PERIMETER PLANNING

AN OLD DESIGN APPROACH FOR A NEW URBAN HOUSING DESIGN

(With special reference to Central European urban housing)

BY

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ABSTRACT

This thesis deals with the renewed interest in perimeter planning as applied in Central Europe, supporting high-density urban developments and a recovery of livability in our cities.

Based on the milestones of multiple storey urban housing, the historical development of the perimeter form is contemplated in chapter 1.

Chapter 2 provides a description of the controversy of the 1920s - the turning point from solid perimeter block development to functional housing design.

New aspects of the contemporary perimeter planning approach are discussed on the basis of proposed and built urban housing schemes in chapter 3.

Chapter 4 investigates the theoretical considerations of the perimeter form in terms of density and the determination of permissible mathematical dimensions.

Design elements of the new perimeter planning practice are examined in chapter 5.

Finally, this study leads to the conclusion that perimeter planning on the basis of mixed land use can contribute to solving problems of contemporary urban growth.

RESUME

Un concept architectural particulier, le planning périmétrique, tel qu'appliqué en Europe Centrale et qui bénéficie actuellement d'un intérêt renouvelé, s'adapte aux développements urbains à forte densité tout en conservant à nos villes leur caractère viable.

L'historique du développement de la forme périmétrique, basée sur les facettes du développement des tours d'habitations en milieu urbain, est abordée au chapitre 1.

Le chapitre 2 décrit la controverse des années vingt (1920) qui correspond au tournant du développement de la forme périmétrique pleine et de l'élaboration du design d'habitation fonctionnelle.

De nouveaux aspects de l'approche contemporaine du planning périmétrique seront discutés au chapitre 3, à partir de l'exposé de modèles d'habitations urbaines projetés et existants.

Le chapitre 4 propose l'étude du modèle théorique de la forme périmétrique en terme de densité et en détermine les dimensions mathématiques permissibles.

On présente au chapitre 5 des éléments du design ainsi que l'application d'une nouvelle forme de planification périmétrique.

Finalement, cette étude conclut que la forme d'architecture périmétrique, basée sur l'utilisation mixte du territoire, contribue à résoudre des problèmes d'expansion urbaine typiquement contemporaine.

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INTRODUCTION

Abandoning the inner city is a common phenomenon in all industrial countries around the world. This process is responsible to a large degree for the deterioration of contemporary urban environments. Problems derived from high-rise housing forms and single-family dwellings resulted in extensive energy costs as well as wasteful use of resources. As a result, the expanding sprawl of our cities caused a dissolution of the town and country due to intensive land use requirements. Viewing the contemporary urban environment with a growing discomfort, one is subjected to an increasing awareness of the importance of residential urban housing that could affect or improve existing urban environment.

This thesis places the emphasis on the re-appraisal of urban housing both of high density and lowrise nature. In recent years perimeter planning practice has been rediscovered as a potential tool in bringing homes into close proximity to work, communal facilities and shopping. Because of its advantages, such as the urban pattern of enclosed private open spaces of greenery and public urban zones, perimeter planning has been increasingly recognized as a new approach to urban housing design in Central Europe. By reviving the traditional city as a mixed residential and commercial place, the street again recovers its function of urban space embodying the vital arteries necessary for any organic urban pattern. Walk-up scaled perimeter blocks no higher than six storeys are designed to create a human scale of small neighborhoods providing a great variety of activities.

Because of the shortage of energy and resources the problem of travelling to and from work has now become more acute. Thus, the single-family house on the outskirts of the city has become disadvantageous from two points of view; first, the long travel distance from home to work and, second, the characteristics inherent to the dwelling form, such as high maintenance costs and low land use efficiency all of which affect its affordability adversely. The application of the garden-city concept has been demonstrated to be unsuitable to meet present-day problems of urban growth. This can be witnessed in the lack of livability present in whole sections of cities which have only one major activity; for example, most housing projects of this century have been almost entirely residential with very few communal or commercial facilities included.

Moreover, when highrise buildings proved to be inhuman and uneconomical, world reaction showed a clear trend against large formally composed projects in favor of high urban densities at low rise and medium profile housing as well as infill projects among existing buildings.

This is the main reason why perimeter planning has been found advantageous supporting a more desirable urban environment. Here, examples of the old type of perimeter block development and new perimeter planning approaches are chosen to provide the fundamental basis of this study about the new aspects of contemporary perimeter planning practice.

CHAPTER 1 - Historical Development of the Perimeter Form and Its Impact on Housing Conditions

Introduction

The perimeter form of block development is an essential structural element of the European city in the Middle Ages, the Renaissance and, most of all, from the period of industrialization up to the beginning of the 20th century. The influences on the development of the perimeter form are reviewed here in historical sequence to give a comprehensive background for an assessment of its contemporary application.

The following statements from classical authors of town planning will serve as a definition of the term perimeter form (perimeter planning, perimeter block, perimeter building block, block-building). In Stubben's opinion, the spaces of a Master Plan, which are defined by streets and building lines for development, are called building-blocks or, simply, blocks.[1] According to Brinckmann, town planning links adjoining houses and forms out of the multitude of houses the larger unit of the building-block. Regarded as an enclosed built-up site surrounded by streets, the building-block appears architecturally as a unit. Whether straight or slightly curved the street becomes a particular feature of spatial effect which is achieved by uniform façades of the building-block. These façades serve two purposes; firstly they enclose the mass of the building by defining its interior structure, and secondly, they maintain the street as a unit by making it appear as a continuous system.[2] Looking behind the perimeter of buildings the next point of interest is the layout of the

interior open space. Although composed of several building plots this enclosed space is to be considered as an entire organization. By putting emphasis on the communal use as Brinckmann argues, the open space has considerable importance.[3]

Thus three elements underlie the town planning principle of the perimeter form. Viewed from the exterior to the interior these are the street, the continuous perimeter building and the interior open space.

1.1 Classical Heritage

Although the perimeter form of block development did not exist in antiquity, in this section attention is focused on early occurrences of the traditional urban block and the introduction of multi-family housing.

The urban block development can be traced back to the very beginning of town planning in ancient Egypt and India. The arrangement of the workers' camp in Kahun of 2670 BC clearly shows parallel rectangular blocks interwoven with surrounding streets based on a gridiron system (Fig. 1.1). The town plan of Mohenjo-daro presents a modified gridiron street pattern where the blocks are spaced at wider distances.[4] (Fig. 1.2)

The first layouts of a regular street grid were discovered with Greek colonial city foundations of the 5th century BC onwards. The town plans of Miletus (Fig. 1.3) and Priene (Fig. 1.4) are laid out according to the Hippodamian plan, a network of intersecting NS- and EW-streets creating almost quadrangular blocks.[5] The plan of Olynthus, however, is organized with the principal streets laid in a north-south direction and connected by minor east-west streets of narrower width forming elongated blocks.[6] (Fig.

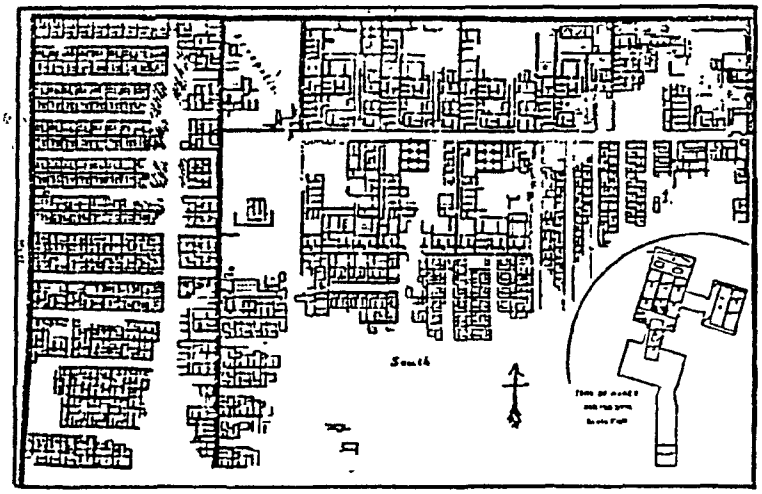


Fig. 1.1 Kahun. Detail arrangement of the workers camp of 2670 BC (Morris, 1972)

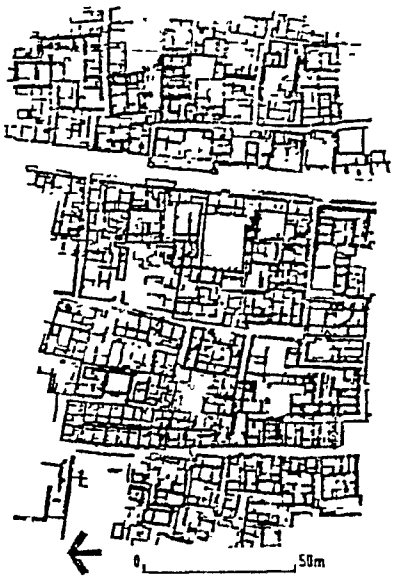


Fig. 1.2 Mohenjo-daro. Detail plan of the excavated housing area in the south-west corner of the lower city (Morris, 1972)

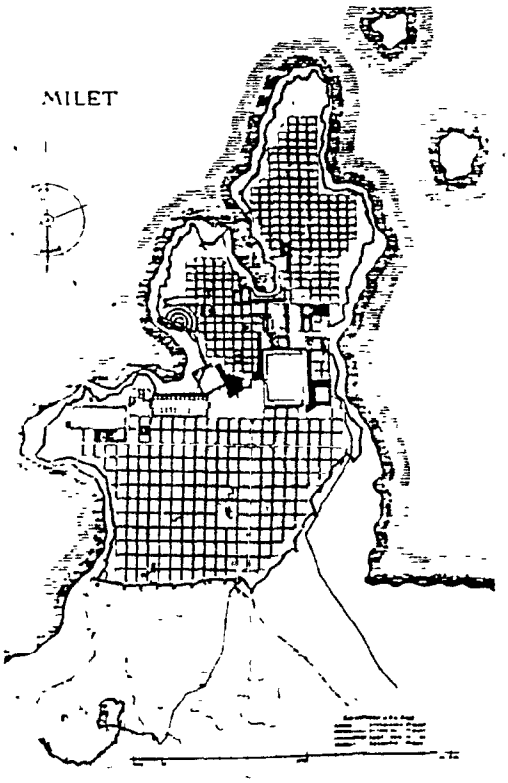


Fig. 1.3 Miletus. Layout of the fifth-century city (Ward-Perkins, 1974)

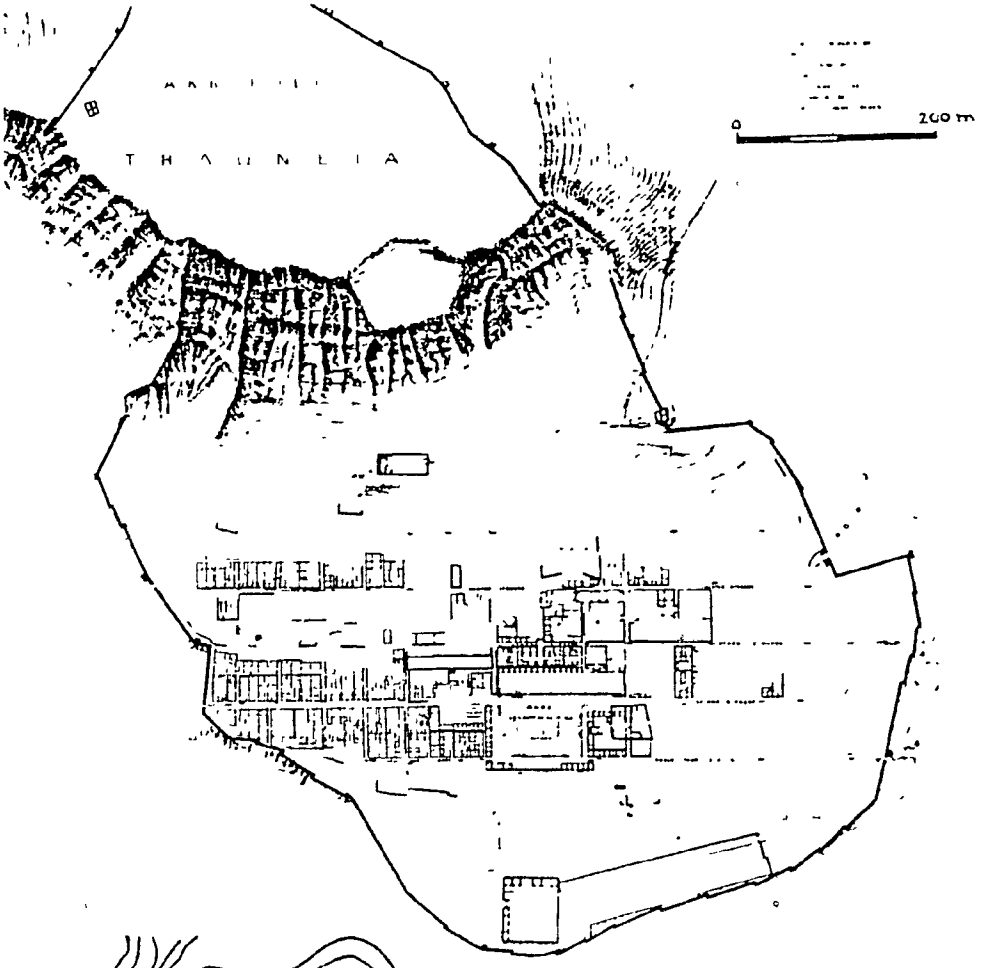


Fig. 1.4 Priene. Founded in the mid-fourth century B.C. (Ward-Perkins, 1974)

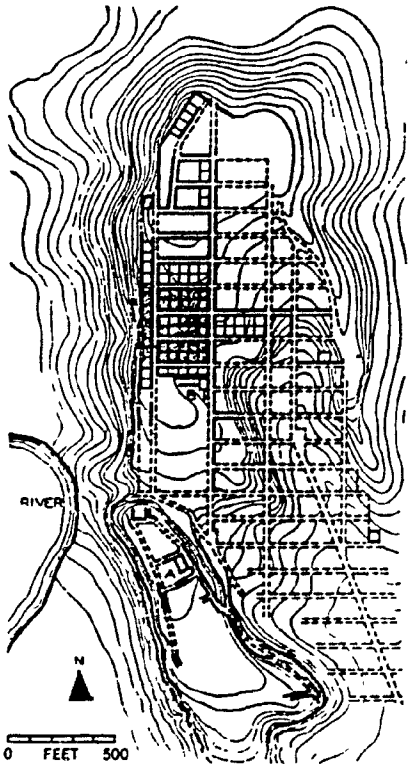


Fig. 1.5 Olynthus. General Plan (Gallion/Eisner, 1975)

1.5) The detailed plan of the housing blocks gives evidence of the solid form of the building arrangement (Fig. 1.6). As in the foregoing examples, the general pattern of urban housing is expressed by the courtyard dwelling (Fig. 1.7) of one or two storeys which is subordinate to the bulk, for example in a typical house in Priene (Fig. 1.8). Although the room arrangement varied somewhat, all dwellings were oriented uniformly. The principal exposure, with the rooms along the courtyard providing air and light, exclusively was made possible by climatic conditions.

Similar arrangements are recognizable with housing blocks at Pompeii (Fig. 1.9) of which the north-western residential area of the town plan of AD 79 was based on a freely interpreted gridiron system.[7] The one- or two-storey houses again were built adjoining each other by covering the entire land of the block area, the 'insula'. The only open spaces within the built-up blocks formed the private courtyards. While the entrance door was the only opening leading to the street in residential areas, other openings such as windows were introduced in adjacent shops facing the main streets.[8]

In contrast to Pompeii, Rome, due to constantly increasing population, experienced speculation in land and buildings.[9] Uncontrolled house construction produced the first known multi-storey buildings in Europe by adding floors on top of the existing one- or two-storey buildings. The fact that additional housing accommodation has been solved through vertical expansion became the starting point of tenement housing for underprivileged multi-family accommodation. There were thus two basic types of housing in the city, the 'domus', the courtyard dwelling for single-family occupation,

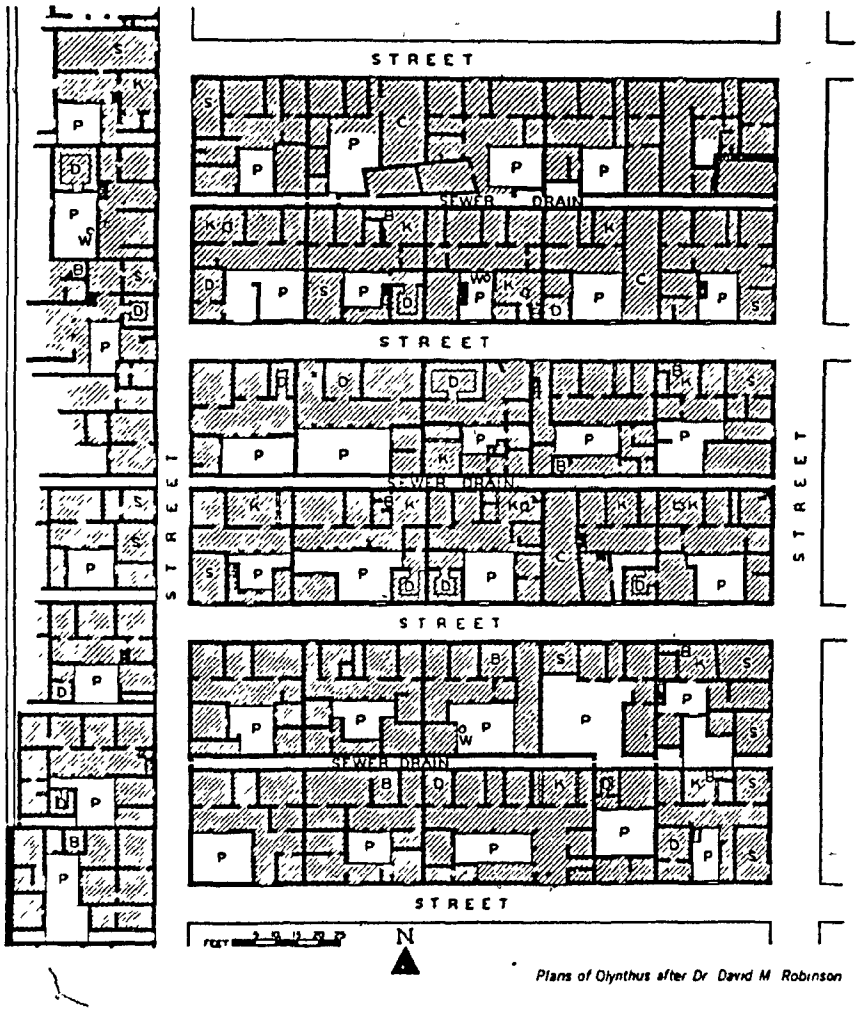


Fig. 1.6 Olynthus. Housing blocks laid out about 432 B.C. (Gallion/Eisner, 1975)

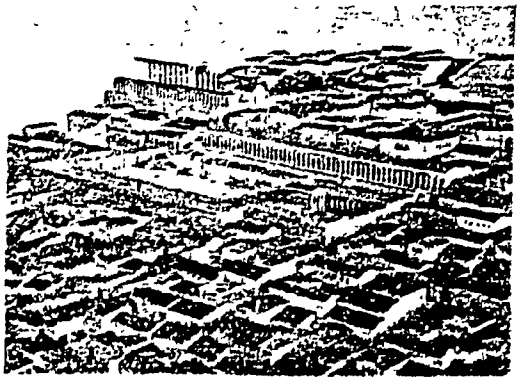


Fig. 1.7 Priene. Showing hillside terracing (Hiorns, 1956)

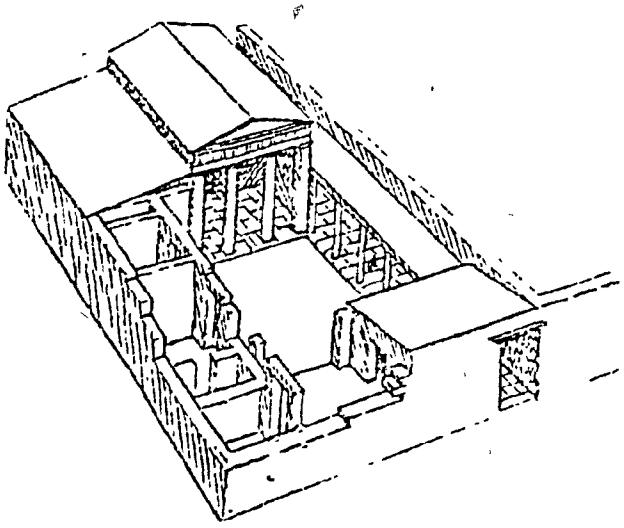


Fig. 1.8 Priene. Courtyard dwelling (Gruber, 1976)

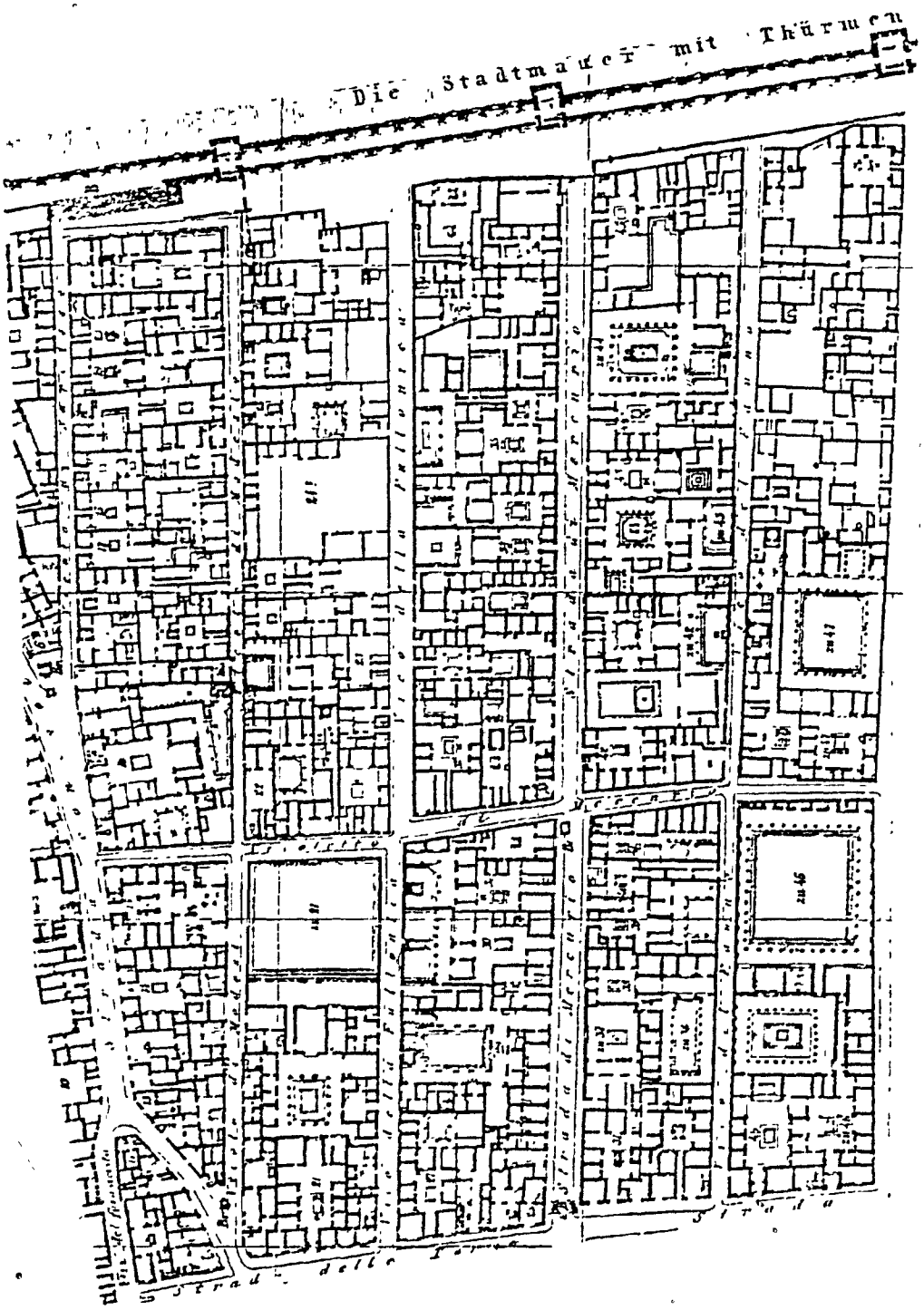


Fig. 1.9 Pompeii. Detail plan of housing insulae in the western corner of the city (Hiorns, 1956)

and the 'insula', the tenement block which was divided up into a number of flats or 'cenecula', of which the average occupancy was at least five or six persons.[10]

For an idea of their form we have to look at survivals of Ostia, the port of Rome. No other town had multi-storey housing blocks (Fig. 1.10) with interior courts and galleries, ample decorations on brick walls, storage and shopping facilities (Fig. 1.11, 1.12). According to Hiorns, there is evidence that the back portions of the buildings may have reached 30.5m (100 feet) although 21.3m (70 feet) was a decreed height-limit for frontages in the time of Augustus.[12]

After the time of the Dark Ages the urban block development, enhanced by streets which developed whether due to organic growth or to planned gridiron layouts, became a prevalent feature of European towns. And the transition from the low-rise, single-family house to a multi-storey building occurred with multi-family occupation becoming the main urban form of housing.

1.2 Middle Ages

In medieval Europe of the eleventh to the fifteenth century the accumulation of houses along the perimeter of the street block can be considered to correspond to our definition - street, perimeter form and interior open space. In contrast to antiquity, the building arrangement developed differently, although many towns cannot deny their Roman origins. Due to geographical, climatic and cultural reasons the layout of the medieval town plan and the formation of the shelter differed considerably in

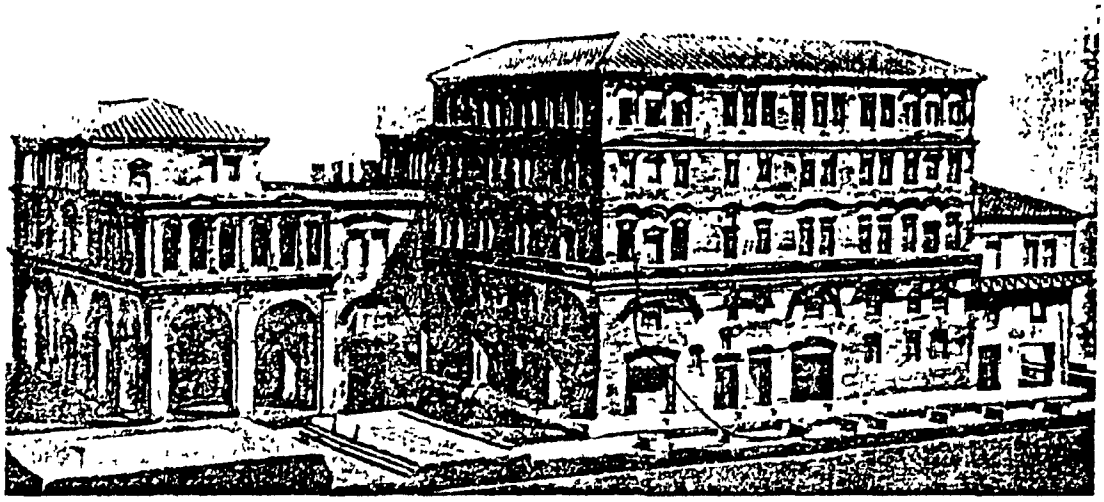


Fig. 1.10 Ostia. Apartment blocks (Brown, 1968)

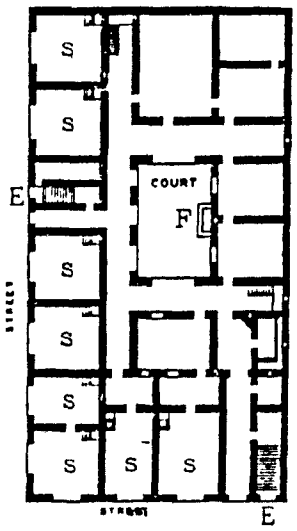
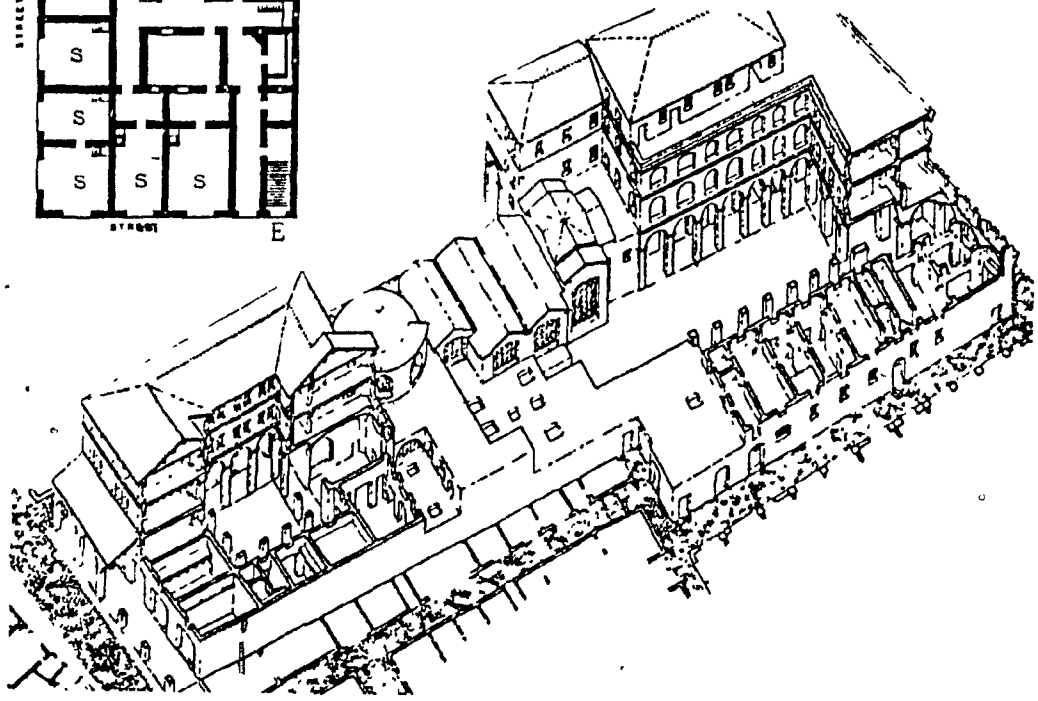


Fig. 1.11 Ostia. Ground floor plan of an apartment block (S=Shop, F=Fountain, E=Entrance) (Gallion/Eisner, 1975)

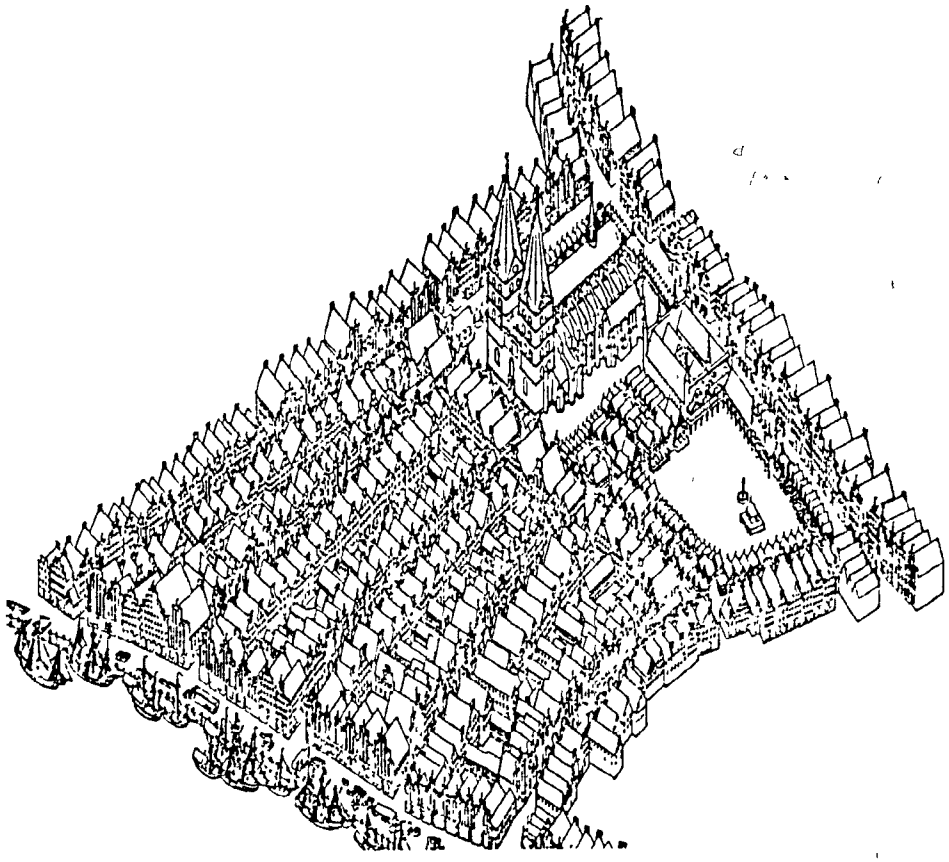
Fig. 1.12 Ostia. Apartment blocks (Brown, 1968)



respect of material, design and construction method. In consequence of the fortification walls, (due to the migration from rural areas to the aspiring trading centers which offered protection of living and housing) the congestion inside the walls led to the organization of still smaller building plots and, finally, to multi-storey housing.

Whether the building blocks of Middle and Northern Europe in medieval times developed from natural growth or from planned layouts of grid streets, they gave an appearance of being continuous along the streets and squares. Lubeck (Fig. 1.13) and Stralsund (Fig. 1.14), two foundations of the Hanse, and Thorn, for example show the perimeter form of block development (Fig. 1.15), as do other colonial city foundations in Eastern Germany and Poland. Although the individual character of each particular house is recognizable among the bulk, the block of houses appears uniform. Regarding the building materials, dimensions, form of bays and roofs, each individual house is almost entirely similar to its neighbor but the building style is never exactly repeated.[14] (Fig. 1.16, 1.17, 1.18).

The continuous sequences of houses which appear as building blocks oriented to the public sphere form distinctly spatial streets and squares. Access is often provided through entrance halls and gateways on the ground floor which is commercially utilized (Fig. 1.19). There is thus a gradual transition of accessibility. The inner courtyards are divided into single plots which are separated by small sheds, walls, fences or hedges. There are two zones of utilization, first, workshops, sheds and stables close to the building and, second, behind this the private garden often used for growing vegetable. Conflicts among the citizens were hardly possible, since



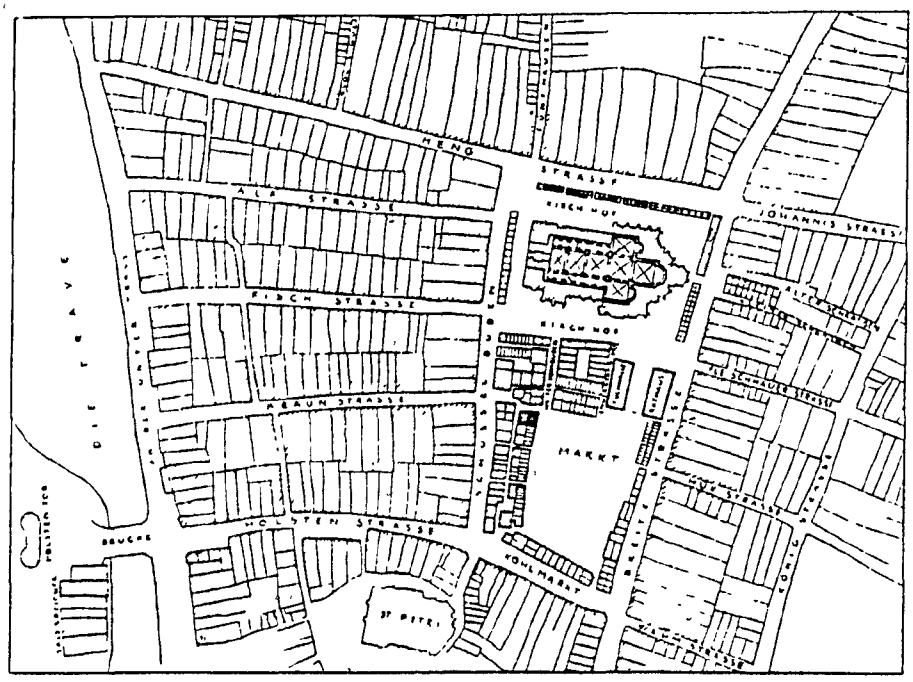


Fig. 1.13, 1.14 Lubeck. Aerial view and plan of the town center in the late Middle Ages.
(Gruber, 1976)

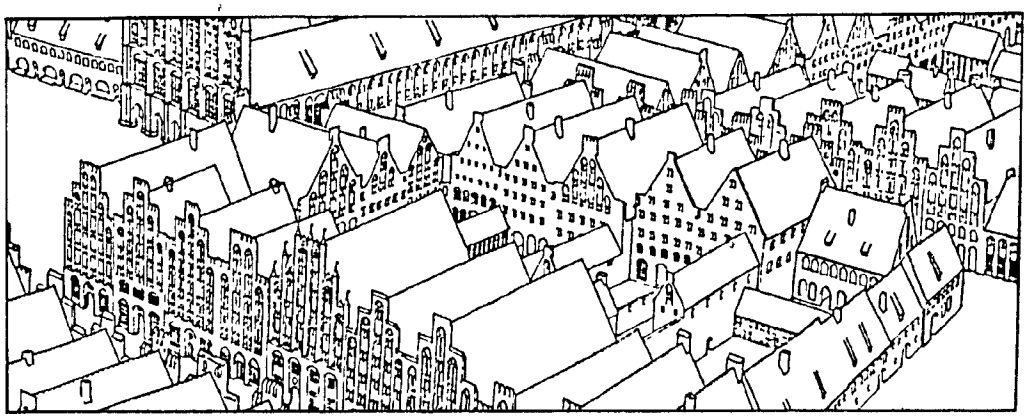


Fig. 1.15 Stralsund. Aerial view of a medieval housing block (Gruber, 1976)

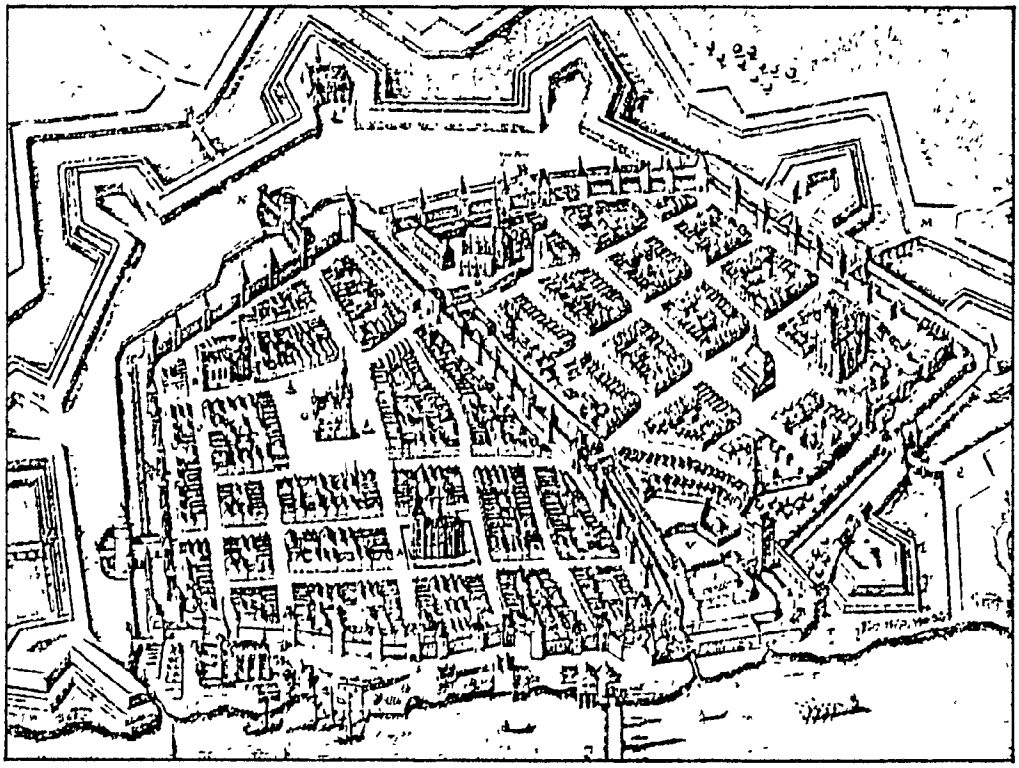


Fig. 1.16 Torun. View of the Old Town (1233) and the New Town (1264). Engraving by M. Merian (E.A. Gutkind, 1972)

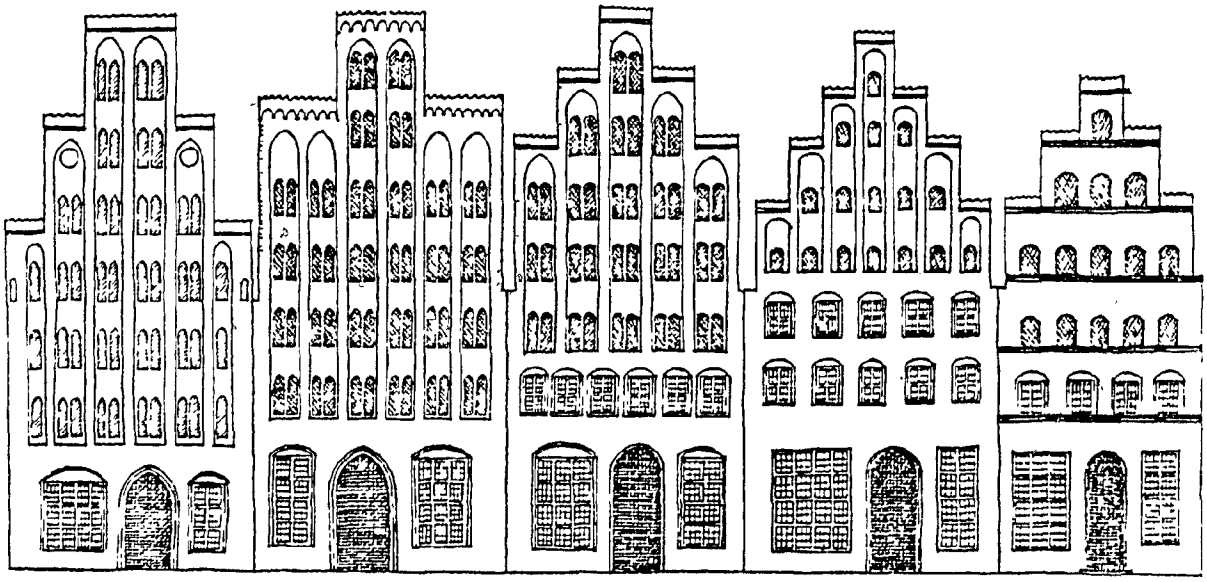


Fig. 1.17 Lubeck. Gable-ended walls of bricks (Gruber, 1976)

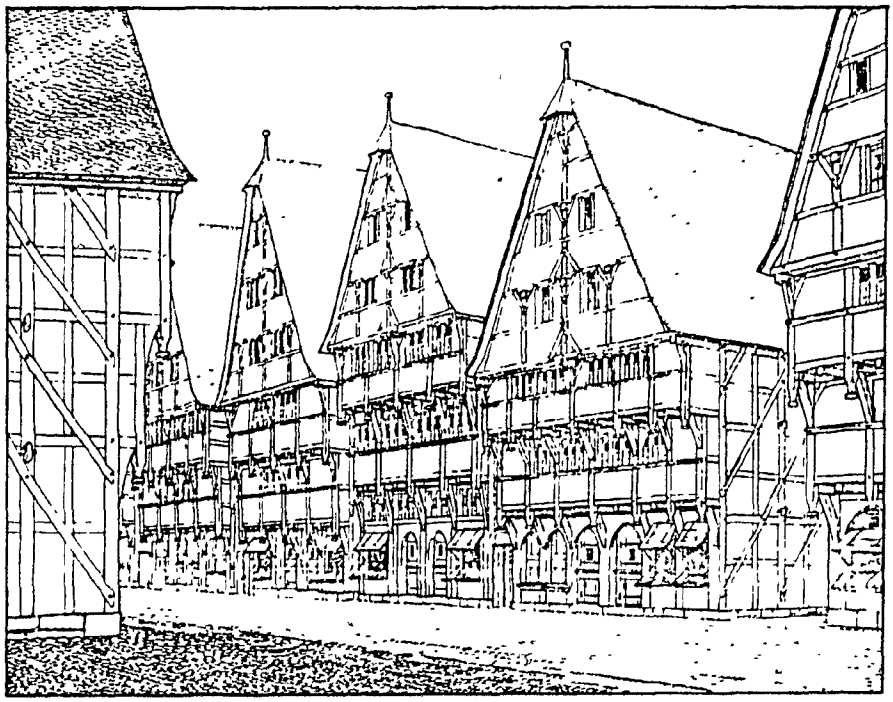


Fig. 1.18 Hessen. Gable-ended walls of wooden framework with brick inlay (Germ.) (Gruber, 1976)

similar trades were adjacent, and the people shared the same habits in living and working.[15]

The size of the block varies somewhat, but it does not generally exceed 60 by 80m[16] (196.8 by 262.5 feet). The block area is parcelled out into nearly equal house plots of approximately 8 to 10m (26 to 33 feet) frontage and up to 30m (98 feet) in depth. The frontage was very narrow in order to give most of the citizens who were merchants or craftsmen access to the street for running their business. The standard house is a gable-ended, multi-storey building set in a row which mostly accommodated the extended and composite family alone.

Because he was the owner and a free citizen, the independence of both the building and the dweller is very much expressed by the gable-ended wall facing the street. Regarding the building arrangement of Danzig, a foundation of the Hanse, the narrow sideroads were originally formed by the eaves of the gable-ended houses and were built-up in the course of time with tiny houses, due to the urban congestion.[17]

The houses of the Zahringer towns in Southern Germany and Switzerland, however, presented the eaves of the roof parallel to the street (Fig. 1.20). And in the fifteenth century many of the original gable-ended roofs finally had been moved with the eaves fronting the street anticipating the Renaissance.[18] (Fig. 1.21)

1.3 From Renaissance to the End of the 18th century

With absolutism new perspectives in town planning caused a distinct change in the architectural treatment of building blocks,

Fig. 1.19 Bavaria. Gable-ended walls (Gruber, 1976)

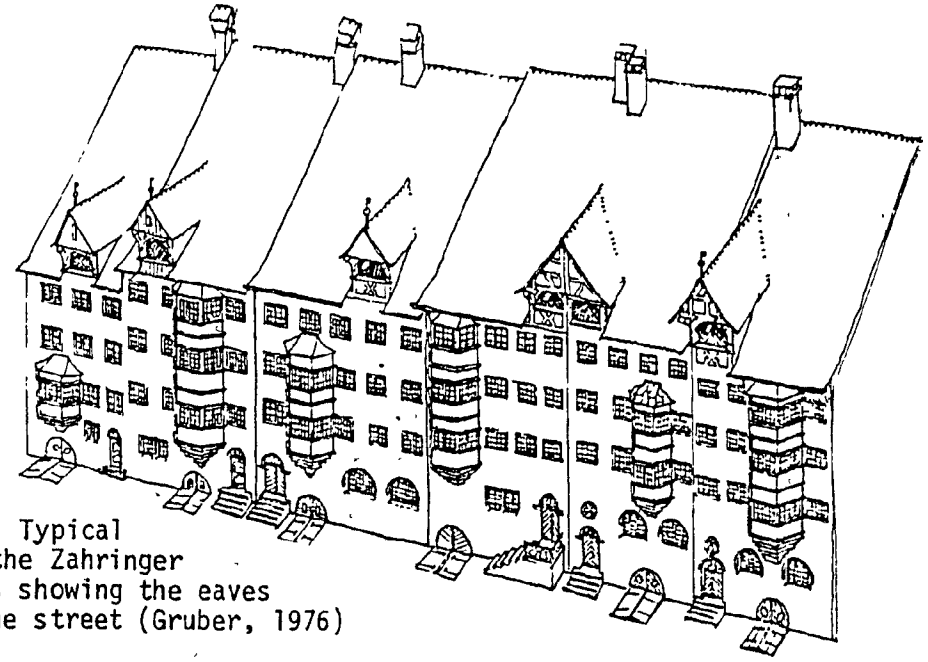


Fig. 1.20 Typical façade of the Zahringer settlements showing the eaves fronting the street (Gruber, 1976)

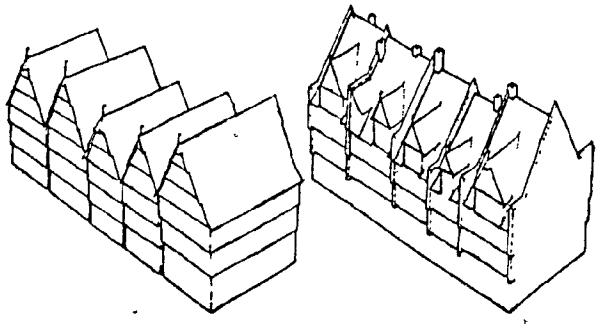


Fig. 1.21 During the 15th century the roofs had been finally moved facing the street (Gruber, 1976)

particularly the continuous set of houses of a perimeter form. The dominating planning principles were symmetric and geometric layouts based on the star-shaped ideal plan, powerful fortification systems, primary straight streets and large squares.

In contrast to the predominant verticality of the medieval townscape and to the frequently intricate detailing of houses in the Middle Ages, Renaissance architecture rejected asymmetrical informality for a classical sense of balance and regularity. Therefore, emphasis was placed on the horizontal instead of the vertical. The houses show identical façades and the parallel horizontals of their ledges, eaves and roof tops tie the houses of the building blocks together creating an architectural unity (Fig. 1.22).

It is in this context that the alignment of the houses around the surrounding streets and the uniformity of their appearance in height and design rightly finds its full evidence. If we compare the medieval townscape of Ravensburg (Fig. 1.23) with its Renaissance extension based on a regular gridiron pattern, we realize a remarkable uniformity of the latter in respect of the size of blocks and the height of the houses.[19] Here, the gridiron also conformed to the Renaissance ideal of aesthetic uniformity and was another principal element of urban planning activities during the 17th and 18th century.

At this time the corner building with two equivalent façades arose from planning grids of streets of the same hierarchy. From the town plan of Ravensburg it is obvious that the area of the street blocks has been enlarged and the shape has become nearly square. The interior organization

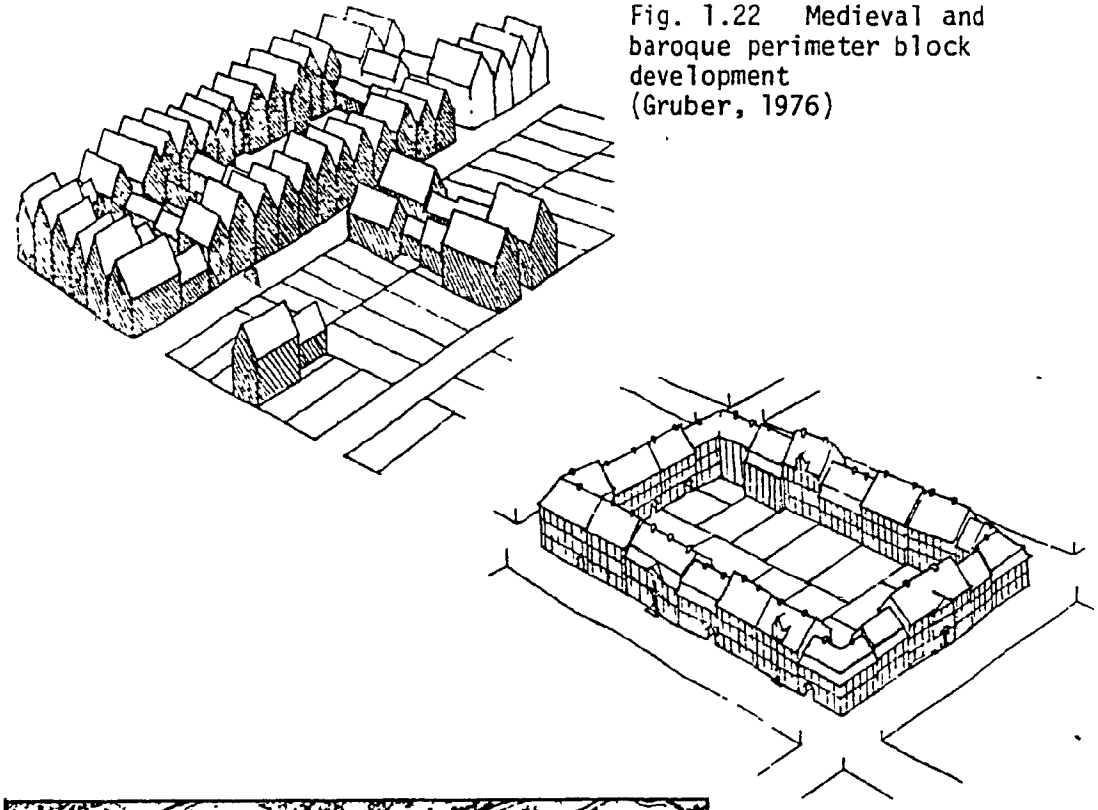


Fig. 1.22 Medieval and baroque perimeter block development (Gruber, 1976)

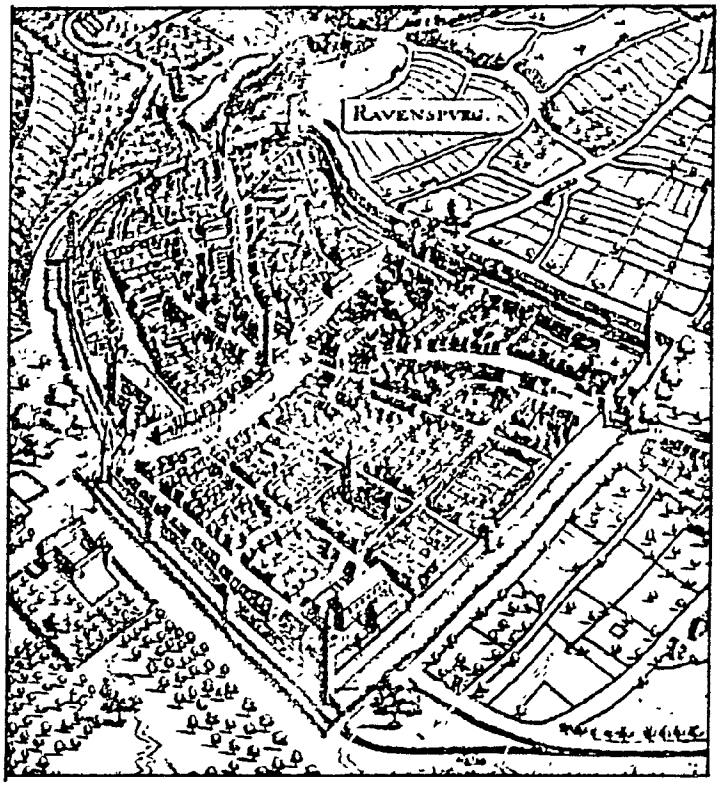


Fig. 1.23 Ravensburg, (South Bavaria). Showing the Renaissance extension of the town (Hiorns, 1956)

of the open space within the perimeter buildings is comparable to the medieval building blocks; subdivided into differently sized plots and clearly separated from each other; these private gardens are packed with workshops or small sheds and stables.

The heyday of these efforts of deliberately planned urban form is marked with city foundations such as Hanau (Fig. 1.24) and Mannheim (Fig. 1.25) and in city extensions such as Berlin-Dorotheenstadt and Berlin-Friedrichstadt (Fig. 1.26). Originating from 'ideal town' plans, the entire layout of both Mannheim and Hanau and of the extension of Berlin, initiated as new settlements for French migrants, were based on a totally rigid gridiron pattern.[20] These towns experienced equal formations of housing blocks of a perimeter form. In 1601, Mannheim was laid out as a bastion with a citadel separated from the residential section. In 1700, a palace was built in place of the former citadel; and the general gridiron street pattern was modified only by the slightly wider main axis-streets in front of the palace. Two of the street blocks were left open as, at most, only incidental public space. Since the resulting townscape appears to be merely monotonous, Camillo Sitte, known as one of the late 19th century advocates of a return to the use of 'romantic' medieval urban form principles, is highly critical of both Mannheim, and Renaissance grid planning in general.[21] Another example is Berlin, where in 1673 the extension of Berlin-Dorotheenstadt had been considered in combination with the primary street axis 'Unter den Linden'. Together with Friedrichstadt, of which the grid plan had been laid in 1688, both plannings were again extended in 1734.[22]

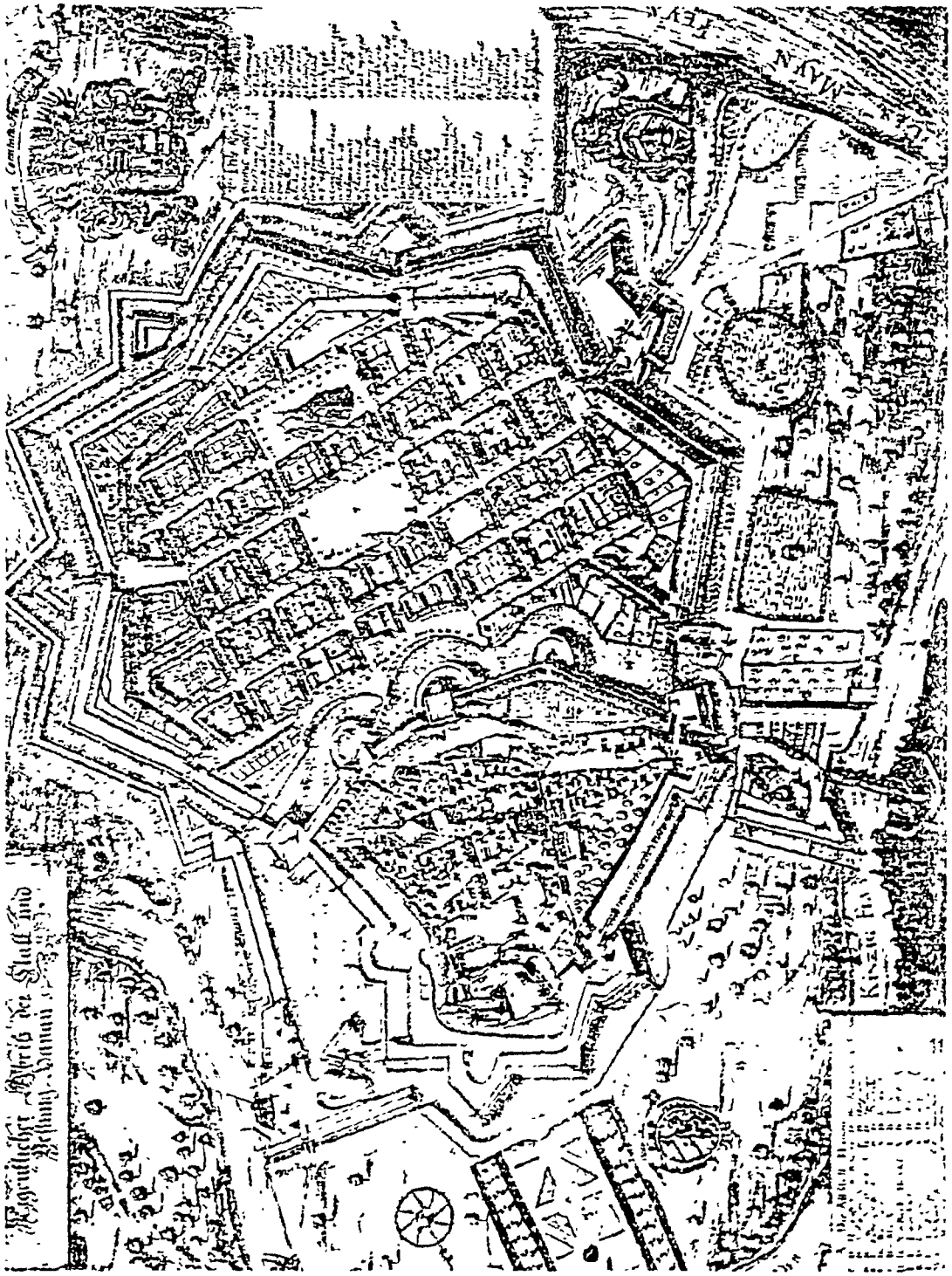


Fig. 1.24 Hanau, Germany. View of the town. Engraving by Christoph Metzger, 1935 (Gruber, 1976)

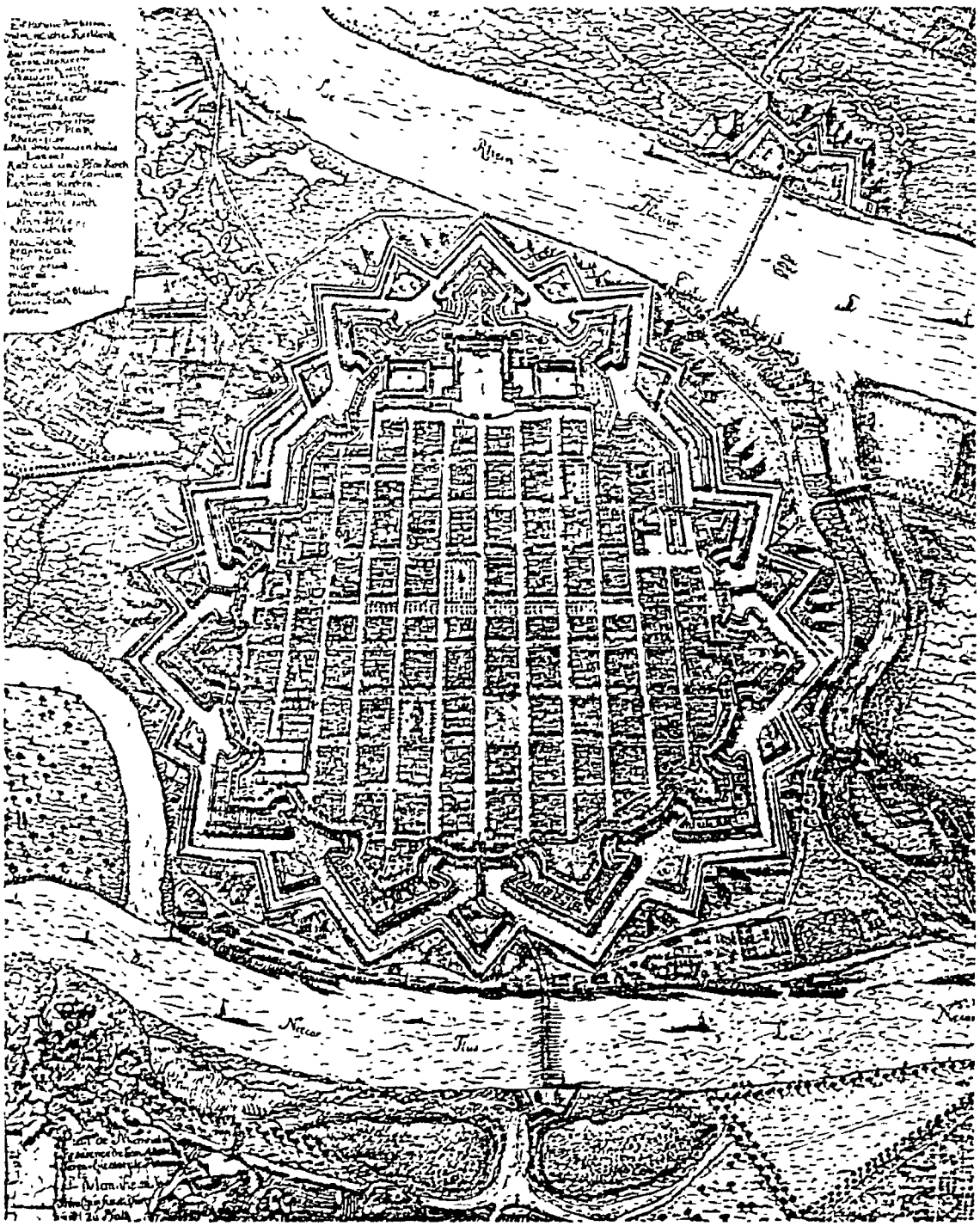


Fig. 1.25 Mannheim, Germany. View of the town in 1758, Engraving by Joseph Baerels. (Gruber, 1976)

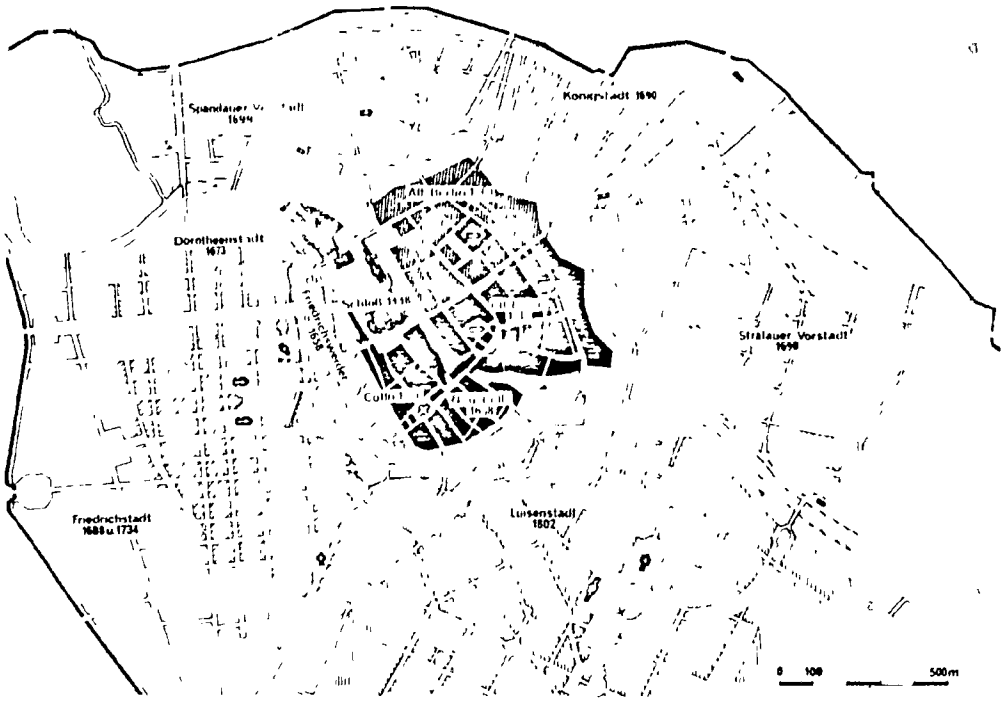


Fig. 1.26 Berlin. Layout of the Renaissance city extensions around 1800 (Braunfels, 1975)

Fig. 1.27 Berlin-Friedrichstadt. Aerial view of the over-densely built blocks of housing about 1900 (Hegemann, 1930)

Yet the usual system of organization and utilization regarding the street with its rigorous surroundings, where the individual house is subordinate to the unity of block, and the interior courtyards containing private gardens, remain the principle planning elements in respect of architecture, the dwelling and the building block. However, there is a gradual change in ownership. After the distinctive impoverishment of the civic population caused by the 30 Years' War (1618-1648), and due to the fact that craftsmen became increasingly dependent on the merchant, rental accommodation made up a considerable portion of housing in the 17th and the 18th century in comparison to the Middle Ages.[23]

1.4 19th Century

What started in Renaissance town planning, namely, the organization by streets of same hierarchy and street blocks of almost equal size, became gradually the systematic approach in the 19th century. As Gruber observes, the layout of the rapidly growing cities were first executed according to the proven system of rectangular building blocks. However, they were too great a scale. Their dimensions did not result from the citizens' dwelling needs as in Priene, Freiburg and Mannheim, but in consideration of cost savings in land and roads the block sizes of the baroque city extension of Berlin-Dorotheenstadt and Friedrichstadt were more extensive.[24] (Fig. 1.27)

In consequence of this development and due to the change of tenure mentioned above, the built-in 'single-family house' was replaced by the multi-storey building on a rental basis. Thus, the resident was no longer

the owner, but the tenant. Consequently, it was the starting point when tenement blocks were going to be built as a mass-produced item - a 'ready-to-be-occupied' product. Building tenements for rent became a profitable enterprise. Since it was left to private initiative, the process involved landowners, speculators and builders who were highly concerned with profit. Excessive land coverage and crowding of people within the buildings generated a population congestion of unprecedented scale.

Because of the growing population due to a phenomenal rural-urban migration caused by the abrogation of serfdom, the demand for housing increased, with the living conditions worsening in proportion. In order to make better use of the entire site, the internal yards and gardens were replaced by rear buildings along the lot line, or small sheds were converted for housing purposes to gain more space for more tenants. This ushered in the development of slums. To understand this period and its problems, one has to remember that between 1800 and 1900 urban population in Europe grew over 300 percent. At the beginning of the 19th century, London had a population of 1,000,000; at the beginning of the 20th century it was 7,000,000. During the same period Paris grew from 700,000 to 3,000,000, and Berlin from 172,000 to 4,000,000.[25]

The separation of the places of living and work broke the homogeneous structure of both the townscape and the population. Factories were surrounded by the residential districts where the workers lived within walking distance of their work-place. The extent of uncontrolled house construction increased the misery and poverty for the working class. By contrast with the unsanitary living quarters of the workers, the residential

suburbs of the well-to-do citizens made a clear social distinction. Thus, the development of both the slum around the factory, and the suburban villa located in a favorable district far away caused a change in the pre-industrial town; and this process, as well as a lessening of the control of systematized town development, resulted in the accelerating sprawl of towns. This became a feature of the major industrial town (Fig. 1.28).

The impact of the industrial revolution was first felt in England. Due to an enormous population growth and housing shortage, speculators, (or so-called 'jerry-builders'), governed the housing market at almost total liberty. Instead of perimeter form tenements as on the Continent the two-storey back-to-back houses represented to the hundreds the typical housing form for the underprivileged poor in English industrial centers. Although they were housed in lowrise buildings, due to religious and socio-economic reasons, living conditions deteriorated. When in the mid-19th century attempts had been undertaken to improve conditions by the 'Public Health Act', the Continent had started to experience even worse conditions.

It was in Berlin where abuses appeared in their most extreme form. Between 1853 and 1887, the building code permitted tenement blocks of any height along streets more than 15m (49.2 feet) in width. Even building heights of one and a quarter times the street width were allowed along streets less than 15m (49.2 feet) wide. There were no details given about the extent of land use nor windows required to give essential light and ventilation. The size of the interior courts, however, were designed only for fire safety reasons. The area of 5.3 by 5.3m (17.4 by 17.4 feet) was

the space required for the turning circle of a fire engine. There were no other regulations concerning the height of rear buildings, except that none should exceed that of the front houses.[26]

During the mid-century period, the poorer citizens were still likely to inhabit the basements, garrets and back-buildings of tenement blocks (Fig. 1.29) of which the more desirable quarters were occupied by the middle class. The façades were treated with ample decoration to emphasize the 'high living standard' of these latter tenants, and on the other hand, to hide the crude and unsanitary living conditions of the poor.[27] (Fig. 1.30) According to Hegemann, the regular building plot of 20m (65.6 feet) in width by 56m (183.7 feet) in depth (Fig. 1.31) accommodated 325 people. The occupation of one and a half person per room of 15 sq.m. (161.46 sq.ft.) without kitchens was considered moderate.[28]

When the congestion due to increasing rural migration became so bad as to be critical, the administration of Berlin once again postponed the essential decision for the horizontal extension of the city.[29] Instead, housing problems were attempted to be solved by cutting up existing buildings into smaller rooms, by adding additional storeys and by building on wings.[30] (Fig. 1.32) The census of 1861 gave full evidence of the prevailing situation - of 521,933 people of the total population, 48,326 lived in basements; of 105,811 dwellings 51,909 had only one room with heating. And the density was dreadful; 27,629 people shared one room with seven others, 18,376 with eight, 10,728 with nine; 5,640 were housed in groups of 10 and 2,904 in groups of 11 in one room with heating.[31]

Because of increasing land values - they doubled in Berlin between

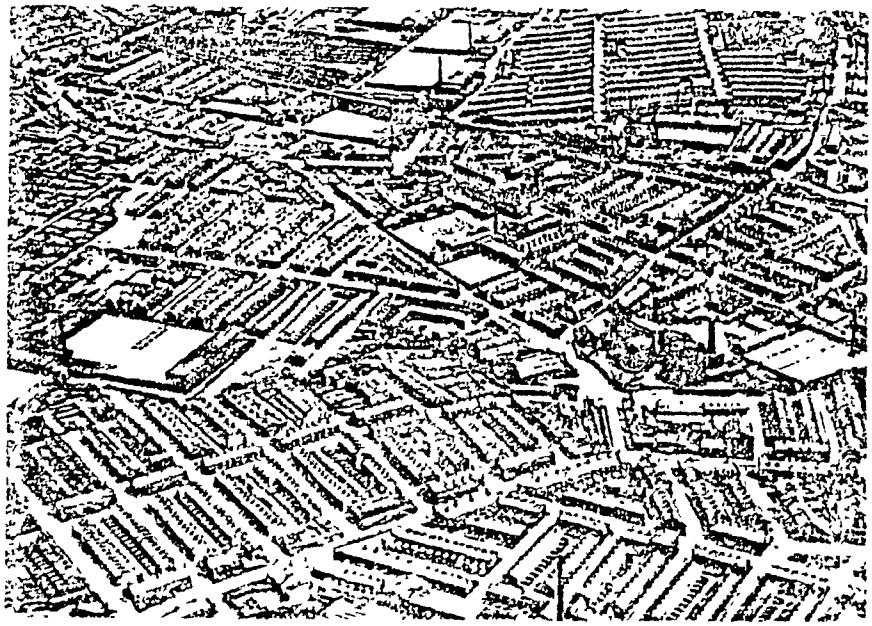


Fig. 1.28 Industrial Town (Hilberseimer, 1955)

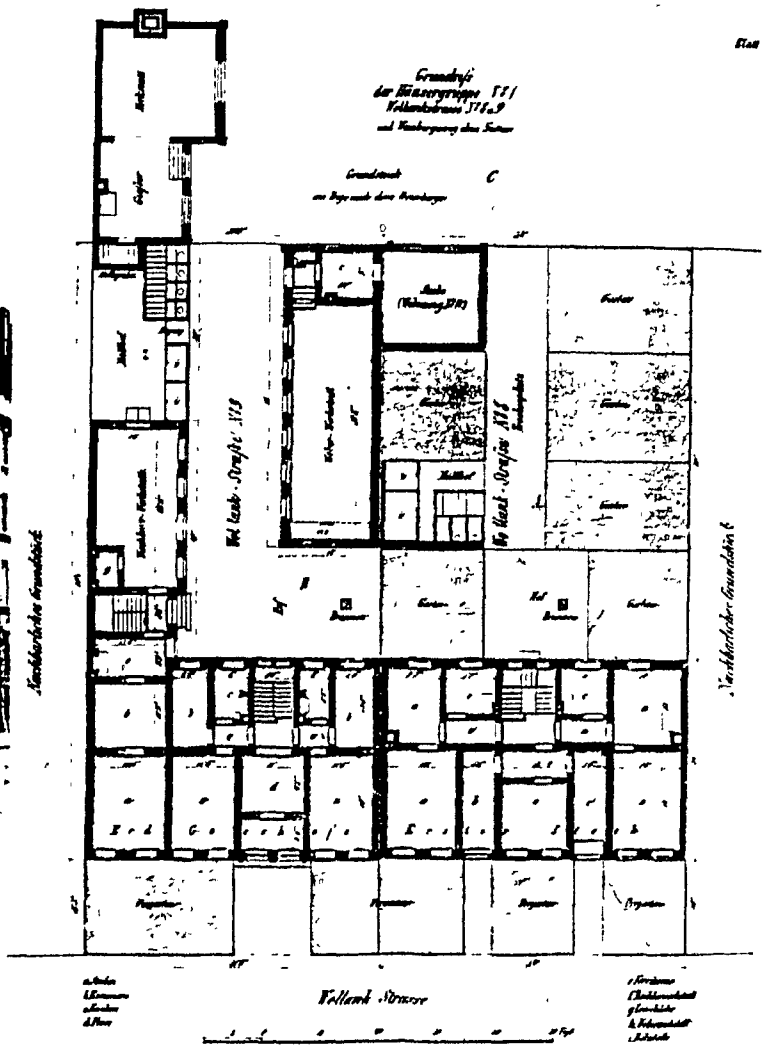


Fig. 1.29 Berlin.
Tenement block on
Wollankstrasse no.8&9
(1848-50)
(Geist/Kurvers, 1980)

Fig. 1.30 Berlin-Kreuzberg. Façades of the tenement blocks showing Renaissance ornaments, Waldemarstrasse (Grote, 1974)

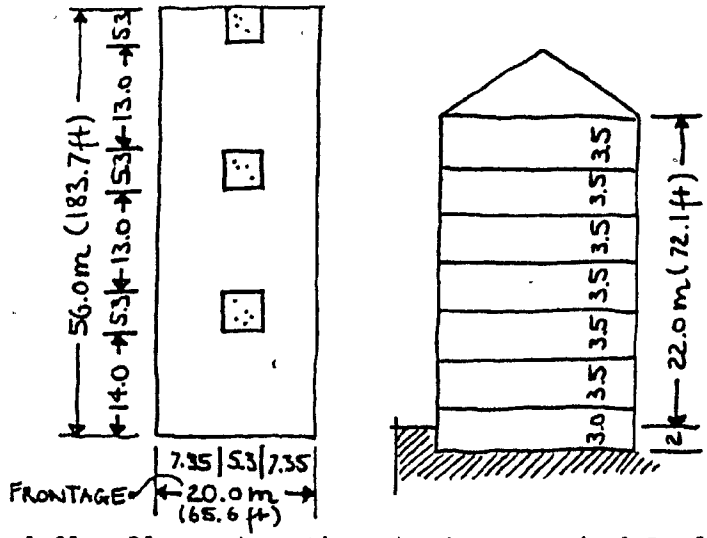
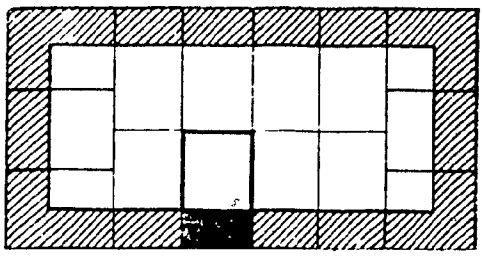
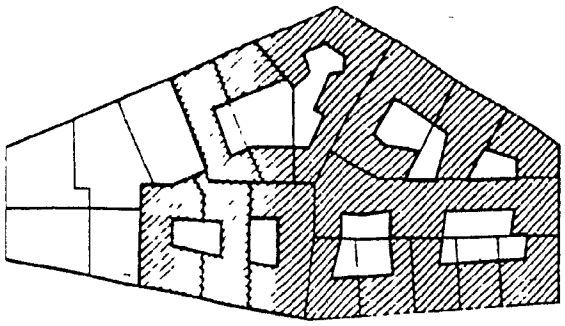


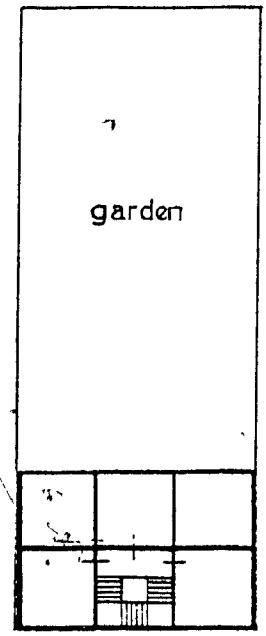
Fig. 1.31 Plan and section showing a typical Berlin tenement block built according to the building regulations in force from 1853 to 1887 (Hegemann, 1930)



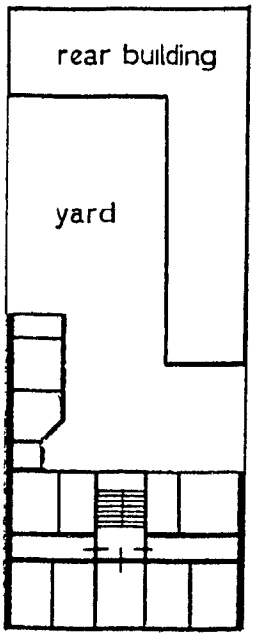
Perimeter block of the 18th century. There is a relation between the house and the site.



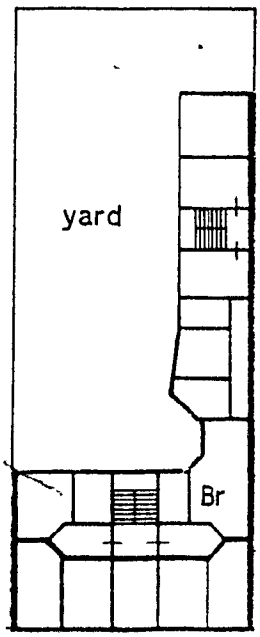
Solid block development about 1900. Intensive site coverage. Small yards become narrow light-shafts. Lot lines are nothing more than property lines.



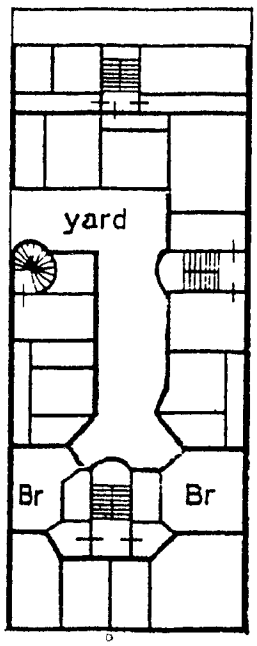
Dwelling of the 18th century. "Single-family house" of two to three storeys.



Tenement block of the 19th century and a wing, about 1880. Four to five storeys.



Tenement block after 1870. There are different types of dwelling units. The large unit leads from the street to the wing (Berlin room). Five storeys.



Solid block development of tenements. Minimal size of open space (yard). Different types of dwelling units (Berlin room = Br) Five storeys.

Fig. 1.32 The evolution of the building form from perimeter building composed of 'single-family houses' in the 18th century to the solid block development of tenement blocks during the second half of the 19th century and the beginning of the 20th century. (Schinz, 1974)

1865 and 1880[32] - and a housing shortage, speculative building favored by the street plan of 1862 grew to an even wider extent than before. As a result of wide-spaced streets, the housing blocks were from four up to 10 times the size of those at Friedrichstadt.[33] (Fig. 1.33) Attributed to the shortcomings of the 1853 building code, three principal building types of the Berlin tenement[34] (Mietskaserne) had been developed to exploit every square meter available (Fig. 1.34).

Narrow gateways connecting dark courts gave access to dwellings and factories which had been integrated into the scheme because none were allowed to be built along the streets. The most widespread type was a house with one or two wings (Fig. 1.35, 1.36) which due to the stereotypical merging of the 'Berlin room' (Berliner Zimmer) was considered the specific type of Berlin tenement blocks.[35] The 'Berlin room' links the front unit with the wing where bedrooms and the kitchen are usually located.[36] Because of the bad illumination the room was often used as movement zone or dining area.

The tenement block 'Meyershof' (in Berlin, Ackerstasse 132/133) built in 1874, represented an extreme case on a site 36.5m (119.8 feet) wide and 130m (426.5 feet) deep (Fig. 1.37), six four-storey housing blocks of 12m (39.4 feet) in depth had been constructed facing alternately courts or gardens of 10m (32.8 feet) in depth (Fig. 1.38). Here, up to 2,000 inhabitants were supposed to live in 300 units.[37] According to Schinz, seven persons per unit shared the particular space of 35 sq.m.(376.75 sq.ft.) in area.[38] The loss of privacy due to common corridors on the one hand, and the subletting of beds to strangers on the other, had become so

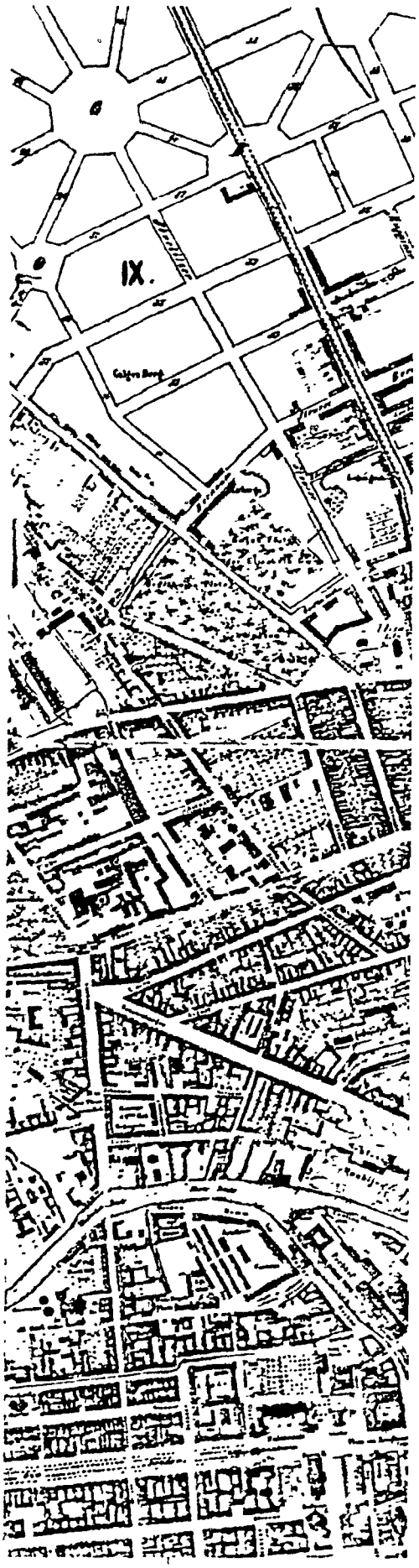


Fig. 1.33 A comparison of housing blocks laid out in Berlin-Friedrichstadt (bottom) and those of the street plan of 1862 (top)
(Geist/Kurvers, 1980)

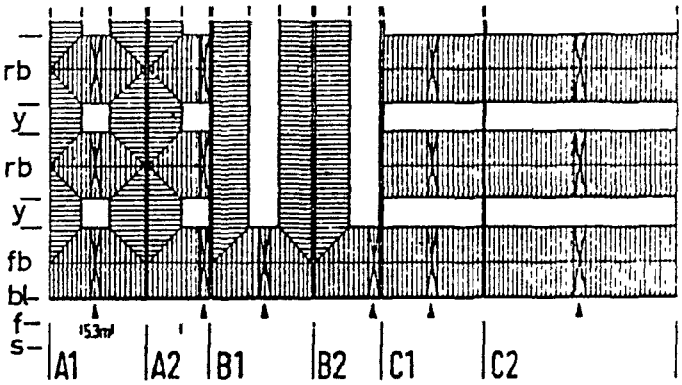


Fig. 1.34 Three principal building types of the Berlin tenement.
(Geist/Kurvers, 1980)

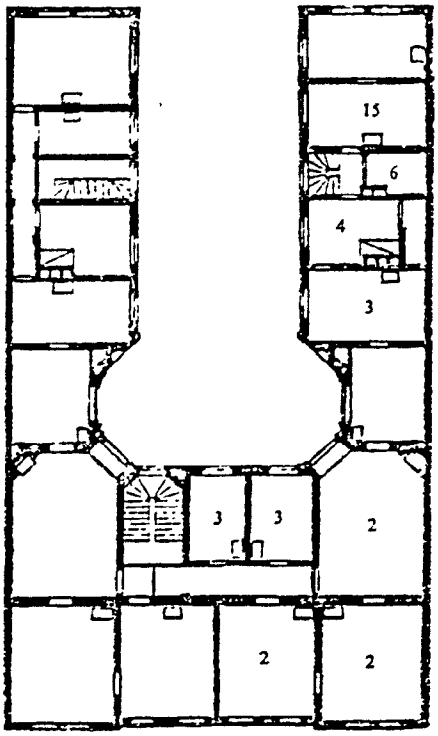
A - Enclosed yard type (front building, side wing, transverse building)

B - Yard is enclosed by side wings (front building, side wing)

C - Transverse buildings set one after the other (particularly suitable for small dwelling units)

y - yard
rb - rear building
fb - front building
bl - building line
f - façade
s - street

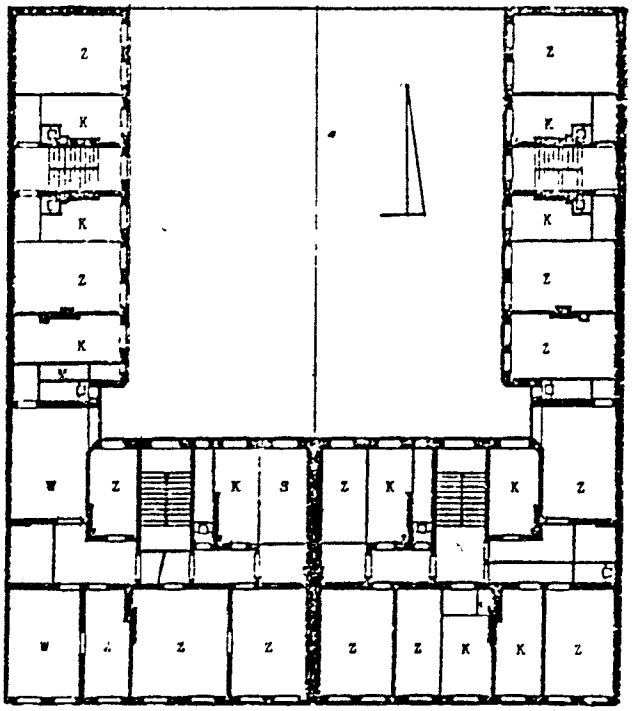
Fig. 1.35 A. Stuler
House Schneider, Berlin,
Anhaltsstrasse 7, (1835)
(Grote, 1974)



First floor

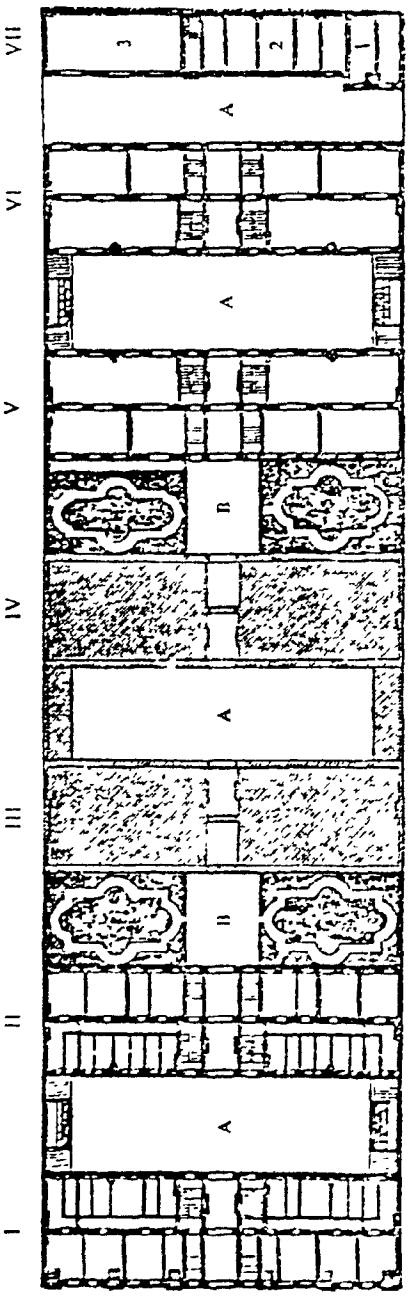
2 - living and parlor room
3 - bedroom, 4 - kitchen,
5 - food storage, 6 - maid,
15 - small dwelling unit.

Fig. 1.36 Berlin-Moabit.
Tenement block, Stephanstrasse
4-15, (1886)
(Grote, 1974)



Z - room, S - bedroom,
K - kitchen, W - living room,
M - maid.

Fig. 1.37 Berlin. 'Meyershof' tenement building, Ackerstrasse 132/133. Ground plan, 1874 - (A) yards. (B) garden. (I-VI) dwelling units. (V-VI) workshops on the ground floor. (VII) administration. (1) steam engine. (2) superintendent; bath house above. (3) shed. (Grote, 1974)



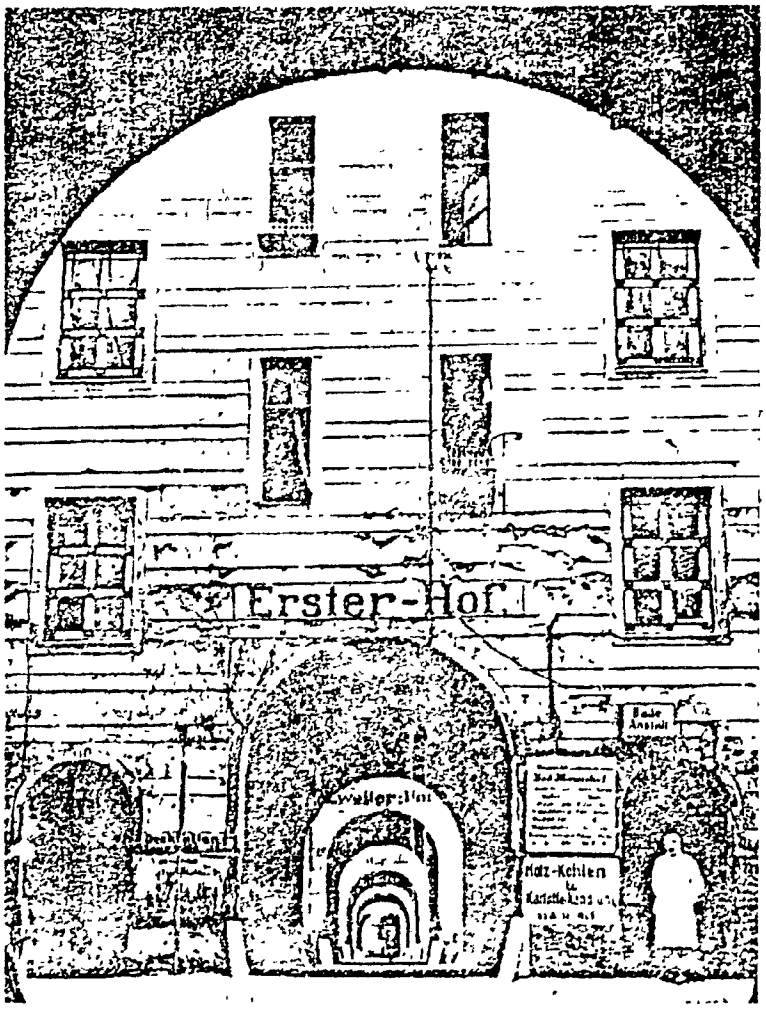


Fig. 1.38 Berlin. 'Meyershof' tenement building, Ackerstrasse 132/133. First yard. (Tafuri/Dal Co, 1979)

disadvantageous in respect of morality and health[39] that it became a distinct characteristic of workers' poor housing conditions.

Berlin as the burgeoning political and cultural center of Germany in the 1870s was seen as the 'ideal' town, and housing schemes were copied without any criticism by all major towns. Not only Germany's booming cities were affected by these abuses, but similar developments were to be experienced in all industrial centers by the end of the 19th century and the beginning of the 20th century (Fig. 1.39).

1.5 From 1900 to 1920

With the growth of industry and the invention of better and faster means of transportation the city had lost its structural entity and, hence, had become a chaotic environment to live in. Due to inadequate building regulations and excessive land use through speculation the perimeter block of the Renaissance had become a solid block of over-densely built tenements in the 19th century. It is striking, that this solid block development is similar to Pompeii, for example, but composed of multi-storey buildings. Whilst economy governed all decisions in respect of improving industrial progress, the homes of the working class people in these unhealthy and ill-constructed sections were neglected.

Writing about the acute housing shortage and the failure of local authorities in housing their working-class citizens adequately, Elizabeth Denby stated: "Instead of creating planned residential areas suited to the revolutionized conditions of industrial life, the new housing estates were mainly built in haphazard extensions of the traditional method of urban

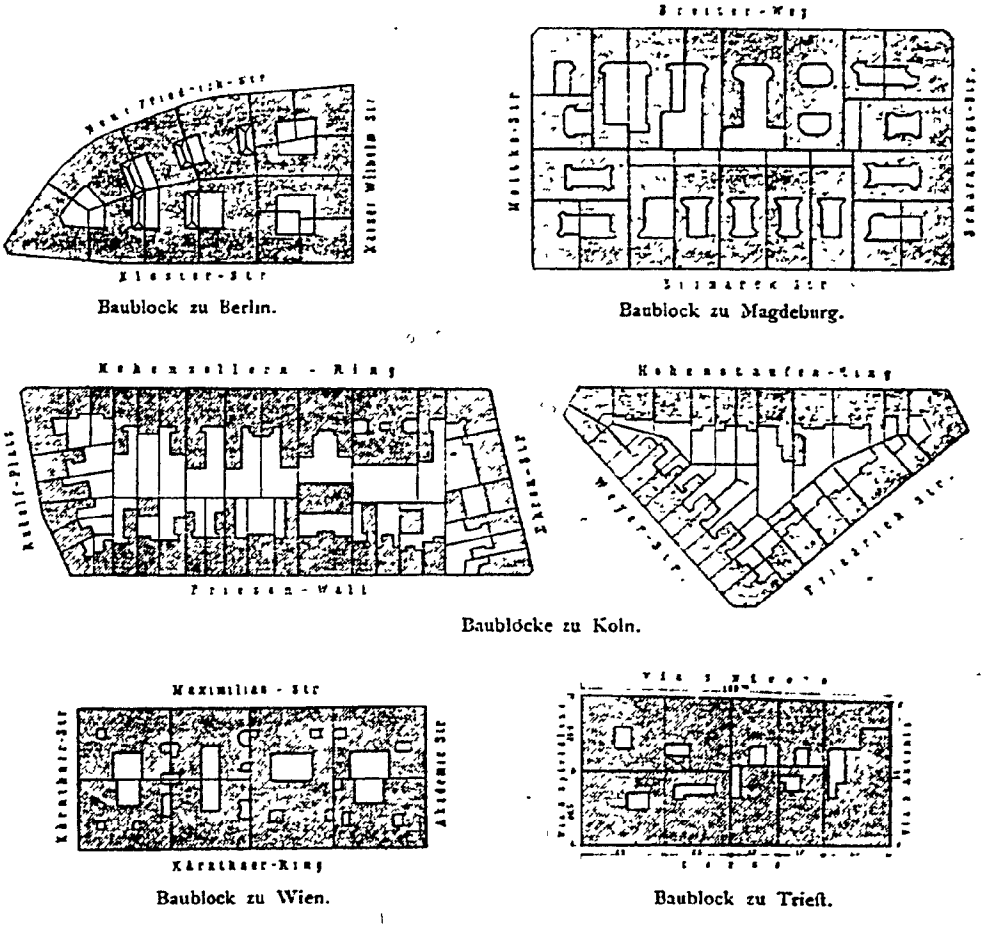


Fig. 1.39 Solid block development in Central Europe (Stubben, 1890)

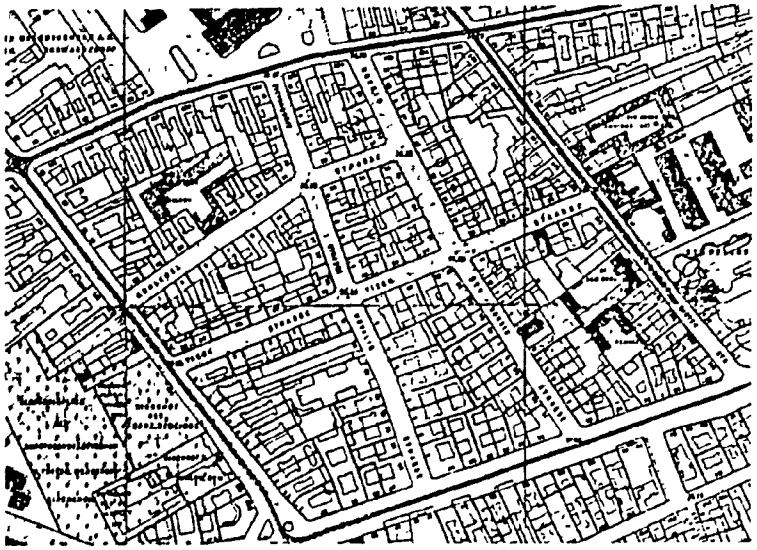


Fig. 1.40 Berlin about 1900. A section of the town plan. Scale 1 : 4,000. (Geist/Kurvers, 1980)

housing. Thus in Berlin, Paris, Vienna, Copenhagen and all the other great Continental cities, blocks of flats were built higher and higher and closer and closer together, one of the most popular designs being constructed six or seven storeys high, with three, four and even five courtyards leading from each other, served by one entrance from the street, estates being mainly composed of one- or two-roomed dwellings off long, dark, interior corridors. Buildings often covered 90 percent of their sites, unattainable luxuries for the mass of the poorer citizens."[40] (Fig. 1.40, 1.41, 1.42)

The following facts and figures illustrate the degree of the bad living conditions of the workers which continued or even increased in those slums of the beginning of the 20th century. In Berlin, around 1905, 1,088,269 inhabitants - or about one half of its total population - lived in dwellings of which the occupation of each room with heating ranged from 3 to 13 people, 158,511 people were housed in 23,786 one-room dwellings, in which each room with heating was shared by 6 to 13 persons. Moreover, there was a lack of kitchens and storage space in 34,000 out of 249,457 one-roomed dwellings. However, 188,000 dwellings lacked no kitchen, but a storage space.[41] (Fig. 1.43, 1.44)

In Paris, the population had grown rapidly by 50 percent between 1861 and 1896 alone and reached 2,714,068 in 1901. Overcrowding both of dwellings and of sites in the center of the city took place within the restricting fortifications until their demolition. In several districts this overcrowding was to the extent of 150 to 243 persons per acre and near the town hall it rose to 405 persons per acre. The death-rate in these slum areas due to tuberculosis alone was twice the average death-rate of all Paris.[42]

Fig. 1.41 Paris. View of densely built and highly populated residential areas. (hilberseimer, 1955)

Fig. 1.42 Vienna. Late 19th century gridiron living quarters located to the west of the Ring. Scale 1: 10,000. (Bobek/Lichtenberger, 1966)

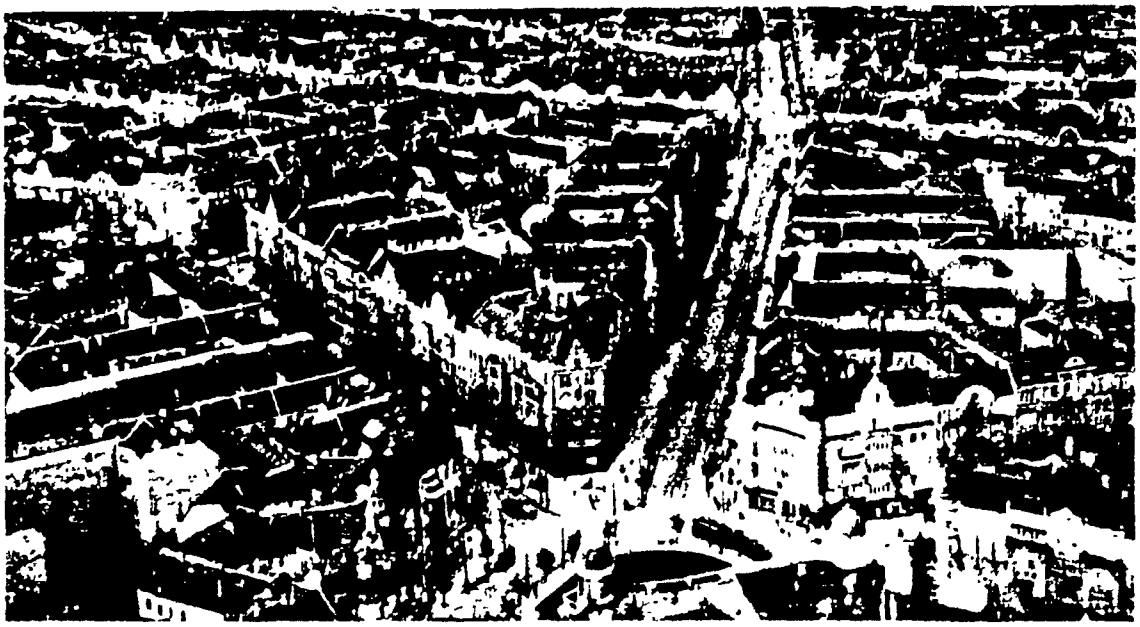


Fig. 1.43 Berlin-Schoneberg. Prager Platz, Motzstrasse (1900-1910). (Hegemann, 1930)

Fig. 1.44 Berlin-Tempelhofer Feld. Aerial view of the tenement block development before World War I. (Hegemann, 1930)

In Vienna, before World War I, 518,000 people - or about 30 percent of its population - lived in overcrowded and over-densely built tenements at the rate of more than two people per 'room'. (And even kitchens, bathrooms and front halls were considered as 'rooms'). The census of 1910 shows that at least 355,000 people had to sleep in rooms having no outside ventilation and receiving light and air only from hallways or narrow light-shafts.[43] (Fig. 1.45)

After the demolition of the city wall, the extension of Copenhagen had been built according to a building plan which was based on a population density of 750 persons per hectare (300 per acre) assuming that the land should be just as intensively utilized in the new sections as in the old. Otherwise, it was feared that the city might spread out over too great an area. Thus, tenement blocks, as a result, gave way to exploitation of land at the expense of the tenants' health.[44] (Fig. 1.46)

Yet, the desire to improve housing conditions began to manifest itself a way during the period of industrialization in England. This reformist movement was greatly influenced by Robert Owen and Charles Fourier whose proposals intended the establishment of cooperative communities and housing.[45] The forerunner of all model towns was Robert Owen's model industrial town at New Lanark, Scotland, as early as 1816, followed by Titus Salt's 'Saltaire' in 1852, Krupp's housing at Essen, initiated in 1865, 'Bourneville' started in 1879 by Cadburys and 'Port Sunlight' about 1886 by Lever Brothers.[46] Some 'model' communities were undertaken by industrialists. Stimulated by critical essays of philanthropists such as Benjamin Disraeli, John Ruskin, Lord Shaftesbury, Engels, and Charles

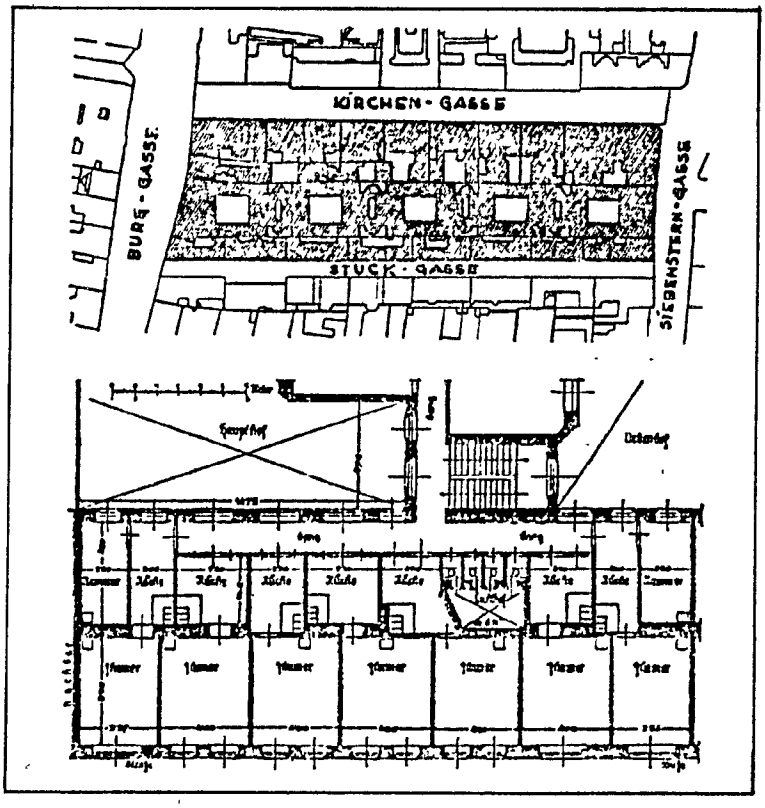


Fig. 1.45 Vienna. Typical dwellings (block plan and floor plan) of the masses, ca. 1900. (Hegemann, 1936-38)

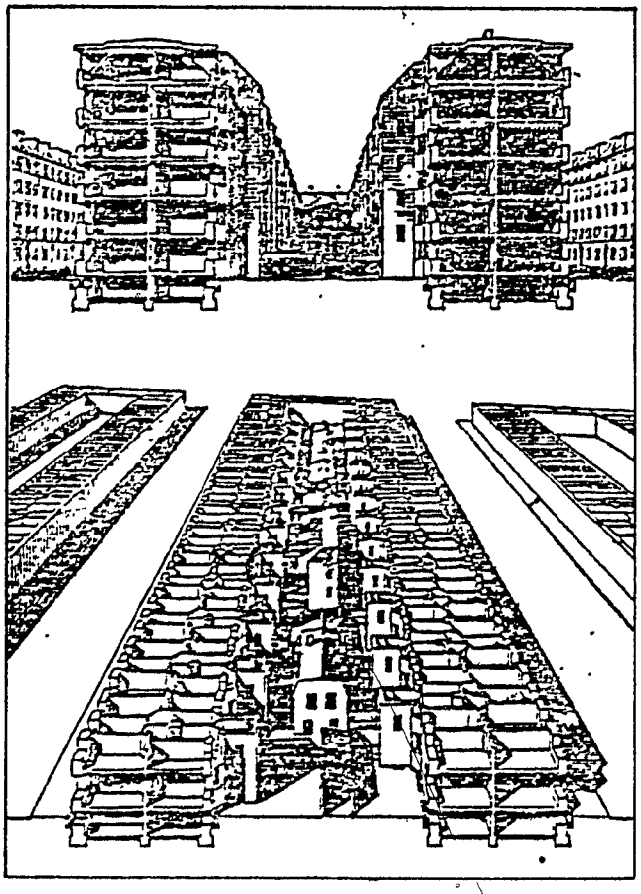


Fig. 1.46 Copenhagen. Tenements. (Rasmussen, 1951)

Dickens[47], their main concern - which was highly paternalistic - was the welfare of people as well as stability of employment and their own profit, respectively.

All schemes had one thing in common - the concept which provided apart from higher standards of space, light, ventilation and sanitation, a sound environment in form of gardens and spaces of common green separated from industrial squalor and social evils. This is what was advocated by Ebenezer Howard in his book "Tomorrow a Peaceful Path to Real Reform" in 1898, four years later retitled "Garden Cities of Tomorrow", and what became known as the Garden City movement in England at the beginning of the 20th century.

As soon as the first garden city was laid out in Letchworth in 1903 to the design of Raymond Unwin and Barry Parker, this scheme attracted the attention of architects and planners on the Continent who were also concerned about counteracting urban congestion and disorder. Thus, it is in the same context that Tony Garnier intended with his concept in 1904 for 'La Cité Industrielle' of 25,000 inhabitants: the separation of the civic center and the residential sections from the factory district by a greenbelt.[48] The general principles and standards involved in the Garden City and in Garnier's proposal for a modern industrial city have highly influenced improvements on the perimeter block buildings in particular, and all planning and housing policies in general after the 1st World War.

Among others cry for light, air and ventilation led to the improved designs of perimeter blocks. The first of these schemes consisted of the two typical characteristics of perimeter form planning, first, the

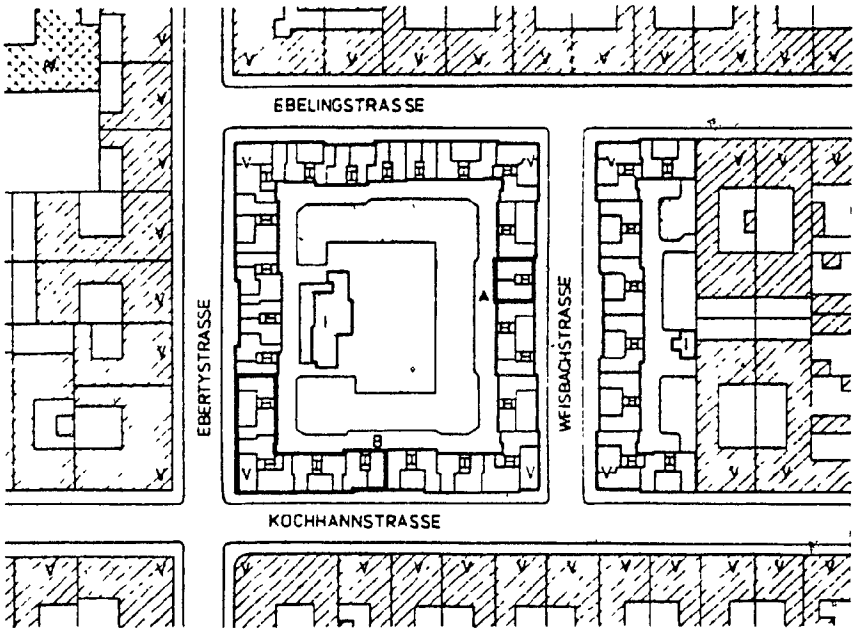
continuous block of houses as an architectural unity underscored by the employment of one sort of material and the uniform treatment of the façades, and second, the communal landscaped interior zone with trees and small gardens related to the ground floor dwellings for private utilization. But their immediate impact on conditions in the industrial centers was so little that urban housing for the working-class people remained nearly unchanged, although most of the new developments were carried out by either trade unions or the municipality.

As in most other European countries it was not before the last decades of the 19th century that the city was finally permitted to purchase land and take part in building activity and enacting new regulations. Aiming at the ideal of English workers' building societies, public utility societies and cooperative housing societies were formed for the goal of building better housing for low-income workers in European as well as in American industrial towns. Public utility societies were given loans at low interest rates and municipal land for lease. Cooperative organizations provided housing of adequate standard and low cost for their members as a non-profit enterprise.

Another important change was the architect's involvement in any capacity for housing projects which first became common practice with developments initiated by housing associations. For example, when in 1892 the 'Berliner Bau-und Wohnungsgenossenschaft' (association for savings and buildings; later transformed into a Berlin cooperative of building and housing) had been established, Alfred Messel, the company's architect, built the project "Weisbachgruppe" in 1898 to 1904, named after its promoter

Valentin Weisbach.[49] Messel designed five-storey apartment houses built along the perimeter of a street block creating a common interior zone of about 60 by 80m (197 by 263 feet) in which a small building had been added in 1906 for baths and communal premises (Fig. 1.47A). In this project, 1,480 people of which 582 were children below the age of 18 years lived in 388 and 18 dwellings with a store. All dwellings were self-contained units with a hallway, kitchen, food storage, flush toilet, balcony and stove heating (Fig. 1.47B). There were no 'Berliner Zimmer'. Seventy percent of all dwellings had cross-ventilation. No rent increase was one of the strict principles of the cooperative society. The landscaped open space contained two playgrounds - a common one and a particular for the kindergarten which was also operated by the society.[50]

This scheme went beyond the new building regulations which were not much better than the previous ones from 1853 to 1887 which they superseded, and which had decisively marked the buildings of Berlin. One alteration consisted of an increase in the minimum area of the inner backyard from roughly 30 to 60 sq.m. (323 to 646 sq.ft.) and after 1897 to 80 sq.m. (861 sq.ft.) (Fig. 1.48). The outstanding feature of Messel's concept was the total opening of the internal part of the block of about 4,800 sq.m. (51,668 sq.ft.) in area.[51] This trend became visible with perimeter block development around the 1920s.



A - Site plan.

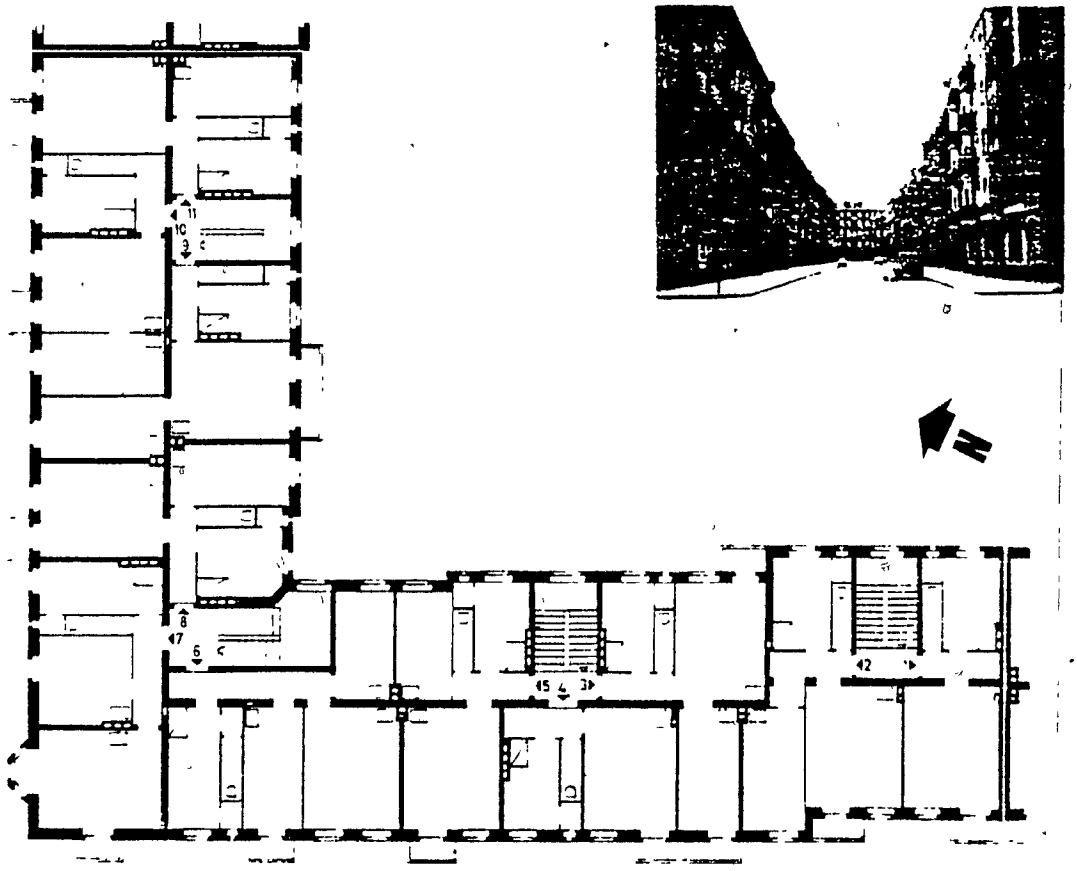
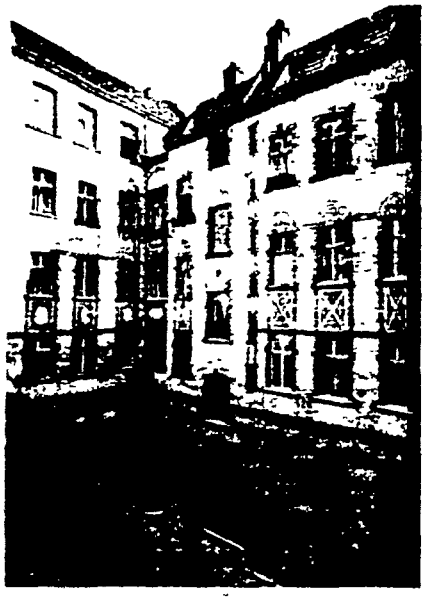
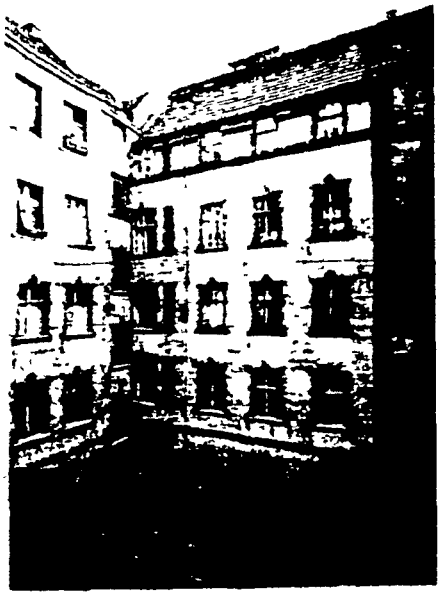


Fig. 1.47 Berlin. 'Weisbachgruppe' project in 1898-1904.
B - Dwelling units. (Joeres/Machule/Reutschler, 1974)

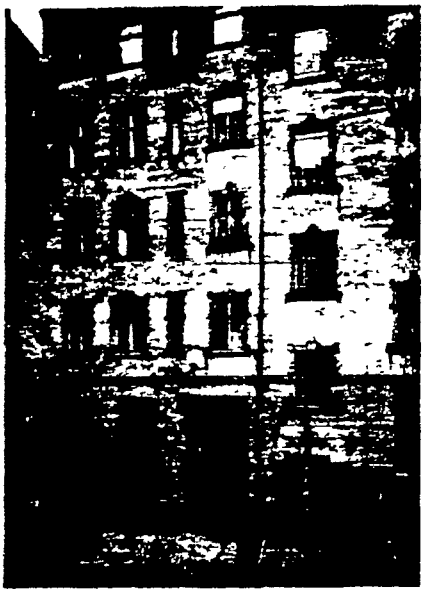
Elevation



First yard



Second yard



Third yard

Fig. 1.48 A Berlin tenement and its three backyards on Schonhauser Allee 62B illustrating the improvements of the building regulations of 1887.
(Hegemann, 1930)

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CHAPTER 2 - The Controversy of the 1920s: Perimeter Form or Parallel Block Development?

Introduction

With few exceptions, planning prior 1925 in Central Europe had been confined to the usual street block. As will be seen in programs in Austria, the Netherlands and Germany after World War I, the first step away from high density to a human scale of housing was the layout of improved apartment houses around the perimeter of the traditional block.

According to Sitte's ideas, the architects of the old school suggested the use of the perimeter building form as the only definition of urban space which would incorporate all amenities for human needs and welfare. The advantages of this type of dwelling were seen as maintaining the street as a unit and, in creating a private realm within the closed block, what can be regarded as the validity of its application to humanize large-scale housing schemes.

Because of new perspectives, modern architects of the 'new realism' (Neue Sachlichkeit) - a counterreaction to the old planning principles based on the traditional block - questioned the good qualities of the perimeter block development. They argued that due to its closed form, a certain portion of dwellings are always at a disadvantage with regard to orientation. Therefore, they gave preference to the terraced house set in a row, one behind the other, which offered each dwelling equal access to sun, air and ventilation.

It was these opposing viewpoints, between the disciples of the

perimeter block development and the architects of the modern movement, which caused the controversy of the twenties. The result of this was that the latter introduced the parallel blocks (Zeilenbau) and functional housing design.

2.1 The Old School of Thought

In the Netherlands in 1915, H.P. Berlage was in charge of an overall plan for a proposed south extension of Amsterdam (Fig. 2.1). Widely influenced by the ideas of Sitte, Berlage also conceptualized unity in terms of street and space, and his regard for the housing block as a definer of urban space was a reaction to the increasing degeneration of form. So, he declared himself in favor of the perimeter building block.

Sitte, whose book "Der Stadtebau nach seinen kunstlerischen Grundsatzen" (City Planning According to Artistic Principles) was first published in Vienna in 1889, derived his theories from the qualities of classical, medieval and baroque spaces which are enclosing. He stressed the significance of irregularity, asymmetry, enclosure, surprise, diversity, continuity of mass connecting elements from the aesthetic point of view.[1]

Consequently Berlage's proposal for the south extension of Amsterdam carried the main features of his interpretation of Sitte's ideas: closed blocks, interior gardens and continuous mass along the streets (Fig. 2.2). The organization of streets was based on a freely symmetric pattern but avoided the monotonous and unimaginative gridiron by employing diagonal streets and streets of different hierarchy. Wide tree-lined streets, which had been hitherto unusual, raised the quality of this housing estate. The

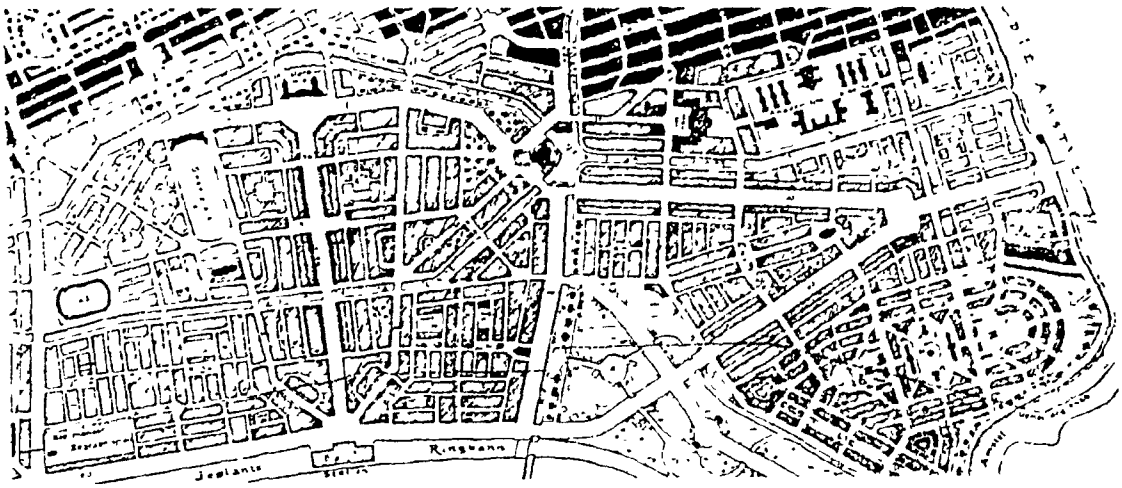


Fig. 2.1 Amsterdam South. Extension plan, 1915. (Grinberg, 1977)

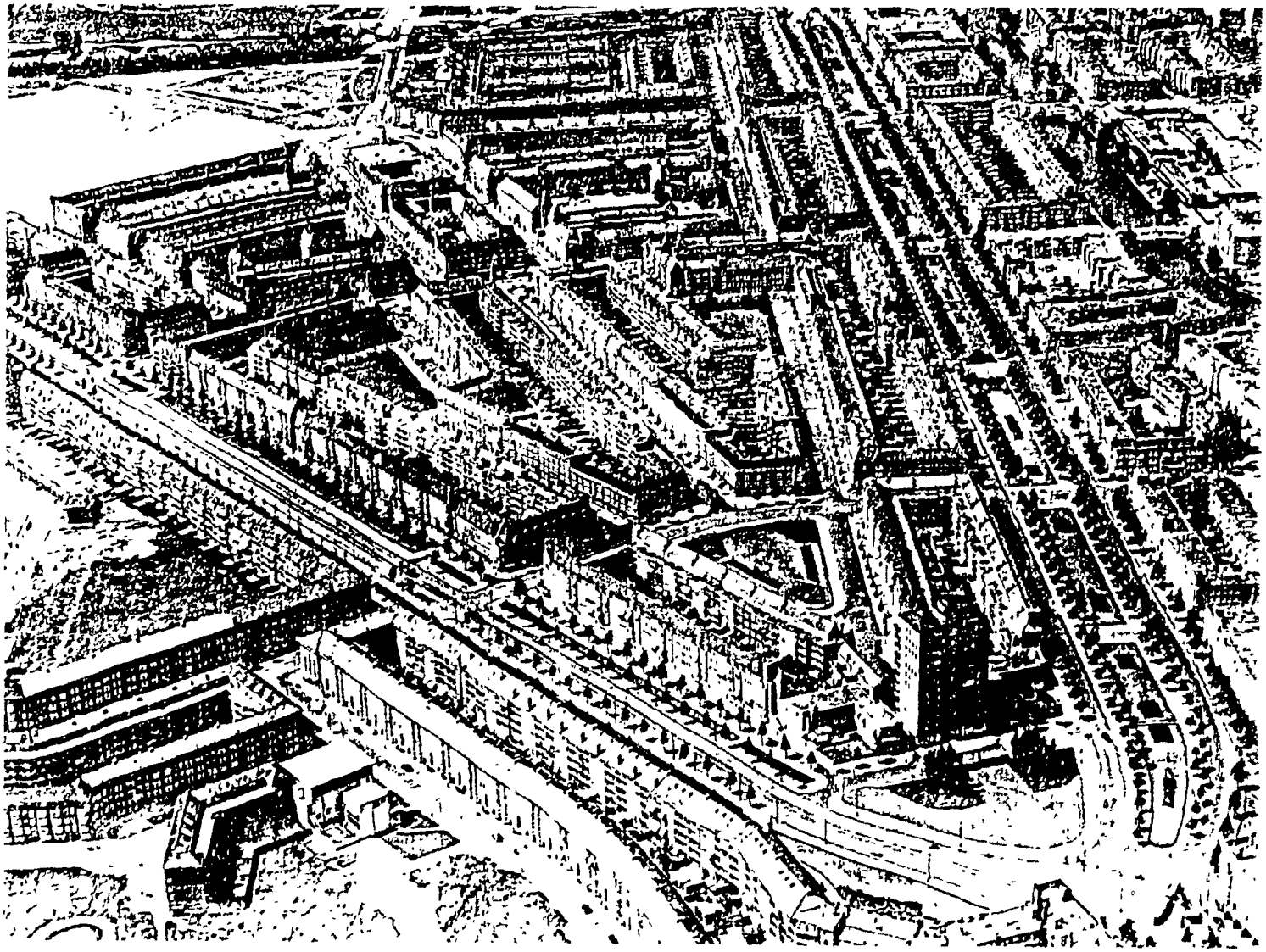


Fig. 2.2 Amsterdam South. Aerial view. (Sherwood, 1978)

size of the perimeter blocks ranges from 100 up to 200m (328 up to 656 feet) in length to 50m (164 feet) in width. They consist of four storeys which are treated as architectural unity surrounding an open space. The streets are very wide in relation to the dimensions of the perimeter blocks.[2]

Some years after World War I a part of his proposal was built by the so-called Amsterdam School. De Klerk, the leader of the group, played a major part in the work. To quote Giedion: "During the twenties this section with its uniform façades was the best-known example of the possibility of making a residential area both attractive and well-adapted to human living."[3]

Returning to Berlage and his often repeated belief that the art of building was exclusively a social art, we understand the new rôle for the architect when he said to fellow architects, "There is an opportunity to show that you are indeed servants of the community."[4] Concluding the impact of Berlage's work on architectural history, Grinberg stated that, "Berlage's socialism in general and comments of this sort in particular played a more influential rôle on the following generation of architects than his actual built work."[5]

M. Brinkmann's Spangen block of 1919 (Fig. 2.3), also conceived within the tradition of the perimeter form, had a closed building mass penetrated by entry portals. This unique housing project for the municipality of Rotterdam which was completed in 1921 consisted of 262 dwellings.[6] The basic housing module of the 4-storey building consisted of two flats above each other (Fig. 2.4), both with their entrances on the inside of the block (Fig. 2.5). Above these were two duplex units, side by

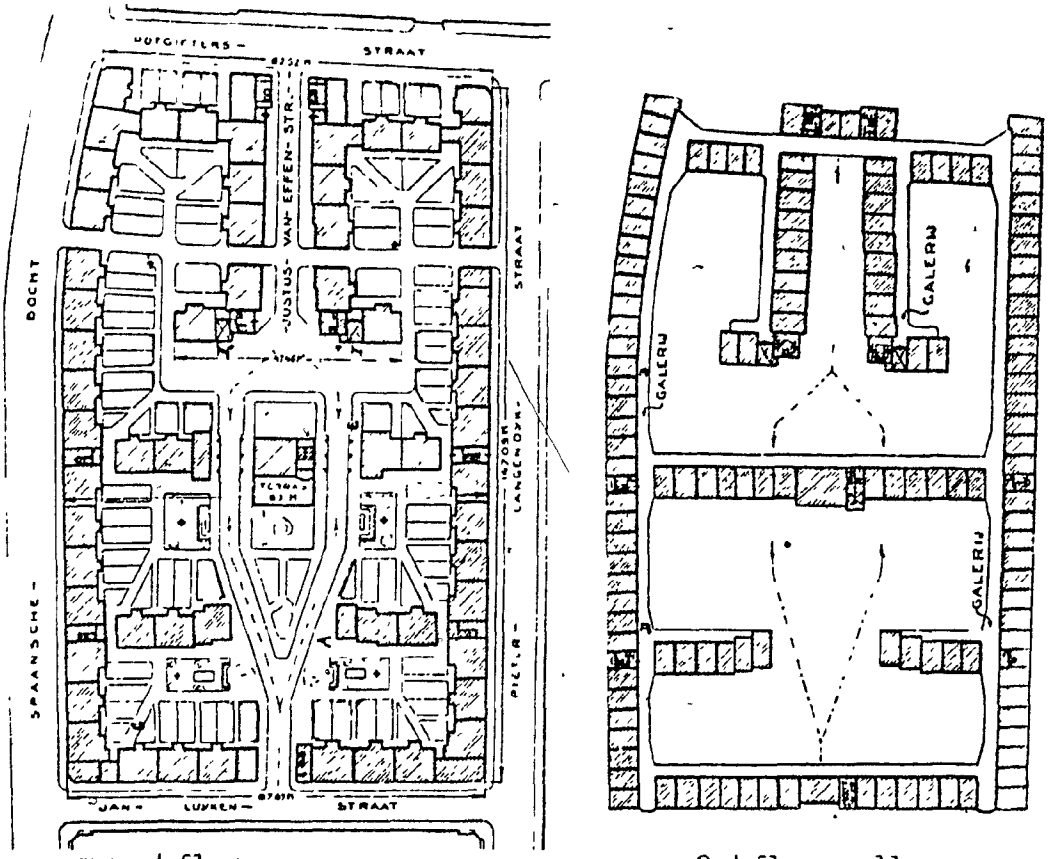


Fig. 2.3 Rotterdam. Spangen municipal housing, 1919-21. (Grinberg, 1977)

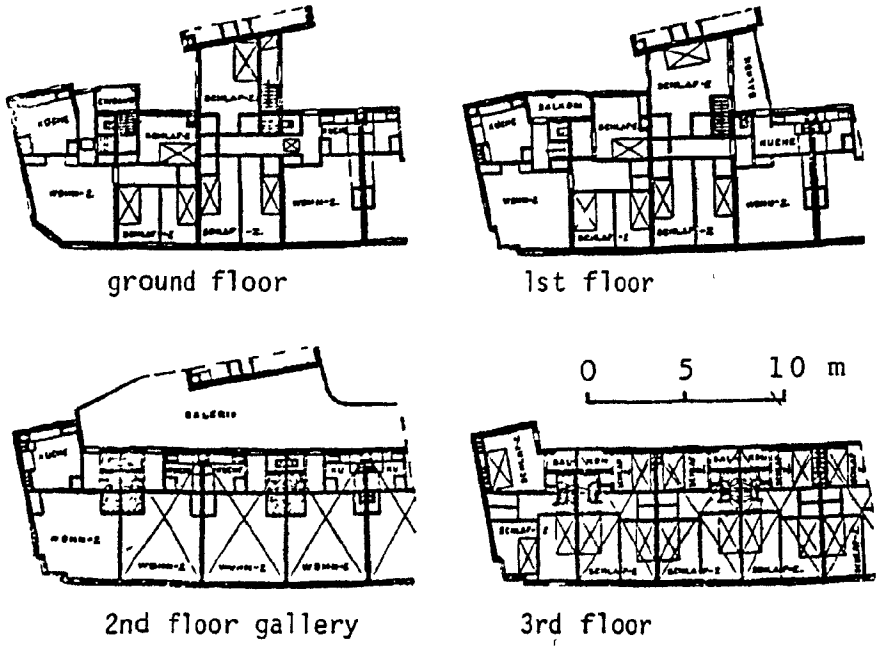


Fig. 2.4 Typical dwelling units of two storeys (maisonette). (Hilberseimer, 1978)

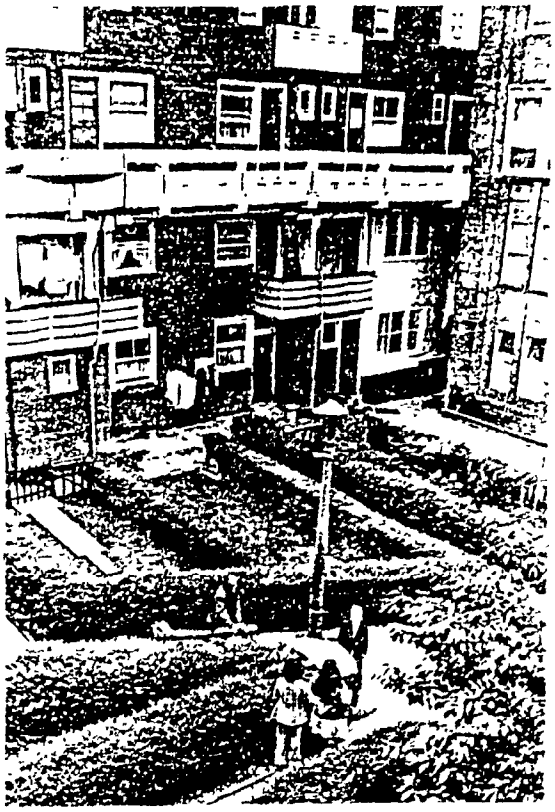


Fig. 2.5 Interior space of the block showing entrance doors and small private gardens.

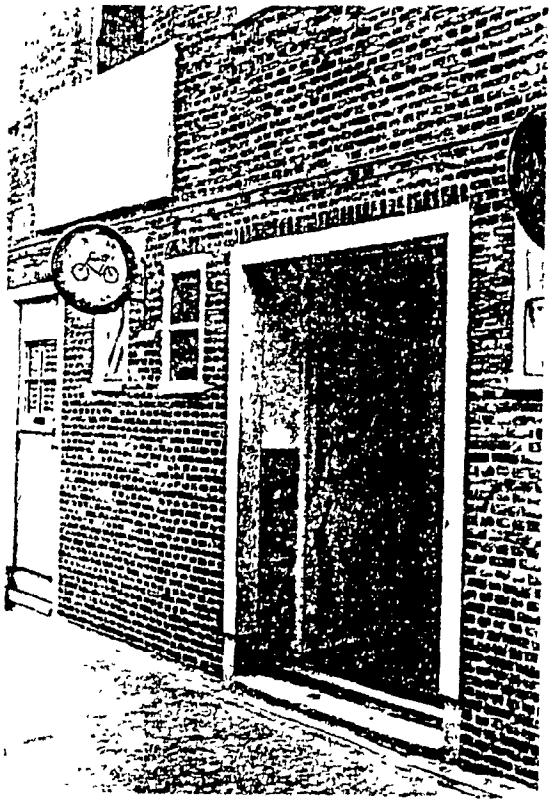


Fig. 2.6 Entry portal (pedestrian)

Fig. 2.7 Entry portal (vehicular circulation).

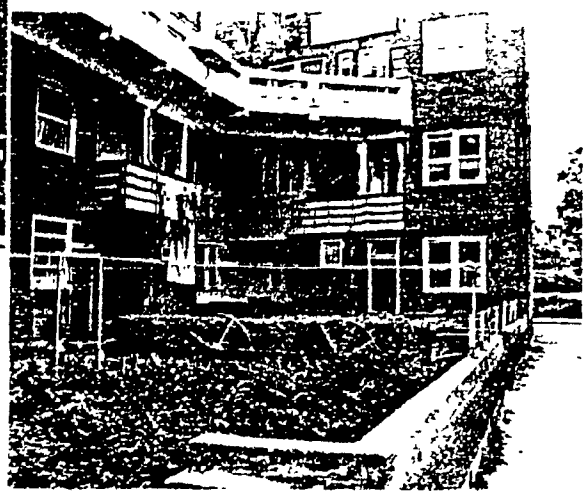


Fig. 2.8 Street elevation showing gallery and entrances outside the block.

(Fig. 2.5, 2.6, 2.7, 2.8 - Grinberg, 1977)

side, of which the entries were off a continuous gallery. This gallery was connected by a number of stairways and freight elevators to the street two floors below. The ground floor units were related to small gardens. There was a bath- and a wash-house at the geometrical center of the block which was given a different treatment from the surrounding buildings.[7]

Writing on the simple architectural language, Grinberg noted that "the sense of community within the interior is thus not overstated by the entry portals, which in other projects are sometimes emphasized to symbolize something that is not there... Most significant is that a sense of place was created, a place with dignity achieved not by aesthetic laws but by the juxtaposition of opposites. But unlike the communal gardens at the center of closed blocks, Spangen's interior is a remarkable blend of public and private territory."[8] (Fig. 2.6, 2.7, 2.8)

But J.J.P. Oud followed Berlage's planning of perimeter form with two large projects, the Spangen blocks (1919-1920) and Tusschendijken block (1920-1923) in Rotterdam before he joined the movement towards functional housing design.[9] In Oud's project Tusschendijken (Fig. 2.9, 2.10) the organization of dwellings was handled in the same way as in Brinkman's Spangen block although the entrances were located on the street (Fig. 2.11) and continued to elaborate upon the communal space (Fig. 2.12) designed earlier with his Spangen blocks. Most significant in Oud's Spangen project was that he had moved the living rooms to the interior of the block (Fig. 2.13). Here the balcony had become a buffer between the private and the communal spaces which increased the validity of both. Employing two portals for access to the communal space, Oud handled the transition between the

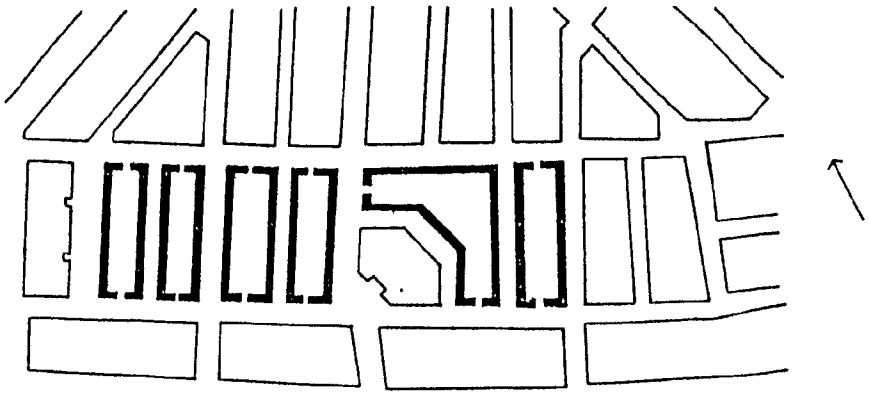


Fig. 2.9 Rotterdam. Tusschendijken municipal housing, 1920-23. Site plan. (Grinberg, 1977)

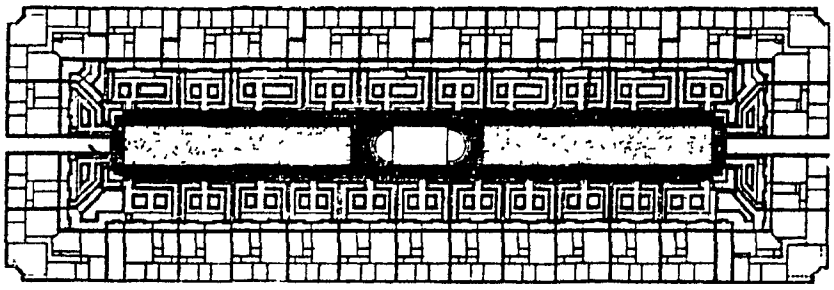


Fig. 2.10 General plan of the perimeter block showing small gardens and a communal space (Hilberseimer, 1978)

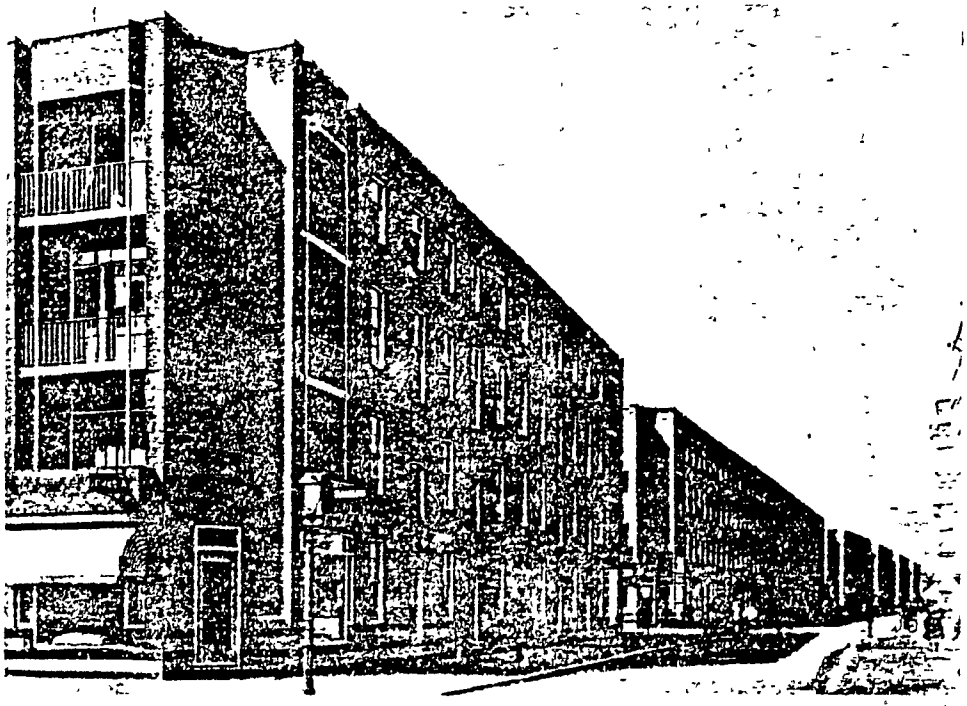


Fig. 2.11 Street elevation of the Tusschendijken housing blocks (Hilberseimer, 1978)

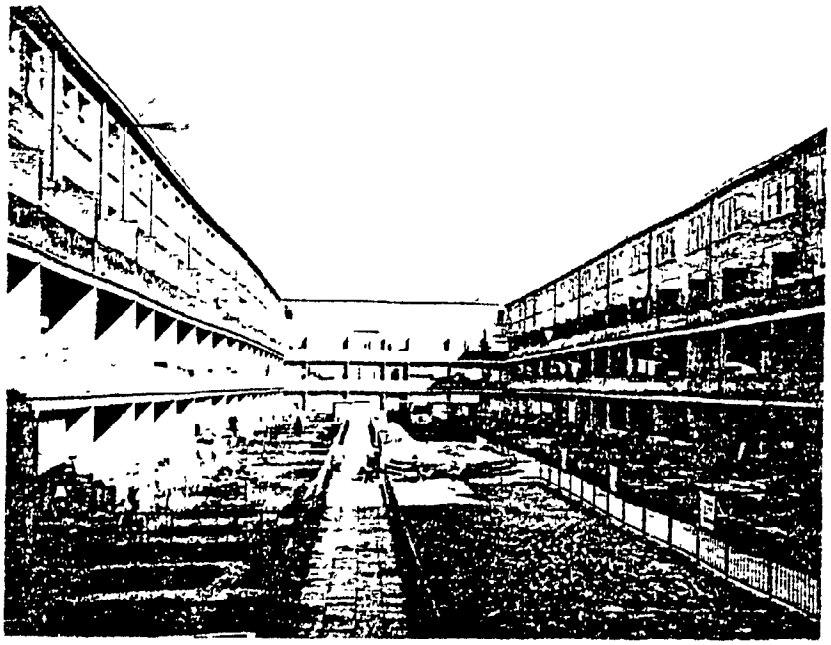
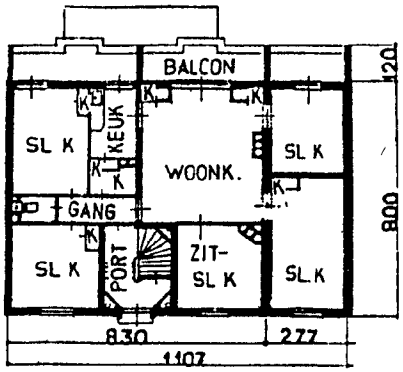
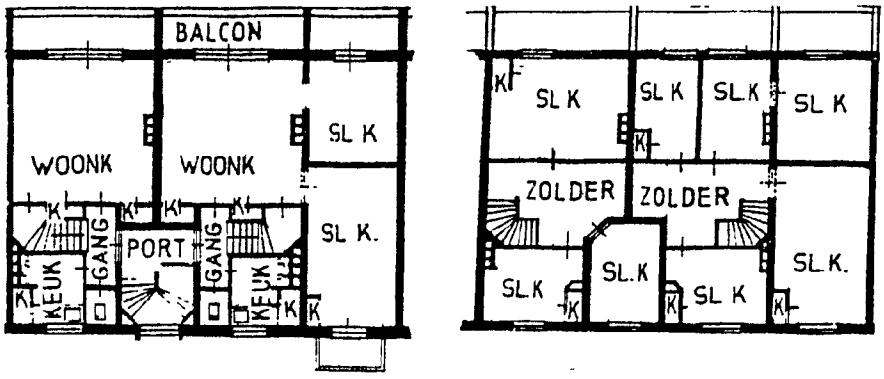


Fig. 2.12 Perimeter housing block Tusschendijken. Interior space of the block (Grinberg, 1977)



ground and 1st floor



2nd floor 3rd floor

Fig. 2.13 Plans of a typical dwelling unit of two storeys (maisonette). (Grinberg, 1977)

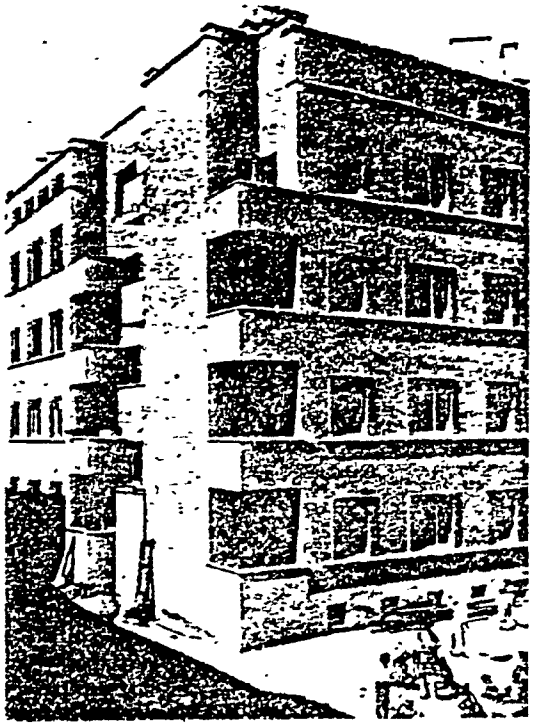
public street and the private gardens of the lower dwellings in much the same way as Brinkman had done in his Spangen block but with the one distinct difference that the portals never had the importance of being the only access to the dwellings.

But it is open to question whether Giedion was right when he said, "it was J.J.P. Oud who first used the interior courtyard as a means of humanizing the tenement blocks in his Tusschendijken settlement (1919)"[10], considering Messel's "Weisbachgruppe" scheme of 1898-1904 in Berlin.

From 1920 to 1933 the Viennese city government initiated a new housing program which involved the best of Austrian architects Hoffmann, Holzmeister and Frank. This program was to house almost one-eighth of the whole city's population of 1,868,000.[11] "These model dwellings were walk-up perimeter blocks consisting of living room, bed-chamber, kitchen with gas stove, water toilet, all well ventilated and well lighted, not only by electricity, but also by sunshine coming in at an unobstructed angle of not less than 45 degrees (measured from the vertical wall framing the windows of the rooms). This means that the height of the buildings is not greater than the width of the streets or courtyards."[12]

The tenement house in Rauchfangkehrergasse (Fig. 2.14) illustrates one of Vienna's typical post-war apartments which had no cross-ventilation. In spite of the decree that no dwelling should exceed a floor area of 38 sq.m. (~400 sq.ft.), the architect Anton Brenner was able to design a respectable dwelling that was distinctive of the utmost economy and greatest efficiency.[13] (Fig. 2.15)

"These model tenements, however, had neither central heating nor



Floor Area	44.0 sq.m. (473.6 sq.ft.)
Cubic Volume	155.0 c.m. (5,473.7 c.ft.)
Window Area	6.4 sq.m. (68.9 sq.ft.)

(From: CIAM - Dokumente, 1979)

Fig. 2.14 Vienna Typical postwar tenement block. Elevation. (Hilberseimer, 1978)

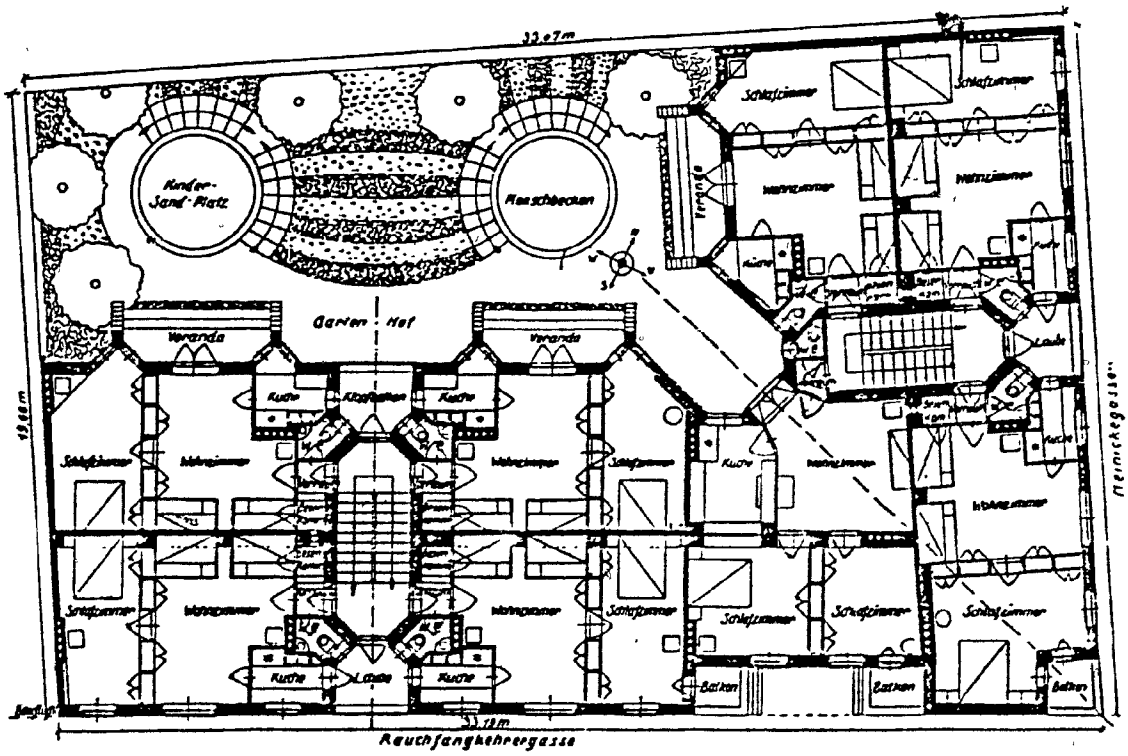


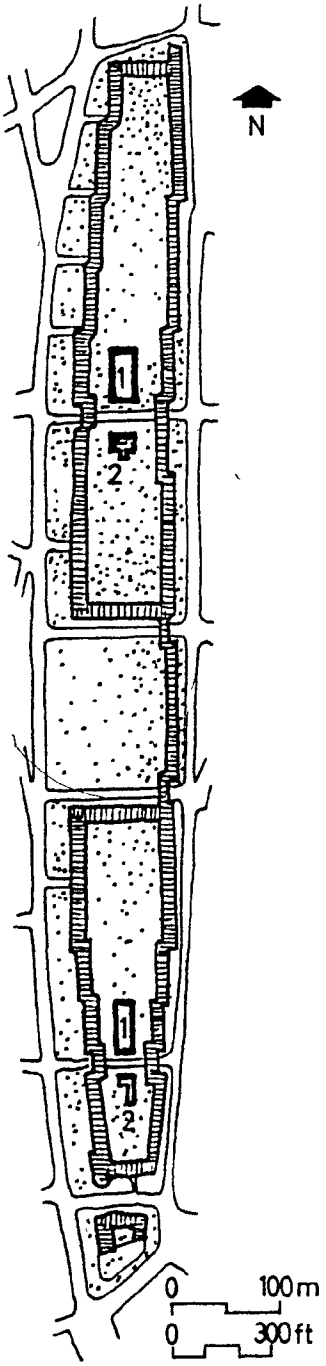
Fig. 2.15 Vienna. Typical postwar tenement block. Plan. (Hilberseimer, 1978)

individual bathrooms. And tenements measuring only 400 square feet appear small when compared with the 500 sq.ft. which are a minimum in New York's new Knickerbocker Village, or with the 760 square feet now considered as a minimum in English housing activities," Hegemann argued supporting the good qualities of the new buildings.[14] As he noted, "... it was purely economic and not political considerations which had shaped his (Dr. Breitner, financial dictator of Vienna) policy of building huge tenements (the famous Karl-Marx-apartment house with its 1,382 dwellings is three-fifths of a mile) rather than building cottage-and-garden suburbs."[15] (Fig. 2.16)

However, the "Karl-Marx-Hof" (1927) by K. Ehn and the "Washington-Hof" (1927-30) by R. Oerly and K. Krist (Fig. 2.17) represented distinct progress in Vienna, since these tenements of improved perimeter form generally covered less than 50 per cent of the building site, while the old blocks had covered from 70 to 80 per cent of their sites. The new schemes incorporated large open spaces of greenery with built-in communal facilities. On 13 acres of the "Karl-Marx-Hof" there were five different gardens which contained kindergartens, playgrounds, wading-pools and baths as well as libraries, clinics, laundries, a post office, shops and restaurants.[16] The architecture was often influenced by the monumentality of Otto Wagner's work.[17] (Fig. 2.18)

While the new scheme of parallel blocks had been applied in Frankfurt and Karlsruhe, the perimeter block planning continued in Hamburg, under the direction of the city architect, Fritz Schumacher. By virtue of a competition, the planning at 'Jarrestadt' (1926-29) involved several architects who proposed four- to six-storey buildings of the perimeter from

Fig. 2.16 Vienna. 'Karl-Marx-Hof' municipal housing. (Denby, 1938)



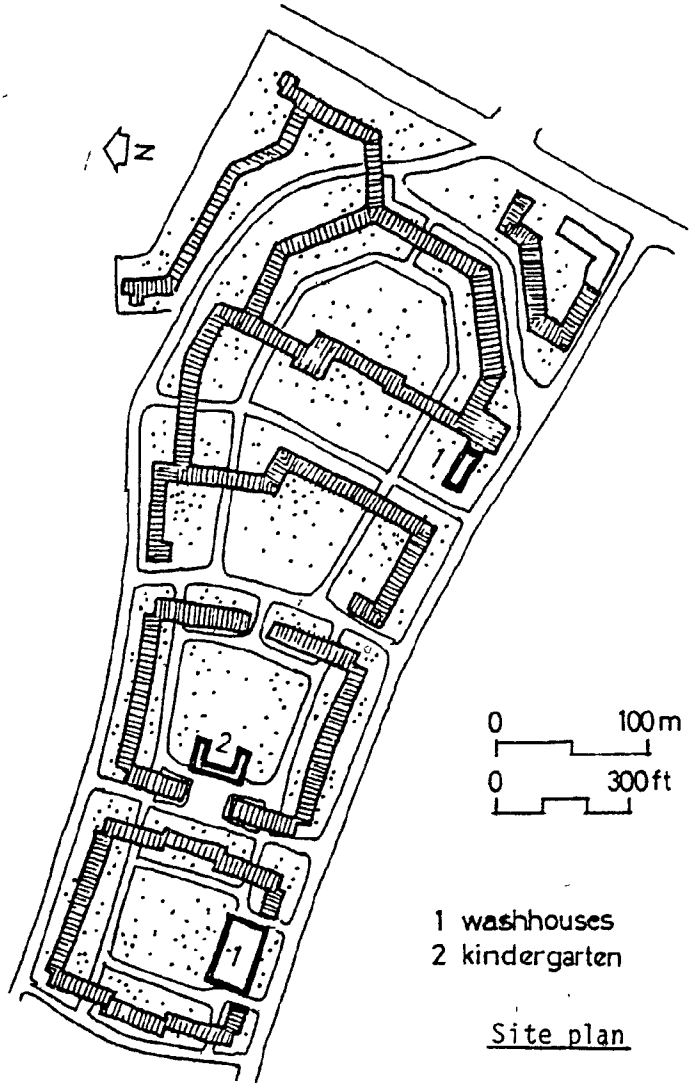


Fig. 2.17 Vienna. 'Washington-Hof' municipal housing. (Denby, 1938)

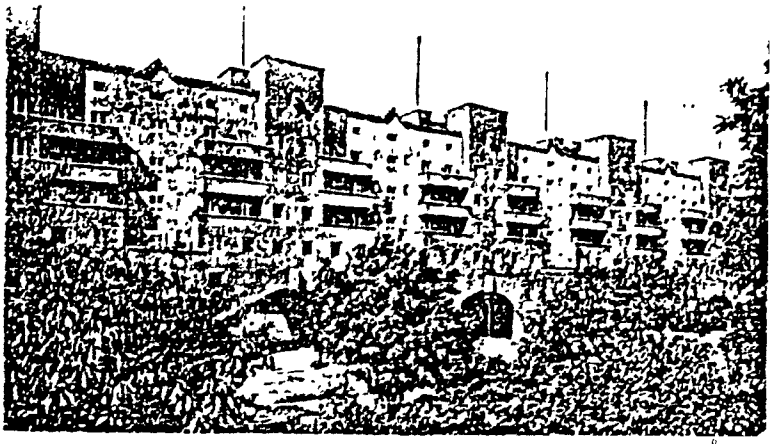


Fig. 2.18 Vienna. Monumental façade of the 'Karl-Marx-Hof'. (Bauer, 1934)

enclosing rectangular open spaces (Fig. 2.19). To quote Gallion and Eisner, "the large space in interior courts was a vast improvement over high land coverage, but orientation of the dwelling was compromised."[18] But the double orientation of the dwellings (street-interior zone) is more advantageous than in most apartment houses built in Vienna about that time (Fig. 2.20). According to principles of the 'new realism' (Neue Sachlichkeit), flat roofs were introduced (Fig. 2.21). Architectural unity, however, was achieved by old-fashioned uniform brick façades (Fig. 2.22).

When in 1929-32 four-storey straight-terraced houses were built on the end of the triangular site (Fig. 2.23), the gradual transition in planning from the concept of the closed block to the adoption of open-ended rows became visible.[19]

The most famous 'Siedlung' (housing estate) of perimeter buildings as well as parallel blocks became the "Hufeisen siedlung' (horseshoe housing estate) in Berlin-Britz from 1925 to 1931 to the plans by the architects Bruno Taut and Martin Wagner (Fig. 2.24).

After the enactment of the Berlin building regulations of 1925, architects endeavored to prevent the construction of any rear buildings despite a high floor area ratio. The aim was to provide for everyone adequate housing in decent surroundings. Writing about the Berlin building regulations of 1925, Johannes Scharf stated in a report of 1927, that the building regulations were wrongly supposed to dictate only buildings along the perimeter of a site. Yet, if the degree of permissible land coverage had not been exceeded, it also allowed wing buildings as well as traverse buildings.

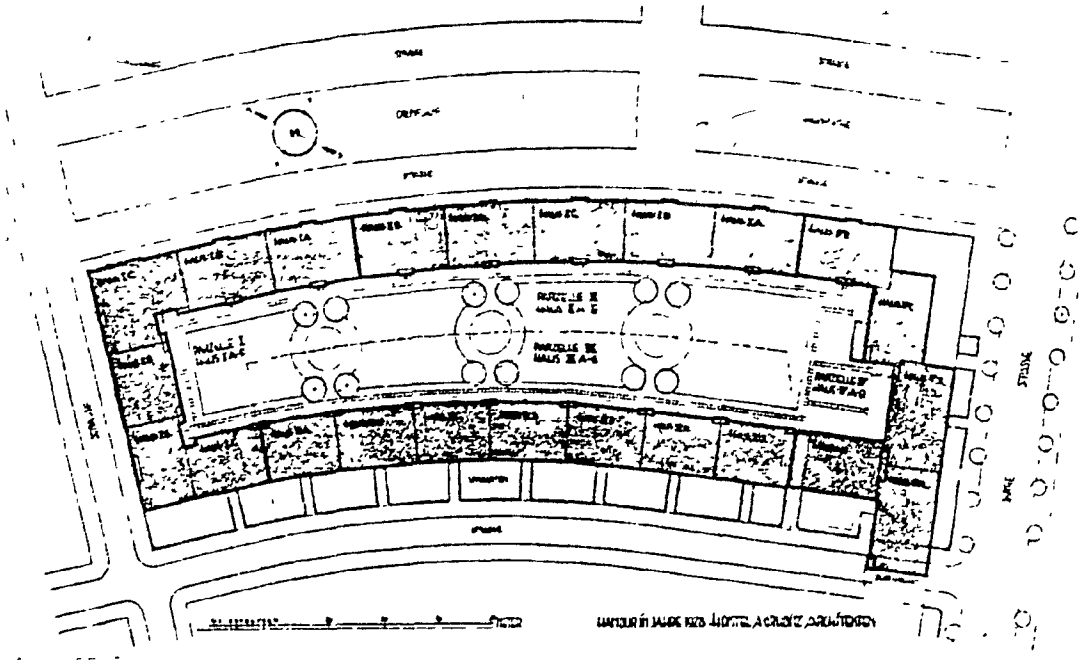


Fig. 2.19 Hamburg-Jarrestadt. Plan of a slightly curved perimeter building block. (Adler, 1931)

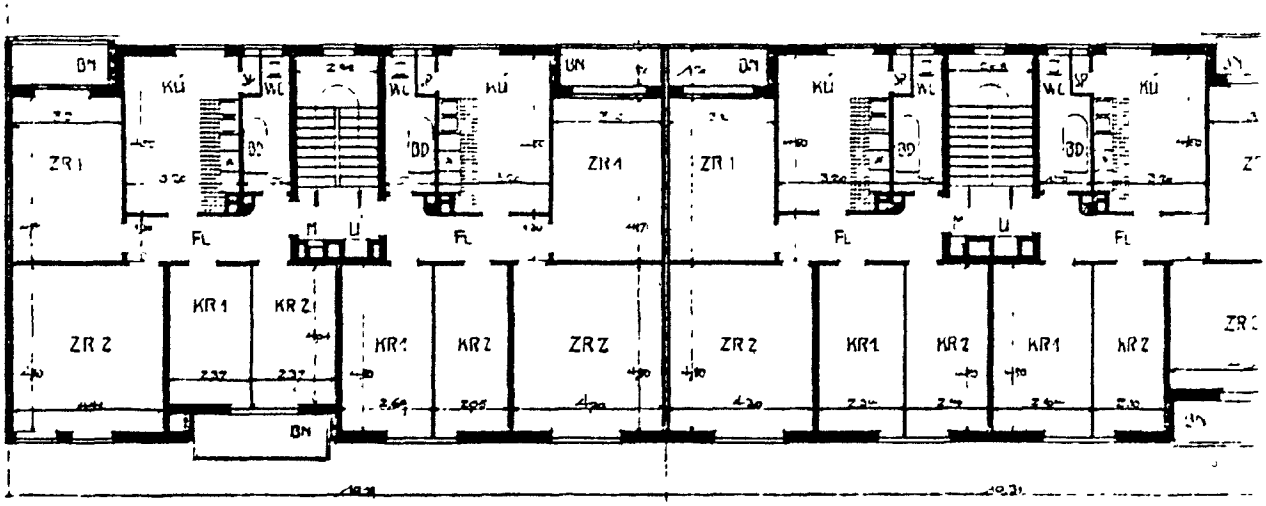


Fig. 2.20 Hamburg-Jarrestadt. Typical dwelling arrangement. Plan: 2R - room, KU - kitchen, KR - small room, SP - food storage, BN - balcony, BD - bath, M - refusal shaft, FL - hallway. (Adler, 1931)

Fig. 2.21 Hamburg-Jarrestadt. Aerial view. (Adler, 1931)

Fig. 2.22 Hamburg-Jarrestadt. Enclosed interior zone of the perimeter block. (Adler, 1931)

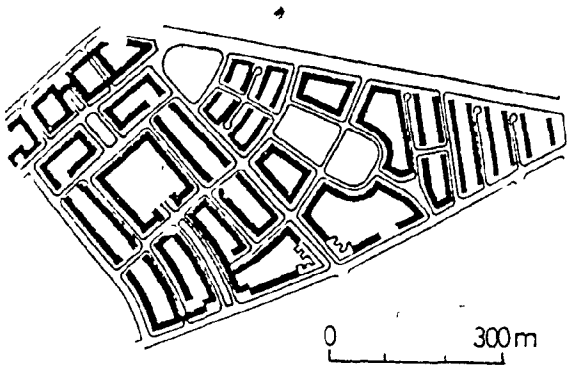


Fig. 2.23 Hamburg-Jarrestadt.
Site plan. (Habich, 1971)

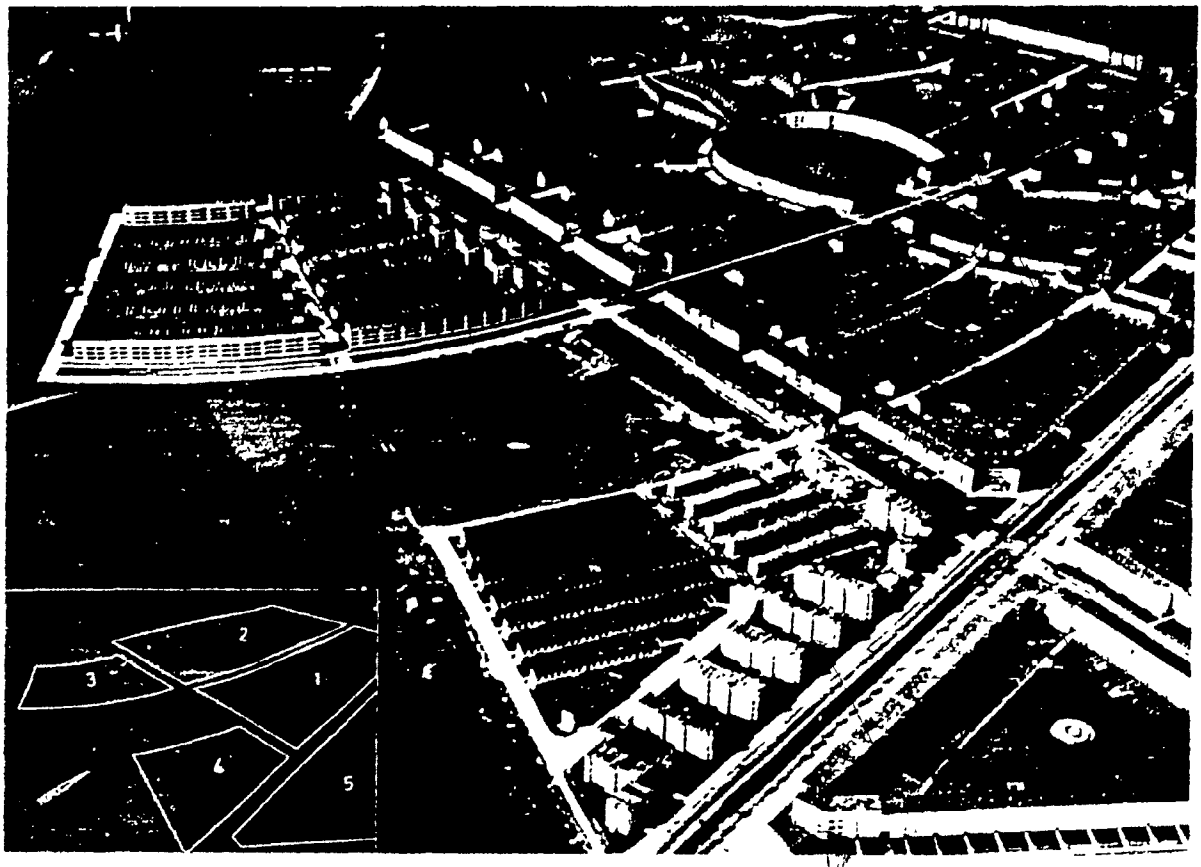


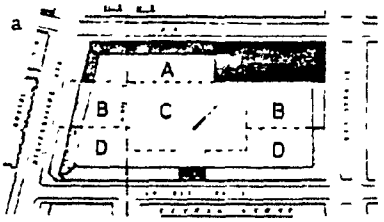
Fig. 2.24 Berlin-Britz. 'Horseshoe' housing estate. Aerial view, 1928. (Schinz, 1974)

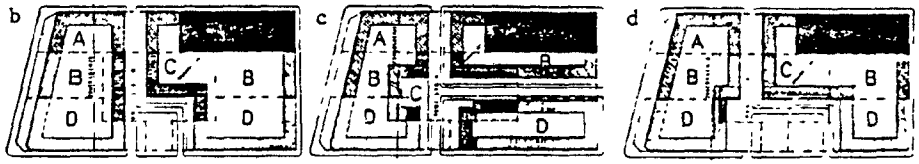
However, to lend money on an estate, the Berlin Mortgage and Housing Corporation (Berliner Wohnungsfürsorgegesellschaft) had only regard for buildings of a pure perimeter form without any wings. Money was also not lent on traverse buildings and houses built within the closed-off open space. Because of very deep sites and various existing lot lines, the architects had no choice but to subdivide them into smaller sites. The possibilities of increasing the utilization of the site area are shown in a graphic demonstration according to the Berlin building regulations of 1925.[21] (Fig. 2.25)

The new developments were designed according to the existing townscape. Perimeter planning, either totally or partly closed, was the major applied design in Berlin up to 1927/1928, when the parallel block development (Zeilenbau) became fashionable.[22] The 'Hufeisensiedlung', named because of the horseshoe-like continuous block of flats located in the core of the whole development, is an example of a mixed type of three-storey perimeter buildings, two-storey rows of single-family houses and multi-storey parallel blocks.[23]

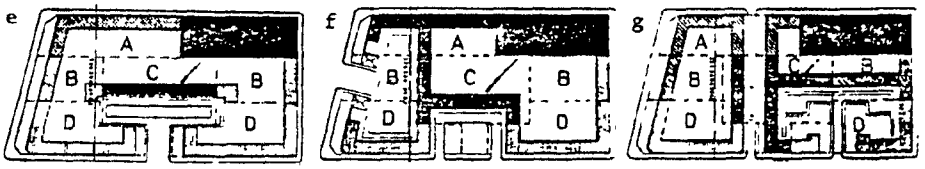
Summing up, Catherine Bauer observes that four stages marked the development in German block planning (Fig. 2.26): "first, the typical 19th century block with rear buildings; second, smaller blocks with buildings all around the perimeter; third, open-ended rows facing each other across traffic streets; and, fourth, a diagram of 'Zeilenbau' with the rows endward to the street and all facing in the same direction."[24]

a - Pure perimeter building block in the north of Berlin. The black area forms a former housing block. The municipal site C separates the sites of the owners of B and D. Poor utilization of these sites, especially of the municipal site C located in the middle.





b - d Subdivision of the sites by means of streets minimizing the size of the site end improving the utilization. Difficult settlement of ownership with solution c, expensive costs in roads, especially with solution d.



e - Because of the wide gap, the interior part of the site can be built; improved utilization of the sites B and D.

f - Solution with indentation (Ehrenhof and 'Hohler Zahn') enables a transverse building; the continuity of the street is suspended.

g - Maximum degree of utilization· subdivision of the site by means of a street and an indentation.

Fig. 2.25 Methods of subdivision of street blocks according to the Berlin building regulations of 1925. (Machule, 1970)

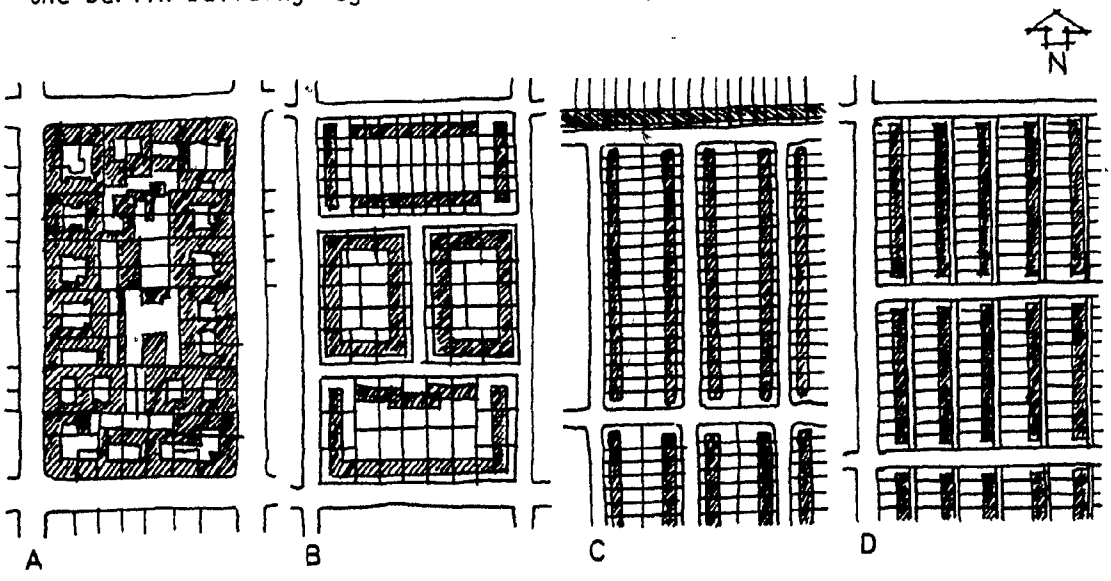


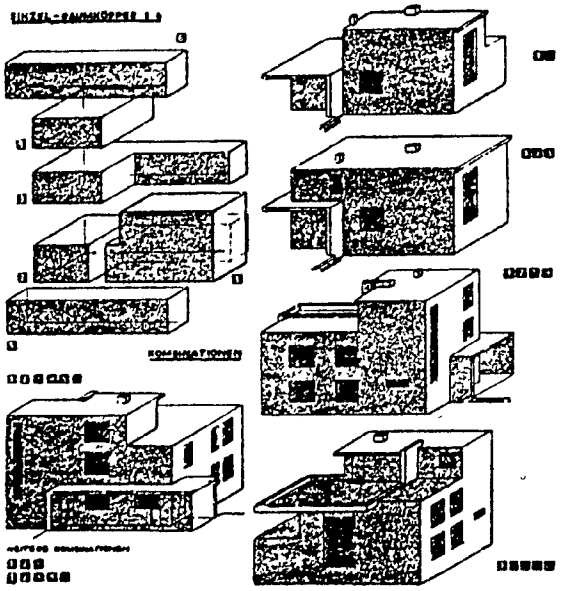
Fig. 2.26 The evolution of block planning from solid block development to parallel block arrangement. (May, 1929)

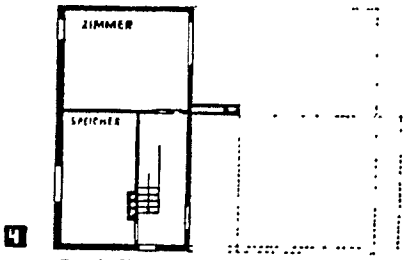
2.2 A New Trend to Functional Housing Design

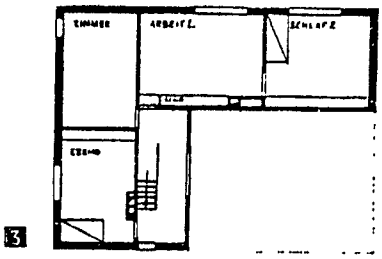
In 1919, after the Bauhaus School had been established by Gropius at Weimar (in Germany), the new movement of the "new realism" (Neue Sachlichkeit) got under way. As Gropius said, "we want to create a clear, organic architecture, whose inner logic will be radiant and naked, unencumbered by lying façades and trickeries; we want an architecture adapted to our world of machines, radios and fast motor cars, an architecture whose function is clearly recognizable in the relation of its forms."[25]

This new approach to architecture was given evidence by the application of modern materials such as steel, concrete and glass. With new technologies in engineering, the old methods of building gave way to a new lightness and airiness. Apart from the new aesthetic of the horizontal, which was to counteract the effect of gravity, a new conception of equilibrium transmuting the dead symmetry of similar parts into an asymmetrical but rhythmical balance, expressed very much the spirit of the new architecture.[26]

At the Bauhaus, moreover, much thought was given to construction techniques which involved the greatest possible degree of economy and efficiency.[27] Therefore, a systematic application of standardization and rationalization to housing was considered with economics in mind. With the idea of combining maximum standardization and maximum variety, a building system for mass-produced houses was developed by Gropius[28] to allow the assembly of prefabricated and standardized parts which when applied was able to fulfill the varying requirements of those to be housed (Fig. 2.27,2.28).







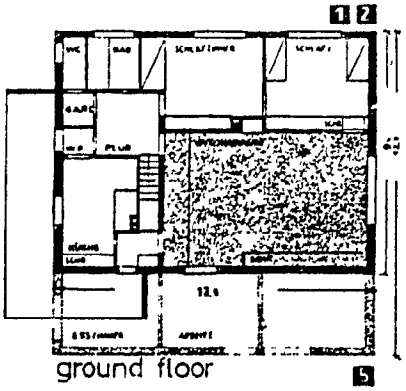
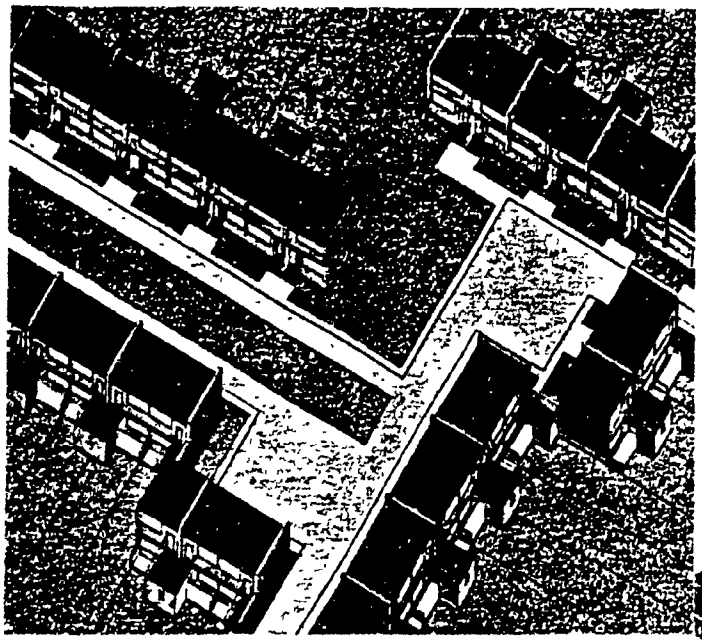
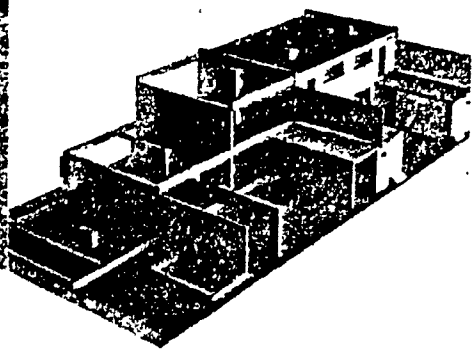


Fig. 2.27 Walter Gropius. Building system of prefabricated and standardized building parts (Hilberseimer, 1978)

Fig. 2.28 Walter Gropius. Building system allowing various types of layout (Hilberseimer, 1978)



A Isometric



B Structural System

Fig. 2.29 Walter Gropius. 'Tortensiedlung' at Dessau, 1926-28. (Hilberseimer, 1978)

The first true experience of this was with the 'Siedlung Torten' at Dessau (Fig. 2.29) which was under construction from 1926 to 1928. The scheme was composed of two-storey rowhouses with adjacent private gardens and a four-storey building in the center containing efficiency dwellings and the office of the cooperative society.[29]

The Weissenhof Colony Exhibition in 1927 in Stuttgart was intended to give modern architects the opportunity to display new materials such as steel, concrete and glass and modern construction techniques and to show how housing as an expression of a new way of living might look (Fig. 2.30). Mies van der Rohe, who purposely organized the program in a way which would allow each architect to develop his ideas freely, invited the leading architects from Germany and other countries to contribute to the exhibition's theme: "the home". The results, admittedly, were not meant as a step toward the improvement of workers' housing. The quality of these buildings is rather to be found in the unschematic, free development of their layouts: the interior of the house as a spatial unity with the living room as the center divided from - yet optically connected to - the surrounding area by mobile elements (dividing walls or furniture), split-level floors or large areas of glass.[30] (Fig. 2.31, 2.32)

As Catherine Bauer puts it "... the interior space itself became something which was directed rather than confined. Parlors, sitting-rooms, halls, dining-rooms, dens, all of them disappeared as such and were merged into one large living space, carefully designed so that many different functions could be carried on in it at once. Space really 'flows' in the best of these houses. And the use of large sheets of glass brings the

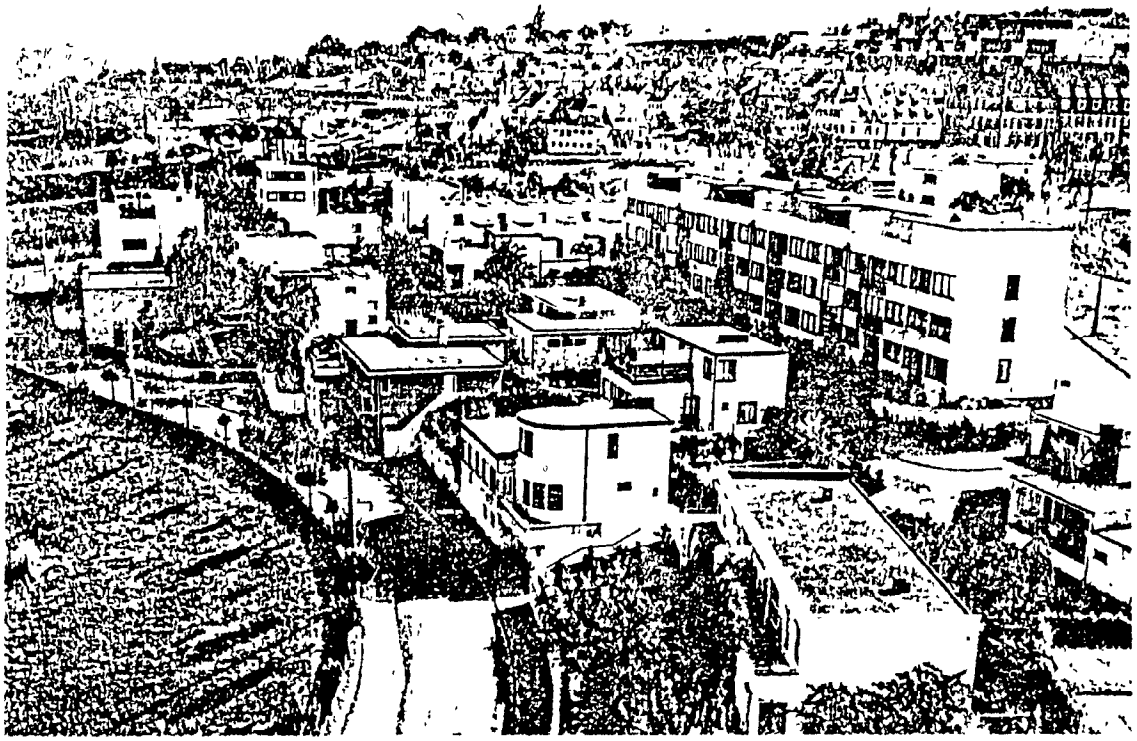
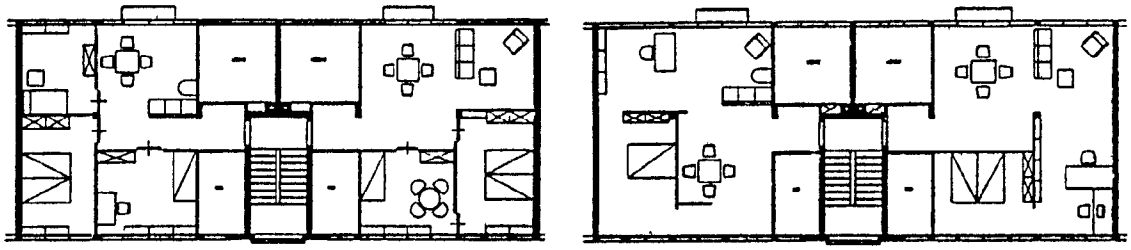


Fig. 2.30 Stuttgart. Weissenhof Colony Exhibition in 1927. Aerial view from the north. (Joedicke/Plath, 1977)



A - Conventional planning

B - Open planning

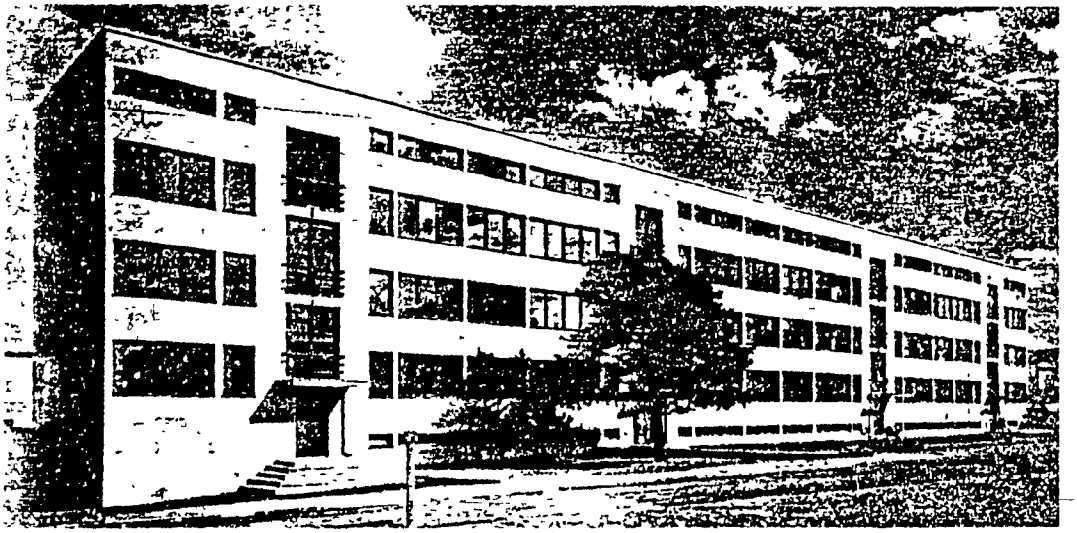


Fig. 2.31, 2.32 Mies van der Rohe. Apartment building in Stuttgart. (Hilberseimer, 1978)

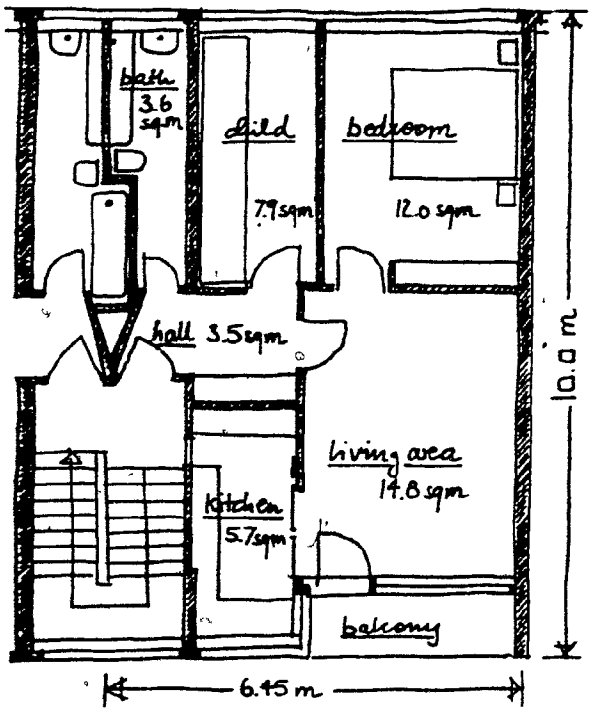
exterior world... into a far closer relation with the interior than can ever be achieved with spotted tiny-paned windows... Better light, better ventilation, and a new breadth of freedom were built into these modern houses."[31]

With the same idea of serving as a platform for modern architects who discussed and presented their ideas of modern planning in the Weissenhof Colony Exhibition, the CIAM - Congrès Internationaux d'Architecture Moderne - was established in 1928. The aim was to do something more substantial toward comprehensive urbanistic and building policies and programs by defining common principles of action. "The most important was the fact", as Gropius, one of its members, said, "that in a world of confusion, of piecemeal efforts, a small, supranational group of architects felt the necessity to rally in an effort to see the many-sided problems that confronted them as a totality."[32]

The first meeting at La Sarraz in Switzerland involved merely an exchange of opinions and was largely dominated by the ideas of Le Corbusier. At the congress at Frankfurt in 1929, the discussion became more concrete and dealt mainly with the notion of the 'Minimum Living Standard Housing' (Existenzminimum) (Fig. 2.33A-D). Thanks to the modern construction methods of cost- and time-saving character, architects argued for the necessity to build flats at reasonable rents which, although small, should be sanitary and comfortable to live in so that still lower paid workers can afford them.[33] To give an idea of the new approach to modern housing design, selected plans of low-cost residential units were shown to the public.[34]

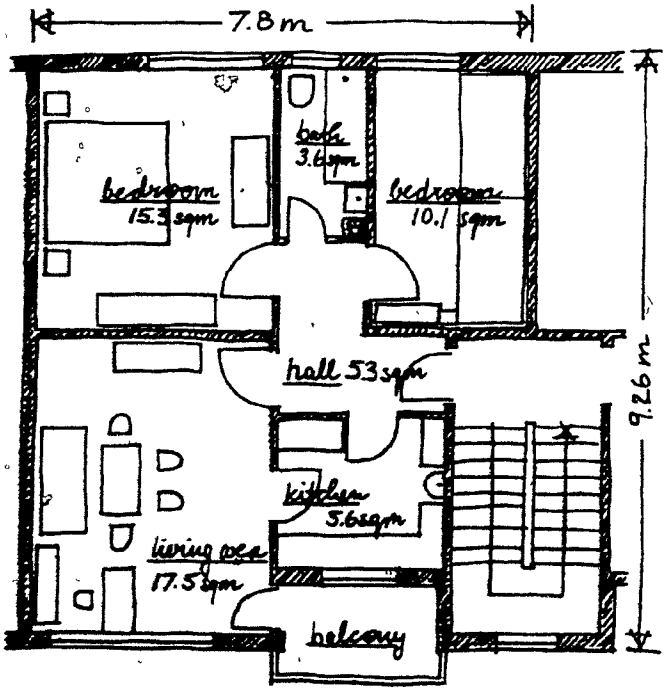
At the same time Alexander Klein developed various standard types

A - FRANKFURT A.M.



Floor Area	47.5 sq.m. (511 sq.ft.)
Cubic Volume	162.9 c.m. (5,752.7 c.ft.)
Window Area	14.0 sq.m. (151 sq.ft.)

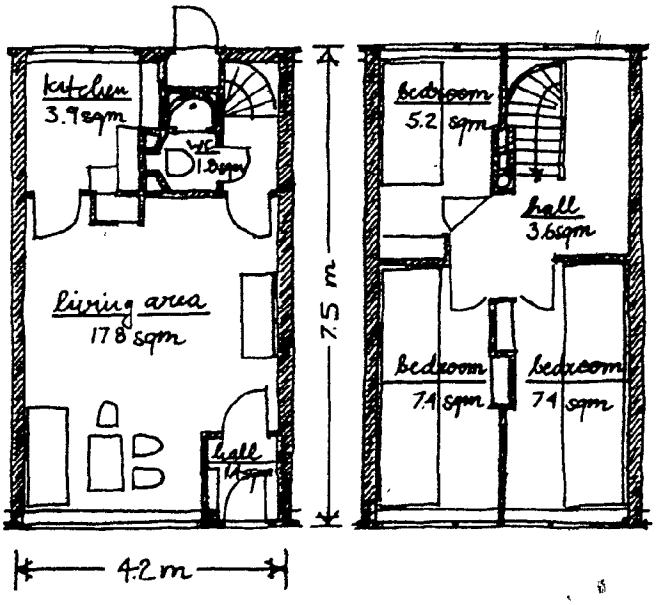
B - BERLIN



Fl. Area	58.4 sq.m. (628.6 sq.ft.)
Cub. Volume	220.1 c.m. (7,772.7 c.ft.)
Window Area	12.6 sq.m. (135.6 sq.ft.)

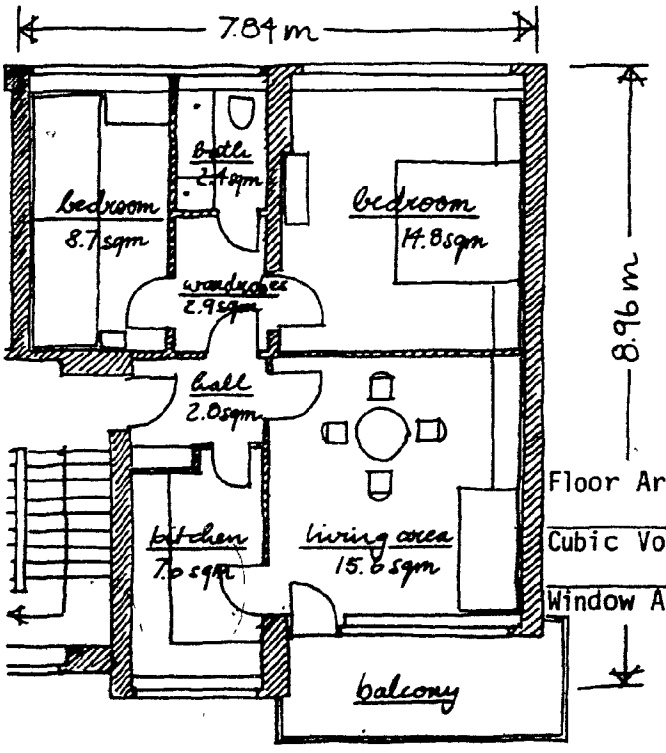
Fig. 2.33 - CIAM - Exhibition in Frankfurt, 1929 - 'Minimum Living Standard Housing' (Steinmann, 1979)

C - ROTTERDAM



Floor Area	48.5 sq.m. (552.0 sq.ft.)
Cubic Volume	189.5 c.m. (6,692.1 c.ft.)
Window Area	12.2 sq.m. (131.3 sq.ft.)

D - KARLSRUHE



Floor Area	54.2 sq.m. (583.4 sq.ft.)
Cubic Volume	206.0 c.m. (7,274.8 c.ft.)
Window Area	16.0 sq.m. (172.2 sq.ft.)

Fig. 2.33 CIAM - Exhibition in Frankfurt, 1929 - 'Minimum Living Standard Housing'. (Steinmann, 1979)

of dwelling units based on different spacings of bays, and internal depth. (Fig.2.34)

Apart from the "minimum dwelling", the greatest point of interest to Gropius was the middle-class home as an economically equipped unit complete in itself; and what structural form each ought logically to assume - whether as part of a multi-storey block, a flat in a building of medium height, or a small detached house. Since the old tenements had fallen into disrepute, the demand for more spacious and above all greener and sunnier cities influenced the attitude in modern planning. In support of the parallel block development Gropius said, "the terrible light-well apartments of the late nineteenth century were eliminated by unified postwar building codes; they were replaced by city block units of peripheral buildings surrounding an interior courtyard, the customary method of today. But this type of construction still has the great disadvantage of inadequate illumination and ventilation. The practice of surrounding the city block entirely on all sides results in unfavorable orientation with inevitable northern exposures for a large number of the apartments as well as unsatisfactory corner solutions, with overshadowed apartments; important health requirements are thus ignored... Parallel rows of apartment blocks have the great advantage over the old peripheral blocks that all apartments can have equally favorable orientation with respects to the sun, that the ventilation of blocks is not obstructed by transverse blocks, and that the stifled corner apartments are eliminated. Such parallel rows also provide for systematic separation of highways, residential streets and footwalks more easily and at less cost than in the case of peripheral construction.

It makes for better illumination and more quiet, and also decreases the cost of road building and utilities without decreasing the effectiveness of land use. The overall distribution is thus considerably functionalized, resulting in improved conditions by hygiene, economy and traffic."[35] Herewith, Gropius illustrated the subject of the controversy between the old school of thought and the modern views of architects who refused the idea of the street defining urban space. Instead, as a matter of fact, the general acceptance of orientation as a planning factor finally led to the new town-planning principle of the parallel block development (Zeilenbau) already applied in Karlsruhe (Dammerstocksiedlung, Fig. 2.35) and in Berlin-Siemensstadt (Fig. 2.36).

The task of the Third Conference of the CIAM in 1930 was to define the way of arranging new settlements in metropolitan areas. As Gropius argued, the need for short travel distances from work to home will favor the use of multi-storey construction. On the basis of comparative studies of parallel blocks with north-south orientation having from two to ten storeys built on a given site, Gropius deduced the following rules (Fig. 2.37):

"1. Assuming a site of given size and a given angle of sunlight incidence (30°), i.e., a given illumination condition, the number of beds increases with the number of storeys.

2. Assuming a given angle of sunlight incidence and distributing a given number of beds (15 square meters or 161 square feet of area per bed) into parallel apartment blocks with varying number of storeys, the size of the required site decreases with increasing number of storeys.

3. Assuming a building site of given size and a given number of beds and

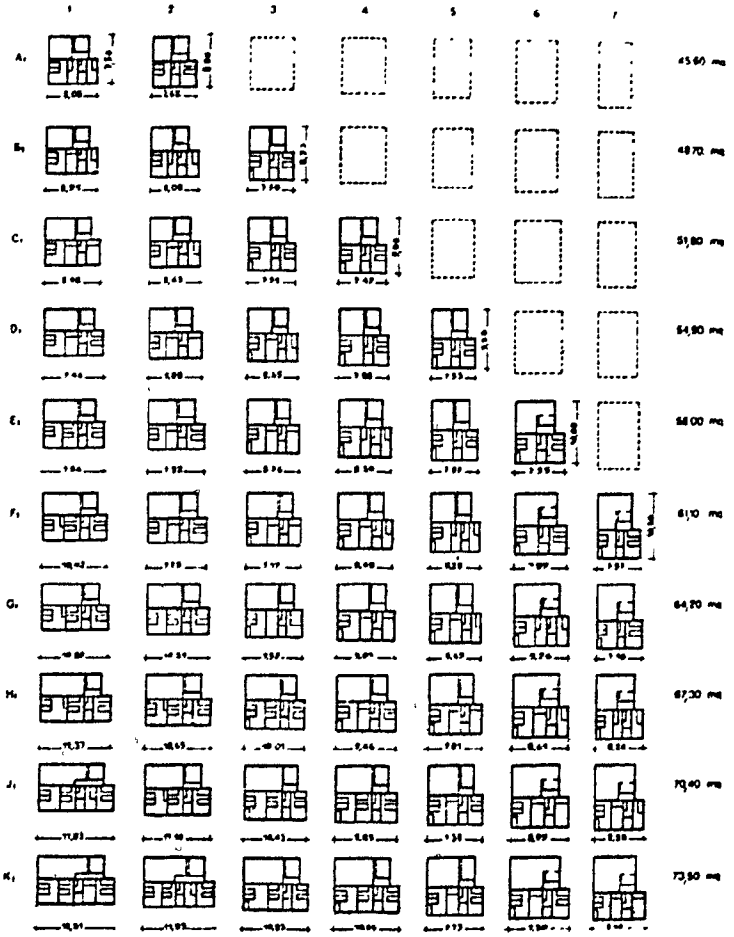


Fig. 2.34 Alexander Klein. Typological plans for minimum housing, 1928. (Tafuri/Dal Co., 1979)

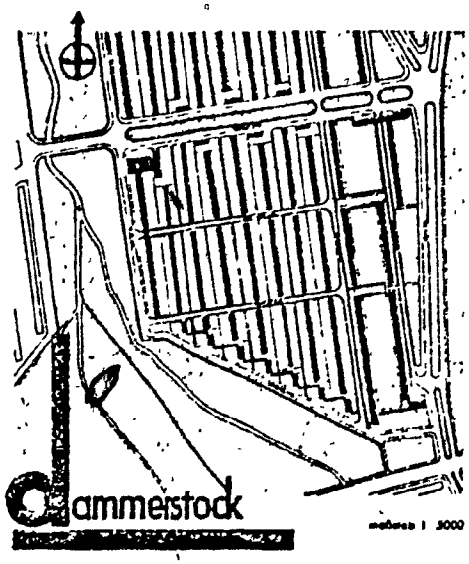


Fig. 2.35 Walter Gropius. 'DammerstocksiedLung' Karlsruhe. (Benevolo, 1978)

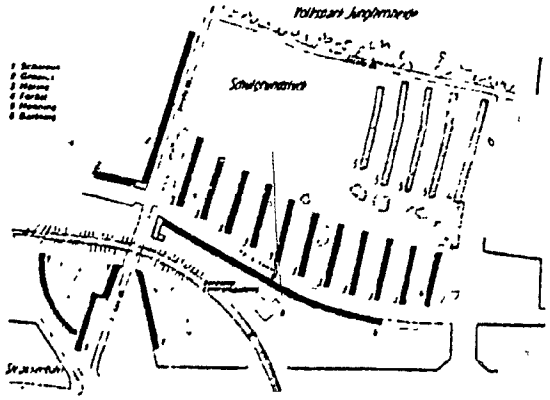


Fig. 2.36 Walter Gropius. Berlin-Siemensstadt, 1930. (Benevolo), 1978)

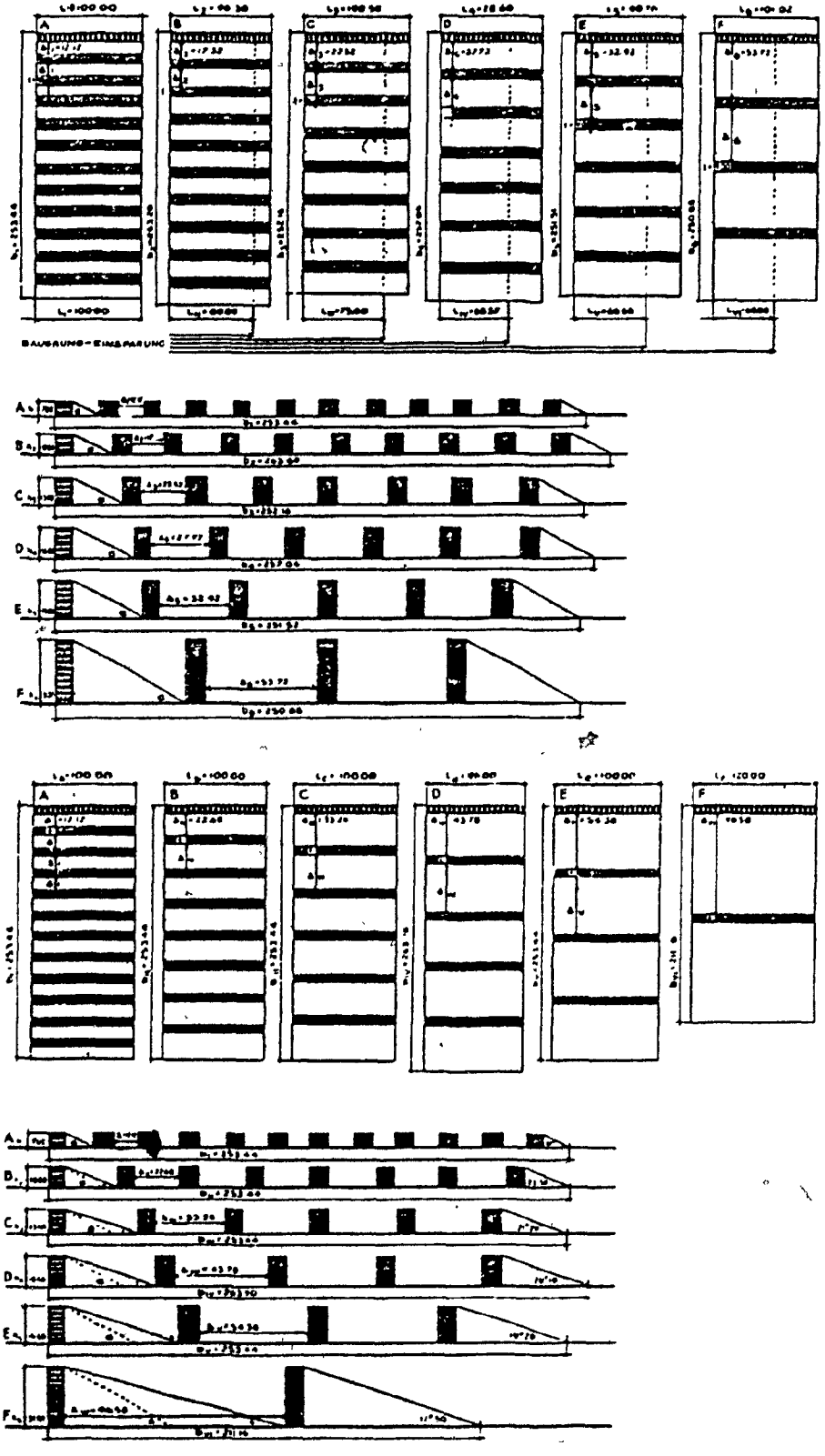


Fig. 2.37 Walter Gropius. Development of a rectangular site with parallel rows of apartment blocks of different heights. (Gropius, 1955)

varying the number of storeys, the angle of sunlight incidence decreases with increasing number of floors, i.e., the conditions of illumination improve with increased height."[36]

As a result, the development of highrise apartment blocks were seen as a type of dwelling which provided a maximum of air, sunlight and vegetation with a minimum of traffic and maintenance needs, and the CIAM passed a resolution that all countries should be urged to investigate the skyscraper apartment block from the sociological and economic points of view.[37]

Two plans for a totally new city - by Le Corbusier for Paris and by Hilberseimer for Berlin - also provided evidence of the dominating desire for solutions in improvements of urban housing. Both concepts have one thing in common - a new beginning without any relationship to the existing townscape, in other words, the renunciation of the 19th century city. The greatest points of interests are the separation of functions - residential and business districts whether horizontally or vertically and traffic as well as open green areas - and the introduction of high-rise buildings.

In 1925 Le Corbusier presented the "Plan Voisin", where he applied the same theories of his "La Ville Contemporaine" of 1922 to a section of the city of Paris.[38] "La Ville Contemporaine" - "the City for Tomorrow" - of three million people (Fig. 2.38) was made up of sixty-storey cross-shaped office buildings with a density of about 1,100 to 1,650 persons per ha[39] covering only 5 per cent of the ground area. The high-towered buildings of steel and glass were set within landscaped open space.

According to Le Corbusier, the demands of modern man are, first and foremost, light and air, freedom of motion, and a pleasant view.[40] Defending this theory, Le Corbusier argued (as quoted by Kleihues), "The buildings of the city must not be put up along the "street corridors" full of noise and dust around dark courtyards. The city's houses can be built without courtyards and away from the streets, with windows looking over large parks..."[41] (Fig. 2.39)

So, the residential district surrounding the office skyscrapers consisted of two types of buildings - the dentil-type of blocks with a density of 300 persons per ha (122 per acre) covering 15 per cent of the ground area and the closed block with the same density but covering 52 per cent of the ground area.[42] The closed blocks were designed to contain spacious green areas for leisure and recreation (Fig. 2.40). The structural feature of the whole plan was clearly dominated by the main highways elevated above the level of local traffic, for delivery vans, passenger cars and pedestrians. There is a railway and subway as a means of rapid transit. The roof of the central station located in the centerpoint of his diagram provided landing space for aircraft.[43] Hereby Le Corbusier influenced decisively subsequent town planning practices in the desire for more spacious, greener and sunnier cities.

Contrary to Le Corbusier's proposal of 1922, Hilberseimer attempted to achieve more concentration and density by proposing a vertical compound of functions of the city.[44] According to Hilberseimer, there are three levels upon each other. Underneath, the commercial city and its traffic, with the main communication traffic underneath, and on top the

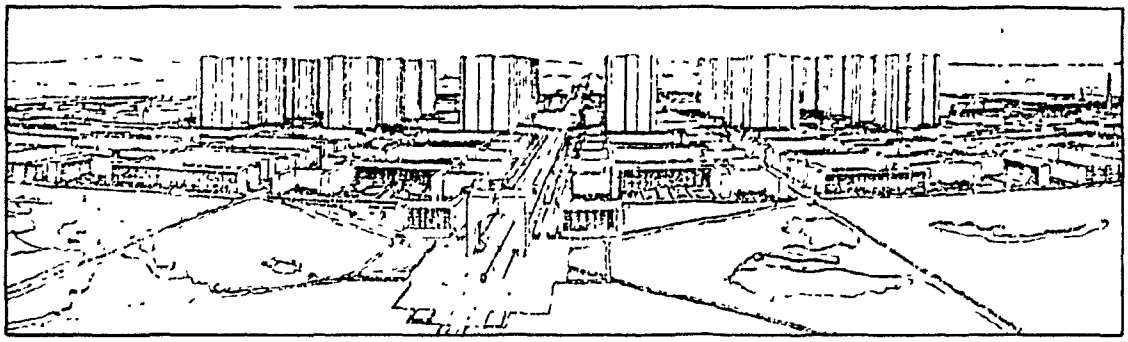


Fig. 2.38 Le Corbusier. 'La Ville Contemporaine', 1922.
(Hilberseimer, 1978)

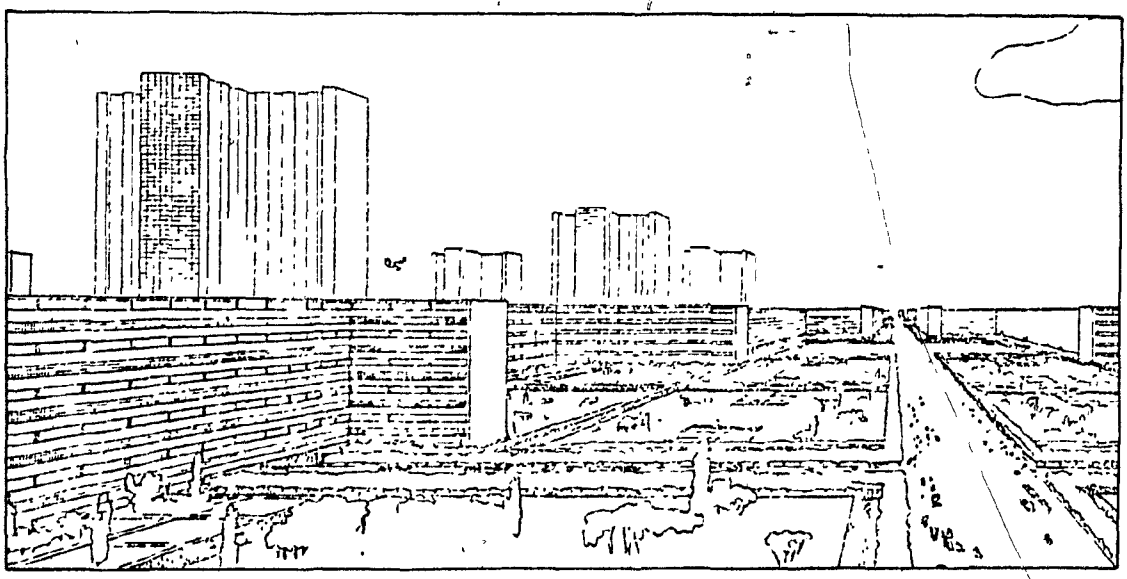


Fig. 2.39 Le Corbusier. 'La Ville Contemporaine', 1922.
(Boesiger, 1960)

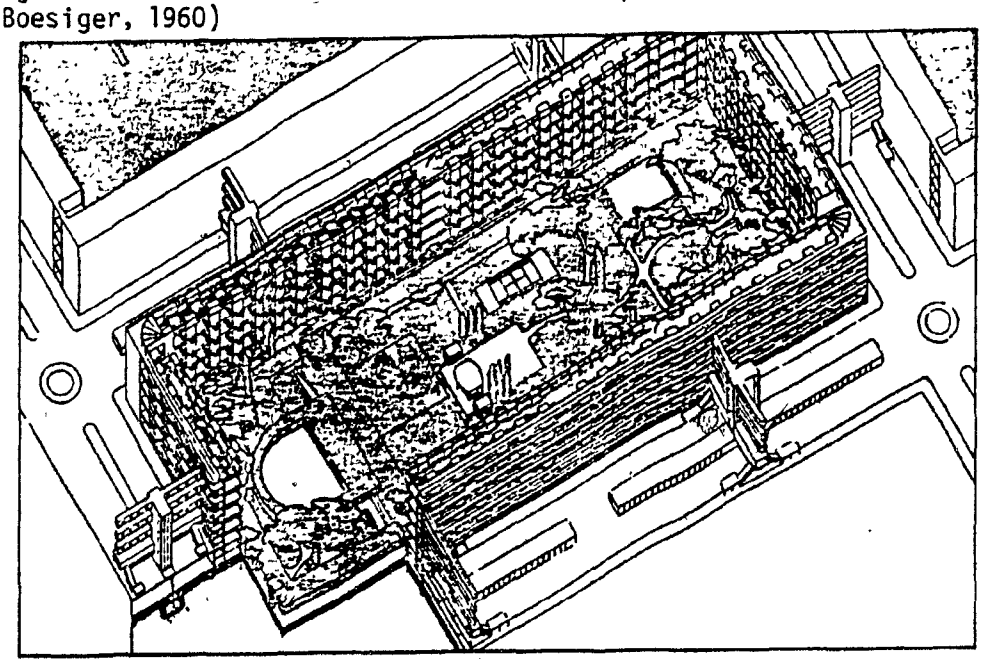


Fig. 2.40 Le Corbusier. 'La Ville Contemporaine', 1922.
(Hilberseimer, 1978)

residential city with pedestrians (Fig. 2.41).

In his theoretical scheme (Fig. 2.42) Hilberseimer accommodated one million inhabitants in 20 storey slab-like blocks of which 5 storeys contained commercial and office space, the rest of the bulk was appointed to residential purposes. The density achieved by piling up working, living and traffic was about 710 persons per ha (290 per acre). Hilberseimer pointed out the advantageous time-saving aspect of the vertical access cores within the buildings in contrast to longer travel distances from work to home with the customary horizontal system.

In his opinion, the freestanding house which caused the vast chaos of the city would disappear. Instead, the multi-purpose building built upon an entire block would contain not only apartment dwellings, office and commercial space but also all living amenities. As for the freestanding house, the old street system, of which perimeter blocks made up of many single houses were built around small badly-illuminated and ill-ventilated courts,they too would disappear. The small size of these blocks makes an expensive and narrow network of streets inevitable without improving the quality of the dwellings and arranging the street system functionally.[45]

The fourth meeting of the CIAM in 1933 dealt with 'The Functional City' and formulated the separation of the four key functions of the city - living, working, traffic and recreation.[46] Most of the principles were already visible in many earlier large-scale housing estates, so there was not so much new about its document 'The Charter of Athens'. It had, however, a fatal impact on contemporary town-planning. What started on a small scale before World War II was consistently applied on large-scale

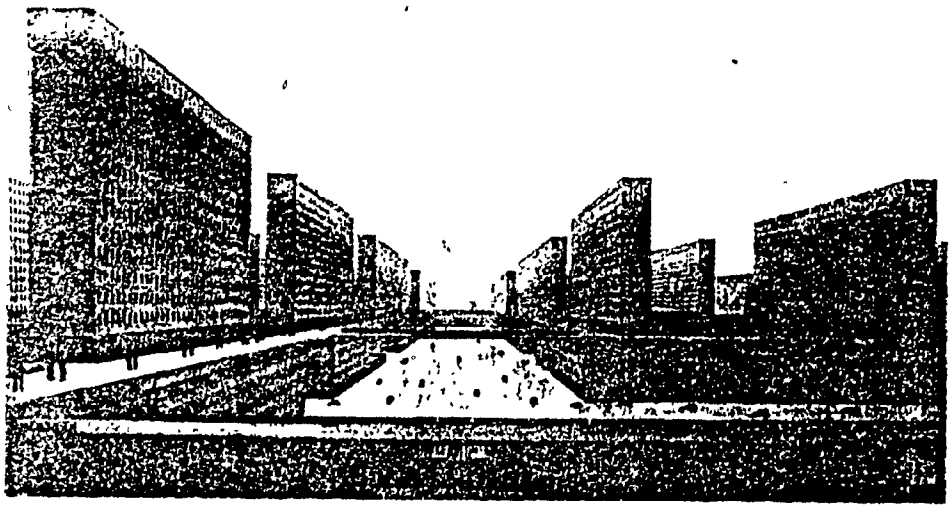


Fig. 2.41 Hilberseimer. Scheme of 20-storey highrise buildings featuring a commercial and a residential city.

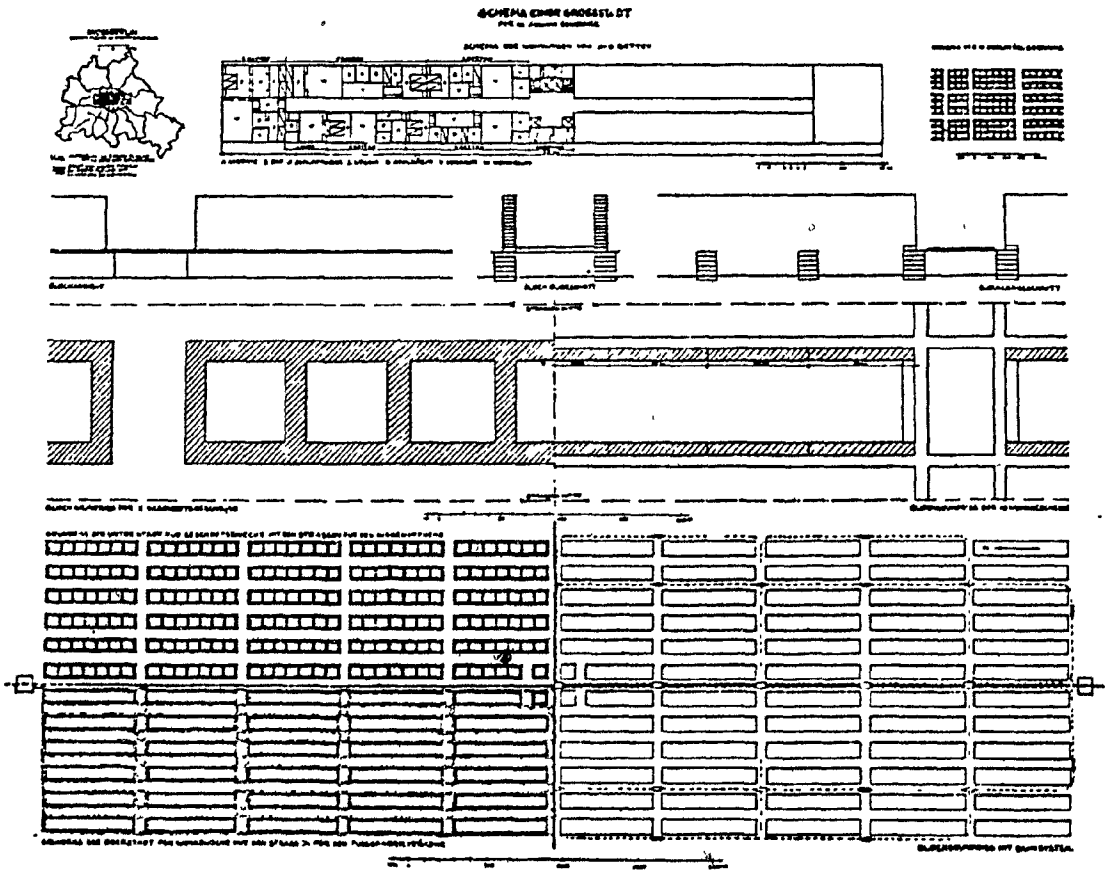


Fig. 2.42 Hilberseimer. Theoretical scheme of 20-storey highrise buildings. (Hilberseimer, 1978)

developments after the War. As a result, the town became stunted by an accumulation of single functions of which the linkage was the motor car.

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CHAPTER 3 - Reconsideration of the Perimeter Planning Practice

Introduction

Much has been said and written about the city and its feature of urbanity which is going to get lost, if nothing happens to define the end of this trend. Whether consciously or unconsciously many people share the same distinctive feeling of a growing discomfort from thinking about the urban environment. What has really been changed, since a group of modern architects were concerned about defining a framework for the better organization of the modern city?

The Charter of Athens, as a result of the CIAM-Conference in 1933, is far and away considered responsible for the prevailing dilemma.[1] Herewith, the problems to be met in the inner cities are also of another consequence. That is to set forth the speculative power of anonymous pools which exert their influence on the decision-making processes concerning town-planning. However, it is beyond the scope of this thesis to deal with this subject matter.

In recent years there has been an increasing awareness of the importance of urban residential development. In support of living in the inner cities, two statements underscore the advantages of urban housing - first, facilities which would have to be created afresh in a new development already exist in the urban area and, second, there is no lengthy time-wasting and exhausting travel from home to work. Moreover the integration of the work-place without the impoverishment of residential qualities is considered imperative to stop the trend of the dissolution of the city.

Furthermore, the constantly increasing price of energy, and of the development and maintenance of roads and sewers is no longer going to be affordable. This is also true of the enormously growing proportion of individual car traffic. With urban housing, difficulties with the provision of shops, schools and other required facilities are easily prevented as has been the isolation, exemplified by loneliness and alienation, of the individual resident.

Related to the circumstances of the modern industrial city, the perimeter block development is considered a form of urban housing which is able to allow and encourage relationships between the functions of housing, working, cultural and recreational facilities.[2] To understand the properties of the perimeter planning practice, one has to remember that this type of planning divides the urban area into private and public spheres. The private domain enclosed by the surrounding building is meant for recreation and communal use among the residents and is usually not accessible by strangers. The street, however, contains all urban functions. Moreover, on the basis of land use and layout studies Martin and March determined good qualities of this building form type with regard to the disposition of traffic, housing and open space about the site (See section 3.2 - Pollards Hill Housing, Great Britain and section 4.1 for details).

Therefore, a gradual realization of multi-functional zoning (mixed land use), based on perimeter planning schemes, would considerably help to arrest the trend of deterioration of the inner city. To understand the modern aspects of the reconsideration of the perimeter planning practice, we

have to review the preceding patterns of urban housing developments and the resultant consequences for man and his environment.

3.1 Patterns of Urban Housing Developments since 1950

With the ravages of the 19th century industrial town in mind, it was thought that the application of Le Corbusier's town-planning proposals of the 1920s and 1930s which implied the separation of the four key functions of a city - housing, working, recreation and traffic, as defined in the Charter of Athens - would help to improve the organization of the city as a whole. Thereby, one intended to make use of modern technologies to serve man in a sound environment.

But contrary to the Thesis 87 of the Charter, the automobile and not the human being became the yardstick for the city.[3] "The real cause of our woe is the failure of the city to keep pace with technological development. The city built for an ancient pedestrian age has failed to adapt itself to the requirement of our motor age". This statement, by Ludwig Hilberseimer[4] in 1955, shows how much attention was focussed on the automobile which provided the individual with transport to the outskirts of the city, such that housing in a country-like environment became more and more the only affordable and desirable solution for the provision of healthy accommodation.

All housing in the inner cities that was not destroyed by the war and felt unfit for modern living was torn down and replaced by huge impersonal business and shopping centers. This demolition of entire housing developments which were replaced by schemes like the "tower in the park" ã

la Le Corbusier, without any relationship to the surrounding townscape, was understood as urban renewal. The social factor was entirely neglected, so that sound neighborhoods were destroyed, and people affected by slum clearance had to socialize elsewhere.

The new housing schemes for healthy community life as proposed by Hilberseimer, Le Corbusier and other architects of that period were based on the separation of the residential, working and recreational areas from the main transportation lines without connecting streets. Super highway systems had to cater to the constant need for accessibility to the residential districts, the shopping centers, the industrial zones and recreational areas. This type of development was thought to be the remedy for modern town-planning. With the replacement of the archaic block or gridiron system in mind, Hilberseimer said, "the speeding automobile requires that we replace this antiquated plan by one which eliminates, insofar as possible, the death trap intersection."[5] Hence, the street was rejected as a "human sewer" (Le Corbusier) by modern architects.[6] For example, in the parallel block development (Fig. 3.1, 3.2) the street, neglected as the definer of urban space, was replaced by parks and playgrounds. Only the ends of the buildings met adjacent streets. "As a result", Oscar Newman stated, "these bordering streets have been deprived of continual surveillance by residents and have proven unsafe to walk along".[7] The separation of pedestrian and vehicular circulation was a typical feature. The straight, parallel blocks often spaced at a distance apart of twice their height were primarily oriented to catch a maximum of sun. However, the green spaces between the blocks were reduced to mere spaces of intervals. The lack of variety and

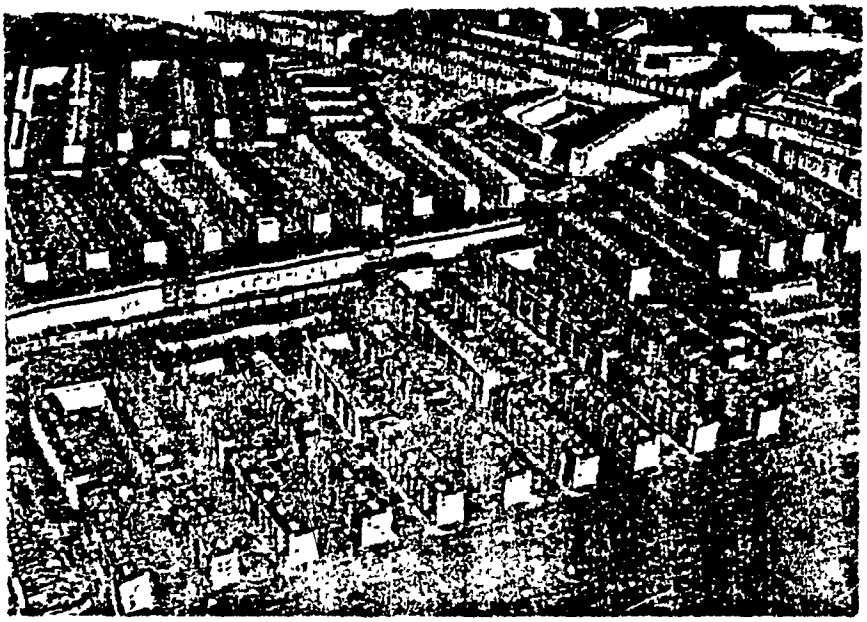


Fig. 3.1 Parallel block development.
Amsterdam South,.1935. (Benevolo, 1978)

Fig. 3.2 Parallel block development.
Bremen 'Neue Vahr' housing estate, 1962.
(E.May, H.B.Reichow, M.Saume, G.Hafemann)
(Peters, 1978)

possibility for social interaction due to a missing communal space were seen to be disadvantageous.

When the machine-like repetition of the parallel block development with its monotonous appearance had been recognized[8], there were many experiments in search of a human scale of housing, aimed at a mix of dwelling types (Fig. 3.3, 3.4). Hilberseimer was one of the first architects who proposed a new settlement type of mixed lowrise and highrise buildings. To designate the center as a sign or symbol, point blocks of different shapes such as the T-, X-, H-, Y-shape or of cylindrical, hexagonal, triangular form were set in a mixed grouping of row- and detached houses and highrise slab blocks.

The demand for a mixture of building types is not only explained by the desire for a variety of form, but also by the socio-economical aspect of creating a community. The combination of low buildings with relation to the ground and multi-storey blocks of flats was considered advantageous because different types of units can be provided to suit families with children or elderly and single people.

In the beginning of the 1960s the dissolution of the city and the loss of urbanism had been recognized in consequence of the application of low density planning. For example, it has been calculated that approximately one-half of the present population of West-Berlin would have to migrate, if the maximum utilization intended had been applied in the regional plan consistently.[9]

The requirement of higher densities led then to the linkage of lowrise and highrise in continuous large-scale blocks of houses (Fig. 3.5,

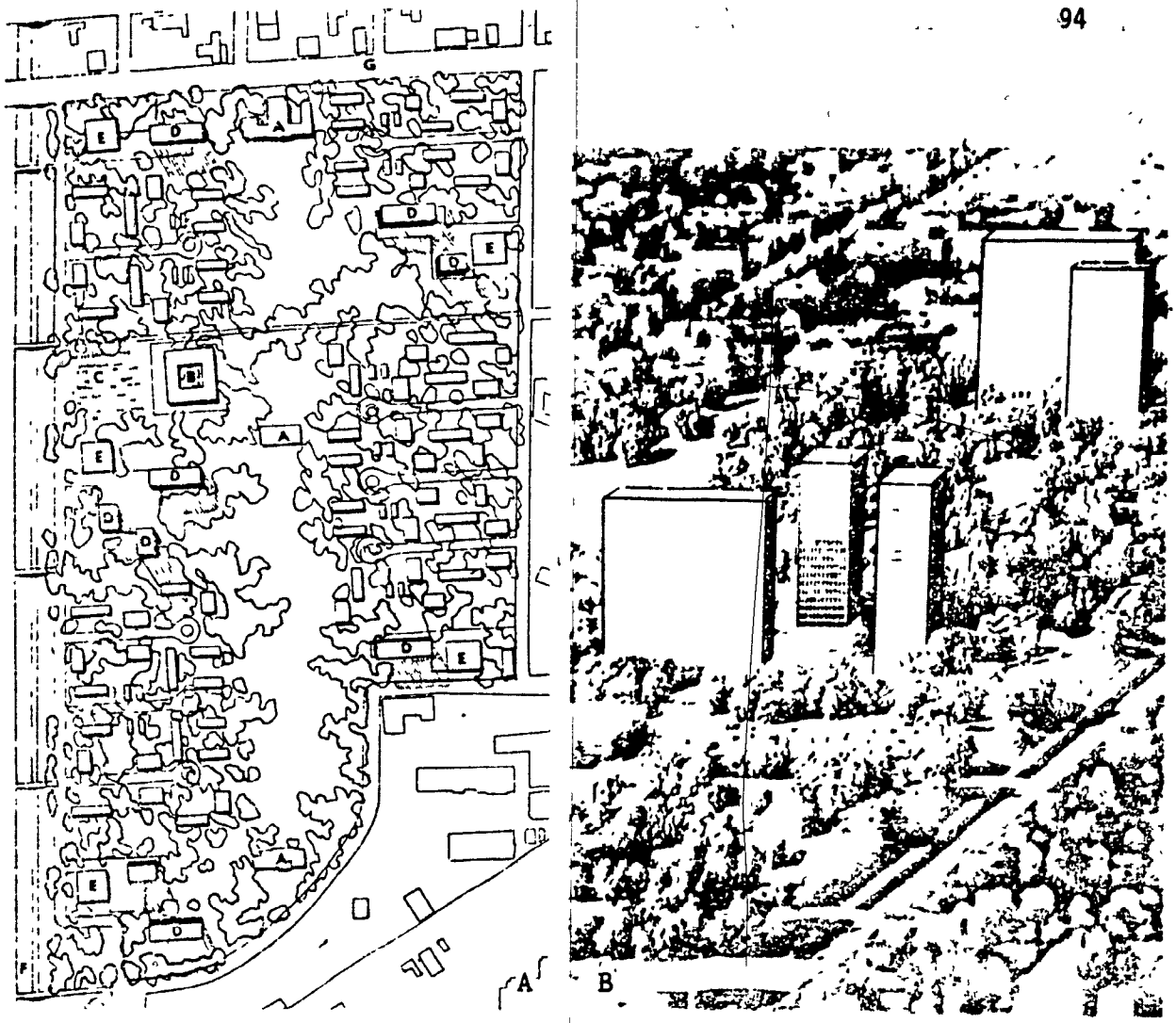


Fig. 3.3 Mixed settlement type of row- and detached houses as well as highrise slab and point blocks.
Detroit. Lafayette Park, 1956. A - Site plan, B - Aerial view.
(L'architecture d'aujourd'hui, 1958)

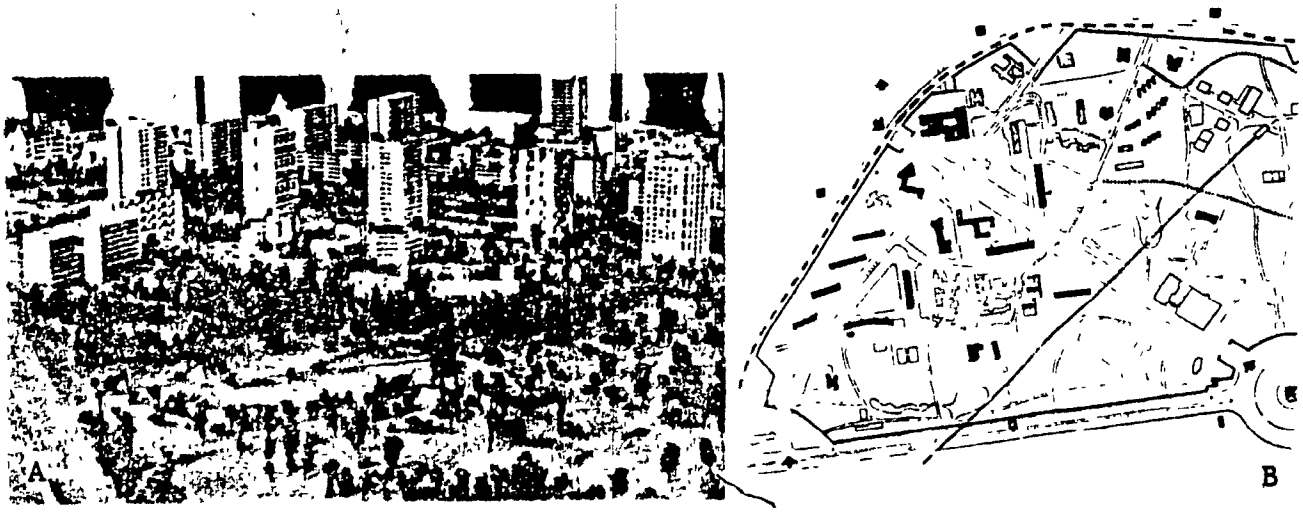


Fig. 3.4 Mixed settlement type of row- and detached houses as well as highrise slab and point blocks.
W.-Berlin. Interbau Exhibition, 1957 - 'Hansa-Viertel'.
A - Model, B - Site plan. (Benevolo, 1978)

3.6). By gaining the corner advantage of cluster housing in the fifties and sixties, where pinwheel blocks or towers hook up with each other, the overall system was to maximize peripheral surface. This created site arrangements consisting of many staggered plan buildings as in the 'Markischesviertel' project in Berlin (Fig. 3.7, 3.8). Some variations were introduced by means of stepped or curved rows (serpentine blocks), diversity of heights and lengths and the visual effect of paint. To communicate the "feeling of home" as being of sociological and psychological importance, bending, recessing, horizontal and vertical staggering of the buildings and an ample layout of green spaces were thought essential methods of preserving a housing estate from uniformity and monotony. But in reality the space between the blocks containing a sprinkling of green became a mainly cultivated monotony. And the appearance everywhere of the anonymity and the uniformity which they had attempted to avoid by means of the new architecture was the proper result of economic construction techniques applied and the building products used in these mass housing projects.

Moreover, the polarization of living and working that can be seen not only in suburban detached housing developments but also in multiple housing units of new satellite towns jeopardized the maintenance of a proper townscape and the liveliness in a neighborhood. For example, the inner cities are only jammed with pedestrians during business hours. Because of the lack of attractions they become deserted in the evening. However, the housing estates, those great expanses of greenery between the concrete and glass apartments, were also deserted much of the day and night. They are only serving as sleeping accommodation.

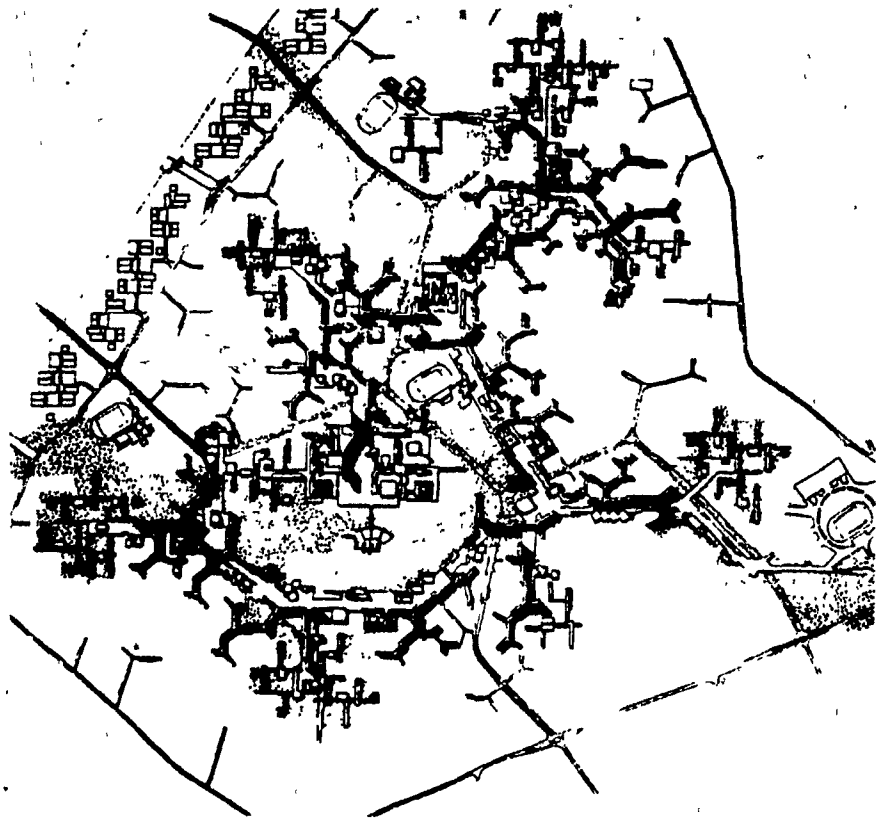


Fig. 3.5 Continuous large-scale blocks.
Toulouse. 'Le Mirail' housing estate, 1961.
Site plan. (G. Candilis) (Schmitt, 1966)

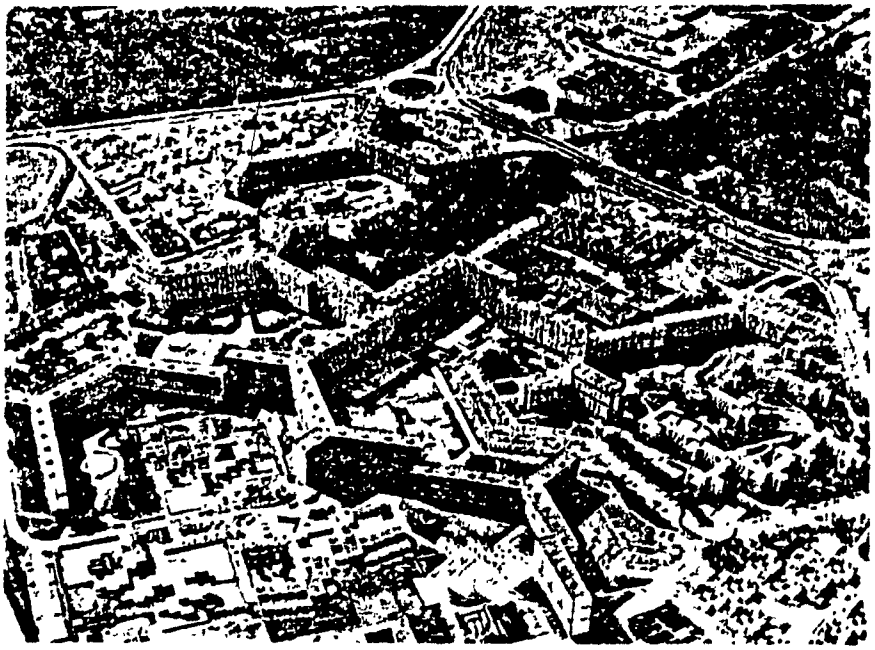


Fig. 3.6 Continuous large-scale blocks.
'Le Mirail' housing estate. Aerial view.
(Peters, 1978)

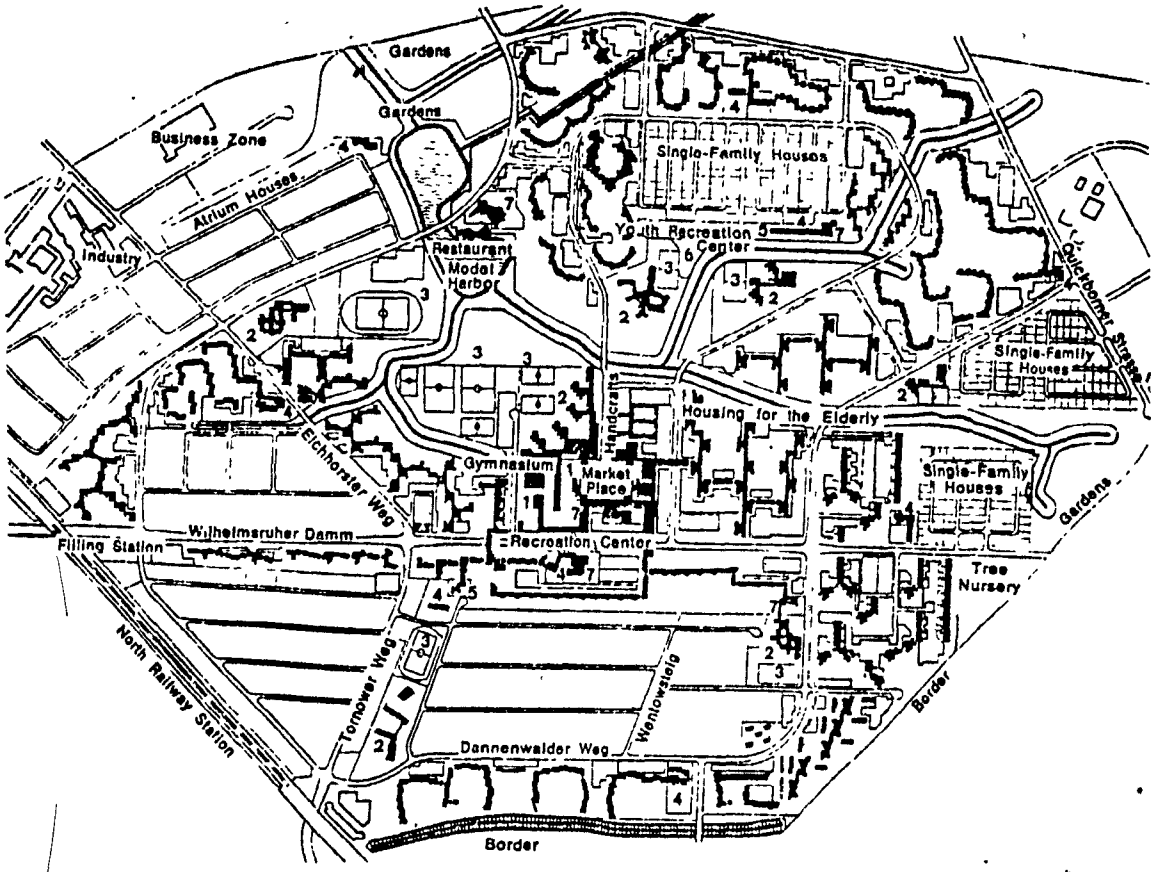


Fig. 3.7 Continuous large-scale blocks. W.-Berlin. 'Markischesviertel' housing estate. Site plan: 1 - center, 2 - schools, 3 - sports grounds, 4 - kindergarten, 5 - maintenance, 6 - day care, 7 - churches, parish centers. (Feuerstein, 1968)

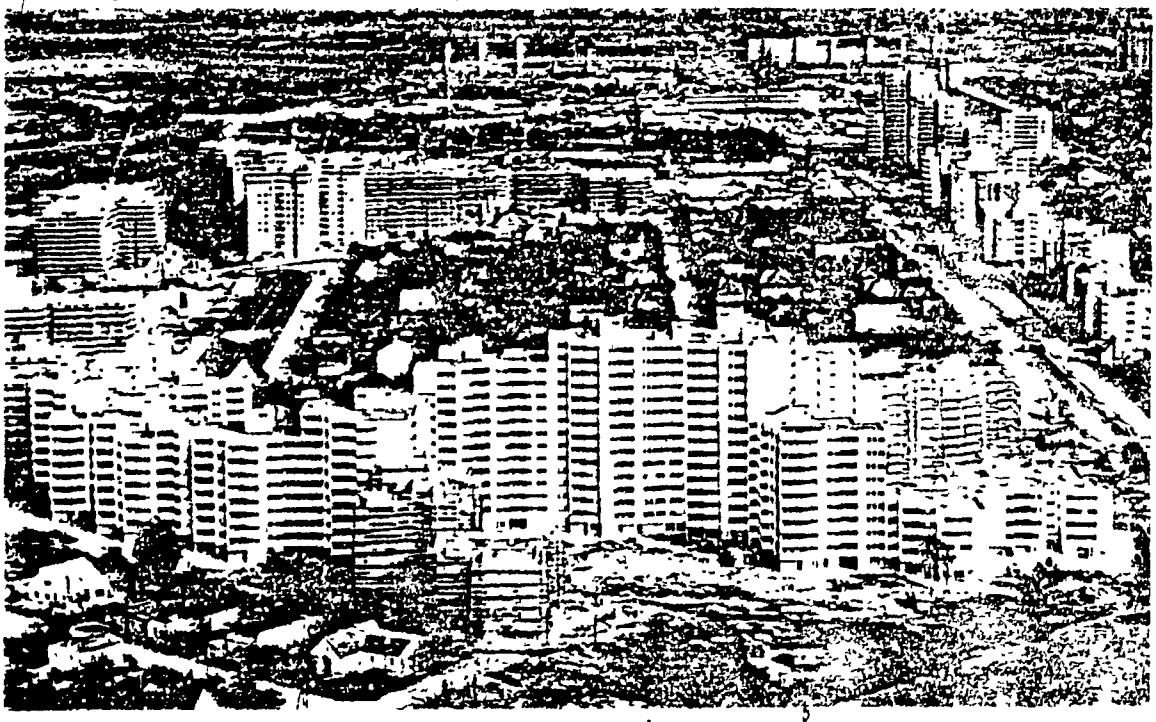


Fig. 3.8 Continuous large-scale blocks. 'Markischesviertel' housing estate. Aerial view. (W.Duttmann, H.C. Muller, and G. Heinrichs, 1964-1971) (Pehnt, 1970)

In the beginning of the seventies a reaction began to set in with the criticism that "the projects offered little or no services or amenities of their own and seriously overburdened those that did exist. Out of scale and unrelated to everything around them, they did nothing to reinforce a community's physical, social and economic fabric; in fact they became one of the most effective ways of destroying it."[10] For example, the anonymity in these modern schemes had become legendary.[11] As Peter Blake rightly observes: "No one ventures out - not for fear of crime, but for fear of boredom."[12] Here the assumption of most modern architects that the user-clients would become accustomed to living the way they were expected to live was quite fateful. "In doing this, ..., (the architects) actually considered that they were fulfilling their social responsibilities to (the residents)."[13]

By having in mind the new perspectives of spaciousness and the suggestion of healthy living in solitary highrise blocks surrounded by landscaped parks, sunlight and air, they condemned the street as being not of hygienic, aesthetic and functional value. This is explained by the fact that physical cleanliness and large open spaces had been equated with social well-being by urbanists of that time. "The belief advanced by modern architects that form can determine behavior stems from these sources."[14]

This seems an open confession that modern town planning has so far been a failure in the field of urban housing. As B. Brolin pointed out, "the mistake of the early modernists had been to advocate essentially one program for all people in all situations; the technical question had been more important than the social one in determining architectural and planning solutions."[15]

3.2 The New Approach to Perimeter Planning

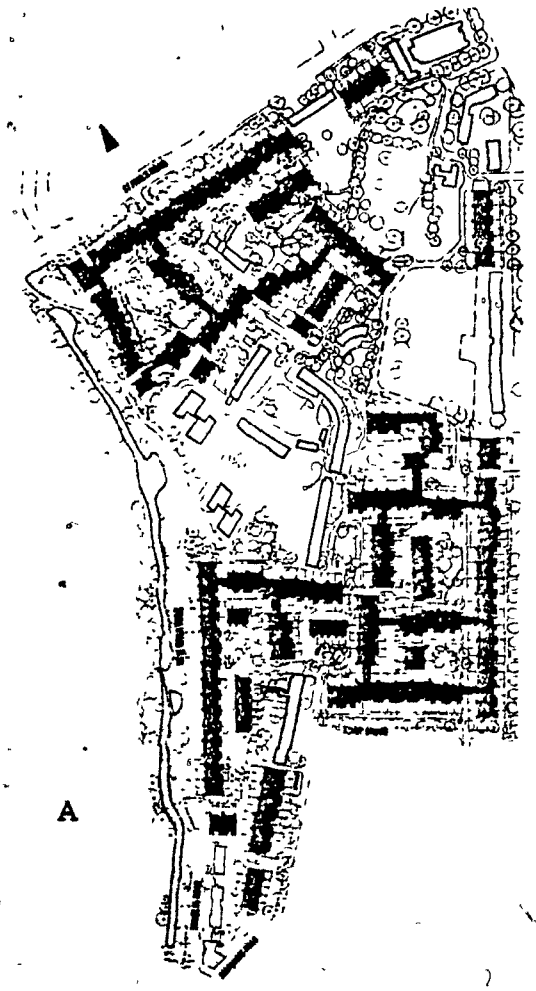
The search for a new approach to urban housing design led architects and planners to recall the old perimeter planning practice of the 1920s. There are many reasons why this renewed interest in perimeter design has attracted so much attention in Central Europe.

For all too long the idea of lowrise urban housing at high densities had been neglected because it was considered unimaginable to accomplish the requirements for social and hygienic standards with high density housing. Nevertheless, in the late 1960s the first attempt to prove the contrary was undertaken in Great Britain. The approach called "high density-lowrise" was supported by the research of Sir Leslie Martin and Lionel March at the Centre for Landuse and Built Form at Cambridge[16] and became of great value for all later planning within this context. As can be seen in section 4.1, continuity avoids a drop in density which would normally occur in cases where corner junctions remain unfilled, and perimeter planning releases a greater single area for open space functions than would be possible by alternative lowrise layouts of similar densities.[17]

Today it is common knowledge that densities expressed by the floor space index of about two and a half cannot only be achieved with highrise buildings but also with lowrise developments.[18] Moreover, the price for new highrise housing is approximately one-third more than for lowrise, as demonstrated by Herbert McLaughlin (Fig. 3.9), who attributes lowrises with 80 per cent site coverage and 10- and 20-storey highrises with 50 per cent (which is still quite dense), and this, together with the fact that the

Building type	Cost per occupied square foot	Ratio of occupied square feet to square feet of land	Cost per square foot with land at $300,000	Cost per square foot with land at $600,000	Cost per square foot with land at $1 million	Cost per square foot with land at $2 million
Two-storey	24.91	1.36	30.98	37.07	45.18	65.44
Three-storey	30.94	2.04	35.21	39.49	45.18	59.42
Four-storey	34.29	2.71	37.57	40.85	45.22	56.16
Mid-rise, 10 storeys	44.35	4.25	46.57	48.79	51.75	59.15
Mid-rise, 20 storeys	47.31	9.5	48.54	49.78	51.43	55.54

Fig. 3.9 Comparative housing costs of lowrise and highrise buildings. (Architectural Record, February 1976)



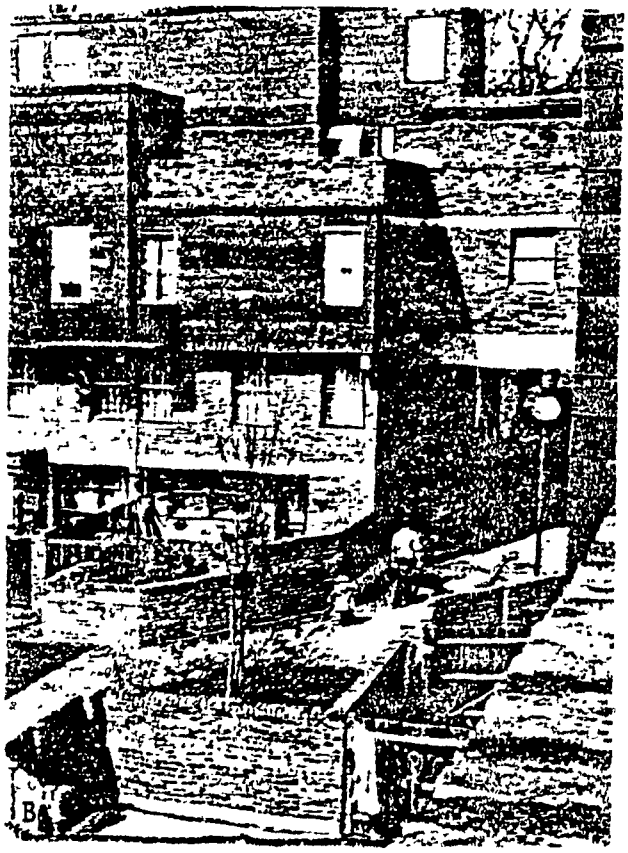


Fig. 3.10 London. 'Marquess Road' in Islington. A - Site plan. B - Five-storey buildings composed of interlocking maisonettes.

operating costs are almost double, results in a change of attitudes.

And because of Oscar Newman's findings, as shown in his book "Defensible Space" of a direct relationship between the height of buildings and the amount of crime and vandalism they engender[19], it can be claimed that there is nothing of advantage in highrise building either from the economic or the social point of view.

Criticizing the planning principles which facilitated the deterioration of our cities, all new proposals made since the late 1960s do not differ in the attempt to revive the inner urban zones by bringing the homes into proximity to the work-place and to cultural facilities. The new planning schemes are also understood as an essential contribution to the conservation of energy and resources in the future. Thus, one of the goals is to eliminate the daily travel between home and work. This is one more reason why there is an increasing awareness of the importance of residential urban housing.

A potential tool in achieving urbanity along with a reasonably high density is found in the perimeter design with its capacity to define streets as urban spaces and to delineate private realms. The integration of light industry which also includes administrative offices, is one of the new components involved in the schemes to be discussed here.[20] Another feature within the new approach to perimeter planning is the handling of parking, pedestrian streets and traffic streets of different hierarchy to prevent inconvenience of many kinds. And another remarkable aspect of perimeter planning within urban renewal projects is that these projects are related to the surroundings in terms of scale of housing and the physical need of man

to socialize within a community.

Following are examples of new perimeter planning schemes which are analyzed and fitted into the building categories given by Roger Sherwood in his book "Modern Housing Prototypes".

Fig. 3.10 Marquess Road in Islington, London[21]

What started with Lillington Street, the first high-density design in London to break decisively with the LCC norm of 'mixed development',[22] found various responses in London and attracted the attention of many architects in Continental Europe. Marquess Road demonstrates that a high-density form of housing with outdoor space for each dwelling can be achieved without giving up individual privacy. With a density of 500 persons/ha the 4- to 5-storey buildings feature private access to the two and three level units of an interlocking system. Elevators and communal stairs give access to the maisonettes along a deck street providing a connection of all buildings. Being not only a means of access but also a zone of activity and interaction, the open deck streets are given over to the tenants to reinforce their feelings of responsibility for that space. It was the same strategy to give 60 per cent of the family-units an outdoor extension in front of their "houses" with direct access to the communal spaces.

Fig. 3.11 Pollards Hill Housing, Mitcham Common, Surrey, Great Britain[23]

The principles established in investigations on land use performances of built forms by March and Martin have been used as design

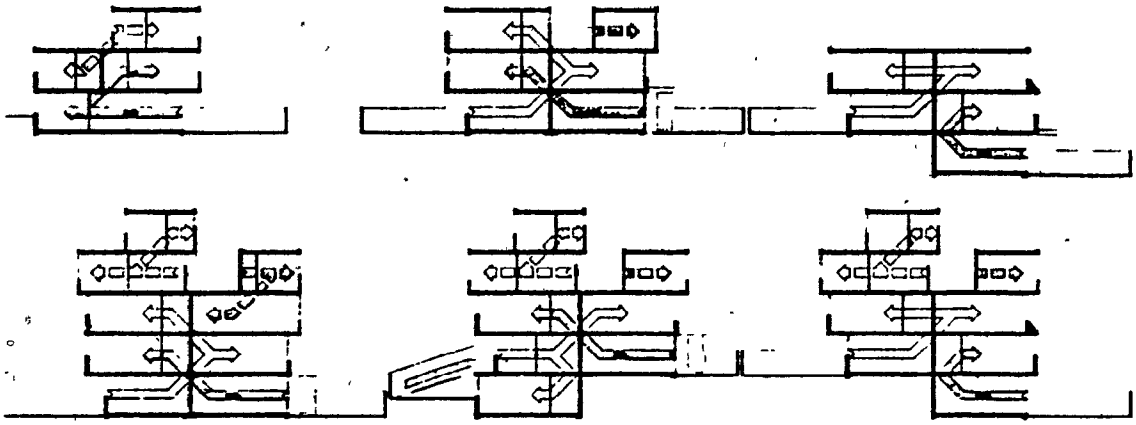
D

C

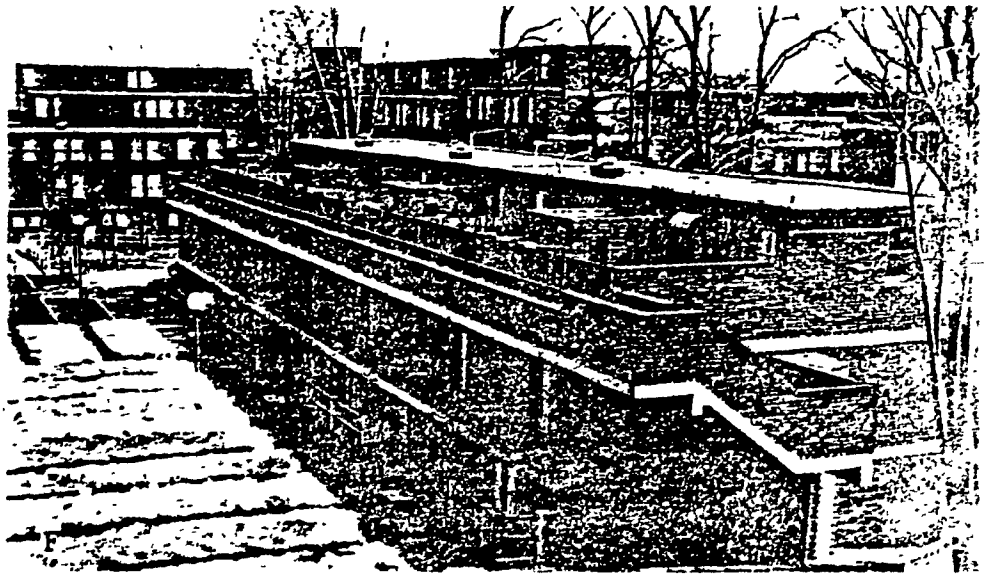
C - Street deck.

D - Connecting bridges for pedestrian circulation.

E - Interlocking dwelling units.



E



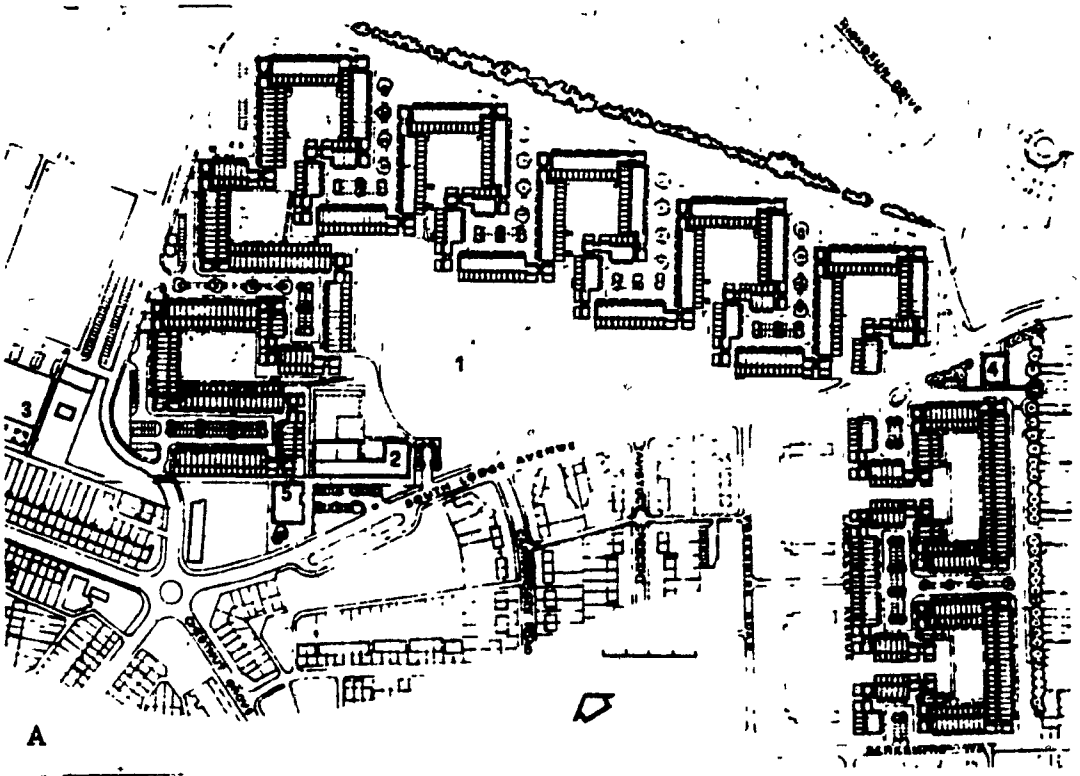
F

F - 'Marquess Road' in Islington. Three-storey buildings within the interior of the block. (A-F Bauwelt, 1976)

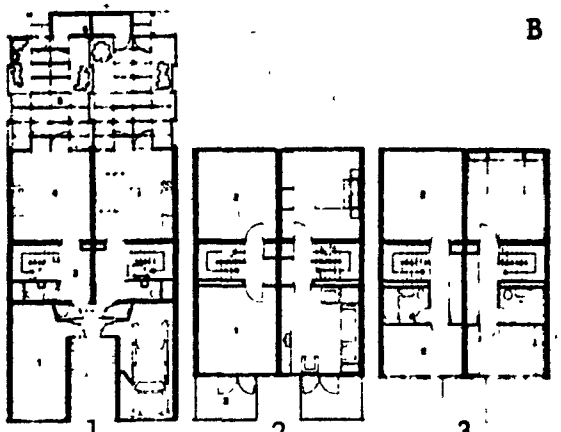
tools in the Pollards Housing Estate. (See also chapter 4 for details). The concepts of continuity and perimeter planning are here translated by the architect Philip J. Whittle into folded bands of housing enclosing a series of squares oriented to the private realm alternating with cul-de-sacs providing motor car access from a perimeter road.

"Inspection of the project shows", as A.J. Diamond says in his study 'Density, Distribution and Cost', "that two simple principles have been used. One is that the development has been kept to the perimeter of the site. This has allowed the consolidation of open space at the center while relegating traffic to the perimeter. The second principle involved is that the overall character of the built form approximates a reticulated court form."[24] As can be seen in section 4.1, the greatest gains, in terms of useful open space, seem to be achieved when buildings are organized as a continuous series of alternating "p"- and "d"-shaped spaces.[25]

This housing project achieves a density of about 250 persons per hectare (100 per acre) and yet almost 70 per cent of its occupants live in houses with private outdoor spaces and are able to park their cars at their doors.[26] The buildings comprise 562 three-storey houses and 288 flats. The dwelling mix features 34 per cent of 2-person flats, 62 per cent of 5-person houses and 4 per cent of 6-person houses which have private access. The flats located at one end of each terrace block are grouped two per floor around a central access stair. At the junctions between housing blocks there is pedestrian access from the cul-de-sac to the interior common space which is of sufficient size to accommodate a cricket field or three soccer fields depending on the season.[27]



A

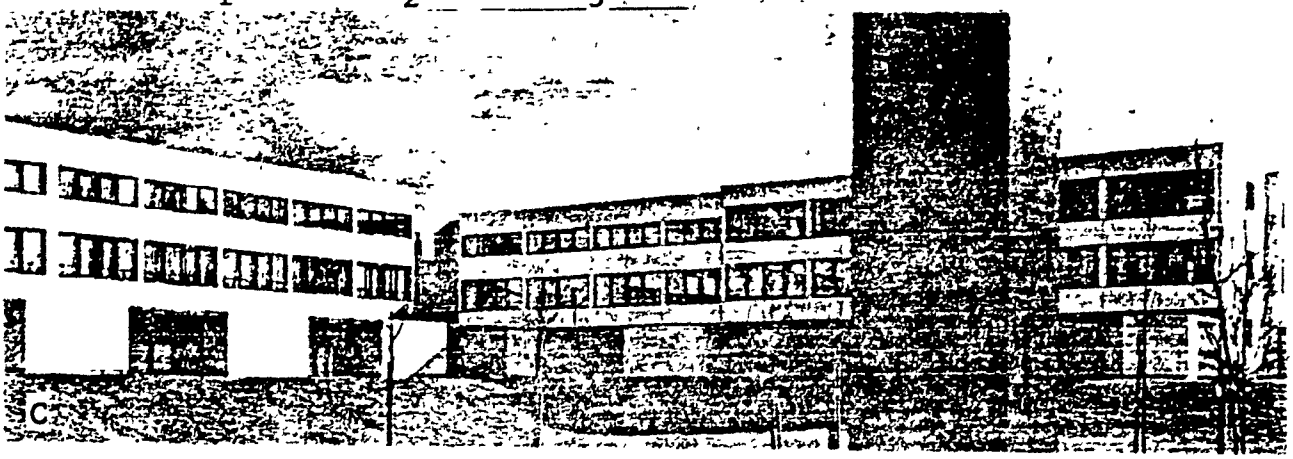


B

A - Site plan.

B - Plans: 1-ground floor, 2-1st floor, 3-2nd floor.

C - Interior part overlooking the common green



C

Fig. 3.11 'Pollards Hill' housing, Mitcham Common, Surrey, Great Britain. (A, B- Peters, 1977; C-Architectural Review, April 1971)

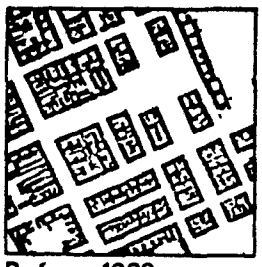
Fig. 3.12 'Block 270' Urban Renewal Project in Berlin-Wedding[28] (1973/74)

The reconstruction of the 'Block 270' at the Vinetaplatz according to prior building lines is the first attempt since World War II to apply a new perimeter planning practices in Berlin. Corresponding to the typical design elements of the surroundings, the building features the same height and 45° corners. Here passageways give access to the interior open space containing grassed areas, playgrounds and groups of benches. Access to the dwellings is not only from the street but also from the rear and the basement where all tenant parking is accommodated.

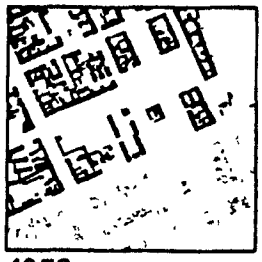
As in the typical housing in Germany in the 1920s and 1930s - Siemensstadt, for example - the access stairs are internal, between back-to-back units, with only minor articulation indicating the position of the stair on the exterior. Each stair serves two units per floor which allows double-orientation. Access to a part of the top dwellings is from an access gallery on the inside of the building. These units open to the street. The core elements parallel to the corridor have only minor windows. The mix of apartment types comprises of 1- to 5-person flats. It is also worthwhile mentioning that in order to preserve the old character of that neighborhood the "Restaurant zur Linde" (Lime Tree Restaurant) has been integrated with a small open-air beer-garden under the still intact lime-tree.

Fig. 3.13 'Rollberge' Urban Renewal Project in Berlin-Neukolln[29]

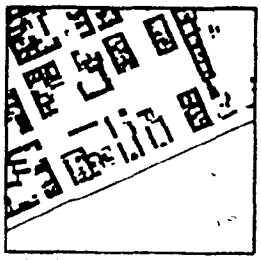
On the basis of a survey there was no alternative to the urban renewal program other than the clearance of eleven housing blocks. Still in



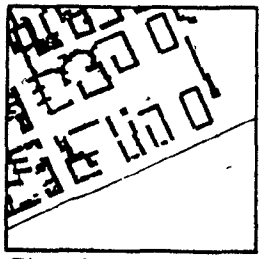
Before 1939



1956



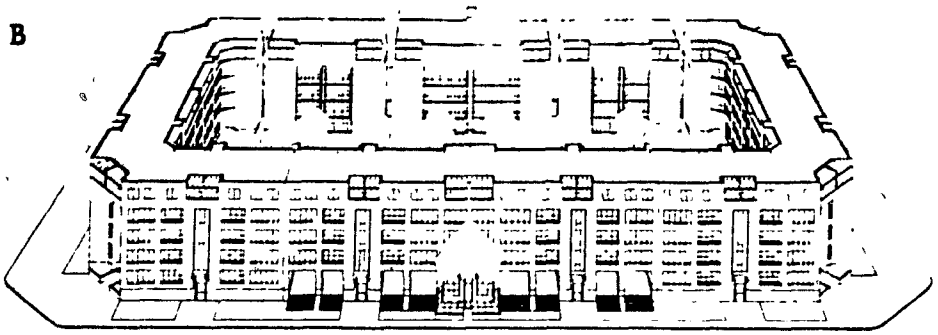
1971



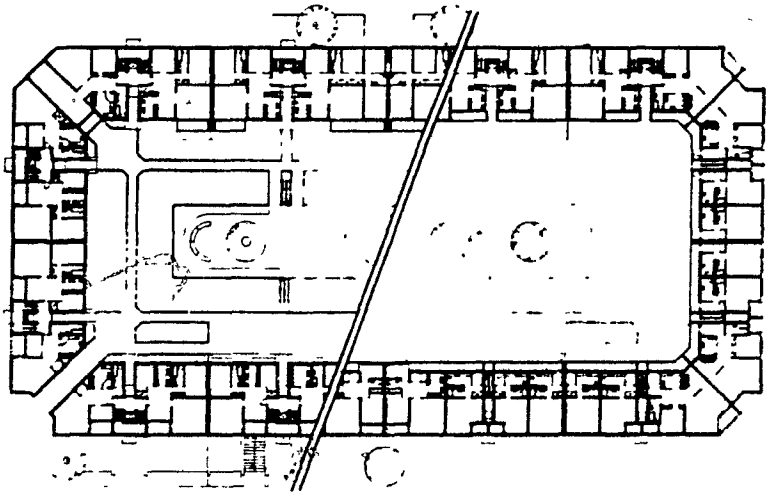
Planning proposal

A - Sections of the district.

B



C



B - Isometric

C - Plans: 1st to 3rd floor (left), 4th floor (right) (for ground floor and basement, see section 5.2).

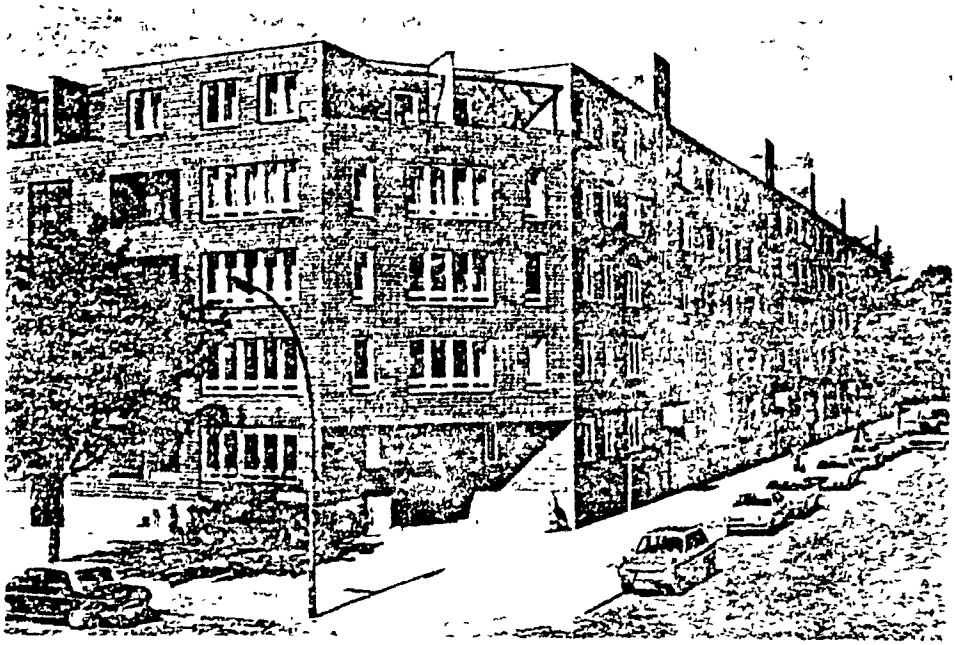
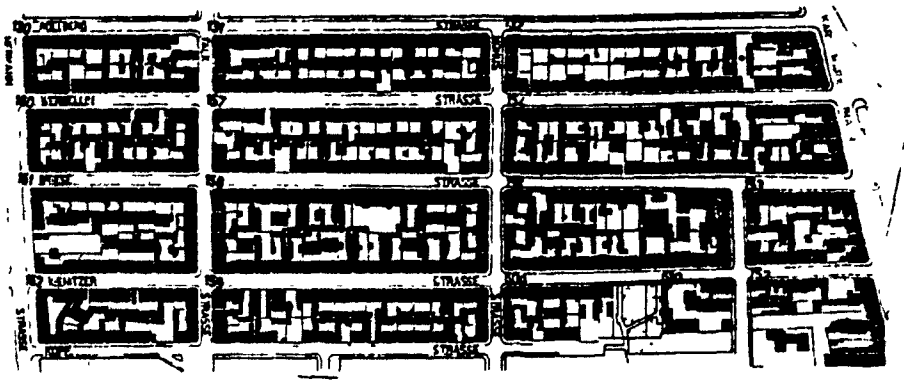


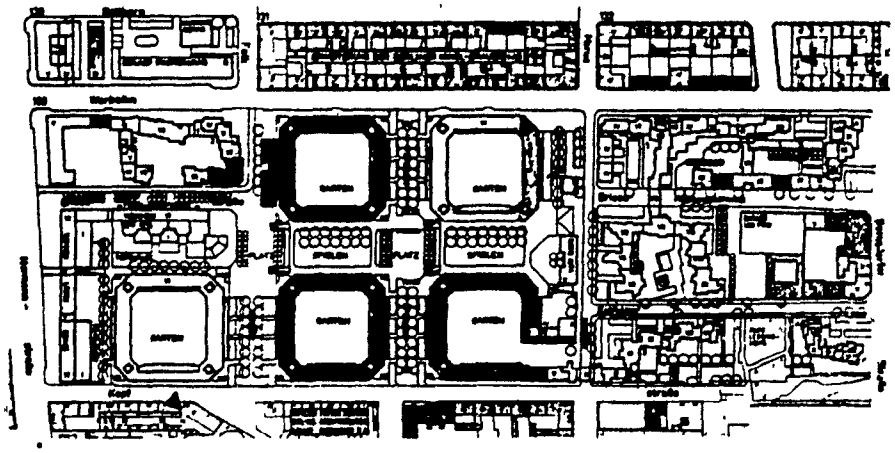
Fig. 3.12 Berlin-Wedding. 'Block 270' urban renewal project. (Baumeister, Dec. 1977)

1963 78 per cent of the existing old buildings had toilets outside the dwelling and 87 per cent lacked a bath. The condition of the buildings was found to be the worst in Berlin. Late in 1977, 80 per cent of the 665 dwellings which were all built with public housing funds were occupied by those people who were affected by the clearance program. In the place of six prior housing blocks five quadrangular perimeter blocks are located amongst two other schemes adjoining the main traffic street. Here, above all, shops and offices are accommodated together with a small portion of housing. The perimeter blocks, of which just one façade faces the vehicular access street, form a cross of interior pedestrian circulation and playgrounds working together. Thus, the open space within the enclosure remains free of noise from playing children while at the same time doing away with the usual separation of the playground from possible disturbance. Public facilities, such as a kindergarten, a welfare-center, a parish center, shops and pubs are within a short distance and can be reached without crossing traffic streets. Namely, car access is from below walking level. Pedestrian access to the enclosed spaces within the perimeter blocks is from the elevator lobby provided only at the four corners of the building. In addition semi-private staircases serve the flats and the maisonettes off an access gallery which runs around the building giving access to the elevators at the second and fifth floor.

A mix of thirty different dwelling types varying from 40 sq.m. up to 120 sq.m. (430.5 sq.ft. up to 1,291.7 sq.ft.) is accommodated in each block comprising about 180 units. This mix features four different types of access such as the single- and double-loaded corridor system, the walk-up

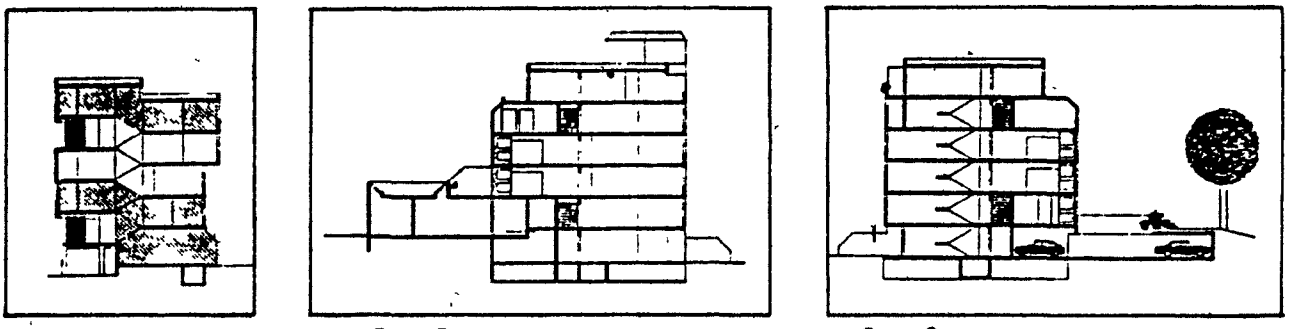


A - Section of the district showing the residential quarter about 1939.



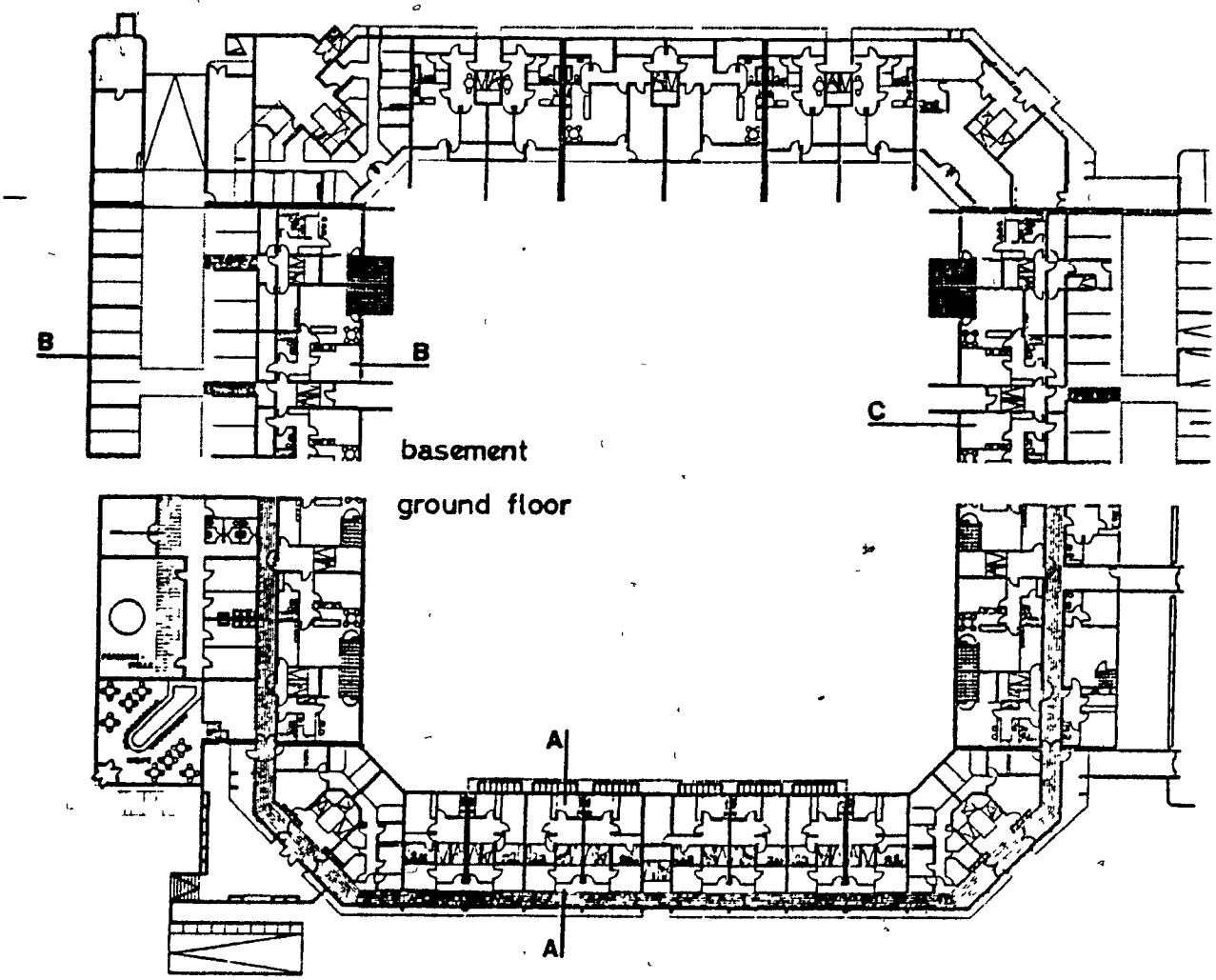
B - Three (dark shaded) of five planned perimeter blocks have been built in the place of six previous, long and narrow street blocks.

Fig. 3.13 Berlin-Neukolln. 'Rollberge' urban renewal project.
C - Pedestrian street between two perimeter blocks.



A - A B - B C - C

D - Sections.



E - Basement and ground floor plan.

Fig. 3.13 Berlin-Neukolln. 'Rollberge' urban renewal project.. (A-E, Baumeister, April 1979)

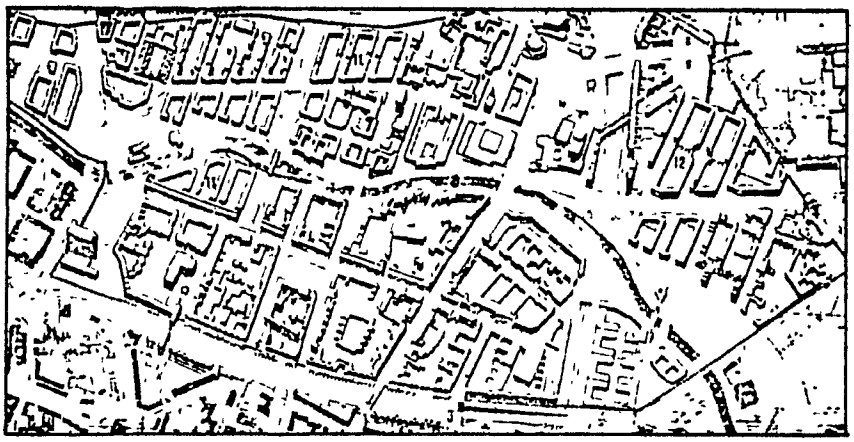
multiple access and single-loaded split-level system. The access gallery faces the outside; and the living area opens to the preferred side of sunlight with alternating relation to the interior open space on the pedestrian streets according to the proper orientation.

This 'Rollberge' project is a good example that with an ingenious layout of double-orientation units (only a few are single-oriented but face the sun) the greatest degree of exposure to sunlight can be achieved with perimeter planning.

Fig. 3.14 Competition entry for the redevelopment of Berlin-Tiergarten[30] (1973)
(by G. Bohm, G. Feinhals, W. Finke, J. Pieper, F. Popp, K. Schalhorn, H. Schmalscheidt)

The area in question is located to the north and south of the Landwehr Canal close to the East-Berlin border (Fg. 3.14A). The dominating buildings feature offices and cultural facilities such as the Symphony Hall and the National Gallery in the northern part. These have a FAR of 1.5, while a FAR of 2.0 can be calculated for the remaining area comprising of mixed functional uses.

In contrast to present zoning regulations which allowed floor area ratios of just 1.1 to 1.2, the new scheme (Fig. 3.14B) proposes intensive utilization at a high density. The building heights are confined to 4 and 6 storeys which communicate a comfortable spatial impression from all sides. By providing outdoor extensions for most of the dwellings, the intention is to combine the advantages of single-family housing with the



A - Site plan.
Scale 1: 20,000.

B - Isometric.

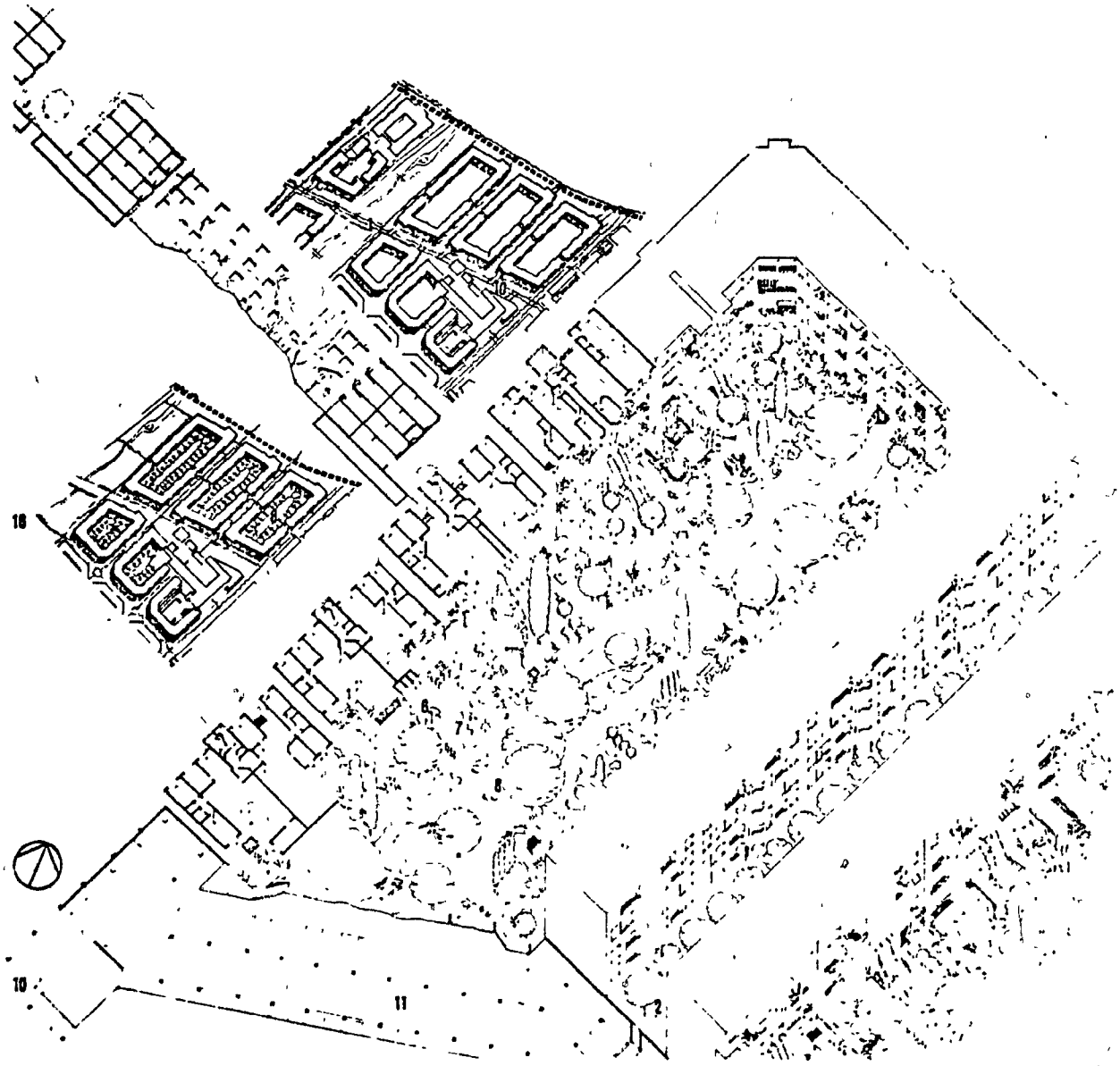


Fig. 3.14 Competition entry for the redevelopment of Berlin-Tiergarten. (Peters, 1977)

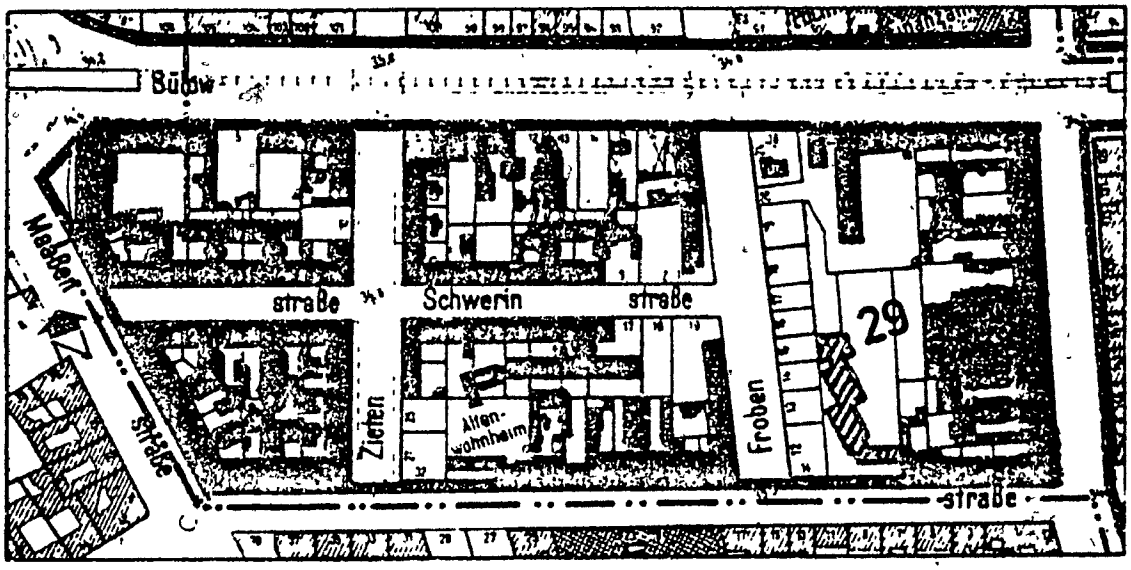
urban form of multiple units. Access to the personal open space is from the living area on the ground floor and from private stairs of one or two flights. Two rows of adjoining gardens are designed with partitions to define and enclose private zones giving privacy and freedom from overlooking. A communal open space is also provided.

The six-storey building of a rectangular perimeter form for example, consists of stacked maisonettes off an access gallery opening to the street on every second floor (single-loaded system). Private entrances as in row housing give access to the maisonette units at ground level. The conversion of dwellings into commercial spaces has also been taken into consideration. Tenant parking is provided for underground garages.

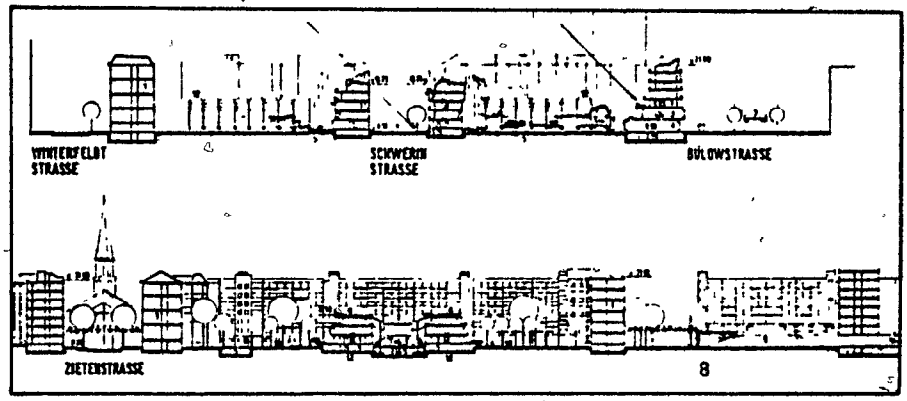
New aspects of designing thoroughfares in combination with housing and working areas can be studied in the sections of the South Highway. (See section 5.4) Service roads maintain a connection between the residential streets and main traffic lines. Since offices are better located along traffic streets than housing, the introduction of 5-storey office buildings is considered to protect the housing blocks from noise. Thus, this project shows how close work-places can be located to housing without disturbing each other. Quite the contrary, in fact, the one taking advantage of the other. Moreover, the whole area is designed to allow a combination of driving, walking, relaxing and playing together.

Fig. 3.15 Survey for the Urban Renewal Program in Berlin-Schoneberg[31](1974)
(by K.K. Pankrath)

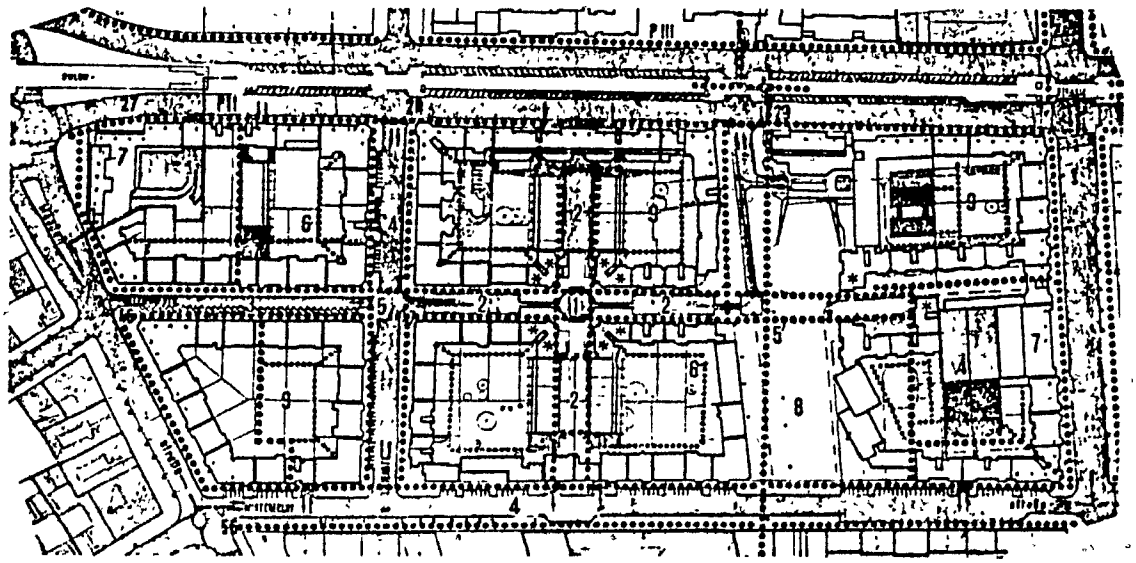
The site is composed of 5 housing blocks. The character of the



A - Previous site plan.



B - Sections north-south, east-west.



C - Proposed site plan.

Fig. 3.15 Survey for the urban renewal program in Berlin-Schoneberg. (Peters, 1977)

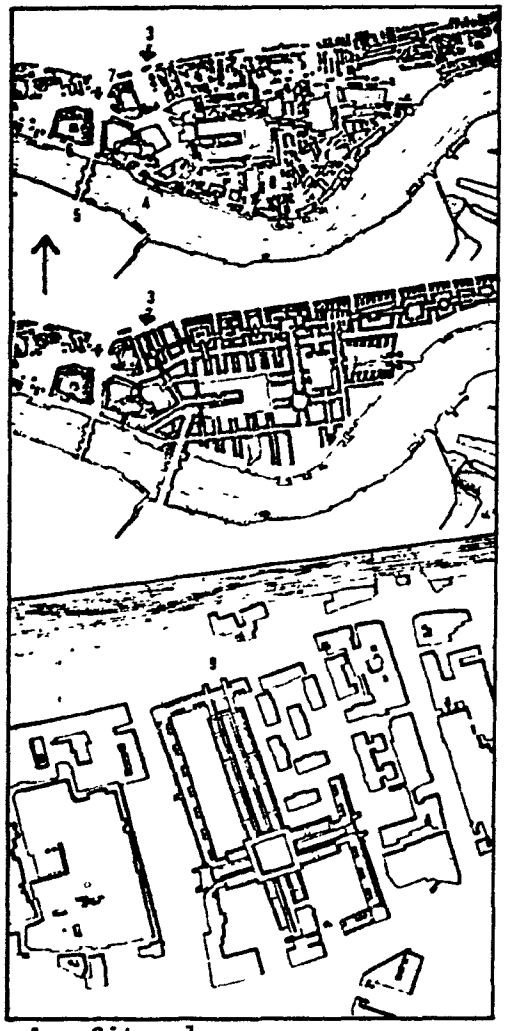
traditional elements of urban space was preserved by using existing buildings which are integrated into the new scheme. Apart from the construction of lowrise housing the demolition of the rear buildings of the 19th century is intended to create spatial enclosures of appropriate size.

One of the new aspects of perimeter planning in the traditional environment is the closing of original streets for through traffic. Instead, their functions are seen in serving as pedestrian streets, playgrounds, meeting places and in giving access to parking lots. The previous rectangular housing blocks of 60 by 140m (196.8 by 459.3 feet) are subdivided by means of lowrise terraces in a north-south direction. In spite of bad exposure to the sun, street walls facing north are maintained because of spatial qualities. Here, dwellings are not provided at ground level or else maisonettes have been considered in their place.

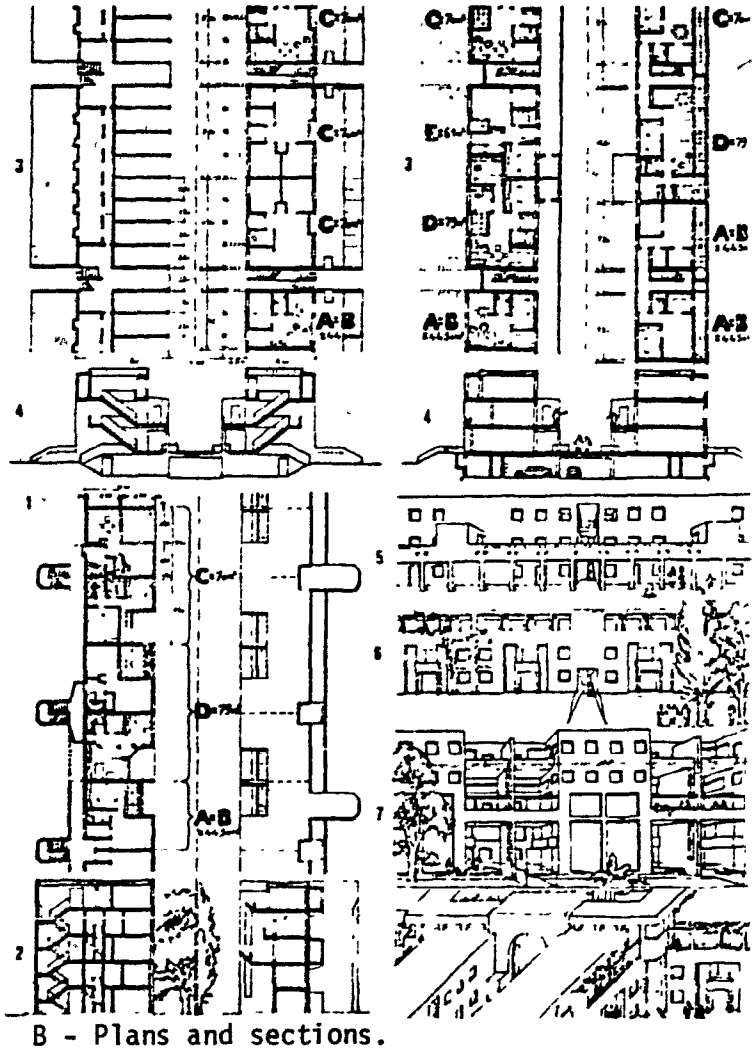
The closing of the Schwerin-Nollendorf street is a gain of about 5,800 m^2 (1.42 acre) of open space which means a decrease of street land from 17 to 10 per cent.

Fig. 3.16 Competition entry for housing at the Royal Mint, London[32] (1974) (by Rob Krier)

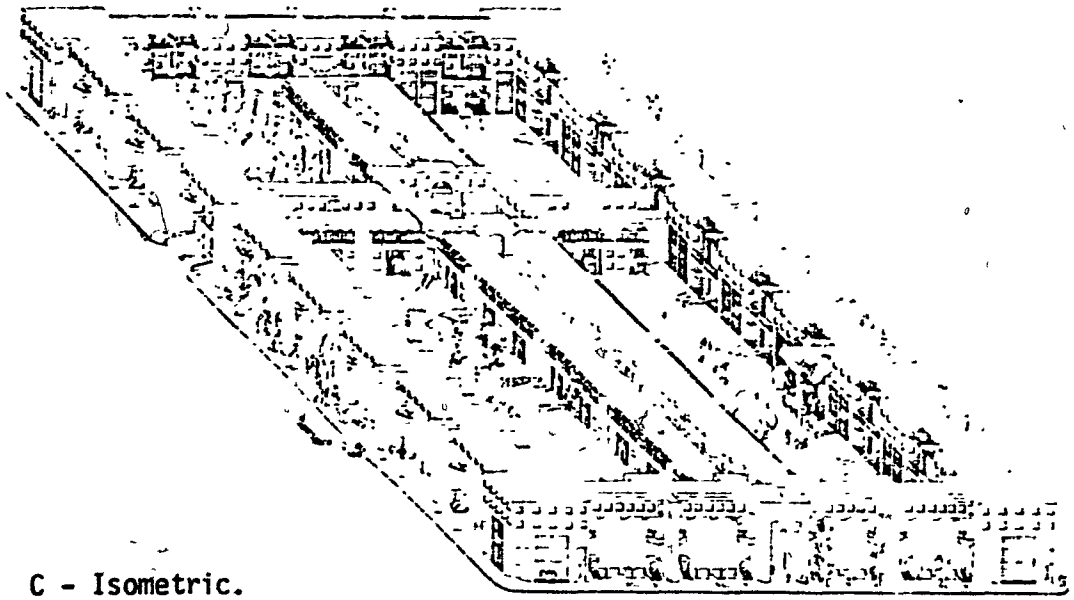
This project comprising of 150 dwelling units is part of an urban renewal program around the docks at the Tower Bridge (Fig. 3.16A). Because of the heavy traffic along the small side of the proposed block, all dwelling units are oriented to the interior (Fig. 3.16B). Two pedestrian streets divide the block of housing and intersect creating a central place. All public and private service facilities are provided here. The isometric



A - Site plan.



B - Plans and sections.



C - Isometric.

Fig. 3.16 Competition entry for housing at the Royal Mint, London. (Peters, 1977)

shows how the perimeter block can be closed in a later phase (Fig. 3.16C).

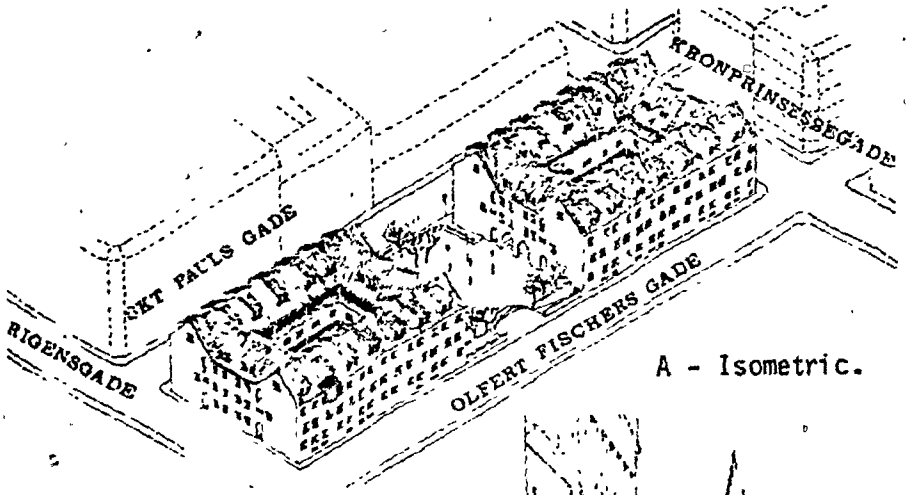
Fig. 3.17 Urban Renewal Project in Copenhagen[32]

(Architects: Kooperative Byggeindustrie, Copenhagen)

In the 17th century the predominant buildings were lowrise houses. Due to speculative building the previous housing block at the Olfert Fischers Gade was made up of 5-storey tenement blocks with narrow light shafts.

The new scheme of two perimeter blocks on a site corresponds to the local character with regard to the height of three storeys and some design elements, such as the pitched roof, dormer windows and gable-ended walls (Fig. 3.17A, 3.17B). A mix of five different apartment types is accommodated in maisonette units ranging from 61.5 sq.m. (662 sq.ft.) up to 115.8 sq.m. (1,246.5 sq.ft.) in size. On ground level the maisonettes have private entrances with private internal stairs to the second level above. Access to the maisonettes above is from an access gallery serviced by a communal stair case.

Despite the small depth of the housing block the architects were concerned with creating an open space by breaking the continuity of the block (Fig. 3.17C). Direct access to both internal stair cases is from the square which opens to either side.

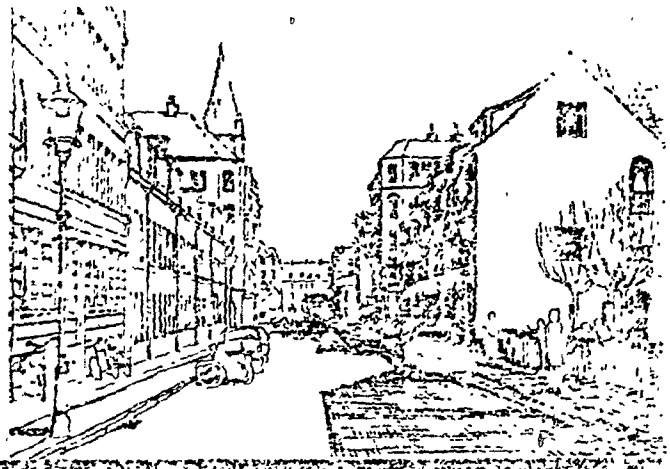


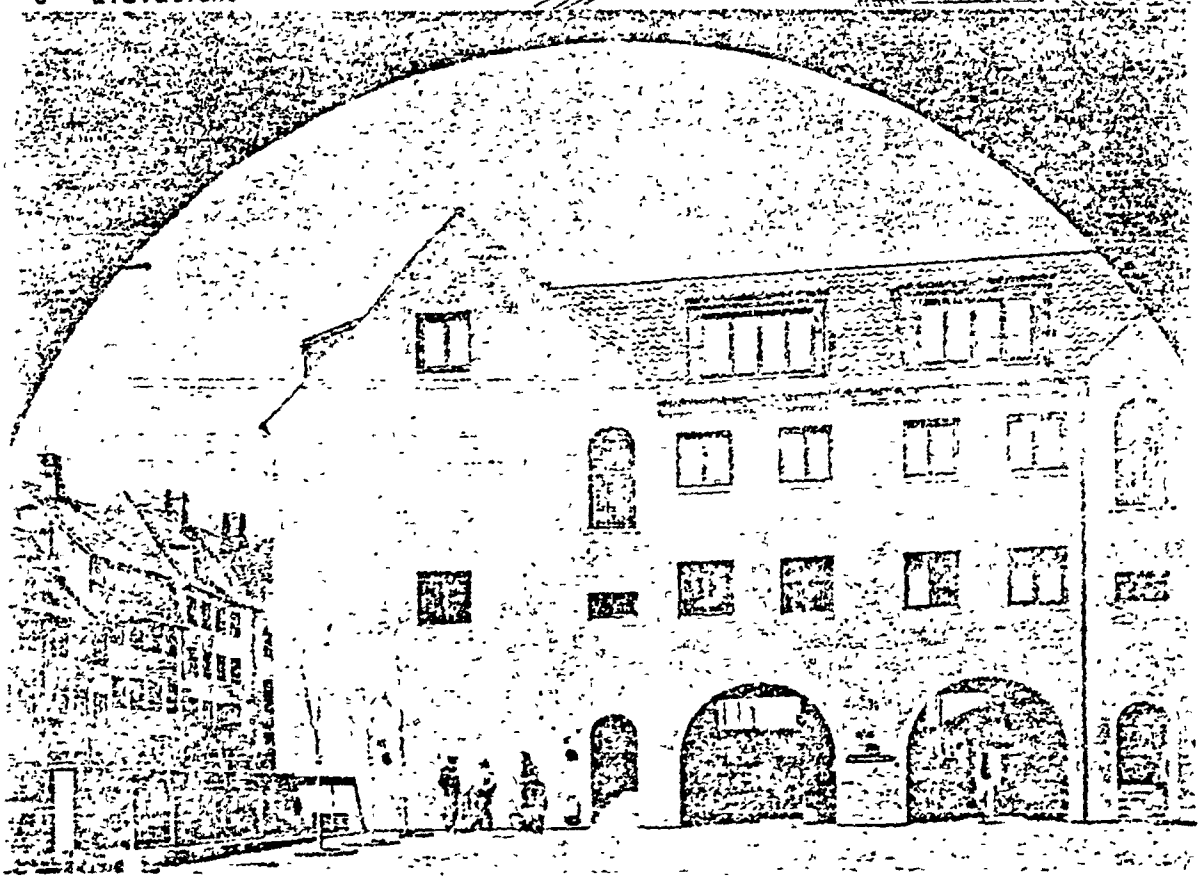
A - Isometric.

Fig. 3.17 Copenhagen.
Urban renewal project
(Baumeister, Febr.'81)

B - Typical street.

C - Elevation.





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30. Peters, ibid., pp. 49-52

31. Ibid, pp. 80, 81

32. Ibid, pp. 68, 69

33. _____, 'Stadtsanierung in Kopenhagen', Baumeister, February 1981, pp. 149-152

CHAPTER 4 - Perimeter Form and Density

Introduction

The question of density has received much attention in Central European countries where shortage of land is a most serious problem. One has to remember that population density determines the kind of housing which may be constructed. But what is the yardstick for ensuring the requirements for sound living conditions? For establishing effective systems of density control we have to consider not only density expressed as intensity of occupation, but also density in terms of volume of buildings, site coverage and height limitations as a means of securing appropriate open spaces. That is to say, according to Jensen, "achieving satisfactory living standards with the greatest possible economy for the largest number of people; only on this basis can it be expected that the maximum potential of building sites will be realized."[1]

Since one has recognized that densities experienced in the slums of the 19th century had a bad bearing on health and living conditions, these bad experiences due to congestion and uncontrolled building activity brought about the healthy reaction of a back-to-nature trend and a desire for settling the majority of the population in single-family houses with gardens. But it was also recognized that housing the majority of the population in detached dwelling was undoubtedly an economic utopia in respect of land use requirement and transportation facilities.

Then, highrise buildings set in a landscaped park-like environment were thought to be the only housing type suitable for urban areas. Because

of the wide spacing of blocks, it seemed to satisfy the need for sunlight, the desire for nature, and the requirement for efficient land use in terms of density.

Now, in Great Britain a recent trend has advocated the abandonment of the highrise building in favor of 'high density-lowrise' in combination with all achievements of modern planning. This is a very promising approach to contemporary housing design, if one realizes that "with favorable land use planning, semi-detached houses can be built at 492 persons to the hectare (200 persons per acre); and three-storey terraces under more normal circumstances can be built up to 651 persons per hectare (265 persons per acre)."[2]

Therefore, detailed and careful investigation on density as an important factor in relation to housing is a part of responsible planning of future housing developments.

4.1 Theoretical Research on Land Use Performances of Elemental Built Forms

Relying on research work and empirical statements, the widespread opinion that tall buildings are essential for efficient land use, especially for urban development, where land prices are usually high and highrise buildings are thought to be the most economic, is no longer tenable.

By comparing existing highrise to lowrise urban housing developments, Herbert McLaughlin pointed out that high-density housing must not necessarily by definition be highrise. The examples compare 10- to 18-storey housing projects with others of three to four storeys, and they

show that the "towers in the park" very seldom result "in a ratio of more than two and a half square foot of site - a density that is equivalent to about 150 units per acre (375 units per ha), and one that can be achieved in lowrise, (and, indeed, is common in many existing four- and five-storey brownstone blocks in New York City)."[3]

The following theoretical approach is in the same context. By making a comparison of five different configurations of highrise and lowrise development the attempt undertaken at the Centre for Landuse and Built Form Studies in Cambridge, under the guidance of Sir Leslie Martin[4] was to show how deceptive appearances can be. All examples had exactly the same site area. Ranging from four 96-storey towers, one 60-storey cartesian skyscraper, sixteen 24-storey point blocks to two arrangements of 8-storey pavilions and courts, each configuration composed the same amount of floor space (Fig. 4.1).

These arguments favor the application of lowrise housing developments in the inner city. Because, in the author's opinion, the perimeter building block is suitable to the urban pattern of streets and blocks, its applicability is to be examined from several points of view.

Starting from the mathematical angle, a comparative study carried out by Sir Leslie Martin and Lionel March[5] was based on the geometric implication of the Fresnel diagram (Fig. 4.2). The fact that the central square equals the first annular ring in area invites a comparison of the two contrasting ways of arranging a building on a given site (Fig. 4.3). Viewed from a multiple array, the model area resulted in reticulated courts (a) and single pavilions (b) covering 50 per cent of the site (Fig. 4.4). Being

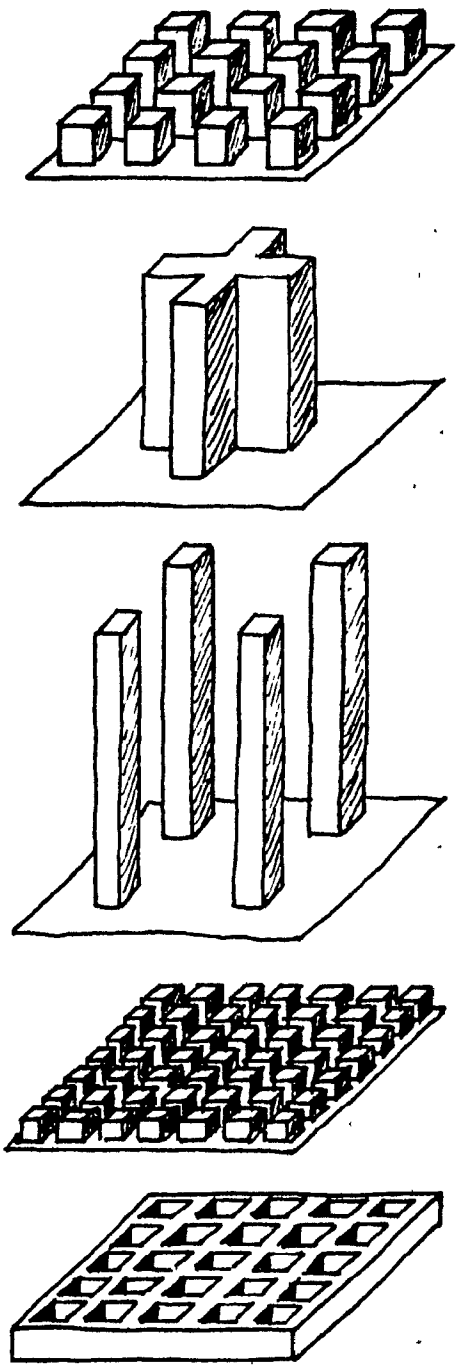


Fig. 4.1 Five configurations showing four times the area of floor space composed on the same site. (RIBA - Journal, May 1967)

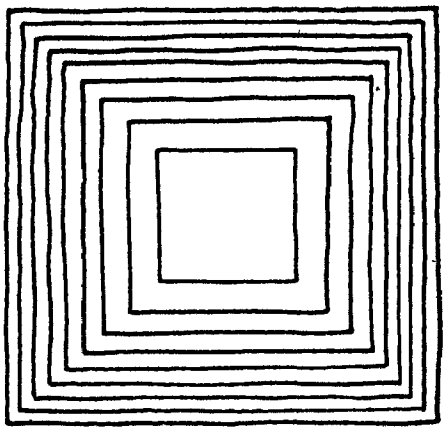


Fig. 4.2 Fresnel diagram. (Martin, March, 1972)

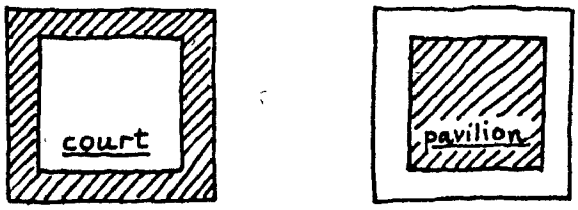


Fig. 4.3 Two contrasting ways of arranging a building on a given site.

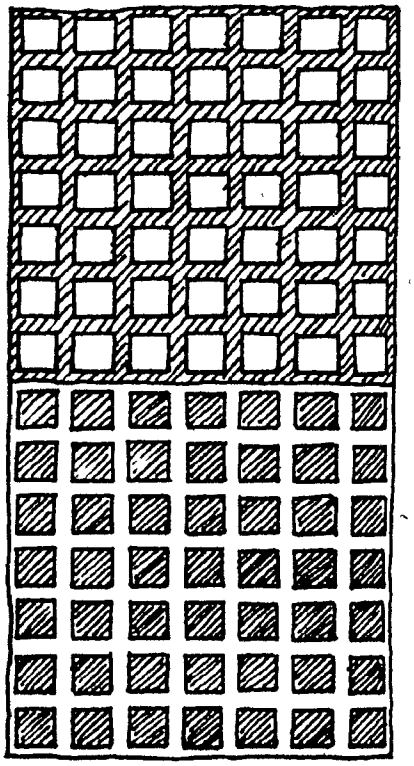


Fig. 4.4 A - array of courts and B - array of pavilions both covering 50% of the site (Martin/March, 1972

regarded somewhat closer to their usual built form, the models in this special case show that with (a) the same built space is placed on the same area of land in exactly one third of the total height of the model (b). (Fig. 4.5)

However, this is merely a theoretical attempt to make land use understandable in terms of buildings. For with realistic consideration the built form of reticulated courts would raise questions of accessibility and utilization. Every step towards more reality would mean a loss in volume or an increase in height.

Nevertheless, the courts appear more advantageous not only in regard to height but also in regard to the possibility of open space for recreation and as a source of natural light and air. Served only by streets the pavilion form does not imply the use of open space, i.e. not a built-up area.

For assessment and application of the perimeter building form one has to determine its specific characteristics in comparison to the parallel block and the pavilion development. Here the point of greatest interest is what built forms make the best use of land. In achieving comparable figures the study has to be based on the same prerequisites such as the same site area, the same built volume, and the same limits on internal depths. The attempt to express this in measurable terms presupposes a simplification of all factors. Thus the building forms being compared represent rough outlines which only allow one to interpret overall tendencies.

An investigation on the question of effective land use done by Martin and March[6] showed the land use performance of arrays of the pavilion,

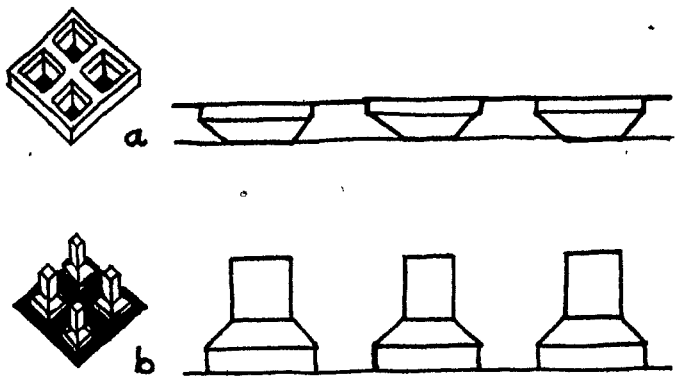


Fig. 4.5 Model (a) places the same built space on the same area of land in exactly one third of the height of the model (b). (Martin, March, 1972)

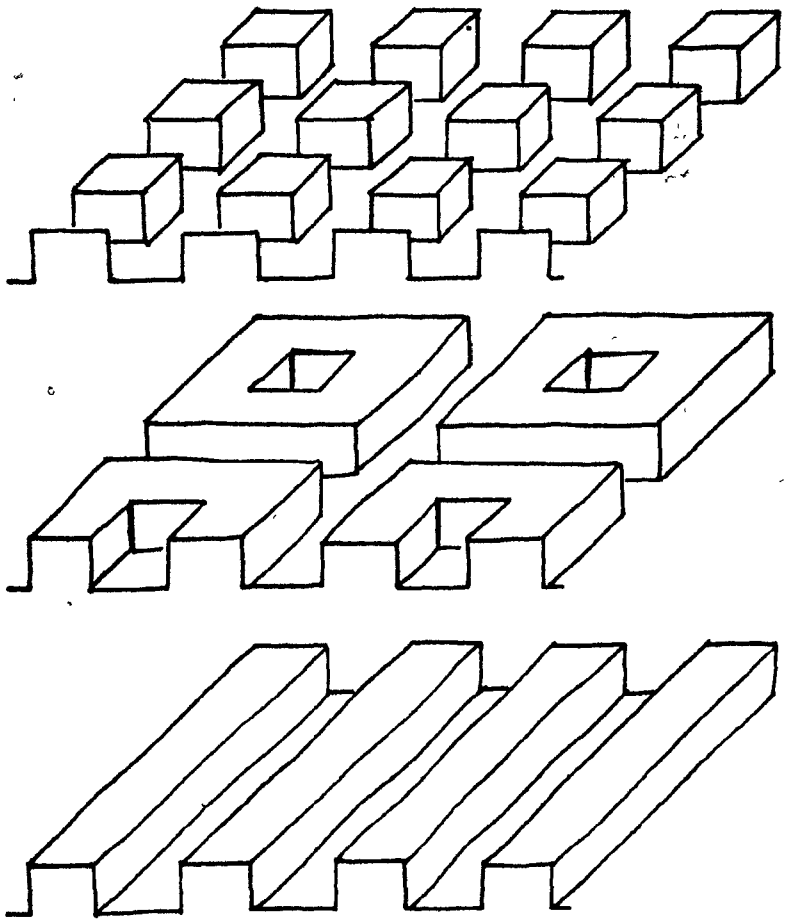


Fig. 4.6 Arrays of the pavilion, the perimeter block and the parallel block. (Martin, March, 1972)

the perimeter block and the parallel block. (Fig. 4.6) Under the given variables (obstruction angle, depth of blocks, floor space index, etc.) each of the building forms results in maximum possible land use. The following statements present interesting observations:

1 - The number of storeys required by the perimeter block is precisely one-third of those needed to maximize the floor space index for the pavilion.

2 - The perimeter block and the parallel block behave identically.

3 - The floor space index for parallel blocks is greater than that for pavilions.

4 - 75 per cent of the maximum land use is already achieved with six storeys by the perimeter block and the parallel block.[7]

Deilmann et al.[8] for example, investigated a finer range of elemental built forms which were contemplated in an attempt to overcome some of the criticism of oversimplication. The theoretical demonstration of three building forms - the pavilion (Fig. 4.7), the parallel block (Fig. 4.8) and the continuous court (Fig. 4.9) - showed the interaction of building heights, land requirement of both low- and highrise developments and the resultant amount of open space.

The examples were based on the German "Regulation on Distances between Buildings and Intervals of Spaces"[9] (Verordnung uber Gebaudeabstande und Abstandsflachen) of March 1970 that gives, according to the number of floors, the porportion of interval areas required to be located on the site. This constitutes 4.5m (14.8 feet) per floor, one-half of the interval

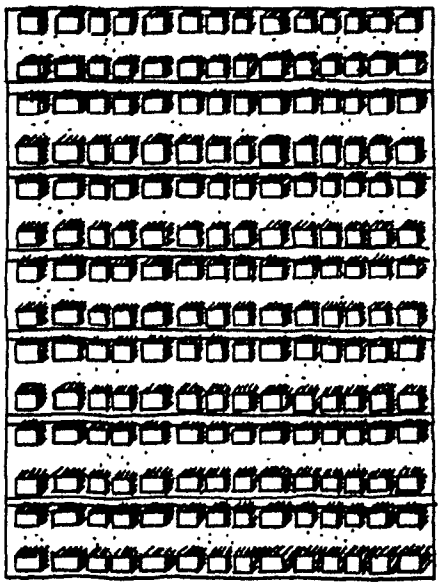
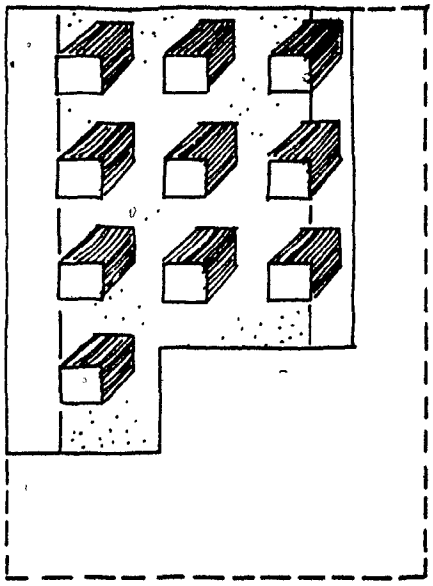
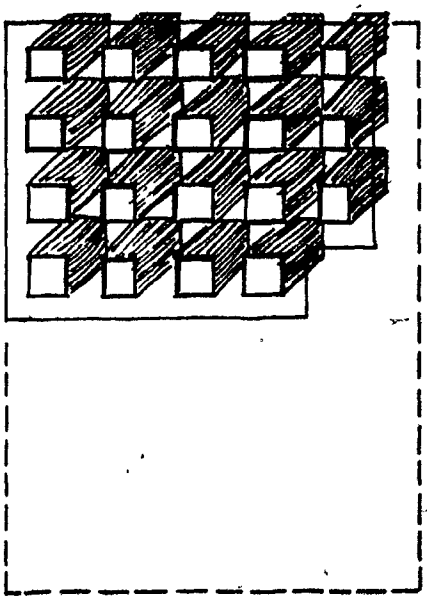


Fig. 4.7 Two-storey pavilions.



Eight-storey pavilions.



Four-storey pavilions.

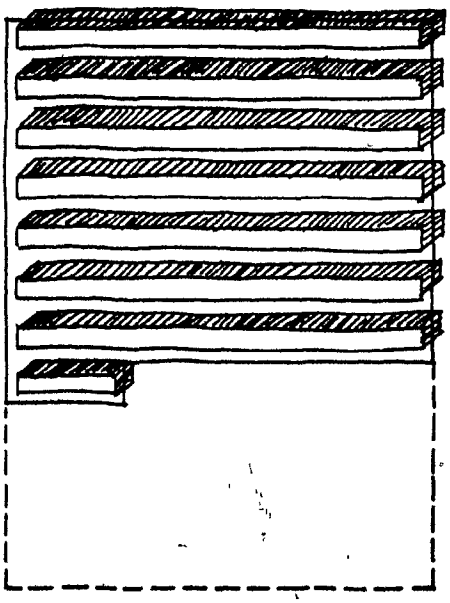
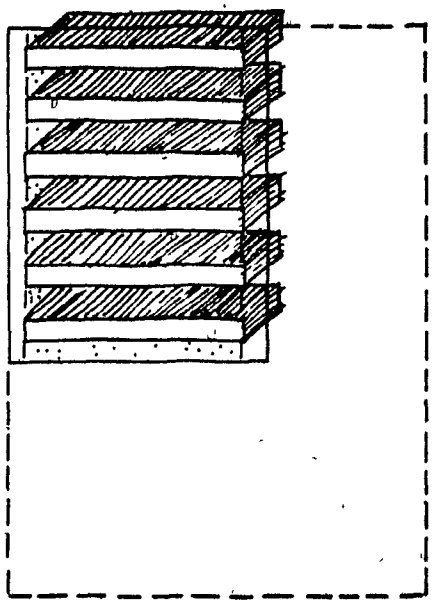
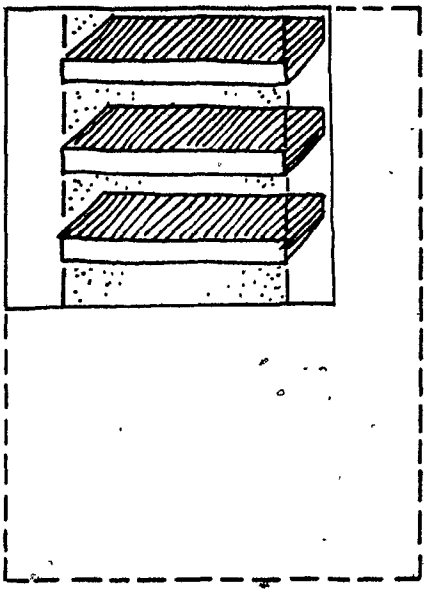


Fig. 4.8 Two-storey blocks.



Four-storey parallel blocks.



Eight-storey parallel blocks.

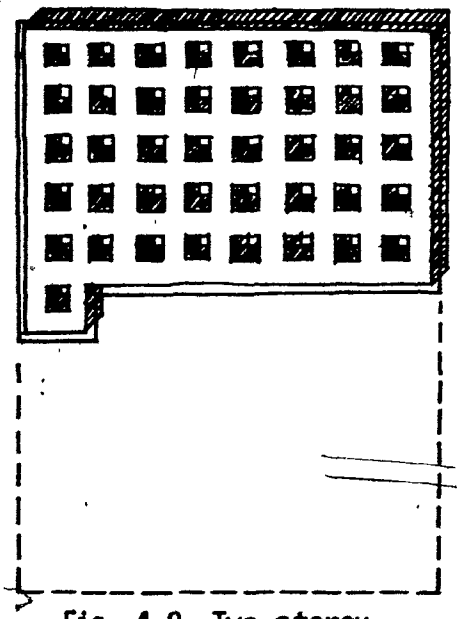
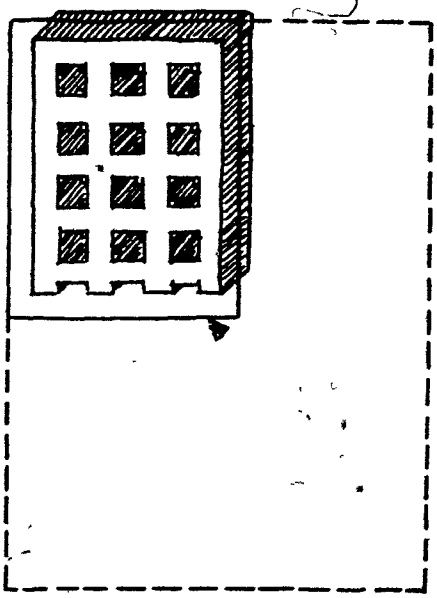
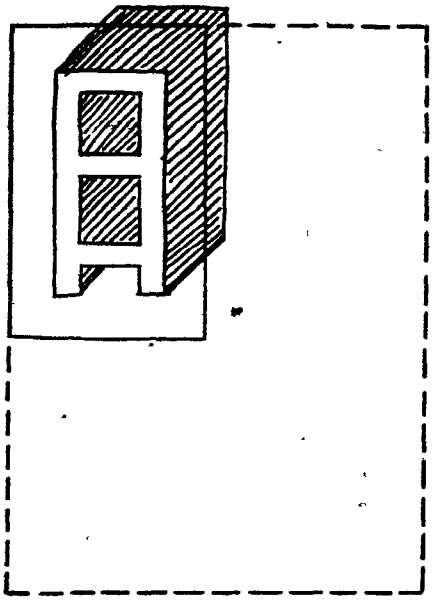


Fig. 4.9 Two-storey continuous courts.



Four-storey continuous courts.



Eight-storey continuous courts.

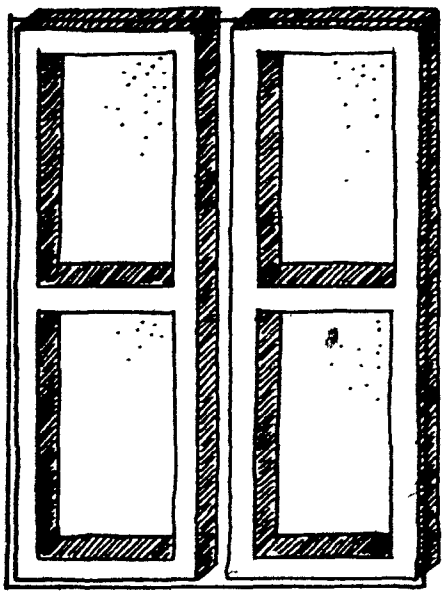
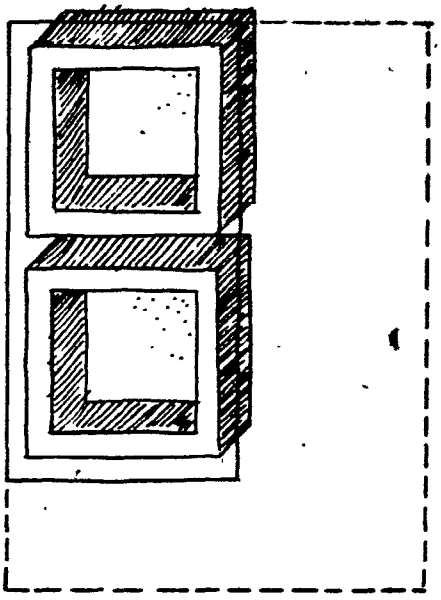


Fig. 4.10 Two-storey enlarged perimeter block.



Four-storey enlarged perimeter block.

area with buildings of up to three floors, two-thirds from four to seven floors, and three-quarters with eight and more floors.

To allow for a comparison in regard to the land requirement of the building forms in question which meet the same prerequisites, all examples also show the land use of the arrangement of 2-storey pavilions (single-family houses) marked by the broken line.

This research resulted in interesting theories which are equal to those of Martin and March. In particular, the highest densities can be achieved with the continuous courts. This built form is the only one that always increases in density with an increasing number of floors. The densities decrease in the sequence of parallel blocks and pavilions. The foregoing also means that the smallest number of floors is possible with the continuous courts, followed by the parallel blocks and the pavilion.[10]

The land use of the continuous courts is the most efficient, followed again by the parallel blocks and the pavilions. The 8-storey courts produce theoretically the minimum value for land use, being only 29% of that of the two-storey pavilion development.[11] But according to the already mentioned disadvantages of the continuous courts - lack of access, bad illumination of areas without exposure walls and low degree of privacy (windows at the corners, etc.) - the values achieved however are not applicable in reality.

Therefore, the maximum possible density should not be considered for development. Instead, perimeter blocks of ample spaciousness and amenities can be designed in an attempt to build a decent environment still at relatively high densities (Fig. 4.10).

Even on the assumption that underground parking is provided in large-scale housing estates, the amount of open space per inhabitant is unequivocally small among all arrangements of continuous courts. However. it ranges from 8 sq.m. (86 sq.ft.) per inhabitant in 3-storey parallel blocks to 36 sq.m. (387.5 sq.ft.) per inhabitant in 2-storey pavilions. The overall land use results are given in Fig. 4.11.

Finally, it should be noted that the work of Martin and March involved in the 'Pollards Hill' housing estate (described in chapter 3) substantiated the original hypothesis that perimeter planning is suitable to the urban pattern. This project revealed that high densities can be achieved with a low distribution of dwelling space.[12] Furthermore, the results worked out in those studies mentioned above appear favorable for housing requirements.

4.2 Determination of the Dimensions of Perimeter Blocks in Relation to Orientation and Density

According to the land requirement of housing and the accommodation of workshops, the accumulation of small plots formed the basis of the usual block sizes in the pre-industrial town. The blocks usually measured about 60 by 80m (196 by 262 feet)[13] in area. The layout in a specific orientation in regard to weather or sun is not recognizable.

On the contrary, the block dimensions were not influenced by any kind of utilization during the 19th century. Rather the layout of streets can be considered the initiator of the block dimensions. Because of the increasing traffic, wide street systems were planned with an ornamental

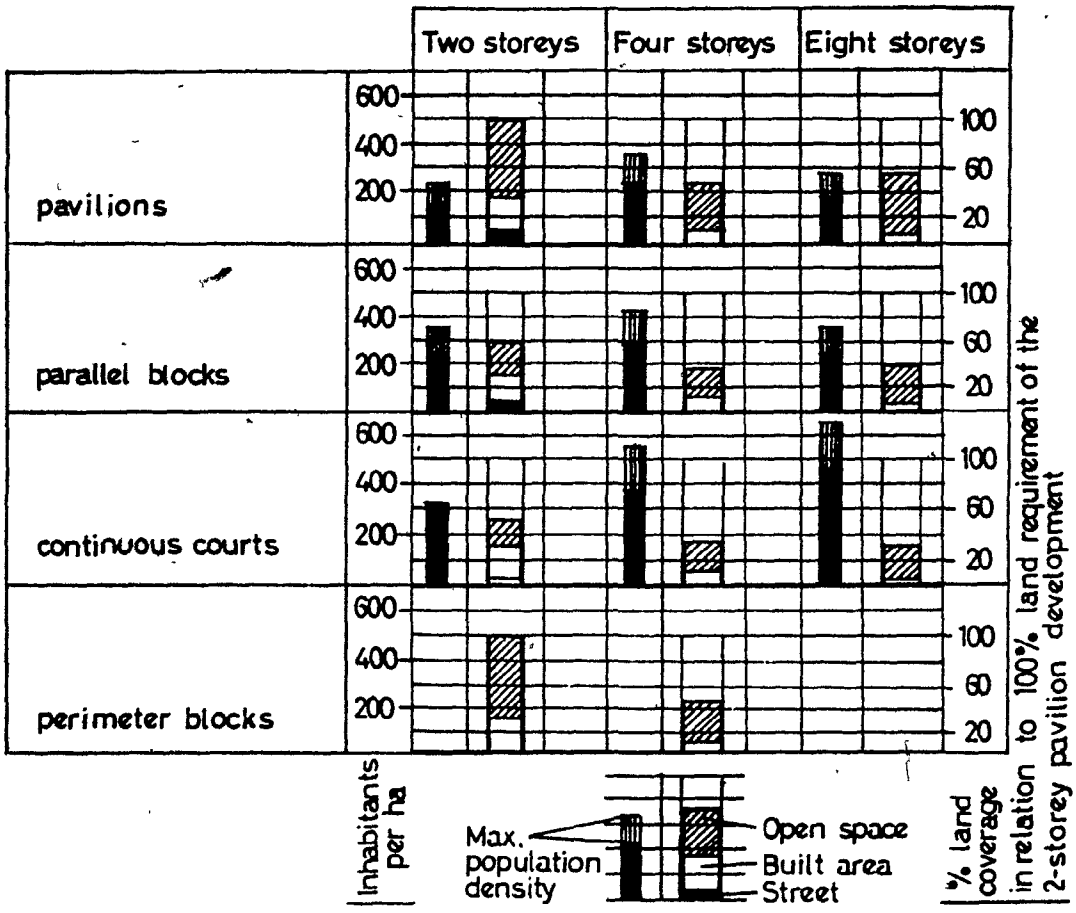


Fig. 4.11 Overall land use results.
(Fig. 4.7 - 4.11 Deilmann et al., 1977)

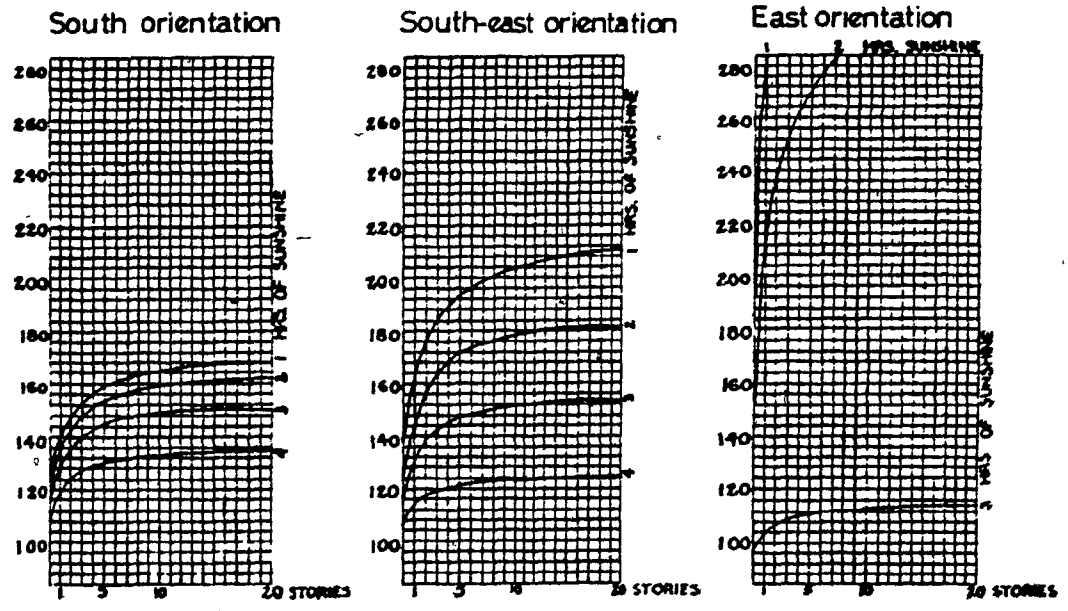


Fig. 4.12 Orientation and duration of sun exposure in relation to density. (Hilberseimer, 1944)

design, a feature of that period. The remainder between intersecting streets was then considered as blocks.

Geometrical forms of blocks based on the triangle, the trapezium and the hexagon, of which the applicability to urban development is discussed by Stubben[14], appear most frequently at crossing diagonal streets with rectilinear running streets. These types of block forms were typical of random development for their specific layout had been primarily very seldom seen.

According to Stubben, the rectangular blocks are more useful and advantageous in regard to subdivision into smaller building plots compared to the quadrangular block. Stubben, however, warns that the uniform application of street blocks based on a gridiron street pattern appears as mere monotony and that the blocks might be hardly distinguishable from each other.[15] But he is not concerned with the aspects of appropriate orientation as a demand for human housing.

Regarding their size, too large blocks of up to 200m by 400m (656 by 1,312 feet) which for instance appeared in Berlin in the late 19th century[16] should be prevented by adequate building regulations. (For example the blocks in New York measure about 61m by 183 to 274m (200 feet by 600 to 900 feet).[17]) On the other hand, too small blocks are not efficient in relation to the amount of adjoining street area and other services. Furthermore, they are not suitable for establishing spacious interior zones within enclosed surroundings.

In Stubben's opinion, the appropriate dimensions of blocks are according to their function as follows[18] - apartment houses and offices -

60m (196.8 feet) in depth and 120m (393.7 feet) in length; workers' dwellings - 35m (114.8 feet) deep and 140m (459.3 feet) long. As Stubben mentions, the ratio of depth to length is usually 1: 2, but in the case of the workers' dwellings it is assumed to be 1: 4.[19] However, these figures are rough outlines for the desirable proportions of blocks which admittedly will change according to local conditions.

The question still remains as to the appropriate design of perimeter blocks which has to meet all demands for sufficient orientation, exposure to sun, ventilation, sanitation, privacy as well as a sense of community. In the 'Handbuch der Architektur' (manual of architecture) Stubben mentions only that due to the obstruction of air and light, limitations on building heights are thought to improve the housing conditions; and for that purpose a certain portion of the site has also to remain vacant.[20]

In 'Wasmuth's Lexikon der Baukunst' (encyclopaedia) we find more detailed information on the relationship of the depth of blocks to the number of floors, depending on the floor space index and the requirements of sanitation. That is to say, all dwelling units have to have certain hours of exposure to the sun.

In Heiligenthal's opinion (1929), an interval between buildings facing the street and the enclosed open space respectively, is absolutely necessary for sufficient exposure to the sun at latitude 50°. This interval amounts to one and a half times the height of the building in a north-south location of the streets and three times the height in an east-west location. Moreover, according to Heiligenthal, in a north-south location of

streets the greatest number of people per hectare can be accommodated without any impairment of sanitation, namely 420 per hectare with a 4-storey development and a 50 percent site coverage, when a sun exposure on only two hours is assumed as the minimum requirement on December 21.[21]

On the basis of an investigation of room insolation in a parallel block scheme, Hilberseimer stated in 1935 that the east and west orientation of rooms is the least advantageous; the south most advantageous and the southeast and southwest reasonably satisfactory.[22] Obviously, this has an important bearing on the organization of the unit plans in modern perimeter block development, which requires a sort of flexibility in planning.

Hilberseimer also showed that orientation and duration of sun exposure must be considered together in relation to density. On the basis of a diagram (Fig. 4.12) it is evident that where the period of sunshine is four hours on December 21, diagonal orientation allows a lower density than southern orientation, but where the period is one, two or three hours, the opposite situation occurs: the southern orientation allows a lower density than the diagonal. Three hours of sunshine is the maximum period with the eastern orientation, and therefore the density permissible is much less than the other.[23]

As we can also see from the diagram, permissible population density also rises with southern exposure as the number of storeys increases. The ratio of this increase is about 20 percent for dwellings with one to five storeys. However, increasing the number of storeys from five to twenty means only an increase in density of about four percent.[24] These are interesting results, because they also support lowrise and medium-rise

developments, respectively.

Attempts to calculate theoretically the dimensions of blocks, namely the depth and length as a function of developing costs, economical internal depth of apartment houses, building heights, etc., produced the following depths of perimeter block development without front gardens[25]:

40 to 45m (131 to 148 feet) with one-storey development,

55 to 60m (180 to 197 feet) with two-storey development,

65 to 70m (213 to 230 feet) with three-storey development,

75 to 80m (246 to 262 feet) with four-storey development.

Financial considerations, however, constrained the prevailing average depth of 60m (197 feet) even with a four-storey development. The length of blocks with regard to the housing conditions is of less importance than the depth. The length is foremost a result of calculating a favorable ratio of street area to site area. In Hoepfner's opinion, 300 to 400m (934 to 1,312 feet) in length are to be considered usual[26], which is quite long.

Bearing in mind good insolation principles, Hilberseimer showed that the type of design chosen also has a bearing on population density.[27] (Fig. 4.13) In other words, the distribution of houses considered to ensure the essential sanitation requirements thus determines the dimensions of a block. In the same context, Hilberseimer also pointed out that one has to consider the latitude in relation to population density.[28] (Fig. 4.14)

An approach depending on the fundamental conditions of the visual perception of human beings is another tool for the assessment of the dimensions of perimeter blocks. This visual perception is subject to optical laws. On the basis of the spatial angle of 27° above and 6° below

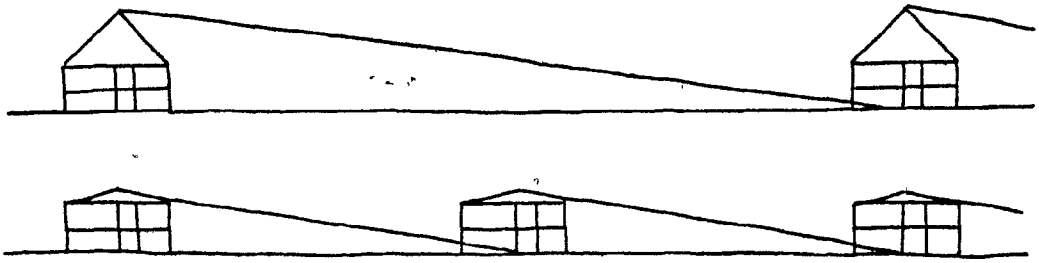


Fig. 4.13 The influence of the type of roof on density.

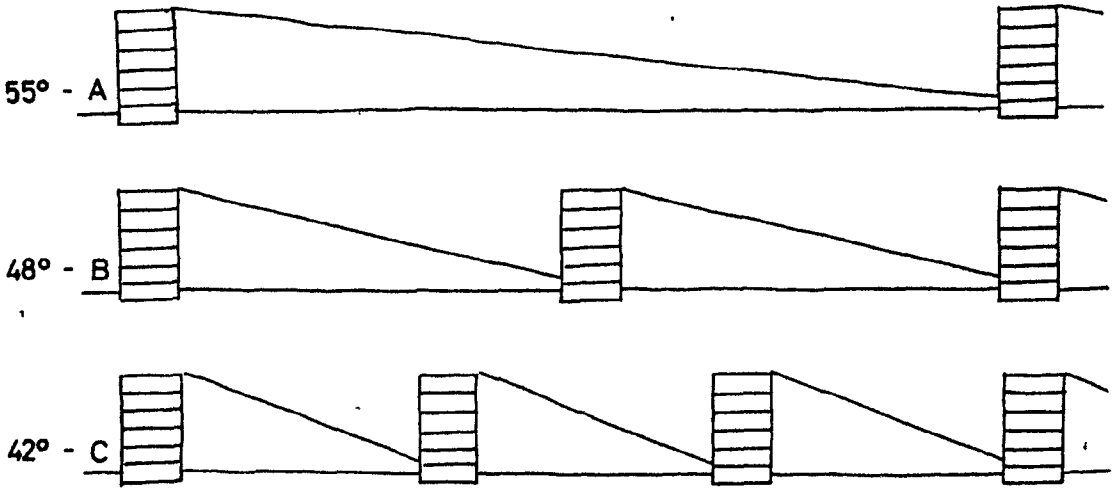


Fig. 4.14 The relation between latitude and population density. (Fig. 4.13, 4.14 Hilberseimer, 1944)

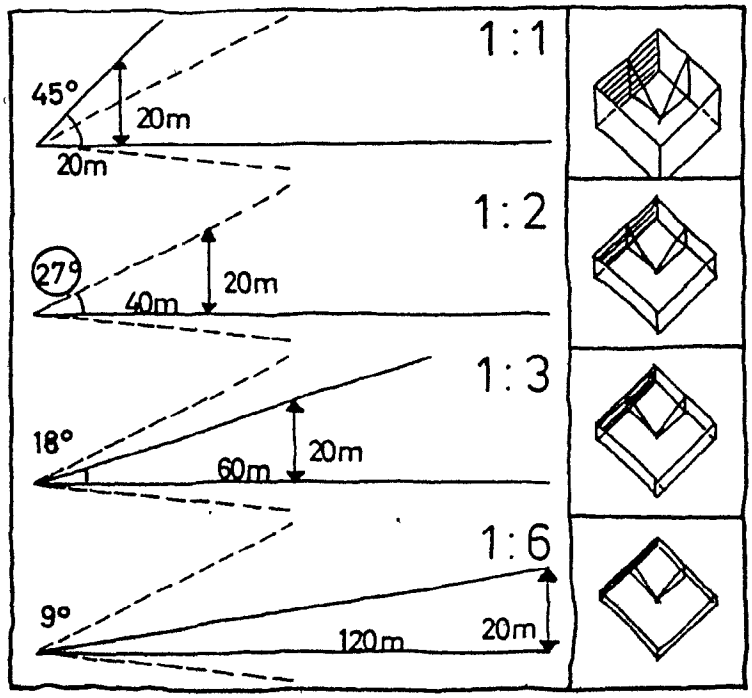


Fig. 4.15 Optical laws after Maertens. (Peters, 1977)

the horizon, which spans the height of the human visual field, the laws of "aesthetic seeing" (Gesetze des "aesthetischen Sehens") have been developed by H. Maertens. The following observations were derived from Maertens' optical laws.[29] (Fig. 4.15)

With the help of this diagram, proportions of the perimeter blocks can be assessed from the ratio of the building height to the depth or length of the enclosed interior zone. The impressions of the space enclosure are as follows:

- ratio of 1: 1 -

Just one-half of the total height of the wall is recognizable by the observer. That is to say, the space can be considered as a forecourt, but not as a PLACE.

- ratio of 1: 2 -

The height of the wall can be completely overlooked by the observer. The space is enclosing, but too narrow to be considered as a place.

- ratio of 1: 3 -

The observer sees a small section of sky beyond the building. The space is no longer entirely enclosing. These conditions are thus most favorable for a place.

- ratio of 1: 6 -

The ratio of the visible height of the wall and the section of the sky is reversed. The place is spacious. If the ratio is furthermore reduced, the effect of the place is going to be lost.

The visual faculty of the human eye is of great importance. Typical visual distances can be derived as follows[30] -

- perceiving of facial expressions up to 10m (33 feet)
- perceiving of facial features up to 25m (82 feet)
- perceiving of body movements up to 150m (492 feet)
- perceiving of human figures up to 1,200m (3,937 feet).

Here the distance of 25m (82 feet) represents to a certain extent a limiting value, since the perceiving of individual persons and the distinction of details of the surroundings is possible within this distance. Combining this visual distance with the visual angle of 27° results in a height limit of the primary visual space of about 10 to 12m (33 to 39 feet).

Man's sense of space and distance in relation to other people is described by Edward T. Hall in his book "The Hidden Dimension".[31] On the basis of observations and interviews with North American adults, Hall found four principal categories of relationships - intimate, personal, social, and public - and the activities and spaces associated with them. Each of the four distance zones has a close and a far phase. The measured distances vary somewhat with differences in personality and environmental factors.

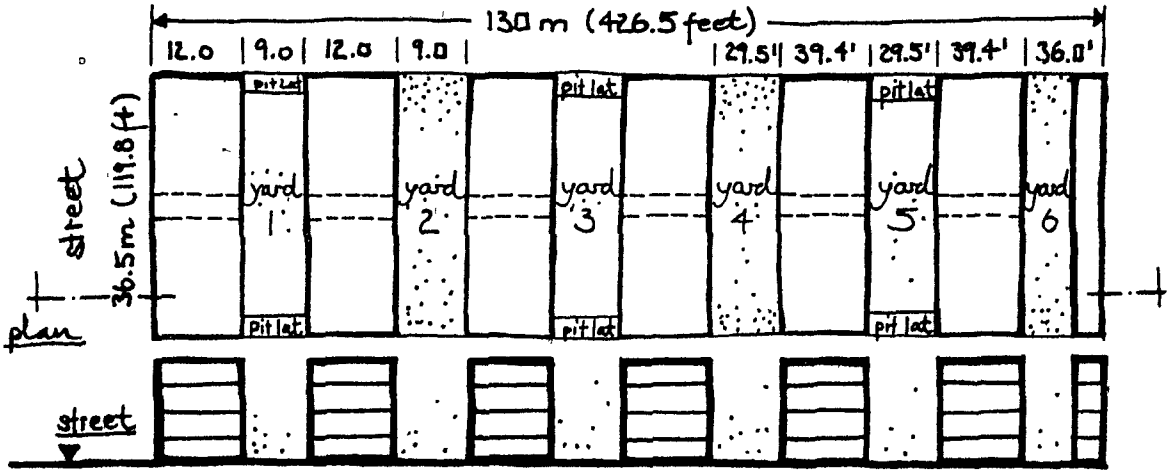
	close phase	far phase
Intimate zone		15-45cm (0.5-1.5 feet)
Personal zone	45-75cm (1.5-2.5 feet)	75-120cm(2.5-4 feet)
Social zone	1.20-2.10m (4-6.9 feet)	2.10-3.60m(6.9-11.8 feet)
Public zone	3.60-7.50m (11.8-24.6 ft)	7.50 or more (24.6ft or more)

Ruled by this distance-sensing system, human behavior patterns which vary from culture to culture help the architect to understand people's spatial needs and to learn how to create congenial environments.

4.3 Density and Site Analysis of Six Selected Built Developments

① Berlin 1874 - 'Meyershof' tenement, Ackerstrasse 132/133 (example of the solid block development, Stubben 1890)

scale 1: 1000



- building height - 4 storeys (storey height ~ 3.50m/11'-6")

- population - 2,000 were supposed to live in 300 units of 35 sq.m. (376.7 sq.ft) in area

60% - land coverage → 2,865.25 m^2 (30,842.3 sq.ft.)

40% - open space → 1,879.75 m^2 (20,234.1 sq.ft.)

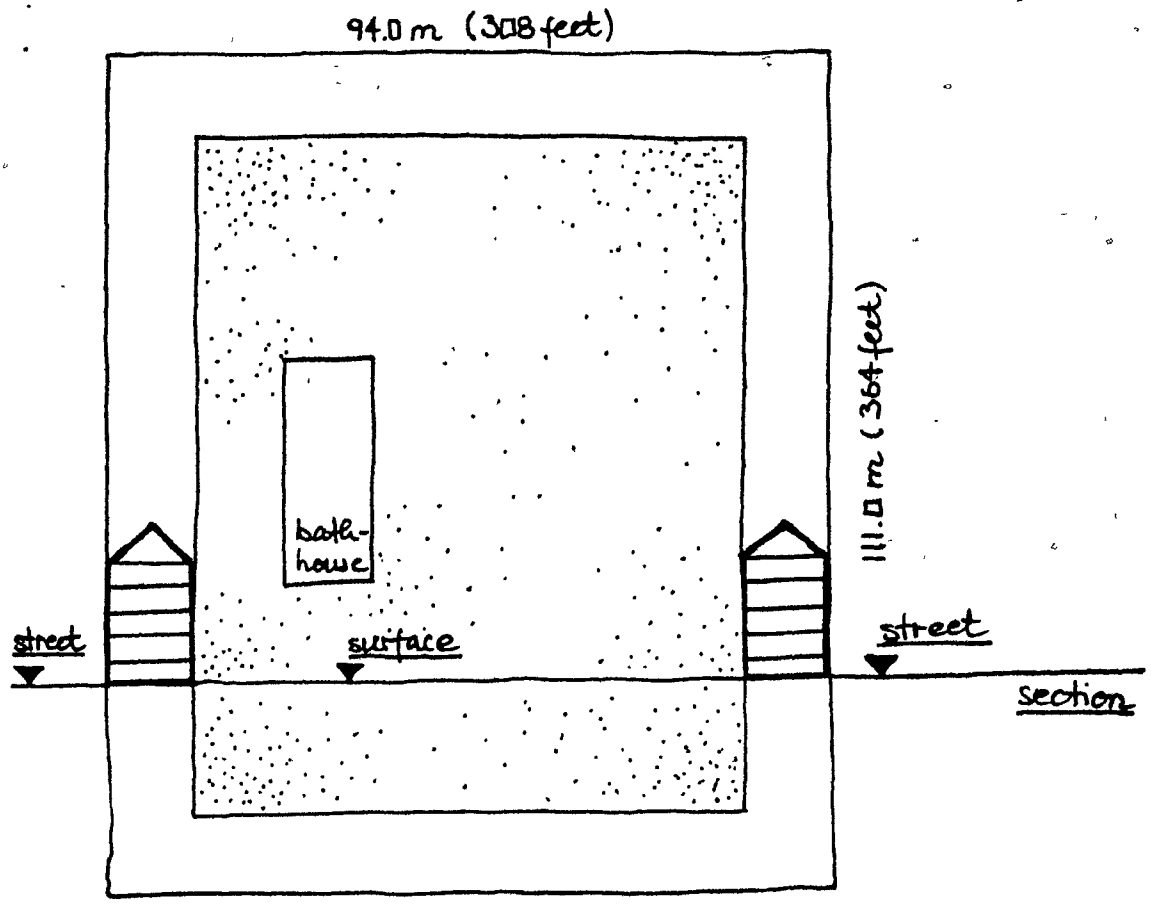
4,745.0 m^2 (51,076.4 sq.ft.)

0.9 m^2 (9.7 sq.ft.) open space per inhabitant - but it is even less, since pit latrines located in the courts reduce the amount of open space available.

ratio of 1: 0.75 → the impression of the spatial enclosure corresponds to that of 1: 1, which means that just one-half of the total height of the wall is recognizable by the observer. The space can be considered as a forecourt only. In respect of orientation at Latitude 52°30' the example chosen represents a serious impairment of social sanitation.

② Berlin 1898-1904 - 'Weisbachgruppe' project.
(Architect A. Messel)

scale 1: 1000



- building height - 5 storeys (storey height ~ 3.20m (10'-6")

- population - 1,480 persons

54% - land coverage → 5,622 m^2 (60,516.7 sq.ft.)

46% - open space → 4,812 m^2 (51,797.6 sq.ft.)

10,434 m^2 (112,314.3 sq.ft.)

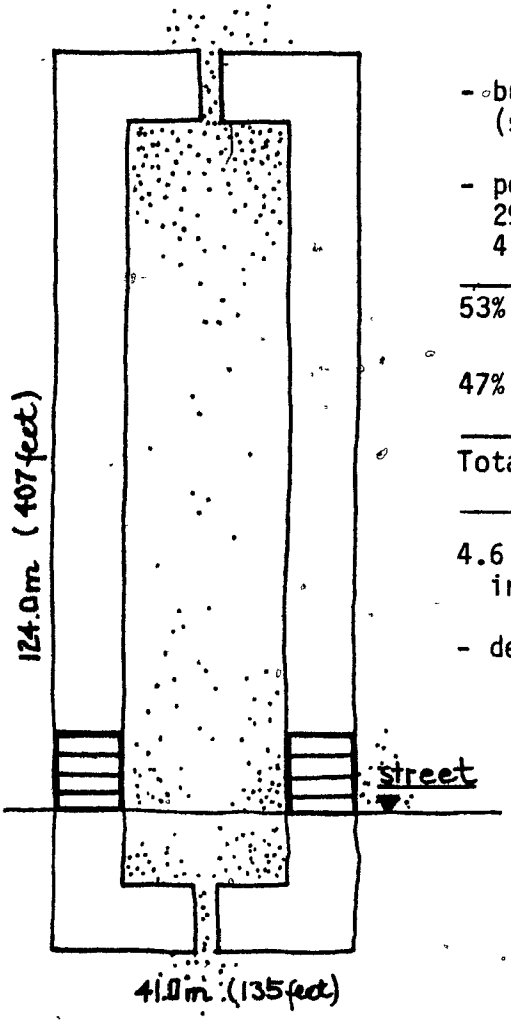
3.25 m^2 (35 sq.ft.) open space per inhabitant

- density → 1,418 persons/ha (579 per acre)

ratio of 1: 4.8 → this result is in between the ratios 1: 3 and 1: 6, which means the space is too large to be considered favorable for a place, but not so large that the effect of space is going to be lost.

③ Rotterdam 1920 - 1923 - Tusschendijken (Architect Oud)
(Grinberg, 1977)

scale 1: 1000



section

- building height - 4 storeys
  (storey height - 2.75m, 9 ft)

- population estimated
  29 units @ 4 floors → 116 units,
  4.5 persons/unit → 522 persons

53% - land coverage →	2,699.3 m² (29,056.0 sq.ft.)
47% - open space →	2,397.1 m² (25,803.0 sq.ft.)
Total :	5,096.4 m² (54,859.0 sq.ft.)

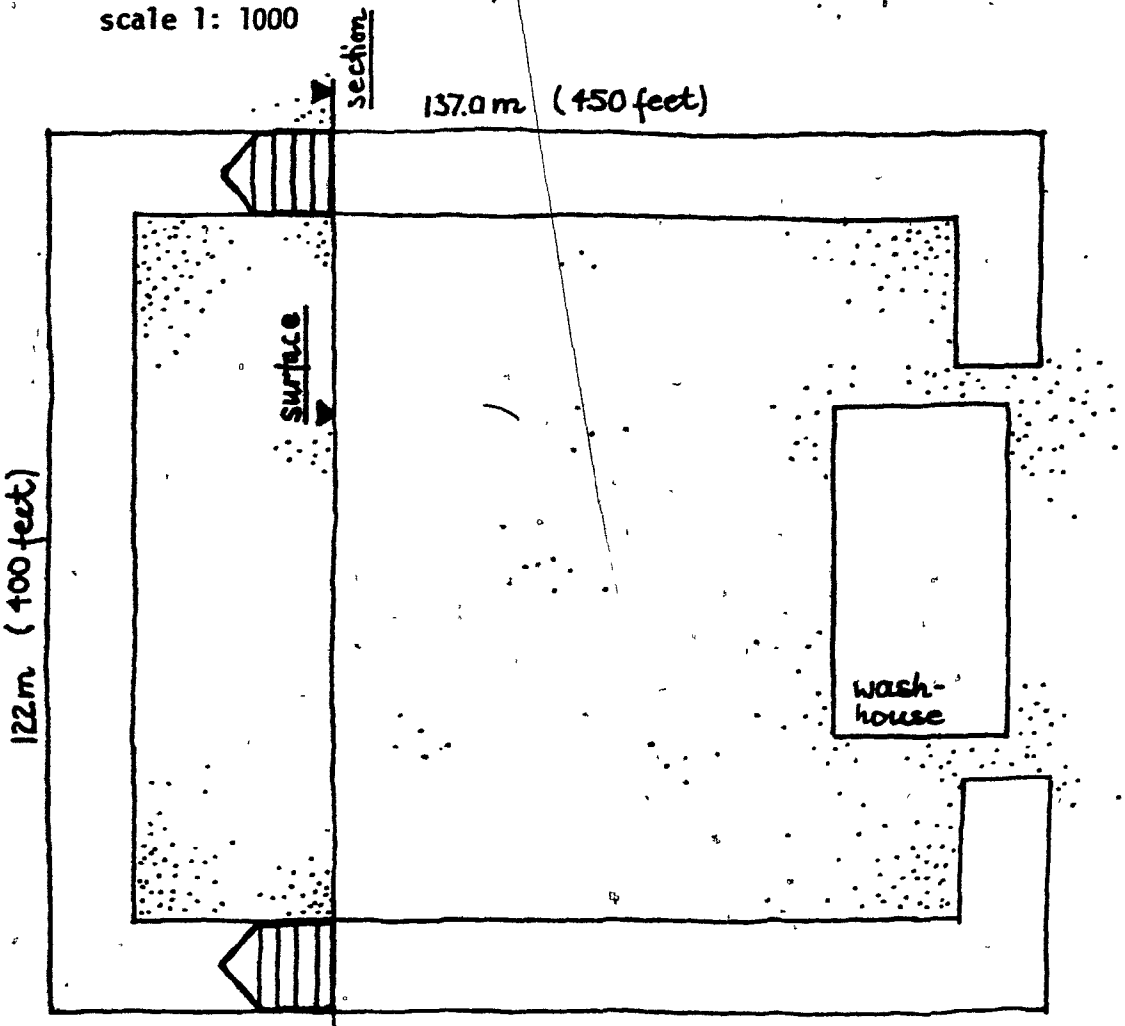
4.6 m² (49.5 sq.ft.) open space per inhabitant

- density → 1,024 persons/ha
  (418 per acre)

ratio of 1: 2 → the height of the wall can be completely overlooked by the observer. The space is enclosing. The width of the interior zone is still below the visual distance of 25m (82 feet) where the perceiving of facial features is possible. This means that all people live in close visual contact.

④ Vienna 1927-30 - 'Washingtonhof' Estate
(Denby, 1938)
(Illustration shows one selected court)

scale 1: 1000



- building height - 4 storeys (storey height ~ 2.75m, 9'-10")

- population estimated
  1,085 flats @ 4.5 persons per unit (average)
  → 4,882.5 inhabitants

④ Vienna 1927-30 - Washingtonhof Estate
(continued)

38% - land coverage
(about 8 acres of building) → 32,552m²

62% - open space
(about 21 acres of garden) → 85,449m²

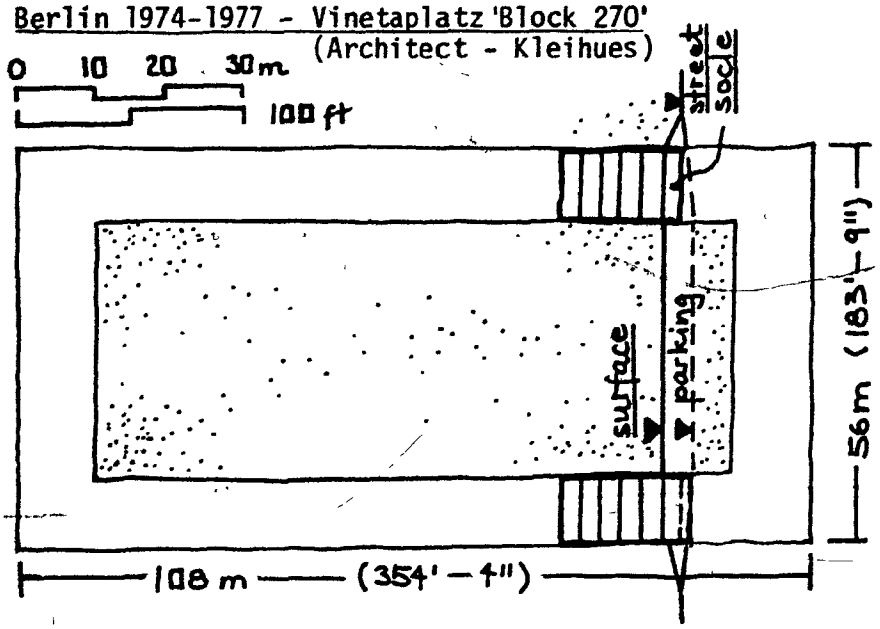
Total site (about 29 acres) 118,001m²

6.7 m² (72 sq.ft.) open space per inhabitant

- density → 413.7 persons/ha (169 per acre)

ratio of 1: 4.4 → (for one selected internal court)
The impression of space enclosure is similar to that of the 'Weisbachgruppe' project.

⑤ Berlin 1974-1977 - Vinetaplatz 'Block 270'
(Architect - Kleihues)



- building height - 5 storeys - 16.5m (54'-0")
  (storey height : 2.80m, socle : 2.00m (6'-6")
  parapet : 0.5m (1'-8")

- population estimated
  126 units @ 2.5 persons per units
  315 inhabitants

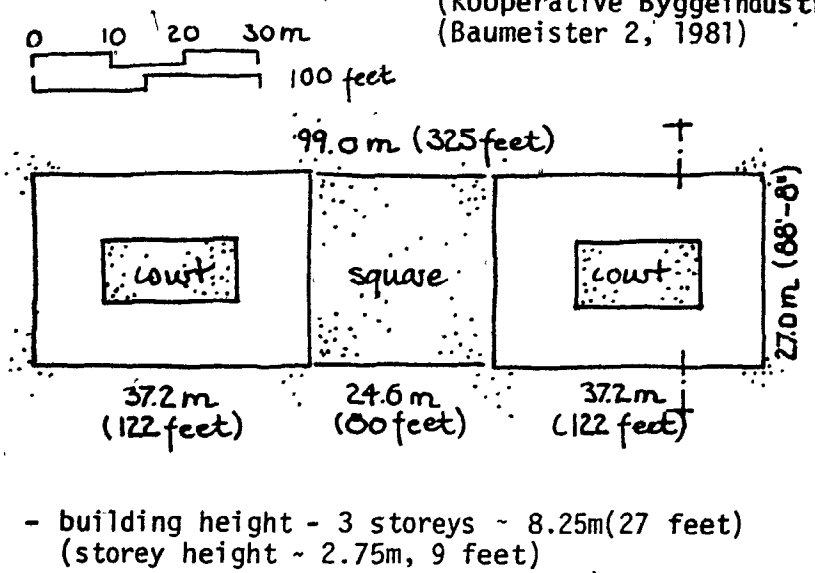
48% - land coverage	2,880 m^2	(31,001.0 sq.ft.)
52% - open space	3,168 m^2	(34,101.0 sq.ft.)
	6,048 m^2	65,102.0 sq.ft.)

10.0m^2 (108 sq.ft.) open space per inhabitant

- density → 520 persons/ha (212 per acre)

ratio of 1: 2.5 → this result is inbetween the ratios of 1: 2 and 1: 3, which means that the space is almost favorable for a place. Beyond the building a small section of the sky becomes visible.

⑥ Copenhagen (late 1970s) - Urban Renewal
(Kooperative Byggeindustri)
(Baumeister 2, 1981)



- building height - 3 storeys ~ 8.25m(27 feet)
  (storey height ~ 2.75m, 9 feet)

- population estimated
  64 units @ 2.5 persons per unit → 160 persons

62% - land coverage	1,669 m^2	(17,965.5 sq.ft.)
38% - open space	1,004 m^2	(10,807.3 sq.ft.)
	2,673 m^2	28,772.8 sq.ft.)

6.3m^2 (68 sq.ft.) open space per inhabitant

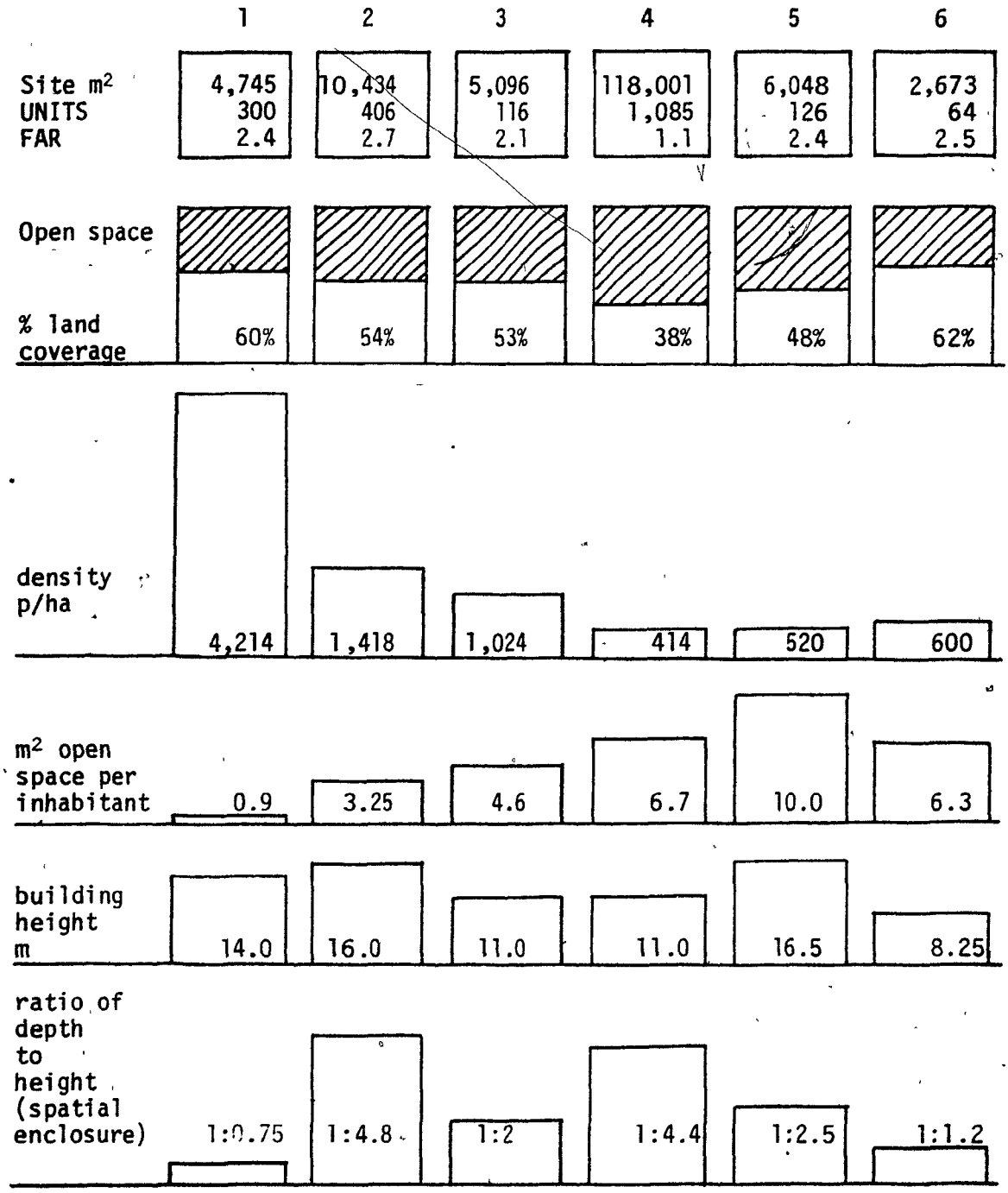
- density → 600 persons/ha (245 per acre)

ratio of 1: 1.2 → (interior court)
Just one-half of the total height of the wall is recognizable by the observer.

ratio of 1: 3 →(square)
The observer sees a small section of sky beyond the building. The space is no longer entirely enclosing. These conditions are thus most favorable for a place.

Density and Site Analysis of Six Selected Built Developments

Table of Results



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CHAPTER 5 - Design Considerations of the Elements of Perimeter Planning

5.1 The Perimeter Building and its Corresponding Open Spaces such as the Street and the Enclosed Interior Zone

The perimeter block development has certain properties which have clear implications with regard to the disposition of traffic, housing and open space. The typical layouts of perimeter buildings feature housing along the periphery of sites defined by surrounding streets and spacious domains of enclosure. Thus, this type of planning is characterized by the distinct delineation of both the street and the private realm within the enclosed surrounding (Fig. 5.1).

In doing so, the interaction of two essential activities of man - circulation and outdoor living are seen to be advantageous in the proximity of housing in the sense of creating urbanity. The reaffirmation of the street as urban space[1,2] in recent town-planning proposals is distinctive of the desire for revitalizing existing urban patterns. The small, crowded and dense spaces of streets are considered to enhance urban life, social contacts and activities of many kinds.

Moreover, the perimeter design is a way to provide good surveillance potential. "Evidently, the orientation of a building to the street and the open design of its lobby," as Oscar Newman points out, "have a direct effect on the attractiveness it possesses to criminal elements. A project with buildings facing and close to a street, with lobbies visible to passersby, is decidedly less likely to experience as much crime as one where these factors do not interplay."[3]

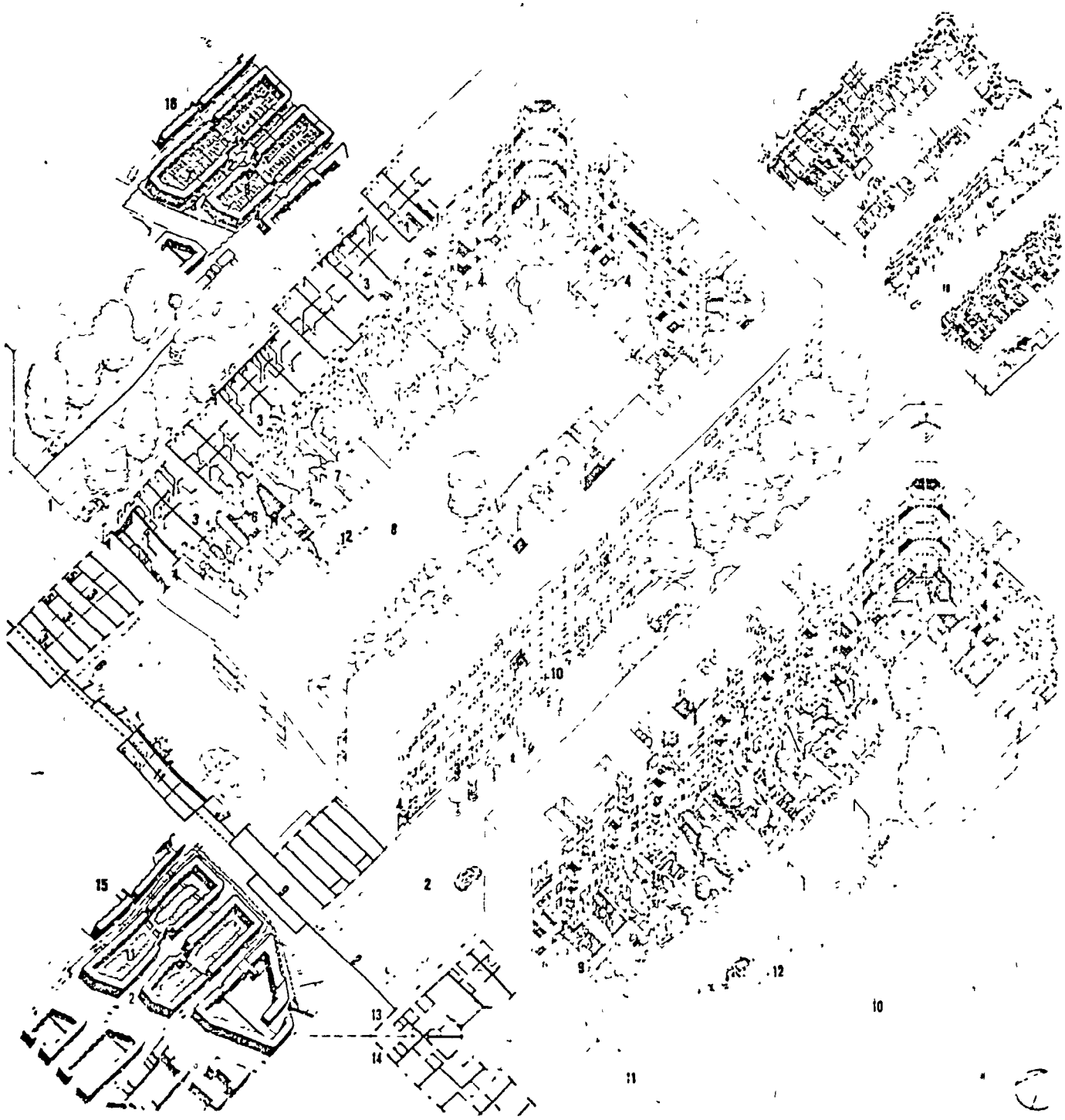

Fig. 5.1 The perimeter block and its corresponding open spaces such as the street and the enclosed interior zone. (Peters, 1977)

In contemporary perimeter planning schemes, the street, as one of the primary functions of the town, communicates the new aspect of spatial ambiguity[4] in planning. By realizing the original significance of the term 'street', these schemes are trying to restrict the movement of cars and encourage instead the movement of pedestrians. This has been suggested for residential streets which give access to parking garages and to the dwellings for delivery or for emergency.

Shifting through-traffic to the perimeter of housing districts helps to confine traffic to local transportation of people and goods. Then, the central area of some streets can be completely closed to traffic and can be turned into play and communal areas. The 'Rollberge' urban renewal project, the 'Berlin-Tiergarten' and the 'Berlin-Schoneberg' housing schemes are examples of this idea.

The perimeter block of housing enables the application of various building types. There are two categories worth mentioning such as 'houses' with a private entrance and private internal vertical circulation, which, for example, was favored in the 'Pollards Hill' housing estate. The second category includes all apartment dwellings with multiple vertical access ('Block 270' in Berlin), access galleries serving maisonette units (urban renewal in Copenhagen) and double-loaded split-level systems ('Marquess Road', Islington, London).

The 'Rollberge' urban renewal project in Berlin is an example that fetures an ample mix of dwelling units and different modes of access. For example, the interlocking system of two-level units produces very compact buildings with few corridors.[5] Furthermore, this type includes the

potential for double aspect open-ended plans allowing sufficient light and air to come in and increasing the livability of the dwelling unit. Sam Davis stresses the advantage of this unit type by saying: "The community fabric of the site is also enhanced because a larger range of spaces are within visual, and often aural contact of the dwelling."[6]

However, lowrise or medium-rise housing at high densities is often seen to be disadvantageous in relation to the impairment of privacy by over-hearing and freedom from over-looking. Nevertheless, the importance that residents can view bordering spaces is emphasized by Oscar Newman who says: "The positioning of front entrances along the street provides them with continuous natural supervision by passersby; the residents within their houses, in turn, provide these passersby with protective surveillance."[7]

Evidently, the type of access is one tool to underscore particular intentions in planning. Whether at the front or at the rear, the location of the entrance has different implications on the tenant's relationship to his neighbor and to the community. While the position of the entrance at the front puts emphasis on the street, the entrance at the rear is considered to enhance social contact and interaction among the residents.

For these reasons private gardens as outdoor extensions of the living spaces are demanded for contemporary multiple housing projects (Fig. 5.2). The advantage of perimeter block planning as being able to accommodate gardens was recognized by Berlage who said that the aesthetic of closure "is useful for the people and is daily of direct influence."[8] He applied this directly to dwellings; "gardens should be more or less at a distance from each other and not openly situated on the ~~street,~~ but totally

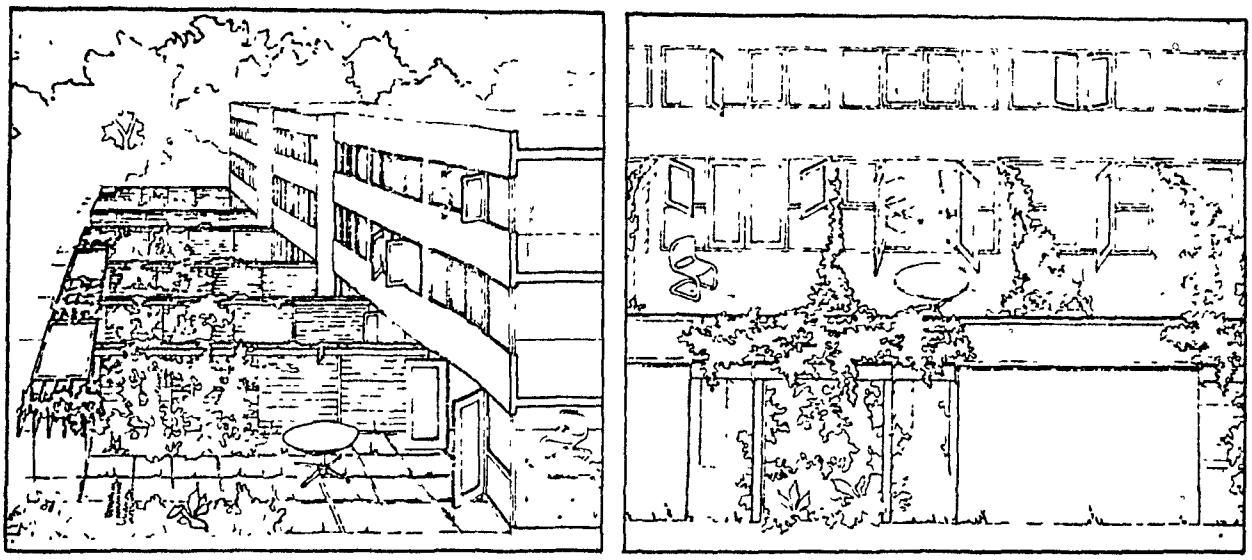

Fig. 5.2 Private gardens as outdoor extensions of the living space. (Peters, 1977)

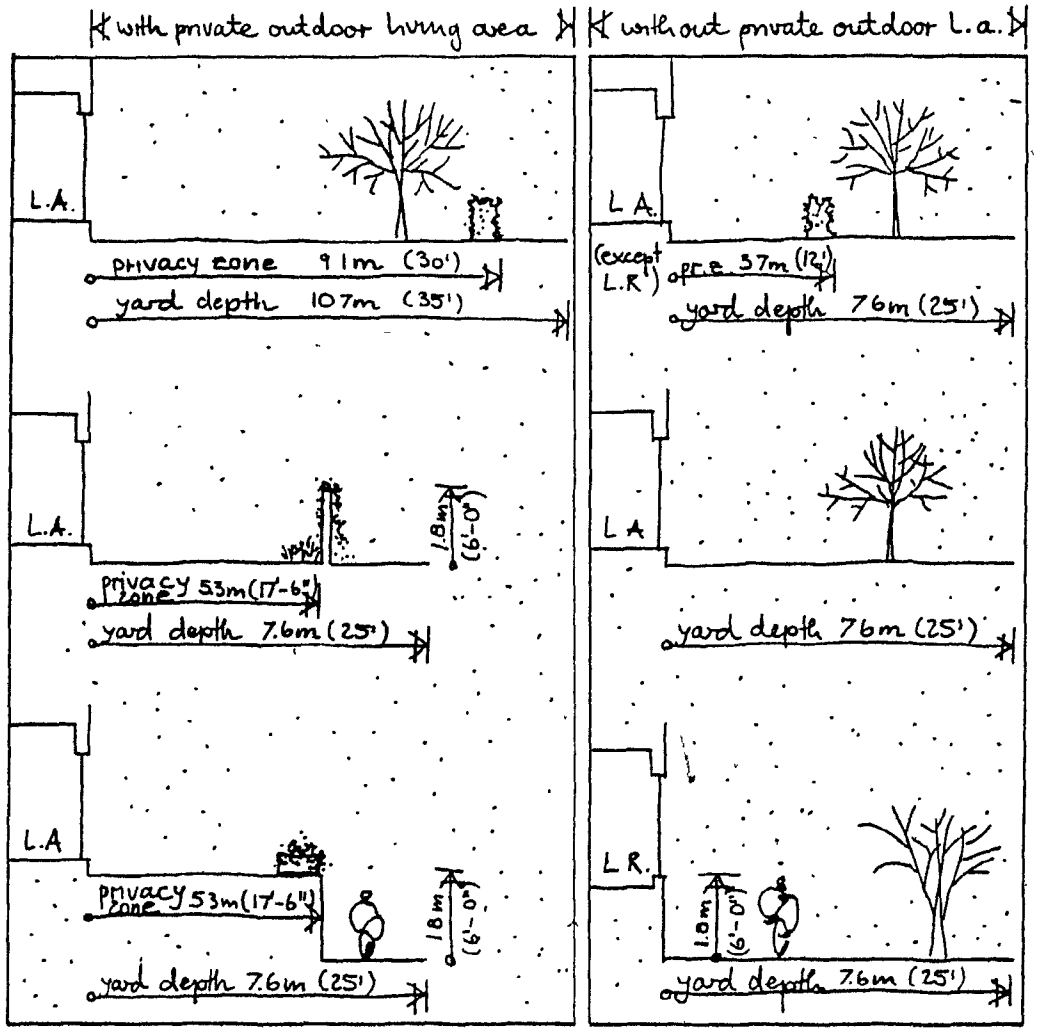

Fig. 5.3 Privacy Zone and Yard Depth Standards. (Mitra, 1979)

surrounded by houses and accessible by two or more dissimilar portals. Through this the gardens are protected and the long rows of houses as a result become of great value."[9] The Spangen housing block and the Tusschendijken blocks in Rotterdam, for example, are planned in this way.

The interior zone that in planning schemes from about 1900 up to 1930 had been devoted to the tenant's use and recreation, had in the 18th century accommodated workshops, stables and land for gardening on small plots marked by walls, fences or hedges, and in the 19th century had been packed with rear dwellings and light industry. In these perimeter housing blocks built in Germany between 1900 and 1930 the exclusive use of the interior open spaces by the occupants was often underscored only by the form of access to it from the communal staircase which led at the basement outside.[10] In doing so, a clear delineation of the private realm from the street was maintained to establish the character of a neighborhood unit not being accessible by any passersby.

The need for both 'personal' and 'shared' open space to cater to a range of activities is stressed by A.J. Diamond. In his opinion, "a factor which strongly influences the preference for single-family detached housing is the existence of personal open space (the word "personal" is used, rather than private, as the single family garden is often private only in the sense of ownership). For example, lowrise multiple-housing which provides personal outdoor space more closely approximates the advantages of the preferred single family detached dwelling in this regard than those that do not."[11]

Many perimeter housing schemes of the past decade have been a

conscious attempt to design ground-related units around the open space for communal use. "We feel much can be done architecturally to give form to the private space," A.J. Diamond observes, "to suggest its bounds and thus to reinforce the occupant's sense of domain and hopefully his feelings of responsibility for that domain."[12] It seems, therefore, important to cede to the tenant the area adjoining his unit, to which he can justifiably respond with a 'psychological territorial claim'.

Bearing in mind that at present it is not well established how large, how private and how defined personal outdoor space should be, A.J. Diamond proposes a more flexible way in this regard, "that the minimum garden area should equal the aggregated indoor living and cooking areas."[13] In a research study for Cité du Havre (Montreal), Norbert Schoenauer has elaborated on privacy zones in relation to yard depths with or without outdoor living area (Fig. 5.3). Another survey by Langston found "that 400 to 500 square feet (37.2 to 46.5 sq.m.) in area, and 15 to 20 feet (4.6 to 6.1m) in depth was satisfactory for the users."[14] However, these standards may vary with the family size and its requirements.

In Germany, the Construction Use Regulation (Baunutzungsverordnung - BauNVO) requires a minimum area of open space of 18 sq.m. (194 sq.ft.) per inhabitant.[15] Circulation areas and parking are excluded. A comparison of the proportion of open space per inhabitant within perimeter housing schemes examined in section 4.3, seems to prove the difficulty of providing the required open space of 18 sq.m. (194 sq.ft.) per inhabitant in multiple housing. The amount of open space of the selected developments ranges from 3.25 to 10 sq.m. (35 sq.ft. to 108 sq.ft.) per inhabitant. This means that

all available open space is to be devoted to the tenant's exclusive use without providing space for communal activities. However, the practicable arrangement of gardens is confined to the dwellings on ground level which are desirable for families with children. This, normally, allows then the provision for shared open spaces which can be furnished with benches for the elderly and with sandboxes for toddlers within landscaping of trees, shrubs and usable grass areas.

Play areas for school age children should be located outside the enclosed open spaces, because, according to experiences with playgrounds in German housing developments of the 1920s, residents were annoyed at the noise produced by children playing ball games and the nuisance of balls destroying window-panes and flower-beds. Since it can be assumed that school age children should be able to reach playgrounds which are suitable for group play such as baseball, football or soccer by bicycle or on foot, appropriate provision should be made for these sports within park areas in proximity of the children's homes.

A new idea introduced with new perimeter planning schemes in Germany features the provision of play areas in conjunction with pedestrian streets. This must be understood as a reaction to the realization that children will continue to play in streets, unless playgrounds have enough interest to capture their imagination.[16]

Visual perception:

The enclosed open spaces of the Steilshoop housing estate in Hamburg (Fig. 5.4) are large and overly-spacious areas of 90 by 150m (295 by 492 feet). Referring to the optical laws of Maertens (see section 4.2 for

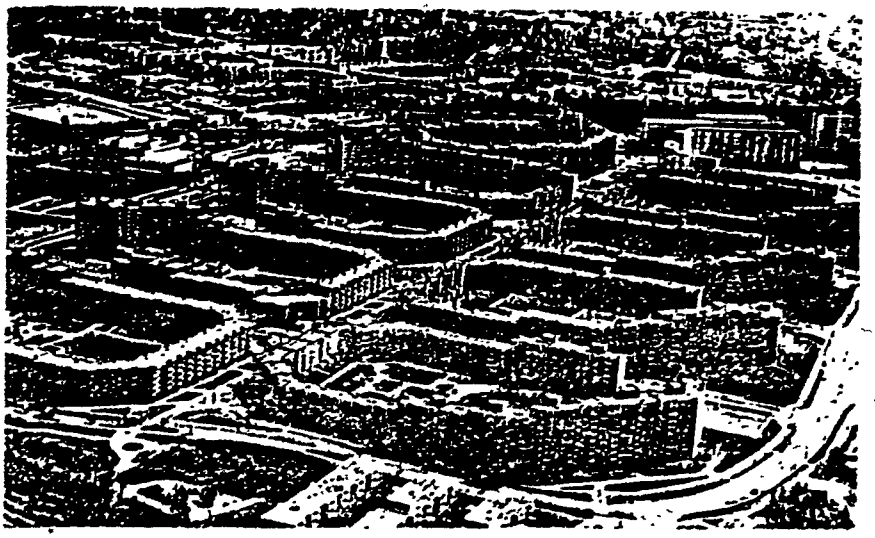

Fig. 5.4 Enclosed interior zone of too great a scale. 'Steilshoop' housing estate, Hamburg. (Peters, 1978)

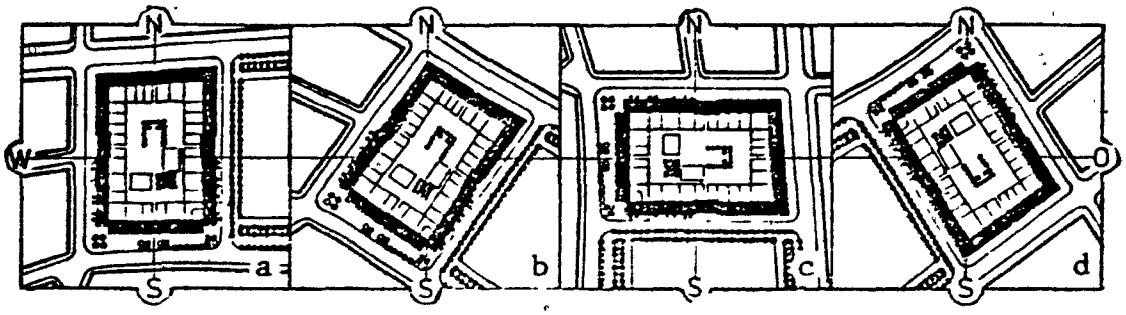

Fig. 5.5 Perimeter planning in relation to orientation. (Peters, 1977)

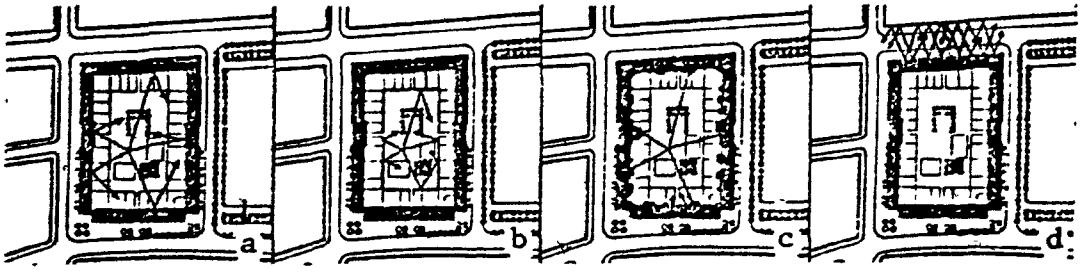

Fig. 5.6 Perimeter planning in relation to sound disturbance. (Peters, 1977)

details), this reveals ratios of 1: 7 up to 1: 11 (viewed from one interior corner), which indicates the loss of any spatial enclosure.[17] Furthermore, as has been mentioned in section 4.2, the perceiving of body movements is only possible up to a distance of 150m (492 feet). The limit of perceiving of facial features, in return, amounts to 25m (82 feet). What shall a mother do to get in contact with her child playing at the opposite end? Apart from being out of hearing, she will not even be able to distinguish her child from others.

With these measures in mind, adequate open spaces communicating utility and feelings of membership (being part of the community) can be achieved with conscious planning. Too large an open space will generate anonymity.

Micro-climate:

Furthermore, the dimensions of enclosed open spaces have a special bearing on the micro-climate. A favorable micro-climate can be established in enclosures as long as the space is not too large compared to the height of surrounding walls, so that the wind can be kept away. During the day walls and paved surfaces store so much heat, that the temperature of the enclosed air increases and the cooling is delayed at night.

An open space which is paved and enclosed by brick facing walls enables a distinct improvement of the micro-climate. It has been proven that the day temperature is about 5°C higher within an enclosed open space than on an open space without protection and the cooling is delayed about three hours at night.[18] This is especially of great value in temperate zones.

Orientation:

Since functional housing design lays stress on good orientation of all units to the sun, the continuous building along the perimeter of a housing block was considered disadvantageous because of the lack of sufficient sun exposure for some of the dwellings. Viewed from four different positions, two façades of each example in Fig. 5.5, a&b, do not face the sun at all. The two other examples in Fig. 5.5, c&d, which are turned against each other by 180°, show the diagonal position of north-south direction. Here, excluding a small portion of the southern interior corner, all external walls get sufficient sunlight during the course of a favorable day of insolation.[19] Consequently, with an unchanged layout of floor plans, all four examples produce different conditions of insolation and illumination inside equal dwelling units at the time being considered.

Therefore, Finke, Popp, Schalhorn and Schmalscheidt[20] focus on the requirement that for contemporary perimeter planning the distribution of various layouts of plans must be done with care according to the specific position on the site.

Sound protection:

The private open space within the enclosure is widely quoted as a quiet realm in contrary to the noisy street. But the internal open space surrounded by multi-storey continuous buildings is a so-called 'sound-space'. This means that the sound produced inside which is reflected from the surroundings increases in volume. The illustrations of Fig. 5.6, a,b,c,d give evidence of the behavior of sound and make suggestions to dispose or absorb sound effectively. For example, a partition wall between

the personal and the shared outdoor space lessens the volume of sound and also a façade with projecting balconies or bay windows diminishes noise disturbance. Materials with even and hard surfaces should not be applied for the purpose of better sound protection.

5.2 Design Solutions for the Corners of Perimeter Buildings

The unique feature of perimeter planning is the continuity of the building around the corner. This requires extra layouts of units of which the interior facing wall may not receive sufficient day- and sunlight, depending on the orientation of the perimeter block. Because of the small portion of external wall in comparison to the unit size and the bigger internal depth (measured diagonally from edge to edge) the problems become apparent (Fig. 5.7).

In addition, there is an impairment of the corner dwelling through traffic noise, especially if both façades are bordering congested streets. Furthermore, an efficient type of layout and access is not easily achieved with dwellings located at the corner of a building. To create and to maintain signs for meeting places such as the pub, "real corners" are absolutely necessary as they are also from the architectural and town-planning point of view.[21]

Making valid the good qualities in respect of the sanitary requirements, the following examples give evidence how differently the problem of the corner has been solved.

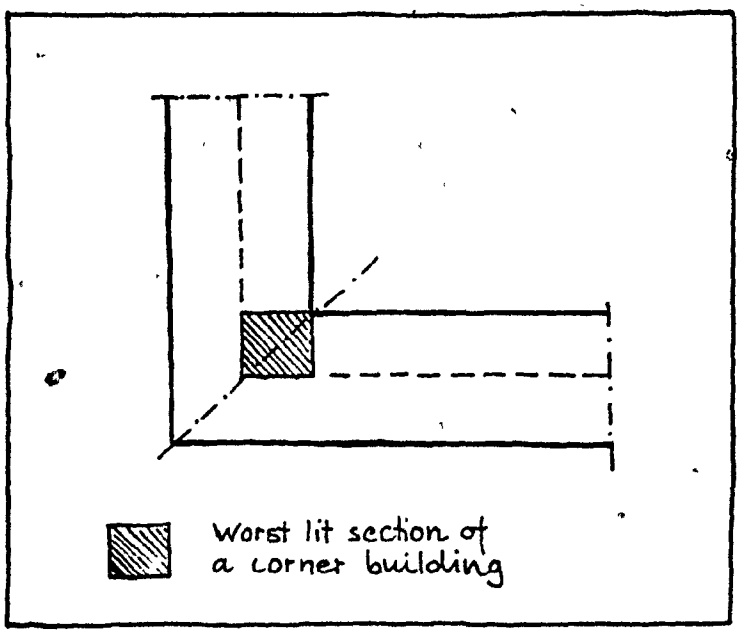

Fig. 5.7 The condition of lighting at the corner of a perimeter block.

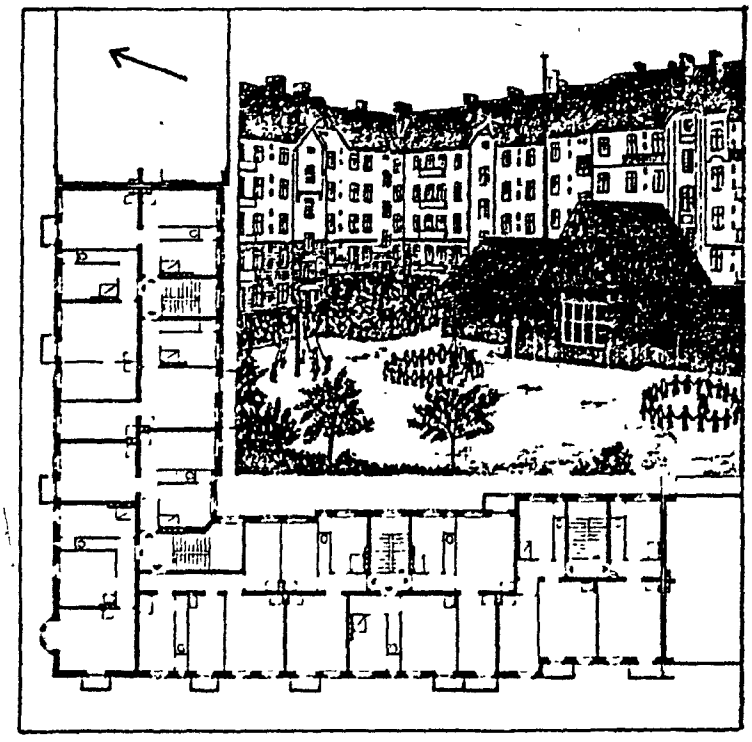

Fig. 5.8 Corner solution of the 'Weisbachgruppe' project, 1898-1904. (Peters, 1977)

Fig. 5.8 Berlin 'Weisbachgruppe' (1898-1904)

(Architect - A. Messel)

By locating the communal staircase at the inner corner of the building, the architect obviated difficulties with lighting habitable rooms. The rooms adjacent to the staircase gain sufficient daylight through the windows provided. Two of the three dwelling units served by the staircase in question have cross-ventilation.

Fig. 5.9 Berlin "Charlottenburg 1" (1904-05)

(Architect - Erich Kohn)

On the right hand side, the same principle of arranging the dwelling units around the communal staircase is used as in the preceding example. But on the left hand side, the design lacks good qualities because of the bad location of the kitchen at the inner corner. The window obviously admits insufficient light. However, both dwellings are cross-ventilated.

Fig. 5.10 Hamburg 'Jarrestadt' (1926-29)

(Architect - Distel and Grubitz)

This corner seems to be an interesting solution. After a close study the layout reveals the avoidance of the problem. By replacing the "real corner" by a recessed joint in the form of a regular housing unit served by an internal access stair, the advantage of the corner of the continuous perimeter form which has been defined by high land use performance and reasonably high population densities has been given up.

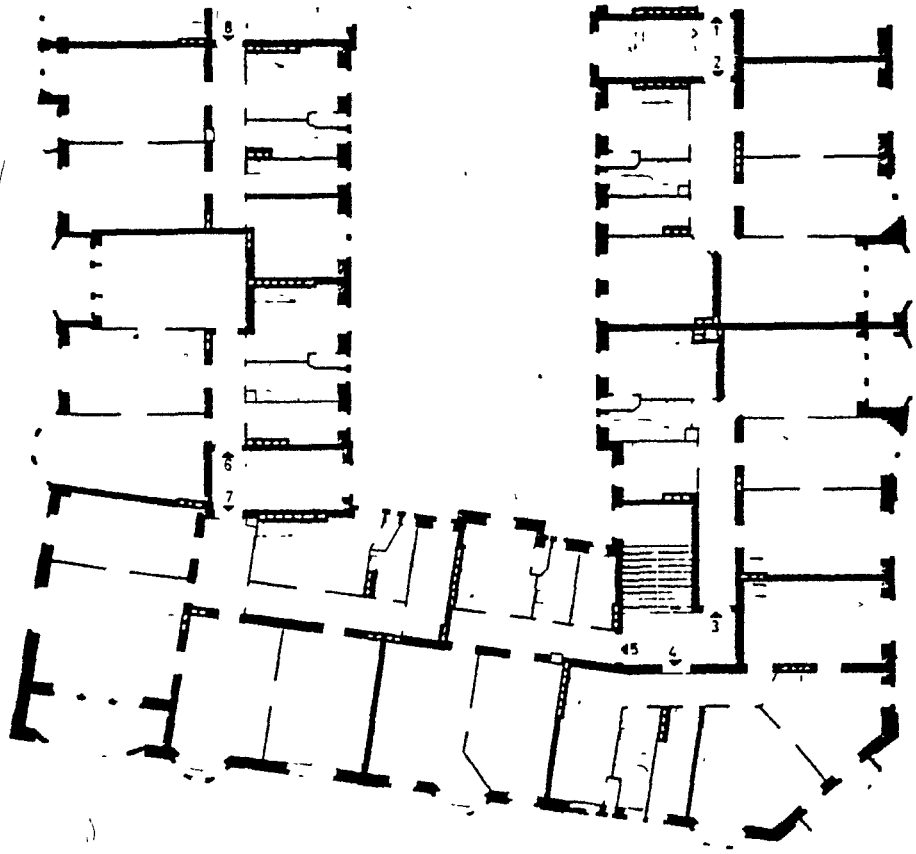

Fig. 5.9 Corner solution of the 'Charlottenburg I' apartment block, Berlin 1904-05. (Joeres, Machule, Rentschler, 1974)

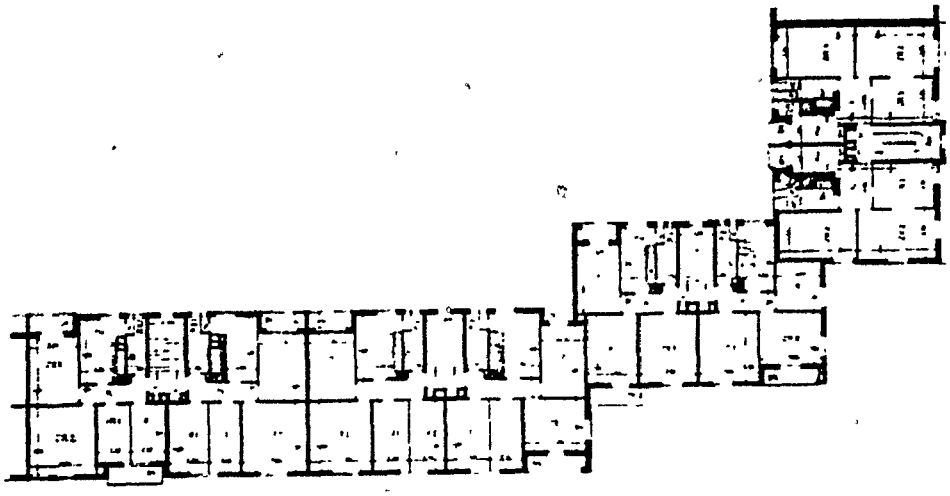

Fig. 5.10 Corner solution of the 'Jarrestadt' perimeter blocks, Hamburg 1926-29. (Adler, 1931)

Moreover, it has created another problem of lessening privacy due to diagonally located windows at a close distance.

Fig. 5.11 Berlin 'Block 270' (1973/74)

(Architect - J. Kleihues)

This example is also ranked with a series of attempts of architectural approach. The diagonal section of the corner is clearly left free for habitable use. Here, at each of the four corners, access is provided to the interior open space from narrow gateways. This air space is maintained up to the fifth floor, where the dwellings on top tie the whole building together and mark the corners at 45°. These corners are a typical feature of housing blocks in Berlin.

Fig. 5.12 Berlin 'Rollberge' Urban Renewal Project (1971-72)

(Architects - Oefelein, Freund, Schmock)

This perimeter housing block of octagonal shape is of continuous form. Creating the short façades, the advantage of the corner joints of 45° can be seen in the reasonable internal depth. Because of the sufficient proportion of facing walls, this layout is of great value in relation to penetrating day- and sunlight.

The staircase located in the corner axis is the only vertical access serving the back-to-back units around the core and connecting the access gallery and double-loaded corridors, respectively.

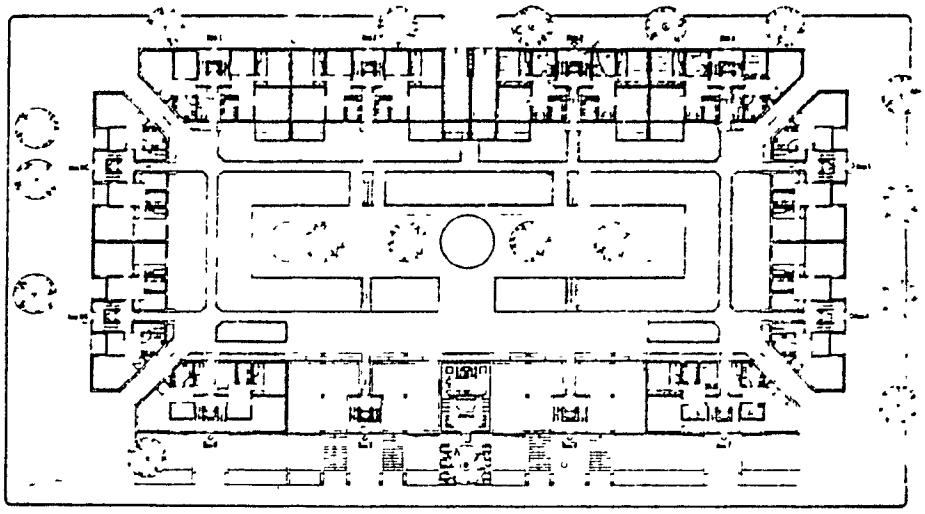

Fig. 5.11 Corner solution of the 'Block 270', Berlin 1972-76. (Baumeister, December 1977)

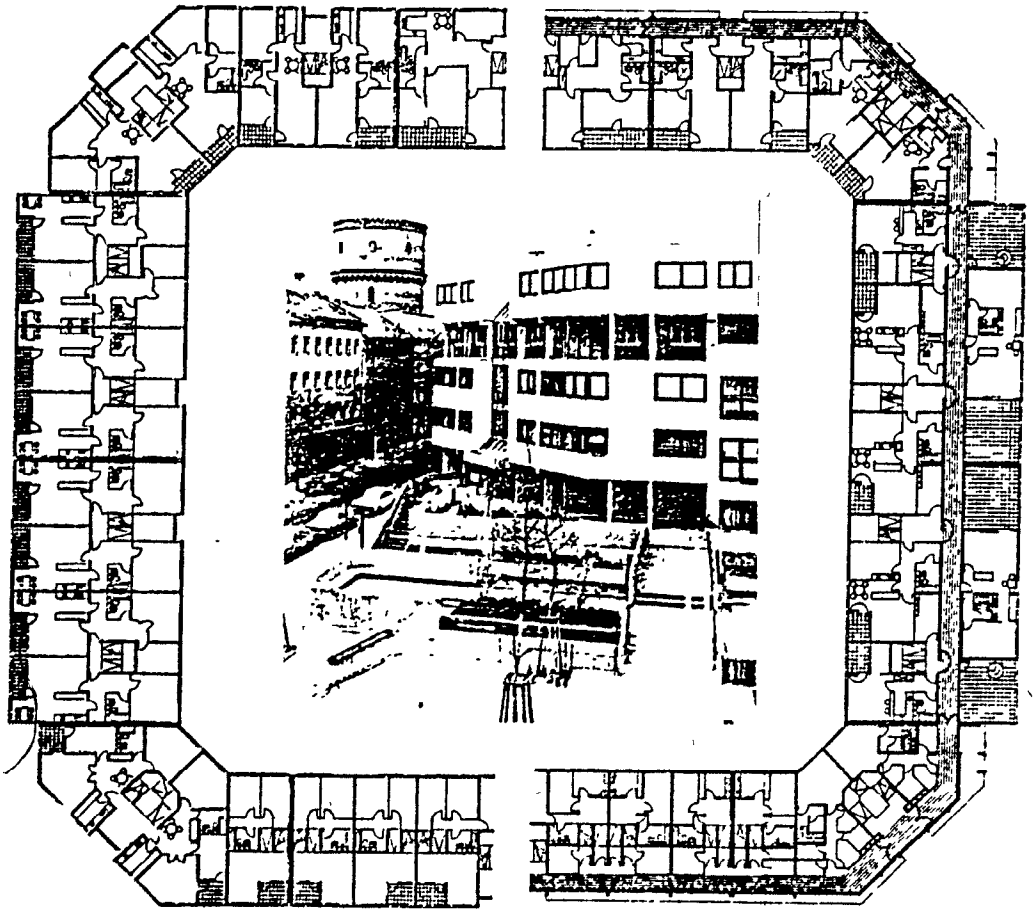

Fig. 5.12 Corner solution of the 'Rollberge' perimeter blocks, Berlin-Neukolln 1971-72. (Baumeister, April 1979)

5.3 Pedestrian Streets, Vehicular Circulation and Parking

The street is no longer only the artery of vehicular circulation but also a place for social interaction and a playground for children. Closed to through-traffic, streets can be of great value to the living environment. "If streets serving housing are designed as culs-de-sac, designed for slow moving, easily observed traffic (no parking)," as A.J. Diamond says, "it is conceivable that cars, people and play could safely mix."[22]

In a user study A. Miller and J. Cook observe that "the special popularity of roads and parking lots presumably derives from other attributes such as hard vertical and horizontal surfaces suitable for ball games, relative freedom from overlooking, and the attraction of motor vehicles."[23]

Displacing traffic lanes is a widely used means of slowing down the speed of cars which increases the degree of safety for children and reduces noise in some way. But, generally, play facilities for young children should be provided close to home and in such a way that crossing the streets is not necessary.

The 'Rollberge' urban renewal project in Berlin, for example, features a horizontal separation of vehicular and pedestrian movement. Car access is from below walking level. Without crossing the traffic streets public facilities such as a kindergarten, a welfare-center, a parish center, shops and pubs are within walking distance (Fig. 5.13).

The wish of most people to be able to enter their dwellings directly from their car, without having to walk in the open, has been

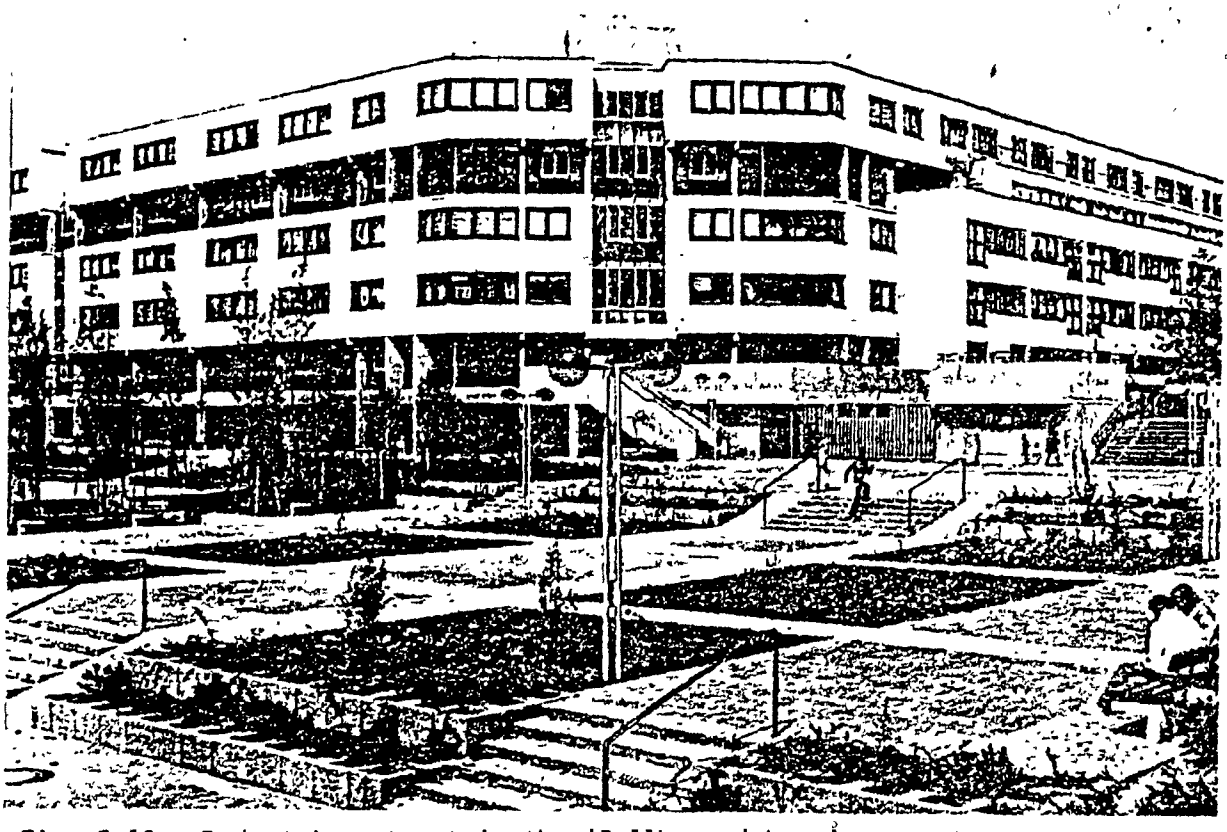

Fig. 5.13 Pedestrian street in the 'Rollberge' housing estate, Berlin. (Baumeister, April 1979)

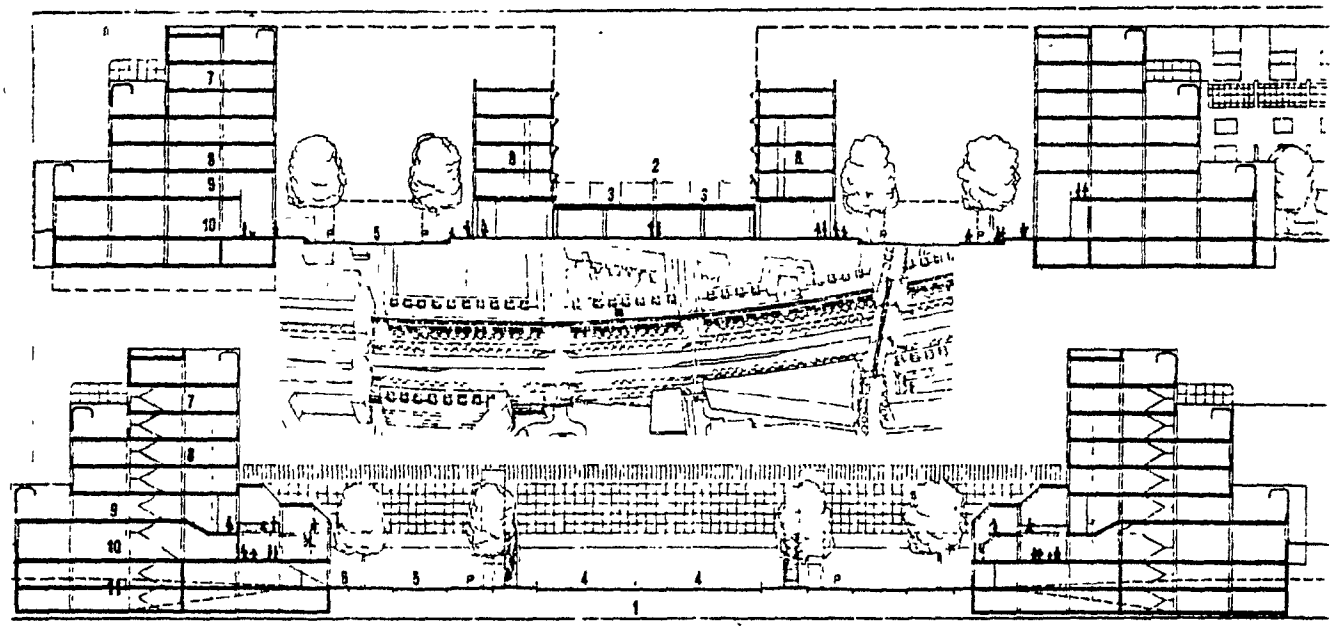

Fig. 5.14 Section of the Southern Highway 'Lutzowstrasse' of the redevelopment program of Berlin-Tiergarten. (Peters, 1977)

realized in the 'Pollards Hill' housing estate in Mitcham, Surrey, Great Britain. The cars can be parked directly within the three-storey houses similar to the advantage offered by single-family detached housing. This, however, is only possible in a low density development.

With higher densities of about 500 persons per hectare (200 per acre), car parking on ground level is no longer possible, nor the provision of access to each dwelling. Then, specific areas for garaging must be placed underground. For example, the 'Block 270' project in Berlin and the 'Berlin-Tiergarten' scheme are planned in this way.

Another solution is provided by the 'Rollberge' project in Berlin, where parking space is accommodated below the elevated walking level between opposite perimeter buildings. Thus, a horizontal separation of car and pedestrian movement is achieved with a cul-de-sac type arrangement. Direct access is to internal staircases and to the pedestrian street.

Evidently, all schemes of the new approach to urban housing design have one thing in common - urban spaces again are designed according to the pedestrian scale. The coexistence of people and car movement is one of the main characteristics.

5.4 The Inclusion of Multi-Functional Uses in Housing Projects

When the city of the 19th century was condemned because of its squalor and its population congestion, its good qualities such as the mixed functional uses, were also rejected. Mixed land use, however, is desirable both from the socio-psychological and economic points of view. The advantage of short travel distances from home to work or shopping

facilities, a characteristic of the high population density and the ideal dispersion in 19th century cities, was lost with functional town planning after the 1920s.

Architects who realized the potential of the perimeter planning schemes, with shops, restaurants, pubs and other public amenities within their improved housing blocks, built such blocks during the period between 1900 and 1930. This can be seen in some of the examples which have been discussed earlier such as the 'Weisbachgruppe' in Berlin, the Tusschendijken housing estate in Rotterdam and the Karl-Marx-apartments in Vienna.

An increasing number of newer projects, particularly those in the urban zones, are attempting to introduce diverse activities into housing developments. The result is a contemporary version of traditional streets with continuous shops and services on ground level over which are stacked multiple housing blocks. Thus, shopping, schools, and places of work are brought into close proximity and are all within walking distance of the residential areas. This approach contributes to the new trend of saving energy and physical resources.

A new aspect of perimeter planning schemes is the disposition of shops along pedestrian streets. For example, the 'Rollberge' urban renewal project in Berlin is planned in this way. Here, all service facilities are gathered around the communal area which has both shopping and leisure activities. This zone is closed to traffic. Parking is provided in the form of culs-de-sac which are below the pedestrian level. Direct access to the communal area is through staircases. Offices are not included within the perimeter blocks but are accommodated in an individual building in the

main traffic street.

Following are the aspects that Finke, Popp, Schalhorn, and Schmalscheidt demand for contemporary urban housing design.[23] Where housing is not suitable because of noisy traffic, offices can be built in its place. In doing so, they serve as a proper sound protection for the housing area behind. The 'Berlin-Tiergarten' redevelopment project is an example of this type of planning. The office buildings along the Southern Highway are considered to absorb noise produced by the speeding traffic (Fig. 5.14). This design approach towards thoroughfares in combination with housing and work-places is another contribution of the new approach of perimeter planning.

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CONCLUSION

Perimeter planning has been practiced in urban development throughout the ages and was only discredited during this century. Its shortcomings were basically due to its misuse rather than its inherent characteristics and therefore it was discarded without a proper evaluation. Today it has been rediscovered and has gained many advocates.

People's reaction against the highrise building and the single-family house on the outskirts of our cities, in favor of lowrise and medium profile compact housing, has produced a reaffirmation of the perimeter planning practice.

The property of perimeter planning in terms of delineating public and private zones is very much expressed with, on the one hand, the street acting as a meeting and/or trading place and on the other the enclosed interior part of the block of housing embodying a realm of landscaped greenery. Thus, the structural urban pattern made up of housing blocks and streets is enhanced as a unit through the enclosure of the block inherent in perimeter planning.

The deterioration of the contemporary urban environment resulted in the rediscovery of the traditional city as a mixed-use place. Once again, the street is seen as an essential part of the living environment where vehicular traffic and pedestrian circulation mix safely without interference and where school age children can experience their first encounters with daily life in close proximity to their homes. Better urban lifestyle values are therefore found in the small neighborhoods of perimeter

block developments defined by the surrounding streets and the interior open space allowing social interaction among neighbors as well as the play and supervision of toddlers. Here, guidelines for determining the proper dimensions of interior open spaces have to be used in such a manner that allows sufficient sun exposure of the dwellings in relation to their height, at the same time also guaranteeing these outdoor spaces to be within visual and aural contact of the dwelling.

Resolving the question of how travel distances from home to work or shopping can be kept to a minimum, perimeter planning prevents a further accelerating sprawl of our cities and contributes to lower fuel consumption and land use requirement. If shopping, schools and places of work are once again in close proximity to housing accommodation, namely within walking distance, the mixed land use concept can give satisfactory results.

This type of planning process also enhances the design of streets in accordance with their hierarchical importance. In contrast to uniform streets, today's approach makes distinctions, such as those between pedestrian streets closed to vehicular circulation, residential streets with access to parking garages, and service roads as collectors leading to the highway systems. By protecting residential areas against sources of noise, buildings facing streets of high speed traffic are rightly used for the accommodation of offices and light industries.

Theoretical research on land use performances of various built forms by Martin and March as well as Deilmann has substantiated the advantages offered by the perimeter form and has proven its suitability to achieve high densities; previously only high-rise solutions were really

thought to produce these equivalent land use efficiencies. As a result, high-rise buildings started to be unpopular in Great Britain in the sixties and led to the new perimeter planning approach for urban housing not only in Britain but also in Central Europe during the last decade.

One major contribution of this new approach is that the scale of the city is no longer related to the automobile but to the human being.

On the basis of perimeter planning the value of the city's function of housing can be only revived and distinctly raised by providing housing beside places of work and places for recreation. This aim is obviously very much evidenced in housing schemes of new perimeter planning and, therefore, the latter should be taken into consideration for more viable future urban developments.

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