Kong the rainfall from year to year can be highly erratic. It has ranged from 46 inches to 119 inches, but the normal value is 85 inches. In a normal year the five dry months from November to March only yield about 9 inches as compared with 76 inches for the remaining seven months.

Hong Kong has a predominant east wind with a northerly component from September to March and a southerly component from May to August.

Hong Kong is liable to be affected by typhoons from May to November, but they are most likely to occur from July to September. The passage of typhoons several times a year at varying distances from the Colony often bring spells of bad weather with strong winds and heavy rain. Occasionally the centre of the typhoon passes close enough to produce winds of hurricane force (velocity over 100 miles per hour) when much damage and loss of life may occur. Because of these strong gales tall structures in Hong Kong have to be designed for far greater wind

stresses than buildings elsewhere.

## POLITICAL INFLUENCES.

The political division of the Colony conforms to the territorial boundaries established at various stages of British possession.

When the Colony was founded, strategic and political reasons led to the development of the Island and to the neglect of the mainland, and this continued to the beginning of the present century. The City of Victoria, the capital of Hong Kong, has long housed the Government's administrative departments and the European business offices, both financial and commercial; these functions formed the core of the Colony where all activities centre. Rapid urban development forced costly upward extension of the City and expansion eastward and westward along the narrow coastal strip. Only when the saturation point was reached did full scale opening up of the Kowloon peninsula take place in earnest.

The addition of Kowloon to the permanent territories of the Colony took place twenty years after the island was established and was considered essential mainly on military gounds. Except for barracks and related buildings, little urban development took place. The lease of the New Territories was the trigger which released the expansion of Kowloon. Urbanization was, however, limited to the old boundary line.

Kowloon's development from a mere offshoot of Hong Kong to a modern city rivalling the island in importance, and boasting much of the Colony's industrial works is attributable to the opportunity it

offered for increasing commerce and industry and particularly to the existence of land to accommodate the vast number of refugees.

Land is usually leased from the Crown in Hong Kong for 999 years and in Kowloon for 75 years, renewable for another 75 years. But once beyond the Kowloon boundary,land may be granted only for a period of 99 years as from 1st July, 1898, the day of cession of the New Territories. This created a difficulty for the Chinese, whose deep cherished belief is to pass on possessions from generation to generation. Therefore they were not prone to develop the New Territories.

The natural barrier of the Kowloon Hill separating Kowloon from the rest of the mainland has long discouraged the spread of urbanization to the New Territories. As leased land, the New Territories enjoy more political liberties. Village elders of various districts in the New Territories often oppose development schemes on the grounds of "Fung-Sui" - a superstitious belief in nature's influence upon fate, for example any change to mother earth, such as the making of a new road, might affect the fate of the village. This political liberty and the respect of the British government for Chinese beliefs and customs has hindered urban growth in this vast territory.

To-day with only thirty-six years left to the lease, with uncertainties as to its future, the Chinese are reluctant to invest heavily in the development of the New Territories unless they are assured of a quick return in profit.

# CHAPTER 3.

# A HISTORICAL REVIEW OF HOUSING IN HONG KONG.

## THE VILLAGE.

The Chinese village settlements in Hong Kong may be divided broadly into three types: the coastal village, those in sheltered valleys and those that dot the plains.

The coastal villages are found in sheltered bays, lying above the high water-mark, strung out on either side of a main street. The teashop acts as the central meeting place, and the villages depend primarily on fishing.

The villages located in sheltered valleys are strung out loosely along pathways or roads. Their sizes are limited and they are extremely poverty stricken in appearance. The houses usually consist of one or two rooms and they are sometimes shared with any livestock that the inhabitants own.

The villages that dot the plains have a much more prosperous appearance. They are the typical village form throughout South China. Usually each village is a clan by itself, the villagers being descendants of the same patriarch. It is customary for the younger sons of a family, having no inheritance, to settle elsewhere and open up new land, and as their offspring multiplied, villages formed. It is not unusual for villages to be known by their family name.

Ancestral worship became the religious rite of the villagers.

The temple or "Ancestral hall" forms the focal point of all village activities, where wooden plates with names of deceased ancestors were housed, offerings placed before them and blessings and protections for the whole village asked in prayer. It also functions as the village school, the gathering place for village meetings, weddings and other village purposes.

The ancestral hall is the largest building in the village, often taller and more elaborately decorated. An open space is left in front of the temple with the other important object of the village, the well, off to one side. Used for drying corn, grass and twigs and as children's playground in daytime, the village "square" in the evening is a scene of informal gathering, a social meeting place for all ages and both sexes, where after a day's tiring work the latest gossip is exchanged.

The houses of the villages are clustered around the hall and its open space, on both sides and behind it. They are built of clay bricks or local stone either coated with lime plaster or left exposed. Some of them have earth floors and suffer dampness. The gabled roofs are generally tiled but some of the poorest houses are thatched.

Many of the villages protect themselves against attack from

Fig. 6. A Typical Village.

Fig. 7. A Village on Lantas Island, New Territories.

Fig. 8. A Walled Village at Kum Tin, New Territories.

other villages, during clan wars, and marauding outlaws with walls and moats. Square or rectangular in plan, they have watch towers on the four corners and narrow battlement windows where lookouts were kept. One gateway traditionally placed on the south wall leads into the main street, flanked by clusters of houses, to the village square and the ancestral temple.

The small village dwellings are confined to one or two rooms. The kitchen was placed on one side of the entrance, with fire pits where food is cooked in round bottomed pans. Twigs, grass and whatever firewood one can gather from the hillside or woods behind the village, were used as fuel. In most cases no chimney or flue is provided and smoke escapes through slits left in the wall or through an opened window. Opposite the kitchen, on the other side of the doorway, is the storage space, where farming tools, fuel and often farm livestock are kept. The large room being the living quarter is kept in the rear providing more privacy for the family. Inside the room, however, privacy is only provided by screens or curtains strung around the bed. The single room may provide shelter for three generations living together.

## THE COMPOUND HOUSE.

The most important type of traditional domestic building is the compound house known as "Ssu Ho Yuan" (四合院) i.e. Court House enclosed on four sides. Its evolution can be traced back to the single structure simple building of two to three rooms, with a space in front reserved as a courtyard. Later additional structures are placed at right angles to the main building forming a letter "U" with the open end enclosed by a wall.

If the premises are large the front wall may be replaced by another building forming an enclosed court. When families are wealthy another court may be added in front and the same process is repeated forming a compound house with double courts. However numerous or however wealthy the family, this is the normal type of dwelling.

The Chinese tradition of symmetry in planning is strongly expressed in the compound house designed along a north-south axis, with all major buildings always facing the south. The structure at the rear, on the northern end of the rear court facing southward is the main or master's suite. Two smaller rooms are attached to both sides of the building forming the bedroom and the master's study. Minor halls on the east and west end of the inner court are

quarters for married sons and their families, or concubines of the master. The separation of the more secluded and private hindcourt from the more casual forecourt was fulfilled by a large central building functioning as the living room where guests were received. The two side buildings in the front court are utilized as guest chambers and studies for the male offspring. The foremost building is usually reserved for kitchen, servants' quarters and store rooms. Though the whole building be symmetrical in relation to the north-south axis, the main entrace is never placed in its logical position, the central axis, but rather to one side, usually the eastern side. This is a fixed principle, originated by superstition; evil spirit must not be able to rush straight into the house. Doors do not open directly from the dwelling house onto the street, and if there are any windows on the street side, they are very small and very high so as to assure complete privacy.

This compound house plan is a development of the Chinese desire for protection both from evil spirit and robbers. It also suits perfectly the Chinese idea of family life. When the sons marry they bring their wives with them and live in a separate chamber. When a new concubine is wanted, another chamber can be utilized or more courtyards may be added, all without spoiling the design

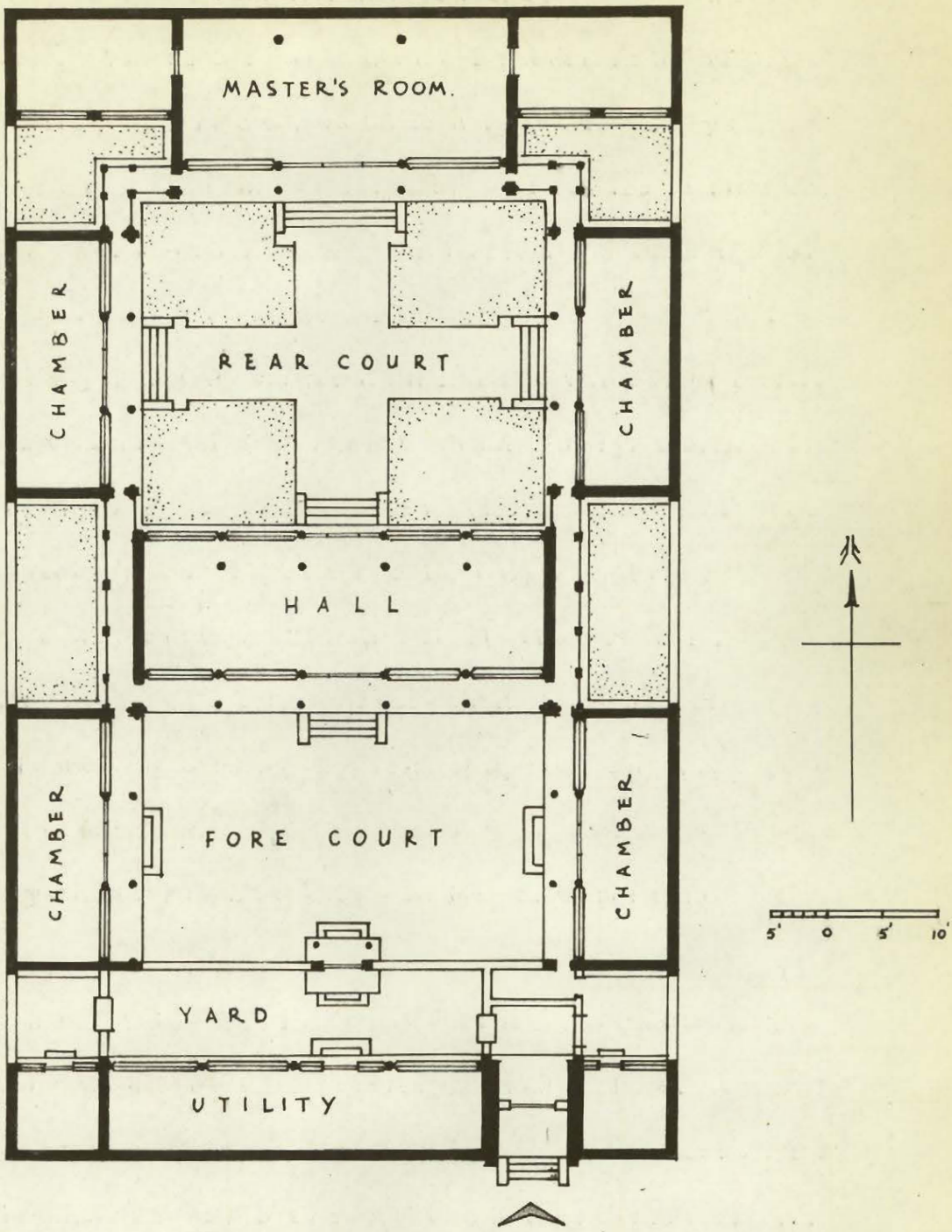
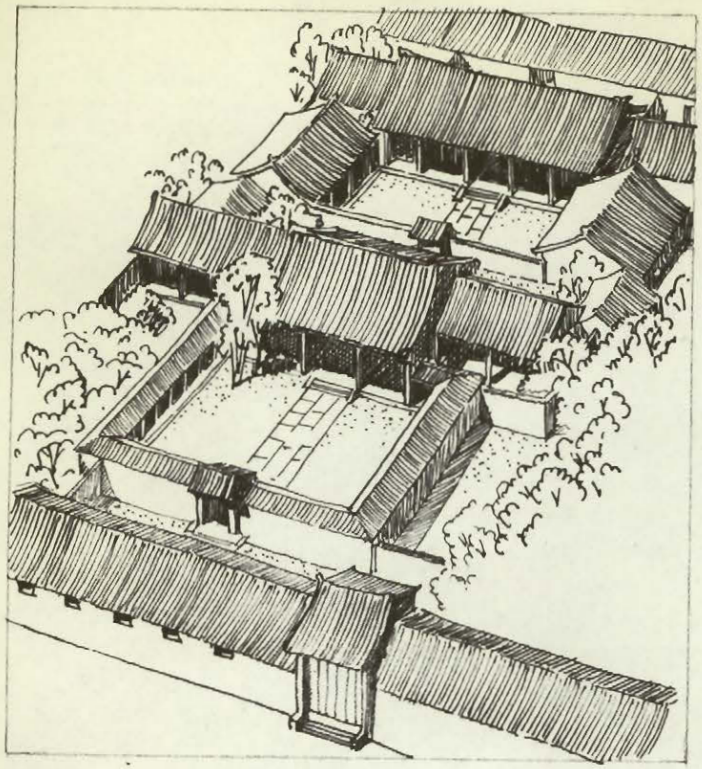



Fig. 9. Plan of a Typical Compound House.



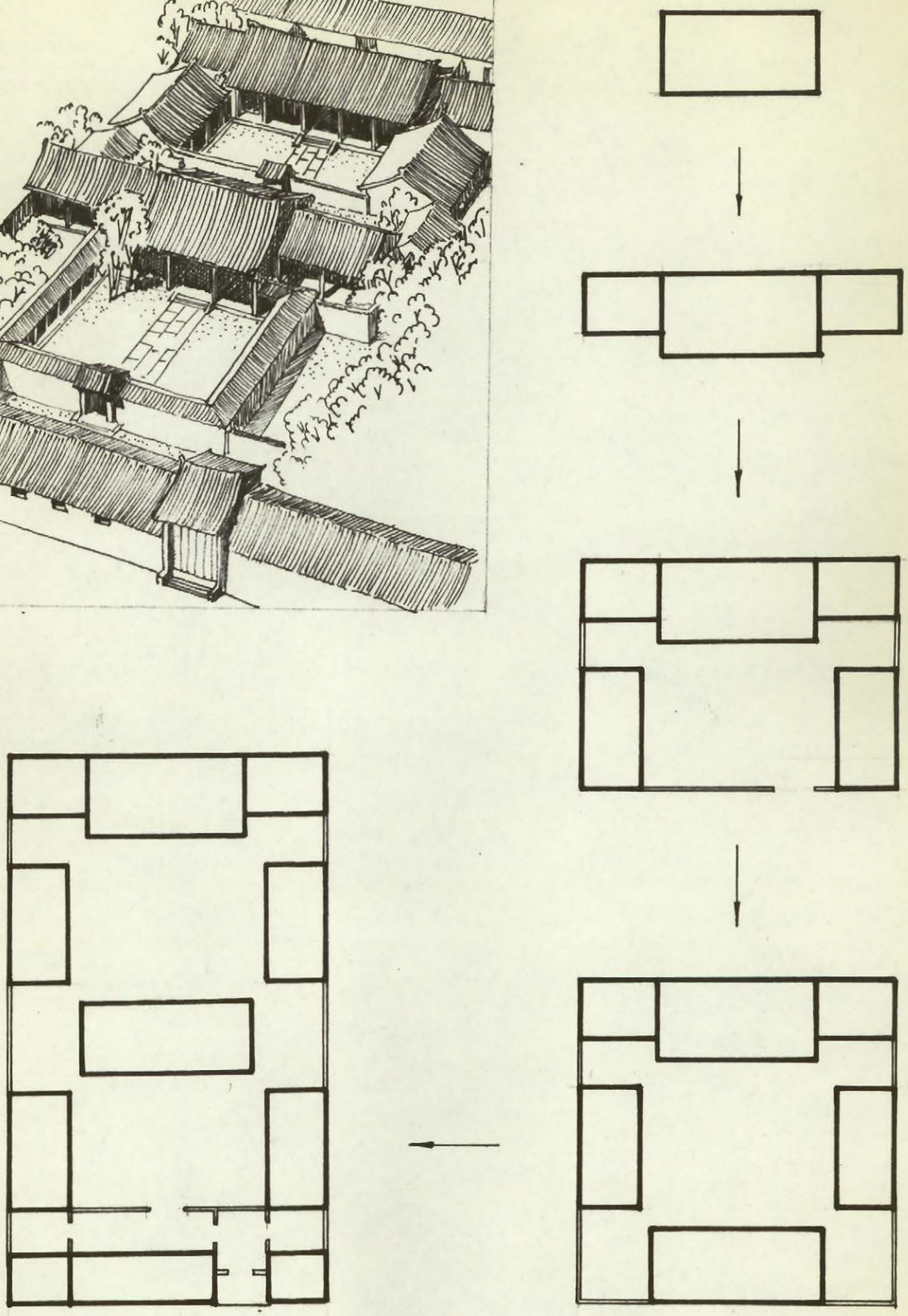


Fig. 10. Development of a Compound House.

of the house, for each can be a complete unit of their own.

The court is an important component in the design, giving light and through ventilation yet providing the necessary privacy. The rear court is planted to form an enclosed formal garden, while the forecourt is either paved by stone or brick with pot plants here and there. The small narrow courtyard behind the forebuilding, was reserved as drying yard and served as a utility space for daily household chores.

The numerative of houses in China[ese] is a word which denotes division, signifying not a room, but rather such part of a dwelling as can conveniently be covered by timbers of one length. As the timbers are seldom very large and long, one division of a building will seldom be longer than ten or twelve feet, and the width from front to back is even less. An ordinary chamber may comprise three or more of these divisions, though there may be but only one partition separating it into rooms. There is no ceiling and the roof which is usually not lofty is in full view.

There are strict rules governing proportions between the different parts and elements of individual building. Various structural parts are completely standardized. This standardization

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*Village Life in China by Arthur H. Smith, D.D.

came about as the result of age long accummulation of experience. The standardized plans are easy for the workers to grasp and memorize and are well adapted for the division of labour; consequently the efficiency in the building operation was considerably increased. It is by working the standardized parts into a whole and producing a plan practicable or suitable for execution and full of artistic expression that the inventive genius of the individual builder is manifested.

## THE FLOATING DWELLINGS.

One of the most interesting elements in the population of the Colony is furnished by the "Boat People" or Tanka, who form a nearly separate community. They comprise nearly five percent of the total population of Hong Kong.

In the early days, these Boat People were aborigines despised by the Cantonese* who devised laws to keep them in their place, and to prevent competition in land tenures. Thus the boat people were forbidden to reside on shore, barred from intermarriage and were not eligible to compete in government examinations upon which alone official employment could be obtained. Although this discrimination no longer exists, most of them were born, lived and died in their floating homes, and the land only accommodated their coffins.

Their junks and sampans not only form their dwellings but also provide for most of them a means of livelihood. These 138,000 water people dwell or operate in over 26,000 native craft of various sizes. It is indeed fortunate that they did not add their share in crowding the already overloaded land areas. Their expansion is unlimited as long as they are able to find a good anchorage for their little craft and shelter against the frequent

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* People of Kwangtung Province

typhoons. With the present existing acute housing shortage the accommodation of another three or four percent of these people on shore would add confusion to the already near chaotic housing situation; the government tends to encourage the Tankas to avoid a break with their ingrained habits, and to preserve the old floating homes as their base.

The junk community in Hong Kong comprises all grades of society from the aristocrats who lord over the three-masters of over a hundred feet long to the small lowly sampans. In the typhoon anchorage they form a town in itself, with floating shops, restaurants and hawkers. The boats are so arranged and anchored that they form "street" patterns that are travelled to and fro by means of "water taxis" - sampans rowed by women or children.

Though some of the larger vessels, mostly fishing junks or cargo carrying junks, may sail away during the fishing season most of the smaller craft were permanently moored in the typhoon shelter.

The larger floating residence may measure over a hundred feet in length and are usually built of China fir, teak or yacal; some were converted old fishing junks which had since retired from active service. The sleeping compartment is usually provided under the

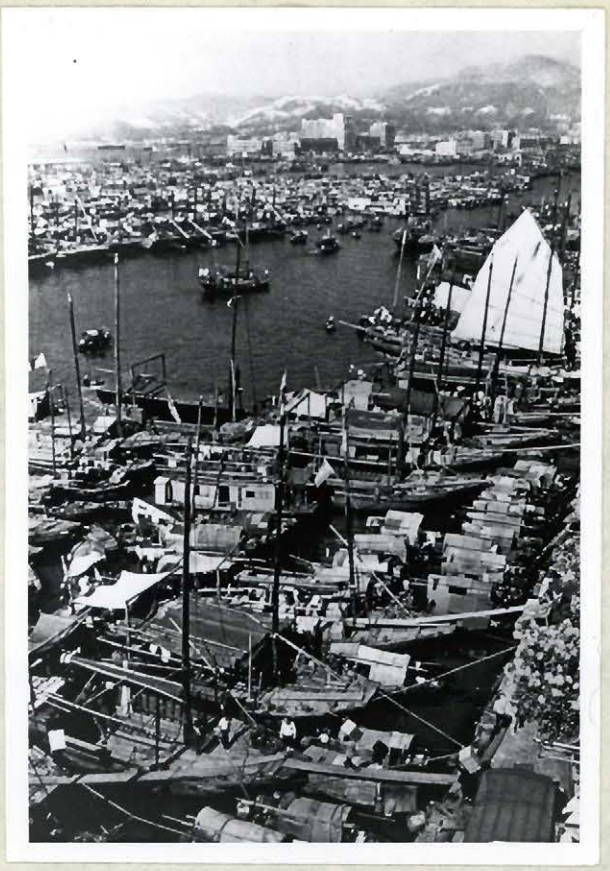


Fig. 11. A Floating Town.

Fig. 12. A Water "Street".

Fig. 11a. A Floating Town.

Fig. 13. Sampan "homes".

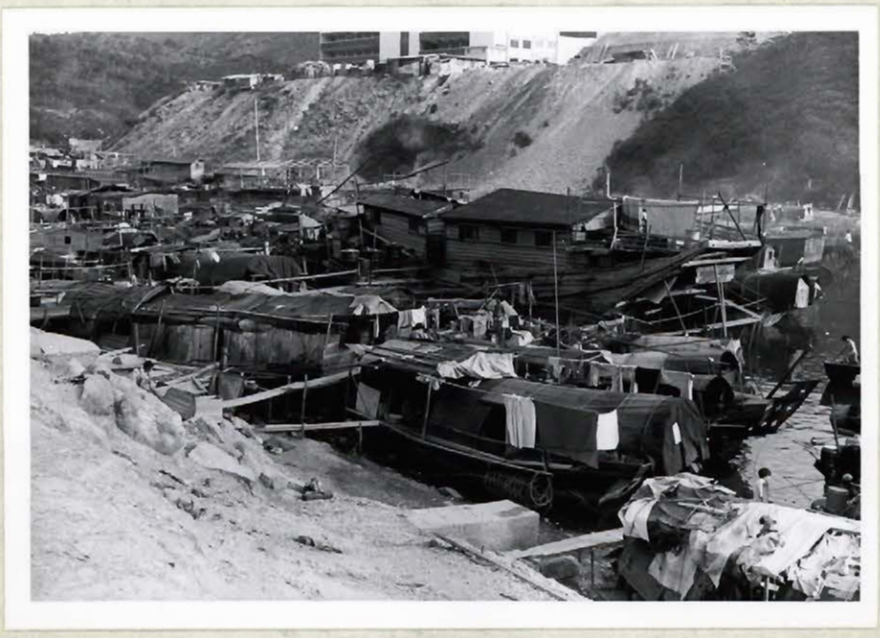


Fig. 14. Boat "Houses".

fo'csstle and the poop where the master of the family has his private chamber. The two front cabins arefor married families, and from each there is a hatchway giving access to compartments where children sleep. The port cabin acts as the chapel, for there is always a shrine to the Queen of Heaven - goddess to the water folks, on a bracket fixed to the outer plank. The poop is the family's mess deck as the kitchen is situated right aft on the port side with the fresh water tank handy alongside. The latrine occupies a corresponding position to the starboard. Meals are laid out on the deck, the family squatting round in a circle for the boat people hardly ever sit. Absence of furniture strikes one's first impression. A straw mat on the floor plank is the bed, except for a few low stools, no table or chairs will be found. This explains the incredible number of souls such junk can carry in proportion to the size; a large three-master carrying ninety and even a twenty foot purse-seiner provides a home for fifteen. Though overcrowding is just as prevalent as the landsman, sunlight and fresh air is no problem to them, and they are comparatively immune to tuberculosis which plagues overcrowded slums.

The majority of the floating dwellings are much smaller craft ranging from eight feet to sixteen feet with a beam of five to eight

feet. The larger of these may have shallow lower decks where the family can crawl in through a hatch at night, but most likely the deck itself fulfils the multiple function of bedroom, living room and kitchen. Semi-circular bamboo ribs were erected over the deck and covered with heavy oilcloth, tarpaulin, or plain canvas heavily soaked with paint. The covering can be rolled up for light and more ventilation when the weather permits. Cooking is usually done near the stern, where compartments for water and other storage are located below the deck planks. The wide beam and fairly flat bottom make them on the whole fairly stable even in fairly choppy sea.

Occasionally one can find a whole "cottage" built on the deck of an old junk, complete with pitched roofs and glazed windows. This is a real house afloat.

## SQUATTERS SHANTY TOWN.

"Squatters" in its broader sense includes three classes of deprived persons; the immigrants who left China before Communist victory, those who left because of their victory and finally the Hong Kong residents who sold out their homes to wealthy refugees and they themselves became destitute.

To the majority of squatters their livelihood depends on the two cities. In their desperate need to find shelter some sleep under verandahs on the sidewalks, some make their home in staircase landings of tenement houses. The staircase being common ground became no one's responsibility, and more out of compassion, they are permitted to stay. Soon they began to invade the roof tops of the buildings. This is especially so in the highly congested area of Wanchai. Because of building regulations all staircases lead directly to the roof and the doors are not locked to enable the tenants to escape to the roof in case of fire and down by the stairs of adjoining buildings. One can virtually reach any building within the same block by way of the roof. The roofs became choice places for the refugees. Illegal structures made of flattened gasoline cans, boards from wooden crates, sprang up overnight. Not all these were built by the squatters themselves, some were by profiteers taking this opportunity to squeeze whatever possible from these

Fig. 15. Side Walk Squatter Sheds.

Fig. 16. Roof-top Squatter Sheds.

destitute beings. The tanks for storing flushing water supply them with water. Rainwater pipes and soil-vents on the roof become their waste disposal system. Their flimsy sheds were tightly packed. Fire is a constant threat. After several serious roof top fires the government registered all existing roof top structures and no new ones may be added though old ones were permitted to stay at least temporarily until further accommodation can be found for them.

Some of the squatters took to the street, their favourite locations are back alleys and scavenging lanes at the rear of buildings. They built their lean-to sheds against the walls of the buildings, with roofs of tar paper, old tin sheets supported by walls of whatever material they can lay their hands on, and covered by pieces of old clothes, rice sacks, grass mats, tin sheets and even cardboard.

Some of these street-side shelters were permitted by the government as a temporary measure for fire victims of squatter areas, to provide for themselves protection from the weather until accommodation could be arranged for them. In such case, temporary latrines and bath-houses were provided for them by the government in the streets.

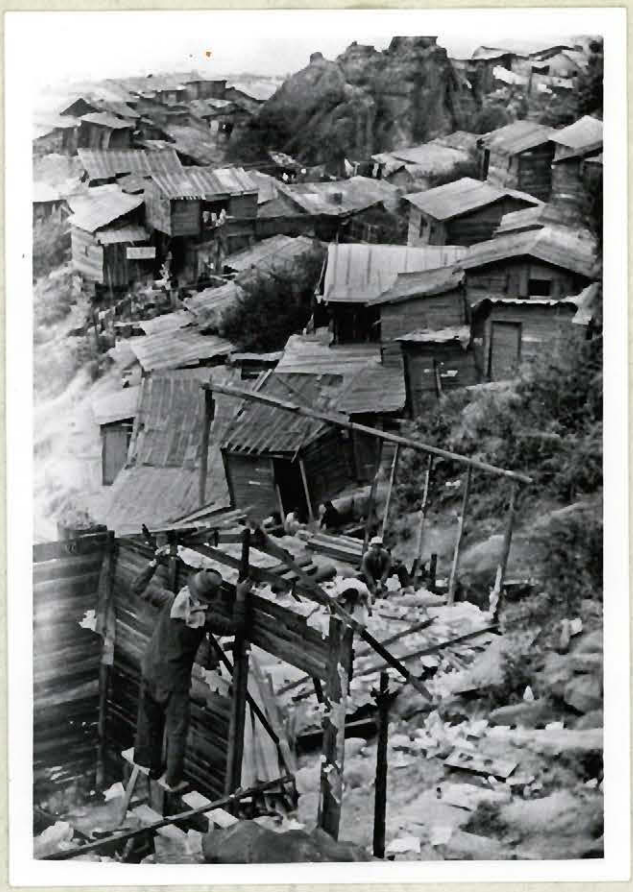
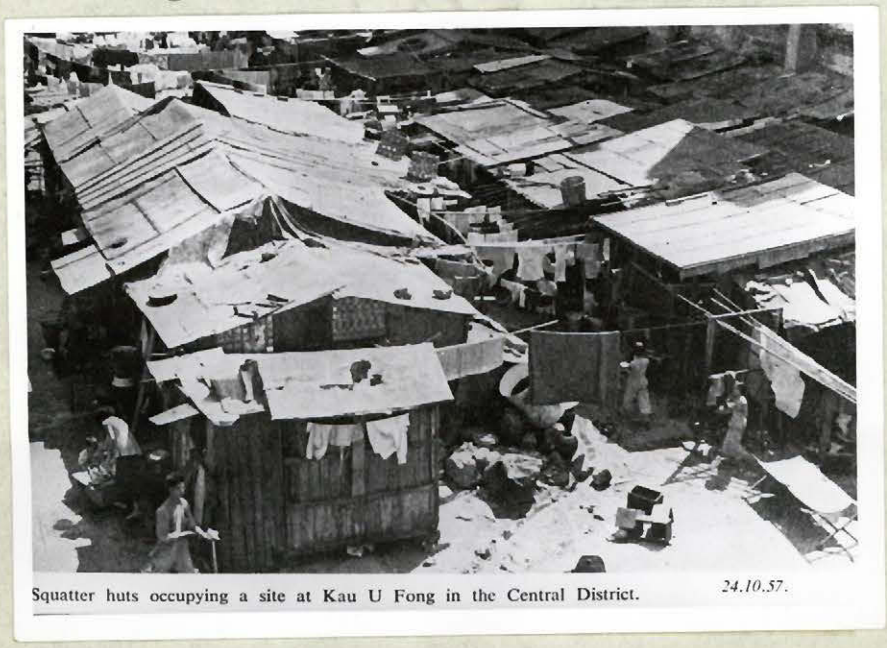


**Fig. 17. Hill Side Squatter Huts.**



Squatter huts occupying a site at Kau U Fong in the Central District. *24.10.57.*

**Fig. 18. Squatter Huts Occupying Level Building Site.**

The majority of the squatters sought shelter in the vast squatter shanty towns which have grown up on the fringe of the urban area. Their need was so great and so pressing that no thought was given to the ownership of land. Virtually every sizeable vacant site which is not protected was occupied. When no flat land is available they move up the hills and colonize even ravines and slopes that are too steep for normal development. The huts were constructed of whatever material they could lay hands on or obtain at very low cost - sheets of flattened old tin cans, wooden boardings, cardboard, sacking slung on frame - every variety of two dimensional material they can beg, steal or buy for a few dollars. Land was scarce even for them, and these unsightly shanties were packed densely like honeycombs, with little ventilation or sunlight and no regular access. These flimsy shacks of canvas, wood and tin were themselves over-crowded beyond endurance. Crowding five or six persons in a space of forty square feet is not unusual. Some of these squatter colonies had populations from thirty to sixty thousand. Density was at a rate of two thousand persons per acre and only in single storey huts. No provision was made for sanitation and practically no organized refuse disposal was provided. Water was collected

Fig. 19. Squatter Fire.

from nearby streams during the wet season, but more often it had to be carried a long way from communal standpipes. Often the huts are shared by chickens, ducks and pigs that provide the owners with extra income. Sacking curtains over doorways give privacy and provide a measure of warmth and protection from torrential rains. Cooking is done in open stoves inside the huts. Kerosene lamps or candles provide light for the night. This increased the risk of fire especially during the dry winter months.

Supervision of such premises is virtually impossible. It forms a grave potential threat to the health and law and order of the Colony. Every kind of vice flourishes; drugs are manufactured, sold and stored; there are divans, brothels and gambling houses. Every form of crime shelters behind its anonymity.

## TENEMENT HOUSES.

Housing in the Colony's urban areas falls into two major types. The European and the Chinese tenements; the latter by far the majority. Nearly seventy five percent of domestic buildings fall into this group. (1) The tenements usually consist of a large living space and a kitchen with or without lavatory. Usually fifteen feet wide (2) its depth may vary from twenty to over fifty feet. In each floor it may house one family or several living in separate cubicles.

The flexibility of the tenements suits perfectly the idea of Chinese family life, as the large living space is without permanent separating walls dividing it into a definite number of rooms. The six and a half feet high wooden partitions may easily be altered and with very little cost to suit family growth, the only difference being that as family size increases the partitioned cubicles decrease correspondingly in area. Three or four generations of families living together in one floor is a common sight.

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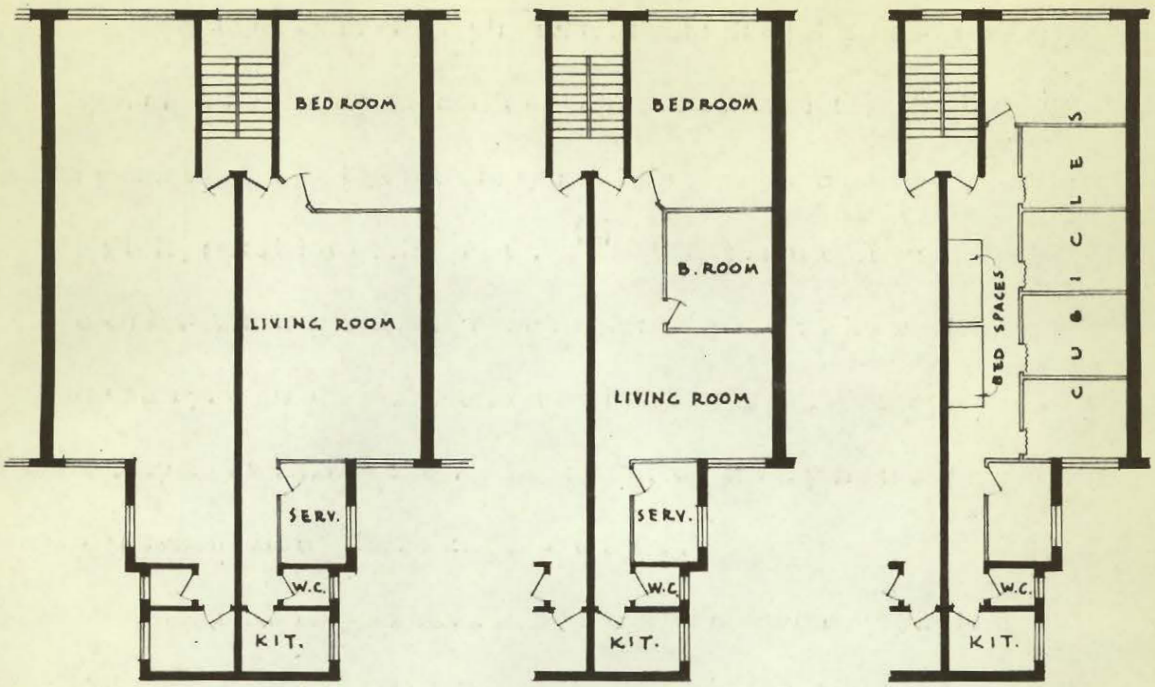
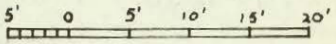
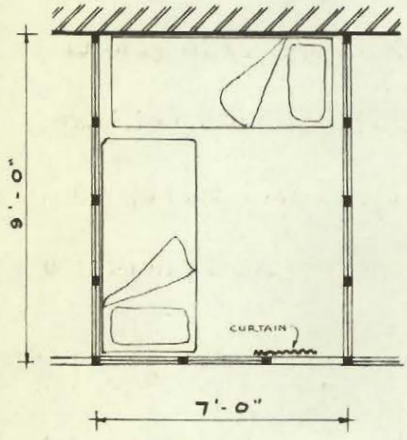
(1) See Appendix.

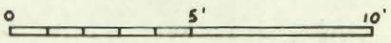
(2) This derived from the fact that the economical length of a Chinese fir joist is about fifteen feet - A. E. Smailes "The Geography of Towns" p. 107.




FROM ONE BEDROOM TO MULTI-CUBICLES




TYPICAL CUBICLE UNIT.

Fig. 20. The Flexibility of a Tenement House.

Having no internal partition, the tenement houses enable the landlord to arrange the room into the largest number of cubicles and bed space that his genius permits in order to obtain the maximum in rental return. Sometimes the cubicles are let and sublet. A tenant may rent one floor from a person who rents the whole building from the property owner. He then partitions the floor into cubicles and acts as landlord himself renting out the cubicles. Often the cubicle tenant in turn may re-sublet one bed space of his cubicle to his friend or relative and thus become the fourth landlord. Sometime the bed spaces are even rented out in rotation, to be occupied in the day time by a worker who does night shifts and at night to the regular day worker.

The flexibility of the tenements also accounts for Hong Kong's ability to absorb large numbers of immigrants into the urban areas. The majority of the tenement floors are shared by several families living in cubicles sharing the common kitchen and lavatories. As the demand for urban accommodation increases the conditions in these buildings become worse. It is not uncommon for a family of four or more to live in a bed space which consists of a bunk-bed, sometimes in two or three tiers. The

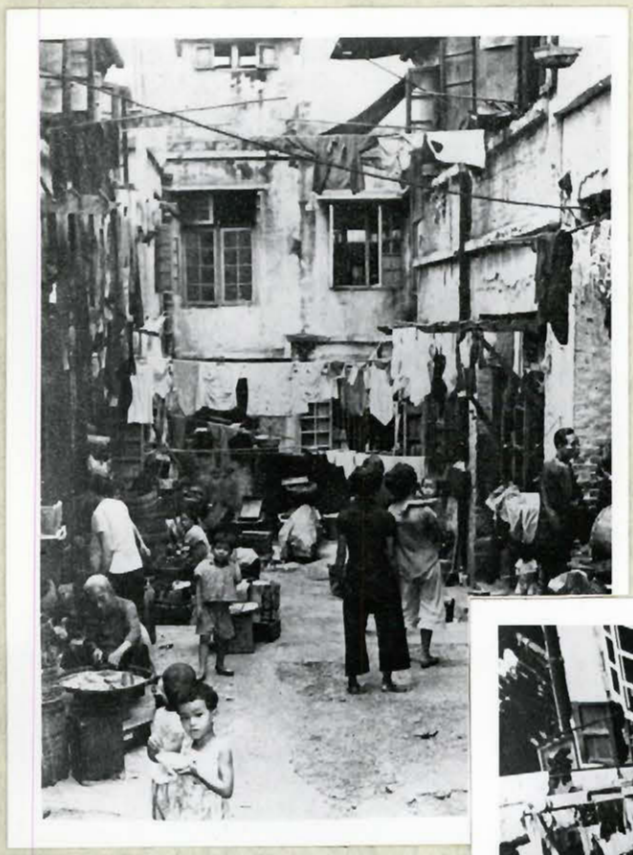


Fig. 21.

Fig. 22.

Exterior of Slum Tenement Houses.

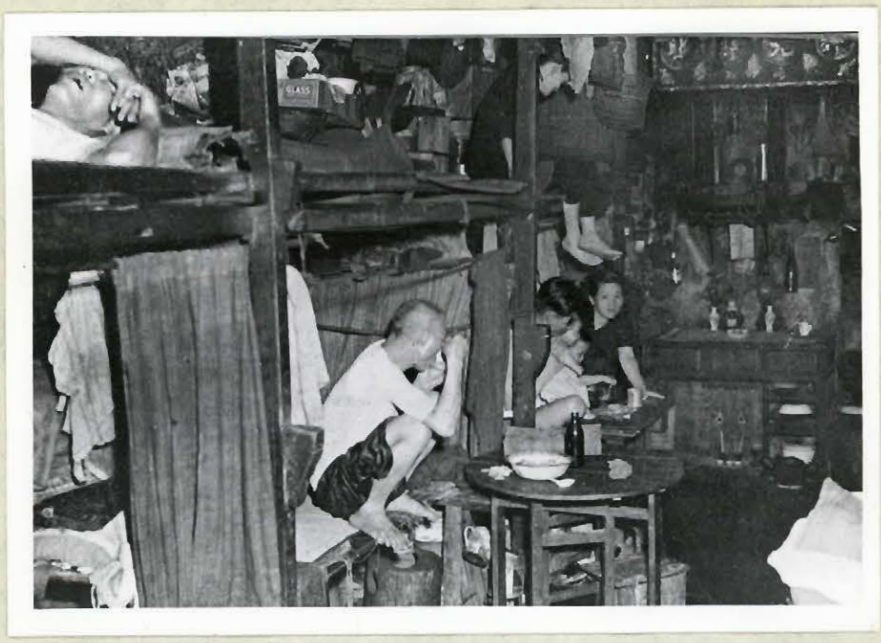


Fig. 23. Interior of a Slum Tenement House.

Fig. 24. Interior of a Slum Tenement House.

only privacy provided is by curtains which screen them off from the other families living in similar bed spaces or cubicles on the same floor. Ventilation depends on the whims of the minority of the occupants with access to the window. One's first impression on entering such premises is overcrowdedness, smoke and dust, the strong pungent odour, and the unending noises and other evidences of confusion and disorder. Sanitary fittings are almost non-existent and generally consist of a water-tap in a communal kitchen, which most of the time does not function because of the water rationing in the dry season, and a bucket latrine screened by a half door - in most cases even this does not exist, the bucket is just placed in the corner in the so-called kitchen.

Such cooking facilities as there are are shared by many families. A decent family life is virtually impossible; constant quarrels and conflicts are unavoidable. One sometimes wonders how people can inhabit such squalid, dark and airless dwellings and yet avoid frequent and serious epidemics. Besides the danger of health, hazards of fire in such crowded conditions are a constant threat.

In prewar days the tenement buildings were seldom more than

three storeys. During the postwar years with the advance in building techniques and reinforced concrete construction, and with the acute demand for accommodation, tenements are seldom under six storeys in height. Most of them are as alike as two peas, in plan and elevation. Small rooms; minimum ceilings and beam height; metal windows and doors which open onto a verandah carried over the sidewalk without vertical supports, and the verandah balustrades of solid brick, rendered and of such height that a standard window can be installed to turn the verandah into a room once the occupation permit has been granted. This type of tenement design and construction is just a product of Hong Kong's building ordinances, and similar in character to the Bye-law houses in the industrial towns of northern England. They are just as likely to become slums. In fact most are already slums.

When speculators are able to assemble several old tenement buildings or a large vacant lot, tenement blocks of sixteen or even over twenty storeys are erected and it may finally house two or three hundred families. They are just as capable of being slums as the small tenement buildings, as the blocks seldom have any communal amenity or relief to the high density dwelling factor.

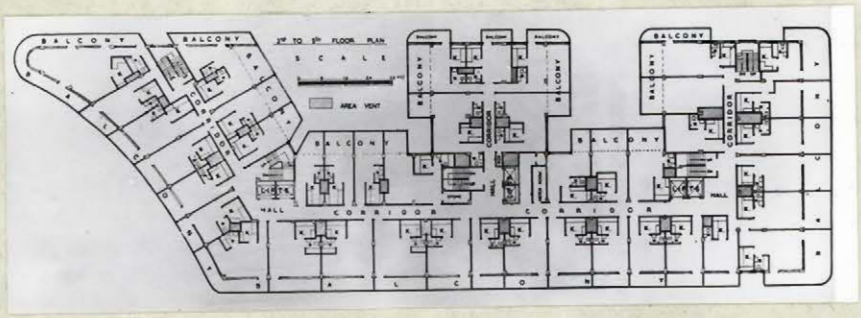
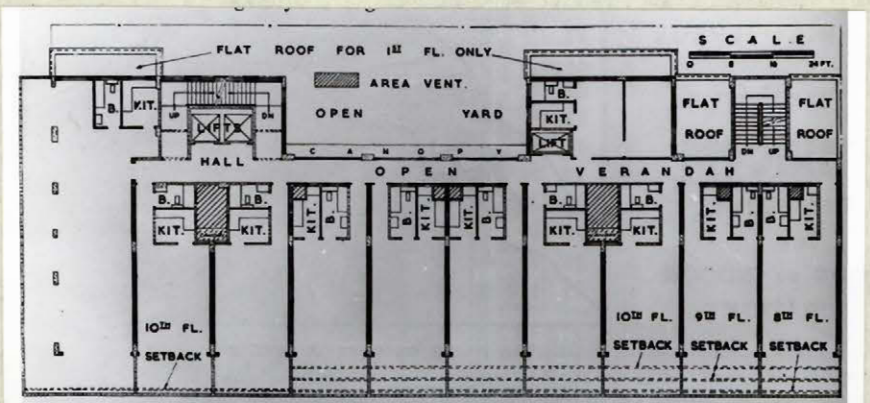



Fig. 25. Plan of a Post-War Tenement Block.




*Typical residential floor plans. Type "A" is the large area on the extreme left; Types "B" to "J" are the spaces along the front; Type "K" is the one flat facing the rear.*

Fig. 26. Plan of a Post-War Tenement Block.

## EUROPEAN COLONIAL HOUSES.

The early European merchants and the administrators of the Colony of Hong Kong, being of the wealthier and ruling class, and unaccustomed to the Chinese domestic dwelling, grouped themselves in European quarters, isolated from the Chinese, and built their own homes each according to his own fancy. No definite period or style was followed. Buildings of distinctly different periods in English architecture may stand side by side; Georgian, Queen Anne, Classical revival, were all built. But, in general, each building has a character of its own specially adapted for use in the tropical climate of Hong Kong. Most of them are only two or three sotreys high, with deep verandahs supported by colonnades and semi-circular arches of the classical orders. The deep verandahs give ample shade against the strong sun and shelter from the pouring rain and keep the rooms inside relatively dry and cool. Internal planning of the dwellings did not differ much from that of England since they were built for those who were accustomed to the living conditions of England.

Until a few decades ago the influence of the European house on the Chinese was not great. Most Chinese adhere to the tenement

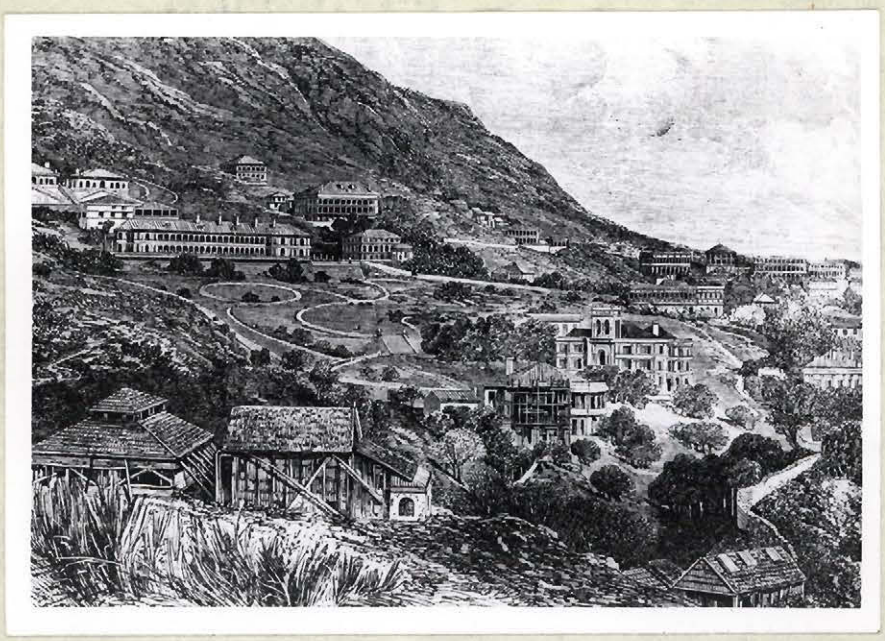


Fig. 27. Buildings in 1865.


Fig. 28. Waterfront in 1890 .

type of housing because of its flexibility which permits better adjustment for the expanding family size. Even to-day the European type of housing is still in the minority; only one fifth of the urban domestic dwellings belong to this category.

# CHAPTER 4.

# LOW COST HOUSING IN HONG KONG.

# RESETTLEMENT HOUSING

## THE FORMATION OF RESETTLEMENT POLICY.

Though refugee influx and the squatter problem began as early as the end of the Second World War, no attempt to tackle the squatter problem in earnest was made by the government of Hong Kong until the middle of 1951 when the estimated number of squatters had already swollen to over three hundred thousand. The government's hesitation and delay in taking action to tackle this problem lies principally in two reasons. Firstly, in the opinion of the government, Hong Kong had granted sanctuary to the refugee, but their rehabilitation and ultimate disposal should be a matter for some wider organization other than that of the Colony itself. Since the responsibility should not fall on Hong Kong itself, there are only three ways in which it could be relieved; the refugees could return to their homeland; they could emigrate to some other country; or the costs of their integration into Hong Kong's own community could be underwritten by some international agency.

In the beginning the first of the three seemed the most logical and likely solution. All through the Colony's history the majority of the refugees returned to the mainland once the turmoil in China had calmed down. The government waited for the refugees who had

suffered these many months of poverty and exile to take matters into their own hands and return once the Communist regime had full control of the country. This optimistic view was soon shattered; it became increasingly clear as the months passed that they would not return. The complication and enormous scope of the other two alternatives plus the necessary time that it would take to muster and negotiate eliminates their application.

The second reason why the government hesitated to come to grips with the situation was the immensity of the problem which it presented. The government believed its prime consideration and responsibility should be the provision of low-cost housing for the original Hong Kong residents. In all parts of the Colony the tenement buildings were crowded five or six times their prewar density. Urgent needs have priority over the provision of decent, permanent, fireproof homes for several hundreds of thousands of people who do not actually belong to the Colony's community. In the past it had never been the government's policy to enter into the field of domestic construction, and there is valid economic reason why it should not do so now. Also in setting itself up as landlord to some three hundred thousand refugees the government would by this fact alone

recognize them as an integral part of the population. This the government is not willing to do. All this political and economic intricacy has held the government in check.

In January, 1950, a serious squatter fire took place in Kowloon City which rendered twenty thousand persons homeless, and in April an immigration control on entry from China was put into force. These two events had their separate effect on the policy of the Hong Kong government. On one hand fire was now accepted as the major and immediate danger and attempts were made to drive fire breaks through the most congested part of the resettlement colonies. This implied that the settlements were accepted, at least temporarily, by the government, in its action to render them less dangerous. On the other hand the hope that with the influx of immigrants checked, and with the more settled condition in South China, there will be a reverse movement of population that might lead towards solving the squatter problem without the government playing a hand, did not materialize. By the middle of 1951 it was evident that the government should make an attempt to tackle the squatter problem in its entirety.

A number of resettlement areas were established to which

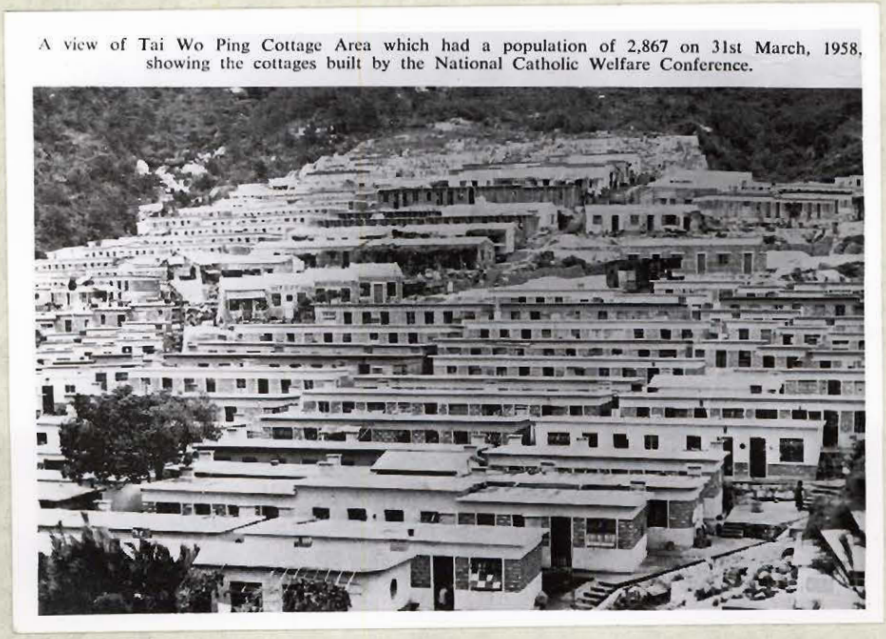
squatters could gradually be moved. These resettlement areas were of two types: "Approved" resettlements and "Tolerated" resettlements. In the former, accommodation was in the form of semi-permanent bungalows and was reserved for families with longest residence in the Colony and who had the means to build huts or one storey cottages conforming with structural standards laid down by the government. Squatters who could not afford to build to this standard went to the "tolerated" areas where little control is exercised on the type of structures erected.

Both types of areas were laid out in planned sites with roads, firebreaks, communal water supply and latrines.

Progress was slow because the majority of the squatters could not afford to build to the standard required in the "approved" area and were unwilling to move to the outlying "tolerated" areas because these were too far from the urban district where they can find employment.

Non-profit organization formed by public spirited business and professional men known as Hong Kong Settlers' Housing Corporation built over fifteen hundred cottages and sold to their occupants on hire-purchase terms spreading over a period

Fig. 29. 'Approved' Area Resettlement Huts.



A view of Tai Wo Ping Cottage Area which had a population of 2,867 on 31st March, 1958, showing the cottages built by the National Catholic Welfare Conference.

Fig. 30. 'Approved' Area Resettlement Cottages by Religious Bodies.

of seven years. Other religious bodies also joined in their efforts. In any case there were only fortyfour hundred of these units, and fifteen or twenty times that number is still needed.

Another problem that arises is that after resettlement the orderly rows of simple fireproof huts or cottages occupied three or four times the amount of land they had occupied under squatter conditions, and by the time three hundred thousand persons had been resettled in this way there remained virtually no land in the urban area on which the process could be continued on any significant scale. Thus this plan, which had made some steady progress for two and a half years, came to a standstill because its basic material, land, was exhausted.

On Christmas night, 1953, the most extensive fire of the Colony's history broke out in Shek Kip Mei. Over fifty thousand persons lost their homes and forty-five acres of land were cleared of human inhabitant. Three immediate decisions were taken by the government which formed the basis of a new policy which is still applied. The decisions were, first, the land cleared by fire should be used to the maximum practical intensity for the resettlement of fire victims; second, the

government would itself build and finance the resettlement buildings, and third, that the government would make itself responsible for the provision of food to the homeless until they could be resettled in permanent buildings. These three decisions constitute a radical departure from every aspect of policy applied so far. It also implied that the government now took direct responsibility for the squatters, and therefore entered the field of resettlement using public funds and its own construction resources.

The stage is now set for action.

## RESETTLEMENT COTTAGES BY SOCIAL ORGANIZATIONS.

One of the early attempts to provide for low cost resettlement housing was done by various relief organizations such as the Church World Services, National Catholic Welfare Conference. Their aim is to house some of the destitute Chinese refugees, especially the victims of various squatter fires.

A typical example of these early attempts are those in Ho Man Tin by Church World Service. Two sizes of units are being provided, one with an overall dimension of 14' 0" x 12' 0" while the other, which is larger, 17' 6" x 13' 6", each containing a living and bedroom space with a small kitchen.

In order to economize in construction costs, and saving in future upkeep, concrete blocks have been decided for the cottages. The external walls are all of four inch thick "Vi-con" block (precast hollow concrete blocks) and kitchen partitions are three inch blocks. Quarter inch thick cement asbestos sheets have been used for the roofs. No plastering has been applied either internally or externally, and all joints being pointed with cement mortar and the wall surface whitewashed. Concrete cooking benches with a steel

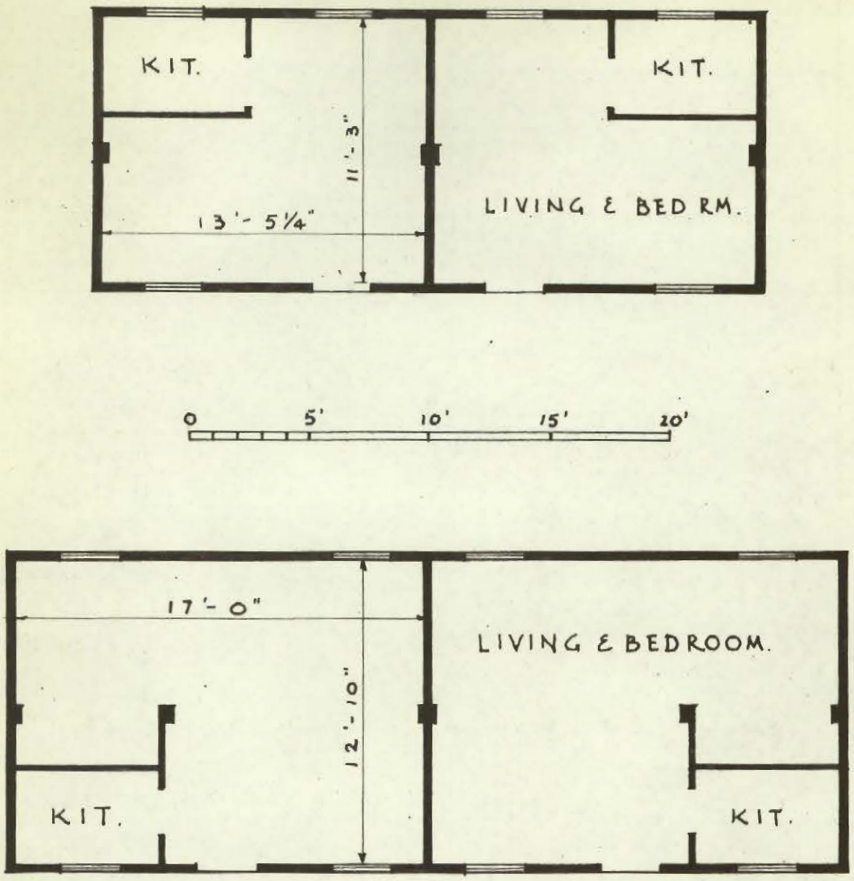



Fig. 31. Plans of Resettlement Cottages at Ho Man Tin.

*Type of squatters huts now being built.*

Fig. 31. Resettlement Cottages at Ho Man Tin.

hood over are provided in all kitchens, and steel windows are used throughout. But no provision is made for bathrooms and W.C.'s. Communal latrines are provided near the site. The cost of small units is $1,150 each and for the larger unit $1,500.

The units will have no interior walls other than those which separate the kitchenette. In order to decrease the amount of external wall, and to place as many cottages as possible on limited sites, the cottages are grouped in pairs or fours and are tightly packed together. The "street" is less than ten feet wide while the near lane is no more than five feet from building to building.

Families that are victims of squatter fires with the ability to meet very moderate assessments for housing were chosen as the first occupants. Monthly payment is collected over a period of forty months amounting to a little more than forty percent of the original cost. If the tenants have been faithful to contract stipulations and to all government regulations, they will be given full title, the remainder of the cost to be written off as a free subsidy.

A day nursery is accommodated nearby for a hundred nursery age children, directed by Hong Kong's Y.W.C.A.

where poorly nourished children can have day time care and be given a nourishing lunch while parents thus relieved of hours of care for the children can seek remunerative employment.

## EARLY RESETTLEMENT HOUSES.

After the most disastrous fire of Christmas night in 1953 in which over four thousand squatter huts were destroyed and between fifty and sixty thousand people rendered homeless , and fortyfive acres were devastated by fire, the government of Hong Kong took up the responsibility to rehouse the squatters.

On December 29, the government announced plans made for rehousing some thirtyfive to forty thousand persons in "temporary" fire-resisting houses. Eight and a half acres of land in the fire devastated area of Shek Kip Mei was to be used for the project. A two-storeyed structure was designed to be built of precast concrete blocks, with precast reinforced concrete ceiling slabs over the ground floor and pitch roofs of cement asbestc sheets on wood purlins for the roof of the upper floors. Both doors and windows are constructed of hardwood boards and the two leaves of the window are not glazed but solid wood.

As far as the site permits, buildings approximately one hundred and seventyfive feet long are constructed; each building contains sixtyeight units, thirtyfour units on the

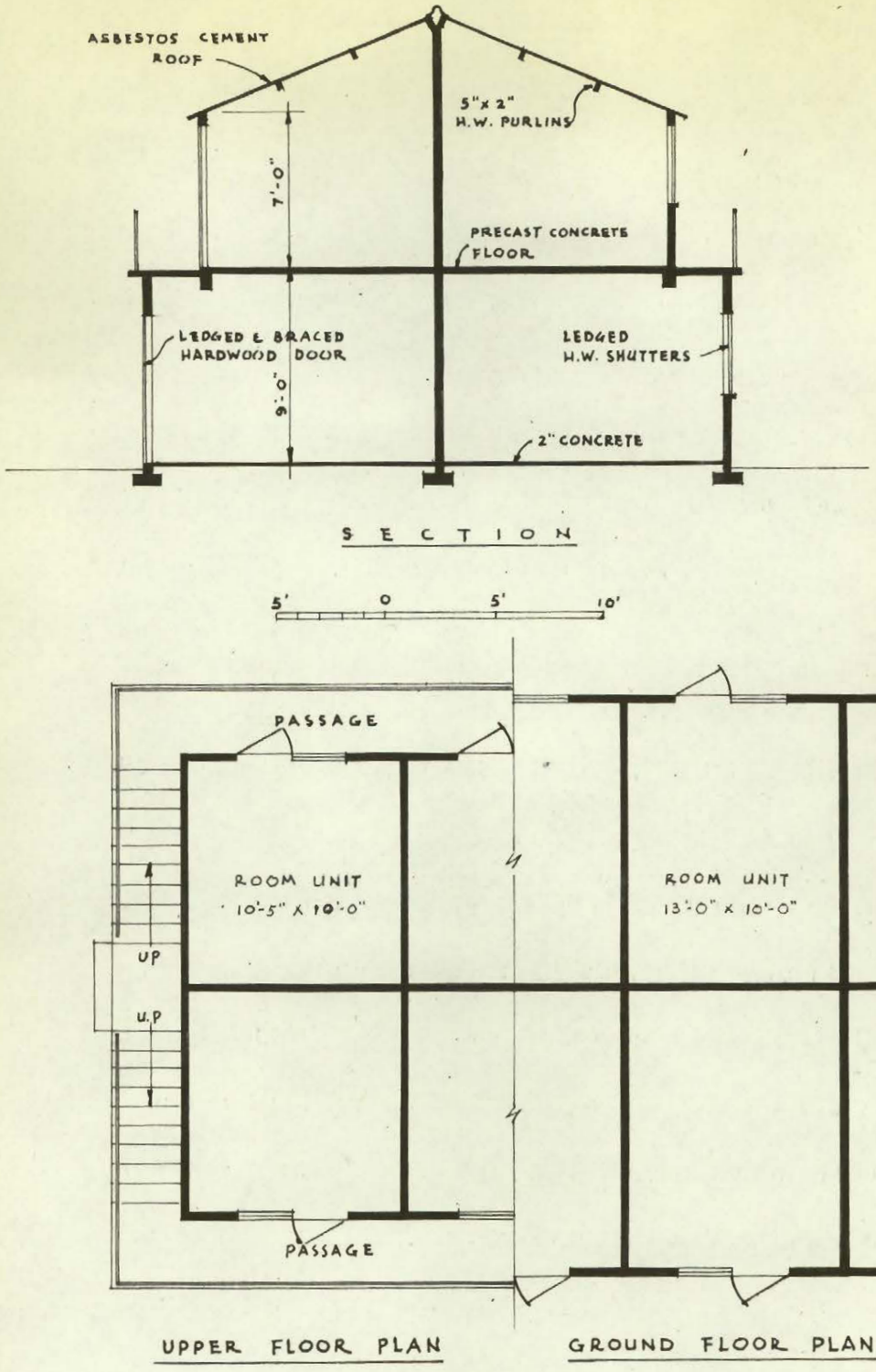
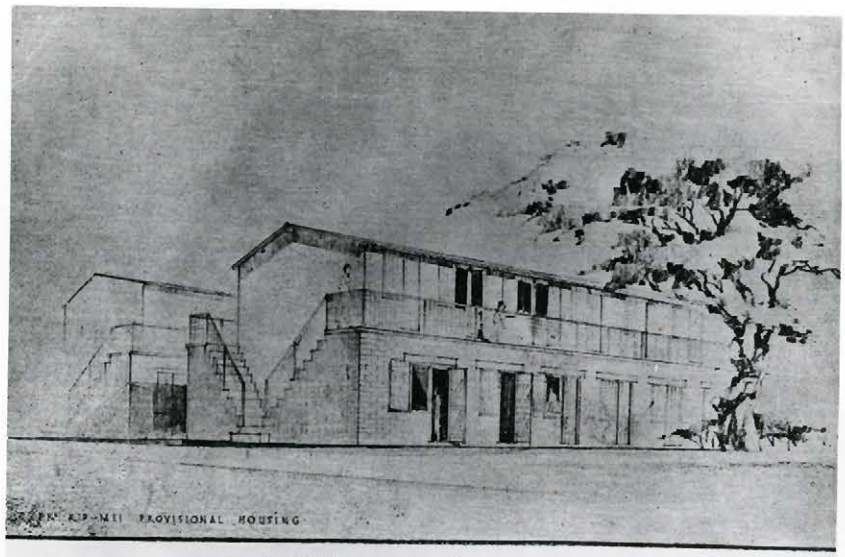



Fig. 33. Plan and Section of 2-storey Resettlement House.



*Architect's perspective of the finished houses.*

Fig. 34. Two-storey Resettlement Houses.

Fig. 35. Two-storey Resettlement Houses under Construction.

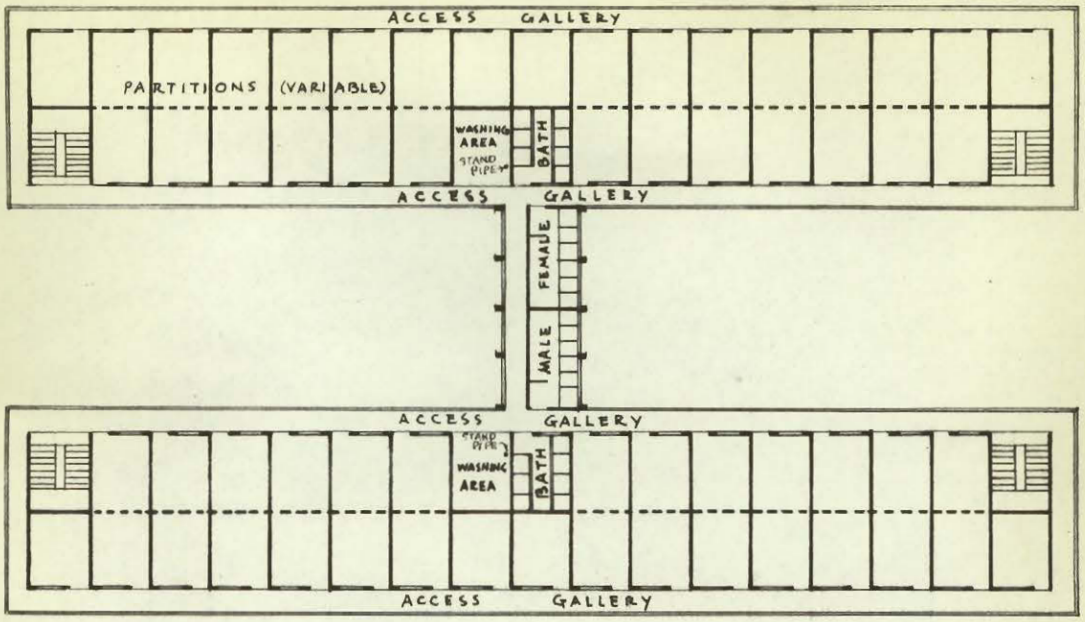
upper floor each thirteen feet long by ten feet wide, and thirtyfour units on the ground floor each ten feet five inches long and having the same width as the units above. Access to the upper floors is by means of concrete stairways placed at each end of the building, leading to an open verandah-cum-passage running the full length of the building. No provision whatsoever is allowed for cooking, bath and lavatory. Cooking is done inside the building and communal water taps and latrines are provided at intervals in the site.

Though it is the intention that these fire victims who are temporarily rehoused in this new village would ultimately resettle in approved resettlement areas and vacated land made available for normal low-cost housing development, yet years later these buildings have not yet given way to better designed resettlement houses.

## THE MULTI-STOREY RESETTLEMENT BLOCKS

To decide whether large scale multi-storey construction is feasible the Government carried out an experiment to construct eight buildings at Shek Kip Mei.

The basic design of the proto-type multi-storey Resettlement building was a six-storey block, H-shape in plan. The long arms of the H consist of sixty-four rooms on each floor and the cross-piece contains two water stand pipes, communal flush latrine and a communal open space for washing clothes. This communal sanitary block serves both residential wings. Each room is of one hundred and twenty square feet,and access is by a balcony which runs completely round each long arm of the H. This balcony inevitably accommodated laundries, cooking places, sit-outeries where often a home craft is carried on by the tenants to supplement the family's earnings. There are four staircases at each corner of the building. The average density of resettlement is five adults to a room - a child of ten years or under counting as half an adult, and smaller families are required to share a room. So each building housed rather under two thousand 'adults' or well over two thousand persons. The allowance of twenty four square feet to an adult represents a considerable degree of overcrowding by normal standards even in Hong Kong building regulations, but this is emergency accommodation; it is sanitary,




PLAN OF STANDARD TYPE.

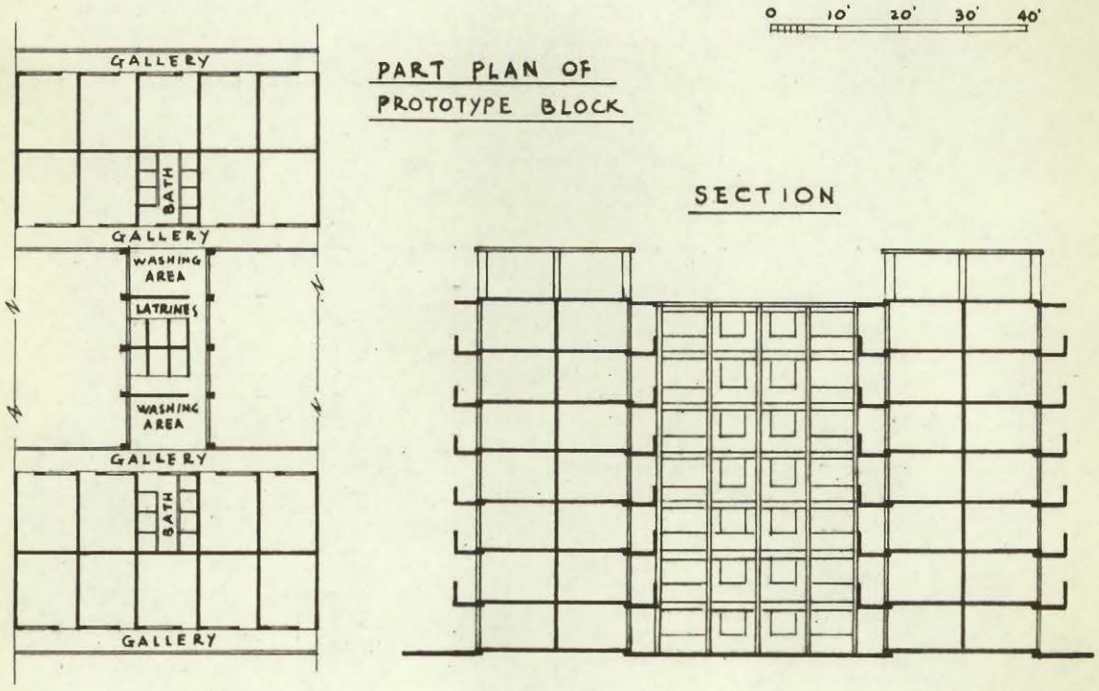



Fig. 36. Plans and Section of Standard Multi-storey Resettlement Blocks.

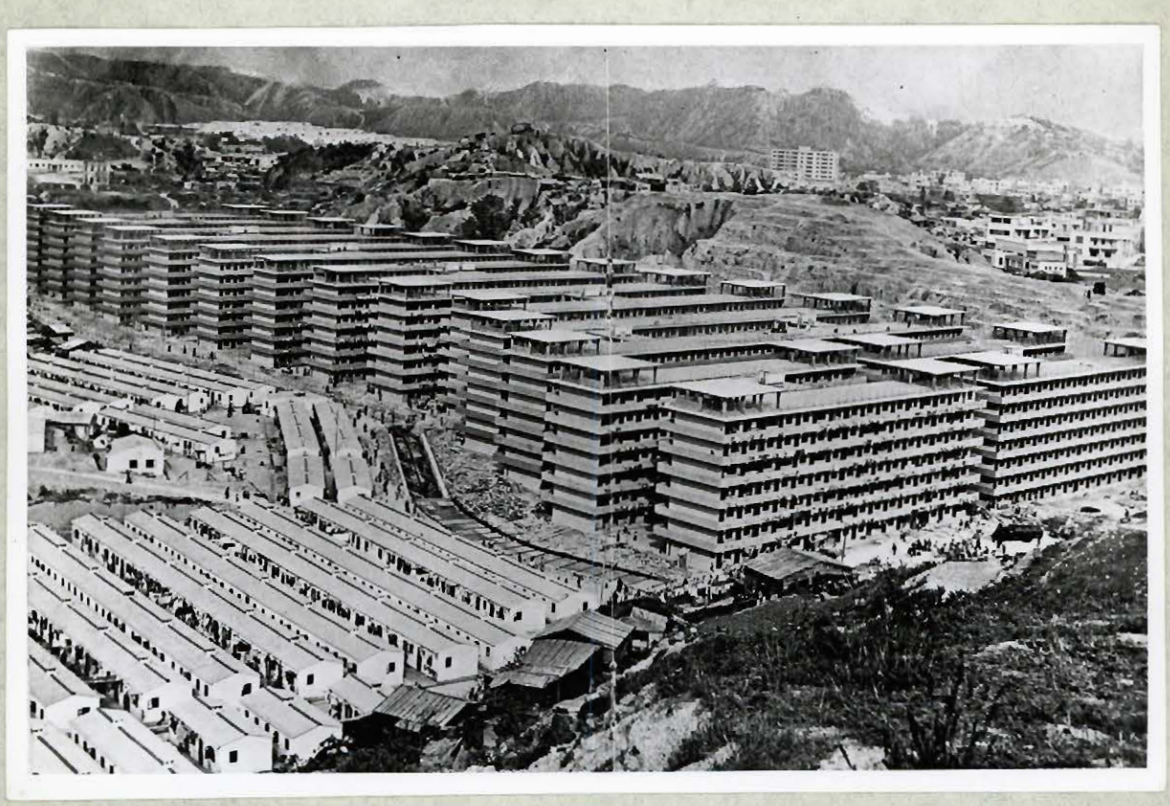


Fig. 37. Multi-storey Resettlement Blocks with one-storey Cottages in the foreground.

weather-proof and fire-proof. It is more realistic to judge it by what it replaced rather than by arbitary standards of what is desirable.

Each long arm of the H is divided into equal bays by means of reinforced concrete bearing walls five to seven inches thick of ten foot centres. Four inch thick reinforced concrete floor slabs span between the cross walls. Access balconies are reinforced concrete cantilevers with four inch reinforced hollow concrete block balustrades. The spine partition running the length of each long arm of the H is of four inch hollow concrete blocks with upper courses built honey-combed in order to provide through ventilation. The cross piece of the H, comprising the flush latrines and open washing space, is of reinforced concrete frame construction designed independently of the long arms to obviate the danger of contraction cracks.

The adoption of ten-foot module box-frame construction enables the walls of the rooms to act both as supports for the floors and as panelling. The comparatively short span greatly reduces the percentage of steel in both walls and floor slabs. Since there is no variation in the height of beams to be considered, the design of the shuttering is simplified and provision can be made for their reuse almost ad infinitum.

The storey height of the building is eight and a half feet which is sufficient to provide through ventilation through the units yet reduce the overall height to such an extent that although seven floors were provided, the tenants of the top floor would not have to walk up more steps than a normal five storey tenement building. (1)

The advantages of a standardized design for this type of construction is easily comprehended. Architectural drawings and detailing are simplified; costing is made almost automatic; quantities can be taken off in the shortest space of time; and plans, details, quantities and specifications can be given in a matter of weeks.

When the eight proto-type buildings had been completed and occupied they were subjected to very careful scrutiny, in order to determine what improvements in design should be made in the light of experience. In spite of continuing study and scrutiny, the design has undergone surprisingly little change from the early model. Buildings are now seven storeys instead of six and have flat roofs strengthened so that they may be used for recreational space, and the enclosed penthouse for use as schools or for boys' and girls' clubs.

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(1) The normal floor to floor height of new tenement buildings is nine feet and a half.

Communal bathing rooms, provided at one for every thirty-five domestic rooms, were added. These bathing rooms have no water laid on but consist simply of seven partitioned stalls where settlers could take a bath by the bucket and scoop method. The number of latrines is also increased in latter designs. A further modification was the conversion of a number of ground floor rooms into shops measuring two hundred and fourty square feet, i.e. twice the size of rooms above, which were let at a realistic rent.

Recently a new type of block was introduced in which the courtyards are enclosed by hollow concrete block screens within which are placed the end staircases. This has brought about a striking change in appearance; but the basic design remains unchanged. One other advantage of this new type of block is having an additional twenty four rooms, each with private balcony, and four ground floor shops.

The wings of these types of building varies from hundred and forty feet to three hundred and twenty feet in length depending on the site. The position of the spine wall or central partition in the proto-type, now varies from floor to floor and in some cases is omitted altogether. It is thus possible to provide rooms of different sizes for larger or smaller families.

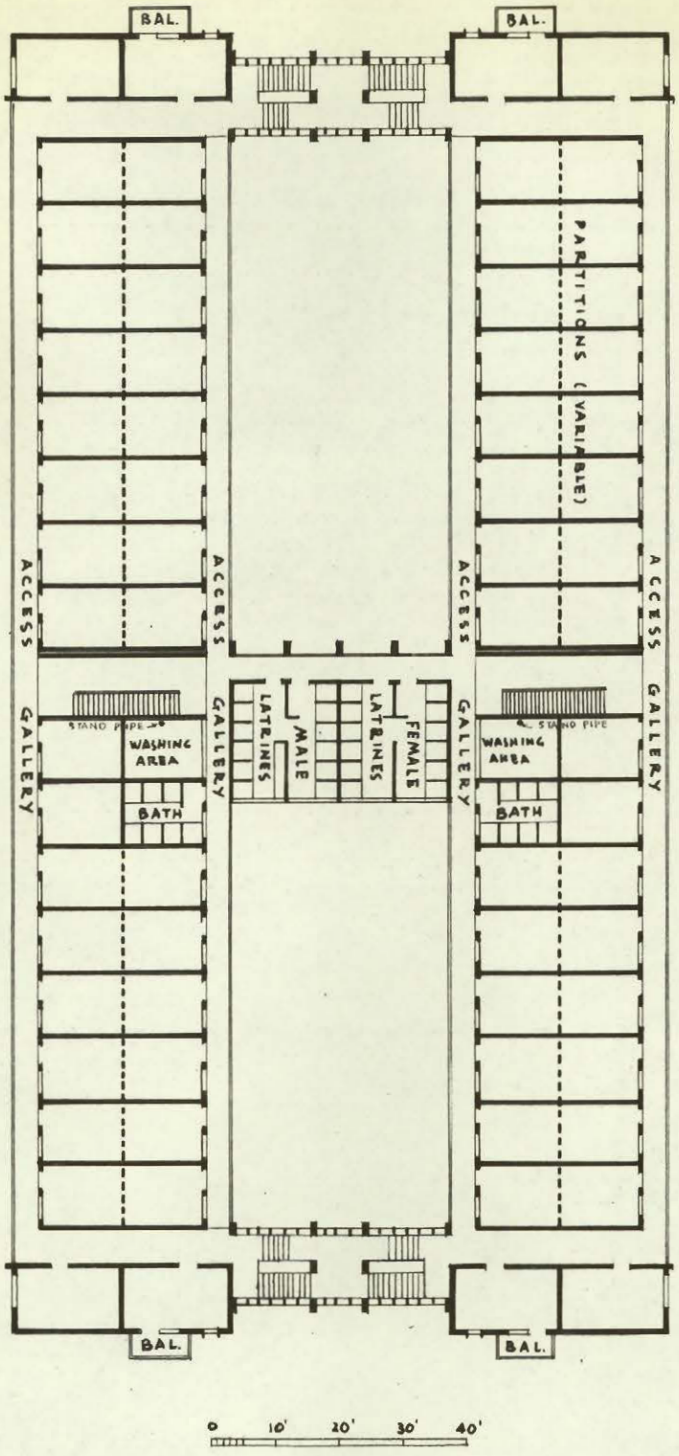



Fig. 37. Plan of Improved Multi-storey Resettlement Block.

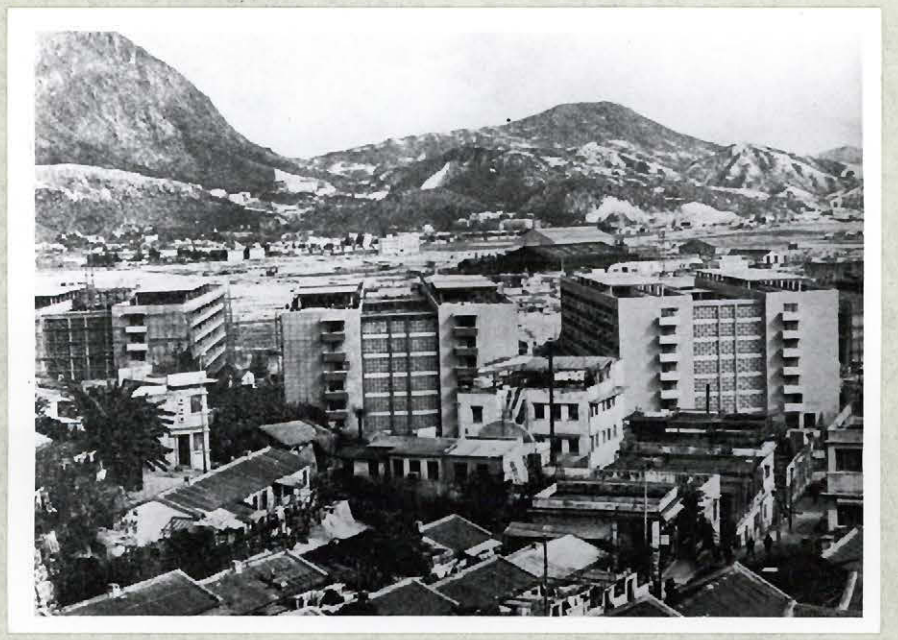


Fig. 39. Improved Multi-storey Resettlement Blocks

The following table gives the dimension of rooms, number of adults and monthly rents.

| Rent in Dollars (H.K.) | Area in Sq. ft. | No. of Adults |
|---|---|---|
| 10 | 86 | 3 to $3^1/2$ |
| 14 | 120 | 4 to 5 |
| 18 | 152 | $5^1/2$ to $6^1/2$ |
| 28 | 240 | 8 to 10 (or two families wishing to share) |

On sites where space is limited and where difficulties of site formation preclude the use of a standard H-block a single wing block known as an I-block is used. The design and the dimensions are similar to each wing of the H-block, the only difference being that the latrines and bathrooms are incorporated in the block itself.

This emergency 'sub-standard' accommodation was built to meet a serious situation, but the buildings are necessary of permanent construction. From the start the designers are conscious that the building on a large scale of permanent substandard cubicle accommodation would in the long run be likely to prove an embarrassment rather than an asset to the community. Thus the buildings were so designed that they could be converted at little cost at a later date into orthodox self-contained flats of either two hundred and forty square feet, i.e. one bay; three hundred and sixty square

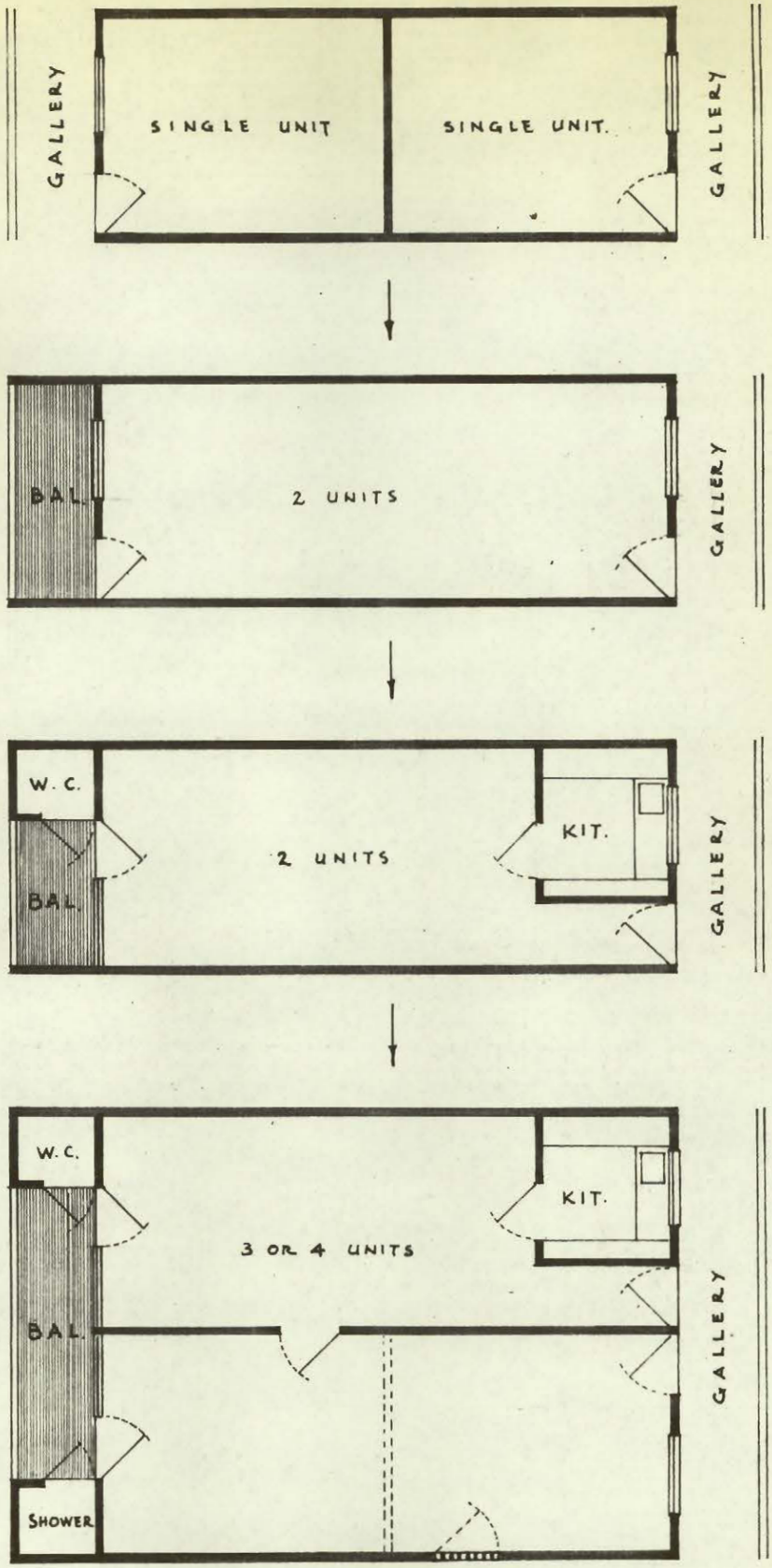



Fig. 38a. Conversion of Resettlement Units into Self-contained flats.

feet, i.e. one and a half bay; or four hundred and eighty square feet, i.e. two bays. Each flat would have its own kitchen, lavatories, shower and private balcony. Conversions of this kind have in fact been made on the top floors of the blocks in most resettlement estates to provide quarters for the estate staff.

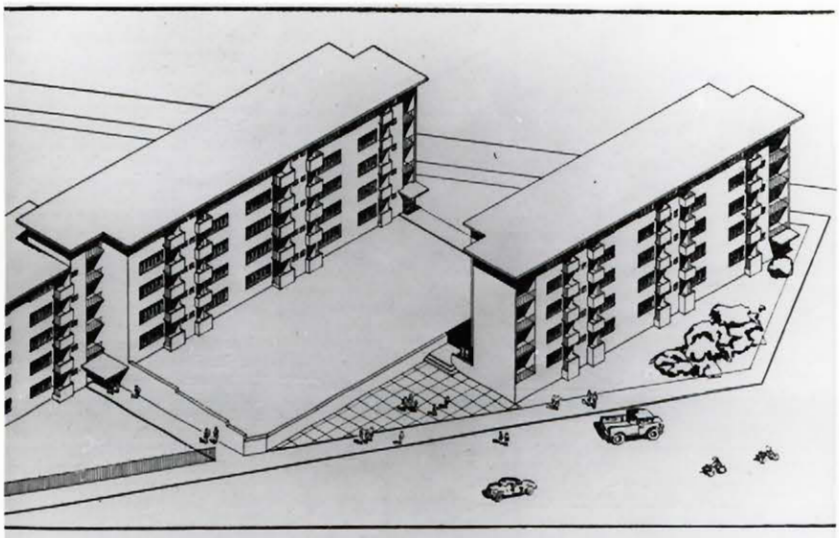
The cost of construction, including site formation and piling, of a seven-storey block containing four hundred and thirty-two rooms of one hundred and twenty square feet each is in the neighbourhood of seven hundred and eighty thousand Hong Kong dollars or about one thousand eight hundred and six dollars per room. The total cost inclusive of land and supervision by the Public Works Department comes to a total of one million twenty five thousand and six hundred dollars or approximately two thousand three hundred and seventy five dollars a room.

## HOUSING SOCIETY LOW-COST ESTATES

### Sheung Li Uk Scheme

Amongst the voluntary bodies that tackled the low-rental housing the principal role has been played by the Hong Kong Housing Society, a non-profit-making but self-supporting organization which grew out of the Hong Kong Council of Social Service. In 1948 a group of public spirited men and women decided to try to do something to improve housing conditions and many of the original members still serve on the present committee.

The aim was to provide accommodation for the poorest class of inhabitants at the lowest rate. For this it would be necessary either to have a subsidy or to get land and money for building on exceptional terms. After long negotiations, finally in 1950, the Government allocated two million dollars to the Housing Society for a pilot scheme in low-cost housing. A site at Sheung Li Uk, Kowloon, approximately two and a half acres, was leased to the Society at a crown rent of twelve hundred dollars per acre, and the price of the land at half the upset price roughly two hundred fifty thousand. This and the two million dollar loan is payable at three and a half percent simple interest for forty years. This scheme thus constitutes the first serious attempt to supply con-



*Perspective drawing of the buildings showing grouping arrangement.*

## SHEUNG LI UK HOUSING SCHEME

| | |
|---|---|
| Location | Shamshiupo, Kowloon |
| Owner | The Hong Kong Housing Society |
| Architect | T.S.C. Feltham, A.R.I.B.A. |
| Erection Year | 1951 |
| Site Area | $2\frac{1}{2}$ acres (approx) |
| Building Type | 5-storey slab blocks with central corridor access. |
| Unit | 4 and 6 person flats. |
| No. of Units | 270 |
| Accommodation | 1420 persons |
| Density | 620 persons per acre. |
| Construction | Traditional R.C.C. frame |
| Building Cost | $1,770,000 (excluding land and site work). |
| Monthly Rent | $67 - $85 (includes rates) |

Fig. 40

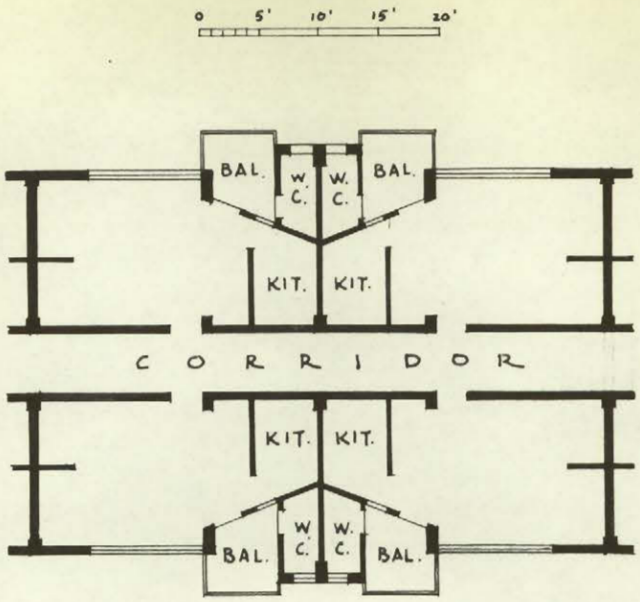
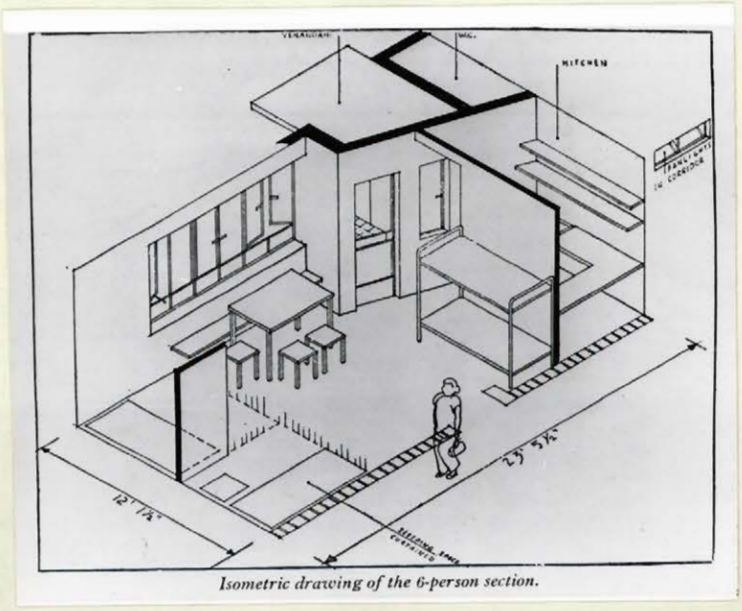



Fig. 42. Plan of Typical Unit, Sheung Li Uk.




*Isometric drawing of the 6-person section.*

Fig. 41. Isometric View of Typical Unit, Sheung Li Uk.

veniently planned space and amenities for workers at low rental, a pioneer step for all subsequent public low-cost projects.

The site comprises two triangular pieces of land approximately equal in area. The site sloped up steeply to the back and a considerable amount of excavation was required in both pieces of land. The building was orientated on an east-west axis, and blocks were built at various levels to economise in site formation.

The object was to provide sufficient and adequate accommodation for families of various sizes at the least possible cost. Therefore, the problem resolved itself into achieving enough living space for the family unit. It was decided to take an average family of a couple with three children and an aged parent making a total of six persons as the basis for one unit, but smaller units are also provided for smaller families. Working according to the Hong Kong Building Ordinance's minimum requirement of thirty-five square feet of floor space per person, two hundred and ten square feet is required for a family of six, and for a family of four one hundred and forty square feet. Four five-storey blocks containing one hundred and seventy units for families of six and one hundred units for families of four were erected on the site. The flats are self-contained and consist of a living space, kitchen, W.C. and shower, together with a small

balcony for drying, washing and other domestic purposes. The depth of each unit has been kept to a minimum, so that the benefit of light and fresh air may be obtained. In order to perfect through cross ventilation, fanlights at ceiling height are fitted in the corridor walls. The kitchen is five feet by eight feet, minimum under the Building Ordinance, and provided with a sink,shelving and running water. The lavatory opens off the balcony and a shower is installed in it.

Construction is post and beam reinforced concrete frame with which the local labourer is familiar. The panel walls and partitions are of concrete blocks plastered. The concrete floor slabs were left unplastered on the underside and finished on the surface with cement screed.

Altogether one thousand four hundred and twenty persons are accommodated in two and a half acres - or roughly six hundred and twenty persons to the acre, though high when compared with the normal figure of developed area of the United Kingdom of two hundred per acre, it is still low compared with the overcrowded areas of the colony or with the density of subsequent low-cost housing projects which are over fifteen hundred persons to the acre.

The cost of the buildings exclusive of land and site work was 1.77 million Hong Kong dollars and calculated at the rate of one dollar and forty cents per cubic foot, the larger flats cost $7,067 per unit, and the small ones $5,686 per unit. The rental per month for the larger flats is seventy dollars plus fifteen dollars for rates while the rent for smaller ones is fifty dollars plus eleven dollars rates.

A community centre was built on the site as part of the scheme, and the open space between the buildings was used for recreation and playgrounds.

Healthy Village Estate, Kings Road

Guided by the experiences gained in their pilot Scheme at Sheung Li Uk, the Hong Kong Housing Society plunged into a second development on Hong Kong side. Two adjacent sites of about two acres were alloted by the Government, facing Kings Road, North Point. The scheme consists of five blocks of flats each ten storeys in height with a total of five hundred and ninety five flats giving accommodation to over three thousand eight hundred persons. The difference in site levels provided an opportunity to include shops on the Kings Road frontage, and the rentals from them will slightly reduce the rental required for the flats.

With a population of over thirty eight hundred, playing space for over a thousand children will be required. This can only be achieved by building higher blocks, leaving the greatest possible open space. A height of ten storeys was decided upon, though the cost of construction will be considerably more, and this made necessary the installation of lifts, an expensive item to install and maintain.

As in the pilot scheme each person will have the minimum living space of thirty five square feet of floor area. In addition there will be a verandah, kitchen closet and shower. The flats are well lighted and ventilated. Two basic types of flats have been planned - those approached by a gallery and those approached by a corridor. Neither has any outstanding advantage over the other. The single gallery approach being single flat in depth and through ventilation is off set by less space available for actual circulation than the corridor approach type because of planning and the position of beds, and the single depth flats are slightly more expensive.

The units planned now vary from four person flats to flats accommodating ten persons.

All buildings are reinforced concrete frame and concrete floor. External walls are of nine inch bricks and internal partition of four and a half inch brick. Walls both internally and externally

are plastered and floors cement rendered. Steel casement windows are used throughout.

The type of accommodation provided in all these units allows for combined living and sleeping quarters, with a separate kitchen, closet and shower and verandah. The different elevational treatment of the gallery type of block forms an interesting contrast with that of the internal corridor blocks. The free use of colour on the exterior also provided additional interest.

An important aspect that was very carefully studied is the question of partitioning. It was found in the pilot scheme at Sheung Li Uk, where no partitioning was used within the unit but where bed spaces were indicated as distinct from the living area, that spaces were seldom used as indicated. By eliminating partitions altogether not only could the cost of partition itself be saved but also a substantial saving could be made in reinforced concrete framing and tenants could then have the freedom to arrange their furniture and possessions as they wished.

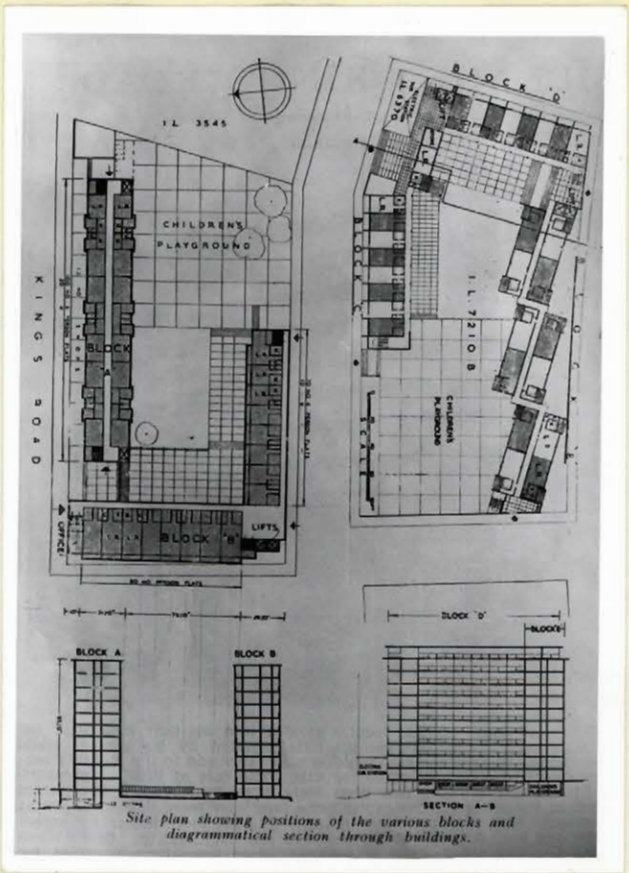
The cost of land is approximately eleven dollars per square foot, and the construction cost of a six person flat is $7,572, and for a four person one $6,515. The total scheme cost roughly six and a half million.

*View of the building from the north-west.*

## 'HEALTHY VILLAGE' HOUSING SCHEME

| | |
|---|---|
| Location | King's Road, Hong Kong. |
| Owner | The Hong Kong Housing Society |
| Architect | T.S.C. Feltham, A.R.I.B.A. |
| Erection Year | 1955 - 56 |
| Site Area | 2 acres (approx.) |
| Building Type | 10-storey slab blocks, with both central corridor and balcony access. |
| Unit | 4, 5, 6, 8 and 10 person flats. |
| No. of units | 595 |
| Accommodation | 3800 |
| Density | 1800 persons per acre |
| Construction | Traditional R.C.C. Frame |
| Cost | $6,500,000 |
| Monthly rent | $60 - $95 (exclusive of rates) |
| Amenities | Shops at ground floor of one block |

Fig. 43




*Site plan showing positions of the various blocks and diagrammatical section through buildings.*

Fig. 44. Layout Plan of Healthy Village.

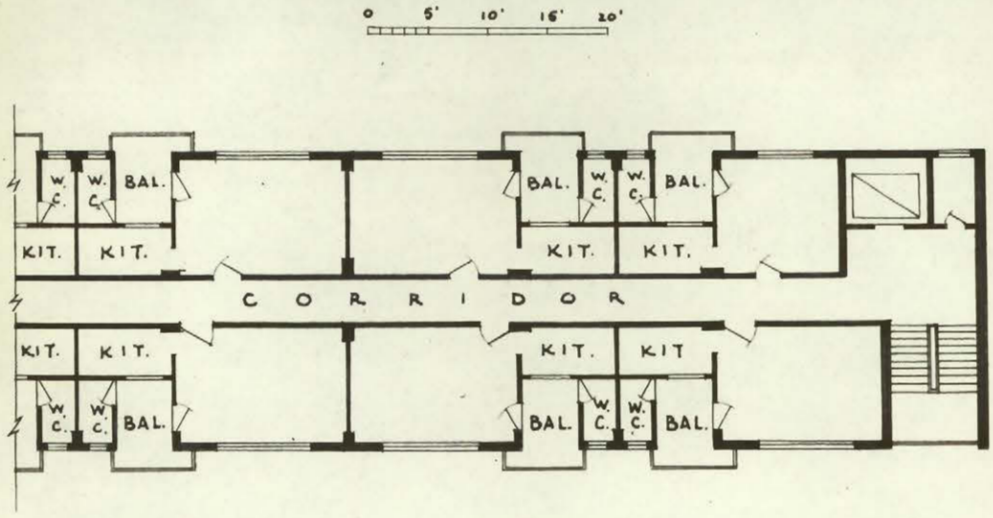
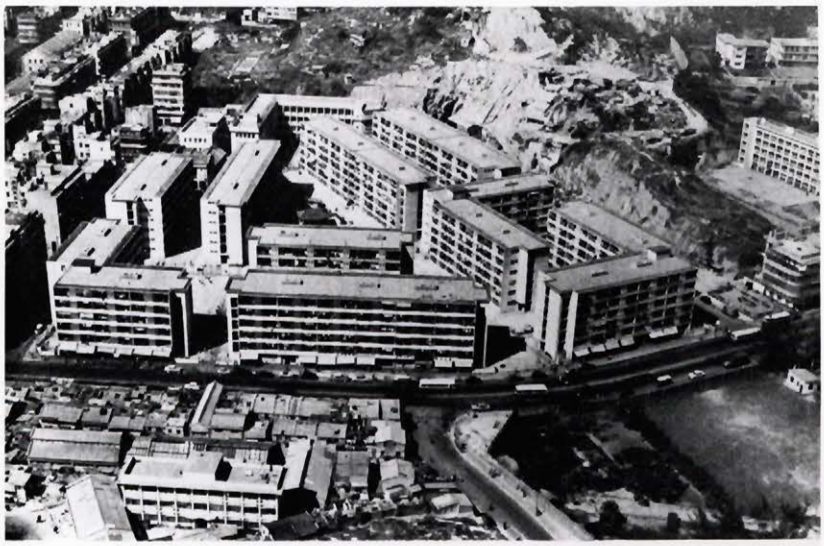



Fig. 45. Central Corridor Flats, Healthy Village.

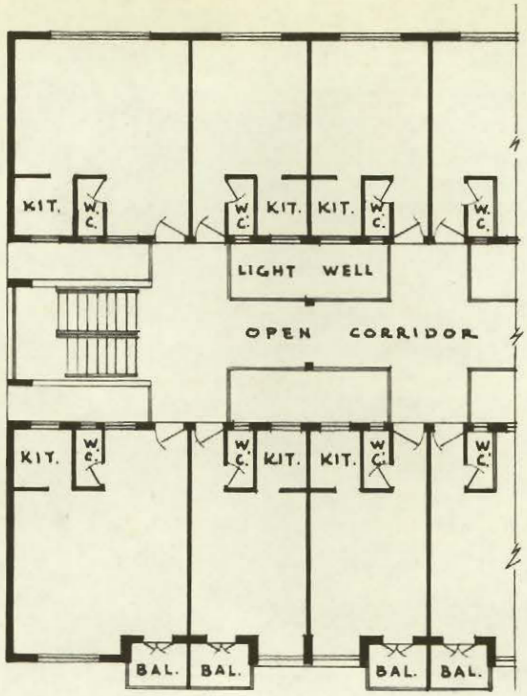


Hung Hom Estate.

## HUNG HOM HOUSING SCHEME

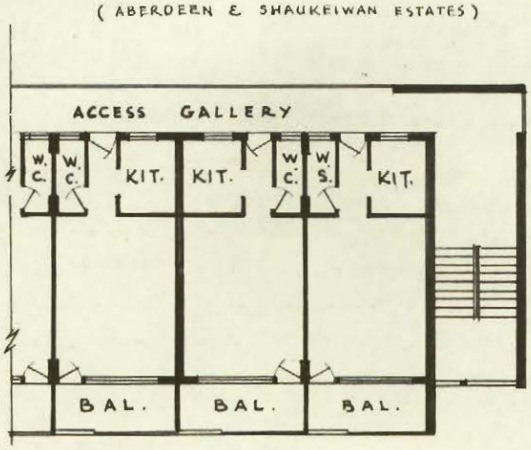
| | |
|---|---|
| Location | Hung Hom, Kowloon |
| Owner | The Hong Kong Housing Society |
| Architect | Chau and Lee, Architects |
| Erection Year | 1957 |
| Site Area | 4.97 acres |
| Building Type | 6-storey slab blocks with central corridor access. |
| Units | 5 and 7 person flats. |
| No. of Units | 1283 |
| Accommodation | 7,997 persons |
| Density | 1,610 persons per acre. |
| Construction | Traditional R.C.C. frame |
| Cost | $7,200,000 |
| Amenities | One primary school and 23 shops |

Fig. 46




CENTRAL LIGHTWELL, FLYING CORRIDOR TYPE

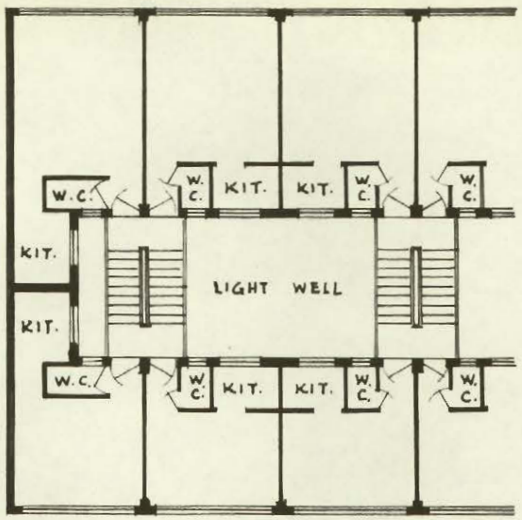
(ABERDEEN & SHAUKEIWAN ESTATES)




GALLERY ACCESS TYPE

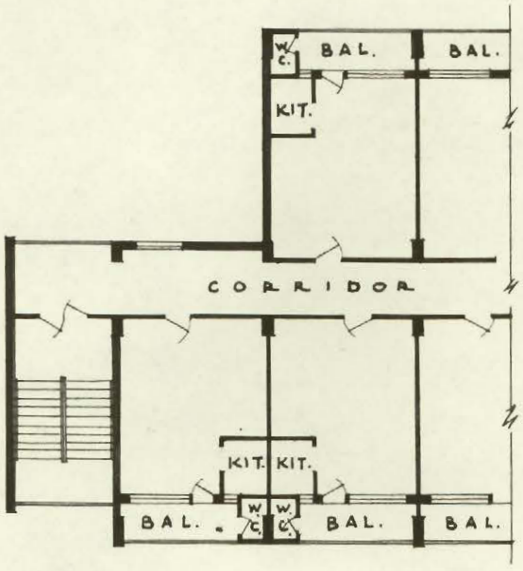
(HEALTHY VILLAGE ESTATE)

Fig. 47. Types of Access (1)




CENTRAL LIGHTWELL, ISOLATED STAIR TYPE

( TSUEN WAN, KWUN TONG ESTATES )




CENTRAL CORRIDOR TYPE

( TANNER HILL ESTATE )

Fig. 48. Types of Access (2).

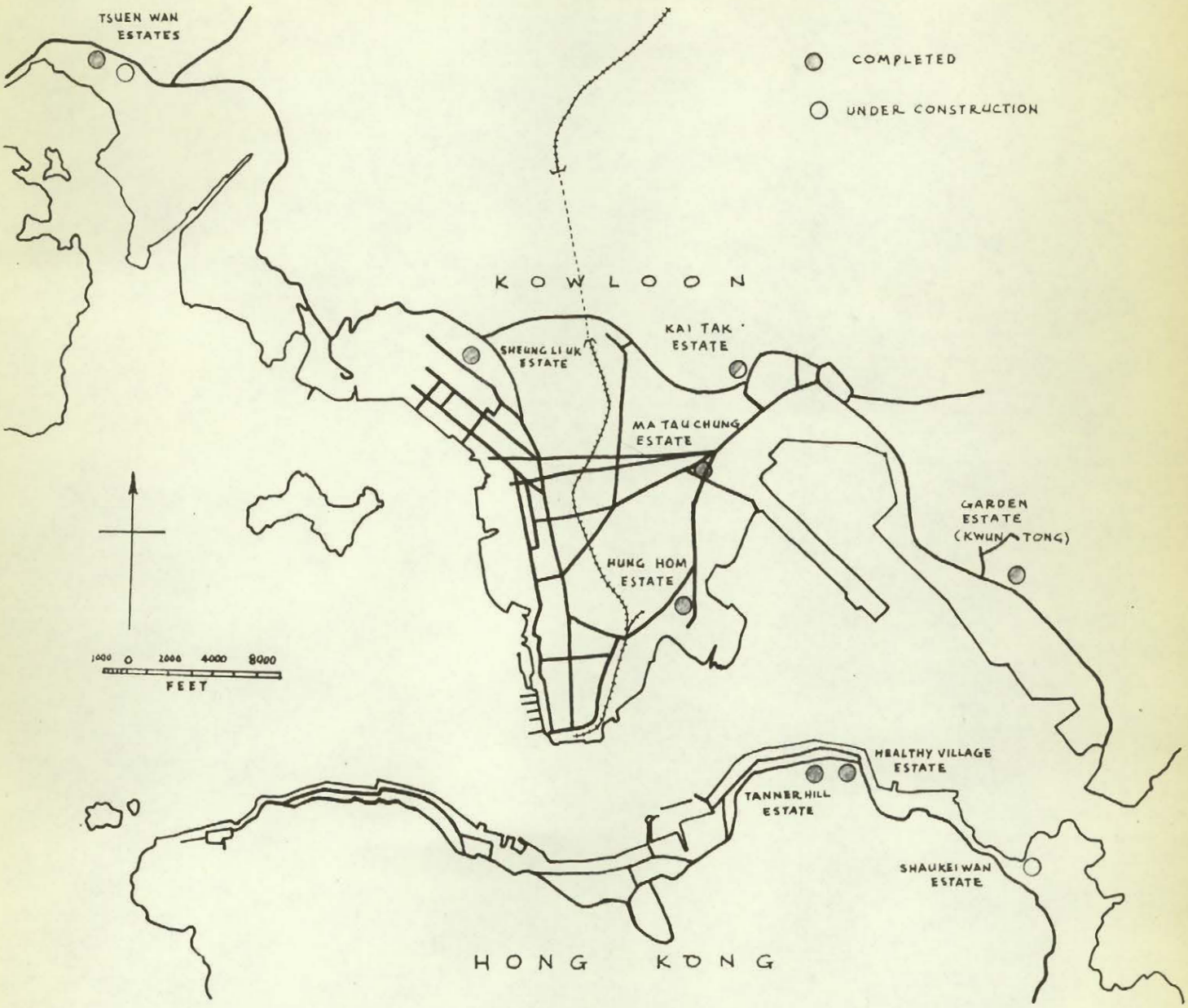



Fig. 49. Location of Hong Kong Housing Society Projects.

The following table shows the type of flats and monthly rent exclusive of rate.

| | | |
|---|---|---|
| 91 | Four person flats | - Rent $60 per month |
| 9 | Five person flats | - Rent $67 per month |
| 198 | Six person flats | - Rent $75 per month |
| 288 | Eight person flats | - Rent $83 per month |
| 9 | Ten person flats | - Rent $95 per month |

The Society has to date constructed a total of eight estates in various parts of Hong Kong and Kowloon which house over twenty eight thousand persons.

# THE HONG KONG HOUSING AUTHORITY HOUSING SCHEMES

## The Formation of Housing Authority

The Government of Hong Kong realised that pilot housing scheme initiated and administrated by private enterprises and voluntary non-profit making agencies would not be sufficient in themselves to solve the acute housing shortage. It was therefore decided to form a Housing Authority capable of dealing with the problem on a sufficiently large scale. With the enactment of the Hong Kong Ordinance No. 18 of 1954 the Housing Authority was created in April 1954. Under the terms of the Ordinance the Authority is given wide powers to deal with the housing problem in many of its aspects, subject to general Government control. It is to operate as a commercial undertaking. Although rents are to be kept as low as possible its housing projects must pay their way. No subsidies, as such, are granted but crown land is allocated at its half upset price - which may be one third or one quarter of its market value. Loans, to be amortized over forty years with interest payable at the rate of three and a half percent (increased to five percent in 1955), were granted. The Government maintains general control over the Authority's activities, and all its housing schemes must receive the approval of the Government before they can be implemented.

## The Policy

Generally speaking the policy of the Authority is to provide flats of a good basic standard, and at as low a rent as possible. The standards laid down provided for self-contained flats, each having its own kitchen, lavatory and balcony. It is realized that this is not the cheapest possible type of unit, and that it could not be provided at a rent within the means of the poorest person. However, any reduction in this standard would mean a reversion to the tenement type accommodation with communal kitchen and lavatories. The rents will vary, and be suited to the requirements and rent-paying capacity of the various types of applicants likely to be encountered. In a cosmopolitan city like Hong Kong this covers a very wide range indeed.

Its directive was originally interpreted as applying largely to the 'white collar class' of workers, hitherto almost unconsidered by officials and private enterprises alike. By providing good accommodation on a large scale, it is hoped that the general level of rent throughout the colony will be lowered and that as a result those who are unable to afford the rent of the Authority's flats will nevertheless be helped indirectly.

## Land and Density

For those who are familiar with the Colony's terrain, it is

easy to see that one of the main difficulties experienced by the Authority is the lack of suitable building sites. Indeed such sites where expensive and prolonged site formation is not involved, are now virtually unobtainable within the urban area, where most of the people rehoused must be accommodated in order to be reasonably near their place of livelihood. It is therefore evident that land within the urban area, or at least the more accessible part of it, must not be sterilized by low though cheaper buildings. Verticle developments, in the form of multi-storied blocks of flats has to be accepted as the only practicable and logical solution to Hong Kong's urban housing problem. This is not the ideal form of dwelling, and it is relatively expensive to construct. In addition the maximum densities permitted in the United Kingdom and elsewhere must be considerably exceeded if sufficient accommodation is to be provided with the limited land resources available. Nett densities of one thousand five hundred or more persons per acre, which would be regarded as slum densities elsewhere in the world, had to be accepted, but even on this basis it has been far from easy to find sufficient land.

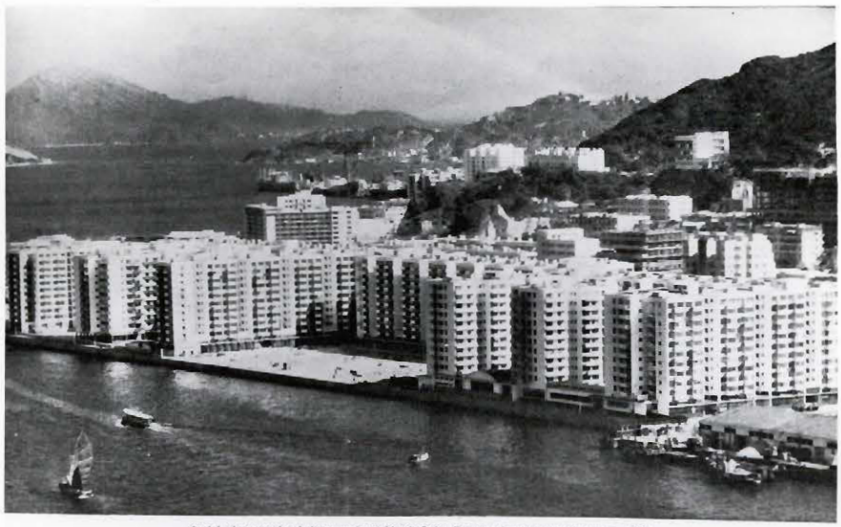
Tenant Selection

The selection of tenants is done on the basis of a point scheme,

in which the most important factor is the applicant's housing need. In order to assess this need, points are awarded for such conditions as the degree of overcrowding experienced by the applicant at the time of application, family sizes, length of residence in the Colony. The tenants are limited to those families whose total monthly incomes, correspond with the proposed rent level, which varies from three hundred dollars up to fourteen hundred.

The North Point Estate

The first project undertaken by the Housing Authority was the North Point Estate at Java Road. The estate, constructed on land reclaimed from the sea, with a magnificent view of the harbour, has a site area of about six and a half acres and is located between Java Road and the sea front. The east and west boundaries being formed by Tin Chiu Street and Tong Shui Road respectively, and consists of three main sections, or courts. The West Court contained a shallow U-shaped perimeter block and one tower block. The Central Court with one long block facing a concourse where a bus terminus and a passenger ferry terminal connecting with Hung Hom, Kowloon, has been incorporated. The East Court also has a U-shaped block but with deeper arms which embraces three tower blocks in its centre.



Aerial photograph of the completed North Point Estate, taken on 14th February, 1958, looking east along the northern shore of the island of Hong Kong, towards Lyeman Gap.

## NORTH POINT ESTATE

| | |
|---|---|
| Location | North Point, Hong Kong. |
| Owner | Hong Kong Housing Authority. |
| Architect | Eric Camine, F.R.I.B.A. |
| Erection Year | 1955 - 57. |
| Site Area | $6\frac{1}{2}$ acres. |
| Building Type | 11-storey towers and slab blocks, with central corridor access. |
| Units | 3 - 8 person flats. |
| No. of Units | 1955. |
| Accommodation | 12,400 persons. |
| Density | 1,550 persons per acre. |
| Construction | Traditional R.C.C. frame. |
| Cost | $27,000,000 (excluding land). |
| Monthly Rent | $75 - $169 (includes rates). |
| Amenities | 1 primary school, 2 health clinics, 1 post office 1 assembly hall. |

Fig. 50

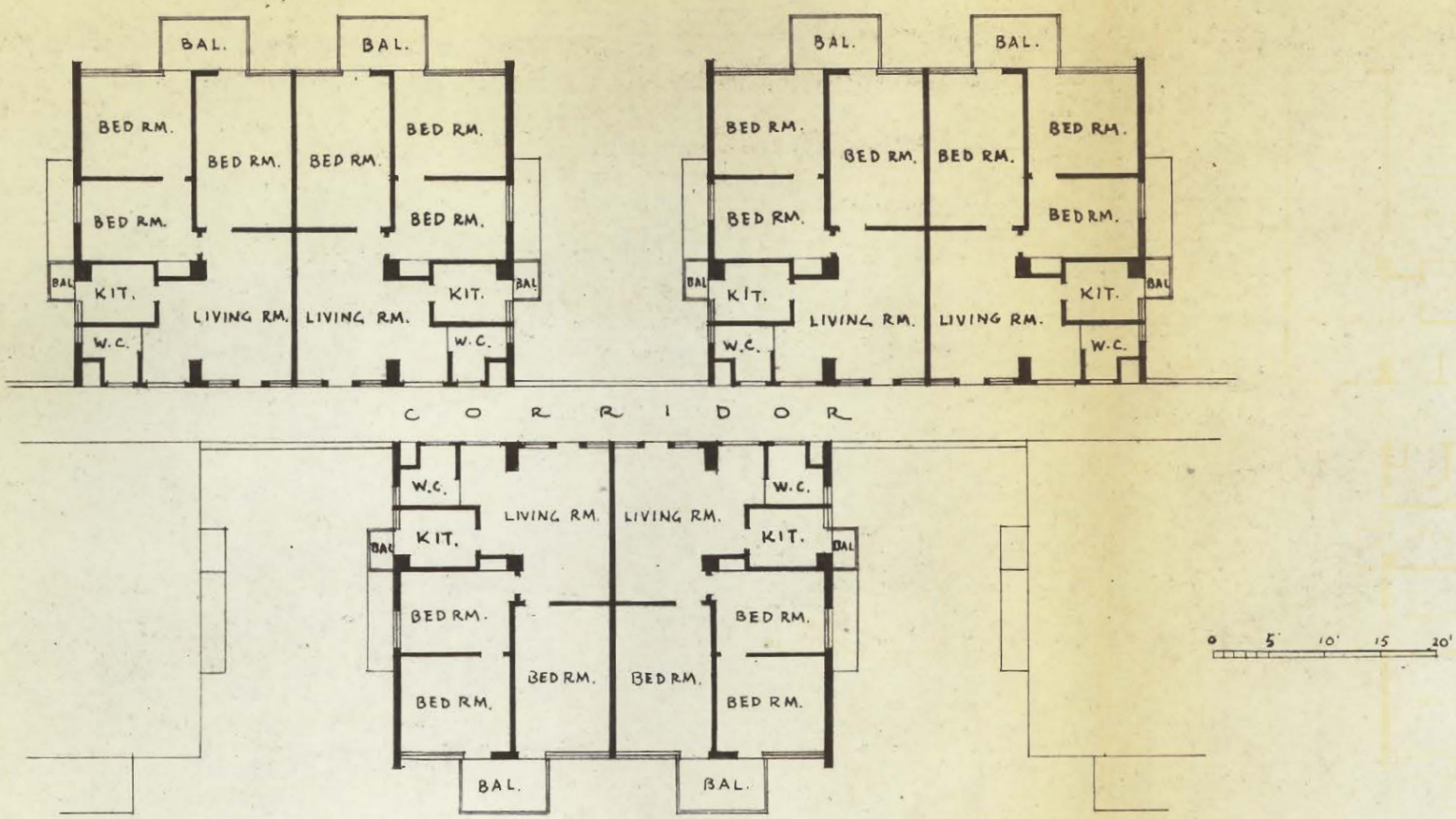



Fig. 51. Plan of Typical Flats, North Point Estate.

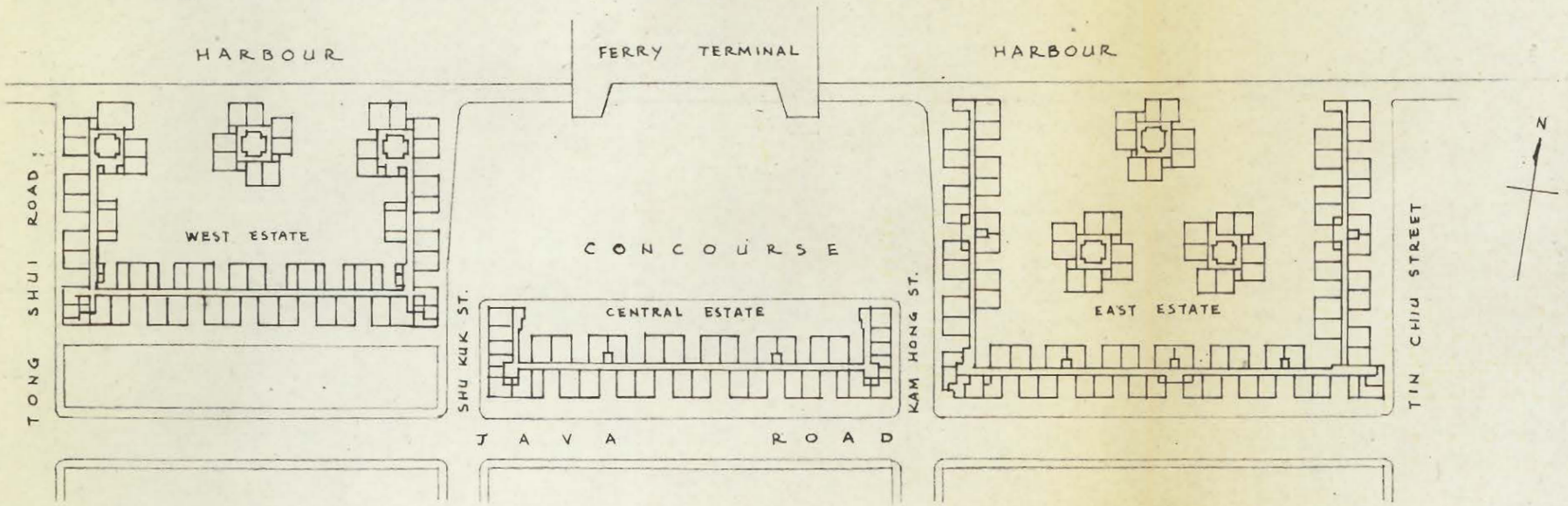



Fig. 52. Layout Plan, North Point Estate.

The three Courts provided for 1955 flats accommodating 12,400 persons, as well as an 18 classroom primary school for eight hundred pupils, two health clinics, a post-office, an assembly hall seating five hundred people and over seventy shops. Although the gross density, i.e. including adjoining concourse and half the width of the roads, is 1550 persons per acre, there is ample provision for playground and open space, which takes up nearly half the total site area. Covered play area is also provided for use in wet weather.

The flats are self contained units, each with its own kitchen, lavatory and shower, and in addition a balcony and facilities for drying clothes. All are of the basic pattern, but varied in size, being designed to accommodate families of from three to eight persons, calculated on the legal minimum of thirty five square feet per adult, i.e. excluding kitchen and lavatory. Each flat has one or more bedrooms, the largest flats have three, which are separated from the living rooms by permanent partitions.

Rents vary from $75 to $169 a month, inclusive of rates, refuse collection, public lightings and lifts.

Particular care has been taken to ensure each flat to have through draught and uninterrupted access to light and air. This is achieved by having the line of flats on two sides of the central access

corridor broken at regular intervals. This arrangement has made it possible to reduce the ceiling height down to eight feet one inch, which is below the standard usually required for this type of building. Adequate lift service is provided and there are refuse chutes at central points in each block.

The access to the flats in the tower block is by balconies which are wrapped around a central well. Each floor contains only eight flats, a pair facing each direction of the four compass points.

The eleven-storey buildings are of simple, monolithic reinforced concrete frame, with brick fill-in walls, cement floors and steel windows. Doors are of hardboard. Internal partitions are also of brick. The external walls are cement plastered while the internal ones and the ceiling are lime plastered. The floor thickness varies from four inches to five and a half depending on the span of floors. Occasionally hollow block rib joist floor is used. All buildings are one hundred feet high and supported by concrete piles, and as the site is reclaimed land, nearly three thousand piles were driven to over a hundred feet deep, with a bearing load of up to sixty tons each.

The individual blocks have been so designed that the gross depth of the reinforced concrete frame is more than half the height

of the building, thus minimizing the effect of wind pressure on this somewhat exposed site. As the rows of flats on both sides of the central corridor are broken at regular intervals, windows may be provided for each room in the flat, for better light and ventilation, which at the same time gives a more pleasing elevation to an otherwise flat and uninteresting mass.

Twenty automatic lifts of the 'cargo' type are provided on a 'skip' floor system, only stopping on ground, fourth, sixth, eighth and tenth floors.

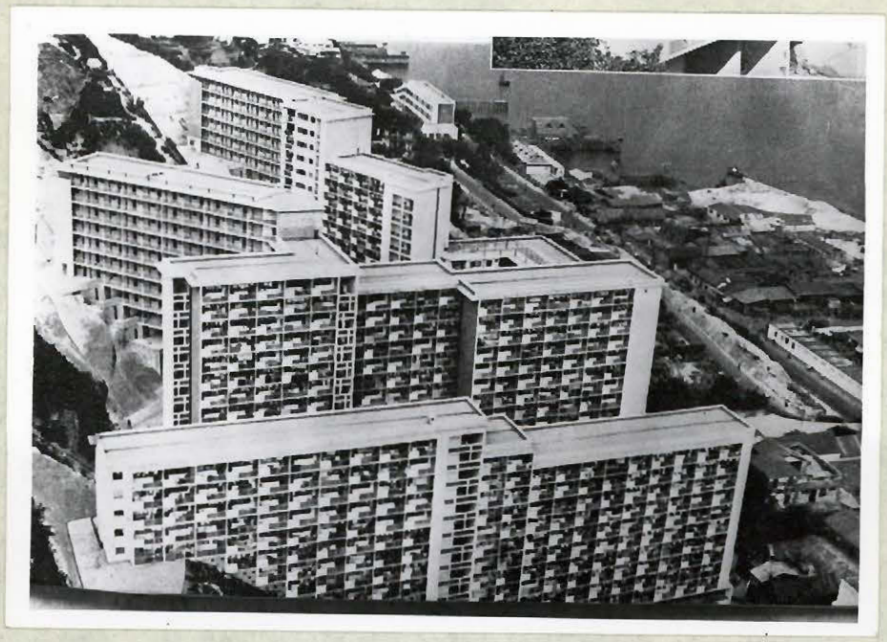
The kitchen equipment consists of a fire clay sink and a cooking bench. No flue being provided and cooking is assumed to be done by kerosene stove or electricity.

The total cost reached the neighbourhood of 33 million dollars. The buildings themselves run to 27 million dollars.

Construction of the Estate started in September 1955 and was completed in November 1957.

Sai Wan Chuen

The Authority's second estate is at Cadogan Street, Kennedy Town, overlooking the western part of the harbour near Green Island. The site comprises the hillside situated just to the west of Cadogan Street about 250 feet south of Victoria Road. It is almost rectangular in shape covering an area of 161,000 square feet or about 3.7 acres.



## SAI WAN CHEUN

| | |
|---|---|
| Location | Kennedy Town, Hong Kong. |
| Owner | Hong Kong Housing Authority. |
| Architect | T.S.C. Feltham, A.R.I.B.A. |
| Erection Year | 1957 - 58. |
| Site Area | 3.7 acres. |
| Building Type | 5 slab block, average 10-storeys, with gallery access. |
| Units | 5 - 10 person flats. |
| No. of Units | 638. |
| Accommodation | 4,200. |
| Density | 1,200 persons per acre. |
| Construction | R.C.C. frame with load bearing R.C.C. spine wall every alternate bay. |
| Cost | $8,000,000. |
| Monthly rent | $99 - $169 (inclusive of rate). |
| Amenities | One 3-storey community centre. |

Fig. 53

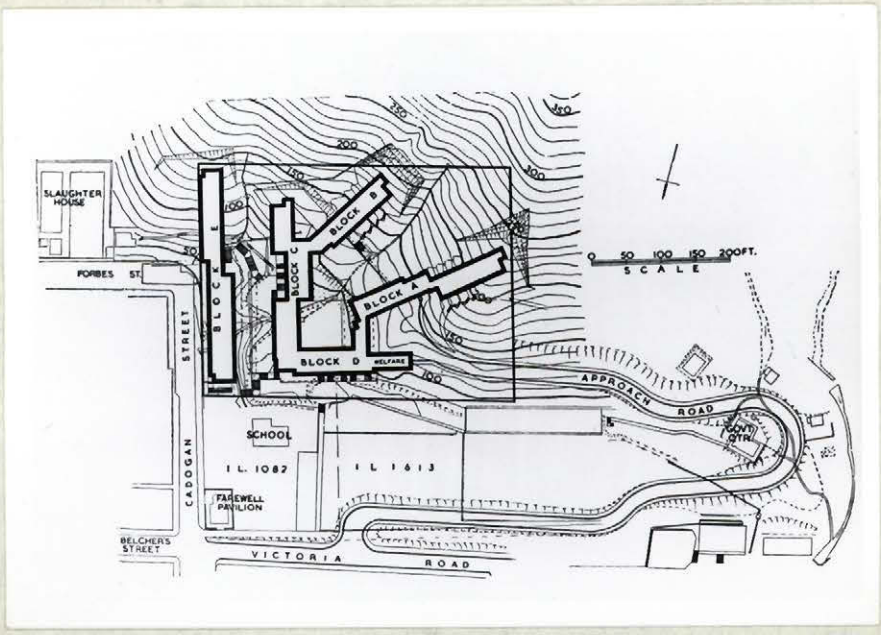



Fig. 54. Site Plan of Sai Wan Cheun.

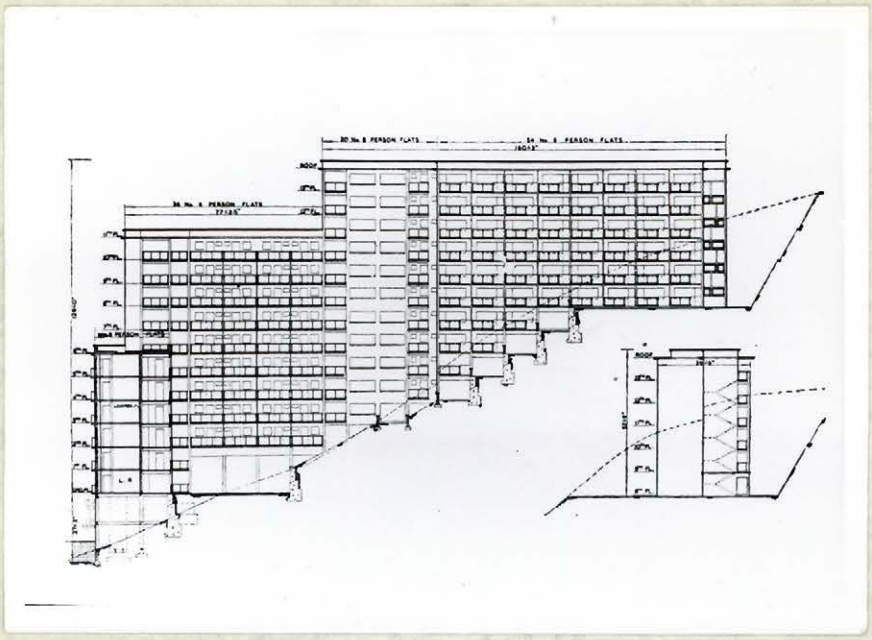


Fig.55 Elevation of one block,
Sai Wan Cheun.

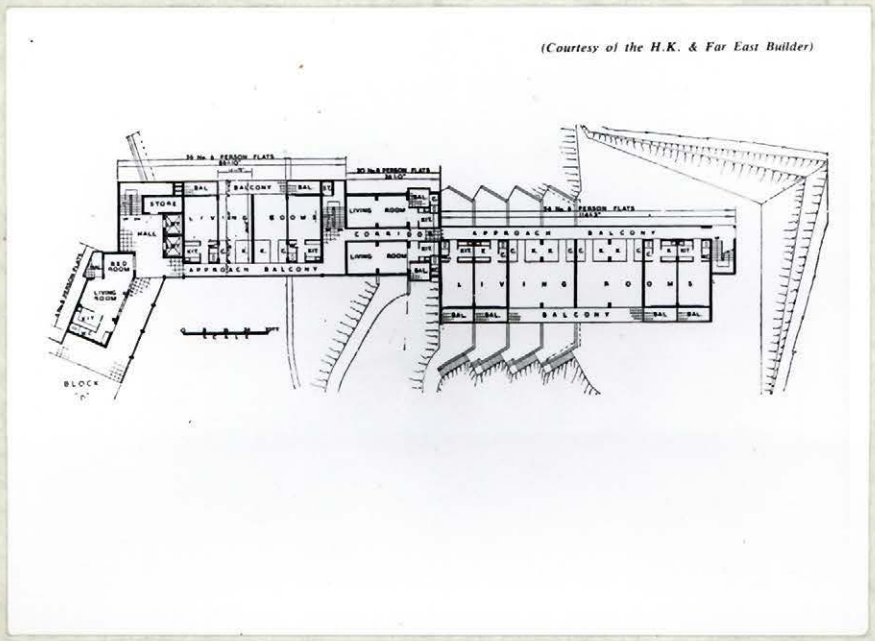



Fig.56. Plan of one block,
Sai Wan Cheun.

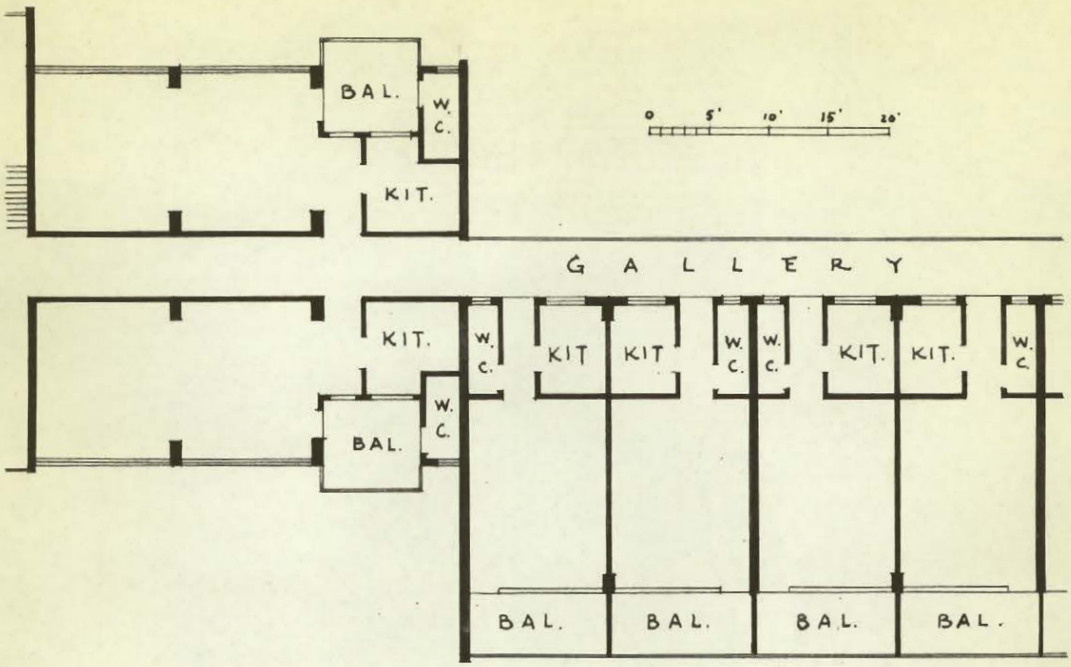
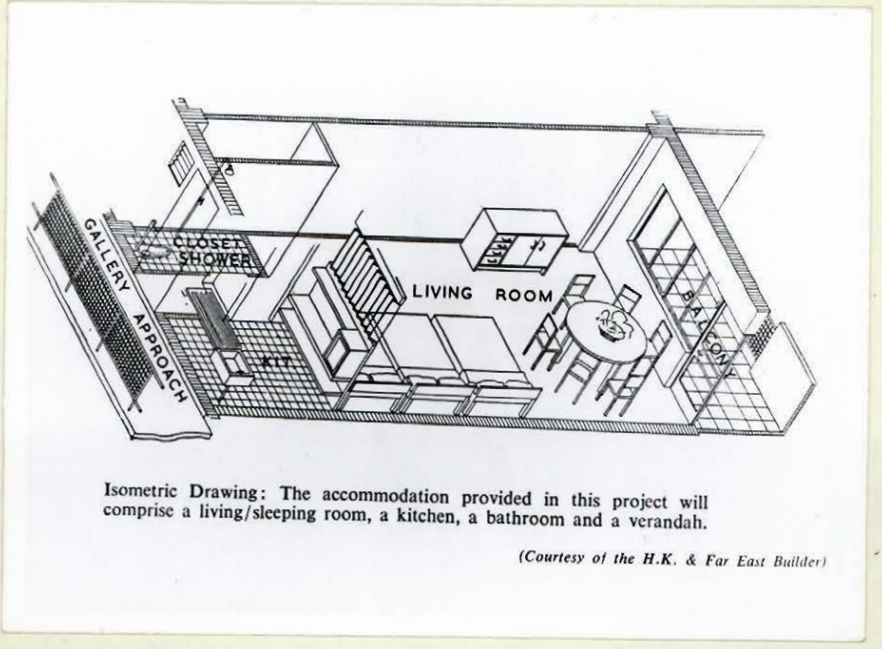



Fig. 57. Plan of Typical Flats, Sai Wan Cheun.




Isometric Drawing: The accommodation provided in this project will comprise a living/sleeping room, a kitchen, a bathroom and a verandah.

*(Courtesy of the H.K. & Far East Builder)*

Fig. 58. Isometric of Typical Flat, Sai Wan Cheun.

The gradient of the site is extremely steep, the lowest point is about 50 feet above street level, and the highest is 285 feet. This slopes roughly from south-west down to north-east.

The western side of the site is particularly steep, sloping at an angle of nearly 45 degrees. For this reason, development here was kept to a minimum because of the high cost of site formation in relation to the building cost. The buildings located on this part of the land were planned on cross contour development whereby successive storeys extend towards the rising ground and stop at their respective floor levels upon meeting the slope. Exit at each floor level was allowed for at the point of intersection.

The steepness and natural difficulties of the site were predominant factors which influenced its development; if extremely high formation work was to be avoided, only buildings of the most direct and straight-forward type could be planned. A considerable number of retaining walls are required even on the lower levels of the site to form various platforms on which the buildings are placed. Traffic will be mainly pedestrian, which called for wide flights of steps leading up from Cadogan Street. Other steps within the site connected the various platforms.

The scheme consists of five multi-storeyed blocks of flats. The height of the blocks varies, the maximum being twelve storeys

and the average being ten storeys. Eight lifts are provided which stop at every third floor. The intermediate floors are thus only one floor up or down. A total of 638 flats of various sizes were planned providing accommodation for over 4,200 persons.

The flats provided in this project were planned for families from five to ten persons, with the majority in the six, eight and ten person group. They are generally of a simpler type than those of North Point, but are likewise self contained. A flat containing the most basic type of accommodation comprises a living-bedroom with a floor area of thirty five square feet for each adult occupant, and a bathroom containing a flush closet and a shower. Each flat has a verandah about 13'-6" wide and 5'-3" deep which functions as a multi-purpose utility space.

Gallery approach system with blocks only one flat deep is adopted, this ensures that all flats are airy and well ventilated, as well as being a simple and direct method of construction specially adapted to such steep sites and it can be erected with the minimum cost. With very little structural alteration two adjoining single room flats can be converted into a large flat with a living room and two bedrooms, should this prove practicable at some future date.

Equipment in the kitchen is similar to that in North Point, a concrete cooking bench, a glazed earthenware sink and no flue. The walls between the kitchen and living room have vertical adjustable glass louvers to give additional through ventilation. Refuse chute is provided at various central points of the different blocks.

The flats have been planned for working class people. For this reason it was necessary to keep to the minimum standard so that the rentals may be brought down within the means of the occupant. Rents vary from $99 to $169 a month inclusive of rates.

A three storey community centre with boys' and girls' club and childrens' library is planned in a central position at the intermediate level, easily accessible to vehicular traffic. Playgrounds and open spaces are provided within the estate. As public markets and shops already exist in the near vicinity, which could well serve the requirements of the tenants of the estate, yet certain portions of the ground floor could be utilized as shops if required. This scheme did not incorporate any school.

All buildings are of reinforced concrete frame construction with reinforced concrete slab floors. The party walls between each pair of flats are reinforced concrete spine walls about eight inches thick

on the lower floors and five inches on the upper ones. This method of construction provides adequate resistance against forces imposed by wind pressure on tall buildings. Both external and internal walls are hollow precast concrete blocks. Walls are plastered except the ceiling. Standard steel casement windows and hollow-core flush doors are used throughout.

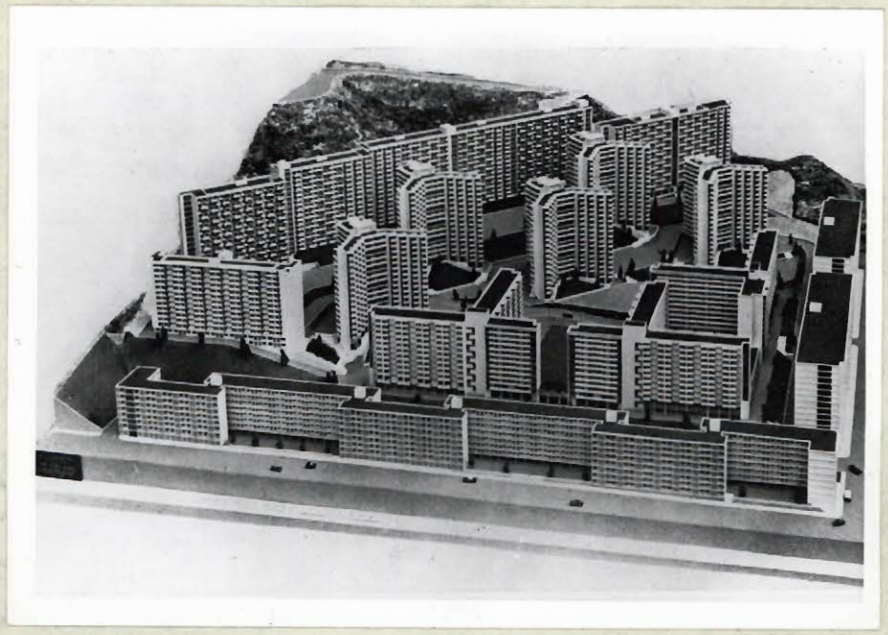
The total cost of this scheme was just over 8 million dollars.

So Uk Estate

The third project undertaken by the Authority is at So Uk, Kowloon. The site which is about 18.79 acres in extent is roughly triangular in shape with a gentle slope upwards towards the northern boundary. Cross-contour building as in Sai Wan Chuen was unnecessary except in one place. The need for difficult and expensive site formation is largely obviated, except in the south-west corner where the land is steep.

On the edges of all three sides of the site slab blocks of eight and twelve storeys in height are erected enclosing three twelve storeyed T-shape blocks on the southern corner and five sixteen storeyed Y-shape tower blocks positioned in the north end.

Most blocks face south, and as the site slopes from south to north the blocks are for the most part on different levels, a



## SO UK ESTATE

| | |
|---|---|
| Location | Cheung Sha Wan, Kowloon |
| Owner | Hong Kong Housing Authority |
| Architects | Eric Cumine (Chairman), Chau and Lee, Leigh and Orange, W. Szeto, and H.S. Luke. |
| Erection Year | 1958 - 62 |
| Site Area | 18.79 acres |
| Building Types | 8 and 12-storey slab blocks, 16-storey tower blocks, with both central corridor and gallery access. |
| Units | 4 - 11 person flats |
| No. of Units | 5320 |
| Accommodation | 32,890 persons |
| Density | 1,450 per acre |
| Construction | Traditional R.C.C. frame |
| Cost | $50,000,000 |
| Monthly rent | $48 - $138 (including rates) |
| Amenities | 2 schools, shops. |

Fig. 59

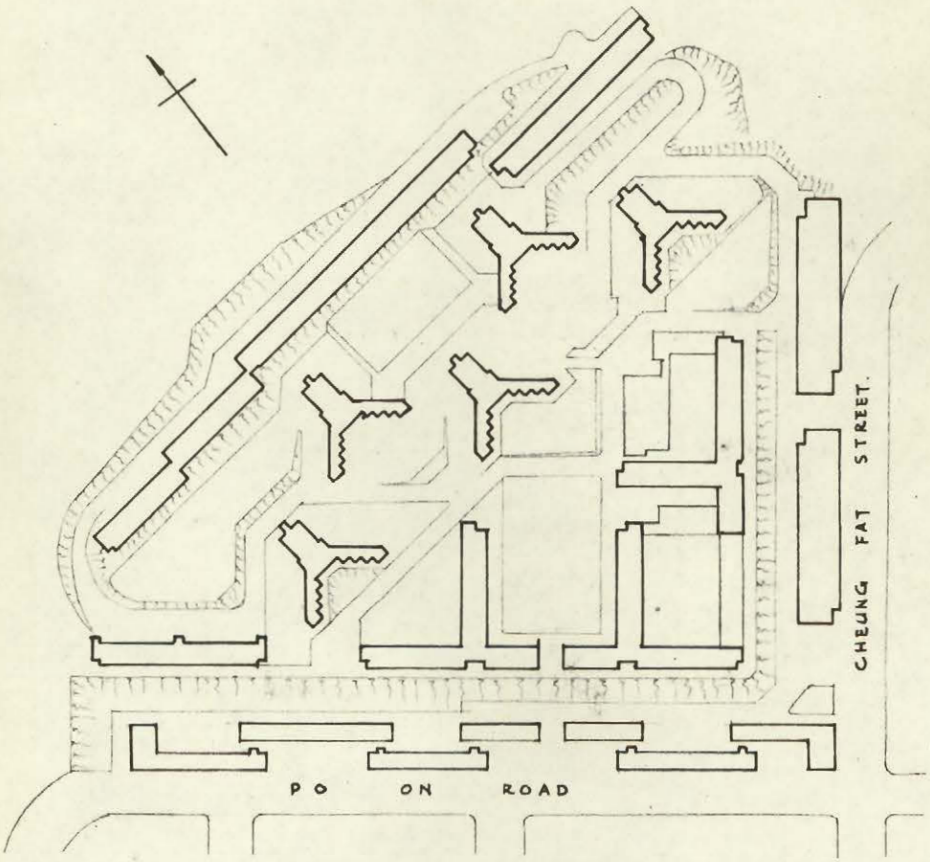



Fig. 60. Layout Plan, So Uk Estate.

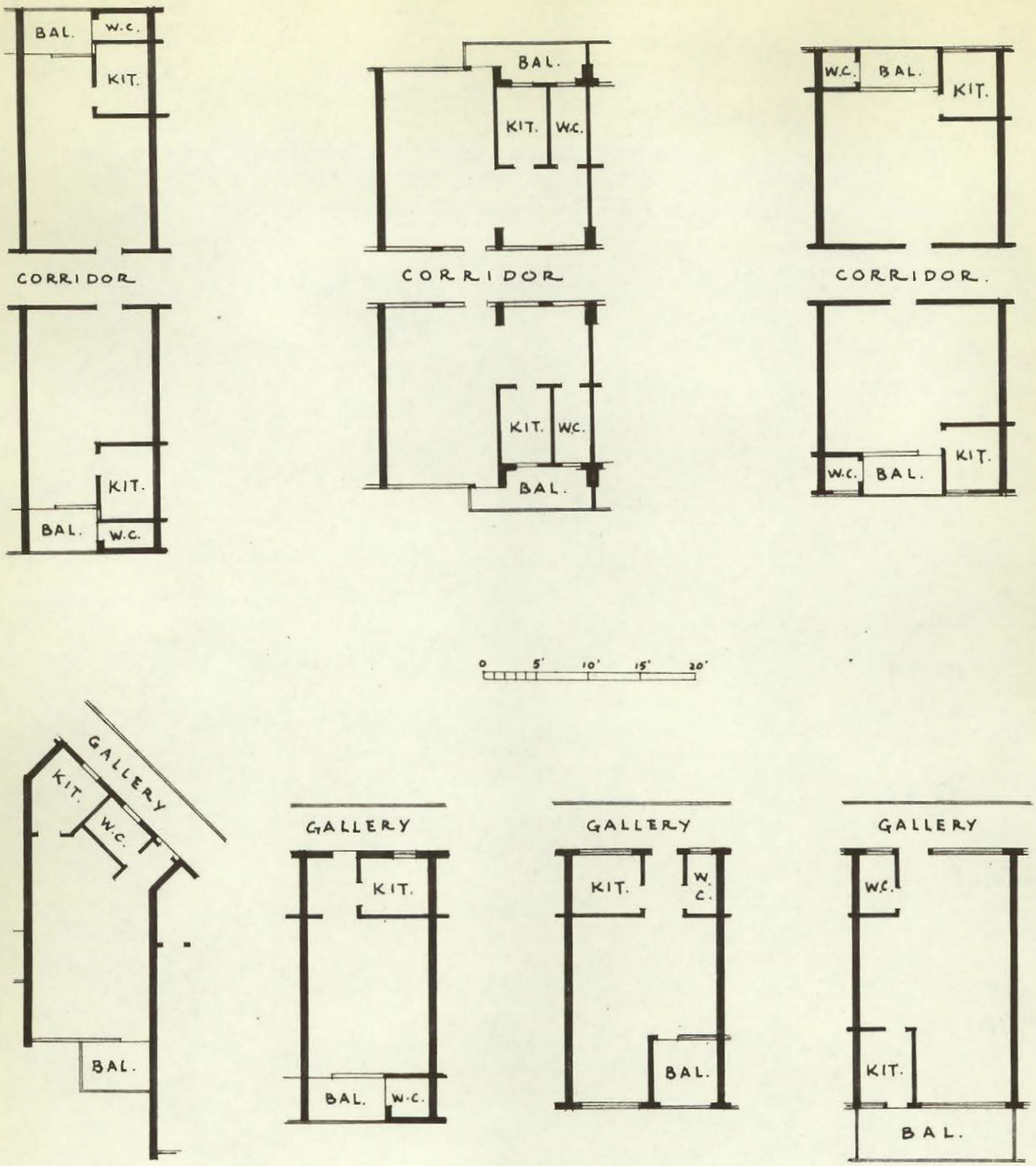



Fig. 61. Plans of Typical Units, So Uk Estate.

circumstance which is favourable to the provision of very adequate light and air in spite of the density aimed at. The whole estate will house over 32,890 people in 5,320 flats, thus reaching a density of 1,450 persons per acre.

The aim is to provide high density housing without monotony and serious overcrowding, and a variety of treatment within a fairly narrow compass of repetitive units combined with plenty of room for recreation and relaxation. Over 270,000 square feet of open space, garden and covered area is provided in the estate.

Flats are planned to suit families of from four to eleven adults with nett living area of thirty five square feet as in other estates.

It is aimed to achieve a fairly wide rental range, with varying rents for the same size of flats, according to the amenities provided and physical location. For example, the flats on the higher northern part of the site are more expensive. Two standards of accommodation is planned. Roughly one quarter of the flats have been built to a standard approximating the North Point Estate, and the remainder to a lower standard.

As in other estates all flats are self contained with their own kitchen, balcony, lavatory and shower. Except for the two slab

blocks on the south-east boundary, which is of a central corridor access type, all buildings have access by gallery approach.

Reinforced concrete frame construction with brick panelling was used throughout. Internal walls are limeplastered and lime-washed. Ceilings are exposed reinforced concrete slabs and floors are cement rendered. 'Skip floor' system lifts are installed in all blocks.

The project is still in its final stage of construction. Two 24-classroom schools are incorporated in the design. The total capital cost of the scheme will be in the region of fifty million. The monthly rental for the flats ranges from $48 to $138 inclusive of rates.

Choi Hung Estate

The fourth and most ambitious of the Housing Authority's projects is an estate on a 27 acre site at Choi Hung, Kowloon, to the north of Kai Tak Airport.

The eggshaped site is completely embraced by main traffic roads, forming an island lot, with its long axis running north-west. The site is comparatively flat and easy to develop, eliminating costly site formation.

This scheme comprises eight slab blocks each of twenty storeys with forty flats on each floor including the ground floor. Each block

The above picture shows a model of the Choi Hung Estate—the fourth low-cost estat to be built by the Housing Authority. — (Photo by courtesy of Housing Authority).

## CHOI HUNG ESTATE

| | |
|---|---|
| Location | Ngan Chi Wan, Kowloon. |
| Owner | Hong Kong Housing Authority. |
| Architect | Palmer and Turner, Architects. |
| Erection Year | 1960 — |
| Site Area | 27 acres. |
| Building Type | 20-storey slab blocks, and 7-storey continuous blocks with central corridor access. |
| Units | 4, 6 and 8 person flats. |
| No. of Units | 7,586. |
| Accommodation | 43,720 persons. |
| Density | 1,930 persons per acre. |
| Construction | Traditional R.C.C. frame for 7-storey blocks and R.C.C. box frame for 20-storey blocks. |
| Cost | $52,500,000 (estimated). |
| Amenities | 3 primary schools, 2 secondary schools, 1 post office and 1 sports field. |

Fig. 62.

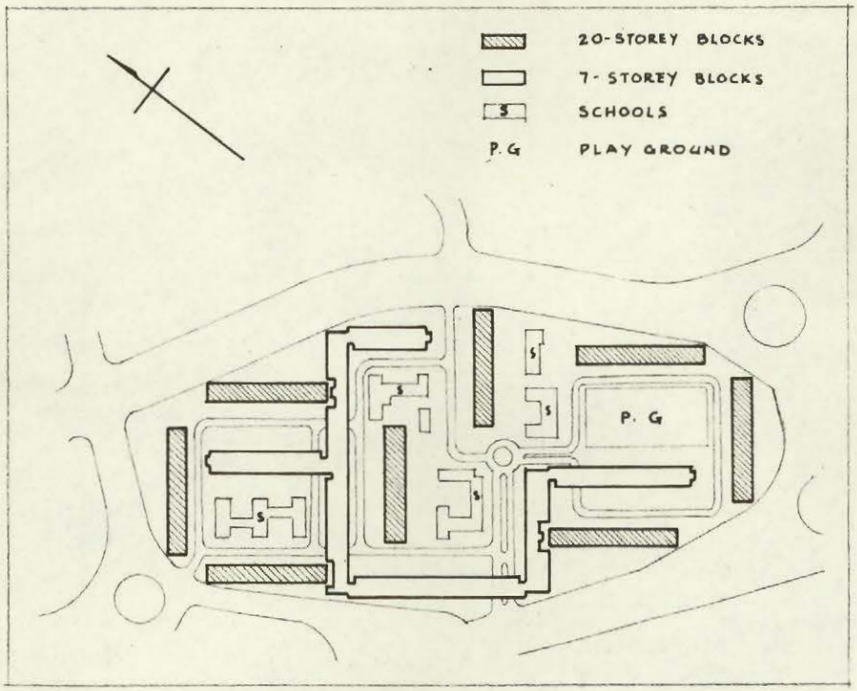



Fig. 63. Layout Plan, Choi Hung Estate.

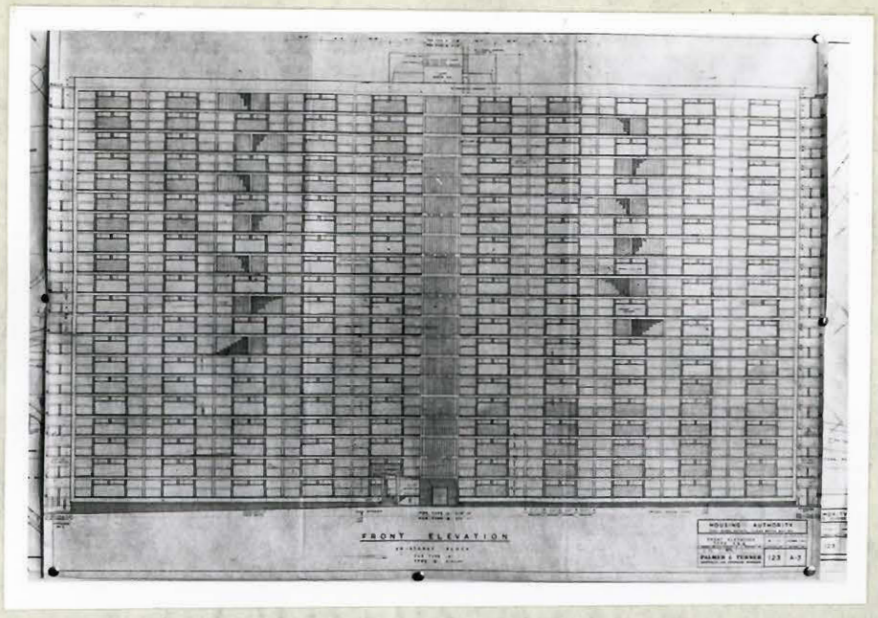



Fig. 64. Elevation of 20-storey Block,
Choi Hung Estate.

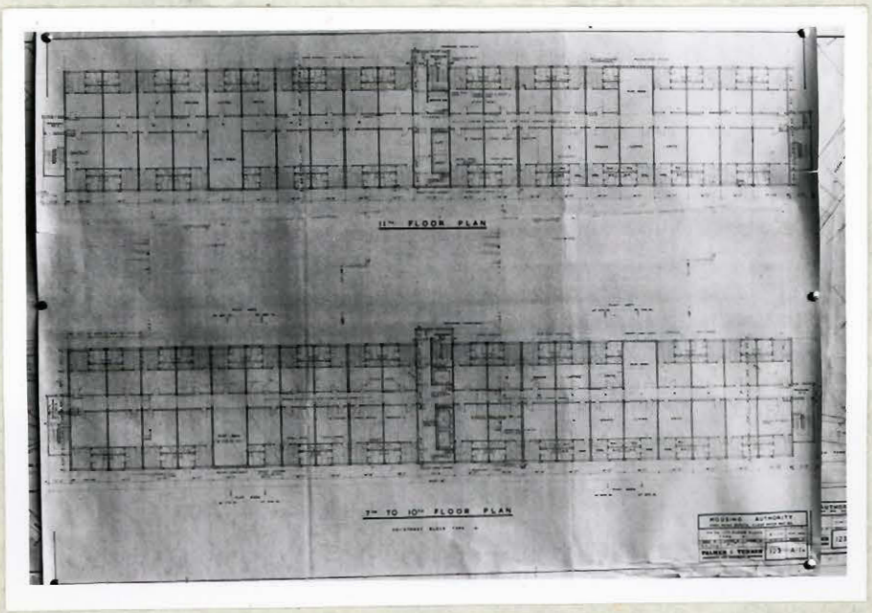
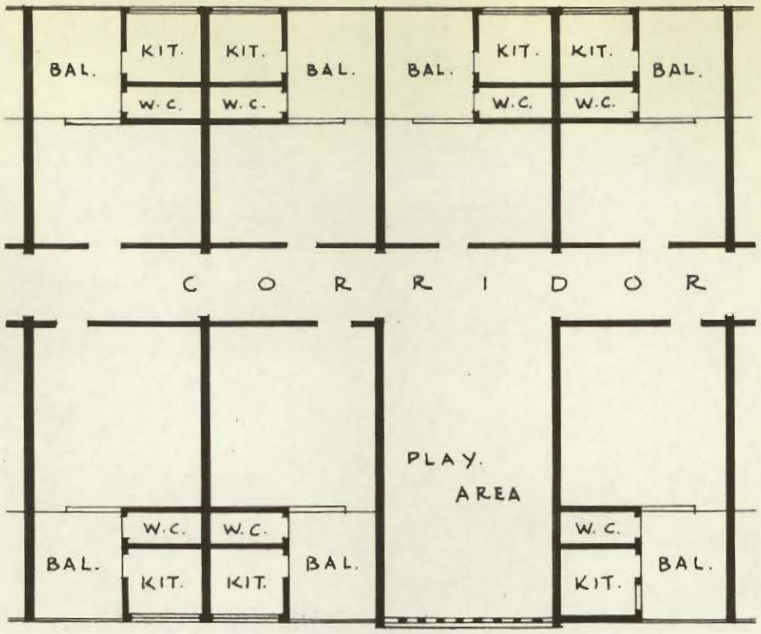
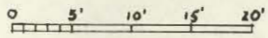
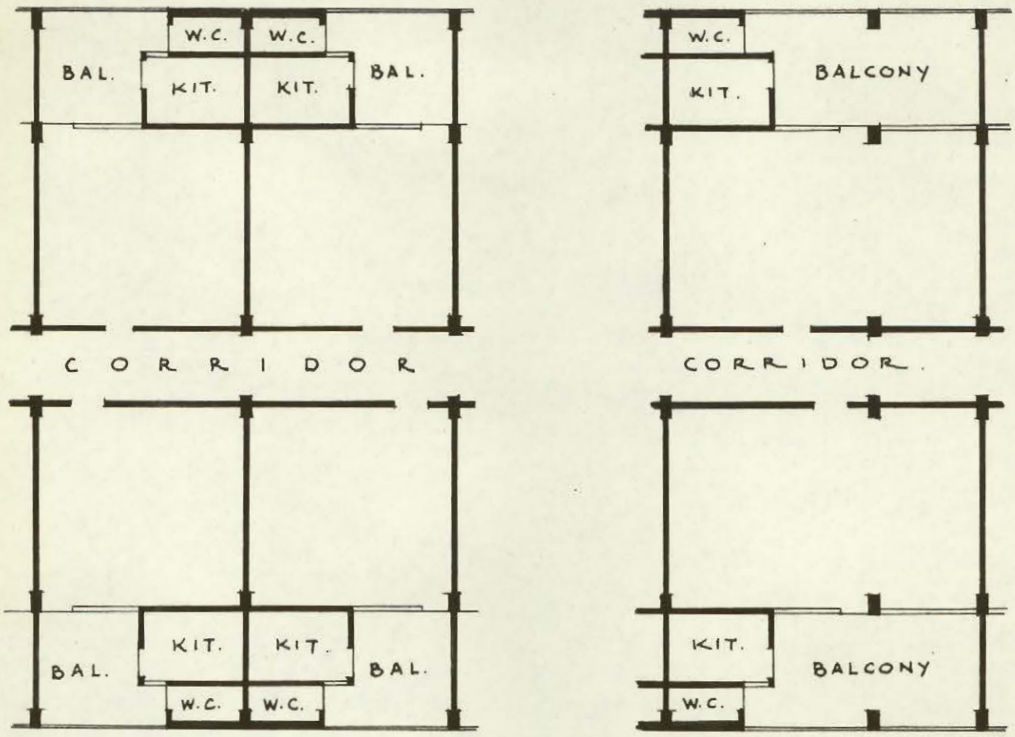



Fig. 65. Plan of 20-storey Block,
Choi Hung Estate.




FLATS IN HIGH BLOCKS




FLATS IN LOW BLOCKS

Fig. 66. Plans of Typical Units, Choi Hung Estate.

will accommodate an average of four thousand people and will be served by three centrally located lifts which stop at every third floor.

The flats are arranged on either side of a central corridor, generally with six person flats on one side and four person flats on the other, except for one block which comprises only six person flats. One particular point about this block was the provision of play areas for the children. From the eighth floor up two bays per floor are reserved for the youngsters, this is not provided for in any previous schemes.

The eight slab blocks were arranged to form almost two enclosed internal courts. A long low building of seven storeys without lifts and standing on pilotis intersect the site linking the slab blocks. The six upper floors will accommodate flats for families of eight, with the ground floor left open as covered area, except for a parade of fifty shops adjoining the bus station in the north-west side of the site.

The flats, as in all other schemes, are self contained providing the same thirty five square feet of nett living floor space and having individual kitchen, bathroom, lavatory and balcony. A standard plan for all the flats is adopted. As kitchen and bathroom occupies

the same amount of space for all sizes of flats. The difference in living-bedroom area is obtained by varying the depth of the flat unit. The width of the units are 14'-7" in the slab blocks and 17'-6" in the low buildings.

The estate is being developed as a complete neighbourhood unit, as domestic in character as can be attained in ultra-high density. A sense of space has been maintained without waste of land. Intergrating tall and low building provided sufficient contrast and adds interest to the scheme. Standardizing of the flats simplifies work and labour and eventually lowers construction cost.

The community amenities will include three primary schools, two secondary schools, a post office and a large sports field. The density will be in the proximity of 1,930 persons per acre, as the 7,586 flats will accommodate about 43,720 people.

Box frame construction with reinforced concrete load bearing cross walls is used for the twenty storey slab block, as this is the most economical type of construction for tall buildings that have to resist strong wind pressure. But the low buildings are constructed in the conventional post and beam manner with brick infill panel walls.

The Estate is now under construction and the total estimated cost of the project is about fifty two and a half million dollars.

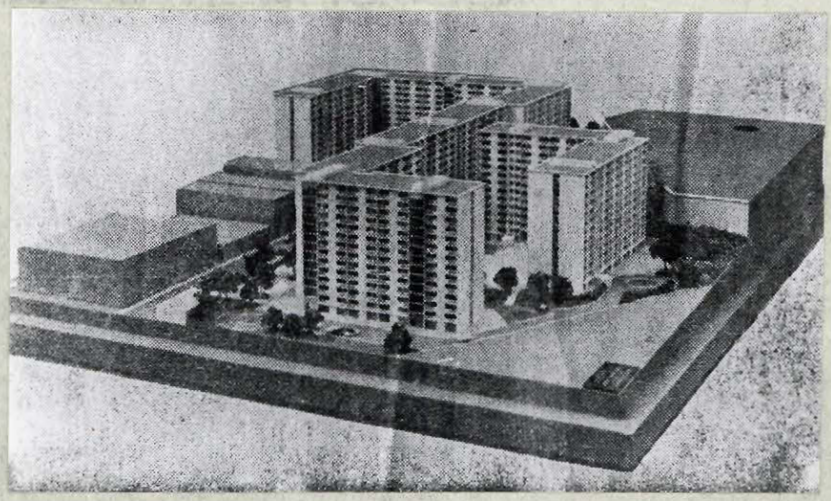
An itemized cost estimate for the buildings is given in the appendix.

Other Housing Authority Schemes

Also under construction at present is the Authority's fifth scheme, the Ma Tau Wai Estate in Kowloon. This is being built on a site over seven acres, which slopes gently from southwest to northwest. Development consists of one long 13-storey block running the length of the site and a shorter block of the same height on the other axis. Standardised units and central corridor was utilized. The ground floor of the long block contains a parade of 21 shops and that of the short block is left open to give a sense of openness. Community amenities are not provided inside the site. Total cost is estimated at 17 million dollars and this is the first design carried out by the Authority's own architectural staff.

As all other schemes each flat will be self contained. The Estate will accommodate about 12,600 persons at a density of 1,640 to the acre, in 2,114 flats.

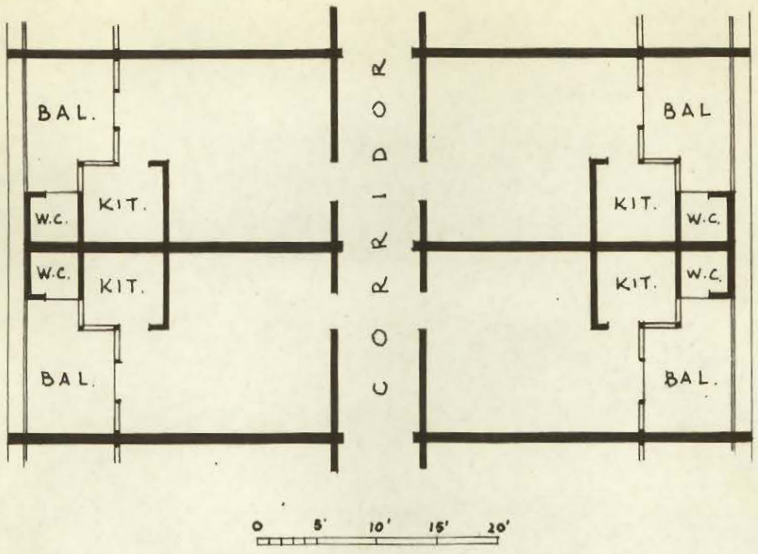
Under consideration are schemes in Kwun Tong, Kowloon; Tsuen Wan, New Territory and one adjoining the Sai Wan Cheun on Hong Kong side.



MA TAU WAI ESTATE

| | |
|---|---|
| Location | Ma Tau Kok, Kowloon. |
| Owner | Hong Kong Housing Authority. |
| Architect | Hong Kong Housing Authority. |
| Erection Year | 1961.— |
| Site Area | 7 acres. |
| Building Type | 13-storey blocks with central corridor access. |
| No. of units | 2,114. |
| Accommodation | 12,600. |
| Construction | Traditional R.C.C. frame. |
| Cost | $17,000,000 (estimated). |
| Amenities | 21 shops. |

Fig. 67.



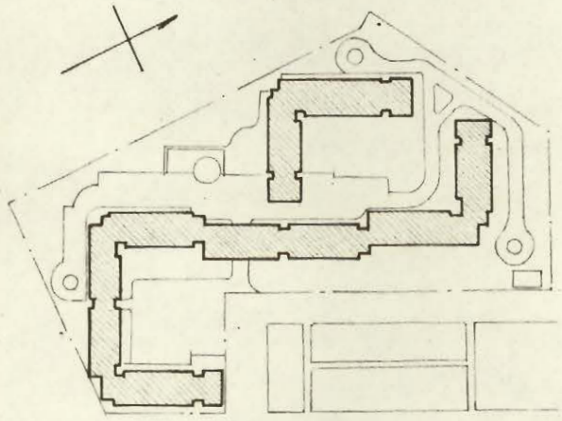



Fig. 68. Typical Units and Layout Plan, Ma Tau Wai Estate.

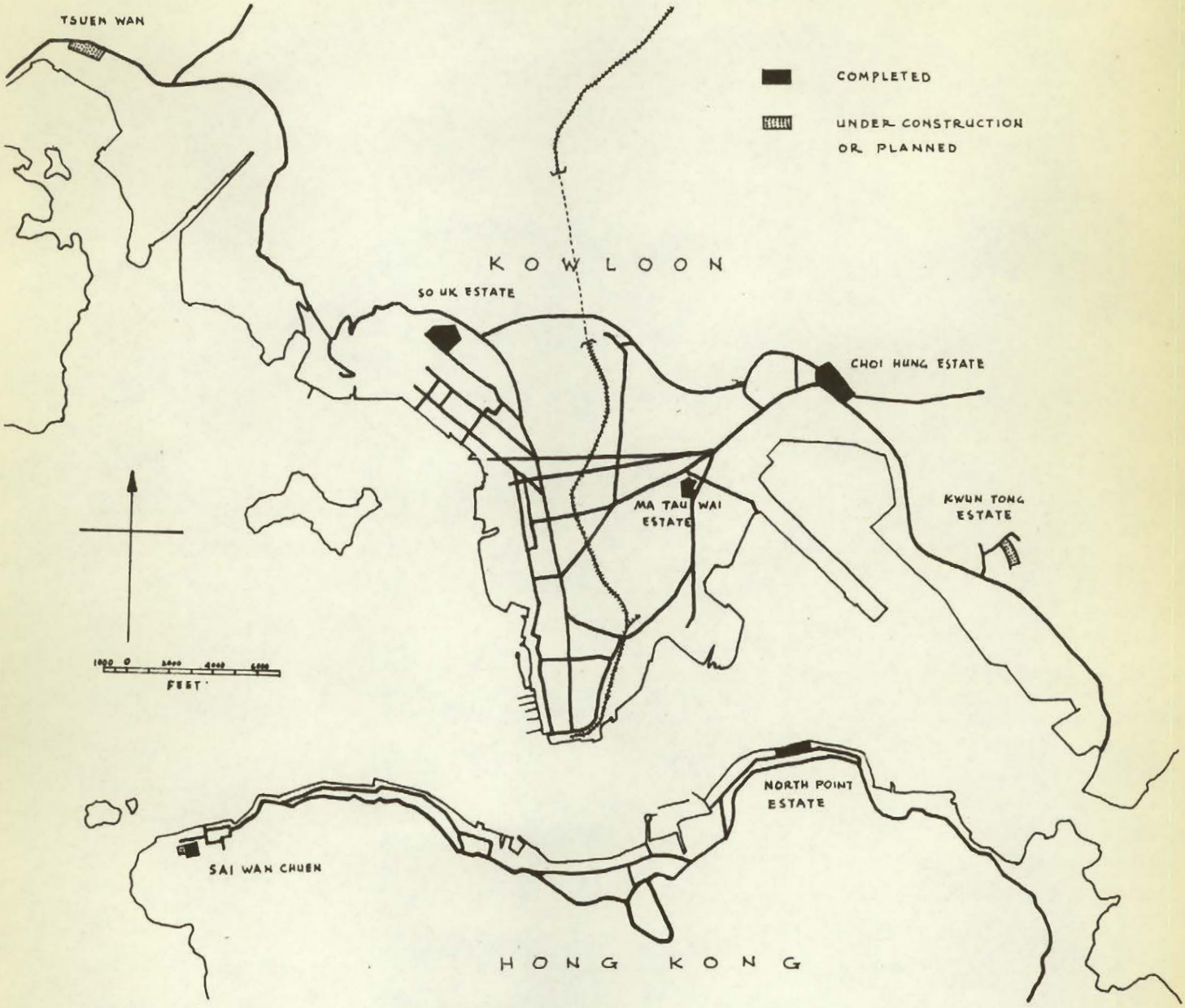



Fig. 69. Locations of Hong Kong Housing Authority Projects.

## GENERAL COMPARISON OF VARIOUS HOUSING SCHEMES

In following the development of low cost housing in the Colony through its short history, it is observed that though the general policy to provide low cost houses has been laid down, no fixed principle in the method of approach has been adopted. Each project is in reality an experiment and a research to explore the various possibilities.

### Layout

The general tendency is to locate long blocks of buildings as close to the boundary as possible, permitting the maximum internal area where extra buildings in the form of slab or tower blocks may be placed as closely packed as regulations of light and ventilation permit to achieve the highest density for the development. This closeness to the boundaries often limited the height of the buildings. Exceptions can be found in Sai Wan Cheun and Choi Hung Estate. In the former the steepness of the site forced the architect to seek a new arrangement. In the latter, a deliberate arrangement in the grouping of tall and low buildings avoids this rule.

### Plans

Two basic types of plan, gallery and central corridor, have been adopted in all the schemes, whether in slab blocks or point blocks.

The gallery approach to flats system is used solely in Sai Wan Chuen and partially in Healthy Village and the So Uk scheme. Flats of this type are generally narrow and deep, with kitchens and lavatories placed near the external gallery, separating the living space from the noisy gallery, as in Sai Wan Chuen and Healthy Village. In the case of So Uk, the kitchen remains near the gallery but the lavatory was placed in front together with the balcony.

This type of single depth flats has the advantage of a through breeze, better sound barrier and a window of full room width to provide better lighting. Its drawback is that it is more expensive to construct and there are less flats per unit length of the building than in the central corridor type. The narrow space between the kitchen and lavatory cannot be used except as a through passage, a factor of considerable importance when the living space for one adult is only thirty five square feet. Being extremely narrow in width the planning and positioning of beds allows less space for actual circulation than in central corridor type.

The central corridor access seemed to be the more accepted approach; it is more economical to construct, and permits the greater number of flats per unit length of the building, thus lowering

the number of stairs required to serve the same amount of flats as compared with the gallery access. Deep but narrow flats are used in Choi Hung and the wide and shallow form in other projects. The former has the advantage of having the maximum number of flats served by the corridor but because of its narrow width and no natural light or ventilation on the corridor side, kitchens and lavatories have to be placed in the front of the flats, resulting in deep balconies with limited light penetration into the living space behind. The direct contact of the living space with the corridor with its steps and echoes is another drawback. One asset is the ability to adopt a basic plan and fixed width; flats of various sizes may be obtained by only increasing or decreasing the depth.

The shallower flats have more window space and hence better ventilation and light penetration but depth is usually limited by the kitchen and lavatory arrangement, though it provides better opportunity of bed space planning and greater circulating space. It has lost the flexibility in design as in the case of deep, narrow ones. Also most of the advantage of maximum number of flats for minimum length of corridor is neutralized.

Construction

Except for Choi Hung, where the twenty storey blocks were of box frame construction, most of the projects utilized traditional

reinforced concrete frame construction. This method has the advantage of easy erection with which local labourers are familiar. The panel walls are filled in either with brick or hollow concrete blocks. Conversion can be undertaken at future date without serious alteration to the structure. The larger column sizes on the lower floors; the longer construction time; and the not taking wind stresses as well as the box frame type of construction are the disadvantages of reinforced concrete frame construction when great height is required.

In the box frame construction, erection can be more rapid, eliminating the erection of partitions and eliminating the necessity of plastering. Formwork may be used repeatedly, all of which contributes to its labour and cost saving, but the main assets is it ability to withstand stronger wind stresses with its solid concrete cross walls. But it is difficult to convert without serious alteration.

Cost

An accurate comparison of costs in various housing schemes is virtually impossible because of too many variable factors which influence its accuracy, i.e. land cost, necessity for site formation, type of facilities provided, locality and date of construction. In general Choi Hung Estate may be singled out as the lowest in cost to provide shelter for a single adult. This lower price may be due to the larger scale of the project, the standardisation of the flat

arrangement which makes mass production and assembly methods applicable, simplifying work and cutting down cost.

# PART II

# CHAPTER 5

# HOUSING IN OTHER COUNTRIES

## HOUSING IN EUROPE AND THE UNITED STATES

Surveys by The United Nations and other special agencies in recent years show, with a few exceptions, that housing conditions in the world remain inadequate and in some less industrialized countries may deteriorate. The cause is closely related to the increase in population, the growing concentration of people in urban and industrial areas, and the lack of resources available for house building.

The core of the housing problem in almost all countries is the high cost of building. In Western Europe the cost of a house averages about four times the annual income of an industrial worker, and in less industrialized countries it may be twice to four times this ratio. It is customary for most western European countries to spend from fifteen to twenty percent of a family's income on rent, and twenty to twenty five percent is not unusual in North America, making it difficult for low income families to obtain adequate housing accommodation without jeopardizing their other essential needs.

As a result, housing, in most countries, has become an important public issue. Formulation, financing and execution of low cost housing programmes became more pressing. It has generally been accepted that poor housing conditions may reduce working efficiency or cause serious social disruptions, and strong efforts have been made by

authorities of various countries to improve housing conditions. Most European countries have tried to promote construction of new houses in various ways. First,financial measures such as tax concessions, state-guaranteed mortgages, extension of loans, capital subsidies, direct subsidies to house holders or builders of low rental houses with public funds; secondly, the stimulation of the development and expansion of resources in the building industry to reduce construction costs, establish training and research institutions for study and the application of economic and technological improvements. Thirdly, steps taken to reduce urban congestion by dispersal to new satellite towns, slum clearance, urban redevelopment and renewal.

The predominant type of dwellings in Western European countries remain the one family house, but there is a general trend towards increasing the proportion of multi-dwelling type of construction. The basic reason for this is shortage of land in large towns and the high land prices, and to a certain extent proportionately lower cost of land development and services connected with great density. In most Eastern European countries housing projects in industrial and urban centres are almost entirely of large multi-family blocks of flats. In the United States the one-family house remains the dominant type.

Most governments in Europe provide subsidies in one form or another to promote house building. In the United Kingdom subsidies are provided under Housing Acts, for buildings which could be kept within the reach of the lower income groups. The subsidies for houses and flats built by the Local Authorities are fixed to represent approximately the annual deficit on a newly provided house. The funds for private enterprises are provided by lending institutes, such as building societies, insurance companies, industries and provident societies and local authorities. In France, state loans redeemable in thirty or sixty five years at a reduced rate of interest are available for housing projects, and depending on circumstances this loan represents eighty to ninety percent of building costs. A form of building premium is also paid over a period of twenty years to new-house builders who fulfill certain conditions. Practically all direct and indirect financing of house building in Sweden is in the hands of the Royal Building Council, a State organization set up for financing new house building programmes. In privately built houses the owner contributes part of the building costs in the form of labour, the balance is in the form of a loan, and the municipality issues land and takes care of administrative problems and gives technical advice. The financing of house building in

Czechoslavakia, as in most of the Eastern European countries, is based on Development Plans for National Economy, and is effected by the various investment institutes. The law for the Five Year Plan (1948) called for approximately one fifth the total national investment to go to house building. Private builders can be granted a long term loan at interest of two and a half per cent which is redeemable in twenty years. In West Germany wholely subsidized dwellings are provided for low income groups. The State provided fifty to sixty per cent of the cost of the building at low interest rate of one and a half per cent, the rest by financing institutes and the housing companies. In the United States building funds for most private enterprises is in the form of mortgages. About one quarter of the funds is carried by individuals and three quarters by banks, saving and loan associations and life insurance companies. The Federal Housing Administration, a state housing agency, undertakes to insure mortgages to guard against loss on the part of lending institutes. The Federal Public Housing Administration provides loans and annual contributions to local public housing agencies for low rental housing and slum clearance projects.

The following will illustrate some of the policies of different European countries to maintain effective provision of housing. In

the United Kingdom the Government established an annual programme of three hundred dwellings of which four-fifths are undertaken by local authorities. Concentration on slum clearance is the local authorities' traditional policy, and it is continuing in all large cities. In France, a long term housing programme was established with the general aim to abolish overcrowding as far as possible, to demolish unsanitary dwellings and to construct new ones at a pace corresponding to the needs created by population increase. This programme provides for building of an annual average of three hundred thousand dwelling units, and State loan was granted to the State sponsored housing organization as well as for construction of rental apartments. In West Germany, house building has expanded almost continuously since 1951. Public financial policies have subsidized about half of the total output and have made generous tax concessions to capital invested in housing, thus promoting a strong mortgage market. The main instrument of housing programme in Denmark has been Government financial assistance in the form of loans covering the bulk of housing output, but since the New Housing Act of 1959, the general policy is to obtain mortgages mainly from the private market. In Italy, Government intervention in housing has been extended to only twenty per cent of

housing output in the recent years and largely through public financial aid. State loans provided the majority of dwellings in Sweden, the ceiling of which being fixed by Parliament. The loan is used as a means to regulate house building and to influence labour market. The housing policy of the Netherland Government was planned control of the building market to ensure both national and local full and continuous use of available resources. Belgium's policy throughout the post war period has been a state guarantee of a minimum annual investment in social housing, but this investment is only fifteen to twenty per cent of total housing investment, the rest mainly depends on private credit market. The situation in Eastern European countries differs from that of most Western European countries, since shortage of housing has been much more acute, mostly due to deliberate policy of maintaining house construction relatively low to give priority to other sectors of the economy, including other forms of construction. National economic plans provide for annual investment programmes for the building industry, based on estimates of available resources and on requirements for housing and other kinds of building. The plans cover the entire field of public sponsored house building, including that carried out by co-operatives or individuals benefited by public grants.

There is a strong trend in a number of European countries for the further development of the co-operative sector. Co-operative housing cannot replace housing provided by public and semi-public agencies, but is useful as intermediate part between public sector and private house building. Co-operative housing is much encouraged in U.S.S.R. and other Eastern European countries, particularly shows signs of playing a growing important role in Czechoslovakia, Hungary, Poland and Yugoslavia.

In most Western European countries there was a tight housing labour market shortage particularly in the skilled trades and supervisory staff, notably in Austria, Denmark, West Germany, Finland, Netherlands, Norway, Sweden, Switzerland and the United Kingdom. This shortage of labour is one factor in the rising cost of buildings.

In post war Europe, most countries have developed non-traditional methods of construction with three main objectives in view. In the first place, to decrease the need for skilled workers on building sites. Secondly, to supplement the traditional materials available, and, thirdly, it is hoped the housing cost can be lowered by wider use of more advanced techniques. In the United Kingdom, partial prefabrication was developed to the extent that at its peak

nearly one-quarter of the house production was prefabricated, but when the urgent demand of housing was met, and it did not result in any saving in cost, it declined. As a contrast, nearly ten per cent of post war Netherlands' house construction is in a non-traditional method.

In many European countries and the United States there has been a considerable increase in the use of prefabricated structural components, mainly in reinforced concrete, mostly in the form of floor beams and slabs, stairs and balconies and parapets, large wall panels in light weight concrete, window surrounds and large partitions. Fuller prefabrication as factory made components tended to be larger and were supplied complete with finishes and attachments for various fittings and services. Site assembly is reduced to joining prefabricated elements, coupling of services and attaching fittings. Though there is no definite evidence of cost saving in the large scale production of prefabrication in the West, the Eastern European countries are organizing large scale development of prefabrication to offset acute dwelling shortage and it is calculated when production is fully established saving will amount to ten per cent as compared with the cost of conventional methods of construction.

France and Netherlands has a trend towards full prefabrication, and the development is continuing. Owing to heavy capital expenditure on fixed plants, equipment, and transport and handling, full prefabrication cannot be successful without Government intervention to ensure sufficient scale and continuity of effective demand and amortize the heavy investment. In most of the other Western European countries development of full prefabrication is rather limited. But prefabrication of the wooden house has flourished in Scandinavian countries, Austria, U.S.S.R. and the United States, where there is a considerable resource of timber available, because wood lends itself particularly well to prefabrication. The resulting components are light and easily transportable.

One advantage of large scale prefabrication is to lower the demand for skilled building labour, independent of weather conditions and output can be continued even in the winter months.

Parallel to prefabrication is the "rationalized" method of site construction, for example, using of "no-fine" concrete, using large sectionalized shuttering for repetitive use for pouring concrete walls, and supply of ready mixed concrete from large central batching plants and standardizing of building bricks and other building components. There is also the general trend to evolutionize the traditional section

of building industry in greater use of machinery, better organization of work, new and improved materials which leads to increased productivity.

Every country in Europe has sought to lower cost of building components. Large scale production has been encouraged by reducing unnecessary multiplication of types and patterns of material and concentrating on the resources on a more limited range of products. As a result most countries introduced standards for type pattern and dimensions of housing elements. Standardization without reduction of types and patterns will have no effect on reduction of cost of the housing elements, but there is a reluctance to accept this discipline involving a limitation of choice. A startof this has been made through modular co-ordination.

Almost in all European countries and the United States there is a tendancy to investigate modular co-ordination, though units of module may vary. But unless the building industry has reached a stage accepting the modules in all their products, modular co-ordination will still remain an imaginary aim. Most countries accepted a ten centimeter module except for Germany and the United Kingdom. The former used a module of twelve and a half centimeters and the latter has to decide between the four inch module or another module more related to the present dimension of bricks. The joint

committee, the British Standard Institute and the Building Research Station of United Kingdom have been investigating in detail the modular co-ordination and are making a joint study with twelve other European countries.

There is difficulty in applying modern methods of site organization to reduce building cost due to lack of trained personnel. Some countries such as the United Kingdom have contractor organizations who provide diplomas for the man trained primarily in management. Others may offer four year courses such as Finland and Czechoslovakia. In several countries instruction is given at technical schools and colleges. In most Western European countries there are special courses of instruction, mainly organized by the building industry itself. In France, Belgium and Italy it is found necessary to set up vocational training courses to provide sufficient men for national housing programmes.

There is a strong movement towards mechanization. In most countries operation of concrete mixing is virtually completely mechanized or rapidly approaching that point. In the United States, Finland, Sweden and Czechoslovakia ready mixed concrete is now normal practice. Power tools are universal in the United States and there is a considerable progress in that direction in the United Kingdom, Netherlands and Czechoslovakia.

In a majority of Western European countries mechanization of building operation is hindered by lack of necessary capital. Belgium, West Germany, France, the United Kingdom and the Netherlands are proceeding on adequate scale in mechanization through normal commercial arrangements. In most Eastern European countries development of mechanization is part of the national investment plan. In other countries such as Sweden, Government loans are available for building machinery to contractors. In Belgium groups of contractors set up pools of machinery for hire to their members.

Standardization of house plans has been in force for some time, waste space has been reduced, and a number of materials and components have been standardized. Two forms of standardization have been exercised, in one, the "model" plan illustrated with certain rules laid down for the size of rooms, standards of accommodation and equipment, heights, etc., with specifications is issued as illustration or advice; in the other, "type" plans for buildings or parts of a building evolved to meet particular set of conditions or particular methods of construction. One form or other is used where housing is subsidized by the Government, especially to the erection of low cost housing. In the Eastern European countries type plans were adopted whenever possible. In the U.S.S.R.

in 1957-58 eighty three per cent of new projects conform to "type" plan. Czechoslovakia eighty-five per cent in 1958. Other major Western European countries such as Belgium, France, Netherlands, Sweden and United Kingdom, favoured "model" plan system laying down minimum area of habitable space and standard of accommodation and amenity.

The object of preparing type or model plans is to improve the design of dwellings in terms of overall dimension, shape and arrangement of rooms, better use of space and the reduction of unusable floor space.

In most Western European countries "model" plans were prepared by national or local authorities. In the Eastern European countries "type" plans are designed by special project institutes. Originally "type" plans are not designed to connect with any given construction system and are equally adaptable to conventional or industrialized sections of house building. Improvement achieved is often amazing. For example, in Czechoslovakia the proportion of usable total living area has risen from forty-two per cent to fifty-two per cent.

Improvement of building materials and new developments has been progressing rapidly. Availability of local raw material influences the field of development. In Northern Europe, timber of excellent quality is available in quantity and more attention is paid

to it. Where working clay is available in Italy, France and West Germany, development is in brick and tile. Climate also exerts strong influence in the development of building materials. In Northern European countries the tendancy is to produce light material of high thermal insulation, while in Meditterranean countries massive construction with high thermal inertia seems more satisfactory. Concrete has seen considerable development in various countries, improvement of cement has been a steady progress and the use of prestress concrete is increasing. Light steel and aluminum sheets are being increasingly used in the United States and several European countries. Plastic lamination and other varieties of press boards are also used extensively throughout the United States and Europe.

Practically all European countries have building research organizations. In some countries various branches of industry have their own organized research. In other ones the research organizations are set up and supported by the Government. In the United States a lot of research is also done by Universities with financial aid from industries, Government and foundations.

# HOUSING IN CANADA

Although Canada is the second largest country in the world, it is only twenty-seventh in its population. With industrial expansion, urbanization is very rapid, creating a greater demand on urban housing. Canada's population is relatively young, with forty per cent under twenty years of age, and has one of the highest birth rates in the world. Immigration accounts also for the rapid increase of population. Housing on a large scale has to be promoted in order to fill the urgent need.

A long period of low housing production because of the depression in the thirties followed by the war years left Canada at the beginning of the post war years without substantial housing industry, and public administration skilled in the art of community building. Initiatives and improvisation were called upon to accomplish the immense task of fulfilling the housing demand.

The National Housing Act was amended at various times to deal with the housing problem. In 1947 guarantees were provided to life insurance, trust or loan companies which invested in purchase and development of land for residential purposes. In 1949 provisions were made for development of residential land through a Federal-Provincial Government partnership, and the Federal Government's

housing agency could act as an individual lender when and where private loans were not made available. In 1954 amendments, charter banks were allowed to act as approved lenders.

Governments at all levels are involved in various aspects of housing. The Federal Government's part is economic in character, and the provincial and municipal governments are concerned with administration and urban growth. While the Federal Government may stimulate and supplement the house building market, it cannot assume direct responsibility which is constitutionally allocated to provincial and municipal governments or private enterprise.

At present nearly half of the housing being built in Canada is in one way or other aided by the national government, sharing in mortgage loans, insuring mortgage loans offered by lending institutions and banks, and in the construction of low rental housing in partnership with provincial governments.

Under the terms of National Housing Act in 1954 the Federal government participates in the following way: (1)

(1) Loan Insurance, the Underwriting of the mortgage investments of lending institutions and banks for the construction of new housing for sale or for rent.

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(1) C.M.H.C. A Review of Housing in Canada, 1958, P.3 - 4.

(2) Loans to home owners or owners of rental property where other sources of mortgage funds are not available; loans of limited dividend corporations in respect of rental housing projects for families of low income; and loans to mining, logging and fishing industries.

(3) Guarantees of Home Improvement Loans made by banks to home owners, and on certain conditions, guarantees of rental revenue.

(4) Investments. The Federal government enters into partnership with provincial governments to acquire and develop residential land and to build housing for rent; 75% of the capital costs and operating profits or subsidies being borne by the Federal government. In addition the Federal government may itself provide housing, e.g. for veteran tenants following World War II, and for the families of military personnel as required. The housing is built by commercial contractors selected after general advertisement to tender prices.

(5) Grants. The Federal government makes grants to municipalities for slum clearance and also makes grants for housing investigations, research and technical assistance.

The Central Mortgage and Housing Corporation, a Crown company incorporated by Act of Parliament passed in December 1945 became the federal agency in the housing field. The Corporation was created because it was felt the commercial operation could best be performed by a crown corporation. It administrates the National Housing Act and co-ordinates the activities of the national government

in Housing. It receives scientific assistance from the National Research Council's Division of Building Research, from the Forest Products Laboratory of the department of Northern Affairs and National Resources, and from other government agencies.

Since then the Corporation assumes the following responsibilities:[1]

(1) Insuring mortgage loans on new housing made by banks, life insurance, trust and loan companies and other approved lenders.

(2) Make mortgage loans to borrowers unable to obtain insured loans from private N.H.A. lenders and make mortgage loans to limited dividend housing companies in low rental housing projects.

(3) Make loans to universities to assist in providing accommodation for resident students.

(4) Make loans to municipalities or municipal sewage corporations to assist in the construction or expansion of sewage treatment projects for the control of water and soil pollution.

(5) Provide insurance to banks on loans made for home improvement and guaranteeing return from moderate rental housing projects built by life insurance companies and private investors.

(6) Buying and selling insured mortgage loans, make loans to mortgage lenders on the security of mortgages and purchase the debentures of lending institutions.

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(1) C.M.H.C. 1960 Annual Report P.3

(7) On behalf of the Federal government, join with municipalities in the acquisition and clearance of areas for urban redevelopment.

(8) Undertake jointly with provincial governments the development of service land for residential purposes, the construction of new housing projects and the acquisition of existing buildings in Urban renewal areas and their improvement of conversion for public housing.

(9) Construct, own and manage housing projects on its own account and on behalf of Federal government departments and agencies.

(10) Encourage the development of better housing and sound community planning and, in carrying out this responsibility, to undertake or arrange for studies and research on the technical, economic and social aspect of housing.

There is no other nationwide public organizations giving direct assistance in buying, selling or leasing of houses, though numerous non-government associations are active in various aspects of the housing field. There is also a loosely-knit National federation of provincial and local co-operative housing societies.

In Canada,co-operative housing is insignificant. More units are co-operatively financed during construction than are co-operatively owned during their useful life. However, governments of Newfoundland, Nova Scotia and Saskatchewan did adopt special measures to encourage co-operative undertaking in house building, and certain religious groups encourage instruction in co-operative organization and house building.

Technical Education in the building field is lagging behind the demand. Training in building skills is largely achieved through apprenticeship schemes and from vocational schools. Important resources of building skills is supplied by the skilled immigrants. In 1958 fifteen universities taught civil engineering and there were five schools of Architecture. No university courses were taught in management and administration of housing. The subjects are learned mostly during employment. Professional newcomers are often employed by Central Mortgage and Housing Corporation, and when they are familiar with Canadian legislation and practice, they are then encouraged to take posts elsewhere in the country. Scholarships for advanced professional training are awarded by professional and the national government in this field.

Public initiated housing has been small in Canada, but a considerable proportion of privately initiated housing had public assistance, the proportion varies between thirty five per cent to forty eight per cent of the total cost. The assistance is largely in the form of insurance by the Federal government of mortgage loans made by private institutional lenders, and in addition, mortgage loans from public funds are also made.

To encourage home ownership, the Federal government's mortgage insurance plan enabled home owners or builders easier credits in obtaining a loan from a lending institute. The loan is for a period of twenty to thirty years and the maximum rate of interest is set by the government. Buildings built under such schemes must meet certain minimum construction standards.

Loans are also made by Central Mortgage and Housing Corporation to limited dividend housing companies to assist in financing the construction of low rental housing projects or purchase of existing buildings and their conversion into a low rental housing project.

For low income families, which felt the strongest impact of Canadian housing shortage, Section 36 of the National Housing Act provides for the construction of subsidizing housing projects by the Federal government in partnership with provincial government. Capital cost is borne by federal and provincial governments in the ratio of three to one, while the provincial government may require municipalities to contribute one quarter of the provincial's share.

Rents in subsidized projects are related to family sizes and incomes. Revenues from the project is normally insufficient to cover capital and operating expenses. Annual deficits are shared

in the same ratio as the capital cost by the governments. In fully recovered schemes, families whose income exceeds five times the monthly rental are not permitted to stay. All projects are leased to local housing authorities which sublet to individual tenants.

Most building organizations are small in scale but with the increased use of heavy and costly equipment and mechanization in building operation, tendancy is in favour of larger builders.

Post war Canada also saw the emergence of large builders who developed whole neighbourhoods for sale; Don Mills in Metropolitan Toronto is an example.

Most of the building materials used in Canadian house building industry are produced in Canada. As Canada is one of the world's largest producers of timber, three-quarters of Canada's new houses are of timber frame construction, about a quarter of the houses are in masonary, solid brick or stone, cement or cinder concrete blocks. Approximately five per cent are prefabricated homes [1]

New materials introduced by building trades are laboratory tested by National Research Council, and research of wood and wood products is conducted by the Federal Forest Products Laboratories.

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(1) C.M.H.C. A Review of Housing in Canada, P.VI - 4

Investigation into economics and technology of house building and planning are usually carried out by individuals, universities and other institutes, mostly subsidized in whole or part by the Government. Central Mortgage itself conducts a continuous programme of economic research in all aspects of housing.

Canadian cities are faced with tremendous task of retarding the process of residential decline and of accelerating the replacement of obsolete housing. Lately more attention has been paid to slum clearance and urban redevelopment, with federal and provincial aid. Under the National Housing Act the federal government may contribute seventy five percent for urban renewal studies and half the cost for clearing and replacing a blighted area. Regent Park Redevelopment in Downtown Toronto and Jeanne Mance project in Montreal are typical examples.

Measures for the prevention of blight have not yet been developed on any comprehensive scale other than control through building, sanitary and zoning codes.

In general, most Canadian housing is of the low detached single family type except in a few large metropolitan centres. Density is low. Percentage of high rise building is low and mostly limited to large cities.

## GENERAL OBSERVATION OF HOUSING TREND.

### Trend to High Density and High Rise Developments.

Residential density has long been debated by planners all over the world. There is a general attitude of thought that the lower the density the better. Part of this distrust of high densities is developed from the justifiable abhorrence of the industrial slums, the congestion, ill-health and unsatisfactory social conditions due to bad sanitation and overcrowding. But with present day development, sanitation has improved, overcrowding decreased. Most countries can no longer afford the luxury of low density development especially in larger towns and cities where a shortage and high cost of land plus the higher cost in land development and servicing low density areas forced the acceptance of higher density. The rigid mathematical rate of density cannot reflect all factors of design. Good design can provide adequate open space for all outdoor functions at relatively high densities, on the other hand, poor site planning can create crowding of building at a low density.

The density range varies in different countries and different cities, it is influenced by the size of the cities and the cost of land available for urban development. In the United Kingdom housing developments range in the net residential density from thirty to two

hundred persons per acre, divided roughly into four groups:-

| | |
|---|---|
| Low | 30 - 60 persons per acre |
| Low-Medium | 61 - 100 " " " |
| Medium high | 101-140 " " " |
| High | 141 - 200" " " |

But in some countries even this high density of two hundred persons per acre has to be exceeded in the cities.

The density of a housing scheme will inevitably influence the type of dwelling. For densities of under thirty-five persons per acre it is usual to design in single family units. It is a density applicable only to suburban areas and impractical in large urban centres. Detached and semidetached houses may have a net density of thirty-five to sixty persons per acre. When density reaches one hundred, combinations of detached units, row houses and walk-up flats are still possible. But with net density of a hundred to a hundred and fifty, desirable accommodation can only be provided by row houses and apartments in high rise buildings. Once beyond this range, to two hundred persons per acre or over, which is applicable within the hearts of cities, only high rise buildings provide a logical answer.

With the worldwide rapid expansion of urban areas there is a marked increase in the proportion of high rise multi-family type of dwellings, for higher densities, with better planning layouts. Housing becomes more and more a large scale undertaking

rather than inidividual small home building.

In the prewar days large housing projects usually developed along the line of a single type of house for the whole layout, but the recent trend is more inclined to the mixing of various housing types giving variety to the scheme and integrating families of various social groups into a common community.

High Rise Buildings.

As densities increase in the urban centres, residential units become more compact; building spout skywards in blocks of flats. These tall blocks can generally be divided into three distinct groups: blocks with corridor access to flats; gallery access type, and the tower or point blocks with direct access to flats.

Corridor type of flats are those to which access is provided by means of internal passages with flats on both sides, fed by staircases and lifts at convenient points. This is the crudest but the most popular form. Corridor flats are hygienically inferior to other types since most flats have only one external wall; it is difficult to obtain cross ventilation in the rooms. The c orridor may become a sound box, transmitting noise throughout the building unless expensive acoustic treatments to walls, ceilings and floors are undertaken. Corridor access is most suitable for one or two room flats, as more rooms usually involve extra internal corridors between rooms and wasting of valuable space.

In gallery type of flats access is provided by means of a gallery which may be open or enclosed, fed by staircases and lifts. It is in reality a series of flats side by side connected by an open gallery.

Unlike the corridor type it is open to the air, and in cases where the staircases and lift halls are enclosed the tenants must go back into the open air again having entered the building; but this disadvantage is compensated by the fact that the flats have external walls on their two opposite sides so rooms can be properly ventilated. Simplicity in plan shape, simple cross ventilation, and ease with which one or two staircases can be made to serve a large number of flats make the gallery plan especially popular with low rental flats. The splitting of the cost of the stairs over a large number of flats, the avoidance of expensive corridors - a gallery requires only cheap floor finishes and a simple brick or concrete balustrade - and the structural simplicity of a building only one flat deep makes for relatively low building cost. With flats of more than two or three rooms it is necessary to make habitable rooms overlooking the gallery, and these rooms will not be suitable for sleeping or resting in.

Another solution to provide large flats with an economical form of access which is a very popular one in the United Kingdom is the maisonette or duplex. The flats are planned on two floors with gallery access - in some cases corridor access - to one floor only and the internal staircases in each flat to the other floor.

The building is virtually a series of superimposed terrace houses. This type of planning avoids windows of bedrooms overlooking the gallery while retaining the possibility of cross ventilation with windows in two opposite external walls.

Towers or direct access flats are those entered immediately from halls, fed by stairs and lifts. The tenant having made the vertical ascent is at the entrance door of his home. The means of access occupies only a small amount of floor area and is economical in the landlord's services. It has the possibility of providing cross ventilation to flats. But the number of flats per floor seldom exceed five or six. Planning is more difficult and construction more complicated and expensive, but a better sense of privacy and luxury is obtained which neither corridor nor gallery access can provide. The tower blocks are more favoured by the Scandinavians.

In low cost housing schemes in Hong Kong both gallery and corridor types have been adopted. Direct access or the tower type of apartment building in its true form has not been used for the tower blocks in North Points scheme and the So Uk projects are only towers with gallery access and not with direct access. It was found that such construction is more expensive than the conventional slab blocks.

Public Housing and Slum Clearance.

The problem of improving housing conditions is made difficult because of the gap between the cost of acceptable housing and the amount that a family can afford to pay. For this reason low income families in most countries find it difficult to obtain adequate housing accommodation. As a result, housing has become an important public issue for most countries especially the newly industrialized countries. The problem related to formulation, financing and execution of low cost housing programmes have become more pressing each year. A large number of countries have introduced within the framework of national economic and social policies aims of promoting the construction of new housing and the improvement of the existing. A considerable portion of housing output in most countries, notably in the European and the communist countries is partly or wholly under government control by means of state-guaranteed mortgages, extension of loans, direct subsidies to householders and the direct building of low cost housing with public funds for rental. Where there is planned economy, government may fulfil the role of investor, designer and even contractor.

In most large cities in the world, public housing goes hand in

hand with slum clearance. Governments have long recognized the effect of slum conditions on the social and economic structure of the cities, and poor housing conditions may reduce working efficiency or lead to serious social disruptions. Slum clearance is an expensive process even though valuable land in the urban centre may be gained through such projects. For most slums are not the result of extreme high densities but rather the uneconomical use of land occupied by low dwellings that are in a state of obsolescence. By clever planning with tall buildings, housing projects of a high density may be provided using less land yet having all the amenities that a well organized and healthy community would need.

Prefabrication, Modular Co-ordination and Standardization.

The grave housing shortage and the financial and economical difficulties caused by the two World Wars compelled countries of Europe to adopt cheaper faster and rationalized methods of house building. Some solution to the problem of supplying mass shelter lay in new industrial process, particularly prefabrication.

The development of prefabrication and in particular the increased output of prefabricated components of precast concrete can be attributed to the following factors: (1)

(1) Saving of scarce material.

(2) Saving of skilled labour and the employment of unskilled labour through the use of machinery.

(3) Reduction of the labour force required on the site through the use of factory made large-size units which can be handled and assembled quickly.

(4) No hold up due to inclement weather - steady work reduces overhead of employer.

(5) Substantial reduction time limit set for erection work through shifting site operation to the factory.

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O. E. E. C. Prefabricated Building: a survey of some European System p. 9.

(6) Saving or eliminating work done by plasterer and bricklayer, etc.

(7) Cutting down operation to the minimum; i.e. prefabrication of large wall units with finished surfaces, windows, door frames and installations already in position.

(8) Less finishing work.

(9) Mass production, standardization and variety reduction can lower cost of the units.

Prior to 1939, precast concrete was restricted to prefabricated floors and staircases; to-day it ranges from window lintels to balconies and cornices. A great deal of emphasis is put on large size elements, and much research is being done to reduce weight to enable easier transport of items such as storey high room size walls totally prefabricated and including installation and finished surface. This type of element is helping to simplify the construction of multistorey apartment blocks.

Various types of lightweight concrete and prestressed concrete components have been employed over the world. Other systems include the use of precast concrete with steel and hollow blocks of slag or pumice concrete.

The prefabrication of internal fixtures and finishes such as

plumbing is also explored and no doubt its use will increase steadily.

The mass production of prefabricated building components is one factor that will reduce cost, but a great deal of attention must be placed on standardization and modular co-ordination. Only rational standardization can lead to the essential development of prefabrication aimed at optimum quality.

The rapid development of building material and industrial elements promotes a strong tendency towards standardization. The same applies to the installation of equipment used in building. It has been realized that only by reducing unnecessary multiplication of types and patterns of materials and components and concentrating their resources on a more limited range of products can manufacturers reduce costs. As a result many countries have introduced standard types, patterns and dimensions for housing elements.

This reduction in types and patterns brought about by standardization implies limitation of the architect's freedom of choice in building components, but it will by no means limit the designer's creative ability in composing this limited choice of elements into various combinations ; avoiding monotony through repetition in the housing design will offer a fascinating challenge to their talents.

The object of modular co-ordination is to create a sound basis for standardization and restriction of elements for the erection and equipping of buildings and, by interchangeability, to achieve a rational production of elements and to enable great freedom of action for the architect. Modular co-ordination aims at bringing the dimensions of all elements under a common denominator, the module.

Should standardization of building components be world wide, under one common module and interchangeable, a great advance would be made towards the simplification of designs and construction methods suitable for low cost housing programmes.

## CO-OPERATIVE HOUSING

Many countries that have made substantial progress in housing promote the growth and development of co-operate housing societies or voluntary housing associations. These are now often the chief tools for providing shelter.

Co-operative housing implies the getting together of people in groups to assist one another in achieving their housing needs on a service basis. Through co-operative housing shelter is provided to people without the prime motivation of speculation for maximum profit. It differs from government sponsored housing in that people through group organization usually have some degree of control over the building, operation or management of their community environment.

Various types of co-operative housings can be roughly classified as follows:

(1) Credit Society: These are organizations which pool small individual savings, and make them available in the form of loans or mortgages to members who wish to buy or build a house.

(2) Aided self-help or co-operative house building society: Aided self-help projects are those in which the government or private agencies provide part of the fund, material, supervision,

etc., in a planned way, to expedite house production by groups of individuals or families. Exchange of labour is an important feature of this organization.

(3) Housing associations or co-operative savings and buildings: Members usually own shares in the society, ultimately equal in amount to the cost of the buildings and reside as tenants of the society, paying fixed periodical payment or "rental", any saving due to management and maintenance is credited to the tenants in the form of rent rebates or refund. In some cases these savings are used as funds for the promotion and development of new projects.

(4) Community housing associations or social housing societies: These are permanent, continuing organization which build housing on a non-profit or limited divident basis, usually under appropriate government legislation. As a rule the dwelling units are "rented" or "let" with no effect made to encourage or provide ultimate ownership; and the tenants have no direct voice in their management or other policies. This is an increasingly important category; and is a form of building activity which falls between the private construction for maximum speculative profit and government construction and management.

(5) Mutual housing or mutual home ownerships: This form thus far only exists in the United States in which the government agency or private corporation builds a housing project, and disposes of it to a tenants' association under mutual ownership plan, and individual members gradually acquire, over a period of years, on payment of "rental" full ownership.

(6) Technical advisory service and management group: They offer technical and economic council and guidance, and services to inexperienced groups who want to undertake co-operative housing ventures.

There is nothing unusual about people banding together to solve their economical needs through combined efforts, when the average man joins with his fellows to accomplish specified objectives, his strength is greatly reinforced. This is the force behind the creation of co-operative housing.

The following are some of the advantages offered by co-operative housing which has direct bearing with the problem of low income housing.

(1) Co-operative techniques in housing encourage both initiative and self help, and enable people to solve their own housing needs rather than depend on others.

(2) Co-operatives have often pioneered in developing efficient techniques of construction and maintenance, resulting in lower rental and housing cost to consumer.

(3) Cp-operatives sometimes combine banking and building operation, pooling small savings of individual members and making them available for building operations. This lowers interest cost for construction loans and generally serves as an accelerating factor in building operations.

(4) Properly operated co-operative enterprises aid in curtailing speculative housing; and also tend to stabilize neighbourhood and property value.

(5) Construction and operation of housing by co-operative organization relieves government of a huge administrative task and economic burden.

(6) Most co-operative housing is essentially a form of home ownership and because any abuse of dwelling or equipment will increase the cost to the careless owner, co-operatives have lower operating costs than most ordinary rental properties, public or private, where such abuse does not necessarily mean higher rental to the offending party, but only to the general rent schedule.

(7) Co-operative principle is readily adaptable to a variety of tasks, and have proved its possibilities for large-scale apartment house construction.

Co-operative housing is, in fact a new way to channel and concentrate private endeavours to provide houses more efficiently.

The monthly cost of co-operative housing to occupants is less than that for equal accommodations in other private enterprise housing because of the elimination of speculative profits, the economy of large-scale building, the close adaptation of dwellings to family needs, the standardization of structures and equipments, the better credit of the group as compared with the individual family alone and the co-operative techniques of maintenance by the occupants.

Most projects have been of the multi-family type. These projects generally rate higher in standards and quality than construction available at comparative price from speculative builders. The co-operative societies recognized that they can keep ahead of the commercial builders only by taking advantage of the most advanced ideas and methods.

## RESEARCH

Only through research can new materials and methods or new ways to rationized old construction to lower the cost of buildings.

Building research sponsored by the State or private enterprises is finding stronger hold in various countries. The field of research is wide, but it can be divided roughly into five categories. (1)

(1) Essentially physical science and technology (natural science, building materials, dwelling structures, and dwelling equipment).

(2) Establishment of human needs (housing hygiene, social psychology, and psychology-physiology).

(3) Essentially planning (dwelling design, urban planning studies, and residential site or land planning).

(4) Transitional to economics (construction methods, construction labour, organization and operation of the house building industry).

(5) Essentially economics (general economic and social data, housing market, finance, management operation, and maintenance of housing and housing cost).

(6) Law (regulation of housing, and legislation and administration).

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(1) Building Research Advisory Board of Housing and Home Finance Agency: Survey of Housing Research in the United States, 1952.

Owing to the diversity in the field of research relating to building, not many countries can branch into every aspect, but there are however certain trends common to many.

The first is scientific research into the physical and chemical properties and building materials from the point of view of manufacture and use. Many large manufacturers have their own research departments and smaller firms become members of research associations which organized co-operative laboratories. Practical benefits are often the results of such researches; for example, a large amount of research work is continually applied to cement, and continually improving its quality and the result is that concrete structures are becoming more economical and higher stresses can be used.

Parallel with research on building materials there has been a large amount of scientific research on strength and stability of building structure and soil mechanics. As an illustration, reinforced concrete frame buildings are normally designed on the basis that the frame works effectively carrying the whole of the load. But it is known that infilling panels must add materially to the strength of the frame. Evaluation of the strength imparted by the panel infilling when available will help in considerable saving in cost of frame and panel.

There are certain research into the field of activity where public health and safety are concerned, and where subject to control by the State or municipality, such as sanitation, fire protection and fire resistance.

Another subject of constant research falls under the users' requirements, such as, use of space, sound transmission, ventilation, artificial lighting, methods of heating and heat insulation. Frequently such research is carried out by the governments themselves.

One other important research is in the physical production of buildings. The various factors in production such as cost analysis; cost control; time, motion and method study and organization of the production process are being studied.

The most certain and satisfactory way in which research can be applied in practice is where the results appear in the form of standards, regulations and code of practice. Standards of building materials and components are based on an extensive background of research into the criteria by which their properties are accessed and, into the standard method of testing by which such properties are evaluated. Regulation is for the calculation and design of structures and springs directly from scientific research into the strength and stability of building structures.

The establishment of national codes of practice covering all building operation has been achieved in the United Kingdom. The code covers aspects of design, the choice of material and workmanship and represents a large volume which evolves very largely from research organization. In works of this kind, governments exercise very great influence.

# CHAPTER 6

## SOME SUGGESTED THOUGHTS FOR KONG KONG

## SOME SUGGESTED THOUGHTS FOR HONG KONG

### Co-operative Housing

Co-operative housing has proved its importance in dealing with housing problem in various countries especially those of Europe. Will it be equally applicable to Hong Kong? In fact co-operative housing is not new to the Colony, the first group of co-operative housings was completed and occupied in 1956, but these and all those that followed benefitted government employees only. The system was based on a loan to cover the cost of construction repayable in twenty years at three and a half percent interest and the granting of land at half the upset price. The monthly payment for the dwelling ranged from eighty to two hundred dollars providing a shelter which cannot be afforded by those having two to three times their income but forced to live in speculative buildings.

The backbone of the Colony, as of every community, is the white collar class. Most of them are spending a quarter to half their income on rents and the majority are spending it for accommodations that is not worth a quarter of what they are paying for [illegible]. Providing these people with good accommodation at a rent within their means which will permit them eventually to acquire

ownership thereof would have far-reaching effects on the political and economical stability of the Colony. Co-operative building societies could be encouraged along the lines of those of civil servants, which with government assistance and encouragement, will vigorously develop a plan of self-housing in the safest and soundest of financial and economic principles.

Up till recently the finance for this type of investment has not been available. The attitude had been that the future of Hong Kong is problematical and any money invested here must yield far above average rate to compensate for the risk involved. However, during the past few years the economic and political outlook has improved and investors are satisfied with reasonable returns on local investments. It is therefore an appropriate time for serious thought to be given to provide housing through the medium of housing societies which can offer from five to seven per cent return on capital investment in them, the security for which is literally "as safe as a house".

On the other hand, a large percentage of speculative apartments were sold with a quarter of the price of the apartment as down payment and the rest in two years with interest, though some would allow for as long as five years but with a much higher interest. If such payments can be pooled together as a co-operative undertaking and

with the government's guidance, better houses at lower cost could have no difficulties.

In providing the guiding principle of co-operative undertaking, the government should take the initiative to promote housing progress through associations, co-operatives and similar means, and to adopt measures to control or reduce speculative in land suitable for housing, enactment of special legislation to promote the organization of co-operative and non-profit or limited profit housing associations; enactment to encourage banks, saving institutions, insurance companies, social welfare institutions and the like to invest funds in non-profit housing; granting special long-term, low interest credit to the non-profit association so as to enable them to function properly; aiding co-operative societies with research and supplying them with information; provision by the government means for guaranteeing mortgages in low cost houses so as to reduce investors' risks and attract private capital to this type of investment.

Its success will surely be another milestone towards the easing of the Colony's acute housing problem.

Research

Very little organized building research has been done by either the government or by individual institutes. Though the government

has laboratories for testing various building materials, they were primarily only for testing materials intended for government use. University of Hong Kong have researches in various fields but seldom is there any related to the building field. With the acute shortage of housing and increasing demand of new house building, research into such field is an urgent necessity. Studies of building materials, construction systems, dwelling designs, are fields waiting to be explored.

An architect in Hong Kong today has to rely on his own experience and luck in his choice of materials and construction methods. Experience is a closely guarded secret and as there is no research into the various materials and construction methods to check their suitability to the local conditions, most architects are skeptical and reluctant to adopt new construction or use new materials even though they may cost less. If there be organised research into various materials and constructions, supported by manufacturers and importers and results circulated to within the building field, it will be profitable to all concerned.

One of the prospective fields of research is the utilization of land. In cross contour planning for example, most of Hong Kong's housing density occurred because of the scarcity of level sites, until recently only expensive blocks of flats have been built on steep hills

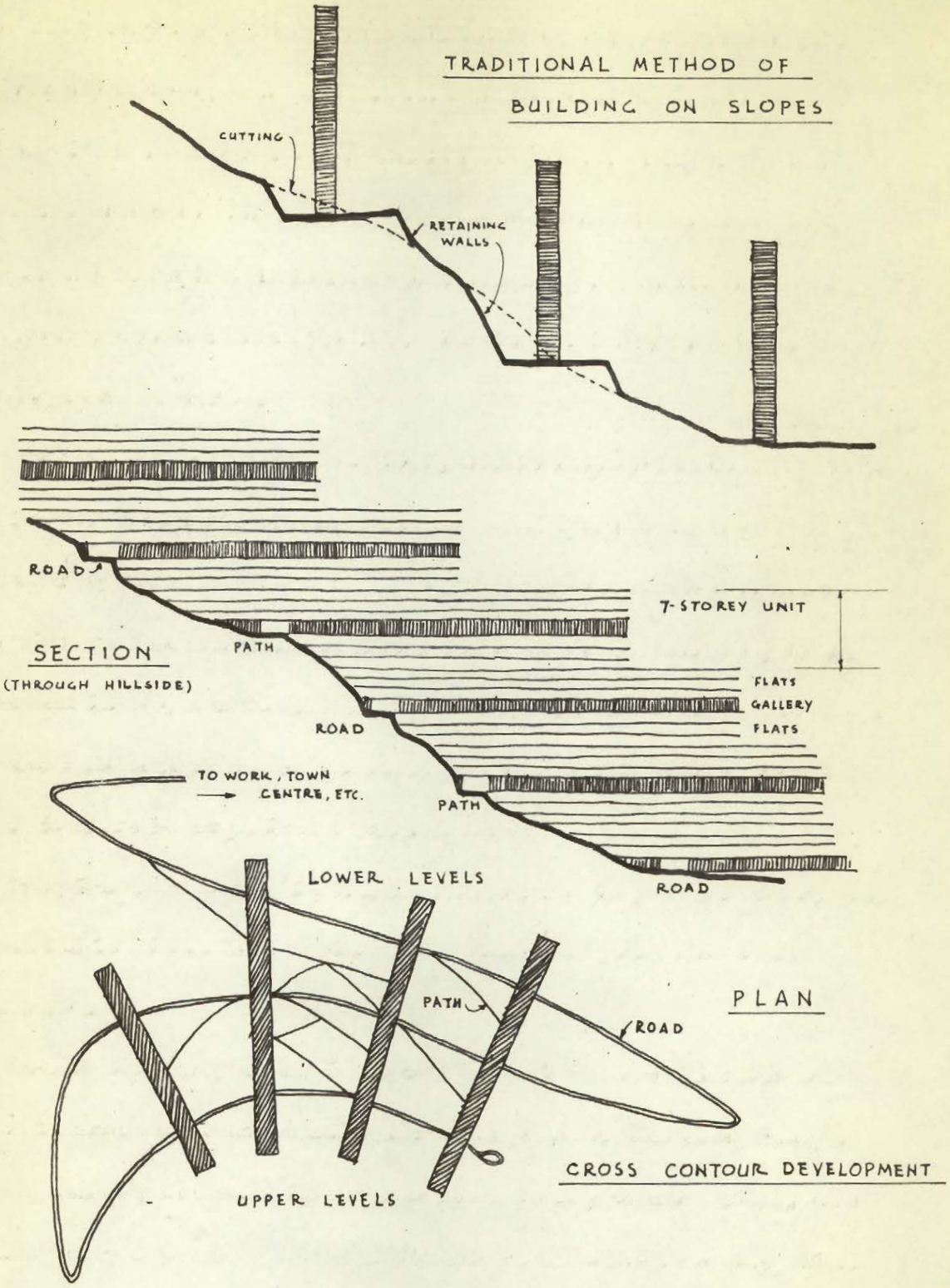


Fig. 70. Cross Contour Development.

and the conventional way of building on slope is to form a level space by excavation and retaining wall. The cost of such development is a luxurious process and only possible by existance of ill paid labourers. But low cost housing projects will not be able to support such expenses, the problem of how to build cheaply and on hilly sites must be faced. If this problem can be solved, great prospects will be opened. Both rent and density can be lowered, standards of space raised and whole communities freely sited in places hitherto considered impossible. At one blow the amount of usable land would be doubled. The Housing Authority's second housing project at Sai Wan Chuen is the first to employ cross-contour construction in a large scale and it is worthy to research into. It has much advantage; the reduced cost of site formation as compared to the terrace-retaining wall method; cost of site acquisition is lower; and following the principle of Sai Wan Chuen of providing points of access from hill side at various levels, the expensive cost of providing lifts can be avoided. With cross contour development every floor can be a ground floor. An estate of such buildings having its normal complement of site roads, would afford its occupants access by road to the upper level. But much research is needed before its true value could be explored.

Another important aspect which is worthy of study is standardization, prefabrication and mechanization. With the low cost housing schemes proceeding on such immense dimensions, standardization of certain elements in the building is essential. The government has been very successful in the standard planning of the resettlement blocks. This same principle could be applied to the low cost housing projects. In the Choi Hung Estate project part of the reason for lower cost comparing with other schemes is in the standardization of all dwelling units; formworks for construction can be repeatedly used.

Side by side with standardization, prefabrication can also be adopted, not in full room units, but in various components of the building, for example, the prefabrication of expensive plumbing systems.

Mechanization can play another important part in large scale construction. The use of mechanical tools and machinery can speed up the construction work and increase the efficiency of the work. It also eases the demand for skilled workers.

There is also a need for research into building codes, many of which prescribe types of materials and methods of construction that are out of date and in many cases uneconomical in the light of current developments. They should be based on performance required of the material, which would permit taking advantage of technological changes which should be capitalized to the benefit of housing consumer.

All these fields are open for organized research. It might be too huge a task for the tiny Colony's finance to deal with, but with joint operation with countries with similar climate in South East Asia it is quite feasible.

# CONCLUSION

To enable formulation of a policy and a programme for low cost housing and community facilities, a survey of man-power and resources and available methods of financing needs to be made.

Individual and group efforts should be mobilised as these human resources have hardly been tapped, because of a lack of incentive and of organisational skill. Renewal of central urban slums opens up new fields for individual and group work. Co-operatives and building societies through group action can contribute significantly to the improvement of the housing conditions.

Efforts should be made to increase the productivity of the building industry and the efficiency of resources already employed. Detailed planning in advance of construction; the simplification of design and building operation; better programming of operations; the development and use of new building materials, equipment and accessories; prefabrication of components; the standardization of building materials; the extension of modular co-ordination; improved organization on worksite; greater mechanization on site operation; work study; vocational and management training and improvement in labour management relations are all examples of ways that would increase productivity within the building industry and tend to lower the cost of building.

The "problem of man" and the "problem of land" will remain, but the tools to shape and master the problem can be forged. Vision and courage are needed.

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HONG KONG GOVERNMENT ANNUAL REPORT

HONG KONG GOVERNMENT, COMMISSIONER FOR RESETTLEMENT REPORT

HONG KONG HOUSING AUTHORITY REPORT

HONG KONG HOUSING SOCIETY ANNUAL REPORT

## SOURCE OF ILLUSTRATIONS

THE HONG KONG GOVERNMENT ANNUAL REPORTS:

Figures 2, 3, 4, 15, 17, 19, 22, 29, 30 and 35

THE HONG KONG HOUSING AUTHORITY REPORTS:

Figures 50 to 61, 63, 68 and 69

THE HONG KONG GOVERNMENT, COMMISSIONER FOR RESETTLEMENT REPORTS:

Figures 18, 20, 21, 23, 24, 37 to 39

THE HONG KONG AND FAR EAST BUILDERS:

Figures 25, 26, 31 to 34, 36, 40 to 46

THE HONG KONG HOUSING SOCIETY ANNUAL REPORTS:

Figures 47 to 49

THE HONG KONG BUSINESS SYMPOSIUM:

Figures 7, 8, 27, 28

PALMER AND TURNER ARCHITECTS:

Figures 64 to 66

THE DEVELOPMENTS OF HONG KONG AND KOWLOON AS TOLD IN MAPS:

Figure 1

HONG KONG IN ITS GEOGRAPHICAL SETTING:

Figure 5

NATIONAL GEOGRAPHICAL MAGAZINE

Figure 11

SING TAO EVENING NEWS:

Figures 16, 67

SOUTH CHINA MORNING POST:

Figure 62

## APPENDIX I

## TOTAL POPULATION OF HONG KONG

Statistic Survey, March 1961

| LAND POPULATION | MALE | FEMALE | TOTAL |
|---|---|---|---|
| Island of Hong Kong | 515,882 | 489,035 | 1,004,916 |
| Kowloon | 370,967 | 353,289 | 724,256 |
| New Kowloon | 431,624 | 419,035 | 850,659 |
| New Territories | 215,554 | 194,351 | 409,905 |
| Total | 1,534,027 | 1,455,710 | 2,989,737 |
| FLOATING POPULATION | | | |
| Hong Kong & Kowloon | 49,647 | 42,214 | 91,861 |
| New Territories | 24,502 | 21,944 | 46,446 |
| Total | 74,149 | 64,158 | 138,307 |
| TOTAL POPULATION | 1,608,176 | 1,519,868 | 3,128,044 |

## APPENDIX II

## BIRTH AND DEATH RATE IN HONG KONG

From Hong Kong Annual Report 1960.

| YEAR | POPULATION | REGISTERED BIRTH | REGISTERED DEATH |
|---|---|---|---|
| 1951 | 2,013,000 | 68,500 | 20,580 |
| 1955 | 2,340,000 | 90,511 | 19,295 |
| 1960 | 2,981,000 | 110,667 | 19,146 |

Data only on natural increase excluding refugee influx.

NOTE: Increase of birth rate and decrease in death rate.

## APPENDIX III

## ESTIMATED POPULATION IN 1966

From Hong Kong Annual Report 1961

". . . . . If the present rate of natural increase and rate of immigration continues . . . . until 1965, the mid-year population of that year will be approximately 3,790,000, but then the present 14 and 15 year olds will be young parents, and a sharp increase in the birth rate is forseeable, which might give the Colony a population of 3,950,000 in 1966."

## APPENDIX IV

## LAND UTILIZATION OF HONG KONG

From Hong Kong Annual Report 1960

| | Class | Approx. Area (sq. miles) | Percentage of Whole Colony |
|---|---|---|---|
| (i) | Built up (Urban area)* | 22 | 5 |
| (ii) | Steep country | 111 | 28 |
| (iii) | Woodlands | 13 | 3 |
| (iv) | Grass and scrub land | 173 | 44 |
| (v) | Eroded land | 20 | 5 |
| (vi) | Swamp & mangrove land | 8 | 2 |
| (vii) | Arable | 51 | 13 |

* Including all industrial and rural villages.

## APPENDIX V

## RATED DOMESTIC ACCOMMODATION IN URBAN AREAS OF HONG KONG

| TYPE | YEAR 1958 | YEAR 1960 | YEAR 1961 |
|---|---|---|---|
| Houses | 1,168 | 782 | 775 |
| Large Flats | 9,419 | 8,267 | 9,092 |
| Small Flats | 14,208 | 19,298 | 21,835 |
| Tenement Floors | 88,622 | 105,909 | 111,590 |
| Low Cost Housing Units | 8,229 | 11,443 | 16,827 |

From HONG KONG ANNUAL REPORT, 1960 and 1961.

## APPENDIX VI

## NORMAL DAILY WAGES FOR DAILY-RATED WORKER IN HONG KONG, 1960

From Hong Kong Annual Report, 1960.

| | |
|---|---|
| Skilled Worker | $8.00 to $21.00 |
| Semi-skilled worker | $4.50 to $ 9.00 |
| Unskilled worker | $3.00 to $7.00 |

Roughly an increase of 15% over 1959.

# APPENDIX VII

## SURVEY OF ACTUAL HOUSING CONDITION IN HONG KONG

From Hong Kong Housing Authority Report, 1959.

> At the (Government Housing) Committee's request a survey was carried out into actual living conditions, by the Hong Kong University at Government expense. This survey covered 1,265,000 persons, consisting of 267,000 households, living in regular housing in the urban area. The position disclosed is one of gross overcrowding. The major proportion of the household have a family income of less than $300 a month, being unable to afford more than $60 a month for an inclusive rent, and inhabiting a living area less than 120 square feet (that of a standard room in a multi-storey resettlement estate). 79% of all households share the accommodation they occupy, 95,000 households were living in cubicles, 43,000 in bed-spaces, 8,000 in cock-lofts, and 4,000 in verandahs. Only 20,400 households had accommodation which included a living room not used for sleeping. 56% of the premises were rent-controlled.

# APPENDIX VIII

## CHOI HUNG ESTATE BUILDING COST ESTIMATES

From Messrs. Palmer and Turner, Architects.

### 20 STOREY BUILDINGS

| Item | Rate | Cost per Building |
|---|---|---|
| R.C. Structure | $ .46 cu.ft. | $ 1,238,781 |
| Piling | $ 800.00 each | 316,800 |
| 9" concrete blocks | $ 54.75 per flat | 45,990 |
| 4" concrete blocks | $ 175.00 " | 147,000 |
| 1" floor screed | $ 95.00 " | 79,800 |
| 1/2" dado | $ 42.12 " | 35,380 |
| 1/2" lime plaster | $ 201.75 " | 169,680 |
| Colour wash | $ 24.21 " | 20,328 |
| Lime wash | $ 10.30 " | 8,652 |
| Snowcem | $ 7.20 " | 6,048 |
| Balcony rail | $ 26.00 " | 21,840 |
| Front door | $ 53.00 " | 44,520 |
| Frame | $ 12.40 " | 10,416 |
| Kitchen & W.C. door | $ 73.12 " | 61,404 |
| F ames | $ 28.00 " | 23,520 |
| Glass - 24 oz. | $ 9.60 " | 8,064 |
| " - 32 oz. | $ 48.00 " | 40,320 |
| Painting | $ 38.00 " | 31,920 |
| Cooking bench | $ 10.00 " | 8,400 |
| Roofing asphalt | $ 1.30 per sq.ft. | 20,354 |
| Windows | $ 260.00 per flat | 218,400 |
| Electrical | $130,000.00 per block | 130,000 |
| Plumbing | $ 252.00 per flat | 211,680 |
| Lifts | $ 53,000.00 each | 159,000 |
| Hardware | $ 26.00 per flat | 21,840 |
| Pumps | $ 8,000.00 each | 16,000 |

| | |
|---|---|
| Total per 20 storey block | $ 3,096,137 |
| Total per 8 blocks | $24,769,096 |

Cube = 21,544,000 cu. ft.

APPENDIX VIII (Cont'd)

LOW BUILDING

| Item | Rate | Cost for Whole Building |
|---|---|---|
| R.C. Structure | $ .50 | $3,096,500 |
| Piling | $700.00 each | $ 575,000 |
| Finishes, as for tall blocks | $908.45 per flat | $1,044,717 |
| Roofing Asphalt | $ 1.30 sq. ft. | $ 146,380 |
| Windows | $260.00 per flat | 299,000 |
| Electrical | $120.00 per flat | 140,000 |
| Plumbing | $252.00 per flat | 289,800 |
| Hardware | $ 26.00 per flat | 29,900 |
| | Total cost for 6 storey block - | $5,621,297 |

Cube = 6,193,000 cu.ft.

## APPENDIX IX

## PROJECTS BY HONG KONG HOUSING AUTHORITY

| ESTATE | NO. OF FLATS | PERMITTED NO. OF PERSONS | APPROX. COST PER PERSON | CAPITAL COST IN MILLION $ | CAPITAL COST INCLUDES |
|---|---|---|---|---|---|
| **ESTATE COMPLETED** | | | | | |
| North Point Estate | 1,955 | 12,265 | $2,576 | 31.6 | 71 shops, estates office assembly hall |
| Sai Wan Estate | 638 | 3,892 | $2,261 | 8.8 | 5 godowns, estate office, welfare centre |
| So Uk Estate (Phase I, II & III) | 3,537 | 22,331 | $1,661 | 37.1 | 36 shops, Post office, estate office assembly hall, kerosene service store. |
| **ESTATE UNDER CONSTRUCTION** | | | | | |
| So Uk Estate (Phase IV) | 1,796 | 11,104 | $1,558* | 17.3 | 3 kindergartens |
| Choi Hung Estate | 7,574 | 43,400 | $1,166* | 50.6 | Post office, 45 shops, estate office kerosene service store. |
| Ma Tau Wai Estate (Phase I) | 1,624 | 9,964 | $1,455* | 14.5 | 21 shops(19 with living accom.) Estate office, party rooms. |
| Kwun Tong Estate (Phase I) | 864 | 5,264 | $1,254* | 6.6 | 16 shops, estate office. |

ESTATES IN PLANNING STAGE

| | | | | | |
|---|---|---|---|---|---|
| Ma Tau Wai Estate (Phase II) | 490 | 2,758 | $1,102* | 3.04 | |
| Tsuen Wan Estate | 2,680 | 16,080 | $1,121* | 18.03 | 16 shops, estate office, party rooms kindergarten, kerosene service store. |
| TOTAL | 21,158 | 127,058 | | 187.57 | |

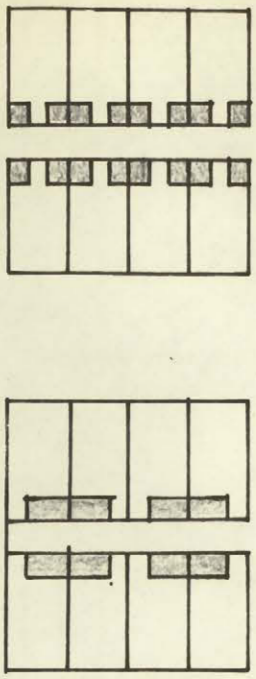
* **Estimated**

# A P P E N D I X  X

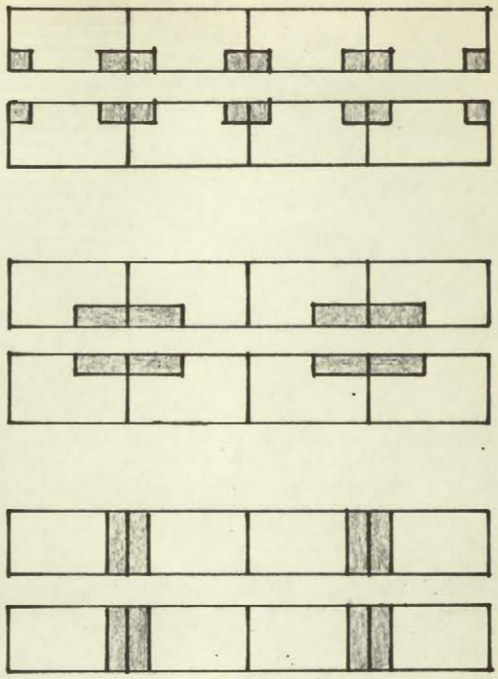
## Various Types of High Rise Domestic Buildings

CORRIDOR TYPE

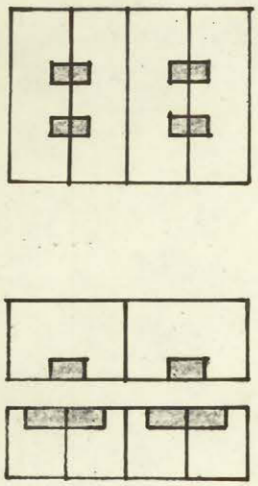
Interior Corridor: basic disposition units and core elements.



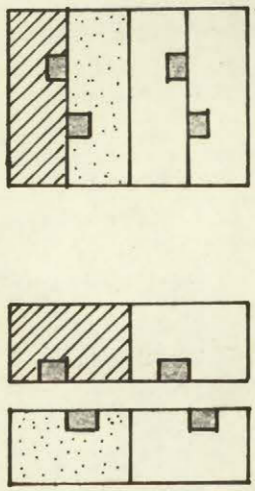
1. Deep, narrow units, minimum corridor length, economical construction and maintenance.



2. Wide shallow units most flexible, maximum corridor and frontage.

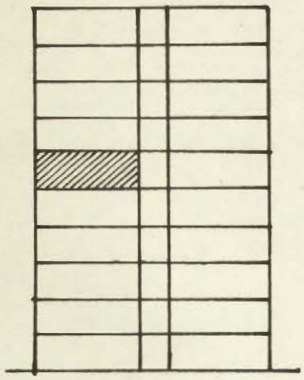


Combination of 1 and 2 on alternate floors, through ventilation in alternate units

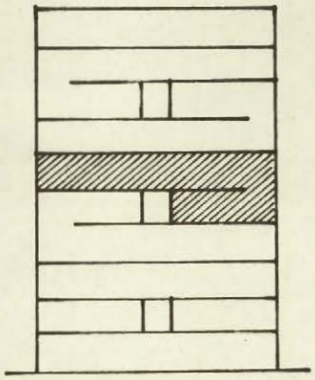


1 and 2 combined in one unit, units interlocked, through ventilation for all units.

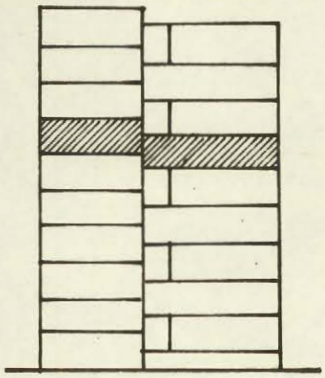
CORRIDOR TYPE



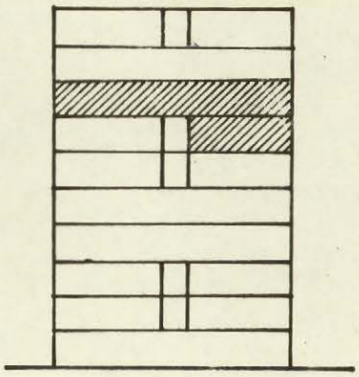
P.p. 225-9



p. 230

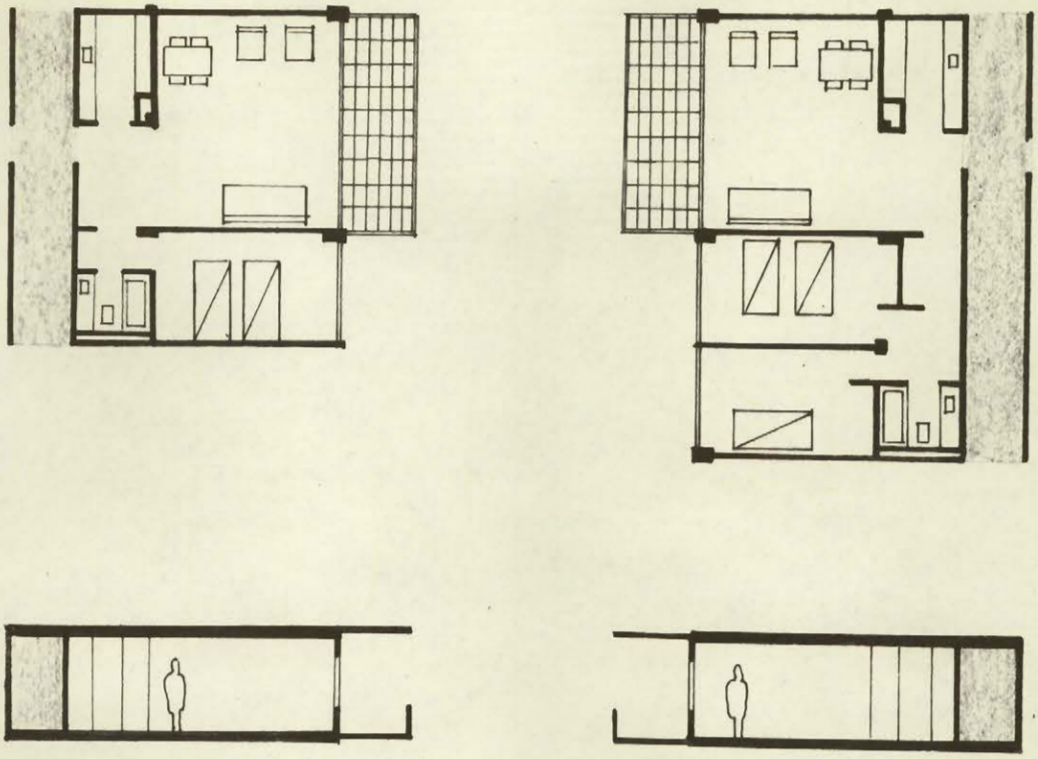


p.p.231-3



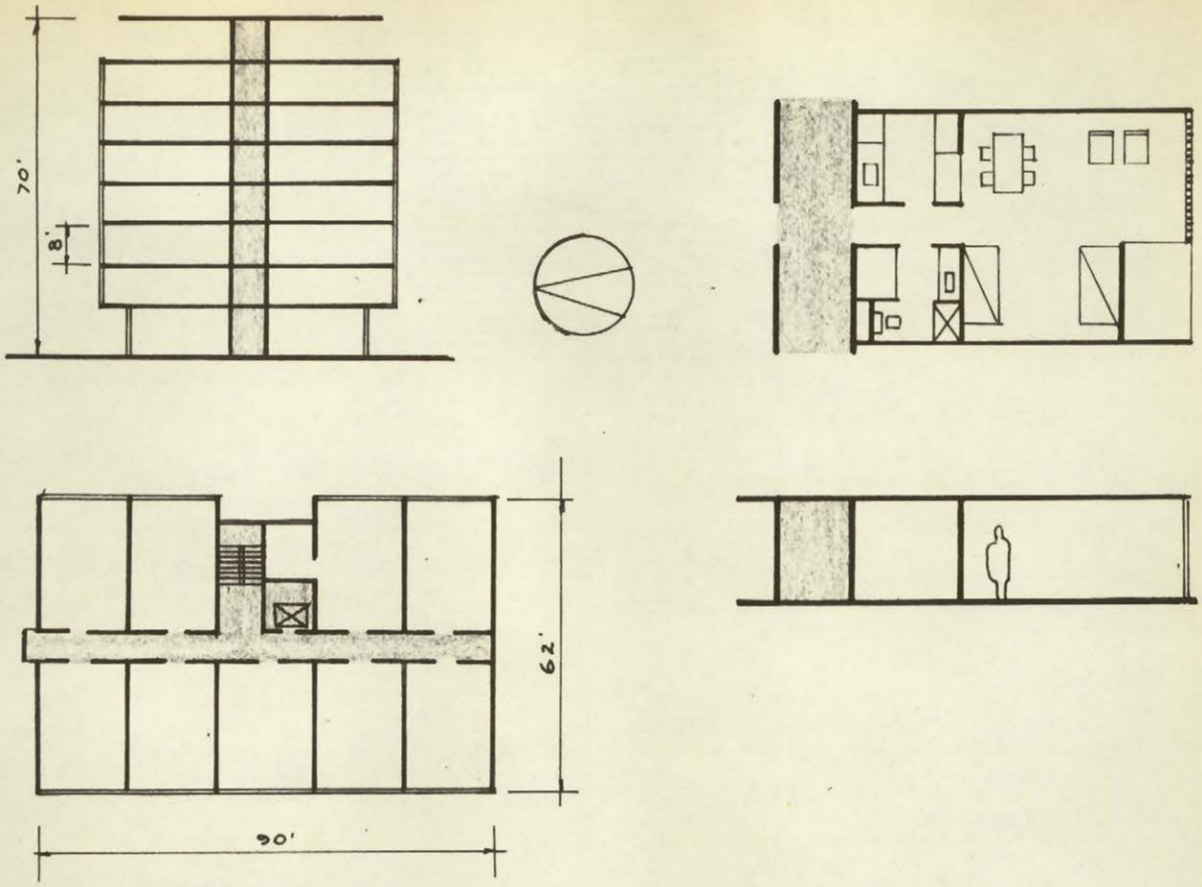
pp. 234-5

Sections may be stacked, split, or interlocked and stacked to eliminate corridors, gain through ventilation, and create more interesting spaces.

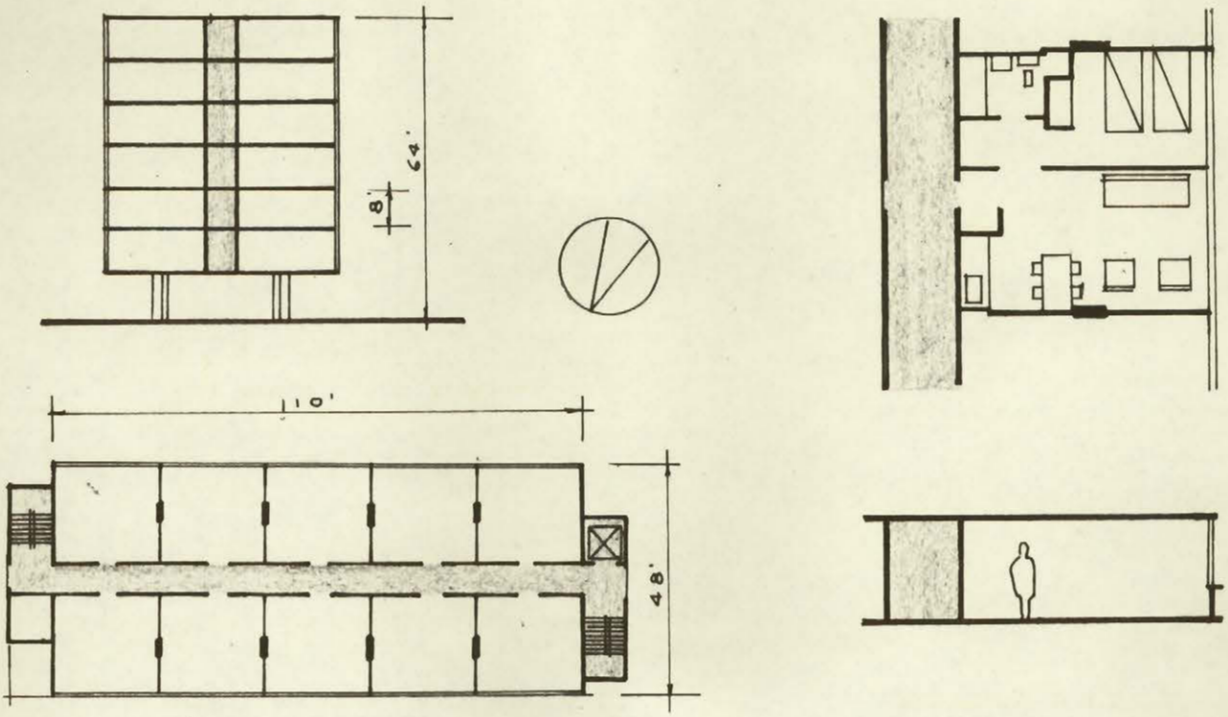



Apartment house, Asburry Park, New Jersey, U.S.A.
Edward D. Stone.
Progressive Architecture, January 52.

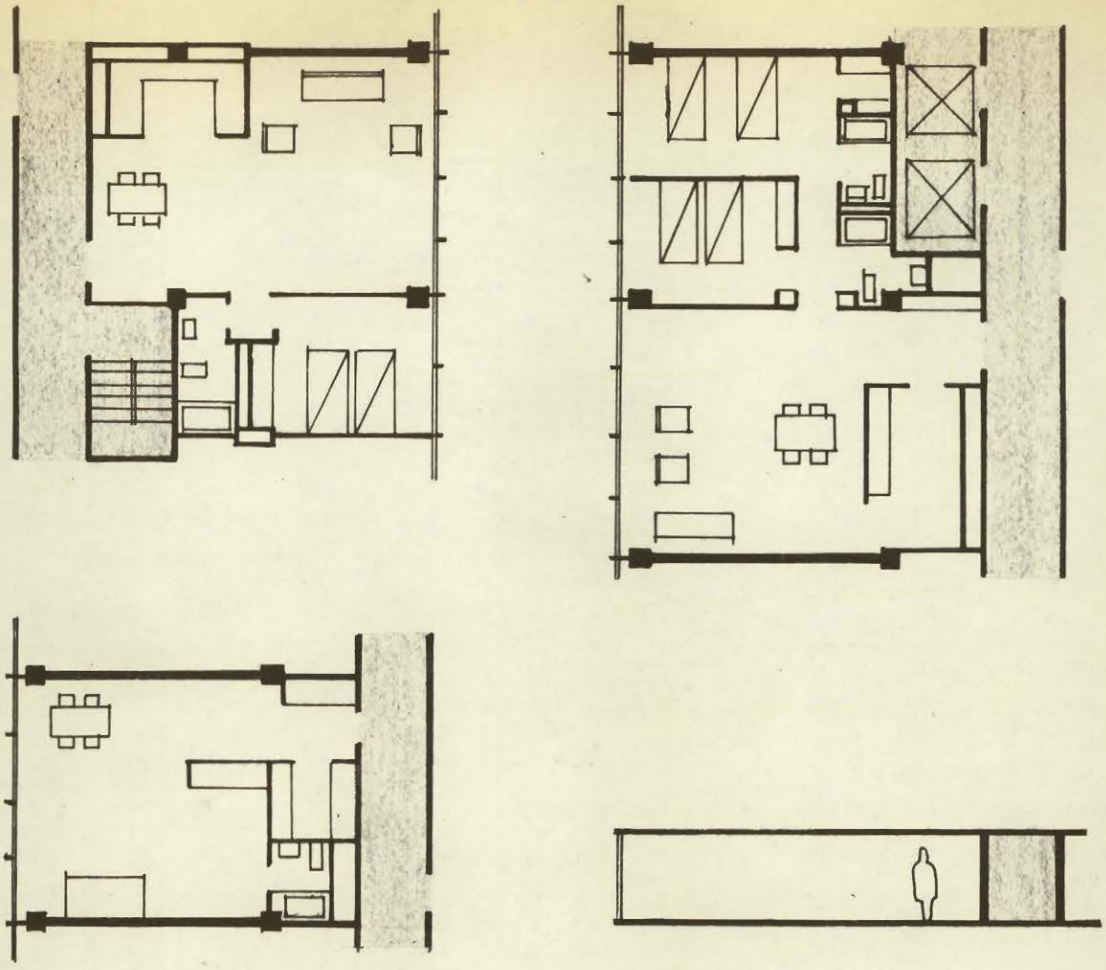
CORRIDOR TYPE

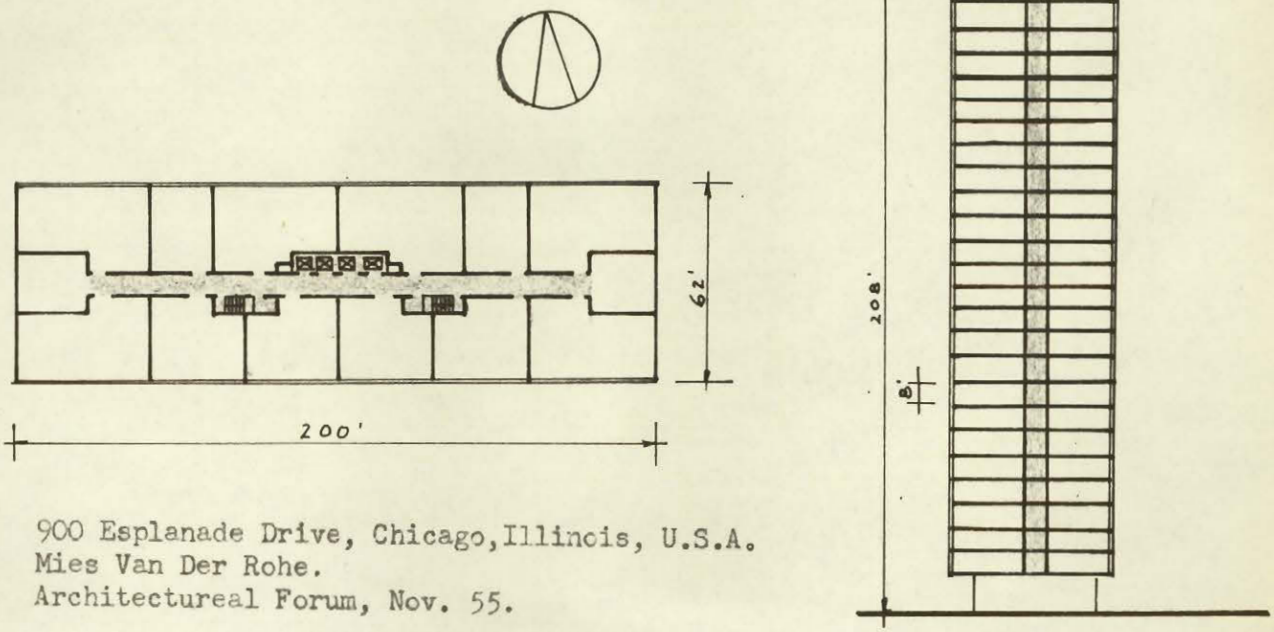



Montserrat, Caracus, Venezuela,
Guinand and Benacerraf.
Architecture D'Aujourd'hui, Oct. 56.

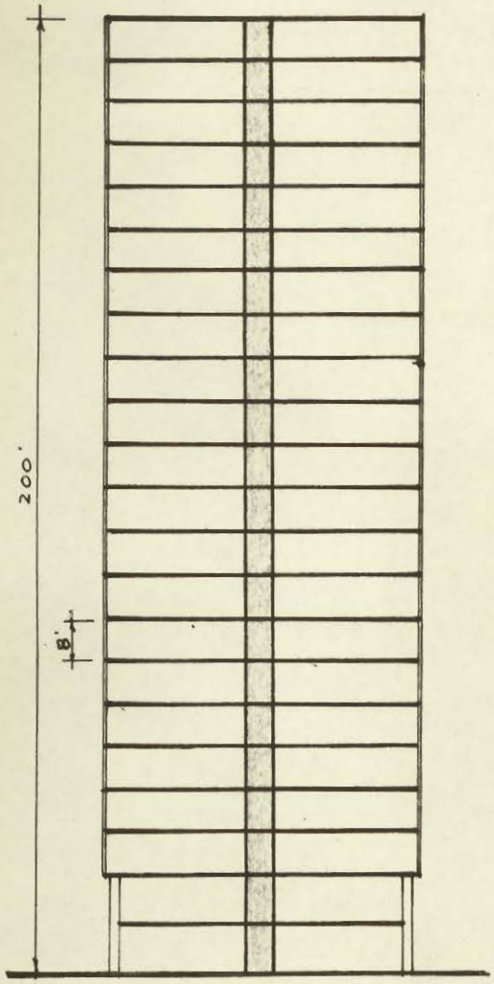


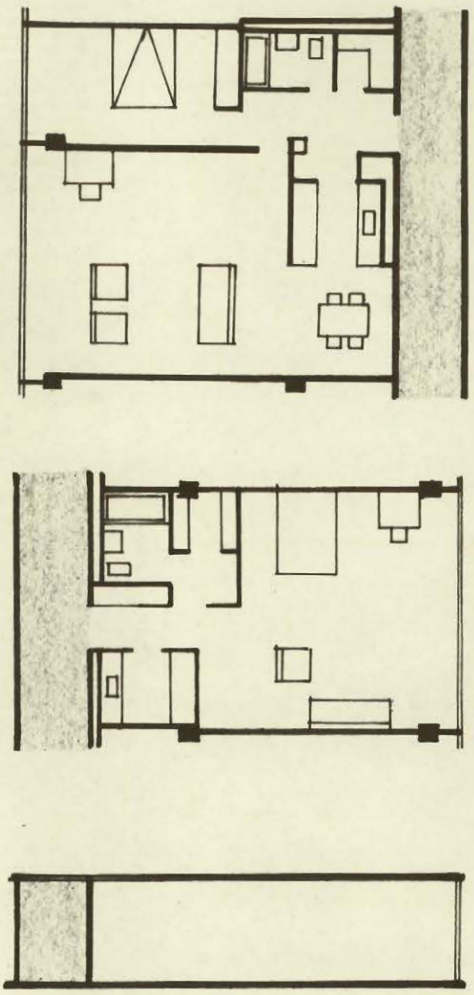

Barbizon Tower Apt., Atlanta, Georgia, U.S.A.
John W. Cherry.
Progressive Architecture, Nov. 52.



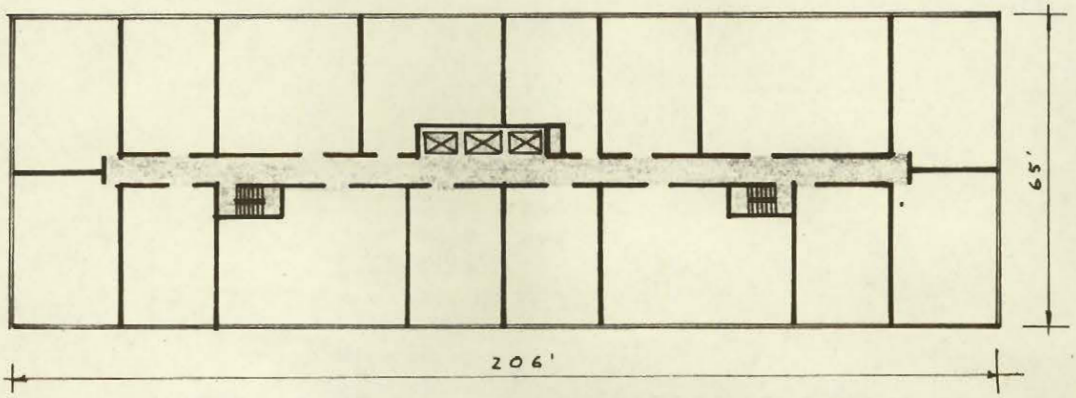


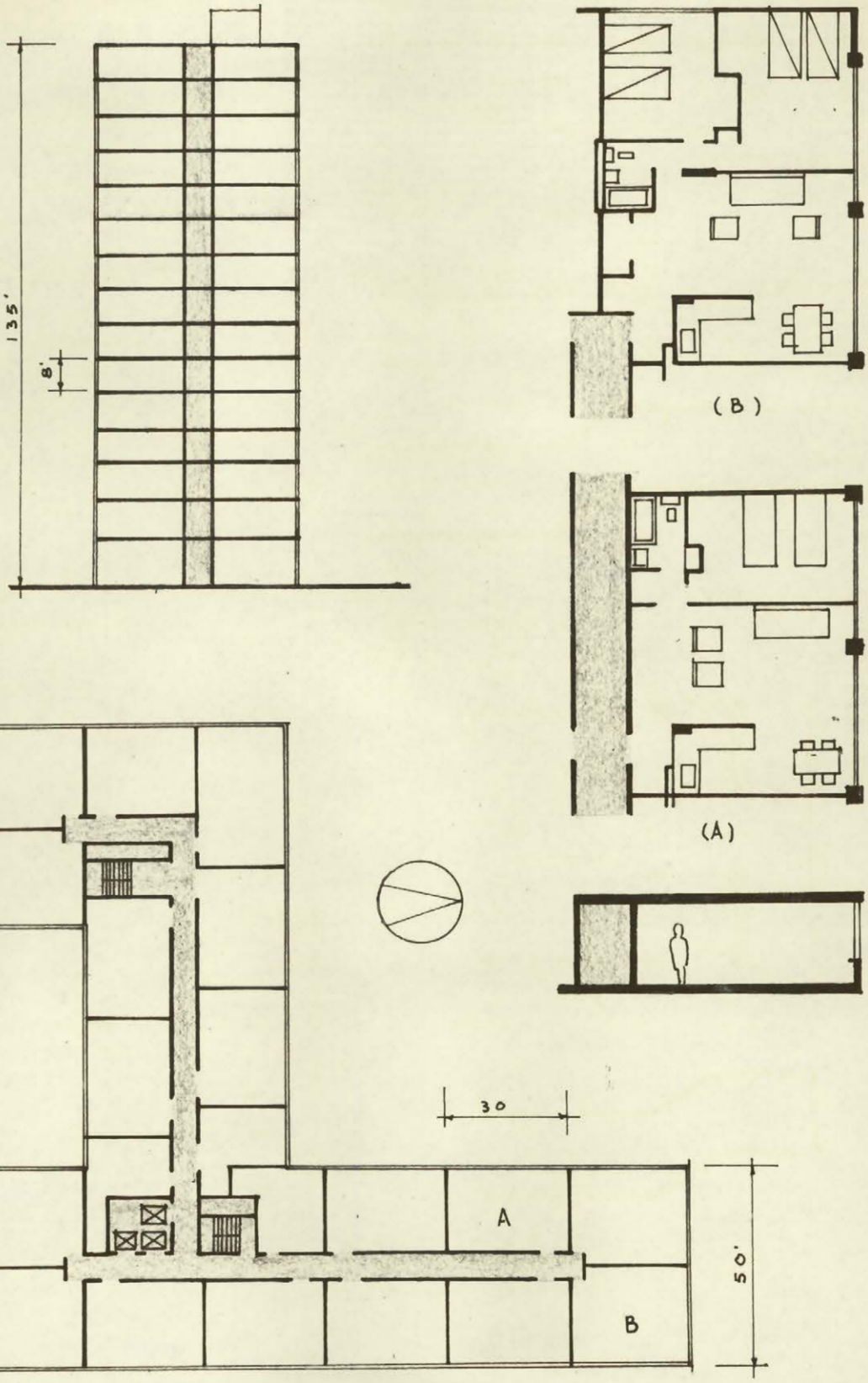

900 Esplanade Drive, Chicago, Illinois, U.S.A.
Mies Van Der Rohe.
Architectureal Forum, Nov. 55.



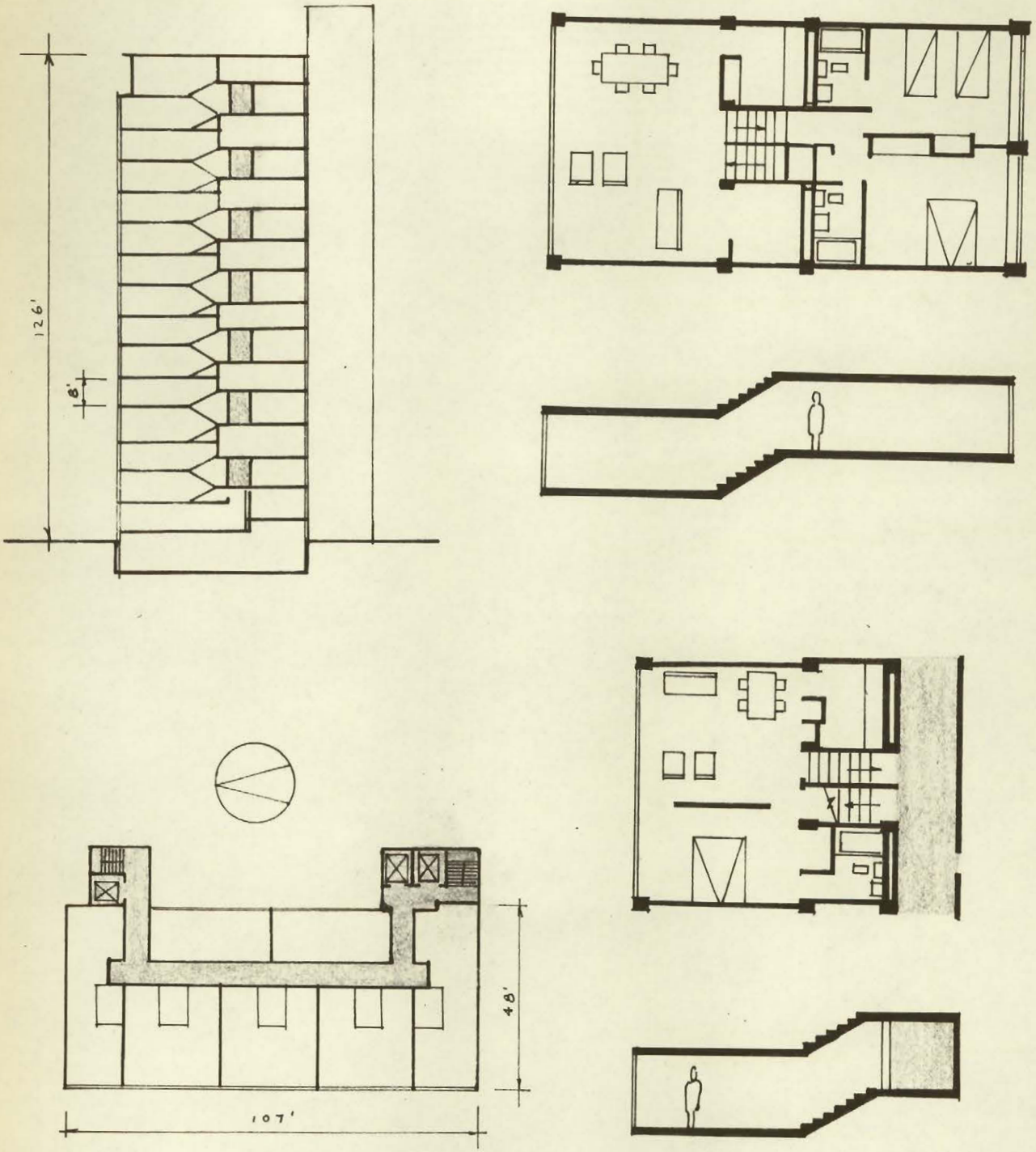
Lafayette Park, Detroit, Michigan, U.S.A.
Mies Van Der Rohe.
Arch. Forum, March, 57.





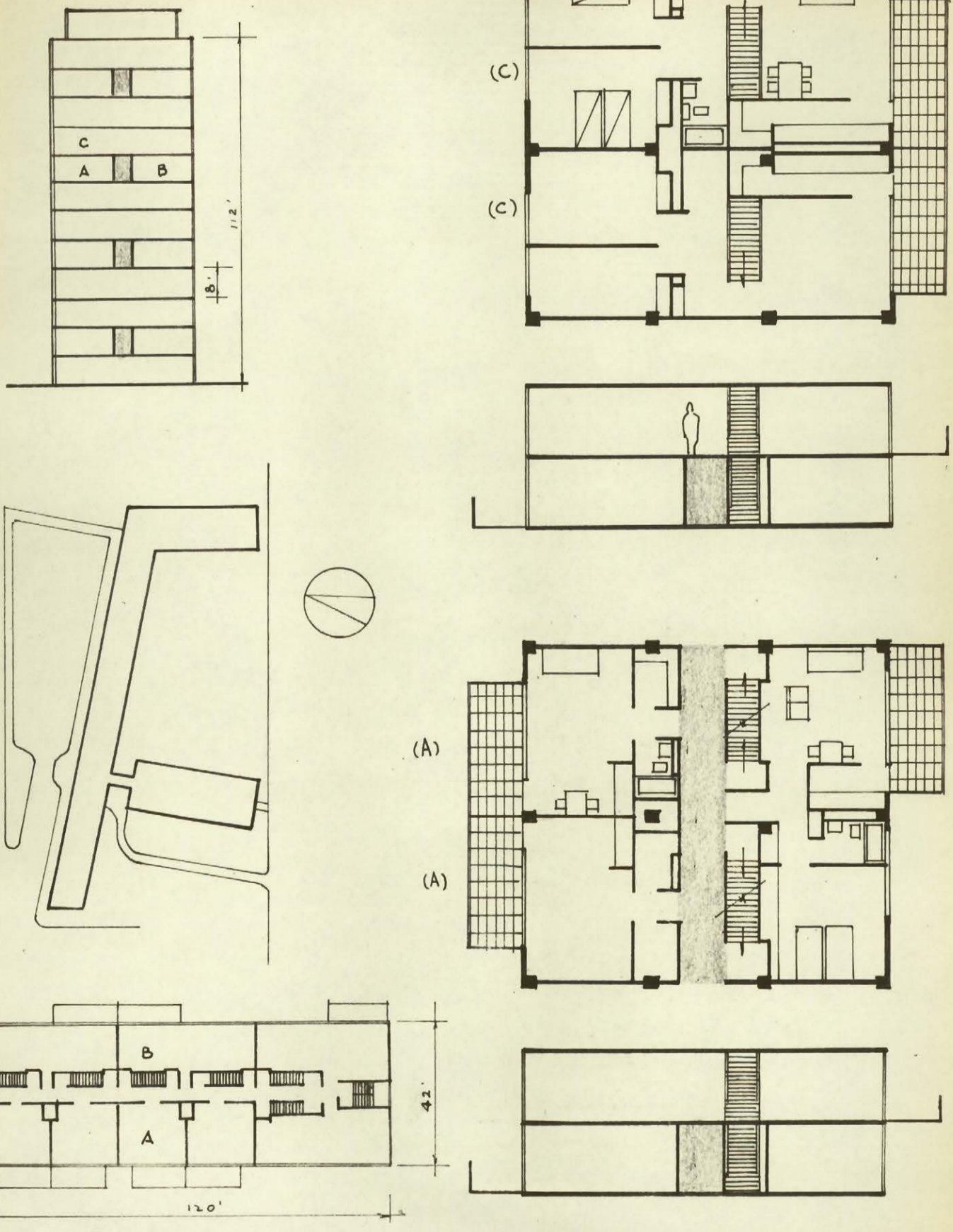

Flamings Apt., Philadelphia, Pennsylvania, U.S.A.
John H. Graham.
Progressive Architecture, Nov. 52.

CORRIDOR TYPE



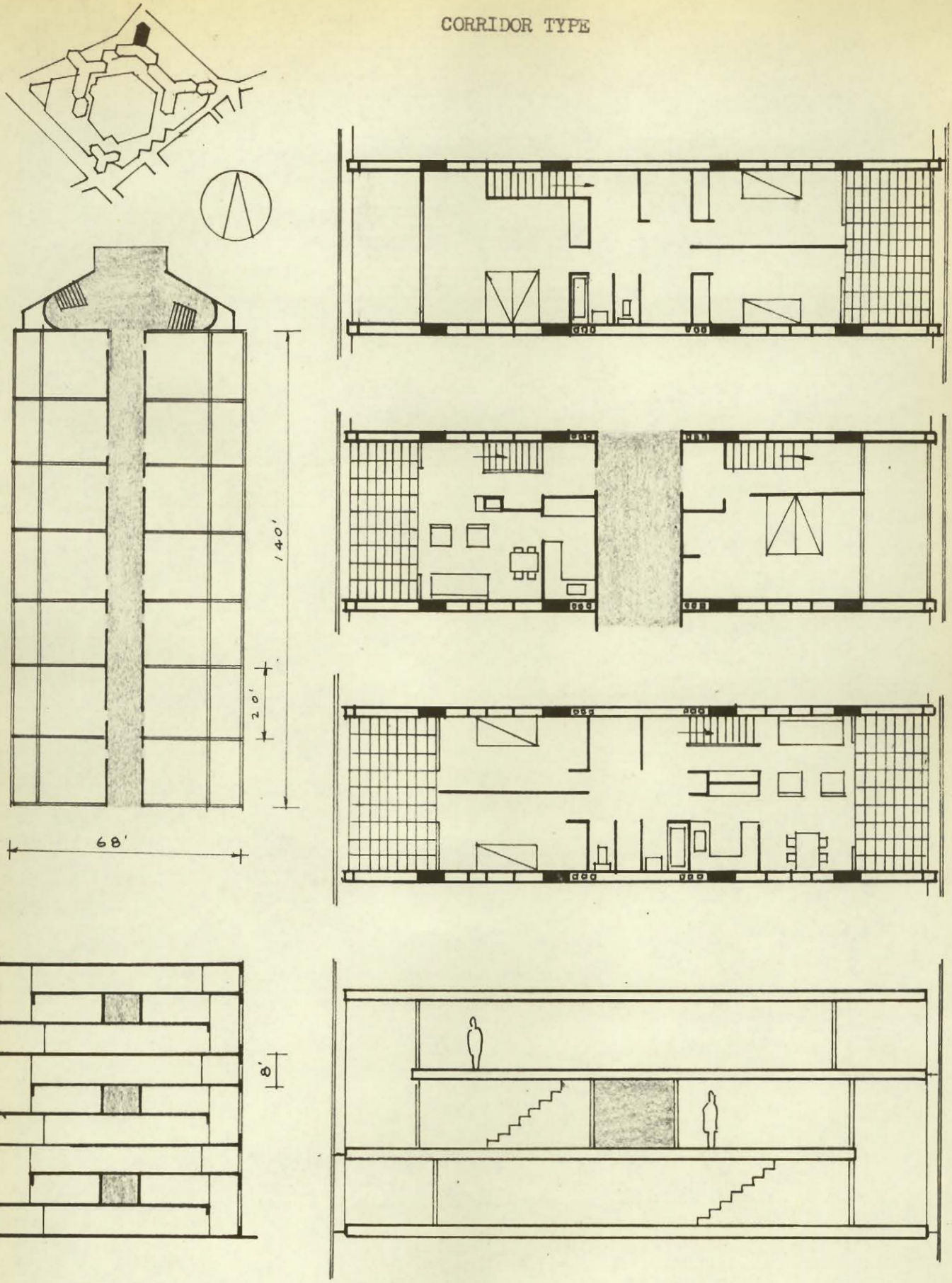

Apartment House, Boston, Massachusetts, U.S.A.
Glaser and Gray
Arch. Forum, Jan. 52.

CORRIDOR TYPE



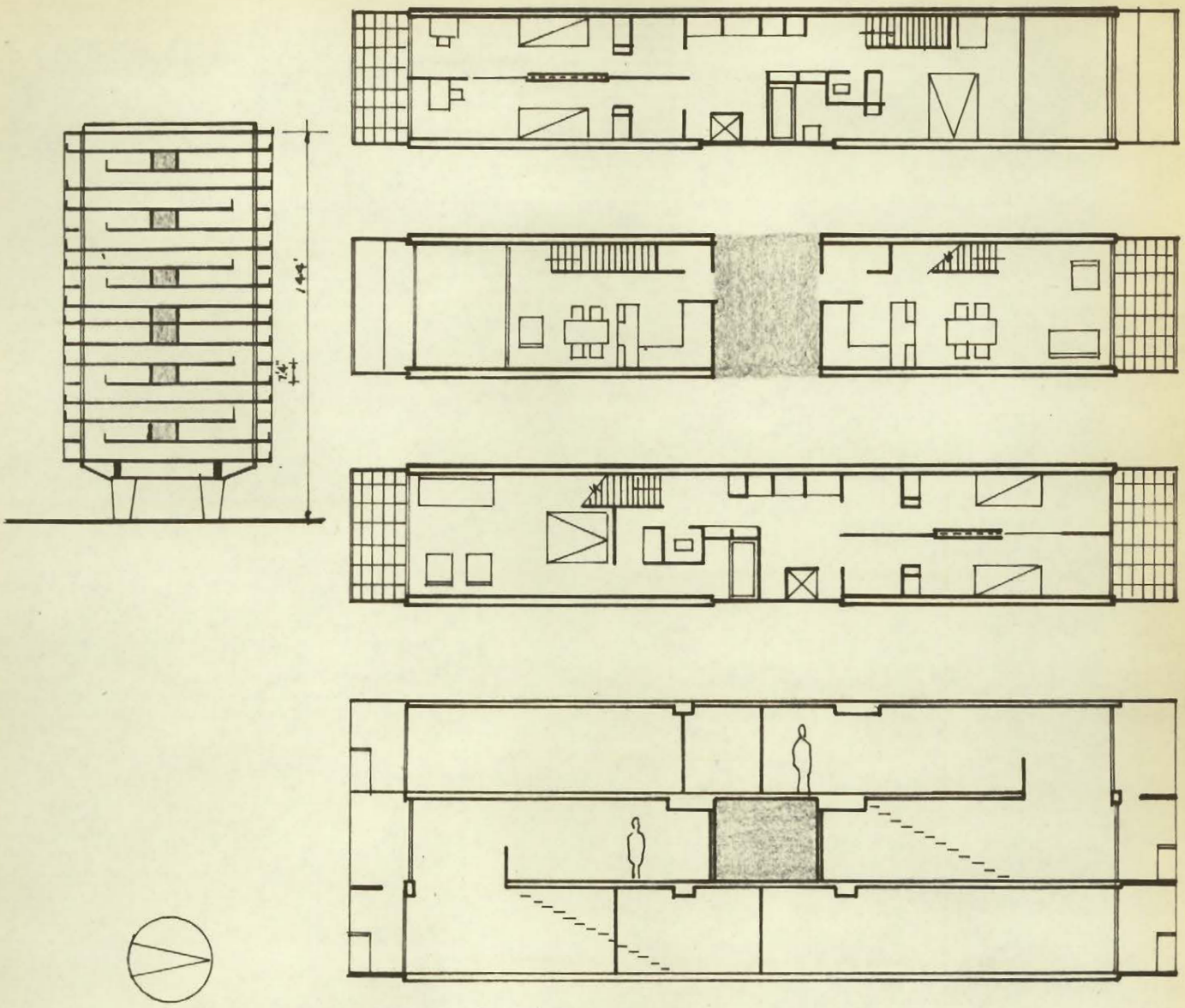

Eastgate, 100 Memorial Drive, CAmbridge, Massachusette, U.S.A.
Brown, Koch, Kennedy, DE Mar, Rapson.
Arch. Forum, MAy, 51.

CORRIDOR TYPE

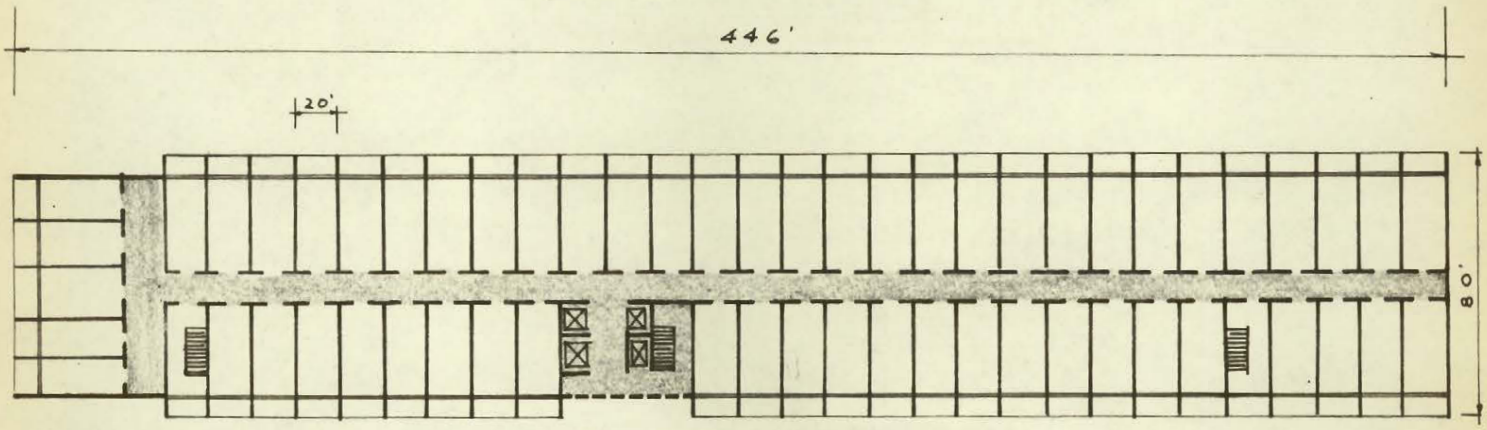



High Paddington, London, England.
Sergei Kadleigh.

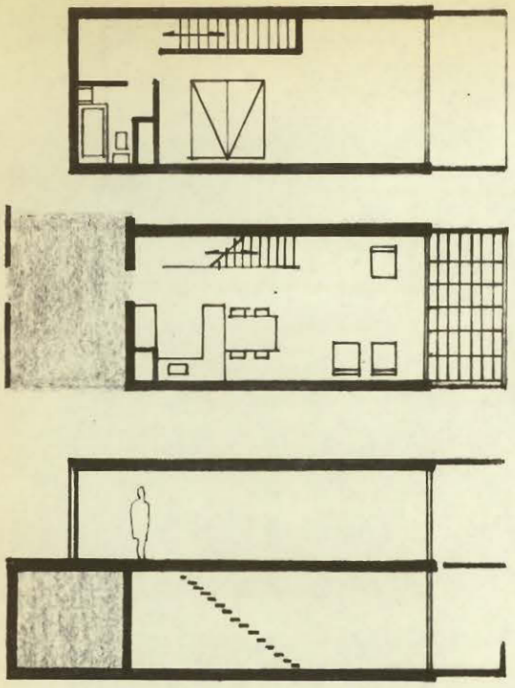
CORRIDOR TYPE

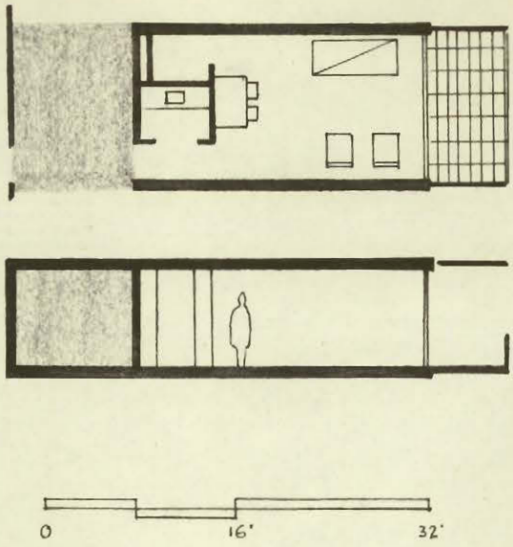


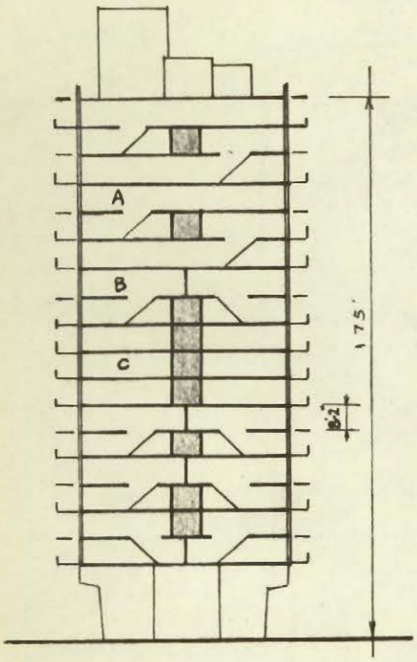

United' D'Habitation, Marseilles, France.
Le Corbusier.

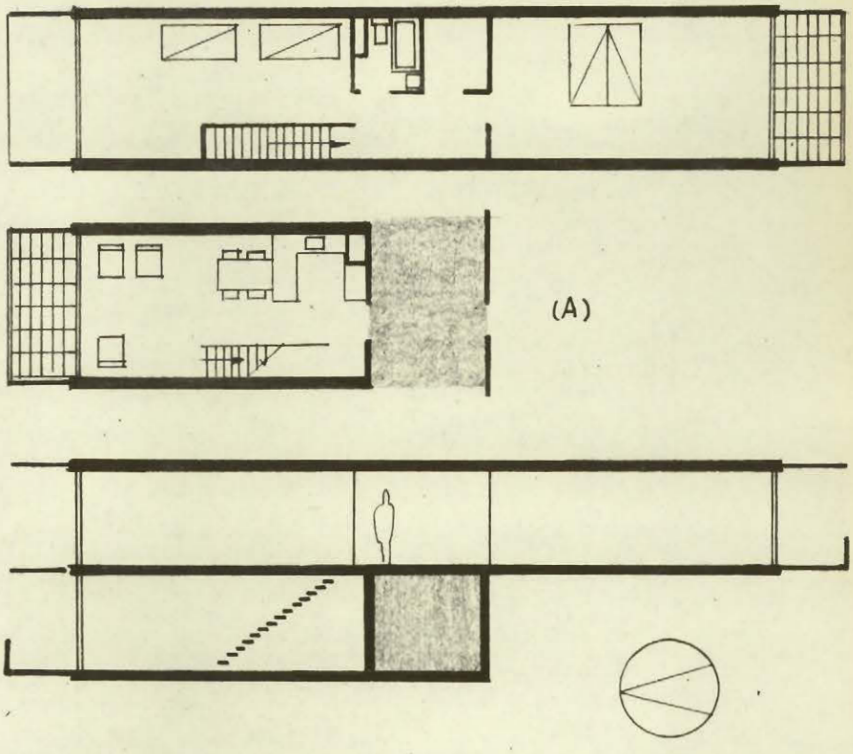


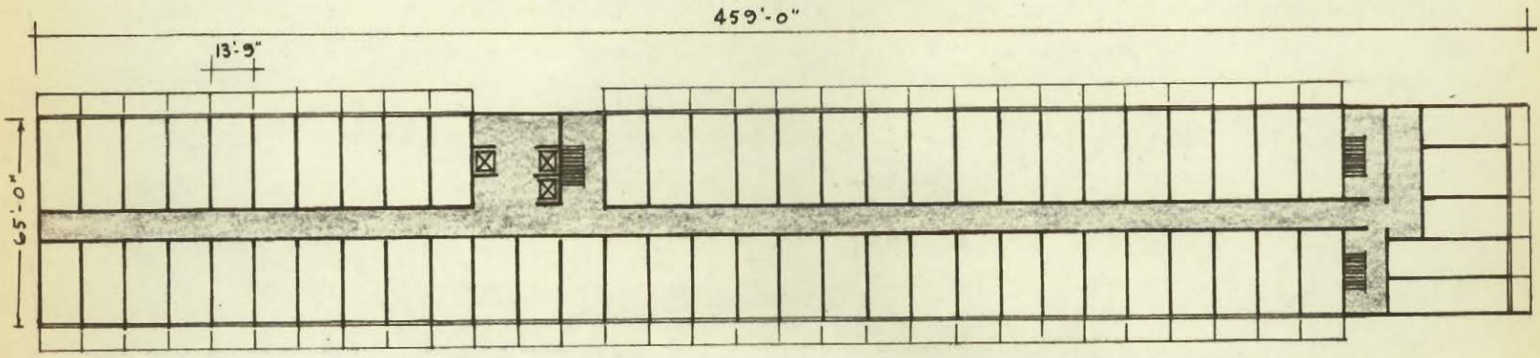
United' D'Habitation, Berlin Germany.
Le Corbusier
Interbau



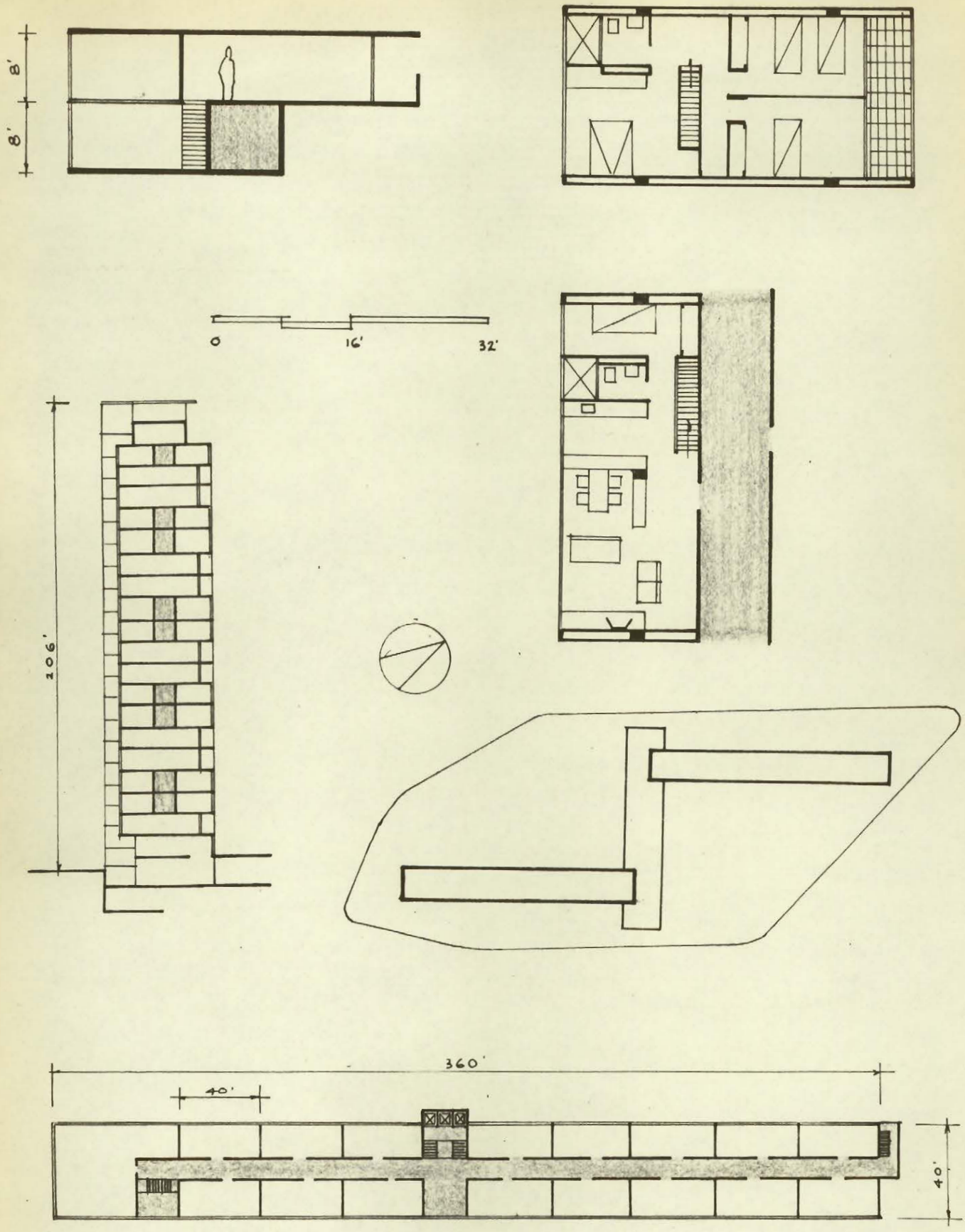



CORRIDOR TYPE

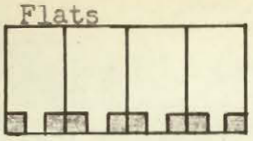



United' D'Habitation, Bogota, Columbia.
Ortega and Soano
Aujourd'hui, Sept. 55.

# GALLERY TYPE

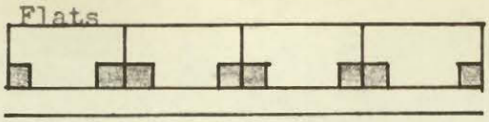
Gallery:- basic disposition of units and core elements.

Flats

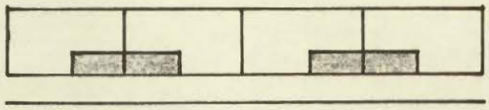


Narrow flats, kitchen and bath split, limited flexability

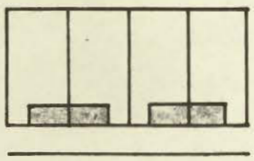
Flats



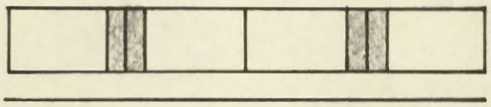
Split kitchen and bath core, wide exposure and more flexibility than at left.



As above except kitchen and bath cores joined.

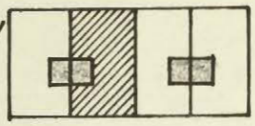


As above except kitchen and bath cores joined.
Both have minimum public area, optiminm privacy, and through ventilation.

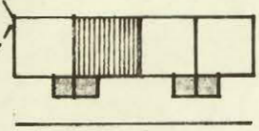


As above except core backed to adjacent unit; less privacy along gallery.
All three have maximum public area, less privacy but ventilation good.

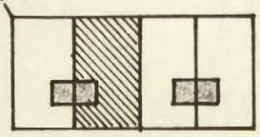
Flats



Upper level flat entered from gallery beneath.

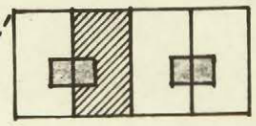


Gallery level flats, conditions similar to units above.

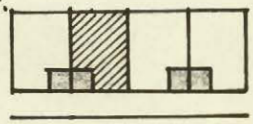


Lower level flat, entered from gallery above, similar to upper level unit.

Maisonette



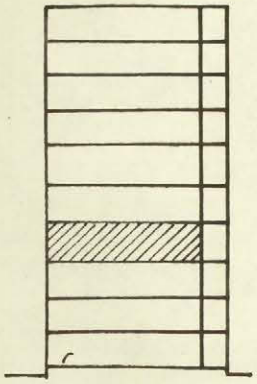
Upper or lower level completely private.



Gallery level, similar to units above.

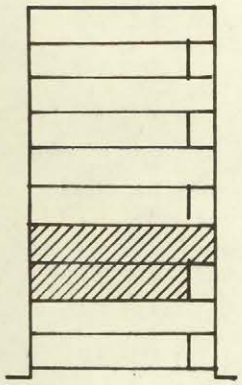
# GALLERY TYPE

Sections indicating disposition of units.



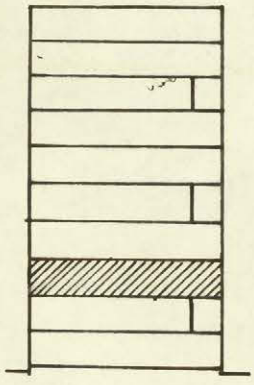
Flats stacked

p. 237-8



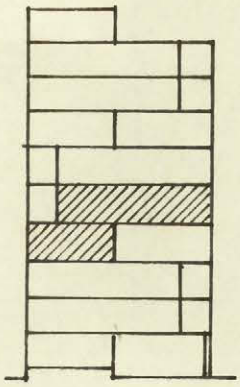
Maisonettes stacked

p. 239



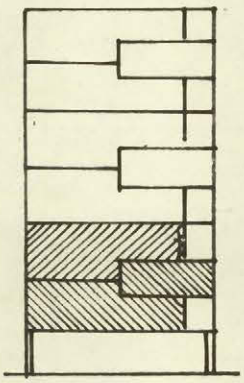
Flats on 3 levels with entry from gallery.

p. 240



Duplexes interlocking horizontally, gallery on alternate sides.

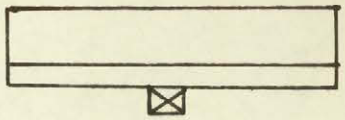
p. 241



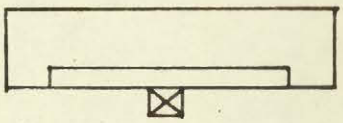
Split level, galleries doubled.

p. 242

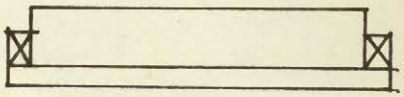
Vertical access to gallery.



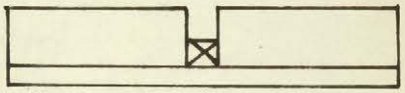
Lift alongside.



Lift along side.
Building with end units.

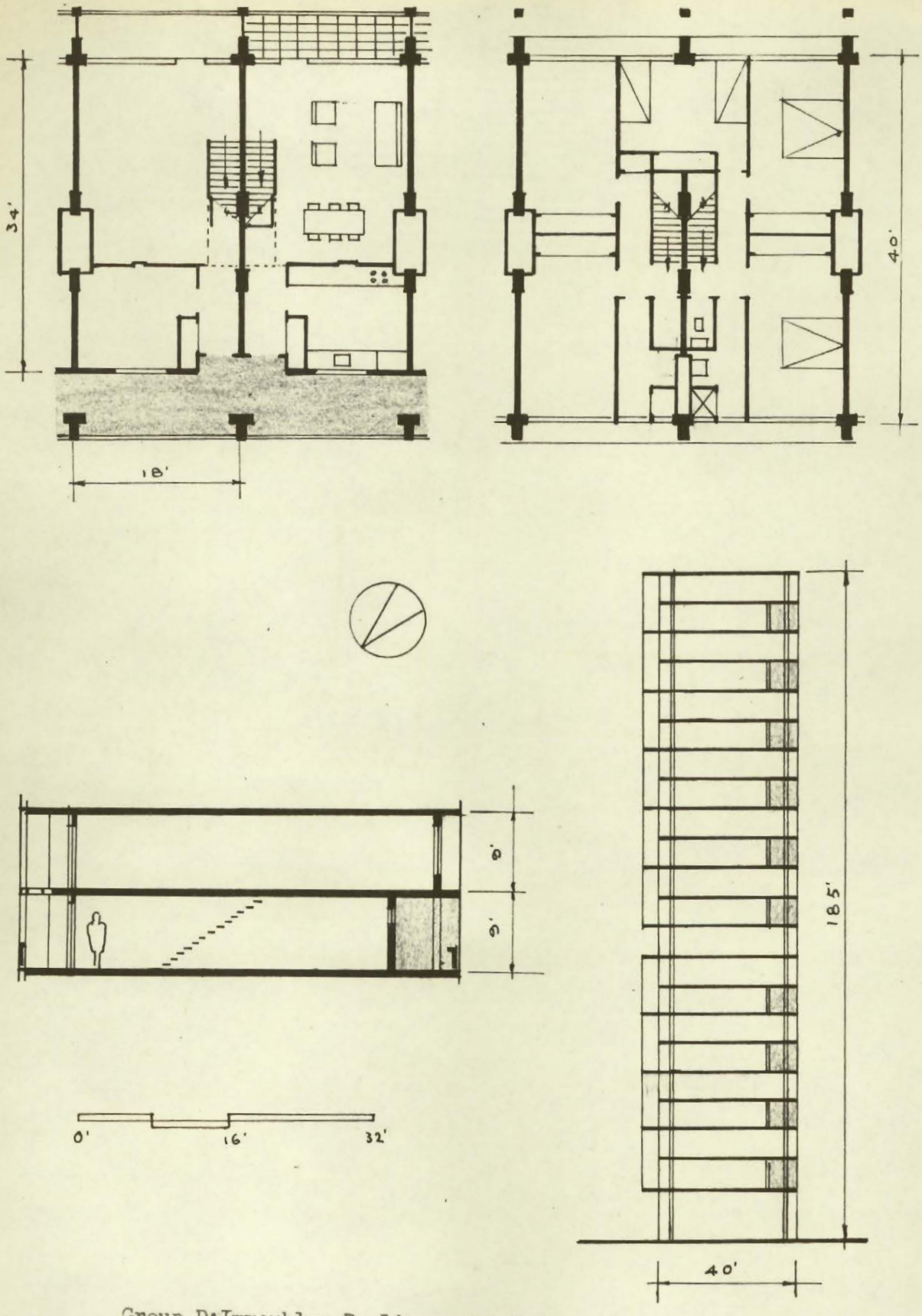


Lifts at ends.



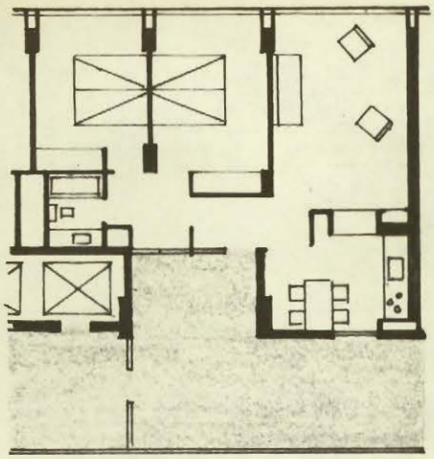
Lift at middle.

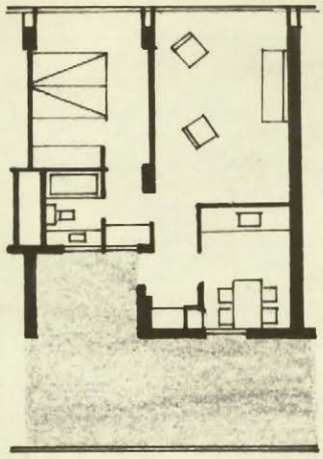
GALLERY TYPE

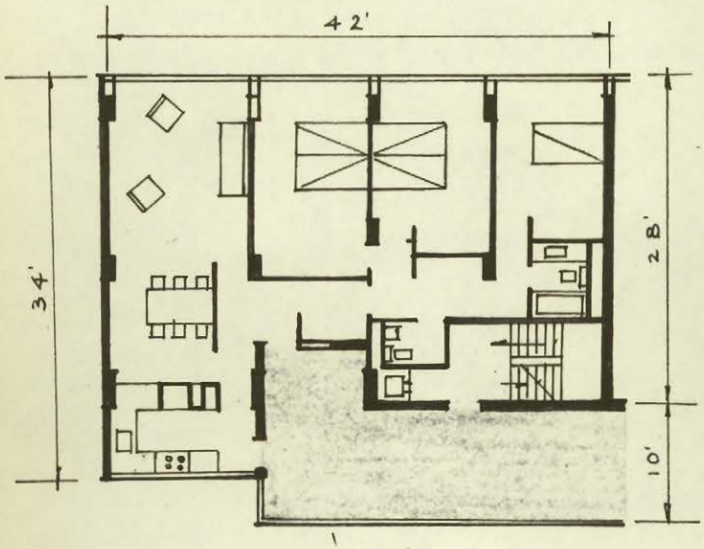


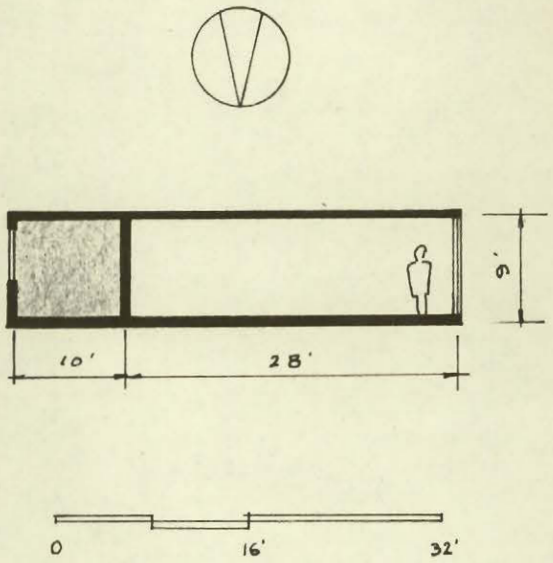

Group D'Immeubles De L'aero Habitat, Algier, Africa.
P. Bourlier, L.Miquel, J. Ferrer-Laloe and H. Allinguy.
L'Architecture D'aujourd'hue, June 1955.

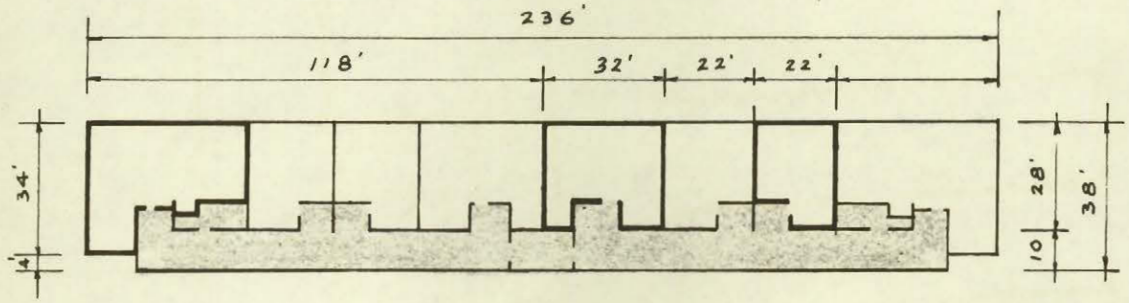
GALLERY TYPE



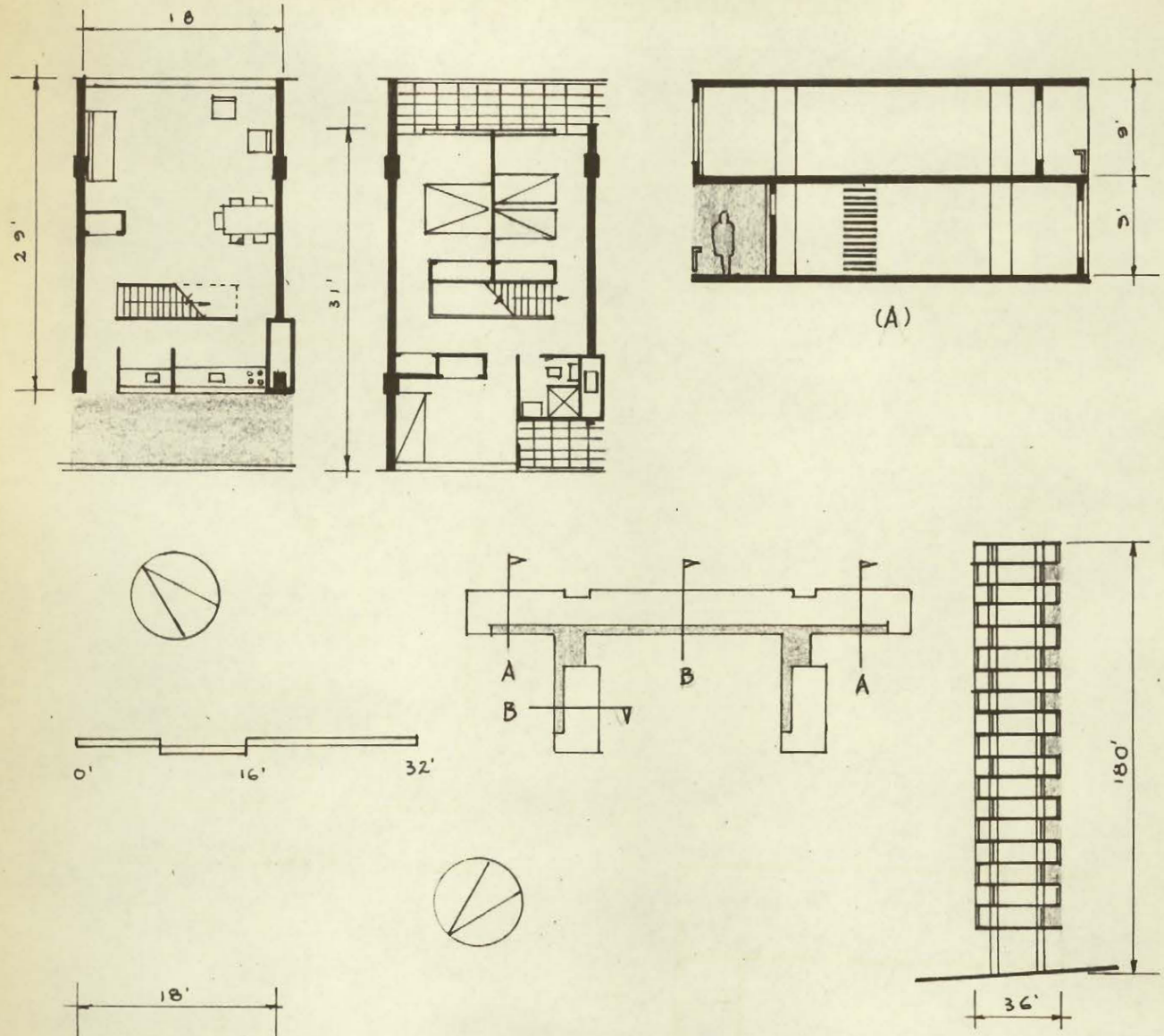




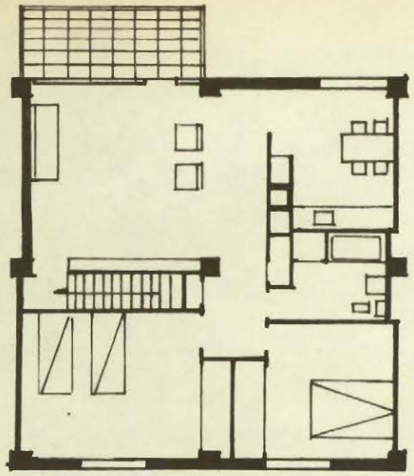



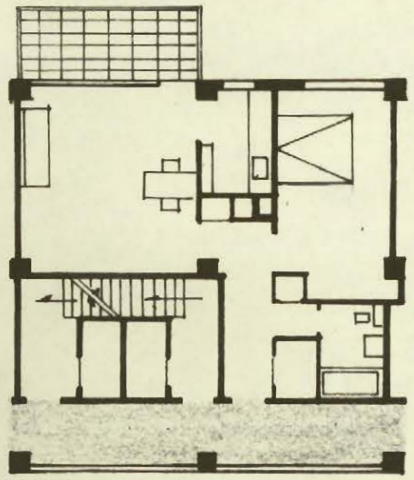

Gallery Apt. (proposal)
Bautechnik Der ECA- Entwicklungsbauten
Neuer Wohnbau 1952

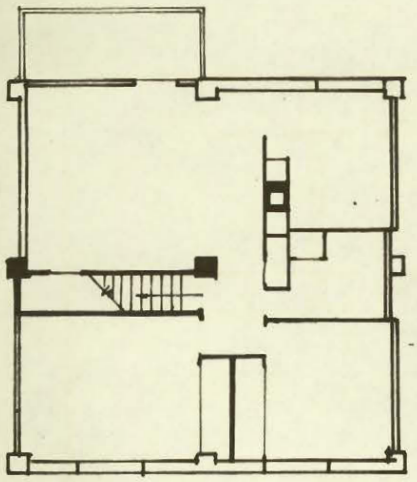


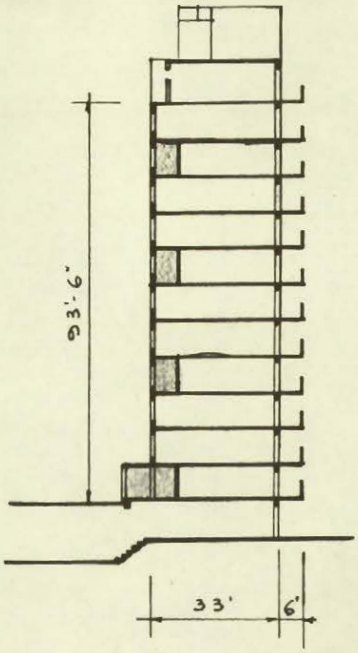

Unit of Residence, El Paraiso, Caraccas, Venezuela
Carlos Raul Villanueva and C. Celio

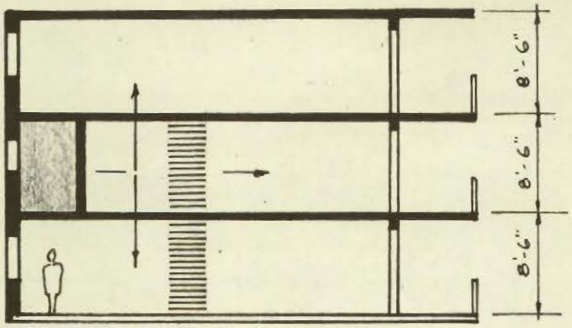
GALLERY TYPE

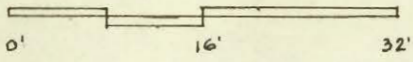






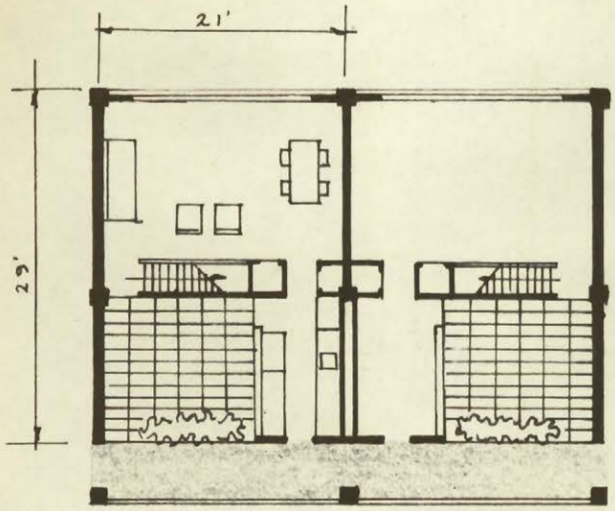


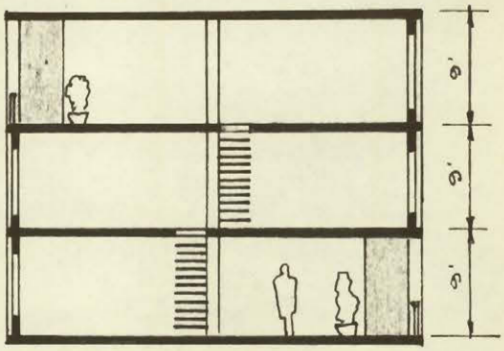



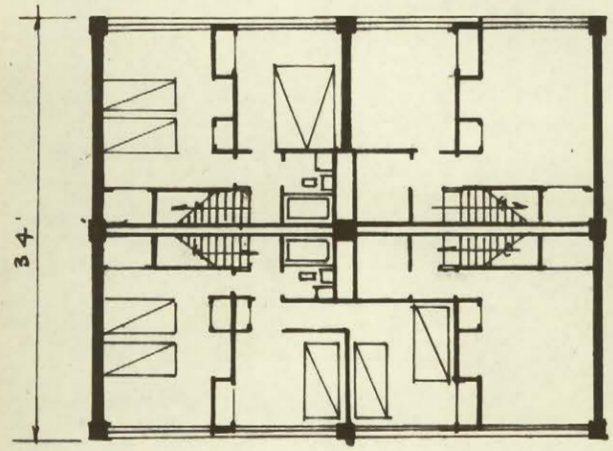



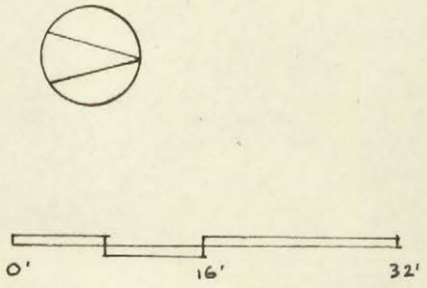

Eastgate, Cambridge, Massachusette, U.S.A.
Brown, Kock, Kennedy, Demars, Rapson.
Magazine of Building, May 1951.

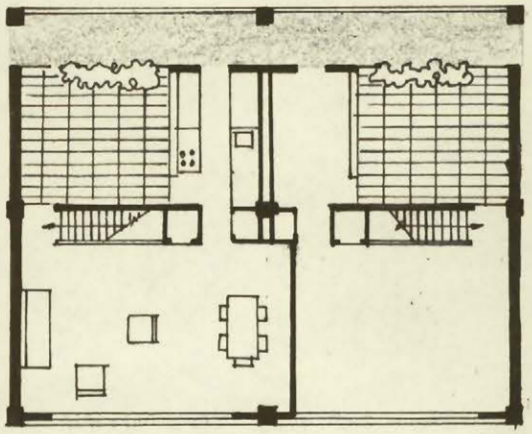
GALLERY TYPE

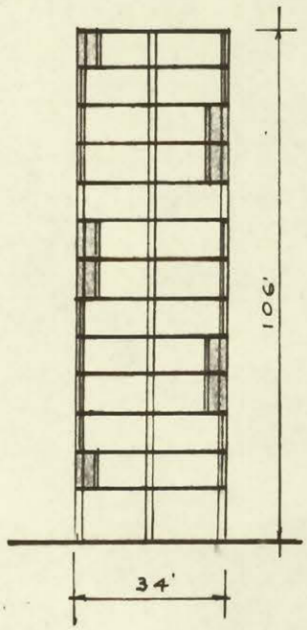


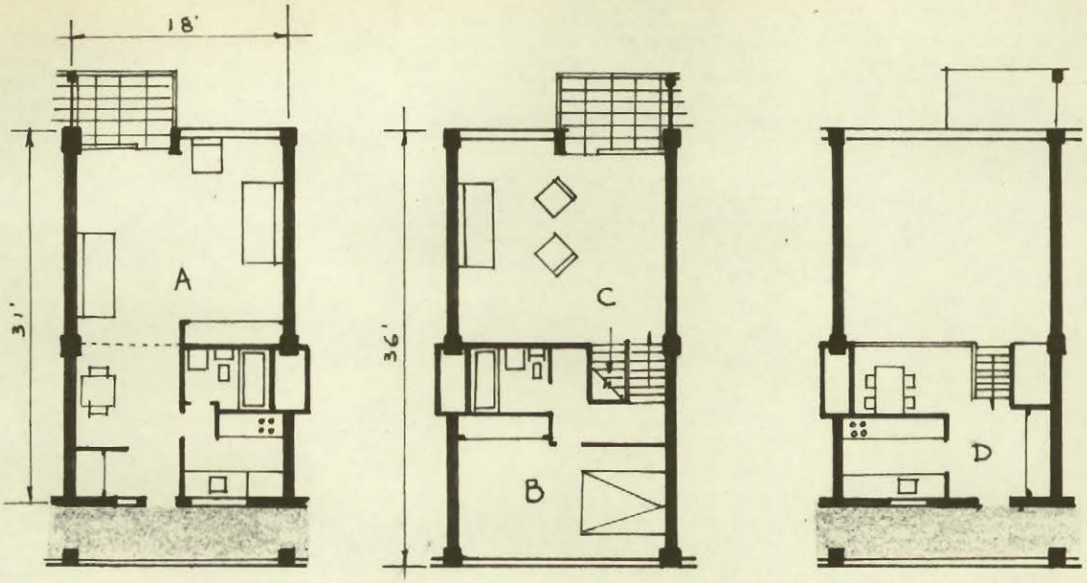



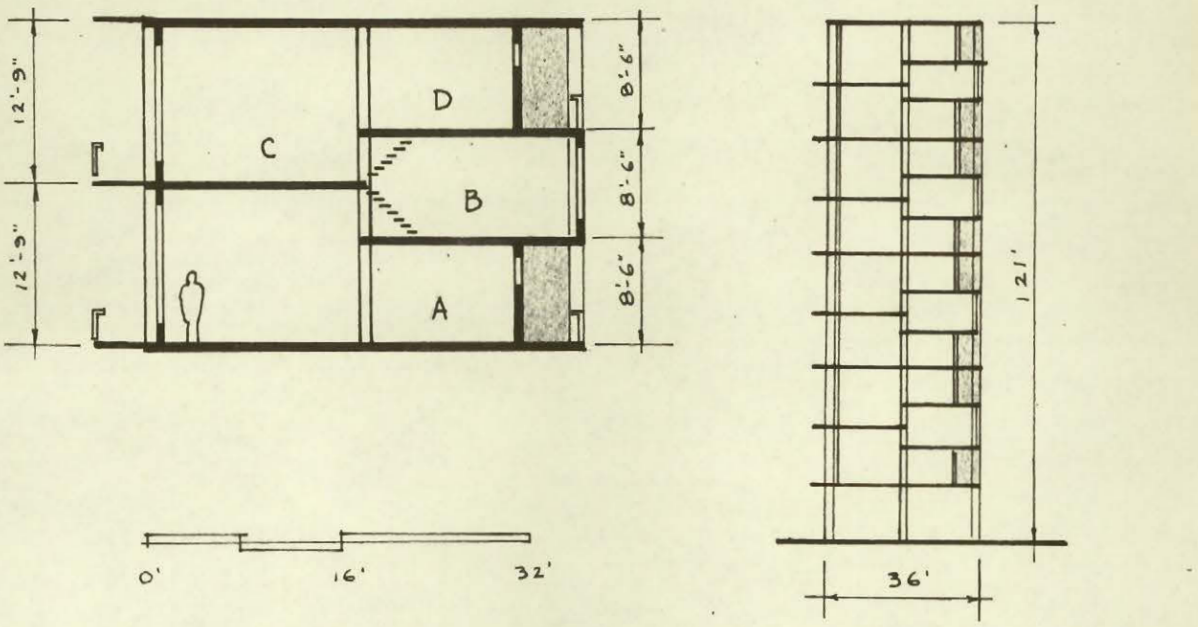






Apartment Building (proposed)
Leinweber, Yamasaki, Hellmuth.
Arch. Forum, Jan. 52.

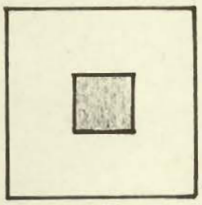
GALLERY TYPE



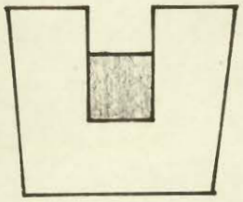

Park Apartments, New York, U.S.A.
Peter Black, Serge Chermayeff, Abel Soreson, N. Fletcher, H. Hebbelin.
Apartment Houses 1947.

TOWERS



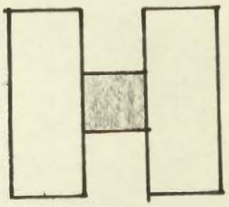
Central core has no connection to exterior, cross ventilation. All orientations possible.

p.p. 244-8



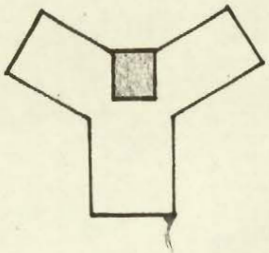
Exterior core leaves 3 sides for favourable orientation.

p.p. 249-250



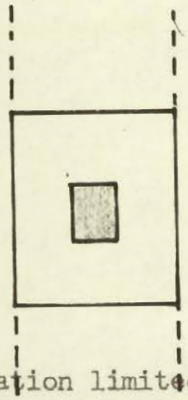
Core accessible on 2 sides from exterior. Maximum ventilation.

p.p. 251-3



Core at crossing point of 3 or more wings. Through ventilation.

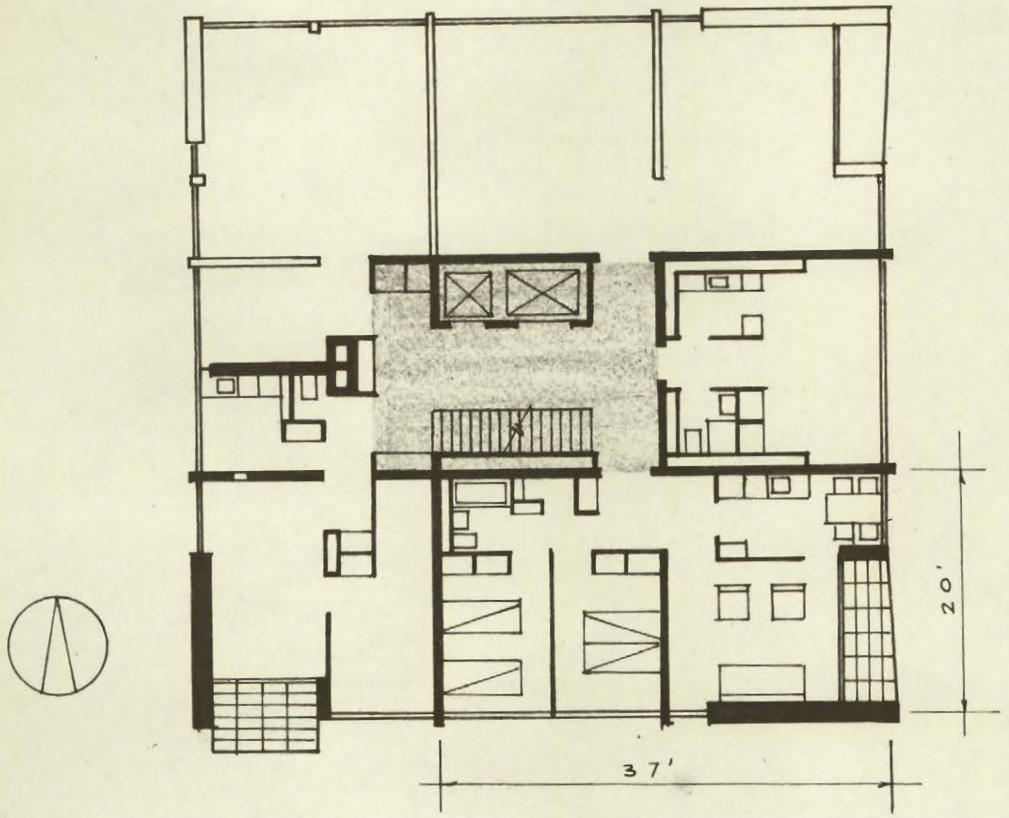
pp. 254-7

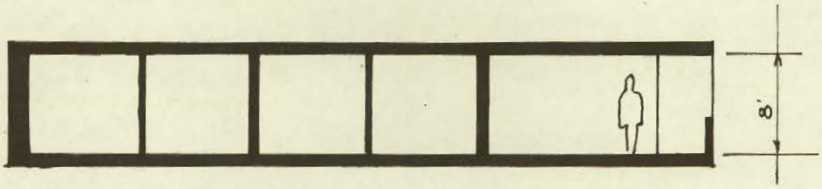


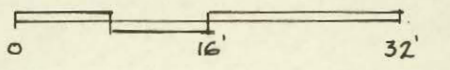
Orientation limited to to sides. Through ventilation, combination into slabs possible.

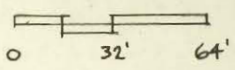
p.p. 258-9

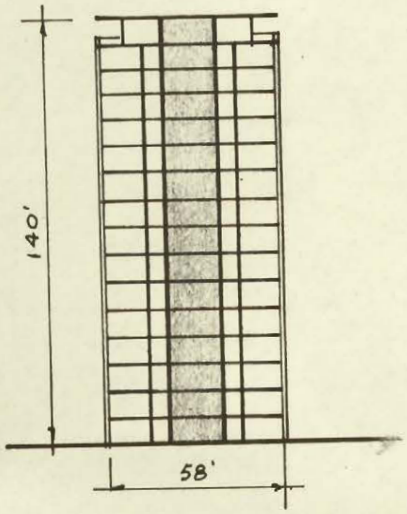
TOWER



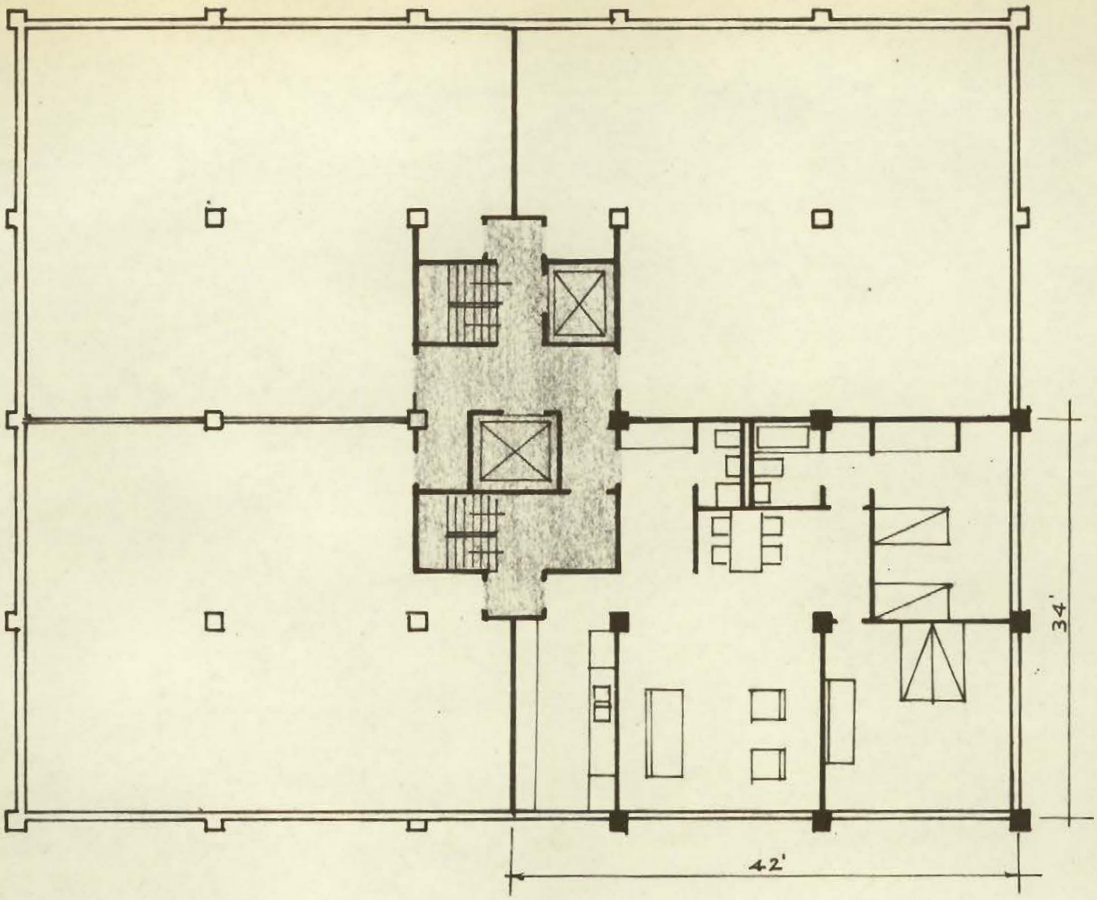



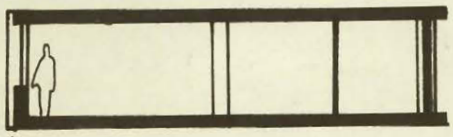



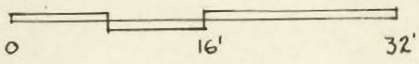



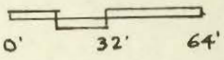

Apartment, Roubaix, France.
G. Gillet.
L'architecture D'aujourd'hui,
July 56.

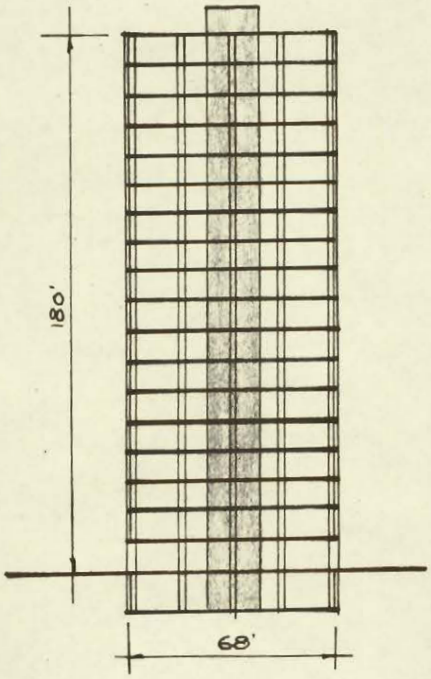
TOWER



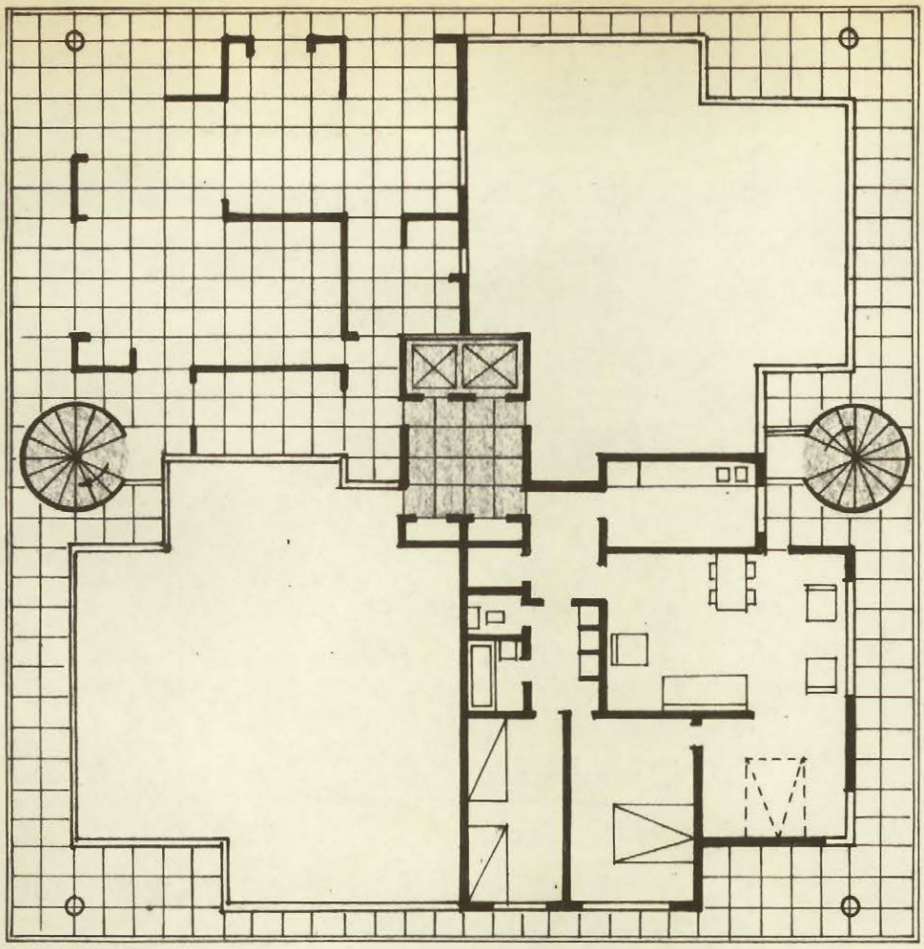





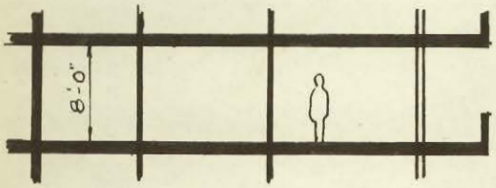



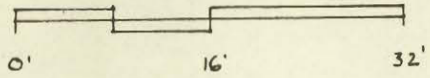



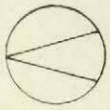

Algonquin Apts. Chicago, U.S.A.
Mies Van Der Rohe.

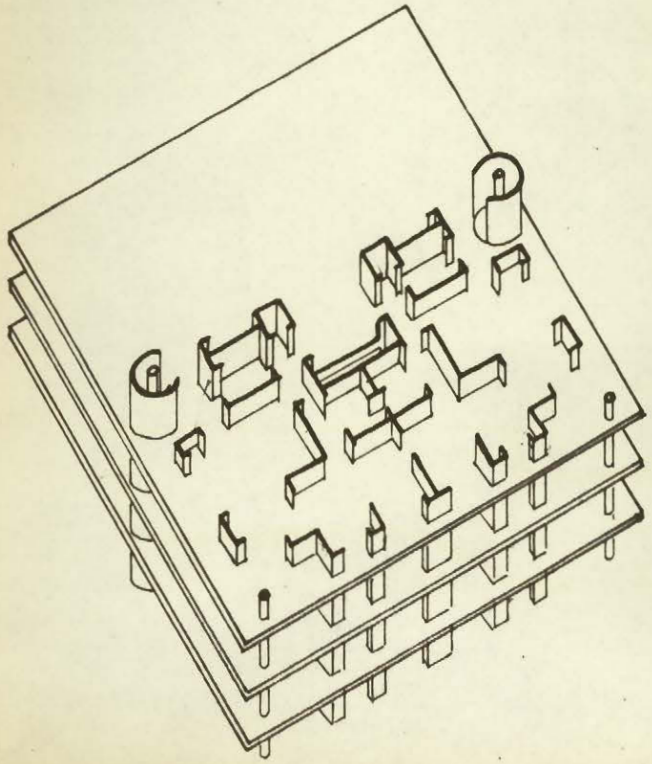


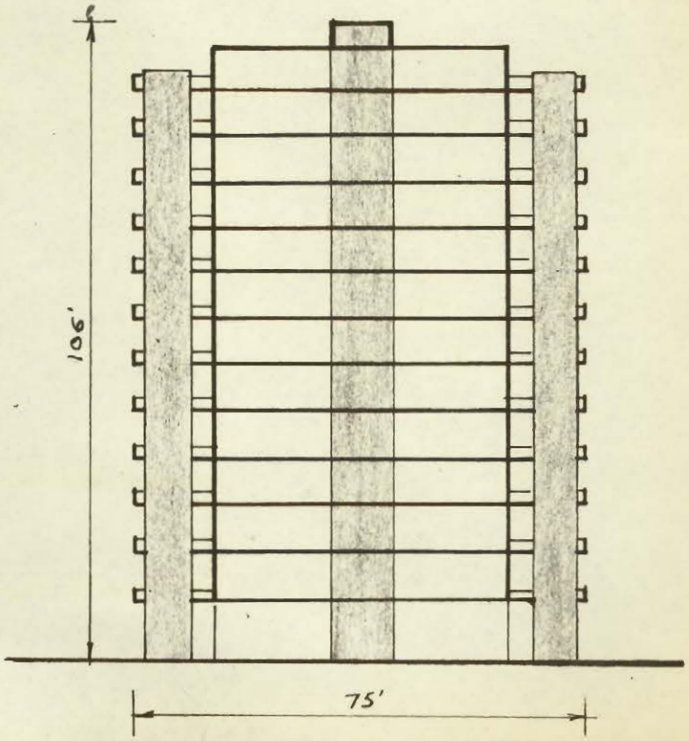

Tower Apt,
Budapest, Hungary.
Olgay and Olgay.
Arch. Record, Jan. 51.

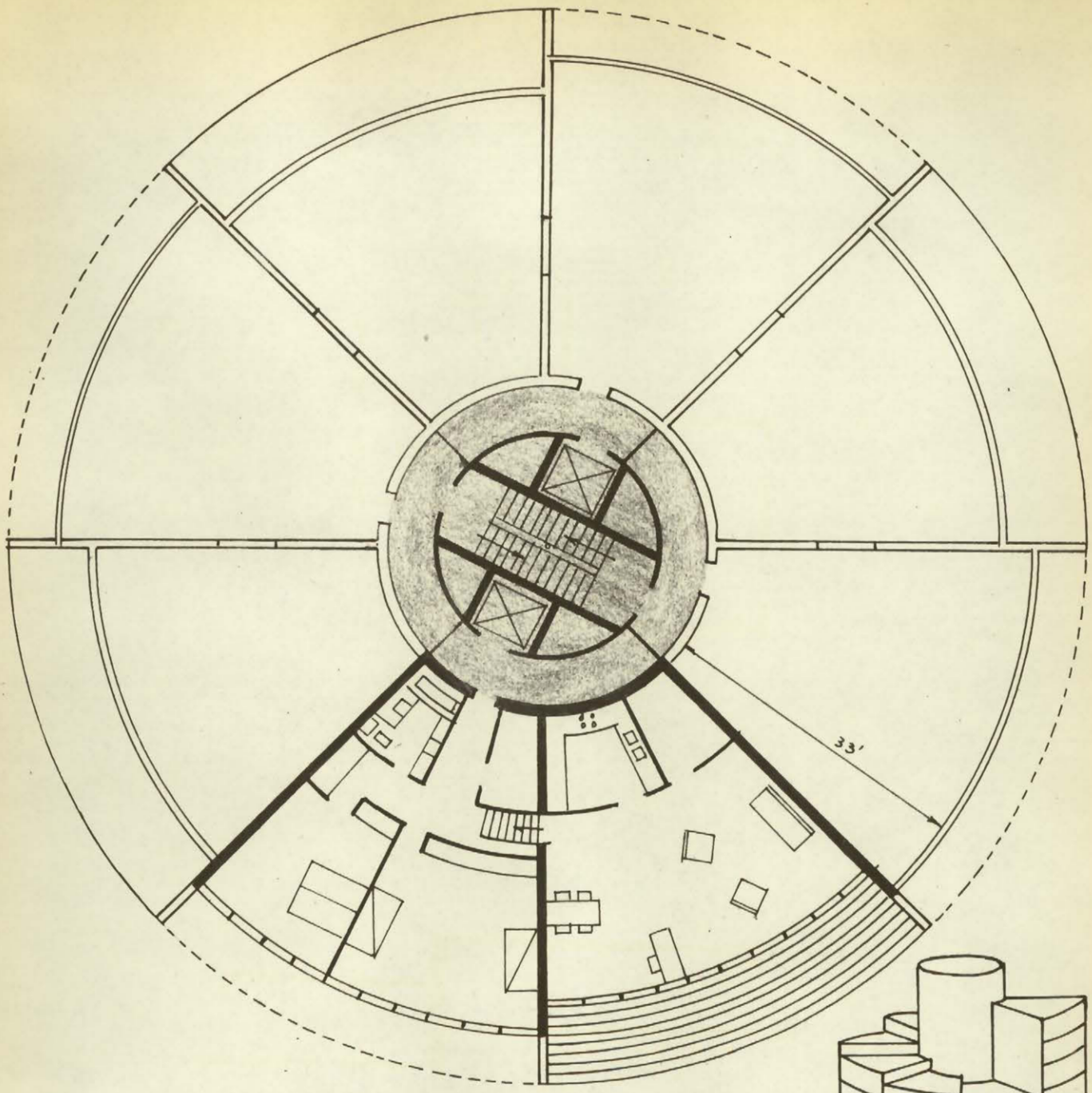


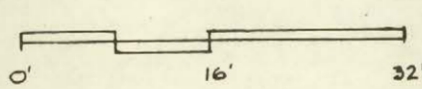



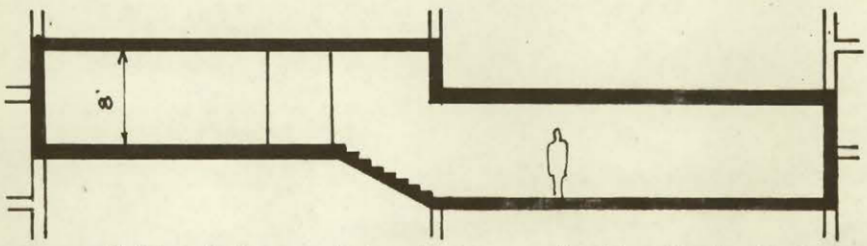



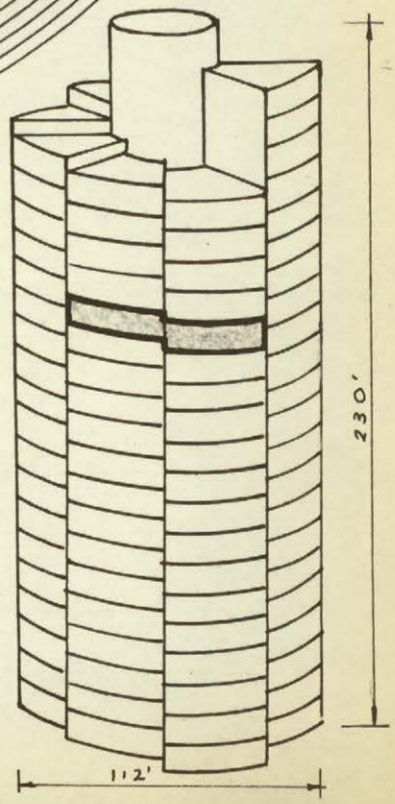






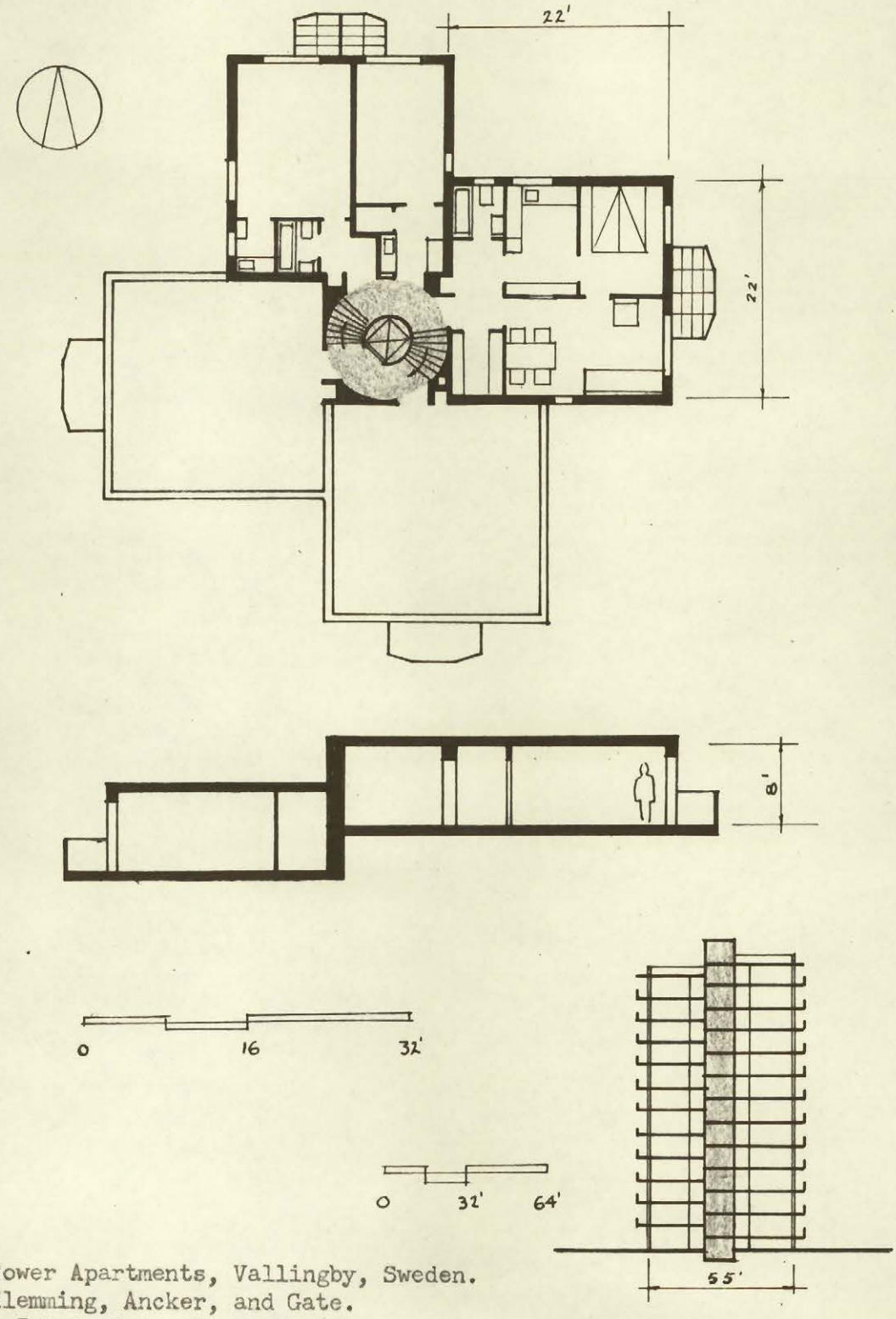




Helical Tower Apt. (proposed) New York, U.S.A.
I. M. Pei.
Arch. Forum, Jan. 50.

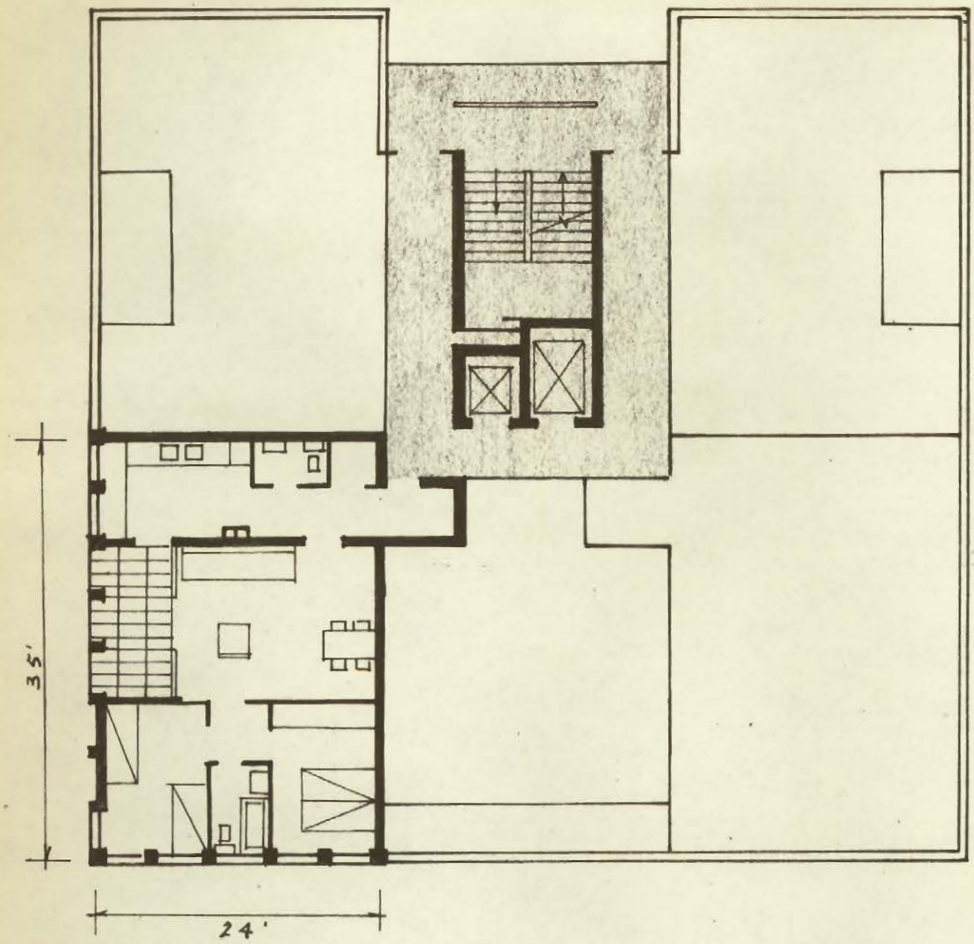
TOWER

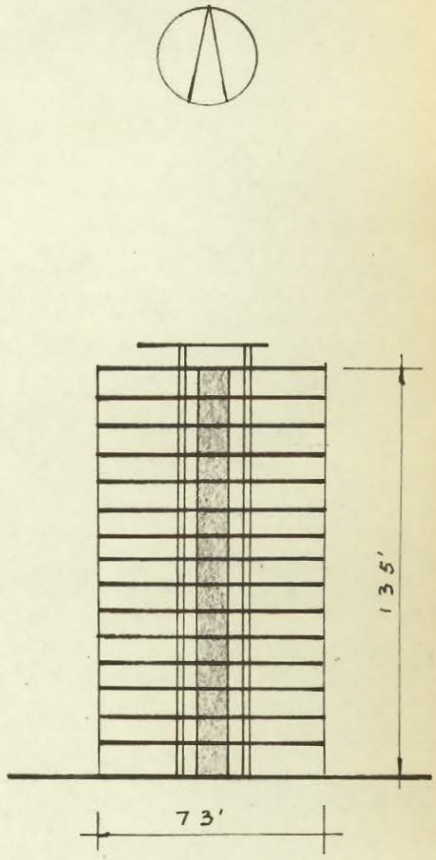


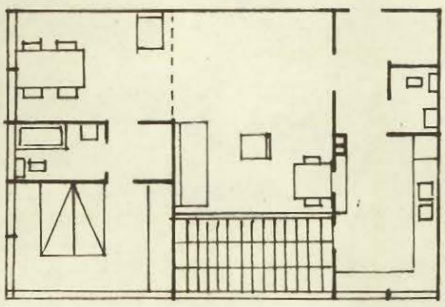

Tower Apartments, Vallingby, Sweden.
Klemming, Ancker, and Gate.
R.I.B.A. Journal, Oct. 56.

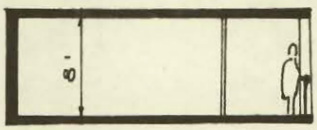
TOWER

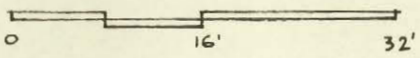
Interbau, Berlin, Germany.
Hassenpflug.

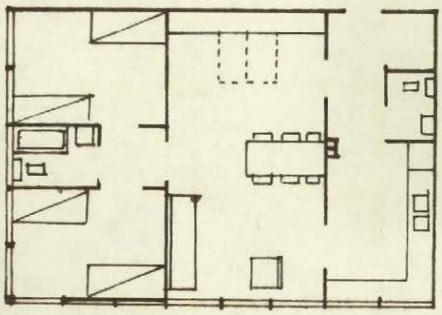


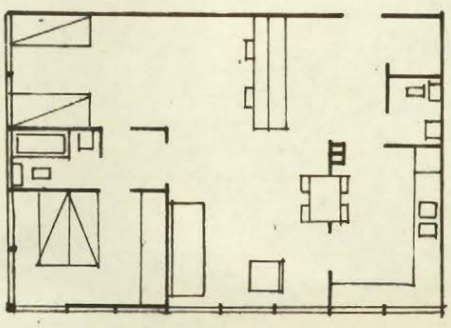







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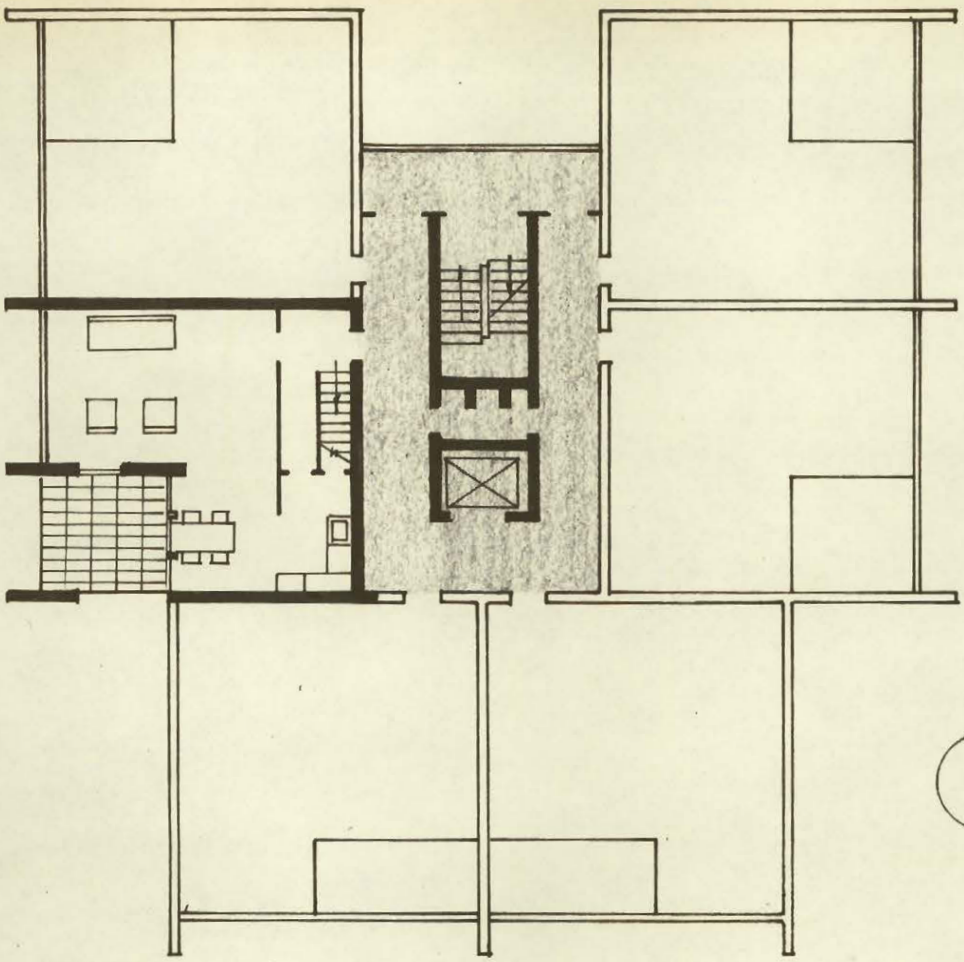
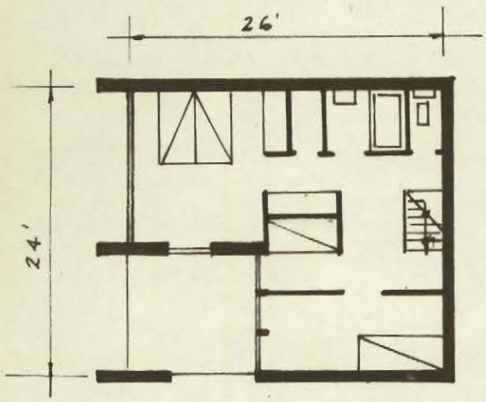
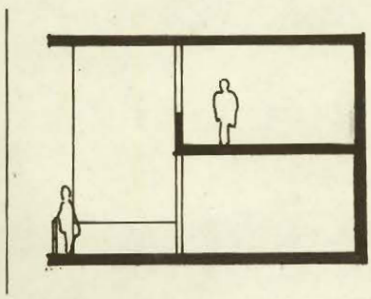
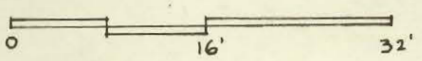
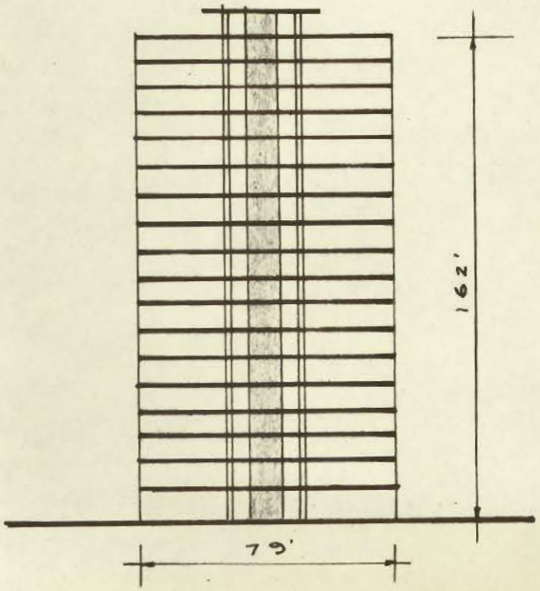


Interbau, Berlin,
Germany.
H. Schwippert.





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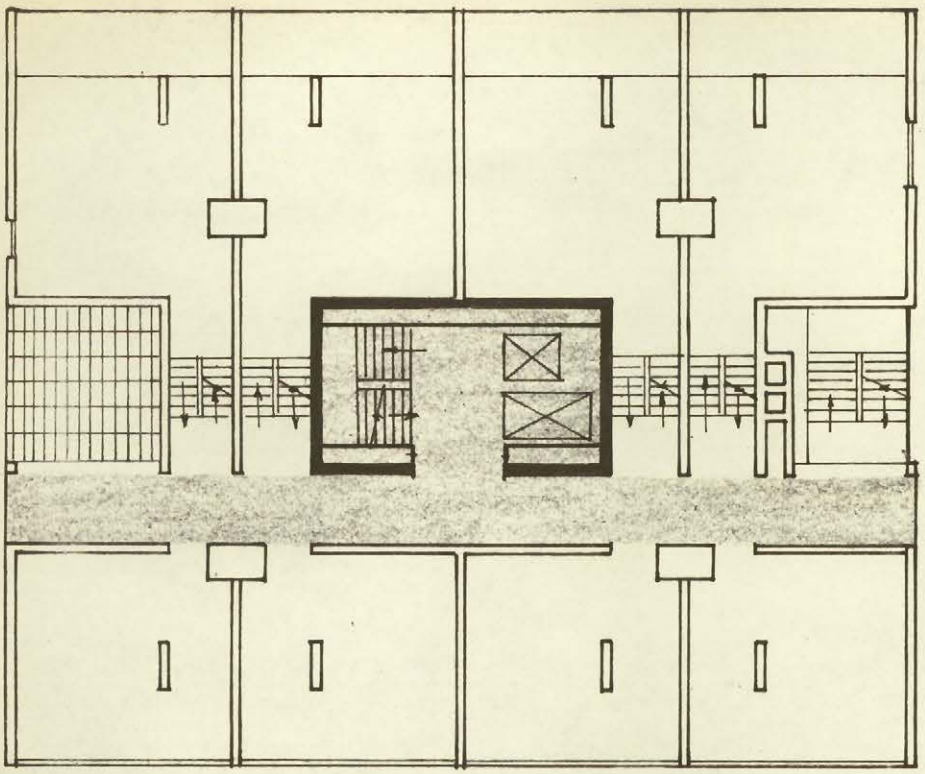
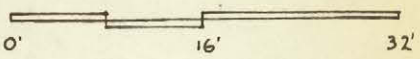
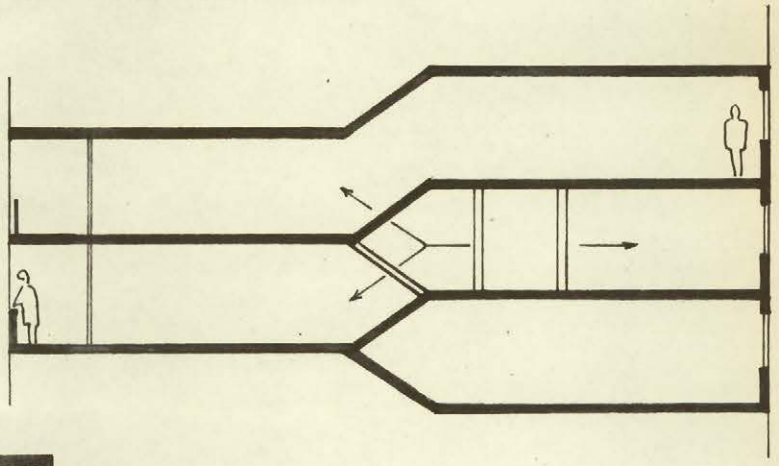
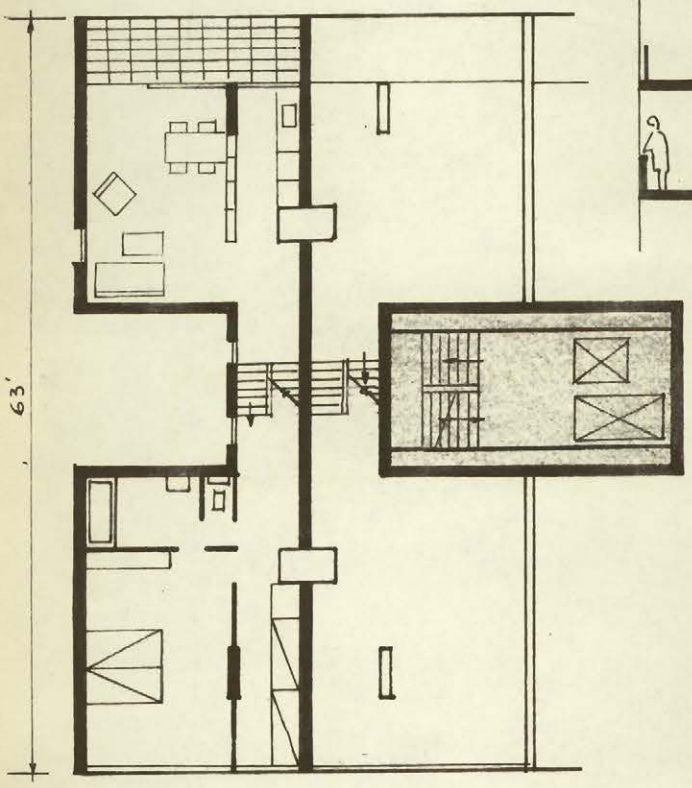
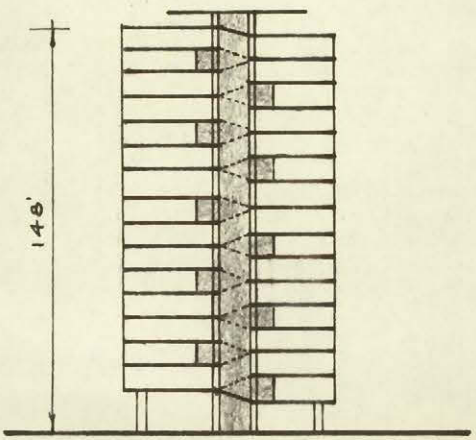


Interbau, Berlin, Germany.
Van Den Broek & Bakema.
Arch. Design, Dec. 61.





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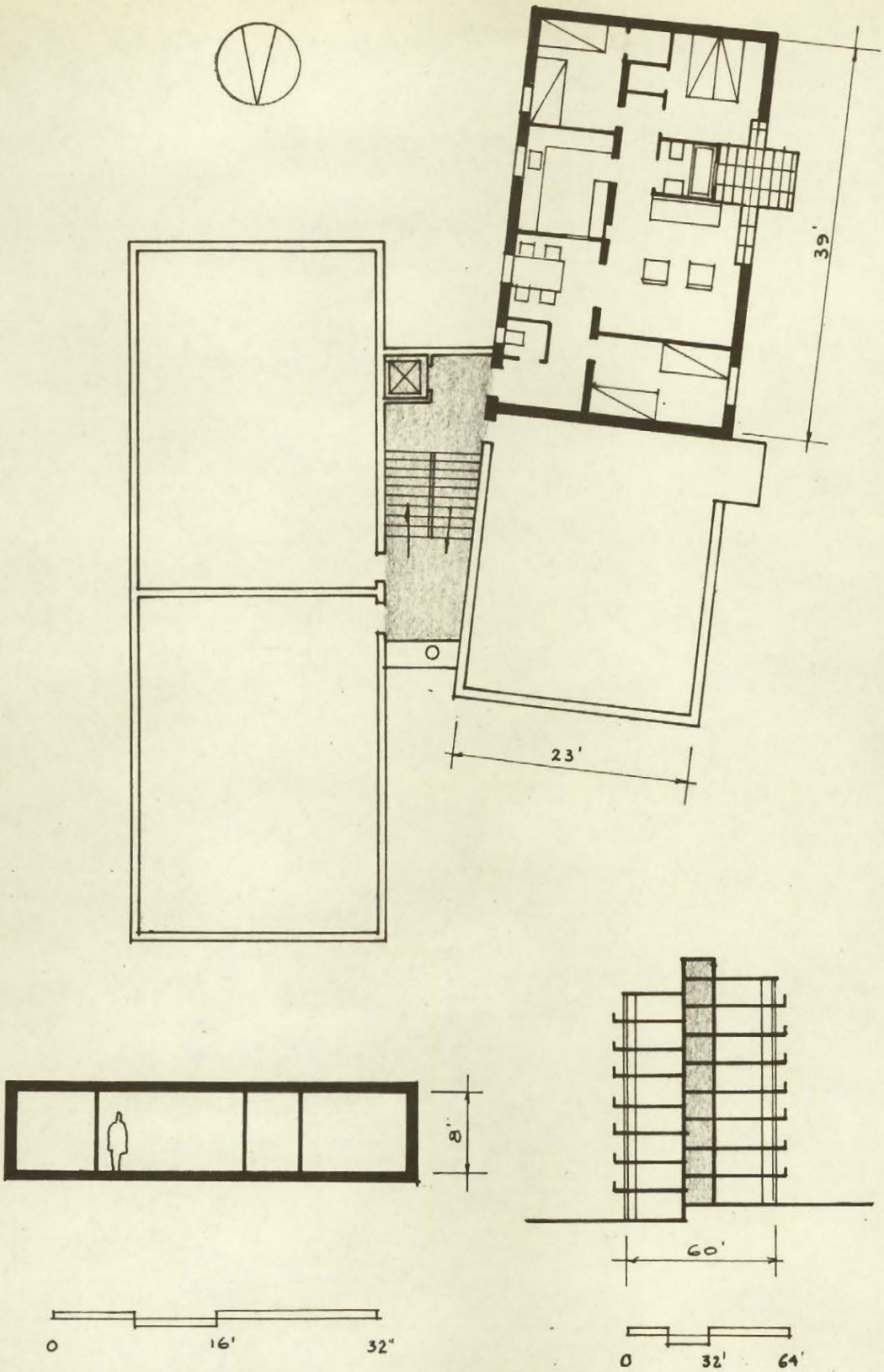
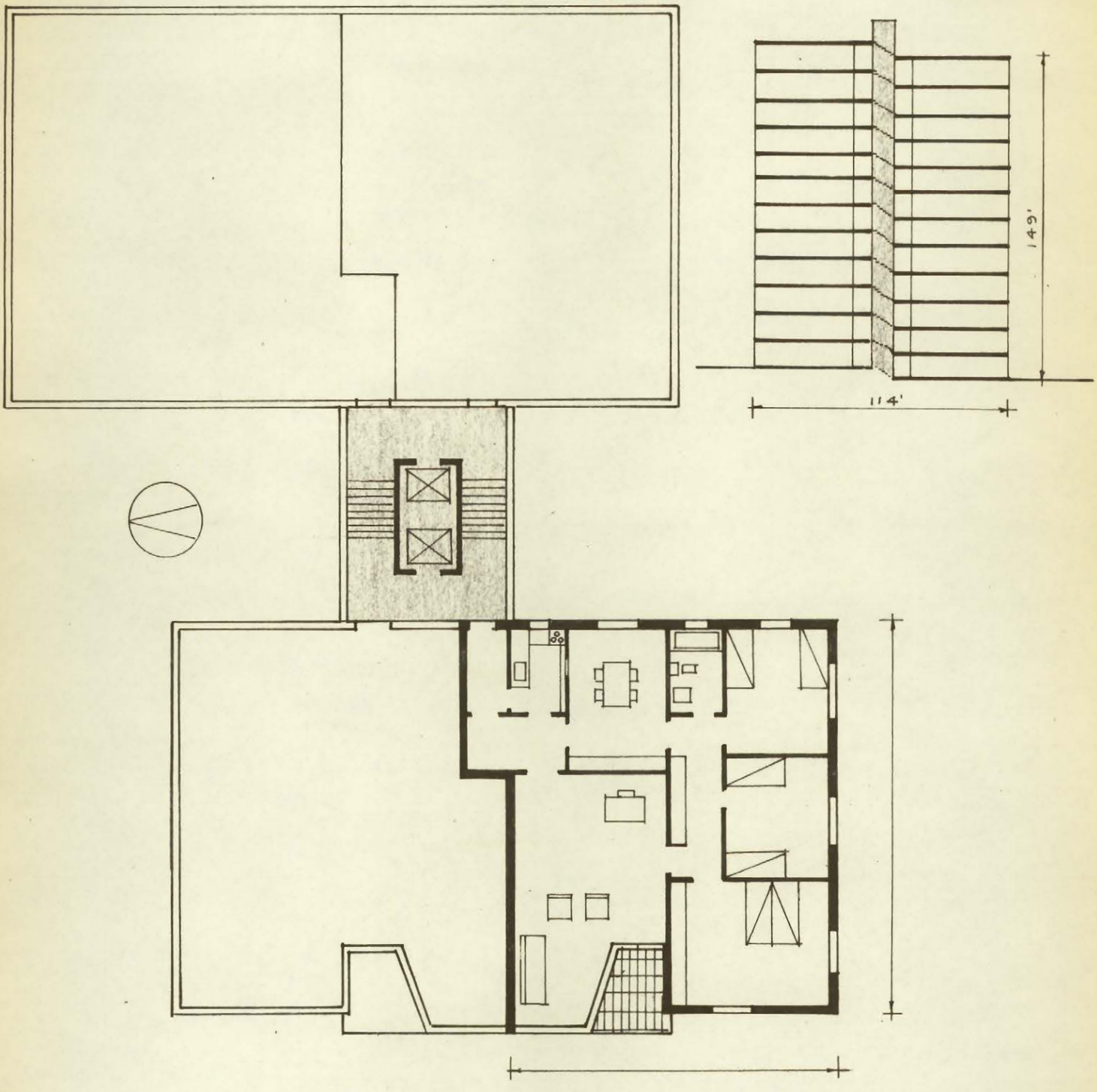



Guld heden Apartment, Gothenburg, Sweden.
Ostnas, Brolid, Wallender.
R. I. B. A. Journal, Oct. 56.

# TOWER

Bellahøj, Copenhagen, Denmark.
Irming
Architecture D'aujourdhui, June 54.

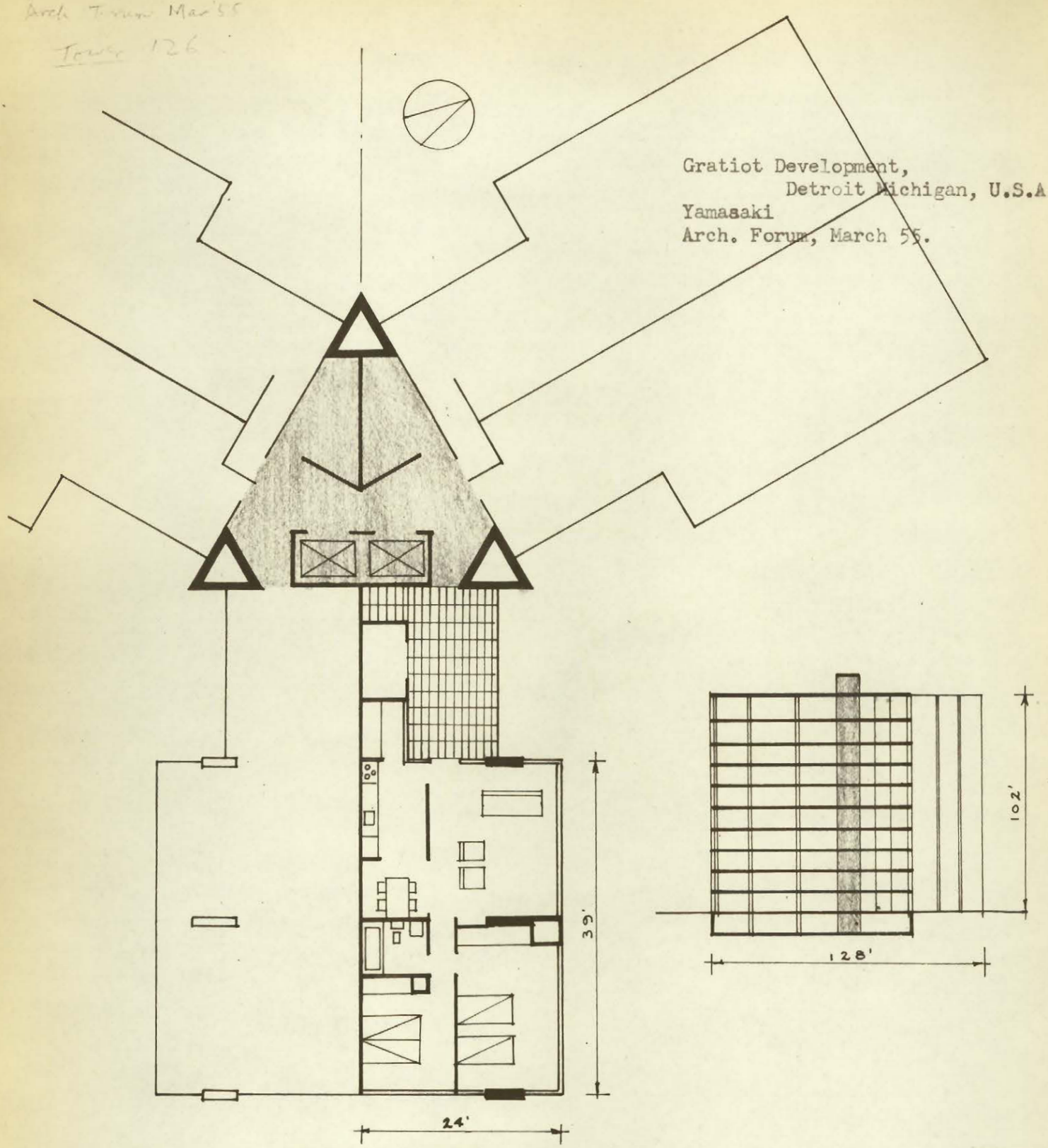


Gratiot Development
Detroit, Michigan, USA
Yamasaki
Arch. Forum Mar'55
Tower 126

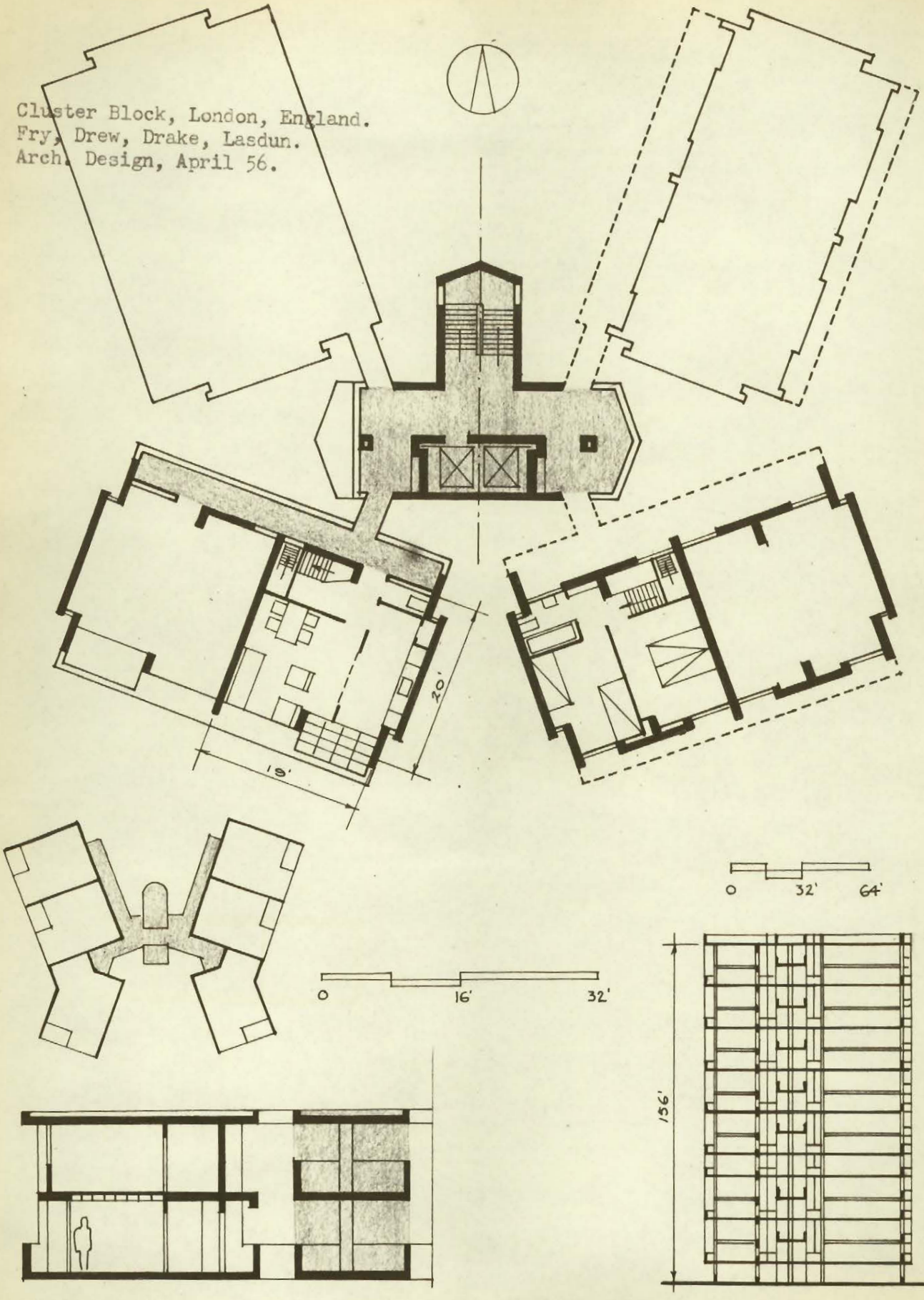


TOWER

Gratiot Development,
Detroit Michigan, U.S.A.
Yamasaki
Arch. Forum, March 55.



Cluster Block, London, England.
Fry, Drew, Drake, Lasdun.
Arch. Design, April 56.



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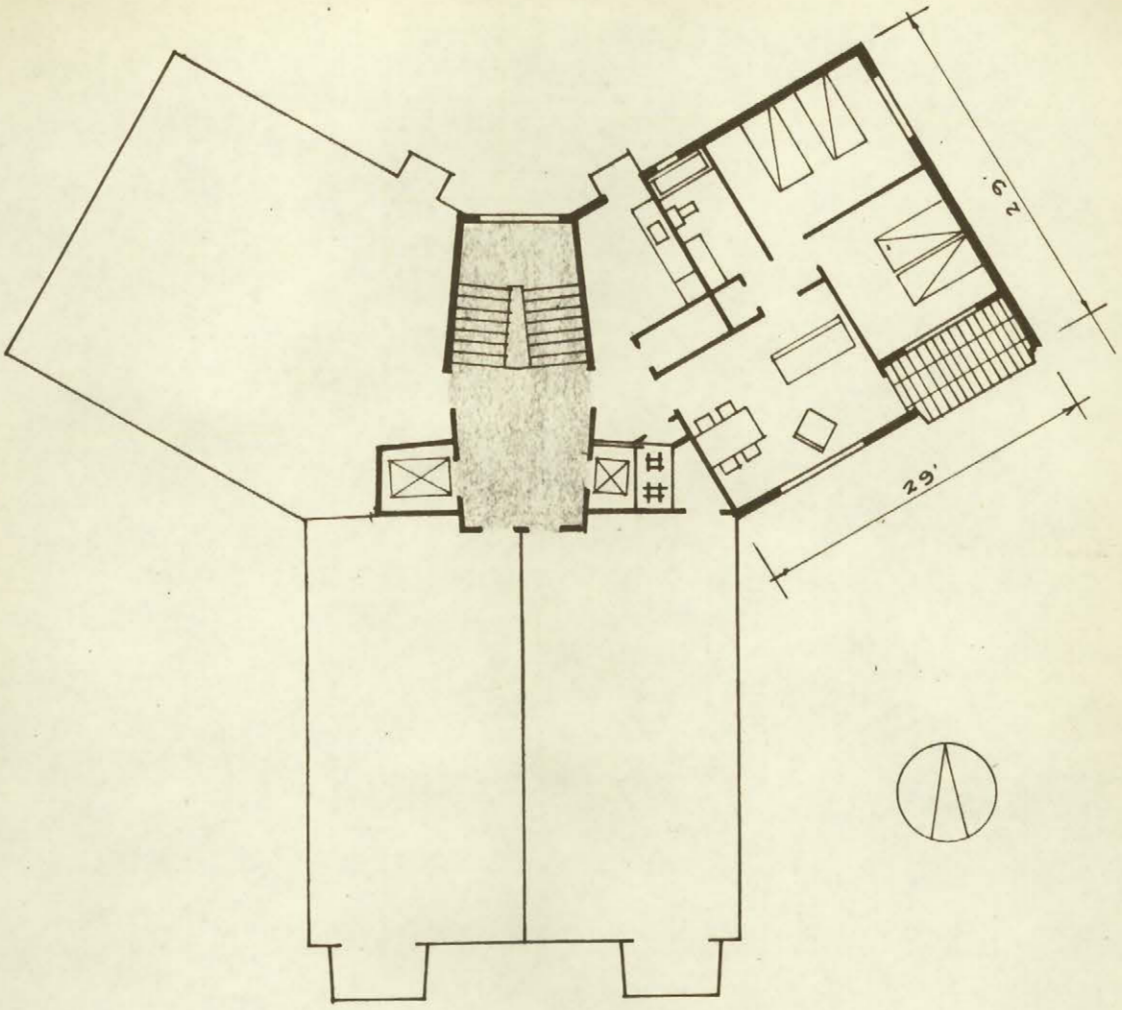
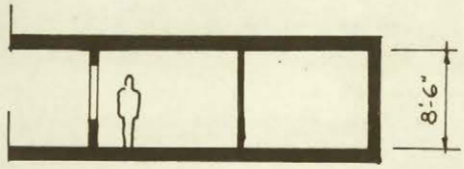
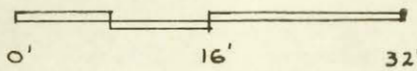
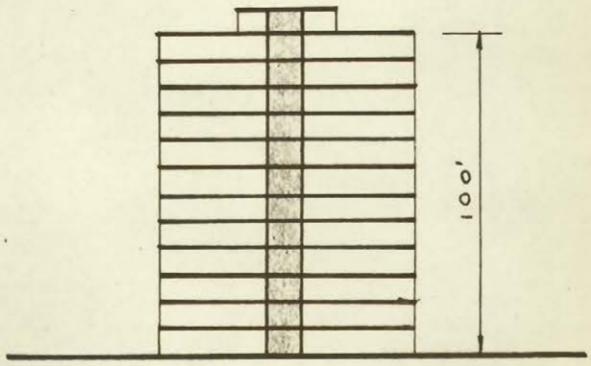
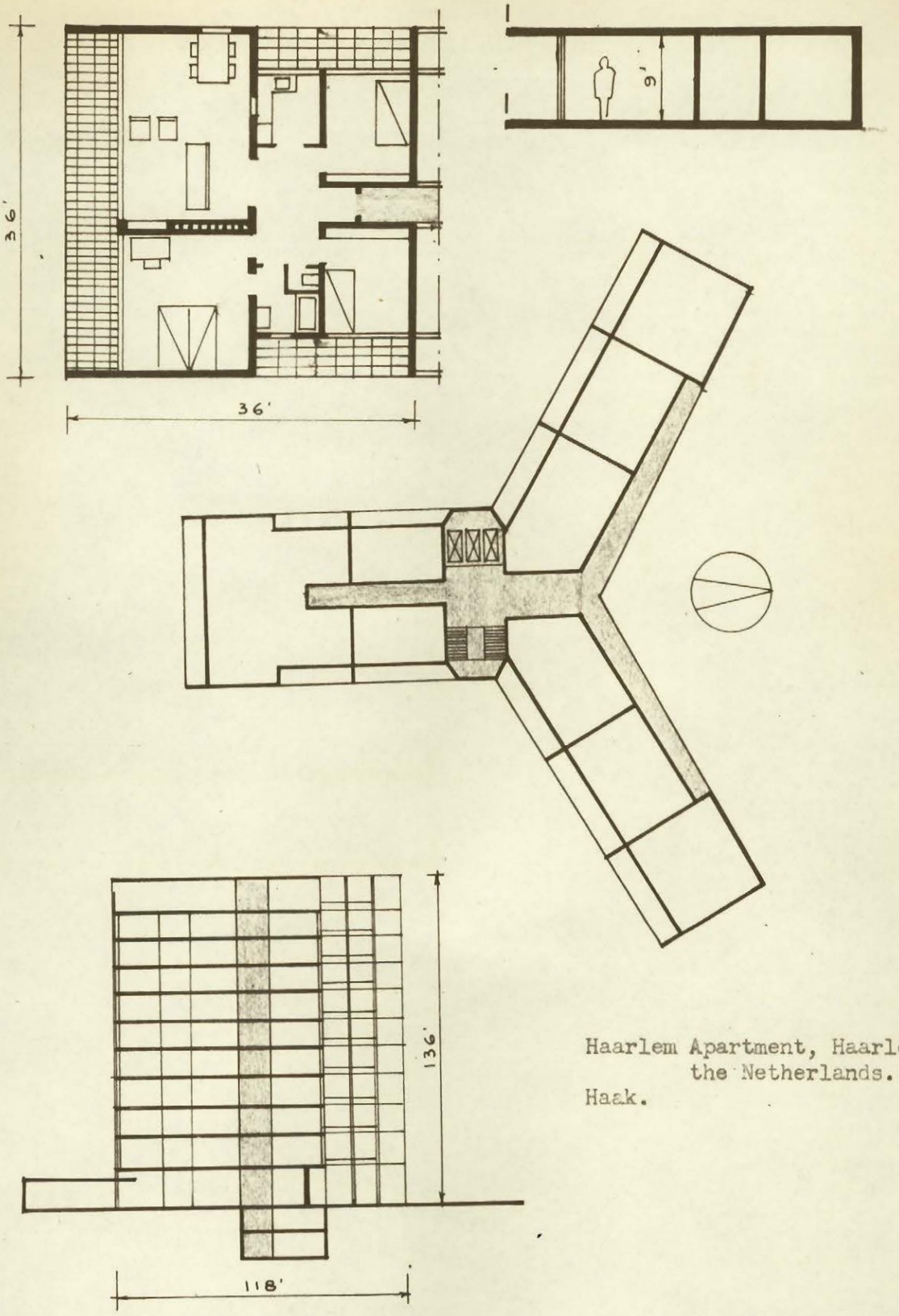


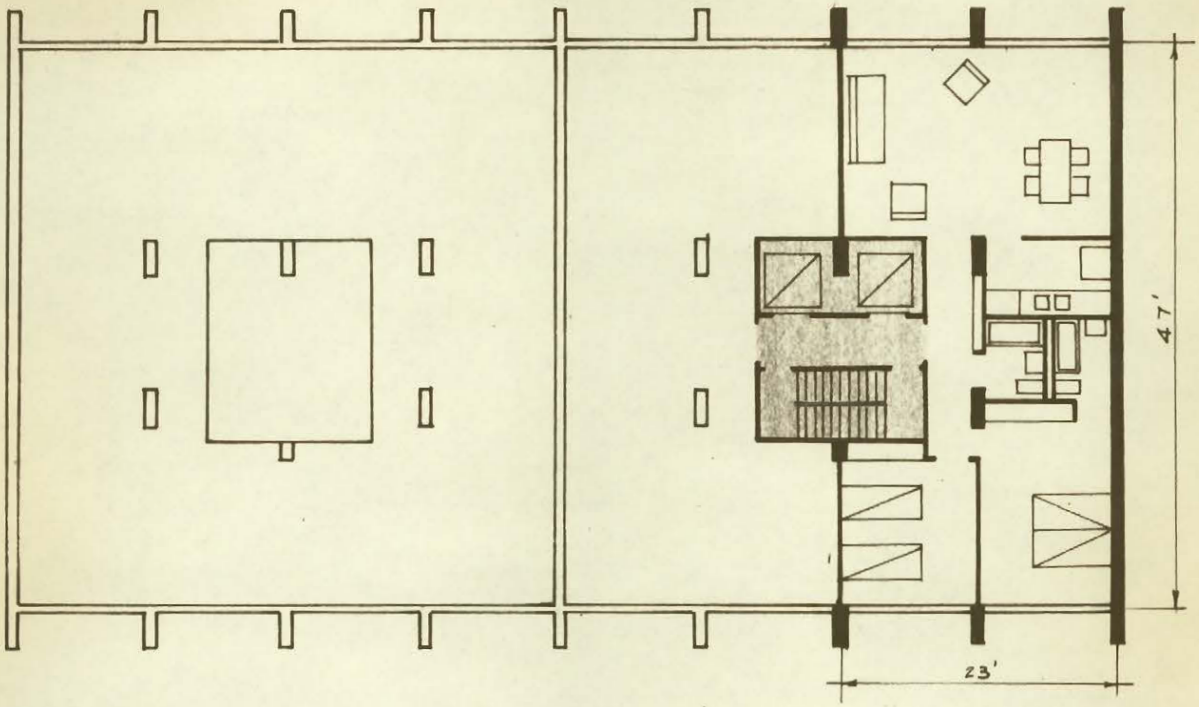



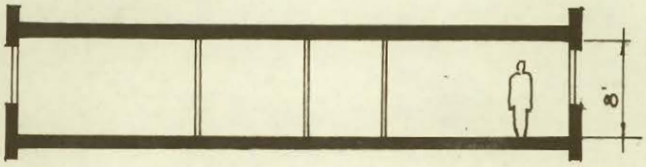

Letzigraben Apartments, Zurich, Switzerland.
Steiner.
R.I.B.A. Journal, Oct. 56.

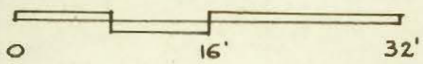


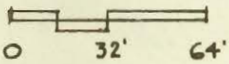

Haarlem Apartment, Haarlem, the Netherlands.
Haak.

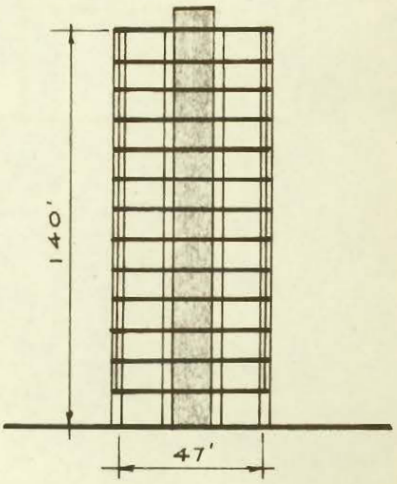
TOWER



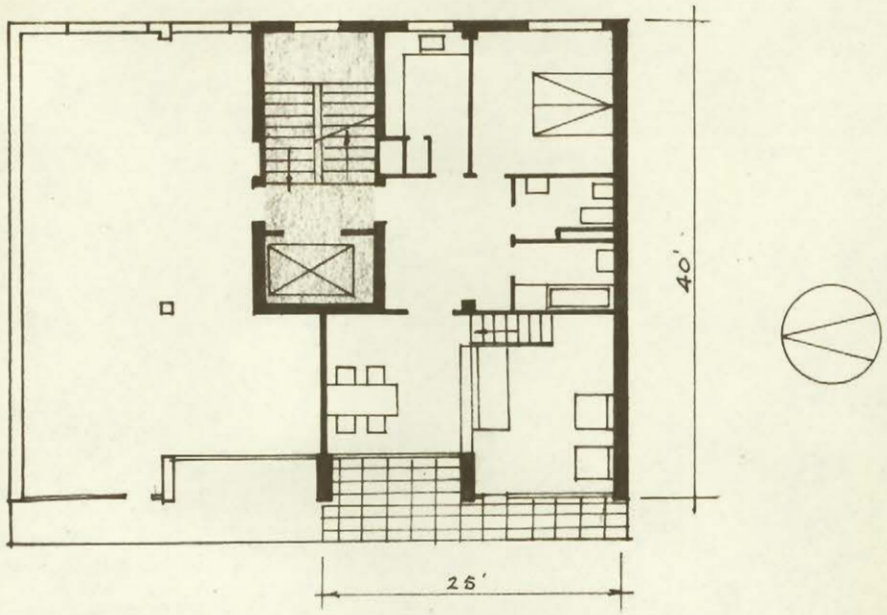



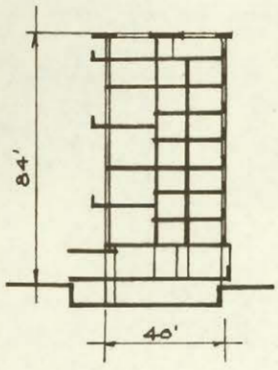



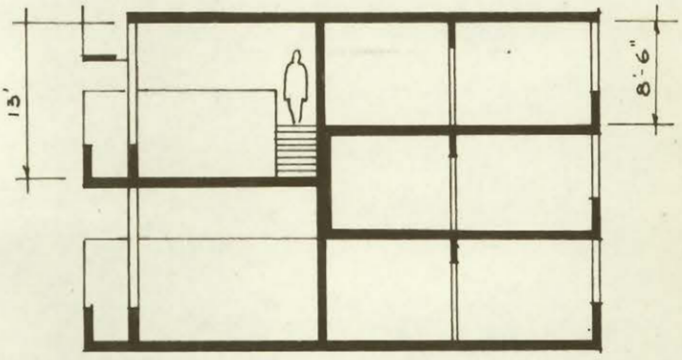



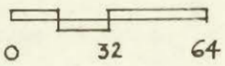

Columbia and Pratt Apartment,
Chicago, U.S.A.
Hausner and Macsai.
Progressive Architecture,
Jan. 57.

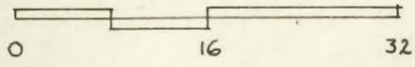
TOWER




Interbau, Berlin, Germany.
P. Vago.