The Conceptual Determinants of Two Archetypal City Forms

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I. CIRCULAR CITIES

1. The basis of circular cities

The circumference of a circle is the shortest line enclosing a given area and thus provides a logical approach to city design and shape where security and economy are paramount. Although the circular enclosure tends to predominate where defence is a primary consideration there are many examples in urban history where no defence reason exists. We therefore need to look further into the reasons for its use.

Can it be said that a reason for the appearance of the circular city, besides security, is that it reflects a concept of the cosmos particularly as it is known that the circle has an ancient and sacred tradition as a cosmic image? It would appear that cosmology, a people's impression of the universe and their place in it, tends to colour every activity in which they engage, providing in every civilization a broad basis of inspiration for artists in the realm of architecture and iconography (Bostiko, 1960, Panovsky 1955). The relationship between cosmology and art is especially apparent in primitive cultures and is quite evident when comparing the differences between the basic ideologies held by Far Eastern and Western peoples in relation to their architecture and allied arts (Lancaster 1956, Bussagli and Gnoli 1960). Surely then, if the influence of cosmological concepts is evident in art and architecture, this could apply to city-building too?

There appear to be three categories of relationship between cosmological concepts and architectural creations of man. These are:

Symbolic: where an artifact follows the presumed principles of proportion of the universe and so strives toward a mystical assimilation into it. (The Temple of Solomon in the Bible, for example, represents a marked search for universal proportion and symmetry.)

Allegorical: where a structure attempts a synthesis of cosmological elements which are clearly recognisable and are point for point associated with individual elements of the structure. (Where for instance the four corners of a building are meant to represent the four parts of the earth.)

Imitative: where there is a precise reproduction of the shape

believed to be that of the universe. (The dome, the pyramid, the tower are good examples.)

There is no reason to believe that city-building, as a creation of man, cannot also be related to these categories of cosmological concepts. The circular city can be considered as belonging to the allegorical category for in certain cultures the circular plan represents the sky. But it can also belong to the imitative where it reproduces the shape believed to be that of the universe. Ideas dealing with the origin, order and form of the universe are found in almost all cultures and in the different cultures the circle is associated with various cults, chthonic divinities and gods of the earth. In Tibet, China and India and other civilizations the circle expresses the same idea as life, the circle being derived from the shape of the sun, which is thought to have command over life on earth, over night and day, and over the seasons. In general cosmological concepts are dominated by ideas of law and order and consequently are reflected, more than anywhere else, in the plans for ideal cities. According to Herodotus (Godley 1928) circular plans for perfect cities were already realised in the cities of the Medes.

2. Circular cities and cosmological concepts

The history of the circular city is a subject in its own right and particular aspects have been dealt with, amongst others, by Lang (1952), Egli (1959), Rosenau (1959), Lavedan-Hugueny (1966), Blumenfeld (1967), and Moholy-Nagy (1968). The purpose here is to analyze the relationship between this form of city and cosmological concepts.

The profound symbolic meaning in the physical arrangement and elements of cultures has not yet sufficiently been explored. In the case of the neolithic and present day African village the material gathered so far reveals a basic system upon which rests not only village culture but also urban culture (Astengo 1967). In other words the meaning of urban space can be derived from an examination of the common cultural background of both the village and the city.

Astengo describes the African kraal as presenting the purest expression of village culture. The circular enclosure, sometimes a perfect circle, contains a group of usually circular huts that may be randomly arranged or clustered so as to indicate family groups. The persistence of this type of settlement at different places and times cannot be fully explained without an understanding of the cosmological meanings implicit in the forms of neolithic villages, and also found in the African kraal today. The peripheral circle limits the internal space of the village and repeats in the microcosm the earthly horizon delimited by the ocean that is supposed to surround the earth, separating an internal order from the external world, which is the prey of demonic forces.

To the Sumerians in the fourth millennium B.C. the world appeared to be composed of two vast superimposed discs, representing the earth and

sky, held apart by a mountain and surrounded by the sea. The cosmic mountain was suggested in the structure of the ziggurat with the gods dwelling in a temple at the top. The oldest cities of which there are reliable records are Uruk-Warka and Al Ubaid, which is almost a perfect circle and we must assume a lost prototype from which this plan developed in a long, gradual evolution (Moholy-Nagy 1968). The Sumerian cities were concentric and single-focused on the ziggurat with houses spread out around. This could be considered a visual proof of the equidistance of each citizen from the ziggurat's source of spiritual, social and economic order, and equally close to the sacred enclosure for protection in time of war.

Early in the first millennium B.C. the Hittites built Cincirli (or Sendjirli) as the capital of their Empire. The outer wall of the city is a perfect circle, disregarding all topographical adjustments and overcoming all obstacles in the landscape to achieve geometric perfection. Apparently a number of other citadels with outer circular walls were also built. It is very difficult not to believe that these perfectly circular walls had some cosmological significance in their imitation, for in spite of topogrphical problems, a circular wall was built as it was believed that this was the shape of the universe.

The tradition of the circular cities in the Near East begun by the Sumerians and continued by the Hittites was also followed by the Medes. Herodotus, the Greek traveller and historian of the 5th century B.C., described Ecbatana (Agbatana) as a perfectly circular city built on the remains of an ancient settlement (Godley 1928). The city had seven circles of walls, whose turrets each had a different colour. The royal palace and the treasuries stood within the innermost circle, the other ring walls dividing the population into seven classes each occupying one of the rings. The cosmological idea of seven planetary spheres and its imitative aspect in the seven ring walls of Ecbatana most probably also inspired the circular plans of the Sassassian cities in the following centuries.

The similarities between the spatial form of Ecbatana and Plato's theoretical city of Atlantis are quite close (Patricios 1970). The Roman author Vitruvius conceived of an ideal city enclosed by a protecting circular wall, with a radial arrangement of eight streets orientated to avoid the prevailing winds (Vitruvius 1914). The choice of the number eight and the circular form are most likely religious or cosmological, probably emphasizing the relationship between man and the universe; whether Vitruvius was influenced by Plato is still a subject of argument (Martin 1956, Rosenau 1959, Frank 1923).

The next period after the Greek and Roman Empires in which circular cities occur is in the 3rd century A.D. under the Sassanids. After defeating the Parthians the Sassanids assumed rule of Persia and broke away from the imposed Hellenistic culture. A new capital city was built at Ctesiphon with a circular plan, little of which has survived. Firozabad (Gur) was also

founded early in the same century and besides having a circular form its main roads are orientated towards the compass points; the twelve sectors into which it is divided are named after the signs of the zodiac.

In the 8th century A.D. the Arabs also laid out their capital city of Baghdad in a circular form, founded on and orientated within the zodiac circle. After 5,000 years this really brings to an end in the Near East a tradition of expressing the law and order of the universe in the physical form of the city. From the Sumerians to the Hittites there is a large gap but in the first millennium B.C. after the Hittites we find the circular army camps of the Assyrians, the city of Ecbatana, the circular city of Hatra in the first century B.C. (Friedlander 1958), the circular city of the Parthians — Darabgerd, and then those of the Sassanids followed by those of the Arabs.

The association betweer. cosmological concepts and city plans was resumed in Italy during the Renaissance period. A number of plans for ideal cities were published and these almost invariably were circular in shape and in quite a few cases were symbolic diagrams of planetary constellations. There are a number of analogies between Plato's theoretical cities and those of the Renaissance theorists, who may be said to form part of the Platonic succession. The question of direct influence between Plato's Atlantis and the Renaissance constructions of the ideal cities however is debatable and remains unresolved (Friedlander 1958).

Be that as it may in 1457 the architect Filarete was commissioned by the Sforza of Milan to construct an ideal city. In his treatise 'Tratto d'architettura' Filarete sets down three main diagrams for the ideal city, 'Sforzinda', which have in common an eight-pointed star. In two cases the star is circumscribed by a single circle and in the third by a double circle. The form of these diagrams can be attributed to Filarete's interest in magic and astrology, and a perfectly matter of fact assumption that the stars and planet influence the ways of men (Lang 1952). From the illustrations of the principal manuscript codices of the treatise the philosophical and astrological origins of the plan, rather than any architectural or planning consideration, are evident. Filarete's ideal city consists of two squares superimposed to form a star shape inscribed in a circle. This is an antique motif which in the Middle Ages and Renaissance was clearly interpreted as a cosmic symbol. This is attested by the illustrations in which seasons of the year, the four elements, the four winds, and the four corners of the world are arranged in just such a scheme of two superimposed squares (Lang 1967).

The star-shape of Filarete's city not only suited the requirements of fortification engineers such as Martini (Rosenau 1959) but had a tremendous influence on other Italian ideal cities. Eventually one at Palma Nuovo was actually built by Scamozzi. Philosophical and astrological concepts are again evident in Campanella's description of his 'Citta del Sole' which is circular in shape and 'it is divided into seven rings

or huge circles named from the seven planets, and the way from one to the other of these is by four streets and through four gates, that look towards the four points of the compass' (Campanella 1885). It is possible that Campanella was influenced by the Copernican diagram of seven planets round the sun as were the artists who depicted pictorial allegories of Dante's Mountain of Purgatory in the form of seven concentric rings (Lang 1952).

It seems certain that the astrological belief that the whole life of a man is regulated by the movements of the heavenly bodies originated in Babylonia and strongly influenced the Sassanids, eventually reaching Rome and Italy where it attained the height of its influence during the Renaissance. At this time it was possible to combine the conceptual approach (the reflection of the geometric structure of the universe in the spatial form of the city) and the utilitarian approach (the necessity for fortifications and town defence).

3. Circular cities and the ideological approach

A number of ideal plans for circular cities appeared in the 19th century but apart from certain exceptions it does not seem that cosmological concepts had any part to play in their formulation. The more significant ideal communities envisioned by men were concerned primarily with the reorganisation of social, economic, and political institutions (Reiner 1963). There do not appear to be any specific reasons for the use of the circular shape by the idealists who depicted their philosophy in a physical form, and it can only be suggested that these Utopian Socialists, discussed below, were attracted by the basic simplicity and regularity of the circle. We may infer that this form suited their ideological approach and was derived from a fundamental belief in an ideally perfect social and political system (cf. Plato's *Republic* and *Laws*). The link between the social idealists and the expression of their ideas in physical arrangements, particularly the circle, is evident even before the Industrial Revolution. Anton Francesco Doni described his ideal city as 'a perfect circle and planned like a star . . . in which all labour is rationalised and universal equality reigns' (Doni 1552).

In the atmosphere created by the French rationalists before the French revolution Claude-Nicolas Ledoux, the visionary architect of the late 18th century, designed an ideal factory town in an oval form around the Royal Salt Works at Chaux as an attempt to improve living conditions. The French rationalists also inspired the reformers in England who attempted in different ways to overcome the worst effects of the rapid spread of factory towns and slums in the nineteenth century. Benevolo (1967), Creese (1966), Choay (1899) and others have studied in detail the attempts made by the reformers (such as Buckingham, Pemberton and Howard) to overcome the problems created by the rapid growth of industrialism.

In 1849 James Silk Buckingham published a book in which he described the layout of his ideal city of Victoria. The city's 10,000 inhabitants were to be housed in buildings arranged in parallel rows on a quadrangular plan and although the shape of the city was square it had circular characteristics: the centre was emphasized by locating the public buildings there; the buildings were arranged in concentric rows and the avenues formed a radial pattern.

Robert Pemberton's aim for founding in New Zealand ten districts, each of 20,000 acres and containing a circular town, is described in his book published in 1854 (Pemberton 1854). According to Rosenau, Pemberton's circular plan was derived from a misunderstanding of the perspective view in Ledoux's work which suggests a circle. In any event, Pemberton believed the circle to be the most natural and most convenient plan as it is derived from the sun, moon, stars and so on, all grand forms in nature. Each town was thus 'to be perfectly round, about a mile in diameter, and taking the form of belts or rings . . .' and in the first circle the major educational institutions were to be located. The influence of cosmological concepts prevalent in previous centuries can be inferred from Pemberton's intention to lay out, within the innermost circle of his city, terrestial and celestial maps all in the shape of circles. This is shown in a map in his book and included in the description of the *Plan of the Model Town.*

There appears to be more than a tenuous link between Pemberton's plan and the radial plan for Ebenezer Howard's ideal Garden City (Howard 1902). Howard is clear in stating that his plan for a concentric city is a diagram only and to be used as a model since the 'plan cannot be drawn until site selected'. Why he used a concentric form with a circular belt of housing, a circular belt of industry on the edge in close proximity to the main railway, is not known. It could be surmised that besides the possible influence of Pemberton's plan the regularity and order of the circle matched Howard's ideals of introducing some order into the conflict of industrial, residential and agricultural land uses in existing settlements and illustrating the need for control of development. The development of the relevant ideas which culminated in Howard's Garden City concept of urban form has been analysed by Batchelor (1969); he also relates the concept to the political and social environment prevailing at the time.

In addition to the circular cities of the reformers of the 19th and early 20th century there are numerous other examples in the 20th century of circular cities — a concentric model town for 10,000 workers in Brazil, the ideal plan for a metropolis by Paul Wolf, and the early kibbutzim in Israel (Moholy Nagy 1968), all of which appear to be associated with ideals of land settlement and community structure.

We may usefully conclude this part of the survey by postulating three conceptual determinants for the circular city which have recurred through history: the circular city may be seen as the most economical form where security is of primary importance; it also expresses a concept of the cosmos

whether allegorical or imitative; and finally appears to be sympathetic to the reflection of an ideally perfect social and political system. These determinants have not necessarily operated singly and in a number of cases at least two of them have been present at the same time.

II ORTHOGONAL CITIES

A strict orthogonal city can be described as one in which within an overall rectangular shape a set of straight streets, parallel to one another, are at right angles to another set of parallel straight streets forming a grid pattern. The blocks enclosed by each grid can be square or rectangular in shape. As with circular cities the history of the orthogonal city is a vast subject (Stanislawski 1947, Egli 1959, Bannister 1961, Reps 1965, Blumenfeld 1967, Moholy-Nagy 1968, Lavedan & Hugueney 1966). For the present purpose it is intended therefore to touch only generally on the concepts which underlie the orthogonal city.

1. The basis of orthogonal layouts

Cities with an orthogonal layout are normally associated with migratory people because of the convenience in surveying and distributing land. The roots of the grid pattern probably belong to pre-urban land division and irrigation methods — to the methods developed from the allotment of agricultural fields and the guidance of water around the fields in the great valleys of Egypt, Mesopotamia, India and China.

The Romans attempted to achieve uniformity in their settlements and rural areas through centuriation in which grid units were based on the amount of land a co-operative ox could plough in one day. In a different way the uniformity of the settlement of the north-western lands of the North American continent during the nineteenth century was governed by the survey system established by the Land Ordinance of 1785 passed by the Continental Congress. The basic system of land surveys divided the land into square mile units that controlled the layout of a large number of American cities. Another system which influenced the layout of cities was the parcelling out of the land as in Southern Ontario. Square 'concessions' of 1,000 acres were made, with dividing lines 33 feet wide, left for public access.

The orthogonal layout in urban history is not only evident in colonial cities but in new town building during the sixteenth and seventeenth centuries, particularly in France and in Northern Ireland under English direction (Reps 1965). Many of the French new towns resembled in form the 'bastides' of the thirteenth century A.D. which were founded under military control to function as military centres. Montpazier with its grid layout of streets and walled perimeter was typical of these cities founded chiefly in south-west France, the northern portions of Spain and on the Welsh borders of England. The form of the 'bastides' in turn was probably

derived from Roman camps, and in both the grid layout facilitated setting out.

2. Orthogonal layouts and conceptual influences.

Can it be concluded however that the appearance and use of the orthogonal layout at other places and times was for the purpose of facilitating the distribution of land and the ease of setting up military camps and settlements? During the great colonisation period of the 8th and 7th centuries B.C. the Greeks founded well over seventy settlements and it would be expected that these would have orthogonal layouts. Present knowledge indicates that this form of layout was only introduced towards the end of the 6th century B.C. and was accepted by the Greeks because of its orderly quality well suited to the Greek cosmological concept of order at the time (Patricios 1970).

Then again a study of the Spanish colonisation of the New World in the 16th century A.D. reveals that the regular urban layout in the pre-Columbian cultures had not been adopted by the Spaniards (Stanislawski 1947), and that grid layouts were lacking in the earliest period of Spanish settlement (Stanislawski 1947b). In 1573 King Philip II issued Royal Ordinances concerning the laying out of New Towns and from a description of how the streets are to be laid out, it is obvious that the laws envisaged a grid pattern of straight streets with intersections at right angles; also the four main streets were to be orientated so that they 'will not be directly exposed to the four principal winds, which would cause much inconvenience (Nuttall 1922). Other Ordinances of the Spanish 'Laws of the Indies' reflect the concepts generating the ideal plan prescribed, for example No. 112 on proportion lays down that the main plaza 'should be in the centre of the town and of an oblong shape, its length being equal to at least one and a half times its width . . .' or No. 134 in which settlers are encouraged 'to make all structures uniform, for the sake of the beauty of the town'. This rare combination of city-building doctrines and prescribed practices determined the form of many Spanish towns in the New World (Reps 1965).

No reasons for the adoption of a grid layout are evident in the Ordinances but the most likely influences were probably the existence of Roman colonial cities; the 'bastide' type of community in northern Spain; monastic complexes; Italian urban extensions and reconstructions, and, perhaps the strongest of all, writers on camp layouts. In particular Book Six of Machiavelli's *Arte della Guerra*, probably published in 1521 and widely distributed in Europe, followed Roman precedent in emphasizing the value of absolute uniformity in camp layout to ensure the preservation of order, discipline and control (Machiavelli 1905 Ed.).

At first sight it may appear that the use and spread of the grid layout on the North American continent was because no other system was so easy to

survey, yielded so many uniform lots, was easy to describe in deeds or to sell from the auctioneer's block. Reps, however, in his history of the gridiron plan in the U.S.A., has found that the early plans of cities with grid layouts avoided some of the later errors committed by those who seized upon this pattern as apparently the most effective and certainly the quickest system of laying out towns (Reps 1965). A prime example of this latter development is to be found during the Californian goldrush in the second half of the nineteenth century when the gridiron plan of San Francisco, ignoring the topography, was extended over the slopes of steep hills to meet the rush for speculation in town lots.

Much of the early impetus to the adoption of the grid iron plan in North America, aside from its intrinsic ease in surveying and its adaptability to speculative activities, stemmed from the position and influence of Philadelphia. This city, the first large city to be laid out on a grid pattern, served for a century or more as a model for the design of other towns with respect to its grid form of streets and its provision for public squares. It seems that the reconstruction plans for London after the Great Fire of 1666 were influential in furnishing ideas on which William Penn designed Philadelphia (Reps 1965); in particular when viewed broadly the similarity between Newcourt's plan for London and Penn's plan for Philadelphia is unmistakable. The implication that the grid form was introduced into the plans for London on grounds other than surveying and land speculation, and also probably influenced the layout of Philadelphia, is thus raised but its further investigation is beyond the scope of this article.

A rare statement on reasons for adopting the gridiron system is provided in the New York Commissioners' report of 1811 concerning the layout plan for the City. At the beginning of the nineteenth century New York and Washington replaced Philadelphia as the centre of political power and economic dominance, and in addition the influence of the extension plan for New York City replaced that of Philadelphia. In describing their basic concepts the Commissioners explain that one of the objectives was to decide whether to confine themselves to rectangular and rectilinear streets or circles, ovals and stars 'which embellish a plan, whatever may be their effects as to convenience and utility . . .', and in considering the reasons for adopting the grid they had in mind that '. . . a city is to be composed principally of the habitations of men, and that strait said, and right angled houses are the most cheap to build, and the most convenient to live in. The effect of these plain and simple reflections was decisive' (Bridges 1811). Following the Commissioners' report the street system established covered the whole island of Manhattan to provide the setting for the location and building of rectangular houses.

3. The orthogonal city and the concept of order.

Apart from the inherent characteristics of the grid layout already

touched upon and the ideas of function and order which are expressed by an orthogonal plan, what other conceptual bases have been ascribed to it? According to Egli the geometrical layout of Kahun in Ancient Egypt is based on the concepts of harmony and balance. On the other hand Moholy-Nagy considers the grid layout as a geometric allegory of cosmic predestination; and where the city is to be 'noble and powerful, the streets should be straight and broad, which carries an air of Greatness and Majesty; . . .' (Alberti 1955 Ed.), but above all it is the concept of order which appears to prevail. As Descartes commented, an irregular street layout as compared to a regular geometric layout is evidence of chance rather than the human will guided by reason (Veitch 1850). Whether Zucker (1954) is right in asserting that the appearance of grid layouts in India, Egypt, Asia Minor, Greece and later in Rome and central America is due to man's generic urge for order and regularity is questionable for as Stanislawski has shown the grid-iron does not spontaneously recommend itself to the town builder (Stanislawski 1947b).

In the work of Le Corbusier we find an instance where the grid street pattern is used for its ability to express order. His town planning studies (Bolsinger and Gersberger 1960) reveal strong geometrical characteristics but three of his cities, more than any others, have a strict grid layout 'after American cities and many if not most of the classical cities of antiquity' (Le Corbusier 1929). Of the three the 'City of Three Million Inhabitants', which appeared at the Salon d'automne in 1922, and the Voisin scheme for the centre of Paris exhibited in 1925 were never implemented but his plan for Chandigarh, the new capital of Punjab, is being built.

Le Corbusier's reasons for using the grid are apparent in his book *The City of To-morrow and its Planning*. He described the irregular city with its winding roads as the 'Pack-donkey's Way' and the regular city with its straight streets as 'Man's Way' for the pack-donkey meanders along, zigzags in order to avoid the large stones and takes the line of least resistance whereas man walks in a straight line because he has a goal, knows where he is going and goes straight to it. Furthermore he stated that the right angle is superior to other angles because of its uniqueness and constancy and in conjunction with the straight line dictate the thoughts and actions of men; for man, by reason of his nature, practises order. Le Corbusier's philosophy was Platonic in character for its basic premise was that we reject appearance (what we see) and attach ourselves to the 'substance' (what we learn or know).

Le Corbusier considered the orthogonal concept supreme, as the height of a civilization and he took as his models the plans of antiquity: Mesopotamian, Egyptian, North African, Indian and Roman. He believed very strongly that order is the fundamental basis in town planning and his book is a search for this, for on his own admission he has 'insisted in Order as being the key to every action, . . .' He considered that modern town

planning can be reduced to the problems of traffic and 'that eternal necessity of the mind, ORDER'. That order is to be obtained through geometry is clear from the foreword to his book.

4. The orthogonal city, growth and change.

Viewed historically, the large difference in spatial form between the 'organic' plans of the post-World War II new towns in England and the 'grid' plans for the new cities of the late 1960's presents a strange phenomenon in the 20th century. The former plans are the outcome of one of the recommendations of Abercrombie's Greater London Plan of 1944 for rehousing 400,000 people outside London in new towns with a maximum population of about 60,000 each. By 1950 under the New Towns Act of 1946 seven towns round London had been begun. The philosophical origin and planning aims of these towns really lie with Ebenezer Howard and the garden city movement, their doctrines largely inspiring the design standards for the new towns assembled by the Reith Committee (Derbyshire 1967).

Against the standards was the need for clear separation of different land uses, particularly between manufacturing and residential areas. The same sort of assumption on separation was applied to the spatial structure of the town. Neighbourhoods were to consist of about 5,000 people and these were to be grouped into districts of 15,000 to 20,000 people. These districts were to be separated by tracts of open space and the overall impression of these towns is one of clusters of built-up areas loosely grouped around a town centre with wide open spaces between the different clusters.

Twenty years later in the late 1960's we find that the group of towns that were planned varied considerably in their spatial form from the post-war towns. The publication of the interim report for Washington, County Durham, in 1965 can be regarded as the watershed mark as it is the first new town to have a fairly strict grid of primary distributor roads. Thereafter a number of other plans for new towns and cities appeared with orthogonal layouts — Mosbrough, Swindon, Southampton-Portsmouth and Milton Keynes. The latter is the most fully developed and justifies further mention. The spatial form of the city is set by the grid pattern of roads (originally at one kilometre intervals) and the dispersal of industrial and other traffic generating activities throughout the whole area. Most of the urban activities in fact are dispersed rather than concentrated with residential areas filling up the remaining areas in the blocks formed by the grid of roads. In all these cities the grid is not used with geometric rigidity as in previous centuries but is adapted to the configuration of the ground.

What then is the reason for the adoption of the grid in the new towns and cities of the late 1960's? Can it be, as Proudlove maintains (Proudlove 1968) that the grid road system is adopted as it provides at minimum cost a balance between the advantages of traffic concentration and the

advantages of land use dispersal? Are there more reasons than this? It is clear that the grid also meets other objectives which have been set, the diffuse road system giving the right environmental quality for the concepts of how people will be able to live in about thirty years time. These concepts and the planning process have been described by a partner in the firm of planning consultants for Milton Keynes (Bor 1968) and partly reflect the theoretical framework postulated by Melvin Webber (1969). According to Peter Cowan (1969) the grid street plan at Milton Keynes is also to provide adaptability, opportunities for change and development, and to even out accessibility across the face of the town.

The belief that a grid of roads will allow for flexibility in coping with growth and change is also one of the basic concepts of the other new towns of the late 1960's — for example, Swindon (Hall 1960), Southampton-Portsmouth (Cowan 1969) and Mosbrough (Goss 1968). There is no apparent evidence however that the use of a grid of roads is consciously used to express any concepts of order as defined by Le Corbusier or as inferred in previous centuries by an examination of city development over time.

From this historical survey we may therefore conclude that the grid form has been used on the one hand for functional reasons — to facilitate the distribution of land, to obtain a 'minimum-cost' road system and the dispersal of traffic — and on the other to express in spatial form concepts such as order and — very recently — 'open-endedness'.

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