

Mobility Infrastructures, Ambivalent Spaces? A morphological approach.¹

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ABSTRACT

The contemporary urban territory incorporates a complex and vast number of different development modes. Urban growth according to the logic of contiguity of urban fabric is broken, especially with the democratization of access to the media, the car initially (2nd quarter of the twentieth century) and more recently the internet. The urban fabric is consolidated in areas near the mobility infrastructures, establishing through them the continuity relationships. The infrastructural network assumes a particular relevance in the structure and organization of urban space today.

Thus, observing the current Portuguese urban context is noticed that one of the networks that had more impact, even today, morphologically speaking, in the hierarchy and structure of the territory is the roads network. With the accentuated urban growth seen in Portugal since the last quarter of the twentieth century, several national roads became embedded in metropolitan systems and dynamics. Moreover, in the last 30 years was introduced in the urban territory a second and wide network of high mobility roads, highways, which combined with the national roads created a vital system to the Portuguese urban fabric functionality. This initiated urban metamorphosis processes on pre-existing roads, presenting them with new urban and morphological characteristics, in accumulation with its primary function, the connection of urban areas. On the other hand, in the surrounding areas of high-speed mobility infrastructures there are also changes in the processes of urbanization and therefore on the morphologies that accompany them. The mobility axes are, in our days, more than simple communication channels. They are urban elements compounds, with hybrid character that incorporate multiple functions and characteristics including contradictory ones

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The article presents some examples of infrastructural elements, of road genesis, located in the Lisbon Metropolitan Area, exposing some transformation processes that were incorporated in recent years and how this had an impact on their morphologies, generating hybrid urban spaces with dubious definition. This article, therefore, contributes to discussion on the emerging values that urban elements introduce in the contemporary territory, and how its apparent ambivalence may allow re-focus the discussion around what role should these urban elements have on the re-definition and structuring of urban territories in the near future

KEYWORDS

Roads; Streets; Morphology; Hybrid Elements; Ambivalent Spaces

1 INTRODUCTION

These days, the City and the Urban Space live moments of profound transformations of urban fabric growth processes. This developed according to different logics, breaking relations of contiguity between the different fragments of urban layouts². The continuous urban mosaic finishes, just as if it were a puzzle that scatters its pieces throughout the territory.

"The transition from City to the Urban dragged a profound metamorphosis of the city: the centripetal, changes to centrifugal, from limited and contained, to something without boundaries, of cohesive and continuous, became diffuse and fragmented; Space legible and structured has become a field of forces organized by new mobilities and spatialities(...)"³

This reality begins to occur intensely in the first quarter of the twentieth century, with increasing development since the turn of century to the present day. First, urban models linked to the Modern Movement, followed by democratized access and use of car, as a preferred vehicle for individual travel, causing a paradigm shift in city growth modes. The urban fabric atomizes itself, metastasizing the territory with numerous fragments. The metropolitan space starts to mix and overlap

² "We fail to understand the urban area as a continuous structure with a recognizable form and come to see it as a system of relations between autonomous parts (...)" (author's translation) in PORTAS N, DOMINGUES Á, CABRAL J (2011) Políticas Urbanas II: Transformações, regulação e projectos. CEFA/FCG, Lisboa. 167.

³ DOMINGUES Á (2010) Rua da Estrada. Dafne Editora, Porto. 13-14.

simultaneously uses and forms that are urban and non-urban⁴, emerging *transgenic*⁵ urban environments that consequently led to different morphological understandings, different patterns of urban development. The continuity relationship between the various urban fragments, seek to get established through mobility infrastructures. The distinct pieces of the urban puzzle, joined now through ropes that cross the territory and thus take advantage of a better position in the binomial location/accessibility.

The communication infrastructures, roads, railroads, or even more recently, digital as the Internet and mobile communications⁶ play then a vital role in the efficiency and to structure the urbanized territory. It is common to observe in contemporary urban territory, specifically along the mobility axis, several pieces of urban fabric attached to them in various ways, types and with specific intents. The mobility infrastructure currently incorporates new skills, accumulating to its primary function, of connection axis, the support function⁷.

In consequence of these events it's observed the occurrence of a group of urban formations with a linear character that in an increasingly significant way, compose and structure large urban areas.

In the Portuguese urban context this phenomenon also occurs, especially over the last four decades. After revolution of April, the growth of urban areas in Portugal happens intensely, supported in many cases by pre-existing networks of national or regional roads. Several roads sections in metamorphosis process and are assumed as reference axes for urban expansions or simply incorporated into the metropolitan urban fabric. Old mobility infrastructures assert themselves today

⁴ MORGADO S (2011) Lisbon: Metropolis and Urbanised Landscape. in RIO FERNANDES J, CRAVIDÃO F, MORAES VALENÇA M (eds) Urban Developments in Brazil and Portugal: Studies of Portuguese-Speaking Countries Series/2. Nova Science Publishers, New York. 2011. Cap.5. 3.

⁵ "Transgenic in the sense of genetically manipulated, is used to overcome the conventional metaphors of hybrid and hybridization, obtained from the crossing of two distinct species. The transgenic doesn't arise by crossing two organisms, but by recombination of genetic material from two or more organisms." (author's translation). Concept of *Transgenic* exposed in DOMINGUES Á (2008) Urbanização Extensiva: Uma nova escala para o planeamento. CITTA 1st Annual Conference on Planning Research. Porto. 15.

⁶ GRAHAM S, MARVIN S (2001) Splintering Urbanism: networked Infrastructures, Technological. Routledge, London & New York.

⁷ The qualities of support and connection are regularly associated with classic street definition. It establishes a parallel between these emerging urban elements and the consolidated urban element - Street.

"(...) It is from the time when a path serves supporting constructed plots and simultaneously allows moving up to the neighborhood, then this element acquires the name of Street. Evidence of street is this double feature: path and construction support". (author's translation). in PANERAI P, MANGIN D (1999) Project Urbain. Éditions Parenthèses, Marseille. 57-58.

as structures with urban character, as fundamental urban elements to understand the current urbanization process.

As such, and considering the Portuguese urban background, in particular the Lisbon Metropolitan Area, the article focuses on these emerging urban elements, dissecting some of their morphological and functional peculiarities, emphasizing certain characteristics which constitute themselves as ambivalents or even contradictions.



Fig. 1: Vila Real, fragment urban fabric | Source: Domingues, 2006.

2 LINEAR FORMATIONS, FABRIC COMPOSTIONAL STRUCTURES

Despite the wealth of phenomena that occur in urban Portuguese, it's pertinent to observe a particular detail the cases of *Linear Formations*⁸. These types of urban structures remind us, in a sense, to a contemporary reinterpretation of the urban element *Street*. Mainly to the streets of exceptional character, streets that assume the role of aggregator link between different homogeneous zones, constituting as hinge element between different types of urban forms.

⁸ It's understood as Linear Formations an urban element composed by a group of mobility infrastructures which together or individually, constitutes an element with unique character, linear, aggregating and structuring various urban fragments and providing the whole one cohesive urban structure.

Furthermore, it is noted the relevance of the street, as most common elements in the production of public space within the city of Portuguese cultural matrix.

Thus, by analyzing some of these emerging elements is verified that these often also play a role in structuring and aggregation of fragments allowing the urban fabric to expand, or rearrange, along the territory without compromising its competitiveness and relationship of continuity with the remaining tissue. Such characteristics make the infrastructure a structure, a skeleton that binds several components, articulating them and creating a whole one and recognizable.

It's observed that these axis are also in a way increasingly significant new urban centralities⁹, not only because of the type of uses that generate and aggregate around them, but also because they contribute to a better structure and hierarchy of the territory, at the same time provide high levels of accessibility. The urban form that emerges is diverse¹⁰, establishing different relationships between the fragments and the infrastructure. Moreover the very early form of infrastructure, highway, national road or railways, causing different types of links between its own structure and surrounding fabric, while maintaining the linear and/or filamentary character and identifying the infrastructure as part of the whole vertebral system¹¹.

Metropolitan systems such as the northwest region of the country reflect several examples of this phenomenon. The lands surrounding the Cavado, Sousa and Ave river valleys, have diffuse urbanization, based on a wide capillary network of national and municipal roads that have served over the past decades as support for urbanization¹². The density of roads and their distinct hierarchies makes the infrastructural network the vital base to support urbanization, commonly being compared by some authors with *filigrana*¹³. However there are a set of axes that concentrate themselves higher relevancy in territorial structuring, supporting activities of greatest influence. Cases like the N14, Maia-Trofa-Famalicão axis or N207, Ermesinde-Paços Ferreira-Freamunde axis, exemplifying how various activities are concentrated along them ranging from small unit housing, commerce,

⁹ VECSLIR L (2007) Paisajes de la nueva centralidad. in URBAN 12. DUOT/ETSA/UPM, Madrid, 34-55.

¹⁰ SOLÀ-MORALES M (1997) Las formas de crecimiento urbano. Edicions UPC, Barcelona.

¹¹ Antonio Font, Lorena Vecslir e Oscar Carracedo, rehearse a possible classification of two types of Linear Formations: *Filaments* or *Linear Polarizations*. in FONT A, VECSLIR L, CARRACEDO Ó (2007) Morfologías Metropolitanas Contemporáneas: Los territorios morfológicos / Contemporary Metropolitan Morphologies: Morphological territories. in FONT A (ed.) L' Explosión de la Ciudad: Transformaciones territoriales en las regiones urbanas de la Europa Meridional / The Explosion of the City: Territorial transformations in the South Europe Urban Regiones. Ministerio de Vivienda, Madrid. 336 - 345.

¹² SUCENA GARCIA S (2007) Exploring Landscape in the "Non-Metropolitan Conurbation of River Ave's Valley. 4th Internacional ISUU Conference. Delft. 172-178.

¹³ Analogy with local jewelry technique - filigrana

industry, leisure or even logistics platforms. Everything hangs on an axis, forming the urban fabric in a linear stretching for many kilometers¹⁴.

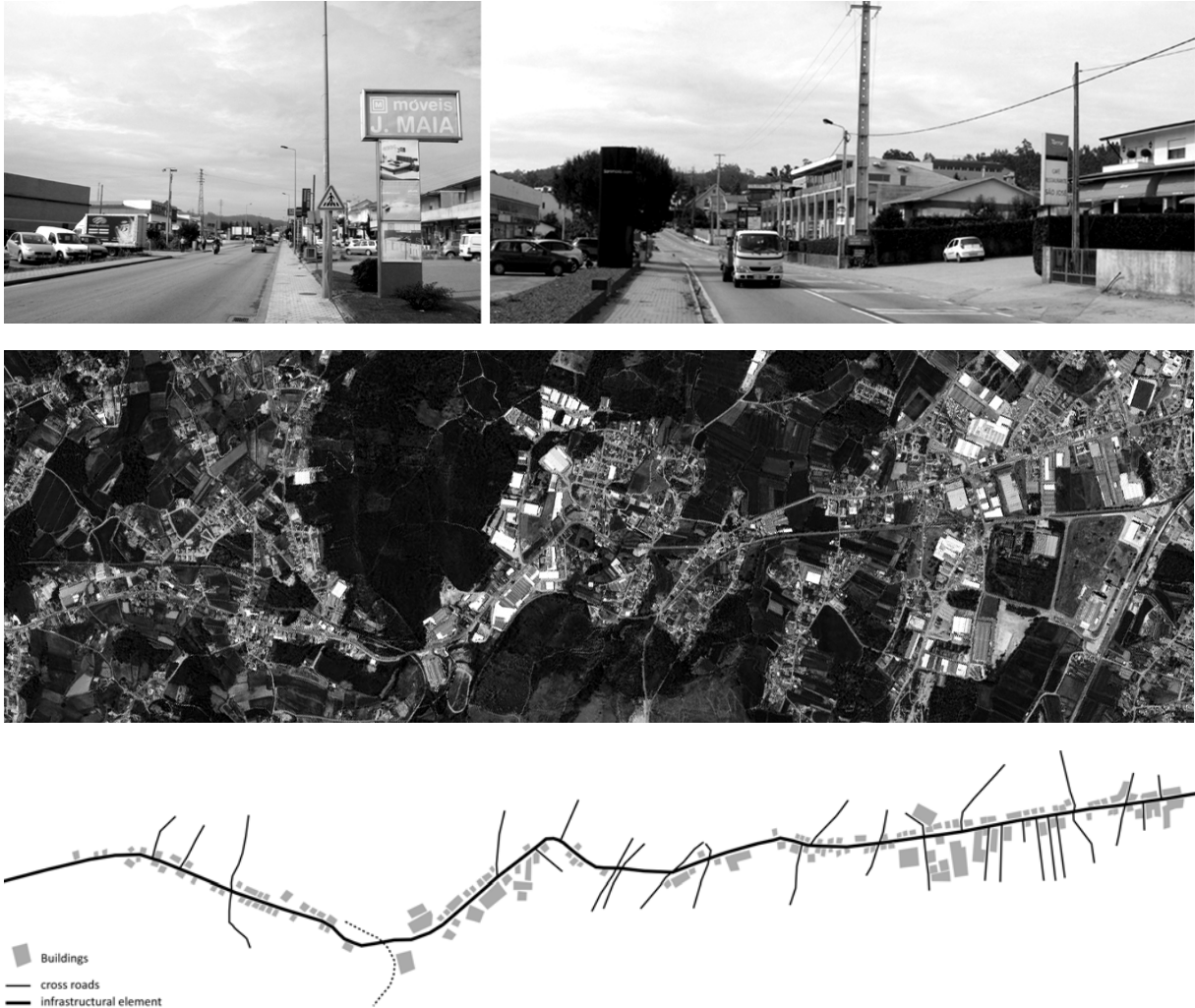


Fig. 2: N14, Trofa | Photographs | orthophotomap | morphological diagram.

These two examples, as well as many others that could be mentioned, become referential elements in generating urban fabric in this region. They are the image of an urbanization process and defined themselves as key elements in the reference area.

Also in the Lisbon Metropolitan Area we can verify the occurrence of such structures. However, don't play such a vital and embracing role as in the previous cases. In Lisbon Metropolitan Area these

¹⁴ "(...) A center line, a rope where everything hangs (...)".(author's translation) in DOMINGUES Á (2010) Rua da Estrada. Dafne Editora, Porto. 15.

filaments appear included in less important plan, although maintaining its dominance in the relationship between tissues, as in the case of N9, N10 and N249-2 among other examples.



Fig. 3: N9, Sintra | Photographs | orthophotomap.

There are still cases of Linear Formations whose structural backbone are mobility infrastructures that descend from freeways or even highways. Along the 90's of the twentieth century, Portugal has developed a strong expansion of highways supported by community funds of the European Union. Was introduced on the territory, a second high mobility network that generated new urban transformations. This type of mobility infrastructures also attracted various pieces of urban fabric to its borders. In these cases there are distinct morphological relations to those seen in linear formations originated by national roads. Besides having a greater thickness, even the formal relations between the road axis and adjacent fabric assume different configurations. Physical connections are materialized in specific locations in the cross roads that pontually appear along the course of the infrastructure. However, due to the high accessibility that they to introduce in the adjacent territory, there is a development of various units (singular or plural) functionally specialized. These formations also have a unified character, defining therefore also an urban element that performs equally fabric aggregation and structural functions. The road N117 or certain sections of the IC19, A1 or A4 (the first two in Lisbon Metropolitan Area and the third one in Oporto

Metropolitan Area) clearly expose this interdependence, functional, morphological and visual, between certain fragments and a freeway.

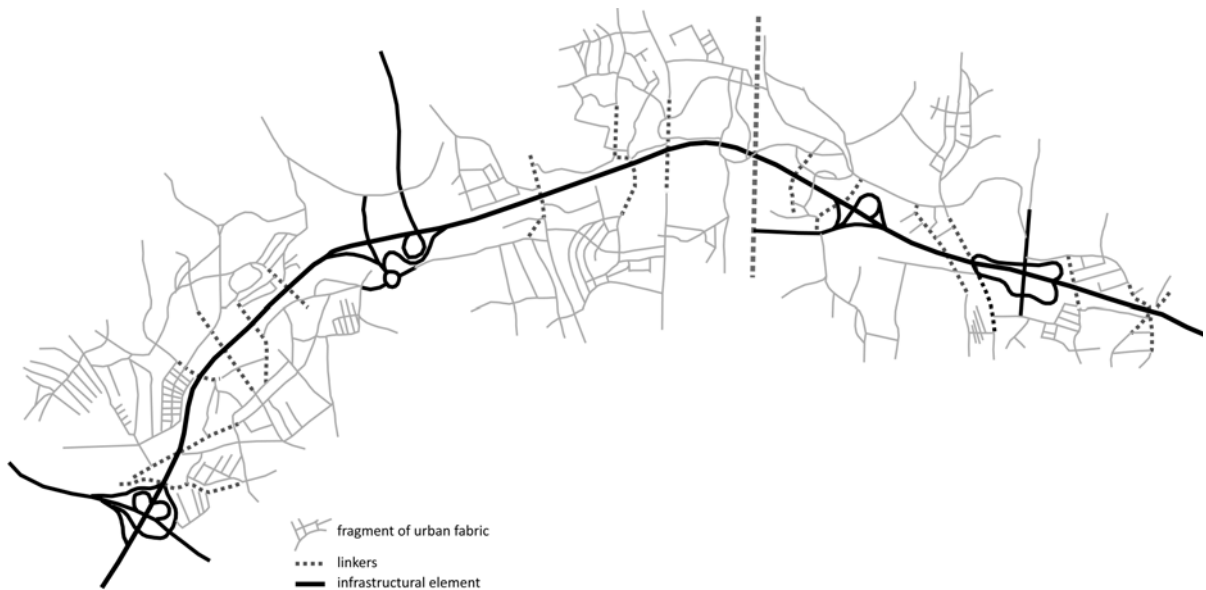


Fig. 4: A4, Matosinhos | Photographs | orthophotomap | morphological diagram.

It should also mention the case of the A44 axis, specifically the section located in Vila Nova de Gaia, where you can more thought and integrated design project between the infrastructure and pre-existing surrounding urban fabric. After the requalification interventions on the Avenida da Republica due to the introduction of the light train, it's also completed VCI, Inner Belt Freeway, joining Arrabida an Freixo's bridges and at south, the A44 freeway from Valadares. The design and construction of this infrastructure demonstrates a clear awareness of the need to sew this infrastructure path and the various marginal urban fabric in a integrated manner. In the area along the Avenida da Republica, where it acquires the toponymy of Avenida dos Descobrimentos, the freeway incorporates a new morphology, with more points of connection and several unity systems between the central path and side roads. The freeway section and its configuration did not cause a loss of efficiency of this infrastructure in terms of accessibility and simultaneously enabled better integration into the fabric.



Fig. 5: A44, Vila Nova de Gaia | Photographs | orthophotomap.

These urban formations types of emerging configuration, to some extent, can be understood as morphological trends of the urban element Street is therefore pertinent to study it, disseminating its

potential in the composition and organization of disarticulated urban areas and slightly consolidates urban fabric.

"(...) When I say street, I mean what the rationalists disparagingly termed "street-channel", in other words, the urban route bounded by the continuity of an architectural line or by the limits of another element that defines compactness." (...) The street is, at the same time, a place, an itinerary, an offer of unpredictable events, or, the vertebral element of the city's two essential functions: information and accessibility, but it is also a recognizable image of the community and transition of services is maintained. "¹⁵

3 EMERGENT LINEAR ELEMENTS. AMBIVALENCES AND CONTRADICTIONS

Within a diverse set of cases of mobility infrastructures existing, at present, in this permanent binomial "speed and support", it's possible to identify some cases that present in a more clear way certain changes in its basic characteristics, whether morphological nature or functional. Thus, becoming paradigmatic cases of the phenomenon of infrastructural axis metamorphosis and therefore offer the opportunity to be object of critical and interpretative analysis.

Having Lisbon Metropolitan Area as senary, presents actual cases of N117 (specifically the sector between Amadora and Lisbon) and N378, showing two distinct processes of evolution, starting from a common origin, the national roads. Moreover, the two elements presents a series of morphological and functional qualities that generate ambivalent or even contradictory configurations, in some respects, characteristics common to other examples and as such constitute the N117 and N378 as case studies.



Fig. 6: N117, Amadora | Photograph.

¹⁵ BOHIGAS O (2004) *Contra la Incontinencia Urbana: Reconsideración moral de la arquitectura y la ciudad*. Electa, Barcelona. 128-129.



Fig. 7: N378, Fernão Ferro | Photograph.

The presentation of the N117 and N378 roads aims to present a variety and a wealth of situations such as: urban layout, the relationship between the public and private component, and finally the function/uses, that should be noted in more depth without forgetting, naturally, timely referrals to other similar urban elements.

3.1 Urban Layout

The N117 and N378 national road were originally as a mean of communication, at a regional level. The first case, the route connects Pêro Pinheiro (Sintra) and Lisbon, through the primordial nucleus of Amadora. For its part, the N378, located in Setúbal's Peninsula, established the connection between the historic areas of Sesimbra and Setúbal.

Over the last 40 years this two roads evolved following different logiscs. This happens, among other factors, due to the position and influence both will gain in the development of metropolitan area's mobility network.

Thus, the N117 ended up to be positioned in a strategic place of greater importance, constituting a major conection axis (in the sector between the Amadora and Lisbon) between two of the main expansion axis of metropolitan Lisbon fabric, paths formed by the lines of Lisbon-Cascais and Lisbon-Sintra railways and even the A5 (Lisbon-Cascais) and IC19 (Lisbon-Sintra) freeways. In the case of N378, it develops as an important structural and aggregation axis of various fragments of urban expansion, while joining these through A2 freeway with the rest metropolis.

These facts led to two distinct evolution modes of the infrastructure, which are expressed in the settings of their two urban layouts.

The N378 also has a section very much related to its genesis, registering little change in its width and section, composed by one lane in each direction and un-consolidated roadsides. The form of this element resembles a spine due to its numerous branches which interweave surrounding fabrics. Noteworthy is the fact that these branches rarely generate crossings, but just interceptions, giving greater centrality to the axis, the N378. The built construction was implanted facing the road, with a minimum distance of 20m¹⁶, forming increasingly over the years continuous urban fronts.

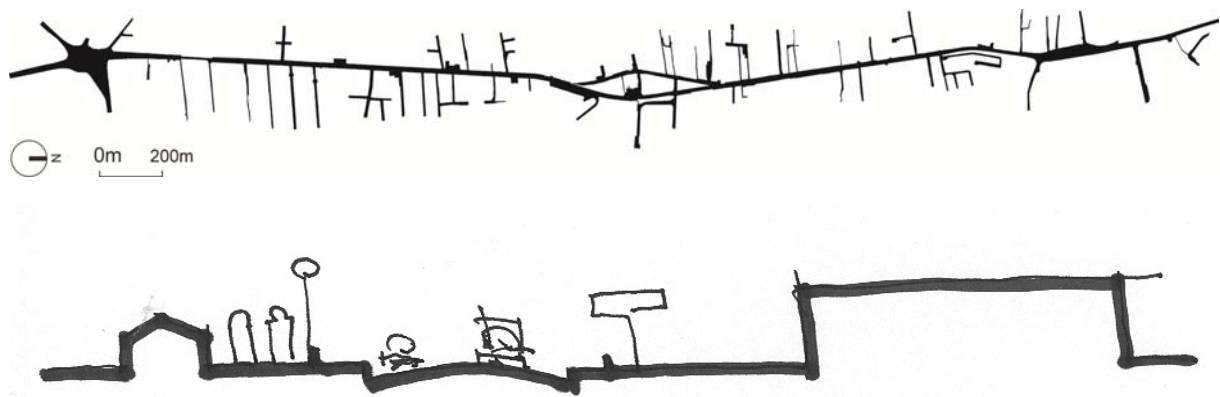


Fig. 8: N378, Fernão Ferro | Urban Layout, significant sector | section type.

This feature can be found in many other infrastructure with filament character through Portuguese territory, as exemplified cases of N10, Azeitão, the N103, Barcelos or even some sector of the N1 between Lisbon and Porto and N125, Algarve.

In contrast, the N117 has now an urban profile substantially different from the original. The mobility network placement, potentiate several changes resulting nowadays in a section very close one to a highway having multiple lanes in each directions, lateral and central tabs. Its urban layout consists, in a central structure that pontually establishes connections with the territory, and a second roads network that interlace on the main axis. Mostly of marginal urban fabrics or just buildings, don't implanted along the roadsides. They are located at the secondary roads network, using it to connect to the main axis, the N117. However, most of the buildings seek to establish themselves in their plots in order to establish visual relationships with the N117. Thus, despite linked to other routes, is with N117 that they relate and are referred to.

¹⁶ Corresponds to *non aedificandi* area imposed by public utility easement, contained in Article 5 of Decree-Law n.º 13/94 of 15 January.

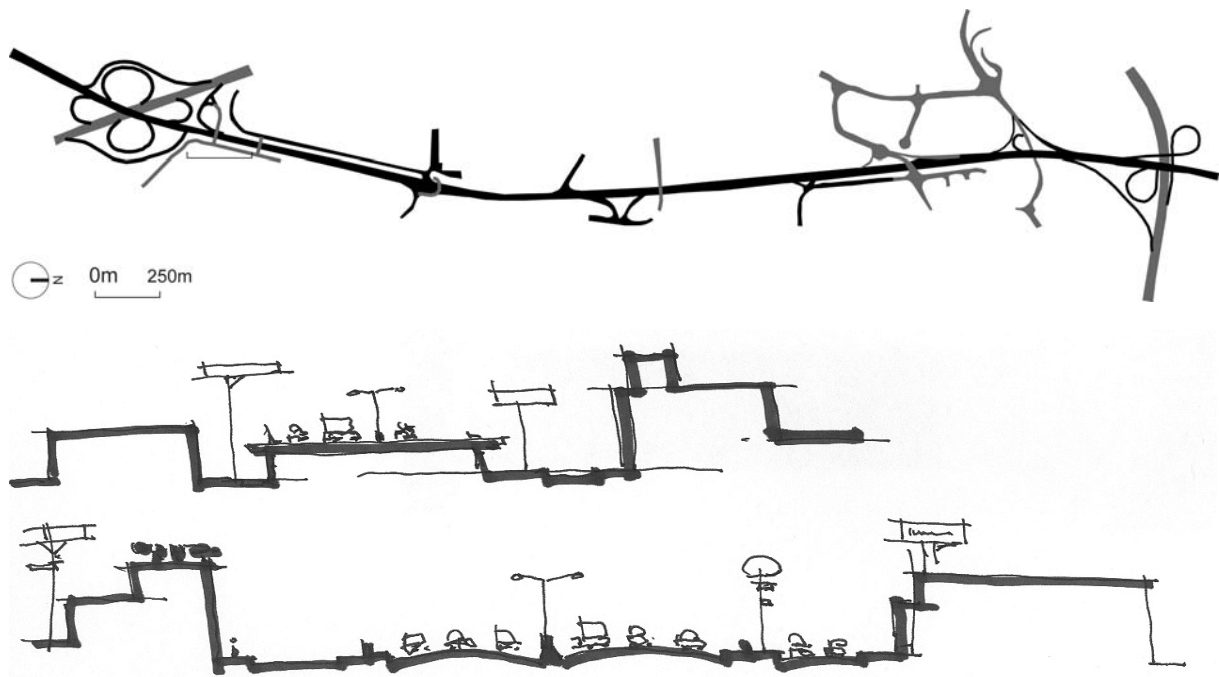


Fig. 9: N117, Amadora | Urban Layout | sections type.

3.2 Tensions between Public and Private

Regarding relations between the public and private component of the N117 and N378, there is an occurrence of some tensions in the transition between the two entities. Even the configuration of the plots of both elements develops very different relationships with the central axis.

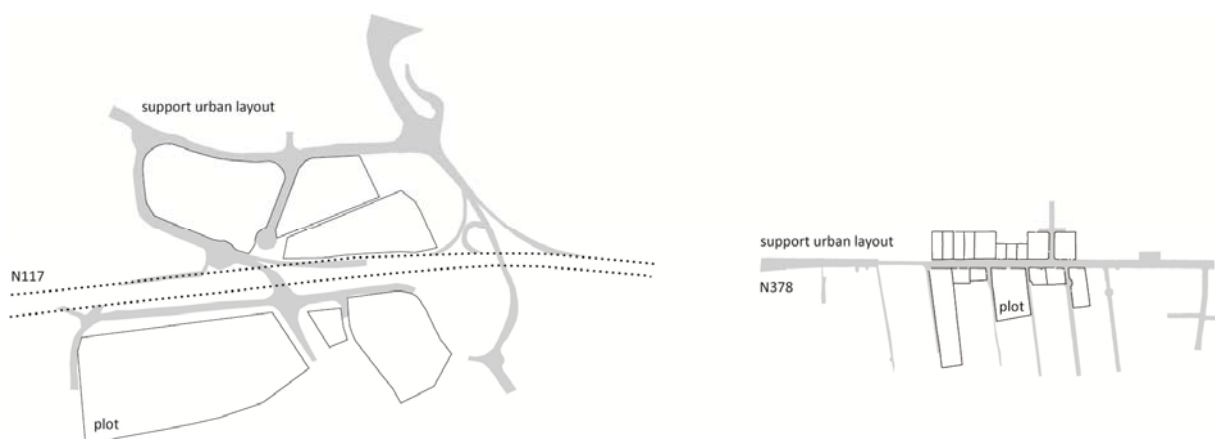


Fig. 10: N117 and N378, the different relationships between the plot and the infrastructure.

Morphologically the N117 has an individual channel, which resulted in a few cases where private plots are implanted directly adjacent to the road. Much of the plots fixed on the secondary network,

creating indirect relationships with the infrastructure. In contrast the N378 has lots directly on the roadside. Each plot is placed adjacent to the road, establishing leveled relationships and consequently a more direct connection.

It is also observed spaces of exceptional character on this infrastructure, a role traditionally associated with squares in consolidated contexts, that in these elements are materialized in hybrid spaces, ambivalent and with uses and managements unclear and defined. In the case of the N378 there are a number of small spaces, widenings normally associated with commercial spaces, restaurants or cafes mainly, who choose to open part of their plot for public use. This occurs confined to a certain schedule (corresponding with the working hours of the facility) or in permanent a manner without control of access during day and night. These spaces of dubious character, private but with public use function as pit stops or rest areas along this filament and as such this spaces add value to the commercial use.

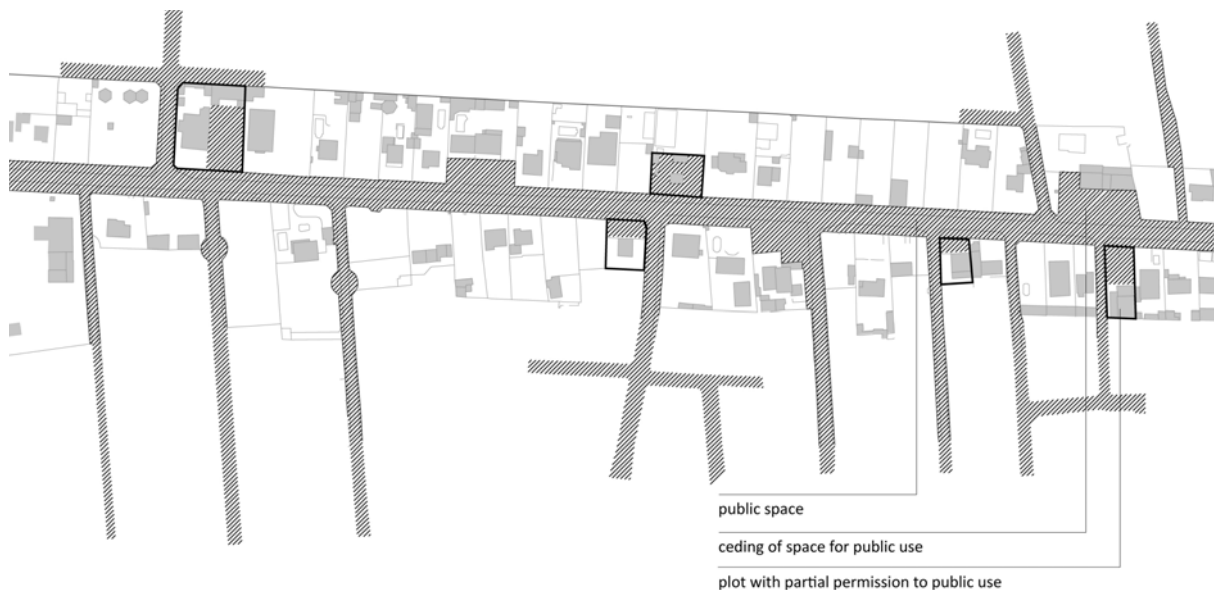


Fig. 11: N378, Fernão Ferro | Plots with hybrid spaces | Photographs of two examples. Left side - plot with ceding of space for public use. Right side - plot with partial permission to public use.

On the other hand, some vacant plots, without specific use and in a state of abandon are commonly used for public activities, of ephemeral character, even if it is a private property.

In N117, such spaces develop associated with gas stations, where the presence of convenience stores generates other uses not related to fuel supply. The presence of a cafe, as well as other food products available on late hours allows these private management spaces to become gathering places, as it happens in certain areas of public space. In the urban element of the N117 there is still the appropriation of some private spaces located inside buildings, as if it was a public space. The absence of exceptional public spaces properly qualified nearby the infrastructure, as well as the presence of several large shopping malls with vast areas of restoration, ends up providing for such places a large concentration of people. These interior spaces are often designed with typological models inspired by the urban public space, trying to recreate in private spaces the environments that take place in spaces such as the street or square. These private areas become meeting points and socialization despite its private management and controlled environment. So these private spaces located along the N117 have similar behaviors and usage of public space, exposing contradictions and ambivalences of the urban element.



Fig. 12: Alegro shopping mall, at N117 | Photographs.

However, this phenomenon can not be said to constitute a new type of city appropriation. In 1748, the Nolli map of Rome evidence these ambiguities, representing the interior of the churches (private spaces), merging with the public space of the city. Thus we are in the present of preview phenomenon materialized in different ways and in places more suited to current social paradigms.

3.3 Functions and Uses

Finally watching these types of Linear Formations ambiguities related to their uses and functions roles, are identified.

So the first inconsistency relates to the function that has the infrastructural within the metropolitan dynamics. Again noting the cases of N117 and N378 identified that these two infrastructures despite the incorporated morphological transformations, eventually maintained the function of connection axis, in a territorial scale. The case of the N117 became it, connecting two major territorial infrastructures and the case of the N378 for its long extension and diversity of urban fabrics that support. Furthermore, the type of activities that each of the examples supports also show different scales of coverage. The N117 supports Multinationals or Franchising structures such as: Continente; Jumbo; Ikea, Conforama; many Official Car Stands, Siemens, Roche, Decathlon, Leroy Merlin, Media Market, among many other large surfaces stores, and because of that it has a much more significant importance in metropolis connections movements. Support of economic activities of wider scale. In the case of N378 it has a wide variety of commercial establishments but with specific character, with some metropolitan influence while containing more local scale activities, supporting closer areas.

Moreover, the N378 is common to find a mixture of uses, with emerging predominance of commercial activities installed in residential use plots. This applies equally in other cases as N14, Trofa, where we can still find great architectural pieces as *Edifício Montra*¹⁷ or cases of N10, Vila Franca de Xira where industrial activity has a decisive presence. In contrast, road N117 became a specialized infrastructural axis. Not by having only one type of use, but because of the predominance of uses involving large surfaces and with wide influence areas.

Of note also that in cases of filamentary formations, like N378 is still visible rural sectors where the agriculture activity persists. Agricultural plots or forestry fronts sectors end up giving a transgenic identity to this element. An identity that accumulates urban and rural, simultaneously and recombine its. This characteristic is even more evident in cases such as N207, Paços Ferreira or N235, Aveiro, where the identity of the urban element is prolonged on the territory for many kilometers.

¹⁷ Architectural typology that combines the big surface, saling and storage products, creating major fronts of propagation through permeable facades.

4 CONCLUDING REMARKS

With these significant changes in the ways and processes of urban growth that occurred during the twentieth century, the city acquired a set of urban elements with unconsolidated morphologies and complex definitions or classifications. However, it was clear the process of transformation of some mobility infrastructures, acquiring new configurations and new functions. They become in many cases hybrid elements, superimposing the primary function, of connection, of support.

This process of metamorphosis raises the question whether this emerging urban element still remains as Road or if perchance is all ready a Street, but with new morphologies? Moreover, these urban elements may lead us to doubt if all its ambiguities and ambivalences are the result of its evolutionary process. An evolution who isn't linear, so with a complex prediction of what it will be their form and function in the future.

However, despite all this morphological instability, currently these urban linear formations are in a clear way, structural elements of the territory. Allow, even in a disjointed ways with the management and planning tools, to hierarchize territories, because they are often assumed as reference elements. These are structures that compose and generate new urban fabric, concentrating around them greater compactness mainly in urban areas of dispersed occupations.

Finally, it should be noted that due to its structuring element personality, these Linear Formations are urban objects of vital importance for the future of urban space. Properly integrated in future planning actions, these axes can contribute decisively to issues such as environmental sustainability or to fabric retraction. These are structures which can be regarded as privileged channels in intervention, compacting the fabric, optimizing the economic and environmental resources, while also creates conditions to enhance the levels of urbanity along these axes. A clear example of the awareness of their potential that these urban formations have, is the concept of "Fiber City", developed by the University of Tokyo, under the coordination of Hidetoshi Ohno¹⁸. It developed a concept of urban development to Tokyo in 2050 on four pillars of urban action: Green Finger, Green Partition, Green Web and Urban Wrinkle. The model exposed in Fiber City and achieved on its four pillars, refocus the discussion on the future of the city in two fundamental points: the reduction and compaction; and environmental valorization as new paradigms for urban development whose vital network support is the infrastructures.

¹⁸ Concept summarized in the following work: OHNO H (2006) Tokyo 2050, Fiber City. in JA, The Japan Architect 63.

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