



## FOR A UNIFIED PROJECT BETWEEN ROAD INFRASTRUCTURE AND THE CITY. LESSONS AND RELATIONSHIPS FROM MODERN URBANISM

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### ABSTRACT

This paper confronts theories and projects of modern urbanism to the possibility of a relational reading of the road infrastructures that drive and absorb the production and growth of Brazilian metropolises. First, some parameters and notions are proposed from which the aim is to interpret fundamental typologies of urban organization and expansion. Then, a review is made on seminal propositions of modern authors, marked by an integrated vision between architecture and infrastructure. Finally, articulations are made between the revised concepts and some general characteristics of Brazilian metropolises, pointing to design issues given by the confrontation between the field of the ideas and the concrete reality.

Keywords: Urbanism. Urban morphology. Urban infrastructure.

### RESUMO

Este artigo confronta teorias e projetos do urbanismo moderno à possibilidade de uma leitura relacional das infraestruturas viárias que impulsionam e absorvem a produção e o crescimento das metrópoles brasileiras. Em primeiro lugar, propõe-se alguns parâmetros e noções a partir dos quais visa-se interpretar tipologias fundamentais de organização e expansão urbana. Em seguida, realiza-se uma revisão sobre proposições seminais de autores modernos, marcadas por uma visão integrada entre arquitetura e infraestrutura. Finalmente, articulam-se possibilidades ensejadas pelos conceitos revisados a características gerais das metrópoles brasileiras, apontando-se questões projetuais dadas pela confrontação entre o campo das ideias e a realidade concreta.

Palavras-chave: Urbanismo. Morfologia urbana. Infraestrutura urbana.



## INTRODUCTION

The main Brazilian metropolises have a common conditioning element in their road infrastructure, which works as a basis for urbanization, for the accumulation of capital and for the differentiation of space necessary for the commercialization of land. The use of the automobile as a means of transportation by the population represents a dispute for displacement conditions, which Villaça (2001, p. 329) defines as the main “determining force in the structuring of the Brazilian intra-urban space”.

Given the high land prices in central regions and the low quality of public transport systems, basically structured road axes attract intense urban occupation, added to large volumes of traffic. Thus, initially peripheral roads, aimed at regional connections, industries and institutional enclaves, are encompassed by urban growth. They absorb, firstly, a population surplus that does not support central locations and, secondly, transport systems, which appear as a “by-product of the interurban system” (VILLAÇA, 2001, p. 82)

From this process, highways or expressways end up incorporating functions, dynamics and occupations characteristic of local roads, configuring what Domingues (2010) calls The Road Street. Marked by discrepant scales and flows, defined by the contrast between a vertical, hierarchical and rational order and a locally established horizontal order (SANTOS, 2002), the spaces delimited by these infrastructures are difficult to read and often identified with chaos, disorder or to error.

Aureli (2014, p. xiv) states that, from the inability of the field of architecture to produce a theory capable of dealing with such complexity, an interdisciplinary “hypertrophied encyclopedia” emerges. Which, however, is unable to grasp and describe the dynamics and relationships that configure these spaces, initially peripheral and later consolidated and distant from a traditional vocabulary, whether in technical or formal terms.

Thus, the question raised by Wall (2014, p. 218) is raised: “if highways are such an effective instrument in the urbanization of the city-region, what are their urban qualities?” Secchi (2014, p. 207) proposes an approach to the theme that, instead of repudiating the modern city, seeks to dialogue with its “morphological orders, settlement principles and their mutual relations”, overcoming sectorial views, seeking new syntaxes and dynamic understandings.

Thus, based on what Pope (2012) *defines as a Unified Project* between architecture and infrastructure, this article seeks to identify a repertoire oriented to road axes and the spaces related to them, understood as an opportunity for a striking type of urbanization on contemporary cities.

Here, the social conditions for the reproduction of urban space on which modernizing vectors focus are not ignored. Efficiently connected vectors, accessible to each other and that exclude large population contingents not inserted under the hegemonic circuits of capital. Nor is it underestimated the fact that inducing urban expansion (MAGALHÃES et al., 2012) has – in the articulation between the State, the real estate market and the infrastructure provision sector – a catalyst. Which drives the distension of urban fabrics and the formation of large voids, due to the speculative retention of land, industrial obsolescence and the closure of large walled occupations to the outside.

However, an understanding oriented to the conformation of the space resulting from these relationships is proposed, occasioned by seminal concepts and projects, whose bases can dialogue with the production of ordinary cities (WALKER, 2010) and peripheral metropolitan regions, marked by major road axes and infrastructure not compatible with central areas.

Therefore, a review is carried out on different patterns of settlement and urban growth conditioned by the road infrastructure; firstly, seeking to point out the

relationships they establish with the configuration of urban fabrics. Then, based on modern works and authors, theoretical-conceptual parameters are articulated to their physical-spatial developments, seeking interpretations of the urban form, not as a sum of constructed objects, but as a set of relations that organize space.

#### *Hierarchy vs. solidarity*

Based on their functional performance, large highways channel flows and increase vehicle speeds, making it possible to reach large distances in short times, what Secchi (2016) called tubes. These are axes that, through operations of specialization and sectorization, establish new relationships and hierarchies with their territory, programmatically separating themselves from their surroundings, accessed through large interchanges, loops or road needles.

The rationality that underpins the construction of these tubes meets the growing demand for mobility, through the construction of larger lanes and the definition of few and clear access points to the system, at increasingly higher speeds and at the expense of less connectivity. The separation and isolation caused by highly specialized and hierarchical infrastructures tend to create barriers and promote the construction of enclaves that deny any porous or permeable character to the territory.

An urban system or project antagonistic to this logic, therefore, non-hierarchical, more permeable and solidary, can be sought in what the author defines with the concept of sponge. In this concept, a diverse and dense network of smaller roads establishes greater contact with its substrate, its dwellings, fields, commerce and productive activities. The sponge is a type of resilient and adaptive surface, integrated into the territory, capable of self-regulating and modifying over time and suggesting the concepts of porosity, accessibility and permeability, as ways to absorb the demands of a multiple, complex and differentiated society.

Izaga (2009) uses the concept of adherence to refer to the degree of registration that a network has on the territory in which it is deployed. Low adherence would correspond to autonomous infrastructure linked solely to its own circulation rules, while high adherence would be associated with capillary qualities or solidarity with the territory and, therefore, with the potential to become more flexible, accessible and receptive to distinct activities and varied means of transportation.

According to Pope (2014), the mesh, or gridiron system, as an urban structuring scheme is an element of simplification and at the same time of distinction; prescriptive, but ambiguous, offering enormous interconnectivity, if read, beyond a reductive icon, as a diagram of diversity and complexity, in which, more than a particular design – straight or organic – it matters a logic, an internal organization.

This logic is found, for example, in Cerdà's extension plan for Barcelona (1859). In which, overlapping the territory outside the medieval city with a grid of 113 x 113 meters of axis, an organization of blocks was determined that would allow the equal distribution of services, roads and infrastructure, throughout the urban expansion. In this system, the understanding of what the city's morphology would be would not be linked to the architectural form, in the figure of large buildings, monuments and avenues, but associated with a diagram that would promote the proportional distribution of capital, resources, population and public policies, integrated by a homogeneous circulation system.

#### *A matter of scale*

Two reflections can be added to the two types of systems discussed – one hierarchical, specialized and linear and the other homogeneous, flexible and porous. These reflections allow us to relativize the conditioning of urban form by road infrastructure, represented in diagrammatic reasoning. The first is in what Aureli (2018) raises about an urban renewal process in Philadelphia, in the 1950s. Organized on

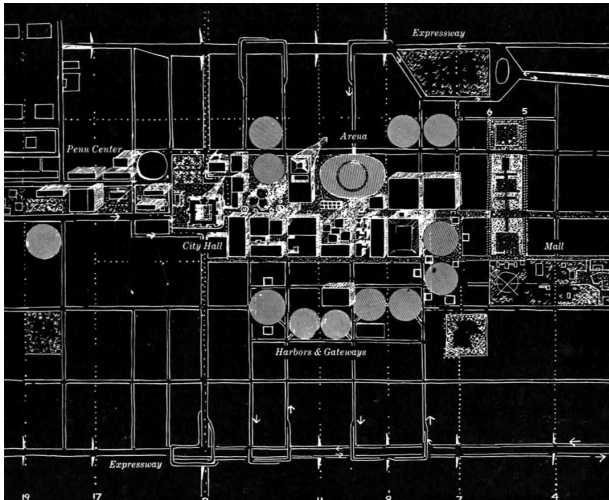


Figure 1. Downtown Philadelphia, by Louis Kahn. Source: Smithsonian, 1968.

the basis of an extensive orthogonal grid, the city had been going through a suburban growth process, in the post-war period, the which was tried to revert with investments in the Downtown, which would end up attracting financial capital and expelling economically more vulnerable populations.

In this context, Louis Kahn, observing the reticular organization of the central area and convinced that the main problem for congested traffic was the repeated intersections and stop points at every corner, designed a new circulation scheme for its streets. This system ranks speeds from the category of expressways to pedestrian lanes, to considerably reduce the number of intersections. Kahn also designs, around the intervention area, large cylindrical towers that would function as parking lots, encouraging the use of private cars and structuring the city based on the organization of flows. Within the perimeter delimited by the cylinders – or bays, as opposed to the rivers, which would be the expressways –, circulation would only take place on foot (Figure 1).

A second reflection comes from Secchi (2016), when commenting on the opposition between hierarchy and

isotropy, when opposed to different urban scales. The author states that, in an isotropic network, there are no prevalent directions; each point is equally connected to all the others, in a conformation antagonistic to the hierarchical one, which approaches, therefore, the qualities of porosity and adherence, relative to the gridiron system or to “spongy” territories.

Secchi observes that, between the two categories, there are no definite boundaries or clear separation, and that different territories or spatial organizations can be, at the same time, strongly hierarchical at a larger scale and considerably isotropic at a local scale, or vice versa. Thus, for example, an occupation based on settlements formed by isotropic infrastructure networks may be inserted in a territorial system whose general characteristic is nucleated.

This relationship can be found in a type of spatial organization that Pope called ladder<sup>1</sup>, exemplified by Hilberseimer’s project to transform the Marquette Park district in Chicago. Which consisted in the transformation of open and continuous meshes into closed units, with cul-de-sac roads, by eliminating essential streets and most of the intersections (Figures 2 and 3). This operation transformed a continuous grid into a series of isolated figures, connected to each other by arterial axes. Demolition after demolition, erasure after erasure, the area of empty space surpasses the constructed area and the ladder diagram emerges, as a hierarchical system, distributed from what Alexander (1965) called the “tree” configuration, composed of small sections of isolated grids.

In the described mechanism, the erasing of the mesh stops the continuity of what before, in a simplified but clear way, was constituted as an arrangement between space and form. The resulting configuration is formed by a linear axis, from which tributaries or “steps” stand out, closed in on themselves, which may eventually be the remains of a once continuous fabric that results obstructed, discontinued.

<sup>1</sup> Ladder resembles, in terms of urban organization, a “fishbone” scheme.

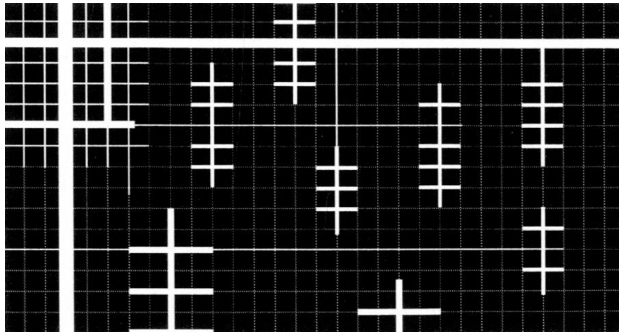


Figure 2. Ladder diagram. Source: Pope, 2014.

The author also alerts to the difference between a global scale and a local scale of organization, in the post-war metropolis, whose general form is perceived as fragile and disorganized, marked by wide voids and urban sprawl. The same metropolis, however, if observed from the internal order to the settlements that punctuate the great voids, is organized and delimited, composed of figures with more controlled and cohesive forms.

#### *Shape x space: expansion patterns*

Road infrastructure, in addition to increasing the efficiency of motorized traffic and optimizing travel between distant locations, had as its motto the expansion of urban occupation, carried out beyond the central regions, where they were implemented. No wonder that the notion of a blank slate, like a blank sheet on which ideas and designs are sketched, was sought as an ideal situation to explore to the full the potentials suggested by a cultural universe from which numerous conceptions of the city emerged.

Although urban expansion, guided by linear axes, can be used to seek principles common to several projects and theories, it cannot be said that today's large metropolitan highways strictly follow a specific model or proposal. However, it is interesting to seek commonalities between works that took speculation about new cities to an extreme, in a historical moment in which new possibilities were stubbornly explored. Keeping their specificities, different protagonists of modern urbanism proposed, each in their own way,

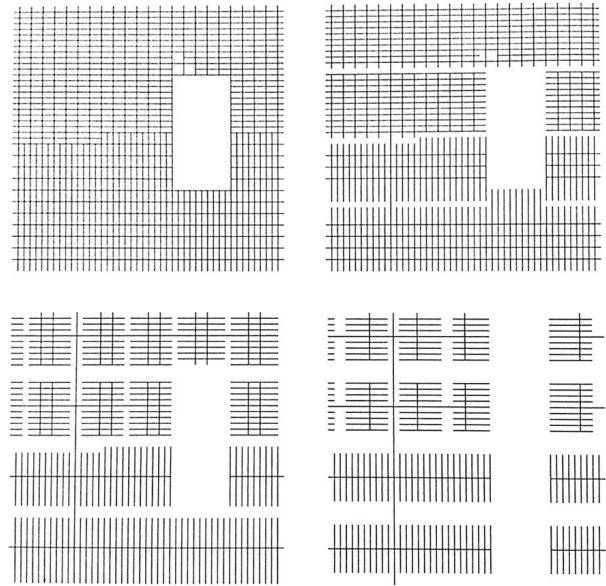


Figure 3. Marquette Park, Chicago, by Hilberseimer. Source: Pope, 2014.

city models that had as their mark the opening of the traditional urban fabric and the infusion of highly idealized concepts of space (POPE, 2014).

#### *Linear Models*

A kind of inversion between space and constructed form resides in the reductive organization of what Pope called ladder. What Köhler (2016, p. 175) calls “batch dissolution” is the subtraction of segments from a preexisting mesh, which remains residually, as a series of cul-de-sacs. These are, in turn, the terminal points of Hilberseimer’s Settlement Units, something like “settlement units”, whose main characteristic is a spatial organization always oriented from a main axis, from which transverse “spines” start, as parts elements of an urban scheme configured on the basis of a continuous and adaptable line.

The principle defined by Hilberseimer has as precursor the Linear City, by Soria y Mata, a variation of the Garden City, by Howard, whose structuring would derive essentially from the need for circulation. In Hilberseimer’s scheme, in turn, the basic occupation unit would have a preponderant role, from which the positioning of the buildings would determine the

general configuration of the settlements. Likewise, the dimensioning of the corresponding commercial, industrial, educational, community, agricultural and leisure zones would reflect the number of inhabitants and the total area of each unit, based on walkable dimensions (KÖHLER, 2016).

The arrangement of these spaces would obey a series of rules or parameters that should not, however, respond to predefined shapes, enabling the schematic and adaptive repetition of a basic element, along a continuous axis, although not necessarily straight. In this way, the new city of Hilberseimer would offer flexibility, adaptability to the topography, a modern, legible road structure and large open spaces, based on what Köhler called a mereological combination principle<sup>2</sup>.

Another city project whose basic structure would start from a main axis articulated to a sequence of transversals would be Rush City Reformed, developed by Neutra, in the mid-1920s (Figure 4). Strongly speculative in character, it was proposed as a regional city built from scratch, designed for a metropolitan region in the USA with a population of one million inhabitants.

In its configuration, this project included groups of commercial and administrative buildings along the main axis, with an underground railway and a lowered highway in relation to the pedestrian circulation level, on a higher level and would eliminate the need for level crossings. The perpendicular roads would be accessed by interchanges, giving access to green areas, parks, residential areas, industrial and community facilities (COLLINS e FLORES, 1968).

Both projects vertically separate the circulation categories, distributing different modals evenly, from superimposed large-scale reticulated systems. In addition, they use basic building typologies,

which allude to a generic and non-formalistic architecture, based on the principles of repetition and industrialization (AURELI, 2011).

Rush City pioneered the importance given to urban accessibility, which should arise from an integrated treatment of different modes of transport. Suburban trains, high-speed trains, automobile transport and even air transport should be distributed and communicated through large nodes that, as intermodal stations, would unify and interconnect the different systems (RIBEIRO, 2007).

In 1930, the Russian architect Leonidov, together with the OSA group, presented a hybrid proposal for the industrial city of Magnitogorsk, between a linear city and a reticulated city (Figure 5). Designed in fact as a sort of mesh contained between two longitudinal axes, this city was to be implanted in a rural and uninhabited area of socialist Russia. It would reflect, according to suprematist/constructivist principles, a series of logics that would enable urban dispersion and decentralization, moving away from the density and bourgeois characteristics of the liberal metropolis (COLLINS e FLORES, 1968).

Over 36 km, Magnitogorsk would be organized between two parallel lanes of transport, with residences and small-scale structures in the middle, public and leisure facilities on one side, parks and schools on the other, outside the main axes. The reticulated infrastructure would combine density and dispersion, landscape and urbanization, in an open system, with infinite growth, but contained in a kind of lane.

Unlike Leonidov, also Russian and theorist Milyutin designed, for a city that would house a tractor factory, what would be a type of linear city divided into parallel strips. Conceived as a “production line metaphor”, this city would be analogous to a “giant industrial plant” (COLLINS e FLORES, 1968, p. 63), with six linear

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<sup>2</sup> Mereology is the theory of part-to-whole and part-to-part relations within a whole.

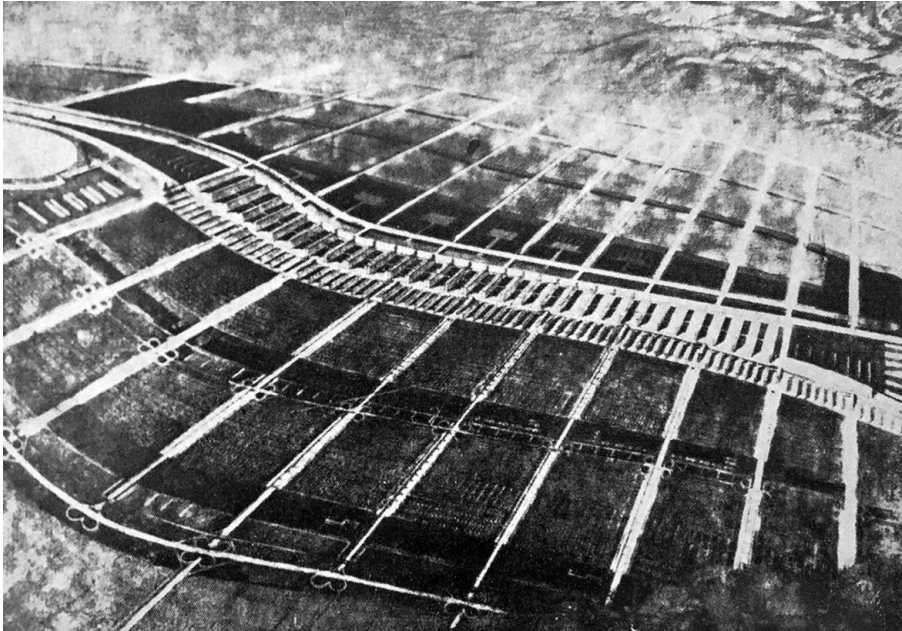


Figure 4. *Rush City*, by Richard Neutra.  
Source: Collins and Flores, 1968.

bands, without transverse axes or sequential variations, classified by their functions: railway, industrial zone, a green belt separating it from the next residential area, a highway and the park area, adjacent to the Volga River.

Milyutin's model was used by Le Corbusier in his creation of The Three Human Establishments, em que "centros radioconcêntricos de trocas", in which "radioconcentric centers of exchanges", commerce, "thought", administration and government, would be connected to each other by "linear industrial cities" (LE CORBUSIER, 1979, p. 85). The complex, in whose center there would be "agricultural exploration units", would also have axes of waterway, road and railway mobility, forming triangular compositions on a regional scale (BOYER, 1989, p. 89).

The idea of triangulation is the seventh of the ten "fundamental principles" of the Linear City of Soria y Mata, for whom "the rational architecture of cities" should adapt "to the environment created by geography and history" (TERÁN, 1964, p. 15), in an ideal city, oriented to circulation and decentralization, of unlimited proportions. Presented much more as a scheme, process or system, without the pretension of

consolidating itself as a resolved architectural form, the Linear City positioned itself in the urban debate under the connotation of an open and experimental proposal, radically opposed, by its basic principles, to the city nuclear, concentric (COLLINS and FLORES, 1968).

In this city-system, without limits to growth, all social classes would have a place, unlike what happened in the centralized, saturated city, which suffered from real estate speculation and the unequal distribution of property. A "countryside colonization" (RUBIO, 2017, p. 76) would act against the emigration of a rural and poor population to the city, in search of income and sustenance. Furthermore, it sought to combine agricultural work with the decentralization of industry, in addition to balancing the then-current opposition between the city and the countryside. Thus bringing, together with the means of transport, better housing conditions to peripheral regions.

However, the very recognition of the existence of a central city opposed by a peripheral one, added to the low density and reduced built-up volume of linear cities were reasons for criticism of the Soria y Mata

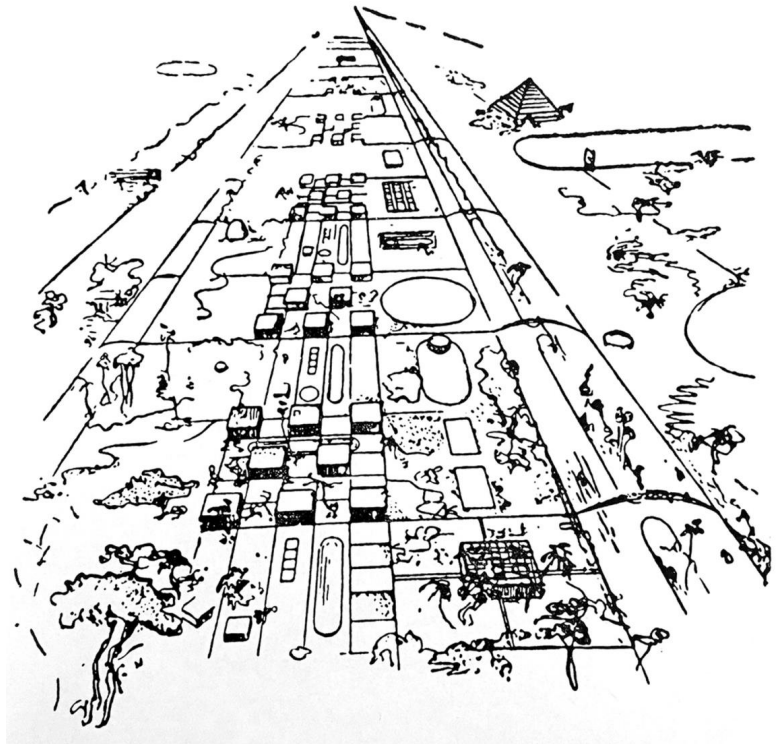


Figure 5. *Magnitogorsk*, by Ivan Leonidov.  
Source: Collins and Flores, 1968.

model. Due to its dependence on a more consolidated area, little autonomy and a pattern of occupation that was opposed to the very dynamics of the urban fact, making it no more than a “great populated road” (TERÁN, 1964, p. 17) or, in the words of Hall (2009, p. 131), an “urbanized suburban dormitory according to the laws of commercial speculation”.

#### *Nucleated models*

The Garden City model, although complementary to the linear one, can be opposed to it in at least two aspects. One in relation to its own dynamics as a theoretical system, more closed, autonomous and pragmatic. The second aspect is related to the nuclear and more isolated character, antagonistic to the continuity of the Linear City. The pattern of settlement and mobility in Garden City is directly linked to rail transport and a type of polynuclear urban expansion, reproduced in different parts of the world, especially after the end of the Second World War.

Howard, creator of the idea of Garden City, saw, in the industrial metropolis, problems related to excessive concentration, unhealthy conditions, unworthy conditions of housing, work and displacement of the population. However, he did not disregard the social virtues of the big city, where cooperation, human relations, science, art, culture and religion should be valued and combined with the qualities of the countryside. In a kind of third way that combined both in decentralized, self-governing and autonomous cooperative communities (HALL e WARD, 1998).

These occupations would provide housing, services, industry and employment, replicating, as they reached their limits, in other similar settlements. The conglomerate of small towns (Social City) separated by green belts would be the realization of the polynuclear configuration, combining urban virtues with those of the countryside, through the establishment of discontinuous and autonomous nuclei (HALL, 2009).



This configuration, however, had unforeseen consequences by the Garden Cities project, instigated by those interested in the possibility of profit and in the creation of neighborhoods that differentiated bourgeois and proletarian classes. Thus, garden suburbs were formed, served by rail transport, but without industries, which were decisive for the urban expansion reproduced from the second half of the 20th century, especially in Europe and the USA. However, to understand this pattern, a previous reflection on the modern city and the first railroad suburbs is necessary.

### *The mesh as a system*

Pope (2014, p. 22) uses the words of Krauss (1979) to refer to the gridiron system as supporting an infinite spatial field, which extends in all directions (Figure 6). This reading, defined as “centrifugal”, allows us to understand the urban fabric, as a principle of expansion and organizational logic, as a non-excludable scheme. To which any point or extension can be absorbed, without having to establish definite limits. Mesh coordinates, for which an exterior cannot be determined, are basically anywhere and everywhere.

Based on this scheme, a city could expand continuously, uninterruptedly. Rail transport made possible suburban nuclear settlements that, although they moved away from central regions, expanded under the same principles. That was how Rio de Janeiro in the 19th century, with the construction of the Dom Pedro II Railway – currently Central do Brasil station – expanded towards the north, originating small urban centers from train stations. In these places, large agricultural plots were allotted, lighter transport systems were added and urban expansion took on great proportions.

A similar process, however, on a much larger scale, took place, also beginning in the second half of the 19th century, in the region of Los Angeles and the San Fernando Valley, in California. Banham (2013) explains that the five railway lines – later replaced by express highways – that departed from the pueblo,

original occupation in the central city, heading north, south, east and west, delineated the form of its expansion, prefiguring a pattern of movement that would characterize it from then on

The allotment of land linked to the railway stations advanced quickly, intensified by the arrival of a large number of immigrants, who established urban centers with economic and institutional life independent of the central formation. Guided by real estate interests, the occupation of the region took place through the launch of an immense mesh infrastructure, unlike what prevailed from the second half of the 20th century. Since then, a discontinuous organization, closed and characterized by guarded condominiums, exclusive shopping centers and business enclaves, has been associated with the figure of the ladder, or of an occupation whose logic, opposite to the mesh and based on the reflections of Rosalind Krauss, Pope (2014, p. 162) classifies it as “centripetal”.

In the centripetal spatial arrangement, marked by a strong differentiation between urban form and space, or figure and background, more than an internal organization, an exterior is reproduced, an exterior, whose condition is vigorously associated with the term “residual” (POPE, 2014, p. 23). The author calls ellipses the spaces outside the formation protagonist of the ladder, inevitable by-products of centripetal development, what is left over, between road axes and enclaves closed in on themselves, in a permanent state of disorganization, or entropy.

### *The project as a strategy*

The intense process of metropolitan growth, especially from the second half of the 20th century, closely linked to the provision of road infrastructure, the maintenance of large urban voids and the functional compartmentalization of activities, produced intermediate, interstitial spaces, sometimes occupied, sometimes kept empty. However, always removed from the predominant logics of circulation of global hegemonic capital, internal control and surveillance,

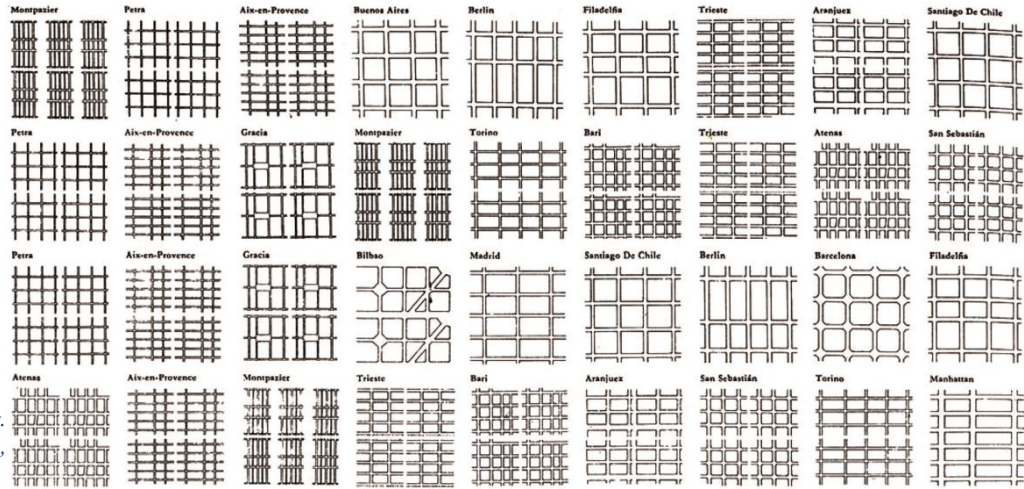


Figure 6. Urban reticles.  
Source: Solà-Morales, 2010,  
p. 60.

and accessibility via private transport. In addition to what is designed, controlled and predefined, plural organizations and dispositions have progressively emerged, whose forms and identities do not obey prescriptions, evolving far beyond what can be anticipated.

Given the heterogeneity of urban forms and perceived ways of life, and beyond a theory that proposed a lexicon in relation to the structure of consolidated cities, some authors sought to review modern urban thinking based on models and totalizations. Expanding the perception of urban form to the constant interference of the continuous flow of vehicles and people and the emergence of diffuse spaces, with imprecise limits, it is worth mentioning what Maki and Goldberg (1964) called Linkage in Collective Form. The authors pointed out exactly the instability generated by arrangements between buildings distributed amidst the large voids produced by open and sprawling forms, the megastructures or infrastructures and the condensed interstitial occupations and settlements, of small grammage and high built density.

In this sense, the idea of connection intends to go beyond mere linear connection, articulating layers, promoting reorganizations or catalyzing separate, individualized or forgotten spaces amidst vast

surfaces and urban spots. The actions of “mediation”, “definition”, “repetition”, “selection” and “route creation” (Figure 7) have a diagrammatic and somewhat abstract character. They seek to dialogue with highly idealized and specialized formulations of space, in an increasingly heterogeneous and complex society.

It is also interesting to consider the work of the Team X collective, as representative of an attitude of approximation “to the world of science, technology and production”. This, however, dispenses with great theories or prototypes, by adopting an “experimental and empirical method” that fits and applies according to each case (MONTANER, 2006, p. 31). Although heterogeneous in its formation<sup>3</sup>, the group – part of what is meant by a modern third generation – shows clear and intense attention to social and cultural plurality, at a time of increase in urban populations around the world.

This approach to architectural and urban design seeks to contemplate and condense everyday activities, avoiding compartmentalization or utilitarian determinations and considering the impossibility of imposing ways of life on volatile and heterogeneous groups. Concepts such as mat-buildings, clusters, webs and stems can be understood as non-formal occupation and growth strategies (WOODS, 1975), Their structural systems

<sup>3</sup> Its main core was composed of J. Bakema, G. Candilis, G. de Carlo, A. Van Eyck, Alison and Peter Smithson and S. Woods.

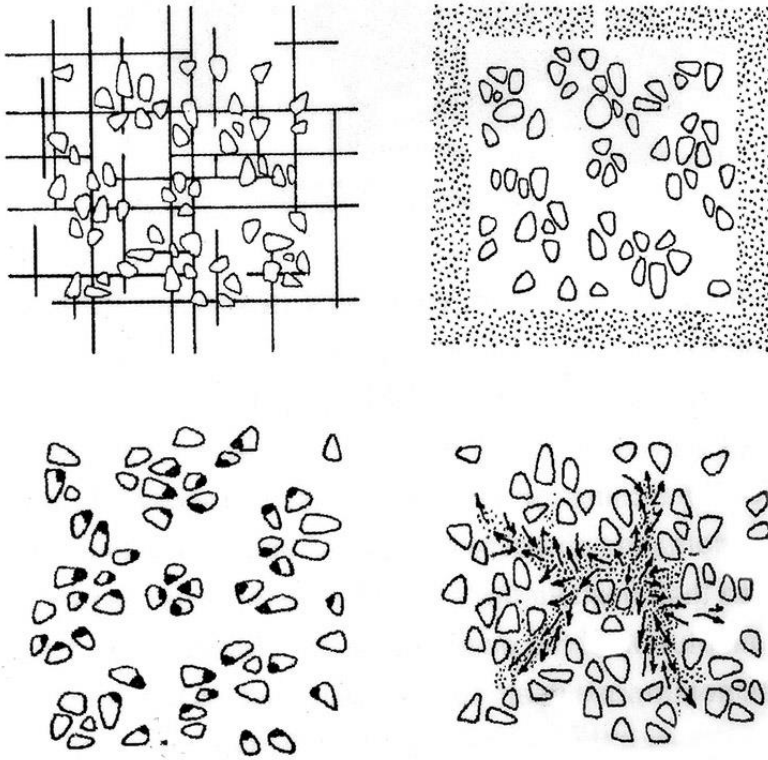


Figure 7. *Linkage*, by Maki and Goldberg. Source: D'Hooghe, 2010.

– adaptive, open and serial – absorb changes and internal reorganizations, dialoguing with the terrains, surroundings or pre-existences where they are inserted, consolidated or not. In this sense, the notion of limit becomes flexible and adjustable, opening up to the incorporation and redistribution of spaces, flows and uses over time.

Projects such as Berlin Hauptstadt, Bilbao Val d'Asua (Figure 8) and Toulouse Le Mirail overlay, on the linear and hierarchical logic of the road infrastructure, different layers of roads, buildings and vertical circulations, articulating high and low speeds, collective and private uses, large and small scales, in moments of transition and modal or spatial connection. Therefore, the project adopts, in opposition to typological or formalist approaches, a topological and infrastructural character, in which the architecture acts as a support system (RAMÍREZ, 2015) for contingent events and interactions. Thus, managing the contrasts between

different plans and conflicting logics, transcending the rigidity of administrative zoning and functional classifications.

#### *Spatial relations as an urban form*

The contemporary metropolis, which is constantly expanding and transforming, does not correspond to models nor is it composed of a univocal system of organization. In Brazil, as a rule, the pattern of transport and road expansion imposes itself, ignoring the prior character of the territories to which it urbanizes, as if they still pre-existed as blank slates. Thus, open spaces, areas that are incipiently occupied or even consolidated – although, in the latter case, they are often poorly structured – do not have their specificities and idiosyncrasies respected or considered by the processes of modernization and supposed development.

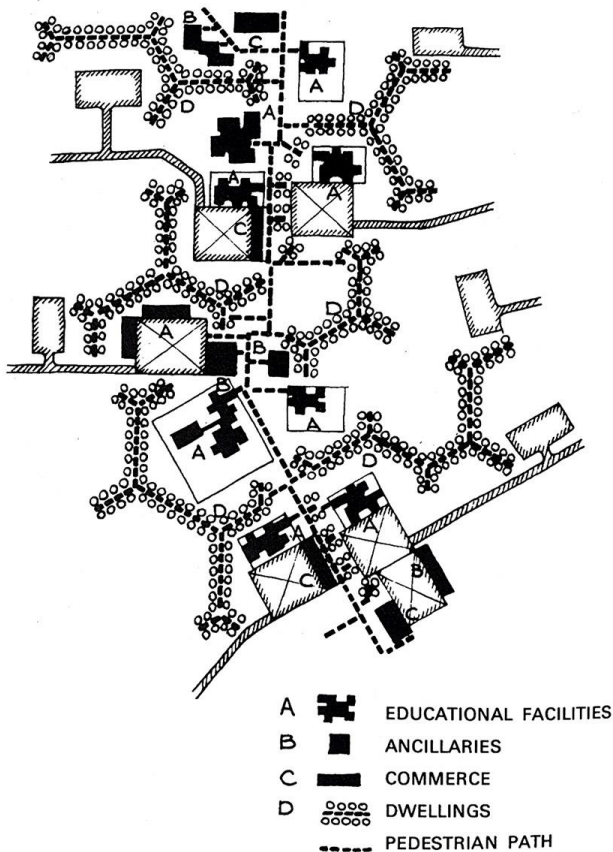


Figure 8. Bilbao Val d'Asua, by Candilis, Josic and Woods. Source: Woods, 1975.

Without project, dialogue or integration between the systems, generic and standardized road infrastructure is added and confronted with other types of infrastructure, fabrics or heterogeneous territorial matrices. Centralities, grids, occupations of organic design and small grammage, linear systems punctuated by isolated buildings, large residential, industrial or institutional enclaves, rural or precariously structured areas and environmental matrices overlap and juxtapose, independently and inadvertently.

Amidst disorganization and entropy (SANTOS, 2002; POPE, 2014), different logics of growth, mobility, occupation and use of space emerge, forming veritable territorial mosaics (LLOP e CARRASCO, 2016). The recognition of this fact can point, beyond parameters or absolute designs, to research on the understanding of relationships that, from the launch of urban

infrastructure, shape plural and heterogeneous totalities. In which the articulation between clashing scales, the continuity between separate parts and the integration between road hierarchies matter more than models, typologies, delimitations or specializations.

In this sense, the “operative diagrammatic conditions that create a certain formal and functional articulation in a system” (AURELI, 2014, p. xli) go beyond scales and constructed artifacts. An understanding of urban design and morphology that goes beyond a merely formal interpretation or the representation of a chaotic and shapeless condition of space can offer clues and insights on how to define and design the framework that at the same time separates and integrates the fragments of the real, dynamic and transitory metropolis. The bet on a review of projects and key concepts, therefore, seeks to contribute to this understanding.

## FINAL CONSIDERATIONS

The infrastructure can relate to the territory according to different logics, levels of interference and registration. Hierarchy, specialization, isotropy and adherence develop in patterns of growth and organization, pointing out different possibilities regarding mobility, occupation, interaction with the edges and limits and accessibility to the landscape.

Seminal works and concepts of modern urbanism, if understood in their origin and historical context and refuted – with the necessary reservations – to contemporary reality, can be repositioned and updated, in conjunction with the complexity of contemporary processes of production and transformation of urban space.

In this sense, it is worth reflecting: is it possible to go beyond a fragmented description of the metropolis, pointing out layers or properties that complement each other, as indices of coherent systems, in the midst of large, apparently misshapen or isotropic spots? Is it possible to distinguish overlapping logics of growth,

absorption and distribution of flows and adherence to the territory? Are there connection, transition or delimitation strategies between these layers, enabling their coexistence and their recognition as legitimate urbanization systems? Can geographic and local scales be integrated based on continuities or transitions between complementary infrastructures? Do projects and models offer lessons on how to design different city fragments, not in a totalizing way, but linked to infrastructure?

Modern authors are a fruitful source of design theories and strategies that, fueled by social utopias, took the genesis of urban form to its ultimate consequences. Faced with an insistent refusal by the field of architecture to confront emerging issues based on their own terms or knowledge, resorting to these characters and their production is a possibility for reviewing and recycling the understanding and possibilities of action on space. More than transposing their schemes and propositions applied to new contexts and the generation of definitive products, it is interesting to learn from their legacy a responsible experimental culture. A culture that is engaged and involved in increasing the vocabulary and the design repertoire for the future city and the next generations.

## REFERENCES

- ALEXANDER, C. A City is not a Tree. *The Architectural Forum*, v. 162, p. 58 - 62, 1965.
- AURELI, P. V. *The Possibility of an Absolute Architecture*. Cambridge: MIT Press, 2011.
- AURELI, P. V. *Habitando la Abstracción: Notas a Ladders*, de Albert Pope. In: POPE, A. *Ladders*. Houston: Architecture at Rice, 2014.
- AURELI, P. V. *Appropriation, Subdivision, Abstraction: A Political History of the Urban Grid*. *Log*, Nona York, v. 44, p. 139-167, 2018.
- BANHAM, R. *Los Angeles: a arquitetura de quatro ecologias*. Tradução de Marcelo Brandão Cipolla. São Paulo: WMF Martins Fontes, 2013.
- BOYER, M. C. *Mobility and Modernism in the Postwar City. Modernist Visions and the Contemporary American City*, Austin, v. 5, p. 86-104, 1989.
- COLLINS, G. R.; FLORES, C. *Arturo Soria y la Ciudad Lineal*. Madrid: Revista de Occidente, 1968.
- D’HOOGHE, A. *The Liberal Monument: Urban Design and The Late Modern Project*. Nova Iorque: Princeton Architectural Press, 2010.
- DOMINGUES, Á. *A Rua da Estrada. Cidades - Comunidades e Territórios*, Porto, p. 59 - 67, Dezembro 2010. ISSN 20/21.
- HALL, P. *Cidades do Amanhã: uma história intelectual do planejamento e do projeto urbanos no século XX*. Tradução de Pérola de Carvalho. São Paulo: Perspectiva, 2009.
- HALL, P.; WARD, C. *Sociable Cities: the Legacy of Ebenezer Howard*. Chichester: John Wiley & Sons Ltd, 1998.
- IZAGA, F. *Mobilidade e Centralidade no Rio de Janeiro*. Tese de doutorado - PROURB, UFRJ. Rio de Janeiro. 2009.
- KÖHLER, D. *The Mereological City: a reading of the works of Ludwig Hilberseimer*. Tradução de Verlag. Innsbruck: Bielefeld, 2016.
- LE CORBUSIER. *Os Três Estabelecimentos Humanos*. Tradução de Dora Maria de Aguiar Whitaker. 2ª. ed. São Paulo: Perspectiva, v. 96, 1979.
- LLOP, C.; CARRASCO, M. *Ciudades, territorios metropolitanos y regiones urbanas eficientes. Estrategias y propuestas de proyecto para la regeneración de la ciudad\_mosaico\_territorial después de la explosión de la ciudad: la Región Metropolitana de Barcelona como laboratorio*. Barcelona: Universitat Politècnica de Catalunya ; Lleida, 2016.
- MAGALHÃES, S.; IZAGA, F.; PINTO, A. L. *Cidades: Mobilidade, Habitação e Escala, Um Chamado à Ação*. Brasília: CNI, 2012.
- MAKI, F.; GOLDBERG, J. *Linkage in Collective Form*. In: MAKI, F.; GOLDBERG, J. *Investigations in collective form*. Washington: St. Louis, School of Architecture, Washington University, 1964. p. 25-52.

MONTANER, J. M. Después del Movimiento Moderno: arquitectura de la segunda mitad del siglo XX. 2ª. ed. Barcelona: Gustavo Gili, 2006.

POPE, A. The Unified Project. Architectural Design, New Jersey, n. 82, p. 80-87, 2012.

POPE, A. Ladders. Houston: Architecture at Rice, 2014.

RAMÍREZ, F. R. Un entendimiento infraestructural del proyecto arquitectónico. Tese de doutorado - Escuela Técnica Superior de Arquitectura de Madrid. [S.l.]. 2015.

RIBEIRO, P. P. A. Teoria e Prática: a obra do arquiteto Richard Neutra. Tese de Doutorado - FAU USP. São Paulo. 2007.

RUBIO, M. Á. M. La “Ciudad Lineal” alternativa al crecimiento imparable de la gran urbe actual. Estoa, Cuenca, v. 6, n. 11, p. 71-80, Julho-Dezembro 2017.

SANTOS, M. A Natureza do Espaço. Técnica e Tempo. Razão e Emoção. São Paulo: EDUSP, 2002.

SECCHI, B. El Espesor de la Calle. In: MARTÍN RAMOS, Á. La Calle Moderna en 30 Autores Contemporáneos y un Pionero. Barcelona: Universitat Politècnica de Catalunya, 2014. p. 203-207.

SECCHI, B. Isotropy versus Hierarchy. In: VIGANÒ, P.; FABIAN, L.; SECCHI, B. Water and Asphalt: The Project of Isotropy. Zurich: Park Books, 2016. p. 34-43.

SMITHSON, A. (. ). Team X Primer. Cambridge: MIT Press, 1968.

SOLÀ-MORALES, M. D. Cerdà / Ensanche. Barcelona: Edicions UPC, 2010.

TERÁN, F. D. Revisión de la Ciudad Lineal. Revista Arquitectura, Madrid, v. 72, p. 3-20, 1964.

VILLAÇA, F. Espaço Intra-Urbano no Brasil. São Paulo: Studio Nobel, 2001.

WALKER, E. lo ordinario. Barcelona: Gustavo Gili, 2010.

WALL, A. Flujo e Intercambio. La Movilidad como Atributo de la Urbanidad. In: MARTÍN RAMOS, Á. La Calle Moderna en 30 Autores Contemporáneos y un Pionero. Barcelona: Universitat Politècnica de Catalunya, 2014. p. 215-220.

WOODS, S. The Man in the Street: a polemic on urbanism. Victoria: Penguin Books, 1975.

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