

Reimaginar la VCI de Oporto: Una transformación urbana regenerativa

Reimagining Porto's Inner Beltway: A Regenerative Urban Transformation

MARCELA PERCÚ
TERESA CALIX

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Resumen

La Vía de Cintura Interna (VCI) de Oporto es una autopista urbana que, paradójicamente, contribuye a la integración y fragmentación del territorio. Su impacto urbano y medioambiental se extiende por una vasta zona a lo largo de sus bordes, amenazando los objetivos de descarbonización de la ciudad. Las autovías, un tipo de carretera asociada al uso masivo del automóvil, se han convertido en un factor determinante en la configuración del paisaje urbano, perturbando a menudo el tejido urbano y social. El modelo centrado en el automóvil ha tenido efectos medioambientales y sociales devastadores, creando barreras físicas y segregando a las comunidades. La adversidad de los desplazamientos peatonales es consecuencia de estas rupturas del espacio, que ahora es discontinuo y jerárquico. La urgencia de promover ciudades más sostenibles exige la consolidación de políticas urbanas que potencien el sistema de espacios colectivos, junto con la transición hacia alternativas de movilidad equilibradas e inclusivas. Esta propuesta apuesta por la regeneración del tejido urbano (y social) integrando el VCI y sus bordes en los sistemas naturales y urbanos de Oporto, recuperando la memoria del territorio y reforzando las relaciones de solidaridad entre comunidades.

Palabras clave: Vía de Cintura Interna de Oporto; Circunvalaciones metropolitanas; Infraestructuras viarias; Integración de infraestructuras de movilidad; Espacios públicos; Urbanismo regenerativo

Abstract

Porto's Via de Cintura Interna (VCI) is an urban motorway that, paradoxically, contributes to the territory's integration and fragmentation. Its urban and environmental impact extends across a vast area along its edges, threatening the city's decarbonisation objectives. Expressways, a type of road associated with the mass use of cars, have become a determining factor in shaping the urban landscape, often disrupting the urban and social fabric. The car-centric model has had devastating environmental and social effects, creating physical barriers and segregating communities. The adversity of pedestrian movements is a consequence of these ruptures in space, which is now discontinuous and hierarchical. The urgency of promoting more sustainable cities calls for the consolidation of urban policies to enhance the system of collective spaces, along with the transition to balanced and inclusive mobility alternatives. This proposal invests in the regeneration of the urban (and social) fabric by integrating the VCI and its banks into Porto's natural and urban systems, recovering the territory's memory and reinforcing relations of solidarity between communities. This research project, developed in the Integrated Master's Degree in Architecture at the Faculty of Architecture of the University of Porto, seeks to offer a plausible vision for restoring urban quality and street life, with the environmental goals of decarbonisation as the motto for urban regeneration centred on sustainable mobility.

Keywords: Porto's Via de Cintura Interna; Metropolitan ring roads; Road infrastructure; Integration of mobility infrastructure; Public spaces; Regenerative urbanism

Marcela Percú (Rio de Janeiro, 1977) is Architect from the Faculty of Architecture of the University of Porto. Currently a researcher at Lab2PT (Laboratory of Landscapes, Heritage and Territory) at the School of Architecture, Art and Design of the University of Minho. Master's Degree Project 'Along the Banks of Via de Cintura Interna: A regenerative proposal for Porto's urban fabric' was nominated for the EUMies Awards - Young Talent 2025. E-mail: marcela.percu@eaad.uminho.pt

Teresa Calix (Viseu, 1974) is graduated in Architecture (Faculty of Architecture, University of Porto-1998), Master in Urban Planning and Design (Faculty of Architecture/Engineering, Univ. of Porto-2002) and PhD in Architecture (Faculty of Architecture, Univ. of Porto-2013). She is associate professor at the Faculty of Architecture, Univ. of Porto, where she is currently the vice dean. She coordinates the Dynamics and Urban Forms Research Line among the PhD Architectural Program and the research group "Morphologies and Dynamics of the Territory" at the Centre for Studies in Architecture and Urbanism. She is also the head of the courses "Projecto 5"–Urban Design Studio – and "Urbanística 2" – Urban Theory – of the Integrated Master in Architecture. Furthermore, she is the coordinator of NEB Goes South, a network of schools of architecture created to broaden and enhance the international debate on co-designing sustainable solutions, an NEB Lab selected by the European Commission. E-mail: teresa.calix@arq.up.pt

Introduction: Road infrastructures in evolution

The Industrial Revolution radically transformed the shape and pulse of the city, in line with the mechanics of production and the demands of capital. Alongside the densification and expansion of urban centres, the initial wave of territorial growth followed a linear pattern, shaped primarily by the railway system.

The emergence of the automobile determines the expansion of industrial cities - whether through ring roads and green belts in medieval towns or by connecting urban cores with satellite cities - progressively imposing new demands on the city and territorial scales¹. The automobile revolution and its mass adoption led to a multiplication of possible destinations, drastically altering the logic of cities and complexifying the notions of road hierarchy, centrality, density and, in particular, distance. The process of urban expansion centred on individual transportation, driven by both planners and the market itself², implies the continuous reorganisation and construction of road infrastructures capable (in theory) of absorbing the flow and guaranteeing the efficiency of the distance-speed binary, resulting in uneven thickening and sprawl of the urban fabric³, a pattern that resonates with Dupuy's (1991) analysis of the structural logic of urban networks and their role in shaping contemporary urbanism⁴.

The 'Taylorism-Fordism-Keynesianism' triad that led the practices of modern urbanism produced the fragmentation of the mono-functional urban entity⁵ through a reductionist model centred on circulation and spatial segregation, severing the city's relationship with society⁶. This shift has directly impacted the quality and configuration of public spaces, radically altering them to the detriment of pedestrian use.

The resulting dissolution of urban form has erased historical values and symbolic meaning and led to the city's functional specialisation as 'operational landscapes' and general 'privatisation' of space, blurring the boundaries between rural vs urban⁷ and public vs private realms⁸. Streets and squares cease to be the central meeting places, dispersing the spirit of citizenship⁹.

The new cycle marked by globalisation introduces 'real-time' operation in an almost unified economic and financial space, reshaping the urban scale and its dynamics¹⁰. This third modern urban revolution brings forth new attitudes towards the future, which are associated with metapolitisation¹¹ and the transformation of mobility systems, as well as the emergence of individual time-space experiences and the redefinition of relations between individual, collective, and general interests.

With the changes in scale and operation modes, accessibility and mobility are key for exercising the 'right to the city'¹². The complementarity of transport modes - or intermodality - is a crucial aspect that must be provided to multimodal citizens traversing heterogeneous city fragments¹³.

The extractivist model led to the convergence of three global crises: global warming, the loss of biodiversity and the depletion of natural resources. In this context, the car-centric model and long-distance logistics place mobility at the core of the problem, recognising that emissions of polluting gases and soil sealing are directly linked to flooding, urban heat islands and soil degradation, threatening the balance of ecosystems¹⁴. Global commitments to sustainable development policies impose a worldwide agenda demanding urgent action to address climate change. This demands for reversing the automobile-centric paradigm, a challenge that requires interdisciplinary collaboration to implement holistic solutions within our shared habitat.

- 1 Françoise Choay, *The Modern City: Planning in the 19th Century* (New York: Ed. George Braziller. 5ª Edição: 1989. - 1ª Ed. NY, 1969), 11.
- 2 Peter Hall, *Ciudades del Mañana: Historia del urbanismo en el siglo XX* (Barcelona:Ed. Serbal, 1996), 58.
- 3 Neil Brenner and Christian Schmidt, "Elements for a New Epistemology of the Urban", In *The SAGE Handbook of the 21st Century City* (United Kingdom: LSE, 2017), 54.
- 4 Gabriel Dupuy, *L'urbanisme des réseaux, théories et méthodes* (Paris: Éditions Armand Colin, 1991).
- 5 François Ascher, *Metapolis: Acerca do Futuro da Cidade* (Oeiras: Celta Editora. 1ª Edição, 1998), 57.
- 6 Henri Lefebvre, *O Direito à Cidade* (São Paulo: Ed. Centauro. 5ª. Edição, 2008), 51.
- 7 Alvaro Domingues, *Paisagens Transgênicas*. (Finisterra, LVI - 118, 2021, pp. 9-24), 16.
- 8 Bernard Huet, "A Cidade como Espaço Habitável", *Revista Lotus Internacional* nº 41. Ed. Electra (1984): 85.
- 9 Daniel Innerarity, *Las ciudades en un mundo globalizado: hacia una nueva forma de ciudadanía*, (Erbropolis: 2008), 24.
- 10 Daniel Innerarity, *Las ciudades en un mundo globalizado: hacia una nueva forma de ciudadanía*, 59.
- 11 François Ascher, *Metapolis: Acerca do Futuro da Cidade*, 56.
- 12 Lefebvre, *O Direito à Cidade*, 117.
- 13 François Ascher, *Novos Compromissos Urbanos*, (Lisboa: Livros Horizonte. 1ª Edição, 2010), 140.
- 14 Helena Madureira, *Processos de transformação da estrutura verde do Porto*. (Porto: Revista da Faculdade de Letras — Geografia I série, vol. XVII-XVIII, 2001-2002, pp. 137 – 218), 140.



Figure 1. Schemes of Porto's Via de Cintura Interna: Surrounding the city center of Oporto and Vila Nova de Gaia. (Annual Average Daily Traffic on Porto's VCI in 2024: 132.600 vehicles – In:Porto Canal); traffic flows in territorial context refers to the original role of the ring road in Porto, linked with Arrábida and Freixo bridges and the major north-south axes, before the ring was completed in Vila Nova de Gaia in 2007; concentric scheme of Oporto's metropolitan area, indicating the outer ring road (CREP). Source: Cartograph by Marcela Percú.

Porto's Via de Cintura Interna: A case study

Conceived in 1954 as a Green Belt Avenue surrounding the most urbanised area of Porto, the Via de Cintura Interna (VCI) is now a 21km long urban ring road. Built in six phases since 1963, with the ring road conclusion in Porto in 1997 and its total closure in Vila Nova de Gaia only in 2007, it forms part of the road access system to the urban centres of Porto and Vila Nova de Gaia, and acts as a collector and distributor for the national road network [Fig. 1].

The subversion of its original design and the growing volume of car and heavy goods traffic have moulded its current road profile into one increasingly detached from the urban network. Paradoxically, this infrastructure, responsible for integrating and connecting the territory, is an element of radical disruption of the urban fabric, which Jane Jacobs refers to as 'frontier zone phenomena'¹⁵ proving to be a factor of spatial segregation and, consequently, social segregation.

The urban and environmental impact of this motorway is perceived at varying intensities, affecting a broad zone of influence along its perimeter. From an aerial perspective [Fig. 2.1], the motorway's high density and numerous intersections simultaneously enable fluidity and congestion. Due to the 80km/h speed limit, the acceleration and deceleration lanes along its access links require large non aedificandi areas.

From a ground perspective [Fig. 2.2], the motorway's incision, oblivious to what is happening on its edges, results in either abysses or visual barriers. The imposition of its logic and scale dictates the surrounding urban form and the positioning of adjacent buildings that border the road, in which acoustic barriers and lines of trees establish little or no space for mediation. Contrary to a design idealised for pedestrian and soft mobility, the continuity of the territory is just perceived by the 'car perspective', as the average speed of movement produces a visual reduction of distances¹⁶. Social housing buildings are predominant in the 'thickness' of the belt. It also hosts key urban attractors, including hospitals, universities and business complexes. However, circulation difficulties severely limit the effective catchment area of these facilities to the margin where they are located. Concepts

15 Jane Jacobs. *Morte e Vida de Grandes Cidades*. (São Paulo, Ed. Martins Fontes. 3ª. Edição, 2022), Parte 3, cap 14: A maldição das zonas de fronteira desertas.

16 João Miguel da Silva Leite. *Ruas emergentes: interpretação morfológica do contexto urbano português*. (Lisboa: FA. Tese de Doutoramento, 2016), 427.



Figure 2.1. Satellite view of Porto, showing the study area; Figure 2.2. Views of VCI taken by a pedestrian overpass in Paranhos; Views of VCI taken by Amial's social housing street. Source: Satellite views from Google Earth 2024 and pictures by Marcela Percú, 2024

like accessibility and inclusion remain incompatible with the conditions imposed by this infrastructure, which offers no provision for pedestrians or cyclists. Environmental degradation and pollution undermine the value of public and private heritage. Although many green spaces are along the VCI, they lack urbanity and do not offer suitable conditions for public use.

Currently, several public policies are underway at local and metropolitan levels, not only to reduce traffic but also to induce behavioural changes. Porto is a city with a lot of productive soil - such as urban gardens and smallholdings associated with rural paths - located in the interstices of built-up spaces. This characteristic is an opportunity to strengthen the relationship between human and natural communities, which already coexist in close physical proximity¹⁷.

Along the borders of the VCI: Plan and project.

It is essential to regenerate the VCI, redefining its performance on both the local and territorial scales.

At the macro scale, this requires declassification as a motorway, removing its crossing function and adjusting vehicle speed and flow. Considering the complementarity of the metropolitan network, the VCI can act as an intermediate intermunicipal road, catalysing urban development by enhancing and diversifying accessibility at its various nodes.

At the local scale, integration with the surrounding urban fabric and articulation between the road's edges depend on a modal shift from individual to collective transport, supported by high-capacity public transport. Multimodality must include options at the individual level, but rebalancing space among various travel modes is essential for effective decarbonisation. When combined with spaces of social interaction, sustainable mobility strengthens society's commitment to climate agreements and healthier ways of life.

The participation of city users is essential to fostering resilient and collaborative governance¹⁸, contributing to the creation of shared spaces that promote community engagement¹⁹. The population's recognition of the pre-existing cultural

17 Herbert Girardet, *Towards the Regenerative City* (World Future Council, 2013), 23.

18 João Ferrão, *O Ordenamento do Território como Política Pública* (Lisboa: Ed. Fun. Calouste Gulbenkian, 2011), 96.

19 Oriol Nel-lo, *A Cidade em Movimento: Crise Social e resposta cidadã* (Lisboa: Tigre de Papel, 2018), 144.

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and environmental value will permit communities to be involved in an ecologically viable, socially inclusive, and environmentally regenerative city project²⁰.

Given the scale and impact of this infrastructure, any intervention must be approached in phases, over the medium to long term. The project, aligned with the five core axes of SDG 11, must be adaptable and flexible, allowing for spontaneous solutions shaped by transience and local context. Its phasing must be open and responsive to take advantage of funding opportunities.

From the monofunctional road to collective asset: context, community and memory

The project's design pursues the idea that the VCI is a collective asset²¹ - not just for car users. As such, it should accommodate all modes of transport enabling all citizens to benefit from this infrastructure. The aim is, therefore, to increase accessibility by integrating different modes and speeds of mobility²².

This shift allows circulation spaces and, specially, the spaces between the infrastructure and built fabric, to be reframed as spaces for social interaction, acting as dynamic elements of the territory through design choices that prioritise community well-being and the creation of shared spaces. Bringing 'street life' back to the current VCI is both a guiding principle and a core objective.

The design of the intermediate space restores the organising role of green and blue structures to strengthen local biodiversity and foster the integration of urban ecosystems within the system of public spaces and mobility. It also reconnects fragmented paths, seeking to reweave the filigree of routes and revive the memory embedded in the landscape.

It is equally important to ensure that today's values - consumption, image and technology - do not jeopardise the values of the past - context, community bonds and collective memory - which still resonate within society²³.

Strengthening networks is also regarded as a cross-cutting objective of the proposal, by articulating natural and urban systems, in which the VCI is envisioned as a positive contributor, creating a more cohesive and sustainable urban network and improving urban metabolism.

The strategic objectives seek to materialise the basic principles of the intervention by:

- Enhancing the natural structure by rehabilitating streams and green areas, integrating them into a cohesive network of public spaces and sustainable mobility;
- Regenerating urban fabrics based on pre-existing structures, reinforcing historical connections and linking past and present developments;
- Neutralising territorial barriers, especially those associated with the VCI and its nodes, bringing together diverse functions and unlocking the area's urban potential;
- Improving accessibility through a variety of transport modes, promoting permeability for the flow of people, water and biodiversity in general;
- Providing housing and public amenities through equitable, balanced distribution, integrating emerging and established centres, and contributing to the financial effort of promoting and maintaining new permeable areas for collective use.

The regenerative proposal for Porto's urban fabric seeks to demonstrate the potential of the VCI and its edges for integrating urban ecosystems. This integration encompasses multiple layers of complexity, engaging communities through relationships of solidarity, urban dynamics, and the memory embedded in the territory. Collaborative action holds the potential to shape a more porous, inclusive,

20 Carina Folea Cardoso Paes. "Urbanismo Regenerativo: Novos paradigmas para a sustentabilidade urbana" (I Seminário Internacional de Arquitetura e Urbanismo. Cidades Inteligentes e Sustentáveis, 2021).

21 Oriol Nel-lo, *A Cidade em Movimento: Crise Social e resposta cidadã*, 102.

22 Nuno Portas and others, *Políticas Urbanas Vol II* (Lisboa: Ed. Fundação Calouste Gulbenkian, 2011), 65.

23 Elio Piroddi, "Dinâmica Urbana-Valores Históricos" (49° Congresso do IFHP- Roma, 2005), 6.

and resilient urban landscape. Therefore, beyond reversing the damaging effects of the VCI and restoring its edges, the primary goal is to reimagine it as a public space: shared, inclusive, and accessible to all. It should accommodate multiple functions and enhance quality of life and strengthen the sense of community.

The process involves re-signifying time, space and distance. Time is slowed down and synchronised with natural cycles. The revitalised space acquires an organicity reflecting the resilience of human relationships and nature. Distance incorporates the experiential dimension of movement with its variations and events. The envisioned transformation is one of a rigid infrastructure into an organic, sustainable system. Local actions at critical nodes reverberate across a broader scale, optimising the systemic functioning of the urban organism.

Methodological approach: understanding and serving the city

The analytical methodology is grounded in the commitment to understanding and serving the city and its citizens through an attentive and cautious approach to the richness of urban places, as the raw material of this collective endeavour²⁴.

It is essential to interpret the transformations, continuities, and absences within its urban fabric to grasp the territory in question- whose essence lies in its complexity²⁵. The approach is segmented to identify and characterise the specificities of the context. The diagnostic is based on the relational reasoning between the elements (both within and beyond the territory) that underpin the solutions and the overall strategy.

Structure, texture and context: an analysis based on narrative devices

To analyse the impact of the VCI on urban morphology - and the processes of 'fragmentation, discontinuity and heterogeneity' of the territory under study - the observation methodology considers three narrative devices: Structure, Texture and Context²⁶. These categories allow for identifying the distinctive characteristics of each autonomously and recognisable fraction of the territory, making them intelligible and thus open to targeted intervention [Fig. 3].

The characterisation of the VCI and its margins considered four themes - *biophysical and environmental support, urban fabrics, urban qualities and dynamics, and mobility and flows* - to encompass the different dimensions in presence and to support the prospective analysis [Fig. 5].

The analysis of the *natural support* focused on characterising the VCI's relationship with the *topography*, clarifying the disjunction between the logic of the road's construction and the morphology of its embedded territory. The *green and water structure* seeks to promote the sustainable use of the territory, minimising the road's impact on natural dynamics such as mobility, permeability, and percolation. The goal is to 'safeguard the biophysical support and quality of life of the population'²⁷ while addressing the challenge of 'understanding the active role of the urban ecological system and the quality of the landscape in structuring and enhancing urbanised areas'²⁸. The study focused on two key aspects of environmental quality: balancing and enhancing local biodiversity and 'understanding the urban condition of the 'green'²⁹ to ensure its functional integration within the ecological network. With the overarching aim of reducing the 'urban load' in ecologically sensitive areas, controlling soil sealing and preserving landscape values, the goal is to create a continuous ecological system composed of spaces that 'cannot be understood only as *non aedificandi* areas or as biophysical components', but as refuges within heavily urbanised environments, integrated on a territorial scale³⁰.

The analysis of *urban fabrics* and their qualities - "continuity and renewal, permanence and variation"³¹ - was conducted through formal decomposition

24 Manuel de Solà-Morales, *De Cosas Urbanas* (São Paulo: Ed. Gustavo Gili, 2008), 18.

25 Paola Viganò, *La Città Elementare* (Milão: Ed. Skira, 1999), 121.

26 Teresa Calix Augusto, "As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto" (Dissertação de Doutorado em Arquitectura, Faculdade de Arquitectura da Universidade do Porto, 2013), 498.

27 According to the objectives of the PDM 2021, in "Physical Support and Environment. Biophysical Characterization. Characterization and Diagnosis Report", April 2018, p. 30.

28 Nuno Portas and others, *Políticas Urbanas Vol I* (Lisboa: Ed. Fundação Calouste Gulbenkian, 2007), 75.

29 Nuno Portas and others, *Políticas Urbanas Vol I*, 75.

30 Nuno Portas and others, *Políticas Urbanas Vol II* (Lisboa: Ed. Fundação Calouste Gulbenkian, 2011), 192.

31 Philippe Panerai, *Análise Urbana* (Brasília: Editora Universidade de Brasília, 2006), 77.



Figure 3. Network of streets and public spaces without VCI and Built-up area showing the scar the VCI causes in the territory. In green, a sample of the interstitial spaces that result between the infrastructural axis and the built fabric. Source: Cartograph by Marcela Percú.

and by distinguishing the different values of the layers that constitute them. The approach considers the concept of the ‘hypertext’ that “explains the city-form of greater permanence”³², still legible today. The superimposition of this road as a new order over the existing one, realised in a fragmented way over time, exposes the process between the idea and its execution in the urban fabric³³.

The analysis by the ‘device’ *structure* leads to the identification of the ‘skeleton’, defined by Nuno Portas as “the definition of the various components and the way they articulate to create a single, recognisable whole”³⁴, based on its System of Collective Spaces. This framework incorporates the qualities highlighted by Panerai, including the “coordination and coherence underlying the elements that form a “whole”, [which] we associate with the production of significant effects of attractiveness or polarisation on the surrounding territory”³⁵.

Regarding *roads and public spaces*, the approach advocates for transforming infrastructure into integrated structure as part of the system of qualified collective spaces, capable of organising the territory and articulating with smaller-scale networks³⁶. While recognising the potential of autonomous transversal connections to enhance territorial cohesion, the analysis also identifies the emergence of regions governed by autonomous logic characteristic of the modernist fabric. This closed network model drastically reduces the number of connecting routes, increases the thickness of the barrier, and reinforces discontinuity, causing the urban network’s erosion process³⁷.

These processes, associated with the railway line, the road interchanges and the presence of large containers as an ‘equipped infrastructure crown’, determine a rigid interfacial relationship between the central core and the peripheral arch³⁸. Together with some ‘public spaces that are not really public’, the acquired thickness corroborates the fragmentation of the territory, which, together with the VCI system, forms insurmountable barriers³⁹.

The detailed examination of *pre-existing roads* [Fig. 4] aims to identify enduring connections between various urban nuclei and pinpoint disruptions that can be revitalised, enhancing territorial permeability and fostering increased interconnectivity and diversified movement patterns⁴⁰. Restoring these links avoids erasing historical values and relations between former urban occupations, currently at risk of permanently losing their identity⁴¹. The strategy is to densify the urban fabric based on a pre-existing logic rather than introducing elements foreign to the city’s nature. The analysis reveals fragmentation in the network of rural paths and traditional 19th-century blocks, often associated with old access routes to the city, as well as separations between social neighbourhoods. The objective is to guide urban design towards transforming a fragmented city into a recomposed and complex urban environment⁴².

Texture analysis involves recognising the ‘textile dimension of various urban materialisation scenarios’⁴³ to identify homogeneity in form, thereby enhancing

- 32 Nuno Portas, *Os Tempos das Formas. Vol.1: A Cidade Feita e Refeita* (Guimarães: DAAUM, 2005), 27.
- 33 Carlos Dias Coelho. “O Tempo e a Forma 2”, In: *Cadernos de Morfologia Urbana: Estudos da cidade portuguesa* (Lisboa: Editora Argumentum, 2014), 120.
- 34 Nuno Portas and others, *Políticas Urbanas Vol II*, 187.
- 35 Teresa Calix, “As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto”, 294.
- 36 Nuno Portas and others, *Políticas Urbanas Vol II*, 192.
- 37 Nuno Portas and others, *Políticas Urbanas Vol II*, 198.
- 38 João Rafael Santos. *Espaços de Mediação Infraestrutural. Interpretação e projecto na produção do urbano no território metropolitano de Lisboa*. (FA-UTL, PhD Thesis, 2012), 266.
- 39 Nuno Portas and others, *Políticas Urbanas Vol II*, 198.
- 40 Bernardo Secchi and Paola Viganò, *Spacial Strategic Structure Plan of Antwerp. Preliminary Project* (Antwerp, 2005), 123.
- 41 Elio Piroddi, “Dinâmica Urbana-Valores Históricos”, 6.
- 42 Elio Piroddi and Paolo Colarossi “The Urban Project: from fragmentation to recomposition”, In: *Architecture & Behaviour*, (Volume 7, nº 4. P. 367-374. 1991), 369.
- 43 Teresa Calix, “As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto”, 327.



Figure 4. Pre-existing roads remains and interruptions by the VCI; Porto's Photoplan 1958. Scale 1:2500; Aerial photo of Amial Social Housing and Monsanto Street connected by Silva Porto Street before the opening of the VCI (1940). Source: Cartograph by Marcela Percú. Porto's Photoplan n° 13 (1958) and Amial Social Housing (1940). © CM Porto Gisa Web.

the intelligibility of the area under study. The aim is to detect disruptions in morphological patterns, identifying the edges and then 'sewing' them together. By analysing different types of 'granulation', it becomes possible to highlight significant occupation sectors and provide typomorphological insights into urban fabrics. The primary objective is to delineate various fabrics to tailor design strategies that respect the unique character of each zone, considering both formal elements and land use⁴⁴.

Regarding the circumstantial and adaptable dimension⁴⁵, analysing *urban qualities and dynamics* focuses on identifying the relationships and specific points of connection between 'things and places'; it aims to facilitate a systemic treatment of the 'urban skin'⁴⁶. While previous examinations of structure and texture have delved into the intrinsic values of the urban form⁴⁷, context analysis explores how these relationships manifest externally, influencing and defining the area's identity from a relational perspective⁴⁸.

This approach aims to identify project opportunities by enhancing pre-existing continuity and cohesion, understanding the urban flows and dynamics resulting from the web of relationships between the elements, and considering their immaterial effects⁴⁹. Observing mediation spaces, material and functional quality and density and distancing, diversifying, or breaking relationships within the study area is instrumental in integrating the territory.

The *functional characterisation of collective spaces* considers the contextual layer and its potential as a connector (or repellent) between points. The VCI is already a 'green' belt, encompassing numerous open spaces. However, many of these spaces lack identity and are perceived as residual or underutilised areas. By reimagining these underused areas as 'pores'⁵⁰ and integrating them with public green spaces, they can acquire common meaning belonging to a single, recognisable whole⁵¹, establishing a cohesive green circuit. This integration enhances usability and accessibility, encouraging new pedestrian and cycling flows and, ultimately, strengthening the social network.

The *functional characterisation of the built environment* frames some key components, such as origins, destinations, and areas, exerting attractive or repulsive forces within the urban system. Notably, elements with catalytic influence - such

44 Vitor Oliveira and others, *O Estudo da Forma Urbana em Portugal*. (Porto: Universidade do Porto, 2015), 213.

45 Bernardo Secchi "Le Condizioni Sono Cambiate", In: *Revista Casabella*, (n° 298-299, 1984), 13.

46 Manuel de Solà-Morales, *De Cosas Urbanas*, 24.

47 Teresa Calix, "As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto", 363.

48 Piroddi and Colarossi "The Urban Project: from fragmentation to recomposition", 369.

49 Teresa Calix, "As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto", 367.

50 Bernardo Secchi and Paola Viganò, *Spatial Strategic Structure Plan of Antwerp. Preliminary Project*, 123.

Biophysical and Environmental Support



Topography



Green & blue structure



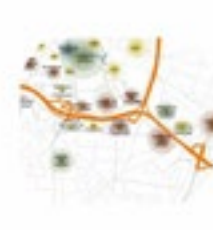
Urban green spaces



SEC



Building use



Communities and Activation Elements

Urban Fabric



Mobility and flows



Figure 5. Samples of the characterisation of the VCI and its margins. Source: Cartograph by Marcela Percú.

as the interplay between residential neighbourhoods, schools, and social support centres - are crucial, especially concerning their interactions across urban margins. This indicator can, therefore, consider relationships that have been hindered by the construction of the VCI and relationships that have not been established due to the difficulty of crossing the barrier.

The *Dynamising Elements* are focal points that exert significant influence over their surrounding areas, often serving as catalysts that radiate a symbolic effect⁵². These elements include public facilities, collective spaces, commercial and service hubs, and heritage buildings with potential for revitalisation. Some polarising facilities outside the belt were also considered, as they have a significant attractiveness⁵³.

Besides, the mapping of the *Communities* aims to identify neighbourhoods that have shaped the territory during urbanization pulses, recognized by distinctive characteristics that confer identity, making them locatable as references on the mental map and thus structuring the city⁵⁴. Empowering residents' associations is pivotal in strengthening community networks and advancing sustainable development. These associations serve as platforms for collective action, enabling residents to organise initiatives that address local needs and enhance communal spaces.

The analysis of *mobility and flows* reveals that the VCI handles more outbound than intra-urban traffic, highlighting the need to reevaluate and enhance the city's circulation framework. The objective is to "untie the knots" of the VCI, effectively incorporating it into a comprehensive "flow system"⁵⁵. Enhancing its role in multimodal travel requires addressing pedestrian accessibility, as current barriers can triple journey distances. Effective flow management will help identify ideal crossing points, increasing connectivity and urban permeability.

51 Nuno Portas and others, *Políticas Urbanas Vol II*, 187.

52 Kevin Lynch, *A Imagem da Cidade* (Lisboa: Edições 70. Ed. original: MIT, 1960), 59.

53 Teresa Calix, "As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto", 321.

54 Kevin Lynch, *A Imagem da Cidade* (Lisboa: Edições 70. Ed. original: MIT, 1960), 58.

55 Teresa Calix, "As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto", 313.

The whole through its parts:

Forces and effects - neutralization and potentiation

The problem was analysed by segmenting it into distinct fragments to comprehend the whole through its parts. Considering that the construction of Porto's VCI spanned 43 years—from 1963 to 2007—significantly influencing urbanisation dynamics and the fragmentation of the built environment, it was essential to examine the buildings - whether they were built before, contemporaneously or after the road - as well as their typology and function.



Figure 6. Strategy synthesis and the intervention action lines applied in a sector. Source: Cartograph by Marcela Percú.

The analysis distinguishes between the linear infrastructure of the road and its nodal points, recognising their distinct roles and impacts within the urban system. The 'line' is a connector materialising the 'tunnel effect', reproducing a gap between the connecting element and the concrete space it crosses⁵⁶. This structure produces significant attracting or repelling forces on the surrounding territory⁵⁷, which is directly associated with the effect on the banks. The nodes play a restrictive role in 'articulating points of access and intra and extraterritorial accessibility'⁵⁸ and do not materialise 'spaces of convergence associated with the building meshes'⁵⁹. Their influence is assessed through the lens of centripetal and centrifugal forces associated with the greater or lesser potential for relevance to the number of systems they articulate.

The examination evaluated elements based on their integration or alienation concerning topography, urban fabric, and the local road system. The different effects on the surroundings were identified by the points where there is potential for cohesion and the stretches where the road should be neutralised.

The strategic plan: heart, lungs and pulse

The strategic plan aims to transform the ring road into a unifying element that bridges the city's core with its peripheral areas to enhance accessibility and foster interactions, bringing distinct areas closer through expansion.

Two primary commitments guide this strategy: one focuses on the adjacent areas, and the other on the road infrastructure connections. This division facilitates phased implementation, aligning with territorial developments and allowing flexibility to seize emerging opportunities. Initially, efforts will concentrate on the margins, aiming to mitigate the ring road's divisive impact through targeted, cost-effective interventions. These actions intend to catalyse subsequent infrastructure enhancements. Thus, emphasising dynamic processes will be more important than constructing artefacts, advocating the reuse of existing resources whenever possible.

56 Teresa Calix, "As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto", 313.

57 Ibidem, 246.

58 Ibidem, 321.

59 Ibidem, 321.

Integrating public transport into the current road network is pivotal for the proposed territorial cohesion and urban regeneration strategy.

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Regenerative principles in a porous and resilient urban project

The proposal aims to foster a more cohesive, inclusive, and sustainable urban environment by embracing urban porosity⁶⁰ as a guiding design principle for integrating the urban and social fabric. By implementing a spatial strategy incorporating small, often underutilized spaces between structures, the plan seeks to enhance the interconnection between public and semi-public areas and between established and emerging urban centres. Regenerating Porto's urban fabric through the reinforcement of pre-existing structures not only preserves historical connections but it also enhances and densifies the network of capillary routes.

By providing new functionalities and modes of travel, including public transport, the strategy aims to provide equitable access to public spaces and mobility, embodying a democratic and diverse vision of urban space⁶¹.

Based on the analysis of the object of study, six structuring principles - *cohesion, sustainability, diversity, permeability, connectivity and memory* - will inform specific actions. By applying these principles, new urban networks will serve as connections and conductors for the movement of people and continuity of natural elements⁶², fostering cooperation from local to territorial scales. The urban insertion of the VCI must contribute to the five lines of action - *Road Structure, Green and Water Structure, Communities, Dynamising Elements, and Mobility* - that will enable implementation in an integrated manner throughout the execution phases [Fig. 6].

The dual nature of urban insertion - encompassing territorial and local dimensions — implies co-dependent actions across *macro, meso, and micro scales*. Addressing the different scales simultaneously offers a fractal global reading, in which the legibility of the principles is perceived from the general strategy to the action in localized interventions, strengthening urban resilience, inclusive accessibility and promoting local economy development by fostering 'small flows'⁶³. This process, flexible and broad in time, includes adaptations and steps backwards and forwards so that each phase can add value to people's well-being; it claims that transformations are a slow and non-linear process.

Three scales: city, neighbourhood and block

Macro-scale: urban plan and intermodality

The macro-scale intervention stems from the reading of the VCI in its connection with neighbouring municipalities and intra-urban dynamics. The distinction between the nodes' services and identifying the most urbanized sections were decisive in defining the proposal. Intermodal stations are proposed at strategic junctions associated with the high-capacity public transport and discourage further car access into the city. The intra-urban links were redesigned as gyratory blocks and integrated into the existing urban fabric, reclaiming extensive *non aedificandi* areas. The section with the most significant barrier impact is tunnelled, freeing up surface connections and enhancing local mobility. In the stretches where the VCI is in a trench, buffers are introduced to re-establish and extend connections between the divided edges.

The proposal for the VCI and its nodes [Fig. 7] seeks to balance the lines of action, positioning the green-blue axis as the aggregating element of the territory, rescuing the character of the green belt and connecting parks and public green spaces. This new 'structure' provides new opportunities for safe and smooth flows through diversified mobility systems, exploiting its potential for territorial cohesion.

Meso-scale: insertion into the urban fabric

The proposal has the most impact at the meso-scale [Fig. 8], with its insertion into the urban fabric and the local road network. Recovering old rural streets and paths

60 Bernardo Secchi and Paola Viganò, *Spacial Strategic Structure Plan of Antwerp. Preliminary Project*, 121.

61 Jan Gehl, *Cidade para Pessoas* (São Paulo: Ed. Perspectiva. 1ª Edição, 2014), 109.

62 Teresa Calix, *As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto*, 2013, 313.

63 Hidetoshi Ohno, *Empowering "Small Flows" in the urban fabric: experiences from Japan*. Field Actions Science Reports [Online], Special Issue 18, 2018.



Figure 7. The proposal Masterplan and the transformed interchanges. Source: Cartograph by Marcela Percú.

Figure 8. The proposal Sector Project: The coverings, public spaces and new equipment/housing connected by the ancient routes and cycle lanes. Source: Cartograph by Marcela Percú.

is fundamental in establishing autonomous local connections, extending dead ends, and resolving intra-urban service road rings. This approach aims to ‘control the coherence of the whole and the internal junction of the fabric’ in a manner consistent with the urban form⁶⁴. Recovering the metrics and alignments of the 19th-century subdivision⁶⁵ led to the design of the ‘new’ blocks and the implantation of new buildings in analogy with the existing fabric. The strategy facilitates the formation of small neighbourhood units to enhance mobility and safety for children and older people, foster community ties, and improve physical and mental health⁶⁶.

The multiplication of contact points along the VCI allows an extensive ecological network, adding naturalised watercourses and retention basins, expectant green areas and gardens. This continuous ‘green patch’ supports the cycling and pedestrian network with public transport stops, mobility hubs, and car parks converted into public spaces. The polarisation of the margins sought to reoccupy and resignify obsolete spaces, creating attractive spaces of urban and cultural value capable of bringing people from afar⁶⁷. The combined effects of macro- and meso-scale interventions have identified key drivers for micro-scale actions.

64 Elio Piroddi and Paolo Colarossi “The Urban Project: from fragmentation to recomposition”, 368.

65 Based on Telles Ferreira’s plan from 1892.

66 Jan Gehl, *Cidade para Pessoas*, 115.

67 Jan Gehl and Lars Gemzøe, *Nuevos Espacios Urbanos* (Barcelona: Ed. Gustavo Gili. 1ª Edición, 2002), 39.



Figure 9. The proposal for Regado's Neighbourhood and Urban Public Park, retaking the water lines to the surface. Before and after sections of the Cintura Interna's Avenue. Source: Cartograph by Marcela Percú.

Micro-scale: interstices and green pores

The micro-scale intervention focuses on ground-level design [Fig. 9], emphasising the pedestrian network's meticulous layout through connecting green pores - interstitial spaces, vacant courtyards and block cores - enhancing urban depth⁶⁸ through the permeability of building ground floors. The new profile of the VCI, consistent with a boulevard typology, aligns with the character and spatiality of different contexts. Through the composition of green corridors, permeable pavements, amenities and dynamizing elements, the design seeks to improve thermal and visual comfort, enrich soil quality, and invigorate street life.

On the micro-scale, through the programmatic distribution of the new buildings and the network of small public spaces, the aim is to foster community engagement and promote the circular economy through street markets, collective gardens and organic waste composting spaces. In short, initiatives that encourage the appropriation of spaces, restore urban soil, and neutralise the ecological footprint will also generate social relations and a way of life of mutual aid.

Intervention phasing: along the banks and the canal

The phasing strategy proved crucial to the proposal's viability considering two lines of action: on the VCI canal and, even more importantly, its edges.

As we have already mentioned, the initial action on the borders seeks to immediately reduce the width of the VCI effect through precise and inexpensive interventions, whose success is instrumental to consolidate the larger-scale intervention. The phasing thus initiates with low-cost, tactical urbanism measures that engage the community and optimise existing resources. The optimisation of resources exploits the different activity schedules, considering schools, street markets and forms of appropriation for leisure.

Slowing down and reducing volume of car traffic, promoting active and collective mobility, creating new green parks and restoring historic roads are all part of a process to gradually change the character of the VCI from a motorway to an urban avenue, with progressive decarbonisation.

68 Peter Carl "Type, Field, Culture, Praxis", In: *Archit Design* 81, 2011), 38-45.



Figure 10. The green and blue system, as a connecting interface. Source: Cartograph by Marcela Percú.

The final phases, involving the redistribution of flows through Porto to the future outer ring road, involve more extensive and resource-intensive projects, such as the development of green buffers, the creation of the tunnels and the redesign of the road links. This timetable considers the reuse of existing concrete structures up to the end of their service life, optimising resource utilisation and minimising environmental impact whenever possible.

The implementation strategy is, therefore, an essential element in guaranteeing the viability of this 'utopia', assuming a constantly evolving process.

Porto's Avenida de Cintura Interna: common habitat

An in-depth examination of the origin, evolution, and construction of the VCI was decisive in identifying the designs and distortions that have led to its hostile character today. In light of current notions of sustainability and livability, the diagnosis identified significant harmful effects of this motorway, such as poor environmental quality and the disruption of urban and social fabrics. However, the quality of the material - urban, natural and social - proved to be a strength and opportunity for the urban regeneration of the VCI. The multi-scalar design approach contributes to integrating the green and idle interstitial spaces between the infrastructure and the built fabric by renaturing and promoting new public spaces opportunities for neighbourly relationships, but also articulating flows at different levels - from everyday life to commuting in and out of the city. Therefore, the effort in designing the intermediate spaces on the edges of the VCI is essential for integrating and articulating the urban and social fabric, clarifying the structural natural/collective spaces and stitching the territory. Also, re-signifying its function beyond its technical condition offers a diversity of public uses, with transport, public spaces, activities and meanings,

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gathering civic and cultural dimensions. This approach demonstrates the mediator potential at both local and metropolitan roles, to become an element of territorial cohesion and promotion of urbanity.

Instead of the motorway, the surrounding green and blue system [Fig. 10] takes on the structuring role of a sustainable mobility network and public spaces, linking old and new centralities while reconnecting neighbourhoods and communities. The proposed green avenue is a shared urban asset and an integral part of the system of public spaces, serving as a circulation channel and a space for people to meet and spend time.

The urban rehabilitation of road infrastructure will remain a pressing and unavoidable issue, particularly amid the ongoing environmental crisis and the cultural and political transformations underway. Sustainable mobility plans are crucial to meet the evolving demands and emerging modes of transportation in the 21st century, promoting healthier lifestyles and ensuring everyone the right to the city.

This research has aimed to illuminate the intricate nature of urban mobility systems and to contemplate the values and concerns essential in devising solutions that serve the community, offering a grounded and sustainable vision for the future.

Autorship

Conceptualisation: MP and TC; Methodology: MP and TC; Research: MP and TC; Writing (Original): MP and TC; Writing (Review and Editing): TC; Supervision: TC.

Statement on the use of AI in the writing process

During the development of this work, the authors used the Chat GPT tool to assist in the text revision process. However, the suggestions made by the tool were not imported directly into the text, and the content was reworded by the authors. The authors assume full responsibility for the content of the published article.

Bibliography

Ascher, François. *Metapolis: Acerca do Futuro da Cidade*. Oeiras: Celta Editora. 1ª Edição, 1998.

Ascher, François. *Novos Compromissos Urbanos*. Lisboa: Livros Horizonte. 1ª Edição, 2010.

Ascher, François. *Novos Princípios do Urbanismo*. Lisboa: Livros Horizonte. 1ª Edição, 2010.

Brenner, Neil and Schmidt Christian. Elements for a New Epistemology of the Urban. In *The SAGE Handbook of the 21st Century City*. United Kingdom: Ed. LSE, 2017.

Calix Augusto, Teresa. *As morfologias da cidade contemporânea: Estruturas e Texturas. Uma matriz interpretativa da forma urbana. O sistema urbano do Porto*. Dissertação de Doutoramento em Arquitectura, Faculdade de Arquitectura da Universidade do Porto, 2013.

Carl, Peter. "Type, Field, Culture, Praxis", In: *Archit Design* 81, 2011.

Choay, Françoise. *The Modern City: Planning in the 19th Century*. New York: Ed. George Braziller. 5ª Edição, 1989. 1ª Edição, New York, 1969.

Coelho, Carlos Dias. *O Tempo e a Forma 2*. Lisboa: Cadernos de Morfologia Urbana: Estudos da cidade portuguesa. Editora Argumentum, 2014.

Dupuy, Gabriel. *L'urbanisme des réseaux, théories et méthodes*. Paris: Éditions Armand Colin, 1991.

Ferrão, João. *O Ordenamento do Território como Política Pública*. Lisboa: Fundação Calouste Gulbenkian, 2011.

Folena Cardoso Paes, Carina. "Urbanismo Regenerativo: Novos paradigmas para a sustentabilidade urbana" In: *I Seminário Internacional de Arquitetura e Urbanismo. Cidades Inteligentes e Sustentáveis*, 2021.

Geddes, Patrick. *Cidades em Evolução*. São Paulo: Papyrus Editora, 1994. Edição Original: 1915.

- Gehl, Jan. *Cidade para Pessoas*. São Paulo: Ed. Perspectiva. 1ª Edição, 2014.
- Gehl, Jan and Gemzøe, Lars. *Nuevos Espacios Urbanos*. Barcelona: Ed. Gustavo Gili. 1ª Edição, 2002.
- Girarded, Herbert. *Towards the Regenerative City*. World Future Council, 2013.
- Hall, Peter. *Ciudades del Mañana: Historia del urbanismo en el siglo XX*. Barcelona: Ed. Serbal, 1996.
- Huet, Bernard. "A Cidade como Espaço Habitável" In: Revista Lotus Internacional nº 41. Ed. Electra, 1984.
- Innerarity, Daniel. *Las ciudades en un mundo globalizado: hacia una nueva forma de ciudadanía*. Erbropolis, 2008.
- Jacobs, Jane. *Morte e Vida de Grandes Cidades*. Ed. Martins Fontes. 3ª. Edição, 2022.
- Lefebvre, Henri. *O Direito à Cidade*. São Paulo: Ed. Centauro - 5ª. Edição, 2008.
- Lynch, Kevin. *A Imagem da Cidade*. Lisboa: Edições 70. Ed original: MIT, 1960.
- Nel-lo, Oriol. *A Cidade em Movimento: Crise Social e resposta cidadã*. Lisboa: Tigre de Papel, 2018.
- Ohno, Hidetoshi. *Empowering "Small Flows" in the urban fabric: experiences from Japan*, Field Actions Science Reports [Online], Special Issue 18 | 2018Panerai, Philippe. *Análise Urbana*. Brasília: Editora Universidade de Brasília, 2006. Edição original, 1999.
- Oliveira, Vitor; Marat-Mendes, Teresa and Pinho, Paulo. *O Estudo da Forma Urbana em Portugal*. Porto: Universidade do Porto, 2015.
- Piroddi, Elio. "Dinâmica Urbana-Valores Históricos". In: 49º Congresso do IFHP- Roma, 2005.
- Piroddi, Elio and Colarossi, Paolo. "The Urban Project: from fragmentation to recomposition". In: Architecture & Behaviour, Volume 7, nº 4. P. 367-374, 1991.
- Portas, Nuno. *Os Tempos das Formas. Vol. 1: A Cidade Feita e Refeita*. Guimarães: DAAUM, 2005.
- Portas, Nuno; Domingues, Alvaro and Cabral, João. *Políticas Urbanas Vol I*. Lisboa: Ed. Fundação Calouste Gulbenkian. 4ª Edição, 2007.
- Portas, Nuno; Domingues, Alvaro and Cabral, João. *Políticas Urbanas Vol II*. Lisboa: Ed. Fundação Calouste Gulbenkian, 2011.
- Santos, João Rafael. *Espaços de Mediação Infraestrutural. Interpretação e projecto na produção do urbano no território metropolitano de Lisboa*. FA-UTL, PhD Thesis, 2012.
- Secchi, Bernardo. "Le Condizioni Sono Cambiate". In: Revista Casabella, nº 298-299, 1984.
- Secchi, Bernardo and Viganó, Paola. *Spatial Strategic Structure Plan of Antwerp. Preliminary Project*. Antwerp, 2005
- Silva Leite, João Miguel. *Ruas emergentes: interpretação morfológica do contexto urbano português*. Lisboa: FA. Tese de Doutoramento, 2016. Solà-Morales, Manuel de. *De Cosas Urbanas*. São Paulo: Ed. Gustavo Gili, 2008.
- Viganò, Paola. *La Città Elementare*. Milão: Ed. Skira, 1999.