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Form and Function in Urban Communities

The infinite variety of form manifested by cities and towns has always appealed to the imagination of men. To us the contrast between the confused ugliness of most modern cities and the ordered beauty of old ones poses the question of origins. Were these communities designed as a church or a palace is designed, or did they develop as trees or flowers grow?

Some scholars have tried to distinguish two types of cities: "grown" and "planned." But this dogmatic distinction is hardly valid, for all cities are created by men acting purposefully. The.choice of site is always an important act of planning and involves a decision that may be made by either a group or an individual. The same holds true for every other element constituting the city. The question is therefore: Who planned this or that element; what was planned by this or that individual or group; and, most of all, why did they plan it so?

Whoever made the decision was ultimately controlled by the needs that the settlement was intended to satisfy. Its functions determined its form. The difference lies in the degree of consciousness of the city builders. Did they anticipate all

their needs and provide for them immediately, or did they have to learn the hard way, being forced gradually to adapt the framework of their community to their way of living?

Between these two extremes, there exists a series of intermediate solutions. At one end we find a swarm of squatters, each building where, when, and how he pleases; at the other, the military camp predetermined to the last doorknob. Neither of these is a city.

WHAT IS A CITY? In primitive human settlements, such as the "longhouses" of American Indians or Polynesians, or the "pueblos" of cliff dwellers, there can hardly be a question whether they were "planned" by the group or "just growed" out of a sequence of unrelated individual actions. In primitive clans, the individual is not yet differentiated from the group.

At a later stage, in the early Middle Ages of Northern Europe, we find two main forms of human settlement: villages and castles. But neither of these may yet be called a city or town. As in the "longhouse," the inhabitants of the castle all belonged to one household, although they were divided by rank and occupation. Villagers, on the other hand, like members of a clan, were equals, but they lived in individual, relatively independent households. Only where the plurality of social units of the village is combined with the social and functional differentiation found in the castle can we talk of a city.

Often the town's difference from the village has been ascribed to the division of industrial and agricultural labor. But in most ages and lands, city dwellers have also been tillers or owners of the soil; and industrial villages have flourished from the remote past to our day.

It was division of class, not work, that separated the city from the village. The testimony of the past is unmistakable on that point. In the medieval city, citizens within the walls enjoyed military, political, or economic power, and legal privileges, especially monopoly of trade and personal liberty.

Likewise, in antiquity the Greek word "polis" denoted public authority. In Homer's day "polis" meant castle, such as that seen in the powerful ruins of Tiryns. The common people lived in scattered villages. Later, one of these villages enjoying a particularly favorable location became the concentration point of the local aristocracy and assumed dominion

over the entire surrounding territory. As merchants and crafts-
men rose in power and finally overthrew the big landowners,
they became the "polis," controlling the countryside and ex-
ploiting the fields increasingly by slave labor. Now the entire
settlement was enclosed by walls. The former castle became
the "acropolis," its walls either demolished or incorporated
in the new enclosure of the city. Finally, in the fourth century
B.C., when new cities were founded, they often lacked either
castle or acropolis. At Priene, for example, the city occupied
the slope of a hill. The towering peak above, though enclosed
within the city wall, was uninhabited except for an occasional
garrison in its fort. The relation is exactly the reverse from
that at Tiryns.

In Italy the development differed somewhat. Here the politi-
cal unit had never been the village, but always the *pagus,* the
region inhabited by the tribe. In normal times its members
lived scattered over the countryside, but when danger ap-
proached, they all took refuge with their herds in a walled
place, usually located on a mountaintop. Remnants of similar
camps of refuge (the *Fluchtburgen* of the German scholars)
are also to be found in other European countries, often dating
back to neolithic times. In Italy, the *oppida* became the capi-
tals and sanctuaries of their tribes. Their center, the *templum,*
magically bound to the four cardinal points, was the ideal
center of the *pagus,* bound to it by the two main streets and
the four gates. Here, in the very center of the enclosure, was
the forum, a meeting place of the tribe. The Greek agora,
in contrast, lay outside the gate of the original polis. Soon the
priests and magistrates became permanent inhabitants of the
place. Again the city had evolved as the seat of a privileged
class, with common folk scattered over the adjoining country-
side.

Apparently, the result was the same as in Greece, but the
different origin made itself permanently felt. The city had
started as the recognized center of a territory. Its sacred walls
remained. The patricians were rarely displaced or subdued by
the plebs. There was usually no duality of acropolis and lower
city, no moving down the slope. Even today, many of these
towns crown the hills of Italy, filled with the palaces of pro-
vincial landlords who thus look out over their tenants in the
valleys.

This characteristic situation is rarely found north of the Alps. Here the development sprang, not from the refuge of the tribe, but from the castle of count or bishop — or from a monastery. Peasants brought their *dime* to the gate of their lord's court. Here, too, they exchanged some of their products with each other, with craftsmen working for the lord, or with traveling merchants. If the location was convenient, a market developed. Its place is always the same, before the gate — as it had been in Greece, and in Palestine still earlier. The Bible leaves no doubt that the gate was all in all: market, meeting place, courthouse, and town hall. As the medieval market developed, a special town hall was erected before the gate. The older German towns, especially in Westphalia, invariably show this sequence: castle, town hall, market.

Because they stemmed from the market, not from the camp of refuge, these North European towns usually developed, not on hilltops, but in valleys. The market might stretch out along a street leading to the gate, or on a road perpendicular to it. Whatever its shape, roads from the surrounding countryside tended to converge on it.

As soon as merchants and craftsmen felt strong enough, they turned against the lord of the "burg." If successful, *they* became the "burghers" and at once started to build wall and moat. However, they did not succeed in suppressing the barons as completely as their Greek predecessors had done. At best, they drove the nobles from the immediate neighborhood, but the lords still continued to rule the countryside from their rural castles. The burghers now formed a secondary class, well above the common peasant folk and used their newly won power principally to monopolize trade within their walls. Merchants' and craftsmen's guilds grew. While the larger houses of the merchants clustered around the market, each craft guild settled in its own street. Organization of space reflected organization of function.

With increasing prosperity, the market could accommodate only a portion of the trade. Peasants were forced to park their beasts and carts before the city gates, and new markets for horses, cattle, or wood developed outside the walls. Once more roads converged toward these points, once more merchants and tradesmen settled along these roads, once more the "outs" rebelled against the "ins" until a new wall took them in

also, making new burghers out of inhabitants of the old "faux-bourg." The familiar "radial-concentric" plan of many old European cities shows the result of these developments.

While suburbs might be included within city walls and while neighboring towns might merge into a single community, the founding of new cities remained the privilege of the secular and ecclesiastic lords. They made ample use of it. Between the twelfth and fourteenth centuries, hundreds of towns were founded throughout western and central Europe, especially in southern France, northern Germany, Bohemia, and Poland.

We should expect the plan of these new towns to follow the radial-concentric scheme, which was beginning to evolve in their predecessors, but there is not a single example of such a plan. The majority of these creations show what we call a "gridiron" scheme.

We usually regard city plans mainly as street plans and think only of traffic needs wherever we see a street following a straight line. But the *locatores* of the medieval towns were concerned, not with traffic, but with parceling out land to settlers. They allotted town plots according to the same method that they used to allot parcels of land to tillers of fields.

In northern Europe, village lands were divided into fields, each cultivated according to the three-year crop-rotation system. Each field was divided into long narrow "hides" of equal width, one for each plowman. Cities in these lands show the same sort of subdivision, with long narrow lots running from street to town wall or to the next street. Only later were these strips cut in half and houses built on both ends.

In Latin countries, with their vineyards and olive groves and with a different technique of plowing—plowing crosswise or both ways—land was divided into squares of equal size. The same unit is to be found in Roman cities: a square block, normally divided into four square lots.

The universal influence of agriculture on city planning was reflected by the important role played by the plow in the founding rites of cities. These rites show curious similarities at points as far apart as ancient Etruria, medieval Bohemia, India, Siam, and the Sudan.

In the great valleys of the Indus, Nile, Tigris, and Hwang Ho, civilization had grown as marshy plains were drained by

systems of ditches and dikes. The newly won land was allotted to tillers of the soil. "Sesostris," says Herodotus, "divided the land, . . . giving to every man an equal square of ground." As far back as 3000 B.C., geometry, the art of land measuring, determined the layout of huge cities built in these plains. Five thousand years later, compare the division of all land west of the Ohio River into square-mile units that controlled the layout of a large number of nineteenth-century American cities.

In all these cases, allotment of a piece of ground to the individual user was the guiding principle; and wherever this consideration determines the plan, the rectangular pattern prevails. The lots add up to blocks, the blocks add up to a city. It is growth *from the inside out, by addition, with a definite interior pattern, but with indefinite outer limits.*

As such, it is the direct opposite of the radial-concentric plan, which starts from the enclosure. Within it the main radial streets divide the enclosed territory into major blocks, which are in turn more or less arbitrarily subdivided by lesser ways into minor blocks and individual lots. Hence, growth is determined from the *outside in, by division, with a definite outer limit, and in an irregular interior pattern.*

These two contradictory tendencies may be traced in every city plan, combined in various ways. The first represents the element that the city has in common with the village: that of being the sum of many social units. The second stems from the element that the city shares with the castle: that of being a single corporate unit, a center of power that controls the surrounding territory politically by the strength of its walls and economically by the tentacles of roads leading to its market.

Only where both of these elements are present, may we talk of cities or towns. A group of houses is not a city; nor, at the other extreme, is any settlement subject only to a single will, as is a palace, an estate, or a monastery. Co-ordination of many social units within one larger unit is the specific task of city planning. The inherent contradiction is ever present. Today, we talk of the "superblock" and of the "neighborhood" as units of planning. The superblock is determined from the outside in, by the surrounding major traffic arteries that serve the city; the "neighborhood" is determined from the

inside out, by the community activities of the inhabitants. The two are not necessarily identical or coextensive.

Only in the irrigated plains where land was subdivided into square acres have cities from the earliest days been laid out on rectangular plans. In hilly Greece, where boundaries of fields and vineyards followed the irregular pattern traced by nature, the arrangement of early towns showed no rational pattern. Streets and alleys were simply the residue left between houses and courts. When rectangular patterns came to be adopted for new cities, resulting probably from experience in colonizing, dimensions of the blocks were carefully determined as multiples of a basic "module," but street widths were not controlled by any definite rule. The secondary character of the streets is clearly visible from the way the "agora," the public place, was arranged. It was always treated as a separate structure, a court surrounded by a U-shaped colonnade, built on one side of a street. The building on the other side of the street was not treated as part of the enclosure of the market place. The "stoa" at Priene, for instance, extends farther along the street than does the colonnade of the agora facing it.

It was different in Italy. There two main streets, meeting at the forum, were the primary elements. They were always broad and straight, even though the blocks were often somewhat irregular. As the Roman Empire came to dominate the peoples of the world, these main streets came to represent its power. They were dominated by some monumental building as a *point de vue,* and the center of the forum was strongly emphasized. Wherever men have desired to symbolize authority, whether in monarchic Versailles or in republican Washington, they have adopted this Roman principle of axiality.

Sometimes Roman city builders further emphasized monumental perspectives by lining both sides of the street with colonnades. This application of a uniform design to the walls of a street or a place, regardless of the variety in building plans behind these façades, reflects faithfully the division between public and private spheres of life in ancient Palmyra as in Napoleonic Paris.

The Greeks knew nothing of this, for they had no conception of the state or law as abstract powers differing from citizens and their decisions. Their buildings on the agora, as

in the sacred precinct of the gods, were never related to any axis, but to man, especially to the person entering the precinct through the propylon, the entrance gate. With them, the rectangular pattern had an entirely different origin and purpose; yet the resulting straight streets lent themselves well to the Roman purpose of axial organization.

The medieval towns cared nothing for such abstract formality, but they adopted the rectangular pattern because it facilitated subdivision. Never were streets emphasized by monumental *points de vue;* nor were places arranged symmetrically to streets. Where a market place was needed, one or more blocks were left open. If their streets were sometimes fairly straight and wide, it was hardly because of traffic needs but because they served an important function as firebreaks. In later periods, for instance, in the replanning of Russian cities during the eighteenth century, it was mainly for this reason that a checkerboard pattern of very broad streets was generally adopted.

The right-angled net of streets, so convenient for the surveyor, was found to be equally opportune for the builder. Bricks or paving blocks, boards or tiles, crossings of rails, or connections for an ever increasing number of pipes — everything was made to fit this most universal of standards. Finally, when traffic increased in speed and volume, straight streets were found eminently fit for rapid movement, and rectangular crossings the most practical for traffic regulation by red and green lights. Thus, the checkerboard pattern, originally developed for a now obsolete function — the division of acres for plowing — was again and again successfully adapted to new purposes.

VICISSITUDES OF THE CONCENTRIC PLAN This persistence of form despite changing functions is even more noticeable with the opposite type, the town plan determined by the circular form of the enclosure.

This type of plan can claim an ancestry no less venerable. If the rectangular division of land goes back to the plowman, the first round enclosure was the herdsman's pen. Today, in the Hottentot kraal, huts are built along the inside of the circular fence, with an open space for the herds in the center. The Scythians, in their camps, parked their wagons in the same way. Villages of the Western Slavs were similarly arranged,

with huts in a wide circle around the central commons and pond.

The circle, shortest line of enclosure, was as appropriate to keep the enemy out as it was to keep the cattle in. Walls of castles of refuge and later of cities were skillfully adapted to use natural defenses, and consequently their outline usually only roughly approximated a circle. But, wherever the city is viewed primarily as a fortress, the circle is regarded as the ideal form. This is evidenced not only by written and painted testimony but also by occasional realizations of the perfect circular wall, as in the ancient Hittite capital of Sendjirli, or in medieval towns, like Bergues in French Flanders, and Madrigal in Spain.

Whether the outline is mathematically exact or not, the circular pattern becomes more blurred as we approach the center. This is a visible expression of the fact that the plan originated with the enclosure and developed from the outside in.

It has been said that walls influence the city plan more profoundly after they have been torn down than when standing. Frequently, fortifications have been transformed into promenades surrounding the city or into a green belt. Because markets developed outside of several of the gates, it was felt necessary to connect these centers of trade with each other by circular streets. When railways appeared, their terminals were located at the edge of the densely built-up core of the old cities. The circular road following the old enclosure of this core gained added importance as a connecting link between these railroad terminals. Sometimes even a circular railroad was built along the line of the former enclosure. Hardly ever have these encircling belts been entirely obliterated.

Such is the tenacity of these simple geometrical forms, the circle, the straight line, and the right angle. They survive because of their adaptability. Forms more specifically adapted to their functions perish as soon as those functions become obsolete. The carefully calculated polygons of Vauban's fortifications have had to be destroyed at great cost, leaving no trace, while the primitive circles drawn by the medieval builder still have their use as voids, just as once they were used as solids. "Transposed" crossings, cleverly invented by city planners less than a generation ago were made obsolete by the

introduction of traffic lights; but these same traffic lights fitted perfectly into the old-fashioned rectangular street crossing. What will happen to our beautiful cloverleaves once our present system of motor traffic will have had its day?

Faced with an ever-changing world, the planner's task is not an easy one. How did the planners of old acquit themselves?

We have mentioned the fact that medieval city planners thought primarily of allotting parcels to settlers, a consideration that usually resulted in a pattern of roughly rectangular blocks. Their concept of the town as an agglomeration of residences for farmers and merchants, protected by a wall, reflected the social structures of the early Middle Ages when traveling craftsmen worked in the houses of their clients. In China, where guilds have always remained weak, this is still largely the case; and it is hardly an accident that Chinese cities show a similar pattern, though often on a much larger scale. But even in medieval cities, planned in the thirteenth and fourteenth centuries at a time when the guilds had become powerful and crafts could be practiced only in the shops of their members, there is nothing in the plans of our towns to indicate that streets were differentiated according to trade or profession, or that streets were designed to serve the traffic moving to and from the market.

Only in the Renaissance period did city planners develop a new concept. The city was to be surrounded by a polygonal wall, with radial streets converging toward the central market with a tower or castle in the middle. The radial streets were connected by secondary streets forming a series of rings concentric with the wall. The central market was to be reserved for the most valuable commodities, and secondary market places, distributed symmetrically halfway between the center and the periphery, were assigned to other commodities. A separate street was to be allotted to each trade. All of these traits were to be found in existing medieval cities, but the new scheme rationalized the type that had developed spontaneously. After 300 years, theory had caught up with practice.

The concept of the city as a complex entity now controlled every detail of the plan. Symmetrical places and streets were carefully designed, sometimes even at the expense of a reasonable shape of the building lots. Few cities were actually built

following *in toto* this elaborate scheme, but many of its elements were embodied in cities built during the following centuries. Especially did the central place with streets radiating from the castle become a favorite motif in many European capitals. Lord Baltimore's cavaliers transplanted it to our shores in their beautiful capital, Annapolis.

At the time when Renaissance architects were designing their "ideal" cities, the economic basis of the medieval city was already beginning to crumble. Craftsmen's guilds no longer monopolized the local market. Division of labor between cities was developing. Rich merchants, favored by princes, set peasants to work on industrial products. Factories and mills sprang up in the countryside. Alongside the merchants, a new upper class of civil and military officers and professional men appeared. As guilds decayed and free trade came into being, weaver's row and tinsmith's alley became mere names. Both the number and the size of trade establishments were constantly shifting. The importance of the market place decreased as permanent commercial shops handled an increasing share of business. The city wall, now of little avail against heavy artillery, was still a serious obstacle to expansion.

The old pattern, with its elaborate, carefully balanced specialization, had become obsolete. What was needed now was a city of a more uniform character. To most inhabitants — the merchants, the civil and military officers, the professional people — the house was now mainly a residence. Industrial activity was carried on largely outside of the city at the sources of waterpower. The needs of the remainder were so undifferentiated that all they asked for was the right to buy, sell, divide, and combine lots as the need might arise.

City planning ideas at the end of the eighteenth century reflected these simplified needs. As in the primitive agricultural town, the city was once more mainly an undifferentiated agglomeration of residences and was once more planned as an assemblage of rectangular blocks. Since no function was localized, there was no center, and there were no streets leading toward a center. All streets were about equally important and, therefore, were made equally wide. Sometimes diagonals were introduced, but as there was no particular spot to which they should lead, they were distributed according to an arbitrary geometrical pattern.

Schematic as this plan seems to be, it was quite well suited to city life as it existed at the time, lacking as it did any clear differentiation of function. But even while these plans were being translated into brick and stone, a new differentiation arose, more fundamental than anything previously known. For the first time in history, separation of residence and work place became general. More people now were drawn into the business center than had ever been attracted by the market. Huge industrial enterprises could no longer be fitted into the small blocks; railroads cut through the established street pattern; smoke and noise drove inhabitants toward the outskirts. Enormous agglomerations clustered around the centers of water-borne and railroad traffic and around the sources of raw materials and energy.

Throughout the Industrial Revolution, city planners had continued to extend their gridiron schemes, but at last a new pattern evolved in response to the new needs. As the residential city of the eighteenth century had resembled the primitive agricultural town with its rectangular pattern, so the localization of functions in the modern metropolis seems to reproduce on a gigantic scale the radial-concentric organism of the medieval city. Rapid-transit lines radiate from the central business district, just as streets had radiated from the central market. Freight terminals for bulky goods have taken the place of the markets formerly at the gates. Industries have been placed in separate zones, just as medieval craftsmen were allotted special quarters. The city wall has disappeared, but the modern city's services stop at the invisible city line, just as formerly protection had stopped at the wall.

Now, however, people live far removed from their work. White-collar workers employed in the business center live in suburbs made easily accessible by rapid transit. Some workers, enjoying reasonably permanent employment, settle around factories on the outskirts, in satellite towns, but the bulk of the workers' families prefer to be closer to the center in a location that allows them maximum mobility in seeking jobs both at the center and on the periphery.

With better understanding of the basic structure of the big city, we have invented new techniques to control it: land-use planning; use, height, and density zoning; protective green belts; green wedges and parkways; superhighways; integrated

systems of transportation; satellite towns; neighborhood planning; etc. While we are, here and there, beginning to use these tools to transform metropolises into livable places, their economic bases are shifting once again. With energy coming to be widely distributed by high-tension networks, sources of energy cease to be centers of attraction. As chemistry discovers uses for everything and makes "waste" an obsolete concept, nearness to sources of raw materials loses its compulsion. With intricate nets of railroads and highways, transportation acts to decentralize as well as to centralize.

As the majority of the population no longer lives on the land, cities begin to lose their age-old distinctive character as seats of the privileged. Industrial villages have grown into communities containing more inhabitants than many of the most famous ancient cities ever had. The old difference between town and countryside is beginning to disappear, and a new unit of human settlement is emerging: the industrial region.

But again the spiral is reversing. Within the region as a whole, functions are not yet localized. In many places throughout this superunit, industrial, business, residential, and even agricultural sections may appear. But the individual units, as well as the entire region, are on a vastly larger scale than anything previously known.

In retrospect, city planning does not seem to have been very successful. Almost invariably, the planners thought of one or two functions, forgetting others that soon became important. The rectangular plan was useful in many ways; but its basic concept of the city as an addition of individual units impaired any functional differentiation and hindered the development of definite centers.

The circular plan proved even more adaptable to various uses, but its basic concept of the city as a definite unit stood in the way of gradual growth. These cities could grow only by leaps and bounds. Until they had gathered enough strength for the leap, they almost suffocated in their enclosures. Nor has removal of the walls entirely overcome this hindrance. The broad boulevards, the parks, or the railroads that have taken their place still act as barriers. While on Manhattan's gridiron the shopping center shifts gradually northward on Fifth Avenue, in Vienna shops still hesitate to move outside the "Ring."

YESTERDAY AND TOMORROW

Yet, there were and are many old cities that are clear and beautifully articulated organisms, perfectly adapted to their functions and to their natural settings; but, with few exceptions, these are cities where the original plan has been all but obliterated by gradual change. We have objected to the concept of the "grown" city, but it must be admitted that the process has much in common with organic growth. It follows the line of least resistance; natural selection is at work. If a street is not used, neighbors encroach on it. Farmers driving to market avoid steep slopes, and the wheels of their wagons trace a street following the contours. There are community decisions also. A street is widened, or a new one is broken through to connect two important sites; a public building is erected in a conspicuous place; swamps are transformed into lakes or parks. There may even be undertakings of great scope, such as a system of superhighways or a central railroad station replacing a confused muddle of terminals and tracks. But all these decisions are made to answer problems as they come up; they are not necessarily part of any preconceived, comprehensive plan.

If the results of gradual adaptation have in the past been so much better than the results of most preconceived plans, should we not follow this method exclusively?

The old cities we admire today took a long time to reach their present perfection. Social changes were slow, and physical decay was rapid. Most buildings were constructed of wood or clay, and most streets were only dirt roads. The process of weeding out the unfit had time to run its course. "Organic" growth was possible. Today social changes are rapid, and our buildings and streets are made of solid brick, steel, and concrete. They remain intact long after they have outlived their usefulness.

Therefore, we can no longer wait for nature to take her course. *We* must take *her* course. We must learn to plan a city in the way it would have grown if it had not been planned—if it could have had the time to grow. This is not the prevailing concept of city planning. Most city planners of the past have approached the design of a city in the same way architects design an individual building or a garden. But the difference between an individual building and a city is not merely quantitative. The individual building provides for one social unit,

even though it may be a large corporation. In contrast, the city consists of a multitude of social units with ever-changing relations.

It is the task of the city planner to anticipate the needs of all these units and to co-ordinate the means of satisfying them. This he can do only if he is able to grasp not merely the changing intentions of men, but also the basic trends that determine these changes. He must be able to understand the ever-changing relations of social forces and of the physical environment in which these forces operate. Essentially, this is a historical approach. Although the city planner does not have to be a historian, he should be historically minded, for it is doubtful whether he can acquire this fundamental understanding without a knowledge of history, especially the history of his own field, the history of cities.

The city builder of old, in creating the framework for the life of his contemporaries, visualized his city as a three-dimensional organization of space and mass. When he designed places and streets, he saw clearly the simple spatial relations of the paved surfaces and the walls of the surrounding buildings. When he traced the city walls following the contours, he visualized the towers and gates crowning the hill. There was no hiatus between the technical and the artistic side of his work. Because his creation *was* clear and logical, it *appeared* clear and logical. Because it sprang from human imagination, it can, to this day, be perceived and enjoyed by human imagination.

Increasing division of labor has destroyed this natural unity of function and form. Street plans are drawn without any conception of the buildings that are going to line them. Every element of the city is treated separately, without visualizing its environment.

Today we must regain, by conscious effort, the essential unity of function and form. It is not a question of inventing a "city beautiful." It is a question of discovering the forms that will most clearly give expression to the functions of our cities, as the form of the old towns reflected their way of living. The social life of men is the specific side of nature that the city builder's art reflects. His task is the same as any artist's; as Albrecht Dürer put it: "For, verily, art is inherent in nature; he who can extract it therefrom will hold it."