LISBOA
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FACULDADE DE ARQUITETURA
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DESIGN PARADIGMS IN PORTO'S PUBLIC AND COOPERATIVE HOUSING IN AND AROUND THE PORTUGUESE REVOLUTIONARY PERIOD:

a systemic approach grounded on spatial analysis

TESE DE DOUTORAMENTO EM ARQUITECTURA
(DESENHO E COMPUTAÇÃO)

Doutoranda:
Catarina Ruivo Pereira

Orientadores:
Isabel Ortins de Simões Raposo (FAUL)
Tasos Varoudis (Bartlett, UCL)

Tese especialmente elaborada para a obtenção do grau de doutor
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ABSTRACT

This dissertation studies a set of public housing estates in Porto developed in the period surrounding the Portuguese revolution, part of which have rarely been examined in architectural research. In doing so, it seeks to provide a global reading of this period that may represent a counterpoint to the criticism large-scale public housing development has been the target for decades, which often points out its urban and architectural characteristics as the root cause of continued patterns of social segregation in their residents.

In this sense, the dissertation first explores the question of how housing is both shaped by society and has the capacity to act back on social relations. It argues that the process through which this happens is twofold: the real estate market acts in class-differentiation, which determines who has access to the city and in which conditions; housing spatially organises socially defined human activity in the system of systems which comprise the house-settlement, as defined by Rapoport. Through a reading of different authors (Harvey, Bourdieu, Lefebvre), it is considered that this interaction most often takes a form favourable for or at least coherent with the reproduction of the relations of production, which have an impact on the ideological apparatus, which will, in turn, be materialised in architectural education, taste and action.

The dissertation relies on the internal duality of space syntax' methods to explore this idea of recursivity in the relationship between built space and society.

Firstly, it seeks to demonstrate that the spatial characteristics of domestic environments do have some impact on how people live. It does so through the systematisation of data available on family dynamics during the studied period and the preliminary exploration of how different patterns of organisation of domestic activities in apartment plans may be reflected in variances in the way people use the space of the house. It further explores how space syntax research has consistently been able to relate spatial attributes with patterns of space-use and articulates these attributes with the hypotheses of residential differentiation developed by Harvey. Through the examination of other authors (Marcuse, Bourdieu, Gros) the socio-spatial concepts of segregation, othering, hierarchisation, domestication and adaptability are developed and analysed in the studied cases. It is argued that it is through these concepts that housing acts as a regulator of patterns of interaction between individuals, groups and social classes in the city, and as such also has an impact on the conformation of different living experiences.

Secondly, syntactic analysis is used to retrieve design patterns from the set of built housing estates, which are then described according to the defined socio-spatial concepts. These are

compared across housing programmes to identify shifting or contrasting design paradigms, and informed by historical knowledge to link them to social and ideological transformations, as well as to understand the role of these housing estates as part of a process of social and urban change. It is shown that while these estates were initially built outside the centre and even purposely segregated, they are often located in what are today well-integrated areas of the city. A paradigm shift is identified as taking place during this period, as a trend can be detected in later housing developments of articulating the estate with its surroundings while maintaining a local community. It is demonstrated that Porto's growth was, to a great extent, articulated with the development of public housing and that this can only be understood globally: Housing - like all human-produced space - it is simultaneously a product of its time that has immediate social consequences; and also a set artefactual elements whose social meaning is transformed by changes that take place around them.

Keywords: Domestic space, Participatory housing, Patterns of house-use, Public housing, Spatial analysis.

RESUMO

Com o processo de industrialização do país e subsequente concentração populacional nos grandes centros urbanos, emergem, desde o início do século XX, programas públicos de habitação. As primeiras tipologias adotadas durante o Estado Novo para as populações oriundas de zonas rurais pobres, adaptam-se à perceção tradicionalista do regime de um modo de vida português. Os conjuntos habitacionais de grande escala que lhes sucederam visavam responder ao modelo de urbanização que se afirmava com a intensificação da industrialização do país.

Nos finais dos anos 1960, o investimento público em habitação permitiu um forte desenvolvimento da investigação teórica e empírica marcada por preocupações sociais e previsões sobre o futuro. Concebida como um mecanismo espacial com consequências sociais, a habitação era pensada como um instrumento de progresso. Em documentos e relatórios de investigação científica deste período, encontram-se repetidas referências à emancipação da mulher, ao desenvolvimento de laços e sentimentos de comunidade e à resposta às necessidades do momento e às aspirações futuras.

Este pensamento progressista emergiu nalgumas instituições estatais permitindo algumas transformações institucionais no último período do Estado Novo, ao longo dos anos 1960 e início dos anos 1970. Todavia, os programas de habitação então desenvolvidos foram limitados, tanto na sua escala como no leque de populações a que se dirigiam, e os conjuntos habitacionais públicos implementados eram entendidos pelo poder político dominante como instrumento de controlo social.

Com o golpe militar do 25 de Abril de 1974, operou-se uma maior transformação do aparelho de estado associada ao fim da guerra colonial e à transformação do modelo económico do país, gerando alterações profundas no balanço de forças e permitindo a organização de movimentos populares fortes, alguns dos quais centrados no direito à habitação. Neste contexto, a promoção habitacional ganhou novos contornos ao nível quantitativo e qualitativo.

Esta dissertação foca a sua atenção neste período, estudando um conjunto de empreendimentos habitacionais de promoção pública e cooperativa construídos na cidade do Porto nos anos que antecedem e sucedem ao 25 de Abril de 1974. Incluem-se nesta leitura quatro grupos de empreendimentos: (i) os que integram a segunda fase do Plano de Melhoramentos da Cidade do Porto, construídos maioritariamente entre 1969 e 1974; (ii) os que são desenvolvidos no âmbito do Serviço de Apoio Ambulatório Local (SAAL) durante o período revolucionário de 1974-1976; (iii) e aqueles que foram construídos para associações de moradores, no mesmo período mas dentro

de outros enquadramentos legais; (iv) os conjuntos promovidos pela Câmara Municipal do Porto, pelo Fundo Fomento da Habitação e os que resultam da articulação entre estas duas entidades, desenvolvidos desde antes do 25 de Abril de 1974 até 1982; (v) e, por último, as cooperativas de habitação económica construídas ao longo deste período. Ao fazê-lo, pretende-se trazer para o campo da investigação em arquitetura casos de estudo que têm sido descurados pela disciplina. Simultaneamente, pretende-se proporcionar uma visão global deste período que possa representar um contraponto à crítica de que a promoção pública de habitação de grande escala tem frequentemente sido alvo. Uma crítica que se tem tendencialmente focado nas suas características urbanas e arquitetónicas, apresentando-as como causa da segregação social dos seus residentes.

A dissertação começa por explorar reflexões de autores que se referem à relação recursiva entre a habitação e a sociedade que a produz. A habitação é entendida como um produto social, o qual tem a capacidade de agir sobre as relações sociais. Isto ocorre de duas formas: o mercado imobiliário atua na diferenciação de classe, determinando quem tem acesso às infraestruturas e equipamentos urbanos e em que condições; a habitação organiza espacialmente a atividade humana - socialmente determinada e atribuída a diferentes indivíduos e grupos - no sistema de sistemas que compõem o conjunto "casa-assentamento", como definido por Rapoport. Com base na leitura de diversos autores (Harvey, Bourdieu, Lefebvre), considera-se que esta interação assume formas coerentes com a reprodução das relações de produção. Embebida no aparelho ideológico, esta interação materializa-se na educação, gosto e prática arquitetónica.

Esta ideia de recursividade na relação entre o espaço e a sociedade é explorada aproveitando a dualidade interna da metodologia da "sintaxe espacial", desenvolvida inicialmente por autores como Hillier e Hanson.

Em primeiro lugar, procura demonstrar-se que as características espaciais dos espaços domésticos influenciam, até certo ponto, a forma como as pessoas vivem. Para o efeito, sistematiza-se a informação produzida por inquéritos sobre dinâmicas familiares realizados durante o período estudado, ao longo dos anos 1970 e 1980. Estes dados são explorados preliminarmente no sentido de perceber de que forma diferentes organizações das atividades domésticas nos fogos se podem refletir em variações nas suas formas de uso pela família. Demonstra-se que é possível detetar características mais ou menos potencializadoras de uso coletivo ou individual dos diferentes espaços da casa, e com maior ou menor potencial para contrariar tendências de segregação e diferenciação de uso por género verificadas dentro das famílias estudadas. Explora-se também a capacidade da investigação em "sintaxe espacial" realizada nas últimas décadas de relacionar atributos espaciais com padrões de uso do espaço. Tendo em conta essas relações, articulam-se conceitos espaciais da "sintaxe espacial" com as hipóteses de diferenciação residencial desenvolvidas por Harvey. Através de uma leitura de outros autores (Bourdieu, Marcuse, Gros), constroem-se e analisam-se nos casos estudados os conceitos sócio-espaciais de segregação, "outro" (othering), hierarquização, domesticação e adaptabilidade. Argumenta-se que é através destes conceitos que

a habitação funciona como regulador dos padrões de interação entre indivíduos, grupos e classes sociais na cidade, e dessa forma também de conformação de diferentes vivências.

Em segundo lugar, a análise sintática é utilizada para encontrar padrões espaciais no conjunto dos empreendimentos habitacionais estudados, que são posteriormente descritos de acordo com os conceitos sócio-espaciais definidos. Estes padrões são comparados entre os diferentes programas habitacionais estudados - programas dirigidos a problemas específicos de diferentes populações, com preocupações e propósitos diferentes entre eles - com o objetivo de identificar paradigmas de projeto diferentes ou contrastantes que, através da sua contextualização histórica, possam ser relacionados com transformações sociais. Desta forma, procura-se compreender o papel desses conjuntos e programas habitacionais como parte de um processo de transformação social e urbana.

Embora os grandes conjuntos habitacionais dos anos 1960 tenham sido construídos fora do centro, sendo intencionalmente segregados, a investigação mostra que eles se encontram em zonas da cidade que hoje estão bem integradas no tecido urbano. Com a transformação do contexto social, o regulamento moral e político, que no Estado Novo acentuava o papel da casa como mecanismo de controlo, foi extinto, alterando-se o significado social da localização dos edifícios na malha urbana, organizados no período anterior de forma a facilitar a vigilância dos seus moradores. Na promoção pública de habitação após o 25 de Abril são também identificados constrangimentos e contradições. Por um lado, a promoção habitacional continuou, em grande parte, a expressar uma estratégia de expansão urbana necessária ao crescimento da cidade capitalista, criando conjuntos residenciais muitas vezes ligados a áreas industriais, mas, por outro lado, a habitação produzida nos primeiros anos de democracia tornou-se mais acessível e de forma geral mais articulada com o tecido urbano existente. Os fogos tornaram-se maiores, embora descurando relações espaciais anteriormente consideradas importantes. A habitação pública nos empreendimentos produzidos nesses primeiros anos de democracia afastou-se do paradigma de isolamento e clara marcação do "outro", embora mantendo uma ideia espacial de comunidade local.

Demonstra-se que o crescimento da cidade do Porto no período estudado esteve, em grande medida, articulado com o desenvolvimento público de habitação, e que isto só pode ser percebido a uma escala global. A habitação - como todo o espaço socialmente produzido - é simultaneamente um produto do seu tempo com consequências sociais imediatas e um conjunto de artefactos cujo significado social é transformado por mudanças que lhe são externas.

Keywords: Análise espacial, Espaço Doméstico, Habitação pública, Padrões de uso do fogo, Participação.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Bandeirinha (2007)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Bandeirinha (2007)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Bandeirinha (2007)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Arquivo Municipal do Porto, Porto's Municipal Archive (gisaweb-cm-porto.pt)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Arquivo Municipal do Porto, Porto's Municipal Archive (gisaweb-cm-porto.pt)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Tirares, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Boavista, plan and traces of use.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing consulted at IHRU's headquarters in Porto.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing consulted at IHRU's headquarters in Porto.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Arquivo Municipal do Porto, Porto's Municipal Archive (gisaweb-cm-porto.pt)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Arquivo Municipal do Porto, Porto's Municipal Archive (gisaweb-cm-porto.pt)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Arquivo Municipal do Porto, Porto's Municipal Archive (gisaweb-cm-porto.pt)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Central de francos, plan and traces of use.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Central de francos, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing in Arquivo Municipal do Porto, Porto's Municipal Archive (gisaweb-cm-porto.pt)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Bessa leite, plan and traces of use.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Bessa leite, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Santo António das Antas - Martim Moniz, surrounding city

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Santo António das Antas - Martim Moniz, plan.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Santo António das Antas - Martim Moniz, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Santo António das Antas - Martim Moniz, apartment scheme: plan and accessibility graph.

Source: Adapted from original drawing in Fleming and Magano (2012)

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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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SACHE, plan and traces of use.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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SACHE urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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SACHE, apartment scheme: plan and accessibility graph.

Source: Adapted from original drawing provided by Porto's Council's urbanism services.

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Santo António das Antas - Contumil, surrounding city.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Santo António das Antas - contumil, plan.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Santo António das Antas - Contumil, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Santo António das Antas - Contumil, apartment scheme: plan and accessibility graph.

Source: Adapted from original drawing in Fleming and Magano (2012)

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Santo António das Antas - Duarte Leite, surrounding city.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Santo António das Antas - Duarte Leite, plan.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Santo António das Antas - Duarte Leite, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Tripeira, surrounding city.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Tripeira, plan and traces of use.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.

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Tripeira, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

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Source: Adapted from original drawing provided by Porto's Council's urbanism services.

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CETA, surrounding city.

Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.
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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.
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Source: Adapted from original drawing in Fleming and Magano (2012)
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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.
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Santo ildefonso, plan and traces of use.
Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.
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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)
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Source: Adapted from original drawing in Fleming and Magano (2012)
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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.
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Habece, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.
Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)
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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.
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Source: Map drawn over dwg by Câmara Municipal do Porto, Porto's City Hall.
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Source: Map drawn in QGIS over Google Maps, 2017 (Space Syntax Toolkit Plugin Gil et al.2015)

Chapter 10

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Plan of porto in 1932 and 1960, with PCE's developments

Source: Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research.

Figure 10.2. *414*

Plan and photograph of a ilha in porto

Source: Saraiva, 2019, p.114, P.185.

Figure 10.3. *416*

Bairro de casas económicas do amial (EHP)

Source: Photograph by the author.

Figure 10.4. *422*

Plan and photograph of Bairro de Ramalde

Source: Lebre, 2016, p.41 and +hotograph by the authorof this dissertation.

Figure 10.5. *424*

Demolished ilhas (4 464) and new housing developments (5 453), representing 24 700 rehoused people in march 1965

Source: http://gisaweb.cm-porto.pt/units-of-description/documents/638879/?Q=plano+de+melhoramentos

Figure 10.6. *424*

Plan of porto 1960, with PCE' and PMCP (1st phase) developments

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LIST OF ABBREVIATIONS

1 ENA – Primeiro Encontro Nacional de Arquitectos, First National Architects Meeting.

AM – Residents' Associations.

AMP – Área Metropolitana do Porto, Porto's Metropolitan Area.

BAM – Residents' Associations' estates.

CAR - Comissão para o Alojamento de Retornados. Housing Commission for Returned Families, a programme of the FFH created in 1974.

CDH - Contratos de Desenvolvimento para a Habitação. Housing Development Contracts, a programme of the FFH created in 1974.

CHE – Cooperativas de Habitação Económica. Economical Housing Cooperatives, a programme of the FFH created in 1974.

CM – Residents' Commissions.

CMP - *Câmara Municipal do Porto.* Porto's City Hall.

CRUARB – Comissariado para a Reabilitação Urbana da Ribeira Barredo. A programme for the rehabilitation of an area of the historical centre of Porto.

EC - Programa de Empréstimos às Câmaras Municipais. Programme of soft loans for councils of the FFH, created in 1974.

ESBAP – Escola Superior de Belas Artes do Porto, Porto School of Beaux Arts. It held the Architecture degree up to 1982, when the Architecture School of Porto's University was created.

FFH – Fundo Fomento da Habitação, a State institution for the development of public housing created in 1969.

IHRU – Instituto de Habitação e Reabilitação Urbana, the State's institute for housing and urban rehabilitation that currently manages housing estates.

LNEC – Laboratório Nacional de Engenharia Civil, a State institution for the development of research in the field of civil engineering. It was founded in 1946 and in 1963 a Group of Architecture and Urbanism was created.

MFA – Movimento das Forças Armadas, Armed Forces Movement. A military movement which was the governance solution in the revolutionary period in articulation with civilian forces in what was called the People-MFA alliance.

NaCh – Normalised Choice.

NaIn – Normalised Integration.

OC – Obras Comparticipadas, programme developed in 1972 for funding institutions of a social character - such as church institutions, municipalities, and the police social services - that developed housing for rent at limited prices.

ODAM - Organização de Arquitectos Modernos, Organisation of Modernist Architects.

PCE – Programa das Casas Económicas, Economical Housing Programme, 1933-1969.

PER – Programa Especial de Realojamento.

PI – Planos Integrados, Integrated Plans, a programme of the FFH started in 1969.

PMCP – Plano de Melhoramentos para a Cidade do Porto, Improvements' Plan for the city of Porto, 1956-1974.

PREC – Processo Revolucionário em Curso. Ongoing Revolutionary Process (1974-1976).

PRID - Programa para a Recuperação de Imóveis Degradados. Programme for the Rehabilitation of Degraded Buildings, created in 1976 by the FFH.

RD – Realizações Diversas, Diverse Developments, a programme of the FFH started in 1969.

RPR, Regime de Propriedade Resolúvel, Revocable property regime.

SAAL – Serviço de Apoio Ambulatório Local. A participatory housing programme of the FFH created in 1974.

TUFA – Total useful floor area.

Introduction

Porto's growth was to a great extent connected to housing development by public institutions. In 2020, almost forty years after direct intervention policies were largely abandoned and part of what existed started being sold away through Right to Buy-like reforms, 13% of housing in the city remains council or state-owned ("Porto ao Nível da Finlândia, 2019).

Today, Porto's housing problem is not the same that motivated the construction of over forty housing developments in between the late 1960s and the early 1980s, affecting around 6 000 families. If in Porto's metropolitan area more than five thousand families need rehousing, just within the municipality there are enough vacant public houses for 30% of them (IHRU, 2018). Within the municipality, there are also twelve times more empty privately-owned houses than families in need. Those families that do have access to a house, most of them do not live in adequate thermal conditions (as this articulates with high electricity prices, Portugal is one of the countries in Europe where more people die of cold-related issues (Healy, 2003; Fowler et al., 2014), many have short-term lease agreements and live in constant danger of being evicted. As this dissertation is being written, the tourism motivated rent speculation that blighted the city for years is expected to decrease with the Covid-19's crisis, as are wages and jobs, and the housing problem is expected to transform once again.

In Portugal, where in 2018, 58% of architects' work was in renovation ("The Architectural Profession", 2019), associated with the rising number of tourism rentals, it can hardly be said that architects have been neutral in the deterioration of living conditions of local residents. It is arguable whether they could have played any other role, when architects depend on the market to pay their own rents. Attempts to counter growing speculation by socially concerned architects have been mainly small-scale operations focusing on the betterment of living standards of specific communities, grounded by the budgetary limits of institutional or academic funding, or working within the boundaries of the real estate market.

In Porto, if small-scale interventions are dictated by economic constraints, they are also in some cases theoretically sustained through an understanding of the role played by public housing in the city's spatial and social development that is often incomplete. Frequently focused either on the social problems associated with the development of Athens Charter-grounded council housing in the 1950s and 1960s within a corporatist dictatorship, or on a shortly-lived participatory programme (*Serviço Ambulatório de Apoio Local,* SAAL) that was founded after the 1974 revolution, this theoretical framework tends to reflect a certain resistance towards institutional, large-scale, top-down housing policies and to apparently attribute a causal relationship between

urban morphology or architectural typology and geographically overlapping social issues. In some cases, the same framework that ideologically sustains community-scale interventions that do often work towards the improvement of living standards in those areas, has been co-opted by a discourse regarding social malaise in council housing that presents demolition and relocation as the most obvious solution. In Porto, four council estates have been demolished in the last fifteen years. Arguably, the most iconic example of this process is also the most recent: *Bairro do Aleixo*, torn down between 2011 and 2019. After years of continuous and premeditated ill-management by the council while socially stigmatising its population and explicitly associating social issues with the inadequacy of the estate's tower block morphology, demolishing a large scale housing development from the early 1970s that so happened to be located on a privileged lot overseeing the river that will now be occupied by luxury housing, was not only presented by its proponents as socially justified, but also as the only socially responsible thing to do (see, for example, "Rui Rio Adia Demolição", 2009; "O Fim do Aleixo", 2011).

In this context, it seems pertinent to a) examine the idea that there is a simplistic causal relation between the forms commonly adopted in social housing and the social segregation of its residents that dismisses the role played by socioeconomic context and accompanying social policies, through b) a focus on the system of housing policies as reflected on a system of housing spaces.

The first (a) determines the larger, overarching question that this dissertation means to tackle. It defines as its guiding hypothesis that the answer to "what is the relationship between the built environment and social relations if not a simple one of cause and effect?", is not that there is none, but that there is one and that it works in both directions: housing form is a product of its context social relations, but it also has the capacity to act back on social relations by impacting their inherently spatial manifestations (Lefebvre, Bourdieu, Hillier and Hanson).

This dissertation sets out to explore the spatial mechanisms through which this recursive process happens.

Specifically regarding housing, the thesis is based on a series of theoretical premises: that it has particular characteristics through which it acts as a mechanism of differentiation and classification in each given society (Harvey, Marcuse, Bourdieu), that the form it takes is inseparable from the context that produced it (Lefebvre, Bourdieu), and that this means that even in its most progressive examples housing is bounded by the limits of the society that creates it, but that none of this means it is just a simplistic reflection of the context where it was developed.

At this level, the dissertation tackles a series of questions regarding the nature of this relationship: What can space tell us about the social relations that produced it? What role does space play back on the production and reproduction of social relations? If man-produced space remains unchanged, how does this role change throughout time?

The second (b) determines the dissertation's focus. It explores a moment in Portuguese history where rapid societal transformations were articulated with a period of intense housing development by public institutions, which is more or less temporally limited by the brief existence of a state institution for housing development (*Fundo Fomento da Habitação*, FFH) between 1969 and 1982.

Focusing on the city of Porto, the dissertation examines the state-subsidised housing estates developed during this period: those developed by the council before the revolution of 1974 (and, briefly, those that continued to be built by the municipality throughout these years); those produced for the populations organised in residents associations - both within the participatory programme SAAL or other legal frameworks; those developed directly by the FFH and those developed by housing cooperatives.

In order to explore the previous questions, as well as providing a thorough understanding of state-subsidised housing in Porto, a new set is posed: What are the spatial characteristics of housing estates in Porto? How do these estates differ from programme to programme? How do they reflect different contexts, objectives or ideologies? How may these result in different domestic or communitary experiences?

Similar questions have been consistently explored in space syntax, a field of spatial studies that arose from a found necessity in the early 1970s of countering behaviouralist and environmentalist interpretations of the social consequences of man-built environment. In turn, space syntax offered an analytical theory of the interaction between space and society that supported a set of quantitative methods, and that had as its fundamental characteristic that it could be empirically tested, verified or falsified. Space syntax (Hillier & Hanson, 1984) argues that what is observable about society, its social processes and relations, are the encounters and interactions of people in space. In that sense, considers the fundamental relationship between the built environment and human agents to be the ordering of relations between people that is an inevitable part of the ordering of space. It is better known for its argument that this interaction can be understood through the measurable quantitative analysis of certain - those defined as configurational - aspects of the built environment.

The dissertation tackles the questions that motivated it by exploring the hypothesis that, as Space Syntax argues, these mostly social processes can be, to some extent, spatially understood and described in quantitative terms.

In this sense, the dissertation relies on syntactic analysis to retrieve design patterns from the set of built housing estates in Porto between 1969 and 1982. Spatial patterns are compared across housing programmes in order to identify shifting or contrasting design paradigms. Relying on space syntax tools to describe them, these patterns are then informed by historical knowledge in order to link them to social and ideological transformations, as well as to understand the role of

these housing estates as part of a larger process of urban but also social change. This is further informed by space syntax's own internal duality. Its methodology has been successfully used to detect patterns in space and describe spatial characteristics that formerly lacked a concrete definition. Simultaneously, these spatial characteristics have also been consistently proven to relate to patterns of movement and occupation of space by people, and so to be able to provide insight into the mechanisms through which housing acts as a regulator of patterns of interaction between individuals, groups and social classes in the city (Harvey), and in that way also towards the conformation of different living experiences.

However, the interaction between housing and society is largely located outside of the spatial characteristics of estates or apartments, and much of it in the realm of the institutions and political power. It is in social and urban policies that major decisions are taken: whether families that need houses get them, if they do, whether they get the roads, transportation, and urban structures that should come with, not to mention the jobs, liveable wages, appropriate education and health care and socialised domestic work that determine the impact of social inequalities in a capitalist society. It is also in social and urban policies that these spatial characteristics of estates and apartments are largely decided, through the assignment of funding, the creation of legislation and regulations.

The space of the house and of the neighbourhood is, nevertheless, simultaneously a reflection of these institutions. It is where their role in the reproduction of society can be further understood, through the spatial organisation of socially-determined domestic-related activities observable in space, and the consequent relations established within the family and between the family and other groups.

In this sense, while the dissertation aims to explore complex social and urban processes, taking into account the importance of time in both its geographic and social dimensions, it remains a thesis in architecture. It focuses on knowledge that can be created through tools that are inherent to the discipline of architecture. As such, its focus is more on how space is a product of its context than how context is also influenced by space. If at moments the dissertation ventures into the second, it does so supported on prior theoretical, empirical and sociological research conducted on this problematic by other authors. Similarly, while in order to provide a systemic understanding of the social and urban roles of public and cooperative housing in Porto, this research found the need to switch scales and look into its urban insertion and role in the urban growth of Porto and its adjacent cities, the urban scale was not the main focus of the dissertation.

Throughout this dissertation it will be argued that the different types of housing promotion developed housing layouts with clear differences between each other and clear "genotypical" (Hillier & Leaman, 1974; Hillier et al., 1987) themes among themselves which can be traced back to historical context, to different societal concerns and projects regarding social class, family life

and gender, and to underlying design paradigms. This argument will be consolidated in three ways: By providing a thorough spatial analysis of the housing layouts developed in Porto between 1969 and 1982, by demonstrating that these spatial characteristics do have some impact on how people live and clarifying how this may be reflected in specific domestic environments, and by showing how changes in the way local institutions, central power and architects thought about housing have had an impact on housing layouts, but also that they reflect contradiction and are subject to transformation over time.

The argument is constructed in three parts, as follows:

Part I of this dissertation defines the epistemological, conceptual and methodological framework through which it is developed. It is introduced in chapter 1 by a revision of the existing literature on state-subsidised housing in Portugal, exploring how it is integrated in, and in part a product of, a larger historical context and its historiographical leitmotifs. The aim of this section is to pinpoint the gap this dissertation sets out to explore, as well as the motives why it should be explored, while situating it within the body of work developed on the subject.

The second chapter reviews key theoretical models on the recursive relationship between built-environment, human agency and use of space. It will explore both theories that examine how architecture, and specifically housing, does play a part in social transformation, and those on the mechanisms through which it tendentially contributes to the reproduction and perpetuation of existing social relations. Touching upon the problematic of contextual constraints and agency, in regards to both the use of space and its production, it defines the overarching framework that guided the methodological process for the systematisation of data as well as its interpretation.

Chapter 3 then defines the methodological framework through which this gap is approached by first integrating it in a solid field of study in architectural research. This chapter explores seminal work to see how space syntax's capacity to detect genotypical patterns in architectural design has contributed to the development of spatial history, concerned with the way in which social phenomena organise and become organised in time-space, as well as relevant literature regarding the application of space syntax methodology to the studying of housing at its different scales - the house, the estate and the global urban system it is a part of - and the interaction between these dimensions. It identifies and contextualises the methodological options made in the development of the analysis, clarifying its relevance for the thesis. It summarises and justifies the adequacy of the set of methods used for the gathering, encoding and exploration of spatial data, as well as of the variables used in the analysis.

Chapter 4 provides a first application of the methodology defined in chapter 3. It explores a series of interpretative surveys on the way families viewed and used the domestic space that was conducted in the 1970s in Portugal with the aim of becoming an empirical back-up for future housing development in the country. It examines the questions and concerns put forth

by researchers at the time to posteriorly evaluate how housing developments respond - or fail to respond - to these raised problems. It provides a systematisation of the data available on family dynamics during the studied period, as well as a preliminary exploration of how the organization of domestic functions in apartment plans may be reflected on variances in the way different activities and people interact. This creates an empirical basis for the latter interpretation of apartment plans, and provides an early indication of how these may relate to different kinds of family dynamics.

Part I finalises in chapter 5 by examining the relationship between the theoretical concepts explored in chapter 2, the spatial approach traced in chapter 3 and the preliminary analysis described in chapter 4, and defining a set of social and spatial concepts to articulate both, which will be used for as the basis for a systematised interpretation of state-subsidised housing development in Porto.

Part II describes and organises the data that are the fundamental basis of this research and provides a preliminary interpretation of the analysed spatial models of housing developments constructed in Porto between the late 1960s and early 1980. This part is divided into four chapters. The first three describe and summarise the spatial attributes of each the of the housing schemes, both at the scale of the estate and of the house. These three chapters are chronologically divided, grouping together housing developed by the council before 1974 in chapter 6, those resultant from popular mobilisation in the revolutionary period in chapter 7, and those posteriorly developed or financed by the FFH or the council in chapter 8. The final chapter 9 provides a comparative analysis of spatial data between different housing programmes.

Part III contextualises the data presented in Part II in the disciplinary (concerning architecture, urbanism and housing policy), political, economic and social context that produced the estates, and explores the programmes following the socio-spatial concepts defined in chapter 2. This part is organised chronologically throughout four chapters:

Chapter 10 provides the background for the time period that is the focus of this dissertation. It first introduces the housing question in the 1930s, as it began to be seen as a problem at the institutional level. In particular, it explores council housing in Porto with special incidence on the estates built between 1969 and 1974. These are the greatest target for criticism of large scale housing development in the city today, and also as they were being planned. As such, this chapter contextualises the estates' spatial characteristics in a larger disciplinary debate, and explores their role in the city's growth. The chapter further establishes the importance of council housing in the scope of this dissertation for the impact it had as a part of an urban development plan, and provides context for the role it played in the relocation of the population from the centre of the city before but also during the revolutionary period of 1974-1976. Additionally, it explores a shift that took place during the late 1960s. This chapter goes through the ongoing disciplinary

discussion on the housing question, and in particular in its gain in momentum around 1969. Spanning from institutional reforms, the series of socially concerned principles and objectives identified in FFH's and LNEC's documents, and a disciplinary transformation taking place in Porto which assigned greater emphasis to the housing question and the social role of architecture, this period is shown to be foundational to the national housing policy that emerged after 1974.

Chapter 11 focuses on the revolutionary period that followed 1974, exploring the transformation in power balance and the growing popular movement centered around the right to proper housing. The chapter systematises the housing policies either introduced or transformed in the revolutionary period which provided, for a brief period of time, a systemic approach to housing developments. The focus of the chapter is the housing development for organised residents associations, with an emphasis on the SAAL, as a programme that moved intertwined with the social mobilisation of the time. Relevant reports and project descriptions produced by architects are analysed alongside the spatial characteristics of the developed neighbourhoods. SAAL in Porto is argued to be a very particular case in a very specific situation, whose material production will be shown to reflect the often contradicting ideologies and material conditions it was a result of.

Chapter 12 examines the two remaining most consequent manifestations in Porto of the post 1974 national housing policy: direct state housing development conducted by the FFH and cooperative housing developments. Regarding the former, it focuses on the creation of the FFH as a new state institution for the development of social housing and its articulation with the work developed by the National Laboratory of Civil Engineering (LNEC) in assisting housing development with grounded research. How this resulted in a simplification of apartment models is explored through its comparison with previous schemes from council housing. While the paradigm of locating housing for the working class in vacant lots outside the urbanised centre continued to be dominant, a point is made that this programme represented a significant ideological shift in urban planning and social housing from the 1950s council plan, that was not only present in its theoretical production and explicit social concerns, but also in the spatial characteristics of these developments. Similarly, regarding housing cooperatives, it is explored how the balance of constraints with the potentialities of their legal framework, allied to a certain extent of participation in the design process, resulted in these estates and apartments displaying different spatial attributes from those of state and council layouts. Finally, it is argued that it is at the larger scale that these programmes were the most relevant, with these lesser-known developments being part of the shaping and development of urban growth in Porto's suburbs and for its relation with adjacent cities.

Finally, chapter 13 concludes the dissertation. Informed by those that came before it, it provides a systematised reading of the processes through which public and cooperative housing was developed in Porto from the late 1960s to the early 1980s that make it an unmistakable product of its time, how it may have had an impact on social life, and also how this impact changed as the city grew and society transformed around the apparently unchanging, artefactual objects that are housing developments.

PART I

THEORETICAL AND METHODOLOGICAL FRAMEWORK

1. THE HISTORY AND HISTORIOGRAPHY OF PUBLIC AND COOPERATIVE HOUSING IN PORTO

The greater part of this dissertation will explore the main questions framed in the introduction through the case study of public housing in Porto between the late 1960s and early 1980s. Housing will be seen to possess particular qualities – both as a spatial element and as a type of commodity – which make it a privileged field for studying the relationship between man-produced space and social relations. This will also be seen to be clear in the case of Porto during this moment of rupture and transition, inevitably characterised by a growth of social contradiction.

The period that is examined in part III of this dissertation is roughly limited in time by the creation of a State department of social housing (*Fundo Fomento da Habitação*, FFH) in 1969, in the final years of the dictatorial regime that ruled the country for four decades, and its extinction 13 years later, in the context of the neoliberalisation of the recent democracy. In the field of architecture, it corresponds to a particular moment in the history of Portuguese social housing, both for the multiplicity of typological and morphological solutions which emerged from intense research, multiple programmes and experiments, and for the particular relevance it had in the development of Portugal's major cities, being in great part responsible for the current urban configuration of Porto and the adjacent municipalities.

As the 1960s started, the two major Portuguese cities Porto and Lisbon suffered from long-lasting overcrowding and lack of proper housing conditions. While the dictatorial regime which preceded the revolution had recognised both the necessity and the usefulness of a public housing

program, it failed to provide a solution for the ongoing housing crisis. Housing decelopments were often directed at public employees with middle-class incomes and, because they worked as devices of governmental control, the process of admission for new families was complicated and highly monitored. So, if the maintenance of labour through appropriate housing had been a constant concern since the dictatorship was established in 1933, it was its socio-economic liberalisation in the late 1960s that allowed for the development of consistent public housing programmes in the country.

In 1969, the FFH was created with the objective of integrating a new national housing programme with urban planning, centralising both in a single organic structure. It worked in close relation to the National Laboratory of Civil Engineering (*Laboratório Nacional de Engenharia Civil,* LNEC), which, having existed since 1946, started focusing on housing under the leadership of Nuno Portas, who between 1963 and 1980 founded and led the Group of Architecture and Urbanism, becoming the Secretary of State for Housing and Urbanism in the first democratic government of the revolutionary period.

Within the discipline, housing became a pivotal point in architectural education from the early 1960s. In the Porto School of Beaux Arts students started working with the populations of the historical centre (having started as an academic course, this practice later inspired a state housing and urban rehabilitation programme in 1974, and also provided the basis for student involvement in the SAAL programme). In parallel, the housing question also began to appear more consistently in architectural publications, until it became a permanent section of *Arquitectura* (Architecture) one of the country's most relevant architectural magazines, in 1969.

Despite all of this, by the time the regime was overthrown in 1974, only about 7% of legal housing was of public development, and the housing gap had risen from 483 000 to 531 000 homes in the previous eight years. The city of Porto was still suffering from long-lasting overcrowding and a generalised lack of proper housing conditions.

The revolutionary period was marked by a series of strong social movements reclaiming the right to proper housing. Supported by popular pressure, the particular social, economical and political conjuncture of what ended up being a short period of time, gave place to the reorganisation of existing institutions and public housing policies, and resulted in the most productive moment for housing development in the country until then.

The state department for social housing promotion and management (FFH) was the leading developer. Benefiting from an increase in financing and with a practice that was connected to the normalisation of constructive processes, development of social studies, data collection and statistical procedures, the FFH developed a series of different solutions in policies, urban morphology and domestic typology which were highly innovative in the national context, and reflected contemporary housing experiences worldwide.

State intervention in housing development was organised in different programs, each tackling specific problems. In Porto, three types of state intervention had a significant impact in the development of the city. The FFH, working with the municipality for the construction of new housing developments, made an effort towards lower segregation of the working class in the city suburbs and adjacent cities through systemic planning. For the populations living in the overcrowded city centre, the SAAL was created to promote the initiatives of ill-housed communities by creating incentives through the municipalities to their collaboration in the transformation of their own neighbourhoods, through direct discussion between architects and residents' associations. Finally, housing cooperatives, which existed since the late 19th century, were also vastly restructured and integrated into the FFH. Having functioned before mostly as a mechanism for facilitating gradual middle class access to private housing, cooperatives benefited during this period from the technical, juridical, social and financial support of the State. Furthermore, the fruit of the initiative and organisation of future residents, these may have a say in the selection and acquisition of sites and the development of typologies.

Like the particular conditions in which they appeared, the new housing programs, responsible for a great part of the production of social housing in Porto, were short-lasting. The SAAL programme was extinct in 1976, having lasted only two years, and the financial aid to cooperative housing was cut down in 1978. The FFH lasted thirteen years before its extinction in 1982, in a political and social context very different from that in which it had emerged. While public housing continued to have a role in some areas of the country and particularly in Lisbon's metropolitan area, it lost significant presence in Porto.

From this point on, with the exception of the SAAL, these programmes have often been absent from studies of Portuguese architecture, housing production and urban growth. The lack of attention and in-depth study from the discipline of architecture regarding housing policies and concretisations that shaped Portuguese major metropolitan areas has been noted by researchers whose work is concerned with filling that gap. Santos Pedrosa (2018, p.281) identifies, regarding the specific case of cooperative housing, a

> [...] silence in the general texts dedicated to XXth century Portuguese architecture (…). When considering foundational or seminal texts (…), even if several references to housing problems can be found, cooperative housing responses are generally absent, both as examples and as a possible response to grave problems of infra-housing or even its absence.[1]

1 "[...] silêncio nos textos gerais dedicados à arquitetura portuguesa do século xx é disso reflexo. Considerando textos fundacionais ou marcantes enquanto olhares alargados, e a título de exemplo, mesmo se surgindo neles diversas referências aos problemas da habitação, as respostas de habitação cooperativa estão genericamente ausentes, tanto como exemplos como enquanto possibilidade de resposta aos graves problemas de infra-habitação ou mesmo ausência da mesma." Translated from Portuguese to English by the author of this Dissertation.

Pedrosa then goes on to demonstrate how essential texts within the discipline systematically ignore housing cooperative, with exceptions being made for some author-pieces. The same issue is identified in Ruivo and Tenreiro (2014), where the authors describe a historiographical dominance of the SAAL programme to the detriment of "the multiplicity of public housing solutions in the post-revolutionary period, funded by the FFH". Concerning the SAAL Programme in Porto, the same authors underline that the "SAAL itself [is] reduced to only a small part of the diversity of responses the programme developed, with the examples almost exclusively mentioned being defining of what might be called the 'School of Porto's model of intervention'."

In researching for this dissertation, a similar disparity was detected in the literature concerning either Portuguese architecture and the architectural response to the housing problem in Portugal, which becomes evident when the focus is the city of Porto, and more so outside academic and scientific production.

During the last decade, Architecture's representation in mainstream media has shifted. From a focus on the aesthetical qualities of the building as an object, the architect and authorship, architectural discourse has begun to emphasise its role as an agent of social transformation. The housing question became, once again, one of the mainstream concerns of practice and theory within the discipline, and of how it presents itself to the broader public. This is quickly revealed in a review of the last decade's Pritzker Prize winners or, even more clearly, of Venice Architecture Biennale curatorships. 2012's Venice Architecture Biennale, Common Ground, from which Urban-Think Tank emerged with a focus on popular squatting of Torre David in Caracas, can be seen as one of the first big moments when this shift began to be mediatised. The trend continued with the successive awarding of the Pritzker Prize to architects recognised by their social commitment, the attribution of 2016's Biennale to Alejandro Aravena and, finally, 2020's theme "How will we live together?".

In Portugal, this trend appears reflected in the mediatisation of a few small-scale housing interventions and the reappearance of the SAAL programme in mainstream discourse. It can be traced back to 2010's Architecture Triennal (*Trienal de Arquitectura de Lisboa*), where "the SAAL and the House of the Future were the point of departure given to the curators [...]"[2] (Sardo et al., 2010) to reflect on the topic of housing, in Portugal and abroad. It was further mediatised at the national scale by the colloquy *SAAL em Retrospectiva* (SAAL in Retrospective) and the exhibition *O Processo SAAL, Arquitectura e Participação* (The SAAL Process, Architecture and Participation) which took place between November of 2014 and February of 2015, it also resurfaced in an international context. 2016's Portuguese representation in the Biennale, NEIGHBOURHOOD: Where Alvaro Meets Aldo, exhibited four social housing projects designed by architect Álvaro

2 "O projecto SAAL e The House of the Future foram o ponto de partida programáticamente dado aos curadores [...]" Translated from Portuguese to English by the author of this dissertation.

Siza, one of which developed within the SAAL. Recently, answering with "In Conflit" to the 2020's Biennale curatorship's question of "How do we live together?", the Portuguese participation brought to the public the processes resulting in and of struggle and contradiction between different actors. However, if one of its case studies focuses on that between ill-housed populations and local power during the construction of SAAL's Bairro 25 de Abril, the exhibition also covers similar conflict in large-scale housing estates, working from the micro to the macro scale.

Anecdotally, it may also be mentioned what books were, at the time of this dissertation was written, available at the Porto School of Architecture's student-led bookstore. Of the books sold at the bookstore in 2020, approximately 10 of them are about public housing developed in the second half of the 20th century, 20 of them mention it. Of these, 6 are specifically about the SAAL, and 13 of them mention it[3]. Concerning Porto, only 3 books touch on the subject of housing that are not specifically about the SAAL. One is Borges Pereira's (2016) book on the Improvements Plan for the City of Porto. The remaining two are one photography book on São João de Deus (layout 1, not considered for analysis) (Cepeda, 2019) and a sociology book on Aleixo (layout 8) (Queirós, 2019), both cases that were demolished by the municipality in the 2000s. If the bookstore is not an adequate sample for scientific research produced on the subject, it does reveal what books exist for a non-specialised public, as well as what is accessible to architecture students today.

However, it is at this same moment that increasing research on the subject starts countering a trend where the SAAL is hegemonic.

Between 2016 and 2019, the research centre of architecture and urbanism of Porto's School of Architecture (CEAU-FAUP) developed a research project[4] that had the objective of mapping and making publicly available public housing in Portugal between 1910 and 1974. Two publications came out of this research. There, the focus on architectural work that had been underexplored is clear, and so is its purposeful bringing back of collective housing policy into the discipline of architecture. The book tackles the difficult subject of exploring the State's architecture of housing during an authoritarian regime and accepting its architectural quality. Its introduction comes with a warning (Ramos in Lameira & Rocha, 2019, p.7):

> It is not our objective to whitewash the role that architects and intervenients predisposed to play, by accepting to create work for the affirmation and glorification of the regime, becoming its political instrument, nor is it to ignore that housing and access to

3 Not every book in the bookstore were read from start to finish during the course of this dissertation and, as such, this estimate may be incomplete.

4 Mapping Public Housing, financed by *Fundação para a Ciência e Tecnologia*, Compete2020, Portugal2020.

> decent housing were weapons used by *Estado Novo's* authoritarian regime which, within the corporative logic of abolishing the idea of class, aimed at dominating the most socially and economically fragile, exploring their needs, imposing rules of civic and moral conduct associated with total compliance with a repressive political power. As such, it is not possible to observe this architectural phenomenon or, in general, all *Estado Novo's* public work, without paying close attention to the context in which it occurred.[5]

But also with a methodological note regarding direct associations of the regime's housing production to its ideological apparatus that have dominated much of preceding mainstream discourse (Ramos in Lameira & Rocha, 2019, p.9):

> [...] that the social, the geographical, the economical, the technical and the architectural are always used as instruments of political action. As such, to look at the architectural production regarding the housing question is to accept its impure praxis as part of processes that, sometimes, lead to their own impasses. There are no simple answers.[6]

Both in its focus and its approach, the project Mapping Public Housing seems to depart from preceding research and discourse. However, and if the work developed at the CEAU-FAUP during much of the time of the development of this dissertation represented an invaluable resource, it is also worth mentioning a detail that is only relevant in a global reading of the dominant historiography of public housing in Portugal. Santos Pedrosa (2018) indicated that at the time of her writing, the research's database included only two examples of cooperative housing. This, she adds, may have to do with the fact that cooperative housing - while undoubtedly existing during the years that go from 1910 and 1974 - grew significantly after the revolution of 1974. Similarly, in the scope of this research, it is relevant that the list of works incorporated in the publication Mapping Public Housing, Guide to specific terminology in State-subsidised residential architecture in Portugal [1910-1974], includes only eight projects developed directly by the FHH, only one of which in Porto: *Bairro da Bouça* (layout 18), a project by Álvaro Siza that was constructed after being integrated into the SAAL. Like in Santos Pedrosa (2018), this would be justified by the

5 "Não serve isto nem para branquear o papel que os arquitetos e intervenientes se predispuseram a desempenhar, ao aceitarem fazer obras para a afirmação e glorificação do regime, sendo um seu instrumento político, nem para ignorar como a casa e o acesso a uma habitação condigna foram armas usadas pelo regime autoritário do Estado Novo que, dentro de uma lógica corporativa de abolição de uma ideia classista, pretendia dominar os mais frágeis, social e economicamente, explorando as suas carências, impondo regras de conduta cívica e moral atinentes com a total obediência a um poder político repressivo. Por isto, não é possível observar este fenómeno arquitetónico, bem como, de forma geral, toda a obra pública no Estado Novo, sem uma forte atenção ao contexto em que ocorreu." Translated from Portuguese to English by the author of this dissertation.

6 "[...] o social, o geográfico, o económico, o técnico e o arquitetónico são sempre usados como instrumentos da ação política. Portanto, olhar a produção arquitetónica relativa à questão habitacional é aceitar a sua práxis impura como parte dos processos que, por vezes, conduzem aos seus próprios impasses. Não há respostas simples." Translated by the author.

time-frame chosen for the research, was it not that, the publication also includes a comprehensive list of SAAL projects, all designed and constructed after 1974.

Still, a contrary reaction to the hegemony of the SAAL in the historiography of public housing in Portugal is surfacing as an apparent consequence of the resurgence of the SAAL itself. It doesn't seem inadequate to pinpoint its emergence to the criticism of 2014's colloquy and exhibition. Among others, Domingues and Bismarck (2014) accused the event of transforming the SAAL "in a souvenir, a memory of the past, [and] of classifying it and burying it in a treasure's box as a sanctified relic, sold as an indulgence to save the discipline's consciousness in its progressive conversion in a bureaucratic, technocratic and depoliticised practice"[7].

In the book published for the occasion, only a few papers took a critical stance. Among them, it is notable that Portas'[8] introductory statement, as well as the round-table with direct actors of the process, sought to actively explore what the SAAL was as a part of its context and of a broader housing policy. While Portas positioned himself against isolating the SAAL as a sociologically and architecturally exemplary and unique product, noting that it was not a model that could be universally applied and that "formulas were necessary to address the needs of people who had the same right to housing as those in an island or in other, more typified, situations and places" (Bandeirinha et al., 2016), the remaining texts seem to focus on the programme's exceptionality.

It was also 2014's recovering of the SAAL programme that set the theme for the exhibition *Escola do Porto: Lado B* (School of Porto: Side B), curated by Pedro Bandeira, and his subsequent book based on the oral testimonies of those who attended the school from the late 1950s to the early 1980s (Faria & Bandeira, 2014). Both were determined to counter a mainstream narrative about the School of Porto, whose relevance for this dissertation lies in its historiographic connection to the SAAL in Porto as an argument of the latter's exceptionality. A link which is most fundamentally explored in Figueira (2002, p.67) who places the SAAL "[...] in the School's imaginary, as the same that the heroic period was to Modernism - foundational, unforgettable, unrepeatable"[9].

Nevertheless, there begins to exist an understanding of the housing policies of the XXth

7 "[...] de o classificar e enterrar num gabinete de curiosidades como relíquia santificada, vendida enquanto indulgência para salvar a consciência da disciplina na sua progressiva conversão em prática burocratizada, tecnocrática e despolitizada." Translated from English to Portuhuese by the author of this dissertation.

8. Head of institutional research on architecture in the LNEC, as well as secretary of state for housing in 1974, in which role he was the official creator of the SAAL

9 "[...] no imaginário da Escola, como o correspondente ao período heróico para o Movimento Moderno - fundador, inesquecível, irrepetível." Translated from Portuguse to English by the author.

century in Portugal, its causes and consequences, that takes on an ampler view. The Institute for Housing and Urban Reabilitation's (IHRU) publications are particularly valuable (Portas & Baptista Coelho 2013; Costa Agarez, 2018), offering a complete, often interdisciplinary view of the series of housing programmes that shaped Portuguese cities, as well as providing essential data regarding the number of houses built within each programme, the actual role of the real estate market versus public housing, and the way each increased and decreased throughout time. Additionally, academic work and architectural research have also found interest on the topic, providing disciplinary approaches to the question of public housing in Porto in the XXth century, but they often focus on specific case studies and are separate from work on social and urban development.

Similarly, seminal books on the subject of state intervention in housing development exist outside of the discipline of architecture. Gros (1982, 1994) and Cardoso (1983) are of particular relevance, both authors who construct a systematic and theoretically grounded work on the role of the different phases of state intervention in housing within the contradictions inherent to the capitalist mode of production. Cardoso (1983), focusing on public housing policies in between 1960 and 1980, their more or less distributive character and their relation to the economic, and to a point inevitably social, conditions that produced them, provides a systemic view of housing in its relation to capitalist society. Gros (1982), focusing on the housing production of the fascist dictatorship, constructs not only a similarly systemic view of housing development under capitalism, but provides an explicitly Marxist reading of its system's contradictions, and expression at the superstructural level. The exceptional character of these works, for the data they collect and the theoretical and analytical constructions they develop, made them essential bases in the development of this research.

Then, it is research within the field of sociology that brings the historical knowledge acquired through historical analysis to the present. Borges Pereira, Queirós and others[10] have developed a consistent body of work on the evolution of state intervention in housing, of policies and legislation, that presents them as a systemic whole not exempt of contradiction and that extends it to the moment we live today. It is also within this field that social consequences of these policies and public housing development can be understood, and in work developed within this field that the tools for delving into this question can be found. If how life developed and evolved in these housing developments is a major and enduring concern of the discipline of architecture both in its theory and practice, and a basis of much of the historiographic approach to this problematic, not a lot of work has been developed on this subject from within the discipline ever since the state

10 A research project conducted between 2007 and 2009 in the Faculdade de Letras da Universidade do Porto, named *Ilhas, bairros sociais e classes laboriosas: um retrato comparado da génese e estruturação das intervenções habitacionais do Estado na cidade do Porto e das suas consequências sociais (1956-2006)* (Ilhas, social housing and working classes: a comparative portrait of the origin and structuration of state intervention in housing in the city of Porto and of its social consequences (1956-2006), provided an important focus on this subject.

institution of civil engineering (LNEC) abandoned this type of research in the late 1970s. What parallels can be drawn in this dissertation between the architecture of public housing - carefully and with risked simplism - and the lives of those who inhabited, must then be based on studies that were not developed with that intention. Again, it is in Borges Pereira and Queirós (2012) on the economic housing production of the early Estado Novo, Queirós (2015) on state intervention in the historical centre of Porto, Queirós (2019) on the paradigmatic case of Aleixo[11], and in the work of other researchers, concerning other regions, such as Guerra (1994) or Vilaça (1993) and more, that clues may be found.

If the importance of these questions has been a pervasive concern of architecture throughout the last century, and Portuguese architecture of public housing provides such a diverse and complex laboratory of examples, systemic studies within the field have been sparse, and much remains unexplored in the dominant historiography. Bandeirinha's (2007) historiography of the historiography through a reading of Portas and Alves Costa's work aptly systematises that this historiography started being created while its history was still on course, and much of it written by its direct intervenients. It is, therefore, 64 years after the first large scale municipal housing plan was developed in Porto, historiography that remains dominantly grounded on a set of principles that were developed in the construction of a critique of Modernism in the 1960s and 1970s. This view has been reflected in a focus on the SAAL over broader, systemic readings, of the last half-century. If this predominance is clear in works such as Figueira (2002), it is pervasive in major works developed within the discipline, such as Tostões (1997) exploration of Portuguese Modernism, or arguably the most relevant and complete book on the subject, Bandeirinha's (2007) comprehensive study of the SAAL programme and concretisations.

Harvey (1985b, p.xii) states that "rigorous science can never be neutral in human affairs; attempts to put oneself outside of history at best produce rigorous and well-meaning pseudo-sciences". The idea that this claim puts forth is that research is the production of human beings that are historically and ideologically located. Similarly to man-designed space, it has, as a whole, the capacity to tell us something about historical and ideological trends. In this sense, this examination of the research conducted and literature produced on public housing in Portugal is not only the ennounciation of the subjects explored or left untouched, but also a reflection of these works' place in history.

The general negligence within the discipline of architecture of studies concerning the public and cooperative housing developments during this period - themselves a large part of the architectural production and thought of their time - may have to do with the bad connotation

11 Aleixo, layout 8 of this dissertation, was an estate designed during the dictatorship, which was squatted by residents of the historical centre before it was finished in 1974, and which became a symbol of degradation, poverty and degeneracy in the popular imaginary of the city until it was demolished between 2011 and 2019.

housing estates have gained in the greater architectural narrative, as has been identified by authors approaching the same subject in different contexts.

Jeremy Till's 2003 book Architecture Depends focuses on the confrontation between two premises: that architecture depends on uncountable contingencies that are exterior to the discipline, and that architects and architectural education are often made to ignore the lack of autonomy of architecture. As such, he explores the History of the discipline's relation with its own autonomy or lack thereof, and how this connects to a historiographical narrative on social housing that became dominant in the second half of the XXth century (2009, p.19):

> The theoretical justification for the autonomy of architecture reached its peak in the 1970s. By then the failure of the modern movement to deliver on its promises of social redemption was obvious. Architects were under fire from all sides. Jane Jacobs's famous assault on modernist delusions in The Death and Life of Great American Cities had been transformed into the populist association of architects with tower blocks (with all their aesthetic and social disgrace), an association that all too conveniently overlooked the fact that tower blocks, at least in the United Kingdom, were not the demented vision of architects with penis complexes but the direct result of the economics of the social housing market in the 1950s and 1960s.

Along similar lines, Boughton's 2018 book Municipal Dreams, narrates a history of council housing in the UK that is also a much-needed contextualisation of "all that 'went wrong' as the conventional narrative has it" (2018, p.3) when it comes to social housing, and a telling, firstly, "of its necessity." (p.2) Boughton's vision ties with that of Till (2009) - and particularly tightly due to both being based in London and existing in the same historical period - in explaining the causes and constraints of council estates, and arguing against the negative connotations the term has gained in the United Kingdom, but also generally across Europe, and certainly in Portugal, as it became associated with an idea of dangerous and decaying social ghettos when, as the author puts it, "in simple terms, it is undoubtedly the case that estates are overwhelmingly now decent places to live." (p.4) The nature of what makes the book so interesting makes so much of it too specific to the United Kingdom to be generalised, but the general dynamics it describes are not, as is not the note Boughton makes at the beginning of the book (p.5), proclaiming that "the attack on high-rise slides easily, and sometimes explicitly, into an assault on the form and principles of social housing more generally that should be resisted." Further on, he builds on what is, in the scope of this dissertation, the central problem of the dominant historiography (p.178):

> It wasn't, however, just the organisational model of council housing that was wrong according to its opponents. On many occasions, it was the new housing's actual form that came under attack. There was, by the 1980s, an established literature challenging many of the cherished ideals of modern urban planning and redevelopment. This was represented

most famously in Jane Jacobs's 1961 book, The Death and Life of Great American Cities.

The association identified by both Till and Boughton of a critique of social issues to a critique of architecture and, further on, to a critique of a model of socioeconomical development, is one that may arise from the view that space has an inevitable impact on social relations. It may be the implicit idea in the generalised erasure of most of Porto's large scale collective housing from architectural studies. This dissertation searches to explore this gap. Accepting the idea that there exists a relationship between space and the context that produces it, the following chapter explores the mechanisms through and the extent to which this relationship is established. Grounded on this theoretical framework, it explores how this is reflected in public housing, providing a systematic approach to the main housing programmes that acted in the city of Porto, identifying each's specific characteristics as well as differences in spatial patterning that may be traced back to social transformations.

2. THEORETICAL FRAMEWORK
THE RECURSIVE RELATIONSHIP BETWEEN SPACE AND SOCIETY

Introduction

In Sergei Eisenstein's 1944 film Ivan the Terrible, architecture plays a role that is much more than decorative and symbolic, but that of an active, insistent, inescapable actor on the characters' plot. Of its set of particularly intrusive characteristics, one notices the low doors, which force characters who go through them to bow down. This recurrent action acts as a symbol of almost claustrophobic oppression, and, throughout the film, these doors act differently on different characters, showing us what this oppression represents to the different actors in the plot. At one point, when the bourgeois muscovites come in, they walk through the doors back first, so that it is their rears they present the Tsar. This scene works as an allegory of the recursive relationship between architectural function and human use of space to be examined the following literature review.

If on the one side it shows architecture working in all its deterministic power when the form of a door goes as far as forcing a symbolic behaviour of deference towards the Tsar - and makes it clear that the function of that door, if not more at least as much as allowing for passage in-between spaces, is exactly the exertion of that symbolism - on the other side it shows architectural function being destroyed through the human use of space.

This recursive relationship between the built environment and human action, materialised in social practices, where one is simultaneously a reflection of and an active agent in the other's construction, has been explored in the many fields of knowledge which study one or the other, and particularly in those approaches which have attempted to study one through the other.

The greater part of the references that will be explored throughout this chapter and which will provide a basis for the theoretical premise of the thesis have their origin in the 1960s and 1970s, where the questions of how the built environment impacts the lives of those who experience it in their everyday lives, of how the built environment itself reflects the society that produced it, and of how answering these questions might inform the action of architects and planners, were embedded on a variety of different, often opposing, theoretical models. This chapter will focus on those authors and concepts that had specific contributions to the development of this research. How the theoretical models by them developed that were adopted and adapted throughout the

thesis depended on the influence of and interaction with diverging models - Lévi-Strauss' structuralism, the often attacked behaviouralism of Hall, the heritage of constructivism and the concept of architecture as a social condenser, Alexander and Chermayeff's (and others) studies for the systematisation of design - may be mentioned, but to dwell on it would make up a thesis itself.

2.1. AGENCY AND STRUCTURE

While this dissertation's theoretical foundation is mostly located in the second half of the twentieth century, the basis of most of the theoretical models examined and adapted go back to classic marxist theory. In particular concerning the question of housing and the city as produced in the capitalist mode of production, a problem that will be further examined throughout this dissertation, Marx, Engels and other marxist authors provide not only important insights, but the foundation for the work more recently developed by Harvey, Lefebvre, Marcuse and Bourdieu, which will represent the theoretical basis for the analytical interpretation conducted throughout this dissertation. In this sense, understanding the reproductive role of housing as explored by these authors requires an overview of recusiveness in the marxist model.

The concepts of base and superstructure establish a basis for recursion in Marx's materialism. Base - the economic structure of society, the productive forces and the relations of production all people establish in "the social production of their existence" (Marx, 1859/2015, p.2) - is only determining of the superstructure - the political forms of class struggle, social institutions, political and philosophical theories, religious views and systems of morals - through the interaction of these various elements, each of them having a role in historical struggles and in determining their form (Engels, 1890; Marx, 1859/2015). If the nature of this iteration is not developed much further by Marx and Engels, it is made clear that the superstructure and its corresponding forms of consciousness are at the same time determined by and relatively autonomous from the mode of production of material life they tend to sustain.

This idea was elaborated on by Althusser (1970). The marxist conception of the State as the organised power of the rulling classes, and its consequential role in the maintenance of labour will only be mentioned briefly in this chapter for the understanding of Althusser's interpretation of marxist thought: For a social system to work it must be able to reproduce the conditions that allow for its existence, part of which means assuring the conditions for the reproduction of labour. This requires making sure that workers have access to the conditions necessary for their survival - a bed to sleep in, clothes to wear, food to eat and feed to their children - but it also

requires the reproduction of the social relations of production. For Althusser, this means to a great extent "the reproduction of its submission to the rules of the established order, that is, a reproduction of the submission of the operariat to the dominant ideology and a reproduction of the ability to use the dominant ideology for the agents of exploration and repression." (Althusser, 1970). According to the author, this reproduction of social rules is sustained in great part by the superstructure, divided in two levels: the repressive State apparatus: the organised power of the ruling classes, the forms of law and government; and many ideological apparatuses: the religious and educational institutions, morality, legality, the political.

So while ideologies, constructed by Althusser as a representation of the imaginary relation between individuals with the real relations in which they live, are a product of the material conditions of existence and practices of the social classes in class struggle and may be diverse, the ideology of the dominant class must necessarily be realised in ideological State apparatuses in order to become the dominant ideology and act on the reproduction of the relations of production through the reproduction of its practice. Ideology is its own practice, "its own functioning in the material forms of its existence" (Althusser, 1970), and all practice happens through and on an ideology.

This does not mean that marxist thought neglects to address the intricacies of social life and the question of the individual. In marxist theory, social development, described as a historical process, determines will and consciousness but is also a result of the activity of people themselves. There are then two essential points to human action. On the one hand, each individual, with their own set of wills and objectives, is always a part of the whole set of individuals in a society, so that "each individual will is obstructed by everyone else, and what emerges is something that no one willed." (Engels, 1890) On the other hand, individuals and groups, in establishing their wills, ideas and aspirations, are always influenced by the objective conditions in which they live. In Marx, "Men make their own history, but they do not make it as they please; they do not make it arbitrarily, but under circumstances existing already, inherited from the past. The tradition of all dead generations weights heavily on the brains of the living"[1] (Marx, 1852/1969, p.15).

It is exactly through recursiveness that, in Marx, revolution is possible. If it is when the organization of society starts blocking the potential for the development of production that revolution is necessary, it is through class struggle that it can be achieved. And class struggle, while ultimately born of the contradiction between existing relations of production and the development of the forces of production, is expressed not only at this level, but also as:

10 "Les hommes font leur propre histoire, mais ils ne la font pas arbitrairement, dans les conditions choisies par eux, mais dans des conditions directement données et héritées du passé. La tradition de toutes les générations mortes pèse dún poids très lourd sur le cerveau des vivants." Translated from French to English by the author of this dissertation.

	Engels, The Housing Question	**1872**
		1917
	Jacobs, The Death and Life of Great American Cities	**1961**
	Chermayef, Community and Privacy	**1963**
		1964
Alexander, A City is Not a Tree	Hall, The Hidden Dimension	**1966**
	Lefebvre, The Right to the City	**1968**
	Rapoport, House, Form and Culture	**1969**
Alexander, The Timeless Way		**1970**
	Giddens, Capitalism and Modern Social Theory	**1971**
	Bourdieu, Outline of a theory of Practice	**1972**
	Meyer, The Architect in Class Struggle	
Broadbent, Design in Architecture	Harvey, Social Justice and the City	**1973**
Hillier & Leaman, How is Design Possible	Lefebvre, A Produção do Espaço	**1974**
		1975
Alexander et al., A Pattern Language	Rapoport, Human Aspects of Urban Form	**1977**
	Castells, The Urban Question	
Benedikt, To Take a Hold of Space, Isovists and Isovist Fields	Giddens, Central Problems in Social Theory	**1979**
Hillier, Hanson, Peponies, What do We Mean by Building Form	Bourdieu, The Logic of Practice	**1980**
	Rapoport, Neighbourhood Heterogeneity or Homogeneity	
Hillier, The City of Alice's Dreams	King, Buildings and Society	
		1982
		1983
Hillier & Hanson, The Social Logic of Space		**1984**
	Harvey, The Urbanization of Capital	**1985**
	Coleman, Utopia on Trial	
	Harvey, Consciousness and the Urban Experience	
		1986
Hillier, Hanson, Graham, Ideas are in Things		**1987**

Table 1.1. Chronological overview of references

> (…) ideological forms in which men become conscious of this conflict and fight it out. Just as our opinion of an individual is not based on what he thinks of himself, so can we not judge of such a period of transformation by its own consciousness; on the contrary, this consciousness must be explained rather from the contradictions of material life, from the existing conflict between the social productive forces and the relations of production. (Marx, 1859/2015, p.20).

Bourdieu's concept of habitus is not distant from this idea of recursiveness. As a response to previous theories, both those which treat practice as a mechanical reaction directly determined by antecedent conditions, and those which reduce intentions, actions and its objective effects to the deliberate conscious intentions of their actors, habitus is necessarily a recursive notion. Produced by the structures of the environment where it exists, habitus is also structuring of behaviour that people learn unconsciously within their culture, resulting in the production of individual and collective practices which will, in turn, produce habitus. Bourdieu's (1972/1995) take on Marx's construction of History states that habitus is "the product of history" and that by producing individual and collective practices, it produces history.

Habitus is structured within the doxa, the universe of the undiscussed, that in the natural and social world which appears as self-evident and is taken for granted, and within which all discourse is located. Inside this limit of what is beyond question, habitus is a "subjective but not individual system of internalised structures, layouts of perceptions, conception, and action common to all members of the same group or class" (Bourdieu, 1972/1995, p.86), where each individual's wills, aspirations and needs may be seen as a variant of the class' habitus. So, in class societies, doxa is a field of class struggle. The definition of what is questionable and what is not is essential to the production of habitus, and so to the practices of individuals, groups and classes. In a way that takes us back to Althusser's conception of a repressive state apparatus and ideological state apparatuses, where the repressive apparatus is also necessarily ideological, and the ideological apparatuses are always repressive to an extent, Bourdieu (1972/1995, p.169) suggests that when the dominant classes can't defend the integrity of the existing doxa, they are forced to establish in its place "the imperfect substitute, orthodoxy."

Consequently, Bourdieu postulates on the tendency for the reproduction of practices, in a formulation close to that of Marx, "[…] a past which survives in the present and tends to perpetuate itself into the future by making itself present in practices structured according to its principles." (Bourdieu, 1972/1995, p.82). While defining habitus as an "endless capacity to engender thoughts, perceptions, expressions, actions", with limits set by the objective conditions which create habitus, which "secures conditioned and conditional freedom […] is as likely to create unpredictable novelty as to mechanically reproduce the initial conditionings" (p.95), Bourdieu's theory seems to veer further away from the importance of human agency than marxism's necessary revolutionary component.

Hillier, Peponis, Penn, Creating Life		
		1988
Hanson, Order and Structure in Urban Design, the plans for the rebuilding of London after the Great Fire of 1666		**1989**
	Steadman, Domestic Architecture and the Use of Space	**1990**
Hillier & Penn, Visible Collages		**1991**
	Kemeny, Housing and Social Theory	**1992**
Hillier, Natural Movement or, configuration and attraction in urban pedestrian movement	Markus, Buildings and Power	**1993**
	Bourdieu, The Weight of the World	
Hillier, Space is the Machine		**1996**
HH, The Reasoning Art		**1997**
Trigueiro, The Dinner Procession Goes to the Kitchen		
Monteiro, Activity Analysis in Houses in Recife		
Hillier & Hanson, The Architecture of Community		
Hanson, Decoding Homes and Houses		**1998**
Amorim, The Sector's Paradigm		**1999**
Hanson, Urban Transformations: a history of design ideas	Bourdieu, Les Structures Sociales de l'Économie	**2000**
Amorim, Hierarchy, power and control on the spatial configuration of brazilian houses	Harvey, Spaces of Hope	
Bafna, Geometrical Intuitions of Genotypes	Marcuse, Enclaves yes, Gethoes No	**2001**
	Harvey, A Produção Capitalista do Espaço	
Peponis, The Spatial Structure of Environment and Behaviour	Gieryn, What Buildings Do	**2002**
Bafna, The Role of Corporeal Form in Architectural Thinking	Lefebvre, The Urban Revolution	**2003**
Hillier, The Knowledge that Shapes the City, the human city beneath the social city	Harvey, Paris, Capital of Modernity	
Batty, A New Theory of Space Syntax		**2004**
Negreiros de Camargo, The Role of Use In Transforming Ordinary Inhabitable Spaces Into Personalized Domestic Environment		**2005**
Vaughan & Penn, Jewish Immigrant Settlement Patterns in Machester and Leeds 1881		**2006**
Dalton, Is neighbourhood Measurable		**2007**
Small-graph matching and building genotypes		
Karlstrom, Place, Space Syntax, Attraction, Accessibility		
Hillier & Vaughan, The City as One Thing		
	King, Can there be theories of housing	**2009**

In fact, while both establish that even individuals who deviate from predictable patterns do it independently of their consciousness, classical marxist theory is simultaneously highly concerned with the mobilisation of masses towards a communist revolution, where individual action is given major importance as a part of a collective whole which is more than the sum of its parts:

> From the fact that the wills of individuals - each of whom desires what he is impelled to by his physical constitution and external, in the last resort, economic circumstances (either his own personal circumstances or those of a society in general) - do not attain what they want, but are merged into an aggregate mean, a common resultant, it must not be concluded they are equal to zero. On the contrary, each contributes to the resultant and is to this extent included in it. (Engels, 1890)

So when Giddens (1979/1990) critically argues that what he calls marxist functionalism accords priority to structure over action, he doesn't negate the recursion present in marxist theory, but looks at it from a point of view which assigns much more theoretical privilege to human action than the authors presented above. In fact, Giddens is often presented as a necessary counterpoint to Bourdieu's conception of habitus and practice (Donley-Reid, 1990; Gieryn, 2002; Steadman, 2015), by authors who believe that an understanding of both authors is necessary to grasp how structures structure agency, but can also be restructured by human agents.

While Giddens' theory of structuration accounts for the duality of structure, meaning that social relations are both the medium and the outcomes of practices, it aims at connecting a concept of human action with a structural explanation in social analysis. It is a theory of the human agent, the conditions and consequences of action, and an interpretation of structure as something which is embroiled in them. It deviates greatly from the models above in that it asserts that social phenomena cannot be explained in terms of collectives, as they are the result of individual decisions, ideas and actions, an approach defined as methodological individualism.

When Giddens divides human behaviour according to two types of consciousness, discursive - that which is undertaken with knowledge and forethought - and practical - those actions individuals learn by rote and do almost unconsciously -, he takes one step towards and one away from Bourdieu. On the one side, the author acknowledges that ideology, the ideas of the ruling class, similarly to Bourdieu's concept of doxa, works as a mean for naturalising the present, causing "social relations to have the fixed and immutable character of natural laws" (Giddens, 1979/1990, p.195) and contributing for its reproduction. On the other side, where Bourdieu argues that even deviant behaviour is mostly unconscious, Giddens assigns individuals the power to, understanding the reasons for their behaviour, use discursive consciousness to achieve their own means.

Similarly, Lefebvre starts from Marx in order to take one step away from it. Because, as in Althusser and Bourdieu, ideology exists in Lefebvre mainly in relation to practice, it is when ideologies are not expressed at a level distinct from practice but are, instead, embedded in it, that

Barceló, The Mathmatics of Domestic Space		**2010**
Psarra, The Ghost of 'Conceived Space'		
Hillier, Is Architectural Form Meaningless? A Configurational Theory of Generic Meaning in Architecture, and its Limits		**2011**
Vaughan, Beyond the Ghetto		
Bafna, Rethinking Genotype	Harvey, Rebel Cities	**2012**
Griffiths, The Use of Space Syntax in Historical Research		
Marcus, Balancing Quantitative Analysis and Social Concern		
Vaughan, Urban Rythms		
Serra, Anatomy of an emerging metropolitan territory		**2013**
Bafna, Artigos depressão e actividade		**2014**
Marcus, Pont, What can Typology Explain that Configuration Can Not?		
Barceló, Mathematics and Archaology	Steadman, Archeology of Domestic Architecture and the Human Use of Space	**2015**

they become effective. It is when they are indissociable from the practice that they take to the level of the undiscussed that they pass the illusion of a "natural reproduction of the relations of production". (Lefebvre, 1973, p.12) For this reason, ideologies cannot be unconscious if they are to act against dominant practices. Not determined by the base, these ideologies are not simply how its contradictions are represented in people's thought. In a revolutionary period - the transition - conscious ideological production, "the result of a collective, spontaneous and conscious theoretical and practical effort" is at the basis of Lefebvre's conception of agency.

> This situation demands a global, concrete project for a new and quantitatively different society. This project goes well beyond the kind of demand which relate either to work (units of production) or to simple improvement of the "quality" of the lived. It cannot be elaborated unless we call upon all the resources of learning and the imagination. It is, in its essence, revisable. Its changes of failure are many, for it has at its tactical disposable no social efficacy and no political force. The new "values" are not imposed they are proposed. (Lefebvre 1973, p.91)

In the scope of this research, whether true consciousness is possible or not in a recursive system is a moot point. What these theoretical models manage to establish is that the relationship between structure and agency goes both ways, with each contributing to the material consequences - the practices - of the other. The resulting system veers towards reproducing itself, and human behaviour, which translates into social relations, tends to follow the moulds established as natural by the interests of the ruling class. Sometimes, due to objective material conditions arising from the contradictions inherent to the system, deviant behaviour occurs - the irreverent bourgeoisie enters a room backs first - and this deviant behaviour has the capacity of causing alterations in the historical processes from which it arose.

2.2. SPACE AND THE BUILT-ENVIRONMENT

In this model, space plays a major role. If, according to both the theoretical constructions presented above and other major theories, social relations are both their own medium and outcome, "a production and reproduction of human beings for human beings" (Lefebvre, 1968a/2000, p.101), then space and time are where these take material form. The built environment is both a product of human agency and a means for the production and reproduction of social relations.

Despite the considerable differences in the theories presented above, the question of space,

and in particular of man-designed environment, is one that Giddens, Bourdieu and in particular Lefebvre found necessary to tackle. Veering towards assigning privilege to human agency, Giddens' model is one where buildings become what people actively do with them, what people use them for, through the spatial and architectural routinisation of everyday interactions. Routine action, strongly influenced by ideology, is considered by Giddens to be an important means of reproduction of practices, and therefore of the dominant social relations, and it is the stronger when "sanctioned or sanctified by tradition, connecting past and present" (Giddens, 1979/1990, p.219)

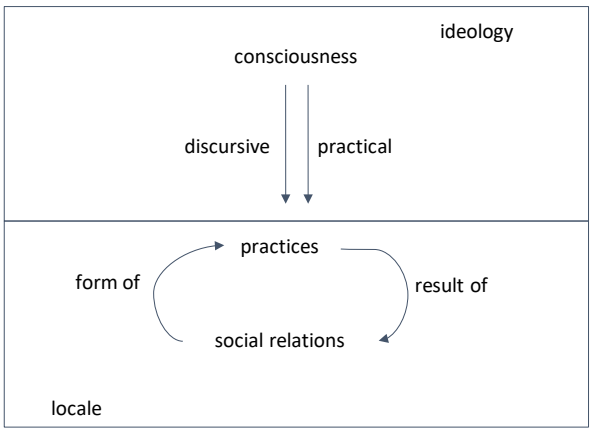


Figure 2.1.
Guiddens' model of structure and agency.

Bourdieu, more inclined to see buildings as external forces structuring social practices, where agents' consciousness is not necessary, also stresses the importance of architectural space as being ideal for the creation of habitus, through the daily and seasonal repetition of tasks, routines, conversations and personal exchanges. Where Giddens develops the concept of locale, referring to the use of space to provide settings of interaction, as something which is more than scenery for this interaction because it possesses features that have a regulatory effect on people's actions; Bourdieu prioritises inhabited space as the main space for the materialisation of generative layouts. Inhabited space sets up divisions and hierarchies between people and practices, being a "tangible classifying system [which] continuously inculcates and reinforces the taxonomic principles underlying all the arbitrary provisions of this culture."(Bourdieu, 1972/1995, p.89)

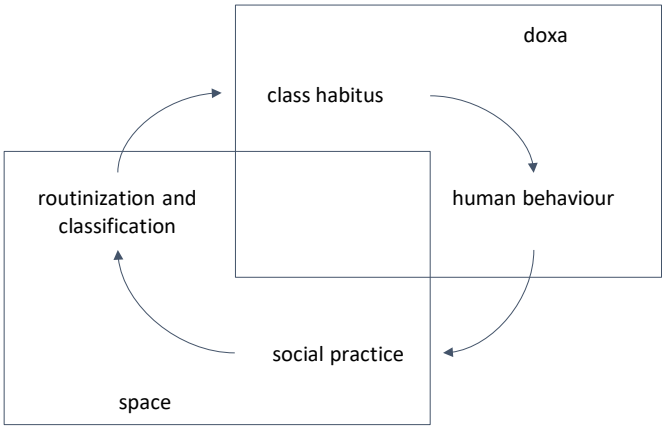


Figure 2.2.
Bourdieu's model of structure and agency.

If these authors found that it was necessary to approach the question of space to resolve the problem of the relationship between structure and human agency, then Lefebvre should be presented as an author for whom the problem was inherently spatial. Agency and conscious thought are the basis of Lefebvre's concept of "project", and urban space is its stage. It is a social product which, by affecting social practices, is fundamental for the production and reproduction of society. The dominant classes are the ones with the institutional power to produce space and do so in a form adequate to their interests. Architects are not exempt from this power - in the form of the market, developers and the authorities - and architectural action is not capable of creating social relations itself, even if "under certain favourable conditions can trends be formulated. Only social life (praxis) in its global capacity possesses such powers - or does not possess them. The people mentioned above [architects and sociologists] can individually or in groups clear the way, they can propose, try out and prepare forms." (Lefebvre 1973, p.151)

As in the theories above, it is through social life that social relations are produced and reproduced. In Lefebvre, social practice is an active agent on the contradictory, political, character of the process of the production of space. "[…] the city transformations are not the passive outcomes of changes in the social whole. The city also depends as essentially on relations of immediacy, of direct relations between persons and groups which make up society […]" (Lefebvre 1968b/2000, p.101) Sitting on the interface between the near order ("relations of individuals in groups of variable sise, more or less organised and structured, and the relations of those groups among themselves" (Lefebvre 1968b/2000, p.101)) and the far order (society, regulated by large and powerful institutions, a legal code, a culture, through which it projects itself as the "higher" order and imposes itself on the near order), the city contains the former, maintaining the relations of production and property, and is contained by the latter which it supports by projecting it on the plan of immediate life: the plan of social practice. And it is by this projection that urban space makes it subject to the action of collective, spontaneous and conscious theoretical and practical effort. In this model, social practice, action from below, the near order, becomes a means for the dissolution of the state through the destruction, not of the mode of production, but of the superstructure of the far order: "[…] a kind of withering away of its power, its strategic capacity and the ramifications of absolute politics. […] it is the institutions and ideologies, the superstructure upon which the absolute state is erected, that crumble." (p.125)

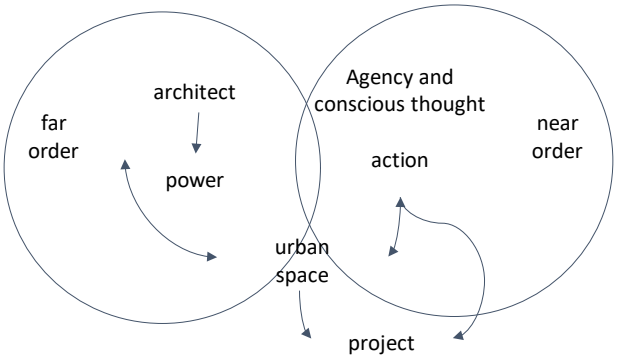


Figure 2.3.
Lefebvre's model of structure and agency.

When it comes to the question of everyday life, Bourdieu privileges the house above all other forms of inhabited and man-produced space, as the major place where routinisation and classification happen. The house and the ways it works as a mechanism of spatial division and class differentiation, which was also approached by Giddens (1979/1980) and Bourdieu (2000), as well as several marxist, neo-marxist and marxian theorists, will be a matter of later analysis. At this point, we will postulate that it does, and focus on how social structures are (only) revealed in their consequences, one of which is the material objects they structure (Bourdieu, 1972/1995). To understand them a structural analysis of the social organisation of the internal space of the house and its relation to the external space is needed.

2.3. SPATIAL ORGANISATION OF SOCIALLY DEFINED ACTIVITIES

This idea was also central to Rapoport's work, who studied the house through the premise that the spatial organisation of human interaction is the most important feature of man-designed environment.

Even though his research, and the field of Man-Environment Studies he developed in the 1970s, focus mostly on understanding how people and groups shape their environment, they are also concerned with the question of how physical environment affects people. While arguing that the use of space has a bigger impact in architectural form than the other way around, and refusing what he considered to be over-deterministic theories, Rapoport considered the human-environment interaction to be bilateral, and the built environment a setting for human activities that can act as a catalyst for behaviour and, more surely, block or deny action.

Rapoport's theoretical privilege of collective human action as a creator of space is made clear in his preference for vernacular architecture. Stepping away from the notion that all individuals are a product of the structure of which they are a part and, in turn, help produce, Rapoport argues that vernacular architecture is "(…) the direct and unself-conscious translation into physical form of a culture, its needs and values - as wells as the desires, dreams and passions of a people. (…) with no designer, artist or architect with an axe to grind." (Rapoport, 1969, p.2) Primacy of human agency is present in the idea that because vernacular buildings are less the result of individual wishes than of collective objectives for the creation of an ideal space, they are more the materialisation of a culture than the work of individual architects. For Rapoport, the lesser the degree of intentionality - using the example of an Eskimo who has no notion of the social structures they are reproducing when building the pre-conceived and pre-accepted form of its igloo - the more

architecture is reflected in society.

Yet, Rapoport's favouring of agency over structure does not contradict that for him "space is experienced as the three-dimensional extension of the world which is around us - the intervals, relationships and distances between people and people, people and things, things and things" (Rapoport, 1969, p.9) These relationships are reflected in the spatial organisation of meaning, time, and communication - where space is a means to shape social interaction, "who communicates with whom, under what conditions, how, when, where and in which context" (p.12) In this model, the organisation of human activity is at the heart of communication.

According to Rapoport, any activity may be analysed through four components; the activity in itself (drinking, buying, cooking); the specific way of doing it (drinking in a bar or by oneself, buying at a mall, cooking with the family or for the family); the additional, related activities which become part of a system of activities (gossiping while shopping, watching tv while cooking); and the symbolic aspects of the activity (buying as a symbol of consumer society, cooking as a ritual). These cannot be separated from the activity itself, and "in Architecture this leads to the distinction between a kitchen for cooking versus the same kitchen as a symbolic place and indicator of status, a living room as a place to 'live' as opposed to that same room as a 'sacred place', a window for light and air as opposed to its use as a means of communicating with other people on the street and in other dwellings." (Rapoport, 1969, p.20)

Following this idea, Rapoport argues that one cannot discuss single activities, but only systems of activities, which occur in systems of settings, neither of which liable of being considered individually. Any setting - for example, a building - exists in the whole context to which it is linked through the activity system of its occupants - which varies across different groups and classes. Rapoport's concept of house-settlement is the application of this model to the analysis of housing. The house cannot be seen independently of the social and spatial system where the system of activities of dwelling takes place. So house-settlement is the set of spaces where the activities of dwelling happen, be it within the limits of the domestic space, or those of the neighbourhood and urban system. When different actors and social groups can be associated with different activities, the spatial organisation of a house-settlement acts on the way social interaction develops.

Rapoport (1990) creates the concept of fixed-feature space (meaning elements such as buildings and walls, opposed to semi-fixed furnishings and non-fixed people and their activities) as the means through which architecture organises activities, and therefore individuals and groups, through the spatial division and determination of architectural function. While Rapoport argues that semi-fixed elements are much more important in providing the cues that guide non-fixed elements, it can be argued that the way semi-fixed elements are organised is also already a manifestation of the interrelationship between all of them. What Rapoport proposes is that semi-fixed

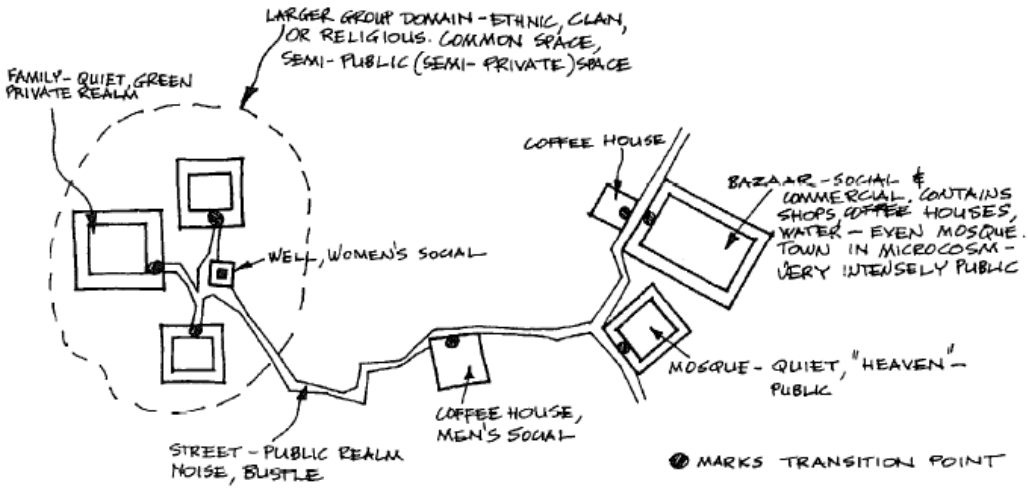


FIGURE 2.4.
House Settlement (Rapoport, 1969, p.73)

elements are both a consequence of and a system of cues for non-fixed behaviour, and that even non-fixed elements - such as the presence of other people, their activities and behaviour - have a strong influence in non-fixed elements themselves.

This argument touches, if lightly, on the model we have been trying to establish of recursion of human action and built environment, but, more importantly, it advances a fundamental question about architectural function and human activity. Human activity and behaviour can contribute to the reproduction of similar activities and behaviours around it, and it can prevent others or the same actions of taking place in the same space. Human actions (or, for Rapoport, non-fixed elements) are causes for the spatiality of other actions and, consequently, these spacial processes are not deterministic, but recursive.

It seems then, that architectural function plays a fundamental role in the relationship between social interaction and the built-environment in two different ways. On the one hand, activities taking place in one determined space are causally related to activities taking place around it. Some activities can be considered attractors while others are incompatible among themselves. This is an easy enough concept to grasp in the domestic space, where sleeping in the bathroom would be highly undesirable, and individuals will usually search for low-density spaces to focus on activities such as studying or working. On the other hand, but directly related to the first, some activities in a system require infrastructures to take place - let's call these fixed-functions. Again, this is easy to visualise in a domestic environment, where a stove - or the closest appliance possible - is needed in order to cook. That people need to use these fixed-functions will, according to the model of functions as attractors or inhibitors, influence the way other spaces are used beyond what it is possible to see through fixed-feature elements alone.

2.4. SPACE SYNTAX, THE GENOTYPE ANALOGY AND THE DESIGN PROBLEM

A similar approach to architecture as an organiser of human activities was also developed in access analysis. The theory in this field was formalised by Hillier and Hanson (1984) who, similarly to Rapoport, considered the fundamental relationship between the built environment and human agents to be the ordering of relations between people that is an inevitable part of the ordering of space. To the theoretical models being developed during the same period on the interaction between space and society, Hillier and Hanson are better known for their argument that this interaction may be understood through the measurable quantitative analysis of certain - those they

define as configurational - aspects of the built environment. This was developed in the field of Space Syntax, defined as a theory as well as a methodology for the study of what formal, spatial and functional forces generate spatial forms. This chapter will focus on the theoretical basis of what was arguably the first time that the question of the relationship between space and society was seen as more than a spatial problem: a problem that can benefit from specifically spatial tools.

Appearing in the early ninety-seventies, Space Syntax bridged the gap between two fields of thought that were, and mostly still are, seen as being far apart. It emerged as a reaction to what were seen by its authors as anti-rationalistic theories of architecture, often fallacious and over-simplistic behaviouralist and territorialist theories such as those by Levi-Strauss and Hall and to the contradictions of structuralist models. If it also appeared in continuity to the work being developed at the time on the application of mathematical concepts to architectural problems in order to systematise the design process (Alexander, 1965, 1979; Alexander et al., 1977) and the understanding of space (Broadbent & Ward, 1971, Broadbent, 1974, Benedikt, 1987), its theoretical focus was on the interaction between space and society. Mainly, it aimed at providing an analytical theory of architecture. While Alexander, Broadbent and others were concerned with the design process - where it comes from, how it works, how to improve it - and worked towards creating a scientific basis that would make it less reliant on architects intuition and creativity through the systematization of procedures and criteria (norms), Space Syntax suggested that it was the understanding the relationship between the forms of man designed space and patterns of social encounter what would allow architects to confront actions with objectives.

Because, in Hillier and Hanson's words, "Without theory, method is nothing" (1997, p.01.1), this depended on the development of a strong theoretical basis to support methodological developments. Consequently, the question of human agency is fundamental to the founding works of Space Syntax, and the idea of recursion of action between the built environment and human actors is made clear in Hillier and Hanson's (1984) critique of structuralism. Characterising it as a theoretical model which philosophical aim is the objectivising of the concept of structure in such a way as to show that the sources of social behaviour lie not in the individual but in society itself and the particular forms it takes, their critique lies on its inability to take this further and search to understand where structure itself comes from. By failing to shift its focus between both how structure organises society and how society organises structure, structuralism makes of these organising rules something that is prior to society: "[…] a society in which the principles of order are located in individuals, not in society itself. The main aim of structuralism, therefore, turns its back on itself, and degenerates into what it was trying to escape from." (Hillier & Hanson, 1984, p.203)

Instead, by confronting the law of the primacy of the rule with the law of the primacy of the phenotype (the object), Hillier and Hanson (1984, p.205) are able to shift the question to "how and why human beings reproduce what they do, and how does this unfold through the dialectics

of thought and reality into a morphogenetic, unfolding layout." In space syntax, as in the models reviewed above, the relationship between structure and social relations is not static, but a recursive process between thought (agency) and reality (the structures embedded in society).

As in Bourdieu, Giddens and Lefebvre, space is not accessory to this model. In Space Syntax, however, space is not only what society produces and where society happens. Exactly because social relations are always spatially materialised, it is also where society can be seen and a means through which it can be known. What is observable about society, its social processes and relations, are the encounters and interaction of people in space:

> Human behaviour does not simply happen in space. It has its own spatial forms. Encountering, congregating, avoiding, interacting, dwelling, eating, conferring are not just activities that happen in space. In themselves they constitute spatial patterns. (Hillier & Hanson, 1984, p.18)

Human activity is then inherently spatial, and social encounters have an inherent spatial logic. Simultaneously, space, because it is a product of social relations, has an inherent social logic. The aim of Space Syntax is to understand how the spatial logic of social relations and the social logic of space relate morphologically. By framing the problem in such a way, this theoretical model aims at moving one step back from any direction of determinism in the relationship between agency and structure. If Space Syntax postulates that space has a direct relation to social life, it does so in convergence with Rapoport's theory of communication: the relation exists because space "provides the material preconditions for the patterns of movement, encounter and avoidance which are the material realisation - as well as sometimes the generator - of social relations" (Hillier & Hanson, 1984, p.ix):

> Any open space is a space in which possibilities have not yet been eliminated, and every open space is continually structured and restructured by the human activity that takes place in it. If we do not conceptualise space in this way we have no way of reconciling human freedom and the human structuring of space. Human activity is never actually structured by space. In structuring space by physical objects we suggest possibilities by eliminating others. But the spaces in the interstices of the physical forms are still 'open'. Within these limits, the infinite structurability of space still prevails.
>
> In our cells we may dance. (Hillier, 1996, p.270)

But if Space Syntax carefully weights on free will and individual agency, claiming that it is by creating restrictions to this agency that space acts on society, it is not individual agency that concerns it. Society is not, according to Hanson (1998, p.132), "made up of an aggregate of individual behaviours". To make this point, Hanson creates an analogy between the basic human

needs covered by housing and the activity of eating: "What is of significance is how eating behaviour is made part of that knowledge which is necessary to being a member of society". It is how this knowledge is embedded in space that makes the studying of architecture essential.

Hillier and Hanson go beyond the idea of recursion. In their model, the individual and the universal are the same. The authors refuse to defend a relation between man-designed environment and social forces, but instead that there is a relation between the generators of man-designed environment and social forces. Space and society are a part of and produced by the same system of social relations, - an idea which Hillier (1996) touches upon with a play on words on Corbusier's famous axiom a house is a machine to live in: "Space is the machine". Its laws of patterning, although not autonomous or separate from society, are independent of human wishes. The rules that act as restrictions on what would otherwise be a random generative process are also - arguably mainly - social. Because space is not a reflection of society but a process which both restricts and is restricted by social forces, there is room not only for the production of known outcomes but also of new ones. These restrictions are transpatial, a concept developed by Hillier and Hanson explicitly to correspond to the marxist concept of ideological superstructure (1984), and act by building "into patterns of space and action complexes of noninterchangeable relations which ensure, through the ritualisation of life, the reproduction of the systems of categories required by that society." (Hillier & Hanson, 1984, p.222)

These restrictions, rules, or stable "deep cultural structures" guiding human action over the environment through building were compared in the early works of Space Syntax to what biologists call genotypes. Using an army camp as an example, Hillier and Leaman (1974) argue that three structures define the form of the human-organised environment - a set of instructions carried on the army's manual; a set of items carried by the army to manufacture the camp, which has the same set of instructions embedded on them; and the set of local constraints and contingency, including personal and environment factors, strategic considerations and so on - and establish the genotype as "the information carried in the instructions and embedded in the instrumental set." (p.5)

What is most interesting in the context of this dissertation is how the genotype analogy developed in Space Syntax to become straightly connected to the importance of architectural function in the ordering of human activity and thus of social relations. In fact, architectural function is not only not a basilar part of Space Syntax theory, but it is also explicitly considered to be unnecessary to the understanding of how space acts on human behaviour. In what concerns urban systems, Hillier et al. (1993) propose the concept of natural movement, corresponding to the proportion of human pedestrian movement which is determined by the urban grid and argues that, while it is not always the largest component of movement in urban spaces, it is the most pervasive and the most consistent. Architectural functions, in this case, land uses, are then located to take advantage of this movement.

In Space Syntax, the idea of the primacy of configuration suffers a necessary alteration in the case of buildings, strongly programmed, where prevalent fixed functions and semi-fixed elements are more determinant of human behaviour, and in the case of planned urban systems, where land uses and spatial configuration are often not synchronised. In buildings, due both to the physical limits they impose on the type of activities that can be carried on inside them and to the embodied knowledge of social relations (a concept not far away from Bourdieu's habitus) that allows for semi-fixed and non-fixed elements to act as behavioural cues, activities - and so categories of people - are assigned to specific spaces. At the same time, this knowledge is carried in the genotype, and the very way these spaces are designed and integrate a spatial system in different ways carries information and limitations on the relationships between different individuals and groups. In this sense, buildings may be a materialisation of the principles organising society "in a domain that is more structured than the world outside the boundary." (Hillier & Hanson, 1984, p.184)

As a result, in buildings activities are often explicitly assigned to spaces and categories of people socially assigned to activities, making the social interfaces among inhabitants and between inhabitants and visitors something that is inherently present in the configuration of space. Buildings and other strongly programmed spatial systems become something close to Rapoport's systems-of-activities, in which each setting or each space (with its corresponding activities and groups) establishes a relationship with all the others and has a specific spatial expression within the system. Within a single building, these relations say something about both the social intentions of their designers and "the dynamics which underpin everyday life which are independent of people's perceptions of the meaning of space" (Hanson, 1998, p.38). Across buildings, a consistence in the patterning of these relations across a sample of buildings may indicate that a genotype exists that is embedded into each of its phenotypes.

The quantification of this idea gives rise to the concept of inequality genotype in space syntax theory. It is defined as a consistent pattern of "relational differentiation of the functions and categories located in different spaces within a plan" (Hillier et al., 1987) through which social relations and processes are expressed in space. When the ordering of functions is consistent across a sample, then a cultural pattern can be claimed to exist in the spatial definition of social relations, "one which can be detected in things, rather than just in the way it is interpreted by minds." (Hillier et al., 1987, p.364)

Underlying this idea is the notion that the configurational properties of architectural function reflect patterns of use and activity that are culturally structured. Going back to Lefebvre, this idea suggests that studying space is to study its production. By shifting the focus from how space impacts behaviour to how social relations impact space, this takes us back to the origins of Space Syntax within a greater movement towards a systematisation of the design process. Then, Space Syntax aimed at setting itself apart from normative theories of architecture, be it those of the behaviouralists or of the adepts of design systematization through computer-aided

methodologies, which would only perpetuate design as "the mistaken slight phenotype modification for the continuous recreation of a genotype" (Hillier & Leaman, 1974, p.3). The development of an analytical theory put the focus on design as an autonomic process, guided by genotypical preconceptions and assumptions that are unconscious to the designer. As Hillier and Leaman elaborated, the action exerted on the environment may appear to architects as a simple result of their agency. But, because it carries an embedded knowledge of social relations, it will produce a coherent result that would not appear as random individual action to the anthropologists of the future. If it is to inform designers, architectural theory should then look away from design and study the environment itself, so that observers might become something like archaeologists of the present, "attempting to uncover the elementary forms through which our societies are being mapped into new spatial structures." (Hillier and Leaman, 1974, p.10)

Throughout the years, Space Syntax has delved into the particularities of architect-designed space. Here, the most pervasive distinction is made through the development of the concepts of genotype of means and genotype of ends, where the latter exists in vernacular architecture (where the social structure of the building is reproduced without other conscious goals) and the former is part of a conscious design process, and where spatial characteristics may remain constant while functional patterns differ (Hillier, 1996).

This idea is elaborated on by Bafna, who starts it by questioning the idea that "sociologically relevant spatial patterns or any modifications to them can only arise from covert sociological process, not overt reflection." (p.20.2) The author argues against the idea in Space Syntax theory that socio-cultural factors determine the form of buildings, while constraints from physical factors only modify the form or restrict variations of it. Using the example of a house by Le Corbusier, Bafna (2003) argues that the designer's concern with geometry has systematic genotypical consequences to the form of buildings. During the course of the design process, the Landhaus has known different, while apparently similar, iterations that seem to go in the direction of a more traditional house becoming more stylistically Le Corbusian. In the process, its genotypical tendencies were thoroughly transformed. "But this is not because he could not have physically done that with the constraints of the original layout (…) but rather because such an arrangement would not have made sense within a cellular layout" (Bafna, 2003).

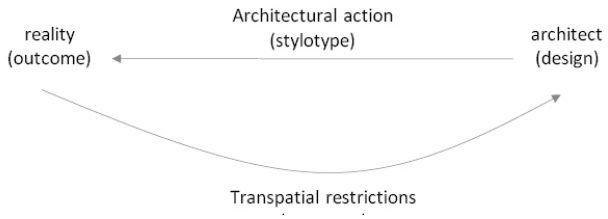


Figure 2.5.
The genotype in the design problem.

This gives rise to Bafna suggesting that there exists a difference between what he calls the sociotype of a building, its genotypical tendencies, "a class of common relational structures that enable the specific general social function which the building must satisfy" (Bafna, 2012, p.76) and its stylotype: the design tactics or architectural style, the formal, geometrical search that guided Le Corbusier from a more traditional house to his final design. Here, while the inequality genotype is what ensures the reproduction of a given culture in a building and so its social viability, "its geometric formulation is (…) not merely an end (an architect's, or a culture's, personal aesthetic preferences dressing up an essential topological armature), but rather a means to effect a topological layout that works at a sociological level." (Bafna, 2003, p.20.15) Integrated into the model that is being constructed throughout this chapter, what Bafna's idea seems to show is that, because what guides architects' taste - or, to use Bafna's words, their specific tactical design moves, aesthetic judgements, design strategies and design conceits - is not different from what guides their idea of what a valid topological organisation is, the sociotype and the stylotype are not to opposing forces, but a coherent expression of the same thing.

2.4.1. SPACE AND THE STUDY OF HISTORY

The reading of different authors presented so far allows for the systematisation of a set of ideas: If the concepts of culture or society can be understood as a determined organisation of social relations, architecture is the means through which it is reflected in space. Because human actors live and interact in space, architecture is not simply the material realisation of this organisation, but also an active part of it, contributing to its shape. The built environment is not merely the result of a series of social determinants. It imposes, in turn, part of its reality, and buildings produced by society contribute to the maintenance of its social relations.

Inseparable from the context that produces it and that it tendentially re-produces back, man-built environment has the capacity to tell us something about this context, and is then a privileged field for the understanding of social processes in history. In particular, space syntax's capacity to detect and describe spatial patterns in terms that are quantitative and as such can be related to empirical data and compared across cases, is an invaluable tool for developing in-depth readings of the relationship between space and society throughout time, as is reflected on its use, and of other mathematical and statistical tools, in recent archaeological research (Barceló et al., 2006, 2015). How this can be explored in articulation with other disciplinary fields has also been examined by Lars Marcus (2012, p.5) in a issue of the Journal of Space Syntax dedicated to the work of Julienne Hanson:

> The aim and ability to balance quantitative analysis with interpretations against a background of broader social theory is of course what one would like to see in all research on such an empirically complex and inherently social subject as cities, but for many reasons this is far from the case. What we have been able to witness over the last decades is rather a divergence into what, for want of better words, can be characterised as quantitative and qualitative studies of cities, a distinction that runs straight through the more familiar categorisations such as human geography and urban sociology.

Marcus then puts in opposition studies that focus on gathering the tremendous amounts of data available in cities and on developing computer-aided modes of urban modeling to those that explore cities as socio-political landscapes to interpret their social injustices and power relations. The first produces social content that "often seems to be overly abstracted" (Marcus, 2012, p.5), the latter sees explanatory proof as being beyond its scope. Julienne Hanson, he argues, had the skill and sensibility to be able to bring both sides together. Throughout this chapter it was argued that it was exactly to do so that Space Syntax was first developed, and it was shown how the problem of society and social relations was always present in those papers that first appeared in the ninety-seventies through the mid ninety-eighties, and it has been continuously explored in contemporary research, alongside methodology-centred and empirically-based studies.

Sam Griffith, also in 2012, and also concerning the work of Julienne Hanson, divided historical research using space syntax into four categories: History as background, where history appears to give context to the study and is an usual example in case study research; History as syntactic growth processes, where research focuses on the growth processes of urban form or differences in architecture typologies; Syntactic morphological histories, which "bring the social context of the spatial configuration of settlement and architectural form to the foreground, often with the primary intention of understanding the contemporary built environment." (Griffith, 2012, p.4); and, finally, Spatial histories, to "indicate research concerned with the way in which social phenomena organise and become organised in time-space". While these are not stagnant notions, and the limits between categories are lose and malleable, this research positions itself towards the latter. It searches to understand spatial history in its relation with historical context (tending, as such, also towards the first and the third) and focuses on the questions of the production and use of space.

There seem to have been relevant developments in the field of space syntax since Griffiths (2012, 77) wrote that "there has been a lack of interest in understanding those processes of mutation, adaptation and disappearance, which make greater demands on understanding the historical particularities of time-space." The chronology of spatial systems has indeed been taken into account in important research during the last decade, but often spatial evolution is seen as something exterior to the context that produces it, almost natural, many times neutral, so that it is possible to deem urban spatial structures as good or bad, desirable or flawed, without a close

examination of what is deemed desirable or flawed throughout time, and to whom it is good or bad.

Space Syntax methodology should not be seen simply as a set of accessory techniques, but as taking advantage of the essential tools architects have to seek to understand and build the world with. These are tools that allow the architect to study the world through their own spatial lens, tools that make architecture a privileged field to study social processes. Through the study of space, through the embedding of spatial structure in the study of historical processes, architecture is a means to study the society that produces it. In this line, Psarra (2010, p.24) argues that "Without input from history and theory configurational analysis alone cannot raise architectural discourse into the level of conscious knowledge. Similarly, without knowledge of non-discursive rules, history and theory are confined within the limits of the discursive, an architecture consisting of sets of concepts, contextual influences, and their historical development". Similarly, Anthony D. King (1984) contends that "the aim is to emphasise the approach and method, the paramount necessity that, if we are to understand buildings and environments, we must understand the society and culture in which they exist."

Space Syntax' development of a series of methodologies and tools for the analysis of the built environment will be presented and analysed in the next chapter, as well as their relevance to this research. At this point, we've attempted to establish the importance of looking at architecture as an ordering of social interaction - patterns of movement, encounter and avoidance in Hillier, and communication in Rapoport - in space as a means to study the relationship between architecture and social structures, and its further relevance for the study of history.

2.5. PREMISE

It has been established throughout this chapter that an examination of the iterative process between space and society must take into account both the formal, configurational features of spatial ordering of architectural function, and insofar as function has the capacity of modifying patterns of behaviour within a spatial system, as well as the use and appropriation of its parts. Due to the classifying and routinising attributes of man-designed environment, and in particular of the house, this quantification can help clarify those questions which Rapoport has presented as the most important to understand the social relations facilitated by buildings: Who does what, where, when, including or excluding whom (and why).

The dissertation will follow with the premise that the spatial organisation of socially determined human activity is the main means through which architecture has the capacity to act on social relations. Housing, in particular, has the capacity to shape social relations through two scales of action; that at which the real estate market acts in class differentiation, which determines who has access to the city and in which conditions; and at the level of the spatial organisation of human activity in the system of systems which comprise the house-settlement. Through habitus, embedded knowledge of social relations, social consciousness, individuals and groups are assigned to different activities. Through how these interact, how each specific system of activities of different individuals, groups and classes forms systems of systems that are entangled together or separated, social interaction is encouraged or hindered. This interaction most often takes a form favourable for or at least coherent with the reproduction of the relations of production which impact on the 'superstructural' ideological apparatus, which will, in turn, be materialised in architectural education, taste and action. As such, to say that architecture acts on human behaviour and on the relationships established between people is not to deny human agency. To say that architectural action is always a social and ideological product is not to take value away from the will of architects, who exist in a context and act under social constraints of which they are only partially aware.

This dissertation is a conjugation of both. It will present a reading of the planned environment as a more or less conscious spatial organisation of people, groups and classes, which is a more or less conscious materialisation of the social structure which produced it, of its contradictions and opposing forces. A materialisation which, despite the unchanging appearance of architecture, is not a static artefact, but an active part of a constantly transforming whole.

A complete understanding of the relationship between architecture and social interaction can hardly take into account only fixed-feature elements, but needs to focus precisely on the ways all these elements come into play and have a role in the construction of each other, and how they relate to the social structure, the relations of production, and the dominant ideology. We make ours the words of Julienne Hanson, whose work on the development of Space Syntax has at times been criticised for the way it focuses on the fixed elements of man-made space, but through probabilistic calculations manages to successfully overlook the intricacies of social life.

> It seems likely that in the future, studies of houses and homes will no longer be satisfied with identifying similarities in the spatial patterning of a set of houses in a particular region or cultural context. Increasingly, analysis will seek to pinpoint the typical ways in which different room functions and domestic activities are configured in people's homes, the importance of furniture and object arrays in providing the scenery and props for social encounter and interaction, how domestic space and its ficture and fittings relate to explicit and tacit household practices, inter-personal behaviour, domestic habits and routines, the postures and gestures which people make in haptic space and even the

> language and concepts which people use when talking about what their homes mean to them. Increasingly, a configurational approach will reach out to related disciplines such as sociology, anthropology and psychology in addressing the social and personal interpretation of domestic space. (Hanson, 1998, p.270)

But, as we advance to the next chapter and methodological approach to this research, we'd also like to underline the importance of understanding the limitations of one's work in a subject as complex as the one we propose to tackle.

> Those of us who believe that science is on the whole a good thing, accept that science is in one sense an impoverishment - though in others an enhancement - of our experience of the world in that it cannot cope with the density of situational experience. It has to be so. It is not in the nature of science to seek to explain the richness of particular realities, since these are, as wholes, invariably so diverse as to be beyond the useful grasp of theoretical simplifications. What science is about is the dimensions of structure and order that underline complexity. Here the abstract simplifications of science can be the most powerful source of great insight. […] The interpretations which we place on space will never be absolute, can never be certain. The best we can offer is internal coherence of an argument which is consistent with the world as it presents itself to us - but this, after all, is the stuff of theory. (Hillier, 1996, p.76)

So let's now go back to Ivan the Terrible's door. Hoping to have established the recursion of social processes and social structures, the role of a human agency which is a product of an ever-evolving context it contributes to produce, we can understand the particular and relevant role of architecture in the ordering of human activities - inherently social and classifying - and so inevitably on the ordering of social relations. We can also understand that it's not deterministic and that in particular objective conditions people do have the power to break it. And that is why it is so important, in a methodology that is also inevitably recursive, to study both the universal and the particular in order to understand which social relations are being produced and reproduced by architectural action.

3. METHODOLOGICAL FRAMEWORK

Introduction

This chapter will describe the methodological framework used for the studying of public and cooperative housing in the period that goes from the late 1960s to the early 1980s. Encompassing syntactic tools and concepts as well as others whose theoretical foundation has been given in chapter 2, the methodology was based on the understanding of the relationship between architectural action and social relations as having to do, to a great extent, with architecture's capacity for organising social practices and interaction through the spatial organisation of human activity. Because this relationship has been shown to be recursive, the methodology was twofold. On the one hand, it encompassed methods for extracting spatial patterns from the built record, which may be indicative of design paradigms. Contextualising these in their social and historical period, as well as in certain architectural and ideological trends, it was used to show how social relations are expressed in space, often in apparently contradicting ways, with different ideological approaches resulting from contradictions in material conditions creating differences in spatial patterning. On the other hand, it searched to include methods for understanding how cultural patterns of family life are reflected in the domestic space, but also how spatial attributes have a role in the way it is used and appropriated. Ultimately, it was a methodology for relating both, by focusing on three different aspects:

1. The actual architectural and spatial materialisation of public housing development,

2. The social and historical context that produced it, and its inherent contradictions,

3. The textual production concerning public housing development, understood not only as an historical source, but as an object of study in itself

The chapter will follow by giving a detailed account of the methodological framework used for the spatial analysis of public housing in Porto between 1969 and 1982, including a clarification of space syntax's methodological character by laying out the main ideas behind it, as well as the basic notions and concepts necessary to understand its set of methods as an adequate means for studying the relationship between architecture and society. It will then specify the set of theories that were applied for the interpretation of the results from spatial analysis in its context.

3.1. CASE STUDY

3.1.1. PUBLIC AND COOPERATIVE HOUSING LAYOUTS IN PORTO - SELECTION AND COLLECTION

This dissertation looks at public and cooperative housing in Porto between 1969 and 1982 through the examination of 41 housing developments constructed with the state's total or partial funding within the municipality of Porto, as well as some which were part of the second phase of an urbanisation and housing development plan first developed by the council in the 1950s. This set encompasses 7 council housing schemes developed between 1969 and 1975, 10 housing schemes developed within the SAAL programme and 6 developed for organised residents associations within other legal frameworks, 11 housing estates of public development after 1974, and, finally, 8 cooperative housing schemes (table 3.2.). In cases where housing development took more than a couple of years, the date of the layout's design was favoured over the date of its completion. This allowed to integrate the layouts in the design paradigms of their time, and to include of a larger number of cooperative developments, which, many times designed in the late 1970s and 1980s, were dependent on more complex bureaucratic processes and often took years to be constructed. Due to a certain fluidity in the process of public housing development, in particular in the years surrounding the revolution of 1974, and to the fact that the FFH assigned the administration of finished estates to the municipality, it is in some cases unclear whether the existing estates were first developed by the municipality or the FFH. The following table identifies these cases according to data available in official sources, which are often contradictory:

	IHRU (state management)	IHRU's stated year of construction	Domus Social (council management)	Domus' stated year of construction	Drawings in council archives	Earliest drawing	Monuments' data - development	Monuments' data - date of construction
23. São Tomé	•	1977					FFH	1970s
24. Viso	•	1977					FFH	1970s
25. Lordelo*			•	1977	•	1974		
26. Paranhos*	•	1979			•	1977		
27. Ramalde	•	1979	•	1979	•	1977		
28. Ramalde do Meio*	•				•	1975	FFH	1970s
29. Pereiró	•	1979			•	1980	FFH	1970s
30. Central de francos			•	1981	•	1978		
31. Bessa Leite			•	1982	•	1977		
32. Vilar Formoso			•	1982				
33. Amial*	•	1983			•	1977	FFH	1980s

Table 3.1. Housing developments by local and central institutions after 1974.

* Apartment schemes are the same or similar

Contradictions between sources, regarding the type of development or year of construction, are further explained for each of these estates in chapters 6, 7 and 8. For simplicity, and assuming FFH's involvement either through funding or direct technical intervention, these will be referred as FFH layouts throughout the dissertation.

While the first studied instances of council housing are not part of a set of nacional housing programmes that started being put forth by the state after 1969, their inclusion was found necessary for the historical understanding of the first. On the one hand, the plan in which they were integrated (PMCP, *Plano de Melhoramentos da Cidade do Porto*) was the first instance of a clear public programme of housing development in the city, thus providing the historical urban, methodological, and typological context for the development of new enterprises, in particular due to the integration of many of the same actors as later programmes. On the other hand, representing roughly 34% of public housing production inside the municipality during the studied period, the importance of these housing developments as the main spaces to where populations from the city centre were displaced could not be overlooked.

	Year	Developer	Estate	House		Year	Developer	Estate	House
1. S. João de Deus		PMP			**24. Viso**	1977	FFH	•	•
2. Aldoar		PMP			**25. Lordelo**	1977	council	•	•
3. Pinheiro Torres	1968	PMP	•	•	**26. Paranhos**	1977	council/FFH	•	•
4. Monte da Bela	1969	PMP	•	•	**27. Ramalde**	1977	council	•	
5. Falcão	1970	PMP	•	•	**29. Ramalde do Meio**	1979	FFH/council	•	•
6. Lagarteiro	1971	PMP	•	•	**29. Pereiró**	1980	FFH	•	•
7. Bom Pastor	1971	PMP	•	•	**30. Central de Francos**	1981	council	•	•
8. Aleixo	1974	PMP	•	•	**31. Bessa Leite**	1982	council	•	
9. Contumil	1974	PMP	•	•	**32. Vilar Formoso**	1982	FFH/council	•	
10. Antas	1974	SAAL	•	•	**33. Amial**	1982	FFH/council	•	•
11. S. Victor	1975	SAAL	•	•	**34. Tirares***	1978	BAM	•	
12. Maceda Acácio	1975	SAAL	•	•	**35. Pego Negro***	1978	BAM	•	
13. Francos	1976	SAAL	•	•	**36. Martim Moniz**	1979	Hcoop	•	•
14. Lapa	1976	SAAL	•	•	**37. SACHE**	1979	Hcoop	•	•
15. Leal	1976	SAAL	•	•	**38. Contumil**	1980	Hcoop	•	•
16. Massarelos	1977	SAAL	•	•	**39. Duarte Leite**	1981	Hcoop	•	•
17. Contumil	1977	SAAL	•		**40. Tripeira**	1981	Hcoop	•	•
18. Bouça	1973	SAAL	•	•	**41. CETA**	1981	Hcoop	•	•
19. Chaves de Oliveira	1976	SAAL			**42. Santo Ildefonso**	1982	Hcoop	•	•
20. Vilar	1976	BAM	•	•	**43. HABECE**	1984	Hcoop	•	•
21. Campo Alegre	1977	BAM	•	•	**44. Boavista**	1986	BAM	•	
22. Carvalhido	1977	BAM	•	•	**45. Presa Velha**		BAM		
23. S. Tomé	1977	FFH	•	•	**46. Campo 24 de Agosto**		BAM		

Table 3.2. Housing estates developed in Porto between 1969-1982. The scale of analysis performed on each is signaled with •.

* Apartment plans were not found for this estate, but it appears to share the apartment scheme of layouts 20 and 22.

While the housing schemes built within the municipality of Porto were considered to be representative of the urban morphologies and domestic typologies developed by the different housing programmes, and so thought adequate to limit in-depth spatial analysis to these 41 cases, it was found necessary to take into account a larger urban area in order to understand the urban strategy and purpose of each programme, as well as the extent of their inter-articulation. Research was conducted in the sense of identifying housing schemes from the same time period in adjacent municipalities that were either integrated in state or council programmes.

Plans and other drawings of housing developments were gathered from a variety of sources. Plans pertaining to council developments and some residents associations' housing schemes were available in Porto's municipal historical archive; drawings of the different proposals and design phases of housing developed directly by the FFH were stored in the archive of the current institute for housing and urban rehabilitation (*Instituto de Habitação e Reabilitação Urbana*, IHRU) in Porto; SAAL designs, the object of several books and research projects, were found in a variety of publications, but particularly in Bandeirinha (2007); drawings and other information concerning cooperative developements were scattered in publications regarding cooperative housing or the relevant architects, in the websites of different cooperatives, and in Porto's city council, to which permit applications were submitted. Additionally, visits were conducted to Porto's public and cooperative housing developments with the aim of complementing the understanding of their organisation, as well as of detecting traces of use of appropriation by their residents. Not all information could be found regarding every estate, and it is expected that other housing schemes were developed both within the municipality of Porto and in particular in the adjacent cities that were not identified in the course of this study.

These housing developments were examined as part of an urban whole, and so the city and its growth are also part of the case study.

3.1.2. TEXTUAL PRODUCTION CONCERNING PUBLIC HOUSING DEVELOPMENT

Different types of textual records were consulted in order to consolidate necessary knowledge for the social and historical contextualisation of architectural practice, and to identify and categorise sets of concerns, objectives and ideological principles regarding social housing and society as a whole across different periods, groups and public housing programmes. In addition to those exposed in chapter 1, primary sources developed during the studied period were also consulted. These are of four types:

1) State subsidised housing research

In 1969, the National Laboratory of Civil Engineering (LNEC) started working in housing-related research. This was reflected in a large body of theoretical production, which assisted the

development of a series of different solutions regarding housing policies, urban morphology and domestic typology. Through the normalisation of constructive processes and development of social studies through data collection and statistical procedures, these solutions were innovative in the national context, and reflected contemporary housing experiences worldwide. This approach to public housing development had at its basis a series of societal principles and objectives that had to do with an ongoing and foreseeable transformation of intra and inter family relations, and so deviated from the traditional family values that were a basis of the dictatorship's rhetoric. These were explicitly stated throughout documents spanning research proposals and publications, as well as institutional reports, but also implicitely reflected in housing guidelines and legislation

2) Project briefs and reports

When available, project briefs and reports elaborated by architects and teams were analysed. These often expressed particular social objectives regarding particular housing enterprises, interpretations and critiques of the legislation and institutional guidelines, as well as how these were to be reflected in specific design choices. SAAL projects, in particular, were acompanied by documentation regarding the process of development of each specific estate. These reported everything from the formation of residents' associations and composition of technical teams, technical difficulties and design adaptations, to the team's demands for financing and payment of delayed wages. They were also a detailed account of the discussions held between residents and technicians (such as architects), often describing conflict or disagreement within one group or the other, and between the two, in which case the position of the technical team was usually thoroughly justified both socially and politically. In other cases, these reports were one of the means used by residents and technicians together to lay out political or strategic positions or demands, in paralel to residents' newspapers and the reports than came out of popular assemblies.

3) Architectural publications, symposia, debates and curricula

After the end of the second world war, the problem of housing in big cities begun receiving particular attention within the discipline, becoming a central point of architects' symposia and debates. In parallel, the question of housing also begun to appear more consistently in architecture publications. In Porto, it became a pivotal point in architectural education curricula during the 1960s and early 1970s, with students in the School of Beaux Arts working with the populations of the historical centre. The written documentation of these elements provide a thorough report of political and ideological positioning within the discipline, as well as a chronological description of shifts on its focus on housing.

4) Generalist and political newspapers and magazines

Outside the institutional and disciplinary circles, the problem of housing for all was often focused on generalist and political media. A systematic review of this type of coverage was not

"So that it is efficient, social work cannot be free. The worker's dignity is not entirely preserved unless he pays rent… Purchasing services, he is elevated in his eyes: each act is the result of spontaneous effort, the freely paid price of his labour."

Academic magazine (Matta, 1909, in Gros, 1982, p.100)

"The defense of the private world - the creation of a human space of serenity facing the exhaustion of contemporary public life - cannot be, however, confused or made into individualism. An isolated home, enclosed, it is not what zealously maintains the vitue of this institution - but what degraded it."

LNEC's Research publication (Portas, 1969)

"We need to counter the development of residential areas that are identified as "social housing" modes of living, where impoverished populations are "given" the opportunity to live. The isolation of impoverished populations in "secondary centres" corresponds to the typical city intervention that accentuates the creation of central areas while constructing peripheral, uncharacteristic places."

FFH's project brief (FFH, 1977)

"Throughout the month we discussed and studied the following aspects:
A) Placement
B) Housing types. Their definition according to families
C) Functional aspects of houses
(…)
Point c) concerns an aspect that revealed inadequacies in our survey and with which we learned a series of things in practice: Our proposals must be grounded in what the residents what and think, but also in the conditions that generated their life concepts. We know that the bourgeois ideology penetrates the popular classes, mainly their higher levels, that is, of specialised workers and poor employees. We need to analyse the different classes assembled in the neighbourhood, because following what the residents say without detecting and fighting against false ideas (which the bourgeoisie makes seems as if they are the best) is resignation and blindness; trying to impose our proposals - even when they appear good to us - without a correct understanding of the ways of life of the populations, of their practical solutions, but also of their level of collective consciousness, is to be a know-it-all."

SAAL's project report (Brigada Chaves de Oliveira, 1975c)

"The North's Residents Commissions' Plenum, gathered the 5th of August at the ESBAP, recognizes the necessity of a clear positioning against the reactionary upsurge and of support of the progressive sector of the MFA. However, taking into account the individualist character of the proposal of the North's Resident Commissions participation in the demonstration; and considering that some of the mottoes proposed have been overcome in practice by the Noth's Residents Commissions; they decide not to be present in said demonstrations and elucidade public opinion through social media that, gathered in plenum, they have decided not to participate in the demonstration."

Residents' newspaper A Zona ("Convocação de Manifestação", 1975)[11]

conducted for the elaboration of this thesis, but relevant examples were often found in the bibliography or associated with the other types of consulted reports. In particular during the years immediately after the revolution during which the SAAL programme operated, political and generalist media were often referred to or coupled with architectural publications and reports. If other types of non-disciplinary media were often accidental additions to the on-going understanding of the period, the local newspapers created by residents' associations mentioned in point b) were an essential and intentional complement to architects' reports.

11 "Para que tenha toda a sua eficácia, a obra social não deve nunca ser gratuita. A dignidade do operário não está inteiramente preservada senão quando ele pagar uma renda… Comprando serviços, eleva-se a seus olhos: cada acto é o resultado dum esforço espontâneo, o preço livremente pago do seu trabalho."

"A defesa do mundo privado - criação de um espaço humano de recolhimento e serenidade diante do esgotamento da actual vida pública - não pode ser, no entanto, confundida ou tornada em individualismo. Um lar isolado, fechado, não é o que aguarda com mais zêlo esta virtualidade da instituição - mas o que a degradou."

"É de contrariar a construção de áreas residenciais que se identifiquem como quadros de vida a "bairros económicos" onde as populações mais desfavorecidas têm a oportunidade que lhes é "concedida" para viver. O isolamento das populações menos favorecida em "centros secundários" corresponde À típica intervenção na cidade que acentua a formação de áreas centrais em contraponto com a construção de lugares periféricos incaracterísticos."

"Durante este Mês foram discutidos e estudados os seguintes aspectos:
Implantação
Tipos de habitações. Sua definição em relação com os agregados
Aspectos concretos do funcionamento das habitações
Continuação da discussão sobre volantes
(…)
A alínea c) respeita a um aspecto que revelou insuficiências no nosso inquérito e com o qual aprendemos na prática uma série de coisas: As nossas propostas devem partir do que pensam e querem os moradores, mas também das condições que geraram os seus conceitos de vida. Também sabemos que a ideologia burguesa penetra nas classes populares, principalmente ao seu nível mais elevado, isto é, dos operários especialisados e dos empregados pobres. Há, pois, que analisar as diferentes classes que estão agregadas no bairro, pois seguir o que disem os moradores sem detectar e combater as falsas ideias (que a burguesia sempre fez tudo para mostrar serem as melhores do mundo) é demissão e seguidismo; tentar impor as nossas propostas – por melhores que nos pareçam – sem um conhecimento correcto do modo de vida das populações, das suas soluções práticas, mas também do seu nível de consciência colectiva, é ser sr. Doutor."

"O Plenário das Comissões de Moradores do Norte, reunido em 5 de Agosto na ESBAP, reconhece a necessidade de uma tomada de posição frontal e clara contra a escalada reaccionária e de apoio ao sector progressista do MFA. No entanto, considerando a maneira individualista como foi proposta a participação das Comissões de Moradores do Norte na manifestação; e considerando que há palavras de ordem propostas que foram ultrapassadas na prática, pelas Comissões de Moradores do Norte; decidem não estar presentes na dita rmanifestação e esclarecem a opinião pública através dos meios de comunicação social, que, reunidos em plenário, decidiram não participar nesta manifestação." Translated by the author.

3.2. THE BASICS OF SPACE SYNTAX METHODOLOGY

If Space Syntax has so far been presented as a theory which appeared to bridge a gap in the models that were being developed in the 1970s on the role of space as a product and a producer of society by connecting them to an emerging mathematical and computational-based field in architectural research, it has also been suggested that its most significant contribution was the development of the idea that because social relations are materialised in space, they are also observable in space. By looking at how space contributes to the organisation of individuals, groups and classes and the relationships between them, one can begin to understand the conditions of its production. Appearing as Space Syntax, the study of the set of rules, principles and processes which govern the structure of man-designed space, its contribution was the more significant for discovering the basis for a methodological approach: "Learning to analyse spatial patterns quantitatively (…) gradually revealed to us the outline of a general sociology of these dimensions, and in the end led to a social theory of space." (Hillier and Hanson, 1984, p.14) Quantification was the most significant step made possible by Space Syntax in this social theory of space: the interaction between space and society is possible of being understood through measurable quantitative analysis of the configurational aspects of the built environment. By analysing spaces and its functions according to their configurational properties within a spatial system, and by identifying common spatial patterns between cases, it is possible to understand how man-designed space carries cultural tendencies in its spatial form.

We saw this much in the first chapter when it was advanced without much elaboration that spatial configuration is in Space Syntax theory the most important way through which "social relations and processes express themselves in space." (Hillier et al, 1987, p.364) Spatial configuration is a type of spatial relation which takes into account how parts get together to form a whole. It exists when the relations between two spaces change with the way they relate - one, the other, or both - to at least a third, and it is the set of relations between elements which are interdependent in a certain spatial system. Hillier and Hanson (1997, p.01.3) cover the core points that we will go through in the first part of this chapter:

> Configurationality means more than sets of relations. It means complexes of interdependent relations with two critical properties: that the configuration is different when seen from different points of view within it; and that when a part of the configuration changes, whether element or relation, the whole can change. Space syntax is about the configurational relation of part to whole and aims to express these properties of configurations in a consistent, rigorous and quantitative way. But it is not simply about quantification. It also itself exploits nondiscursivity by using graphical representations

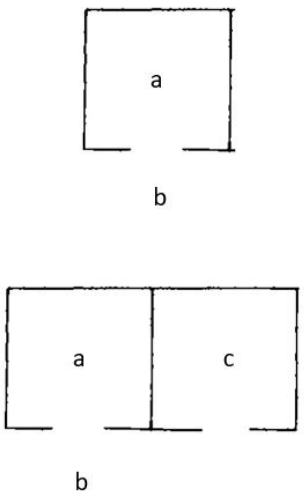


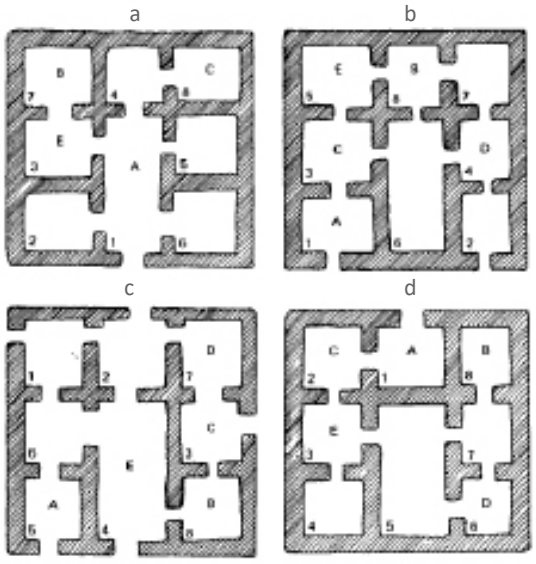
Figure 3.1.
Elementary cell (top) and relations between cells (bottom)
Adapted from Bill Hillier and Julienne Hanson, 1984, The Social Logic of Space, p.147

> of configurational properties, including quantitative properties, so that the intuitive eye and the analytic mind can work together in detecting the hidden patterns in architectural things.

To elucidate the importance of the concept of configuration, let us consider figure 3.1. It is a schema of how the simple architectural action of building four walls and a ceiling has social meaning embedded in itself. This action creates a limit between an inside and an outside, dividing space into two categories: the interior, which presupposes the existence of inhabitants, people who belong inside those limits; and the exterior, the domain of strangers, people who do not belong inside those limits except, potentially, as visitors - people who are allowed only temporary access to the interior space. Between the two, it is established a threshold, an interface between these two categories over which inhabitants exert control and strangers do not.

A building is, in its simpler form, an organiser of these two categories, to which is added a system of control. It defines an interface between inhabitants and visitors, controlling the relations between them. This is what all buildings have in common; all are more or less complex elaborations of this basic structure: it is the global function of a building. When a third space is added to the system in the form of a second building, the relationship between *a* and *b* is altered. *b* is no longer simply the exterior of *a*, but also an interface between *a* and *c*. Not just the domain of strangers to *a*, *b* becomes a space of potential encounter between *a* and *c*, a space which the inhabitants of either must navigate in order to reach the other. *a*, to which no new element or connection was added and thus seems to remain spatially unaltered, is also changed. Its inhabitants maintain their privileged access to and control over *a*, but they also become potential strangers to *c*. When an alteration is made in the spatial system as a whole and *a* and *b*'s spatial roles in the system change, so do their social roles. It is at this level - that of configuration - that space must be understood in order to extract social meaning.

In the 1997 paper The Reasoning Art: Or, the need for an analytical theory of architecture that is quoted above, Hillier and Hanson argue that Space Syntax is not just a methodology, but also a theory applied to make discursive what is nondiscursive in architecture. Configuration, as well as the relational schemas we use to order and interpret spatial elements, are treated unconsciously. It is something we understand intuitively but not analytically, and thus we do not possess the means to express it. Just like we are capable of using syntactical and semantical rules to form coherent sentences without using any of them consciously, configuration - the result of the syntactic rules that govern the structuring of space - is nondiscursive. It is something we think with, not something we think of. That this is so is what makes Space Syntax necessary. We can only compare spatial systems and interpret the social meaning of their differences and similarities by looking at the configurational relations that define their spatial patterning. Space Syntax both makes configuration something we can think of by making it quantifiable, but it also represents it graphically, "so that the intuitive eye and the analytic mind can work together in detecting the hidden patterns



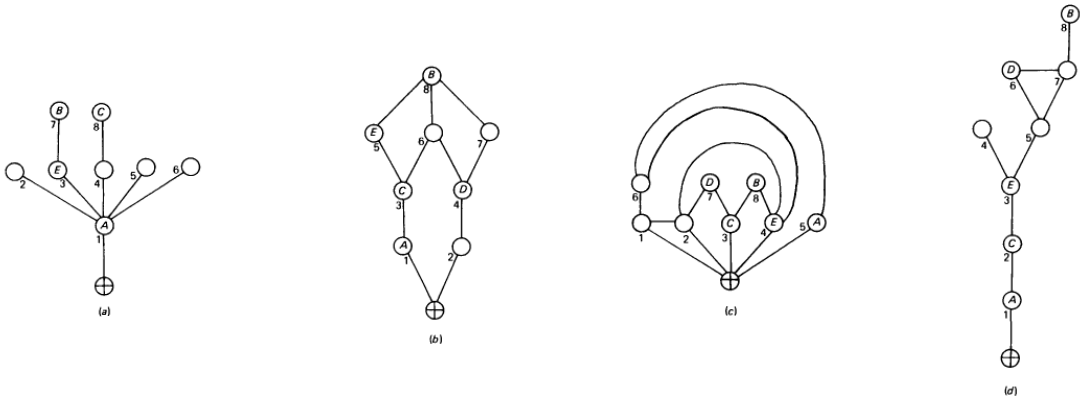


Figure 3.2.
Four theoretical buildings with identic geometries (top) and their adjacency graphs (bottom)
Bill Hillier and Julienne Hanson, 1984, The Social Logic of Space, p.150-151

in architectural things. (…) Space syntax makes the deployment of nondiscursive intuition more rational and therefore more discursive. It aids design as what it is: the reasoned deployment of intuition. Architecture remains, as ever, the reasoning art." (p.01.5)

How these graphical representations work will now be shown through examples of growing complexity. Figure 3.2. shows the plans of four spatial arrangements - let us say four buildings - and their corresponding justified graphs. In Space Syntax, a justified graph is a dual graph of its equivalent plan (and vice-versa): each vertex (node) represents one space of the plan, and each link (edge) represents a connection between spaces. Nodes are ordered according to the number of connections necessary to reach their equivalent space from an origin - often the exterior of the building.

It is now important to understand configuration as a topological concept. Topology is defined by Broadbent (1974, p.220) as "The mathematics of position (geometria situs) and of distortion, which is concerned, not exactly with undulations, torsion, etc, but with the geometrical properties of objects which are so fundamental that their relations maintain constant, independently of any applied distortion. In mathematical terms, topology is concerned with the transformation of invariant relations."

The topological aspects of the four plans - those that would remain the same independently of transformations applied to their form - are expressed in the graphs, and so is their configuration. As such, while the plans represent four similar buildings - buildings with the same dimensions, the same number of rooms, the same internal division - their topological and configurational properties, expressed in the justified graphs, show clear differences. These are not drastic transformations to the shape of the buildings, but differences which have an impact in the way they are experienced by people. For example, the justified graph of 3.2.a shows one central space which is connected to the exterior of the building (the origin node) and connects four other spaces. Two of these spaces have one connection to one other space each. The relationships established between the different spaces in 3.2.a, clearly expressed in the graph, seem similar to those that could take place in a contemporary western apartment. If we label space 1 as a livingroom, spaces 2, 3 and 5 as bedrooms, 6 and 7 as bathrooms and 4 and 8 as a kitchen, this configuration seems to permit the type of interactions between family members and activities that would be expected. The justified graph of 2.3.d is drastically different. If the same labels are kept, the succession of spaces will not result in a socially valid apartment. The front door would connect to a bedroom, and then require to go through a bathroom and another bedroom in order to reach the other spaces of the house, breaking established conceptions of privacy and family relations.

Figure 3.3. shows three house-plans designed by Frank Lloyd Wright between 1938 and 1941, which were first shown to be duals of the same graph in March and Steadman (1971). The three houses have strikingly different shapes which, when labelled according to architectural function

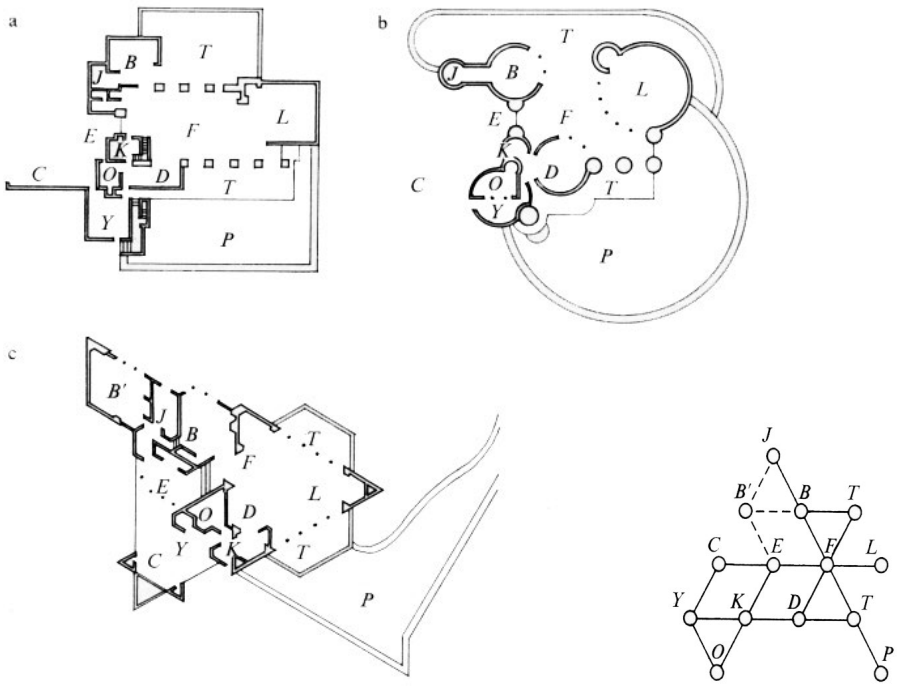


Figure 3.3.
Three houses by Frank Lloyd Wright with identic adjacency graphs
Lionel March and Philip Steadman, 1971, The Geometry of Environment, in Geoffrey Broadbent, 1974, Diseño arquitectónico, Arquitecture y Ciencias Humanas, p.234

and represented in a graph, reveal the same underlying pattern of relationships between spaces. The entrance of the house is always connected to a living room which organises the remaining spaces. The kitchen and dining-room are always placed together, with a connection to the office. The bathroom is always adjacent to the bedroom, which is in all cases separated from the kitchen and dining-room by the central family room. The houses also display a visible set of similar design tactics: rooms are not completely enclosed by walls, connecting to each other through often undefined limits. Where these are defined and privacy assured, see the case of the bathrooms, it is not through the enclosing of walls and creation of doors, but through differences in the height of the floor or ceiling, the extension of corridors, the redundancy of walls, and in the resource to columns and pillars.

Again, this brings us to Bafna's conception of a sociotype and a stylotype. If Frank Lloyd Wright has an architectural style, a certain pattern in the way he organises the elements that define space, this style - at least one that may be identified in these houses, designed throughout these four years - seems to be associated with a way of seeing domestic life. An idea, perhaps unconscious, of how this life should be carried: one that needs a certain number and type of activities-in-spaces, and that also needs an ample social space to be the centre of the house, a small office to be located near the kitchen, the bedroom to be the furthest possible away from the swimming pool, and all of these elements to be positioned in relation to each other in a specific configurational arrangement. It seems that, in these houses, it is not only a consistent design tactic, but also a consistent genotypical signature that makes up Wright's architecture.

What we have seen so far is that it is the configurational properties of space that make up for its social role and that it is through them that social relations can be seen. Space Syntax theory argues that because configuration is something we think with rather than something we think of, it must be translated graphically in order to be understood. In spatial arrangements more complex than those that we have looked at before, justified graphs of functional spaces become not only too complex to be understood but may fail to be an accurate representation.

As we have seen in the last chapter, Space Syntax is based on the theory of natural movement: the proportion of movement determined by the configuration of space which, while not always being the most significant component of movement in urban spaces, is the most pervasive and the most consistent. According to Hillier et al. (1993, p.32) "Urban grids are cultural products because they create, through natural movement, encounter fields with different structures." - usually regarding different degrees and types of a probabilistic interface between categories of people: inhabitants and strangers, men and women, adults and children, different social classes, and others. It is by impacting movement - where and how these categories of people perceive and then move through space - that space impacts and translates social relations and, in a complex and weakly programme spatial arrangement, it is the visual information of spatial configuration that informs people's patterns of movement. While in a house, for example, where the bathroom

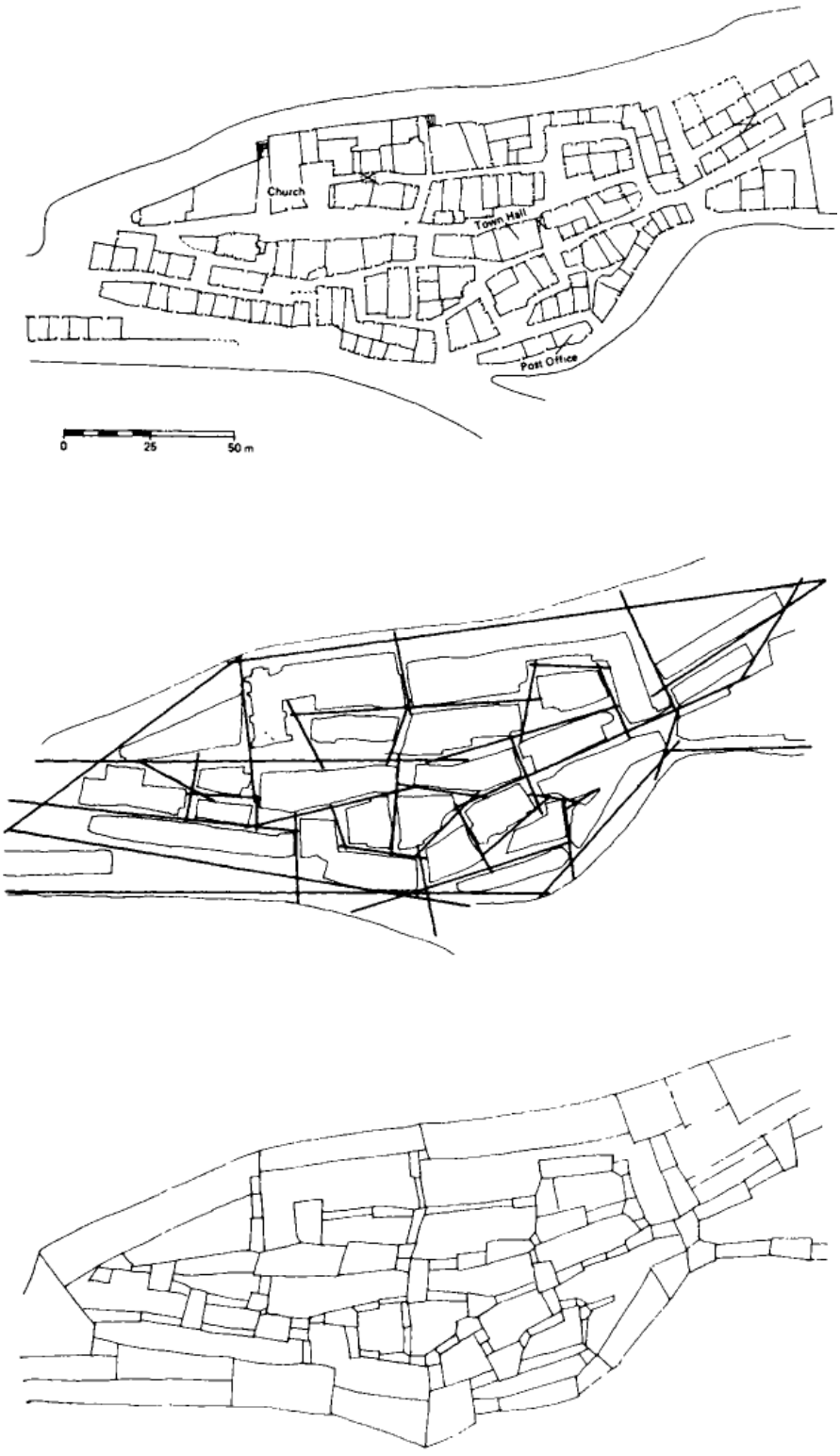
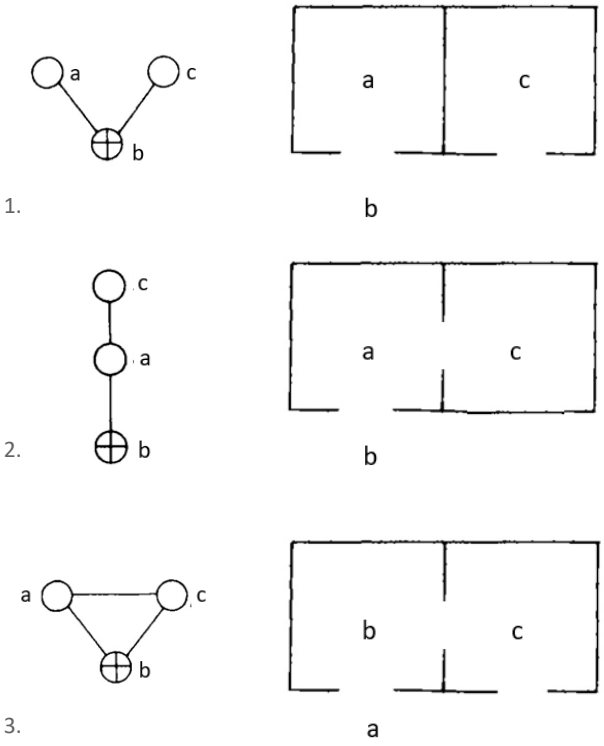


Figure 3.4.
The small town of G. (above), its axial (middle) and convex maps (bellow)
Bill Hillier and Julienne Hanson, 1984, The Social Logic of Space, p.90-91

is located will necessarily impact on how people move and use spaces, in a large urban system it is not so relevant where a necessary activity is located, but which people have access to it, and in which conditions. Furthermore, it has been shown that the configurational properties of urban systems can influence where activities are located, which in turn may influence how people behave within these systems (Bielik et al., 2018).

Space Syntax proposes two basic ways to divide a configuration into its constituent parts: convex forms and axial lines (figure 3.4.). Every point in space is part of two components: a direction - axiality, and two dimensions - convexity, and therefore convexity and axiality are the elements which form the visibility grid of an observer moving inside a spatial arrangement. Convex spaces are bidimensional extensions and include the least amount of widest spaces that are necessary to cover the whole spatial system. These are spaces within which all points are visible from every other point: any line that connects to points within a convex space cannot cross the space's limits. As such, convex spaces represent the largest units of space that may be perceived at any given moment within the spatial system and are, therefore, the most elementary units of analysis. They are, however, static. The structure of movement within a system is more accurately captured by axial lines, which are defined as "the fewest and longest lines of sight that can be drawn through the open street spaces of a study area" (Hillier and Hanson, 1984, p.17), and are the basis of configurational analysis of complex spatial arrangements. The spatial structure of urban systems is understood through its representation as a finite number of linear spaces, and through the analysis of how each of these is connected to all the others, thus making it possible to know how connections are seen by observers as they move within the system, and so how space's configuration is perceived.

Because both convex and axial maps result in dual graphs, where convex spaces and axial lines are represented as nodes (vertices) and their connections or intersections as links (edges), the basic notions and concepts of Space Syntax do not - and can not - take metric distance into account. While Euclidian metrics have been introduced in Space Syntax, their role has been, as argued by Bafna (2003, p.5) "that of modifying the role of topology - fine-tuning it, so to speak - rather than inherently helping define spatial structure." Other, configurational, properties of space are taken into account. According to Hanson (1998, p.27) "the invention of the justified graph is more than a simple illustrative tool to clarify space configuration in buildings and settlements. So far as 'space syntax' theory is concerned, the configurational variables 'depth' and 'rings' turn out to be fundamental properties of architectural space configurations, and also the means by which architecture can carry culture." The configurational properties of depth, the minimum number of topological steps that have to be taken in order to move from one space to another, and ringiness (or choice), the property of a system which offers people different paths to reach the same spaces, directly relate to how spatial organisation enables and favours - or doesn't - social interaction, and are directly connected to the configurational relations of symmetry and distribution.



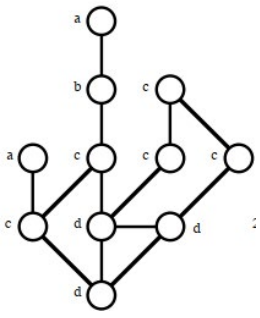


Figure 3.5. *TOP*
1. symmetrical, non-distributed configuration (above), 2. asymmetrical, non-distributed configuration (middle), 3. symmetrical, distributed configuration (bellow)
Bill Hillier and Julienne Hanson, 1984, The Social Logic of Space, p.90-91

Figure 3.6. *BOTTOM*
Topological space-types
Bill Hillier, 1996/2007, Space is the Machine, p.249

To explore these two basic syntactic notions - symmetry and asymmetry, distribution and nondistribution - we will refer back to figure 3.1. *a* and *c*, in relation to *b*, are symmetrical: the inhabitants of both would relate to the exterior space and to each other in the same way. If the connections between these spaces are altered, as shown in figure 3.5.2, and the opening between *b* and *c* is moved to link a and c instead, then these spaces become asymmetrical in relation to *b*. When justified graphs are constructed with their origin on each of these enclosed spaces, these look different. The graph with origin on *a* is shallow - all spaces are one topological step from it - and the graph with origin on *c* is deep - *b* is two topological steps away from it and one must move through a to reach it. This would give these spaces different social meanings, in that *a* - the space in relation to which *b* and *c* are symmetrical - would become the privileged space for interaction between the inhabitants of *c* and the visitors from *b*. Both figure 3.5.1. and 3.5.2. represent non-distributed relations: spaces can only be reached through one path. When a connection is added so that all spaces are connected to each other, the relation is distributed: there are alternate paths to reach each space. This new connection alters the social role of *a* described for figure 3.1. While it still connects to *c*, it no longer controls its relation to *a*.

Hanson has suggested that there is a fundamental relationship between these elementary types of spaces and the generic activities that take place in buildings (figure 3.6.):

> Locally, configurations can be made up of four broad topological space-types. First, there are terminal spaces, which are endpoints in the justified graph and are linked to the rest of the complex by only one entrance. Such spaces can only accommodate movement to and from themselves, and so it is in their nature that they are intended mainly for static occupation, either by people or things. The influence of these spaces is local, and eliminating any one space from the complex by unlinking it would make very little difference to the rest of the layout. Secondly, there are spaces which are themselves thoroughfares, but which are part of a larger tree-like complex. Such spaces cannot be dead ends, but they are on the way to or from a dead-end so, by implication, any movement through these spaces is still highly directed. Thirdly, there are spaces which have more than one link and so can be traversed, but which also lie on a single ring so that it is possible to enter at one point on the ring and leave at another. Finally, there are spaces with more than two links and which form the intersection of more than one ring. Movement through these spaces generates choice as to where to go within whole sub-complexes of spaces within the overall configuration. (Hanson, 1998, p.174)

According to Hillier et al. (1987, p.366), "[…] it is the quantitative picture of a spatial configuration that betrays its cultural bias, not a simple qualitative diagram. […] ideas are built into things not so much through visual representation as through the configurational principles by which a spatial pattern is constituted by its markers into a cultural intelligible." These principles can be expressed quantitatively. To this purpose, the notions of symmetry and distribution are translated

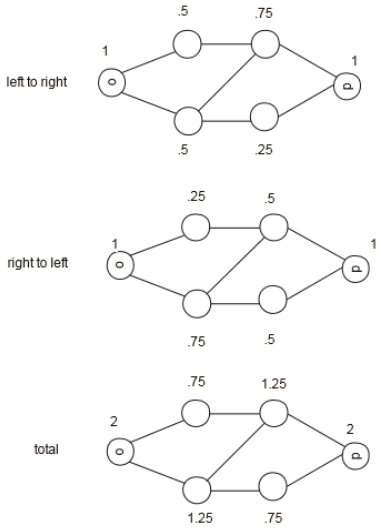


Figure 3.7.
Representation of the syntactic measure of choice
Bill Hillier, Tao Yang and Alasdair Turner, 2012, Normalising least angle choice in Depthmap and how it opens up new perspectives on the global and local analysis of city space

into the concepts of, respectively, relative asymmetry and control. Relative asymmetry represents how far a pattern approximates a unilinear sequence, in which each space leads exactly to one more - creating the deepest possible model - or a system where every space is directly connected to the origin - creating the shallowest possible model - and is expressed as:

$$\text{relative asymmetry} = \frac{2(MD-1)}{k-2}$$

Where MD is the mean depth of the system and k is the number of spaces in it. The measure of relative asymetry is used to construct the most often reported measure in Space Syntax research, that of integration. The integration of a space is, then, the function of the average number of topological steps that one must take in order to move from one space to all the others in a spatial system. It expresses the depth of a given space in relation to all the others, integration values being the larger when all the others in the system are shallow in respect to it.

The second concept, control, "measures what degree of choice each space represent for its immediate neighbours as a space to move to." (Hillier et al, 1987, p.237). It does so by considering that each space has a *n* number of neighbours and it gives each neighbour *1/n*, and then measuring how much each space gives to its immediate neighbours and how much it takes in turn. Control is a local measure; it measures the relation of a space to its neighbours. Choice is its global equivalent which, considering the entire system, measures how likely a space is to be passed through on the shortest paths from every space in the system to every other space.

Consider *o* and *d* in figure 3.7. To explain how the measure of choice works, Hillier (2012, p.158) covered all simplest paths between them:

> "We assign a value of 1 to o, then move the value in the direction of d, at each stage splitting the value according to how many choices we have at each point. At the first layer of the top graph in Figure 5 there are two choices, so each gets .5. At the second stage, the top .5 gives all its value to the top node, while the lower .5 splits its value between the two choices available in the next layer. At the third layer, a total value of 1 is received at the destination. We then carry out the same procedure (second graph in Figure 5) in reverse, from d to o, noting that the values acquired by each node are not the same when calculated the other way round. The sum of the two (third graph in Figure 5) is then the total choice acquired by each node from simplest routes between o and d. The choice value of a node will then be the sum of values acquired by each node on simplest routes between all pairs of nodes in the graph."

As we have seen, the configurational properties expressed in syntactic measures contain social roles and meanings in themselves. We can now quantify these properties. Table 3.3. shows a comparison of the values of integration for Frank Lloyd Wright house *a* and houses *a* and *b* of figure 3.2, where similarities between the spatial properties of Wright's houses and building a

help to understand why the latter approaches more the configuration of a house. Both Wright's layout and a present a social area with a very large value of integration located at one step from the exterior. If this space is made the origin of a justified graph, the graph will be shallow and symmetrical. Both locate the bedroom (or bedrooms) one step away from this space, making it deeper and with a medium value of integration. The deepest spaces, two steps away from the social area, also have the lowest integration. One step away from the bedroom and in a non-distributed relation, these spaces are bathrooms. In Wright's layout, these properties are also applicable to the office and exterior spaces. Now, differences can also be identified by comparing a and b. Here, the most integrated space is also deep inside the system, making it an odd space to represent the social threshold between inhabitants and visitors. If labels are assigned to spaces, it would be necessary to cross bedrooms and bathrooms in order to reach this integrated livingroom. The depth and asymmetry of the layout, contrarily to a, creates many spaces which should serve different purposes.

FLW HOUSE		SQUARE 1		SQUARE 2	
E	1,399	**E**	0,986	**E**	0,806
L living room	1,137	**1 living room**	4,435	**1 living room**	1,109
T terrace	1,299				
B bedroom	1,399	**3 bedroom**	1,267	**3 bedroom**	1,267
		2 bedroom	0,986	**2 bedroom**	0,887
		5 bedroom	0,986	**5 bedroom**	0,806
J wc	0,758	**7 wc**	0,634	**7 wc**	0,887
		6 wc	0,986	**6 wc**	0,887
K kitchen	1,299	**4 kitchen**	1,267	**4 kitchen**	1,267
		8 kitchen	0,634	**8 kitchen**	0,887

Table 3.3. Integration values of figures 3.2. and 3.3.

In the simplest example of figure 3.1. the basic operation of moving one door, thus shifting the location of the threshold between different spaces, completely alters the distribution of integration values. All configurational analysis, more or less complex, follows this same logic. In urban systems, integration has been consistently associated with pedestrian movement, to the location of retail and services, to patterns of crime or riots, and differences in gender roles. In the domestic space, different values of integration and depth have been shown to relate with specific patterns of use in housing. Consequently, they also mean something, as we have seen in chapter 1, about the social structure in which these spaces were configured.

3.3. SPATIAL ANALYSIS OF HOUSING ESTATES

If anedoctal, it is particularly interesting in the scope of this dissertation that space syntax originated not only from the found need to provide an analytical theory of the relationship between space and society, but also from personal motivations regarding the housing estates built in London during the 1960s:

> My starting point was in the 1960s when they were building visually very exciting housing estates. I thought it was the best architecture that had ever been, it was very exciting. And then when you went into the places, you got this terrible sense that life wasn't worth living. […] There is something completely wrong there. And space syntax originated in trying to understand that. That feeling of Oh, my God! I can't bear this—this is wrong! (Hillier in Westin, 2011, p.6)

Space Syntax thus originated from an explicit concern with the development of new neighbourhoods, as a response against normative theories of architecture which, in the authors' views, failed to correspond in reality to the set of principles they followed in theory. Guided by goals which were often seen as desirable, "designed with the best of communitarian intentions" (Hillier et al, 1987, p.234) estates were verified to be underused, some of them registering the same encounter rates during the day as residential street areas did during the night. With the encounter rate falling to around a third or a quarter of what was normal in residential streets, the authors argued that it was like "the inhabitants of these estates live in perpetual night." (Hillier et al, 1987, p.247)

This gave rise to a syntactic definition of what is a housing estate. In opposition to a street, "an open and distributed local event in a larger open and distributed system" (the city), an "estate is a discrete local domain with some degree of segregation from surrounding streets" (Hillier and Hanson, 1984, p.263). This definition is integrated in the postscript for The Social Logic of Space, where the authors apply the theory of space that is developed throughout the book to the spatial organisation of modern society, defining it as "a function of differentiation principles of social solidarities" in a class relation. This class relation in capitalism requires workers to be spatially concentrated where there are the most jobs, but also for them to be organised in asymmetrical nondistributed social relationships - such as hierarchical ones - that are hard to maintain when a lot of people are gathered together. Hillier and Hanson argue that, in this sense, "space is the paradox of capitalism" (p.266):

> Fundamentally, this is why the nineteeth-century dreams of a social order, in which the benefits of capitalism are retained through the creation of a quisecent working class, are sreamed in a strongly spatial form. From the factory communities of Robert Owen

> and the phalansteries of Fourier, to the garden cities of Howard and the technological romances of Le Corbusier, the fundamental form of the dream is identical: the design of the peaceful industrial production by the redesign of the spatial form of communities using a new urban genotype.

The authors then oppose two different forms of this dream of transforming society through space. The soft solution, of which Howard's garden cities are the paradigm, "works by meaning rather than syntax" (p.266), by building ideological order over a small community, disaggregating cities and fragmenting them into noninterchangeable zones, "ordered by a strong exogenous model expressing a conception of social order". The hard solution, represented in housing estates, arises from the system of production itself, reproducing in space the essential syntax of relations of the social system: the separation of workers through hierarchical forms of space. This solution is defined by a clear outer boundary with few entrances, separate blocks and separate staircases: spatial mechanisms that first group a large number of people together to then separate them into smaller and smaller units by using non-distributed syntaxes.

This research took into account these spatial properties - symmetry, distribution and depth - in order to investigate how the 41 studied housing developments - the overwhelming majority of them seen to be syntactic estates - performed in their relation to the surrounding city, in the relationships established between different spaces in the same layout, and in the relation of their dwellings - and as such of their residents - both to the layouts as a whole, and to the surrounding city. Different measures of integration, choice and depth were applied to each estate to understand each of these relations as is systematised in table 3.4 (page 77).

3.3.1. GLOBAL, NOT LOCAL: HOUSING ESTATES AS PART OF THE URBAN FABRIC

As it was explained in chapter 3.2, it is through the measurable, quantitative analysis of configurational aspects of the built environment that space syntax proposes to explore the interaction between space and society. Configurational aspects of space are those which are interdependent in a spatial system, so that by altering a part, the configuration of the whole changes. As such, even when focusing on a part, syntactic analysis is studying its role as part of a system and, in the words of Hanson (2000, p.122) "all of these properties, even when applied at the neighbourhood scale, are global not local." Housing developments cannot be seen as complete systems in themselves, but as part of the larger and ever-transforming "system of systems" that is urban space.

In this sense, analysis was conducted along two vectors: a chronological vector, used to understand how the layouts performed at the moment they were developed and how they perform today; and a scale vector, used to understand how the estates perform in their relation to their immediate surroundings, but also to different scales of the urban system.

Scale vector:

The scale vector will be approached specifically in regards to different scales of the urban system. How housing layouts perform in their relation to immediate surroundings will be further elaborated in 3.3.2. A segment map was created in QGIS, with resource to the Space Syntax Toolkit Plugin (Gil et al, 2015), over Google Earth's 2018 map of Porto and its adajcent municipalities. Segment maps are a "broken representation of axial maps, where segments are the inter-junction lines between points of intersection in an axial map" (Al-Sayed et al, 2014) and have been shown to have a better capacity than axial maps for detecting finer variations is street spaces (Turner, 2001b, 2007; Ratti, 2004; Figueiredo & Amorim, 2005,2007).

Space Syntax research has consistently found strong correlations between configurational measures and aggregate human movement in urban systems (Hillier and Iida, 2005). It has also demonstrated that configuration has a larger impact on movement than metric distance and that it has an impact on the way we perceive metric distance itself. The explanation provided by Hillier and Iida (2005) for the former is simple: if the same objective can be achieved by travelling a short distance as by travelling a long one, most people will choose the short distance. Consequently, the axes in the city that are closer to all others (those with larger values of integration) are more likely to be visited than those that are not. Similarly, if most people will choose the shorter distance, most people will also choose the shorter path to get there.

Regarding the latter, Hillier and Iida tested the effects of different representations of distance cost relations in the relation between the city network and aggregate movement: least metric lenght (distance cost is measured as the sum of segment lenghts), fewest topological turns ("distance cost is measured as the number of changes of direction that have to be taken on a route"(p.7)) and least geometric angle change ("distance cost is measured as the sum of angular changes that are made on a route, by assigning a weight to each intersection proportional to the angle of incidence of two line segments at the intersection"(p.9)). After applying the different concepts of distance models to different areas in London, the authors concluded that least angle correlations frequently had the best performances, being only marginally surpassed by fewest turns in some cases, and never by metric distance.

As such, while people tend to chose what they consider to be the shortest distances, the authors argue that "their concept of distance is, it seems, shaped more by the geometric and topological properties of the network more than by an ability to calculate metric distances." (p.15) This inference regarding the way people perceive space has been questioned and further discussed in Omer and Jiang (2015) and Omer et al. (2019), but it is, nevertheless, an intuitive way to understand the model provided above. Angular analysis of segment maps has then been a regularly used technique to counter flaws in axial analysis and has been found to correlate with pedestrian movement (Hillier and Iilda, 2005; Varoudis et al., 2013) and was found appropriate for the analysis of

the segment map of Porto.[12]

If configurational properties are global, not local, and parts must be considered as integrating a continuous system of spaces, then the question must be posed of how to define a spatial limit for the analysis. This is not merely a problem of principle. Taking into account only the area that is the immediate object of analysis results in the attribution of artificial limits to a spatial system which mat skew the results. This is the clearest in regards to the boundary effect. By failing to consider part of its connections, the spaces located at the artificially defined edge also appear as artificially segregated.

In this sense, two steps were taken to minimise the boundary effect. Firstly, while for the most part, this dissertation focuses on the municipality of Porto, a part of its metropolitan area significantly larger than the main area of study, of which the municipality is approximately at the centre, was taken into account. The boundary was drawn in order to include all of Porto's adjacent cities, and be confined to the limits of the Metropolitan Area of Porto (AMP) while approximating a circle as much as possible, with a radius of around 11 to 13km, complying with the three conditions defined in Hillier et al. (1993). All main case studies are located within the municipality, and are the closest to the edge when it is defined by a natural boundary - the ocean - at a distance of approximately 2900m. The estate closest to an artificial boundary is over 8km away from it, making the largest radius used (5000m) viable for analysis.

Secondly, metric radii were applied to angular analysis. The metric radius of syntactic measures takes into account the "metric distance from each segment along all the available streets and roads from that segment up to the radius distance" (Al-Sayed et al, 2014), and was suggested by Turner (2001b) to contribute to minimising the edge effect. This should appear logical: for example, when considering a radius of 800m, the relationship that is calculated is not that of all nodes in the system with all the others, but the relationship of all nodes in the system with all those that are within 800m from it.

12. Details on how angular depth is calculated and how syntactic measures were adapted for angular segment analysis are not central to the dissertation but were found necessary to be included:
"Angular segment depth is calculated by adding up the weighted values of the edges, where each edge is weighted by the angle of connection. To make it more clear, the intersection of two segments at an angle of incidence 47±, which might be approximated to 45± degrees, might have a weight of 0.5. If one of these segments is intersecting with a different segment at 107± degrees, then it will have a weight of 1. If these three segment elements are connected in the same direction then the depth between these street elements is the sum of their weighted angular intersections, that is; 0.5 +1=1.5. This angular sum can be considered to be "the cost of a putative journey through the graph", and from it a "shortest path" is one that presents the least angular cost from one segment to all others in a street network, (Turner, 2001a). The turn angle is always regarded as positive and the calculation accounts only for directional movement, meaning that, the point where one leaves the segment, a "forward" link should be in the same direction as the point at which one has previously arrived at the segment's "back" links." (Al-Sayed et al., 2014)
Hillier and Hanson's integration measure is adapted from what we have seen in the previous subchapter to angular segment analysis as such:
Integration = NC/(TD/ND) = NC * NC/TD))

Consequently, applying metric radius to calculations does not only contribute to minimising the edge effect, but it also gives us another type of information about space. In the example given above of using an 800m radius, which represents a walking distance of more or less 10 minutes, what is represented is the probability of local pedestrian movement: the areas that are more likely to be moved-though or moved-to by people walking in the neighbourhoods where they are located. The interest of introducing metric measures that reflect a local scale is further elaborated by Hillier (2001, 2002, 2007), who proposed that urban systems have a dual form, being composed of a "foreground network of linked centres" and a "background network of primarily residential space in which the foreground network is embedded" (Hillier et al, 2007, p.001:01). This seems to be constant across different cities, and is related to the invariants in axial maps across different cultures (Hillier, 2001, p.5):

> - that the axial maps of cities are made up of a small number of long lines and a large number of short lines;
>
> - that this becomes more the case as cities become larger; and
>
> - that in general the distribution of line lengths in cities approximates a logarithmic distribution.

In this system, "the variants tend to be local and the invariants global" and, as Hillier et al. (2007) further clarify, "in terms of understanding structure-function relations, urban space seems to be globally topo-geometric but locally metric." Topo-geometric measures such and integration and choice express the properties of the network at an extended scale and capture "structure-function relations such as natural movement patterns"(Hillier et al, 2007). At a local scale, metric properties are required to capture these relations.

The analysis conducted for this dissertation used integration and choice values at an 800m, 1500m, 3000m and 5000m radius. The former two were found to represent, respectively, a walking distance of around 10 minutes and 20 minutes. The latter two better represent vehicular movement flows, and are necessary to minimise the boundary effect.

Additionally, following what was defined in chapter 2, from the viewpoint that it is (also) through the organisation of human activity within the house-settlement system that social relations are reflected and reproduced in space, then the methodology for spatial analysis must take into account the definition of activities as they are assigned to architectural function and of spatial properties that might impact how these articulate and interact. In this sense, the location of nearest retail and services, playgrounds, sports facilities and schools were registered in QGIS in the segment map. Following the logic of the house-settlement, these facilities were considered to be part of the set of activities relating to the global function of dwelling. The latter three, corresponding to activities performed outside of the house by children and teenagers, were considered

facilities essential for the activities associated with housing at the scale of the neighbourhood in publications of the four housing programmes studied in this thesis. Retail, such as grocery stores and supermarkets, without which the daily execution of domestic activities like cooking and eating would not be possible, and services, such as restaurants and bars, which are likely to have an impact both on neighbourhood and domestic life, were considered as complementary domestic functions.

Chronological vector:

It was the initial intention of the research to use cartographic redrawing (Pinho e Oliveira, 2009, Serra and Pinho 2011, Vaughan et al. 2013) to create a series of representations of Porto between the 1960s and today. This method consists in creating an axial map corresponding to the contemporary city and then overlaying it on older maps. However, due to budgetary restraints, it was not possible to acquire cartographic data for Porto's adjacent cities during the studied period. Information regarding only the city of Porto is, however, made available by Oliveira for the years of 1932, 1948, 1960, 1978 and 2003. If for the reasons elaborated above regarding the global property of syntactic analysis and the need to counter edge effect, these maps of the council were not sufficient to develop a quantitative analysis of the estates' performance in relation to city growth, they provided an invaluable basis for the development of a broader, temporal understanding of the areas where the estates were constructed, of its original level of urbanisation and subsequent growth.

For the development of a diachronic model, normalised measures should be used. Values of integration and control are influenced by the number of segments in the system (Hillier et al. 2012), and therefore cannot be compared across different maps. As such, most Space Syntax research concerned with the evolution of urban systems across time or with comparing geographically separate systems uses normalised measures.[13]

In this sense, and taking into account the original objectives of the research, normalised measures of integration and choice were used throughout this study. Even though these objectives proved to be outside the limits of what this dissertation could accomplish, the apparent relevance of diachronic analysis for a systemic understanding of state-subsidised housing development

13. Normalised angular choice: NaCh_r = logCh_r+1/logTD_r+3 where,
NaCh_r = Normalised Choice at radius r,
Ch_r = Choice at radius r,
TD_r = Total Depth at radius r.
Normalised angular integration: NaIn_r= logInt_r^1.2/TD_r where,
NaIn_r = Normalised Integration at radius r,
Int_r = integration at radius r,
TD_r = Total Depth at radius r.

in Porto throughout the years justified the use of these measures as a first step towards future work. However, it was necessary to take into account particularities in the way these measures, in particular normalised choice, were shown to work: Mean NaCH is usually higher in more regular urban grids, like those of Barcelona and Manhattan, and the mean tends to decrease at higher radii. This may be due to lower radii tending to reflect more regular or urbanised grids, which lead Al-Sayed et al. (2009) to advice that NaCH means and maxima make more sense for continuous urban systems than for suburban or poorly urbanised areas. Additionally, maximum values of NaCH have been shown to consistently increase slightly with higher radius.

Similarly, while because NaCH is independent of size, it can be more efficiently compared across radii, it has also been shown to not reliably represent movement when using low radii or looking at areas located towards the edge of systems. However, as we have seen, the systems analysed in this thesis were modelled so that the target areas of study are inside a large buffer zone.

3.3.2. DEPTH, SYMMETRY AND DISTRIBUTION IN HOUSING LAYOUTS

As we have seen, in syntactic terms, an estate is defined by high and successive levels of hierarchisation that work towards separating people into smaller and smaller groups - first by removing them from the main city fabric and working as a "discrete local domain with some degree of segregation from surrounding streets" (Hillier and Hanson, 1984, p.263), then by further splitting its inhabitants throughout a deep, asymmetric and non-distributed system. As we have also seen, the latter two can be expressed quantitatively in the measures of, respectively, integration and control. Additionally, it has also been shown that depth from the exterior gains particular importance in housing estates: when the integration core of the estate lies on its periphery, then the encounter rate of people in spaces "seems to become more a function of depth from the outside than the internal pattern of integration". (Hillier et al, 1987, p.247)

Hanson (2000) developed an analysis of how design paradigms of estate layouts transform over time, through a study of Somers Town, a neighbourhood in London which, suffering interventions and transformations throughout a century, was described by Hanson as a "housing zoo", containing at least one specimen of pretty much every "species" of twentieth-century social housing. In this study, Hanson analysed 22 housing schemes using six syntactic measures of depth, specifically designed to explore the urban transformation from street to estate layouts. Hanson's six measures of depth converged with this research's objectives and were adopted, and in some cases adapted, in order to explore the relationship between the estates and its urban exterior, between the internal spaces of the layout, and between the estates' dwellings, the estate and the urban exterior. This is illustrated in figure 3.7. The six axes represent, starting on the superior vertical axis and proceeding to the right: the number of steps between the exterior urban arteries and the interior of the residential buildings; between the interior of each residential building and

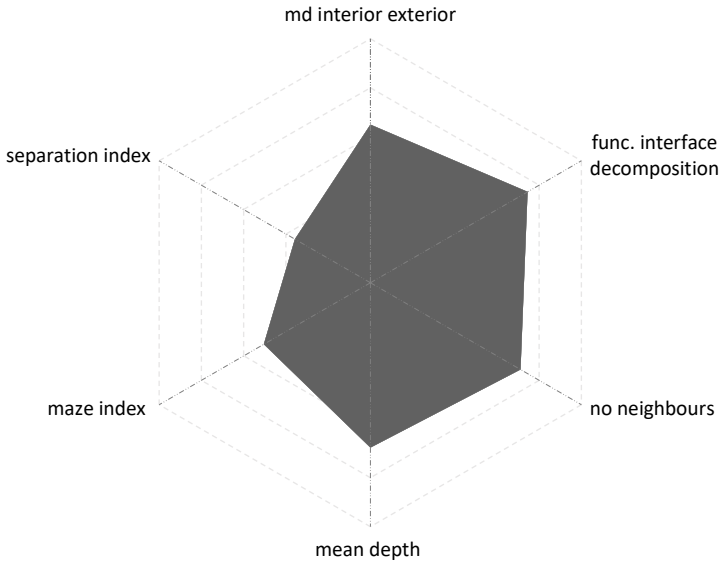


Figure 3.8.
Representation of depth measures used in the analysis of estate layouts

all others; between the exterior spaces of the estate and the interior of the residential buildings; between all internal spaces to the estate and all others; between the main urban arteries and the interior of the estate and, finally, the minimal depth between the exterior urban fabric and the interior of the residential buildings.

While simple measures of the articulation of the spaces of the layout with its exterior and between each other, in combination with a general reading of the segment map of Porto and its adjacent cities and of the smaller maps of Porto's urban growth, this provided useful information on the performance of these estates. Furthermore, it provided information that can be intuitively read in radar charts where the kinds of relations favoured in each estate are made visually clear: of the urban exterior with the estate, neighbourhood relations within the estate, or relations between the family and the city that are not controlled by an intermediate scale.

These three levels of spatial relations were then analysed for each estate taking into account the variables in the following table 3.4:

BETWEEN INHABITANTS AND STRANGERS	
Density	A function of area and number of inhabitants, where each apartment is considered to have the as many occupants as its number of rooms plus one.
Urban equipment and infrastructure	Whether essential urban functions exist within the estate or in its vicinity, favouring a system of activities that is interior to the estate or that develops in its locality. Whether the estates are provided ease of accessibility to educational, cultural, institutional, health or sports equipment.
Global and local integration, global and local choice	As explained in section 2.3.2.
Integration core	Hillier et al. (1987) have studied different types of estate and found that in nearly all cases the internal structure of the estate is of such complexity that the most integrated lines are those on the outside of the estate. The integration core was registered as being either in the periphery or in the interior of every estate based on the integration values of neighbourhood's axial maps.

Table 3.4.
Variables for the analysis of the space of the estate.

Maze and separation indexes	Defined by Hanson (2000) as the mean depth of the axial system from the surrounding streets, constructed from the measure of axial step-depth from the exterior of the system, the maze index is used in order to understand how inviting or intimidating the layout might be to outsiders. The opposite relation, that of residents to the exterior of the estate, is given by Hanson's separation index: the mean convex depth of surrounding streets from the nearest dwelling entrances. While the two measure values of mean depth, fluctuating between 0 and any possible number of steps, the maze index is constructed from axial maps, while the separation index from convex maps. According to Hanson (2000, p.108): "Sociologically, axiality might be considered to reflect more a visitor's dimension of the system, as it provides information about what lies ahead and how to find one's way", and so it is appropriate to study how outsiders may perceive the system. Convexness, on the other hand, reflects how people perceive static space, and has more to do with how inhabitants perceive their neighbourhood as a system of different spaces in different relationships to the surrounding city.
The number of openings to surrounding streets	Surrounding streets were defined as those streets which, exterior to the estate and not a part of its design, would be at one topological step from the interior of the estate in a graph where to each street would correspond a node.

BETWEEN NEIGHBOURS

Syntactic measures	The two syntactic measures of choice and integration were used to understand the axial system. Choice was demonstrated by Hillier et al. (1987) to be a better predictor of movement than integration when concerning estate's inhabitants, who do not need to rely on reading and understanding a spatial system with which they are already familiar. Mean depth was used as a basis of comparison for the maze and separation indexes, and so calculated both from the axial and convex maps. Integration values were also registered for all functional spaces, in order to detect similarities and differences in the ordering of functions in the neighbourhood.
No-neighbours score	The mean depth of the convex system from the dwelling entrances.

Functional space type	It has been shown in chapter 1 how it is also through the arrangement of human activity in space that architecture has a role in the developing of social relations. Al-Homoud (2003) has shown that functional distance in estates - the degree of perceived distance encountered in moving from one point another that depends on the position of functional activities and opportunities for additional activities as determined by the layout - has an impact in the number of trips made by residents. Because they are more likely to make frequent trips outside when functional distance is small, it negatively correlates to the chance of casual meetings between residents. In order to get an idea of how often spaces are likely to be used in trips to and between functional spaces in a residential layout, the concept of functional space types is used throughout this thesis. These are an elaboration on Hillier's (1996) topological types of spaces that were exemplified in chapter 3.2.: ff corresponds to fixed feature functions; fa to spaces that can only be accessed through fixed feature functions; fi to functionally independent spaces – they do not connect to or are accessible from ff; fb to spaces that must be crossed in other to reach ff; fc to spaces that are in at least one ring with fb; and fd to spaces which are in at least one ring with ff.
Distribution and cul-de-sacs	A distributed-non distributed ratio was calculated by dividing the number of distributed spaces by the number of cul-de-sacs in each estate.
Constituted spaces and neighbourliness score	The percentage of spaces constituted by front-doors was registered, as well as the average number of doors in each, to understand the potential for encounters between immediate neighbours.
Equipment and infrastructure	The existence or non-existence of functional spaces such as sports equipment, local retail, playgrounds or clothes hangers within the estate that may encourage the creation of neighbourhood relations.
Traces of use	While some empirical data was used to sustain and complement the interpretation of spatial patterns in apartments, no empirical basis was used concerning the use of the neighbourhood space by its inhabitants. Interpretation regarding use was based on the available literature relating spatial properties with patterns of movement and occupation, as well as other social variables. Traces of use were registered during field visits as a complement to quantitative analysis. These were categorised as either programmed: where traces of use correspond to planned features of the estates, such as clothes drying in hangers and people gathering around benches; or non-programmed: space appears to be used despite or beyond the intentions of its designers, such as when clothes hangers are improvised between trees, or the small patches of grass in front of residential buildings are appropriated for vegetable gardens.

BETWEEN THE FAMILY AND NEIGHBOURS, OR THE FAMILY AND STRANGERS

Functional interface decomposition	Interface decomposition was used by Hanson (2000) as one of the six syntactic measures for exploring the urban transformation from 'street' to 'estate' layouts, and it is the value of the mean steps (constructed through convex mean step depth) between dwellings in the shortest path that links all dwellings in the layout together. Other labelled spaces, such as retails and playgrounds, were added to this measure, in order for it to represent the mean steps between all functional spaces in the layout.
Minimum and mean depth from the dwellings	The minimum and mean depth of the axial system from the entrances to houses or residential buildings were compared in each estate to the mean depth of the layout, the functional interface decomposition and the maze and separation indexes.
Mean depth between dwellings and the exterior	The mean convex steps between dwellings and surrounding streets were calculated to understand how residents may perceive their closeness to the exterior of the estate.
Type of distribution in building, number of neighbours	Some types of distributive systems, such as galleries, have been indicated as favouring of interaction in research conducted in Portugal during the 1960's. In addition to the number of houses sharing the same access, this should provide an understanding of the likeliness of daily encounters between residents in the same building.

In order to extract the spatial data needed to construct the depth measures and to provide a visual aid, axial and convex maps were constructed for each estate. Axial maps of the estates as they were originally built were constructed over the previously modelled map of the municipality of Porto in the ninety-seventies, adding a necessary layer of complexity to it. These were modeled individually and analysed with DepthmapX (Turner, 2001a, Varoudis, 2012) and take into account streets, sidewalks and pathways in each housing scheme, and the surrounding streets. In cases where a previously existing street was integrated into the estate layout, it is considered as both a part of the layout and the nearest surrounding street. Redundant walking paths such as sidewalks separated from the main road by green-areas or low walls and urban furniture were not considered. Additional axial lines were added marking the entrances of dwellings and other functional spaces.

Convex maps were created by modelling the plans of the estates as they were first built into Rhinoceros and utilising Grasshopper's plugin Syntactic, developed by Pirouz Nourian and Samaneh Rezvani at TU Delft, in order to analyse the resulting graphs. They were constructed at the height of 1.50m, not taking into account non-accessible spaces. A convex space integrating a non-walkable soft landscaped area (such as dividing bushes and vegetation) was considered to be one convex space. Functional spaces (spaces pertaining to one specific label or function) were modelled as one convex space, regardless of their shape. Non-functional spaces were divided

according to major shifts and turns, as well as other design mechanisms to signal boundaries, such as landscaping or pavement changes that would cause spaces to be perceived as separate.

The definition of the activities of the house-settlement departed from the analysis of the series of projects of sociological research in the ninety-sixties and ninety-seventies undertook by the FFH and the Laboratory of Civil Engineering (LNEC), which were intended to be an empirical back-up to inform future housing development.

Regarding the exterior and collective spaces of housing estates, rules and guidelines for functions were vague and changed according to the different housing programmes in place. Nevertheless, public-funded research and published guidelines by the state department for social housing systematically alerted for the necessity of designing spaces for collective social use. These should consist of public facilities and services like schools, sports facilities and playgrounds - where activities performed outside of the house by children and teenagers take place – social centres, and public spaces like gardens and squares. Retail, such as grocery stores and supermarkets, without which the daily execution of domestic activities like cooking and eating would not be possible, and services, such as restaurants and bars, which are likely to have an impact both on neighbourhood and domestic life, were considered as complementary domestic functions. As such, these spaces were signalled in the maps and labelled as they appeared within the estate according to whether they are programmed fixed features (encompassing spaces such as dwellings, shops and sports facilities), or non-programmed spaces with no specific associated activities.

3.4. SPATIAL ANALYSIS OF THE DOMESTIC SPACE

3.4.1. THE IMPACT OF THE DOMESTIC SPACE IN HUMAN ACTIVITY AND PERCEPTION

We have seen how Space Syntax literature has vastly discussed the ways cultural patterns are reflected on domestic space, and how the genotype analogy - and subsequent elaborations - was developed with the underlying notion that the configurational properties of architectural function reflect patterns of use and activity that are culturally structured. This has been thoroughly studied within the field in research concerning vernacular architecture as a product of clear social relations, but also in research that explored the more complex and less ritualised relations established in modern families.

Here, Bafna's work is again of particular relevance. In 2014, an analysis that aimed at

understanding whether there was a relationship between the space of the house and levels of physical activity inside the home, showed that the total of sedentary hours was significantly related with a measure of interconnectedness, the negative of the log of mean total depth, which works as a different type of normalised total depth. It can be interpreted as a direct measure of the degree of mutual integration of all the rooms in an apartment; where greater values of interconnectedness correspond with high integration, and differences in smaller values count more than those at higher values. It was also shown that much of this association was due to hours spent watching tv, which, contrarily to working on a laptop or reading a book, is a fixed-feature leisure activity that is also social and can be conducted almost accidentally: According to Bafna and Chambers (2014, p.38) the "results thus bore out our main hypotheses: sedentary activities showed association with spatial configuration of the unit, and of these only those with social and incidental participation showed association with spatial configuration."

Similarly, in 2017, Bafna et al. conducted a preliminary study that indicated that there exists a relationship between depression in women and the centrality type of the apartments where they lived: female residents in apartments where the most integrated spaces were those where communal activities take place had less than half the rate of depression than female residents in living-centred apartments. An unexpected but important observation in this study was that this rate did not decrease significantly when women live alone, which suggests that isolation due to depth may not be the result solely of actual isolation due to women's preponderant role in conducting domestic work, but also a subjectively perceived quality related to the idea of what a house is and how it works that is embedded into people's perception

Results such as these elaborated above seem to indicate that in fact, the configurational properties of housing layouts are not only revealing of the ideas of family and domestic life of the society that produced them but that they are also capable of having an impact on the way people behave, interact and even feel in their daily lives.

3.4.2. LEARNING FROM THE ANALYSIS OF SECONDARY DATA

The interest of such conclusions in the scope of this dissertation led to the inclusion on the research process of an exploration of what kind of impact the configuration of apartment layouts may have had on the dynamics of Portuguese families in the 1970s, facilitated by the existence of a useful, but yet relatively untreated, set of secondary data.

The former was provided by the Survey on Urban Housing (Pereira and Gago, 1984), a unique experiment in the county in its attempt to relate the spatial properties of apartment layouts to the way families perceived, used and appropriated domestic space. The Survey was conducted by the State Laboratory of Civil Engineering (LNEC) during the period considered in this thesis. It provided data that served as the basis for the exploratory analysis and for a subsequent set of

preliminary observations both on how families used the space of the house, and how this use may be affected by the house's spatial properties.

The exploration of this set of data was preceded by the examination of other documents produced by the LNEC during the period considered for this thesis, in particular, a) the body of work produced by Portas (1959, 1960, 1969) regarding domestic activities, apartment areas and family life, and b) the theoretical production that sustained the elaboration of the Survey. The reasons for this were twofold:

Firstly, the focus of research regarding housing within the LNEC was analysed as an object in itself in order to identify a series of institutional objectives and social concerns that might or might not be reflected in the housing development conducted by state institutions and often by architects connected both to research and practice.

Secondly, as part of the set of research projects developed at the time, the Survey on Urban Housing was at once framed by the same transversal social concerns and provided an empirical back-up to them. The translation of these concerns into the Survey's design was what made it possible to search within it for clues on the relationship between certain aspects of family life and spatial patterns that might apply to the study of housing developments.

The Survey and related research were developed to aid architects and planners in designing social housing for diverse and constantly-changing ways of life, being in-depth studies of family life and its connection to domestic activities and the house. In this sense, they were essential both for developing a general understanding, based on empirical knowledge, of the ways of life of Portuguese families during the studied period and for studying the explicit objectives, social concerns and principles of state institutions regarding social housing as a space of production of domestic life.

Furthermore, this body of work had some underlying social concerns that had to do with a perceived great ongoing transformation of society that was reflected in the alteration of the ways people lived. These concerns can be systematised as focusing on:

a) the emancipation of women and their new role in family life,

b) the bettering of life and work conditions and a new meaning of home, family and children,

c) the growth of urban centres and the development of neighbourhood relations and mutual aid systems.

The examination of the Survey on Urban Housing in the scope of this dissertation was grounded on this set of concerns, as well as on the hypotheses identified in the previously described documents regarding both how social transformations may have an impact in family

life, and how these may be encouraged or hindered by the organisation of the space of the house. These ideas were articulated within the theoretical and methodological framework presented so far. If it is one part of the theoretical premise developed in chapter 2 that a fundamental role of architecture is the organisation of human activity, the Survey on Urban housing was an empirical step towards the understanding of how and to what it is organised by the spatial characteristics of the domestic environment.

How this contributed for the development of an analytical framework for approaching the analysis of domestic layouts will be presented in the following chapter of this dissertation, where the Survey on Urban Housing, its methodology, analysis and preliminary conclusions will be described.

3.4.3. MODELLING AND ANALYSING SPATIAL DATA:

The analysis was conducted for one type of apartment per housing development. Apartment layouts are usually similar within each estate, with variations often existing only in the number of bedrooms. In most cases, the addition or removal of bedrooms does not represent a relevant alteration to the functioning of the house, with bedrooms usually forming a clear, independent cluster. In these cases, the most common three-bedroom layout was selected for analysis. In cases where it was verified that the variation in the number of bedrooms had an important impact in the apartment's configuration, these layouts were included in the analysis as well.

Apartment graphs were modelled in Rhinoceros and calculated with Grasshopper's plugin Syntactic. Each labeled space was modeled as a node in the graph. Each area destined to a specific activity was counted as one, regardless of its shape. When labels are unclear, spaces are divided when there exists a sharp division (in the form of doors, steps, difference in heights, or other clear separations such as fixed furniture) between them. The reasoning for this is twofold. On the one side, it is a purpose of this thesis to understand cultural bias present in house designs not only in their potential consequences, but also in their intention. As Bafna and Chamber (2014, p.37) propose, "Labels are significant not so much because they identify specific activities associated with space, but because they give evidence of a culturally determined segmentation of spaces."

Not all of the available plans of Porto's apartments included labels. When these were unclear or unavailable, spaces were divided whenever there exists a sharp division (in the form of doors, steps, differences in height, or other clear separations such as fixed furniture) between them, and labels were assigned according to those defined in the Survey.

Additionally, labelled spaces were considered as belonging to functional sectors, according to the type of activities they are expected to hold, and defined as collective, private or services. This type of clustering has been used in various studies of the configurational aspects of the domestic

space. Amorim (1997, 1999), Bafna (2001), and Ramos (2006) have argued that genotypical properties are more stable when these functional clusters are considered than when looking at the relationships between individual rooms. Bafna (2001, p.20.13) has made the further point that, by adding layers of meaning, the structure of clusters represents the essential genotype:

> [...] the mediating element that includes both the sociologically significant structure of permeability relations between the individual spaces of the house, and the classificatory structure of spaces that represents the shared cognitive understanding of the spatial program of the house in the mind of the individual designers.

Simplified accessibility graphs were modelled according to these functional sectors to detect fundamental differences in the organisation of the house across programmes. These will be described and their relevance clarified throughout Part III of this dissertation.

The analysis of each apartment scheme took into account the existing literature on space syntax' application to the study of housing, as well as the preliminary observations that resulted from the analysis of the Survey on Uban Housing, and examined the variables in the following table 3.5.:

BETWEEN THE FAMILY AND STRANGERS

Total useful floor area (TUFA)	The area of all enclosed spaces in a house, including terraces and staircases.
Minimal area ratio	The percentage of the minimal housing areas defined in the general regulation for urban construction (decree-law 38 382/1951, decree-law 177/2001) to which the studied apartment's TUFA corresponds. While the studied cases are earlier than the altered regulation, this should indicate how these houses adapt to contemporary standards. Adaptation to evolving living standards was one of the main concerns in research at the time.
Density	Calculated through the division of the house's TUFA by the number of bedrooms plus one, density corresponds to the area per resident when a house presents ideal occupation.

Table 3.5. Variables for the analysis of the domestic space.

Depth from the exterior	The number of steps between all rooms and the exterior.

WITHIN THE COLLECTIVE, SERVICES AND PRIVATE SECTORS

Area	The area of the living room and other spaces of collective potential, of services and bedrooms.
Minimal and ideal area ratio	The percentage of the minimal and ideal room areas to which the common, services or private areas of the house correspond, as defined in Portas (1969):

	minimum area (3br)	ideal area (3br)
living room	12m^2	18m^2
kitchen	6m^2	7.8m^2
bedroom (largest)	10m^2	12m^2
bedroom (medium)	8m^2	11m^2
bedroom (smallest)	6m^2	9m^2

Relative size	The relative size of the common, services or private areas of the house, normalised between 0 and 1, as well as the percentage of the house's area occupied by these areas.
Mean depth and relative mean depth	The mean depth between different sectors, as well as the relative mean depth of the common, services or private areas of the house, normalised between 0 and 1.
Integration:	The values of integration of each of the house's labelled spaces.
Functional space type	As defined in table 3.4.

BETWEEN SECTORS

Relative areas	The relative areas of different sectors, in order to identify the largest and smaller, as well as variances in area assignment to sectors across programmes.
Integration and difference factor	Integration values were registered for all spaces, both functional and transition, in order to detect similarities and differencies in the ordering of functions in the house, and identify consistent genotypical patterns where there might exist. The Difference factor, an entropy-based measure adapted from Shannon's H-measure that was developed by Hillier et al (1987), was used to quantify the degree of difference between the integrations values of functional spaces. It can be any value between 1 and 0, 1 corresponding to weak inequalities in a sample and 0 to strong ones.
Centrality type	The functional type of the room with the largest integration values, as defined in Bafna et al. (2017).
Functional orientation	The number of transition spaces divided by the total number of spaces. Values range from 0 (no transition spaces) to 1 (all spaces are transition spaces). Lower values indicate "functional oriented" apartments and higher values indicate "transitional oriented" (Amorim, 1999).

4. PRELIMINARY ANALYSIS: THE SPACE OF THE HOUSE AND FAMILY DYNAMICS

Introduction

This chapter will examine three documents that are exemplary of the research conducted on housing and ways of life that was mentioned in the previous chapter which, by focusing on intra-family relations and their transformation in its relation to the space of the house, offer different methodologies but one same approach to the question of housing development. 1) Portas' 1956 Social Housing and a Methodology for its Architecture (*A Habitação Social - Proposta para a Metodologia para a sua Arquitectura*), if preliminary, offered a systematisation of the theoretical assumptions that guided much of the National Laboratory of Civil Engineering's (*Laboratório Nacional de Engenharia Civil,* LNEC) work on housing in the following decades. 2) Portas' 1969 Functions and Area Requirements in Housing (*Funções e Exigências de Áreas da Habitação*) was the conclusion of years of research, and condensed in its propositions for minimal and ideal areas in housing much of the empirical and theoretical work conducted up to that point. 3) The completed 1984 version of the Survey on Urban Housing (*Inquérito à Habitação Urbana*) by Pereira and Gago, which assembled a set of questionnaires - and some analysis - that were conducted between 1969 and 1977 with the aim of becoming an empirical back-up to inform future housing development in the country. The latter was unique in its attempt to relate the spatial properties of apartment layouts to the way families perceived, used and appropriated domestic space. It was conducted to aid architects and planners in designing social housing for diverse and constantly-changing ways of life, by making architects' options verifiable through theoretical and empirical research. If this objective remained mostly unaccomplished until today, its analysis provides a set of relevant data to be explored in the scope of this dissertation in two ways:

1. In regards to how societal transformation affected families throughout these years, how they lived and how they were expected to live in the near future.

2. In regards to how institutions saw their role in designing not only for these families but in designing for their future. Designing for the future meant, in the immediate, designing for the emancipation of women at home, for a house whose leisure potential grew, and always providing more than the minimum deemed acceptable at each specific moment, by being aware of the

fleeting nature of conceptions of human dignity in constant transformation.

As such, the objectives of this chapter are threefold: 1) to systematise the framework through which institutional research that was deeply connected with housing production (particularly from 1969 with the creation of a State Department for Public Housing) saw the ongoing transformation of family and society and the role of housing in adapting or contributing to it. 2) To inform this work with sociological knowledge that may relate to the families who inhabited these estates, as well as how they lived and behaved in the space of the house. 3) To provide a preliminary exploration of the extent to which the domestic environment acts as a facilitator or inhibitor of patterns of behaviour and interaction that are relevant to this dissertation.

4.1. THE TRANSFORMING FAMILY AND HOME OF THE 1960s AND 1970s

4.1.1. THE EVER-CHANGING WORLD

The surveys that composed the Survey on Urban Housing were conducted in 1971, in the context of a perceived rapid alteration of life models "which recreates habits and needs, which implies a constant readjustment of ways of life."[11] (Pereira & Gago, 1984, p.3)

As the country furthered its industrialisation, research was concerned with the material questions that greatly influenced the use of architecture and the city: new technologies were altering techniques that were centuries old, new urban equipment changed the way of using the city and the house and, as mobility and transportation changed, accessibility itself was altered, and so were the relations and appropriation of "places and things".

A focus on societal transformation was reflected in the criticism of Le Corbusian-machine-à-habiter models, which arguably tried to, based on purely theoretical models, have the pedagogical function of "teaching families to live" (Pereira & Gago, 1984, p.9); teaching them how to abandon "old prejudice" and "bourgeois habits". Arguing that these pedagogical models had not worked - the overcrowding of houses did not allow for its proper utilisation, families carried rural habits with them as they were placed in new houses and used them accordingly - the authors proposed instead the production of empirical knowledge on how people lived, so that "the house does not

15 "(...) recriando hábitos e necessidades, o que implica um reajustamento constante das maneiras de viver." Translated from Portuguese to English by the author of this Dissertation.

translate anymore a schema defined by technicians, but the way of life detected through direct inquiry of the population and taking into account requirements and averages by class."[12] (Pereira & Gago, 1984, p.9)

Merely knowing how people live would not solve the points raised against modernist models and, while this does not become explicitly resolved in the text, Pereira and Gago seem to lean towards the idea of programming for the future, not the present, that was better explored by Portas. This idea was expressed in the proposition that architects should "programme for diversity", that they should search for typologies which could support, economically and in the best possible conditions, different ways of life, and also in the argument that surveys with such an objective "[…] should aim to be a reflection of the variety and richness of everyday life instead of reducing it to layouts inferred from the average, they should not be content with knowing what happens in the house, but try to understand what it means to 'live the city'":

> (...) We need data to reinvent man's home and to reinvent it we need to re-learn its meaning, understand its use, acknowledge its symbolism.[13] (Pereira & Gago, 1984, p.9)

This is also hinted at in a set of three questions that were proposed at the beginning of the text as something architects ask themselves: design what?, design for whom?, design how?, for which possible responses always presented ideas of growing flexibility and preparation for the future. Design what? Defined programmes or polyvalent city-buildings? Design for whom? For the population one knows, for the population one guesses will exist or for the population one wants, "resultant of the conjugated effort of integrated planning including education, economical, social and physical development, oriented towards a type of population defined as that we wish to reach"[14]? (Pereira & Gago, 1984, p.4) Design how? Determined forms for determined programmes where spaces have assigned functions, evolutive architecture exploring new technical resources, construction without assigned functions, thus elastic and polyvalent, or "building in a way so uncharacteristic, so disconnected from one sole programme that [space] can be used in all

12 "A casa traduz já não um esquema decidido pelos técnicos, mas o modo de viver detectado através de inquéritos directos à população e considerado em termos de exigências e modos de vida médios por escalões de população." Translated from Portuguese to English by the author of this Dissertation.

13 "Precisamos de dados para reinventar a morada do homem e para a reinventarmos temos de reaprender-le o significado, entender-çhe o uso, reconhecer-lhe a simbologia." Translated from Portuguese to English by the author of this Dissertation.

14 "(...) resultante dos esforços conjugados de um planeamento integrado incluindo educação, desenvolvimento económico, social e físico, orientado por um tipo de civilização que seria definido como o que interessa alcançar" Translated from Portuguese to English by the author of this Dissertation.

"Underlying the study and the decisions it implied is the idea that there exists a significant correlation between the spatial characteristics of housing and the behaviour of individuals and groups within it, either because it hinders or prevents certain activities, or because it foments and encourages others.

That is why it is possible to define a contemporary notion of minimum as the group of conditions underneath which housing would, with significant probability, restrict the level of individual or group development allowed by society in a given point of its evolution.

It is easy to conclude that the severity of not satisfying minimum requirements set with this criterium is in the likeliness that it will induct an attrition element in a possible evolution, a fact that is well documented in large part of recent economic housing development that, irredeemably skimpy due to small budgets, are now partially obsolete, incapable of keeping up with growing requirements mostly due, as we will see, to the transformation of women's role, the increased schooling and independence in young people and the introduction of new motivations for group recreation inside the home."

Nuno Portas, Functions and Area Requirements in Housing, 1969, p.8[15]

different circumstances without it imposing or hindering?"[15](Pereira & Gago, 1984, p.4)

This idea was developed further in Portas. In Functions and Area Requirements in Housing, housing areas are seen as reflections of the social struggles of each historical moment. The necessary minimal areas for each given function, as functions themselves, are not an absolute given, but something that changes according to culture and societal evolution that have an impact on how families function:

> The family reflects and is the confluence point of the solicitations and contradictions of every historical moment. It might be the last stronghold to suffer the clash, but it also is, surely, the one which suffers the most its consequences - positive or negative. What has been called the family crisis (based on the crisis of youth, for example) is not more than the slow and tardy reflection of a powerful and yet undetermined historical transition.[17] (Portas 1956, p.21)

As society evolves, aspirational-needs quickly become necessary-needs, and for that reason, housing must be thought by taking into account the needs of the future, and not the aspirations of the past. When not possible, and so that at least the developed housing was adequate for the first families living in it, areas should be "(...) the best that can be achieved through maximum

15 "(...) construindo de um modo tão incaracterístico, tão desvinculado a um único programa que se possa usar dela nas mais variadas circunstâncias sem que ela se imponha e o impeça?" Translated from Portuguese to English by the author of this dissertation.

16 "Subjacente ao estudo e às opções que nele se tomaram está a ideia de que existe alguma correlação significativa entre caracteristicas especiais da casa e comportamento dos individuos e grupos que a ocupam, seja no sentido de constrangimento ou impedimento de certas actividades, seja como fomentador ou propiciador de outras. Daí que se possa definir uma noção actual de mínimo como o conjunto das condições abaixo das quais a habitação concorreria, com probabilidade significativa, para restringir o grau de desenvolvimento individual ou o grupo que a sociedade já permitiria uma dada fase da sua evolução.
É facil de concluir que a gravidade da não satisfação de uma exigência mínima fixada com este critério está na probabilidade com que se introduz um elemento de atrito numa evolução possível, facto bem evidenciado em larga parte das realizações de habitação do tipo económico dos útlimos lustros as quais, irremediavelmente acanhadas devido às pequenas economias pretendidas, estão agora parcialmente obsoletas, sem possibilidade de acompanhar um acréscimo de exigencias real, devido sobretudo, como se verá, à alteração do papel da mulher, ao acrescimo da escolaridade e de independencia dos jovens e ao aparecimento de novas motivações para o lazer em grupo dentro da habitação." Translated from Portuguese to English by the author of this dissertation.

17 "A família reflecte e é o ponto de confluência, das solicitações e contradições de cada momento histórico. Poderá ser o último reduto a sofrer tal embate, mas é, também, com certeza, o que sofre mais as suas consequências - positivas ou negativas. O que tem vindo a chamar-se a crise da família (na base da crise da juventude, por exemplo) não será, assim, mais do que o reflexo moroso e retardado de uma poderosa e ainda indeterminada transição histórica." Translated from Portuguese to English by the author of this dissertation.

economical use of existing resources at a given time."[18] (Portas, 1969) The belief that housing developments would quickly go obsolete due to the permanent raising of housing standards through social struggle was explored in two ways in LNEC's research. On the one side, effort was put into the exploration and development of evolutive housing (and preliminary evolutive urban space) models, as well as different types of flexibility and polyvalence of the habitat; on the other, research on how people lived, on family dynamics, on their needs and aspirations, was often conducted with an eye not on what was stable, but on what was transforming.

4.1.2. WOMAN'S EMANCIPATION AND HER ROLE IN THE FAMILY

This underlying concern brought particular importance to the studying and understanding of the transforming role of women in society and its reflection within the house and the family. If, as seen above, Pereira and Gago did not believe that architects had a "pedagogical role" or that it was up to architecture to decide that women should be emancipated within the family, their work still had a significant focus on women, how they lived and what role they had in the family. As such, the authors argued that "it would be important to search for solutions which solved the isolation of the housewife"[19] (Pereira & Gago, 1984, p.39), and which valued the mutual presence of family members when at home, and in particular of women when occupied with domestic chores.

Portas (1959/2004, p.27) assigned to the awareness of the social evolution of women's role in the family the basis of "the revision of the concept of housing organisation undertaken in the last few years"[20]. Women were starting to work outside the house, they had better access to education and jobs, and so their role as mothers and housewives was quickly transforming. Children were now put in kindergartens, and domestic chores were starting to be shared, not only between women but also including sons and husbands. Women, now with their own jobs and financial independence, were seen as starting to feel a *de facto* equality:

> Women (who slowly become equal to men when it comes to access to education, even frequently superseding them in the struggle for life and the conquest of financial independence) transform traditional domestic roles, participating or administrating the

18 "(...) as melhores forneciveis para um aproveitamento económico máximo dos recursos existentes num dado momento" Translated from Portuguese to English by the author of this dissertation.

19 "Teria o maior interesse procurar soluções que resolvessem por um lado o isolamento da mulher doméstica (…)" Translated from Portuguese to English by the author of this dissertation.

20 "O aspecto porventura mais revolucionário da moderna descoberta da família é o que respeita ao papel que nela a mulher desempenha. Ver-se-á que esta transformação e a sua tomada de consciência estão precisamente na base da revisão do conceito de organização da casa a que se tem procedido nos últimos anos." Translated from Portuguese to English by the author of this dissertation.

> couple's income, keeping up more with their husbands (who will little by little lose the privilege of a life aside or even hidden from the family), participating in political and union roles or in neighbourhood life.[21] (Portas 1959/2004 p.29)

Nevertheless, empirical research reported that women were still the ones almost exclusively in charge of domestic chores and taking care of children, and that was the primary reason why it was considered essential to make women "the protagonists of the space of the house: because we will insist against solitude, in the urgency of unhesitatingly treating space's organisation for the promotion of encounter, of cooperation and friendship; in the essential importance of placing at the centre of domestic life the woman who works hard and the few but precious moments in which family comes together at home."[22] (Portas 1959/2004, p.32)

If it is referred by Portas (1959/2004) that young couples, displaced, unstable and precarious, display closer, more honest and equal relationships, women are barely ever considered as the half of a couple. In Pereira and Gago's surveys, no questions were asked regarding the relationship between men and women, and Portas developed no hypothesis of spatial arrangements to favour life as a couple. Instead, even though it was acknowledged that household chores were rapidly transforming due to technological advancements and precooked meals, and that men and children were becoming more and more participative, it was also recognised that making the woman the centre of domestic life meant paying much attention to the kitchen. It was when treating the kitchen, its organisation, its relation to other spaces and its area, that women were mentioned the most.

To counter women's segregation in their own homes, Portas (1969) proposed three main guidelines for the house's spatial arrangement: 1) Kitchens should always be designed in order to accommodate more than one function and allow for a variety of activities, or be linked to alcoves or balconies that might be used for informal, social activities. 2) Kitchens should be linked to the living room, in order to guarantee women's participation in social activities, in particular because the appearance of televisions in households seemed to be moving to the living room family-gathering activities that used to take place in the kitchen. How this link should be developed was

21 "A mulher (que lentamente se iguala ao homem no acesso a numerosos sectores da educação e do ensino, suplantando-o mesmo com frequência, na luta pela vida e a conquista da sua independência económica) transforma os papeis tradicionais no lar, participando ou admnistrando os rendimentos do casal, acompanhando mais o marido (que deixará pouco a pouco a regalia de uma vida à parte senão oculta da família) participando em tarefas políticas, sindicais ou da vida comunitária do bairro." Translated from Portuguese to English by the author of this dissertation.

22 "Compreender-se-à agora por que a mulher vai assumir um papel de protagonista do espaço do habitat: porque insistiremos contra a solidão, na urgência em tratar o agrupamento resolutamente, como fomento do encontro, da cooperação e da amizade; na importância essencial em colocar no centro da vida caseira a mulher que trabalha duramente e os poucos mas preciosos momentos em que a família se encontra junta no lar." Translated from Portuguese to English by the author of this dissertation.

a complex question, to which Portas presented a variety of solutions taking into account the smells and disarray that, existing in the kitchen, should not interfere with common areas, taking into account the existence of guests, or the possibility of creating a separate space for meals, often accompanied with a careful exposure of possible social consequences of each solution. 3) Kitchens should ideally be not only located near the entrance - in order to facilitate the transportation of groceries - but also enable visual communication with the exterior of the apartment so that women may talk to neighbours, look after their children and take advantage of urban movement.

4.1.3. FREE TIME, A NEW MEANING OF HOME AND CHILDREN

A concern with how the increase of time spent at home verified at the time had implications in the collective life of the family and the relationship developed between children and parents was a concern of both Portas and Pereira and Gago. Growing consumption of mass media was considered likely to reflect on a more substantial amount of leisure time spent at home instead of outside, visiting neighbours or local commerce and services: "(…) the development of collective equipment in the neighbourhood or city does not seem to prevent, despite its importance and attractiveness, a tendency for this increase of free time at home."[23] (Portas 1969, p.47) However, while it appeared that neighbourhood relations were declining, it was also suggested that family life was becoming more collective. Simultaneously, there was also an increase in extra-spatial solidarities. The house was becoming the locus of social life not only in the relationships established between household members but also as a place for social gatherings with friends. Portas (1969) argued that with this came the need for creating a greater separation from the exterior of the house, related to the transition of social life to more elective relationships that may have the house as its locus. Confirming the growing desire for privacy, families systematically showed to prefer houses with a clear interface between exterior and interior (Portas 1969, Pereira & Gago, 1984).

A reduction in birth rate altered the relations parents established with their children. There was now a more significant focus on education at home, and a generally closer relationship between the two groups as parents wanted to spend more time with their children at home. This was accompanied with an increase in privacy requirements between children (in particular teenagers) and parents, which resulted both in the spatial separation of social activities like hosting, children's play, teenagers' activities and adults' work - increasing area requirements - and in the search of spaces that might be used to bring different groups together. Portas, in particular, expressed a particular concern with how the form of the house might have an impact on children's development:

23 "(…) o desenvolvimento de equipamentos colectivos à escala do bairro ou da cidade não parece impedir, apesar da sua importância e atractivo, a tendência para este aumento do tempo livre no lar." Translated from Portuguese to English by the author of this dissertation.

> According to its spaciousness and organisation, the house might be, for a child, an open world or, contrarily, closed and full of interdictions. The lack of space prevents them from expanding, puts them at the mercy of adults humour, provoked by tiredness or stress, which translate in excesses of affection or severity.[24] (Portas 1969, p.54)

How the relationship of parents with their children was associated with the space of the house was a particular concern of Portas, who believed it might have broader social implications: "A decrease in youth delinquency symptomatically follows places were these concerns are felt, particularly when housing was thought to educate them."[25] (Portas 1969, p.27)

In Pereira and Gago, this was reflected in the categorisation of families according to their values: traditional, modern or in transition. Amongst the variables for this categorisation was whether or not women worked outside the house, but also how much independence was given to children, the role assumed by parents in their education, the time and characteristics of the time spent together at home.

If the concern for the woman's role in the family was reflected in particular focus on the space of the kitchen and its articulation with the rest of the house, the question of the family as a collectivity resulted in the specific study of the living room as one of the spaces of the house "most vulnerable to the evolution of habits, to the family's social mobility and to the contradictory requirements observed in its phases of transition."[26] (Portas 1969, p.47) The living room was the space which hosted both intra-familiar communication and its relation to the exterior world, and one which importance in the house seemed to be connected to social mobility, the increase in free time and in resources to invest in the home (Portas 1969).

Therefore, these studies registered several different approaches to the living room and made suggestions focused on the flexibility and polyvalence of social spaces that should be capable of accomodating all steps of the family's transformation. Instead of focusing on minimal areas, Portas argued that when it came to spatial organisation, planning for future requirements often

24 "Ora conforme o seu desafogo e concepção a casa pode ser para a criança um mundo aberto ou, ao contrário, fechado e cheio de interdições. A falta de sítio impede-a de se expandir, põe-na mais à mercê dos humores dos adultos provocados por fadiga ou enervamento, que se traduzem em excessos de ternura ou de severdade." Translated from Portuguese to English by the author of this dissertation.

25 "A redução da delinquência juvenil acompanha sintomaticamente os meios onde se respiram estas preocupações, sobretudo se o habitat foi pensado para as educar."Translated from Portuguese to English by the author of this dissertation.

26 "(...) das mais vulneraveis à evolução dos costumes, à mobilidade social das familias e às exigencias contraditorias que se observam nas suas fases de transição." Translated from Portuguese to English by the author of this dissertation.

proved counterproductive. For example, even though he showed a preference for an open articulation of social spaces and was against, in particular, the creation of independent dining rooms - which would have consequences in the area of the house, and often put women in a more clear position of serving the family - he pointed out that "the solution was defended in experimental projects when some surveys verified that families wanted a sheltered and tidy room for their "dining furniture" so much that they wouldn't hesitate to sacrify a bedroom, even when necessary, to transform it into a dining-room."[27] (Portas 1969, p.51)

4.1.4. DOMESTICATION AND THE NECESSITY OF COMMUNITY

While, as we have just seen, the evolution of the family seemed to be in the direction of the prevalence of extra-spatial relations, both Portas and Pereira and Gago assigned significant importance to the promotion of neighbourhood relations. This is clear in Pereira and Gago (1986, p.28):

> (…) it is suggested as a fundamental cause of individual isolation, of lack of satisfaction in relations (…) of mental disorders and of the violence which characterises highly industrialised societies, the loss of intimate social relations with a sufficient number of people. This loss can only be repaired by the reconstitution of primary groups (familiar or others) that are sufficiently broad. As physical proximity is considered a base condition for the existence of a primary group, the entire housing-neighbourhood programme is put into question: how do we develop and organize housing, which primary groups of cohabitation will be formed, which cohabitation rules will they adopt?[28]

And in Portas (1959/2004, p.20):

> The defence of the private world - the creation of a humane space of retreat and serenity against the exhaustion of public life - cannot be, however, confused by or turned into individualism. An isolated home, enclosed, is not the one that most zealously preserves

27 "A solução foi no entanto defendida em projectos experimentais quando se verificou nalguns inqueritos que as familias desejavam de tal modo um compartimento resguardado e arrumado para a sua "mobilia de jantar" que não hesitavam em sacrificar um quarto de dormir, ainda que necessário, para o transofrmar em sala fechado." Translated from Portuguese to English by the author of this dissertation.

28 "(…) aponta-se como causa fundamental dos problemas de isolamento dos indivíduos, da insatisfação nas relações (…) dos distúrbios mentais e da violência que caracteriza as sociedades altamente industrializadas, a perda de convívio íntimo com um número suficiente de pessoas. Essa perda só é reparável com a reconstituição de grupos primários (familiares ou outros) suficientemente amplos. Como considera condição base para a existência de um grupo primário a proximidade física dos seus membros, é todo o programa habitação-vizinhança que se põe em causa: como realizar e agrupar a habitação, qual ou quais os grupos primários de coabitação que se irão formar, que regras de coabitação adoptarão eles?"Translated from Portuguese to English by the author of this dissertation.

> the virtuality of the institution [of the family] - but what caused it to degrade.[29]

Portas, in particular, related the loss of neighbourhood relationships - in spite of other extra-spatial relations - to greater domestication and individualisation of the family, which would be reflected in more traditional values:

> It happens sometimes, unfortunately, that the unilateral defence of the values of family isolation, against solutions which intensify the 'probability' of social life, even though the problem is faced in these two terms, presents itself more as an alibi of a certain social through which aims at atomizing and assigning bourgeois values to popular social classes, as a technique of neutralisation of their capacity for solidarity and defence.[30] (1959/2004, p.109)

To which he counters:

> It is established here one of the principles of personalism: that of the existence of a dialectic, a balance that is always to be finished, between the need of the 'other' in the development of individual personality (man personalises himself as he participates in community life) and the need to return to oneself, of one's own breathing and interior growth, and a condition of authenticity in this encounter with the 'other'.[31] (Portas 1959/2004, p.20)

For Portas, a successful family, engaged in community life, is a family who is simultaneously in charge of its own space, with the required privacy for the individual growth of each of its members, and a family which has its extra-familiar social life promoted by the environment in which it lives.

In this sense, Portas relates three stages of the social life of families with types of housing. The

29 "A defesa do mundo privado - criação de um espaço humano de recolhimento e serenidade diante do esgotamento da actual vida pública - não pode ser, no entanto, confundida ou tornada em individualismo. Um lar isolado, fechado, não é o que aguarda com mais zêlo esta virtualidade da instituição - mas o que a degradou." Translated by the author.

30 "Sucede às vezes, infelizmente, que a defesa unilateral dos valores de isolamento da família, contra as soluções que intensificam as "chances" da vida de relação, embora encarem o problema nos seus dois termos, se apresenta mais como um alibi de certo pensamento social que procura atomizar e emburguesar as classes sociais populares, como técnica de neutralização das suas capacidades de solidariedade e defesa." Translated from Portuguese to English by the author of this dissertation..

31 "Radica aqui um dos princípios ao personalismo: o da existência de uma dialéctica, um equilibrio sempre por acabar, entre a necessidade do "outro" para o desenvolvimento da personalidade individual (o homem personaliza-se na medida em que participa na via comunitária) e a necessidade do regresso a si, da própria respiração e crescimento interior, como condição de autenticidade nesse encontro do "outro"." Translated from Portuguese to English by the author of this dissertation.

first, made up of direct relations of encounter and cooperation, needs a housing group articulated with social equipment, as

> an inorganic and individualist urbanism cannot centre these potentialities in the estate: the absence of spaces of common interest and of associations for their management, of spaces of reunion and entertainment of a familiar character, will serve the maintenance of the separation of family members by gender or age, and as such, the club and bar for men and the house for women.[32] (Portas 1956, p.33)

The second, consisting of organized families that are capable of reclaiming and solving their own problems, requires a spatial connection between an associative structure and social life: families that take care of the maintenance of order and cleanness in the neighbourhood, manage collective equipment, and establish relationships between inhabitants which are useful for the community. The third includes the family in local politics through its organisation in organisms which have the residential community as its basis.

In this same line, Pereira and Gago put the focus on the distance between the house and the other activities of the family. When large, this distance would cause dispersion of family members and a reduction of activities performed together at home - both due to other interests and to the decrease of free time in favour of longer commutes - creating more independence but also distance within the family. In the estate, this would result in less frequently used exterior and collective spaces, turning the neighbourhood into a dormitory often void of movement and sometimes with a threatening appearance, and weakening neighbourhood relationships. However, with no empirical basis on which to found possible solutions, Pereira and Gago (1984) did not approach the question of neighbourhood relationships and mutual-aid systems further at this time.

This idea of domestication as defined by both what happens at home and what happens outside of it demanded a transformation that transcended the scope of architecture and urbanism, and put further pressure in a long-felt contradiction by progressive technicians between a willingness to create socially useful housing programmes and accepting the logic of urban land speculation, which resulted in the "inhumanity of imposing brutal cost reductions to a housing programme that impact areas, equipment, finishings or result in the amputation of collective equipment."[33]

32 "Mas um urbanismo inorgânico e individualista não permite centrar no bairro estas virtualidades: a ausência de lugares de interesse comum e associações para a sua gestão, de reuniões e divertimentos de carácter familiar, manterá a divisão dos membros por sexos ou idades e, com ela, o clube e o café-para-homens e a casa para as mulheres" Translated from Portuguese to English by the author of this dissertation.

33 "Desumanidade de acabar por se impor a um programa habitacoal rduções brtais de custo, incidindo nas áreas habitaveis, no equipamento e acabamento do fogo, ou na amputação do equipamento colectivo." Translated from Portuguese to English by the author of this dissertation.

(Portas 1956, p.55) As an alternative, Portas (1956, p.56) proposed:

> […] to build houses, but houses […] that nurture instead of strangulating; the need to create collective equipment that is so far an exclusive of the privileged classes (ex: kindergartens), that implies, first of all, a legislative apparatus and a specialized organization that we lack. But that also requires the qualitative management of urbanism and housing: a division of the localization criteria of jobs, entertainment and housing, today almost always […] disintegrator elements of family reunion […][34]

4.2. LEARNING FROM THE SURVEY ON URBAN HOUSING

4.2.1. DESCRIPTION OF THE SURVEY

The Survey to Urban Housing (Pereira and Gago, 1984) was the final report of a long-running research project whose main goal was that of providing a better understanding of family dynamics and ways of life at home, while also articulating with the field of research which was starting to explore how these were affected by architectural action. Using contemporary sociological studies as a point of departure, the research project combined the development of theoretical thought with empirical data on how families lived and used the domestic environment gathered through the realization of questionnaires. The principles and concerns transversal to the period that were summarised in the previous chapter of this dissertation were expressed in the three main objectives of the research:

1. To gain knowledge on societal evolution both in its global trends and particular aspects which affect housing, in the sense of defining a theory of housing which should consider the totality of everyday life with the house as its basis, and which should define the meaning of habitat through the understanding of how people live in the spaces they inhabit.

2. To gather and select data on how families use the space of the house that might be useful in the definition of housing programmes, and whose explanatory character might enlighten

34 **"**[...] construir fogos, mas fogos que [...] estimulem em vez de estrangular; necessidade de levar por diante a dotação de equipamento colectivo agora ainda exclusivo das classes privilegiadas (ex: os jardins de infancia), o que implica, antes de mais, um instrumento legislativo e uma organização especializada que nos falta. Mas atinge também o tratamento qualitativo do urbanismo e da habitação: exige uma divisão dos critérios de localização dos centros de trabalho, recreio e habitat, que são agora quase sempre [...] elementos desintegradores da reunião familiar [...]" Translated from Portuguese to English by the author of this dissertation.

architects about the meaning of the spaces they create.

3. To determine "values-spaces" that express both requirements and images of housing, utility and poetics. Housing should be a reflection of these through the active search for their knowledge and through a flexibilization of forms:

> The hierarchic values of housing are not necessarily expressible in space, there might not be direct correspondence, but the built environment must allow, and if possible favour, their expression. We search to know the formal language and the physical values that without conditioning, give the user freedom of expression and possibilities of appropriation.[35] (Pereira & Gago, 1984)

SPATIAL CRITERIA FOR SAMPLING					
relationship between the house and it's immediate surroundings	privacy and socialisation	privacy	design solutions with and without living or bedrooms open to public or semi-public spaces	single family housing	living room on ground floor, entrance side bedroom on ground floor, entrance side no living room or bedroom on ground floor, entrance side
				central or side corridor	living room over corridor bedroom over corridor no living room or bedroom on entrance side
				central access	living room on entrance side bedroom on entrance side no living room or bedroom on entrance side
		socialization between neighbours	design solutions with different types of house distribution	aggregation scheme with up to 4 houses	narrow access hall
				aggregation scheme with more than 4 houses	single family houses corridor large access hall

Table 4.1
Spatial criteria for sampling used in the research conducive to the Survey to Urban Housing (Pereira & Gago, 1984)

35 "Os valores hierarquizados próprios do habitar não são necessáriamente exprimíveis em espaço, pode não existir uma correspondencia directa, mas o espaço construído terá de permitir, e se possível favorecer, a sua expressão. Procura-se entao conhecer a linguagem formal e os valores fisicos que sem condicionar, deixam ao utilizados liberdade de expressão e possibilidades de apropriação." Translated from Portuguese to English by the author of this dissertation.

SPATIAL CRITERIA FOR SAMPLING				
living room-kitchen sector	relationship between area and use	dimension	kitchen	small <6m² (cannot accomodate meals)
				6m²<medium<8m² (can accomodate meals)
				large >8m² (permite refeições, lavagem de roupa, etc)
			living room	<16m2
				> 16,2m²
				< 20m²
			living room-kitchen sector	> 26m² < 30m²
				> 30m²
	flexibility of design solutions for sets of activities	formal solution	single living and dining room	
			living and dining room in two permeable spaces	
			additional small living room	
			additional small room for domestic tasks	
	problems coming from the type of permeability between the kichen and the living-dining room	independence kicthen-living room	non-separable kitchen and living-dining room	
			separable kitchen and lliving-dining room	
			independent kichten and living-dining room	
		living-dining room privacy (or lack of)	no crossing	
			crossing for kitchen service only	
			different circulations	
		house dimension	T1 (18%) T2 (6%)	
			T3 (35%)	
			T4 (19%)	
			T5 (15%)	
			T6 (7%)	

The objective of the research project was then not only to gain knowledge on how families used the space of the house but also to use this knowledge to understand the values attributed to the house in everyday life and inform a future architectural decision process that was equipped to reflect them adequately. These values and societal concerns were focused on three main aspects regarding the transforming family and home of the 1960s and 1970s, which had mainly to do with a) a search for design solutions that might reflect a shift in the understanding of the woman's role in the household; b) how housing development might take into a growing intensification of the time spent at home and simultaneously; c) how design might counter the consequent decline of neighbourhood relations.

The Survey searched to answer these questions through a series of interpretative and quantitative questionnaires that were conducted on 300 families living in four areas within the municipality of Lisbon (figure 4.1.) and distributed across 50 different apartment schemes. These areas were

selected because architectural drawings were easily accessible, while simultaneously representing a wide range of families of different socioeconomic classes, apartment layouts and urban morphology, integration in the city and rent layouts. Based on the formulation of the social and spatial hypothesis explored in section 4.1., criteria for sampling based on spatial attributes were established (table 4.1.), to which these housing developments mostly corresponded.

Benfica (B), is an area in the west of Lisbon composed by single-family houses. It was developed in the late 1940s in what was at the time a mostly unurbanised area of the city, disconnected from secondary urban centres, as well as local infrastructures and services. Alvalade (A) was one of the first experiences of large scale collective housing in the country. It was developed around 1950 in a central area of Lisbon in the scope of an affordable housing programme conducted by social security institutions which, working with some of the better-known architects in the country, became known by the architectural quality of its enterprises. Olivais Norte (ON) and Olivais Sul (OS) are two large, adjacent, social housing estates built in the 1960s in the scope of the same programme. They are made up of large housing blocks and wide-open spaces and, located in the north of Lisbon, away from secondary urban centres, they have few and concentrated local services and infrastructures.



Figure 4.1.
Map of Lisbon with localization of the four neighbourhoods. Google Earth, 2019.

The selected families were categorised by their social, economic and professional status, and according to the dominant type of social values demonstrated. The first categories depended solely on the condition of the "head of the house" - the husband, father to the children in a traditional family, and the woman when single or widowed - and took into account level of instruction, profession, position in his career, monthly income and income per capita. These variables were then aggregated to define the family's socioeconomic level. The second category divided families into those with traditional values, those transitioning from traditional values to modern values, and finally, modern families. This classification took into account the criteria shown in table 4.2.:

the role of the woman, both in the house and outside of it, the role of the "head of the house" at home, their attitude towards sexual life, their aspirations regarding their children's professional success, the type of authority exerted over children and both the type of relationships established within the family and its openness to the outside world. Additionally, families were characterised according to the ages of the couple, the number and ages of children.

ATTITUDE TOWARDS WOMEN	women	occupation
		reasons why she works, or not, outside the house
		individualization, or not, of domestic tasks
	men	responsability for household income - occupation
		participation in domestic activities
	couple	attitude towards sexual life
ATTITUDE TOWARDS CHILDREN	aspirations regarding children's professional success	differences between genders
		distinction, or not, of aspirations according to gender
	parents' authority over their children	freedom in the personnal organization of bedrooms
		appreciation of the education children have in school
		necessary condition to leave children unwatched
FAMILY LIFE		frequency and type of conviviality between family members
AWARENESS OF THE EXTERIOR WORLD		type and regularity of reading

Table 4.2.
Variables for the definition of the families' socioeconomic level.

The process of inquiry included pre-defined questionnaires with room for different answers than those proposed. The results were presented in a collection of apartment plans, each representing one of the 300 families. The interior space was divided into rooms labelled according to a general function, such as kitchen, living room and bedrooms. For each family, the arrangement and disposition of furniture were registered. In each labelled room, it was represented which domestic activities took place, and which family members were usually present at the different times of day (defined as morning, lunch time, afternoon, evening and night), as seen in figure 4.2..

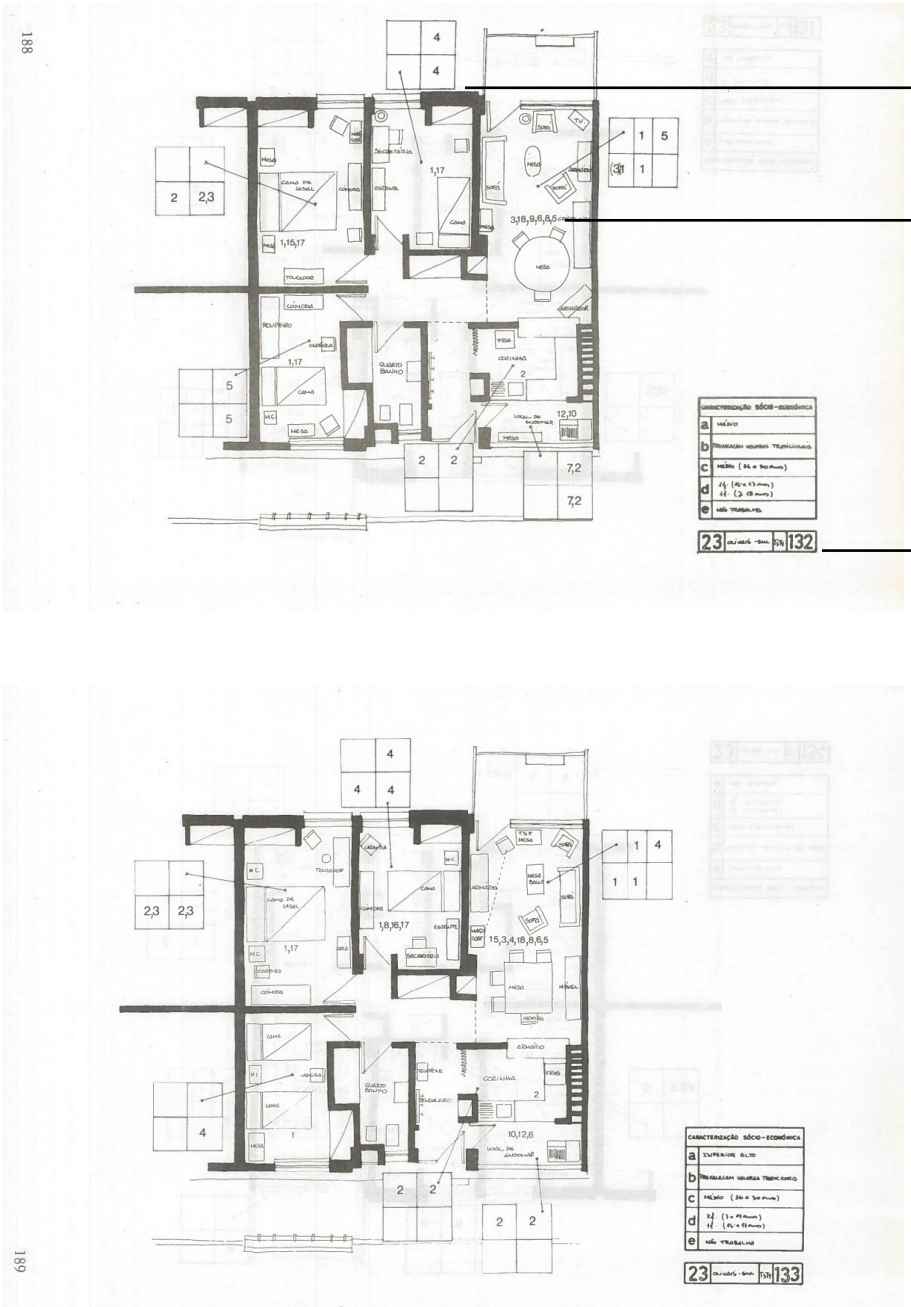


Figure 4.2.
Survey data for two families in the same apartment scheme.
Luz Valente Pereira and Maria Amélia Gago, Survey on Urban Housing, 1984, p.188-189

Additionally, each family was characterised according to socioeconomic variables, such as income level, traditional or progressive values, parents age, children's age and the employment status of the woman, as defined in table 4.3:

FAMILY MEMBERS	TIME SLOTS	LABELLED SPACES
woman	morning	bedroom
man	lunch time	kitchen
children (female)	afternoon	livingroom
children (male)	evening	diningroom
other relative	dinner time	exterior space
housekeeper	night	other space
all members		

Table 4.3.
Labels contained in each plan in the Survey on Urban Housing

The plans published in the Survey's reports provide information on where domestic activities take place, and where and when household members are usually located in the house. Domestic activities are defined in the Survey according to previous research (Portas 1969) on essential domestic functions. These were considered to be: *sleeping, prepare meals, regular meals, weekend meals, special meals, general permanence, adult guests, children's play, studying, professional activity, young guests, ironing, washing clothes, drying clothes, sewing, particular permanence, adults studying.*

The questionnaires included a variety of questions whose information is not fully available in the reports. For example, data on for how long the inquired families had resided in Lisbon and where they resided before, or on how satisfied they are with their houses and what they would change about it, are available only as aggregated information on the globality of the sample, and not regarding each specific family. Similarly, data regarding which members of the household performed which tasks and when were gathered during the questionnaire process, but not published alongside the plan-household sets. Similarly, the research process that lead to the decisions made regarding the definition of social attributes of families are not described or supported - empirically or theoretically - in the document.

This Survey was designed to shed light on some questions regarding the transformation of society, the ways of life of families and the use of the domestic space. So that the research was practicable with the existing resources, the sample used was defined in order to "present a series of characteristics that allowed for the analysis of the proposed problem, and it was not attempted to make it representative of any determined population"[36] (Pereira and Gago, 1984, p.11).

36 "A amostra a utilizar deveria portanto apresentar um conjunto de caracteristicas que propiciasse a análise do

The selected cases are not distributed evenly throughout the different areas, nor dimensioned in order to be representative of them. Representing 6% of the universe of the four chosen areas, the results of the Survey are not representative of that population. Less so are they representative of the population of Lisbon, and even less so of that of the whole country, reaching up to Porto. Due to the limited amount of data gathered and the variety of apartment schemes included in the study, any conclusions regarding different forms of use for different apartment schemes are limited. If the families were equally distributed across apartment layouts, each layout would have information on its use by only six families. Because families are not equally distributed across layouts, some gather even fewer data.

Additionally, as we have just seen, some of the information collected throughout the study was not made fully available. As such, the analysis and subsequent interpretation took into account three critical limitations of the dataset:

1. It is not clear what the identification of family members in spaces in time-slots means regarding the regularity of that occurrence. It is not possible to know if the convergence of family members in the same labelled spaces and in the same time-slots is an indicator of co-presence.

2. It is also not explicit whether the "all" category is a representation of all family members at the same time or a substitute for signalling all individual family members.

3. An essential amount of social data regarding each family, as well as most non-spatial information from the inquiries – notably who performs which activities - was never fully published. As a consequence, it is possible that potentially interesting interpretations are being missed, or can only be advanced as hypotheses.

Therefore, the inquiry was considered to be an interesting source of empirical information both on the relationship between domestic activities and the space of the house, and on family life in urban areas in the 1970s that would be otherwise unavailable. However, it was sought that the approach to its analysis focused on general rather than minute aspects of these so that it would be possible, in articulation with the theoretical framework, other studies, and the information available on the case study, to add - without too much guesswork - to the understanding of housing in Porto between 1969 and 1982, not only in how it was designed but also in how it might have provided a basis for family life.

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problema proposto e não se procurou torná-la representativa de um qualquer conjunto determinado de população." Translated from Portuguese to English by the author of this dissertation.

4.2.2. METHODOLOGY

The steps taken for the analysis of the Survey on Urban Housing that had as its primary objective informing the posterior analysis of apartment layouts developed in Porto in between 1969 and 1982 are illustrated in figure 4.3. (see next page), and described throughout the following points.

1. Definition of a preliminary analytical framework

The analysis conducted on the Survey was based on the set of concerns put forth by researchers at the time, as well as on the hypotheses they identified regarding both how social transformations may have an impact on family life, and how these may be encouraged or hindered by the organisation of the space of the house. These ideas were then articulated within the theoretical and methodological framework presented so far. It is part of the theoretical premise developed in chapter 2 that one central role of architecture is that of organising socially defined actvities in space. In this context, the Survey on Urban Housing was an empirical step towards an understanding of how and to what extent patterns of domestic activities and interaction may be organised, encouraged or hindered by the spatial characteristics of the domestic environment.

In this sense, two of the four main social and familiar transformations identified in the studied documents where chosen to be further examined, due to being related to relations established inside the house: a) how the emancipation of women reflected or not in the domestic environment and b) how an expected increase of time spent at home impacted the relations established between family members. An initial, pre-spatial analysis looked at how these translated in patterns of human activity in the house or, more specifically, how these could be observed in the distribution of family members and activities in the space of the house during different times of the day. The subsequent spatial analysis took into account the hypotheses posed in the examined documents in regards to which spatial mechanisms may encourage these transformations, as well as space syntax theory and methodology.

An understanding of women's role in the family was limited to the observation of whether patterns of co-presence between women and other family members existed or not, whether traditionally feminine domestic activities were performed in spaces where social activities also took place, and, additionally, whether these patterns changed in the few cases where women held full-time jobs. It implied a closer examination of the space of the kitchen, its area and syntactic attributes, as well as its relation to other spaces of the house. If these spatial attributes were shown to have some relation to women's integration at home, then they might be said to provide spaces with an emancipator potential.

How an increased time spent at home impacted family relations was examined in regards to two opposing, but not excluding, types of relations. It was observed whether or not family

Figure 4.3.
Preliminary steps for analysis

members seemed to spend time in the same rooms during the same time-slots, whether there was a strong or weak preponderance of activities with active or passive social potential, but also whether there were spaces where only one family member was registered at a time, or where individual activities were predominant. This implied a closer examination of the living room and bedrooms, their area and syntactic attributes, as well as their relation to other spaces of the house, number of rooms, non-labelled spaces and the overall area of the house. If these spatial attributes were shown to have some relation to patterns of co-presence between family members and social activities, then they might be said to provide spaces with social potential. Contrarily, if these spatial attributes could be shown to allow for privacy between family members for the realisation of certain individual activities, then they might be said to provide spaces with potential for individual development.

This preliminary framework for analysis is synthesised in figure 4.3.

How activities were classified according to types is synthesised in the following table 4.5.:

private needs	1) sleeping
extended chores	9) professional activity
	19) adults studying
passive leisure	8) studying
	17) particular permanence
interactive/collective leisure	7) children's play
	5) general permanence
	16) young guests
	6) adult guests
communal needs	3) regular meals
	18) weekend meals
	19) special meals
household chores	10) ironing
	15) sewing
	12) drying clothes
	12) washing clothes
	2) preparing meals

Table 4.5.
Classification of activities according to types

2. Data extraction from plans

The apartment plans published in the Survey's report were first redrawn in CAD, and their corresponding accessibility graphs were then modelled in Rhinoceros. Utilising Grasshopper's plugin Syntactic, developed by Pirouz Nourian and Samaneh Rezvani at TU Delft, the syntactic measures of integration, difference factor, control, links-nodes ratio, total depth, mean depth and depth between each space to all other spaces were extracted from the graph. Additionally, Grasshopper was used to extract the total area of apartments and the total and relative area of spaces, the depth of each space from the exterior of the apartment, and the type and functional type of spaces. Data regarding the way different families used the house - which activities were performed in each space of the house, which family members registered in each space of the house in each time-slot - were encoded into the CAD drawings and extracted with resource to Processing[37] so that they could be associated to the corresponding housing layouts and spaces.

Accessibility graphs were constructed at the height of 1.50m, not taking into account non-functional spaces, such as closets, and divided according to labelled spaces, regardless of their shape. As seen in chapter 3, It is argued that this type of partitioning relates more clearly with the way the space of the house is understood by its inhabitants (Amorim 1999, Monteiro 1997, Bafna 2013). Additionally, this type of partitioning is necessary for grouping of spaces according to the type of activity that is likely to take place inside them. Griz & Amorim (2015,p.6, p.5) argue that "the most efficient way to analyse the relationship between the domestic space organisation and its social meanings (…) is by observing the emerging spatial patterns of inequality genotypes (…) related to a set of domestic activities", both by looking at them through the convex spaces that house these activities and through the three main domestic sectors: social, private and service. Similarly, Bafna (2001) defends that clusters add a new layer of meaning to nodes in the hierarchically organised graph, depending on which cluster it belongs to, and what structural role it plays within it, and that it is the structure of clusters that represent the essential genotype.

3. Data encoding and organisation

This process produced three datasets. One is made up of categorical variables, containing the identifying labels of the apartment schemes and spaces to be analysed: a label for each neighbourhood, an ID for each apartment scheme, and a label for each type of space. Other gathers data regarding spatial attributes, and contains numerical data, both continuous and discrete. Finally, the third dataset contains categorical data encoded as nominal dichotomy variable types, describing what activities are performed in which spaces of the house, and what household members are registered in which spaces at which times. The latter also adds an extra level of analysis. While the

37 Code developed by Petros Koutsolampros, PhD researcher at the Bartlett School of Architecture in 2018.

in the first and second datasets, each variable had only one value for each labelled space, the third dataset provides a variety of different values, according to how many households share the same apartment scheme.

Spatial and social data were encoded following a combinatory strategy. All variables were included in one same dataset where each row corresponds to one labelled space that belongs to one household. The redundancies created through this process - as spaces organised in similar apartment schemes and so sharing the same spatial attributes are repeated as they are attributed to different households - had to be taken into account during the analysis. In order to explore the main questions of this research, spatial variables were considered the independent variables, and variables regarding house use were considered dependent variables.

4. Description of the gathered data and visualisation

While the aim of that study was explicitly to relate spatial attributes with the way domestic activities are carried in the apartment, this was not fully achieved at the time. Most conclusions pertain to the modes of aggregation of different activities, with some, not thoroughly systematised, information on the relationship between different activities and the area of kitchens. The analysis published in the book is informative of the way of life of the sampled families, providing some sociological results of the inquiries that cannot be learned by studying the plans. The knowledge provided by this information was incorporated in the exploratory analysis conducted on the gathered data.

The data were organised, described and subjected to a preliminary analysis through exploratory data visualisation. In the first moment, the data was explored through its description, in order to provide an understanding of the information present in the dataset. Here, particular attention was given to social variables such as social class, type of family or age of parents, in order to search for significant differences in the type of spaces corresponding to different values that might invalidate using spatial attributes as the independent variables. In a second moment, the data were explored through a variety of graphs and tables in order to visually detect possible patterns of the types of activities (individual, services and collective) that more often take place in different types of labelled spaces, the amount of time spent in the house and type of room by each family member, the most common spatial attributes of each type of activity and, finally, some spatial attributes relating to different types of use of the domestic space.

The preliminary findings from these two steps are organised and presented throughout the following sub-chapters as follows:

1. First, a statistical description of the dataset is provided.

2. Then, the integration values of different activities are explored in order to detect

patterns that can be compared to those of previous syntactic studies.

3. Finally, for each of the three defined aspects of family dynamics to be explored in space (i) the patterns of collective use of the house, ii) the organisation of women's life at home and iii) the private appropriation of spaces), data will be explored around three points:

a) Ways of life and family dynamics,

b) General patterns of room use by household members,

c) potential differences in patterns or room use according to spatial attributes.

4.2.3. ANALYSIS

4.2.3.1. Description of the dataset

The dataset resulting from the process of digitation, data extraction and combination described in 4.2.2. contains information on 60 apartment schemes and 281 households, disposed throughout 1651 rows. It examines a total of 5 categorical independent variables for labelling spaces; 9 nominal polytomy independent variables regarding the socioeconomic character of households; 10 continuous independent variables regarding spatial attributes; 4 discrete independent variables of spatial depth; 3 independent dichotomy variables regarding space categories; 17 dependent nominal dichotomy variables regarding types of activities; and 42 dependent nominal dichotomy variables regarding household members in time-slots.

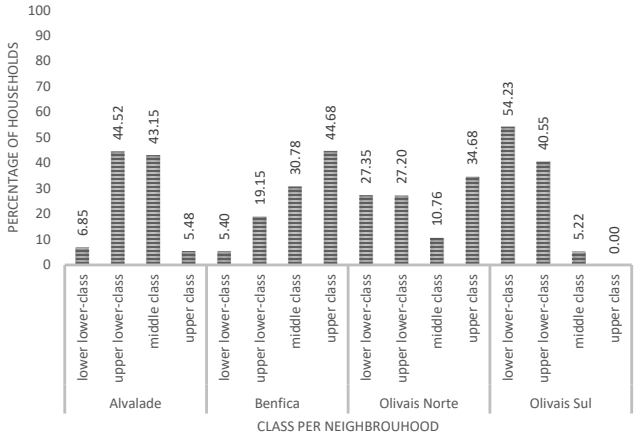
LABELS	neighbourhood, household, typology, type of room, ID of room
SOCIOECONOMIC ATTRIBUTES	social class, family values, age of couple, children 3-6yo, children 7-14yo, children 15-17yo, children 18+, professional status of woman
SYNTACTIC MEASURES AND AREA	integration, control, difference factor, links-nodes, mean depth, total useful area, area, relative area, integration of transition spaces
SPATIAL DEPTH	depth to exterior, depth to livingroom, depth to kitchen, total depth
SPACE CATEGORIES	space-type, functional space-type, centrality type
TYPE OF ACTIVITIES	sleep, prepare meals, eat meals, eat special meals, eat weekend meals, general permanence, adult guests, child's play, studying, professional activity, clothes related, permancence in exterior, sewing, young guests, personal permanence, studying adults
HOUSEHOLD MEMBERS IN TIME SLOTS	all, woman, man, sons, daughters, relatives, employee, morning, lunch, afternoon, evening, dinner, night

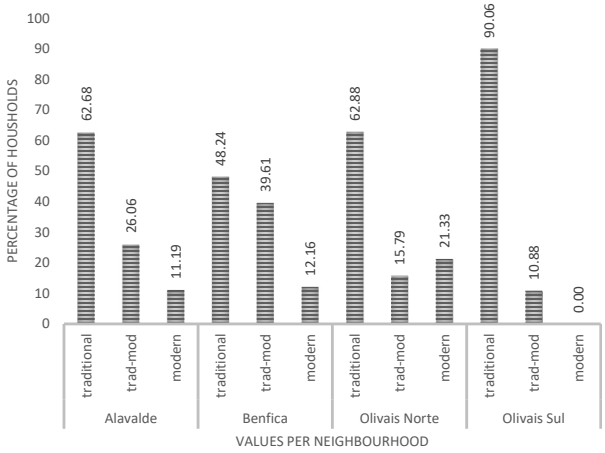
Table 4.6. Variables in the dataset constructed for the analysis of the Survey on Urban Housing Pereira & Gago, 1984

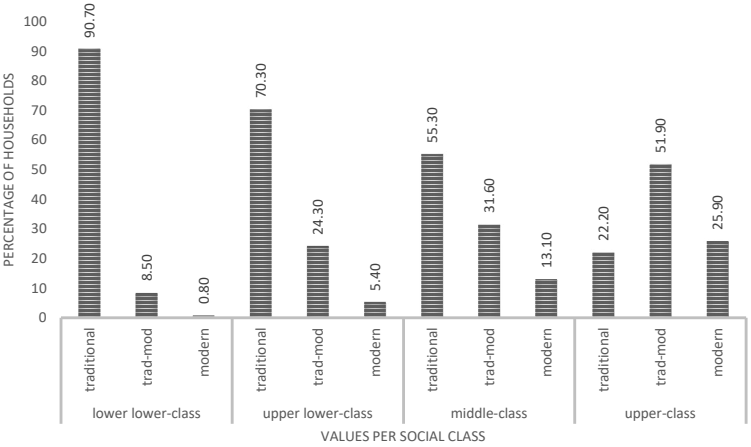
The published reports (Pereira and Gago, 1984) reported information on 300 families living in 50 apartment schemes, distributed across 4 different areas in Lisbon. However, during the process of plan redrawing in CAD, it was made evident that, due to slight differences in the plan - either the result of variations of the same type or of alterations done to the apartments by their residents - the survey presented 79, rather than 50, layouts with different configurations. Some of these included as little as 1 case of household-occupation, while others reached a maximum of 9 cases of household-occupation. In this sense, a total of 19 cases where minor variations in the apartment layout resulted in configurational changes and which corresponded to only one case of household-occupation, were excluded from the analysis. However, the disparity of households per apartment scheme remained, as some apartment schemes are repeated in as little as 2 families and some in as many as 10. This raised the problem of finding appropriate ways of aggregating data other than apartment typologies, which was approached through exploratory analysis and visualisation of the data.

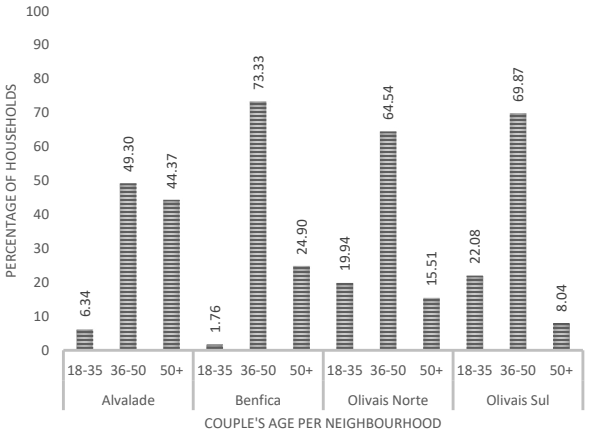
Similarly, the sample is unevenly distributed through the four neighbourhoods, both in the amount of inquired families and in their socioeconomic characterization. While 76% of the sampled families belong to the lower classes, figure 4.4. shows that these are heavily concentrated in Olivais Sul, which contains roughly ¾ of this class, and low numbers of middle and upper-class families. The latter are better represented in Benfica, which has a much more balanced sample. Family values (ranging from traditional to modern) also seem to vary across neighbourhoods. If it is clear that what werre considered traditional family values are dominant across the sample, Olivais Norte has a more significant percentage of families with more modern values. The majority of households in the sample consists of couples within the age range of 36 to 50 years old, but Olivais Norte and Olivais Sul have generally younger residents, and Alvalade and Benfica generally older residents. The vast majority of inquired women did not perform any professional activity. The proportions of working and non-working women across neighbourhoods are reasonably similar. If it is noteworthy that families in the lower classes have the largest percentage of non-working women, the strata of the population represented in these categories must also be taken into consideration. The surveys were conducted in the early 1970s and concerned families living in public housing. As will be explored further in chapter 7, public housing during the Portuguese dictatorship was most often not directed at the most impoverished of working class families but at families with stable, if low, income.

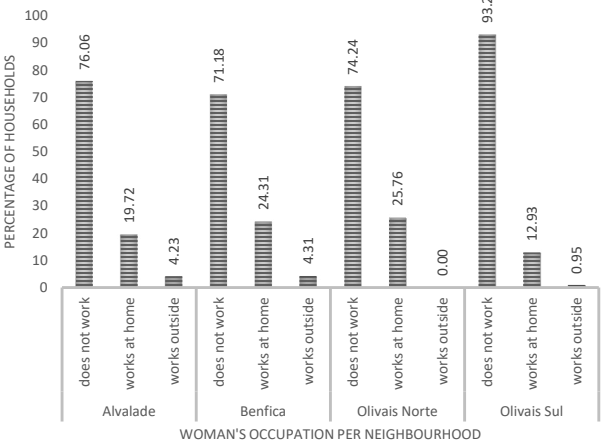
In light of these differences, it appeared important to check for variables that might be influenced by class and show similarities across the sample, or influenced by neighbourhood and break the sample is considerably different sets. Regarding socioeconomic characteristics, figure 4.5. shows that class differences translate in a growth of the total useful area of apartment layouts. In particular, layouts assigned to middle and upper-class households in Olivais Norte are larger than other cases. The average area of labelled rooms follows a similar growth pattern to that of total useful floor area, which seems to indicate that larger aparments are not simply composed by a larger number of spaces.











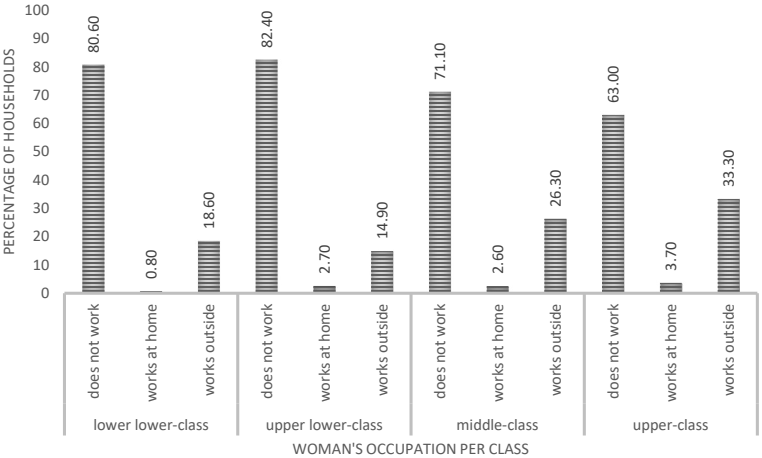


Figure 4.4.
Descriptive graphs: a) class per neighbourhood b) values per neighbourhood and per class, c) couples' age perneighbourhood, d) woman's occupation per neighbourhood and per class

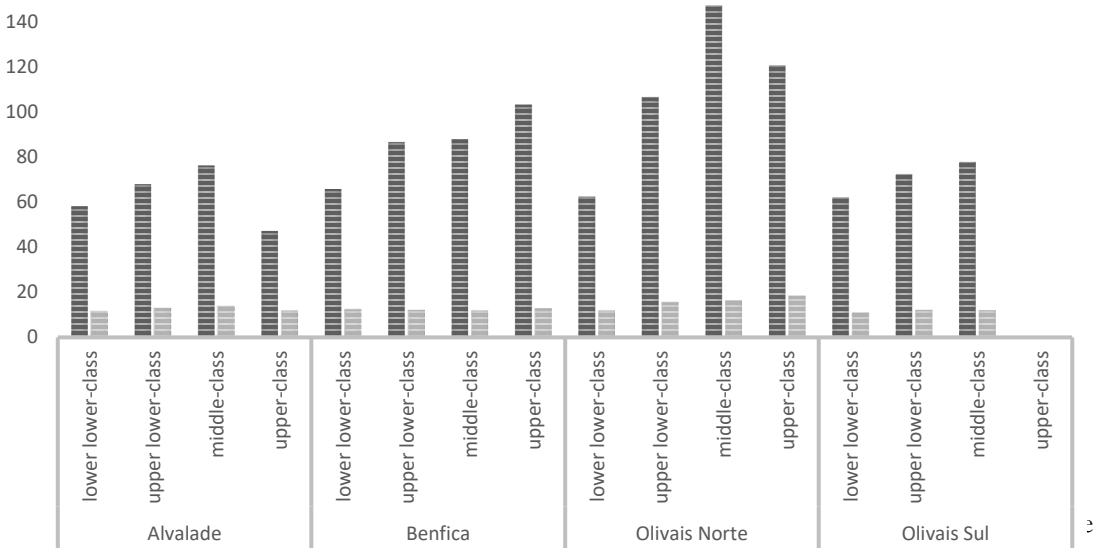


Figure 4.5.
Mean total useful floor area and average area of labelled rooms per class, per neighbourhood.

more significant. Benfica, where most of the layouts are for two-story apartments, has much lower average values of integration and larger values of total depth than any of the other neighbourhoods.

If there do not seem to exist stable patterns of spatial differences across class or neighbourhood, substantial variations in the means of integration, total useful floor area, control, depth and difference factor (table 4.7.) can be verified across the dataset and were taken into account during the analysis.

	TUFA	INTEGRATION	CONTROL	TOTAL DEPTH	MEAN DEPTH	DIFFERENCE FACTOR
mean	81.60	0.87	0.69	38.95	2.76	0.78
std	31.21	0.36	0.61	20.30	0.80	0.08
min	50	0.40	0.17	0.65	0.37	0.55
25%	59.4	0.65	0.25	22	2.18	0.72
50%	74.1	0.81	0.5	32	2.53	0.79
75%	97.3	0.95	0.83	56	3.45	0.87
max	176.5	2.65	3.67	105	5.26	1.24

Table 4.7.
Description of the dataset.

4.2.3.2. Patterns of integration of activities

When ordered by integration, activities show a pattern consistent with previous research conducted by Monteiro (1997), on the ordering of domestic activities by integration in Brazilian houses. In her study, Monteiro gathered space use data on 101 houses from 3 neighbourhoods in order to understand how different groups of activities reflected social and cultural concepts of spatial distribution within a dwelling. The neighbourhoods represented different spatial attributes

and social classes. The activities considered were defined based on a different set of studies, but a parallel can be drawn with those from the Survey to Urban Housing, as indicated in table 4.7. No correspondence exists for dating, washing the face, taking baths, making love, going for a stroll, drinking beer, shopping, doing special tasks. While playing with children was initially considered by Monteiro as an extended chore and watching tv as passive leisure, empirical data showed these were more often considered as interactive leisure.

	Survey on Urban Housing	**Monteiro (1997)**
private needs	1) sleeping	sleeping
extended chores	9) professional activity	working
	19) adults studying	
passive leisure	8) studying	studying
		reading
	17) particular permanence	listening to music
		watching tv
interactive/collective leisure	7) children's play	playing with children
	5) general permanence	chatting/watching tv
	16) young guests	
communal needs	6) adult guests	meeting with friends
	3) regular meals	having lunch
	18) weekend meals	dining
	19) special meals	
household chores	10) ironing	ironing
	15) sewing	
	12) drying clothes	washing clothes
	12) washing clothes	
	2) preparing meals	cooking/washing up

Table 4.8. Correspondence with activities identified by Monteiro (1997)

While differences are to be expected for studies carried out with different methodologies and

on different demographics, the results of the two, as shown in figure 4.6. and figure 4.7., present consistent similarities.

As in Monteiro, meals are the activities which take place in rooms with the highest average levels of integration. They are followed by general permanence, which takes place in the same relatively integrated rooms as the activities in Monteiro's study that would be encompassed by this more general term, such as watching tv, chatting and listening to music. Sleeping appears at the end of both charts, around the 0.8 integration mark.

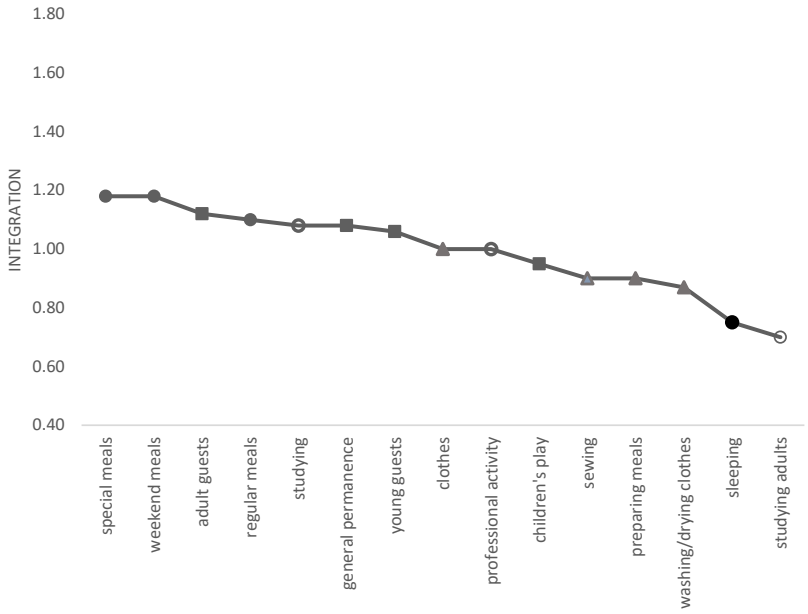


Figure 4.6. Activities ordered by mean integration values (Survey on Urban Housing)

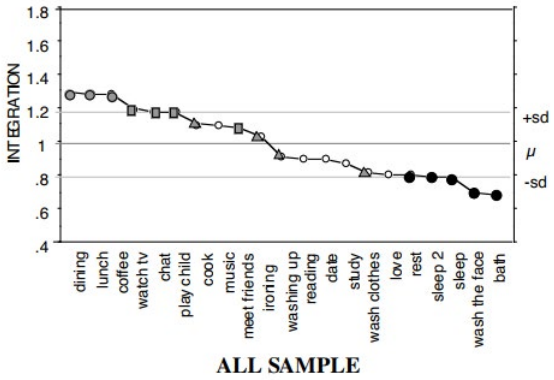


Figure 4.7. Activities ordered by mean integration values Circe Monteiro, Activity Analysis in Houses of Recife, Brazil, in Proceedings of the First Space Syntax Symposium, 1997, p.20.8, London

There is, however, a notable difference in the integration of cooking. Because cooking is a fixed activity, meaning it has to take place in a determined pre-equipped room, this seems to point more towards a difference between the Portuguese and Brazilian apartment layouts than it does to a question of choice of use. Another notable difference can be verified in the integration levels

of studying, which while one of the better-integrated activities in the Survey on Urban Housing, is at the lower end of Monteiro's integration chart. However, as Monteiro does not differentiate between studying and adults studying it is not possible to know the significance of this difference.

It is also worthy of note that while similarities between the Survey on Urban Housing data and Monteiro's research appear to be clear when the two samples are considered in their entirety, these do not hold up when the samples are divided according to socioeconomic class. While these correspond to different types of housing layouts in Monteiro, it has been shown in the previous chapter that no consistent spatial differences in lower, middle and upper-class apartments seem to exist in the Survey on Urban Housing apartment layouts. Without access to more detailed information than that provided by Monteiro (1997) regarding the socio-economic characteristics of the families in public housing, middle-class flats and middle-class housing, it is not possible to attempt an exact correspondence.

However, class differences do exist in the data that suggest that some of the variation in the way activities are distributed in apartments across samples may surpass spatial differences. An example of this is that while kitchens are not larger or more integrated in lower-class apartment schemes (cooking is one of the less integrated activities for this class), a larger variety of activities seem to be distributed between the living room and the kitchen (figure 4.9. on page 124). On the contrary, while kitchens are one of the most integrated labelled spaces in middle-class apartment layouts, these families seem to mostly use these spaces for those fixed activities that cannot take place anywhere else in the house. Instead, and similarly to upper-class families, activities with varying degrees of socialisation take place in less integrated living rooms and the bedrooms.

An ordering of average integration values may or may not translate into a consistent ordering of activities in each type of apartment. Table 4.9. suggests that a pattern exists for the activities of eating, sleeping and general and particular permanence. Sleeping shows consistently low values of integration, consistent with those verified for bedrooms, and tend to concentrate in the first quartile of integration in each apartment scheme. Meals and general permanence, which both often take place in living rooms, most often take place in the better integrated areas of the house.

	<1st quartile	1st-2nd quartile	2nd-3rd quartile	>3rd quartile	
sleep	66%	24%	9%	1%	100%
general permanence	23%	14%	15%	48%	100%
meals	26%	12%	9%	53%	100%
particular permanence	60%	24%	6%	10%	100%

Table 4.9. Percentage of activity counts per quartile of integration.

In parallel, there is a lack of correspondence between the average integration values of

labelled rooms and activities that is demonstrated in table 4.11.. While an activity like sleeping, which occurs with few exceptions in one type of labelled space, the values of integration associated with other activities seem to be independent of any particular type of room. This may be an indication that spatial characteristics are favoured over any specific label for the exercise of certain types of activities.

4.2.3.3. Patterns of Collective Use

a) Ways of Life

Regarding collective life, the reports published in 1984 (Pereira and Gago) indicate, as we have seen, an increase of the time spent at home at the expense of neighbourhood relations. In fact, according to results published in the book but not made available as workable data, only 30% of inquired families reported having mutual aid relationships with neighbours, and most indicated family and friends as their major extra-household relationships. House-guests were reported as being mainly family members, while the inquired families reported receiving friends at home "frequently" in 16% of cases, or "seldom" in 46% of cases.

At home, the growth of media like the television was expected to have an impact on family relations. If mass media was indeed gaining importance during the 1970s, only 55% of the inquired families regularly watched TV, while 87% listened to the radio. As these activities are not discretised in the Survey and fall under the umbrella of general permanence, it is not possible to evaluate their impact in the collective life of the family, or relate these results to differences in social class.

It was also indicated in the published book that the increase of free time spent at home might have an impact on the relationships established between parents and children. The published reports informed that children were often unsupervised at home. Only 53% of families reported surveillance at home, in which cases it is mainly performed by women. However, when performing activities outside of the house, this number rises to 82%. In these cases, surveillance is performed not only by women, but also by older siblings. Women remain the ones most in charge of children supervision, confirming the idea put forth by Portas (1969) that a visual connection between the kitchen - where women, as we will see, spend most of their time at home - and the exterior space of the neighbourhood, may facilitate this task, while simultaneously putting women in closer contact with their children.

b) General patterns of room use

In order to provide a first understanding of how household members use the spaces of the house, the mean percentage of total amount of times each household member is registered at home by type of labeled space was plotted in table 4.10..

ALL	WOMAN	MAN	SON	DAUGHTER	RELATIVE	EMPLOYEE

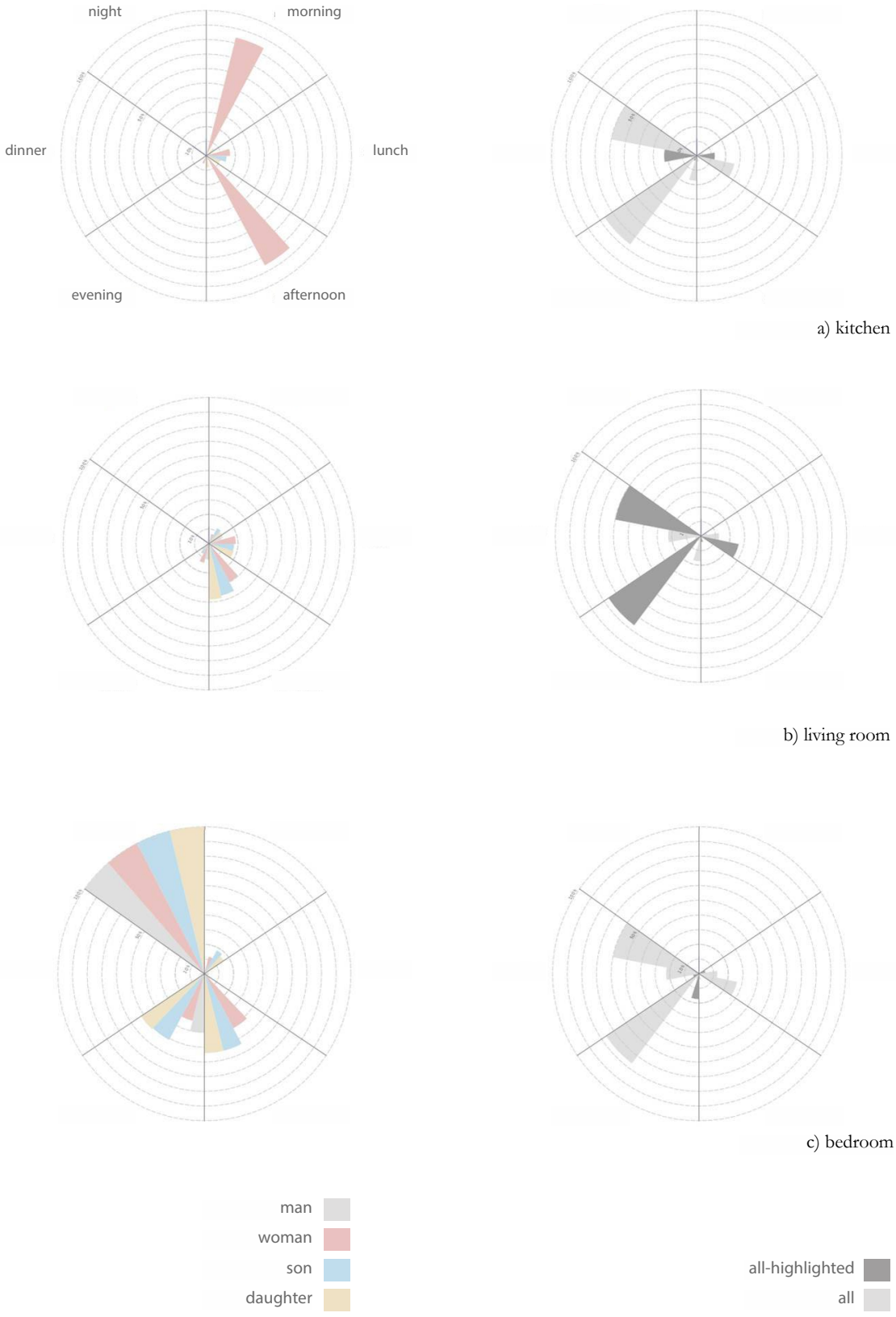


Figure 4.8.
Distribution of family members throughout the day for the three most common types of labeled spaces:

bedroom	11.74%	37.20%	78.65%	66.77%	67.56%	43.36%	28.39%
kitchen	15.76%	37.59%	3.27%	5.39%	6.87%	26.55%	48.39%
living room	67.85%	13.86%	16.34%	20.71%	20.41%	17.70%	2.58%
other space	4.50%	5.95%	1.31%	4.10%	2.58%	7.08%	19.35%
exterior space	0.16%	5.40%	0.44%	3.02%	2.58%	5.31%	1.29%
	100%	100%	100%	100%	100%	100%	100%

Table 4.10. percentage of total counts of each household member in each type labeled room

Here, it seems possible to identify three different categories of household use patterns: The first groups men and children, who are registed in bedrooms an average of two thirds to three-quarters of the time-slots when they are at home in, and less than one-fourth of it in living rooms. The second pertains to women, who follow a different pattern of household use from men and children. They divide their time at home mostly between bedrooms and kitchens, spending only a small amount of their time at home in the living room. It is also of note that only living-in relatives spend a considerate percentage of their time at home in kitchens apart from women. Similarly, it seems to have some social meaning that the difference of time-slots registed in the kitchen between sons and daughters is minor. The third group relates to when all household members are registered as being in the same labelled space in the same time slot, through the use of the "all" category. When families are registered as gathering together, two-thirds of occurences take place in living rooms, confirming the common-sense intuition that living rooms are the spaces of the house with the most potential for collective use. Kitchens, where meals may take place, and bedrooms, which may be seen as more private spaces, show similar results to each other.

A finer reading of the ways different household members use the spaces of the house is provided in figures 4.8..a, b and c, to which the element of time was added. These represent the distribution of family members throughout the day for the three most common types of labelled spaces: living rooms, bedrooms and kitchens. The grey charts, representing the mean percentage of the total amount of times the category "all" is counted in a living room by time-slot, further confirm this type of space's potential for collective use. It indicates that household members are most likely to gather collectively in living rooms than in any other type of space, and particularly during the evening and dinner-time. In smaller percentages, the "all" category is also registered in kitchens during meal-times, and in bedrooms during the evening. While the other categories of household members are not capable of providing information on co-presence due to the limitations explained in 4.2.1., it seems nonetheless noteworthy that when family members are registered individually, they are registered in bedrooms the majority of times (independently of time-slot), and less so in living rooms. Children are those who are more often registered individually in living rooms, as opposed to men, most registered in bedrooms, and women, who seem to spend most of their time at home in the kitchen. In this sense, while children and men appeared to have a similar pattern of room occupation when time-slots were not taken into account, this added layer of data



Figure 4.9.
Percentage of counts of activities in type of room for lower and upper lower-class (top), middle-class (middle) and upper-class families (bottom)

introduces apparent differences in the way these family members use the house.

A similar table to 4.10. was plotted in order to provide a first understanding of how activities are distributed across types of rooms: the percentage of total counts of each activity is registered in each type labelled room was plotted in table 4.11.. Here, again, different patterns could be identified according to the type of activity and type of room. Regarding activities or rooms with the most collective potential, two groups have been identified:

	SLEEP	PROFESSIONAL ACTIVITY	STUDYING ADULTS	STUDYING	ADULT GUESTS	YOUNG GUESTS	PARTICULAR PERMANENCE	GENERAL PERMANENCE	CHILDREN'S PLAY	REGULAR MEALS	WEEKEND MALS	SPECIAL MEALS	PREPARE MEALS	CLOTHES	WASH/DRY CLOTHES	SEWING
bedroom	93%	45%	50%	37%	20%	37%	81%	33%	55%	5%	9%	3%	0%	40%	2%	53%
kitchen	0%	0%	0%	8%	2%	1%	5%	5%	7%	27%	15%	1%	100%	17%	77%	6%
living room	4%	45%	50%	49%	75%	56%	12%	58%	26%	62%	70%	94%	0%	28%	3%	32%
other space	3%	0%	0%	5%	4%	5%	2%	5%	4%	6%	6%	2%	0%	14%	11%	9%
others	0%	10%	0%	1%	0%	0%	0%	0%	8%	0%	0%	0%	0%	1%	8%	0%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 4.11. percentage of total counts of each activity in each type labeled room

The first encompasses meals. As we have seen in figure 4.8., it is common for the "all" category to be registered in living rooms during dinner-time. Here, it seems to be further confirmed that meals take place mainly in living rooms. Additionally, meals seem to become less likely to take place in kitchens the less ordinary they are: while 27% of daily meals take place in the kitchen, only 15% of weekend meals do and only 1% of special meals. The previous figures provide information that may indicate that when the entire family is present during meal-time, this meal is more likely to take place in living rooms: the household member category "all" was seldom registered in kitchens; the same category was more often present in living rooms during dinner than during lunch; men are only home from the evening onwards (there being not enough data to know whether they spend less time than the woman at home when not at work); and children also seem to be more present from the afternoon onwards. It is also interesting that with only 3% to 9% of all types of meals being recorded in spaces labelled as bedrooms and 2% to 6% in spaces labelled as other spaces, this dataset doesn't seem to reflect Portas (1969) concern that many families gave up bedrooms in situations where livingrooms lacked privacy in order to have a formally defined place to display their dining furniture.

The second group of activities can be identified encompassing those that take place either in living rooms or bedrooms. These are mostly activities that take place during household member's

free time at home - as opposed to domestic chores - and that may assume varying levels with desired interaction with other family members. Some of these are tendentially individual activities, such as studying or working at home, others objectively social, such as receiving guests, and others, such as "permanence" - what one does in their free time - or playing, may be both. It is, in particular, non-determined collective or individual character of many of the activities that are part of this group that may tell us something about the collective life of the family, as well as the relationship between children and parents.

Considering that the data excludes cases of overcrowding, it is assumed that conditions exist in each household for activities that require a quiet environment to be conducted in such spaces. Therefore, for example, that in 57% of reported cases, children study in living rooms and kitchens rather than in bedrooms, may be more indicative of the relationship established with parents and their growing involvement in children's education, than of a lack of an adequately quiet place to work. If the simplification of table 4.11. does not provide enough data to know whether this choice is exclusionary (the same children either always study in the kitchen or always in the bedroom), it does indicate that a significant amount of studying is done in potentially collective areas of the house. It is also worthy of noting that professional activities and studying adults are also activities that are not predominantly registered in private spaces but are instead evenly divided between bedrooms and living rooms.

It was seen in table 4.10. and figure 4.8. that household members are more often registered in bedrooms than in social areas of the house, but that they are more likely to be registered as part of the "all" category in the latter. Table 4.11. shows that, while some individual activities take place in living rooms, bedrooms also gather a set of activities with social potential. It is exemplary of this that children seem to chose bedrooms as a place to play rather than living rooms and kitchens shared with their parents, that the large majority (81%) of activities of personal permanence (those activities that are carried on individually in one's free time at home) are registered in bedrooms, that only 58% of activities of general permanence (activities of a social nature) are recorded in living rooms and 5% in kitchens, while around a third were recorded in bedrooms.

In order to understand if some of these tendencies of space use may be related to class differences, figures 4.9a, b and c were plotted. In regards to what was observed before, it is interesting that individual activities such as adults studying or working from home are exclusively performed in bedrooms in upper-class households while remaining distributed between living rooms and bedrooms both in middle and lower classes. It is also of note that more activities that are not domestic chores are performed in kitchens in lower-class households than in the other classes.

c) Differences in patterns of room use according to spatial attributes

From this early description of patterns of room use, a set of questions was identified that seemed of particular interest to be further explored:

1) What are the spatial attributes of living rooms that gather the most variety of activities, of those that gather also individual or mainly social activities? Do these differ from those of living rooms that gather less?

2) What are the spatial attributes of living rooms that gather the most household members? Do these differ from those of living rooms that gather less?

In a first moment, this was approached by simple visualisation. A table was plotted representing the percentage of times each activity was registered in each room for each apartment scheme in the dataset and colour-coded in order to make it easy to identify where variation or concentration of the same types of activities may relate to the apartment scheme's configuration or other spatial properties. The same process was conducted in regards to the percentage of times each household member was registered in each room. While this type of visualisation is flawed for assigning more significant weight to apartment schemes used by a small number of households, it proved an important aid throughout the process of exploratory analysis.

It allowed to intuit, for example, that the number of activities performed in a living room may be connected to its area. Table 4.12. seems to support the hypothesis that a relationship may exist between the area of a living room and the number of activities, and particularly between the relative size of a living room (the percentage of the house occupied by this space) and the number of activities registered within it, as mean values of relative size do seem to grow steadily as activities add up. However, when activities are divided by type, this relationship seems to decrease.

number of activities	0	1	2	3	4	5	6	7	8	9
average relative size	10.67	12.12	13.29	14.57	13.33	17.46	18.96	20.52	20.23	21.97
number of social activities	0	1	2	3	4					
average relative size	12.07	14.12	18.72	15.86	17.21					
number of private activities	0	1	2	3						
average relative size	13.46	16.84	15.67	2.94						
number of chores	0	1	2	4						
average relative size	14.61	17.67	18.56	14.73						

Table 4.12.
Average room relative size per number of activities.

Similarly, when the same was attempted in regards to integration, as shown in table 4.13., no relation could be visually detected. As such, while, for example, social activities seem to be more likely to be registered in highly integrated spaces, the values of integration do not seem to have a significant impact on the number of social activities performed in one same living room. This result may indicate that while integration seems to have some impact on the type of activities that are performed in one same room, it does not necessarily have an impact on the number of activities.

number of activities	0	1	2	3	4	5	6	7	8	9
average integration	1.45	1.07	1.11	1.15	1.02	1.28	1.09	1.41	1.42	1.99
number of social activities	0	1	2	3	4					
average integration	1.06	1.18	1.26	1.15	1.39					
number of private activities	0	1	2	3						
average integration	1.12	1.23	1.04	0.77						
number of chores	0	1	2	4						
average integration	1.12	1.36	1.38	1.27						

Table 4.13. Average value of room integration per number of activities.

While area and integration seem to have, if any, a minor relation to the number of activities registered in living rooms, their connection to the other types of spaces in the house seems to have a more significant impact. The relationship between activities that can either take place in living rooms or bedrooms was explored as illustrated in table 4.14., which shows the percentage of time-slots where activities are registered in living rooms according to their depth from the nearest bedroom. The table, if preliminary, seems to indicate that the shallower the living room is from bedrooms, the more some types of activities are registered as taking place in it. The same seems to work in the opposite direction. Going back to Portas' (1969) concern with extra bedrooms being used as dining-rooms, it is worth noting that, while only 5.3% of all bedrooms were registered as being used for any kind of meal, this number rises to 20% in spaces that while labelled as bedrooms are both not used for sleeping and open directly to the living room.

depth from bedrooms	1	2	3
general permanence	72%	65.0%	52.0%
children's playing	18.75%	18%	11.80%
studying	60.40%	54.70%	55.90%
personal permanence	4.17%	1.44%	7.35%
clothes	45.80%	32.80%	15.40%

Table 4.14. Percentage of living rooms where certain activities take place according to depth from bedrooms.

When living rooms are located in between bedrooms and kitchens, making it impossible to go from one to the others without moving through them, the results seem to suggest that living rooms are more used by household members and also gather a more significant number of household members in the same time-slots. As can be seen in table 4.15., this is the clearest in regards to children, whose number of counts in living rooms doubles when this space is in between the kitchen and the bedrooms. While the amount of household members registered in the same space in the same time-slot is not, as we have seen, necessarily an indicator of co-presence, the values in table 4.15. are still worthy of note. In regards to all time-slots except for dinner, the amount of household members registered in the living room is largely higher when this space is located between the kitchen and the bedrooms.

location of living-room	woman	man	son	daughter	all
between kitchen and bedrooms	0.64	0.20	0.81	0.82	0.98
independent	0.41	0.18	0.40	0.38	0.64

Table 4.15. Average counts in living room per household member, where 0 represents no counts and 1 represents an average of one count per living room. Counts were summed across times of day and, as such, values may rise above 1.

location of living-room	morning	lunch	afternoon	evening
between kitchen and bedrooms	6.55%	20.78%	20.53%	23.28%
independent	2.90%	9.47%	13.14%	15.04%

Table 4.16. Mean percentage of family members counted in the living room per time slot.

When adding to the previous situation, the living room and kitchen are articulated - either through direct access or visual connection - household members are similarly more likely to be counted in these areas:

articulation kitchen/living room	morning	lunch	afternoon	evening
social pole	5.58%	15.13%	18.82%	19.62%
independent	2.38%	8.78%	10.49%	15.35%

Table 4.17. Percentage of household members counted in the living room when it is articulated to the kitchen or independent.

4.2.3.4. Patterns of Private Appropriation

a) Ways of life

We have seen in chapter 4.2.1. that the sample selected for the Survey excluded cases of overcrowding. The published reports indicate that 70% of the sampled families have 3 to 5 members and mostly consist of couples with children. 41% of households have 4 members (as should be indicated by the preponderance of 3 bedroom apartment schemes in the sample). 60% of the sampled families have 1 or 2 children. Of the entirety of sampled children, 43% are aged 7 to 14 years old, 21% 15 to 18 years old, 19% are over 18 years old, and 17% are younger than 7 years old. It seems that most school-aged children are in school, as 61% of children are students. 20% of them are student-workers and 10% perform a professional activity.

Nevertheless, around a quarter of inquired women reported feeling the need for larger spaces and that 59% of them feel the need for more rooms, in particular bedrooms (26%). In this sense, 38% of families made alterations to their houses in order to create more spaces (the configurational character of these alterations has been explored by Moreira and Serdoura, 2017). Additionally, almost every family (98%) reported feeling the need for a balcony or a small yard, where children could play and from where adults can enjoy the outdoors.

There is little information in the reports regarding which types of individual activities were performed by family members. The reports inform that most of the inquired families did not read books or magazines, although men frequently read the newspaper. It is also indicated that children are in most cases allowed to play everywhere in the house, with only 27% of families reporting imposing some limitations, which may suggest that children do choose to play in bedrooms, as seen in chapter 4.2.2.3..

b) General patterns of room use

The previous section has focused on spaces and activities that might be connected to patterns of interaction and co-presence between family members. This section will focus on how household members exist individually in the space of the house and, further on, on the spatial potential of apartment layouts to allow for privacy.

As we have seen in table 4.10., men and children spent, respectively, 79% and around 67% of their time at home in their bedrooms, while women only spent 37% of their time in the same type of spaces. If it is important to note that these percentages include the time spent in bedrooms at night, sleeping (which should account for 16.7% of these percentages), there remains a significant amount of time spent in bedrooms in opposition to more commonly social spaces of the house. In order to understand if this comes from a desire to be alone, two questions should be further explored: in which spaces did household members spend more time by themselves, and what kinds of activities were more often associated with which types of spaces?

		living room	kitchen	bedroom	total counts alone	total counts
morning	women	13	172	19	204	319
	men	4	0	0	4	8
	son	10	0	26	36	75
	daughter	9	0	19	28	75
lunch	women	2	7	2	11	106
	men	14	0	1	15	35
	son	2	2	1	5	73
	daughter	5	0	1	6	61
afternoon	women	38	173	59	270	443
	men	2	0	6	8	26
	son	22	0	44	66	190
	daughter	19	0	49	68	207
evening	women	12	12	23	47	147
	men	10	0	46	56	127
	son	5	1	69	75	129
	daughter	5	0	56	61	113
total	women	65	364	103	532	1015
	men	30	0	53	83	196
	son	39	3	140	182	467
	daughter	38	0	125	163	456

Table 4.18. Total counts of household members alone in a room.

Regarding the former, table 4.18. was constructed. It illustrates the number of times household members were registered as the only ones in a determined room during a determined time-slot and compares it to the total amount of times the same household members were registered as being

at home (either by themselves or in rooms where other members are also registered). Dinner-time, for the small number of counts outside of the category "all" and night-time, for concerning mainly the activity of sleeping, were not included in the table. The first thing that stands out is that family members were registered as being the only ones in a room during a time-slot a large number of times. Women were registered as being alone in rooms more than half of the times they were registered at home, and other household members appeared alone between 35.7% of times (daughters) and 42.3% of times (men). The table also confirms a series of observations from figure 4.8. regarding the distribution of household members in the house throughout the day, adding a new layer of information.

When the two are read in articulation, it seems to be possible to form an idea of how household members move around the house during the day. Children and men are not often registered at home during the morning and lunch-time when men are likely to be at work and children in school. When at home in the morning, they are more often in bedrooms. These are where children are more often registered alone. Women are registered at home throughout the day, in particular in the morning and the afternoon. Again, due to the character of the "all" category, women may be equally present at home throughout the day. During these periods, they are mainly registered as being in the kitchen, often by themselves. In the afternoon and evening, when children and men start being registered as being at home, they are more often counted individually (not as a part of "all") in bedrooms. These are the spaces and time-slots where children are more often counted as being alone, although the increase of the "all" category in living rooms during the evening may suggest that bedrooms are where they choose to be alone, whereas living rooms is where they choose to be with others, in particular in regards to this time-slot. The difference between time spent alone in a bedroom or a living room is considerably lower for men than for children. Even though most of the time women are registered by themselves in kitchens, they are also counted as being the only household members in living rooms and bedrooms, in particular during the afternoon.

Regarding how activities are distributed across spaces, we must go back to table 4.11., where it was observed that there does not exist a clear distinction between individual and social activities in regards to the types of rooms where they take place. It was noted, for example, that children often seem to choose to study in living rooms and kitchens rather than in bedrooms, while however choosing to play in bedrooms. Similarly, it was also seen that while activities of general permanence (of a social nature) are most often recorded in living rooms, they are also recorded in bedrooms a significant amount of times. Now, looking specifically at the types of activities performed in bedrooms, the idea that this distinction is not clear is further confirmed: 80.4% of bedrooms are used for sleeping in - a mostly private activity, benefiting from isolation and quiet, 23.9% of them are used for studying - a similarly individual activity that may benefit from the same sort of qualities, and 30.9% are used for particular permanence - a general umbrella encompassing individual leisure activities. However, potentially social activities are also present:

41.4% of bedrooms are used for playing by children, 19.8% for general permanence, and 19.2% for receiving guests.

c) Differences in patterns of room use according to spatial attributes

Even though the data do not present a clear distinction in the types of rooms where individual and collective activities take place, we have seen in chapter 4.2.3.2. that activities in the dataset seem to connect to spaces with integration values in a determined pattern, which has also been verified in Monteiro (2007). In that chapter, we have seen that social activities tend to be on average associated with the most integrated spaces in their layouts. However, while eating-related activities and receiving adult guests (an activity which often takes place during dinner) are the most integrated, these are followed by studying and only then by general permanence and receiving young guests. These activities of a more social character were followed by domestic tasks and then, at the bottom of the chart, by sleeping. When household members are similarly organised by integration, as illustrated in figure 4.10. and table 4.19., there does not appear to exist a similarly consistent pattern of integration values as that observed for activities.

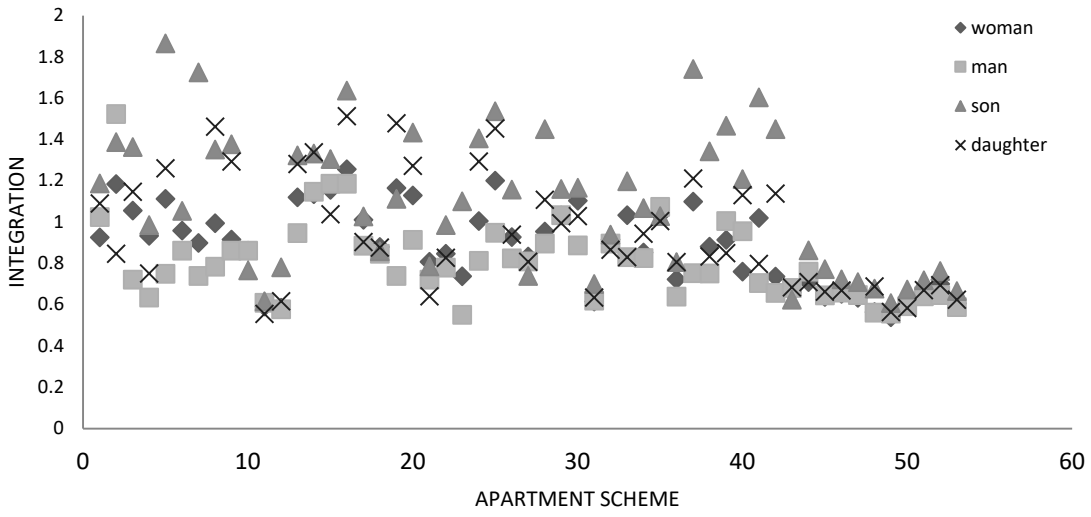


Figure 4.10. Average integration of spaces where household members are registered.

	<1st quartile	1st-2nd quartile	2nd-3rd quartile	>3rd quartile	
man	25%	13%	9%	53%	100%
woman	40%	12%	18%	30%	100%
son	43%	12%	9%	36%	100%
daughter	32%	12%	15%	41%	100%

Table 4.19. Percentage of time spent in spaces per quartiles of integration in each apartment-scheme.

Women appear to spend more time in the less integrated spaces of the house than men, which may be supported by the fact that women perform domestic tasks in kitchens. It was also verified

that, during the night time-slot, both men and women tend to score below average integration. In order to explore this result, the total of 803 bedrooms in the dataset was divided in bedrooms belonging to parents (240), children (398) (sons (218) or daughters (196)), or others (195), according to which family members were recorded as using each of those labelled spaces during the night time-slot. Then, for each category in each household, the mean values of integration, area and depth from the exterior were calculated, as is illustrated by table 4.20.. These preliminary results seem to indicate that spatial attributes may have some impact on how bedrooms are attributed to family members. It seems, for example, that parents' bedrooms may be deeper from the exterior and larger than children's.

	average bedroom	other bedrooms	children's bedrooms	parents bedrooms
area	9.06	8.09	8.92	10.17
integration	0.75	0.71	0.77	0.74
depth from the exterior	3.93	3.62	3.96	4.12
sum of activities	2.49	2.03	2.9	2.14

Table 4.20.
Mean spatial attributes of bedrooms according to type of occupant.

The activity of sleeping (paralleled only by the activity of special meals) establishes the most consistent activity-labelled space relationship and was recorded in 93% of times in spaces labelled as bedrooms. However, while sleeping mostly takes place in bedrooms, there are 19.6% of bedrooms in the totality of households in the dataset that are not assigned to household members and do not accommodate that activity. Smaller rooms that are shallower from the living room tend not to be used as bedrooms. Of those opening directly to living rooms only 69% are used to sleep in, while when two topological steps away from a living room 78% of the cases are used as traditional bedrooms, and when three steps away 90% are used as bedrooms. The same relationship seems to be established between bedrooms and entrance areas. When one topological step away from the entrance, only 57% of rooms are used to sleep in, when two steps away only 66%, when 3 steps away 71.4%, with the percentage continuing to grow until the case of bedrooms located six topological steps away from the entrance (the deepest bedrooms in the dataset). Due to the usual proximity between livingrooms and entrance areas, this result does not make it possible to know whether either or both have an impact on the way bedrooms are used.

The labelled bedrooms that do not effectively function as bedrooms are most often used during the afternoon and evening, the same periods when household members are more often signaled as being in bedrooms (as verified in figure 4.8.). In 48% of cases these labeled bedrooms are used by women and, in 35% of cases, by children. Table 4.21. was plotted in order to explore what kind of activities are registered in these labelled bedrooms, according to whether they are actual bedrooms or not. Some activities seem to be fairly incompatible with spaces where people sleep, such as meal-related activities, or social activities such as receiving guests of those pertaining

to general permanence. Rooms where professional activities take place also seem likely be turned into offices, as they are much more often registered in rooms where sleeping doesn't take place. Contrarily, some activities seem to be complementary. Playing is not only registered mainly in bedrooms (over collective labelled spaces), as it is registered more often in bedrooms where people sleep. Similarly, particular permanence is also more often registered in these types of spaces.

	registered sleeping	did not register sleeping
regular meals	0.15	8.92
special meals	0.62	2.55
weekend meals	1.08	7.64
general permanence	14.86	40.13
adult guests	8.98	15.29
young guests	8.67	10.19
children's play	46.9	18.47
personal permanence	35.6	11.47
studying	23.07	27.39
professional activity	1.86	7.64
clothes	16.87	58.6

Table 4.21. Percentage of times activities are counted in bedrooms where the activity of sleeping has been registered or not.

The data also seem to suggest that the relationship between bedrooms and the main social space of the house, the living room, may have an impact on the kind of activities that take place in the first. For example, while we have seen that it is uncommon for bedrooms to be used for meals, the number of times meals are registering as taking place in bedrooms does seem increase when these are not used to sleep in, and are one or two steps away from the living room. Regarding bedrooms that are actually used to sleep in, it seems like the data may indicate that general permanence in these areas decrease as the rooms become deeper from the living room and that, conversely, particular permanence increases as depth from the living room increases as well.

4.2.3.5. Organisation of Women's Life at Home

a) Ways of life

The final reports of the Survey indicated that only 20% of the inquired women undertook a professional activity outside of the home. Of these, 80% indicated financial reasons as a motivation for working and 7% indicated they worked in order to guarantee the family's future. Only around 10% indicated motivations of personal professional accomplishment, and less than 5%

indicated financial independence from their husbands or mental hygiene as reasons to maintain a professional activity. However, it was seen in figure 4.4. that lower class families had a smaller percentage of working women than middle and upper-class families. As only the man's income was considered in defining the socioeconomic character of families, it cannot be said that these middle and upper-class families are wealthier because women work. As such, even though financial reasons are the most common for women to work, the percentage of women who do only reaches around 14% to 19% in the lower classes, and raises to 26% to 33% in middle and upper class families.

At home, the study indicates that women are the main responsible for 68% to 82% of domestic chores. Around 35% of households have a hired housekeeper, and children help with only 5% to 16% of domestic work. In this dataset, neither men nor other living-in relatives contribute significantly to domestic tasks. It is not possible, with the available data, to know whether these percentages vary across class, or according to whether or not women hold a professional activity.

These two aspects of women life easily explain why women are the members of the household who consistently spend the most amount of time at home. In general, women are signaled as being at home in the morning in around 85% of cases, 45% during lunch, 80% in the evening, 5% during dinner and 100% at night. It is reasonable to assume that during the evening and dinner-time, women would count as part of the 'all' category (which is reported as existing in 80% of both time-slots), leaving only lunch-time as a time-slot when it is not certain whether women are at home or not.

b) General patterns of room use

It has been repeatedly shown in the previous points that women display patterns of house-use that are substantially different from those of men and children, which are more similar between themselves. Women divide their time at home between the bedroom and the kitchen, presenting a smaller percentage of time spent in the living room than children, but fairly close to that of men. The same is verified regarding their presence in the living room during the different time-slots, where their presence seems to be very similar to that of children. This may indicate that it is during the day, when men are at work and children in school, that women spend most of their time in the kitchen and bedrooms, as was supported by table 4.18. (page 130.), which shows that it is during the morning and afternoon that women spend more time alone, 35.9% of which in the kitchen. This is also further supported by table 4.22., which illustrates the percentage of households where women are registered as being in the kitchen during the different time-slots, considering whether or not they hold a professional activity. It is particularly telling that women who work professionally from home are counted almost half the time in kitchens as women who don't work. The results pertaining to women who work outside of the house, due to very small representation in the dataset, as well as the convergence of kitchen-use in the small sample of

working women, cannot be reliably interpreted.

Table 4.22. Percentage of woman counts that take place in kitchens, according to women's occupation

	morning counts in KT	lunch counts in KT	afternoon counts in KT	evening counts in KT	dinner counts in KT	total counts in KT
does not work	93.62%	20.74%	92.02%	5.32%	1.06%	42.55%
works at home	46.81%	2.13%	65.96%	8.51%	0.00%	24.68%
works outside	100.00%	0.00%	100.00%	0.00%	0.00%	40%

Living-in relatives are the only other type of household members that spend a considerate percentage of their time at home in kitchens. Even though they were not added to all graphs and tables due to their small representation in the dataset, these are often retired parents of the main couple, and spend a great amount of time at home. However, as it was indicated before, living-in relatives don't offer any significant help in domestic chores.

Table 4.9. (page 120) showed that the kitchen, for its fixed feature elements, necessarily concentrated activities such as meal preparation and washing and drying clothes. The table also showed that meals are more likely to take place in living rooms, with some instances of daily or weekend meals taking place in kitchens. Activities with social potential are uncommon in kitchens: 21% of these spaces register studying - a mostly individual activity that may be conducted with the help or company of others, only 10% register general permanence, 8.2% playing and 2.5% personal permanence. Other, non fixed-function domestic chores such as those pertaining to the treatment of clothes, almost exclusively carried out by women, are registered in bedrooms 40% to 53% of times, and around 30% of times in living rooms. The data seem to suggest, then, that not only are social activities not common in the kitchen, but domestic tasks are also not very common in social areas.

Here, as seen in figure 4.9. (page 124), it seems possible that class plays a role in the way these activities are distributed. The kitchen, in general, seems to be used for a wider variety of activities in lower class households than in other classes. Even though kitchens are not larger or more integrated in lower class apartments (as seen in 4.2.3.2., cooking is one of the less integrated activities for this class), activities with potential for socialization or co-presence such as studying, receiving guests or general permanence, only take place in kitchens in lower class households. Simultaneously, domestic work such as that pertaining to the treatment of clothes, seems to take place more often in living rooms in this class than in the others. On the contrary, while cooking is one of the better integrated activities for middle class families, these seem to mostly use the kitchen for those fixed activities that can't take place anywhere else in the house Instead, as in upper class families, activities with varying degrees of socialisation, take place between the living room and the bedrooms.

c) Differences in patterns of room use according to spatial attributes

The data presented so far regarding women's use of the space of the house seem to indicate three aspects to take into further examination: that women are the ones in charge of household work; that these activities are mainly registered in kitchens and bedrooms; that they spend most of their time at home alone in the kitchen, while also being registered in living rooms during the same time-slots as children and men.

Regarding the types of spaces more likely to be used by women for domestic work, we have seen in table 4.11. (page 125) that activities related to the treatment of clothes were more often registered in living rooms that are one step away from the nearest bedroom, while also being more often registered in bedrooms that are not used for sleeping - usually the shallower and smaller rooms in the house. However, table 4.14. (page 128) shows fairly inconclusive results in regards to the existence of any relation between depth and the use of bedrooms for domestic tasks: while the amount of times these activities are counted in bedrooms does seem to decline as depth from the exterior increases, this is not a linear relationship, with 43% of bedrooms 3 steps away from the exterior being used for treating clothes, while only 27% of rooms 2 steps away from the exterior are used in the same way. However, we have seen in chapter 4.2.2. that domestic chores are usually associated to mid-values of integration, and in figure 4.10. (page 132) that women are often signaled in less integrated spaces. Table 4.23. suggests that this may be countered by the integration of the living room, as it shows that slightly higher values of integration are associated to a larger number of household activities being registered in the same living room.

number of domestic tasks	**0**	**1**	**2**	**3**
integration of the living room	1.11	1.36	1.38	1.27

Table 4.23. Integration of the living room per number of domestic tasks eprformed in that room.

Regarding the integration of women with other family members, it has been shown in table 4.15. (page 125) that women (and children, to an even larger extent) are more present in living rooms when these are located in between the bedrooms and the kitchen in such a way that it is not possible to move from the first to the second without going through the living room. The same is not verified in the inverse relation, and family members do not seem to be more or less present in kitchens regardless of this configuration. Similarly, the results seem to suggest that the placement of the kitchen, its area and its configurational properties don't have but minor implications on the number of family members that use it.

4.3. Preliminary Findings and Conclusions

When the Portuguese Laboratory of Civil Engineering started experimenting with methods for relating empirical data with spatial attributes in the late 1960s, it aimed not only at understanding how families lived the domestic space and so facilitate the development of housing adapted to a transforming society, but also at providing architects with tools that should make it possible to confront their objectives with the potential outcomes of their work. Even though the analysis of the Survey on Urban Housing was not explored as far as ideally intended at the time, it proved that an analysis not taking into account extensive spatial attributes was already capable of giving clues of the way families lived. The preliminary results presented throughout this chapter seem to suggest that taking the analysis further may indeed tell us something about the relationship between the configuration of spaces and the ways families use them.

The work of analysis developed in the scope of this dissertation had the intention of providing an empirical basis for constructing an understanding of the familiar dynamics and types of space use of Portuguese families in the 1970s, which may further inform the analysis of the case study, within a set of limits imposed by the dataset itself, such as a small sample and ambiguous variables. Nevertheless, the analysis conducted seemed capable of finding relationships, some of them transversal across different cultures, between spatial attributes of apartment layouts and the domestic activities conducted by families, that are indicative of patterns of space use associated with those questions that concerned social housing development at the time the Survey was conducted:

Factors contributing to sociability in the household:

Living rooms, for their capacity for functioning as spaces of reunion and co-presence, appeared as likely spaces of sociability in the household. However, while these were the spaces where family-members were the most registered in the same time-slot, as well as those most often used for the reunion of the entire family, bedrooms were as often preferred spaces for activities with social potential. As these also appeared to be spaces more likely for individual use, the type of sociability in the household seemed to be reflected both in the amount and frequency of inherently social activities, as well as the social or individual character of activities such as meals, studying or children's play. It was seen that the inherently collective activity general permanence was the most often registered in highly integrated spaces, and that the centrality type of the house being functional (and in particular when the most integrated space was the living room) might be conductive to more types of activities being registered in living rooms. No other syntactic attributes were possible to be identified as having a significant impact on the amount or type of activities taking place in living rooms, and area and the relative size of the room were suggested to have only a minor relation to the amount of activities registered in this type of space. However, the analysis

suggested that when living rooms are mandatory through-spaces between bedrooms and kitchens or the exterior they are more likely to be used in moments where the whole family is at home, as well as increasing the amount of time spent in them by women. Similarly, the existence of a social pole including a kitchen and a living room might be conductive of more family members spending time in living rooms. However, because these two situations can often be verified simultaneously, it may be that only one or the other have an actual effect, or that it might depend on a combination of the two.

Factors contributing to the possibility of privacy between family members:

The apartments in the Survey's dataset exclude cases of overcrowding. As such, each household has as many members as the number of bedrooms of their apartment scheme, plus one or two. According to the data regarding house use, this by itself seems to be enough for providing the potential for household members, in particular children, choosing to be alone. In fact, all family members are registered as being the only ones in a room in a large amount of time-slots. Children are those who are registered alone in less time-slots, and seem to spend most of that alone time in their bedrooms. In general, they are also often registered in living rooms, which, in articulation with the indication by the majority of inquired families that no impositions are made regarding where children may and may not play, may be an indication that being alone or not is a choice they are allowed to make. Simultaneously, children's bedrooms seem to be better integrated than those of parents, which may perhaps justify an easy coming and going from bedrooms to living rooms, and create a feeling of closeness to the rest of the house when in their bedrooms.

Men, while spending less time at home, are more likely to spend it by themselves than children, and, curiously, are similarly likely to be alone in bedrooms as they are in the living room. That being alone may be a choice for these family members seem to be further suggested by the fact that bedrooms (the type of space where men and children are more likely to be counted as being alone) are not exclusively individual spaces. In particular children's bedrooms often register potentially or inherently collective activities.

Women, like in other situations, display a different pattern from those of children and men when it comes to being alone. They are the family members who are registered alone in more time-slots, and are more often registered alone in kitchens. This suggests that women are often alone, regardless of their preference, because they have to: they are forcibly alone when men are at work and children are at school, and they are often alone in kitchens because they are solely responsible for housework in the great majority of cases. However, when apartment layouts have extra rooms, allowing them not to be used as bedrooms, these are often used by women and children. Clothes related activities (including sewing) are the most common in this type of room, followed by general permanence and then studying, which may indicate that these may function as secondary living rooms, directed to certain activities that may bring women and children together.

Factors contributing specifically to woman's integration or segregation:

Similarly, the differences in the pattern of house use verified in women in relation to other family members should be further explored if the forms of their segregation in the household are to be understood. The Survey showed them spending a much higher percentage of the day at home in relation to men and children and, shown in the data to be singlehandedly in charge of all household work, this time was consistently spent in kitchens. Even though the data suggested that women spent a similar amount of time in living rooms as other family members during the times of the day men and children were at home, the data, as we have seen, is ambiguous in relation to what the count of family members in rooms actually means. Furthermore, as they were registered as being in different spaces during the same time-slot, it may be assumed that women's time is living rooms is split with time spent in other spaces. As such, it is still likely that women performed activities like preparing meals during these time-slots, and is consequently important to focus on the integration of kitchens, as well as on the type of relationship established with the other spaces of the house.

Contrarily to livingrooms, the area and integration values of kitchens seem to relate positively, if having a minor impact, to the number of activities taking place in the kitchen, but none to the amount of family members who regularly used it. In fact, as the activities most affected by this variance were those related to domestic work, an increase in activity number has no significant relation to the kitchen's role as a space of reunion or co-presence, meaning instead that women are likely perform most chores in kitchens in opposition to bedrooms – where children may be playing or studying – or living rooms – where the whole family does assorted activities. As no spatial attributes or relations established with specific types of room could be found that related to more counts of other family members in kitchens, the data seems to suggest, as women have been verified to make most of their appearances in the kitchen, that the only factors contributing to their integration with other household members would have been either the direct connection of living rooms and kitchens, which may result in a larger amount of times women are signaled in living rooms, or the visual opening of kitchens and living rooms, allowing for women to more easily interact with other household members.

4.3.1. FUTURE WORK

The Survey on Urban Housing (Pereira & Gago, 1986) constitutes, even today, one rare example, in Portugal, of an exhaustive sociological field survey of great relevance for the disciplinary field of architecture. Furthermore, its analysis in the scope of this dissertation was preliminary, as its role within the research was of informing the interpretation of the case study. With respect to a different population, this role was limited. These preliminary results have provided some information on the ways of life of families in the 1970s, that is supported by other research conducted during that period. They were also able to demonstrate that, to some extent, spatial and configurational attributes have an impact in the way houses and rooms are used by the family and types of family members.

As such, the dataset appears to have the potential for further examination, and its broad availability should be useful for future research. In that sense, the data gathered and systematised for this dissertation is being reorganised in a database that will simplify its reading[38]. This project should follow by contacting the LNEC in an effort to make an organised set of data available for future investigation. The complete set of information for 279 households was organised in the relational scheme shown in figure 4.11.:

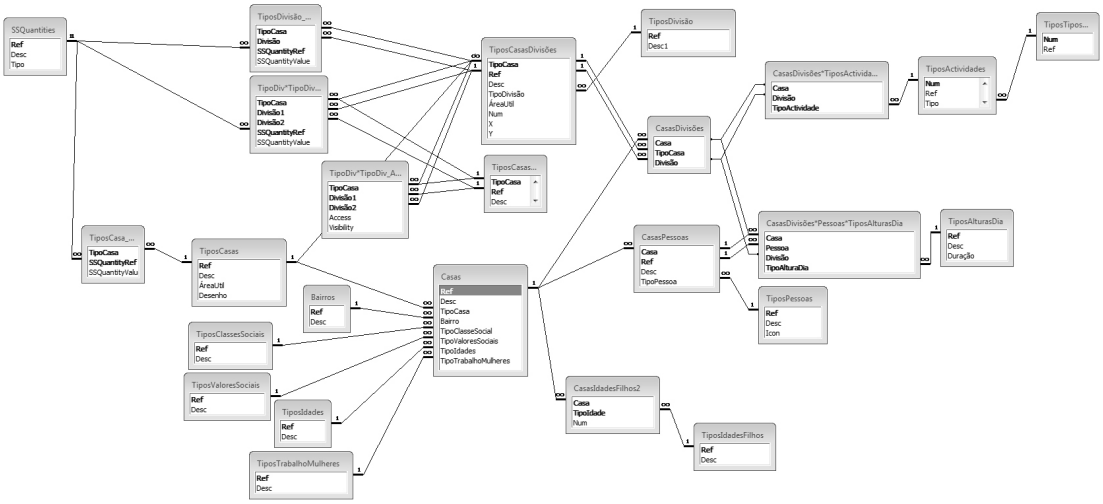


Figure 4.11.
Relational skill of the working database for the Survey on Urban Housing

As it has been seen, the work of the Survey was conducted throughout several years, predictably by several researchers, and, as such, there is some lack of consistency in the criteria of annotations in the documents. These inconsistencies were only corrected when mistakes were clear and, if some assumptions had to be made regarding, for example, the meaning of the "all" category during the process of analysis, data was digitised as closely as possible to the Survey. This should allow future researchers to make their own reading of the data and its process of development.

38 This work is being conducted with the invaluable support of Franklim Morais at LIA-ESAP.



Figure 4.12.
Working form for consulting information regarding house-use for a household in Olivais Norte.

5. THE SPATIAL ROLE OF HOUSING DEVELOPMENT IN CAPITALISM

Introduction

In chapter 2 we have defined the lens through which we will look at the proposed problem. It was seen that to look at social housing is to look at which class interests are expressed in state intervention and to look at which system of social relations it seeks to maintain. So while the main object of this thesis is the set of public-funded housing neighbourhoods built in Porto between 1969 and 1982, these static architectural concretisations will be contextualised in a process of urbanisation in the Harvey-an sense of the word (Harvey, 1985): a process which depends on a series of interconnected factors, such as the circulation of capital, the changes in labour-power, the spatial organisation of production, and others. Contructed over a short period of time, these neighbourhoods were all the result of decades of planning, discussion and struggle, as well as of social evolution and shifts in social forces. If, as we have previously seen, housing is always the product of the social struggle between classes and within capital, then it is essential to understand when, why, by whom, for whom these public housing programmes and housing projects were developed. Similarly, it is not possible to study the relationship between housing and the use of space by looking at architecture in a void. If, as Space Syntax has demonstrated for decades, space does have properties which impact on patterns of movement, encounter and avoidance, these patterns gain social meaning when they are located in a place and in a time, which are themselves in continuous transformation.

This chapter will briefly explore authors whose work examines the social processes that result in and of public housing development in capitalist societies. The role played by the spatial attributes of housing in the organisation of adequate social relations will be integrated into the theoretical framework developed in chapter 2. By combining this model with the set of methods examined in chapter 3, this chapter investigates the spatial mechanisms through which housing functions as a mechanism of social differentiation. Segregation, othering, hierarchisation, domestication and adaptability will be defined as concepts that are simultaneously social and spatial, that will serve as a basis for the interpretation of spatial data on public housing developments in Part III of this dissertation.

5.1. HOUSING PRODUCTION IN CAPITALISM

It is outside of the scope of this dissertation to explore the intricacies of capitalist development and state intervention. Nevertheless, it should be addressed how the state's intervention in matters of housing connects to the theoretical framework developed in chapter 2. It was seen there that every society's existence is dependent on its capacity for the maintenance of labour-power, by assuring the conditions both for its reproduction and for the reproduction of the social relations of production. It was then elaborated how space's role is recursive: it is both a product of society's existing social relations and, by organising human activity and so actively interfering in social practices, a means for their reproduction. The house was then mentioned not only as a necessary component for the reproduction of labour but also as a privileged form of man-produced space for the reproduction of social relations, being seen by Lefebvre (1974), Gros (1982), Harvey (1989), Bourdieu (2000), and others as a primary classifying device in capitalist society.

Housing is not a commodity like all others, but a problem that must be resolved for the proper functioning of a society. However, in capitalist societies, housing is also a field of contradiction (Gros, 1982, Harvey, 1985a, 1985b, 1989). Opposing developers' need to make land profitable by increasing prices and so construction costs, is the industrial capital's need for productive workers and accessible rents, in order for wages to be kept low. When this contradiction pends in favour of landowners to the point of jeopardising the reproduction of labour, the conflict is often resolved by forces that are exterior to the market. In these cases, Harvey (1989, p.66) explains that :

> […] capitalists are forced to some degree to constitute themselves as a class - usually through the agency of the state - and thereby to find ways to channel investment into research and development and into the quantitative and qualitative improvement of labor power.

As a planner, the capitalist state has a determinant role in the stabilisation of the economy, the creation of the necessary conditions for balanced growth and accumulation, and the containment of civil disorder and struggle between groups (Harvey, 1989). Consequently, it is not abnormal that, in determined moments - connected, for example, to public investment after an economic crisis in order to favour economic growth - the dominant classes invest on housing as one of the necessary structures for capitalist development, productive and profitable. A product of social struggle, both between capital and the populations that need houses to live in, and between the different factions of capital, housing is a product and a reflection of these social relations, which determine and are reflected in the way housing works as a mechanism of differentiation and classification in each given society.

Harvey (1989, p.66) systematises this question by dividing the

> wide range of social expenditures that relate primarily to the process of reproduction of labor power […] into investments directed toward the qualitative improvement of labor power from the standpoint of capital (investment in education and health by means of which the capacity of the laborers to engage in the work process will be enhanced) and investments in cooptation, integration and repression of the labor force by ideological, military and other means.

Housing is an investment that inherently fits into both. Its provision in adequate conditions is likely to both raise labour productivity and prevent the need to raise wages. However, as we have seen, the reproduction of labour does not depend solely on the reproduction of its conditions of existence, but also on the reproduction of the conditions for its reproduction through the reproduction of social relations. A reading of Harvey (1985a, 1985b, 1989) and Gros (1982) suggests that housing is one of the mechanisms for this reproduction in three different ways. Firstly, it is used as an instrument to organises groups and classes in the city, materialising capitalist social and technical division on space and contributing for its reproduction. It is mechanism to organise classes, groups and individuals at different spatial and social scales: the city, the neighbourhood and the house. By creating residential differentiation (Harvey, 1985a, 1985b, 1989), housing works as a classifying device. It can be used to privilege or hinder certain interactions, foster communities and solidarities or work towards furthering segregations. Secondly, it often is the privileged space for the reproduction of the family as an ideological institution. When reinforcing its role as an element of individualisation is the possibility of access to private property, it results in a systematic financial effort for the acquisition of the latter (Gros, 1982), as well as a concentration of investment and domestication of people's projects (Bourdieu, 2000). Thirdly, and consequently, being an object that can be owned, housing reinforces the legal value of private property. Becoming a commodity dominant in people's aspirations, "[housing] plays an important role in the involvement of the dominated classes in a network of dependencies" (Gros, 1982, p.17)[14] convenient to the dominant class.

Chapter 2 of this dissertation proposed that how space is produced says something about the context that produced it, and the social relations that it aims at reproducing. It was also proposed that, to the extent to which it does, it is through the organisation of human interaction in space that architecture, the product of social relations, has the capacity of acting towards their reproduction. While there will not be an attempt to quantify these processes, they can be systematised in spatial concepts that relate to the points above.

5.2. THE SPATIAL PROPERTIES OF HOUSING POTENTIAL FOR CLASSIFICATION, SEGREGATION, OTHERING AND HIERARCHISATION

Class differentiation

Harvey defines class differentiation in space as a residual force reflecting the social relations in a preceding mode of production. In this sense, it is arguable that, to some extent, all housing is an instrument to produce or reinforce class differentiation. By classifying groups according to their performance in the real estate market, it determines who has access to what parts of the city. Specifically, the classifying role of public housing is particularly clear, in that it groups the most impoverished families in the same space. By eliminating the appearance of choice of the real estate market, public housing constitutes a fixed space for parts of the working class within the city according to the social relations and power balance of the society that produced it.

If all public housing estates have a classifying role in the city, what the three following points explore is, then, how these housing developments respond to Harvey's hypothesis of residential differentiation (Harvey 1985a, p.118):

> 1. Residential differentiation is to be interpreted in terms of the reproduction of the social relations within capitalist society
>
> 2. Residential areas (neighborhoods, communities) provide distinctive milieus for social interaction from which individuals to a considerable degree derive their values, expectations, consumption habits, market capacities, and states of consciousness.
>
> 3. The fragmentation of large concentrations of population into distinctive communities serves to fragment class-consciousness in the Marxian sense and thereby frustrates the transformation from capitalism to socialism through class struggle, but
>
> 4. Patterns of residential differentiation reflect and incorporate many of the contradictions in capitalist society; the processes creating and sustaining them are consequently the locus of instability and contradiction.

Segregation

Segregation appears in this context as a spatial mechanism for the concretisation of hypothesis 3. It is defined by Marcuse (2001) as a "process by which a population group is forced to cluster in a defined spatial area", which he defines as a ghetto, which is opposed to an enclave, "area of spatial concentration in which members of a particular population group congregate as a means of protecting and enhancing their economic, social, political and/or cultural development". This

goes in line with Vaughan et al.'s (2010, 2013) argument that areas of the city that are seen as ghettos, with the social implications that word carries, are often clusters, which have been shown to have the capacity to be beneficial to their residents. Both Marcuse's (2001) definition of ghetto as an "area of spatial concentration used by forces within the dominant society to separate and limit a particular group, held to be and treated as inferior by the dominant society" and Vaughanet al.'s (2010, p.2) definition of clustering as "part of a natural process of acculturation and integration" are associated with processes of racial and ethnic exclusion and inclusion in the city. However, the distinction also seems appropriate when dealing with class integration in the city, a process, as Vaughan et al. (2010) also note, often as likely to be translated in distinct spatial patterns.

In this sense, segregation will be understood as a spatial process resulting in the separation of a determined group of people - in this case, more defined by class than other social characteristics - from the main spatial and social fabric of the city. In order to understand segregation, the following question is asked in regards to each housing programme in place in Porto between 1969 and 1974: Do their developments encourage or hinder articulation of their residents with the city? Locally, this may be understood through measures of the relation between housing estates and the surrounding city, such as local integration, separation index, mean depth from the exterior, and through the functional aspects of that relation, such as the existence of public or collective fixed-function spaces outside the estate but in its whereabouts. Globally, whether systems of activities exterior to the estate are encouraged or not may be related to global measures of integration and choice.

Othering

The concept of othering is introduced as segregation seen from the eyes of strangers. It is intended to explore whether housing estates are seen as ghettos - this being supported by the superstructural idea in people's minds of what a ghetto is - or whether these spaces are more likely to be understood by non-residents as integrating parts of the urban fabric. A part of housing estates' othering has to do with people being able to identify them as housing estates, that is, as clusters of working-class families. Much of this has to do with what housing estates look like in the popular imaginary, and is often connected to extra-syntactic characteristics such as, for example, the frequent use of prefabricated elements in façades. However, it is also clear in the literature that it is also likely to have to do with the potential of these spaces to be visited by non-residents. Spatially, we've seen this to be translated in spatial attributes that measure how likely it is for people with no local knowledge of the estate to visit it, such as maze index, local integration and choice, amount of cul-de-sacs, and also by the existence, or not, of public or collective fixed-function spaces within the housing estate with potential to be used by non-residents.

Hierarchisation and potential for community

In Marcuse's (2001, p.2) definition, spatial segregation is a type of "involuntary, or better yet, hierarchical" clustering , where a cluster is "an area of spatial concentration of a population group. It is the generic term covering any concentration of members of a particular group, however, defined, in space, at a larger scale than a building." While the idea of voluntary clustering brings about the question of whether or not any allocation in the real estate market is purely one's choice, a definition that is grounded in hierarchy rings similar to Hillier and Hanson's (1984) conception of a "hard solution" for the contradictions between capitalism's need for workers to be spatially concentrated where there is work to be done, but also for them to be organised in hierarchical, controlled relations. In Space Syntax terms, hierarchy can be defined as an asymmetrical nondistributed relationship, that may exist both socially and spatially.

In this sense, this type of segregation that is not between the estate and the city, but internal to the estate itself, will be referred to as hierarchisation: the process through which the potential for socialisation and for the creation of mutual-aid systems, or communal activity within the neighbourhood that is brought about by the large concentration of people in the same space, is countered by spatial mechanisms. In cases where hierarchisation is smaller or non-existent, it is more likely that "residential areas provide distinctive milieus for social interaction from which individuals to a considerable degree derive their values, expectations, consumption habits, market capacities, and states of consciousness," and become members of one same community.

Hierarchisation will be explored by examining whether the spatial attributes of housing estates are likely to encourage or hinder patterns of encounter and possible interaction between neighbours, taking into account measures of the relation established between different households in the same estate, such as functional interface decomposition, no-neighbours, constitutedness and mean depth, but also examining the existence or lack-thereof of fixed-function collective spaces, or areas with potential for collective use.

5.3. THE SPATIAL PROPERTIES OF HOUSING COLLECTIVE, INDIVIDUAL AND EMANCIPATOR POTENTIAL IN AND OF THE FAMILY

Domestication and the potential for community

Both Gros (1982) and Bourdieu (2000) argue that the role of the house in the relationship established between the family and the exterior world is not only dependent in the articulation of the area where it is located with the urban fabric. For both authors, it is also in the individualisation of life and domestication of aspirations, in the making of the home the centre of people's lives, that the house plays a role in the types of relations established between individuals and the society where they exist.

For Bourdieu, this individualisation and domestication of projects have much to do with the spatial attributes of the neighbourhood, arguing in his post-script (2000, p.277) "The Basis of Petit-Bourgeous Misery" that single-family housing in the periphery is organised so that their inhabitants "know neither the solidarity of the old working-class neighbourhoods, nor the isolation of fancy condos: distant from their workplace by hours of daily commute, they are deprived of building relationships in their neighbourhoods […]"[15]. Additionally, the author considers the single-family housing typology to be in itself designed so that it becomes the focus of all investment: investment of time and resources as well as of affection. In this sense, it determines a domestication of aspirations in which, stuck in the order of the private (in opposition of collective projects of political struggle) and "centred around the education of children as the way to individual achievement, the family unit becomes the place of a sort of collective selfishness that finds its legitimation in the cult of domestic life [...]"[16] (p.230).

In line with Bourdieu, Gros (1982) proposes that one of the mechanisms through which housing is an element of social pacification and maintenance of order is by making of housing something to be acquired and then, consequently, something that imprisons the house-owner in a knit-tight net of economic dependences, weakening its relation to the community and ideologically reinforcing individualisation and private appropriation of both objects and people.

Substantial reflection was produced in Portugal in the 1960s and early 1970s about the individualising character of housing. The works examined in this dissertation focused on how this may be countered, and how spatial attributes may encourage communitarian interaction and the creation of mutual-aid systems. Part of this work will be subject of analysis in chapter 7 of this dissertation. The potential for domestication or community-creation of apartments in housing estates as a fundamental mechanism through which housing has the capacity to regulate social relations will be interpreted taking into account:

a) those ideas developed at the time, which are not only based on thorough theoretical and empirical research but are also capable of revealing cultural paradigms and design intentions,

b) the type of ownership inscribed in the legal framework of each programme of housing development, and

c) spatial attributes, informed by literature, in the field of space syntax and others, in particular the distribution of functions between the interior of the apartment and its exterior.

Adaptability

Another way in which social relationships are reflected in the domestic space is in its character as a result of social struggle. Portas (1959/2004) and Bourdieu and Accardo (1993/1999) argue that the conditions of working-class housing - many of which have necessarily to do with spatial attributes - are almost always the possible minimum in order to respond to the advancements made by continuous social struggle and to the particular power balance of its time. According to Bourdieu and Accardo (1993/1999), the objective conditions of the working class engender aspirations and practices that are likely to be compatible with those objective requirements. Improbable practices and aspirations are then excluded for being either unthinkable - outside the realm of the doxa - or through "double negations, which inclines agents to make a virtue of necessity, that is, to refuse what is anyway refused and to love the inevitable." (p.74) According to these authors, the history of housing is a history of social struggle, as it transforms according to social changes that are reflected in the spatial characteristics of housing, but also in the way family dynamics change over time. Portas (1959/2004), as explored in chapter 4, traces a history of area requirements for housing in relation to an ever-changing social context, and argues that the institutions in charge of developing housing for the lower classes must design for predictable future aspirations and needs of their residents, and not for what they believe to be possible in the present moment.

However, as seen in chapter 4, it is not only the increase in areas or the development of plumbing and subsequent introduction of private bathrooms in apartments that reveals the adaptation of housing requirements to social transformation. If when looking at segregation and othering in housing estates the relations we are looking at are those between social classes, racial or ethnic groups and how these social relations are expressed in the city, when looking at apartment layouts, it is the relations (sometimes also of segregation and othering) between individuals that are also a part of groups - women and men, parents and children - that are expressed in the space of the house. The relations between these individuals are also a part of the social relations that compose society. The relationship between men and women is one that becomes embedded in space as gendered activities, informed by social and cultural norms, are organised inside the space of the house. In this regard, Hillier and Hanson (1984, p.101) speak of the kitchen as "categoric segregation, that between men and women (…) The relations of this space articulate in a very strong way the domination of everyday transactions in the household by women. The

household is a 'sociogram' not of a family by of something much more: of a social system."

In this sense, the interpretation of domestic interiors aimed at detecting attributes that may indicate adaptability to, and encouragement or hindrance of ongoing transformations in social and family dynamics, taking into account:

a) the ideas developed at the time, which are not only based on thorough theoretical and empirical research, but are also capable of revealing cultural paradigms and design intentions,

b) information provided in the reports of the Survey on urban housing on family dynamics and how people lived the space of the house, and

c) spatial attributes of domestic interiors, informed by literature in the field of space syntax and others, and by the data gathered from examining the Survey on Urban Housing on three specific points:

1. The collective potential of spaces,

2. Potential for individual development,

3. Potential for women's emancipation and integration in family life.

PART II

ANALYSIS AND RESULTS

Introduction

In the course of this research, 41 housing developments were identified and analysed. This set included housing projects developed across social and historical periods, in the scope of various housing programmes, through different processes and the action of different individual or collective agents. It has been hypothesised throughout this dissertation that these varying contexts and processes of production should be reflected in different spatial attributes. In this sense, it should be possible to identify trends or clear design paradigms that may be linked to social, historical or ideological shifts and transformations. Finally, a historically contextualised analysis of design patterns should then be able to shed light on how social relations are reflected in the space of these public housing developments, and through which spatial mechanisms they act back. This will be examined in Part III of this dissertation.

Part II presents the fundamental basis of that examination. As such, it was considered that it was an essential part of this thesis text. Even though the thorough reading of Part II is not necessary for the understanding of this work and its conclusions, it provides necessary information on individual cases, as well as on the methodology of analysis. For each housing development, spatial data is described at the scale of the estate and the apartment, as well as that of the relations between each scale and of that between the development and its surrounding city. This allows for an individual reading to be made of each case, that supports and informs the contextualised interpretation in the final part of this dissertation. Additionally, statistical analysis was conducted on this set of spatial data with the objective of identifying differences and the extent of these differences between the different public housing programmes studied throughout this research. If the set of comparisons presented in this last chapter 9 is non-contextualised and, as such, has little meaning, this represents necessary work of data systematisation without which the following chapters would not have been possible.

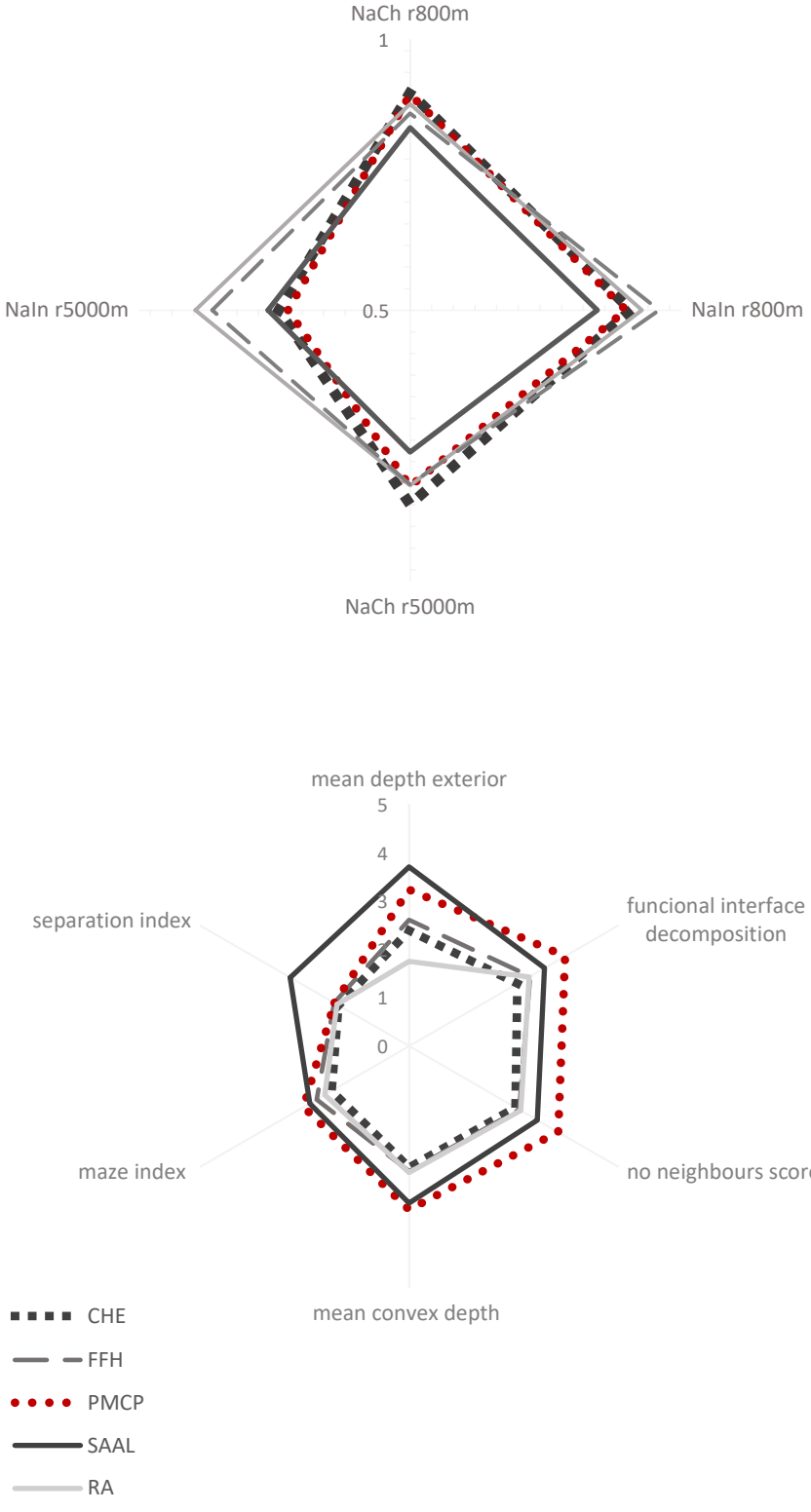


FIGURE 6 .1.
Average values of NaIn, NaCh and depth measures for each studied programme with PMCP housing signaled in red.

6. DESCRIPTIVE ANALYSIS OF COUNCIL HOUSING ESTATE AND APARTMENT LAYOUTS BETWEEN 1969 AND 1974

Introduction

Seven out of nine housing developments from the Improvements Plan for the City of Porto (*Plano de Melhoramentos da Cidade do Porto,* PMCP) were analysed in the scope of this research. These correspond to projects prior to the 25th of April of 1974, were built between 1969 and 1975, and have the capacity for housing approximately 2 260 families. The analysis, conducted at the scales of urban insertion, estate layout and apartment scheme, is summarised in figure 6.1. and in tables 6.1., 6.2. and 6.3.. The following subchapters will describe the spatial attributes of each of the seven housing developments at these three scales and in the relations between them. These results will be contextualised in a reading of the social and historical conditions of their production in chapter 10 of this dissertation.

	#houses	m²/resident	NaIN5000	NaIN800	NaCH5000	NaCH800
3. Nuno Pinheiro Torres	428	40.9	0.68	0.73	0.78	0.86
4. Monte da Bela	179	36.4	0.83	1.10	0.86	0.80
5. Falcão	236	29.3	0.56	0.88	0.76	0.87
6. Lagarteiro	397	50.3	0.53	0.96	0.79	0.92
7. Bom Pastor	446	34.8	0.84	0.92	0.84	0.93
8. Aleixo	247	24	0.77	0.81	0.91	1.08
9. Contumil	329	10.7	0.85	0.93	0.81	0.81
av.	323.14	31.8	0.72	0.90	0.82	0.89

TABLE 6.1.
Global and local integration and choice of council estate layouts within the PMCP

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
3. Nuno Pinheiro Torres	2.91	2.59	2.52	2.40	2.44	2
4. Monte da Bela	5.04	4.59	4.32	4.03	4.29	2
5. Falcão	3.58	4.06	3.91	3.65	3.14	2
6. Lagarteiro	3.19	4.20	4.07	3.91	2.56	2
7. Bom Pastor	3.34	4.31	4.13	3.96	2.86	2
8. Aleixo	3.5	2.91	2.67	2.35	1.34	1
9. Contumil	1.13	3.40	3.29	3.36	1	1
av.	3.17	3.62	3.45	3.31	2.43	1.63

TABLE 6.2.
Depth measures of council estate layouts within the PMCP



FIGURE 6.2. Nuno Pinheiro Torres, surrounding city.

	TUFA m2	density m2/r	integration	difference factor	mean depth exterior	functional orientation %
3. Nuno Pinheiro Torres	57.3	14.33	0.85	0.75	2.6	20
4.Monte da Bela	56	14	1.05	0.72	2.27	18
5. Falcão	61.9	20.5	1.45	0.74	2.75	18
6. Lagarteiro	60.8	15.2	1.06	0.76	2.6	20
7. Bom Pastor	39.3	13.1	1.83	0.38	1.75	12.5
8. Aleixo (A)	65.7	16.43	1.28	0.61	2.8	23
8. Aleixo (B)	75.3	15.06	1.15	0.74	3	28.5
9. Contumil (A)	71.5	17.88	1.07	0.72	2.9	18
9. Contumil (B)	70.4	17.6	0.95	0.81	2.8	16

TABLE 6.3.
Spatial attributes of council apartment schemes within the PMCP

6.1. LAYOUT3: NUNO PINHEIRO TORRES

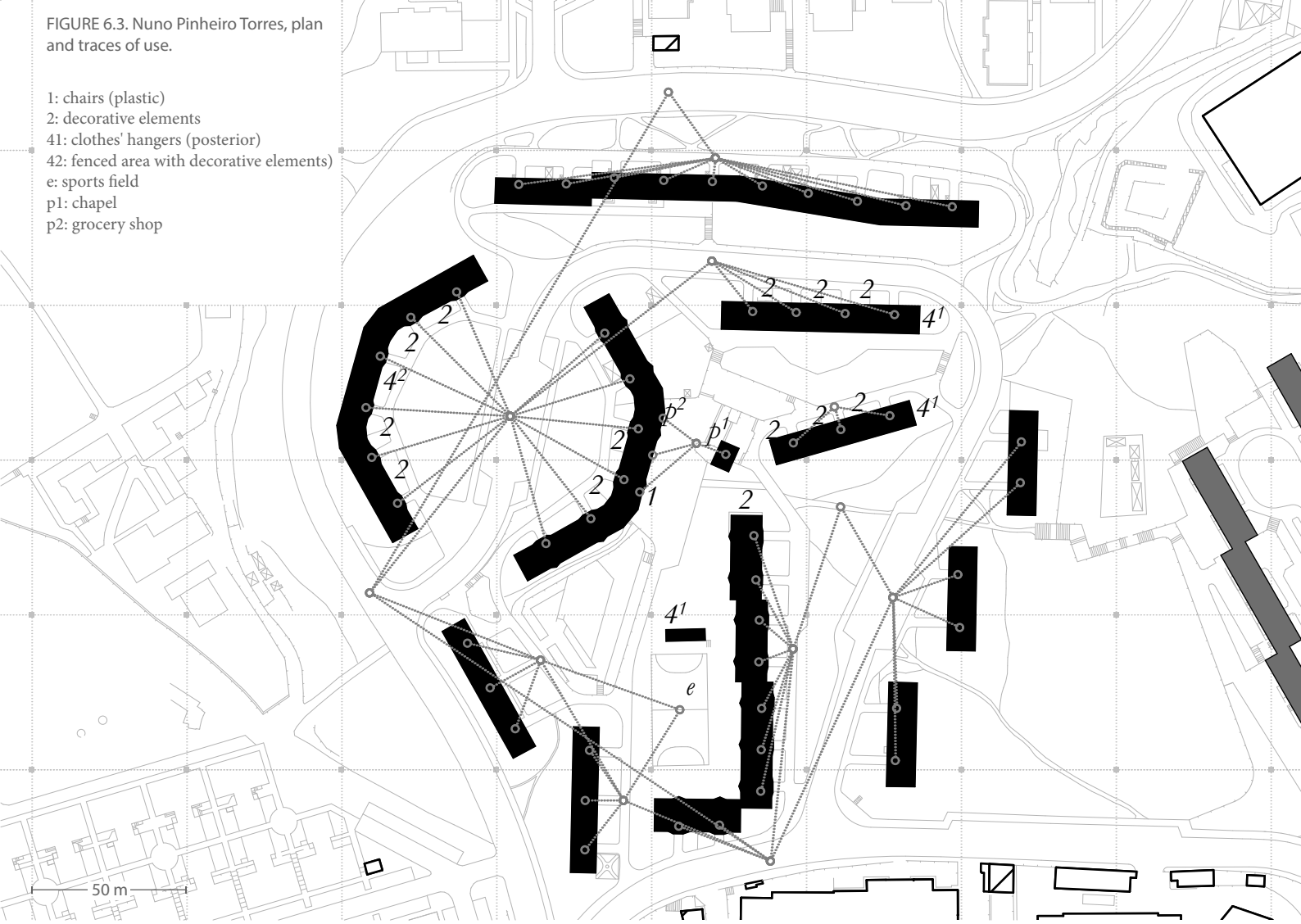
a) Relation to the surrounding city

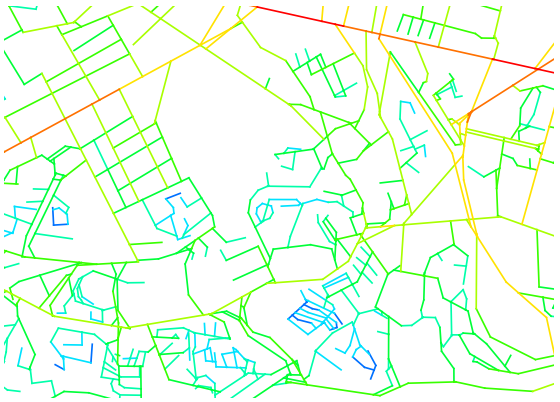
Layout 3, Bairro Nuno Pinheiro Torres (originally Bairro do Lordelo) was founded in 1968 and is both one of the largest and one of the less dense estates built during the second phase of the PMP (area=70000m2, space per inhabitant=40.9m2). It was built in a vacant area in the whereabouts of existing public housing, benefiting from public equipment and facilities in a 500m radius such as schools, a semi-public sports centre, and, from 1987 onward, Porto's contemporary art museum and park. If the area remains fairly residential today, with public housing schemes filling the remaining urban voids, the city grew considerably around it throughout the last decades. Located in between three arteries of the city with high potential for through-movement (Avenida da Boavista, Avenida do Marechal Gomes da Costa and Rua do Campo Alegre are all in the first decile of NaCh) - the estate is also not far removed from retail, services and public transportation providing good accessibility to the centre of the city, to the riverside and the coast.

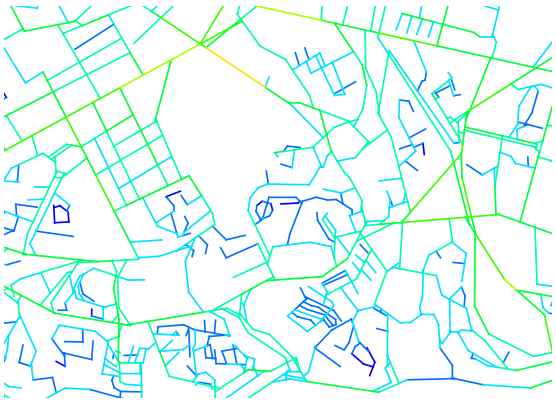
The estate is located in an area with a high density of public housing and was fit in between the back of the large private park and two existing streets, adopting a semi-circular shape that turns inward against the back of the park and opens towards perimeter streets usually through a system of redundant sidewalks separated by gardened areas. As such, despite being one of the only layouts that are not located in the back of existing buildings, its 'maze index' - if the lowest of the housing schemes built before 1974 - is still relatively high: when passing through exterior

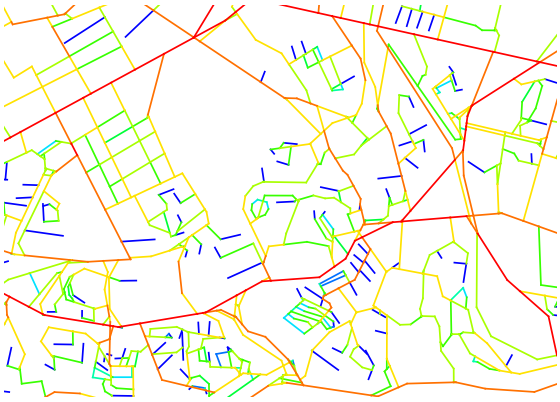
FIGURE 6.3. Nuno Pinheiro Torres, plan and traces of use.

1: chairs (plastic)
2: decorative elements
41: clothes' hangers (posterior)
42: fenced area with decorative elements)
e: sports field
p1: chapel
p2: grocery shop









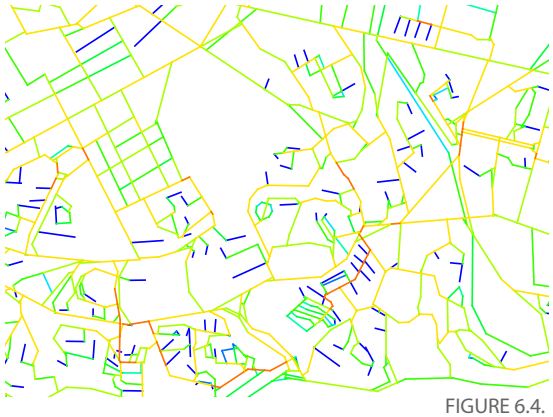


FIGURE 6.4.
Nuno Pinheiro Torres, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

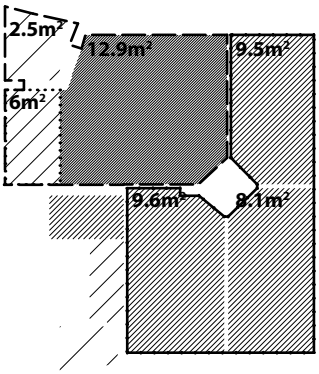
streets, people must, on average, take 2.4 turns in order to reach all spaces within the layout.

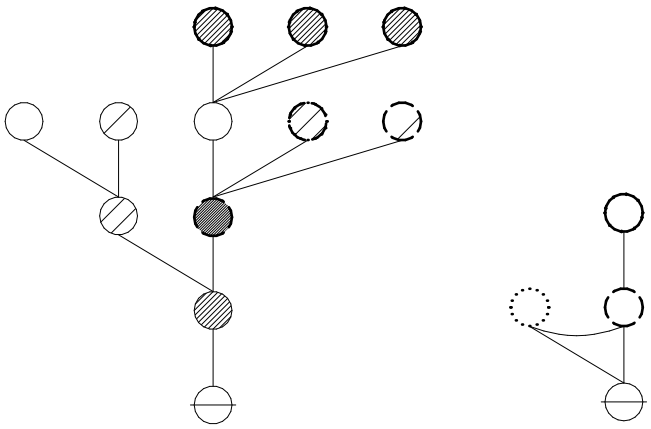
b) Relations between collective spaces

The layout is, however, fairly grid-like. With five openings allowing for an open relationship between exterior streets and the interior of the estate, it is a relatively shallow layout. This shallowness is accentuated by all spaces being 'distributed' (there are no cul-de-sacs), and by most of them being in 'rings'; all non-transition spaces are c or d-types and so are accessible through more than one path. Despite the rough terrain, the system of spaces is highly-permeable and translates into a relatively low mean depth between all spaces, which can on average be reached in 2.4 convex steps. Buildings' entrances constitute 69% of convex spaces, and the number of doors accessible through each varies between 2 and 9 and averaging at 5. The spaces with the higher number of entrances are either those which face the street but are distanced from it by gardened areas or a circular, court-like space defined by two buildings facing inward. The latter is divided in two by a street, from which buildings are separated by semi-circular gardened areas, the pathway around it giving access to front doors. Smaller convex spaces in the centre of the lot are often directly constituted by buildings' entrances, which points towards the hypothesis that these more complex systems were meant to adapt to the lot's topography while simultaneously separating houses from the nuisances of car circulation. Despite common redundant sidewalks, this layout has the franker relation to buildings' entrances of the seven; from any convex space, it is possible to reach all residences' doors in 2.5 topological steps.

The housing scheme includes a sports field and a no longer existing playground, which were only built after 1974, two stores, and a chapel, which already existed on location at the time of the estate's construction. A library, a daycare and a social centre that should occupy the basements of buildings were also designed after the estate's construction. All existing functional spaces are located around a convex space integrating the churchyard. Located in what almost is the estate's geometrical centre, this space is designed as a social pole. It is the most integrated space in the layout (Int(HH)=4) and, despite being a ringy 'd-type' space, it is a functional b-type space, exerting exclusive control over access to stores and the chapel. While it is possible to reach the sports field through other spaces, located at a mean depth of 1.9 steps from all the estate's spaces, the space surrounding the churchyard is often the most direct. Deep within the convex system (Depth exterior=3), this space seems to provide the potential for encounters among residents more than between residents and strangers.

Conversely, the sports field is accessible one step into the estate, in an area more accessible for people coming from outside. It remains, however, invisible from the exterior streets, requiring local knowledge in order to be reached. The other spaces are either transition areas in the form of access pathways, or gardened areas separating residential buildings from the streets. These gardened areas have been appropriated in different ways. The smaller green areas that exist between, the deeper buildings and internal pedestrian streets were in some cases fenced in and decorated by the occupants of the ground floors. A series of permanent clothes hangers was





INTEGRATION

min. value	0.48
25th percentile	0.65
50th percentile	0.68
75th percentile	0.98
max. value	1.57

private sector

collective sector

services sector

FIGURE 6.5.
Nuno Pinheiro Torres, apartment scheme: plan and accessibility graph.

recently placed in the larger gardened areas, both in the central spaces around the churchyard and in shallower spaces near residential buildings.

c) Relation to individual houses

If the 'maze index' is still relatively high, the 'separation index' is average and the 'no-neighbours', 'interface decomposition' and mean depth from the exterior are on the lower side of the seven PMP estates. This means that while strangers are not very likely to non-purposely find themselves in the interior of the layout, residents are, on average, convexly closer to the convex system and to the exterior streets than in most other PMP layouts.

d) Relationship of the house with the exterior

The apartment scheme of layout 3 is a small 57.3m2 house, corresponding to 63% of the minimum area defined in Part I of this thesis. Considering that the apartment is inhabited by as many people as the number of bedrooms plus one, the apartment has 14.33m2 per resident. Depth is created in the small layout through the introduction of two transition spaces into the design, which in one moment separate the living-room from the exterior, and in another separate the bedrooms from the collective space of the house. While not complying with legislated areas and reducing rooms to the minimum, the layout includes an exterior balcony and a small clothes-dedicated space, adjacent to the bathroom. In this sense, it complements within the apartment scheme two functions that are present in the estate's layout: exterior permanence and drying clothes.

e) Collective sector of the house

The apartment has a 12.9m2 living-room, which scores above the minimum area but bellow the ideal, and which is the largest space of the house. It is simultaneously the shallowest and the better-integrated room. It is the organizing centre of the house: separated from the front-door by a small entrance-hall, it opens to the kitchen, connects to the balcony and a small hall that leads to the bedrooms. With a functional b-type living-room that functions as the only connection between the bedrooms and the kitchen, and both private and services sector and the exterior of the house, the layout translates into an A1 simplified accessibility graph.

f) Services sector of the house

The kitchen is integrated into the living-room, openly connecting to it both accessibility and visibility-wise. By itself, the kitchen has the minimum area of 6m2 and, in the collective pole it creates with the living-room, it reaches a 18m2 area. Even though it can be considered part of the collective area of the house, it is placed in such a way that it is deeper both from the outside and from the bedrooms, making it necessary to move through the living-room in order to each it. If



FIGURE 6.6. Monte da Bela, surrounding city.

its frank connection to the rest of the house means it is not segregated, this distancing makes it a lesser integrated space than the living-room.

g) Private sector of the house

Bedrooms are larger than the minimum area but smaller than the ideal, being simultaneously the deepest and less integrated spaces of the house. Some privacy seemed to be intentionally added to the private sector of the house through the introduction of a small hall between the living room and the bedrooms.

h) Relationships between sectors of the house

	transition space >	kitchen >	living-room >	exterior >	washroom >	bedrooms >	exterior space >	other space
integration	2.054	1.021	1.021	0.885	0.829	0.829	0.603	0.603
area	2.7m^2	3.6m^2	13.5m^2	-	4m^2	8.77m^2	0.9m^2	1.8m^2
area minimum	-	0.52	1.13	-	-	1.027	-	-
area ideal	-	0.46	0.75	-	-	0.9	-	-
depth exterior	1.5	2	2	0	3	3	3	3
type-space	b	b	b	b	a	a	a	a
functional type-space	fb	ff	fi	ff	ff	fi	fi	fa

TABLE 6.4. Nuno Pinheiro Torres, spatial attributes of apartment schemes.

The apartment can be represented as a simplified accessibility graph A1, where there is a clear definition of collective and private sectors through 20% of spaces being transition spaces. Integration values of functional sectors are ordered, from largest to smallest, as [collective-services]-private, with a difference factor of 0.75. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members, and in particular by women. The private sector is clearly separated from this area of the house and, scoring near the minimum area for bedrooms, does not appear to encourage its use for individual activities that require space or extra furniture.

6.2. LAYOUT 4: MONTE DA BELA

a) Relation to the surrounding city

One of the first estates to be constructed within the second phase of the PMCP, layout 4, Monte da Bela, while average-sized, accommodates the lowest number of families of all PMP estates. Occupying an area of 34 395mm2 and encompassing around 180 houses, the layout allows 36.4 meters per resident - an average density for PMP developments, while low when compared to other programmes. In 1969, it was built in the whereabouts of a XIXth century market square, in

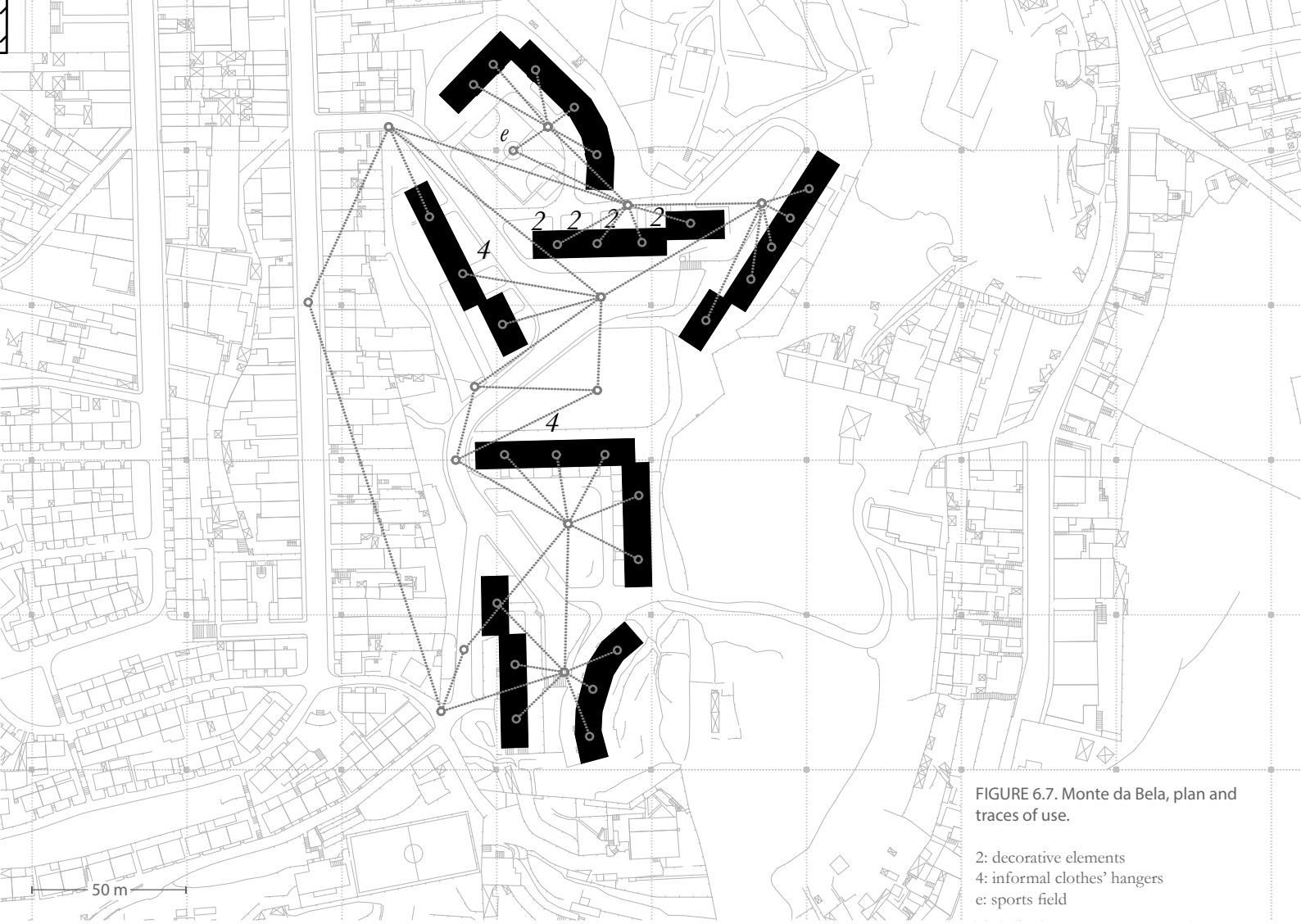


FIGURE 6.7. Monte da Bela, plan and traces of use.

2: decorative elements
4: informal clothes' hangers
e: sports field

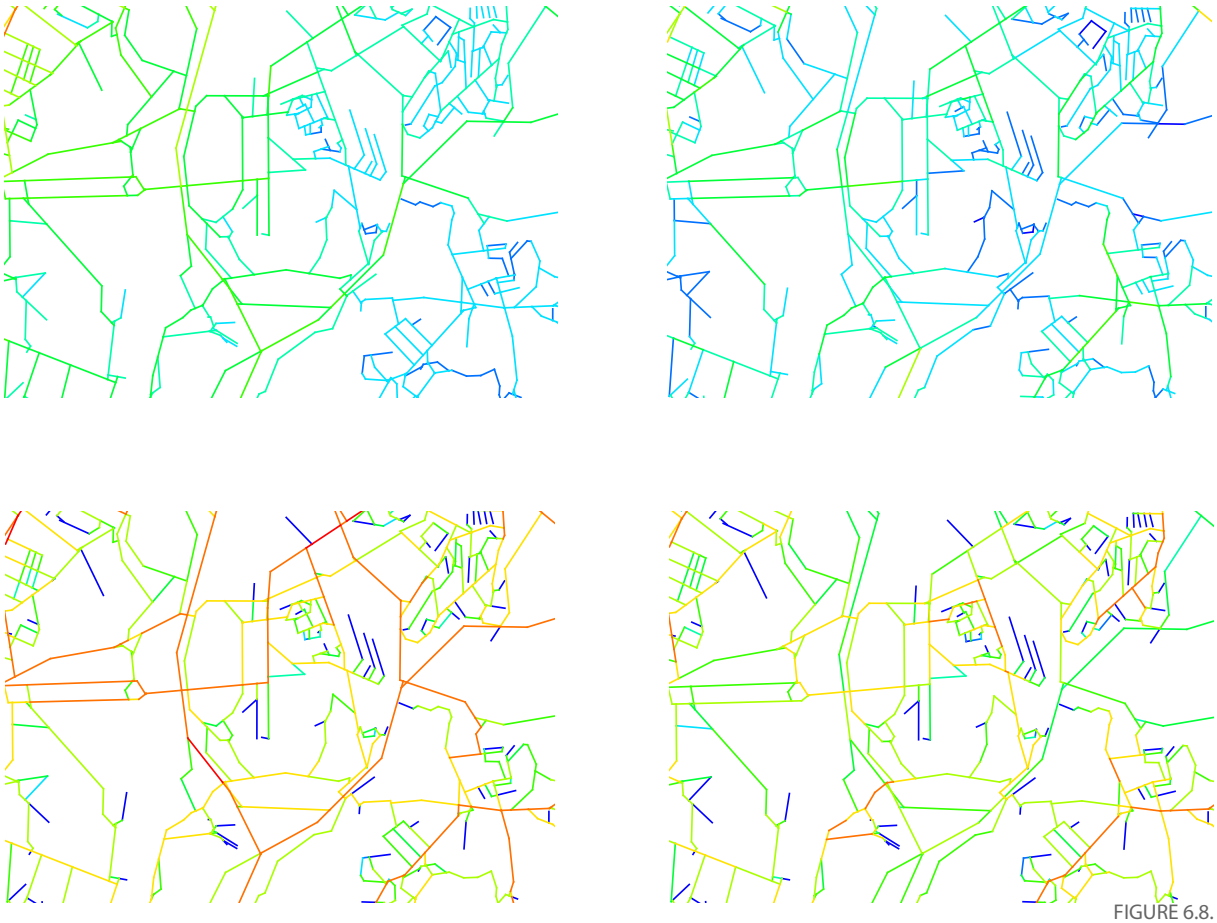


FIGURE 6.8.
Monte da Bela, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

an area of the city that remained mostly rural. Originally at the fringe of the city, this area's urbanisation was associated with the development of public housing, which is today prevalent. Of these, layout 4, presents above-average values of both global and local integration (NaIn(r=5000)=0.83, NaIn(r=800)=1.1) for PMCP estates. Similarly, despite its peripheral location in the city, the layout is located in proximity to a public square and a public park and is served by local retail and services and a school within a 500m radius.

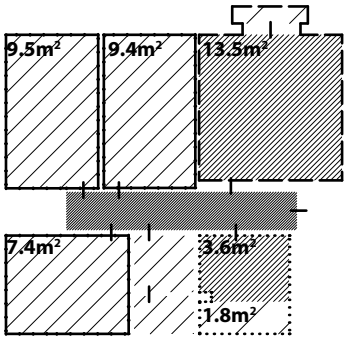
Like other PMP estates, layout 4 is situated in the interior of a lot. Behind pre-existing houses and only permeated by two openings, the estate is invisible from the primary city grid. Requiring local knowledge both to find and navigate, this layout presents the highest value of maze index and the largest depth from the exterior not only in relation to municipal estates but among all studied cases.

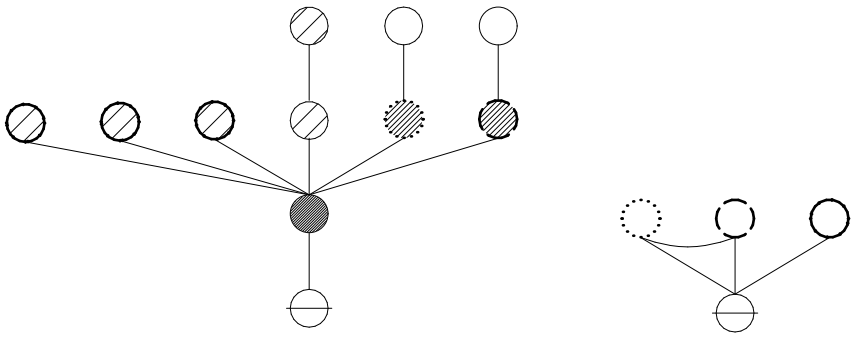
b) Relations between collective spaces

Deep from the exterior and hierarchised, this layout has an average integration of 1.01 with a high difference factor of 0.91. It is organised around three sets of exterior spaces from which residential buildings are accessible. All three have a different character - one is a hard-landscaped area, another is a parking space from which an accessibility path departs, the last is organised around a sports field - and the three are similarly integrated into the spatial system, creating a well defined tree-like model. This model is emphasised by the large amount of transitional convex spaces, which present no entrances to functional spaces and, while in most cases integrated into rings, only half are functional b type-spaces.

While this layout does not resort to redundant sidewalks, these central spaces also create space between streets and residential buildings. If this separation of buildings from the street was justified in layout 3 as stepping back from traffic noise, the interiority, low values of choice and consequent low through-movement of the access lines in layout 4 do not seem likely to create the same problem. While two of the central spaces seem, in the original design, to translate the intention of allowing for the creation of collective spaces, only one of them was transformed into a piece of collective equipment, the second remaining an ambivalent hard landscaped are with no associated functions, today surrounded by a metal grid that further dissociates the area from functional spaces. Despite being located in the shallower areas of the estate, these spaces are 3 and 4 steps away from the exterior and appear designed for internal use within the estate and not by the outer local neighbourhood.

Non-fixed-function convex spaces do not present traces of appropriation by the residents but, as is common in PMP estates, smaller areas separating residential buildings from pathways do. In layout 4, these are comprised of small, floor-level fenced spaces - surrounded either by grids or, more commonly, by small bushes - that are accessible through doors located next to the buildings' entrances. At the times of visits, these spaces were heavily marked by traces of different types of use and appropriation, some displaying plants and decorative elements typical of single-family





INTEGRATION

min. value	0.60
25th percentile	0.77
50th percentile	0.86
75th percentile	1.02
max. value	2.05

private sector

collective sector

services sector

FIGURE 6.9.
Monte da Bela, apartment scheme: plan and accessibility graph.

houses front yards, others presenting utilitarian objects such as clothes hangers and sinks.

c) Relation to individual houses

Constituted convex spaces provide accessibility to an average of 4,5 front-doors, with one of the organising courtyards having only 3 front doors and the largest - which is divided in two - giving access to 11. While the separation index lies on the trend for PMP estates, the depth between dwellings and the exterior and among dwellings again presents the largest values not only in PMP estates but across case-studies, with residents having to cross, on average, 5 convex spaces in order to reach the exterior urban space and 4,6 spaces in order to reach all other dwelling entrances.

The buildings' staircases are exterior and give access to two apartments per floor. These show the same traces of appropriation and use as floor-level spaces, being used to dry clothes and presenting decorative objects and plants. As such, while the small space adjacent to the kitchen in layout 4's apartment schemes does not seem to correspond to the practical needs of their residents, these functions appear to remain private. Clothes are washed and dried in the whereabouts of one's apartment.

d) Relationship of the house with the exterior

The apartment scheme of layout 4 is the smallest apartment type developed within the second phase of the PMP. With 56m2, corresponding to 62% of the minimum area as defined in chapter 3, it has a density of 14m2 per resident, when ideally occupied by as many people as the number of bedrooms plus one. It has an unusually shallow configuration, where all spaces connect to the same convex space. Even though the living room and kitchen open to this corridor through a doorless embrasure, some privacy seems to be sought in the placement of this opening. While not complying with legislated areas and reducing rooms to the minimum, the layout includes a small clothes-dedicated space, adjacent to the kitchen. In this sense, it complements within the apartment scheme the function of washing and drying clothes, similarly present in the estate's layout.

e) Collective sector of the house

With 13.5m2, the living-room is the largest space of the house, scoring above the ideal area for a three-bedroom apartment. It is a functional i-type that connects to a 1m2 balcony, too small for integrating semi-fixed features for supporting social activities, and to the central transition corridor, and as such does not control access to fixed-function spaces of the house.

f) Services sector of the house

The kitchen is located in front of the living-room and is, as such, one of the metrically closer spaces to the apartment's entrance. It connects visually to the collective area of the house and, as such, even though one must step into the corridor to reach the living room from the kitchen,

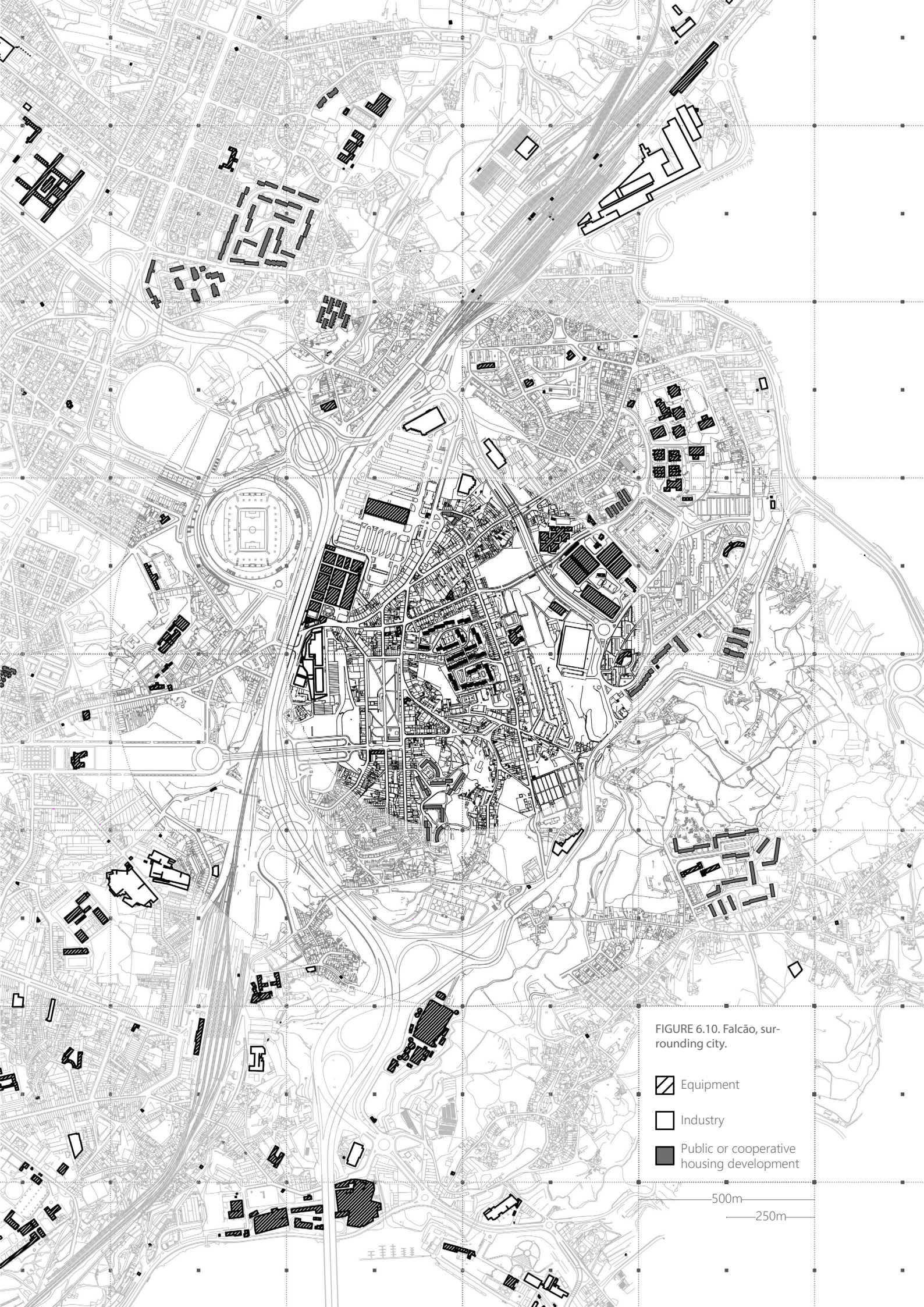


FIGURE 6.10. Falcão, surrounding city.

which is two convex spaces away from it, it is at axial depth 1. The kitchen is of the smallest of all studied cases, with an area of 3.6m2, and connects to a 2m2 space for clothes treatment.

g) Private sector of the house

Bedrooms score around the minimum area, occupying around 16% of the house each, they are functional i-types and open to the same central corridor as collective and services spaces.

h) Relationships between sectors of the house

	living-room >	transition spaces >	kitchen >	bedrooms >	washroom >	exterior space >	exterior
integration	1.571	1.222	0.733	0.676	0.647	0.647	0.478
area	12.9m²	1.75m²	6m²	9.067m²	4.2m²	2.5m²	-
minimum area ratio	1.08	-	1	1.07	-	-	-
ideal area ratio	0.72	-	0.88	0.94	-	-	-
depth exterior	2	2	2	3,67	4	3	0
type-space	b	b	b	a	a	a	b
functional type-space	fb	fb	ff	fi	ff	fa	ff

TABLE 6.5. Monte da Bela, spatial attributes of apartment scheme.

While the kitchen does not provide direct access to the living-room, from which it is separated by a clearly defined convex transition space, both spaces connect visually through large openings. As such, if it cannot be said that there is a clearly defined collective pole, and the layout can be represented as a simplified accessibility graph B2, it appears to reflect the intention of articulating the collective and services sectors of the house. Even though the central corridor is the better-integrated space and all sectors share a similar value of integration, this collective-services set visually controls movement to and from the bedrooms, which may encourage the type of instance use that was suggested in chapter 4 to be associated with configurations where the living-room is located in between functional spaces. The services sector is particularly small and, split into two small spaces, its collective potential is further hindered. The private sector is small, scoring near the minimum area for bedrooms, and does not appear to encourage its use for individual activities that require space or extra furniture.

6.3. LAYOUT 5: FALCÃO

a) relation to the surrounding city

Layout 5 was designed by the same team and at around the same time as layout 4 and is located in its proximity, sharing many of its characteristics but also presenting configurational differences. Similarly located on the interior of pre-existing lots adjacent to a 20th century market square,



FIGURE 6.11. Falcão, plan and traces of use.

1: barbecue
2: decorative elements
4: informal clothes' hangers
e: sports field
i: cultural and sports association
p: informal car mechanic

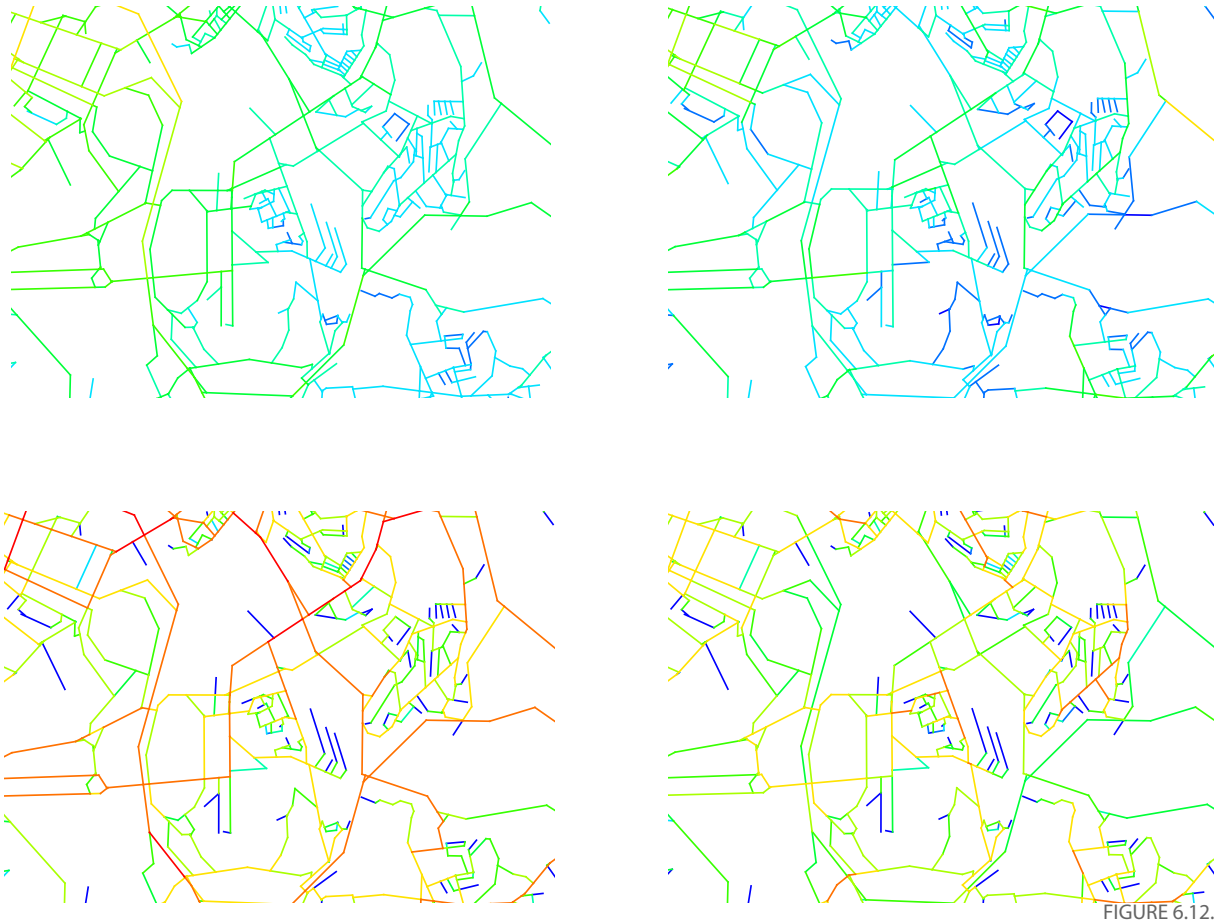


FIGURE 6.12.
Falcão's urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

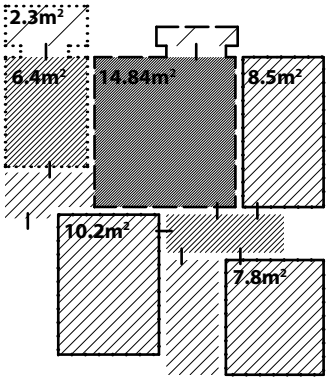
layout 5 maintains low values of global integration (NaIn(r=5000)=0.56, (r=3000)=0.56), but average values of local integration (NaIn(r=800)=0.88). However, while built on the back of existing houses and accessible through only 3 openings, this layout is not entirely removed from the main city fabric. Instead, it constitutes a possible crossing across the lot. While this crossing is broken down in several turns, requiring not one but three axial lines to complete, the local choice values of its segments are either similar or higher than those of alternative routes. However, the estate was built in two phases that appear as separated clusters of buildings, with only pedestrian pathways making the link between the two parts, and this counterpoint to the estate's invisibility only applies to the first phase to be constructed, the other remaining a cul-de-sac to traffic, and unlikely to be visited by non-residents.

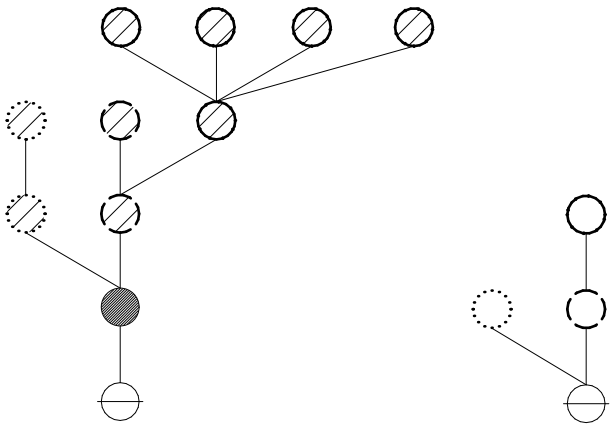
b) Relations between collective spaces

When understood as one sole pedestrian convex system, layout 5 maintains 2 identifiable integration cores, located at the edge of each of its phases. While larger, with more 56 houses and around 12.000m2 than layout 4, layout 5 is also denser (m2/r=29.3) and more grid-like, as is revealed by its relative shallowness. However, although ringier, with all transition spaces being c or d types, only 46% of them are constituted by the front-doors of functional spaces - a consequence of its secondary system of pedestrian pathways connecting the two different phases of the estate.

Constituted spaces are generally streets, to which buildings open directly, and redundant sidewalks exist only when pedestrian areas of collective potential are created between buildings. Each phase of the estate is organized around a central space located at a maximum of 3 steps from all other spaces on that part of the layout. This depth increases when both phases are considered as one system: the sports field around which the first phase is organized is located at an average of 3.8 steps from all other spaces, and the collective space at the centre of the second phase is at an average of 2.8 steps from all other spaces.

In the first part to be built, this central area is divided in two by the street that crosses the lot, and effectively transformed in two different convex spaces through a system of gardened areas, redundant sidewalks and pedestrian pathways. One of these sides contains a sports field and opens directly to the street, connecting to a social centre through a pathway in between the field and an adjacent building. The second space is removed from the street by this system but is also similarly distanced from the front-doors of the buildings to which it is adjacent, and is today used as a parking lot. The central area of the second phase of the estate is also divided in two: one half is directed at traffic and is defined by a fixed-function parking lot, and the second half comprised a system of pedestrian spaces connecting directly to the buildings' front doors.





INTEGRATION

min. value	0.70
25th percentile	1.00
50th percentile	1.11
75th percentile	1.58
max. value	4.42

private sector

collective sector

services sector

FIGURE 6.13.
Falcão, apartment scheme: plan and accessibility graph.

Neither of these spaces showed traces of use at the times of visits, but informal clothes hangers were placed in between trees, or in pedestrian pathways in the backs of residential buildings.

c) Relation to individual houses

Layout 5 varies greatly in terms of the number of neighbours sharing the same accessibility space, displaying both buildings that open directly to the street, and small pedestrian pathways or redundant sidewalks giving access to an average of 3 entrances. Residents are, on average, 3.6 convex steps away from the exterior urban grid and 4.1 steps away from all other dwellings. Depth among neighbours is felt mostly between the two phases of the estate. The second phase, in particular, is smaller and tree-like, creating a system of spaces common to all of its residents.

d) Relationship of the house with the exterior

The three-bedroom apartment type of layout 5 has an area of 61.9m2, corresponding to around 69% of the minimum area defined in the previous chapter. When considering that the apartment is inhabited by as many people as the number of bedrooms plus one, the apartment has 20.5m2 per resident. Depth is created in the small layout through the introduction of two transition spaces into the design, which in one moment separate the living-room from the exterior, and in another separate the bedrooms from the collective space of the house. While not complying with legislated areas and reducing rooms to the minimum, the layout includes two exterior balconies, complementing within the apartment scheme the activity of exterior permanence. Besides the balconies - the largest of which has been enclosed during a renovation project - no dedicated space exists for treating clothes. Similarly, no collective spaces were designed for this purpose in the layout, and informal clothes' hangers could be found in the exterior.

e) Collective sector of the house

The apartment has a 14.8m2 living-room, which scores above the minimum area and slightly bellow the ideal, and which is the largest space of the house. It is one of the shallower and the better-integrated room. The living-room is a functional b-type that functions as the only connection between the private and services sector of the house, without opening directly to either of them. It connects to a 1.1m2 balcony, too small for installing furniture associated with exterior permanence. In visits to the estate, these spaces appeared mostly unoccupied or used for drying clothes.

f) Services sector of the house

The kitchen is simultaneously small, bordering on the minimum area, and poorly integrated. Located at one step from the entrance hall, it is shallow from the exterior and from the living-room that connects it to the rest of the house.

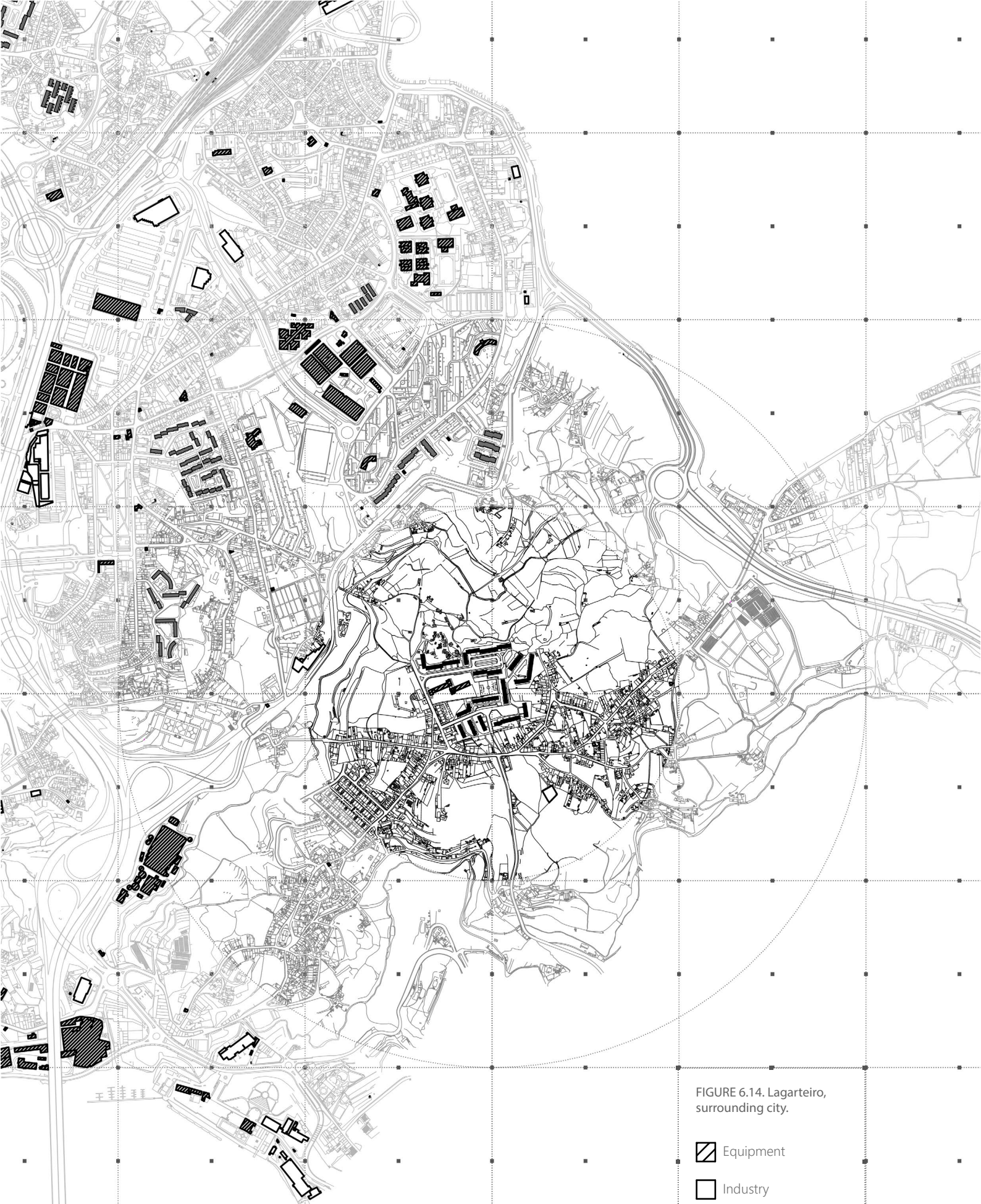


FIGURE 6.14. Lagarteiro, surrounding city.

g) Private sector of the house

Bedrooms are small - too small for the comfortable introduction of furniture supporting activities of individual development - and simultaneously the deepest and less integrated spaces of the house. Some privacy appears to be intentionally added to the private sector of the house through the introduction of a small hall between the living room and the bedrooms.

h) Relationships between sectors of the house

	living-room >	kitchen >	transition space >	washroom >	bedrooms >	exterior space>	exterior
integration	4.423	1.659	1.493	1.106	1.106	0.885	0.698
area	14.8m²	6.4m²	2.8m²	4.2m²	8.833m²	1.7m²	-
minimum area ratio	1.23	0.94	-	-	0.95	-	-
ideal area ratio	0.82	0.82	-	-	0.968	-	-
depth exterior	2	3	2	3	3	4	0
type-space	b	a	b	b	a	a	b
functional type-space	fb	ff	fb	ff	fi/fa	fi	ff

TABLE 6.6.. Falcão, spatial attributes of apartment scheme.

The accessibility graph of apartment scheme 5 is similar to that of apartment 3, but translates into a simplified B1 type, where kitchen and living-room are not either directly or visually connected. Sectors are clearly defined, with the ordering of integration values going from the largest to the smallest as: collective-services-private, with a difference factor of 0.74. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members. Even though it is not connected to the kitchen, its control of all access to bedrooms has been seen to potentially increase the likeliness of this sector being used by women. The private sector is clearly separated from this area of the house and, scoring bellow the minimum area for bedrooms, does not appear to encourage its use for individual activities that require space or extra furniture.

6.4. LAYOUT 6: LAGARTEIRO

a) Relation to the surrounding city

Located in an area at the edge of the municipality that was, and remains, weakly urbanized, Layout 6 presents the lower values of integration at the global scale of all studied cases. With nearly 400 houses built in a 90.000m2 lot, this is the largest estate built during the second phase of the PMP, but, with a very low density of around 50m2 per resident, it is the third when it comes to the number of dwellings. In the sprawling, mostly rural area, the layout's structure gives it relatively high values of local integration. The area is removed from the centre of the city, constituting

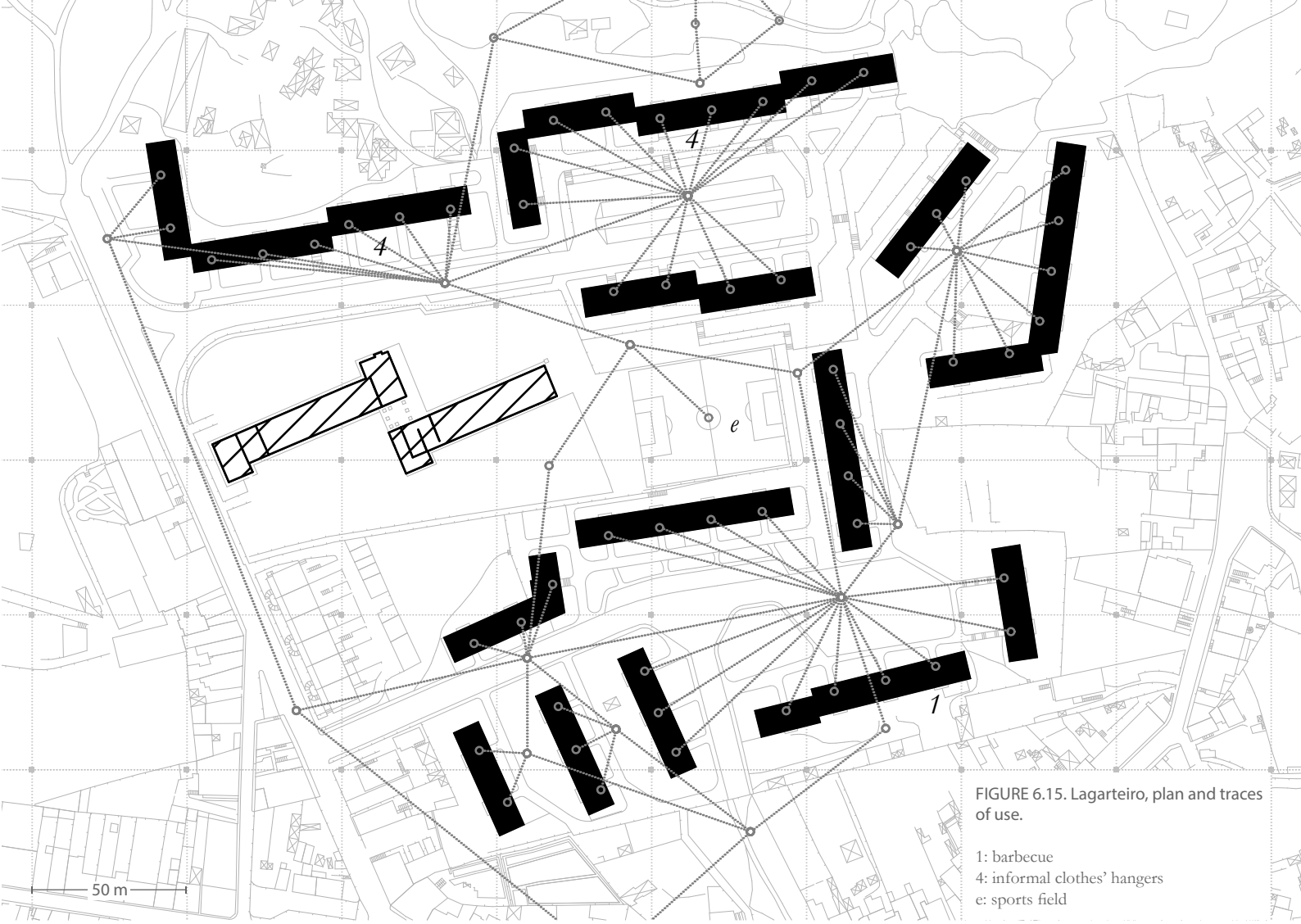


FIGURE 6.15. Lagarteiro, plan and traces of use.

1: barbecue
4: informal clothes' hangers
e: sports field

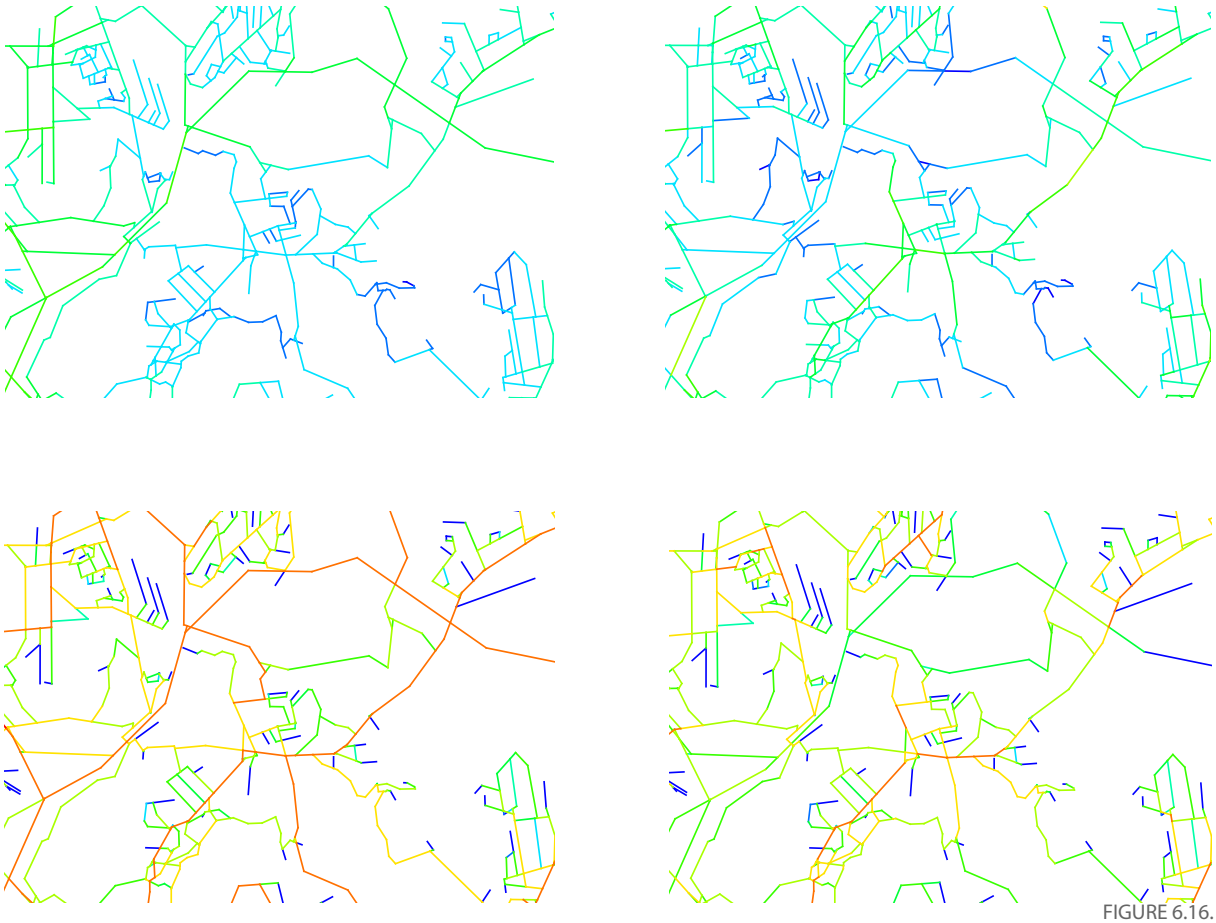


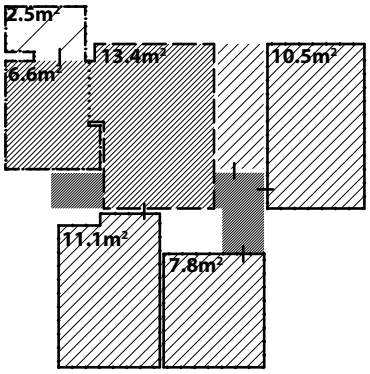
FIGURE 6.16.
Lagarteiro, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

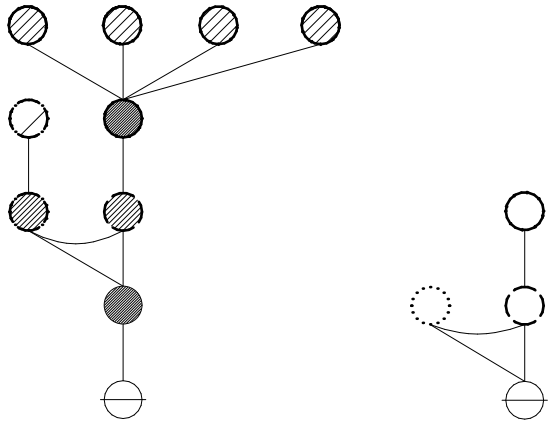
a periurban locality with an abundance of retail, services and urban equipment - mostly local commerce, cafes and restaurants, religious structures, a health centre, a recent urban park, and a school and sports field integrated into the layout. Despite the layout's high values of NaIn r800 and r1500, most of these urban functions are located in its exterior, along pre-existing high choice lines in its vicinity. The estate is located behind pre-existing houses on three of its fronts, the remainder turning its back on the part of the lot that remains vacant until today and which was planned to become a cemetery. The average line in the layout is located more than two axial steps away from the exterior urban fabric, with 4 streets controlling the access to its interior, making the layout mostly invisible from the main streets, and unlikely to be crossed by non-residents. It is worth noting that 400 families, accounting for almost 2000 people assuming the average family of 4, makes up for a large percentage of the people living in this area of the city and as such assigns larger relative importance to the layout.

b) Relations between collective spaces

While 90% of the layout's spaces are distributed, presenting 3 cul-de-sacs that function as connections to residential buildings, the estate was itself a cul-de-sac, until the recent development of an axis with large global choice values in its back, allowing for the layout to be fully crossed. As such, the layout is now relatively shallow from the exterior - presenting maze and separation index values that are around the average for PMP layouts - with fixed-function spaces located on the deepest nodes of the system. The mean depth between convex spaces raises higher, well above the average for PMP layouts, indicating a treelike structure where the spaces of the designed neighbourhood are, on average, almost 4 convex steps away from each other. Only 60% of these spaces are constituted by doors to functional spaces. With a neighbourliness score of 4.5, the number of front-doors per convex space varies from 2 to 9, with the lower numbers being those of cul-de-sac spaces. Due to the layout's treelike structure, neighbours are, on average, more than 4 convex spaces away from each other.

While there exists a system of redundant sidewalks separating the street from the buildings' front-doors, no mechanisms exist to assure gradual privacy from the movement lines of the layout to these access spaces. Instead, visibility is total within each convex space. The layout integrates a school and a sports field. Both located in the deeper areas of the estate, these functional spaces are not well integrated, displaying values below the average. As in other PMP estates, the school is deep from the globality of the layout, but shallow in relation to its exterior, allowing for students and staff to access it without stepping inside the estate. Contrarily, the sports field is both deep within the layout and deep from the exterior. It is located in a non-constituted convex space defined by the backs of the school and residential buildings, and its use seems to rely on school activities and local knowledge by the residents. The larger values of integration of spaces connecting to a large number of front-doors, as well as their simultaneously ringy and functional b-type space character, could assign these a collective potential to these spaces. However, in most





INTEGRATION

min. value	0.65
25th percentile	0.69
50th percentile	0.77
75th percentile	1.31
max. value	2.20

private sector
collective sector
services sector

FIGURE 6.17.
Lagarteiro, apartment scheme: plan and accessibility graph.

cases, these areas are occupied by parking lots.

At the time of visits, traces of use were fundamentally the appropriation of sidewalks with informal clothes hangers. A shallow, non-constituted, poorly integrated space located in between the back of one residential building and the back of pre-existing houses, seems to be regularly used by the layouts' residents for the celebration of events. In two visits, one taken around Christmas and the other a few days before the city's official celebration, tents, barbecues and other structures were identified in the area.

c) Relation to individual houses

Accessibility to houses is, in the majority of cases, provided through large convex spaces that reunite several different buildings and where routine co-presence and awareness of one's neighbours are likely to be produced. Similarly, as the estate's permeability to the exterior city is majorly controlled by one primary axis, a barrier is created where residents can easily be known and differentiated from strangers. Simultaneously, however, the layout presents of the highest values of functional interface decomposition, with fixed-function spaces being an average of 4.2 steps away from each other, thus creating smaller, relatively independent, control clusters similar to those seen in layout 3, 4 and 5. Houses are accessible through interior staircases serving 8 apartments

d) Relationship of the house with the exterior

The three-bedroom apartment type of layout 6 has a total useful area of around 61m2, resulting in a density of 15.2m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. Depth is created in the small layout through the introduction of two transition spaces into the design, which in one moment separate the living-room from the exterior, and in another separate the bedrooms from the collective space of the house. The layout includes a dedicated space for the treatment of clothes, a domestic function which, while not integrated into the design of the estate's collective areas, has been registered taking place outside, in informal clothes' hangers.

e) Collective sector of the house

The apartment has a 13.4 living-room, an area above the minimum and slightly below the ideal. It is simultaneously the largest, shallower and the better-integrated space of the house, functioning as its organizing centre. It is separated from the front door by a small entrance-hall, it opens to the kitchen and connects to the bedrooms.

f) Services sector of the house

The services sector of layout 6 encompasses a kitchen and a dedicated space for treating clothes. The sector is small, with a kitchen's area close to the minimum, and presents a considerably lower value of integration than the living-room. However, the space of the kitchen opens



FIGURE 6.18. Bom Pastor, surrounding city.

to the living room through a wide gap in the wall. It is a shallow space, two steps away from the exterior.

g) Private sector of the house

The private sector of apartment scheme 6 is not clearly defined. The layout integrates three enclosed rooms. Two of them connect to a small transition space which also connects to the bathroom, organizing a deep and little integrated cluster. The third, one of the largest, connects to the living-room.

h) Relationships between sectors of the house

	living-room >	transition space >	kitchen >	bedrooms >	washroom >	other space =	exterior
integration	2.2	1.397	1.222	0.771	0.733	0.647	0.647
area	13.4m^2	1.95m^2	6.6m^2	9.8m^2	4m^2	2.5.m^2	-
minimum area ratio	1.12	-	1.1	1.31	-	-	-
ideal area ratio	0.74	-	0.97	0.99	-	-	-
depth exterior	2	2	2	3.67	4	3	0
type-space	c	b	c	a/c	a	a	b
functional type-space	fd	ff	ff	fi	fi	fa	ff

TABLE 6.7. Lagartei-ro, spatial attributes of apartment scheme.

The apartment can be represented as a simplified accessibility graph A1, where the kitchen and living room are connected and the latter functions as a transition space, controlling access to the private sector of the house. This configuration has been suggested to be conductive of more intense use of collective areas by family members, and in particular by women. While it has a clearly defined two-bedroom private sector, the layout presents functionally ambiguous spaces. The services and collective functional spaces function as a social pole, and a room is adjacent to the living-room, a characteristic which the results of the analysis of the Survey on Urban Housing have suggested may lead to that space not being used to sleep. In this sense, privilege seems to be assigned to potentially social areas, which make up over half the apartments area while being simultaneously the most integrated.

6.5. LAYOUT 7: BOM PASTOR

a) Relation to the surrounding city

Layout 7, Bairro do Bom Pastor, was founded in 1973. Housing 247 families, it is a moderately small, albeit dense estate (area=38200m2, area per inhabitant=34.8m2). The only estate to be built in one of the areas where *ilhas* were to be demolished, it was located in an area of the city that was already well developed at the time. In the vicinity of arterial roads of the city and

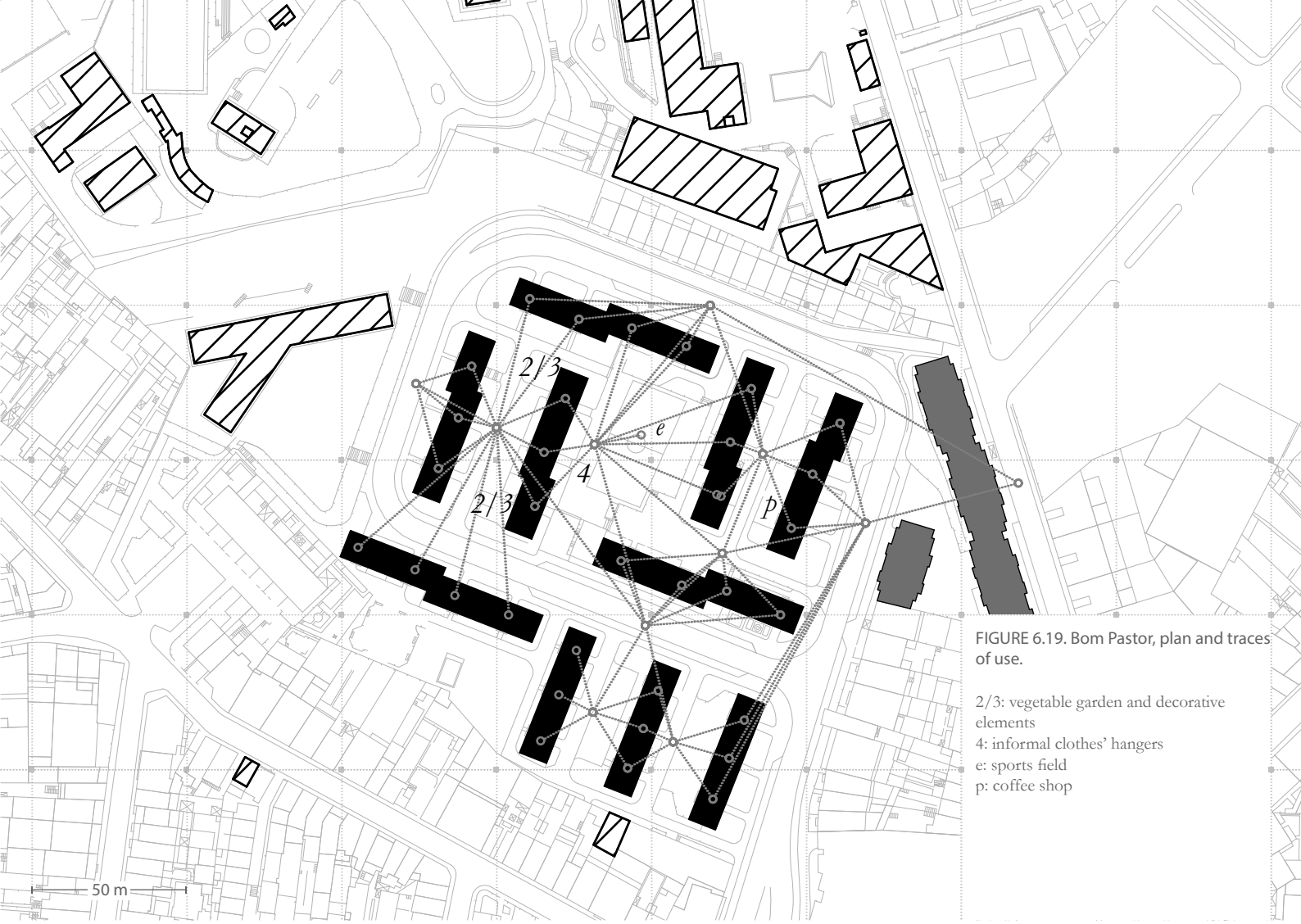


FIGURE 6.19. Bom Pastor, plan and traces of use.

2/3: vegetable garden and decorative elements
4: informal clothes' hangers
e: sports field
p: coffee shop

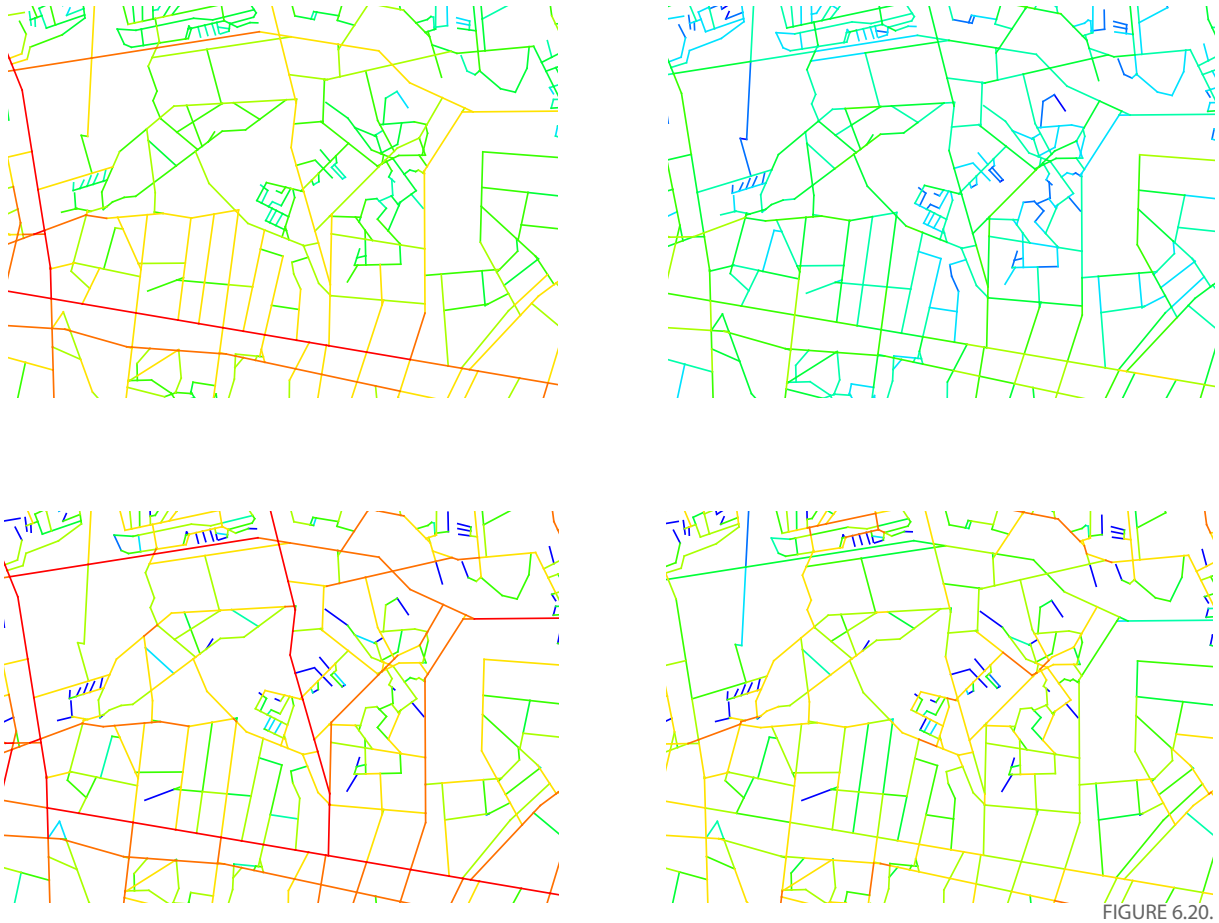


FIGURE 6.20.
Bom Pastor, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

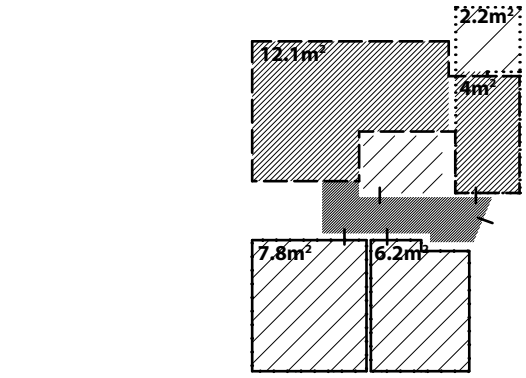
densely urbanised areas, it benefited from all sorts of urban equipment and facilities, as well as an abundance of retail, services and public transportation. Nevertheless, this was the only estate built during the second phase of the PMCP to integrate all commercial spaces, a social centre, a sports field and a school which, not being a part of the same intervention, was planned simultaneously. The area was highly integrated when the second phase of the PMP was planned, making this the better located of the developed estates, and further benefited from the city's growth. Many of the surrounding streets are in the first decile of integration, and one of the streets which connects to the housing scheme is an important artery connecting to the adjacent municipalities to the north.

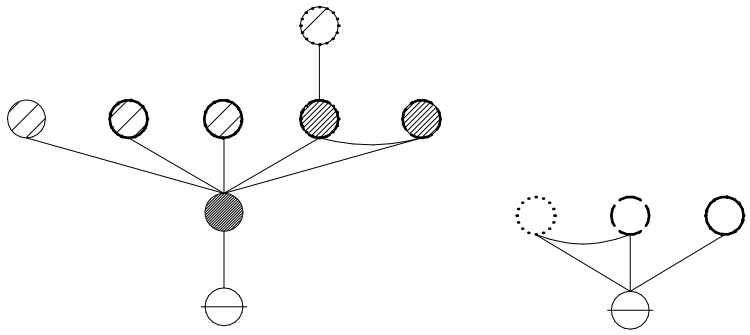
If the estate is located in a privileged area of the city, it is also removed from the main urban grid. It is located in the interior of a block that was constructed all-around and has only two openings through which to connect to the exterior (discounting the option to pass through the school). The interior of the estate is on average nearly 3 axial turns away from the nearest streets, which places its 'maze index' on the higher half of all housing schemes developed within the second phase of the PMCP. While the estate's invisibility might be countered by its privileged location in relation to an elementary school, it seems more likely that non-resident students use a side entrance connected to the main street, creating instead a spatial division between those who live in the estate and those who don't.

b) Relations between collective spaces

Like in the other layouts developed within the PMCP, almost all spaces in layout 7 are distributed, creating a fairly ringy, grid-like system. Despite the ringy character of transition spaces, most of which are c-type spaces, this layout is characterised by low integration and fairly hierarchised spaces (difference factor=0.77), and convex spaces that are at an above-average depth from each other. Similarly, neighbours are, on average, more than 4 topological steps away from each others' doorsteps. Because convex spaces are smaller and more controlled in this layout, the number of doors per convex space decreases in comparison to other cases (neighbourliness score=4.3), and the doors distribution across spaces is more asymmetrical, ranging from 7 in the most integrated street of the layout, to 3 in lesser integrated spaces.

One of the spaces with a larger number of front doors is a central area where a sports field is located. While they are not the integration core of the estate, which lies on a street that crosses the estate, splitting it into two building clusters, the convex spaces within which the sports field is located represent a well-integrated, constituted, space of the system. At 3 steps both from the exterior of the layout and the other spaces within it, this equipment only seems to serve the estate over its exterior due to the system's depth, which makes this central area a possible transition space, while not the more likely for all dwellings due to its low control values. The social centre and the headquarters of the estate's residents' association (AM) seem to reflect an idea of collective use by the neighbourhood over public use by the surrounding city. These, while located in the ground floor of buildings which open to one of the streets connecting to the exterior urban





INTEGRATION

min. value	0.69
25th percentile	0.99
50th percentile	0.99
75th percentile	1.55
max. value	6.90

private sector

collective sector

services sector

FIGURE 6.21
Bom Pastor, apartment scheme: plan and accessibility graph.

fabric, are respectively 3 and 4 topological steps away from the exterior of the lot, turning instead to its inside.

No traces of use were encountered on the exterior spaces of the layout during visits in between 2016 and 2020. However, informal clothes hangers and other types of appropriation of the small gardened spaces separating buildings from the street were common before the estate's rehabilitation.

c) Relation to individual houses

Accessibility to houses is, in the majority of cases, provided through large convex spaces that reunite several different buildings and where routine co-presence and awareness of one's neighbours is likely to be produced. Similarly, as the estate's permeability to the exterior city is majorly controlled by one main axis, a barrier is created where residents can easily be known and differentiated from strangers.

Simultaneously, however, the layout presents of the highest values of functional interface decomposition, with fixed-function spaces being an average of 4.2 steps away from each other, thus creating smaller, relatively independent, control clusters similar to those seen in layout 3, 4 and 5. Houses are accessible through interior staircases serving 8 apartments.

d) Relationship of the house with the exterior

The 12.1m2 living-room represents 30% of the apartment's area. It is divided into two convex spaces, one of which opens to the kitchen, the other to the corridor. Both are functional c-type spaces and, as such, provide access to a fixed function - the kitchen - without controlling all access to it. While the largest sector of the house, the collective area is not the best integrated. It is 3 steps away from the exterior of the apartment and 2 steps away from the bedrooms, in front of which it is located. In this way, access to the living-room involves either crossing the kitchen or walking past bedrooms' doors, and there does not exist a clearly defined area for strangers or guests, separated from spaces prone to domestic use.

e) Collective sector of the house

The 4m2 kitchen connects to a 2.2m2 space dedicated to clothes' related work and opens to the living room, creating a pole of social potential that occupies 40% of the apartment. It is a c-type space, connecting both to the entrance hall and the living room and, while small, the kitchen presents the largest value of integration of all functional spaces, second only to the central corridor.

f) Services sector of the house

The 4m2 kitchen connects to a 2.2m2 space dedicated to clothes' related work and opens



FIGURE 6.22. Aleixo, surrounding city

Equipment

Industry

Public or cooperative housing development

500m

250m

to the living room, creating a pole of social potential that occupies 40% of the apartment. It is a c-type space, connecting both to the entrance hall and the living room and, while small, the kitchen presents the largest value of integration of all functional spaces, second only to the central corridor.

g) Private sector of the house

Bedrooms are smaller than the minimum area. No additional privacy is assigned to these spaces, accessible through the same main corridor as the collective areas of the house.

h) Relationships between sectors of the house

	transition space >	kitchen >	living-room >	bedrooms =	washroom =	exterior >	other space
integration	6.896	1.724	1.379	0.985	0.985	0.985	0.690
area	3.6m²	4m²	12.1m²	7m²	2.4m²	-	2.2m²
minimum area ratio	-	0.67	1	0.73	-	-	-
ideal area ratio	-	0.59	0.67	0.64	-	-	-
depth exterior	1	2	2	2	2	0	3
type-space	c	c	c	a	a	b	a
functional type-space	fb	ff	fd	fi	fi	ff	fa

TABLE 6.8. Bom Pastor, spatial attributes of apartment scheme.

The apartment can be represented as a simplified accessibility graph A2. The kitchen and living-room are articulated in a pole of social potential integrating a ring with the main distribution corridor, and there are no clearly defined sectors. Integration values drop after the highly integrated transition space and are similar for functional spaces. The difference factor of the apartment is a strong 0.37. The kitchen is the best integrated functional space, followed by the living-room and then by the bedrooms. With no clearly defined sectors, articulated collective and services sectors, and bedrooms that connect to a ringy system, the design appears to assign privilege to the social potential of spaces.

6.6. LAYOUT 8: ALEIXO

a) Relation to the surrounding city

Layout 8 represents one of the later estates constructed within the PMCP, being one of the two that were only finalised after the revolution in 1974. Built explicitly to house the inhabitants of the old centre of the city, maintaining a relationship to the river both in its proximity to the riverside and in the high-rise morphology of its buildings that allowed its residents to maintain a view of the river, the layout was also connected to the new port to the north through its location near important city axes characterised by large values of global NaCh (Rua do Campo

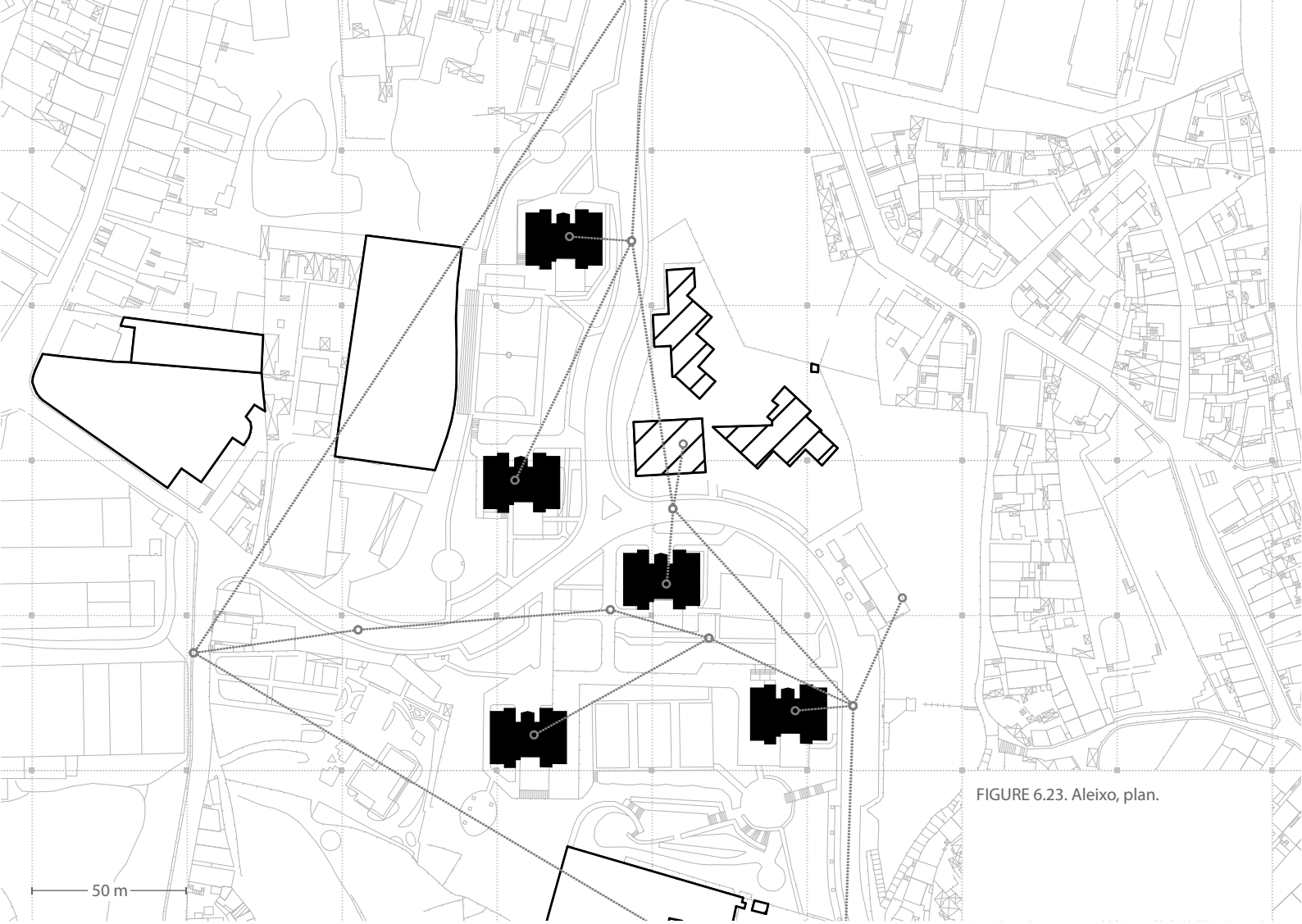


FIGURE 6.23. Aleixo, plan.

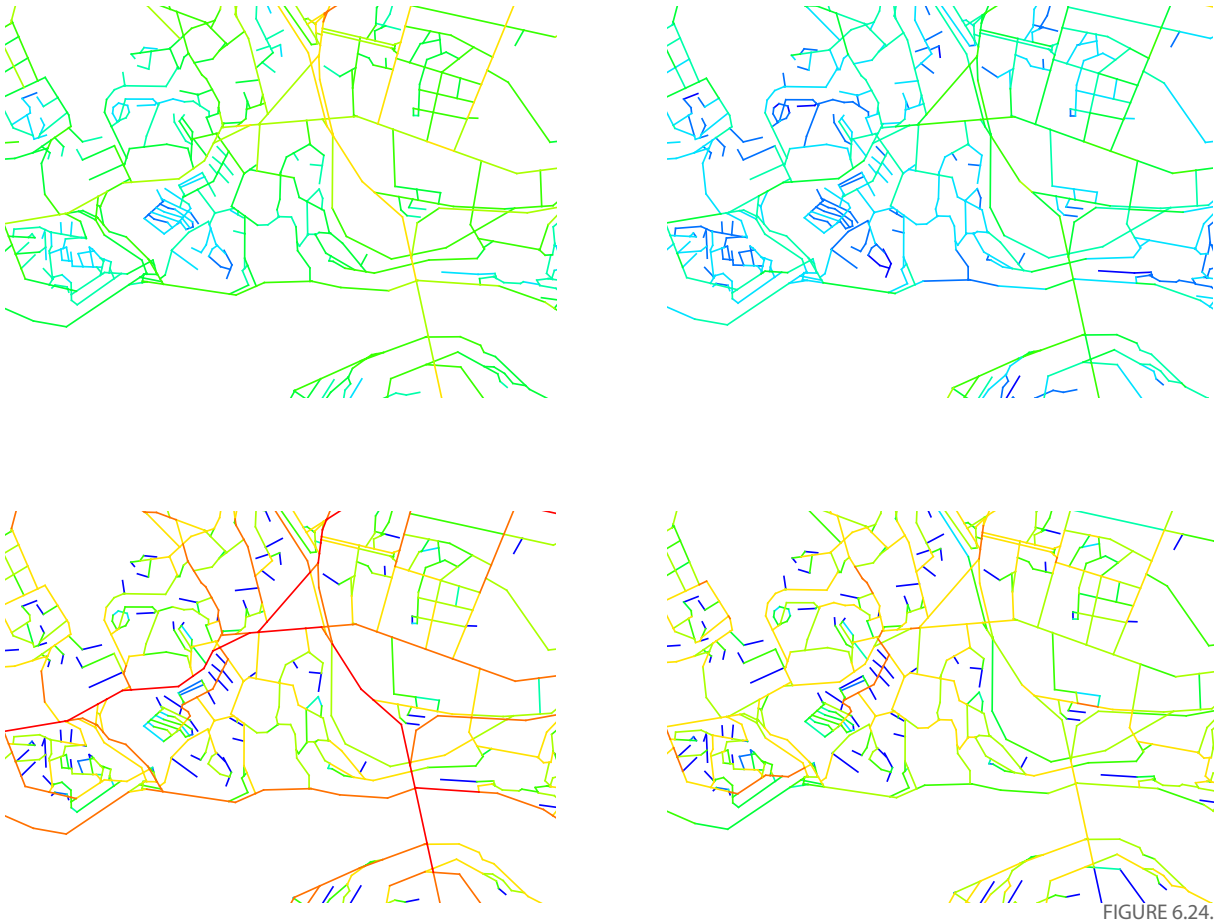


FIGURE 6.24.
Aleixo, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Alegre NaCh(r5000)=1.33). It is located in a mainly residential area that grew connected to public housing development but, connecting the riverside to an important axis of the city, and is well served by retail, services, transportation and other urban infrastructure. The layout itself is made up of lines of average integration, but above average choice at all scales.

Morphologically, layout 8 represents a clear exception. It is the only estate built between 1969 and 1982 that is more than 4 storeys high, with residential towers positioned according to solar orientation and organised directly around the main street that became integrated with the city's street system. However, while it is the only PMCP layout that is directly connected to a street that is integrated into the primary urban grid, residential buildings, whose front-doors all face north, are detached from the main street. Instead, following the logic of small clusters within one larger cluster detected in previous layouts, each is connected to one pathway that creates a barrier from the main street. Nevertheless, most spaces are distributed and, with a maze index of 1.31 and a separation-index of 1, the exterior system presents the lowest depth measures in relation to the main city fabric of all PMCP estates. As such, navigating through the layout is likely not dependent on local knowledge.

b) Relations between collective spaces

The placement of residential buildings along the street but with entrances that step back from it results in a tree-like but shallow structure whose integration core lies on the public street and expands to integrate a central space among the towers that, in the original design, was explicitly created with the objective of being a centre of social interaction in the estate. However, residents from overcrowded sublets in the old city centre occupied the estate after the revolution of 1974, before its full completion. Consequently, parts of the original design were never carried on, in particular those concerning collective areas and activities. The social and senior centres and sports field that served the estate, as well as the school that was planned in the PDP, were only posteriorly built, with a configuration that differed substantially from the original intent. While the architectural design included a central area that would include fixed-function spaces and that should connect the different residential buildings, the social centre ended up being placed on the opposite side of the street, at a minimum of 3 convex steps from residential buildings. Instead of a ringy, functional b-type space, social functions became more segregated and functionally segregated. The consequences of this seem to be twofold. On the one side, the removal of fixed-function spaces from the better-integrated areas of the layout is likely to reduce passive use by routine awareness and co-presence among neighbours. On the other, the lack of functional spaces in the central, more integrated and more likely to be visited areas of the estate takes away some of its intentionality and make them less likely to be used as places of reunion and community-building. As such, while the depth between residential buildings - which sits at an average of 2.9 steps - would certainly not decrease had the original design been completed, the depth between neighbours would have.

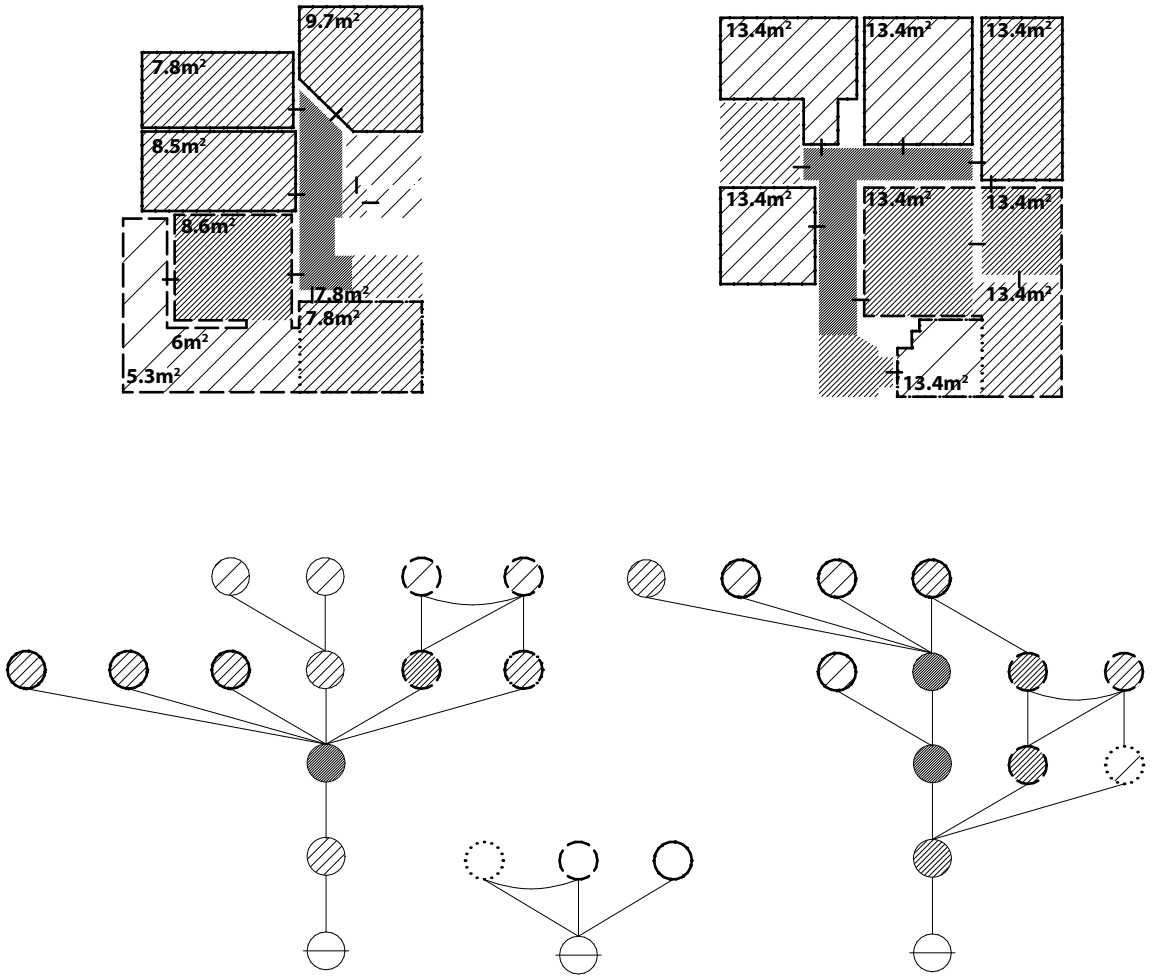


FIGURE 6.25.
Aleixo, apartment schemes A (left) and B (right): plans and accessibility graphs.

This estate is one of the two PMCP layouts that were demolished in the last decades. Regarding layout 8, this process began in 2011. In 2016, when the research presented in this dissertation was started, not only two of its residential towers, its school and social centre had been demolished, but a notorious process of social abandonment of the estate was being carried on by the municipality (Queirós, 2019). As such, it was not possible to visit the estate in its normal functioning.

c) Relation to individual houses

While layout 8 presents particularly low values on depth measures that relate the system to the outside - specifically the maze and separation indexes - the succession of spaces between the main street and the buildings' entrances results in an above-average depth between the exterior and the dwellings.

Each building houses 52 families, around 200 people when assuming that the average family consists of the number of rooms in an apartment plus one. Explicitly aiming at creating a space for social interaction between residents (Teles, 1969), apartments were accessed through an open central space that reunited a series of o-shaped corridors. Even though the timing of this research did not allow for visits of Layout 8 before its demolishing, photographs and documentaries show this interior space as one that became an extension of the apartments, being thoroughly used by residents and displaying traces of use such as clothes hangers but also furniture and decorative elements (see, for example, Quelhas, 2013; Salaviza & Alves Jr., 2018; Guiomar, 2020).

d) Relationship of the house with the exterior

Two different apartment types were analysed for layout 8, due to apparent significant differences in their plans.

Both apartment types are larger than other PMCP estates while remaining below the minimum area. The three-bedroom apartment type has an area of 65.7m2, corresponding to 72% of the minimum area and a density of 16.42m2 per resident when ideally occupied, and the four-bedroom apartment type has an area of 75.3, corresponding to 83% of the minimum and to an ideal density of 15m2 per resident. Apartment scheme 1's functional spaces all connect to the same transition space and are, as such, at an equal convex depth of 2 steps from the exterior. However, the living-room requires one less visual turn in order to be reached from the exterior, as it is located in front of the entrance door. Apartment scheme 2's spaces present differentiated relations with the exterior. The living room, kitchen and one bedroom are located at depth 2 from the exterior, while bedrooms are at depth 3. Both layouts include fairly large exterior spaces connected both to the services and collective sector and offer the possibility of exterior permanence within the house.

e) Collective sector of the house

Apartment scheme 1 of layout 8 includes two living spaces whose areas add up to 14.6m2. Even though each of the spaces is smaller than the legislated minimum, combined they grow above it. Furthermore, one of these spaces extends to the area where the fixed-feature furniture necessary for cooking is located, which results in an area of collective potential of 22.4m2, 34% of the apartment's area. Considered as a set, this functional sector is the better-integrated of the house, following the central transition space.

Apartment scheme 2 of layout 8 similarly includes two living spaces and one kitchen, the three making up a larger than required collective sector. While positioned differently in the apartment plans, the configurational relations established between the living spaces, their associated balconies and the kitchen are similar in both apartment schemes. They vary, however, in their articulation with the remaining spaces of the house. If the collective sector maintains the mean largest integration value, it is much closer to the values of integration of bedrooms in apartment scheme 2.

f) Services sector of the house

Importance appears to be assigned to kitchens through their integration into the collective spaces of both apartment schemes. While, as in other PMCP apartment schemes, kitchens remain small, they are not only well-integrated but integrate rings and are openly connected to potentially collective spaces of the house.

g) Private sector of the house

It is in the private sector that the two apartment schemes differ the most. Layout 8's Apartment scheme 1 has a private sector which, while sharing the same depth from the exterior as collective spaces, is clearly defined in its not belonging to the ringy system that includes the living-rooms and kitchen. In apartment scheme 2, the private sector is not defined, and the spatial attributes of bedrooms are not consistent. Two of the bedrooms, along with one bathroom, are the deepest functional spaces of the house and present a smaller value of integration than the private sector. A third bedroom is shallower, located at 2 steps from the exterior, and the space of the house with the lowest value of integration. The fourth bedroom is deep, at 4 steps from the exterior, and connects to the same balcony as the collective sector. All rooms are small, bordering on the minimum area.

h) Relationships between sectors of the house

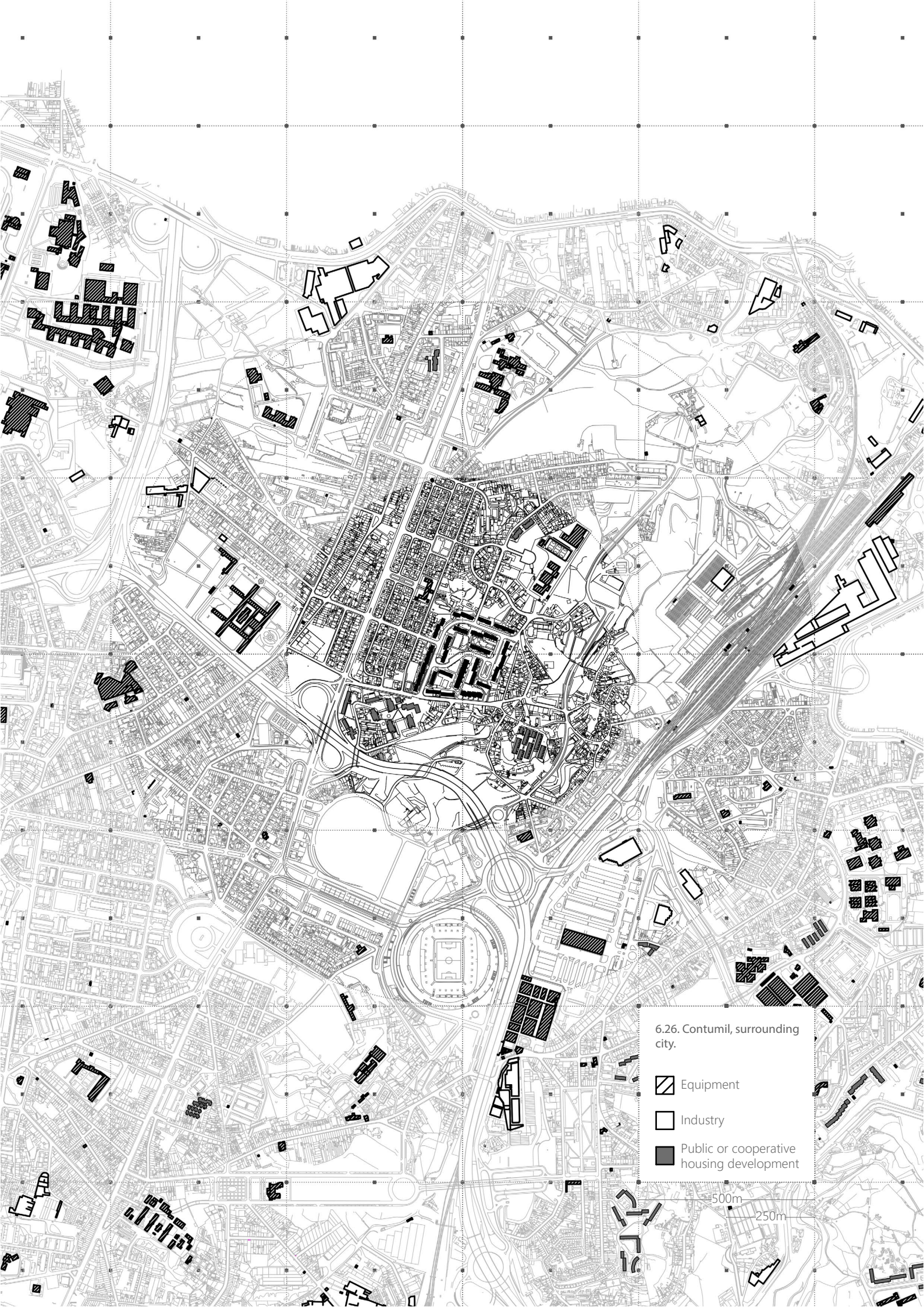
	transition space >	living-room >	kitchen >	bedrooms >	washroom >	living-room >	exterior space >	exterior
integration	2.078	1.515	1.399	1.054	0.932	0.909	0.866	0.727
area	2.5m²	8.6m²	7.8m²	8.67m²	1.75m²	6m²	5.3m²	-
minimum area ratio	-	1.37	1.3	1.03	-	1.37	-	-
ideal area ratio	-	0.91	1	0.9	-	0.91	-	-
depth exterior	2	3	3	3.33	3.5	3	4	0
type-space	b/c	c	a	a	a	d	c	b
functional type-space	fd	fd	fd	fi	ff	fd	fd	ff

TABLE 6.9. Aleixo, spatial attributes apartment scheme-A.

	transition space >	exterior space >	living-room >	washroom =	living-room >	bedrooms >	kitchen >	exterior
integration	1.631	1.387	1.095	0.991	0.991	0.884	0.832	0.717
area	2.5m²	5.3m²	8.6m²	1.75m²	6m²	8.67m²	7.8m²	-
minimum area ratio	-	-	1.22	-	1.22	1.03	1.3	-
ideal area ratio	-	-	0.81	-	0.81	0.9	1	-
depth exterior	2.5	4	3	4	3	4.3	2	0
type-space	b/c/d	d	d	a	c	a	c	b
functional type-space	fb/fd	fd	fd	ff	fd	fi	ff	ff

TABLE 6.10. Aleixo, spatial attributes apartment sheme-B..

While the collective sectors of the two apartment schemes share the same adjacency graph, the way kitchens doors are placed in the two layouts differ. If apartment scheme 2 can be represented by a simplified adjacency graph type A2, where there exists a services-collective social pole but the living-room does not control access to the bedrooms or the kitchen, apartment scheme 1, where the placement of the door makes it ambiguous whether it belongs to the space of the living room or of the kitchen, should be characterised as a simplified accessibility graph type A1. Even though both apartment schemes have a transition space as their most integrated space, some importance seems to be assigned to a well-integrated, larger than average living-room and kitchen social pole which includes a similarly larger than average exterior space. The ambiguity and small size of private spaces suggest that privilege was assigned to the potential for collective life of the apartments.



6.26. Contumil, surrounding city.

6.7. LAYOUT 9: CONTUMIL

a) Relation to the surrounding city

With 432 houses and occupying an area of around 50.000m2, this is one of the denser estates developed within the PMCP, surpassed only by layout 8's 24m2/r. Developed between 1971 and 1984, layout 9, Bairro do Contumil, was the last PMCP estate to be completed. It was developed in four different phases by different architects. The first phase, constructed in 1971, was designed by the same team of architects as layout 8, and was deeply connected to the research that was carried on at the time in the LNEC. If this phase is better known, the whole completed layout reflects the trend that can be verified from layout 7 onwards in the approach to the design of exterior spaces and the relation to the primary urban grid.

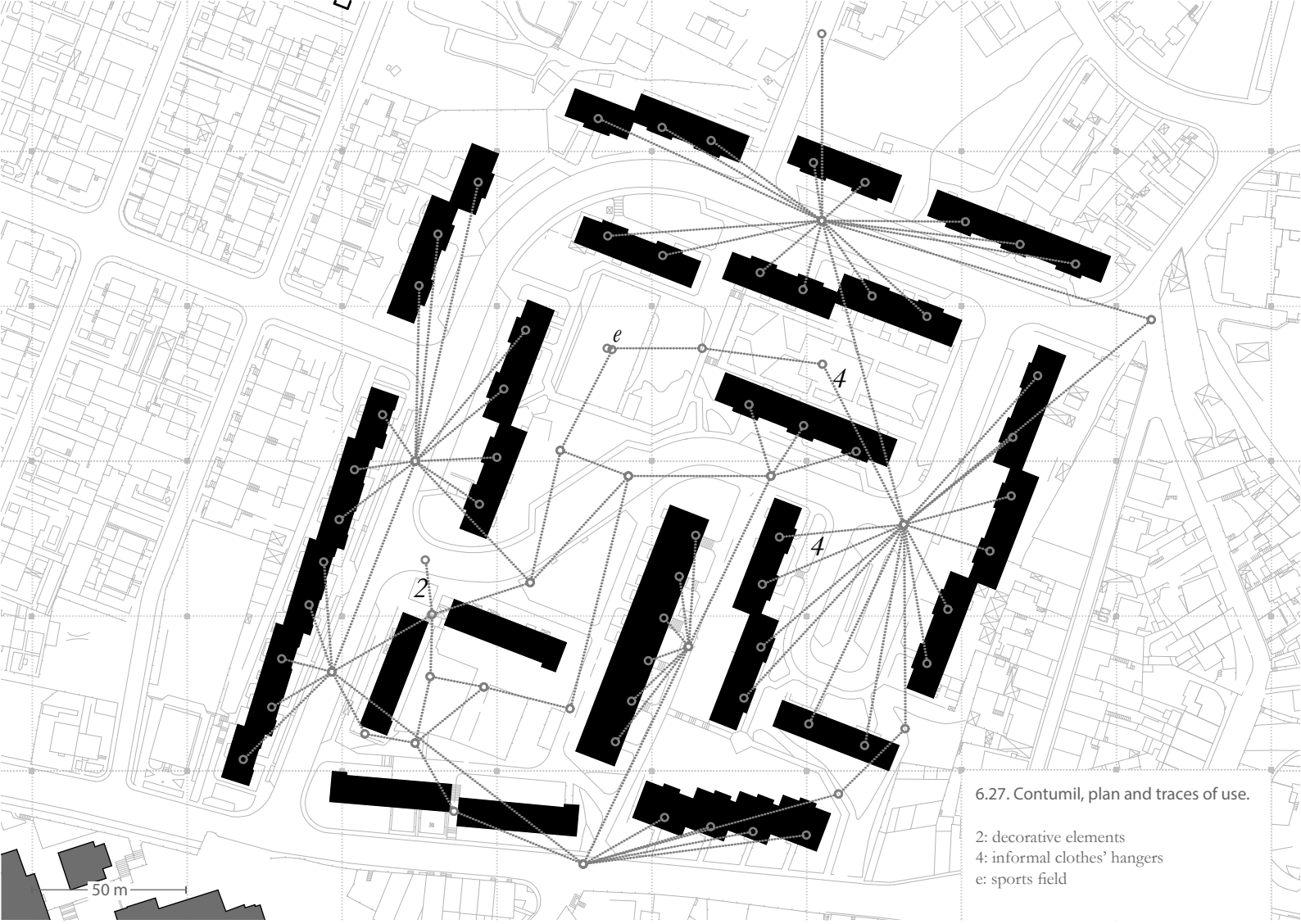
It is situated in a mainly residential area, where local retail and services exist but are not abundant, and other urban infrastructures such as sports facilities, schools and social structures are mostly assured either within the estate or similarly in nearby housing developments. Located in a structured area, even though it is integrated into the surrounding urban grid, it is relatively less locally integrated than other estates. Despite its location near an important, high choice, outbound axis, public transportation has only recently been fully assured by the council.

While located in an area of relatively low integration of the city, the layout connects openly to the surrounding urban tissue, creating a residential fabric where these infrastructures appear meant to be shared across developments. This is apparent in the globally lower depth values of the layout. With a maze index of 1.39, layout 9 is close to the lower values verified in later housing programmes and is the only layout developed within the second phase of the PMCP that constitutes street-frontage in a consolidated urban area. Similarly, it is penetrated by several streets that continue in its exterior, becoming a gridlike system, shallow from the surrounding city.

b) Relations between collective spaces

This gridlike system is not only shallow from the exterior, but shallow in its overall configuration, presenting depth values that are low for PMCP layouts. It is the only layout where all spaces are distributed, and all transition spaces are functional b-types - providing access to residential buildings - while simultaneously part of one or more rings. Consequently, the mean depth between convex spaces is well below average for PMCP estates, with all spaces being at an average of 3 steps from all others, and functional spaces at an average of 3.16 steps from all other fixed-functions.

Most spaces are constituted. The earlier part of the estate adopts an external corridor building typology that results in a low number of front-doors in the exterior areas of the layout, while the



6.27. Contumil, plan and traces of use.

2: decorative elements
4: informal clothes' hangers
e: sports field

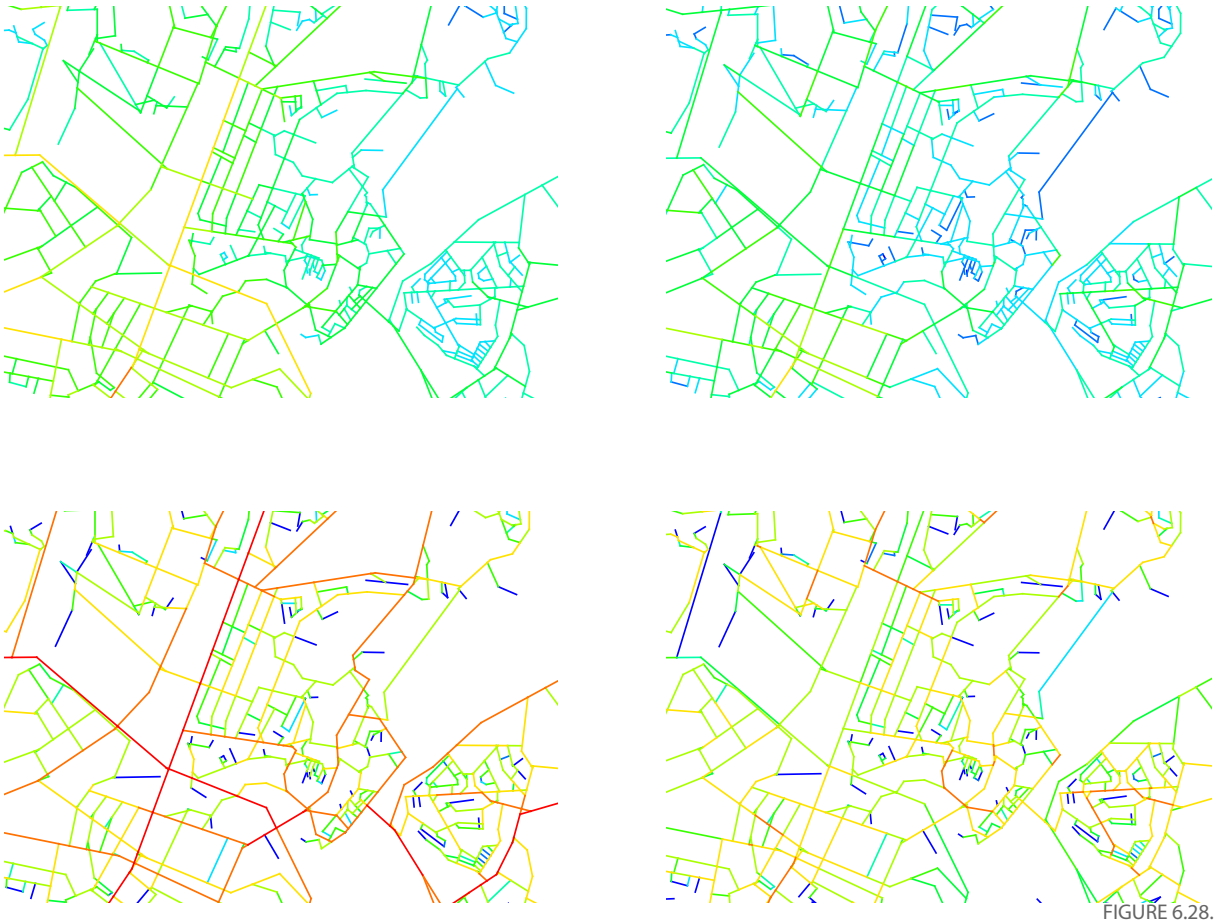


FIGURE 6.28.
Contumil, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

long lines that make up the later phases are characterised by a large number of entrances, reaching 16 and averaging at 11.25.

No system of redundant sidewalks is used, and these doors open directly to the street, only stepping back slightly as entrances are defined by small, green areas adjacent to the buildings where concrete benches are placed. In this layout, soft-landscaped spaces lose their roundabout character and become their own convex spaces with the potential to be used rather than seen. While these spaces are a or b-types located on the back of buildings and so not constituted by front-door, secondary doors open towards them, thus increasing its integration in the system.

The layout's axis of higher local choice, a pre-existing street that crosses the estate, is tangential to the sports field, integrating this equipment in a broader residential structure.

c) Relation to individual houses

Both creating street-frontage and being crossed by a street that is not exclusive to the estate, layout 9's separation index is 1, the minimum, meaning that when walking through the primary city grid one can access the interior of the residential buildings without taking any extra turns. Residents share the access spaces to their houses with an average of 88 other families, are less than 3 steps away from all exterior spaces of the estate, and on average less than 2 steps away from the surrounding city - the lowest value registered for PMCP estates. In the first phase of the estate, access to apartments is done through an exterior corridor with has been subsequently closed through the installation of windows. From 1974 onwards, access is assured by a central staircase serving 2 apartments on each floor.

d) Relationship of the house with the exterior

Contumil's four-bedroom apartment type has an area of 71.5m2 and an ideal-occupation density of 17.9m2/r. The apartment scheme presents differentiated relations with the exterior. There exists an entrance hall at depth 1 from the exterior that openly connects to 2 living-spaces at depth 2. One of these spaces functions as the organising centre of the house, further connecting to the kitchen and the bedrooms access hall, at depth 3. Two exterior spaces are integrated in the layout, one of which possessing a fixed-feature tank for washing clothes. In this sense, it complements within the apartment scheme two functions that are present in the estate's layout: exterior permanence and clothes-related domestic work.

e) Collective sector of the house

The apartment scheme includes two living spaces, one of which both adjacent and visually contiguous to the kitchen. Even though each of the spaces is smaller than the legislated minimum, combined they grow above it. Together, living areas add up to 19.8m2. When the area where

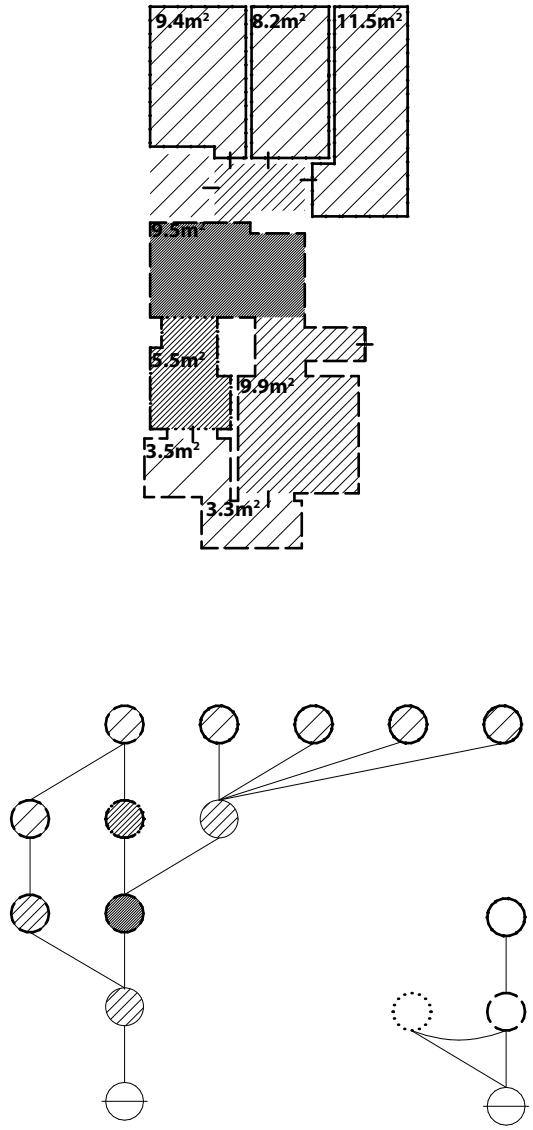


FIGURE 6.29.
Contumil, apartment scheme: plan and accessibility graph.

fixed-feature kitchen furniture is considered, it adds up to 25.3m2, corresponding to 36% of the apartment's area. The collective-services pole is the better integrated functional area of the house. However, one of the living-rooms is both 2 steps away from the kitchen and less integrated into the house in general. The remaining living-room functions as a transition space, controlling access to the kitchen and bedrooms.

f) Services sector of the house

Importance appears to be assigned to the kitchen through its integration into the collective spaces of the apartment scheme. It is not only well-integrated but integrate rings and is openly connected to potentially collective spaces of the house.

g) Private sector of the house

The apartment scheme presents bedrooms that approximate the minimum area. While remaining openly connected to the collective sector of the house, there is a deeper, less integrated, clearly defined private sector, while one room appears as functionally ambiguous.

h) Relationships between sectors of the house

	living-room >	**transition space >**	**kitchen >**	**bedrooms >**	**washroom >**	**exterior space >**	**exterior**
integration	1.741	1.088	1.045	0.771	0.746	0.686	0.681
area	19.8m^2	2.8m^2	5.5m^2	9.7m^2	2.6m^2	3.4m^2	-
minimum area ratio	1.65	-	0.92	1.19	-	-	-
ideal area ratio	1.1	-	0.79	0.99	-	-	-
depth exterior	2	2	3	4	4	3.5	0
type-space	c	c	c	a	a	c	b
functional type-space	fd	fd	ff	fi	ff	fd	ff

TABLE 6.11. Contumil, spatial attributes of apartment scheme.

Even though there is not a clear division between the private, collective and services sectors, the apartment scheme presents two sectors with very different configurational attributes. The private sector is composed of a-type bedrooms, all at 1 step from a transition space, while the collective and services sector is composed by often door-less c-type spaces, integrating a ring with exterior balconies. In this sense, the apartment scheme resemble those of layout 8. Importance seems to be assigned to a well-integrated, larger than average living-room and kitchen social pole which includes a similarly larger than average exterior space. The ambiguity and small size of private spaces appear to support the hypothesis that privilege is assigned to the potential for the collective life of the apartments.

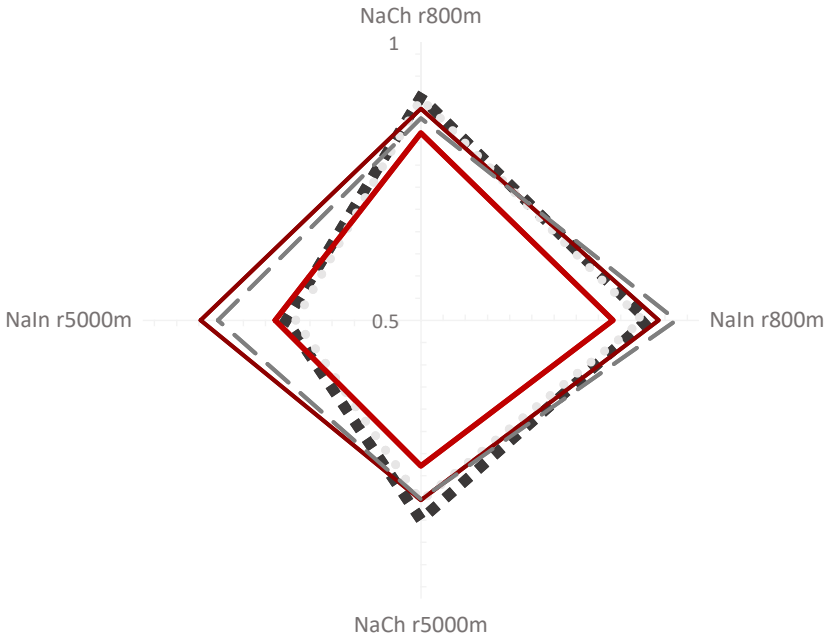
7. DESCRIPTIVE ANALYSIS OF ESTATE AND APARTMENT LAYOUTS DEVELOPED WITH AND FOR ORGANISED RESIDENTS AFTER 1974

Introduction

Eight housing developments from the SAAL programme and six others developed for organised residents associations were analysed in the scope of this research. These correspond to projects resultant from the popular movement that arised during the Portuguese revolutionary period, and were in their majority built between 1969 and 1977, providing housing for approximately 980 families. The analysis, conducted at the scales of urban insertion, estate layout and apartment scheme, is summarised in figure 7.1. and in tables 7.1., 7.2. and 7.3.. The following subchapters will describe the spatial attributes of each of the seven housing developments at these three scales and in the relations between them. These results will be contextualised in a reading of the social and historical conditions surrounding their development in chapter 10 of this dissertation.

	#houses	m2/resident	NaIN5000	NaIN800	NaCH5000	NaCH800
10. Antas	32	47.1	0.77	0.84	0.75	0.79
11. S. Vitor	12	108	0.81	0.80	0.63	0.67
12. Maceda	16	53.8	0.65	0.68	0.26	0.26
13. Francos	44	74.6	0.91	0.91	0.10	1.11
14. Lapa	68	66	0.86	0.98	0.80	0.92
15. Leal	16	37.7	0.91	1.21	0.87	1.03
16. Massarelos	80	6.24	0.69	0.71	0.86	1.14
17. Contumil	62	48.8	0.63	0.71	0.72	0.77
18. Bouça	126	31.1	0.89	1.01	0.84	0.84
	47.1	52.6	0.79	0.87	0.75	0.84
20. Vilar	144	19.1	0.69	0.83	0.73	0.81
21. Campo Alegre	56	21.4	1.00	1.10	1.05	0.10
22. Carvalhido	32	10.4	1.44	1.50	1.36	0.90
34. Tirares	128	18.3	0.61	1.04	0.84	0.91
35. Pego Negro	96	14.8	0.61	0.76	0.87	0.93
44. Boavista	88	18.4	1.02	1.05	0.77	0.87
	90.7	17.1	0.90	1.05	0.94	0.90

TABLE 7.1. Normalised Integration and Choice of SAAL and AM estate layouts.



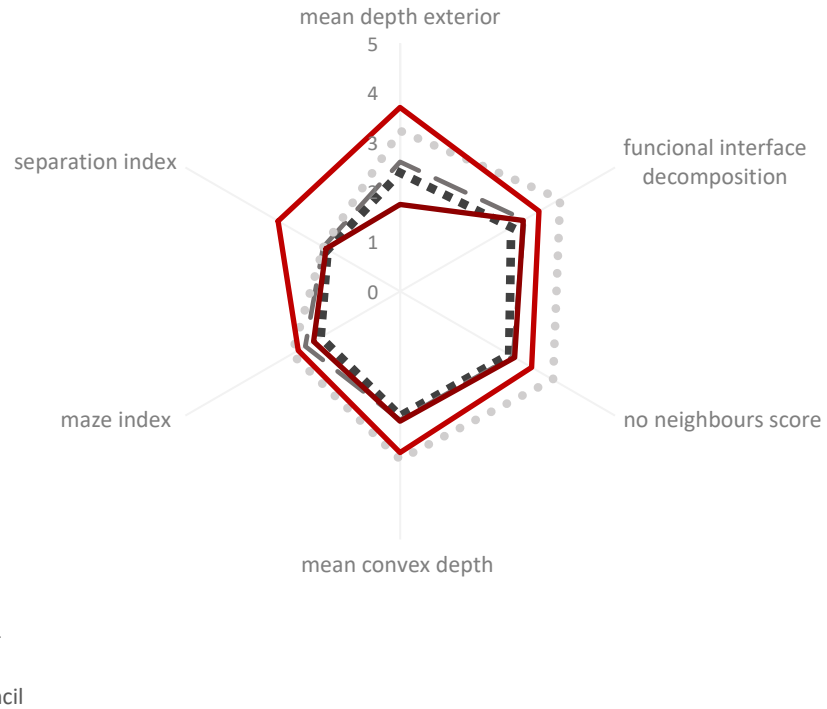


FIGURE 7.1.
Average values of NaIn, NaCh and depth measures for each studied programme with SAAL and AM housing signaled in red.

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
10. Antas	4.17	2.69	2.9	2.76	2.55	3.33
11. S. Vitor	4.75	1.83	3.08	2.46	3.11	4.75
12. Maceda	4.2	2.95	2.95	2.95	2.23	3
13. Francos	4.36	4.46	3.41	4.23	1.86	2.5
14. Lapa	4.01	4.29	3.6	4.17	2.73	2.67
15. Leal	3.23	3.16	2.97	3.07	2.31	3
16. Massarelos	2.33	2.03	2	2.09	1.57	2
17. Contumil	3.21	3.72	3.35	3.62	2.91	2
18. Bouça	3.13	3.98	3.29	3.90	2.07	2
	3.71	3.23	3.06	3.25	2.37	2.81
20. Vilar	2.03	3.42	2.80	3.04	3.24	1.33
21. Campo Alegre	1.86	2.61	2.77	2.77	2.04	2.00
22. Carvalhido	1.60	2.50	2.29	2.12	2.11	2.00
34. Tirares	1.13	2.25	2.44	2.28	1.04	1.00
35. Pego Negro	1.56	2.72	2.63	2.48	1.54	1.5
44. Boavista	2.33	3.70	3.06	3.02	2.11	2.5
	1.75	2.87	2.67	2.62	2.01	1.72

TABLE 7.2. Depth measures of SAAL and AM estate layouts.

	TUFA m2	density m2/r	integration	difference factor	mean depth exterior	functional orientation%
10. Antas	90	30	0.66	0.85	3.6	0.31
11. S. Vitor	88.2	22.05	0.79	0.74	3.3	0.27
12. Maceda Acácio	130.3	43.43	0.72	0.87	3.8	0.31
13. Francos	57.2	14.25	0.67	0.88	4.6	0.31
14. Lapa (A)	132	44	0.72	0.82	5	0.44
14. Lapa (B)	113.8	37.93	0.69	0.79	4.2	0.4
15. Leal	57.3	19.1	0.64	0.90	4.5	0.31
16. Massarelos	51.3	13	0.82	0.74	2.5	0.27
18. Bouça	85	28.33	0.77	0.81	3.3	0.31
35. Vilar	72.32	18	0.90	0.74	3	0.25
36. Campo Alegre	70.11	23.37	1.03	0.79	2.5	0.18
37. Carvalhido	72.32	18	0.90	0.74	3	0.25
38. Tirares	72.32	18	0.90	0.74	3	0.25
39. Pego Negro	72.32	18	0.90	0.74	3	0.25

TABLE 7.3. Spatial attributes of SAAL and AM apartment schemes.



FIGURE 7.2. Antas, surrounding city.

7.1. LAYOUT 10: ANTAS

a) Relation to the surrounding city

Layout 10 was one of the first SAAL projects to start in 1974. Its operational unit included a series of *ilhas* that existed in the area and constituted entire lots where now is located a municipal estate constructed in 2001. Taking advantage of a then vacant space within the operational unit, the layout occupies a 6000m2 area in the interior of a pre-existing lot and is characterised by a low density, allowing more than 45m2 per resident. Like other SAAL developments, layout 10 does not include urban equipment and infrastructure and displays values of local integration (r800, r1500) and choice (all radii) that are bellow both the average for SAAL housing and the average of all cases, revealing poor integration in the local urban tissue, and a weak probability of being used as a space of through-movement. However, at larger radii, the layout displays values above average, integrating an area of the city that is well articulated with the global urban system.

Similarly, the lot is adjacent to an important, high-choice (local and global) axis of the city. It is in this axis that most retail and services can be found in a 500m radius around the layout but, to the west of the avenue, the area was already fully urbanised at the time and provided access to schools, parks and green spaces, and other urban infrastructures. The axial system is on average 2.6 steps away from the surrounding city, to which it is connected through 3 openings in the lot.

b) Relations between collective spaces

If the depth from the surrounding streets gives the layout an inevitable treelike character, the spaces of the designed layout are organised in a gridlike structure, sharing similar values of integration. All spaces are distributed, forming one or more rings, and are divided into non-constituted, transition spaces between the surrounding streets and the housing development, and constituted spaces within the development itself. These spaces provide access to either 16 or 8 houses at a time. Due to its depth from the outside and amount of topological steps required to access the surrounding streets, while houses are at an average of 2.69 steps from each other and convex spaces at an average of 2.75 steps from each other, houses are, on average, over 4 steps away from the street. This assures privacy to the front-yards, which, visually open to the transition spaces of the layout, are private spaces where social interaction with neighbours can happen.

c) Relation to individual houses

The separation index of layout 10 is high, taking more than 3 steps to reach the closest door from either surrounding street. Similarly, houses are distanced from the exterior of the lot on average by over 4 steps. Most of these steps are taken through transition, non-constituted streets,

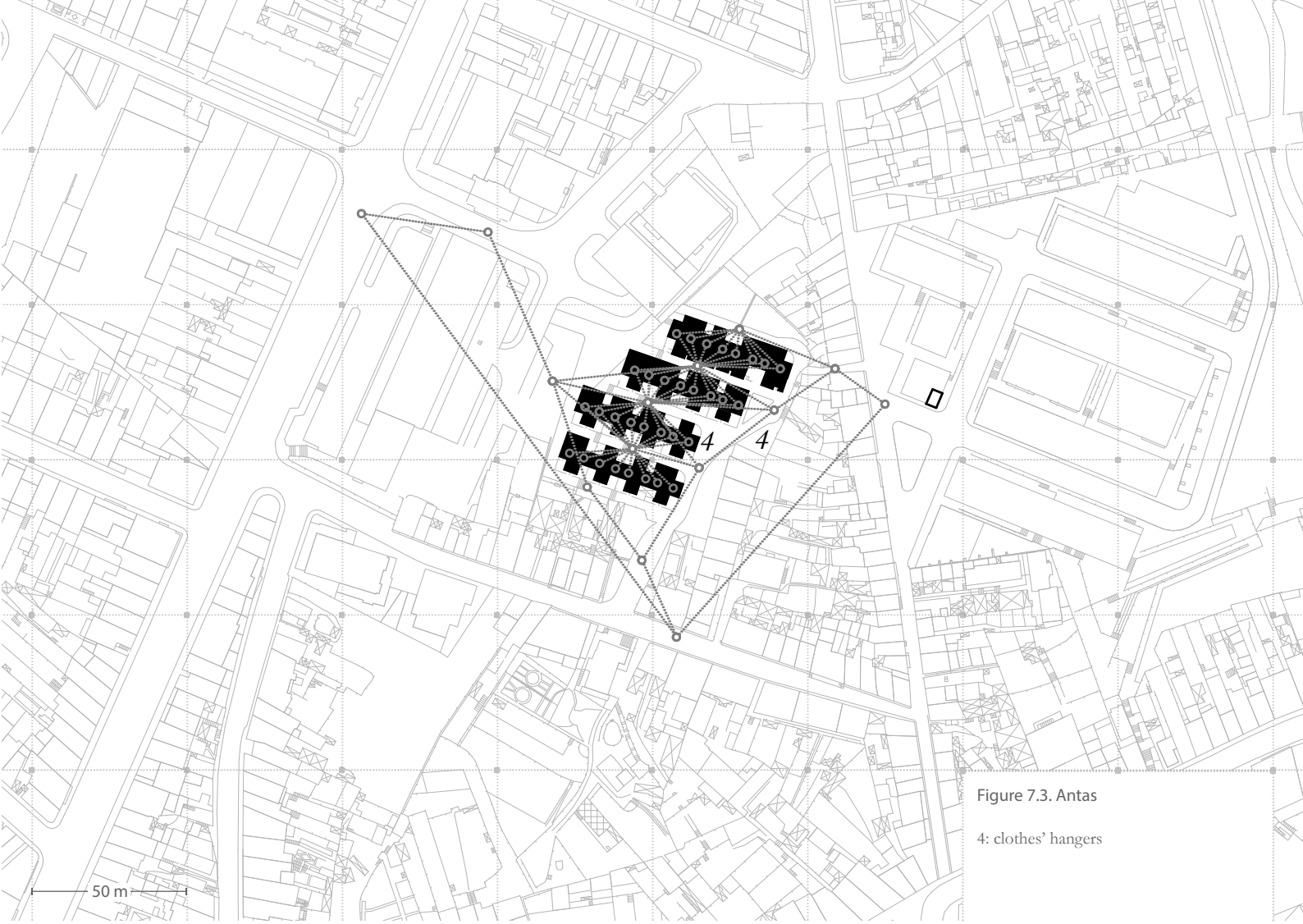


Figure 7.3. Antas

4: clothes' hangers

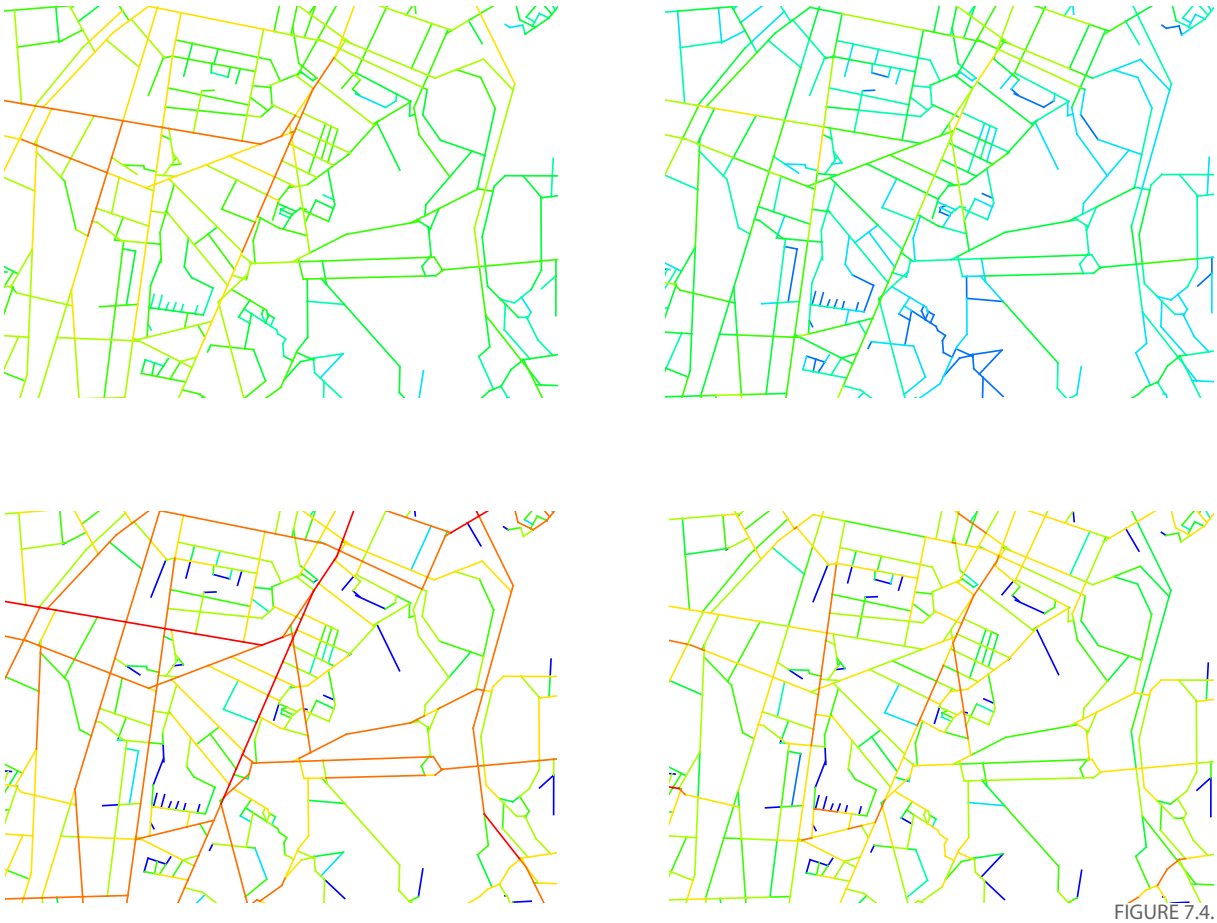


FIGURE 7.4.
Antas, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

with constituted spaces being grouped together, as can be verified through the neighbourliness score of 12.8. When both sides of streets are constituted, half of the doors open to a private front-yard and the other directly to the interior of the house, dividing neighbours into two categories: those with whom co-presence often implies permanence and routine knowledge of one's private life through the interaction between the street and front-yards, and front-yards and front-yards, and another where co-awareness depends only on one's movements from and to home. While the only traces of use in collective spaces that were identified during visits were the use of clothes hangers in space 44, traces of use within those private spaces that have the potential for interaction with the surrounding neighbourhood were also accounted for. While many front-yards were mostly empty, most others seemed to be used mostly for domestic activities such as washing and drying clothes.

d) Relationship of the house with the exterior

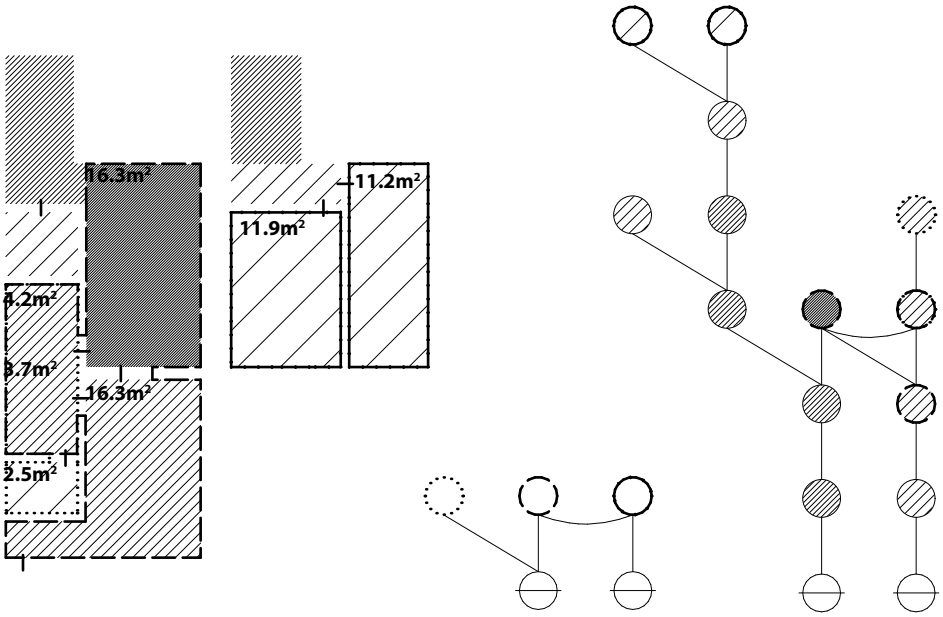
The analysed scheme is of a 90m2 two-bedroom house, 16.3m2 of which belong to an exterior yard, with an ideal density of 30m2 per resident. The layout has two different connections to the exterior, but remains deep, with its deepest spaces - the two bedrooms - being located 7 steps away from the exterior. While the layout's exterior streets present similar attributes, a distinction can be made between the two entrances, where one connects to collective areas of the house and the other to private spaces. Its shallowest nodes correspond to an exterior space, visually connected to the exterior spaces of the layout. This space connects to the living-room, the shallowest space within the house. The design of the exterior layout does not integrate spaces of collective use or for clothes' related tasks. While both of these functions are accommodated within the houses, informal clothes hangers were detected in the exterior layout.

e) Collective sector of the house

The living-room has an area of 16.3m2, which scores above the minimum area and slightly below the ideal, and represents 18% of the house's TUFA. It is simultaneously the shallowest and the better-integrated room, functioning as the organising centre of the house. It opens to an exterior area of the house and is both accessible from and visually connected to the kitchen, to which it controls access. The living-room is located between the kitchen and the bedrooms, but a second entrance gives direct access to the staircase that connects directly to the bedrooms.

f) Services sector of the house

The services sector appears to be split into 3 different spaces, integrating a kitchen, a living area and a storage or clothes related area. While the kitchen itself, with an area 5.5m2, is fairly small, it is complemented by a similarly sized living area and opens to the living room, creating a pole of social potential with an area of 24.16m2, corresponding to around 27% of the house's TUFA. As such, while the kitchen presents a small value of integration, it is well connected to the collective spaces around it.



INTEGRATION

min. value	0.41
25th percentile	0.52
50th percentile	0.70
75th percentile	0.78
max. value	0.96

private sector

collective sector

services sector

FIGURE 7.5.
Antas, apartment scheme: plan and accessibility graph.

g) Private sector of the house

Bedrooms are located on the second floor, which can be accessed through the collective areas of the house or a more private second entrance. They are the deepest and least integrated spaces of the house, but are larger than previous examples, scoring on the ideal area.

h) Relationships between sectors of the house

	living-room > transition space > exterior space > kitchen > washroom > exterior > other space > bedrooms							
integration	0.957	0.782	0.758	0.699	0.627	0.520	0.510	0.413
area	16.3m²	7.24m²	16.3m²	4.2m²	3.2m²	-	16.3m²	11.5
minimum area ratio	1.36	-	-	0.69	-	-	-	1.19
ideal area ratio	0.91	-	-	0.61	-	-	-	1.01
depth exterior	2	4.5	1	3	4	1	2.3	7
type-space	b	b	b	b	a	b	a/b	a
functional type-space	fb	fb	fb	ff	ff	ff	fa/fb	fi

TABLE 7.4. Antas, spatial attributes of apartment

The analysed apartment scheme of layout 10 is one of the few SAAL layouts that include a social pole encompassing the kitchen and living room. Additionally, this aggregated area of potentially collective use is also connected to a front-yard, which is visually open to the exterior street, and, as such, places the social spaces of the house shallow from the exterior. Conversely, the bedrooms are deep from both the exterior and the social pole of the house, creating a well-defined private sector. The former is also the least integrated sector, followed by the services sector which, while displaying small values of integration, connects to the living room, the better-integrated space of the house.

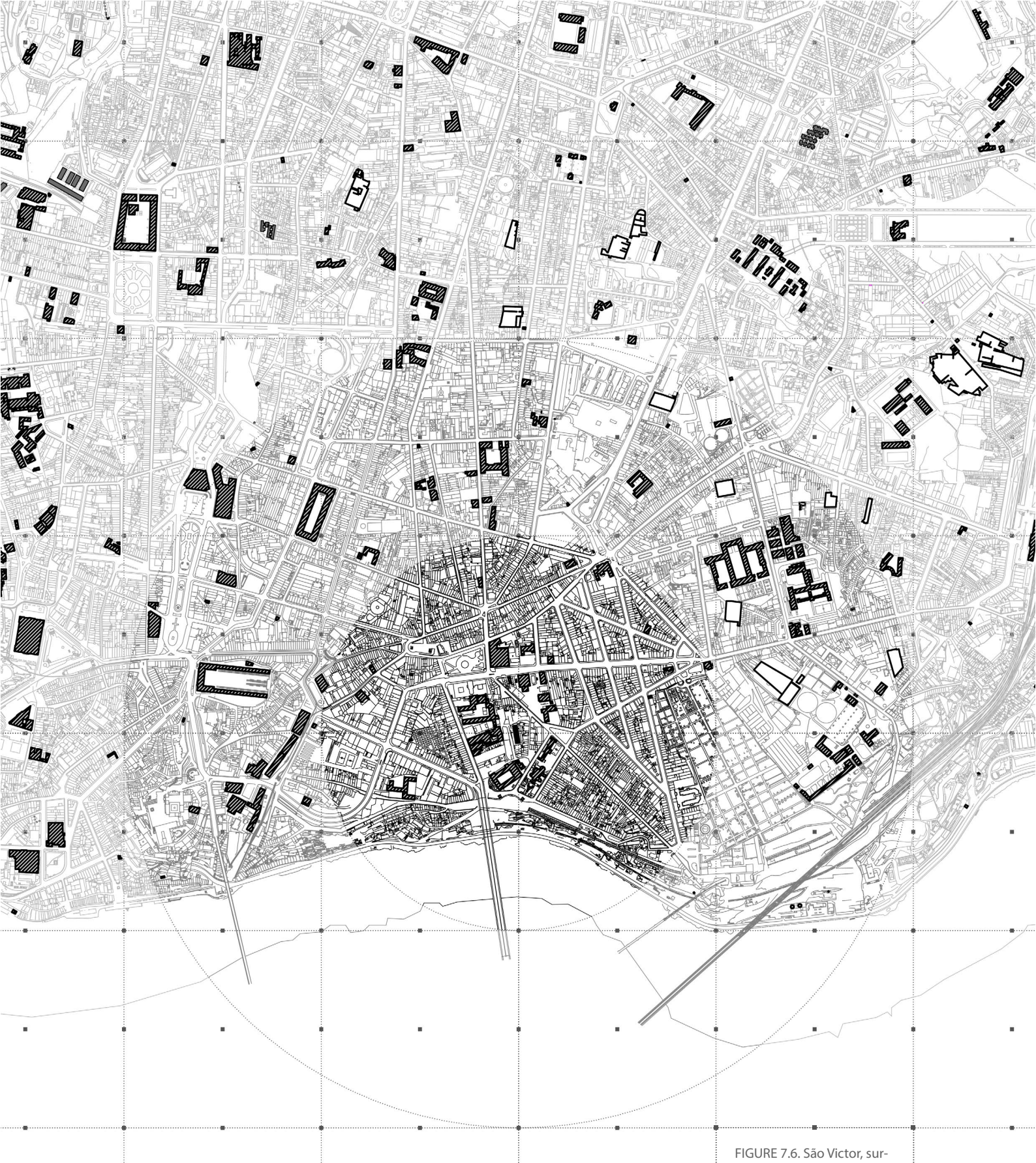


FIGURE 7.6. São Victor, surrounding city

Equipment

Industry

Public or cooperative housing development

500m

250m

7.2. LAYOUT 11: SÃO VICTOR

a) Relation to the surrounding city

One of the first SAAL developments that started in 1974, layout 11 was never completed and remains very distant from its intended configuration even today. Located in an area of high concentration of *ilhas*, the housing development should have been able to house 615 of 630 families. Instead, only 12 residences were constructed, and many *ilhas* remain in the interior of surrounding lots.

The realised project occupies an area of around 1700m2 and allows for more than 100m2 per resident. The requalification of the interior of the lot in 2007, with the construction of a new housing development with capacity for 18 families and the rehabilitation of vacant space, has opened the original houses to the street and resulted in the creation of a succession of soft-landscaped collective spaces.

The area of the city where layout 11 is located has been urbanised since the early XXth century and is characterised by the predominance of institutional buildings, such as Porto's School of Beaux-Arts - where, at the time, the course of Architecture was taught - and the municipal library, and by its proximity to the institutional centre of the city, where are located the City Hall, a train station, the old market, and an abundance of retail, services, transportation and other urban infrastructure. As such, while the development itself is only averagely integrated and is characterised by low choice values, the larger area where it is inserted is an important centre, both in its configuration and in its ensemble of institutional and cultural functions, at the level of the municipality.

Similarly to layout 10, layout 11 has no direct contact to the surrounding streets, appearing instead invisible from the main city grid. If the original design included the rehabilitation of a few pre-existing houses facing the street, a connection of the layout to the existing structured grid of tree-lined streets sided by bourgeois housing was never planned. As such, the original design would not have resulted in a significantly lower maze index than the average 3.1 steps between the surrounding streets and the totality of the axial system, which can be accessed through 3 openings in the lot.

b) Relations between collective spaces

Constituted by one single line of houses, the existing layout is a tree-like system of which the deeper nodes are dwellings. This results in a low percentage of constituted spaces, as only two spaces connect to the houses' entrances. Here, a distinction can be made between front-doors, which connect the most integrated space of the layout to a corridor that provides access to the kitchen and living room, and back-doors, which connect a lesser integrated space the houses'

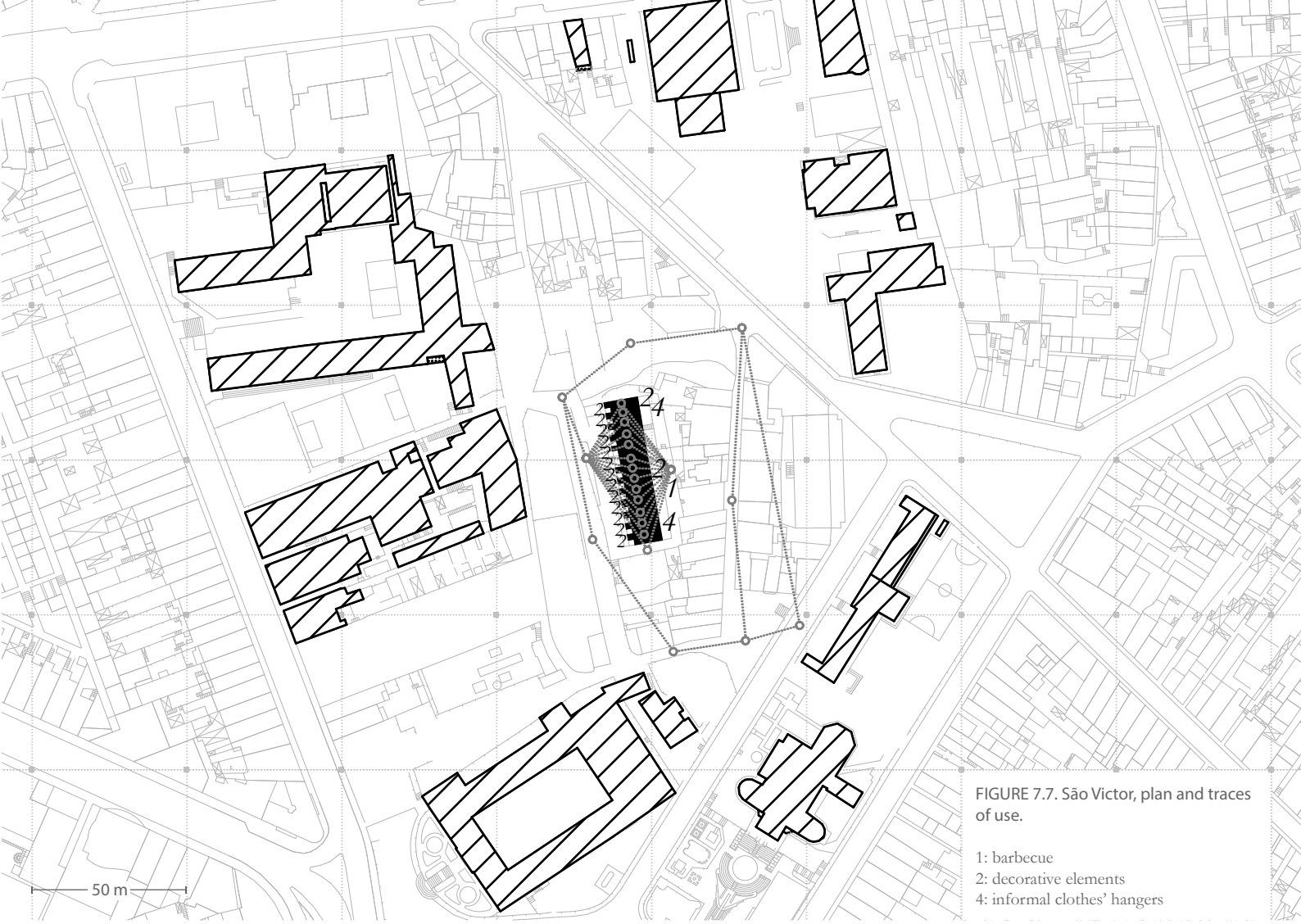


FIGURE 7.7. São Victor, plan and traces of use.

1: barbecue
2: decorative elements
4: informal clothes' hangers

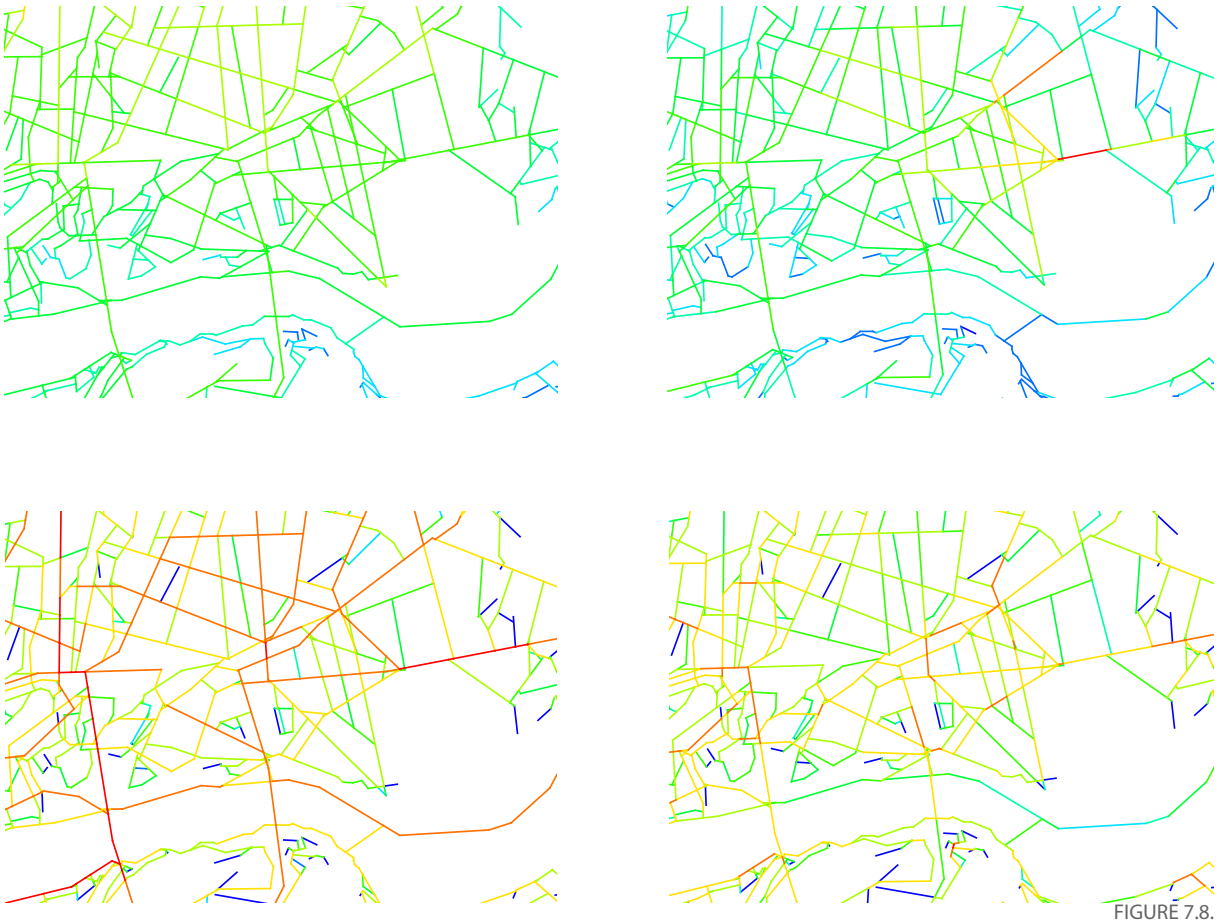


FIGURE 7.8.
São Victor, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

backyards. If the distinction between front and back is clear in the difference of integration values and intuitive as one must cross the front to reach the back, it is also expressed in the traces of use present in the layout. Like other SAAL developments, layout 11 does not provide fixed-function spaces or areas of explicit collective use. Instead, it relies on private but visually open spaces to create a potential for interaction between neighbours.

c) Relation to individual houses

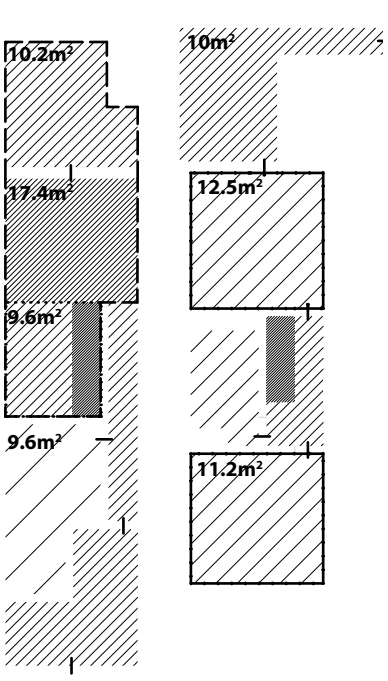
Houses are deep from the surrounding street: in order to reach the dwellings, one must cross an average of 4.75 convex spaces. Because the layout has only one constituted space, the separation index and mean depth of the houses function effectively as the same measure. Grouped together, houses are the minimum of 2 steps from each other. However, the relationship between immediate neighbours is franker than that. In the fronts of houses there exist terraced areas the size of an average front yard, that are characterised by their lack of walls and doors. Instead, low walls the height of benches separate these semi-private areas, creating a shared space between adjacent houses.

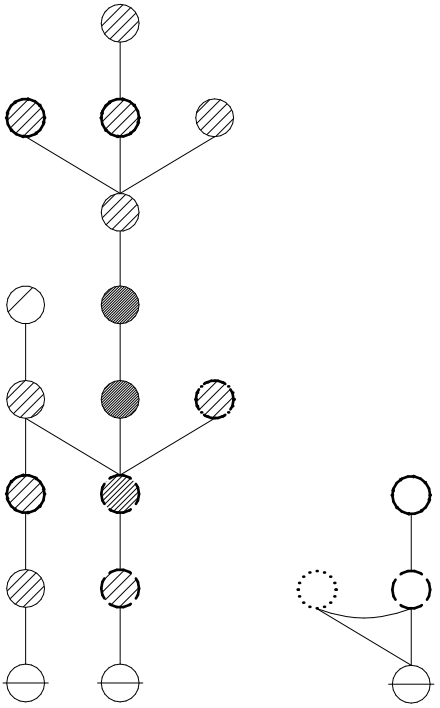
Similarly, backyards - today enclosed by walls, opaque windows and official doors - were designed to be open, and balconies were originally separated by see-through handrails, indicating an idea of communal life that had its locus on the housing cell. Traces of use identified during visits to the housing development consistently seem to indicate that the open terraces in front of houses have a decorative function, as they are characterised by the existence of plants and other decorative elements. In opposition, backyards have been closed by opaque windows, and clothes hangers and other traces of use can be found in balconies, as well as, if less commonly, chairs, tables, and other objects indicating the performance of collective activities.

d) Relationship of the house with the exterior

The analysed apartment scheme has a total useful area of 88.2m2, corresponding to approximately 22m2 per resident when in ideally occupation. In this case, the ambiguous room located on the ground floor was considered a bedroom. When exterior areas are not considered, the apartment scheme's area is of 57.73m2, and density decreases to 14.43m2/r. Today, the layout is deep from the exterior, with its deepest interior space 8 steps away from the space of the neighbourhood. However, this represents a transformation of the original design. With a front and a back entrances connecting to exterior spaces that, while part of the house, were not enclosed by walls, the original layout had a shallow ground floor with a maximum depth of 4, and a first floor with a maximum depth of 6.

Furthermore, the balcony on the first floor originally opened to the balconies of neighbouring housing, facilitating neighbourhood interaction. In this sense, the layout simultaneously displayed areas bellow minimum requirements and presented a closer relationship with the exterior,





INTEGRATION

min. value	0.45
25th percentile	0.66
50th percentile	0.70
75th percentile	0.82
max. value	1.07

private sector
collective sector
services sector

FIGURE 7.9.
São Victor, apartment schemes: plan and accessibility graph.

apparently inviting neighbourhood relationships. In particular, the backyard, open to a back, secondary street, included a washing tank and presented a space where household chores might be conducted while sharing time with elements of neighbouring houses.

The major transformations that the original design of the apartments underwent ever since they were constructed represent traces of use and appropriation of the domestic space. The continuous space in the back was enclosed and integrated within the houses, and the open balcony has been protected by opaque divisions.

e) Collective sector of the house

The apartment has a 17.4m2 living-room, which scores above both minimum and ideal areas and is the largest space of the house. It is the better integrated functional space (while not the better-integrated area of the house) and the shallowest from the exterior. It is the organising centre of the house: it controls access to the kitchen and bedrooms. With a functional b-type living-room that functions as the only connection between the bedrooms and the kitchen, and both private and services sector and the exterior of the house, the layout translates into an A1 simplified accessibility graph.

f) Services sector of the house

The kitchen is integrated into the living-room, openly connecting to it both accessibility and visibility-wise. By itself, the kitchen has an area of 9.6m2, above the minimum area. In the collective pole it creates with the living-room, it reaches a 27m2 area, and represents a particularly large common area across cases. Even though it can be considered part of the collective area of the house, it is placed in such a way that it is deeper both from the outside and from the bedrooms, making it necessary to move through the living-room in order to each it. If its frank connection to the rest of the house means it is not segregated, this distancing makes it a lesser integrated space than the living-room.

g) Private sector of the house

Bedrooms are larger than the ideal area and are simultaneously the deepest and less integrated functional spaces of the house. Privacy seems to have been intentionally added to the private sector by placing it on the second floor. However, access to bedrooms is controlled by the collective area of the house, and a balcony designed as open towards neighbourhood houses is adjacent to one of these rooms. An additional room exists on the ground floor, which is its deepest space from the exterior, and the only one that can be reached without crossing labelled collective areas.

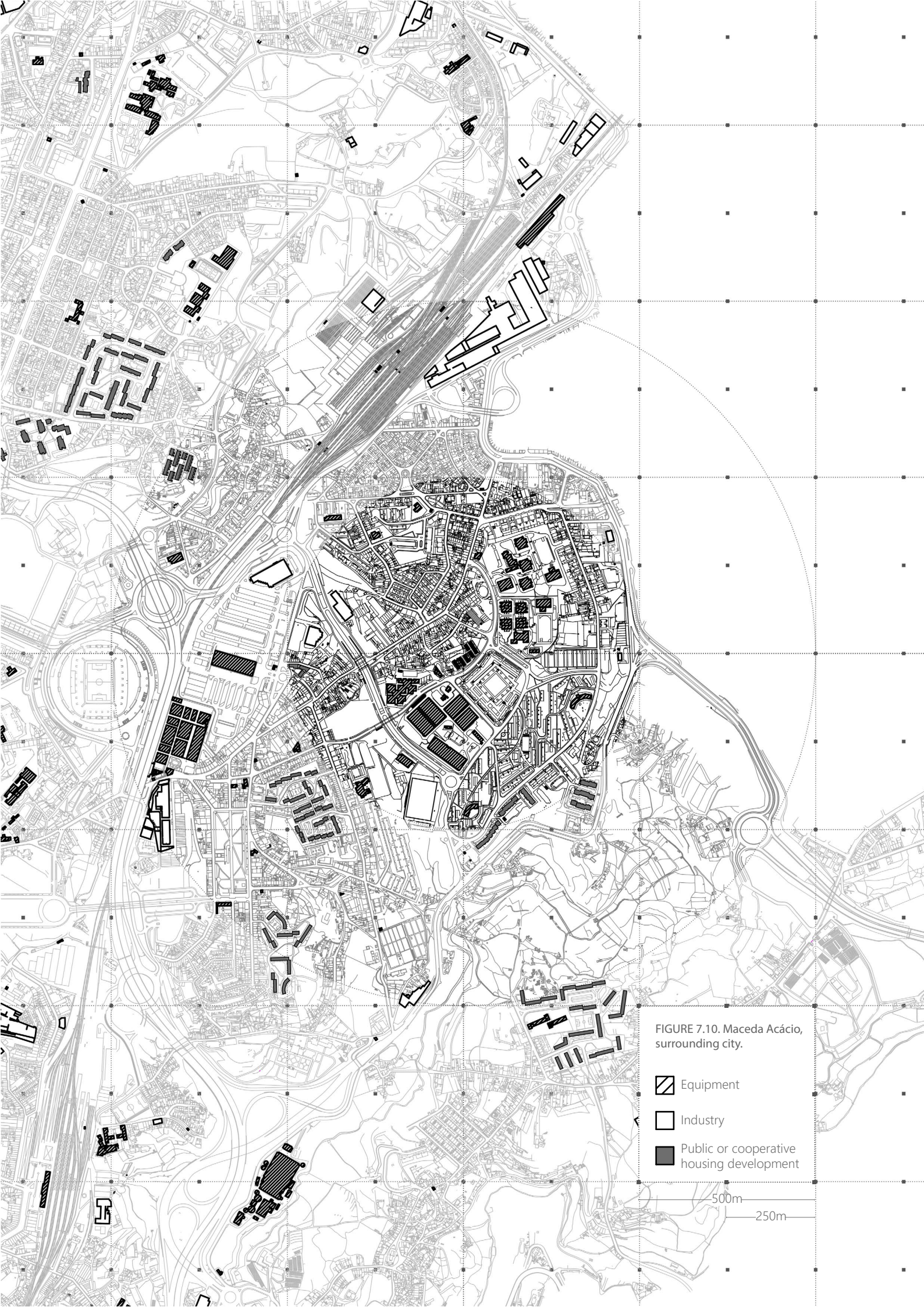


FIGURE 7.10. Maceda Acácio, surrounding city.

h) Relationships between sectors of the house

	transition space>	living-room >	exterior space >	kitchen >	exterior >	bedrooms >	washroom >	other space
integration	1.072	0.840	0.768	0.736	0.672	0.663	0.654	0.453
area	4.1m²	17.4m²	10.1m²	9.6m²	-	11.9m²	4.6m²	9.6m²
minimum area ratio	-	1.45	-	1.60	-	1.22	-	-
ideal area ratio	-	0.97	-	1.41	-	1.03	-	-
depth exterior	3.5	4	4	4	0	6	6	7
type-space	c	c	c	a	b	a/b	a	a
functional type-space	fb	fi	fb	ff	ff	fi	ff	fi

TABLE 7.5.. São Victor, spatial attributes of apartment

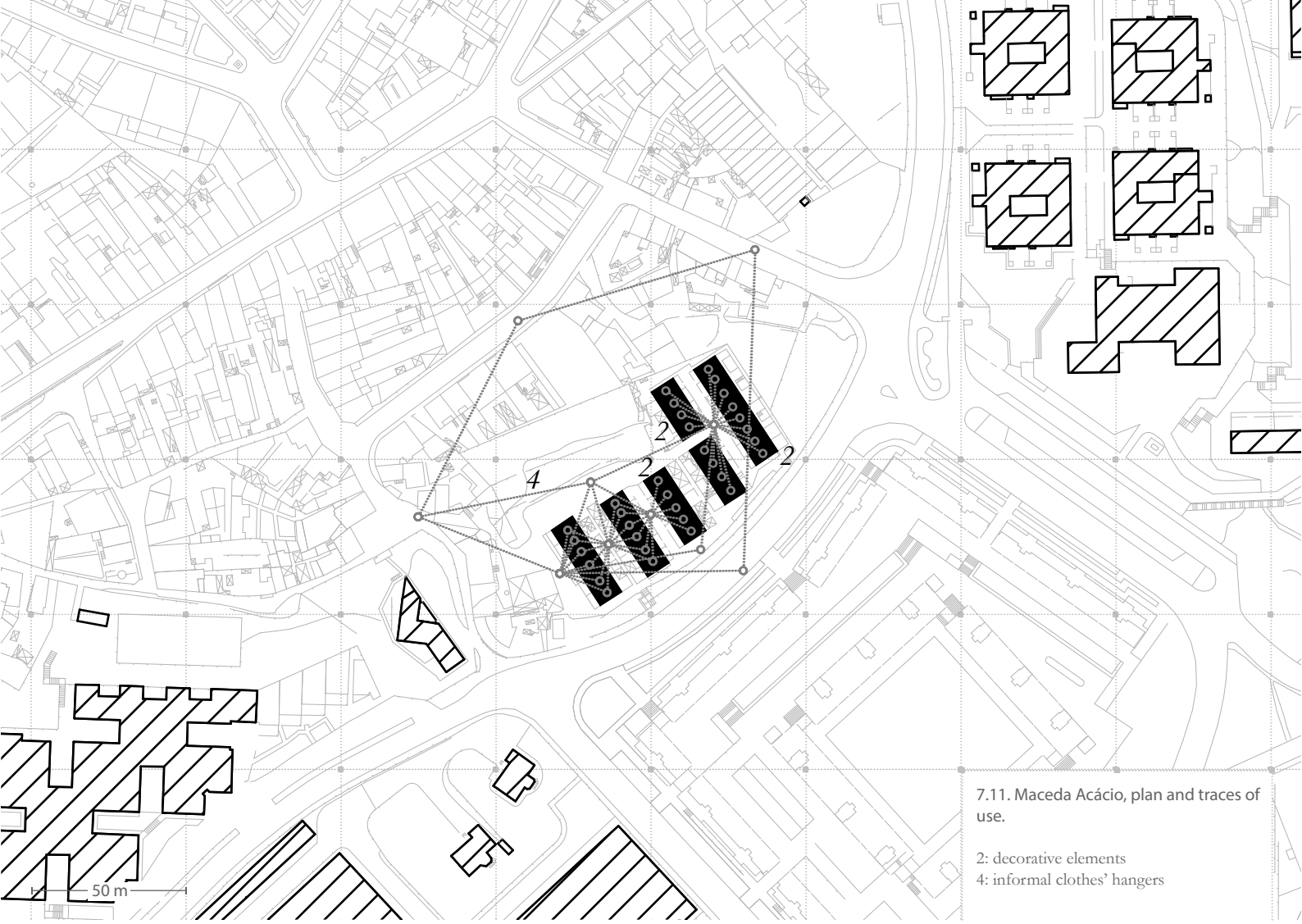
The apartment can be represented as a simplified accessibility graph A1. There is a clear definition of a collective and a private sectors through the introduction of a staircase, but an additional, more functionally ambiguous, room exists. Sectors are ordered according to their values of integration, from largest to smallest, as collective > services > private. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members, and in particular by women.

7.3. LAYOUT 12: MACEDA ACÁCIO

a) Relation to the surrounding city

The area in the East of the city where layout 12 is located was weakly urbanised by 1974. A significant part of construction in the area during the previous decades was of PMCP estates, which were not accompanied by the development of urban infrastructure capable of articulating this area of the municipality with its more central locations. Layout 12, in particular, is one of the most poorly integrated SAAL developments. Nevertheless, while removed from the urban structure, its location in the continuation of a pre-existing locality allows access to a school, local retail and services in a 500 radius. The layout includes no fixed-function spaces and, with only 16 dwellings and the lowest registered values of choice at all scales, is very unlikely to be used as a through-space when moving from one point to the other.

While the layout is situated on the edge of its lot, its interior is protected from the adjacent urban artery by vegetation and a difference in height. This results in an increase of the necessary number of steps to reach the interior of the layout from the street from the minimum 1, to a maze index of 2.23. Consequently, even though the lot where it is located constitutes street-frontage, the layout is not part of the main city fabric.



7.11. Maceda Acácio, plan and traces of use.

2: decorative elements
4: informal clothes' hangers

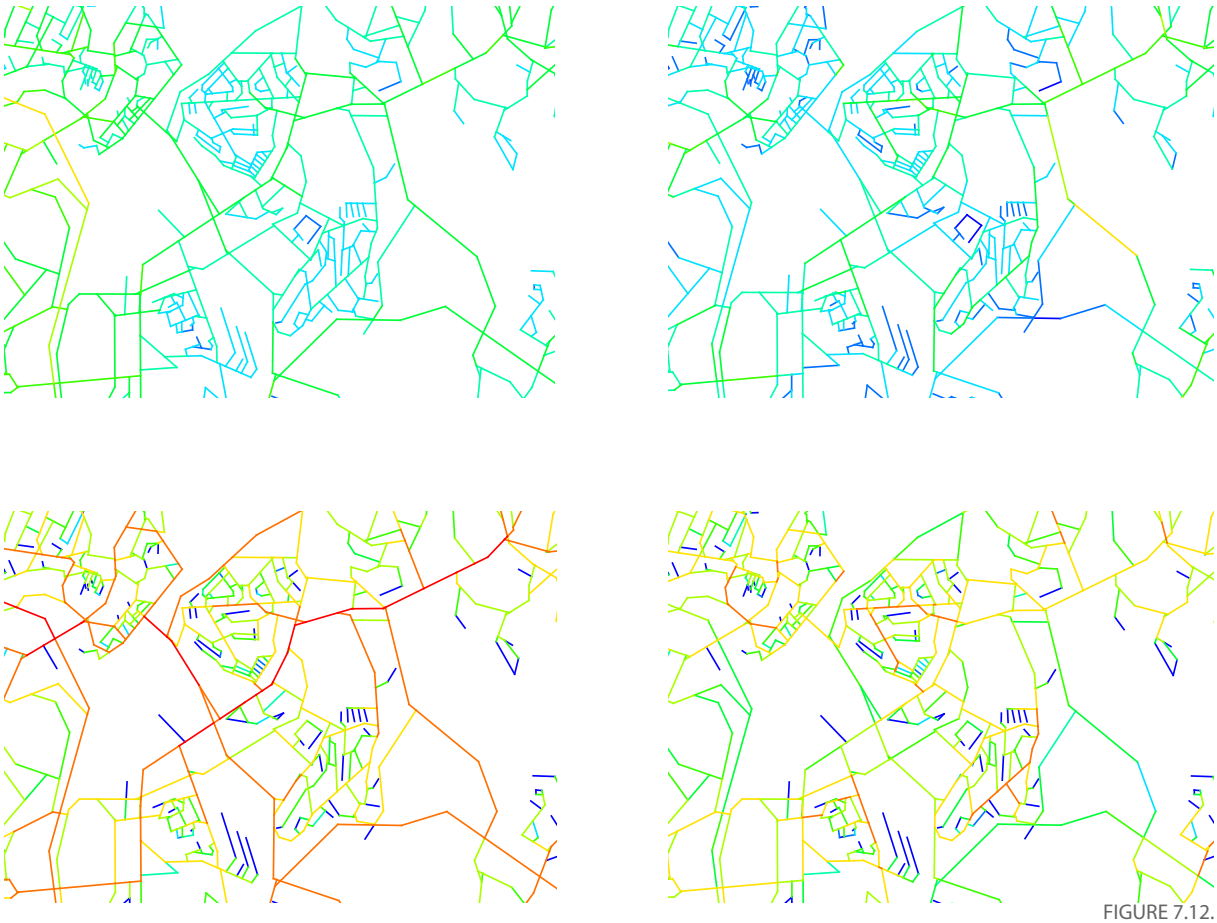


FIGURE 7.12.
Layout 12's urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

b) Relations between collective spaces

The layout is only accessible from one edge of the lot, creating a deep, treelike structure, where the shallowest house is 3 steps away from the nearest street. All transition spaces in the layout are in one or more rings, and 57% of them are functional b-type spaces. The largest of these is constituted by 16 front-doors, and the one with the least accesses opens to 4 front-doors. When walking by a blank wall, one is always one turn away from a constituted space and, when walking through any space of the layout, one is on average less than 3 convex turns away from all others.

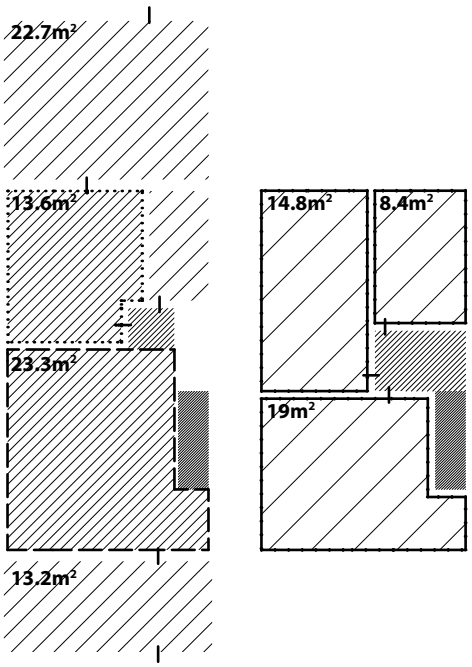
Decorative elements, specifically potted plants, were found on transition spaces.

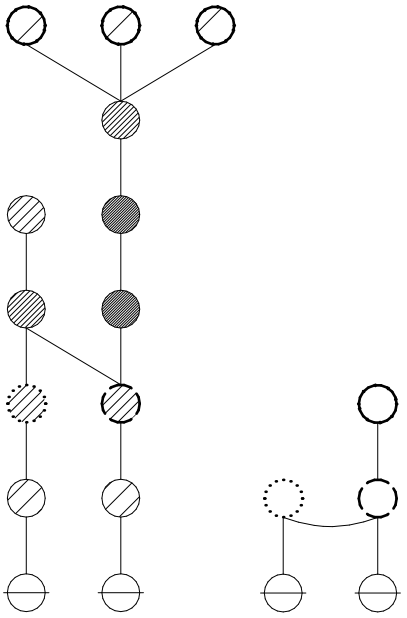
c) Relation to individual houses

While houses are grouped together, they are on average 2.95 steps away from all others, and 4.2 steps away from the surrounding streets. Within the layout, front-doors open directly to the collective spaces, with front yards functioning, as in other layouts, as transition spaces from the space of the neighbourhood to the space of the house. In this case, contrarily to layout 10, houses are not oriented accordingly to solar exposure, but so that front-yards face each other in access streets. This results in a clearer distinction between front and back than in other layouts: the street system is divided into a wider street-grid to which front-yards open and which allows for a larger number of neighbours to create relations of co-presence and awareness from within the limits of their own homes, and into a narrow street-grid - one with barely enough width for two people to cross each other - that connects to backyards which have, in its majority, been enclosed. These two grids share the same values of integration, as do the spaces to which they relate within the house: the living room in the front and the kitchen in the back.

Both the data analysed in the first chapter of this second part and other consulted studies (the most recent from 2019) indicate that women spend more time in domestic chores than any other family member and that a large amount of the time they spend at home is spent in the kitchen. As such, it seems likely that this division in a front and a back grid would have an impact on the way the layout is used, with the back grid being the almost exclusive domain of women performing domestic work.

Traces of use differ in front and backyards, which may indicate these spaces perform different functions. The smaller front yards often display decorative elements, such as plants, sculptures and religious figures, but also many that are integrated into the architecture itself, such as the different materials used in facades. Additionally, fences have been observed being used for drying household linen and towels. The larger backyards have, in most cases, been enclosed. When they are open, and traces of use can be identified from the exterior, these seemed mostly related to domestic chores such as washing and drying clothes.





INTEGRATION

min. value	0.49
25th percentile	0.58
50th percentile	0.73
75th percentile	0.83
max. value	0.99

private sector
collective sector
services sector

FIGURE 7.13.
Maceda Acácio, apartment schemes): plan and accessibility graph.

d) Relationship of the house with the exterior

Layout 12's apartment scheme has an area of 130m2, of which 36m2 (28% of the house's area) is exterior, consisting of a front and back yards. As such, the house is well above the minimum area, with which it complies even when the exterior spaces are discounted. This area corresponds to 43.3m2 of total area, or 23.5m2 of interior area, per resident. It can be represented as a simplified accessibility graph B4, where there exist two entrances and both the kitchen and the living-room function as transition spaces between the exterior and the interior of the house. While equally shallow, located 2 steps away from the exterior spaces of the estate, the collective and services sector of the house establish different relations with the surrounding neighbourhood, as kitchens open towards a larger 22.7m2 backyard connected to narrow, secondary paths, and living-rooms open to a smaller 13m2 front-yard. The private sector, located on the second floor of the house, is deeper from the exterior and has its access controlled by the living-room. The deepest room is 5 steps away from the exterior, making this a shallower scheme than those of most SAAL developments. The large yards have the potential to complement two activities not included in the design of the estate's layout: exterior permanence and clothe-related housework. Nevertheless, non-programmed, informal clothes-hangers were detected in transitions spaces.

e) Collective sector of the house

The living-room has an area of 23m2, corresponding to 18% of the house and being close to the double of the minimum area and above the ideal area for living-rooms in three-bedroom apartments. It connects to a front-yard, a small hall that organises the kitchen and bathroom, and the bed-rooms, to which it controls access. It has an integration value of 0.8 and is a b-type space that does not integrate an interior ring. Even though it is connected to a front-yard which, the size of an average bedroom, had the potential to be used as a social area, visits to the layout revealed that these spaces do not often present traces of being used collectively, but instead display decorative elements.

f) Services sector of the house

The kitchen, with 13.6m2, is larger than average, corresponding to double the area defined as ideal in Portas (1969), but smaller than the living-room and two of the three bedrooms. It is 2 steps away from the exterior and from the living-room, 5 steps away from the private sector. Similarly, a b-type space, it shares the living-room integration value. While distanced from the living-room, it is articulated with a large backyard with potential to collective use, to which it controls access.

g) Private sector of the house

Bedrooms are larger than the ideal area and are simultaneously the deepest and less integrated

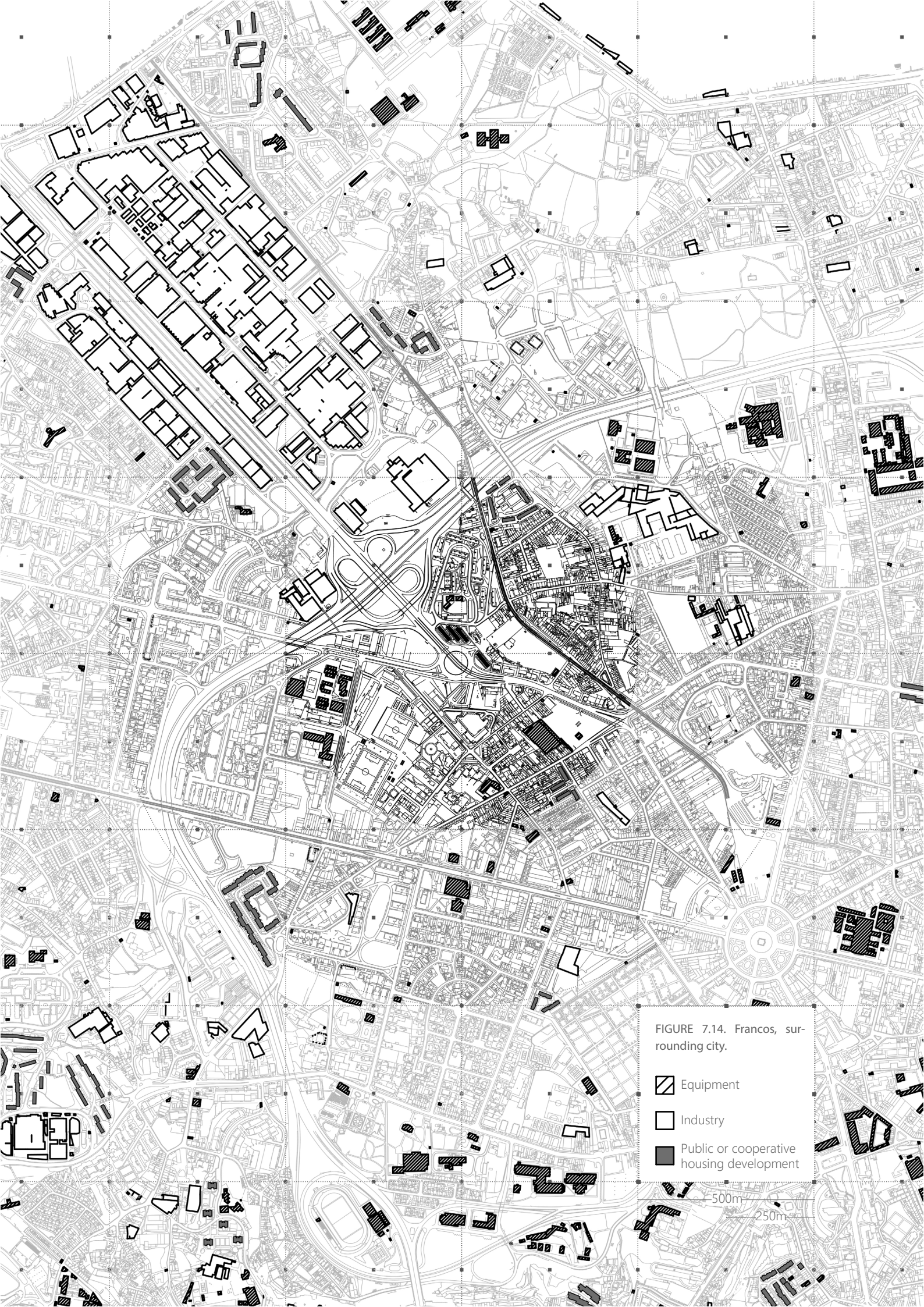


FIGURE 7.14. Francos, surrounding city.

functional spaces. Together, the three bedrooms occupy around half the area of the house, all three complying with the ideal areas defined in Portas (1969). This sector, not integrating a bathroom, is located 5 steps away from the exterior and has a low integration of 0.5.

h) Relationships between sectors of the house

	transition space>	kitchen =	living-room >	washroom >	exterior space >	bedrooms >	exterior
integration	0.989	0.791	0.791	0.674	0.606	0.505	0.491
area	2.9m²	13.6m²	23.3m²	4.5m²	18.0m²	14.1m²	-
minimum area ratio	-	2.27	1.94	-	-	1.58	-
ideal area ratio	-	2	1.24	-	-	1.38	-
depth exterior	4.5	2	2	4	1	7	0
type-space	b	c	c	a	c	a	b
functional type-space	fb	ff	fd	ff	fd	fi	ff

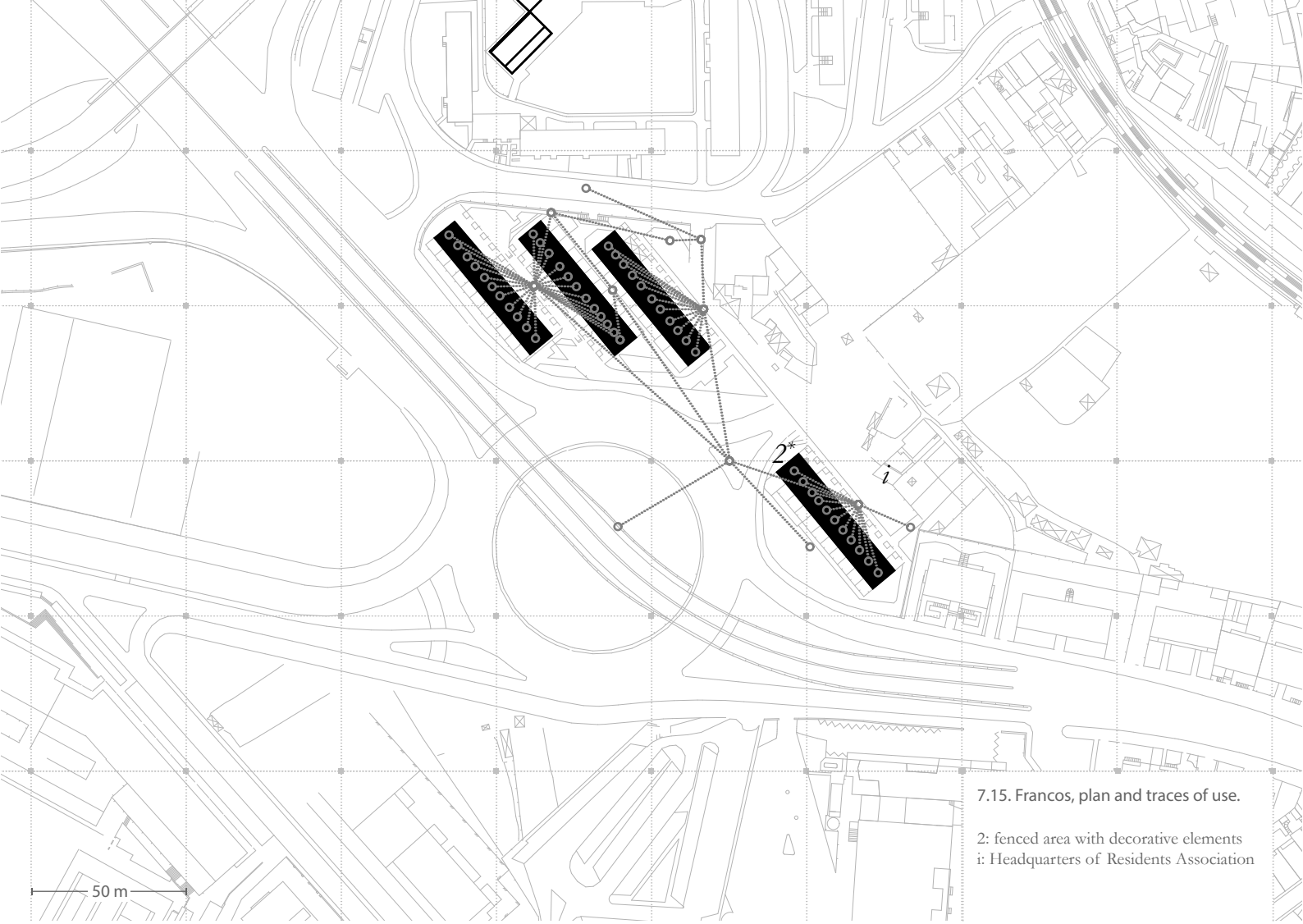
TABLE 7.6. Spatial attributes of layout 12's apartment scheme-.

With 31% of transitions spaces, the layout has large values of depth between spaces and from the exterior. It has a low average integration of 0.71 with a high difference factor of 0.87, and sectors are ordered according to integration values, from largest to smallest, as collective and services (0.8) followed by services (0.5). Transition spaces are the better-integrated of the housing scheme, and the exterior is the least integrated part of the system. Functional sectors are defined, being separated by a minimum of 2 and a maximum of 5 convex steps. The collective area seems to be assigned some importance, being connected to the front of the house, large and controlling access to the bedrooms. However, all other areas are similarly larger than in most of the studied cases. The services area, in particular, is large and controls internal access to a backyard with potential for collective use and, as such, provides some opportunity for accidental use by household members who do not frequent the kitchen.

7.4. LAYOUT 13: FRANCOS

a) Relation to the surrounding city

Layout 13 is a 12 700m2 development of 44 houses, located at the intersection between three highways: the inner radial of the city, the highway connecting Porto to the north of the country and eventually Spain, and the highway connecting Porto to the centre and south of the country - all of which provide access to other municipalities within the AMP whose movement and functional dynamics are straightly articulated with Porto. Consequently, the layout has of the larger values of choice at all scales of the studied cases, and is well integrated not only globally, but also at the local level. This area was sparsely urbanized in the 1960s, and its growth was connected to the development of the industrial centre as planned in the city's urban plan, and to the gradual



7.15. Francos, plan and traces of use.

2: fenced area with decorative elements
i: Headquarters of Residents Association

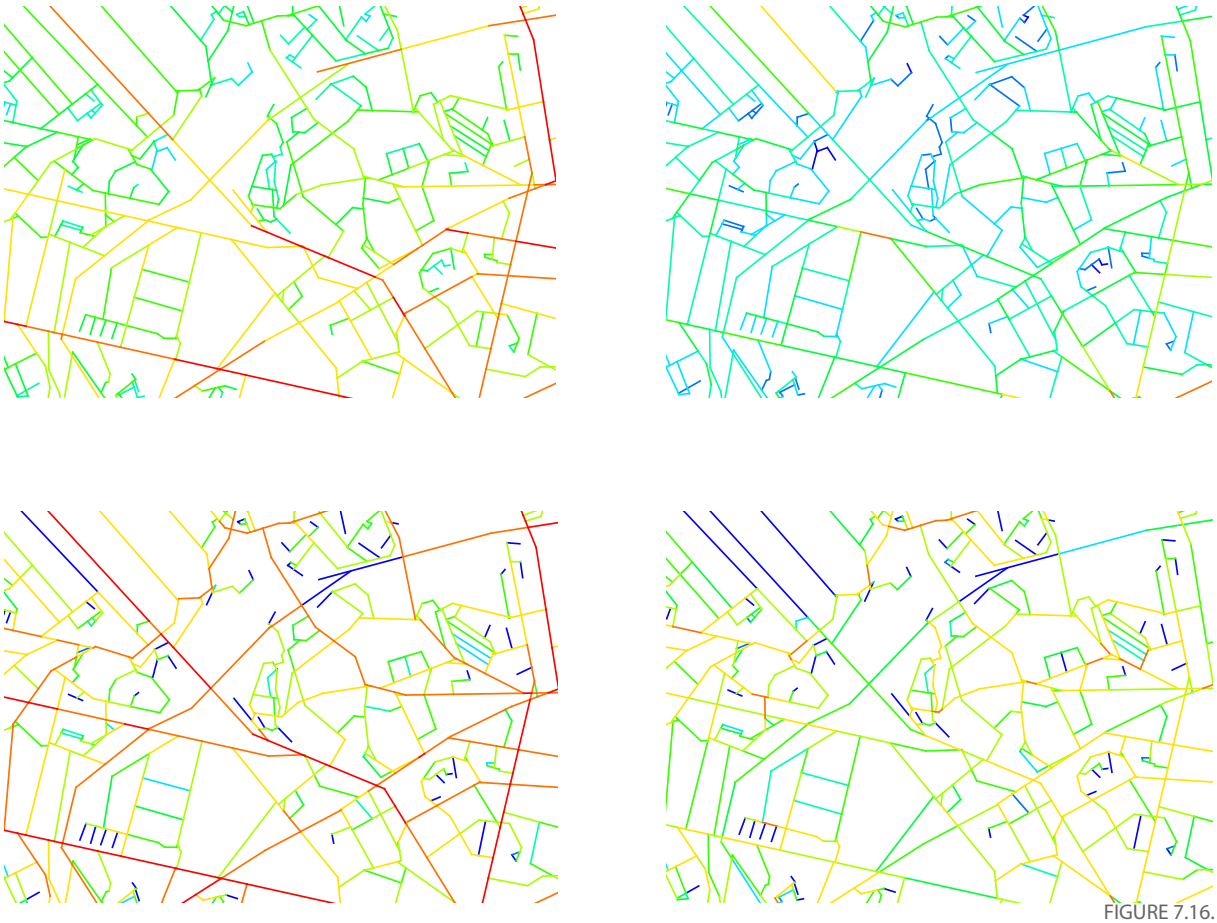


FIGURE 7.16.
Francos, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

installation of public housing estates in its vicinity. Even though the area is mainly residential, retail and services are today assured locally, both available within a 500m radius of layout 13, as are sports facilities and schools. Additionally, the layout is also within walking distance of cultural structures and has good access to public transportation.

With high potential for through-movement, similar design mechanisms to those seen in layout 12 were used to protect the interior of the layout from the street's movement. The layout is located in a small space of urban land and occupies the front of its lots, creating street frontage. However, front-doors turn inwards away from the high-choice axis, and a difference in heights is used in one of its sides to differentiate further the collective areas of the estate from the exterior street-grid. In this case, these mechanisms do not substantially increase the topological distance between the surrounding streets and the axial system, the layout can be accessed through 4 openings, and the maze index is a low 1.86.

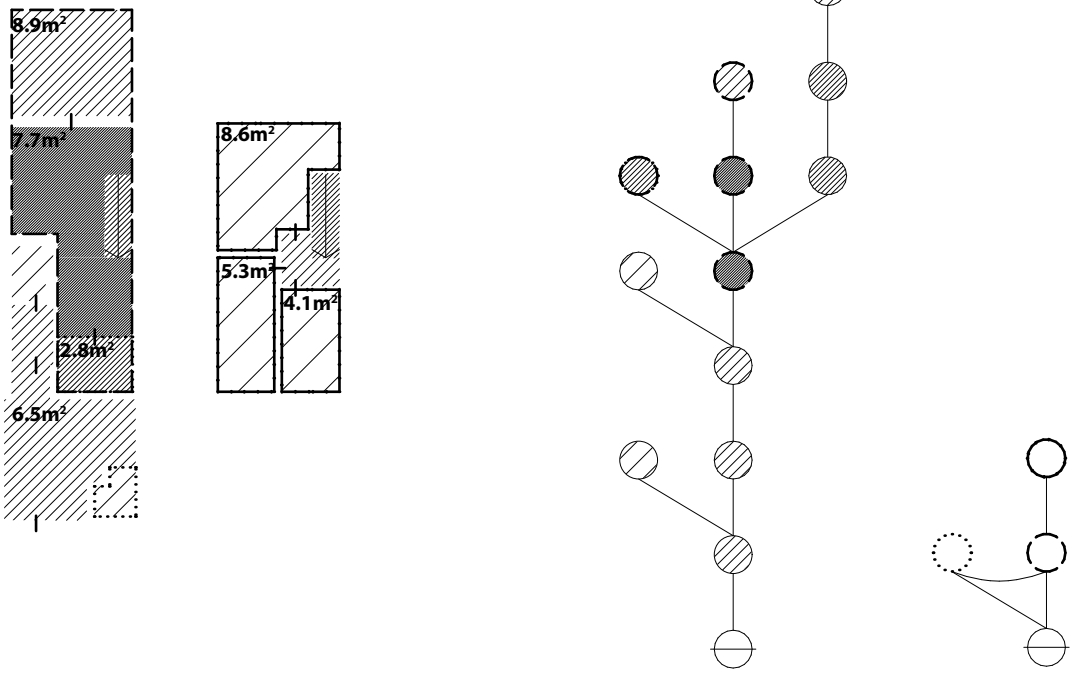
b) Relations between collective spaces

While this layout establishes a closer relationship with the primary city grid and is shallower from the surrounding streets than previous cases, it is also a less grid-like system. The convex spaces of the layout are, on average, 4.26 steps away from all others, the highest value registered for SAAL developments. 89% of these spaces are distributed, and the majority is included in one ring. Little more than one-fourth of spaces are constituted by front doors. Two of these three pathways provide access to 11 houses, and the third, constituted by front-doors on both sides, serves 22 houses.

Layout 13 includes a social and senior centre that is located at the edge of the layout, at the end of a functional b-type cul-de-sac. This space becomes of mandatory use not only for the 11 families whose houses open towards it but also to all neighbours accessing the centre, which assigns it, if not potential for collective use, potential for the routinization of co-awareness between neighbours in a space well differentiated from the surrounding city. Similarly, while, like most SAAL layouts, layout 13 does not have large exterior spaces, there are two small open areas located at the opposite edge of the layout, separated from the street by a significant difference in height that assures some privacy. These are both shallow and well-integrated in the layout, and the two spaces where traces of use, specifically moveable chairs, were detected during visits.

c) Relation to individual houses

While the closest house to the street is only 2.5 steps away from it, the average resident is over for convex steps away from the primary city grid and 4.46 steps away from all other neighbours. The typology of layout 13's houses includes, like previous cases, a front yard and a backyard. In this case, however, front yards relate visually to the street but not to neighbouring houses, and backyards - in its majority posteriorly enclosed by their inhabitants - do not connect to the street.



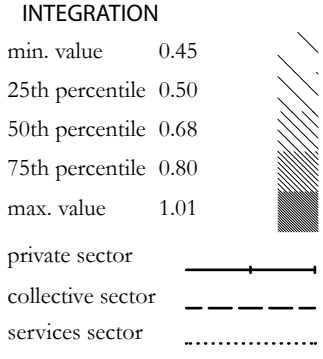


FIGURE 7.17.
Francos, apartment schemes: plan and accessibility graph.

Consequently, the relation the estate layout establishes with the houses is fundamentally different, as neighbours have a reduced possibility of interacting with each other from the interior of their houses. Traces of use in these yards are also different from other layouts, as it is more common to encounter activity-related objects such as chairs, tables, parasols, rather than only decorative elements.

d) Relationship of the house with the exterior

Apartment scheme 13 is small, with an area of 57m2, corresponding to only 63% of contemporary's legislated minimum and resulting in a density of 14.25m2 per resident. It is a deep apartment scheme where spaces are an average of 4.3 steps from the exterior; the shallowest functional space is 4 steps away from the front door and the deepest 8 steps. A series of transition spaces make the transition from outside to inside: a 6.5m2 front-yard is at step 1 from the exterior, then there exists a small exterior hall at step 2, a small interior hall at step 3 and only then a first functional space at step 4. In this sense, the interior of the house connects more frankly to the most private backyard than to the front yard, which is open towards the street, which appears to favour intra-familiar over neighbourhood relations. The house layout includes exterior space and a dedicated space for clothes related tasks, two functions that are not integrated into the estate's exterior spaces.

e) Collective sector of the house

The house has two different but openly connected spaces on the ground floor. One of them has an area of 4.4m2 and connects to the kitchen through a sliding door which allows them to form one single space when open, and the other has 7.7m2 and connects to an 8.9m2 backyard. While small, the two living areas make up an area of 12.1m2, slightly above the minimum area, and correspond to 25% of the house. Together, the two spaces are the organizing centre of the house, controlling access to the kitchen, the backyard and the second-floor bedrooms. However, one of these spaces is shallower and more integrated, while the other, less integrated, creates a more private living-room-backyard pole in the house.

f) Services sector of the house

The kitchen is small, corresponding only to half of the minimum area as defined in Portas (1969). When completely open to the adjacent living-room, the resulting space has an area of around 7m2, barely above the minimum area for kitchens and bellow the minimum area for living-rooms. When open, it exerts some visual control over the access from the exterior to the interior of the house, promoting potential interaction between household members using the kitchen and the rest of the family.



FIGURE 7.18. Lapa, surrounding city

g) Private sector of the house

The private sector is well defined. Located on the second floor of the house, it is the deepest and least integrated. Bedrooms are small, all of them falling well bellow the minimum area.

h) Relationships between sectors of the house

	living-room >	transition space >	kitchen >	exterior space >	washroom >	other space =	exterior >	bedrooms
integration	1.013	0.805	0.799	0.667	0.561	0.497	0.497	0.454
area	7.7m²	1.2m²	2.8m²	7.7m²	1.5m²	1m²	-	6m²
minimum area ratio	1.28	-	0.7	-	-	-	-	0.68
ideal area ratio	0.86	-	0.47	-	-	-	-	0.60
depth exterior	5	4.6	5	1	4	2	0	8
type-space	b	b	b	c	a	a	b	a
functional type-space	fi	fb	ff	fb	ff	fi	ff	fi

TABLE 7.7. Francos, spatial attributes of apartment scheme.

A clear distinction is made in apartment scheme 13 between collective and private sectors of the house. Some overlap of uses may be unavoidable, as the stairs for the bedrooms' floor are located in one of the two living spaces, in front of the kitchen area. The collective sector is, as such, a functional b-type space, organizing access to all spaces of the house, which can be represented as a simplified accessibility graph A1. The layout is deep; with 31% of transition spaces, it presents functional spaces that are, on average, 3.6 steps away from each other. The collective sector is the better-integrated of the house, surpassing transition spaces, and is followed by the kitchen and then the bedrooms.

7.5. LAYOUT 14: LAPA

a) Relation to the surrounding city

Layout 14 is a globally well-integrated housing development located in what was at the time a growing centre of the city. It was built in the continuation of pre-existing houses in a lot which remains non-urbanised today. It has above-average values of local choice and local integration, the street to which it is adjacent having local through-movement potential, which has become more significant with the construction of a nearby subway station. However, even though it is adjacent to the primary city grid, layout 14 presents values that surpass the average in most depth measures. For instance, its maze index of 2.74 is the second-highest of SAAL layouts, meaning that while connected directly to the main street, from which it can be seen, the globality of the axial system is almost 3 steps away from the surrounding city. This distancing is achieved, as in previous cases, by putting the estate at a different height from the public street, creating a clear

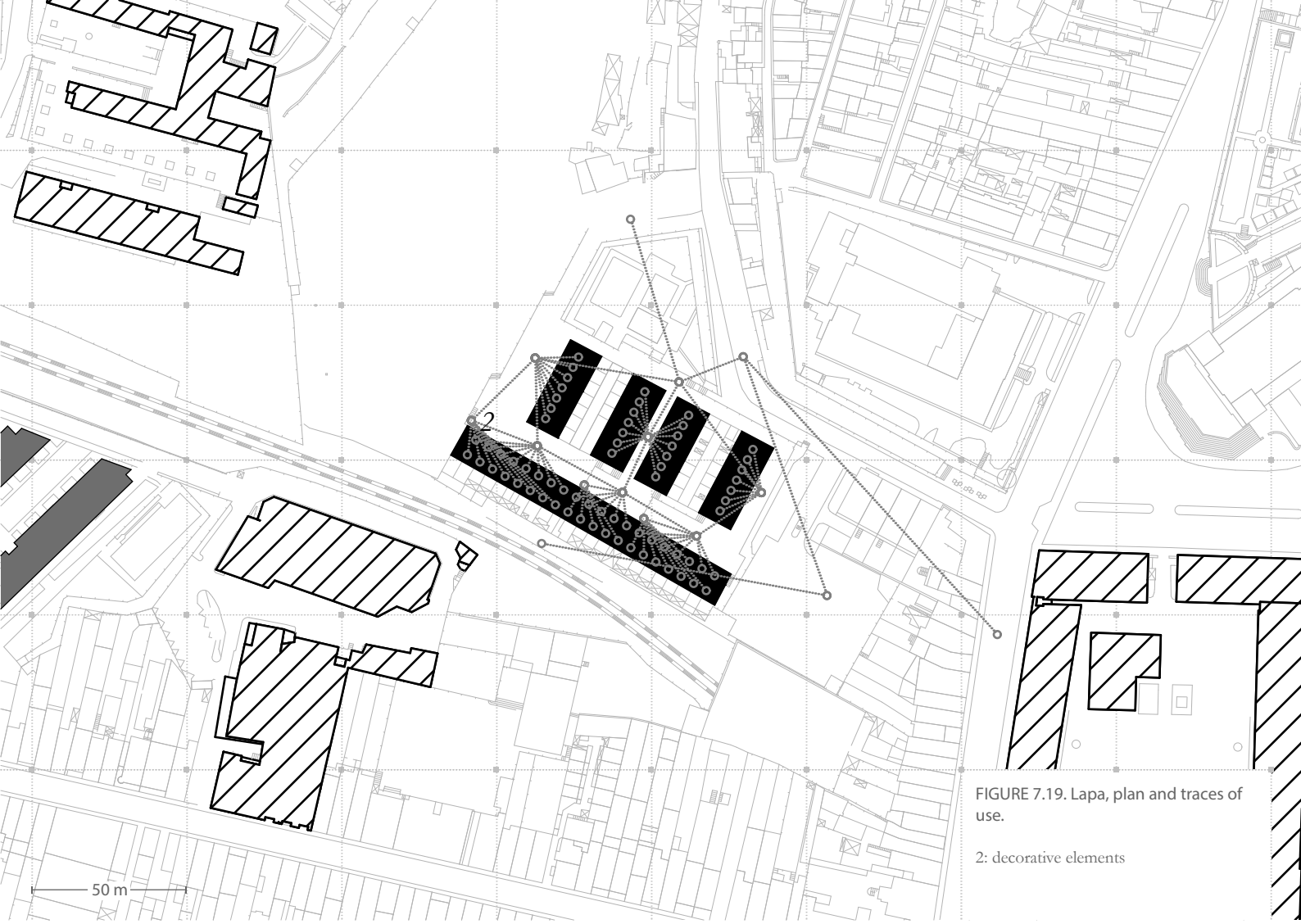


FIGURE 7.19. Lapa, plan and traces of use.

2: decorative elements

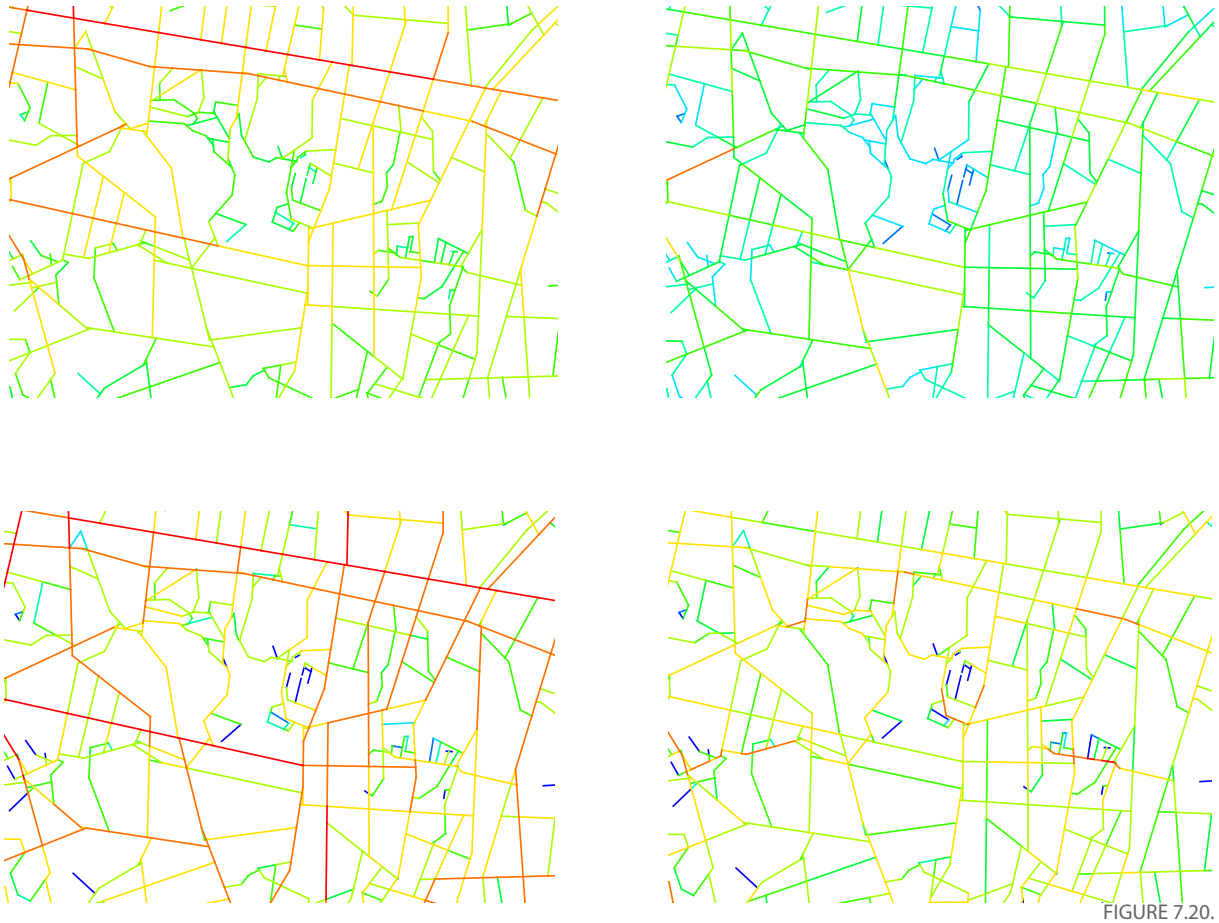


FIGURE 7.20.
Layout 14's urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

differentiation between the interior of the development and its exterior. Nevertheless, the layout has easy access to retail and services and schools, and is, today, very well served by public transportation. Additionally, it is located in the vicinity of a public square. With almost 18 000m2 it is the second-largest SAAL developments in Porto and, with 68 houses, it has the largest number of families.

b) Relations between collective spaces

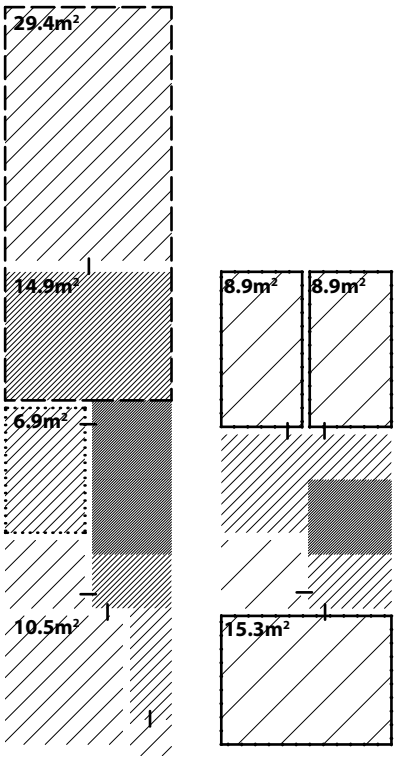
Despite all spaces being distributed and many of them in rings, the layout is relatively treelike, with convex spaces being an average of 3.9 steps away from all others and over 4 steps from dwelling entrances. Functional b-type spaces in particular, which control access to fixed-function spaces, are all c or d-types and can be accessed through more than one route. 64% of spaces are constituted, and the layout has a neighbourliness score of 7.11: the space with the most front-doors connects to 12 houses, and the constituted space with the least connects to 4. This is the first case with superposed houses. Access to the first floor is done through an exterior corridor that has an open visual relation with the convex spaces underneath it, which results in neighbours who, while not sharing the same entrance space, will often see each other and are likely to be aware of each other's existence. As this is also the first layout where houses do not have front yards, it seems to reflect a different type of neighbourhood, where relationships are not established in the permanence in one's own house. The layout also includes a playground. It is located in an averagely integrated area that, while adjacent to the main street, has its entrances one step away from it. It is, nevertheless, shallow, and can be accessed from a different point without stepping inside the housing development.

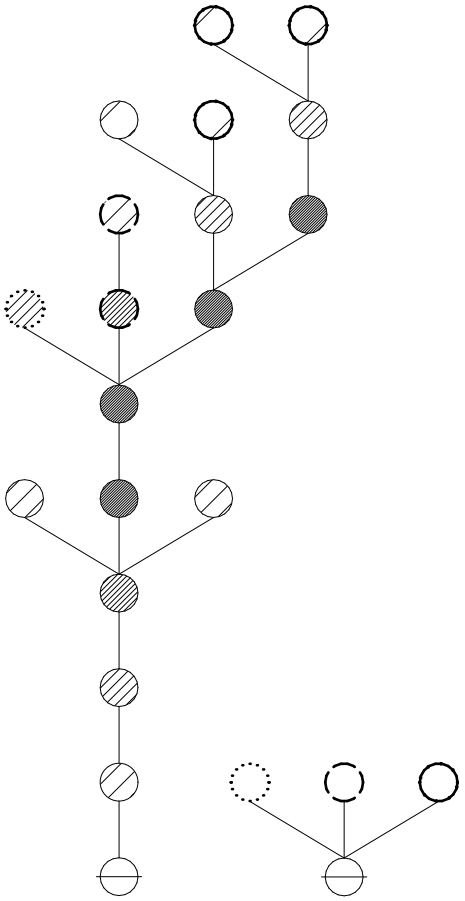
c) Relation to individual houses

Layout 14 has a separation-index that approximates the mean value for SAAL layouts: front doors are at an average of 2.7 steps from the surrounding streets. It is composed of two different types of housing blocks. Those closer to the exterior are two-storey row houses. These are accessible through three convex spaces with 6 or 12 front doors each. Deeper from the exterior, there is a block of superimposed row houses, accessible through three contiguous convex spaces and an exterior corridor on the first floor. Ground floor spaces connect directly to an average of 7.3 doors and establish a visual relation with 7.3 more.

d) Relationship of the house with the exterior

Apartment scheme 14 is large. With an area of 132m2, it corresponds to 145% of contemporary's legislated minimum and results in a density of 44m2 per resident. Even though 29.4m2 belong to a backyard, the remaining 100m2 are above the minimum for a three-bedroom apartment. It is a deep apartment scheme where functional spaces are, on average, 5 steps away from the exterior. Bedrooms are at 100% depth, 8 steps away from the exterior, and collective areas are





INTEGRATION

min. value	0.44
25th percentile	0.55
50th percentile	0.59
75th percentile	0.79
max. value	1.05

private sector

collective sector

services sector

FIGURE 7.21.
Lapa, apartment scheme: plan and accessibility graph.

at 63% depth, 5 steps away from the exterior. Three transition spaces make the transition between the exterior estate layout and the collective areas, which, similarly to apartment scheme 13, establish a closer connection with the private backyard than with the neighbourhood.

e) Collective sector of the house

Layout 14's 14.9m2 living-room sits above Portas' (1969) minimum area. It is a functional b-type space that functions as the only connection to a large backyard and articulates openly with its transition spaces, which it visually controls. As such, while it does not directly connect the bedrooms to the exterior of the house or the kitchen - and as such does not benefit entirely from occasional use derived from household members passing through - it controls movement between the private and services spaces of the house and the outside. The living-room has the largest integration value of all functional spaces and, deep and connected to the backyard, appears to be thought as a collective space for the house's inhabitants rather than guests.

f) Services sector of the house

The kitchen is an independent space with a small area of 6.9m2, close to the minimum 6m2. It displays a value of integration slightly smaller than that of the living-room and is deep from the exterior.

g) Private sector of the house

There is a clearly defined private sector on the upper floor of the house, where three bedrooms and a bathroom are located. These present the smallest integration values of all functional spaces while complying with minimum and ideal area requirements.

h) Relationships between sectors of the house

	transition space > living-room > kitchen > washroom > exterior space > other space > bedrooms > exterior							
integration	0.932	0.787	0.75	0.594	0.566	0.547	0.529	0.442
area	4.2m²	14.9m²	6.9m²	3.8m²	29.4m²	10.5m²	11m²	-
minimum area ratio	-	1.24	1.15	-	-	-	1.27	-
ideal area ratio	-	0.83	1.00	-	-	-	1.12	-
depth exterior	4.375	5	5	4	6	3	8	0
type-space	b	b	a	a	a	a	a	b
functional type-space	fb	fi	ff	ff	fi	fi	fi	ff

TABLE 7.8. Lapa, spatial attributes of apartment scheme.

Functional sectors are clearly defined in layout 14's apartment scheme. Collective and services' areas are in a different floor from the private sector, but an ambiguous room exists on the ground floor. The kitchen and living-room open to the same transition space, but are not directly connected. All functional spaces comply with minimum areas. The living room is the better-integrated space, followed by the kitchen, and then the bedrooms.



FIGURE 7.22. Leal, surrounding city.

7.6. LAYOUT 15: LEAL

a) Relation to the surrounding city

Layout 15 is located a few blocks to the east of layout 14, in an area that had a higher density of construction than layout 14's, but which shared many of its attributes. It is a central part of the city with both high levels of integration and choice at all scales, characterised by an abundance of retail, services, institutional buildings and other urban structures, as well as, today, very good access to public transportation. It tackled a population living in precarious housing in the interior of existing blocks, part of which remains in the same situation today.

The layout is very well integrated both globally and locally, displaying of the higher values of integration and choice at all radii. Locally, this seems to be the SAAL development that most successfully implemented the idea of the proletarian island (as explored in chapter 6) by managing to attach the ensemble of houses to a pre-existing secondary route that crosses the block in the direction of the large public square to the west, and which has a high potential for local through movement.

b) Relations between collective spaces

Only 18% of spaces have entrances to functional spaces. Transition spaces are ringy and, in their majority, do not control access to fixed-function spaces. Depth measures between spaces within the system score average values for SAAL layouts. All spaces are distributed, most integrating one ring. Even though, with 16 houses, the development is small, three steps must be taken on average in order to reach all spaces in the system, either exterior or the interior of dwellings. Only 19% of spaces are constituted by front-doors. These are exterior corridors that go through the two blocks that make up the estate, each of which composed of two rows of houses: the smaller groups 3 houses together, the larger 10. Accesses to houses are in this way differentiated from other areas of the estate, dividing these into two categories: street-like axis connecting houses and two larger cemented areas that are located on each side of the blocks.

If, as is common in SAAL layouts, layout 15 does not have any fixed-function collective spaces, it is of not that these cemented areas, with values in between 1.33 and 1.92, are very well integrated into the estate. Furthermore, the better-integrated space is also shallow, one step away from the secondary route and 2 steps away from the main grid, providing likely access to and from the interior of the estate.

Layout 15 was visited twice during the research process. The first visit was during the Summer of 2016, and an abundance of potted plants was registered in one of the hard-llandscaped areas. In a posterior visit three years later, however, not only were no traces of use seen within the layout, as a chain blocked the main staircase to the same space.

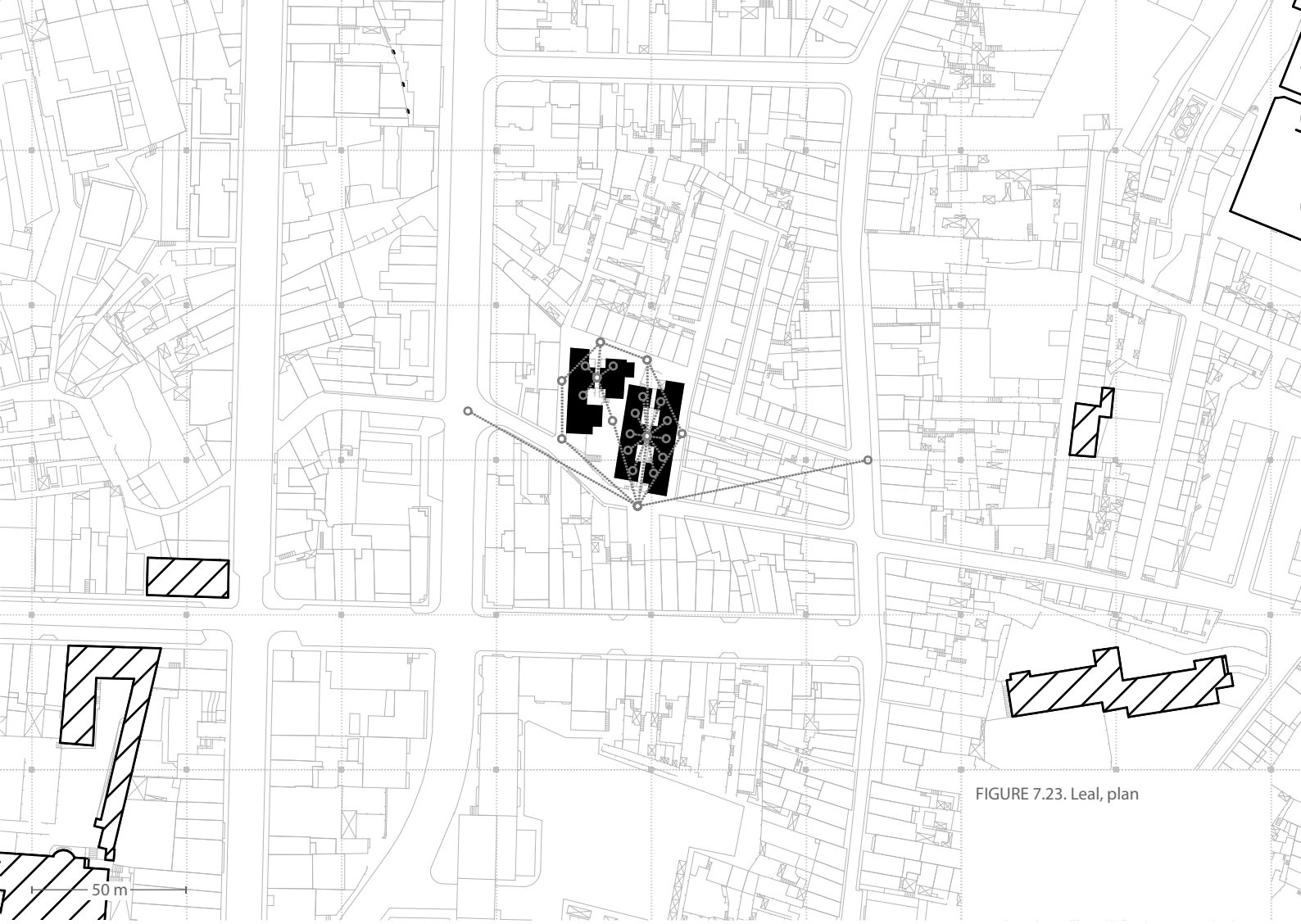


FIGURE 7.23. Leal, plan

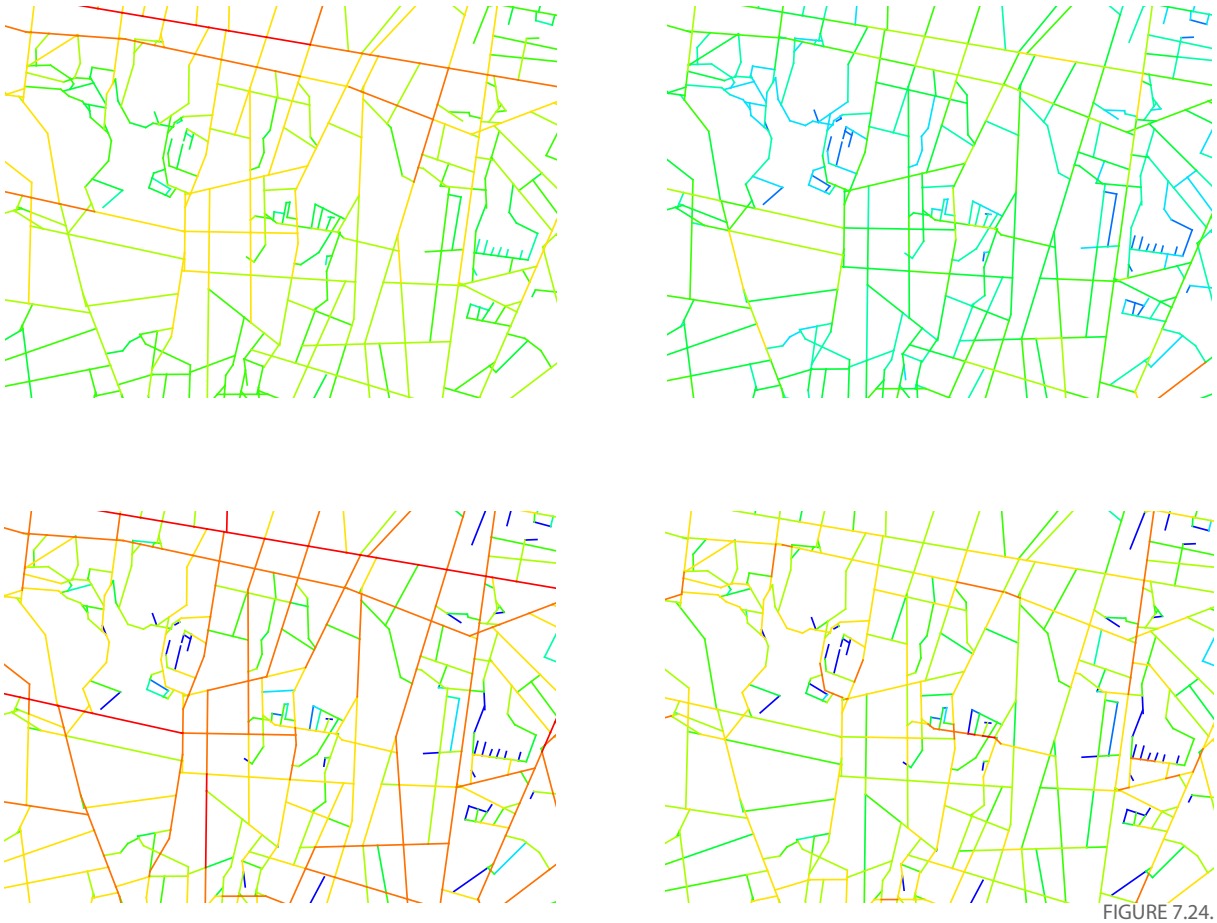


FIGURE 7.24.
Leal, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

c) Relation to individual houses

The nearest houses to the exterior of the lot - the 10 houses that make up the largest block of the housing development - are separated from the main street by 3 convex steps, which would make it invisible from the outside. However, while the rule used to define that a street is exterior to the layout depends on it providing access to other functional spaces outside the limits of the layout's lot, the high values of NaCh(r800m) of the secondary street to which the layout is adjacent must be considered. If local movement is likely to take place in this secondary street, then residents of the estate would not feel that their houses are hidden away from the urban space, but adjacent and visually open to it. Layout 15's house design includes front yards, which have all but one been enclosed by their inhabitants. Had they remained as planned in the original design, these would be visually permeable from transition spaces, but its privacy from other houses was in most cases assured.

d) Relationship of the house with the exterior

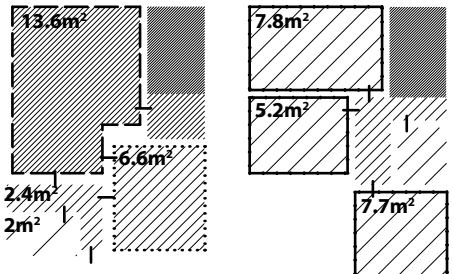
The analysed scheme is of a 57.3m2 three-bedroom house, 4.4m2 of which belong to an exterior yard and exterior storage. It has an ideal density of 14.2m2/r when the latter are considered and of 13.2m2/r when they are not. The layout is deep from the exterior: it has an average depth from the exterior of 4.3, the bedrooms are the deepest spaces of the house and are located 9 steps away from the exterior. Its shallowest nodes correspond to an exterior space which has often been enclosed by residents. This space connects to the living room and the kitchen, the shallower functional spaces of the house.

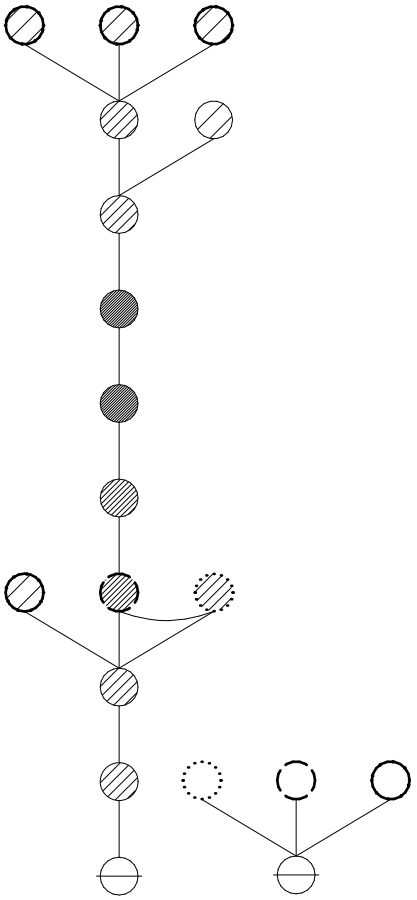
e) Collective sector of the house

The living-room has an area of 13.6m2, which scores above the minim area but bellow the ideal, and represents nearly 25% of the house. It is one of the shallowest and the better-integrated room, controlling access between the kitchen and the rest of the house, as well as access to the upper floor, where the bedrooms are located.

f) Services sector of the house

The kitchen is accessible through the living-room but is not visually connected to it. As such, there is a collective-services pole on the ground floor of the house, but the two functions are spatially separated. It is less integrated than the living-room, displaying values closer to those of bedrooms. With 6.6m2, the kitchen has an area only barely above the minimum required.





INTEGRATION

min. value	0.44
25th percentile	0.52
50th percentile	0.57
75th percentile	0.78
max. value	0.89

private sector

collective sector

services sector

FIGURE 7.25.
Leal, apartment schemes): plan and accessibility graph.

g) Private sector of the house

Bedrooms are located on the second floor, which can be accessed through the collective areas of the house. They are the deepest and least integrated spaces of the house. Bedrooms are small, all of them falling well bellow the minimum area.

h) Relationships between sectors of the house

	transition space >	**living-room >**	**exterior space >**	**kitchen >**	**washroom =**	**bedrooms >**	**other space =**	**exterior**
integration	0.850	0.787	0.75	0.568	0.52	0.52	0.444	0.444
area	2.5m²	13.6m²	2.4m²	6.6m²	2m²	6.9m²	2m²	-
minimum area ratio	-	1.13	-	1.1	-	0.8	-	-
ideal area ratio	-	0.76	-	0.97	-	0.7	-	-
depth exterior	4.5	2	1	2	9	8.33	2	0
type-space	b	c	c	c	a	a	a	b
functional type-space	fb	fd	fd	ff	ff	fi	fi	ff

TABLE 7.9. Spatial attributes of layout 15's apartment scheme.

A clear distinction is made in apartment scheme 15 between collective and private sectors of the house. Overlap of uses may be unavoidable, as the stairs for the bedrooms' floor are located in the living room. The collective sector is, as such, a functional b-type space, organising access to all spaces of the house, which can be represented as a simplified accessibility graph A1. The layout is deep; with nearly 31% of transition spaces, it presents functional spaces that are, on average, 3.2 steps away from each other. The collective sector is the better-integrated of the house, followed by services areas and finally bedrooms, but is surpassed by transition spaces.



FIGURE 7.26. Massarelos, surrounding city.

Equipment

Industry

Public or cooperative housing development

500m

250m

7.7. LAYOUT 16: MASSARELOS

a) Relation to the surrounding city

Layout 16 is located on the hill that goes from the same important through-axis that connects to layouts 3 and 8 (Rua do Campo Alegre) down to the river. If this area remains weakly urbanised today, displaying low values of integration at all scales, it has grown since the construction of the layout in 1977 with the installation of a university campus in vacant lots of the higher part of the area. However, layout 16 is poorly integrated but has large values of local NaCh(r800m, r1500m), which are in part resultant of the addition by one resident of a staircase connecting the layout to the higher level, better integrated at the global level, where the School of Architecture has been located from 1992. While construction is sparse, the area is well served in terms of urban structures. Retail and services are available in a 500m radius, and it is well connected to public transportation. Leisure and cultural structures exist in walking distance: the riverside has pedestrian and cycling lanes, there is a nearby botanic museum and park, as well as a cinema and art gallery, a theatre and planetarium, all within a 1000m radius. If the area is undoubtedly well equipped, the particular location of the layout makes it necessary for its residents to be able to climb the steep streets that connect them to all these structures.

With 80 built houses - far from the 630 proposed initially (Bandeirinha 2007) - layout 16 is one of the largest SAAL developments in Porto. It is also, by far, the denser. Being made up of two collective housing blocks located on each side of one main access, this layout's maze index of 1.57 is the lowest of all SAAL developments in Porto. The layout appears in the continuation of the surrounding, pre-existing urban space.

b) Relations between collective spaces

The layout is made up of two blocks that define three different spaces: a cemented space in the front, the main access street connecting the two blocks, and a semi-soft semi hard-landscaped space in the back. The layout is a gridlike system with high average integration of 1.86 and a low difference factor of 0.46. Convex spaces, weakly hierarchised, are an average of 2.09 steps away from each other and 2 steps from the front-doors of residential buildings. The two spaces in the front are in more than one ring, and the two spaces in the back create a cul-de-sac when accessibility through residential buildings is not taken into account. Because residential buildings can be entered both through the front and the back, layout 16 has no functional b-spaces with complete control over the entrance to functional spaces. The central hard-landscaped area, however, has much higher values of integration and control than other spaces and is located at a mean depth of 1.2 steps from both exterior spaces and the interior of residential buildings. The remaining hard-landscaped spaces are, in turn, over 2 mean steps away from the other spaces in the layout. Traces of use detected during visits reflect a difference between the central space and others.

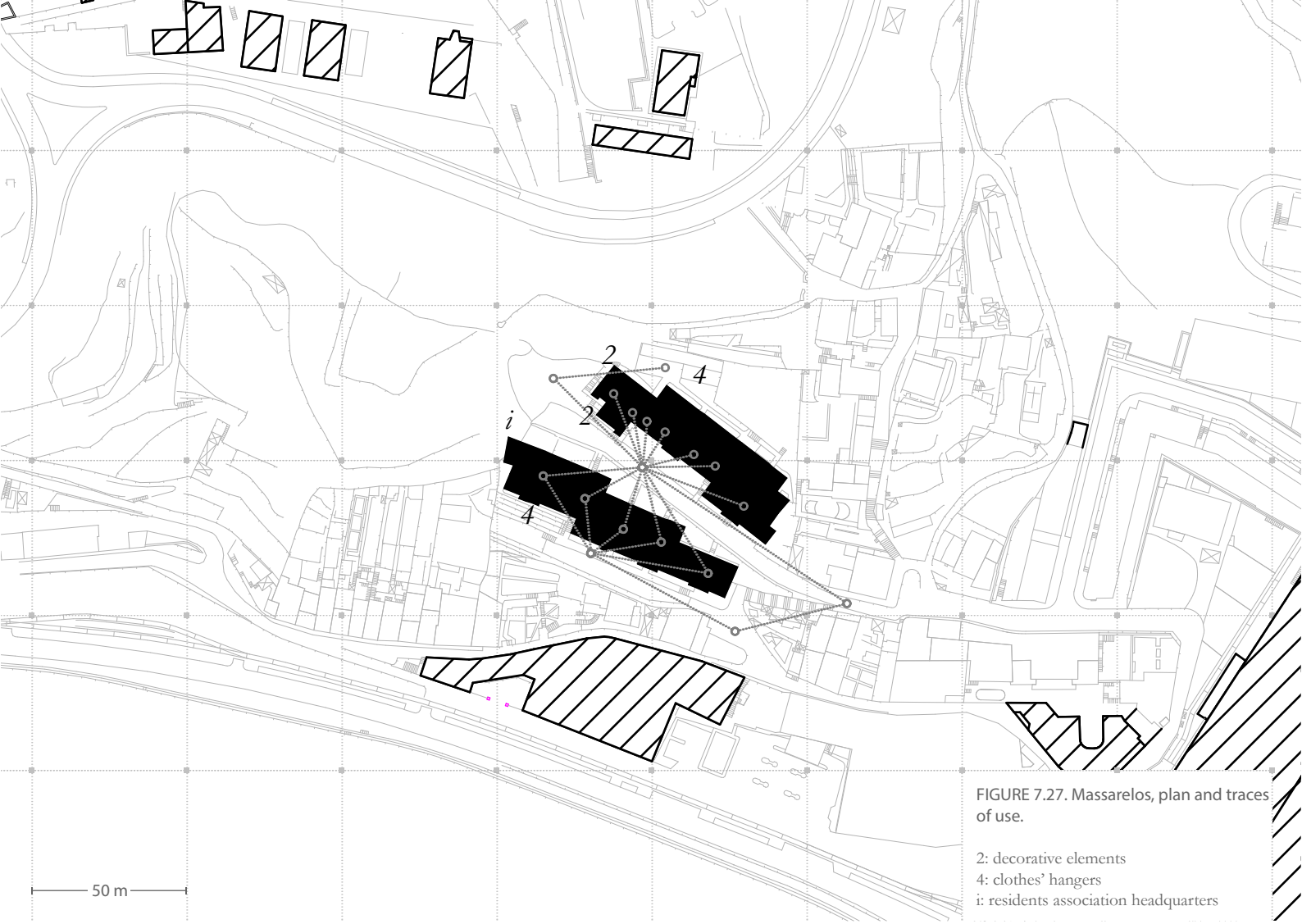


FIGURE 7.27. Massarelos, plan and traces of use.

2: decorative elements
4: clothes' hangers
i: residents association headquarters

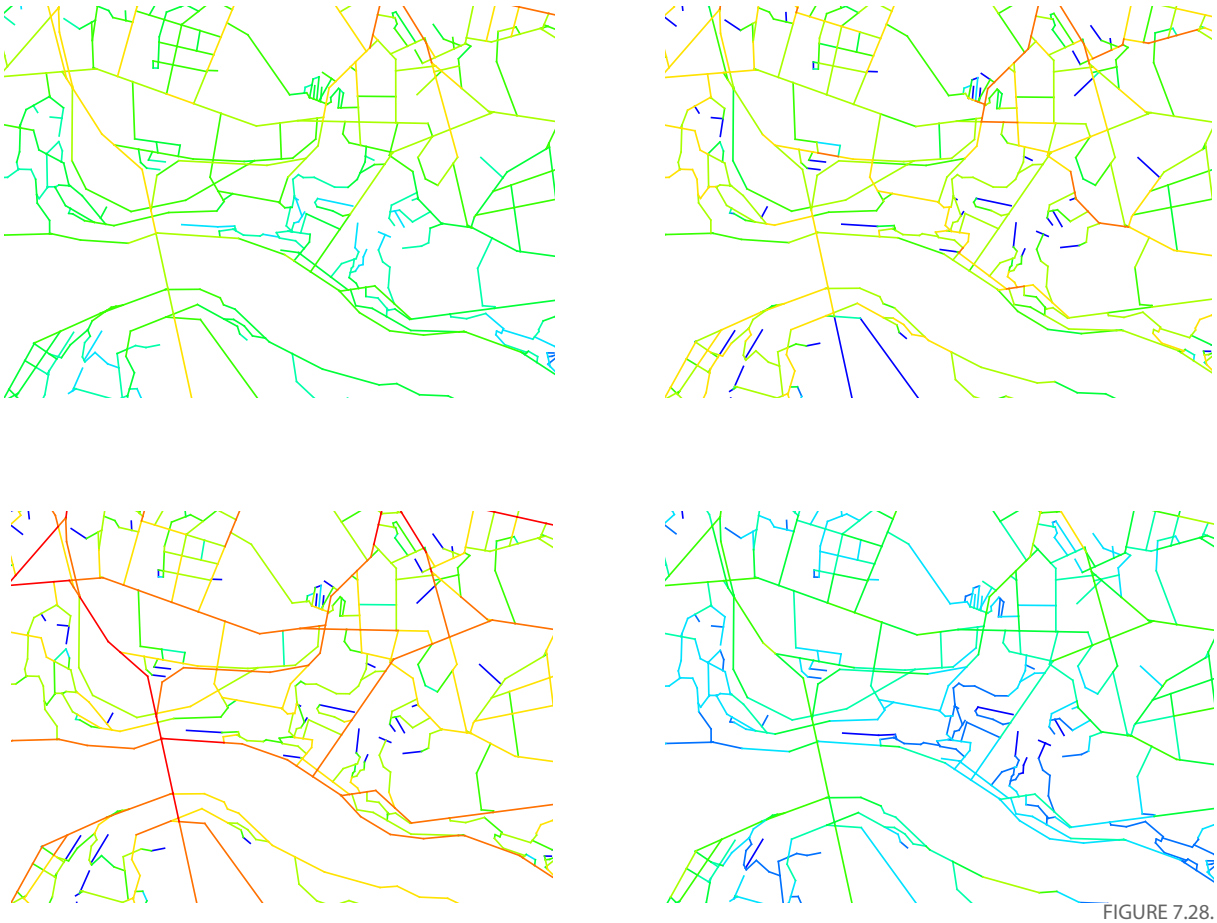


FIGURE 7.28.
Massarelos, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Clothes hangers have been placed in the spaces in the backs of buildings, occupying the greater part of these areas. The central space is mostly occupied by parked cars, but some activity-related traces of use were detected, such as children's toys.

Additionally, at the end of this space, it is located a social centre - the headquarters of the residents association that manages the estate. Well integrated, this space extends to the outside by creating an open terrace with tables and chairs. Half of the spaces are constituted. The central space gives access to both blocks through 12 entrances, and the secondary spaces are connected to 6 entrances each.

c) Relation to individual houses

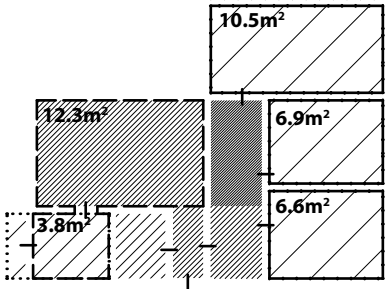
The central space between buildings was not considered to be an exterior street to the layout because, even though it connects to houses outside of it, the part inside the layout was originally a cul-de-sac - and today connects only to a narrow staircase - and is thus unlikely to be used by non-residents. As such, while residential buildings open directly to the street, they are 2 steps away from the exterior of the layout. Access to houses inside the residential buildings is made through semi-exterior staircases which open to both sides of the building. These connect to different exterior spaces, and each connects two apartments on each floor and an average total of 8. Outside these small groups of apartments, neighbours are separated by an average of 2.03 steps. Traces of use could also be found in these open, semi-collective spaces. Staircases are often decorated with potted plants, the open halls - crossed mostly by neighbours sharing the same building and benefiting from the sun and air exposure - are often occupied with moveable clothes hangers, and the areas directly in front of doors and small alcoves are often decorated with objects that could typically be found in domestic environments.

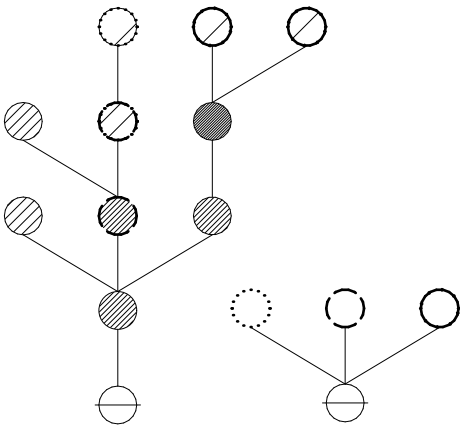
d) Relationship of the house with the exterior

The analysed apartment scheme has a total useful area of 52.3m2, corresponding to approximately 13m2 per resident when ideally occupied. While small, its total useful functional area of the apartment approximates that of most SAAL layouts when exterior spaces are not considered. Depth is created in the small layout through the introduction of two transition spaces into the design, which in one moment separate the living-room from the exterior, and then further separate the bedrooms from the collective space of the house. The layout includes a dedicated space for the treatment of clothes, a domestic function which, while not integrated into the design of the estate's collective areas, has been registered taking place outside, in informal clothes' hangers.

e) Collective sector of the house

The apartment has a 12.3 living-room, which scores above the minimum area while below the ideal, and which is the largest space of the house. It is simultaneously the shallowest and the better integrated functional space, surpassed only by transition areas. It is a functional b-type space that controls access to the services area.





INTEGRATION

min. value	0.44
25th percentile	0.62
50th percentile	0.74
75th percentile	0.84
max. value	1.23

private sector

collective sector

services sector

FIGURE 7.29.
Massarelos, apartment schemes: plan and accessibility graph.

f) Services sector of the house

The kitchen is accessible through the living room but is not visually connected to it. As such, there is a collective-services pole on the ground floor of the house, but the two functions are spatially separated. It is less integrated than the living-room, displaying values similar to those of bedrooms. With 3.8m2, the kitchen's area does not comply with the required minimum area. It connects to a 1m2 space for clothes treatment, together with which the services sector remains among the smallest of the studied cases.

g) Private sector of the house

Bedrooms are similarly small - too small for the comfortable introduction of furniture supporting activities of individual development - and simultaneously the deepest and less integrated spaces of the house. Additional privacy is added through the introduction of an enclosed corridor.

h) Relationships between sectors of the house

	transition space >	living-room >	washroom =	exterior >	kitchen >	bedrooms >	other space
integration	1.229	0.948	0.737	0.737	0.632	0.601	0.442
area	4m²	12.3m²	2.2m²	-	3.8m²	8m²	1m²
minimum area ratio	-	1.03	-	-	0.63	0.82	-
ideal area ratio	-	0.68	-	-	0.49	0.71	-
depth exterior	2	2	2	0	3	4	4
type-space	b	b	a	b	b	a	a
functional type-space	fb	fb	ff	ff	ff	fi	fa

TABLE 7.10. Massarelos, spatial attributes of apartment scheme.

The apartment can be represented as a simplified accessibility graph A1, where there is a clear definition of a collective and a private sectors, and a certain ambiguity of use is favoured through the articulation of the collective and services areas of the house. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members, and in particular by women. The private sector is clearly separated from this area of the house and, scoring near the minimum area for bedrooms, does not appear to encourage its use for individual activities that require space or extra furniture. The integration values of functional sectors are ordered, from the largest to the smallest, as collective-services-private.

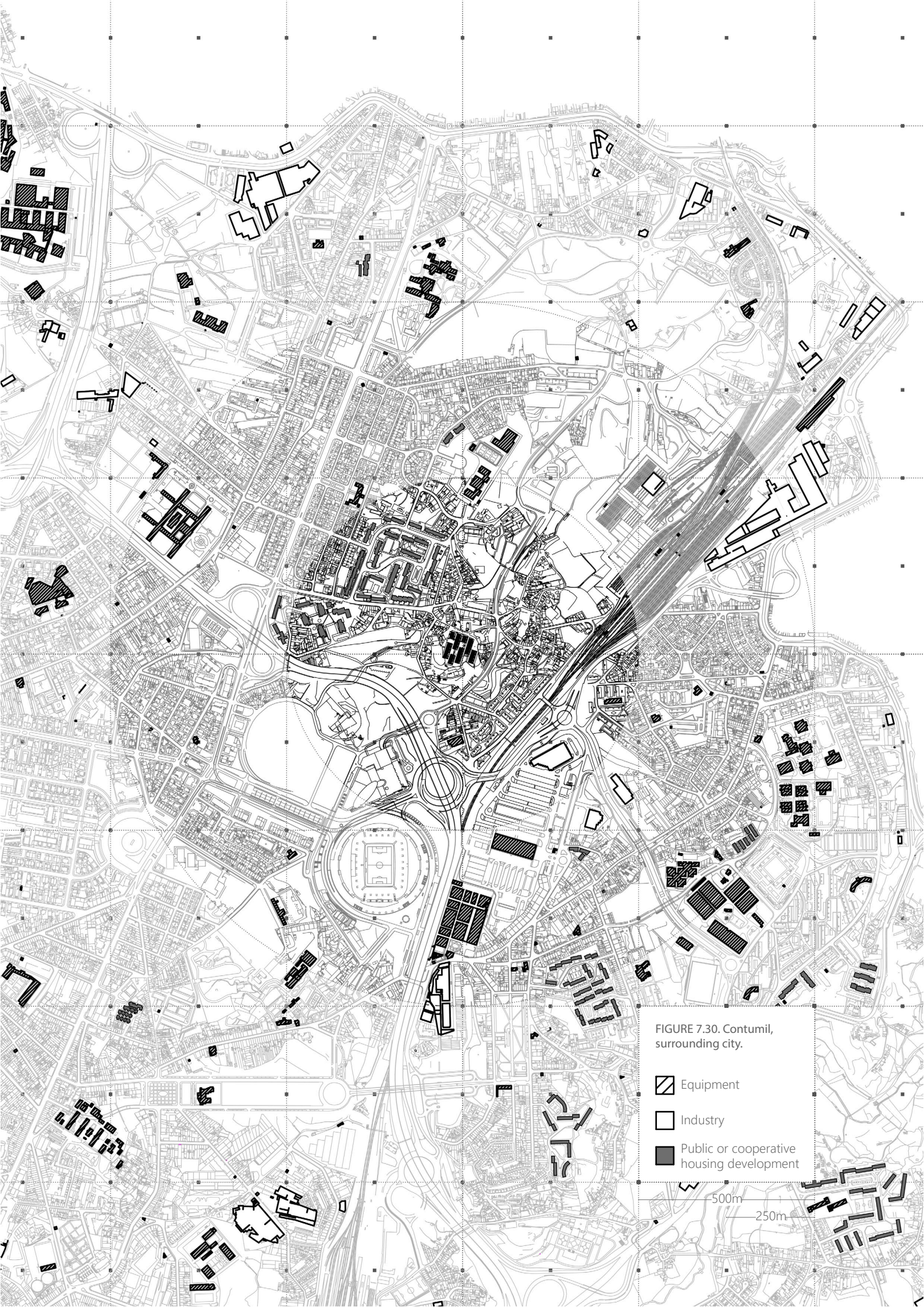


FIGURE 7.30. Contumil, surrounding city.

7.8. LAYOUT 17: CONTUMIL

a) Relation to the surrounding city

While located less than 300m away from Layout 9, while the former was not only articulated with the existing city grid but managed to add to that structure, Layout 17 is removed from the primary city grid and presents much smaller values of integration and choice, not only at the global scale but also locally. Additionally, this layout presents the second largest maze index of SAAL developments, as its axial system is at an average of 2.91 steps from the surrounding street grid. It is located behind existing buildings, in the interior of a lot that seems to have never been fully constructed and can be accessed through a secondary street that crosses the lot and an additional narrow pathway. Similarly to layout 9, this layout has access to some local retail and services and is located in the vicinity of pre-existing housing developments that provide sports facilities, schools and social structures. With 62 houses in 11 200m2, the layout is large for a SAAL development.

b) Relations between collective spaces

Despite the grid-like appearance of the estate, depth is increased in the system by the way hard-landscaped spaces are lodged alternately between the rows of houses so that they do not face each other and it is not possible to cross the estate in one single topological step. The large values of depth measures reveal this much: convex spaces are at an average of 3.62 steps from the others and an average of 3.35 steps from all front-doors. Nevertheless, all spaces of the layout are distributed and most of which integrate more than one ring. Spaces vary between constituted longitudinal lines and smaller, square spaces that connect streets of different heights. Each longitudinal space provides access to at least 6 doors, and the neighbourliness score is 21, which means the average resident shares the access space to their house with 20 other families. The larger hard-landscaped spaces present large values of integration, but function as parking-lots instead of collective areas.

c) Relation to individual houses

Houses are all oriented in the same direction and, as such, there is no clear differentiation between the front and the back of the house or between primary and secondary streets in the layout. As in other layouts, on one side the entrance is made through the kitchen and on the other through the living room, thus clearly defining separate collective and services poles. This distinction, however, is not translated into the layout's design. If women are more likely to spend time in the kitchen and adjacent yard, all types of neighbours will cross the public space to which the yard opens.

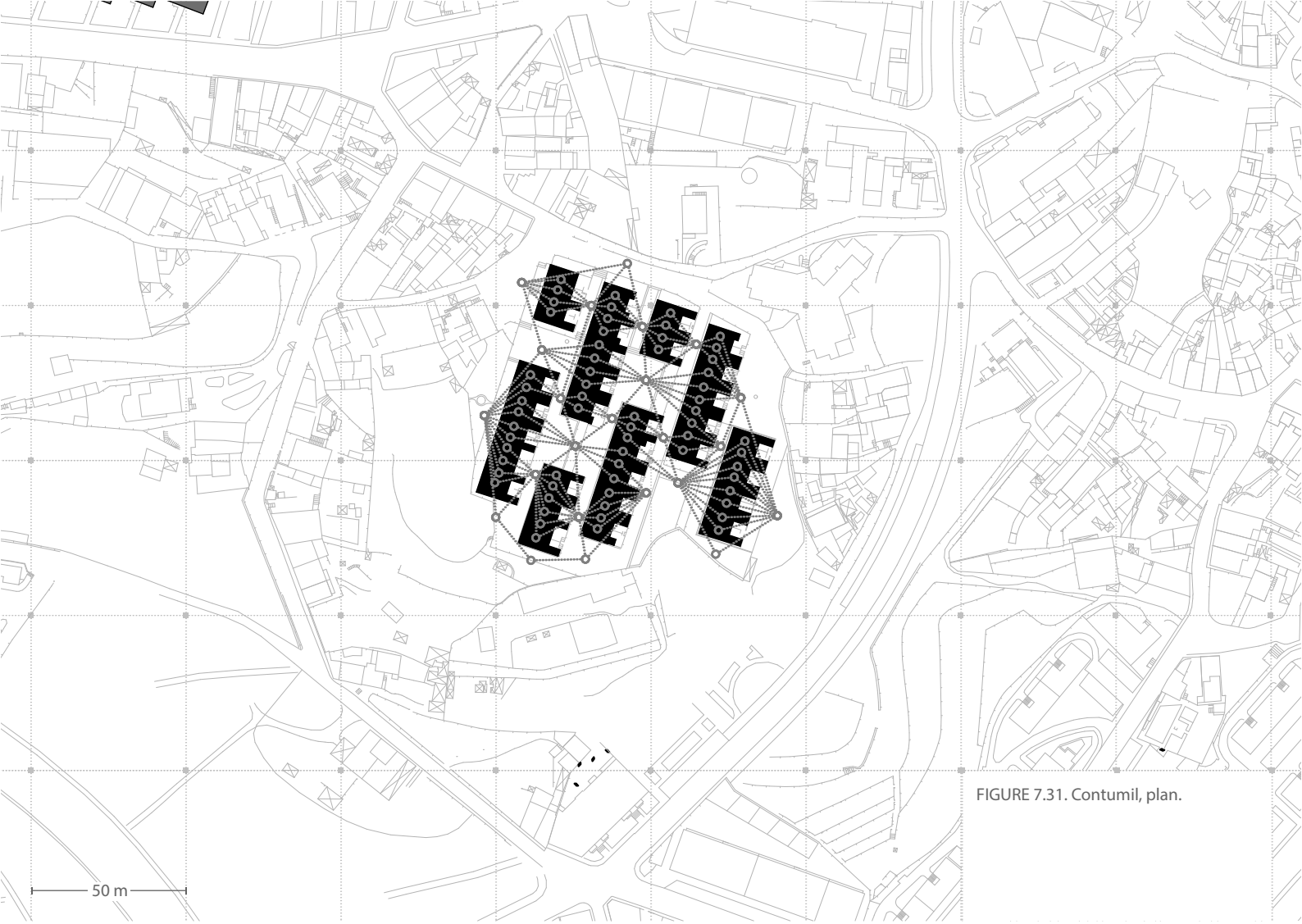


FIGURE 7.31. Contumil, plan.

As such, while depth measures within the layout and between functional spaces present values above average for SAAL layouts, it should be noted that constituted spaces serve 20 dwellings on average (considering both entrances). As such, while houses are deep in the system, they connect to others in large clusters.

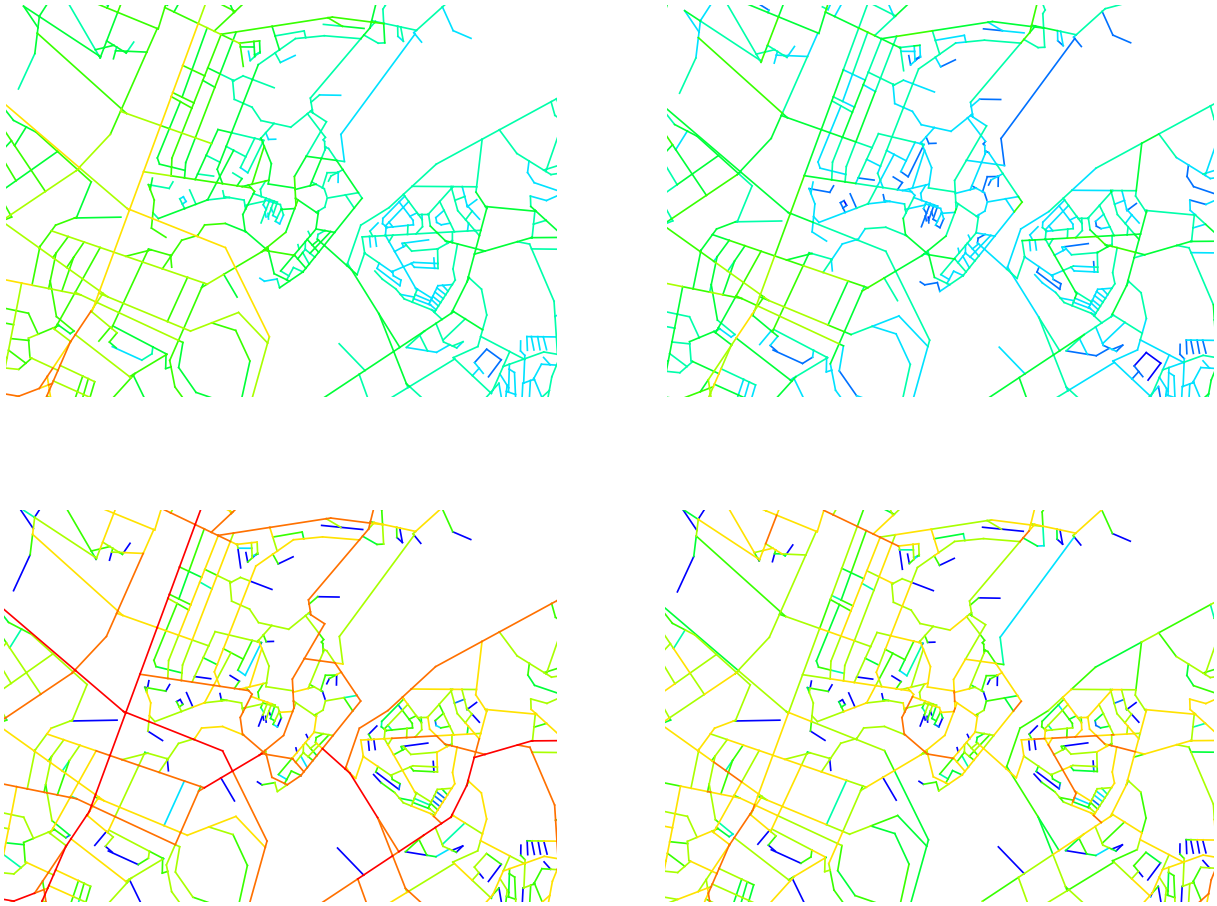


FIGURE 7.32.
Contumil, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.


7.33. Bouça, surrounding city
Equipment
Industry
Public or cooperative housing development
500m
250m

7.9. LAYOUT 18: BOUÇA

a) Relations to the surrounding city

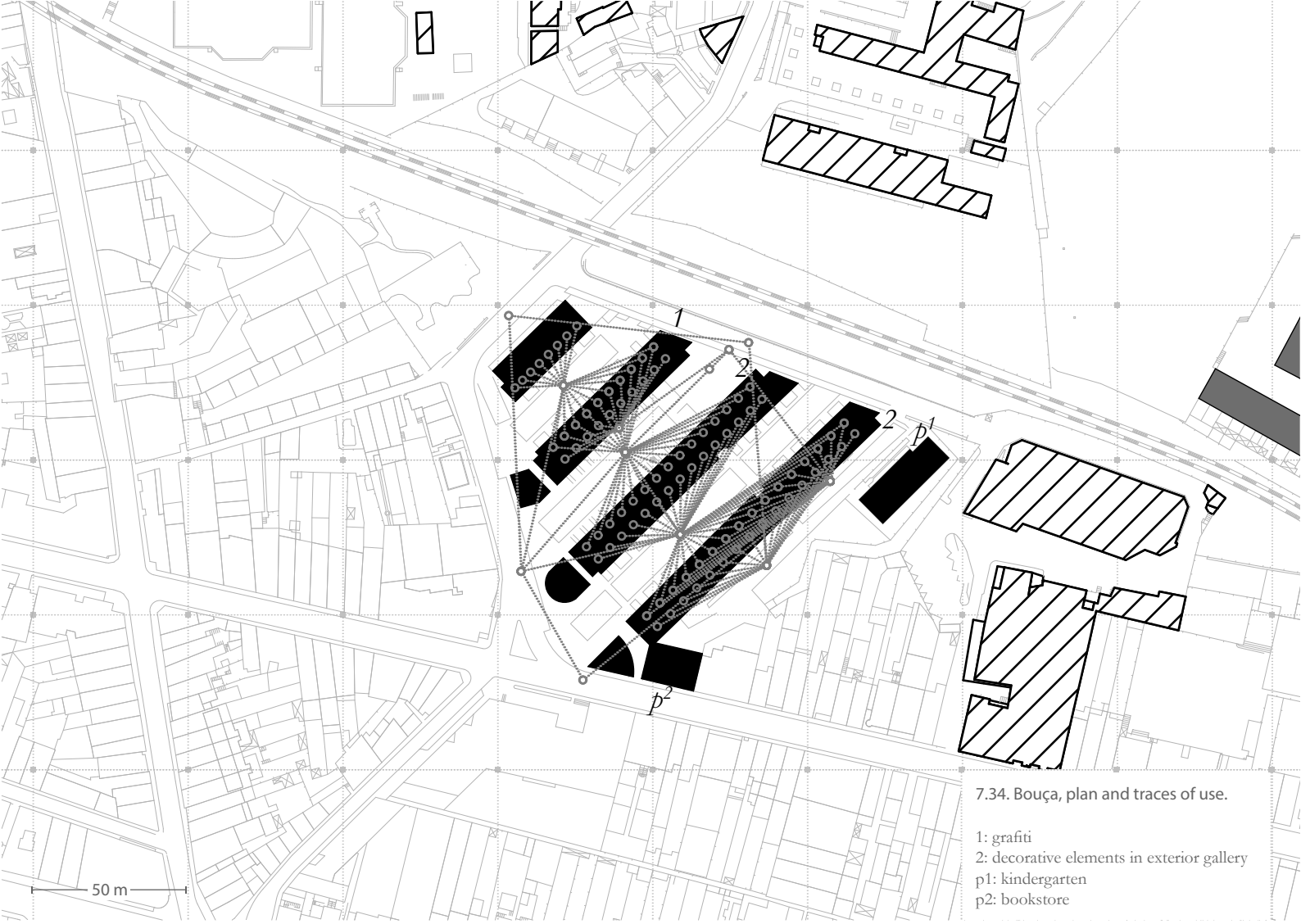
Layout 18 is adjacent to the main axis that connects the centre of the city to the oceanside, and one of the better-integrated SAAL layouts in the city. While its project dates from 1973, only one of its four blocks was constructed at the time. Originally conceived within the FFH, the estate was integrated into the SAAL programme and assigned to the organised population of the area, with whom the architect and brigade still worked together in furthering the design. As such, while completed in 2006 as a housing cooperative, the housing development can still be considered the largest SAAL estate and one of the denser, with an area of around 18 500m2 and housing 126 families.

Located only 120 meters away from layout 14 as the crow flies, the two are effectively separated from each other by a railway. While the two share large values of integration, layout 18 is better integrated at a local scale. The street which it touches is an important through-axis, already solidified in the urban fabric at the time of the estate's construction. It has a high density of retail and services and a good articulation with the city's public transportation network. While well integrated, layout 18 creates a wall against the railway and has average values of NaCh at all scales.

Even though, unlike other cases, the estate is fully visible from its exterior, it only touches the main street with one of its corners, while the remaining are adjacent to low choice streets. It has, nevertheless, one of the lowest maze index values for SAAL layouts, being likely perceived by non-residents as an integral part of the main urban space.

b) Relations between collective spaces

While directly connected to the exterior urban grid and so not very deep from the exterior in relation to other SAAL developments, layout 18 is fairly treelike, with convex spaces being at an average of 3.9 steps from all others. This attribute is accentuated by the redundancy of accesses necessary to have all houses opening directly to the outside, in this case, open-air corridors on the second floor. Even though all spaces in the layout are distributed, they are usually a part of only one ring, which often includes a large number of nodes relative to transition spaces. In this way, the layout's overall depth is increased. The layout is constituted by four blocks of superposed two-storey houses placed in parallel to each other across the lot, which are articulated three main exterior spaces. All provide direct accessibility to houses, but are spatially differentiated. The central, better-integrated space is hard-landscaped and divided into two different heights, one at the ground floor, the other at the level of the first-floor, bellow the open-air corridors that give access to the second row of superposed houses. This space controls access to 24 houses but is visible from the access corridors, as well as from 68 of the 126 houses. Requiring less than 3 steps



7.34. Bouça, plan and traces of use.

1: grafiti
2: decorative elements in exterior gallery
p1: kindergarten
p2: bookstore

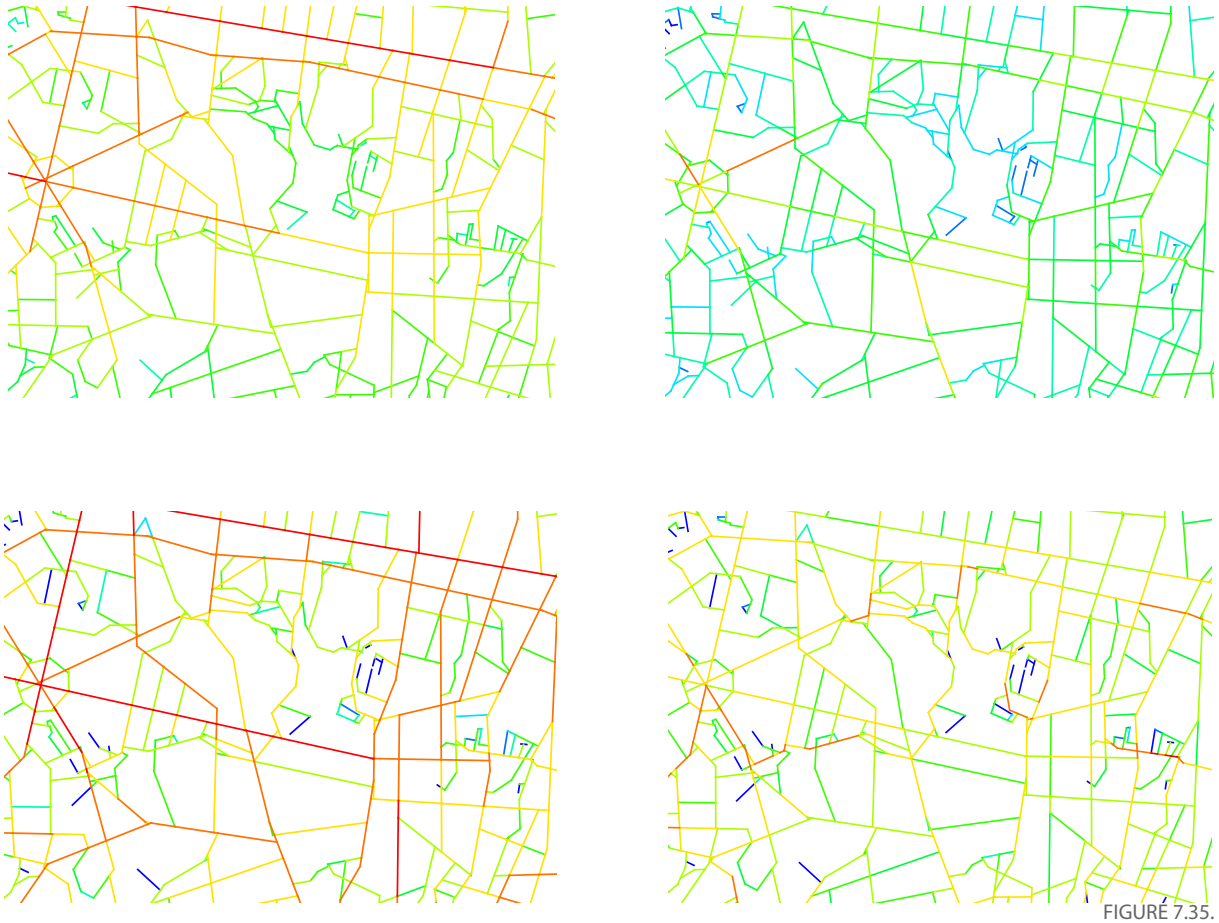


FIGURE 7.35.
Bouça, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

to reach all spaces in the system, including all dwellings, it is designed as the central space of the layout. However, during field visits, this space did not display traces of use other than decorative elements - mainly plants - on the staircases leading up to the first floor. Annually, however, during Porto's city celebration - São João - this space is filled with tables and used by the whole community. The lesser integrated courtyards have a central gardened area, that separates the space into two identifiable, while still mutually visible, access corridors.

The first block to be built in 1977 was the largest, positioned in a way so that closed the interior of the existing block and turned itself in towards the inside. Ground-floor apartments are accessible from both sides of the block but faced, for decades, a non-urbanised front of the lot.

c) Relation to individual houses

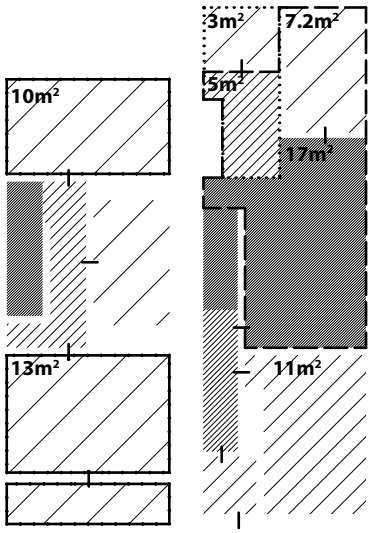
The street adjacent to the northern blocks was not considered to be exterior to the layout because, even though it connects to houses outside of it, the part inside the layout was originally a cul-de-sac - and today connects only to a narrow staircase - and is thus unlikely to be used by non-residents. As such, while residential buildings open directly to the street, they are 2 steps away from the exterior of the layout. Access to houses inside the residential buildings is made through semi-exterior staircases which open to both sides of the building, connecting different levels of exterior space, and each connects two apartments per floor, a total average of 8. Outside these small groups of apartments, neighbours are separated by an average of 2.03 steps. Traces of use could also be found in these open, semi-collective spaces. Staircases are often decorated with potted plants, the open halls - crossed mostly by neighbours sharing the same building and benefiting from the sun and air exposure - are often occupied with moveable clothes hangers, and the areas directly in front of doors and small alcoves are often decorated with objects that could typically be found in domestic environments.

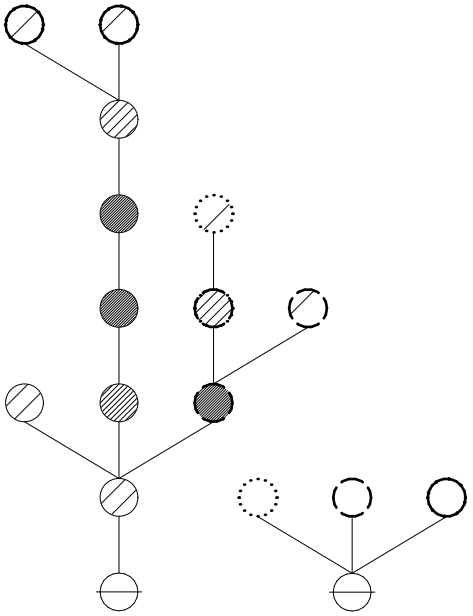
d) Relationship of the house with the exterior

The analysed scheme is of an 85m2 three-bedroom apartment which, with an ideal density of roughly 21m2 per resident, approximates the ideal area requirements seen in chapter 3. Depth is created in the layout with little economy of transition spaces, which make up approximately 30% of the house's TUFA. Spaces are at an average of 3.31 steps from the exterior. The shallowest functional spaces are the living room and downstairs room at 3 steps from the exterior and the deepest the bedrooms. An exterior entrance hall is closed from the exterior by a railing door that makes it possible to maintain visual permeability between the interior of the house and its exterior without leaving the house open to strangers.

e) Collective sector of the house

The apartment has a 17m2 living-room, which scores above both the minimum and ideal areas, and which is the largest space of the house. This space presents the largest value of integration. A collective pole organised around the living-room. It controls access to the kitchen, to which it





INTEGRATION

min. value	0.51
25th percentile	0.58
50th percentile	0.60
75th percentile	0.84
max. value	1.08

private sector

collective sector

services sector

FIGURE 7.36.
Bouça, apartment schemes): plan and accessibility graph.

establishes a relation of great permeability, as well as with related spaces. While in other SAAL designs the collective areas of the house are articulated with yards that connect to the neighbourhood, here the collective sector is enclosed, turns to the inside, to collective life. While a functional c-type space, the living-room controls all access to the kitchen.

f) Services sector of the house

The kitchen is integrated into the living-room. Separated from it only by a counter, it is openly connected to it both accessibility and visibility-wise. By itself, the kitchen has an area of 5m2, below the required minimum. However, in the collective pole it creates with the living-room, it reaches a 22m2 area. Even though it can be considered part of the collective area of the house, it is placed in such a way that it is deeper both from the outside and from the bedrooms, making it necessary to move through the living-room in order to each it. Nevertheless, its direct connection to the rest of the house means it is not segregated.

g) Private sector of the house

Bedrooms are larger than the minimum area but, on average, smaller than the ideal, being simultaneously the deepest and less integrated spaces of the house. Two of the bedrooms are located on the upper floor, deep from the exterior and poorly integrated into the space of the house, and create a clearly defined private sector. However, an additional room exists on the ground floor.

h) Relationships between sectors of the house

	transition space >	living-room >	kitchen >	bedrooms >	exterior >	washroom >	other space
integration	1.08	1.01	0.674	0.599	0.587	0.568	0.505
area	4m²	17m²	5m²	10.25m²	-	6m²	3m²
minimum area ratio	-	1.51	0.83	1.28	-	-	-
ideal area ratio	-	0.94	0.74	1.08	-	-	-
depth exterior	2.5	3	4	4	0	5	5
type-space	b	c	c	a	b	a	c
functional type-space	fb	fd	ff	fi	fb	ff	fd

TABLE 7.11. Bouça, spatial attributes of apartment scheme.

The apartment can be represented as a simplified accessibility graph A1. There is a clear definition of a collective sector, which includes services functions, and of a private sector, distanced from the rest of the house by being located on a separate floor. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members, and in particular by women. The collective sector has the largest integration values, followed by services and then the private sector.



FIGURE 7.37. Vilar, surrounding city.

7.10. LAYOUT 20: VILAR

a) Relation to the surrounding city

Layout 20 is a poorly integrated estate located over the river. It is the largest of AM layouts, occupying an 11 000m2 lot with 144 apartments. Even though it presents some of the lowest values of integration at all scales of all studied cases, and in particular of cases located in the centre of the city, the estate is located close to retail and services, schools, playgrounds, an urban park and cultural equipment. Contrarily to most AM estates, layout 20 is situated in the interior of an existing lot, being enclosed by existing houses to the northeast and southwest, by a seminary on the northwest, and by a park on the southeast. It is accessible from the outside through three points, one of its buildings faces the main street grid and one other opens to the seminary. As a result, the layout has the largest maze index of all AM developments, taking, on average, over 3 steps to fully course the layout.

b) Relations between collective spaces

Layout 20 has no differentiated spaces of collective potential other than a sports field - a posterior addition that appears forethought in the original design, located on a vacant space near one of its openings between the exterior street at the inside of the layout. As such, it is shallow from the exterior, allowing direct visibility from the primary street grid. It is also the less integrated space of the layout, with 4 steps distancing the sports' field from the nearest residential building, without stepping outside of the estate.

The layout constitutes a cul-de-sac, developed in a series of rings that include the nearest exterior axis and, as such, present low depth values in measures regarding the relation of its residents with the exterior. However, while all spaces are in rings with the exterior of the layout, less than half integrate rings interior to it, making it so that the interior of the estate is fairly tree-like and hierarchized, and spaces are not likely to be used by either residents or non-residents who do not live in connected buildings.

c) Relation to individual houses

One-third of the spaces are not constituted by the front-doors of buildings. Those that are, give access to 5 buildings on average, ranging from 3 to 9. Front-doors are distanced from accessibility axes by small, non-accessible, gardened spaces, such as those often registered in PMP and FFH's layouts. Houses are further away from each other than from the exterior of the layout. Like in most other cases of multi-family buildings, each entrance gives access to 8 apartments, 2 on each floor.

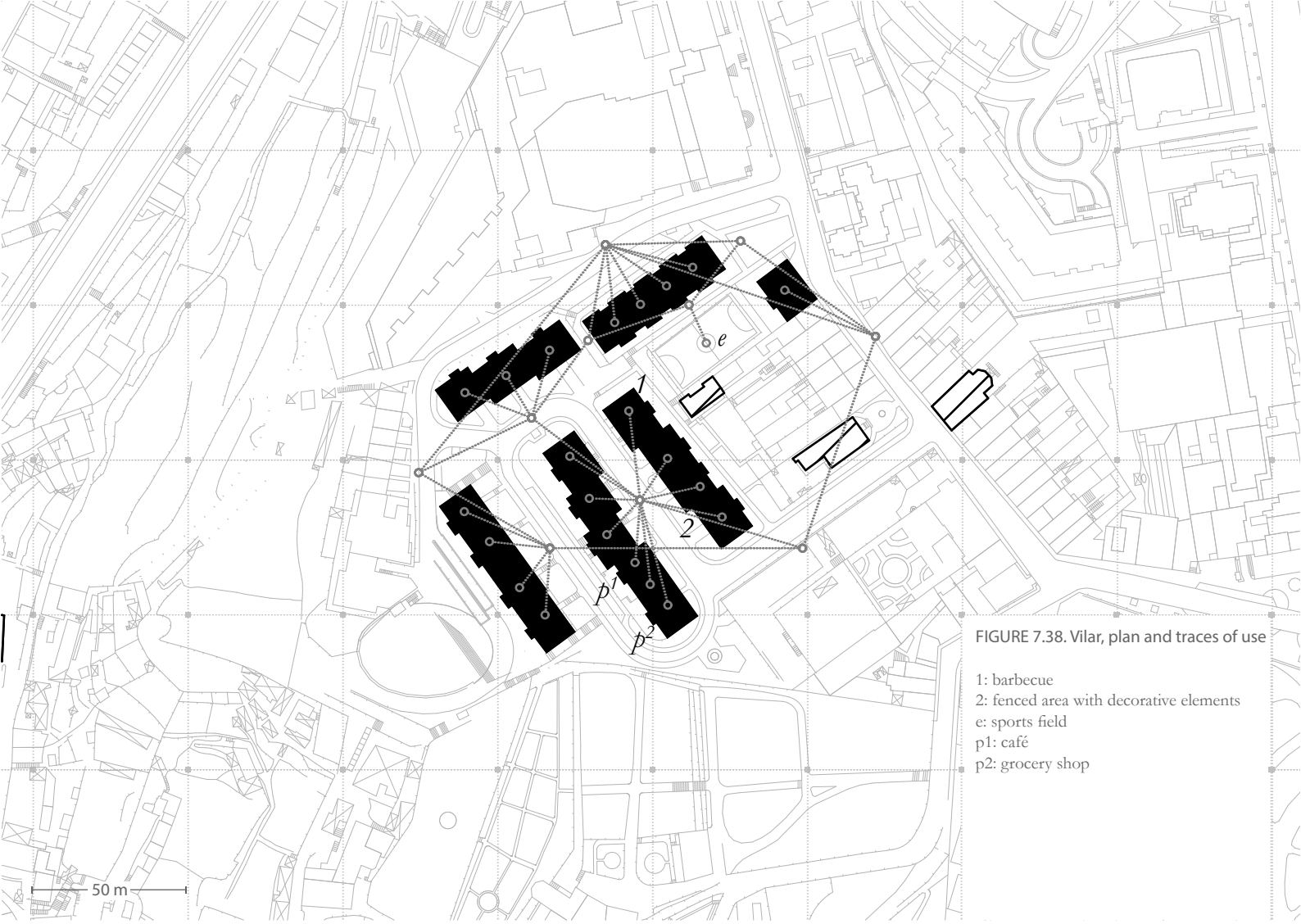


FIGURE 7.38. Vilar, plan and traces of use

1: barbecue
2: fenced area with decorative elements
e: sports field
p1: café
p2: grocery shop

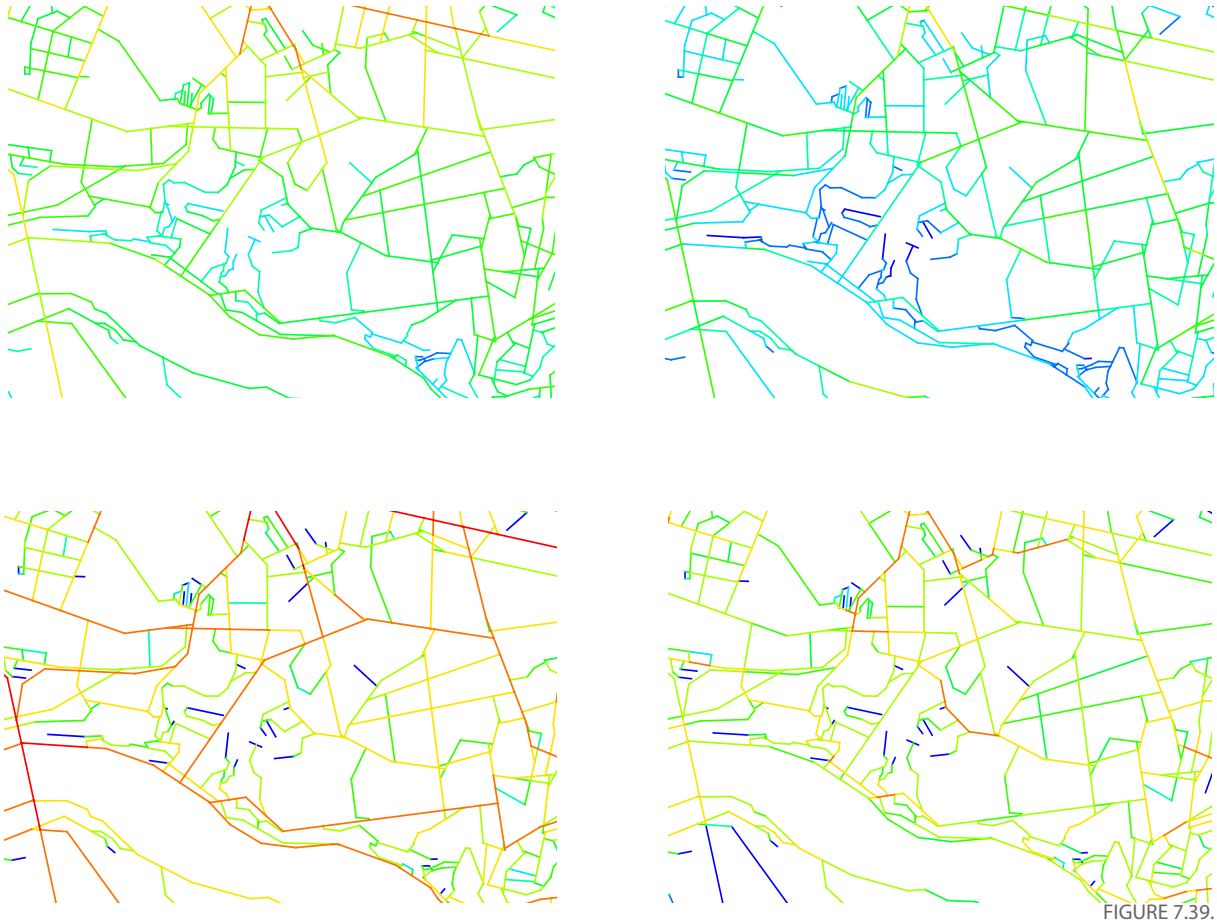


FIGURE 7.39.
Vilar, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

This apartment scheme is shared by Vilar (20), Carvalhido (22), Ramalde do Meio (28) and Amial (33), and is speculated to represent the apartments of Tirares (34) and Pego Negro (35) as well.

a) Relationship to the exterior of the apartment

The three-bedroom apartment type of layout 20 has a total useful area of around 72.3m2, resulting in a density of 18m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. Depth is created in the layout through the introduction of two transition spaces into the design, which in one moment separate the living-room from the exterior, and in another separate the bedrooms from the collective space of the house. The layout includes a dedicated space for the treatment of clothes, allowing for the individualisation of most services activities.

b) Collective sector

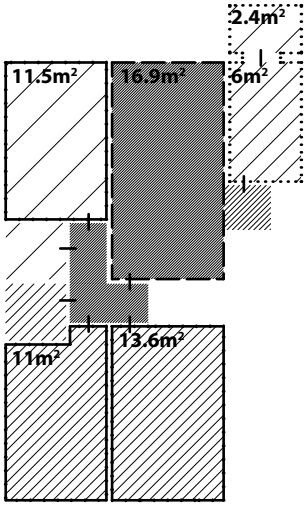
The apartment has a 16.9m2 living-room, which complies both with the minimum and ideal areas seen in chapter 3, and is the largest space of the house. It is an enclosed space, separated from the services and private sectors by a hall and a corridor. Located in between the front door and the private area of the house, it controls access between bedrooms and the outside and bedrooms and the kitchen and is the space with the largest value of integration.

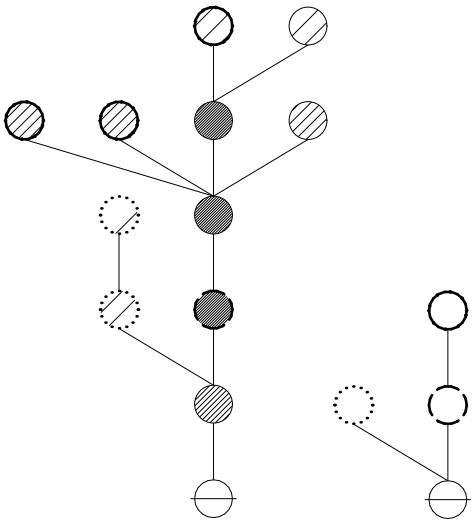
c) Services sector

The kitchen's area rounds the required minimum. Additionally, it is connected to a dedicated space for the treatment of clothes, with an area of 2.4m2, which results in a services sector with 8.4m2. It is an enclosed space, has no connection to other functional spaces, and presents the lowest value of integration of functional spaces. Located at one step from the entrance hall, it is shallow from the exterior and the living-room.

d) Private sector

Bedrooms are relatively large, all approximating 12m2 - large enough for the comfortable introduction of furniture supporting activities of individual development. They are simultaneously the deepest and less integrated spaces of the house. Some privacy appears to be intentionally added to the private sector of the house through the introduction of an L-shaped corridor between the





INTEGRATION

min. value	0.47
25th percentile	0.65
50th percentile	0.82
75th percentile	1.03
max. value	1.42

private sector

collective sector

services sector

FIGURE 7.40.
Vilar, apartment schemes): plan and accessibility graph.

living room and the bedrooms.

e) Relationships between sectors

	living-room >	transition space >	bedroom =	washroom >	kitchen >	exterior >	other space
integration	1.424	1.236	0.825	0.825	0.681	0.627	0.475
area	16.9m²	1.7m²	12m²	2.4m²	6m²	-	2.4m²
minimum area ratio	1.41	-	1.34	-	1	-	-
ideal area ratio	0.94	-	1.16	-	0.97	-	-
depth exterior	2	2.7	4.3	4	2	0	3
type-space	b	b	a	a	b	b	a
functional type-space	fb	fb	fi	ff	ff	ff	fa

TABLE 7.12.
Vilar, patial attributes of apartment scheme.

The accessibility graph of this apartment scheme translates into a simplified B1 type, where kitchen and living-room are not either directly or visually connected. Sectors are clearly defined, with the ordering of integration values going from the largest to the smallest as collective, private, services, with a difference factor of 0.74. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members. Even though it is not connected to the kitchen, its control of all access to bedrooms has been seen to potentially increase the likeliness of this sector being used by women. Simultaneously, the services sector, more likely to be used by women, is segregated from the rest of the house. The private sector is clearly separated from this area of the house and, with bedrooms that comply with minimum areas, may encourage its use for individual activities that require space or extra furniture.



FIGURE 7.41. Campo Alegre, surrounding city.

7.11. LAYOUT 21: CAMPO ALEGRE

a) Relation to the surrounding city

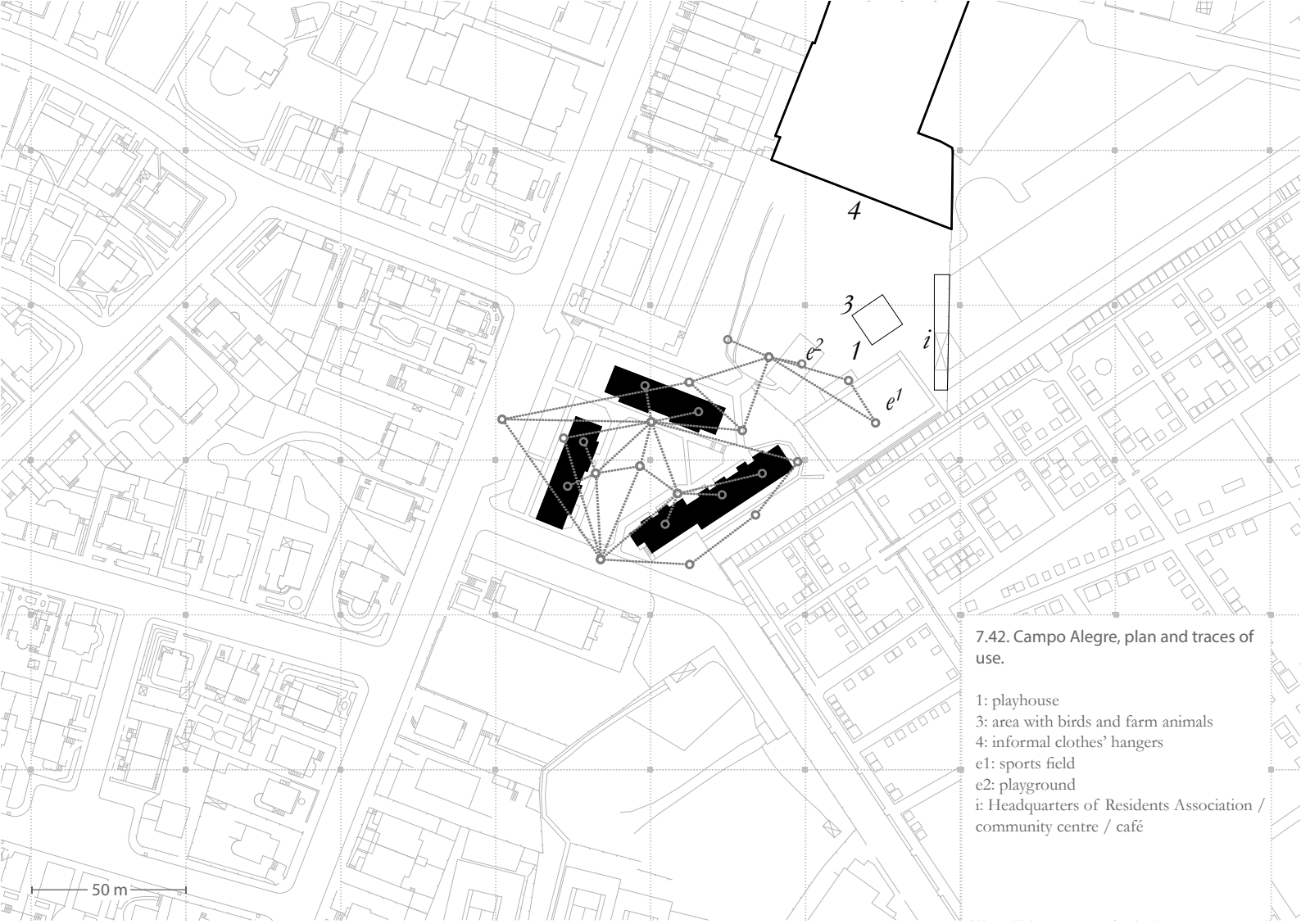
Located in a central area of the city, layout 21 occupies a 4 800m2 lot with 56 houses and is the less dense estate developed for AMs outside of the SAAL. It is located in a well integrated, high-choice axis, one axial step away from two of the city's main accessibility lines at the global scale, being well connected both to the centre of the city and to the seaside. Even though the estate is located in a mainly residential fringe, it is situated in close proximity to retail and services, as well as in the vicinity of other urban structures. It is located down the road from the city's botanical garden, and less than a kilometre and 3 axial steps from the museum of contemporary art.

The lot opens to the street in two of its four sides, is limited by a cemetery on another and by an originally vacant lot on the last. Even though it creates street-frontage on the axis with the highest potential for traffic movement, the layout is turned inwards. All doors are located in a space defined by the three residential buildings that has a small gardened area at its centre. These buildings do not touch, creating accessibility and visibility axes from the main city grid, and allowing the gardened area to reach one of the streets. Additionally, there is a small triangular cemented area located on the back of one of the buildings that turns outwards towards the street that, in the continuation of the side-walk, might function as a small public space. As such, even though the layout turns inward, it maintains a fairly frank relation with its exterior, displaying a maze index and depth from the exterior that round the average for AM developments.

b) Relations between collective spaces

Layout 21's original design includes only the three residential buildings and central gardened area and is, therefore, a shallow and ringy system. However, in the originally vacant lot to the north of the estate are now located a sports field, a playground and a community centre with a coffee shop. This lot is encased between the backs of buildings and the cemetery and as such deep from the exterior, and its addition results in the decrease of the estate's overall integration and increase of the hierarchy of spaces, as well as of its depth from the surrounding streets. Similarly, while in the original layout all spaces were distributed, the inclusion of this functional area results in a decrease in the distributed-non distributed ratio and of its constitutedness rate, with only 25% of spaces opening to the front-doors of buildings or other functional spaces. All entrances to residential buildings open to the same courtyard, but are divided across three pathways that serve two or three entrances each. As such, while the estimated 220 residents of the estate all cross the same central space, they are more likely to encounter their immediate neighbours.

While on one side of the layout it turns its interior space towards the street, on the other, more



7.42. Campo Alegre, plan and traces of use.

1: playhouse
3: area with birds and farm animals
4: informal clothes' hangers
e1: sports field
e2: playground
i: Headquarters of Residents Association / community centre / café

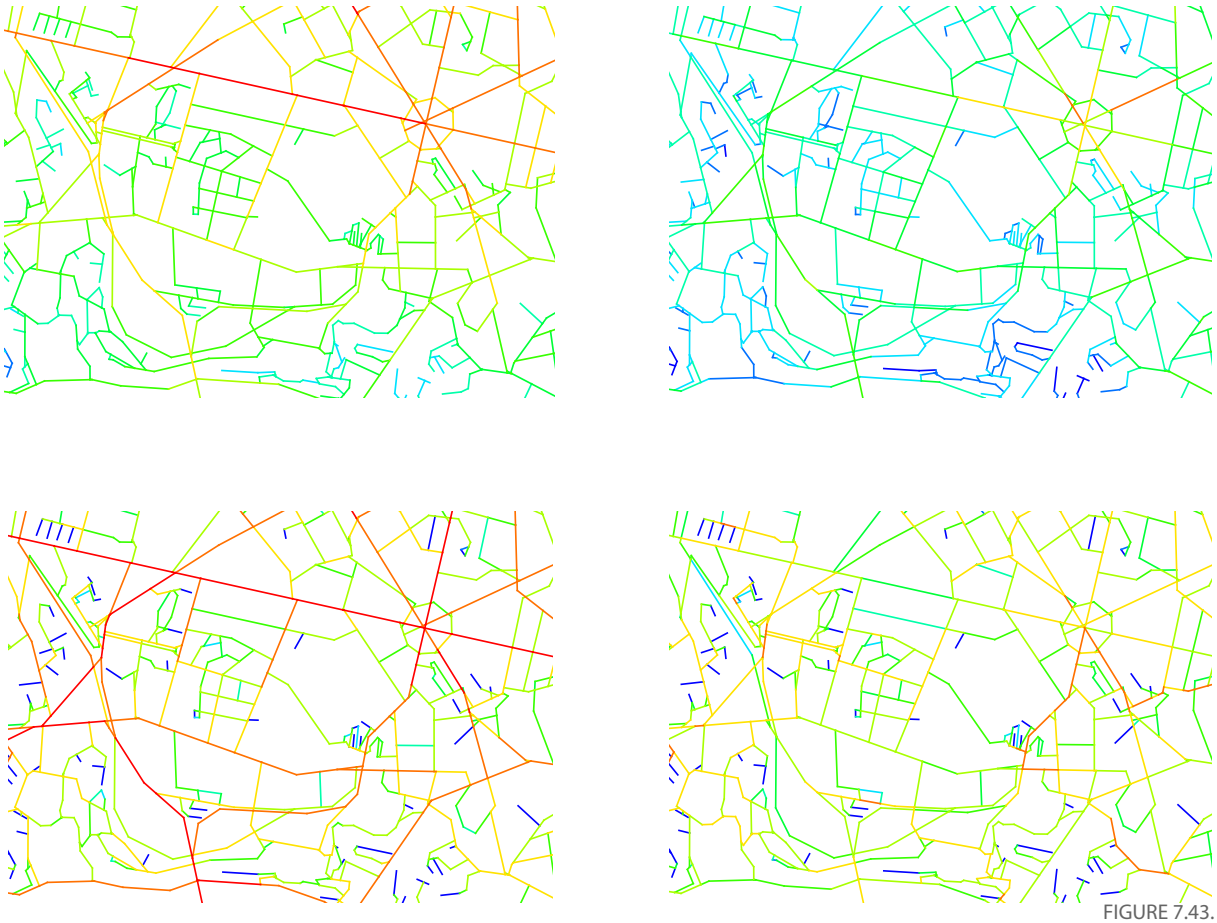


FIGURE 7.43.
Campo Alegre, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

likely to have strong traffic, the layout not only turns its back to the exterior, but it is also distanced from it by one extra step, through the insertion of a redundant sidewalk.

Separated from the original layout, collective functions are deep, and particularly deep from the exterior, involving local knowledge in order to be found. Not integrated in the original layout and appearing to belong to the residents' association, the coffee-shop, playground and sports centre seem likely to be intended for local use. Traces of use were identified in the whereabouts of this functional area that reveal heavy appropriation of the lot's vacant space. On the opposite side of the pathway that leads to the coffee-shop, there are located several cages with birds and farm-animals. Fixed toys, such as a play-house, were placed near the coffee-shop. The more distant vacant area near the end of the lot is occupied with unplanned clothes hangers.

c) Relation to individual houses

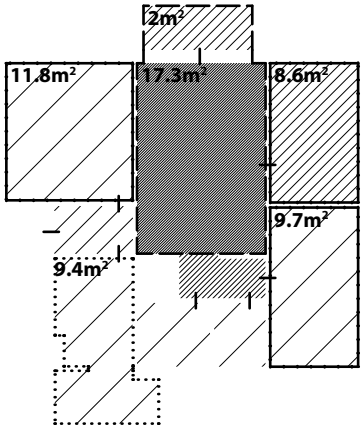
Layout 21 displays two clearly separate functional areas with different configurational properties, which appear to be the result of different processes. The original 1977's design encompassed only dwellings and a community centre, to which were added, in the early 1990s, the sports field and playground were added in a different lot. As a result of this process, fixed-function collective spaces are distanced from the residential buildings. They are disposed in the interior of a lot, present low values of integration and integrate a closed ring that functions as a cul-de-sac and, as such, depend both on local knowledge and purposeful use. Inversely, dwellings are shallow, being on average 2 steps away from the main city grid and from each other.

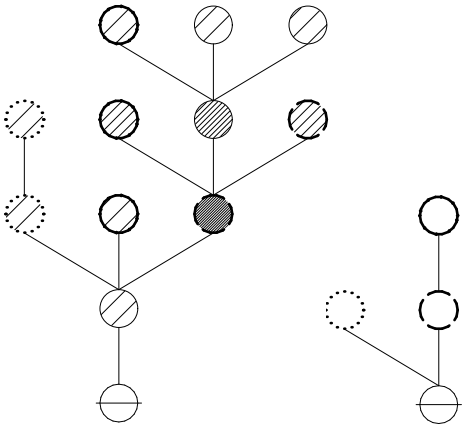
d) Relationship to the exterior of the apartment

This layout shares the same apartment scheme as Ramalde do Meio (layout 28) and Carvalhido (layout 22), as it is speculated that the same scheme is used in Tirares (layout 34) and Pêgo Negro (layout 35).

The three-bedroom apartment type of layout 21 has a total useful area of around 70m2, resulting in a density of 17.5m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. Depth is created in the layout through the introduction of two transition spaces into the design, which in one moment separate the living room, kitchen and one of the bedrooms from the exterior, and in another separate another bedroom and washrooms from the collective space of the house. In this way, the layout translates an uncommon approach to depth, as depth from the exterior does not clearly increase with the type of function assigned to sectors. The layout includes a dedicated space for the treatment of clothes, allowing for the individualisation of most services activities, as well as an exterior balcony.

e) Collective sector





INTEGRATION

min. value	0.74
25th percentile	0.75
50th percentile	0.84
75th percentile	1.33
max. value	2.21

private sector

collective sector

services sector

FIGURE 7.44.
Campo Alegre, apartment schemes: plan and accessibility graph.

The 17.3m2 living-room represents approximately 25% of the apartment's area. It is the largest and better-integrated space of the house. It controls access to two of the three bedrooms, one of which is directly connected to it, while the other is distanced by a small corridor. Additionally, it is also located in between those bedrooms and the kitchen.

f) Services sector

The services sector of layout 6 encompasses a kitchen and a dedicated space for treating clothes. The sector is small, with a kitchen's area close to the minimum (the entire sector has an area of approximately 9.5m2), and presents a considerably lower value of integration than the living-room. It is an enclosed sector, has no connection to other types of functional spaces, and presents the lowest value of integration of functional spaces. Located at one step from the entrance hall, it is shallow from the exterior and the living-room.

g) Private sector

Bedrooms comply with the minimum area requirements, although areas are different for each of them. Similarly, each of the three bedrooms occupies a different configurational position. The largest opens to the entrance hall and is at one step from the exterior, the kitchen and the living room. The smaller bedroom connects directly to the living-room. Finally, the remaining bedroom connects to a small corridor that also gives access to two washrooms.

h) Relationships between sectors

	living-room >	**transition space >**	**exterior space >**	**bedroom >**	**washroom =**	**kitchen =**	**exterior**
integration	2.21	1.47	0.88	0.79	0.74	0.74	0.74
area	17.3m²	2.44m²	2m²	10m²	2.8m²	9.4m²	-
minimum area ratio	1.57	-	-	1.17	-	1.81	-
ideal area ratio	0.96	-	-	1.03	-	1.38	-
depth exterior	2	2	3	3	4	2	0
type-space	b	b	a	a	a	a	b
functional type-space	fb	fb	fi	fi	ff	ff	ff

TABLE 7.13. Campo Alegre, spatial attributes of apartment scheme.

The accessibility graph of this apartment only roughly translates to a simplified B1-type, as the living-room acts as a transition space only to two-thirds of the houses' bedrooms. In this sense, while the services sector is well defined, a certain ambiguity exists between the private and the collective sectors. The integration values of functional sectors are ordered, from largest to lowest, as collective, private, services, with a difference factor of 0.79. Integration values vary between bedrooms and both bedrooms and the kitchen present considerably lower integration than the living-room.



7.45. Carvalhido, surrounding city.

7.12. LAYOUT 22: CARVALHIDO

a) Relation to the surrounding city

Layout 22 occupies a 2 900m2 lot with two residential buildings encompassing 32 apartments, a central gardened area and a small cemented space. The two buildings represent the first phase of the original project, which included the later construction of 6 other buildings and a larger landscaped area.

The estate has access to nearby retail, services and schools, is within 1km of the city's main concert hall, and is well connected both to the public transportation and to important accessibility routes. Located in an east-west axis of the city, the layout presents the largest values of global integration and choice of all studied cases (similar to those of layout 43, located in the following block of the same street), as well the largest values of local integration, but not of local choice. This indicates that, while likely to function as a destination at all scales, the layout is located in an area that is more likely to be traffic-heavy than to register a large concentration of pedestrian movement.

As such, even though it is located in a highly integrated area of the city, the layout may be unlikely to be crossed by non-residents on their way to other destinations. Furthermore, even though the lot touches the street, depth is created from the main street grid as the existing buildings turn sideways, opening to narrow pathways that connect to the street. Additional spaces are located on the back of the lot, accessible only by crossing the layout. This translates into a maze index above 2, which indicates a layout that cannot be fully perceived from its exterior.

b) Relations between collective spaces

Sharing similar characteristics to layout 21, layout 22's dwellings are located at some depth from the surrounding city while remaining shallow from the nearest main axis, and articulate with collective spaces that are deep within the spatial system. As pathways unfold around the buildings, creating redundant accessibility rings, and further connect to the back of the layout, where a hard-landscaped space with collective potential is located, only 11% of the layout's spaces are constituted by front-doors. For the same reasons, only this collective area is a non-distributed functional a-type, while all other spaces are integrated into rings, at an average depth of 2.12 steps from each other and of 2.28 from front-doors.

While the original layout included a series of landscaped spaces of collective potential between residential buildings, the built layout includes only a gardened area in between the two buildings and an only more or less defined space in the deepest part of the estate. The first, enclosed by small bushes, is not accessible and appears intended to be seen but not used. The second, similarly

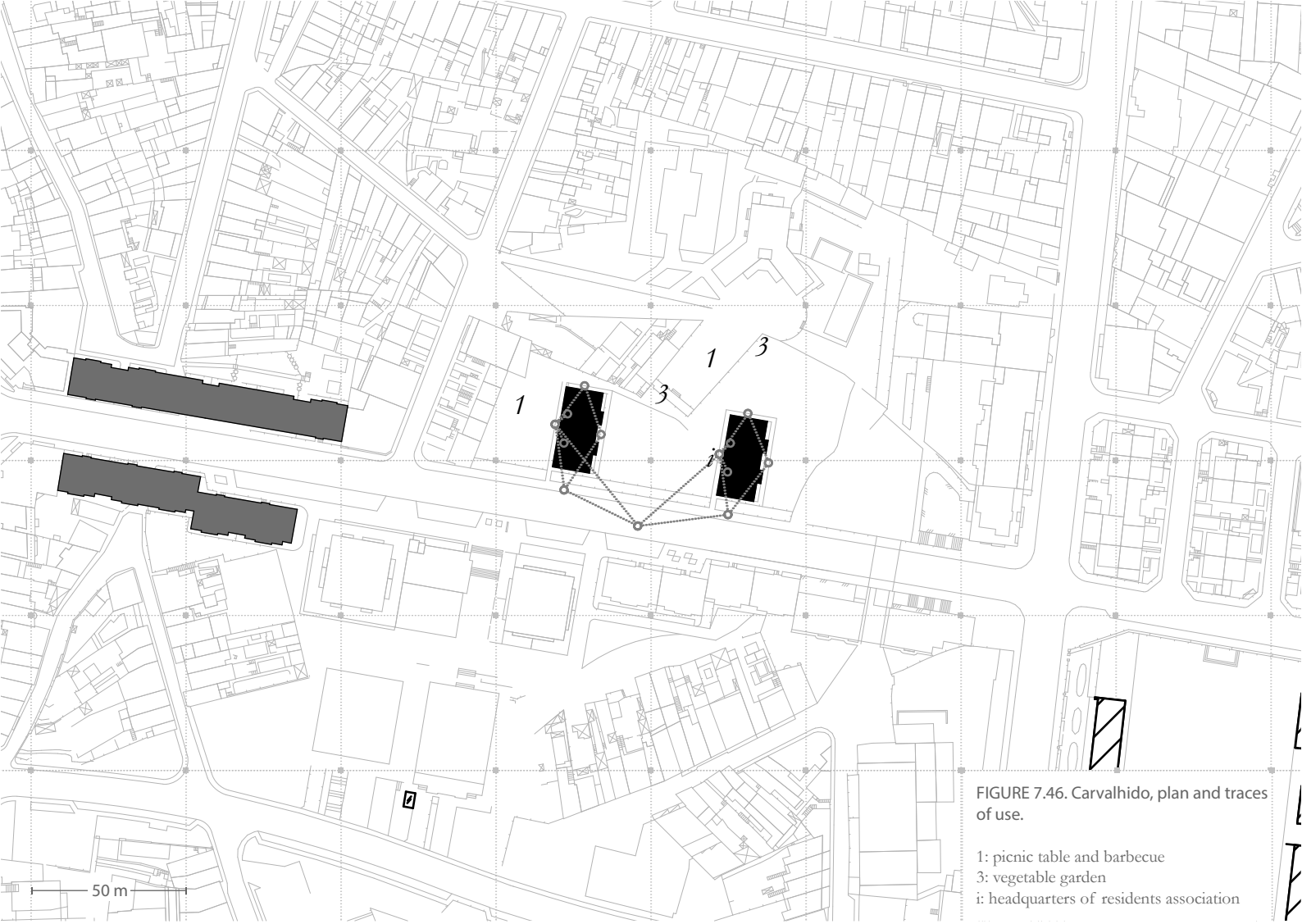


FIGURE 7.46. Carvalhido, plan and traces of use.

1: picnic table and barbecue
3: vegetable garden
i: headquarters of residents association

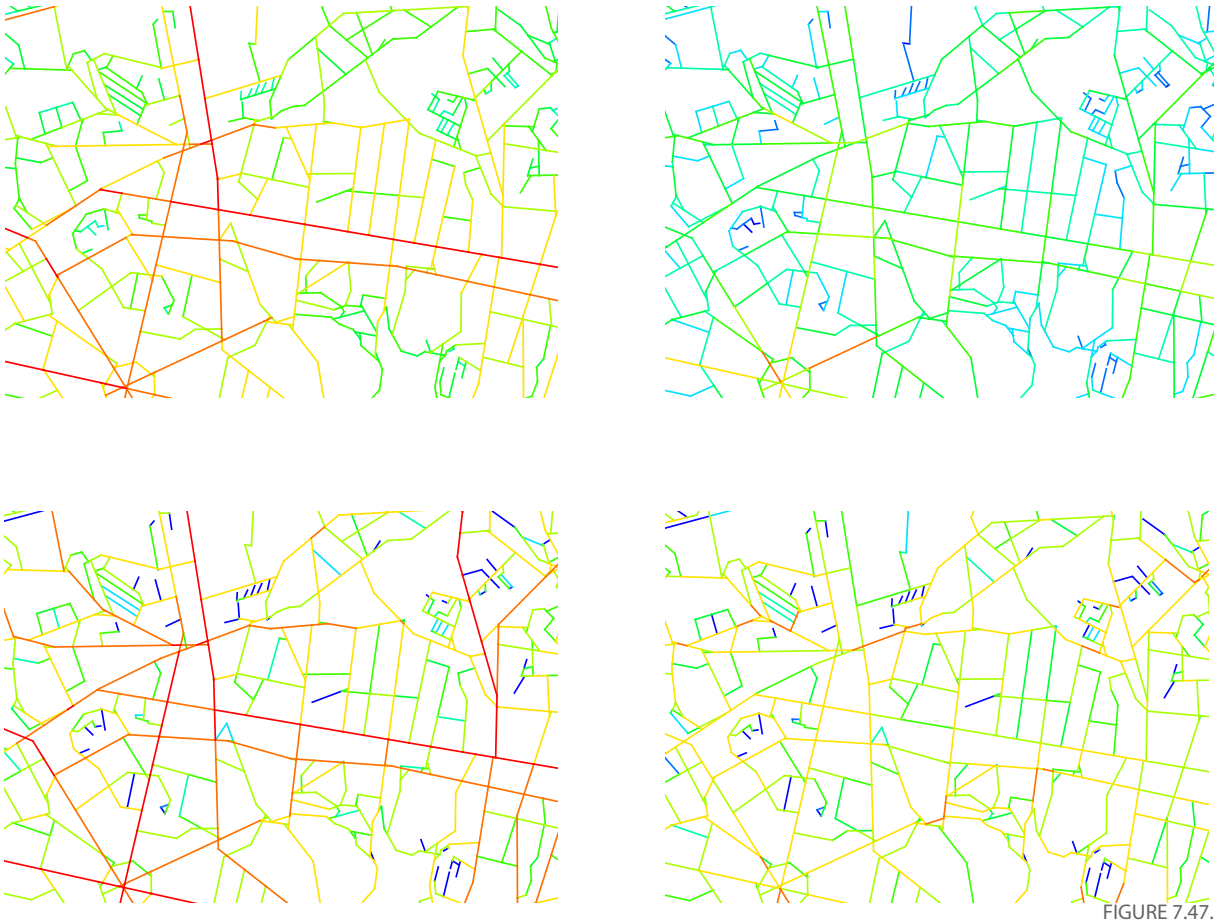


FIGURE 7.47.
Carvalhido, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

to what was verified in layout 21, appears to be informally used. This is the only space are where traces of use were detected. This space includes tables and a barbecue. During field visits, firewood was stored in the barbecue and plastic tables and bags in its vicinity.

c) Relation to individual houses

The dwellings are relatively shallow from the exterior, presenting an average separation index of 2, but distant from each other. While the mean depth between the front-doors of buildings is 2.5, the shorter route includes the exterior of the layout. Additionally, the two buildings are similarly and similarly oriented and, as a result, the front-doors of the two buildings are not visible from each other. Neighbours are, instead, divided into two groups of 16 that are not likely to interact or be aware of each other as they move to and from their homes. These groups are, like in most other cases, further divided into two different entrances, each connecting to 8 apartments, 2 per floor.

This layout shares the apartment scheme described in 5.2.10, concerning Vilar (layout 20, page 257).



FIGURE 7.48. Tirares, surrounding city.

7.13. LAYOUT 34: TIRARES

a) Relation to the surrounding city

Layout 34 is one of the larger AM developments, integrating 128 apartments in a 9 360m2 area. It is located in the continuation of an existing PMP estate, in an area that is mainly residential and characterized by a high percentage of public housing. If layout 34 is well integrated in this urban fabric, presenting above-average values of local integration and choice, this area of the city is itself characterized by unusually low values of integration. This is further emphasized by the disconnection in the street grid created by the highway to which layout 34 is adjacent. Turning its back to the highway, layout 34 opens directly to the main street grid, with most of its entrances connecting to the axis with the largest local choice of its surrounding city. With a maze index close to the minimum of 1 and a mean depth from the exterior of 1.13, the layout can be fully understood from an exterior that is likely to be crossed by non-residents.

b) Relations between collective spaces

Layout 34 has no differentiated spaces of collective potential. Pathways give access to the back of buildings, where entrances to two functional spaces are located. Today, one is used as the Residents' Association headquarters and the other as facilities for the Portuguese Association of Handicap People. The exterior spaces in the back of buildings, narrow and separated from the movement of the main street, do not appear to be used by the layout's residents for collective activities: no traces of use were found during visits, and these spaces are mostly occupied by parked cars.

c) Relation to individual houses

With residential buildings that open directly to the main street grid, the layout presents the minimum separation index of 1. Each entrance controls access to 8 apartments, 2 on each floor.

It is speculated that his layout shares the apartment scheme described in section 5.2.10., concerning Vilar (layout 20, page 257).

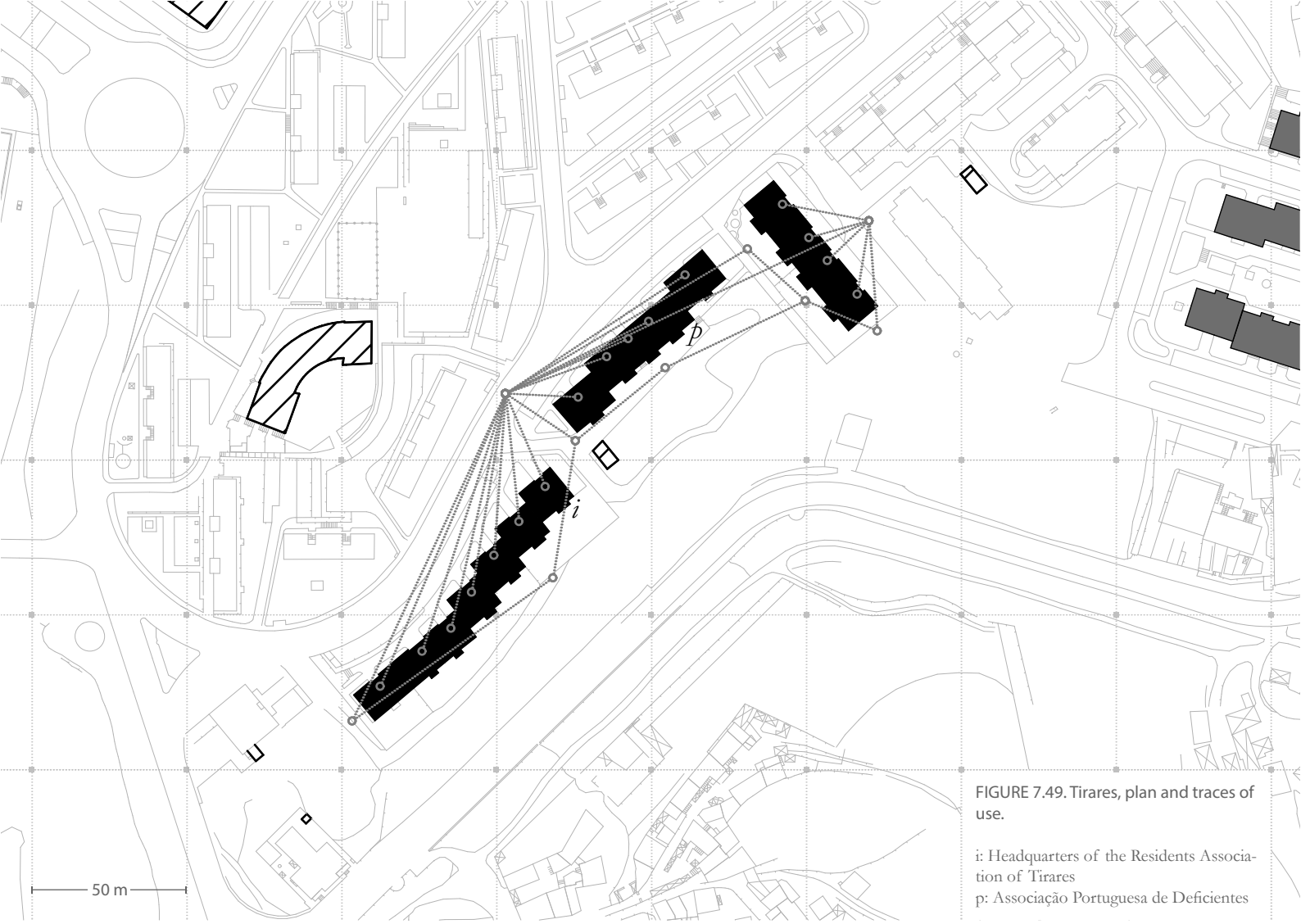


FIGURE 7.49. Tirares, plan and traces of use.

i: Headquarters of the Residents Association of Tirares
p: Associação Portuguesa de Deficientes

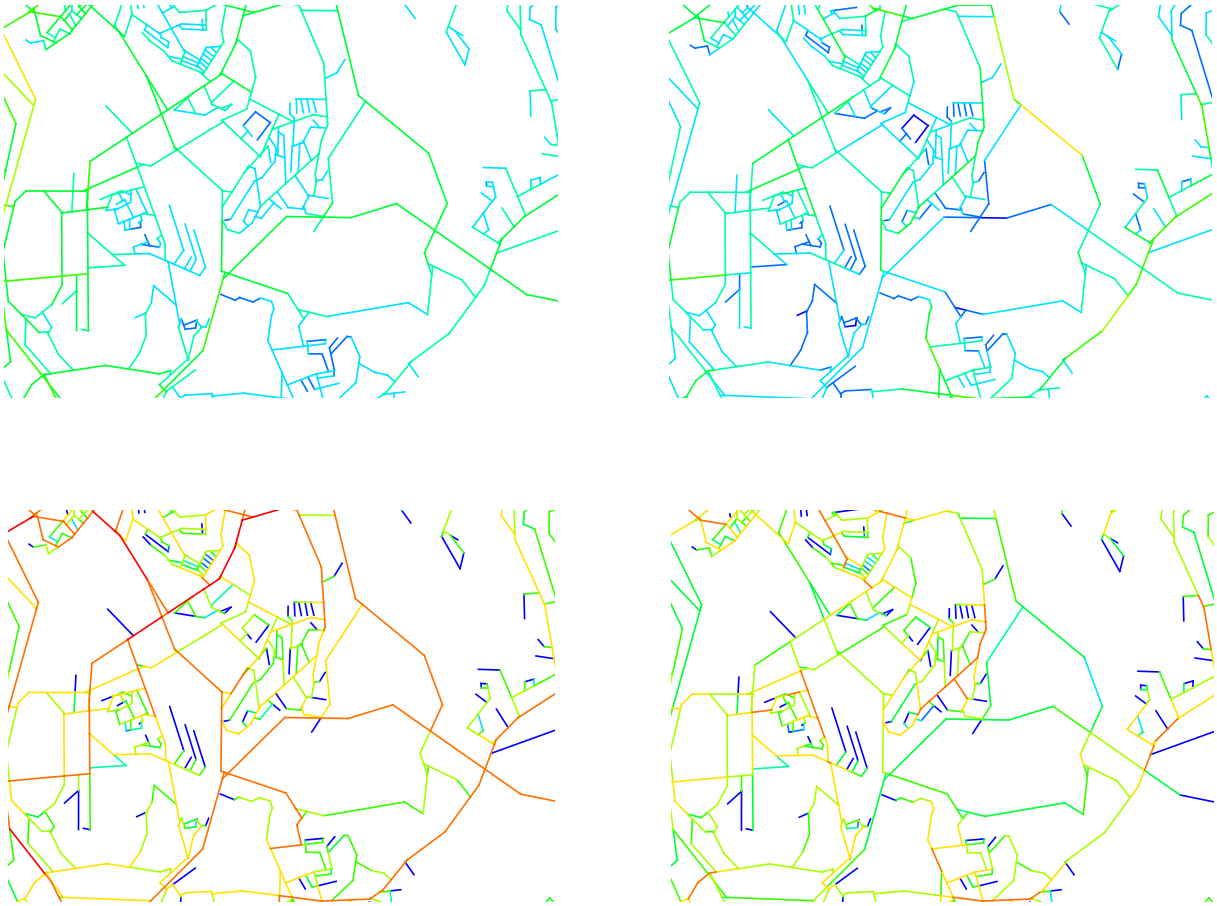


FIGURE 7.50.
Tirares, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.



FIGURE 7.51. Pêgo Negro, surrounding city.

7.14. LAYOUT 35: PEGO NEGRO

a) Relation to the surrounding city

Layout 35 comprises 96 apartments organized in three collective housing blocks in a 5 680m2 lot situated in the far east of the city, in a mainly residential area with sparse retail and services, adjacent to Porto's outer radial. Located close to layout 34, it shares its particularly low values of global integration but not its values of integration into the surrounding city. The values of NaIn r800 of layout 35 are low and, while the outer radial is a major accessibility route in the city, the layout is adjacent to a part that presents small NaCh at both the local and global scales.

Additionally, the layout establishes a less direct relation with the primary street grid, while maintaining a small maze index and mean depth from the exterior. Despite two of the three housing blocks opening directly to the exterior, these are poorly integrated secondary axes to which access is limited to pedestrians on one side. The third block connects to a purely pedestrian accessibility system.

b) Relations between collective spaces

All of layout 35's spaces are integrated into at least one ring and, while this ring always includes the nearest exterior street, also connect to each other independently of the surrounding grid. As such, all spaces are distributed c or d types and are in their majority constituted by front doors. The layout presents around average values in measures of internal depth. Similarly to most developments for RAs, layout 35 includes an interior space for the residents' association's headquarters. It is located in the estate's integration core and is shallow both from the layout's system and its exterior. However, the convex space it opens is not constituted by any other front-doors and is characterized by a complex system of pedestrian accessibilities, visually separated from the exterior by vegetation. As a result, this configurational centre of the layout both appears designed to serve its residents and to mark a space that is separated from their daily-lives, being likely to require purposeful use by residents and neighbours with local knowledge.

c) Relation to individual houses

The layout has a very small separation index of 1.5. Residents either have immediate access to the exterior or are located on step away from it. The two access streets are constituted by 4 or 8 front-doors, encompassing 16 or 32 families.

It is speculated that his layout shares the apartment scheme described in section 7.10., concerning Vilar (layout 20, page 9).

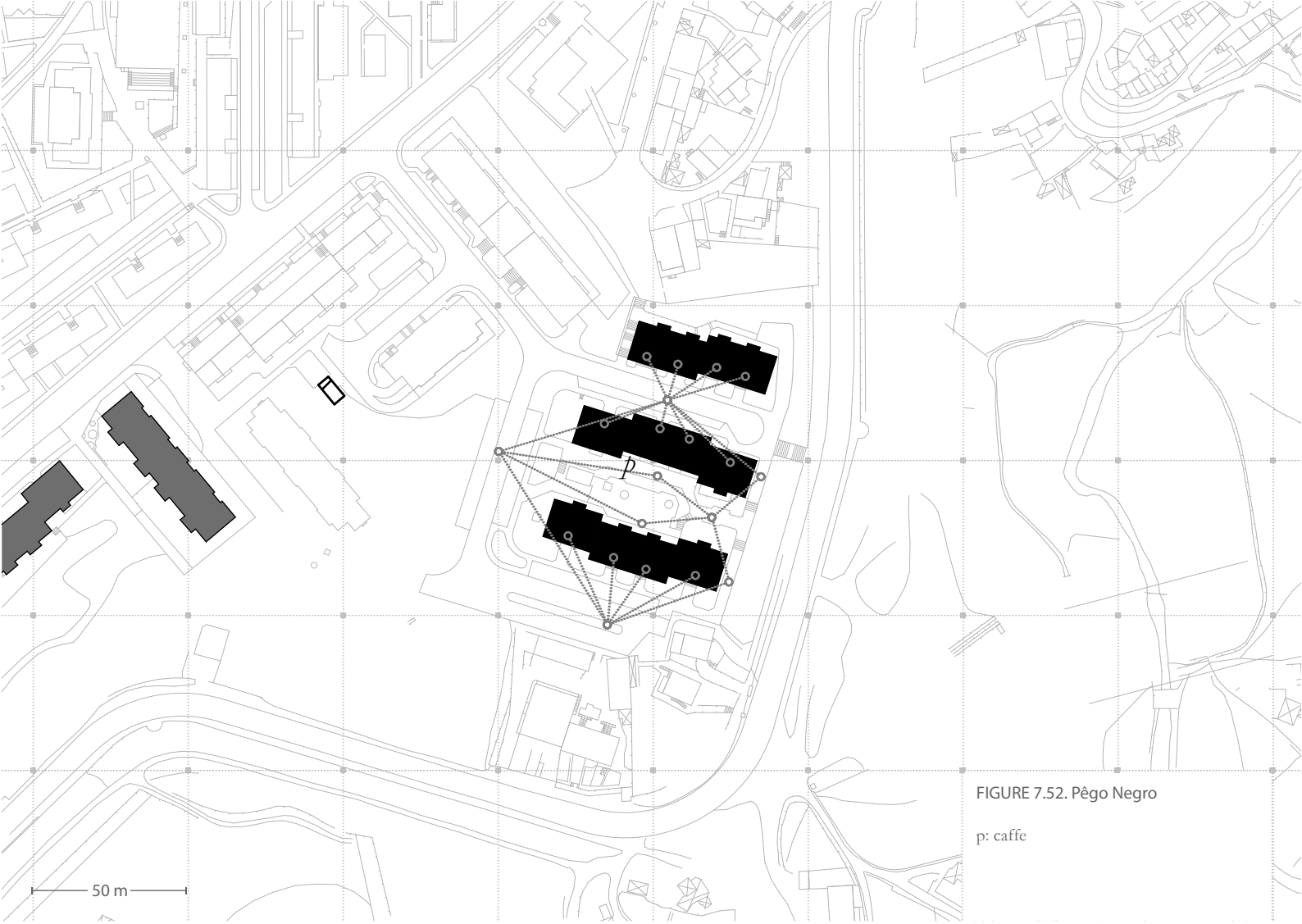


FIGURE 7.52. Pêgo Negro

p: caffe

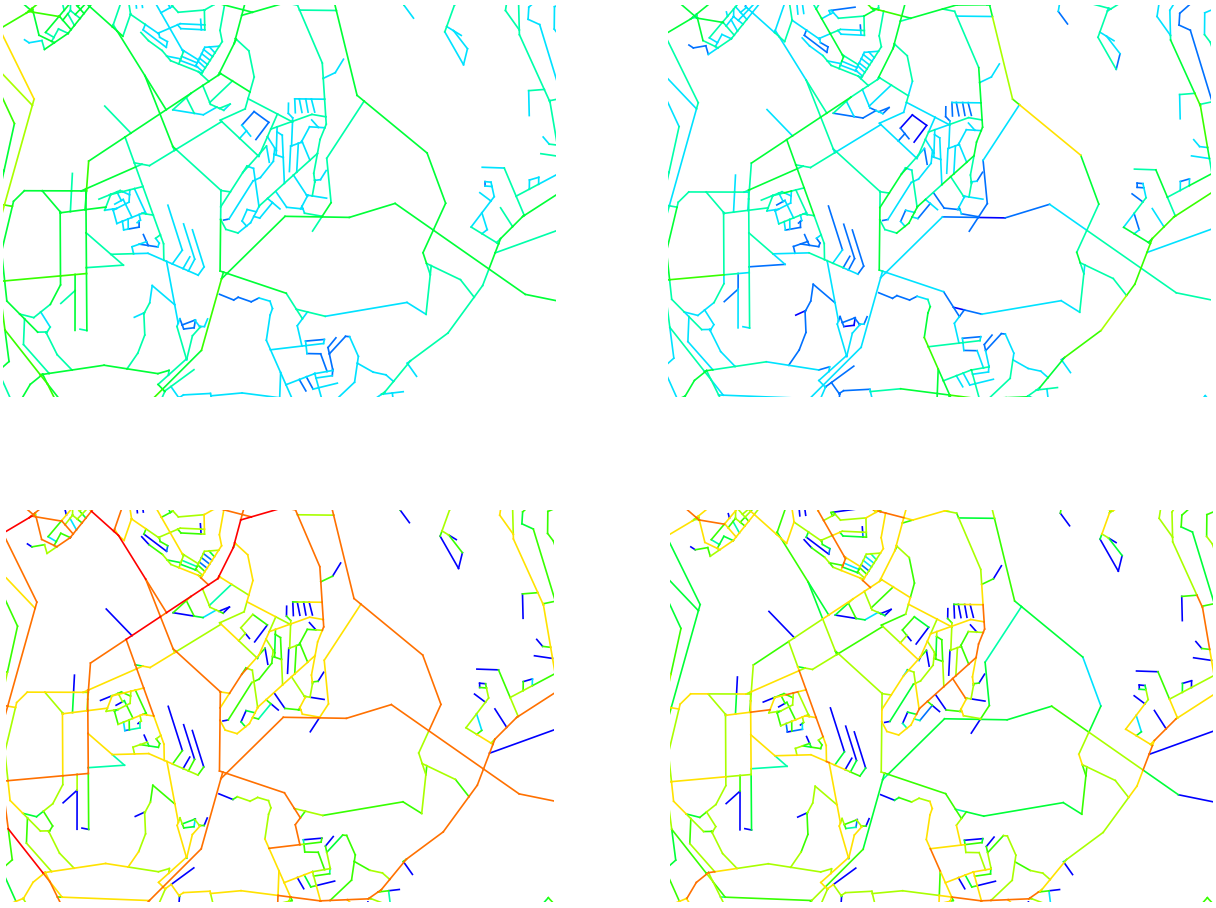


FIGURE 7.53.
Pego Negro, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.



FIGURE 7.54. Boavista, surrounding city.

7.15. LAYOUT 44. BOAVISTA

a) Relation to the surrounding city

Layout 44 is a small estate, housing less than 90 families in a 6 470m2 lot. The housing development was originally intended for a residents' association that was integrated into the SAAL. After the programme's dismantlement in 1976, the project was handed to the council, and the city's toponymy seems to suggest that the residents' association organized into a cooperative. While the head architects from the SAAL brigade were allowed to carry on with the project, the council's regulations resulted in a complete transformation of the original design.

As is common in SAAL layouts, it is located in a central area of the city. Three axial steps from the main axis that connects the seaside to the centre of the city, the layout is within 500m of retail and services and other urban equipment, such as the city's main concert hall. This area is characterized by large values of global integration and choice and encompasses both important accessibility routes and destination points. Consequently, layout 44 is one of the layouts with the larger values of NaIn (r=5000). Inversely, its values of NaCh, both local and global, are bellow average.

Even though the layout is located occupies the front of its lot, creating street-frontage, it presents above-average values in depth measures of its relation to the main city-grid. If these are an inevitable consequence of the lot's depth, they seem to be mostly the result of the conscious design of a system of redundant pathways around the buildings and where their front-doors are located. In this sense, while layout 44 turns its back to the street, it cannot be said that it turns inwards, as its internal street is also faced by the backs of buildings.

b) Relations between collective spaces

Layout 44 presents the largest depth values between spaces of the layout of all the studied AM developments. Fixed-function spaces are separated by an average of 3.7 steps, and convex spaces are an average of 3 steps away from each other. While the layout is ringy, with all spaces being integrated into at least one ring, only one-third of its spaces are constituted by dwellings entrances.

The central, better-integrated space 18 is a cul-de-sac street, faced by the back of residential buildings on both sides and 3 steps away from the dwellings' entrances. Integrated into rings, it does not control access to most of the layout's spaces. While it is the least-effort path between the main city grid and the estate's community centre, residents do not need to cross it in order to reach the only fixed-function collective space of the layout. Space 18 is occupied by a parking lot, which assigns it a fixed-function and may guarantee its role as a space of encounter between neighbours despite its distance from the front doors.

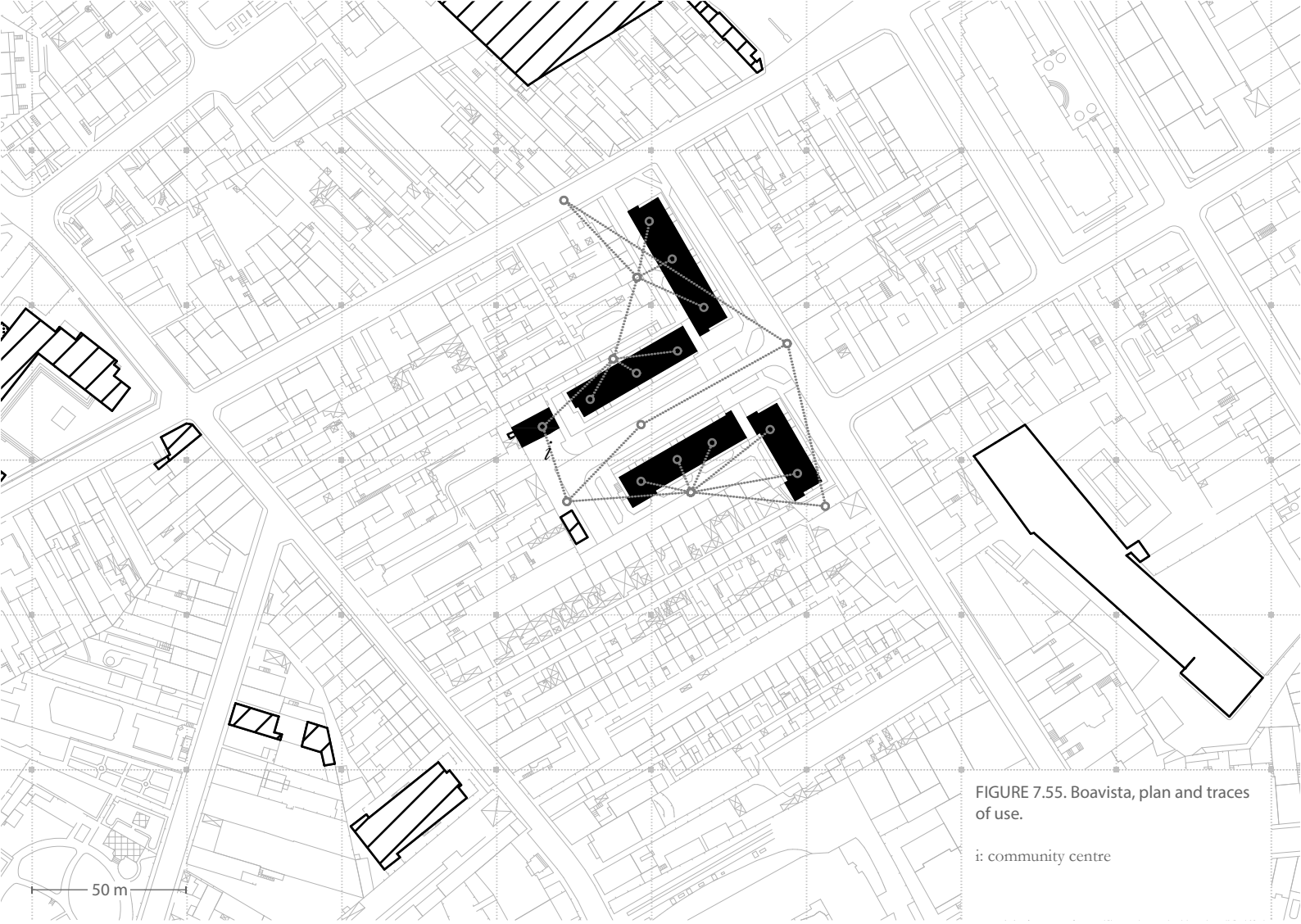


FIGURE 7.55. Boavista, plan and traces of use.

i: community centre

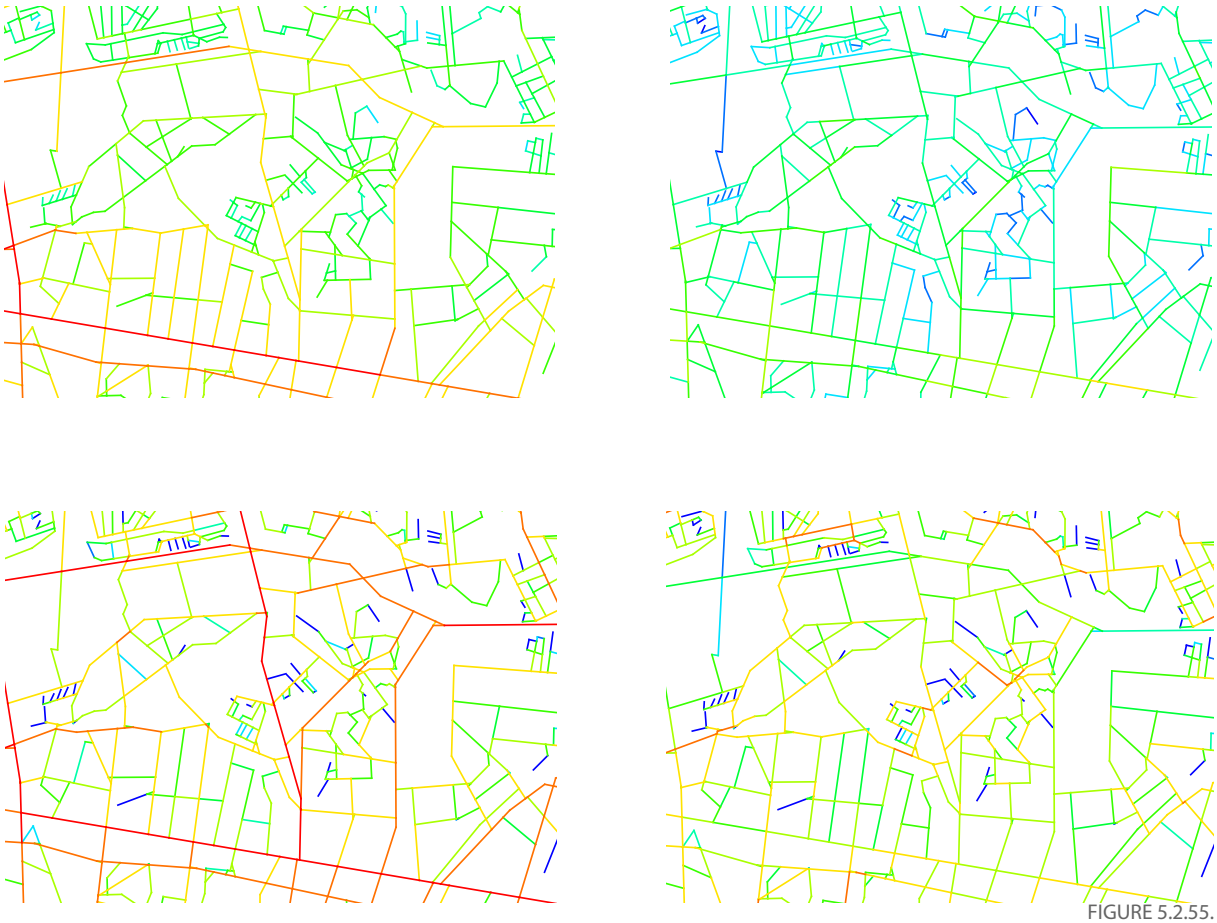


FIGURE 5.2.55.
Layout 44's urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

No traces of use of exterior spaces were detected in site visits.

c) Relation to individual houses

The placement of front-doors on the back of buildings results in one of the highest values of separation index of all studied cases (only SAAL developments consistently have separation indexes higher than 2.5). The pathways where front-doors are located give access to 16 to 24 apartments each. The pathways are connected two by two and turned to the back of the lot, limiting the number of neighbours that are likely to cross. Each entrance connects to 8 apartments, 2 on each floor.

No apartment scheme was analysed for layout 44.

8. DESCRIPTIVE ANALYSIS OF PUBLIC AND COOPERATIVE ESTATE AND APARTMENT LAYOUTS BETWEEN 1977 AND 1982

Introdução

Seven housing developments developed with the state institution for housing development's (*Fundo Fomento da Habitação,* FFH) and Porto's council involvement, as well as four other developments that appear to be council developments were analysed in the scope of this research. These correspond to public investment in housing after the 25th of April of 1974 and are resultant from the increase in financing, new housing programmes and restructured insitituions that followed. They were built after 1977 and correspond to designs prior to 1982, when the FFH was dismantled. Additionally, eight cooperative housing developments, were also analysed. Designed or built between 1974 and 1982, these were developed under new legislation for cooperative housing. The analysis, conducted at the scales of urban insertion, estate layout and apartment scheme, is summarised in figure 8.1. and in tables 8.1., 8.2.. and 8.3.. The following subchapters will describe the spatial attributes of each of the seven housing developments at these three scales and in the relations between them. These results will be contextualised in a reading of the social and historical conditions surrounding their development in chapter 12 of this dissertation.

	#houses	m2/resident	NaIN5000	NaIN800	NaCH5000	NaCH800
23. S. Tomé	490	58.7	0.88	1.11	1.03	0.862
24. Viso	545	19.7	0.71	0.93	0.76	0.688
25. Lordelo	168	27.9	0.79	0.79	0.61	0.624
26.Paranhos	160	21.6	0.74	0.74	0.70	0.677
27. Ramalde	272	21.1	0.70	0.80	0.80	0.822
28. Ramalde do Meio	170	31.1	0.78	1.07	0.92	0.775
29. Pereiró	80	33.7	0.78	1.08	1.00	0.887
30. Central de Francos	256	13.3	0.87	0.94	0.67	0.606
31. Bessa Leite	328	35.8	0.93	0.90	0.73	0.795
32. Vilar Formoso	64	10.5	1.13	1.21	1.23	1.181
33. Amial	80	31.2	0.84	0.85	0.91	0.831
av.	237.5	27.7	0.83	0.95	0.84	0.795
36. S.A.A. Martim Moniz	30	19.7	0.78	0.89	1.22	1.19
37. SACHE	32	38	0.81	1.17	1.12	1.16
38. S.A.A. Contumil	30	24.3	0.77	1.09	1.05	1.10
39. S.A.A. Duarte Leite	20	69.8	0.72	0.77	0.75	0.87
40. Tripeira	196	40.7	0.76	0.78	0.67	0.72
41. CETA	224	51.1	0.70	0.80	0.83	0.92
42. St. Ildefonso	78	17.8	0.76	0.78	0.67	0.72
43. HABECE	50	11.3	1.44	1.50	1.36	0.90
av.	82.5	34.1	0.84	0.97	0.96	0.95

TABLE 8.1.
Global and local integration and choice of public and cooperative layouts after 1974.

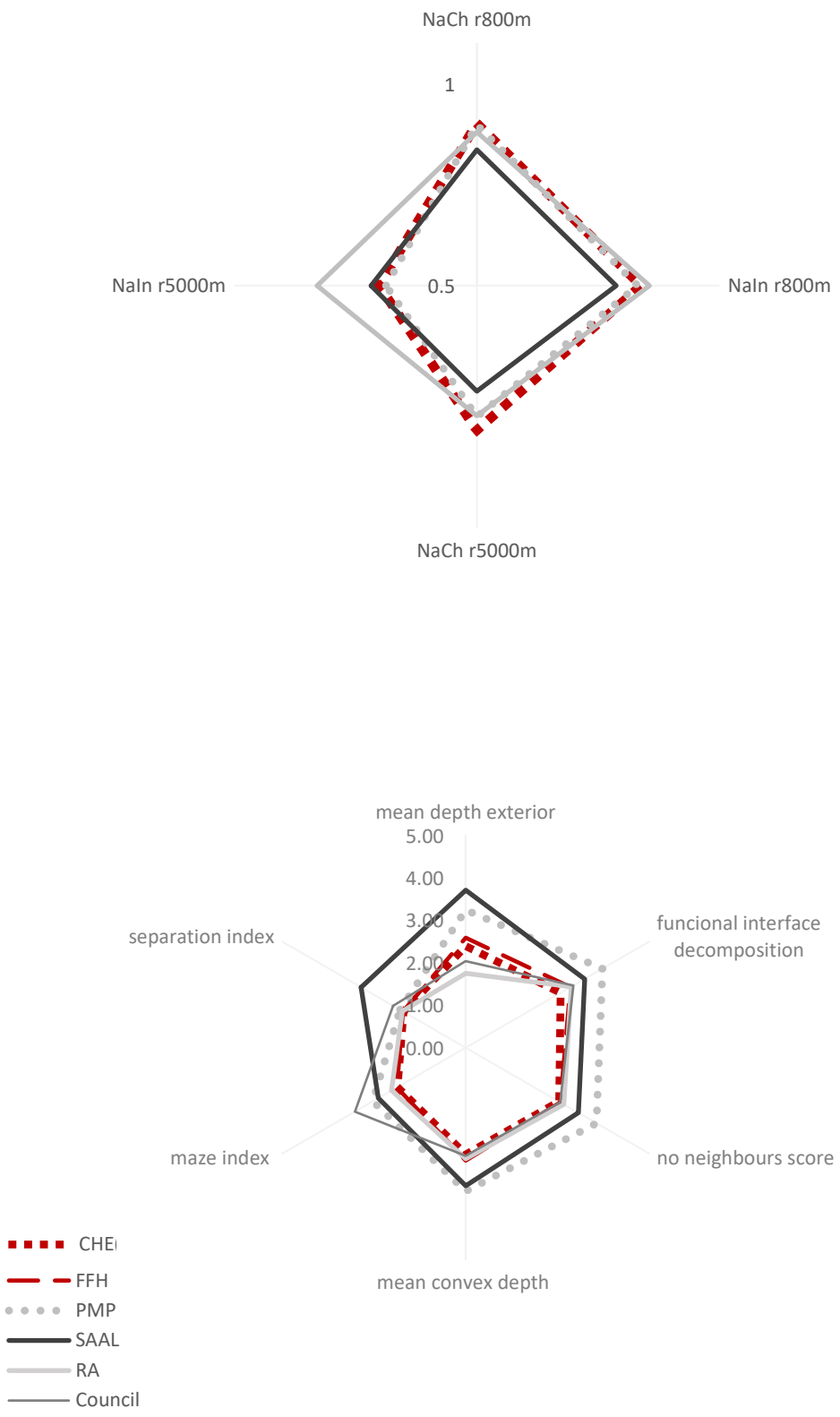


FIGURE 8.1.
Average values of NaIn, NaCh and depth measures for each studied programme with public and cooperative housing signaled in red after 1974.

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
23. S. Tomé	4.336	4.426	3.73	4.072	2.161	1.75
24. Viso	2.404	3.332	2.67	2.889	2.122	1
25. Lordelo	2.529	2.621	2.642	2.584	2.611	1.667
26. Paranhos	1.538	3.048	2.500	1.941	2.647	1.75
27. Ramalde	2.75	3.125	2.465	2.3	2.25	1.5
28. Ramalde do Meio	2.775	2.395	2.35	2.378	2.972	2.667
29. Pereiró	2	2.393	2	2.236	2.067	2
30. Central de Francos	2.4	2.813	2.583	2.6	1.801	2
31. Bessa Leite	3.969	3.112	3.271	3.104	3.765	2.5
32. Vilar Formoso	1	2.25	2	1.969	0.667	1.333
33. Amial	3	2.3	2.7	2.400	1.235	1.5
av.	2.609	2.892	2.628	2.588	2.209	1.788
36. S.A.A. Martim Moniz	1	1.33	2	1.56	1.14	1
37. SACHE	2.58	1.88	2.17	2.73	1.5	2
38. S.A.A. Contumil	1	1.6	2.4	1.95	1.46	1
39. S.A.A. Duarte Leite	1	2.75	2	2.22	1.83	1
40. Tripeira	4.32	3.72	3.93	3.34	2.73	3
41. CETA	4.03	3.96	3.24	3.50	2.64	2
42. St. Ildefonso	4.18	3.84	3.58	3.42	2.68	2.5
43. HABECE	1	1.6	1	1.39	0.83	1
av.	2.39	2.58	2.54	2.51	1.85	1.69

TABLE 8.2.
Depth measures of public and cooperative estate layouts after 1974.

	TUFA m^2	Density m^2/r	Integration	Difference factor	Mean depth exterior	functional orientation
23. S. Tomé	67.5	16.9	0.913	0.797	2.69	0.231
24. Viso (A)	92.7	23.17	1.071	0.714	2.73	0.267
24. Viso (B)	94.9	23.7	0.86	0.786	2.77	0.33
25. Lordelo	56.75	14.19	0.855	0.602	2.6	0.25
26. Paranhos	71.5	17.875	0.778	0.491	3.25	0.25
28. Ramalde do Meio	71.4	17.9	0.695	0.751	2.58	0.37
29. Pereiró	32.6	16.3	0.730	0.822	2.37	0.25
30. Central de Francos	59.7	14.9	1.111	0.711	2.2	0.273
33. Amial	71.5	17.875	0.778	0.491	3.25	0.25
av.	68.728	18.09	0.866	0.685	2.716	0.274

TABLE 8.3.
Spatial attributes of FFH and council apartment schemes after 1974.

	TUFA m²	Density m²/r	Integration	Difference factor	Mean depth exterior	functional orientation
36. S.A.A. Martim Moniz	105.8	26.45	1.20	0.66	2.3	0.18
37. SACHE	91	27.60	0.81	0.85	3.4	0.19
38. S.A.A. Contumil	121.3	40.43	0.93	0.79	2.75	0.25
39. S.A.A. Duarte Leite	121.3	40.43	0.93	0.79	2.75	0.25
40. Tripeira	83.7	20.9	1.66	0.41	1.9	0.18
40. Tripeira	87.03	21.75	1.18	0.67	2.2	0.18
41. CETA	78.9	19.7	1.19	0.57	2.2	0.17
42. St. Ildefonso	86.3	21.6	0.82	0.84	3.9	0.33
42. St. Ildefonso	96.3	19.26	1.13	0.65	3.1	0.17
av.	96.85	26.46	1.1	0.69	2.72	0.21

TABLE 8.3
Spatial attributes of cooperative apartment schemes after 1974.

8.1. LAYOUT 23: SÃO TOMÉ

Today, Bairro de São Tomé (layout 23), is administered by the Portuguese Institute for Housing and Urban Renovation (Instituto da Habitação e Reabilitação Urbana, IHRU). The architectural drawings consulted in the IHRU's headquarters were undated, but one document (IHRU, 2018) says its construction was finished in 1977.

a) Relation to the surrounding city

Layout 23 is almost three times the size of the average of other layouts developed directly by the state institution: it has an area of 11 5000m2 and density of 55.5m2 per resident.

The estate is well integrated both locally and globally, located alongside the same axis as layouts 32 and 33 on one side, and adjacent to the largest university campus in the city which, although not finished at the time, was planned in the PDP. Its surroundings are mainly residential, with the old north-south axis to the west providing retail and services, and the university guaranteeing some access to urban infrastructure and public transportation. Located in an expanding, residential area outside of the inner radial of the city, this is one of the few post-revolutionary public estates that are not solely residential, integrating a school and a sports field as well. The layout is located behind preexisting buildings on two of its four sides and, while creating street-frontage wherever possible, this front does not always open to the main street. Where it is adjacent to the neighbouring council estate, the layout turns inwards, creating a clear limit between the two. Where it faces the main, high-choice axis, buildings open outwards.

Additionally, an alley penetrates through the estate, splitting it in two, with the apparent intention of connecting the two main axes in between each the layout is located but is instead blocked by the lots of preexisting houses. As such, the layout faces two main axes, and its interior is accessible by four streets that serve only the estate itself. Even though it maintains the PMCP's characteristic of occupying the interior of existing lots, its maze index, although high in relation to other developments of the same programme, is not the highest.

b) Relations between collective spaces

The layout is made up of a series of blocks organised around two large longitudinal spaces which then separate into two courtyards, and a central alley. Its complex morphology is translated in a tree-like configuration, where a series of non-constituted transition spaces lead to separate clusters of dwellings. While all convex spaces in the system are distributed, most of them conforming two or more rings, the system is deep. Its depth values are tendentiously larger than other layouts from this period, in particular in all measures that have to do with relations within the system. Layout 23's mean depth, functional interface decomposition and no-neighbours

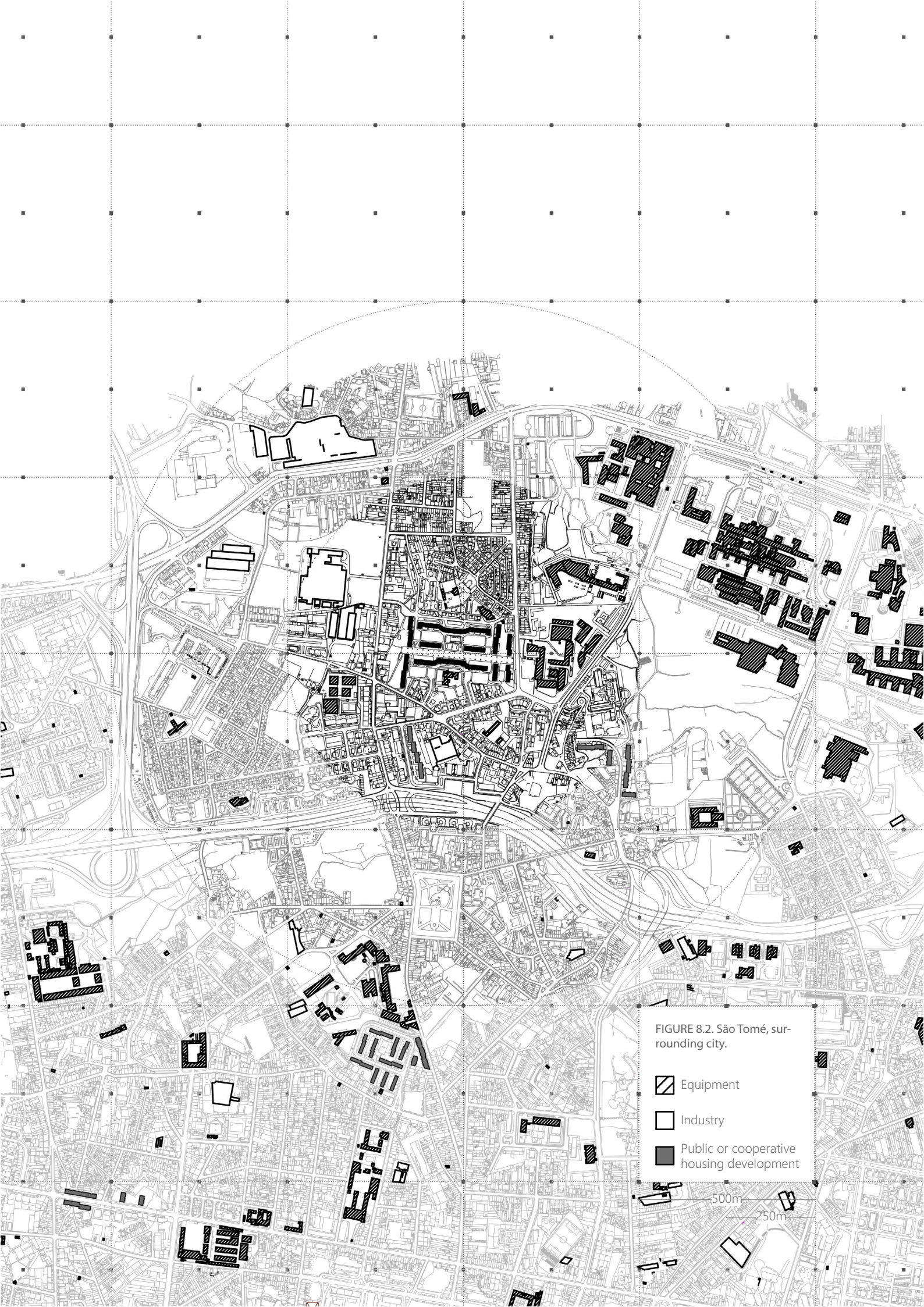


FIGURE 8.2. São Tomé, surrounding city.

(respectively 4.07, 4.42 and 3.73) are well above the same measures for most other post-1974 developments. Similarly, the mean depth between all dwellings and all the nearest axes of the primary city grid is the highest of all cases. The separation index, which indicates the proximity of dwellings to the nearest exterior street, lays on the average for state developments (which is low in relation to other programmes), translating into a right-leaning star-graph, that seems to indicate a larger separation between the system's inhabitants - neighbours - than between the layout as a whole and the exterior city.

Buildings' entrances are distributed around the four main courtyards, which are also of the better-integrated spaces in the system. Its integration core, however, lies on the central alley. This space is not constituted by front doors, which may support the hypothesis that it was designed to constitute a crossing through the estate. Each set of two courtyards is divided by a functional space or set of spaces. The functional spaces organised around this space are defined by residential buildings on all sides, displaying a large value of integration within the layout, and are also not deep from the exterior. If the retail corridor on the ground-floor turns inwards, creating straighter relations with the interior of the layout than with its exterior, the central sports facilities might have been designed in association with the unfinished alley, and so expected to more easily connect with the exterior. Similarly to what was verified in relation to PMCP layouts, he school, while integrated within the layout, is located at its edge. In this way, students and staff can access the school without stepping into the estate.

c) Relation to individual houses

Apartments are accessible through sets of internal staircases, serving two apartments per floor, eight in total. These are organised in sets of 8 to 12 entrances around a courtyard, which serves around 64 to 96 families. While the large size of these courtyards potentiates for moments of co-presence and awareness between large numbers of residents, dwelling entrances are at an average of 4.44 steps from all the others, 4.16 steps from the sports field, 4.45 steps from the shops and 4.34 steps from the outside.

d) Relationship of the house with the exterior

The apartment scheme of layout 23 is a 67.5m2 house, corresponding to 74% of the minimum area defined in the previous chapter. If considering that the apartment is inhabited by as many people as the number of bedrooms plus one, the apartment has 16.9m2 per resident. A succession of transition spaces creates an increase in depth from the exterior that puts the kitchen and living-room at 2 steps from the front door, two of the bedrooms at 3 steps and one final bedroom and washroom set at 4 steps. The layout includes an exterior balcony and a small clothes-dedicated space, adjacent to the bathroom. In this sense, it complements within the apartment scheme two functions that are present in the estate's layout: exterior permanence and drying clothes.

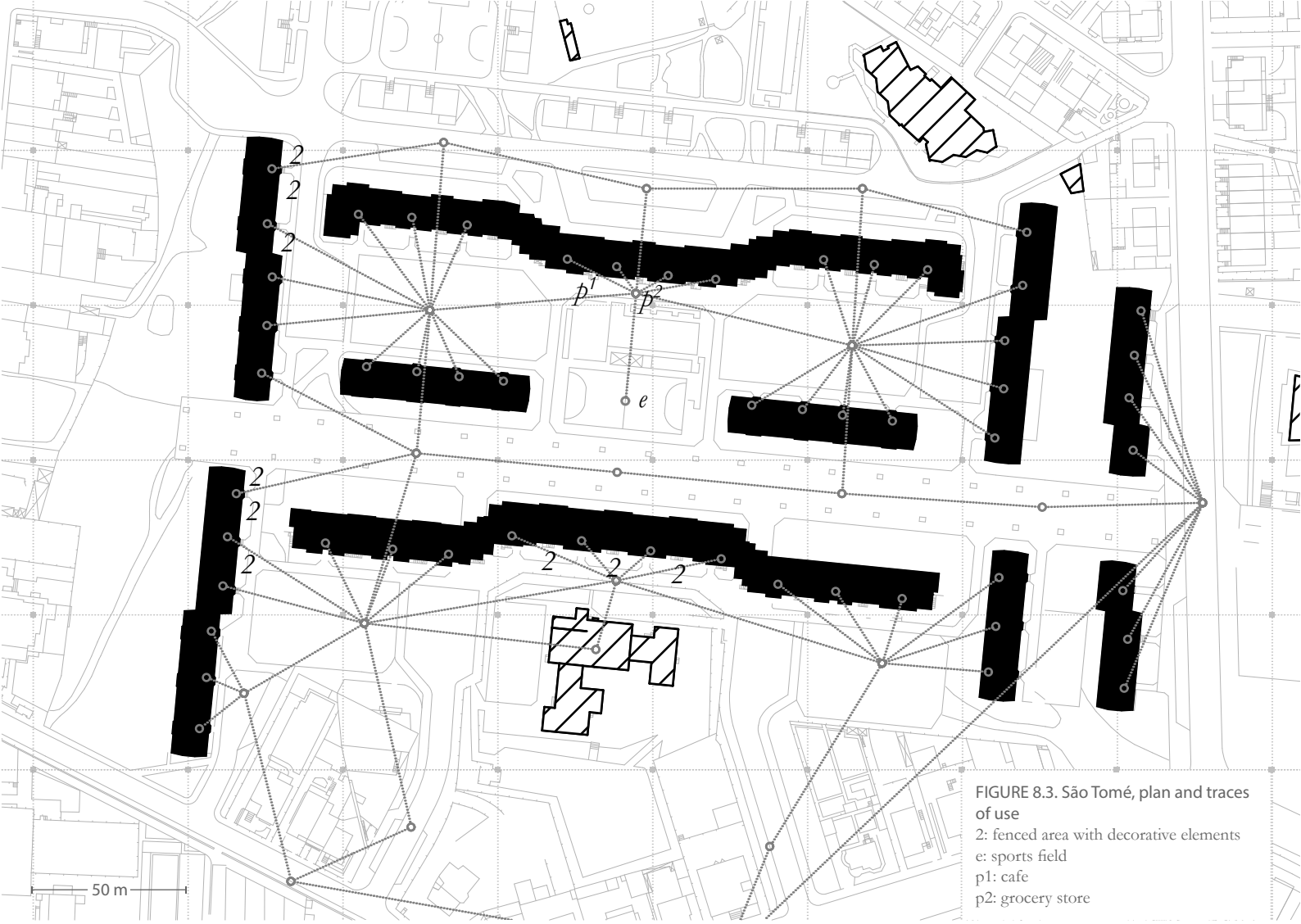


FIGURE 8.3. São Tomé, plan and traces of use
2: fenced area with decorative elements
e: sports field
p1: cafe
p2: grocery store

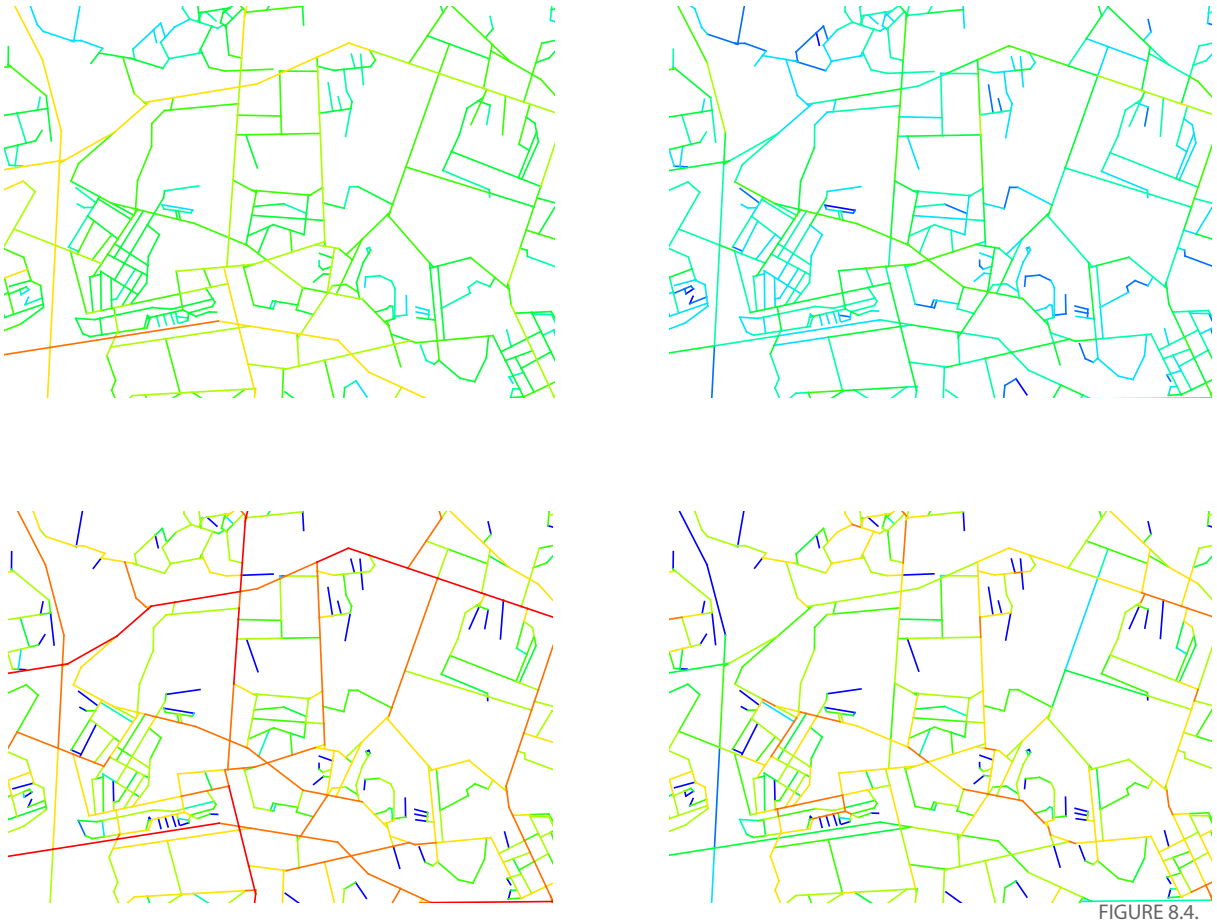


FIGURE 8.4.
São Tomé, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

e) Collective sector of the house

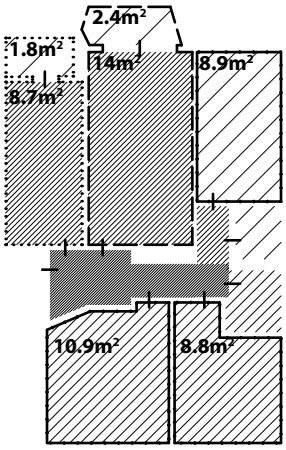
The living-room has an area of 14%, which scores above the minimum requires and corresponds to approximately 20% of the TUFA. It is a functional i-type that connects to a 2.4m2 balcony, large enough for integrating minimal semi-fixed features for supporting social activities, and to the central transition corridor, and as such does not control access to fixed-function spaces of the house.

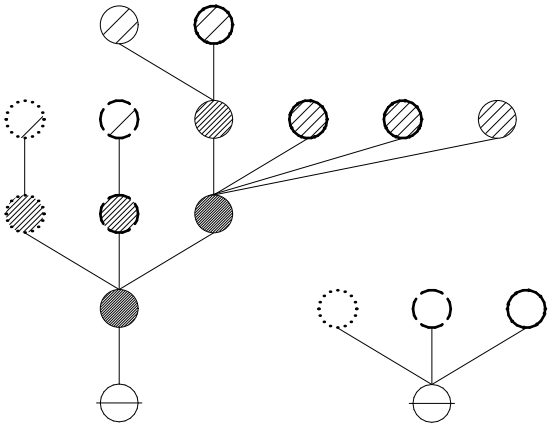
f) Services sector of the house

The kitchen is the functional space metrically closer to the front door. It has an area larger than both the minimum and ideal requirements and connects to a space for the treatment of clothes with an area of 1.8. In total, the services sector has an area of 10.5m2, approximately 15.5% of the apartment's TUFA. While separated from the collective areas of the house, it opens to an entrance hall visually connected to the bedroom's corridor and is one of the better integrated functional spaces of the house.

g) Private sector of the house

Bedrooms comply with minimum area requirements, with an average area of 9.5m2. They are the deepest and less integrated spaces of the house. While some privacy appears to be intentionally added to the private sector of the house through the introduction of corridors, transition spaces are openly connected.





INTEGRATION

min. value	0.57
25th percentile	0.69
50th percentile	0.78
75th percentile	0.87
max. value	1.49

private sector

collective sector

services sector

FIGURE 8.5.
São Tomé, apartment schemes: plan and accessibility graph.

h) Relationships between sectors of the house

	transition space >	kitchen = living-room >	exterior >	bedroom >	washroom >	exterior space =	other space
integration	1.489	0.870	0.870	0.791	0.760	0.727	0.568	0.568
area	2.3m²	8.7m²	14m²	2.4m²	9.5m²	2.1m²	-	1.8m²
minimum area ratio	-	1.48	1.17	-	1.13	-	-	
ideal area ratio	-	1.28	0.78	-	0.99	-	-	
depth exterior	2	2	2	0	3.67	4	3	3
type-space	b	b	a	b	a	a	a	a
functional type-space	fb	ff	fi	ff	fi	ff	fi	fa

TABLE 8.4. São Tomé, spatial attributes of apartment scheme.

The accessibility graph of apartment scheme 23 translates into a simplified B2 type, where kitchen and living-room are not either directly or visually connected. Sectors are functional a-type areas and defined through the differentiation of transition spaces. The collective and services sectors are equally integrated, with an integration value above that of bedrooms.

8.2. LAYOUT 24: VISO

Today, Bairro do Viso (layout 24), is administered by the Portuguese Institute for Housing and Urban Renovation (Instituto da Habitação e Reabilitação Urbana, IHRU). The architectural drawings consulted in the IHRU's headquarters were undated, but one document (IHRU, 2014) says its construction was finished in 1977.

This layout was part of an Integrated Plan, developed by the FFH and constructed in different phases across time. Since it was not possible to construct, at the time of this thesis' conclusion, an accurate timeline of this plan and of the action of different actors, only this section – whose plans and information were provided by the IHRU – was analysed. It is believed that the analysis of the entire plan would provide different results, in particular lower depth values from the exterior. Furthermore, the entire plan encompasses equipment, retail and collective spaces which were not included in the analysis.

a) Relation to the surrounding city

Layout 24 is generally less well-integrated than other state developed layouts: while it is relatively well-integrated locally (NaIn=r800m), its values of integration are closer to those of PMP estates than to the average FFH layout. The second largest of the estates developed by this programme, it is less than half the size of layout 23, but is denser and houses 545 families. It is located one block of houses away from the outer radial of the city, which defines the limits of



FIGURE 8.6. Viso, surrounding city.

the municipality, in an area, adjacent to the industrial centre of Porto, which is almost exclusively residential and which was mostly urbanized in between the ninety-sixties and mid-ninety-seventies. Despite its less privileged location in relation to other state housing developments, the estate is within a 500m radius of retail and services, a school and cultural facilities.

Similarly to layout 23, the estate was constructed on the back of existing houses on one of its sides. However, as the layout is made of entire blocks that constitute the primary street grid, this does not reflect in an increased depth from the exterior.

b) Relations between collective spaces

While its maze index of 2.12 is above average for public housing developments from this period, it is still a relatively low value when all cases are considered. Nevertheless, while it might be unlikely for non-residents to step into the layout, residents are in great proximity to the main urban grid, as all but seven building entrances do not open directly to the main street. This is reflected in a small value of mean depth between all the houses and all the surrounding streets, but mostly by its separation index, close to the minimum 1.

The estate is made up of six buildings organized around two courtyards, and 3 parallel blocks that connect to secondary accesses.

The ground floor is traversable so that both the street and two large hard-landscaped areas can be accessed through the residential buildings. As such, all spaces, including residential buildings, integrate rings, except for the three blocks perpendicular to the main street.

While the layout's integration core lies on its exterior, the interior courtyards are well-integrated spaces. If their centrality and integration might contribute to their potential of collective use, being functional c-type spaces, they do not control access to the dwellings and are not necessarily crossed by the estate's residents on a daily basis.

c) Relation to individual houses

Layout 24 is one of the first estates where the great majority of residential buildings connect directly to the main city grid so that no spaces exclusive to the estate need to be walked through in order to reach one's apartment. However, while connecting the estate's residents to the main urban fabric, the layout also provides broad courtyards that, while public spaces, can only be accessed either through the buildings or through openings in between buildings. The most well defined of these spaces is one step away from the back-doors of 96 families, the other 64.

d) Relationship of the house with the exterior

Two different apartment types were analyzed for layout 24, due to apparent significant

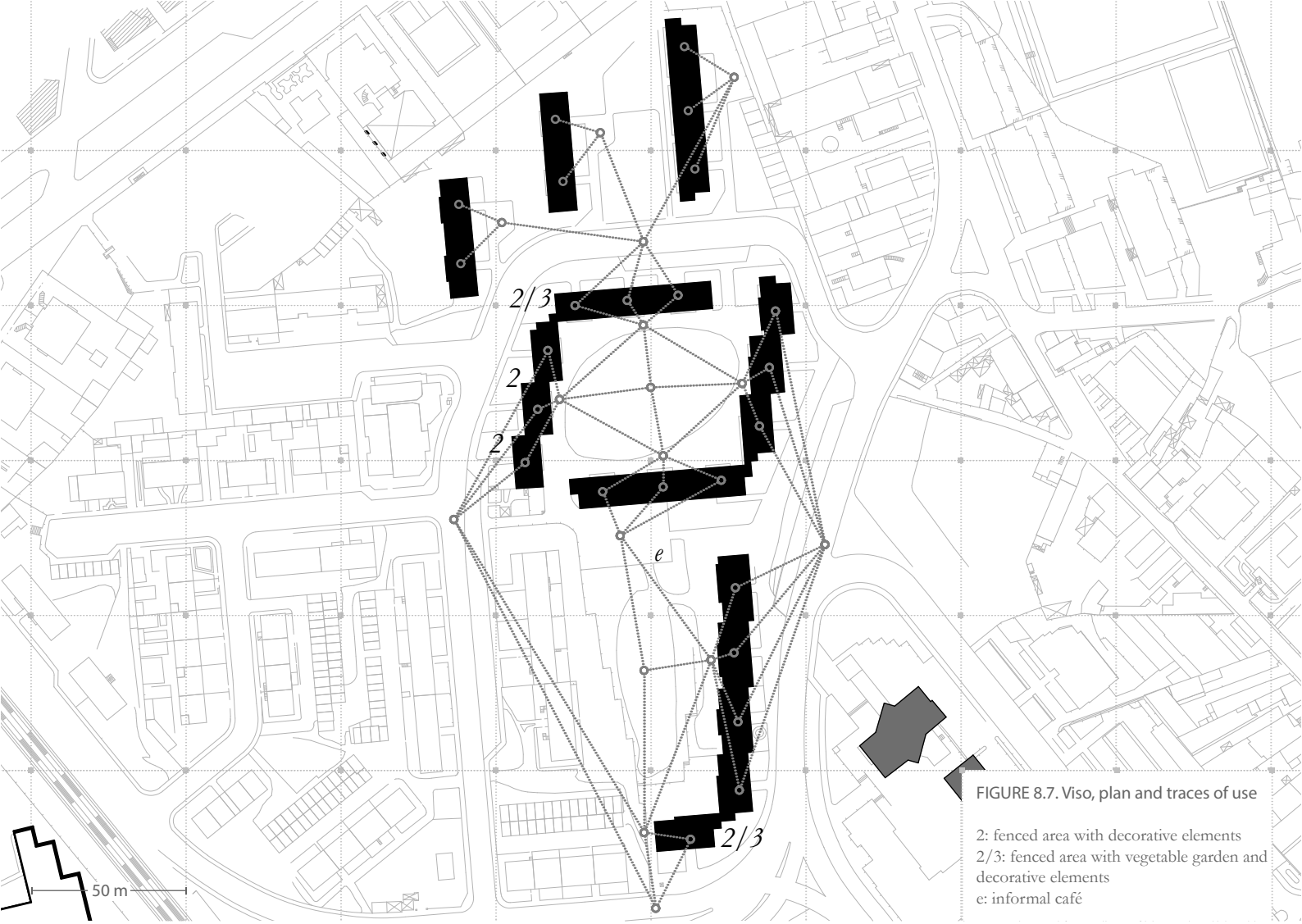


FIGURE 8.7. Viso, plan and traces of use

2: fenced area with decorative elements
2/3: fenced area with vegetable garden and decorative elements
e: informal café

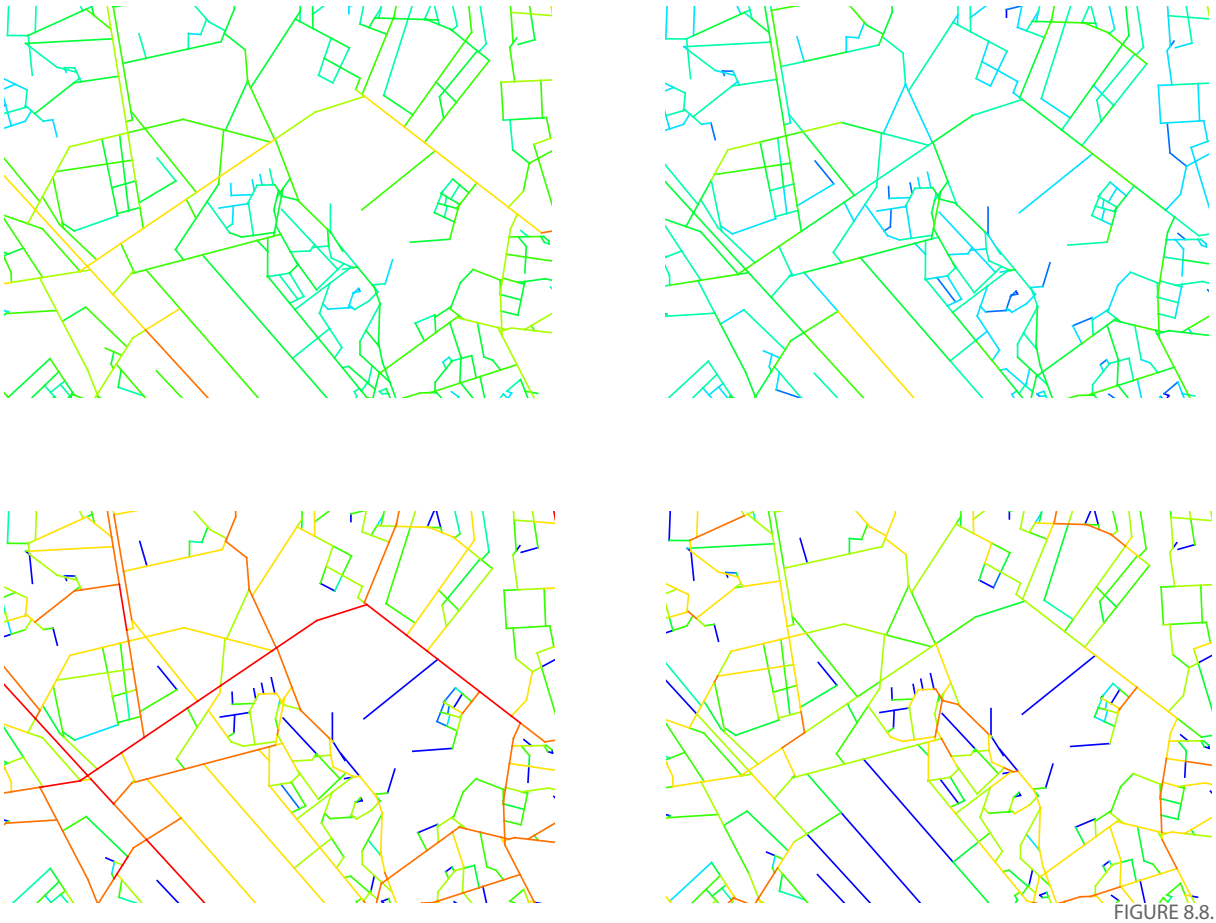


FIGURE 8.8.
Viso, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

differences in their plans.

The apartment type A of layout 24 is 92.7m2, corresponding approximately to the minimum area defined in the previous chapter. When considering that the apartment is inhabited by as many people as the number of bedrooms plus one, the apartment has 18.54m2 per resident. While revealing a certain economy of space, two transition spaces create depth in the layout. One, at depth 1 from the exterior, organizes one room, the kitchen and the living room. The other, at depth 3, organizes two bedrooms, separating them from the living-room. The apartment scheme includes a balcony and a dedicated space for treating clothes, allowing for clothes related activities to be individualized.

The apartment scheme B of layout 24 has a total useful area of 92.7m2, corresponding to an ideal density of 23.18m2 per resident when the maid's bedroom is not considered, and of 18.5 when it is. Similarly to type A, it has 2 sets of transition spaces, where the first makes the connection from the exterior to the kitchen and living room, and the second between the living-room and the bedrooms. As such, bedrooms are the deepest functional spaces from the front door.

e) Collective sector of the house

Apartment A has a 21m2 living-room, which scores above both the minimum and ideal area requirements, and which is the largest space of the house. It is, by large, the better-integrated space of the house, located at an average of 1.7 steps from all other spaces of the house. It has one connection in each of its four walls and is part of 2 different rings. One is established with the entrance wall and the kitchen, to which it connected both accessibility and visibility wise. The other is established with two rooms and the entrance wall. Additionally, it also opens to a hall connecting two bedrooms and to a balcony. The latter has an area of 2.9m2, allowing for some furniture to be installed.

Apartment B has a 26.2m2 living-room, which scores well above the minimum area and corresponds to approximately 28% of its total useful floor area. This space is a functional b-type that functions as the only connection between the private and services sector of the house. It shares the largest value of integration with the kitchen and is at an average depth of 2.3 steps from all other spaces.

f) Services sector of the house

The services sector of A is encompassed by a kitchen - divided into two different convex spaces - and a space for the treatment of clothes. The kitchen has an area of 9.8, to which is added 1m2. In a ring with the living-room, to which it is openly connected, the kitchen is not segregated from the centre of the house, while remaining shallow from the exterior.

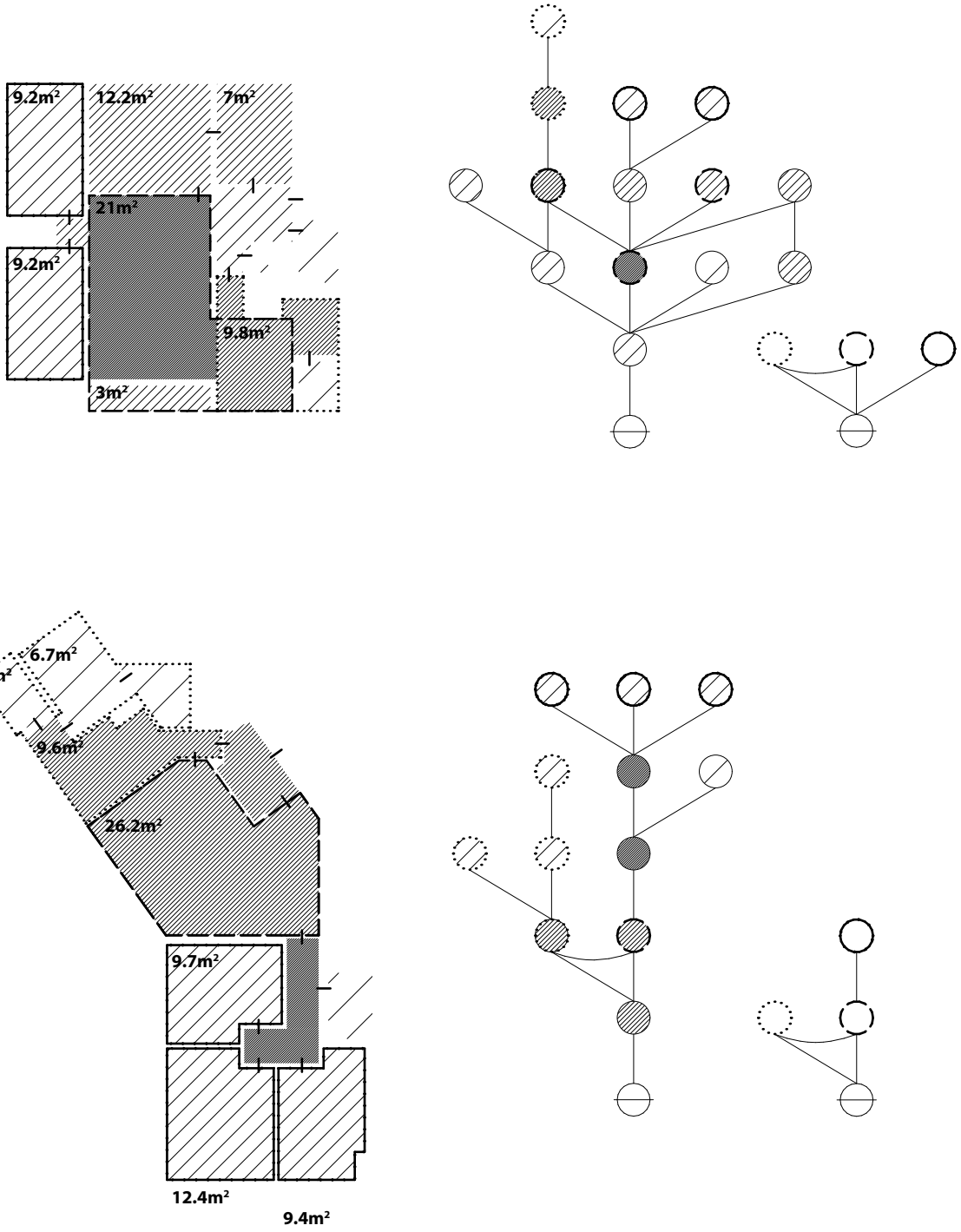


FIGURE 8.9.
Viso, apartment schemes A (top) and B (bottom): plan and accessibility graph.

The kitchen of B has an area of 9.6m2, to which are added 2.8m2 of a dedicated space for clothes' treatment. It is shallow, but a well-integrated space of the house, as it controls accessibility to a bedroom and washroom set. Were this not considered, the kitchen would have a lower integration value than the living-room. As this bedroom is labelled as a maid's room, a space household members are likely not to use, the kitchen's integration should vary according to who is using the apartment. This maid's private sector is located at 2 steps from the living room and 3 steps from the other private sector.

g) Private sector of the house

The private sector of A is not clearly defined. Four rooms exist in the apartment scheme that appears likely to be used as bedrooms, due to their spatial attributes. Two, with an area of 9.2m2 each, are the deepest and less integrated functional spaces of the house, accessible through a hall controlled by the living-room. Two others, one with an area of 12.2m2 and the other 7m2, are connected between themselves, the living room and the entrance hall. Large enough to accommodate additional furniture, these latter rooms also appear likely to be used for other activities.

As mentioned, the apartment scheme B of layout 24 has two separate private sectors. These are both well defined. The maid's private sector connects and is controlled by the kitchen, and has a total area of 9.7m2, only 6.7m2 of which pertain to the bedroom. The household members' private sector encompasses three bedrooms, all of which larger than the required minimum, and two washrooms. Both sectors are equally integrated.

h) Relationships between sectors of the house

	living-room >	**kitchen >**	**transition space >**	**exterior space >**	**exterior >**	**bedrooms >**	**washroom >**	**other space**
integration	2.140	1.471	1.242	0.981	0.872	0.832	0.804	0.765
area	21m²	9.8m²	3.6m²	3m²		10.2m²	2.2m²	4.4m²
minimum area ratio	1.75	1.63	-	-	-	1.41	-	
ideal area ratio	1.17	1.44	-	-	-	1.06	-	
depth exterior	2	3	2	3	0	3.7	3	3.5
type-space	d	c	b/c/d	a	b	a	a	a/c
functional type-space	fd	ff	fb	fi	fb	fi	ff	fa/fi

TABLE 8.5. Viso, Spatial attributes of apartment scheme-A.

Apartment scheme 24-A is exceptionally ringy and is ambiguous in the definition of functional sectors. Its accessibility graph can be translated into a simplified A1 type, where kitchen and living-room are directly and visually connected, and the living-room functions as a transition space. However, while it controls access between two bedrooms and the exterior or the kitchen, a large part of the house can be used without stepping into it. Nevertheless, given both the integration of the kitchen into a social pole and the existence of ambiguous rooms, the apartment scheme



FIGURE 8.10. Lordelo, surrounding city.

seems to take into account what were at the time considered likely domestic transformations.

	transition space >	kitchen =	living-room >	exterior >	bedrooms >	bedroom employee >	other space >	washrooms
integration	1.311	1.010	1.010	0.758	0.674	0.674	0.627	0.576
area	3m²	9.6m²	26.2m²		10.5m²	6.7m²	2.8m²	4m²
minimum area ratio	-	1.6	2.18	-	1.24	-	-	-
ideal area ratio	-	1.41	1.46	-	1.08	-	-	-
depth exterior	2.5	2	2	0	4	3	3	2
type-space	b	c	c	b	a	b	a	a
functional type-space	fb	ff	fc	fb	fi	fa	fa	fi/fa

TABLE 8.6. Viso, Spatial attributes of apartment scheme-B.

While sharing some similarities with apartment type A, such as the relationship between the living room and a private sector, apartment type B show attributes that are unique across all cases. Its accessibility graph translates into a simplified B1 type, where the kitchen is connected to the living-room without creating a clear social sector. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members. The private sector is separated from this area of the house and, scoring above the minimum area for bedrooms, may encourage its use for individual activities that require space or extra furniture that might otherwise take place in the living room.

8.3. LAYOUT 25: LORDELO

Today, Bairro do Lordelo (layout 25) is administered by the Company for Housing and Maintenance in Porto's Municipality (Empresa de Habitação e Manutenção do Município do Porto - Domus Social, DS). DS' records state that the estate was built in 1977. Architectural drawings have been found from as early as 1974.

a) Relation to the surrounding city

Layout 25, Bairro do Lordelo, is an estate designed in 1974 but built in the late 1970s that encompasses 168 houses in an 18 747m2 area. It is located in a neighbouring lot to layout 3 and in continuation of an estate from the first phase of the PMCP, in a mostly residential area of the city. Similarly to layout 3, it benefits from public equipment and facilities in a 500m radius such as schools, a public sports centre, and, from 1987 onward, Porto's contemporary art museum and park. Developed around a decade after layout 3, it was not constructed in a notably transformed area. While its integration values are higher than those of layout 3, the area remains poorly integrated both globally and locally.

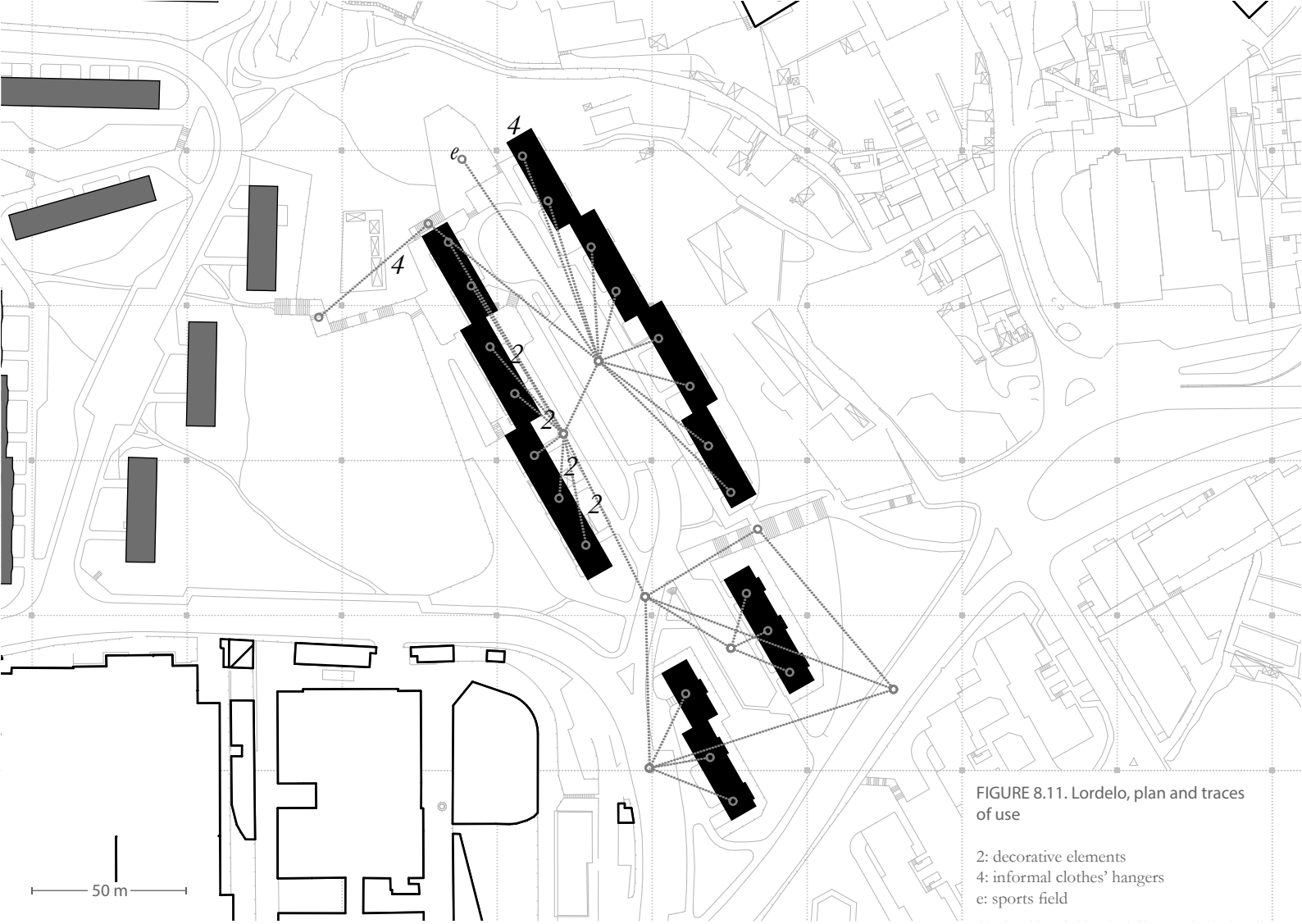


FIGURE 8.11. Lordelo, plan and traces of use

2: decorative elements
4: informal clothes' hangers
e: sports field

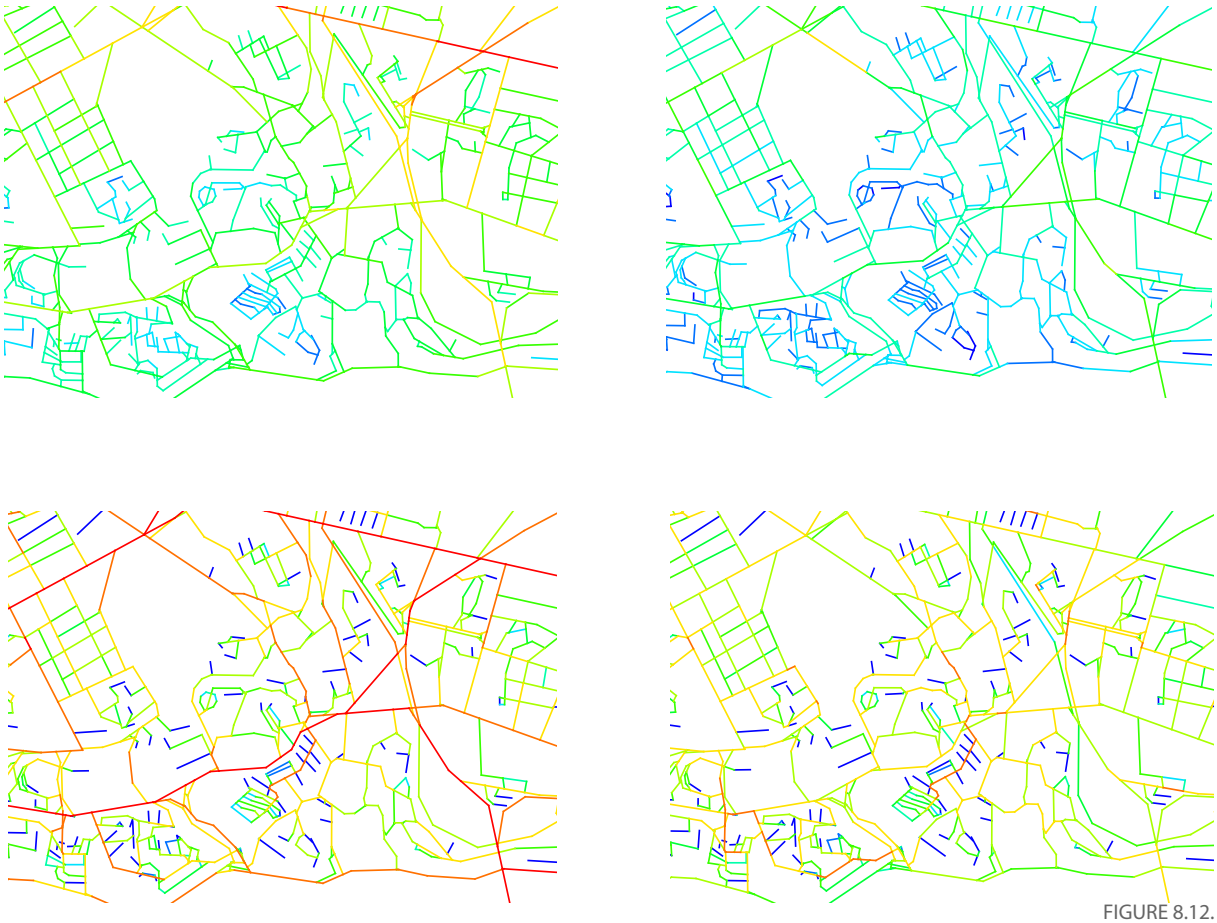


FIGURE 8.12.
Lordelo, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

Additionally, because layout 25 is a cul-de-sac, its choice values are also lower than average. Located close to three arteries of the city with high potential for through-movement at the global scale, the estate is also not far removed from public transportation providing good accessibility to the centre of the city, to the riverside and the coast. Similarly, it is two axial steps away from an important axis with high local choice, where retail and services are located.

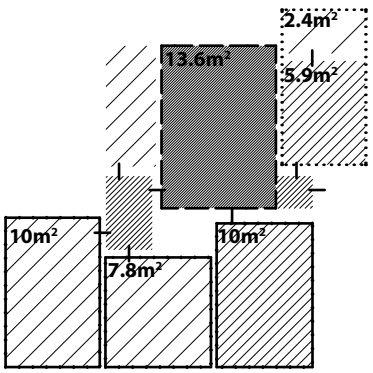
However, even though the lot directly connects to this axis, the estate is constructed transversely in relation to it and is served by a system of interior streets. With only two road accesses and two pedestrian pathways connecting the layout to the primary street grid, the estate's maze index is high in relation to other multi-building layouts developed during the same time-period: when passing through exterior streets, people must, on average, take 2.6 turns in order to reach all spaces within the layout.

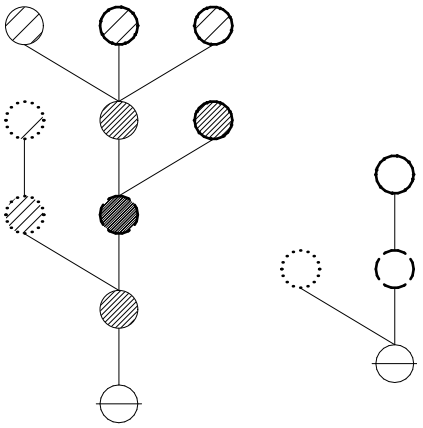
b) Relations between collective spaces

The estate is composed by two main blocks organised around a central cemented space, two smaller blocks shallow in relation to the main street grid, and a sports field on its deeper edge. All spaces are placed along the same line, constituting an axially shallow but convexly deep configuration. However, including a small number of spaces, these are easily accessible from each other: all spaces of the layout can be reached in an average of 2.6 convex steps from any other space. 50% of spaces are constituted by buildings' entrances, the number of doors accessible through which varying between 3 and 8, and averaging at 5.5. The spaces with the least number of entrances are the most shallow, and those constituted by the most front-doors are the better integrated, central spaces of the layout. Even though the two larger blocks front each other, they are located at different heights and are therefore accessible through two different convex spaces. In this sense, it seems that the redundant pathways identified on this layout are, like those in layout 3, at least in some way the result of the lot's topography.

Today, the housing estate includes a small sports field. Its original design, from 1974, provided space for the posterior construction of a primary school between layouts 3 and 25, that was not built. A primary school is located within 500m of both estates, to the north of layout 3. The only existing collective labelled space presents a low value of integration and is located at an average of 2.4 convex steps from the buildings' entrances. The central space of the layout, while presenting the largest value of integration, is used as a parking lot and, with no associated functions or urban furniture, seems more likely to provide a space for possible encounter than for collective use and appropriation.

This assumption appears to be supported by the fact while that no traces of use were identified in this larger, more integrated space, the small gardened areas in the pathway at the lower height - where privacy may be assured by the difference in height as well as by a smaller value of integration - displayed decorative elements.





INTEGRATION

min. value	0.48
25th percentile	0.65
50th percentile	0.68
75th percentile	0.98
max. value	1.57

private sector

collective sector

services sector

FIGURE 8.13.
Lordelo, apartment scheme: plan and accessibility graph.

A series of informal pathways, carved into the vegetation through time by continued use, can also be considered traces of use in this layout, showing discrepancies between the way the estate was designed and how it is used. Countering the estate's depth, these pedestrian paths lead from different directions to the deepest part of the configuration.

c) Relation to individual houses

Even though the layout's design accentuates the lot's depth, its separation index is a low 1.7 and mean depth from the primary street grid an average 2.5. Residents are, then, on average as close to the exterior of the layout as they are to the layout's interior spaces. Access to apartments is done through an exterior staircase connecting to 2 apartments on each floor, which was seen in visits to be used for informal clothes' drying.

d) Relationship of the house with the exterior

The three-bedroom apartment type of layout 25 has a total useful area of around 57m2, resulting in a density of 14.19m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. Depth is created in the layout through the introduction of two transition spaces into the design, one of which separates the living room from the exterior, and the other separates two of the bedrooms from the collective space of the house. The layout includes a dedicated space for the treatment of clothes, allowing for the individualisation of domestic work.

e) Collective sector of the house

The apartment has a 13.6m2 living-room, which complies with the minimum area seen in chapter 3, and is the largest space of the house. It is an enclosed space, separated from the services and private sectors by a hall and a corridor. Located in between the front door and the private area of the house, it controls access between bedrooms and the outside and bedrooms and the kitchen and is the space with the largest value of integration.

f) Services sector of the house

The kitchen's area rounds the required minimum. Additionally, it is connected to a dedicated space for the treatment of clothes, with an area of 2.4m2, which results in a services sector with 8.3m2. It is an enclosed space, has no connection to other functional spaces, and presents the lowest value of integration of functional spaces. Located at one step from the entrance hall, it is shallow from the exterior and from the living-room.

g) Private sector of the house

Bedrooms' areas are smaller than the required minimum seen in chapter 3, which may hinder the comfortable introduction of furniture supporting activities of individual development. They

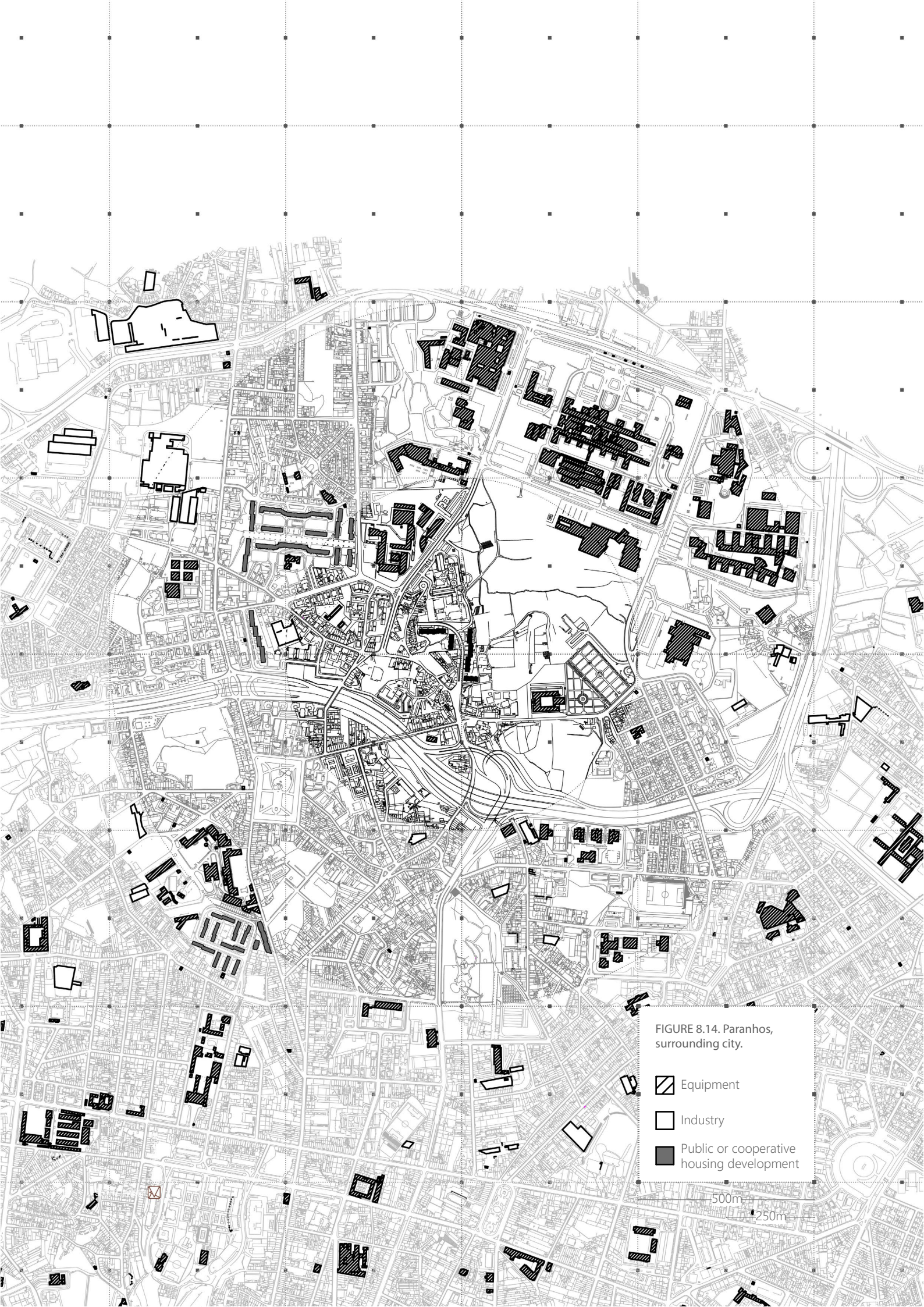


FIGURE 8.14. Paranhos, surrounding city.

are simultaneously the deepest and less integrated spaces of the house. While there is a clearly defined private sector, separated from the living-room by an enclosed corridor, there also exists a bedroom that opens directly to the collective sector.

h) Relationships between sectors of the house

	living-room >	transition space >	kitchen >	bedrooms >	washroom =	exterior >	other space
integration	1.571	1.222	0.733	0.676	0.647	0.647	0.478
area	13.6m²	1.3m²	5.9m²	9.4m²	4.1m²	-	2.4m²
minimum area ratio	1.15	-	0.98	0.99	-	-	-
ideal area ratio	0.76	-	0.87	0.89	-	-	-
depth exterior	2	2	2	3.67	4	0	3
type-space	b	b	a	a	a	b	a
functional type-space	fb	ff	fi	fi	ff	ff	fa

TABLE 8.7. Lordelo, spatial attributes of apartment scheme.

The accessibility graph of this apartment scheme translates into a simplified B1 type, where kitchen and living-room are not either directly or visually connected. While there exists some ambiguity between collective and private areas, there are defined sectors. The living-room is the better-integrated space, followed by the kitchen and bedrooms. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members. Even though it is not connected to the kitchen, its control of all access to bedrooms has been seen to potentially increase the likeliness of this sector being used by women. Simultaneously, the services sector, more likely to be used by women, is segregated from the rest of the house.

8.4. LAYOUT 26: PARANHOS

Today, Bairro de Paranhos (layout 36) is administered by the IHRU. Its documents state the estate was built in 1977. Porto's Municipal Archive (Arquivo Municipal do Porto, AMP) stores the estate's architectural drawings, which contain the council's housing department's (Direcção dos Serviços de Habitação) stamp and are signed by Rui Paixão, an architect who authored several of PMCP's projects.

a) Relation to the surrounding city

Layout 26 is constituted by four housing blocks with a total of 160 apartments, organised within a 13 810m2 lot. It is located in between the edge of the city's main university campus, a functional area planned in the PDP, over a decade before the construction of the estate, and the largely residential area where layout 23 is also located. Despite constituting a functionally



FIRGURE 8.15. Paranhos, plan and traces of use

1: informal pathway
2: fenced area with decorative elements
3: fenced area with vegetable garden
4: informal clothes' hangers

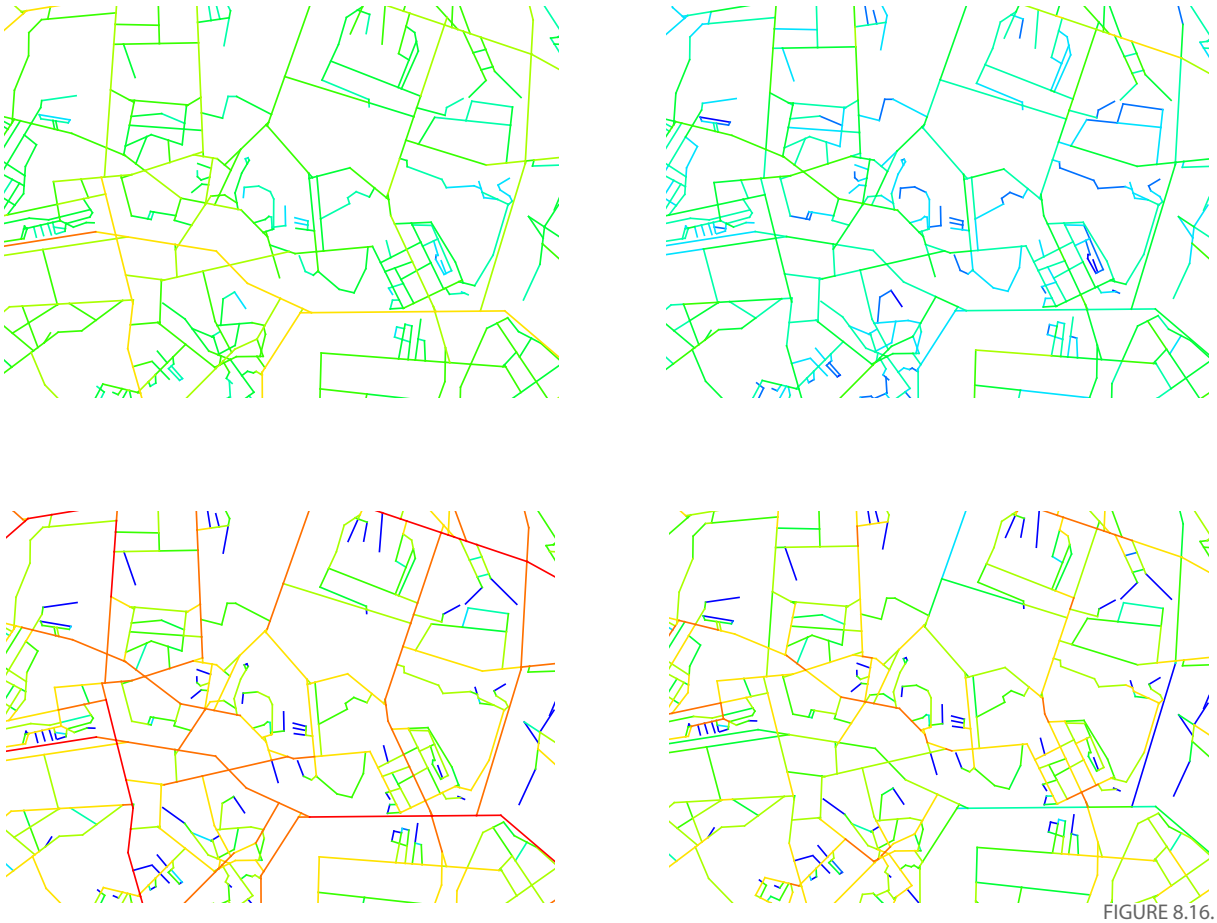


FIGURE 8.16.
Paranhos, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

important area of the city, visited daily by thousands of people, it is a generally poorly integrated area at the global scale. The estate reflects this with low values of NaIn r=5000 and furthers it with similarly low values of NaIn r=800. Nevertheless, the layout benefits from nearby retail and services and cultural equipment and has access to public structures such as schools and the public transportation network.

The estate is constituted by a set of buildings organised along one interior street that culminates in a cul-de-sac, where dwellings face on one side the back of a university building and on the other a derelict front of the lot. The primary street grid permeates the layout in such a way that most, but not all housing blocks open directly to the street. However, due to the complexity added by the block that turns to the back of the lot, layout 26's maze index of 2.6 is relatively high.

b) Relations between collective spaces

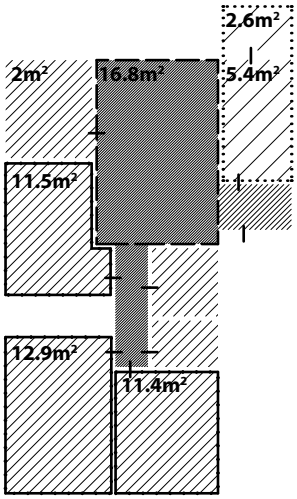
The layout is relatively shallow, resultant of an original design that intended to connect its internal axis to the two nearest streets. Hindered from reaching the main street grid by existing houses on the west edge of the lot, the layout became more treelike, with one of its blocks being located in an a-type space, or cul-de-sac. Layout 26 has no labelled collective spaces, 75% of its spaces are distributed, and 50% constituted by front doors. While most blocks face a street that is not exclusive to the layout but is its better-integrated space, they are distanced from the street movement by small gardened areas or by a system of redundant sidewalks, resulting in a mean depth between the exterior and the dwellings of 2.2 steps. Dwellings are further separated from each other, with an average of 3 steps between them. Poorly integrated, the cul-de-sac axis is not likely to be visited by residents of other blocks. Here, similarly to layout 26, informal pathways that are not a part of the design were counted as traces of use. These not only connect to the exterior of the layout, creating an opening in the area where one was originally planned but also create an axial system in the back of blocks.

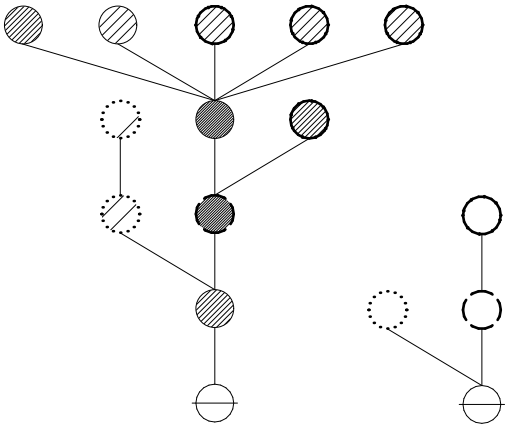
c) Relation to individual houses

Most of layout 26's front doors open in the direction of the main street and the layout presents relatively low separation index of 1.75 and a no-neighbour score of 2.5. Residents have between 23 and 71 neighbouring families sharing the same access space and share an interior access hall with 7 other families.

d) Relationship of the house with the exterior

The scheme analysed for layout 26 is considered of a four-bedroom apartment, found in articulation with the more common three-bedroom scheme of layouts 20, In this sense, its total useful area of approximately 78.6m2 results in a density of 15.7m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. Revealing area economy, only





INTEGRATION

min. value	0.44
25th percentile	0.58
50th percentile	0.65
75th percentile	0.89
max. value	1.12

private sector

collective sector

services sector

FIGURE 8.17.
Paranhos, apartment scheme: plan and accessibility graph.

around 6m2 of this area belong to two transition spaces. As in other apartments developed after 1974, these transition areas create depth between the front door and the kitchen and living room, and then between the living-room and bedrooms. The layout includes a dedicated space for the treatment of clothes, allowing for the individualisation of this type of domestic work.

e) Collective sector of the house

The living-room presents the largest value of integration and is located at an average of 1.8 steps from all spaces of the house. Simultaneously, it is also the largest space of the house, with an area of 16.9m2. It is a functional b-type space, controlling access between bedrooms, the kitchen and the exterior. It connects directly to a room through a large sliding door which, when completely open, allows for an ample visual connection between the two spaces.

f) Services sector of the house

The services sector of layout 26 encompasses a kitchen and a dedicated space for treating clothes. The sector is small. The kitchen's area sits just above the minimum required and presents the lowest value of integration of all functional spaces.

g) Private sector of the house

There is a clearly defined a-type private sector, encompassing three bedrooms, all of which comply with minimum areas and have an average area of 10.9m2. While some are small, hindering the introduction of furniture for supporting individual activities, the largest bedroom has an area of 13.1m2. The fourth bedroom, with an area of 6.85m2, opens directly to the living room through an ample sliding door.

h) Relationships between sectors of the house

	living-room >	transition space >	bedrooms >	washroom >	kitchen >	exterior >	other space
integration	1.119	1.098	0.683	0.653	0.603	0.560	0.435
area	16.8m²	1m²	11.9m²	2.4m²	5.4m²	-	2.6m²
minimum area ratio	1.4	-	1.42	-	0.90	-	-
ideal area ratio	0.93	-	0.97	-	0.79	-	-
depth exterior	2	2.3	4.7	5	2	0	3
type-space	b	b	a	a	b	b	a
functional type-space	fb	fb	fi	ff	ff	ff	fa

TABLE 8.8. Paranhos, spatial attributes of apartment scheme.

The accessibility graph of apartment scheme 26 translates into a simplified B1 type, where kitchen and living-room are not either directly or visually connected. There are defined sectors,



FIGURE 8.18. Ramalde, surrounding city.

of which the collective has the largest values of integration, followed by the private and then the services' sector. The collective sector represents the better integrated, larger area of the house, and displays configurational properties that may, according to the results presented in the previous chapter, facilitate its use by family members. Even though it is not connected to the kitchen, its control of all access to bedrooms has been seen to potentially increase the likeliness of this sector being used by women. Nevertheless, the kitchen, where women have seen to be likely to spend time, is segregated from the rest of the house. There is a private sector separated from this area of the house, where it may, in some rooms, be difficult to use for individual activities that require space or extra furniture. Additionally, there is a bedroom that opens directly to the living room. The results of the analysis of the Survey on Urban Housing (Pereira & Gago, 1984) presented in this dissertation, suggested that this characteristic may decrease the likeliness of it being used as a bedroom.

8.5. LAYOUT 27: RAMALDE

Both the IHRU and Domus Social claim management of Bairro de Ramalde (layout 27) in their public websites. Both state the estate was constructed in 1979. Porto's Municipal Archive (Arquivo Municipal do Porto, AMP) stores the estate's architectural drawings, which contain the council's housing department's (Direcção dos Serviços de Habitação) stamp.

a) Relation to the surrounding city

Layout 27, Bairro de Ramalde, was founded in 1979 and houses 272 families in a 2 300m2 lot. It is located to the northwest of the inner radial of the city, adjacent to the industrial area that had been planned in the PDP. While retail and commerce exist in a 500m radius of the estate, the area is mostly residential, and the layout benefits from schools, sports equipment and other urban structures from neighbouring estates. The area where it is located has become denser since the estate's construction, but it presents, today, values of global integration that are in the lowest 20% of the studied cases and of local integration in the lowest 10%. Similarly, with low values of NaCh r=800 and r=5000, it is not likely that layout 27 includes important through-movement axes.

Located in this relatively segregated area of the city, the estate opens to the main street grid where it faces the more residential axis while simultaneously turning its back to the industrial complex. Where front-doors open directly to the street, a system of redundant sidewalks separates them from the movement of non-residents. With four openings connecting the interior of the layout to its exterior, its maze index of 2.25 sits on the average for the studied cases, a low value for such a large scale estate.

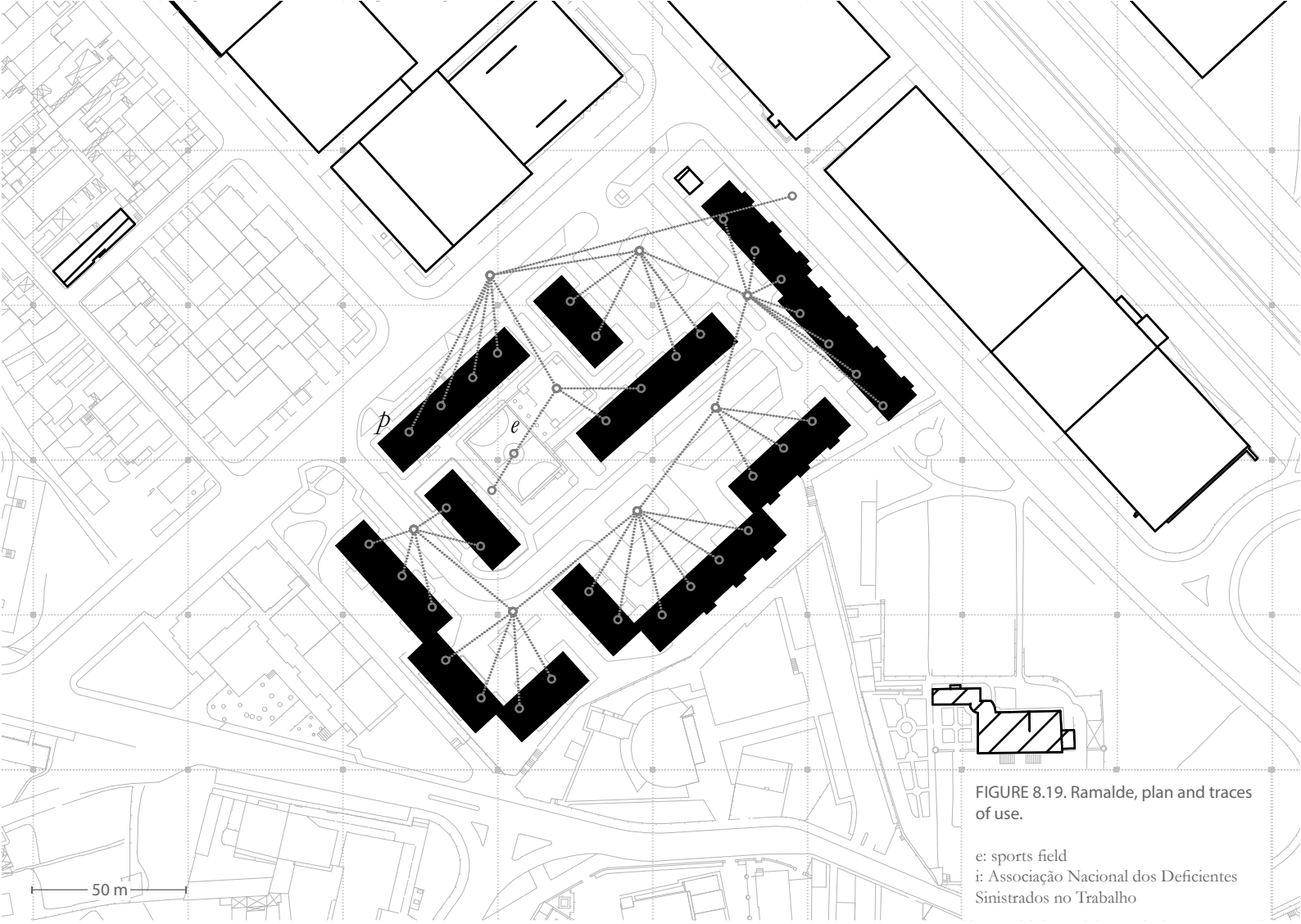


FIGURE 8.19. Ramalde, plan and traces of use.

e: sports field
i: Associação Nacional dos Deficientes Sinistrados no Trabalho

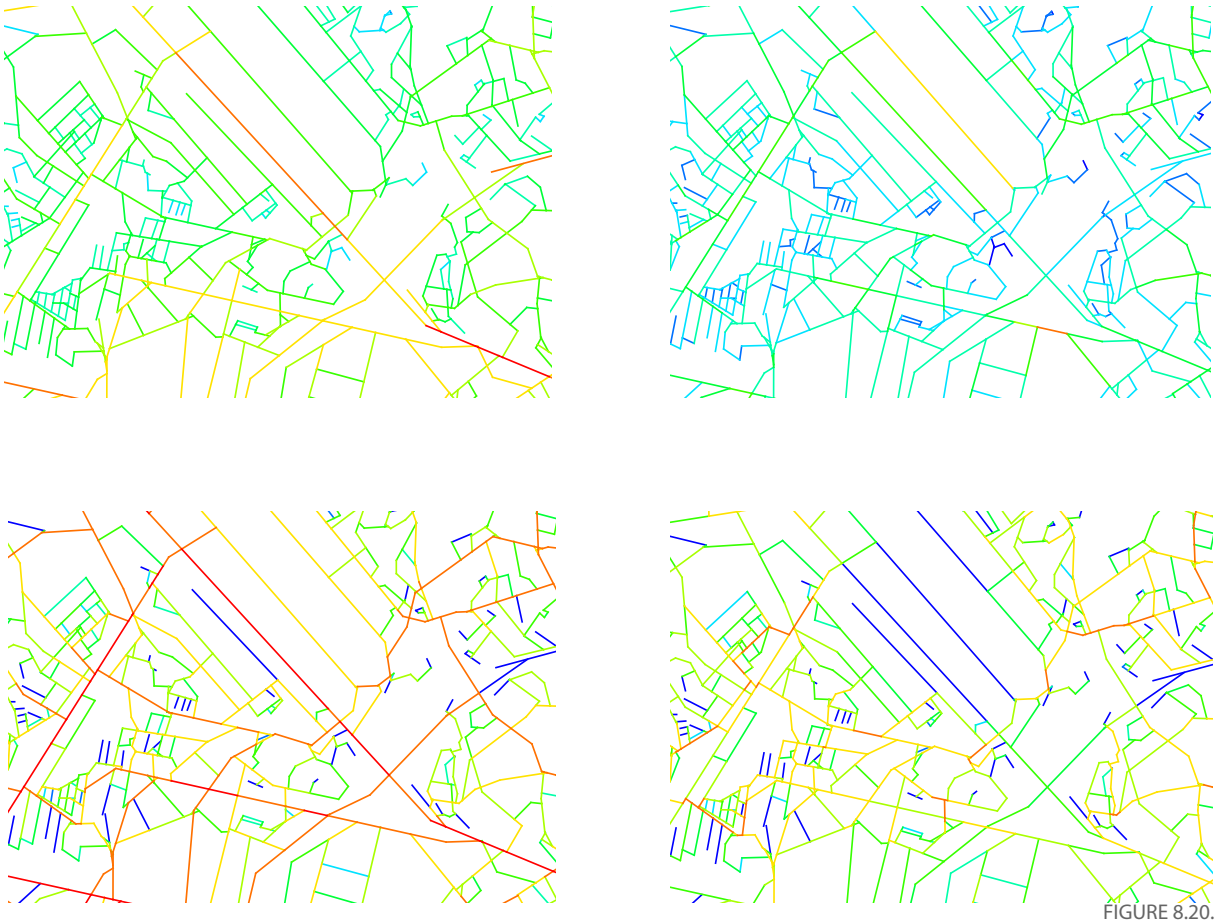


FIGURE 8.20.
Ramalde, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

b) Relations between collective spaces

The estate is a treelike system, where the shallower spaces control access to the deeper ones. While all spaces are distributed, and one ring exists in the layout that does not include its exterior, the layout functions as a cul-de-sac, with all entrances connecting to the same exterior axis. Nevertheless, the system remains shallow, with convex spaces that are, on average, 2.5 steps away from each other, and 3.12 steps away from dwellings. 75% of convex spaces are constituted by buildings' entrances, the number of doors accessible through each varying between 4 and 9. The spaces with a larger number of entrances are wide convex spaces broken down by small, soft-landscaped central areas. In this sense, while large and well-integrated convex spaces constituted by front-doors might encourage collective use, these are instead designed as streets bordered by parking spaces. The least amount of entrances turn towards the functional core of the layout, where a sports field and a smaller, delimited, cemented area are located.

While geometrically at the surface of the estate, the sports field is topologically distanced from it, accessible only through pedestrian pathways. Similarly, this space is outside the integration core of the layout, which surrounds it, and, with an average depth from other convex spaces of 2.7 steps and the dwellings of 2.8, it is distanced from the layout as well.

The small gardened spaces in front of buildings that are common mechanisms for distancing the front-doors from the collective areas of the estates are defined by tall bushes, and no traces of appropriation were detected in them. Other spaces of the layout also did not present traces of use or appropriation at the times of field visits.

c) Relation to individual houses

Shallow and with instances of front-doors that open directly to the street, the layout presents a separation index of 1.5, close to the minimum of 1. Residents are, on average, topologically close to the main street grid and in relative proximity to the spaces of the layout.



FIGURE 8.21. Ramalde do Meio, surrounding city

8.6. LAYOUT 28: RAMALDE DO MEIO

Today, Bairro de Ramalde do Meio (layout 28) is managed by by the IHRU. Porto's Municipal Archive (Arquivo Municipal do Porto, AMP) stores the estate's architectural drawings, which contain the council's housing department's (Direcção dos Serviços de Habitação) stamp and are signed by Rui Paixão, an architect who authored several of PMCP's projects. Drawing were found from as early as 1975.

a) Relation to the surrounding city

Layout 28 is smaller than earlier FFH estates, integrating 170 houses in a 21 168m2 area. It is located to the southeast of layout 24, following the same line of industry and warehouses. Better integrated than the former, layout 28 presents values of global NaIch (r3000, r5000) that, while smaller than average for State developments, are amongst the better integrated layouts overall. It creates street-frontage in a high choice axis at all radii. This part of the city, as described in layout sheet 24, was developed according to the PMP mostly through the development of council and state housing connected to the development of an industrial area extending from the inner radial to the edge of the municipality. Locally, it is an almost exclusively residential area with a limited - although existent - access to retail, services and other urban structures.

The layout is between existing streets, adjacent to the then developing industrial area and in continuation of the few pre-existing houses. The Layout is composed of two inward-facing parts: three plots located in front of a railway and industrial area, which open to the inside of the lot; and four plots creating a courtyard where their doors are located. The latter functions like a closed block, one of its sides creates street-frontage in the existing street, another defines a small square in front of existing houses. Exceptionally, two of the blocks have direct entrances to ground floor apartments, with doors facing the main street.

Resulting from all its front-doors turning inwards, while most of its buildings create street-frontage, this layout presents particularly large values of depth from the exterior.

b) Relations between collective spaces

All of the layout's spaces are distributed, functional c-types in rings with the exterior streets. Around one third of its spaces are constituted by front-doors, which indicated that the predominance of blank walls is not exclusive of the estate's relation with the main city fabric.

Convex spaces of the layout are an average of 2.38 steps away from all others, and 2.35 from all buildings' entrances. The three blocks adjacent to the main street are accessible through the same transition space, which contains 9 front-doors that are regularly used by 72 families. The courtyard gathers 11 doors, being a mandatory transition space for 88 families.

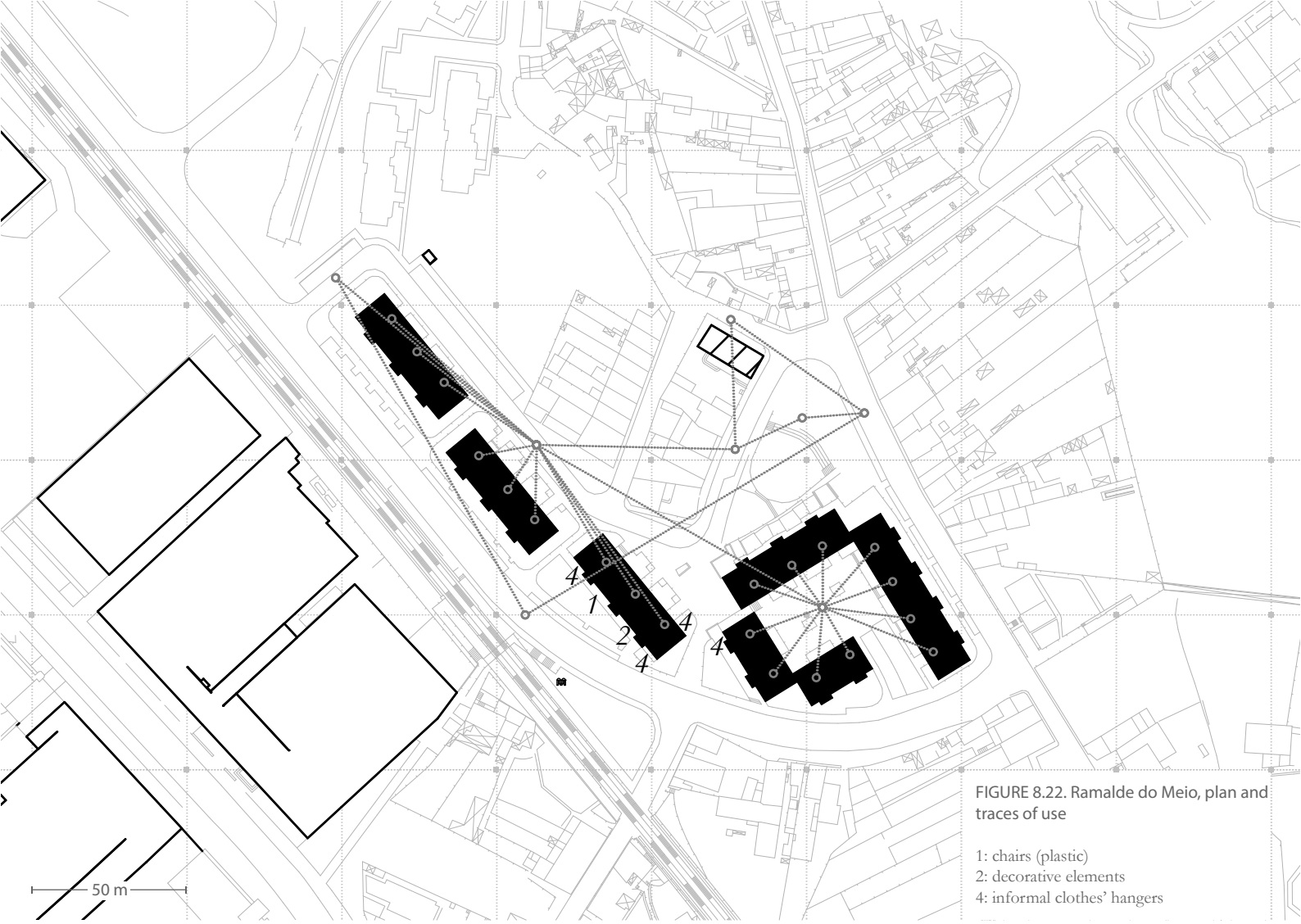


FIGURE 8.22. Ramalde do Meio, plan and traces of use

1: chairs (plastic)
2: decorative elements
4: informal clothes' hangers

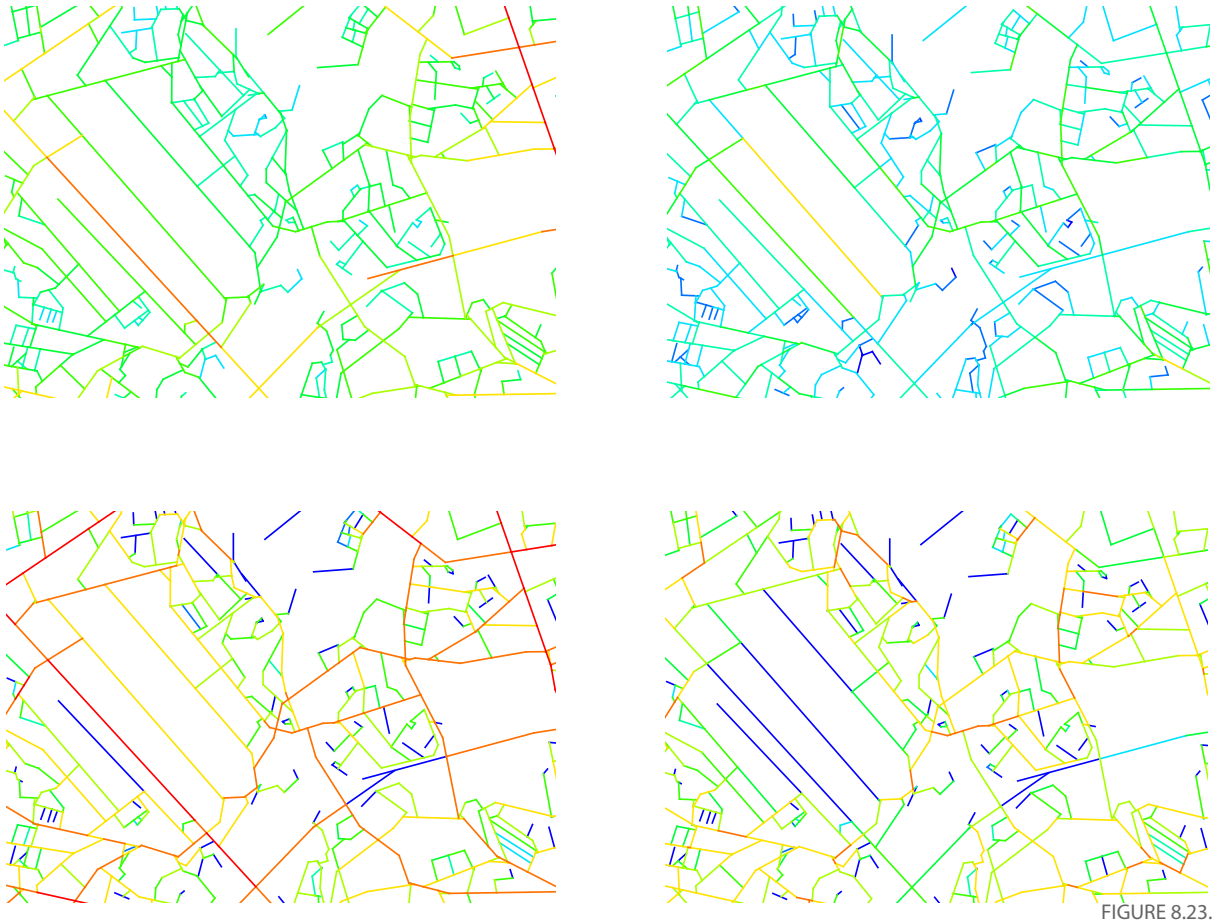


FIGURE 8.23.
Ramalde do Meio, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

The courtyard is by far the most integrated space in the layout. While it connects to most of the dwellings' entrances and to the main street, the connection is made through a small opening between buildings that make the space mostly invisible from the outside. A secondary space in this layout, open to the street and at an average of 3.6 steps from the residential buildings, is the only case of including clearly public space in the estate's design.

Traces of use were detected in the courtyard in the form of containers (such as bottles or food-boxes) littering the small green areas in front of the buildings. Informal hangers were placed in interstitial spaces or in between ground-floor entrances facing the street, where plastic chairs were also registered.

c) Relation to individual houses

The inwardness of the layout results in a greater depth between residents and the exterior grid than its morphology would indicate. Residential buildings are 2 to 3 steps away from the nearest street, and its distance between each other ranges between the same values. Like the majority of layouts studied in this dissertation, buildings have no specific spaces of collective potential; staircases connect eight apartments each, two per floor.

This layout shares the apartment scheme described in 5.2.10, concerning Vilar (layout 20, page 257).



FIGURE 8.24. Pereiró, surrounding city.

8.7. LAYOUT 29: PEREIRÓ

Today, Bairro do Pereiró (layout 29) is managed by the IHRU. Its documents state the estate was built in 1979. Porto's Municipal Archive stores the estate's architectural drawings, which contain the council's housing department's stamp. Matos (2001) states that this is a council development, from 1980.

a) Relation to the surrounding city

Layout 29 includes 80 apartments in a 10 783m2 area, being substantially smaller than those constructed before. It is located on the opposite side of the industrial area from layouts 24 and 28, and is slightly better integrated in the global urban system than the former two. It is overall well integrated both locally and globally, but relatively more so at the local scale. Although located on the main city grid, the NaCh values of the axis it is adjacent to decrease as it approaches the industrial area, and consequently the estate. While also weakly urbanized, prior housing existed on this side of the industrial area, which was already denser by the time the estate was built. Today, it displays a higher density of retail and services than the area surrounding layout 24 and 28.

Layout 29 follows a design strategy apparently similar to that of layout 28, with one plot facing the street and other three turning inwards to a courtyard. Again, while occupying a lot that constitutes street, extra steps of depth are added by the creation of transition spaces - in this case a parking lot - between the main street and the buildings. Nevertheless, the layout presents of the lower values in measures relating to depth between the spaces interior to the system and the exterior urban fabric.

b) Relations between collective spaces

The layout includes one cemented space with collective potential, where benches have been placed by the estate's most recent renovation. This space has the largest value of integration. It is at 1 convex step from most of the estate's dwellings, to which it controls access, and from the nearest exterior street. The second better-integrated space in the layout represents an example of the ambiguous relation of post-revolutionary housing developments with the primary street grid. This is a functional b type space, which controls access to the interior of one of the buildings, and is separated from the main sidewalk and street by a small gardened area. A parking lot occupies the majority of its area.

c) Relation to individual houses

All buildings connect to a hard-landscaped space that then connect to the street. The majority of front doors (8 out of 10) all connect to a courtyard, while the remaining 2 connect to a parking lot, separated from the street by a gardened area.

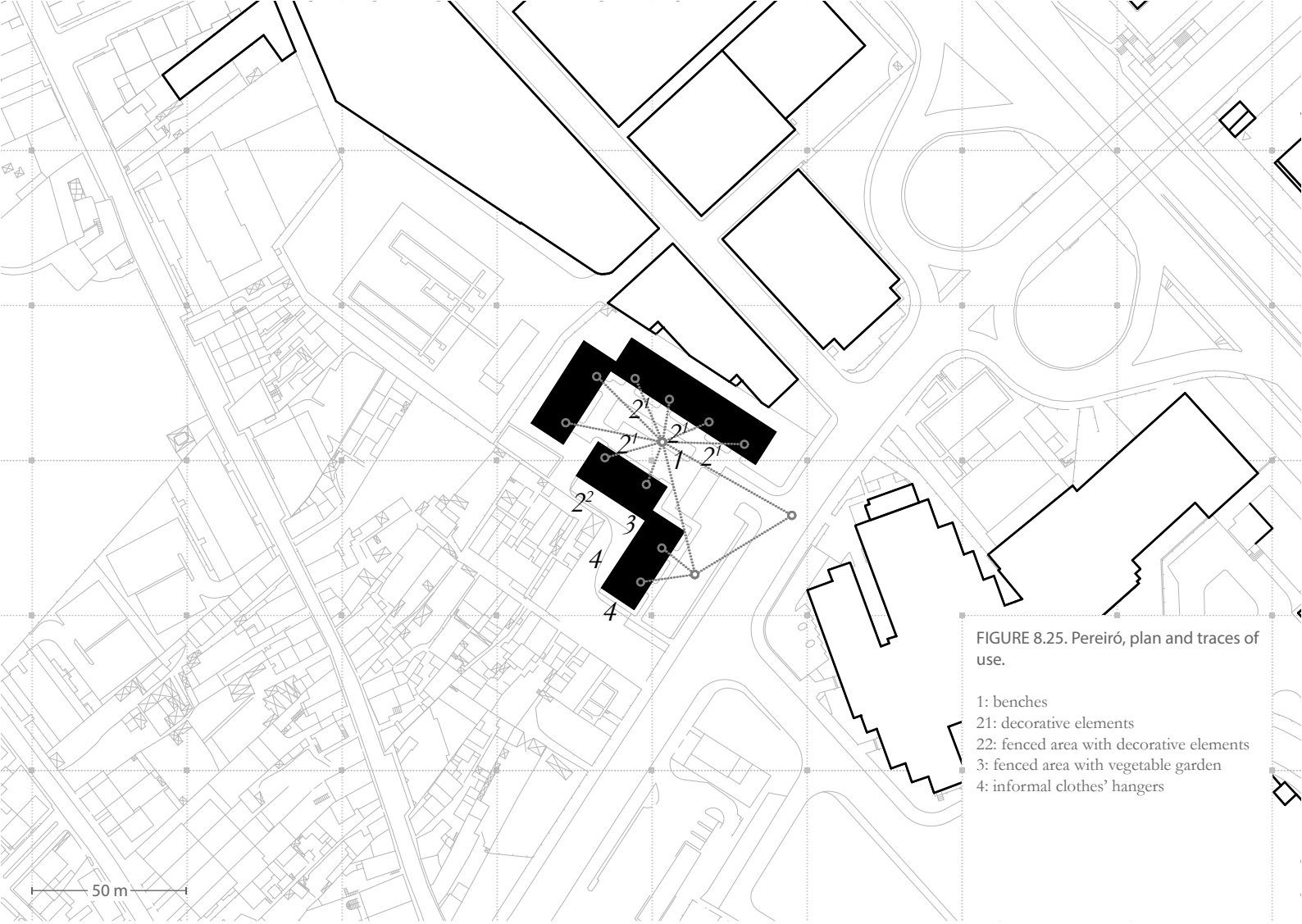


FIGURE 8.25. Pereiró, plan and traces of use.

1: benches
21: decorative elements
22: fenced area with decorative elements
3: fenced area with vegetable garden
4: informal clothes' hangers

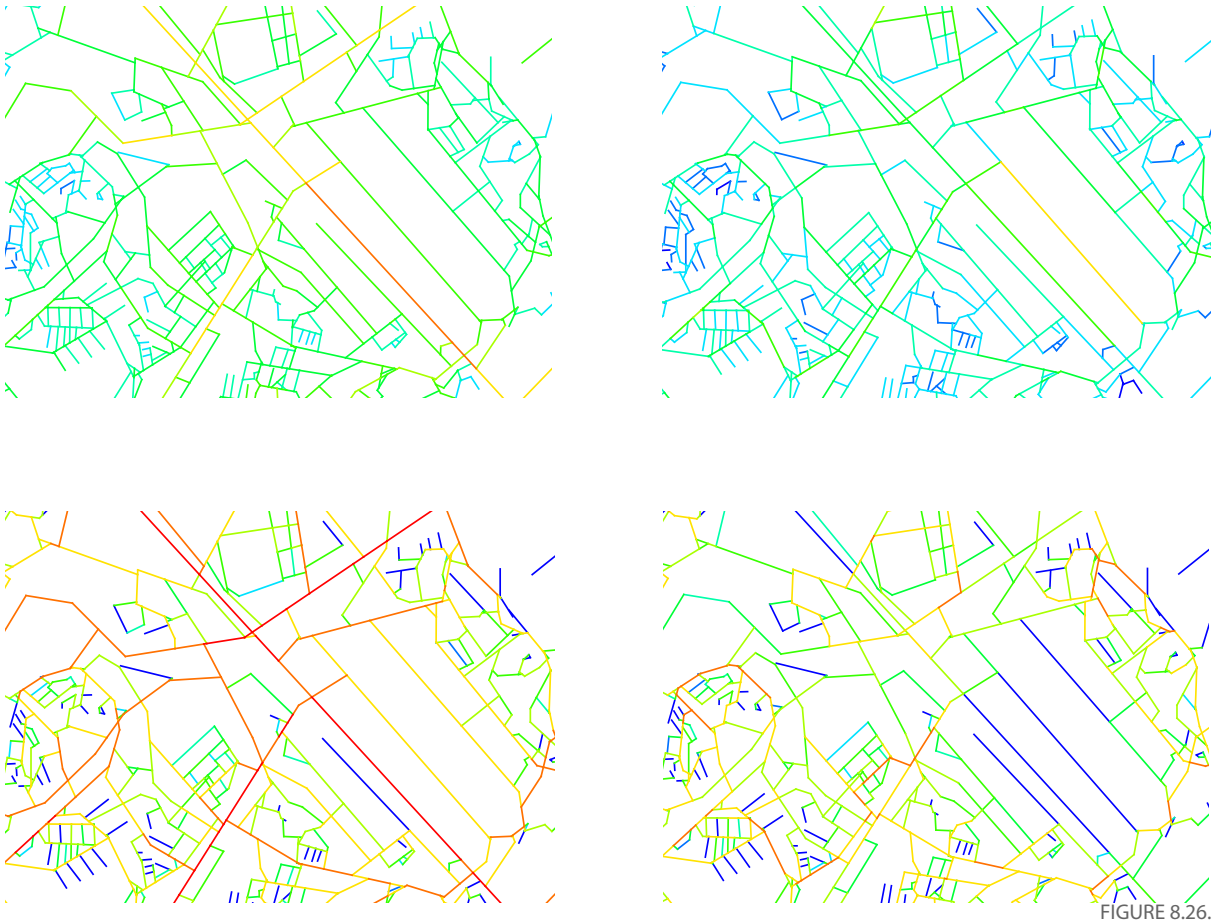


FIGURE 8.26.
Layout 29's urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

d) Relationship of the house with the exterior

The apartment design chosen to analyse regarding layout 29 is a one-bedroom apartment, articulated in the building with the three-bedroom apartment shared with layout 20, 22, 28 and 33. The apartment has an area of 32.6m2, which would result in a density of 10.9m2 for three residents, or 16.3m2 for two. Depth is created in the layout through the introduction of two transition spaces into the design, which in one moment separate the living-room from the exterior, and in another separate the bedroom from the collective space of the house. The layout includes a dedicated space for the treatment of clothes, allowing for the individualisation of most domestic work.

e) Collective sector of the house

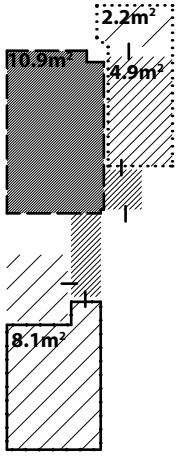
The apartment has a 10.9m2 living-room, which complies both with the minimum and ideal areas seen in chapter 3, and is the largest space of the house. It is an enclosed space, distanced from the services and private sectors by a hall and a corridor. Located in between the front-door and the private area of the house, it controls access between bedroom and the outside and bedroom and the kitchen, and is the space with the largest value of integration.

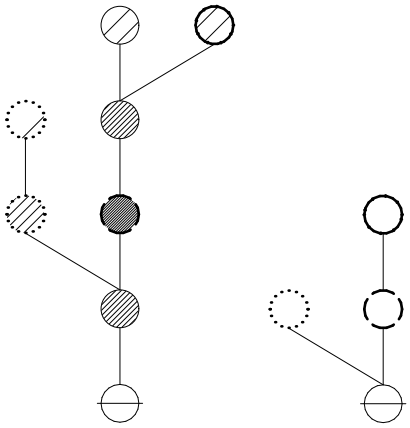
f) Services sector of the house

The kitchen's area rounds the required minimum, while remaining bellow it. Additionally, it is connected to a dedicated space for the treatment of clothes, with an area of 2.4m2, which results in a services sector with 7.3m2. It is an enclosed space, has no connection to other functional spaces, and presents the lowest value of integration of functional spaces. Located at one step from the entrance-hall, it is shallow from the exterior and from the living-room.

g) Private sector of the house

The bedroom is small. Equivalent to the smallest bedroom of the three-bedroom scheme, it remains smaller than the minimum area for a one-bedroom apartment. It is the deepest and less integrated space of the house. Privacy is created in the same manner as in larger apartment schemes, not showing particular concern with the different domestic experiences of smaller and larger families.





INTEGRATION

min. value	0.43
25th percentile	0.49
50th percentile	0.57
75th percentile	0.85
max. value	1.15

private sector

collective sector

services sector

FIGURE 8.27.
Pereiró, apartment scheme: plan and accessibility graph.

h) Relationships between sectors of the house

	living-room >	transition space >	kitchen >	exterior >	washroom =	bedrooms >	other space
integration	1.150	1.006	0.690	0.575	0.493	0.493	0.431
area	10.9m²	1.4m²	4.9m²	-	2.8m²	8.1m²	2.2m²
minimum area ratio	1.09	-	0.81	-	-	0.77	-
ideal area ratio	0.99	-	0.72	-	-	0.68	-
depth exterior	2	2	2	0	4	4	3
type-space	b	b	b	b	a	a	a
functional type-space	fb	fb	ff	ff	ff	fi	fa

TABLE 8.9. Pereiró, patial attributes of apartment scheme.

The accessibility graph of this apartment scheme translates into a simplified B1 type, where kitchen and living-room are not either directly or visually connected. Sectors are clearly defined: the collective sector has the largest values of integration, followed by the services and then the private sector, with a difference factor of 0.74. While the expected size of the family does not seem to be taken into account in the design of the apartment, except in the generally smaller areas of functional spaces, the bedroom becomes less integrated as it is disconnected from similar areas.



FIGURE 8.28. Central de Francos, surrounding city.

8.8. LAYOUT 30: CENTRAL DE FRANCOS

Today, Bairro Central de Francos is managed by the Company for Housing and Maintenance in Porto's Municipality (*Empresa de Habitação e Manutenção do Município do Porto - Domus Social,* DS). Porto's Municipal Archive stores the estate's architectural drawings, which contain the council's housing department's stamp.

a) Relation to the surrounding city

Layout 30, Bairro Central de Francos, is a large, low density estate located on the inside of Porto's inner radial, in the northwest of the city. Its 256 apartments are distributed in a 13 660m2 area, across 6 housing blocks organised around one central space. It is located in an old city cluster that was urbanised throughout the ninety-fifties and ninety-sixties with the development of Porto's industrial area and public housing estates in its vicinity and benefits, in result, from nearby retail and services. The layout is relatively well integrated at the global scale, connected to a high NaCh r=5000 axis and close to a central area of the city, having access to public equipment and transportation.

The layout is adjacent to the inner radial on one of its sides and to existing buildings on other two, creating street-frontage on the last, where buildings open directly to the main street grid. A connection is created to the opposite side of the lot and, while its local choice values are fairly low in relation to other layouts, it is relatively well locally integrated and its maze index is low, with only an average of 1.8 axial steps being needed to fully understand the layout.

b) Relations between collective spaces

While large-scale, the layout's configuration is simple. Three openings make the connection between exterior streets and a relatively shallow interior of the estate. This shallowness is accentuated by all spaces being distributed and in rings: all non-functional spaces are c or d-types and so accessible through more than one route. Convex spaces can on average be reached in 2.6 steps.

67% of convex spaces are constituted by buildings' entrances, the number of doors accessible through each varying between 3 and 5. Most entrances open to the central courtyard, which is composed by cemented pathways that lead to the buildings, organized around a central gardened area that contains a sports field and a smaller court. 4 entrances open directly to the main street. A prefabricated, unplanned space for the residents' association opens to a pathway connecting to the outside of the lot, facing the railway. The latter turns outwards and, shallow and visible from the exterior of the layout while poorly integrated within it, seems placed in such a way that it can serve the surrounding city. Conversely, the sports fields are located in the integration core of the layout, two steps away from the front-doors of buildings.

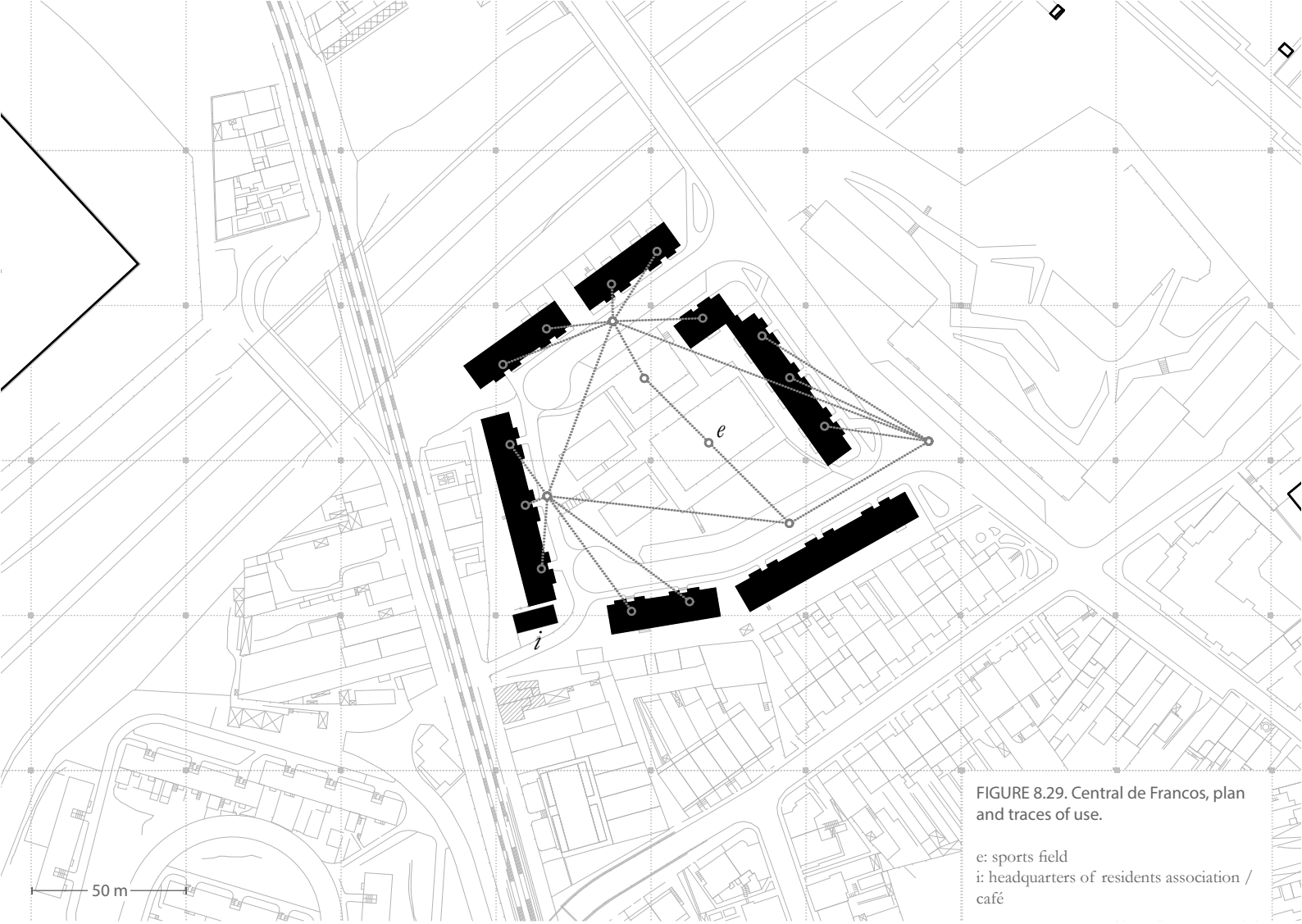


FIGURE 8.29. Central de Francos, plan and traces of use.

e: sports field
i: headquarters of residents association / café

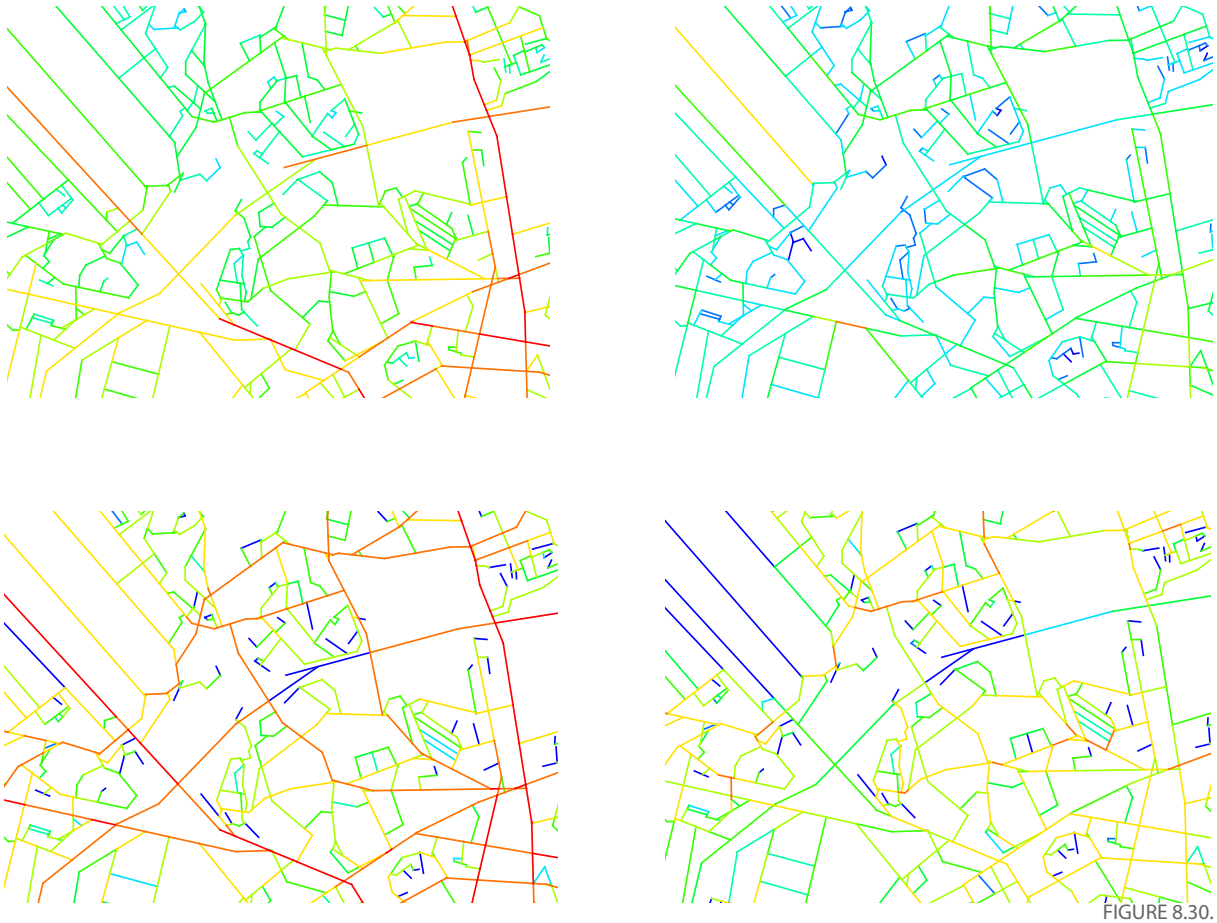


FIGURE 8.30.
Central de Francos, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

c) Relation to individual houses

Layout 30's separation index is above average for estates built between 1969 and 1982 in Porto, with residents having to move, on average, through a minimum of 2 and mean of 2.4 convex spaces in order to reach the exterior urban space. Houses are accessible through interior staircases serving 8 apartments, 2 on each floor.

d) Relationship of the house with the exterior

The apartment scheme of layout 30 is a small, 59.7 three-bedroom apartment, which corresponds to 65% of the minimum area as defined in chapter 3 and translates to a density of 14.9m2 per resident, when ideally occupied by as many people as the number of bedrooms plus one. It has a shallow configuration, where the deepest spaces are 3 steps away from the exterior.

e) Collective sector of the house

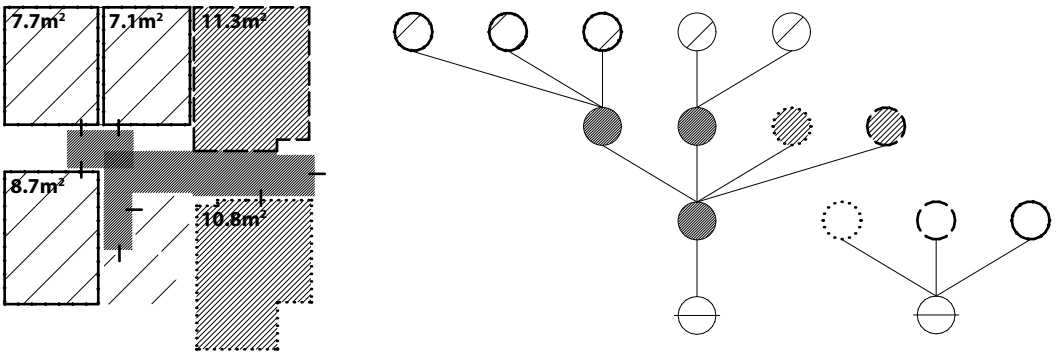
With 11.3m2, the living-room is the largest space of the house, while scoring bellow the ideal area for a three-bedroom apartment. It is a functional i-type that connects to the central transition corridor, and as such does not control accessibility to fixed-function spaces of the house.

f) Services sector of the house

Appearing similar to the apartment scheme of layout 4, the kitchen is located in front of the living-room and is, as such, one of the metrically closer spaces to the apartment's entrance. It connects visually to the collective area of the house and, as such, while one must step into the corridor to reach the living-room from the kitchen and the latter is, then, two convex spaces away from it, it is at axial depth 1. With an area of 10.8m2 The kitchen is larger than the required minimum, but includes in this area space for washing clothes.

g) Private sector of the house

While the apartment scheme is similar to that of layout 4, additional depth is created between the common and private areas of the house through the introduction of an L-shaped corridor for accessing bedrooms and wash-rooms. Bedrooms' areas are either close to or smaller than the minimum area.



INTEGRATION

min. value	0.70
25th percentile	0.82
50th percentile	0.95
75th percentile	0.95
max. value	1.88

private sector

collective sector

services sector

FIGURE 8.31.
Central de Francos, apartment scheme: plan and accessibility graph.

h) Relationships between sectors of the house

	transition space>	exterior =	kitchen =	living-room >	bedrooms >	washroom
integration	1.880	0.948	0.948	0.948	0.781	0.698
area	2.9m²	-	10.8m²	11.3m²	7.8m²	2.3m²
minimum area ratio	-	-	1.8	0.89	0.94	-
ideal area ratio	-	-	1.59	0.59	0.82	-
depth exterior	1.7	0	2	2	3	3
type-space	b	b	a	a	a	a
functional type-space	fb	ff	ff	fi	fi	ff

TABLE 8.10. Central de Francos, spatial attributes of apartment scheme.

The kitchen is does not provide direct accessibility to the living-room, from which it is separated by a clearly defined convex transition space, but both spaces are large and share the same transition space, to which the living-room establishes a frank connection. As such, if it cannot be said that there is a clearly defined collective pole, and the layout can be represented as a simplified accessibility graph B2, the collective and services sectors of the house are articulated, and privilege is assigned to these common spaces as they are the better integrated and occupy approximately 37% of the house's total useful floor area. Even though the central corridor is the better-integrated space, this collective-services set visually controls movement to and from the bedrooms, which may encourage the type of accidental-use that was suggested in chapter 4 to be associated with configurations where the living-room is located in between functional spaces. The private sector is small, scoring near the minimum area for bedrooms, and does not appear to encourage its use for individual activities that require space or extra furniture.

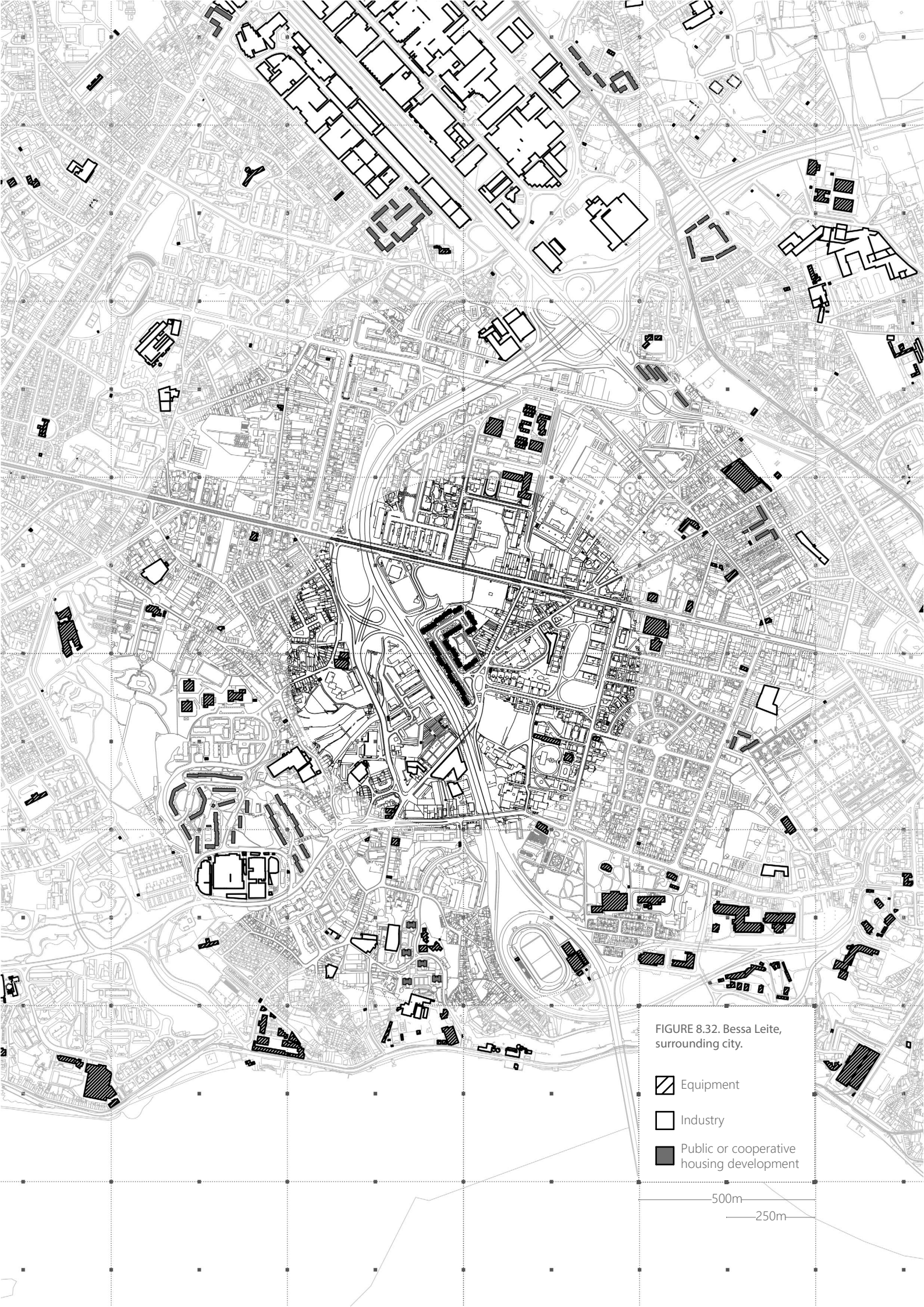


FIGURE 8.32. Bessa Leite, surrounding city.

8.9. LAYOUT 31: BESSA LEITE

Today, Bairro de Bessa Leite (layout 31) is managed by the Company for Housing and Maintenance in Porto's Municipality (*Empresa de Habitação e Manutenção do Município do Porto - Domus Social*, DS). Porto's Municipal Archive stores the estate's architectural drawings, which date back to as early as 1977 and contain the council's housing department's stamp.

a) Relation to the surrounding city

Layout 31 is a large estate, composed of 328 apartments in 7 housing blocks, organized in an around 47 000m2 lot. It is a low-density estate, allocating 52.6m2 of land per resident. It was built in a vacant lot adjacent to the inside of the inner radial of the city, close to the main east-west axis connecting the centre to the seaside, and displaying one of the largest average values of global integration of the studied cases. As a result, the estate benefits from public equipment and facilities in a 500m radius such as schools, the city's botanical garden and its main concert hall. It is within a 1000m radius from a public sports centre and Porto's contemporary art museum and park. Furthermore, marked by a large concentration of offices and residences, the area has plenty of retail and services, and public transportation providing good accessibility to the centre of the city, to the riverside and to the coast.

While both well-integrated globally and connected to axes with high potential for through-movement at the global scale, the layout is only averagely integrated locally and presents of the lowest values of local choice of the studied layouts. Furthermore, adjacent to the highway and partially hidden behind existing buildings, layout 31 has a very high maze index: when passing through exterior streets, people must, on average, take 3.8 turns in order to reach all spaces within the layout.

b) Relations between collective spaces

The interior of the layout is similarly deep, encompassing spaces that are, on average, around 3 steps away from each other. The estate is organized along an L shaped system of spaces to where entrances open, with a secondary gardened area being located in the back of the central buildings. As such, only 42% of the layout's spaces are constituted by front-doors. While all transition spaces are distributed and part of at least one ring, rings always include either the outside of the layout or the secondary pedestrian area. Spaces are distant from each other: the L shaped system that constitutes the integration core of the estate is at an average of around 2 steps from other spaces and of 1.8 to 2.8 from the buildings' interior.

Constituted spaces are sided by parking spaces, additional redundant sidewalks in some cases furthering the distance between buildings' entrances and the street. The system of redundant

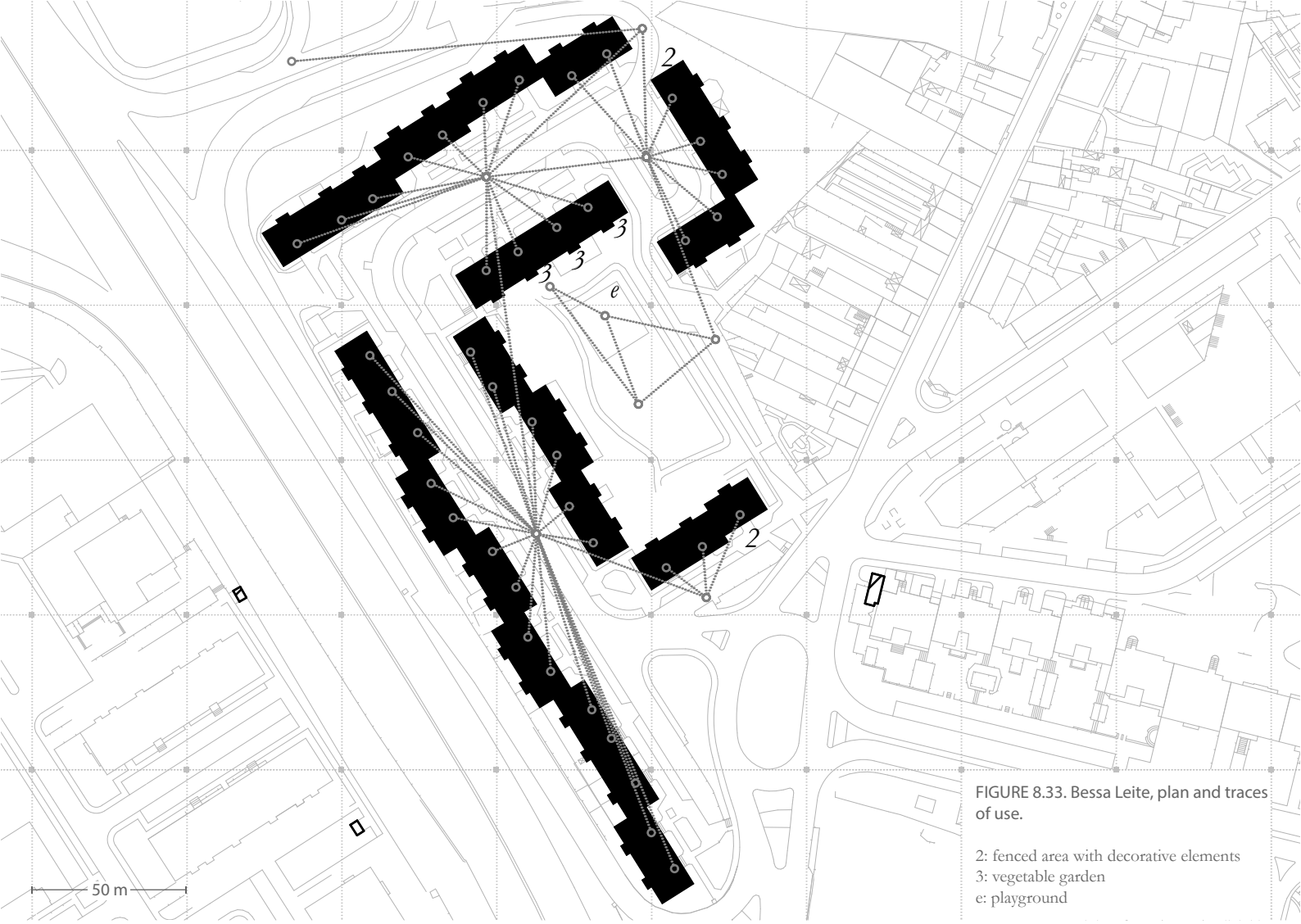


FIGURE 8.33. Bessa Leite, plan and traces of use.

2: fenced area with decorative elements
3: vegetable garden
e: playground

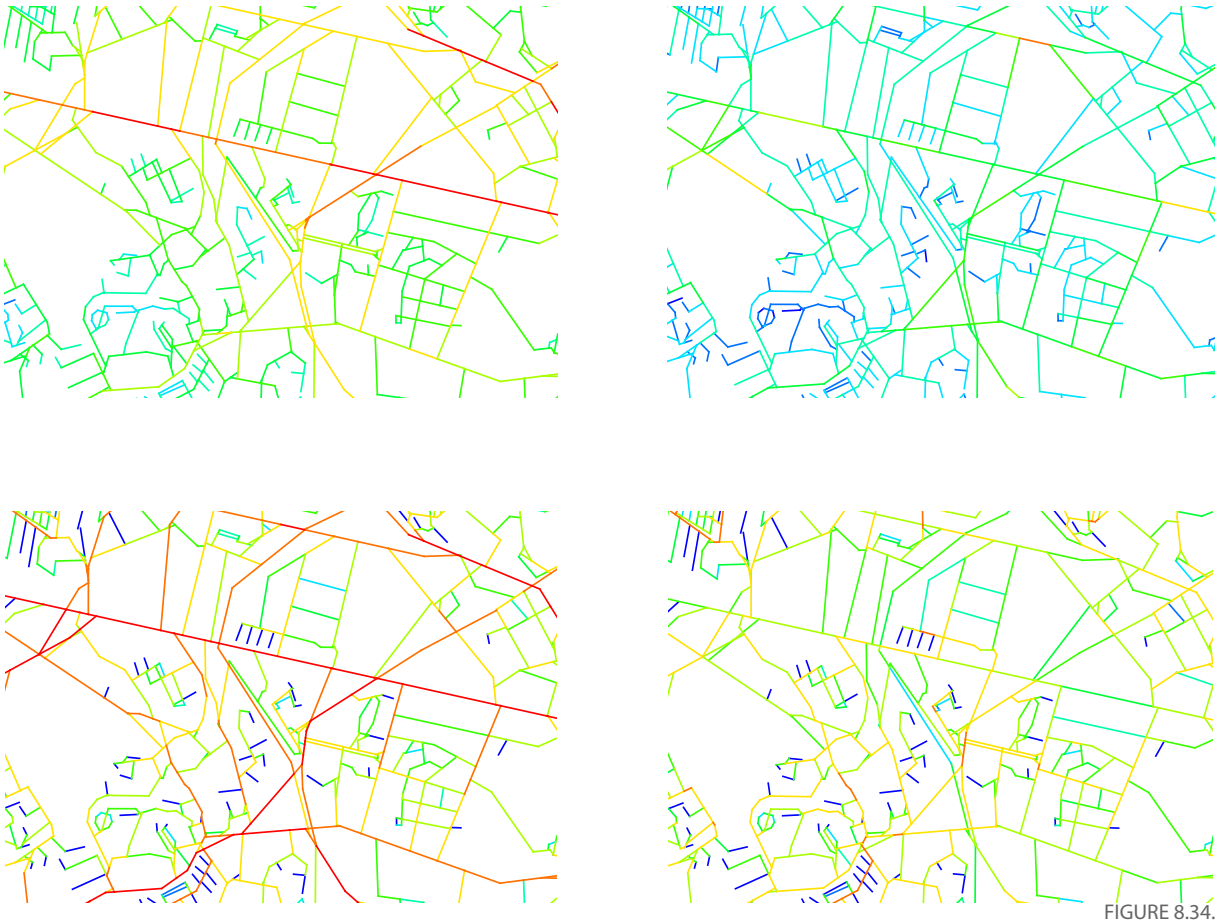


FIGURE 8.34.
Bessa Leite, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

sidewalks connects to the mostly pedestrian back of buildings, where a playground and a garden are located. If poorly integrated into the layout, 3 steps away from the nearest front-door, these spaces are invisible from its exterior and, surrounded by the estate's blocks, highly controlled by windows.

Vegetable gardens were registered in spaces adjacent to the backs of buildings in this large gardened area, as well as in the backs of buildings at the edge of the layout, where it turns towards a large vacant lot.

c) Relation to individual houses

Layout 31 has one main access point which controls traffic access to the entire estate, and two secondary entrances, one of which is pedestrian. As a result, its separation index is high, and residents are on average at a minimum of 2.5 and a mean of 3.8 steps from the exterior. Blocks are, on average, around 3 steps away from the others and share a large number of neighbours. Constituted spaces distribute from 14 to 18 families. Apartments are accessible through sets of internal staircases, serving two apartments per floor, eight in total.

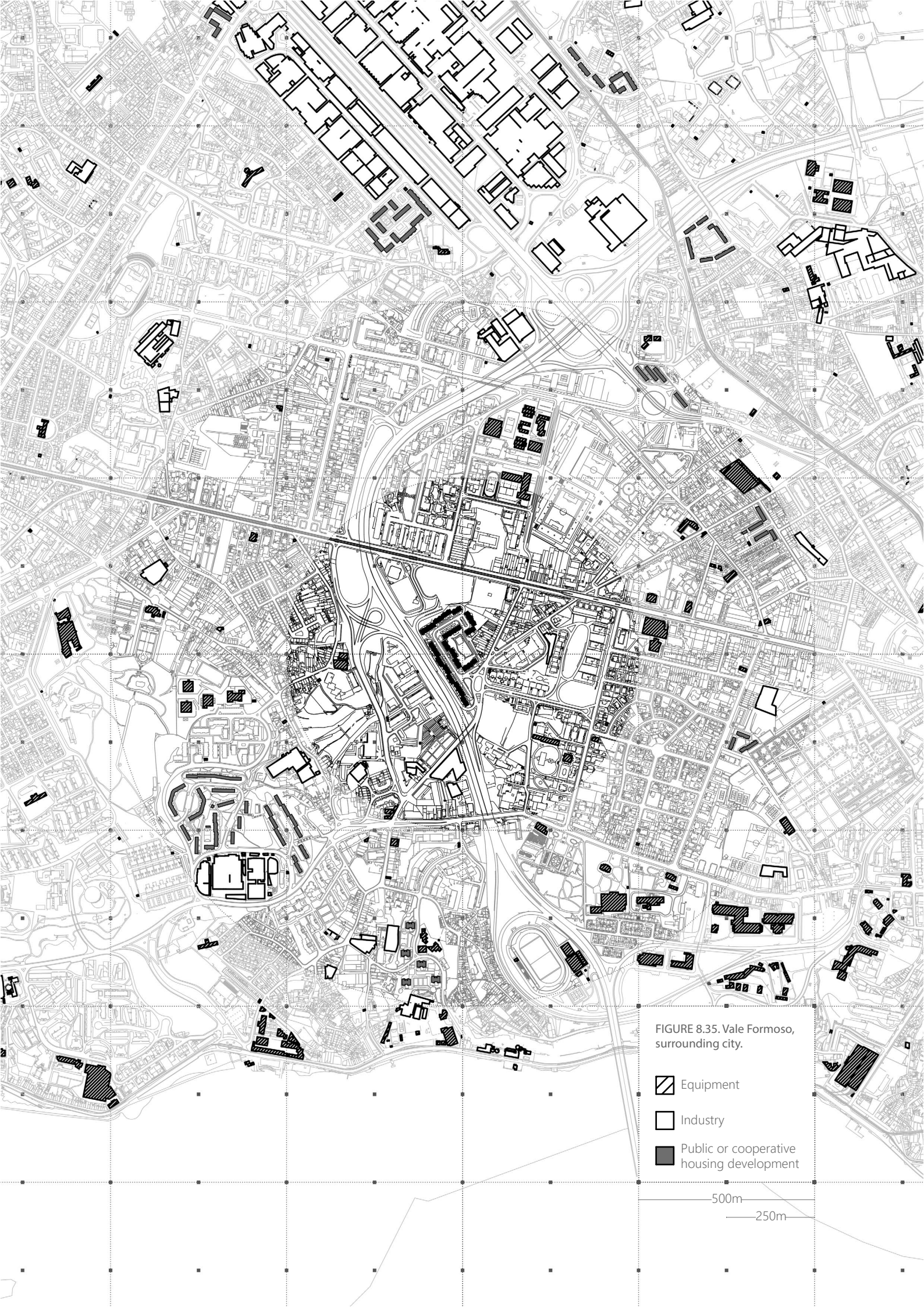


FIGURE 8.35. Vale Formoso, surrounding city.

8.10. LAYOUT 32: VALE FORMOSO

Today, Bairro de Vale Formoso (layout 32) is managed by the Company for Housing and Maintenance in Porto's Municipality (*Empresa de Habitação e Manutenção do Município do Porto - Domus Social*, DS). Porto's Municipal Archive does not store architectural drawings of the estate.

a) Relation to the surrounding city

Layout 32 occupies nearly one third of the area of the second smallest state layout (33), and, with 64 apartments, is one of the few layouts with less than 10m2 of land per resident. Adjacent to layout 7 to the west and to the old street axis that connects to layout 23 on the right, it is has particularly large values of integration, and is one of the better-integrated estates across programmes. While layout 7, the better integrated of PMCP estates, was simultaneously well-integrated but removed from the from the main city grid, layout 32 connects to the city fabric where the first does not. Additionally, it is the first layout where all buildings' entrances open directly to the sidewalk, without any spatial mechanisms differentiating the building from others in its relation to the street. Even though the smaller of the two buildings does not connect to a main street, but to one that integrates the effectively cul-de-sac ring that is layout's 7 configuration, this layout still presents the lowest maze index of all cases.

b) Relations between collective spaces

In layout 32, the ambiguous relation to the street that characterised earlier post-revolutionary public estates is abandoned. The design does not seek to open towards the main city grid while simultaneously creating spaces of collective potential that are interior to the layout itself. Instead, the idea of the estate as a neighbourhood-unit seems to be abandoned, and the layout presents no collective areas. The soft-landscaped area in between the two buildings, due to its topography, seems unlikely to be used in this sense.

c) Relation to individual houses

Most of the buildings' entrances are at depth one from the street, with the very low separation index of 1.33. Like in other public layouts, the entrances open to a staircase that connects two apartments on each floor, eight apartments total.

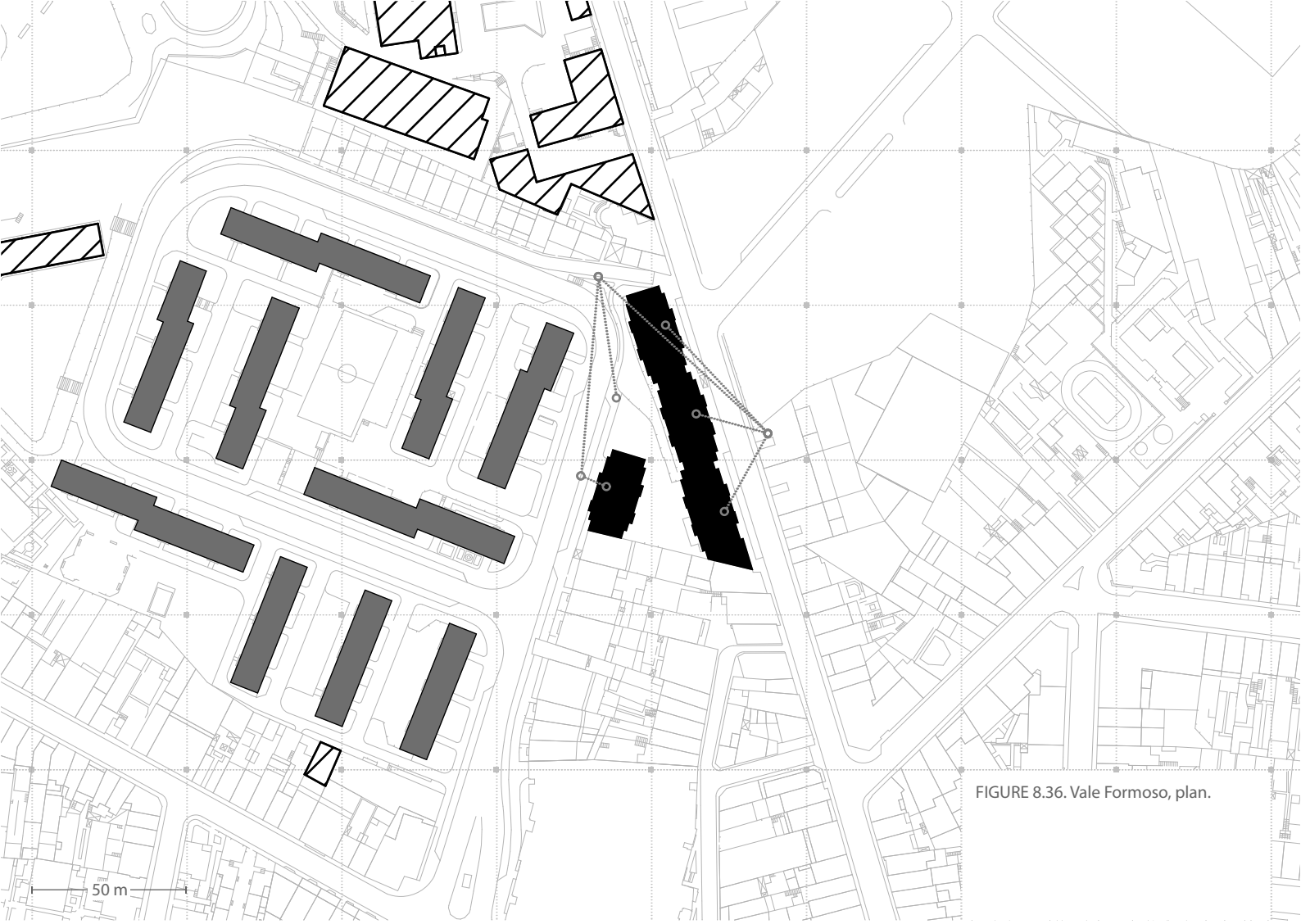


FIGURE 8.36. Vale Formoso, plan.

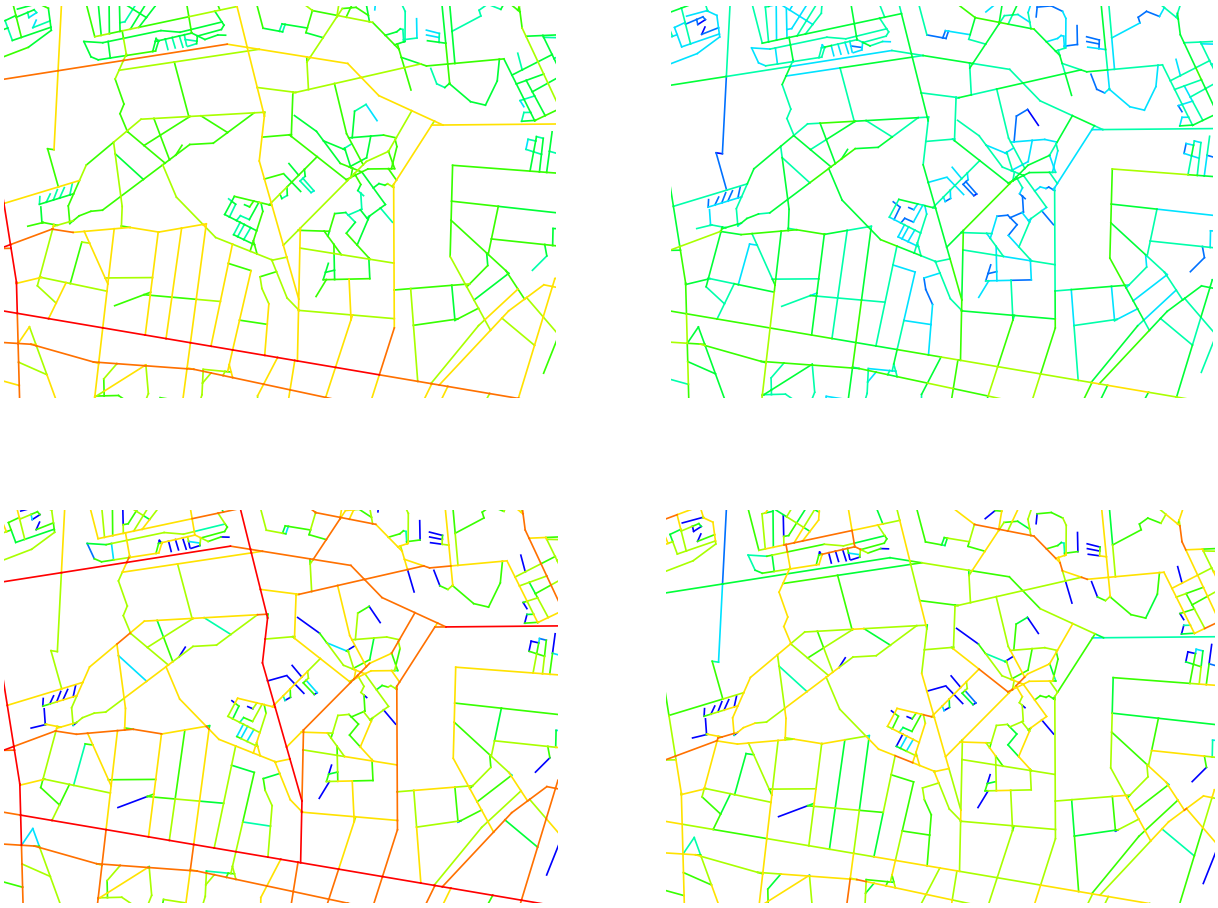


FIGURE 8.37.
Vale Formoso, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

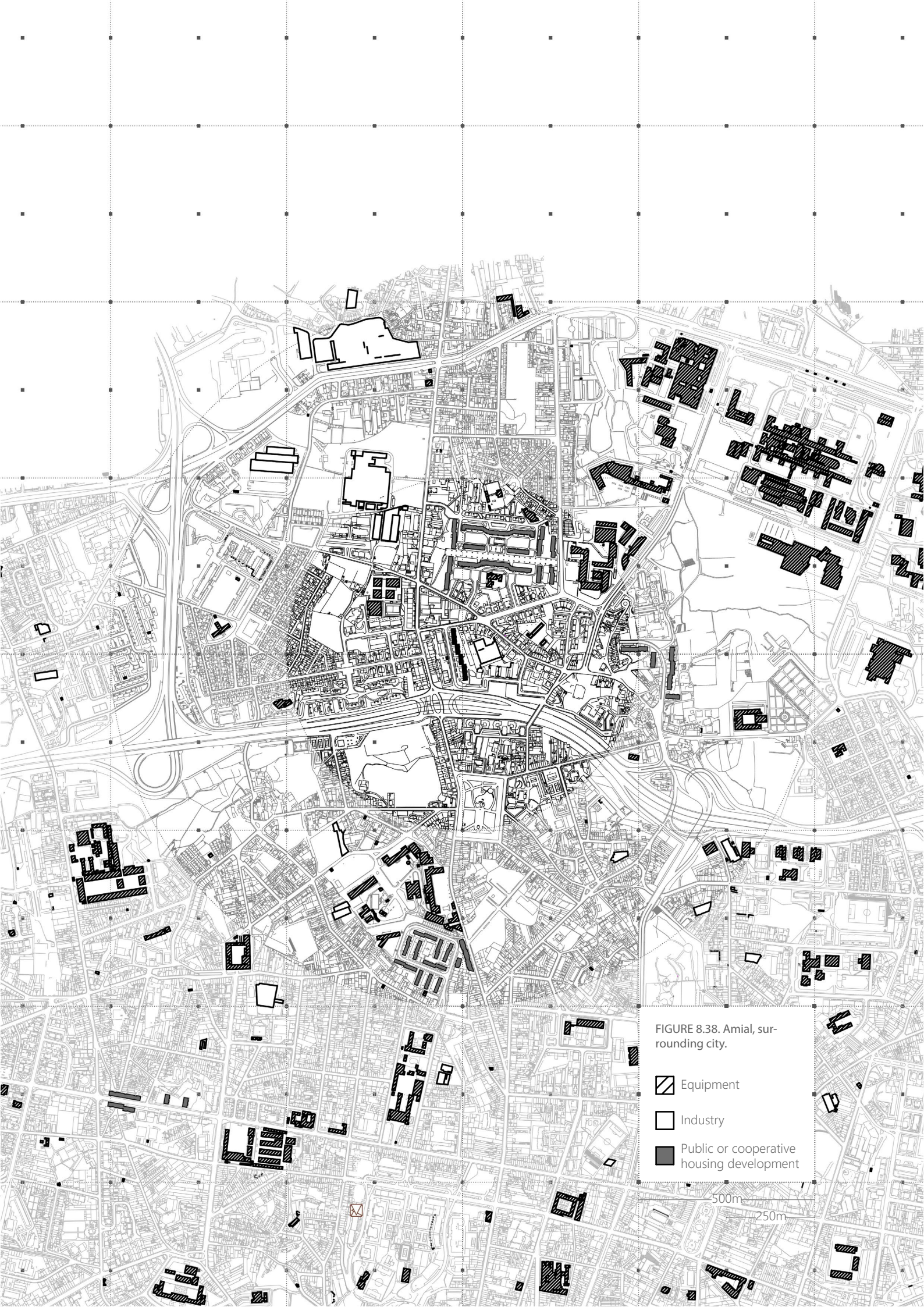


FIGURE 8.38. Amial, surrounding city.

8.11. LAYOUT 33: AMIAL

Today, Bairro do Amial (layout 33) is managed by the IHRU. Its documents state the estate was built in 1983. Porto's Municipal Archive stores the estate's architectural drawings, which contain the council's housing department's stamp and date from as early as 1977.

a) Relation to the surrounding city

Layout 33, with an area of around 10 000m2 and 80 apartments, is larger than layout 32 but still considerably smaller than previous layouts. It is located to the south of layout 23, in a lot touching the inner radial of the city, similarly benefiting from the local retail and services located on the high-choice axis leading out to the northern councils, but integrated in a mainly residential area. While presenting a lower than average local integration (mean NaIn(r800)=0.85), the layout turns outward, turning directly to a street characterized by average NaCh values, but one step away from high-choice axes. If layout 33 seems to follow the shift detected in layout 32 regarding the construction of neighbourhood-units connected to social housing, its relation to its surroundings is more ambiguous. Made up of one or a series of four adjacent blocks, the estate turns outwards towards the street, and all of its front-doors are one topological step away from it. However, small gardened areas are located in front of the building, separating it from the main sidewalk so that an extra turn must be taken in order to reach the doors, and, where the building moves deeper inside the block, a system of redundant sidewalks exists.

b) Relations between collective spaces

The estate faces the street and, as such, depth measures regarding the system's relationship with the exterior city grid are low. However, they reflect the existence of a hard-landscaped space of collective potential in the back of the buildings, which may have held a playground. Less integrated in the urban grid than layout 32, layout 33 also seems to differentiate itself from its surroundings more clearly, resulting in a more likely understanding by the residents of who their neighbours are. In the small entrance spaces in front of the buildings, benches and chairs were sometimes detected.

c) Relation to individual houses

Buildings are on average 1.5 steps away from the street and 4.5 steps away from the space of collective potential in the back.

This layout shares the apartment scheme described in section 5.3.4., concerning Bairro de Paranhos (layout 26, page 311).



FIGURE 8.39. Amial, plan and traces of use.

1: fenced area with barbecue and children's swimming pool
1/2: fenced area with chairs and decorative elements
2: fenced area with decorative elements
4: informal clothes' hangers

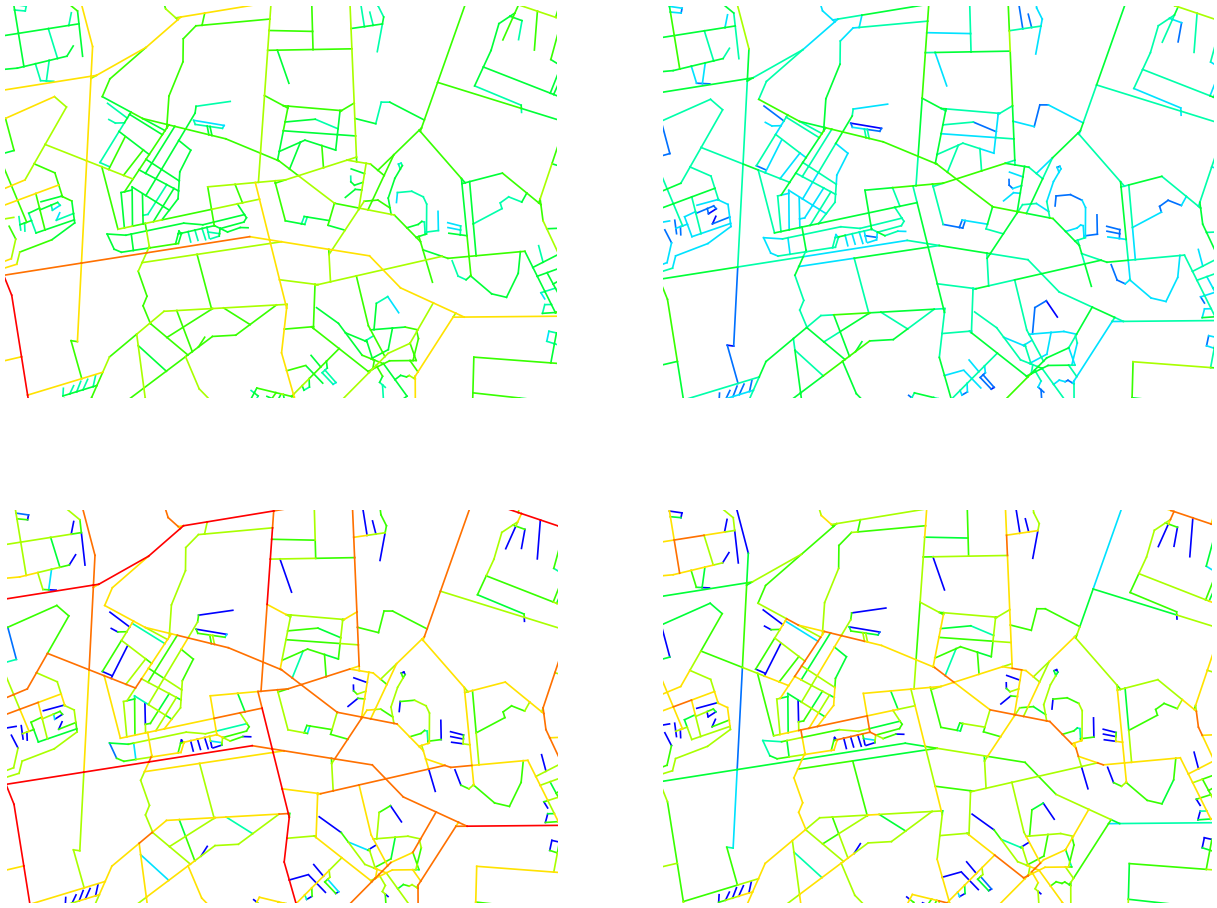


FIGURE 8.40.
Layout 33's urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.



FIGURE 8.41.. Santo António das Antas - Martim Moniz, surrounding city

8.12. LAYOUT 36: SANTO ANTÓNIO DAS ANTAS - MARTIM MONIZ

a) Relation to the surrounding city

Layout 36 is a small cooperative development with around 30 apartments, averagely integrated in the urban system in a low-density area of the city, and is situated in an axis with a high probability of through-movement, with local and global NaCh values in the 7th and 8th deciles. Located to the northwest of the city, between the outer and inner radials, the layout is around 2km away from the seaside and is down-the-street from the main urban park. This area is mostly residential, providing some retail and services, there are nearby schools and leisure spaces.

Even though the layout occupies the front of its lot, the narrow sidewalk widens in front of the residential building. The distinction between this space and the sidewalk is achieved through the use of different materials, both integrating the same convex space. As such, the layout has a low maze index of 1.14.

b) Relations between collective spaces

The layout does not include any explicitly collective spaces. With only two entrances and a parking space behind the building, this layout displays particularly low values in all depth measures. The wider sidewalk at the front is the better integrated space of the layout, contrasting with the deeper - both from the exterior and from the system itself - parking lot in the back.

c) Relation to individual houses

The interior of the residential building that composes the layout is divided in two, each entrance having a staircase which connects 8 apartments, 2 by each floor. Dwellings' entrances are separated from each other by 2 steps, with the same exterior space controlling access to both and the back of the building.

d) Relationship of the house with the exterior

The three-bedroom apartment type of layout 36 has a total useful area of approximately 106m2, resulting in a density of 26.5m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. The apartment scheme is shallow from the exterior; the deepest spaces are bedrooms, at 3 steps from the front-door. Depth from the exterior is divided into two: the collective and services sector are at depth 2 from the exterior and connect directly to the entrance hall, the private sector organises around a corridor at depth 2 from the exterior. The layout includes a dedicated space for the treatment of clothes, allowing for domestic work to be conducted inside the home. The house has larger areas than the ideal defined in Portas (1969), allowing for the performance of activities that may require specific equipment or furniture.

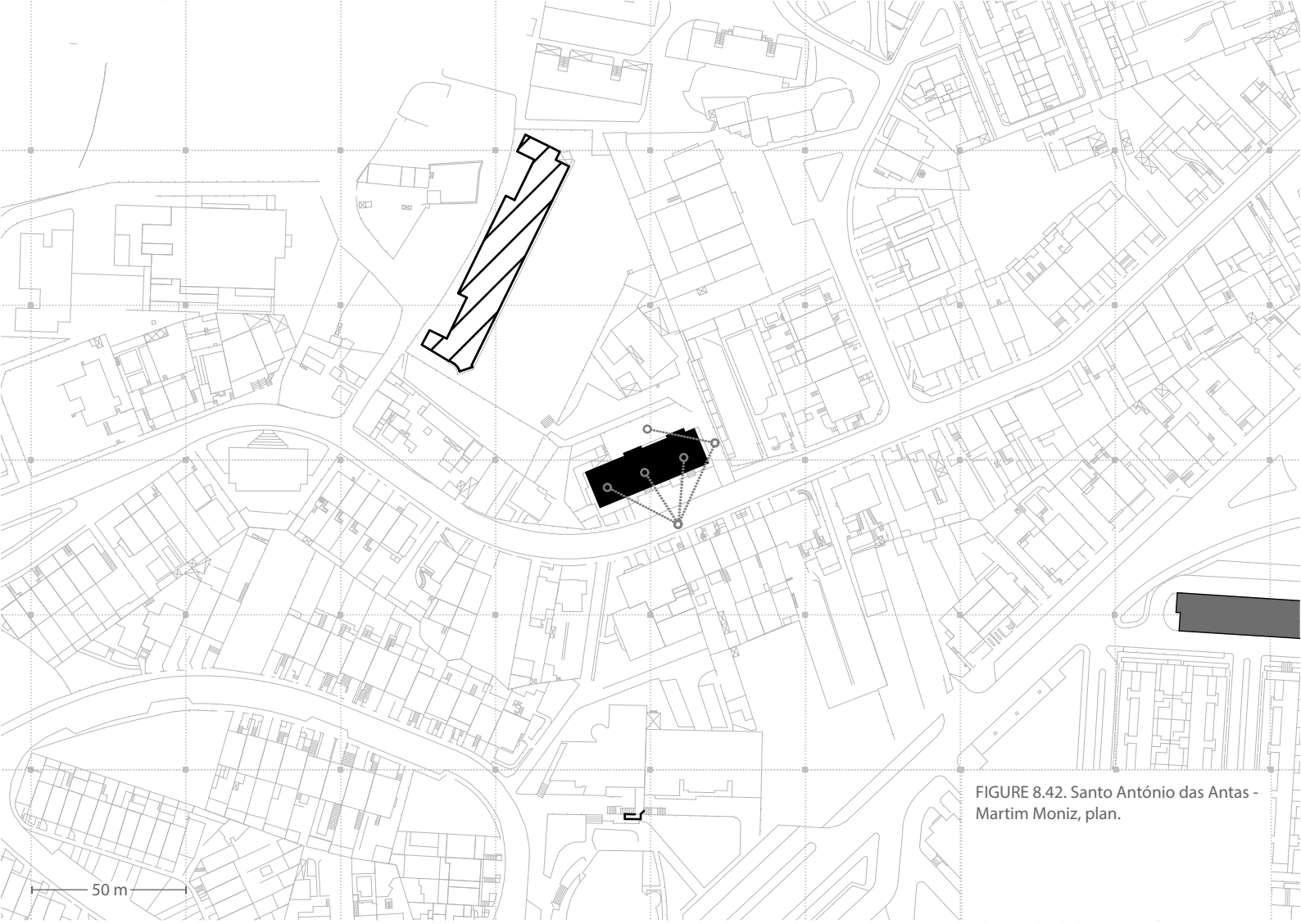


FIGURE 8.42. Santo António das Antas - Martim Moniz, plan.

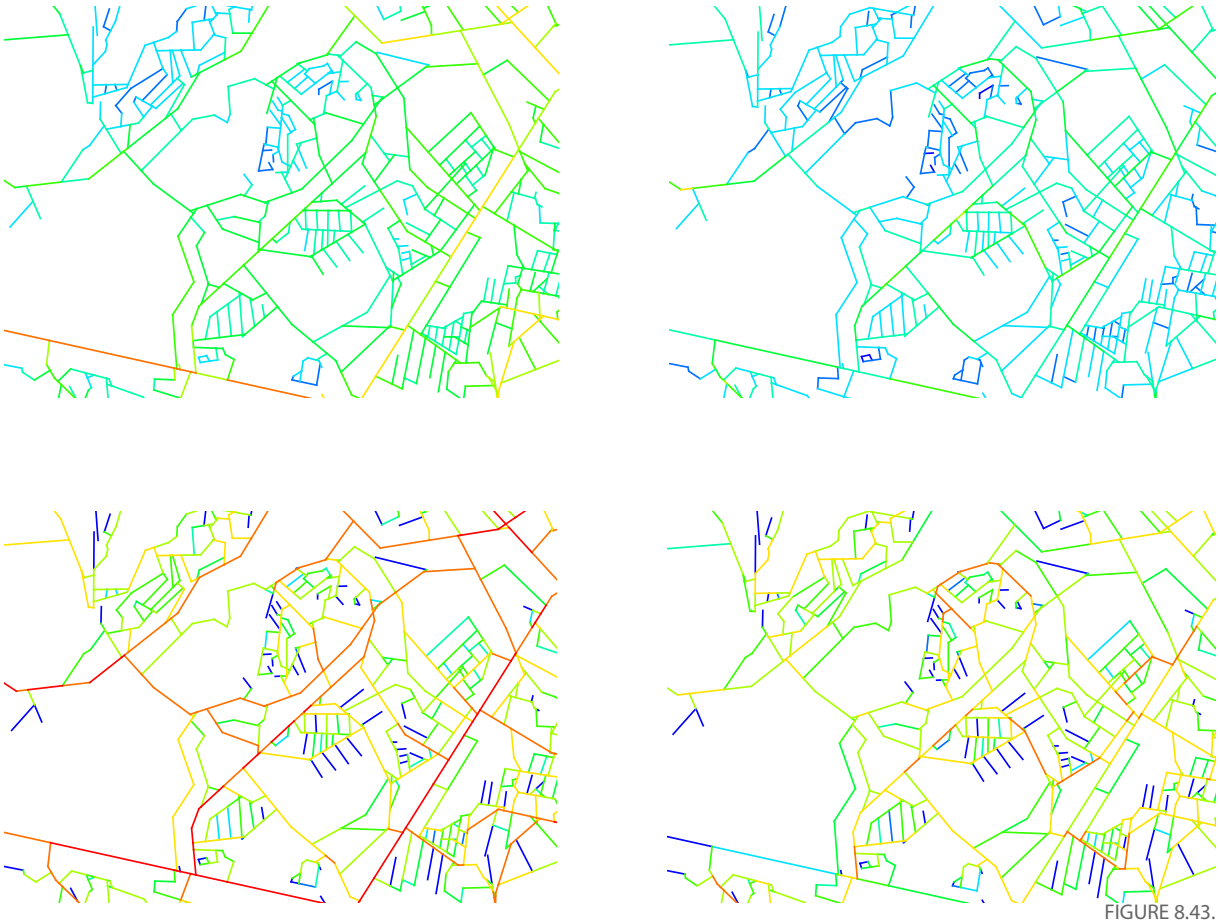


FIGURE 8.43.
Santo António das Antas - Martim Moniz, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

e) Collective sector of the house

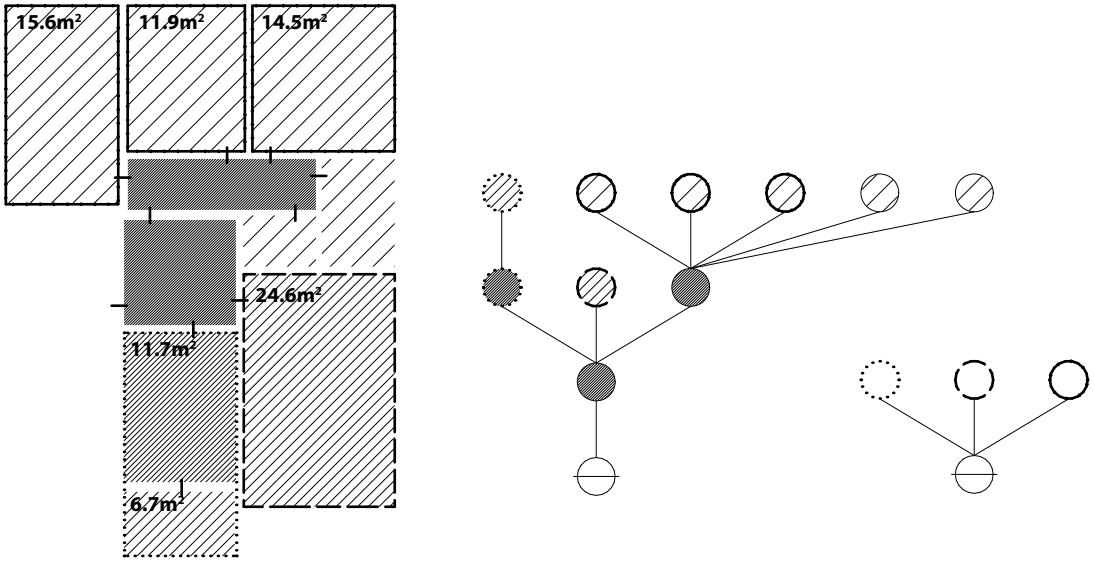
The collective sector comprises one 24.6m2 living-room, which complies both with the minimum and ideal areas seen in chapter 3, and is the largest space of the house. It is an enclosed space, separate from the services sector, and does not control access to any areas of the house.

f) Services sector of the house

The kitchen has an area of 11.7m2, well above both the minimum and ideal areas, and articulates with a space for the treatment of clothes with an area of 5m2, which results in a services sector with 16.5m2. While large, it is an enclosed space and has no connection to other functional spaces. Located at one step from the entrance-hall, it is shallow from the exterior and from the living-room.

g) Private sector of the house

Bedrooms have areas above the ideal defined in Portas (1969), large enough for the comfortable introduction of furniture supporting activities of individual development. They are the deepest spaces of the house, with privacy assured through the introduction of a corridor that separates them from the entrance hall.



INTEGRATION

min. value	0.57
25th percentile	0.69
50th percentile	0.78
75th percentile	0.87
max. value	1.49

private sector

collective sector

services sector

FIGURE 8.44.
Santo António das Antas - Martim Moniz, apartment scheme: plan and accessibility graph.

h) Relationships between sectors of the house

	transition space >	kitchen >	living-room >	bedrooms =	washroom >	exterior
integration	2.433	1.106	1.020	0.948	0.948	0.885
area	6.7m²	11.7m²	24.6m²	14m²	4.05m²	-
minimum area ratio	-	1.95	2.05	1.64	-	-
ideal area ratio	-	1.72	1.37	1.44	-	-
depth exterior	1	2	2	3	3	0
type-space	b	c	c	a	a	b
functional type-space	fb	ff	fd	fi	ff	ff

TABLE 8.11.
Santo António das Antas - Martim Moniz, spatial attributes of apartment scheme.

The accessibility graph of this apartment scheme translates into a simplified B2 type, where kitchen and living-room are not either directly or visually connected. Sectors are clearly defined, but functional spaces share very similar values of integration, inferior to the that of transition space.



FIGURE 8.45. SACHE, surrounding city.

8.13. LAYOUT 37: SACHE

a) Relation to the surrounding city

One block apart from layout 36, layout 37 is located further into an area composed mainly by public or cooperative housing. It remains in the proximity of some, if scarse, local retail and services, of schools and of leisure spaces such as the main city park, which were all either existent or planned at the time of the estate's conception. Nevertheless, it is one of the better integrated housing cooperatives at all scales, and is, similarly to layout 36, associated to a high choice axis. The studied building is only the first phase of a 3 phases development, whose project started in 1979 and was finalized in 1998.

Similarly to other small-scale cooperative housing layouts, the development consists of one single building but, unlike other cases, it does not open directly to the street. Instead, a redundant sidewalk, separated from the main circulation system by a small gardened area. As most commonly observed in council estates, n alternate pedestrian system of pathways is created around the single residential block. The simplicity of this system is reflected in the low maze index of 1.5, indicating that the spaces that conform it are all lbetween 1 and 2 steps away from the main city grid.

b) Relations between collective spaces

Around the building there are hard-landscaped spaces that give access to individual garages and exterior parking spaces. Separated by a steep difference in heights, the two spaces in the front and the two spaces in the back are only connected by a staircase. Consequently, their use as an alternate route for traffic is hindered, protecting the balconies that turn inwards, and making these spaces function mainly as accesses to the interior of more recently developed phases.

A coffee shop is located the centre of the building block, at the higher level of these two spaces, in the most integrated space of the system. As the differentiation of the building from its surroundings, the inclusion of functional collective spaces is uncharacteristic of small-scale cooperative housing. With the functional spaces at its centre - the front and back entrances to the residential building and the coffee shop - separated by less than 2 steps, the convex system works as a ring the convex system works as a ring where spaces are at a mean depth of 2.73 steps from all others.

Besides the tables and chairs on the terrace in front of the coffee-shop, no traces of use were detected in exterior spaces during visits. The circulation system around the building is mostly occupied by cars.

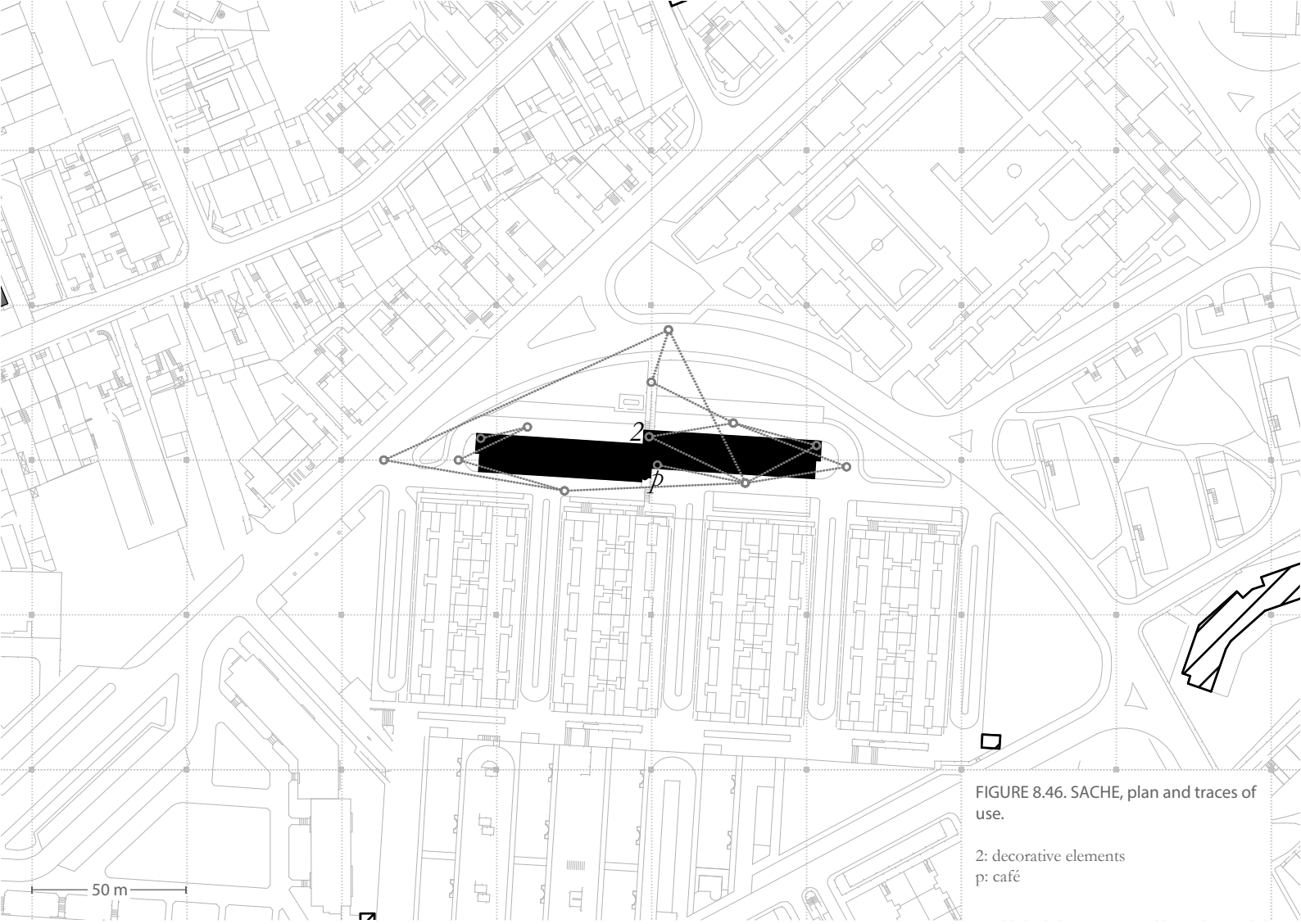


FIGURE 8.46. SACHE, plan and traces of use.

2: decorative elements
p: café

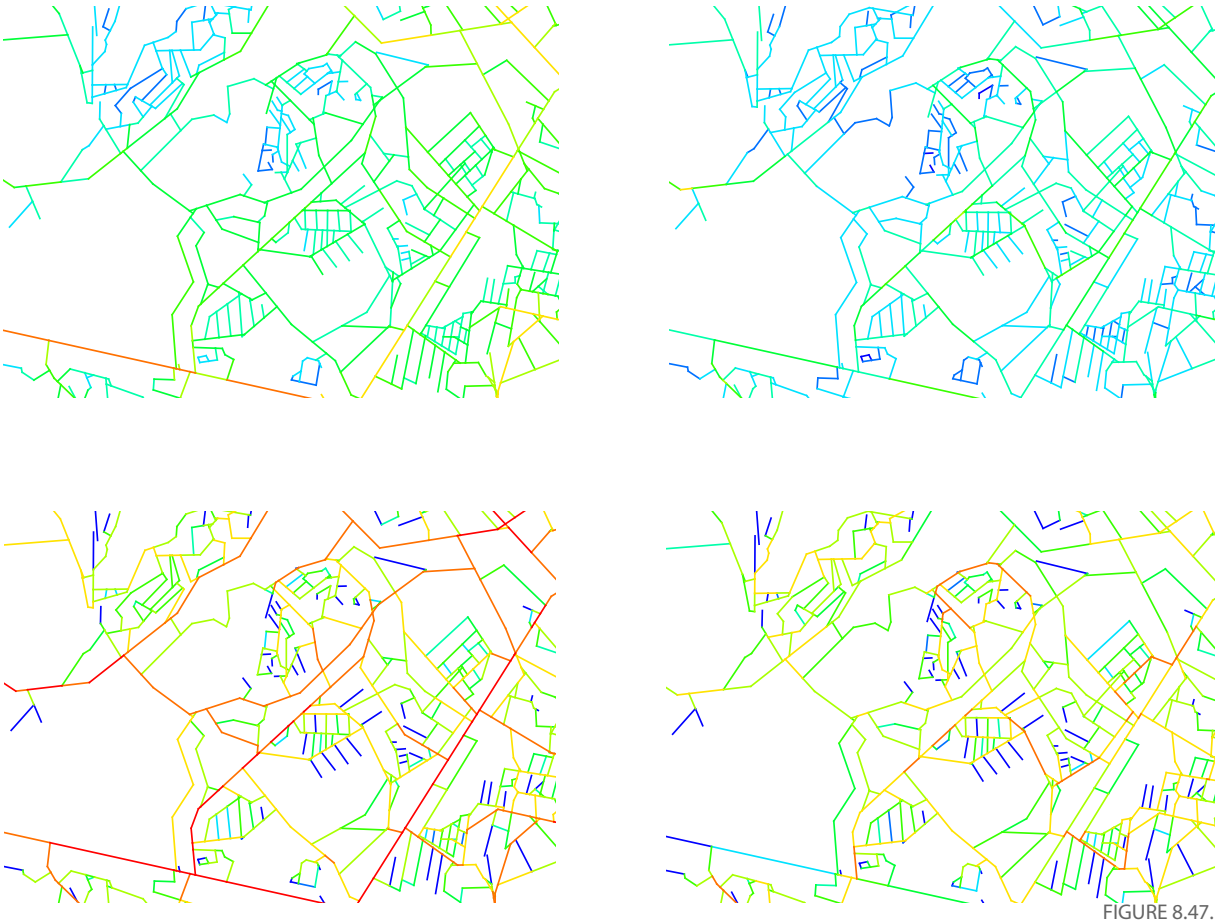


FIGURE 8.47.
SACHE urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

c) Relation to individual houses

Circulation within the building is achieved through longitudinal open-air corridors, facing the front. There is a staircase at the centre, accessible both through the front and the back of the building, and one on each end. As such, assuming shortest routes, 4 to 8 families are likely to cross in each corridor.

d) Relationship of the house with the exterior

Layout 37's apartment scheme has an area of approximately 90m2, which corresponds to 22.5m2 per resident and exceeds minimum area requirements. It is a deep apartment scheme where spaces are at an average of 3.4 steps from the exterior, but functional spaces are not deep from the exterior. The complex configuration of the apartment scheme, whose spaces are split by differences in height in the interior of the house, results in functional spaces with ambiguously defined limits that include both shallow areas, connected to the apartment's entrance, and deep areas, closer to the bedrooms.

e) Collective sector of the house

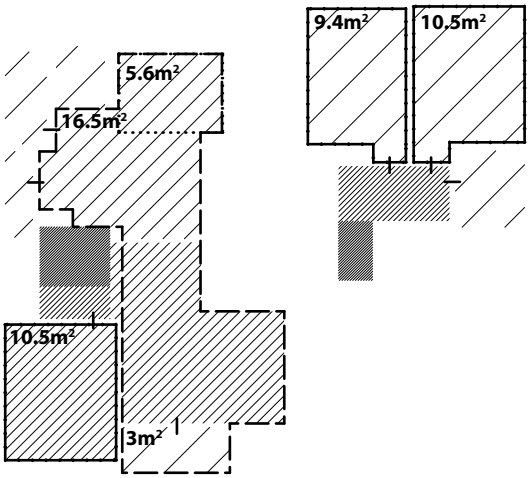
The ground floor articulates different, but accessible and visual connected, spaces, which make up the collective sector of the house. The living room is broken into two convex spaces at different heights. The first connects to the entrance of the apartment and controls access to all other areas of the house. The other opens to a 3m2 balcony and is at a convex distance of one step from the staircases that connect to the upper floor. Combined, the two parts have an area of 16.5m2, larger than required for three-bedrooms apartments.

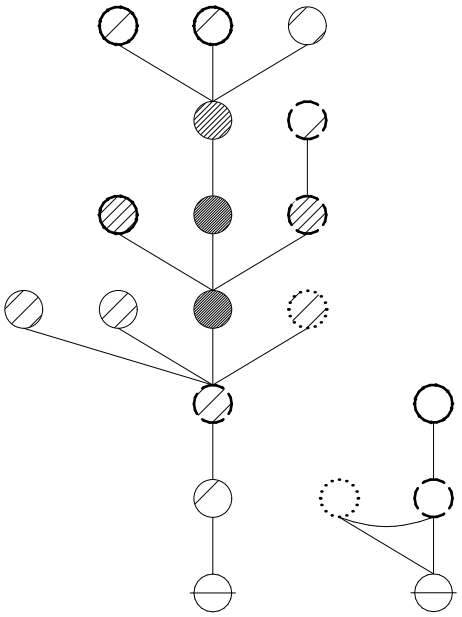
f) Services sector of the house

With 5.6m2, the kitchen is smaller than the minimum required area. However, it has an ample connection to the living-room that assigns it some visual control over the access from the exterior to the interior of the house, promoting potential interaction between household members using the kitchen and the rest of the family.

g) Private sector of the house

While there is a well-defined private sector, which located on the upper floor of the house, is the deepest and least integrated, a functionally ambiguous room exists in the middle floor, 2 steps away from the deepest living-room. Bedrooms' areas approximate ideal areas.





INTEGRATION

min. value	0.64
25th percentile	0.67
50th percentile	0.69
75th percentile	0.93
max. value	1.15

private sector

collective sector

services sector

FIGURE 8.49.
SACHE, apartment scheme: plan and accessibility graph.

h) Relationships between sectors of the house

	transition space >	living-room >	kitchen >	exterior >	bedrooms >	washroom >	exterior space
integration	1.124	0.772	0.694	0.676	0.657	0.638	0.613
area	3.4m²	11.2m²	5.6m²	-	10m²	2.7m²	3m²
minimum area ratio	-	1.5	1.08	-	1.24	-	
ideal area ratio	-	1.17	0.83	-	1.06	-	
depth exterior	3	2	2	0	5.3	3.3	5
type-space	b/c	c	c	b	a	a	c
functional type-space	fb	fd	ff	ff	fi	ff	fd

TABLE 8.12. SACHE, spatial attributes of apartment scheme.

Sectors are not clearly defined in layout 37's apartment scheme. Functional spaces with collective potential have ambiguous limits and there exists a social pole that includes the kitchen. This collective sector is a functional b-type space which organises access to the private areas of the house, and incorporates its better-integrates spaces. An enclosed room exists in a different floor from the other two bedrooms. While the apartment scheme is deep, it only has 2 clearly defined transition spaces: the staircase and the bedrooms' hall.

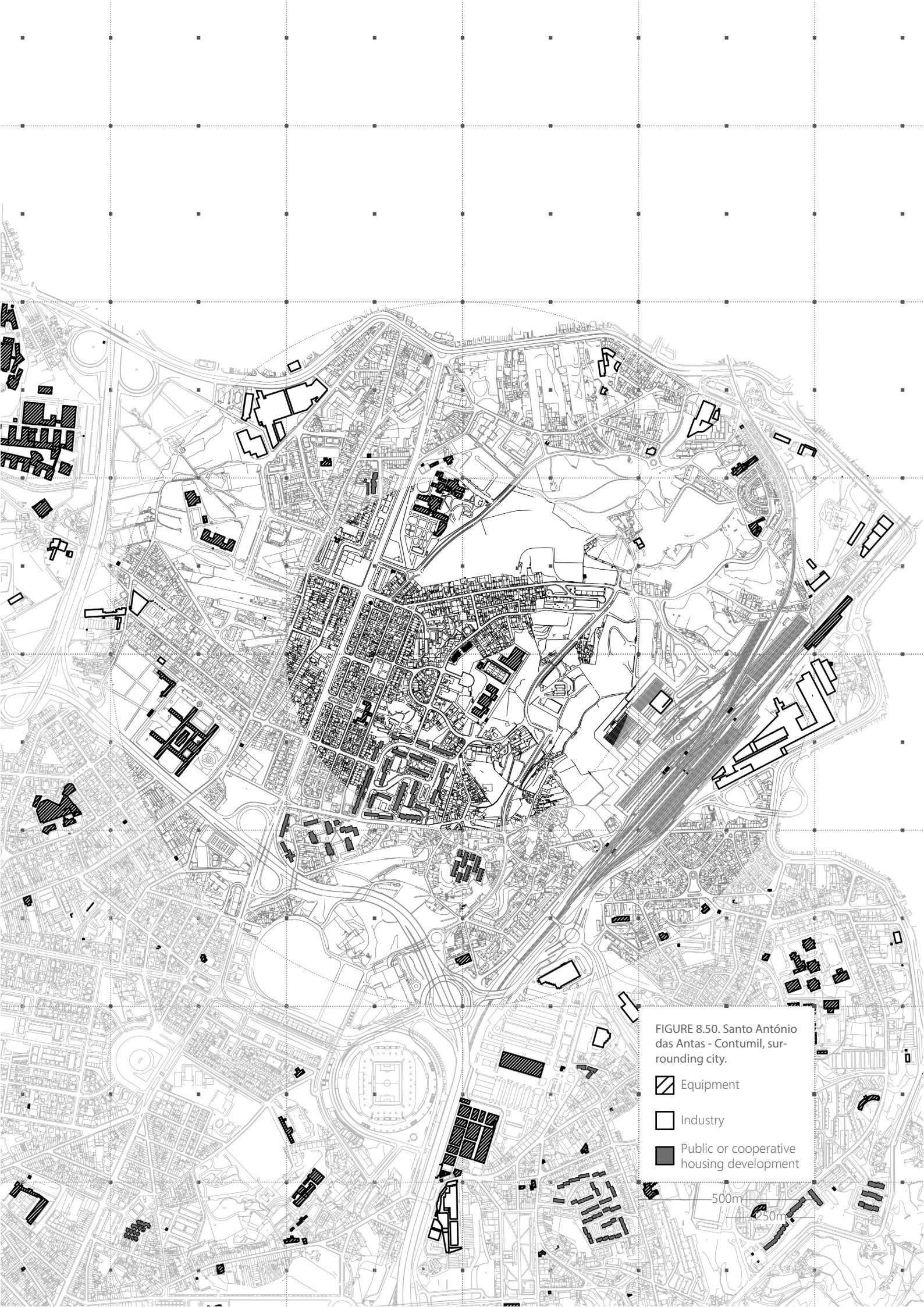


FIGURE 8.50. Santo António das Antas - Contumil, surrounding city.

8.14. LAYOUT 38: SANTO ANTÓNIO DAS ANTAS - CONTUMIL

a) Relation to the surrounding city

Layout 38 is located on the same axis that permeates through layout 9. In a mainly residential area, it sits in close proximity to an economic housing development from the 1930s and an estate from the first phase of the PMP. Similarly to the earlier layout 9, the housing cooperative has access to nearby local retail and services, but not in abundance, and other urban infrastructures as provided by the nearby housing developments. Weakly integrated in relation to other housing developments at the global scale, the small layout is better locally integrated than most (NaINr5000m=0.77, NaInr800m=1.092). Occupying the front of its lot, it also presents larger values of choice than most other layouts. However, even though it is located at the front of the lot, the residential buildings do not open directly to the street. Instead, a short wall separates the sidewalk from an interior circulation system. Nevertheless, most of the system can be understood from the main street and the maze index is low (mi=1.46).

b) Relations between collective spaces

Similarly to what was verified in layout 37, layout 38's residential buildings are surrounded by a system of spaces that differentiates them from their surroundings, standing as two independent buildings. This system functions at two different heights, following the street at the front, and going down one floor on the back. As such, the two central hard-landscaped areas HL9 and HL10 are effectively two separated convex spaces. The integration core of the layout lies on its exterior. Its shallowness in relation to both buildings and to the street, with which it also establishes a visual connection, assigns to it some potential for collective use. It is, however, a functional type-i space, existing independently of functional spaces. Because the gates between the street and the interior of the layout are placed directly in front of the buildings' entrances, residents do not have to cross this space in the course of their daily lives.

c) Relation to individual houses

Due to the differentiation between an system of collective spaces interior to the layout from the system of public spaces that composes the urban grid, the separation index is higher in layout 38 than in other small scale cooperative housing layouts. Each entrance connects to a staircase that serves 8 apartments, 2 per floor.

d) Relationship of the house with the exterior

The three-bedroom apartment scheme of layouts 37 and 38 has a total useful area of approximately 121m2 m2, resulting in a density of 30.25m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. The apartment's maximum depth

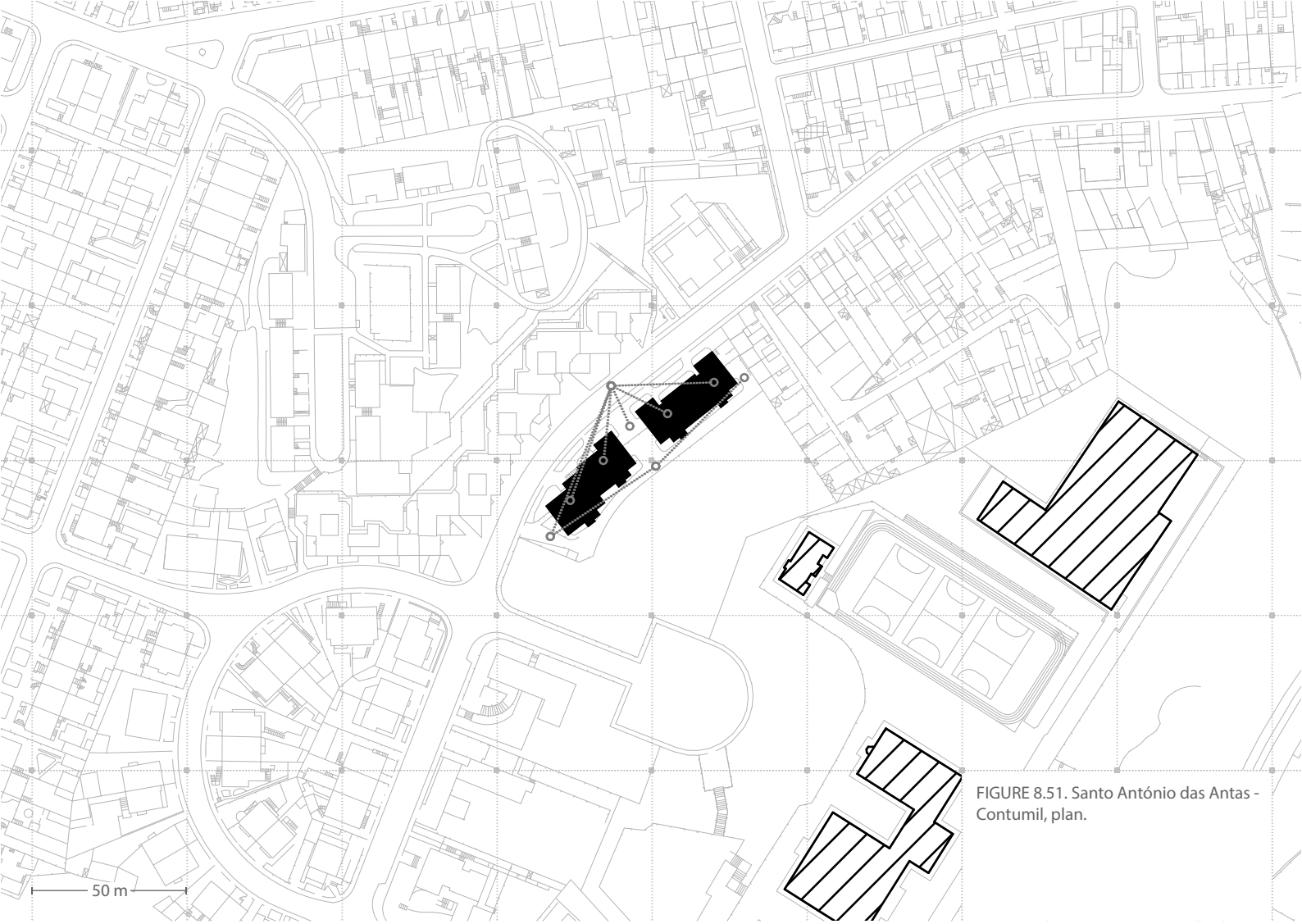


FIGURE 8.51. Santo António das Antas - Contumil, plan.

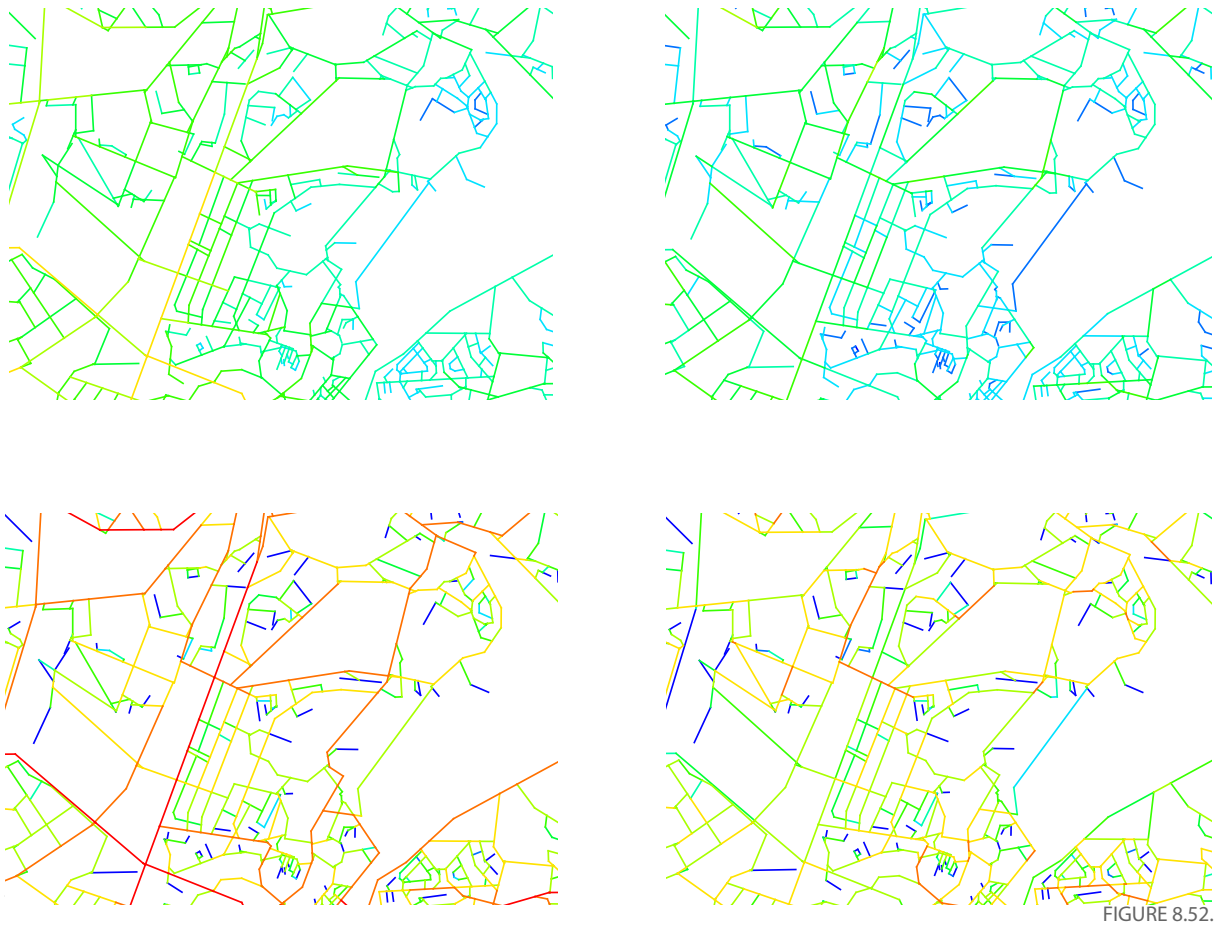


FIGURE 8.52.
Santo António das Antas - Contumil, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

from the exterior is 4, corresponding to bedrooms and washrooms. Depth from the exterior is divided into two: the collective and services sector are at depth 2 from the exterior and connect directly to the entrance hall, the private sector organises around a corridor at depth 3 from the exterior. An additional corridor makes the transition between the entrance hall and the bedroom's corridor. The layout includes a dedicated space for the treatment of clothes, allowing for domestic work to be conducted inside the home. Areas are substantially larger than the ideal defined in Portas (1969), allowing for the performance of activities that may require specific equipment or furniture.

e) Collective sector of the house

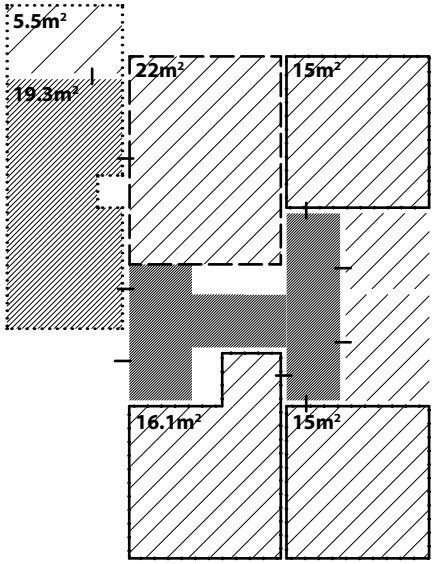
The collective sector comprises one 22m2 living-room, which complies both with the minimum and ideal areas seen in chapter 3, and is the largest space of the house. While it does not control access to any areas of the house, the living-room connects to the kitchen.

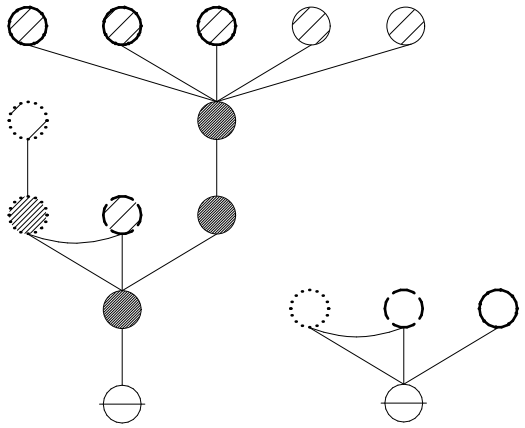
f) Services sector of the house

The kitchen is uncommonly large, with an area of 19.3m2, and further articulates with a dedicated space for the treatment of clothes with an area of 5.5m2. In total, the services sector has an area of 24.8m2, larger than the living-room.

g) Private sector of the house

Bedrooms have an average area of 15.5, fairly larger than the ideal defined in Portas (1969), and large enough for the comfortable introduction of furniture supporting activities of individual development. furniture supporting activities of individual development. They are the deepest spaces of the house, with privacy assured by two corridors that separate them from the entrance hall.





INTEGRATION

min. value	0.54
25th percentile	0.75
50th percentile	0.78
75th percentile	0.80
max. value	1.48

private sector

collective sector

services sector

FIGURE 8.53.
Santo António das Antas - Contumil, apartment scheme: plan and accessibility graph.

h) Relationships between sectors of the house

	transition space >	kitchen >	bedrooms =	washroom =	living-room >	exterior >	other space
integration	1.479	0.825	0.783	0.783	0.783	0.712	0.540
area	5.5m²	19.3m²	15.5m²	5.3m²	22m²	-	5.5m²
minimum area ratio	-	3.2	1.8	-	1.8	-	
ideal area ratio	-	2.8	1.6	-	1.2	-	
depth exterior	2	2	4	4	2	0	3
type-space	b	c	a	a	c	b	a
functional type-space	fb	ff	fi	ff	fd	fb	fa

TABLE 8.12. Santo António das Antas - Contumil, spatial attributes of apartment scheme.

The accessibility graph of this apartment scheme translates into a simplified A2 type. Sectors are clearly defined, but functional spaces share very similar values of integration that are significantly inferior to those of transition space. The kitchen is unusually large, with enough space to be used for meals or other family activities. Bedrooms also have ample areas, not substantially inferior to that of the living-room, and may support the necessary equipment or furniture necessary for the development of individual activities. While there is a social pole composed by articulated kitchen and living-room, the living-room does not control access to the kitchen, and may not benefit from the sort of incidental use detected by Bafna (2014) and preliminary findings of the analysis of the Survey on Urban Housing (Pereira and Gago, 1984).



FIGURE 8.54. Santo António das Antas - Duarte Leite, surrounding city.

8.15. LAYOUT 39: SANTO ANTÓNIO DAS ANTAS - DUARTE LEITE

a) Relation to the surrounding city

Layout 39 was developed by the same cooperative as layout 36 and 38, and so shares many of the same traits. However, even though all three share small integration at the local scale and below-average values at the global scale, it is not only the lesser integrated of the three, but of all cooperative layouts. It is located in the vicinity of layout 38, in an area that maintains a mainly residential character, with some local retail and commerce. Similarly to layout 36, layout 39 is made up of only one building which, while opening directly to the street, takes a step back from the front of its lot and creates a wider sidewalk in front of its entrances. The separation between buildings and the street is then the minimum.

b) Relations between collective spaces

Like in all previous cooperative layouts, there exists a secondary circulation system around the building, separating it from its surroundings and creating a ring. On the back, this system connects to the estate's garages, and has an impact in the way the estate is perceived from the outside, as reflected in a higher maze index of 1.83. Similarly, depth values regarding the relations between spaces within the layout are also higher than in previous single-building estates. No other collective spaces exist in the layout.

c) Relation to individual houses

Access to buildings is done directly from the main street. Each entrance serves 8 apartments, with a staircase connecting 2 per floor.

Layout 39 shares the apartment scheme described in section 5.3.14., concerning Layout 38 (page 359).

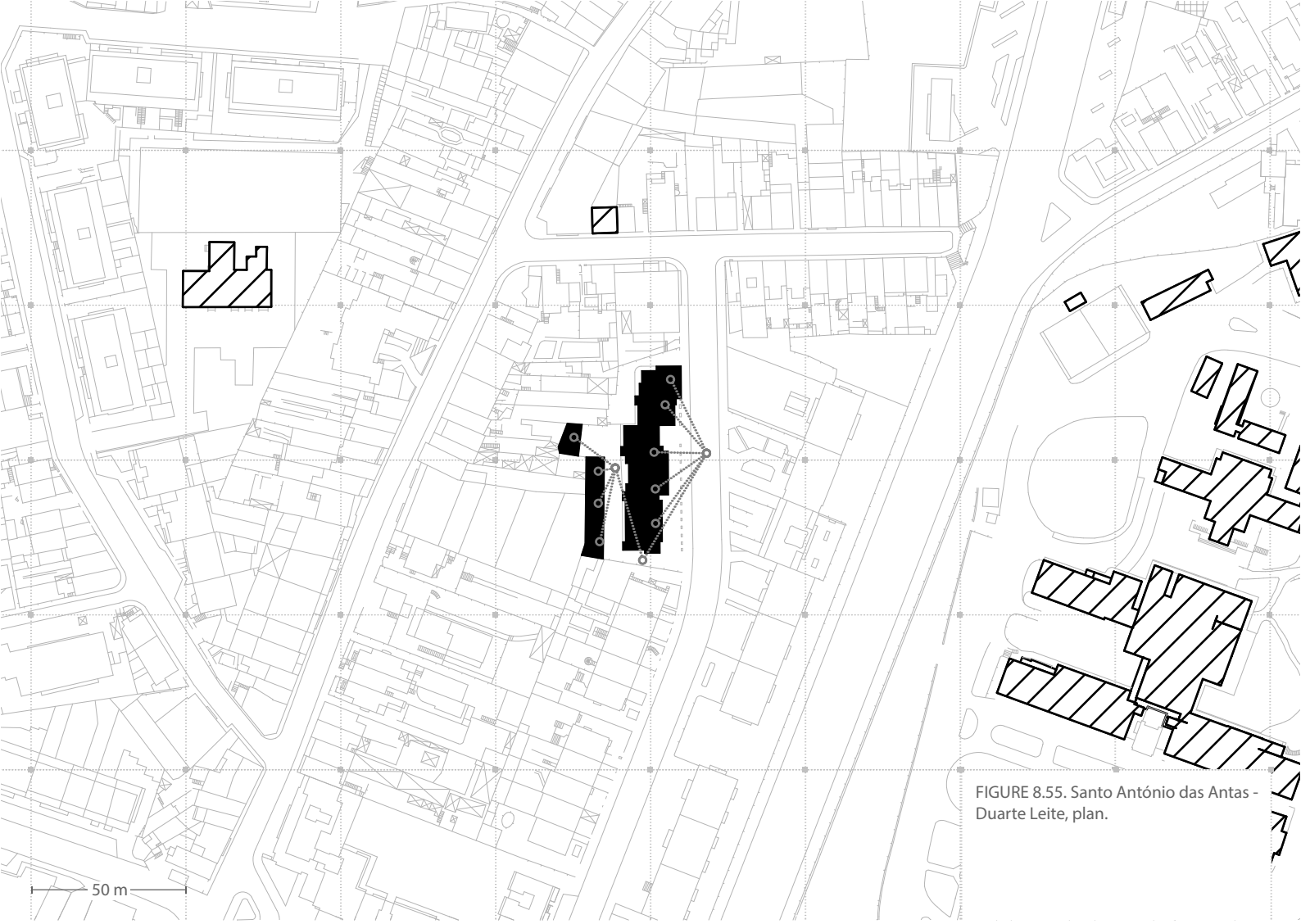


FIGURE 8.55. Santo António das Antas - Duarte Leite, plan.

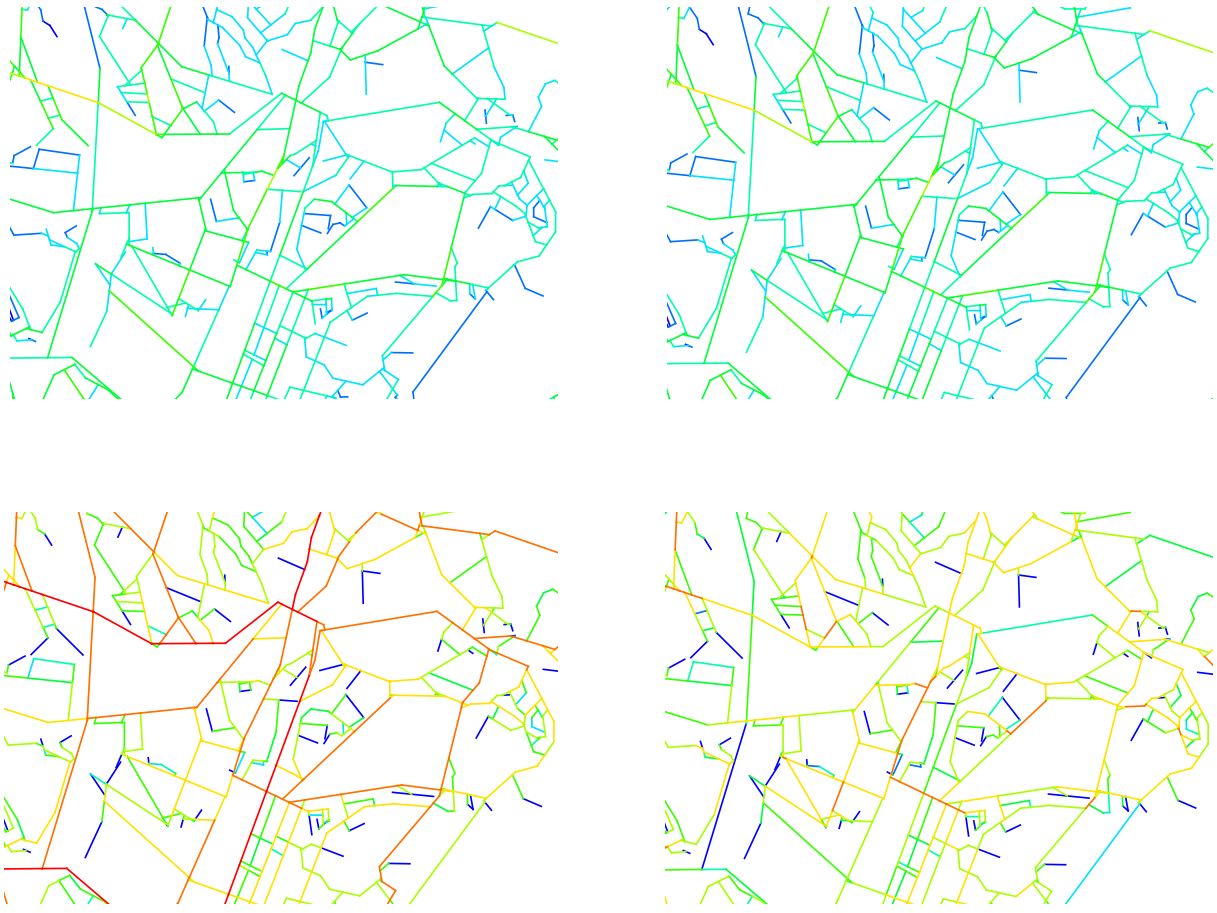
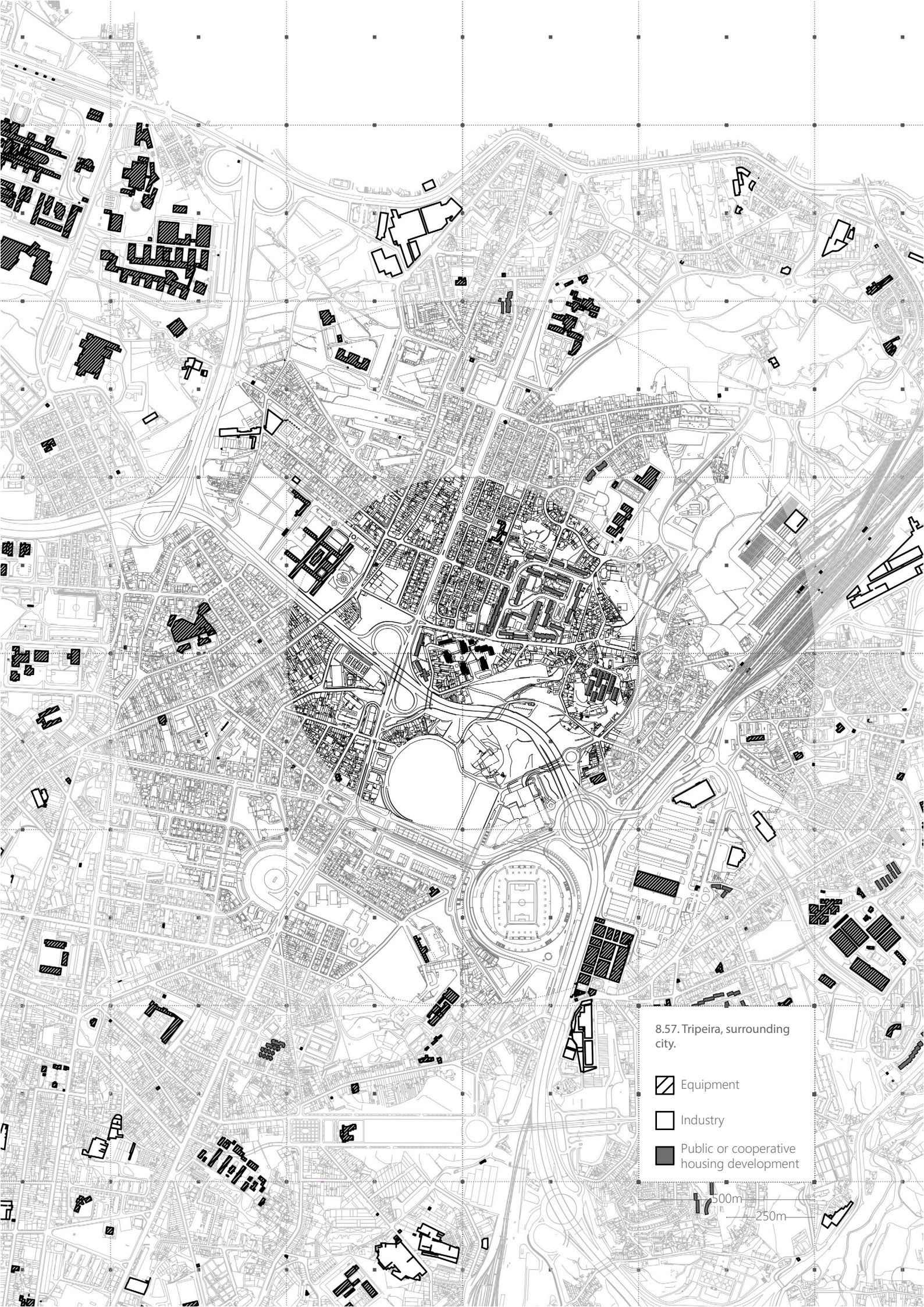


FIGURE 8.56.
Santo António das Antas - Duarte Leite, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.



8.57. Tripeira, surrounding city.

8.16. LAYOUT 40: TRIPEIRA

a) Relation to the surrounding city

The layout is located between layout 9 and an interchange with inner radial of the city, presenting very small values of integration at both scales. However, while located in the same mainly residential area as layouts 9, 36 and 39, it is also in closer proximity to the inner side of the radial, where the high-choice axis it is adjacent to becomes better integrated in the urban system. Even though the area adjacent to the opposite side of the inner radial was only consolidated in the second half of the 20th century, it is a well-integrated part of the city with an abundance of retail and services, as well as other urban structures. Layout 40 is a large scale but low-density estate which occupies a 22 182m2 area with 196 houses, distributed across five housing blocks. It is located in the middle of a lot partially defined by existing houses, but with two free sides connecting to the main street grid.

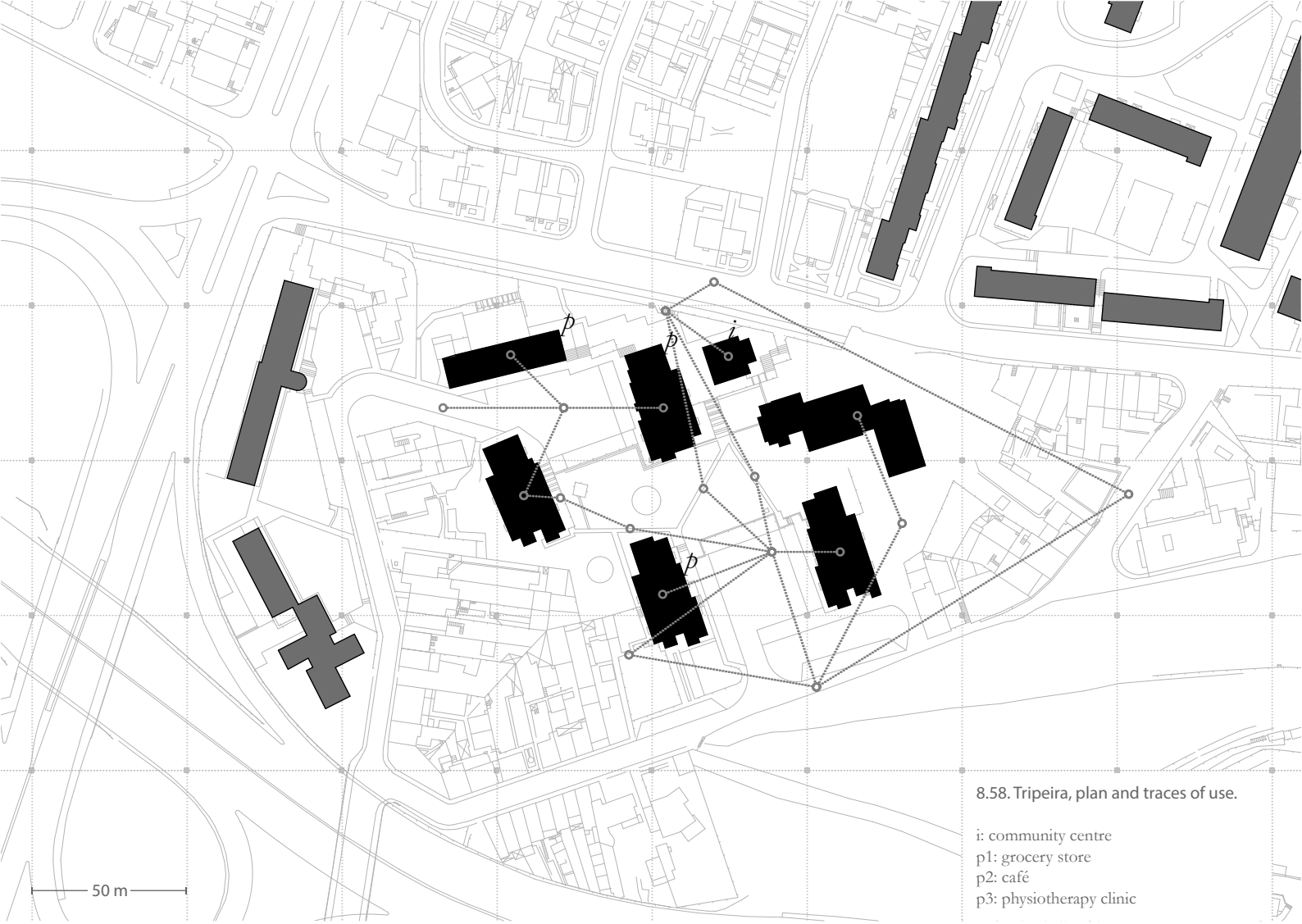
The estate, however, is separated from the main circulation system by gardened areas with large trees, with exception with a point where it turns outwards, with a coffee-shop and a social centre facing the street. Nevertheless, even those are separated by the main street by a difference in heights, which creates a terrace over the sidewalk. As such, its maze index is closer to that of PMCP or SAAL estates than of post-revolutionary public or small-scale cooperative housing. Taken together with its low local choice values, this might suggest that it is unlikely that pedestrians with no local knowledge would cross it as they walk through the city.

b) Relations between collective spaces

Layout 40 is treelike and deep from the exterior, residents are far from the spaces of the layout, and from their neighbours and functional spaces. The latter are not located in the interior of the housing scheme. Instead, the functional spaces created by this development are poorly integrated in the layout and are shallow, turning outwards, one step away from the main city grid and an average of 5 steps away from all buildings, apparently designed to serve the mainly residential area surrounding the housing development. Buildings are turned inwards, with a clear integration core in the geometrical centre of its composition. This core is constituted by a system of gardened spaces that connects the two large parking lots from which one can access the buildings. Besides its quality as a potential leisure area, and so a space with collective potential, the layout's configuration does not provide motives for residents to non-purposely cross these areas.

c) Relation to individual houses

Layout 40 scores considerably low on constitutedness for a multi-building layout, with only a quarter of its spaces being constituted by the front-doors of buildings, and its separation index



8.58. Tripeira, plan and traces of use.

i: community centre
p1: grocery store
p2: café
p3: physiotherapy clinic

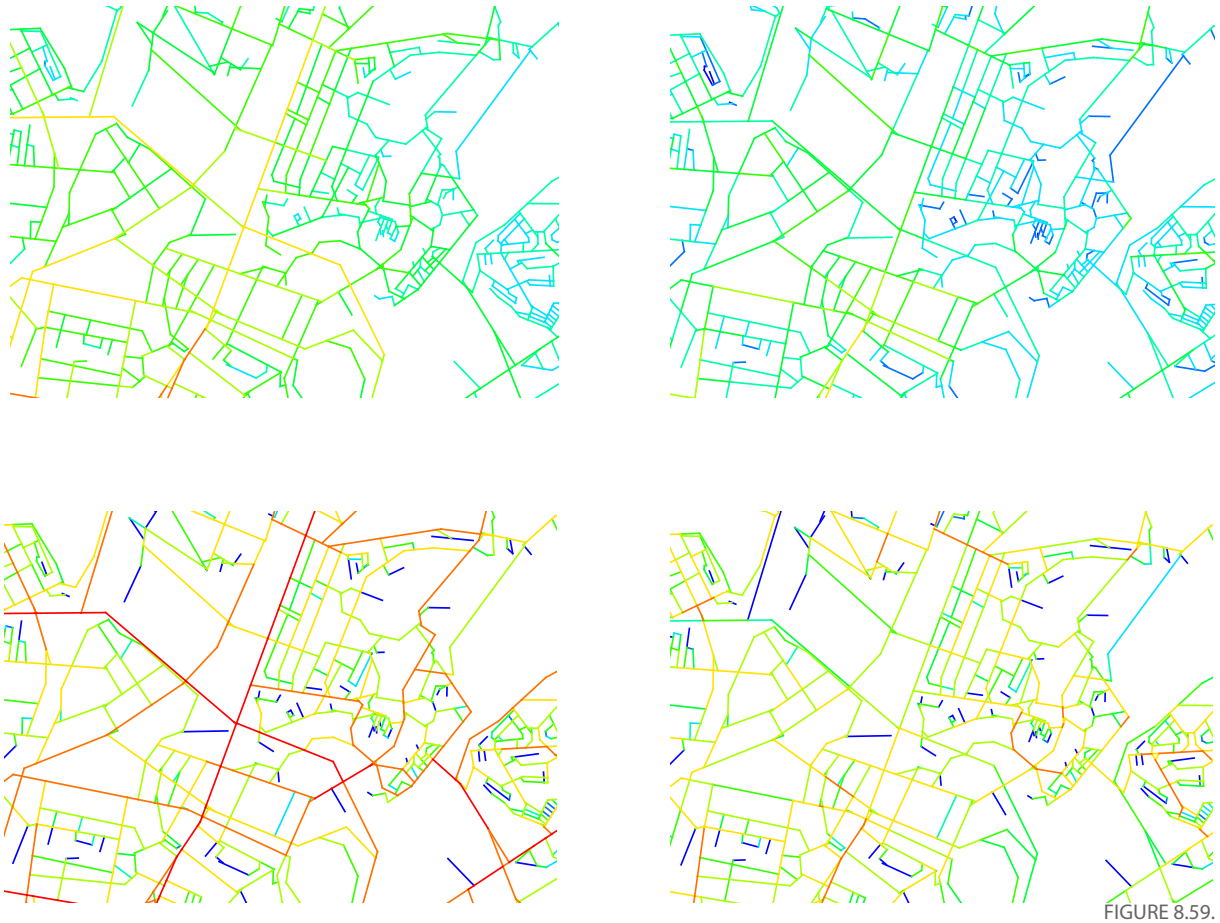


FIGURE 8.59.
Tripeira, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

and no-neighbour score are the highest of all cooperative housing. Consequently, residents are deep both from the exterior and from the interior of the layout. The two hard-landscaped spaces concentrate all the entrances, with a large number of neighbours using each one of them. However, their character as parking lots may allow for awareness of neighbours, but is not likely to encourage interaction.

d) Relationship of the house with the exterior

Layout 40 includes buildings with different types of accesses. In order to understand how this may affect internal configuration, two different apartment types were analysed. Both apartment schemes are shallow; their bedrooms - the deepest spaces from the exterior - are at depth 3 from the front door. Both have total useful floor areas slightly inferior to the minimum requirement for three-bedroom apartments, and a density of around 20m2 per resident when ideally occupied. Both apartment schemes have a continuous transition space with a significant enough turn that it was considered as two separate convex spaces. In apartment type A, the shallowest convex split of the corridor connects the entrance-hall, the living-room and the kitchen, and the deepest connects bedrooms and wash-rooms. In apartment type B, sectors are less clearly defined in their depth from the exterior, as the shallowest split or the corridor connects the front-door, kitchen and one bedroom, and the deepest two bedrooms, wash-rooms and the living-room.

e) Collective sector of the house

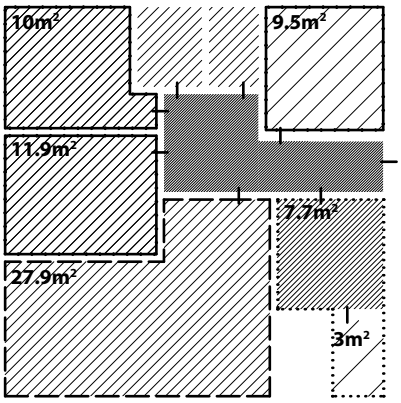
Both living-rooms are large (25.1m2 in type A and 27.9 in type B), with areas that are substantially larger than the ideal defined by Portas (1969). They are the largest spaces of the house, but are neither better integrated nor control accessibility to other areas.

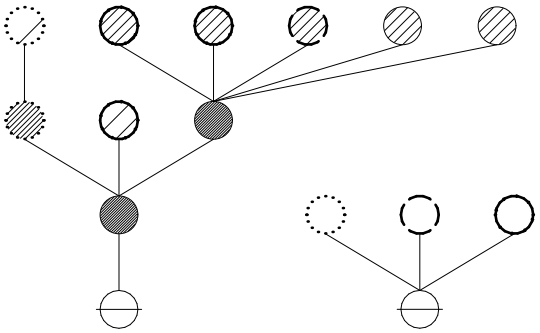
f) Services sector of the house

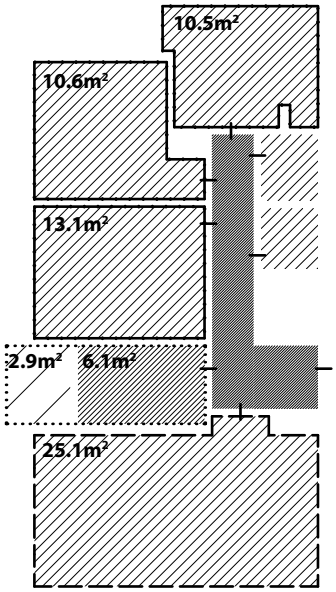
Kitchens comply with the minimum area and the kitchen in layout B is slightly larger than the ideal defined in Portas (1969). Both are connected to a dedicated space for the treatment of clothes with an area of approximately 2.7m2. It is an enclosed space, has no connection to other functional spaces. In both cases located at one step from the entrance-hall, it is shallow from the exterior and from the living-room.

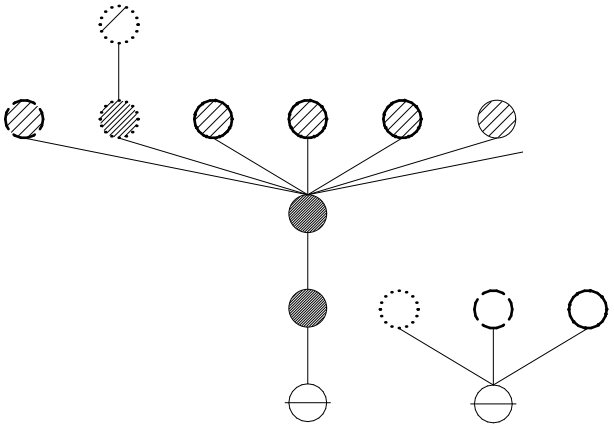
g) Private sector of the house

Bedrooms comply with minimum requirements, in some cases surpassing ideal areas, and have an average area of 11.4m2 in type A and 10.5 in type B.









INTEGRATION

min. value	0.74/0.88
25th percentile	0.97/0.92
50th percentile	1.21/0.95
75th percentile	1.34/1.07
max. value	4.05/2.43

private sector
collective sector
services sector

FIGURE 8.60.
Tripeira, apartment schemes A and B: plans and accessibility graphs.

h) Relationships between sectors of the house

The accessibility graphs of both apartment schemes translate into a simplified B2 type. Type A has clearly defined sectors while type B introduces some functional ambiguity, but functional spaces share very similar values of integration in both apartment schemes.

	transition space >	kitchen >	bedrooms =	washroom =	living-room >	other space =	exterior
integration	4.055	1.474	1.206	1.206	1.206	0.737	0.737
area	5.1m²	6.1m²	11.4m²	2.2m²	25m²	2.9m²	-
minimum area ratio	-	1	1.35	-	2.1	-	-
ideal area ratio	-	0.9	1.18	-	11.39	-	-
depth exterior	1.5	2	2	2	2	3	0
type-space	b	b	a	a	a	a	a
functional type-space	fb	ff	fi	ff	fi	fa	fb

TABLE 8.13. Tripeira, spatial attributes of apartment scheme-A.

	transition space >	kitchen >	exterior =	living-room >	bedrooms >	other space
integration	2.433	1.106	0.948	0.948	0.906	0.885
area	5.2m²	7.7m²	-	27.9m²	10.5m²	3m²
minimum area ratio	-	1.28	-	2.66	1.2	-
ideal area ratio	-	1.13	-	1.55	1.09	-
depth exterior	1	2	0	2	3	3
type-space	b	b	b	a	a	a
functional type-space	fb	ff	ff	fi	fi	ff

TABLE 8.14. Tripeira, spatial attributes of apartment scheme-B.



FIGURE 8.61. CETA, surrounding city.

8.17. LAYOUT 41: CETA

a) Relation to the surrounding city

Layout 41 is the largest cooperative development within the municipality, occupying an area of 42 477m2, with 224 houses. It is located in the northwest quadrant of the city, further north than layouts 36 and 37, near the outer radial of the city. It is surrounded by three large urban structures - two hospitals and a private school - that are adjacent to the outer radial in a particularly weakly segregated part of an otherwise well-integrated area. The estate itself presents the lowest values of global integration of all cooperative layouts. Locally, while the layout's values for both choice and integration are similarly low, the estate is adjacent to a high choice street (located above the 9th decile). However, adjacent to two different streets and limited by pre-existing buildings on two sides, the estate mainly turns its back to the street. Only one of its buildings can be accessed directly from the street, while a coffee-shop located at the edge of the layout does turn towards the street, but is separated from it by a difference in height. The interior of the layout can be accessed through 3 openings between buildings, and it has a high maze index. Non-residents are not likely to walk through the layout in their path to somewhere else, and residents are an average of 4 steps away from the main street, ranking this among the layouts with the largest depth between the dwellings and the outside of the estate.

b) Relations between collective spaces

The layout is deep from the outside, and its spaces are distant among themselves, displaying depth values similar to those of PMP estates. All its spaces are distributed and in one or more rings, and the layout has one of the larger values of constitutedness, with almost 70% of its spaces being constituted by the front door of buildings or functional spaces.

Layout 41 it seems to translate an idea of neighbourhood and neighbourhood equipment in line with what was verified in PMCP estates. There is a playground that is an average of 3,5 steps away from the outside and a minimum of 3, 3.27 steps away from all dwellings entrances and a minimum of 2. It is also an integrated space within the layout but not in the city, further articulated with a well-integrated system of transition and soft-landscaped areas. Simultaneously at the geometrical centre of the layout and in the transversal axis that divides the layout in two, there is a sports field. It is less integrated, deeper from the system and shallower from its exterior, and further away from the dwellings entrances than the playground, establishing, as usual, a franker relationship with the outside of the layout. The coffee shop is the shallowest functional space in the system. At one topological step from the important through-street at the local scale, it should serve the nearby housing developments as well. Besides well cared for flowerbeds in the fronts of buildings, no traces of use were detected in the layout.

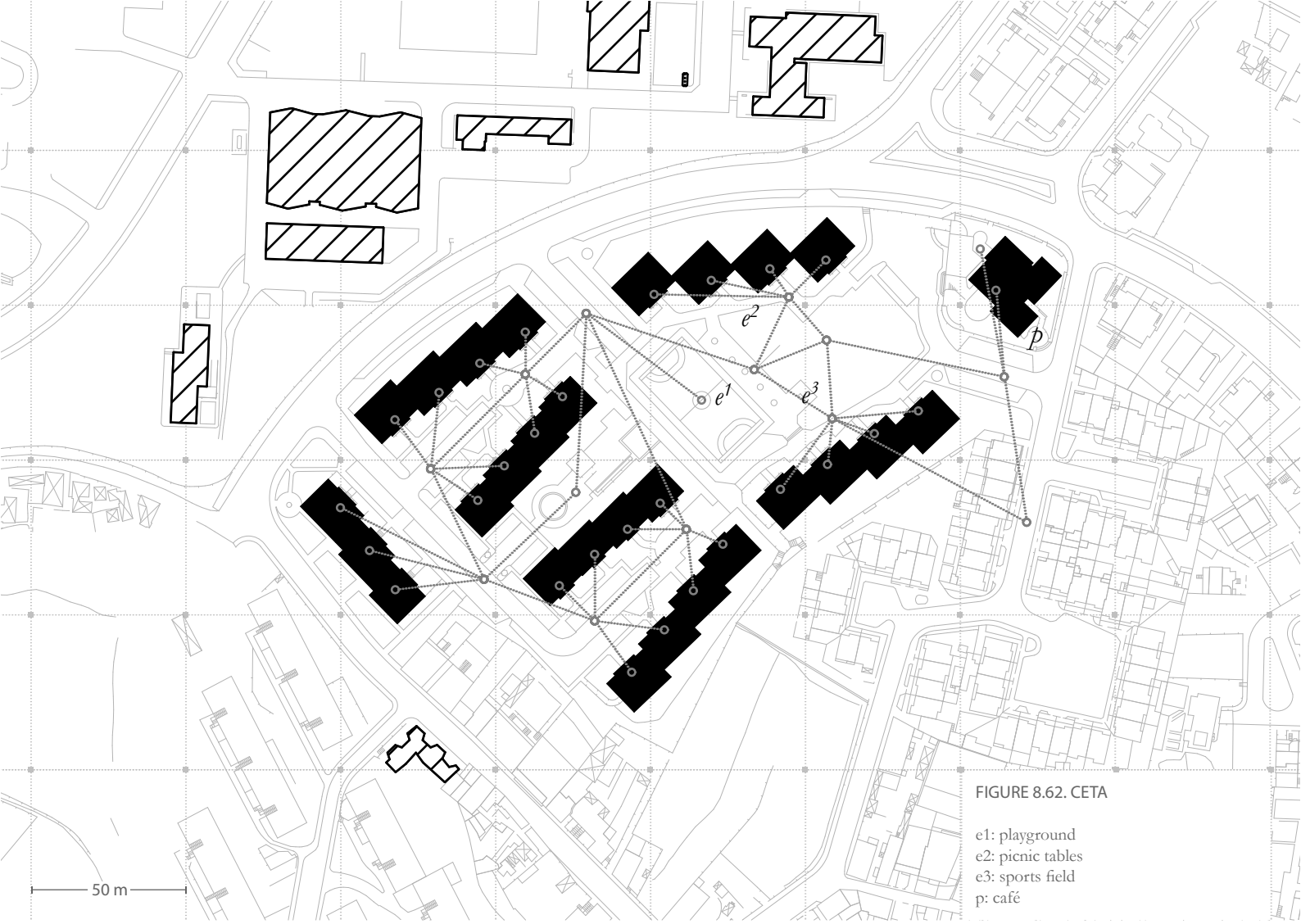


FIGURE 8.62. CETA

e1: playground
e2: picnic tables
e3: sports field
p: café

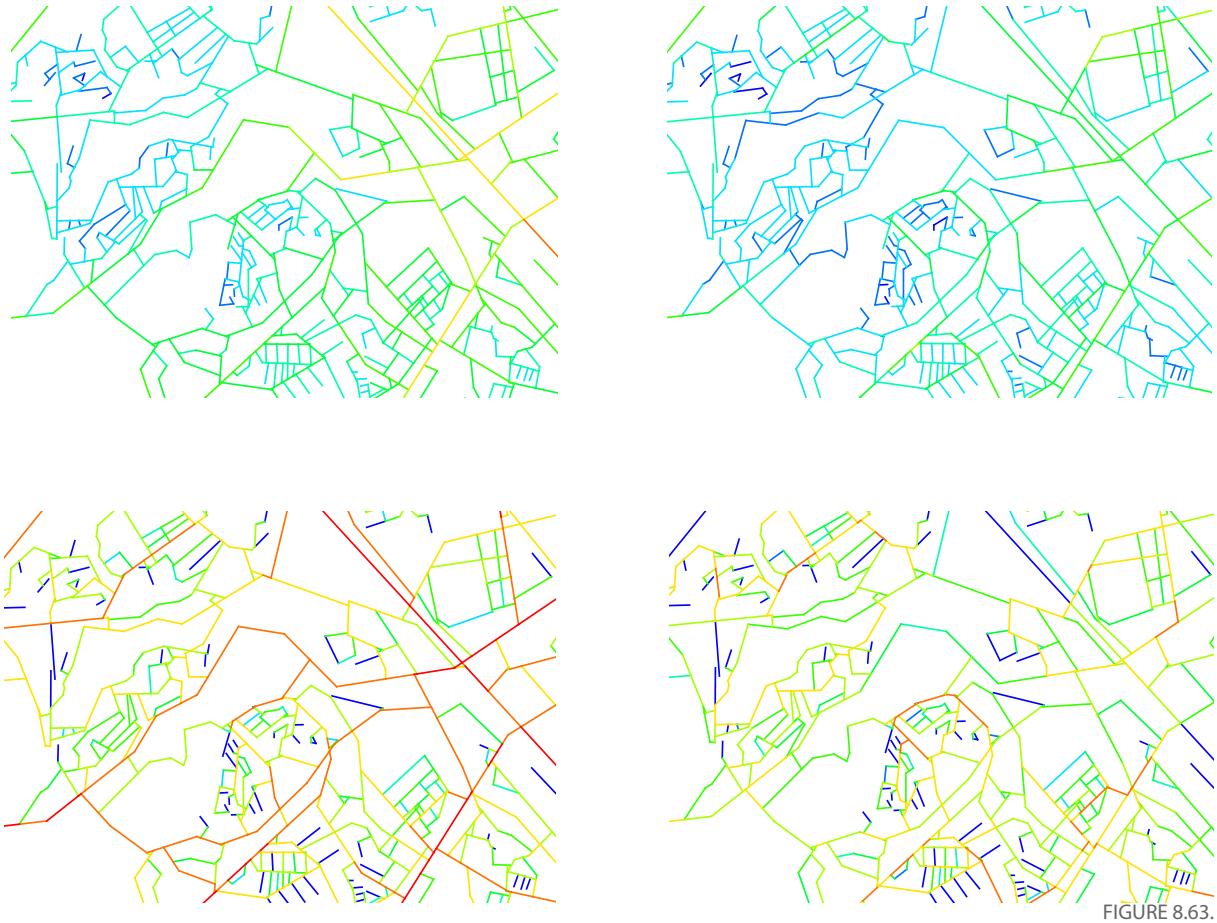


FIGURE 8.63.
CETA, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

c) Relation to individual houses

Residents are deep from the exterior, with a mean depth of 4 and a separation index of 2. Constituted spaces provide access to an average of 4.7 front-doors, from 1, in the case of the tower block (which contains as many apartments as each horizontal building-set), to 8. Within the buildings, the distribution is generally done through a staircase connecting 8 houses, 2 per floor and, in the case of the tower block, 16 apartments, 4 per floor.

d) Relationship of the house with the exterior

The three-bedroom apartment type of layout 41 has a total useful floor area of approximately 78.9m2, which results in a density of 19.7m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. The apartment scheme is largely organised around one entrance hall, from which two bedrooms, the kitchen and the living-room are accessible. Additional depth is added by a smaller hall that connects to one bedroom and two wash-rooms. The deepest bedroom is at depth 3, and the deepest washroom at depth 4.

e) Collective sector of the house

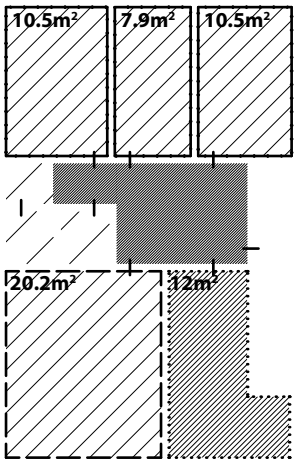
The collective sector comprises one 20.2m2 living-room, an area that surpasses both the minimum and ideal areas seen in chapter 3, and is the largest space of the house. It is an enclosed space, separate from the services sector, and does not control access to any areas of the house.

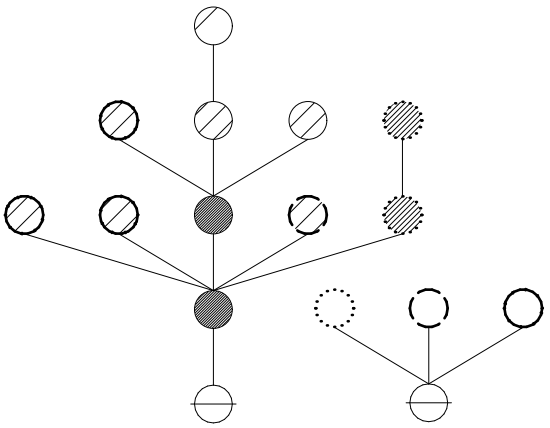
f) Services sector of the house

The kitchen has an area of 12m2, well above both the minimum and ideal areas, but includes a space for the treatment of clothes. While large, it is an enclosed space, has no connection to other functional spaces. Located at one step from the entrance hall, it is shallow from the exterior and most other functional spaces.

g) Private sector of the house

Bedrooms' areas are larger than the required minimum , and have, on average, 9.4m2. Two open to the same central hall as collective and services space.





INTEGRATION

min. value	0.78
25th percentile	1.04
50th percentile	1.04
75th percentile	1.17
max. value	2.44



private sector

collective sector

services sector

FIGURE 8.64.
CETA, apartment schemes: plan and accessibility graphs.

h) Relationships between sectors of the house

	transition space >	kitchen >	exterior =	bedrooms =	living-room >	washroom
integration	2.437	1.205	1.045	1.045	1.045	0.78
area	5.7m²	12m²	-	9.4m²	20.2m²	1.6m²
minimum area ratio	-	2	-	1.1	1.68	-
ideal area ratio	-	1.76	-	0.96	1.12	-
depth exterior	1.5	2	0	2	2	3.3
type-space	b	b	b	a	a	a
functional type-space	fb	ff	ff	fi	fi	ff

TABLE 8.15. CETA, spatial attributes of apartment scheme.

The accessibility graph of this apartment scheme translates into a simplified B2 type, where kitchen and living-room are neither directly nor visually connected. The collective and services sectors are well defined, as they are composed of one space each, but there does not exist a clearly independent private sector. Functional spaces share similar values of integration that are inferior to that of the entrance hall.

8.18. LAYOUT 42: SANTO ILDEFONSO

a) Relation to the surrounding city

Layout 42 defines the west edge of the same lot where layout 40 is located, sharing similar characteristics regarding its relation to the surrounding city. It is a medium-sized layout, made up of two separate buildings and 78 houses. Due to its small dimension, its large depth values, similar to those of larger housing schemes, are noteworthy. Located in a highway interchange, the lot has a small proportion of practicable street-frontage. As such, even though buildings are placed on the edge of the lot, they can only be accessed through particular points on its smaller edges. Depth from the main street does not appear to be a design decision as much as a design condition resultant from lot-acquisition.

b) Relations between collective spaces

Layout 42's depth values between collective spaces are similarly exceptionally large for a smaller-scale estate. The layout is not only deep from the exterior, but tree-like as a spatial system, displaying depth values that are equivalent to - and in some cases higher than - those of larger, multi-building developments. The front doors of the two buildings are separated by an average of 3.84 steps, and convex spaces within the layout are, on average, 4.42 steps away from each

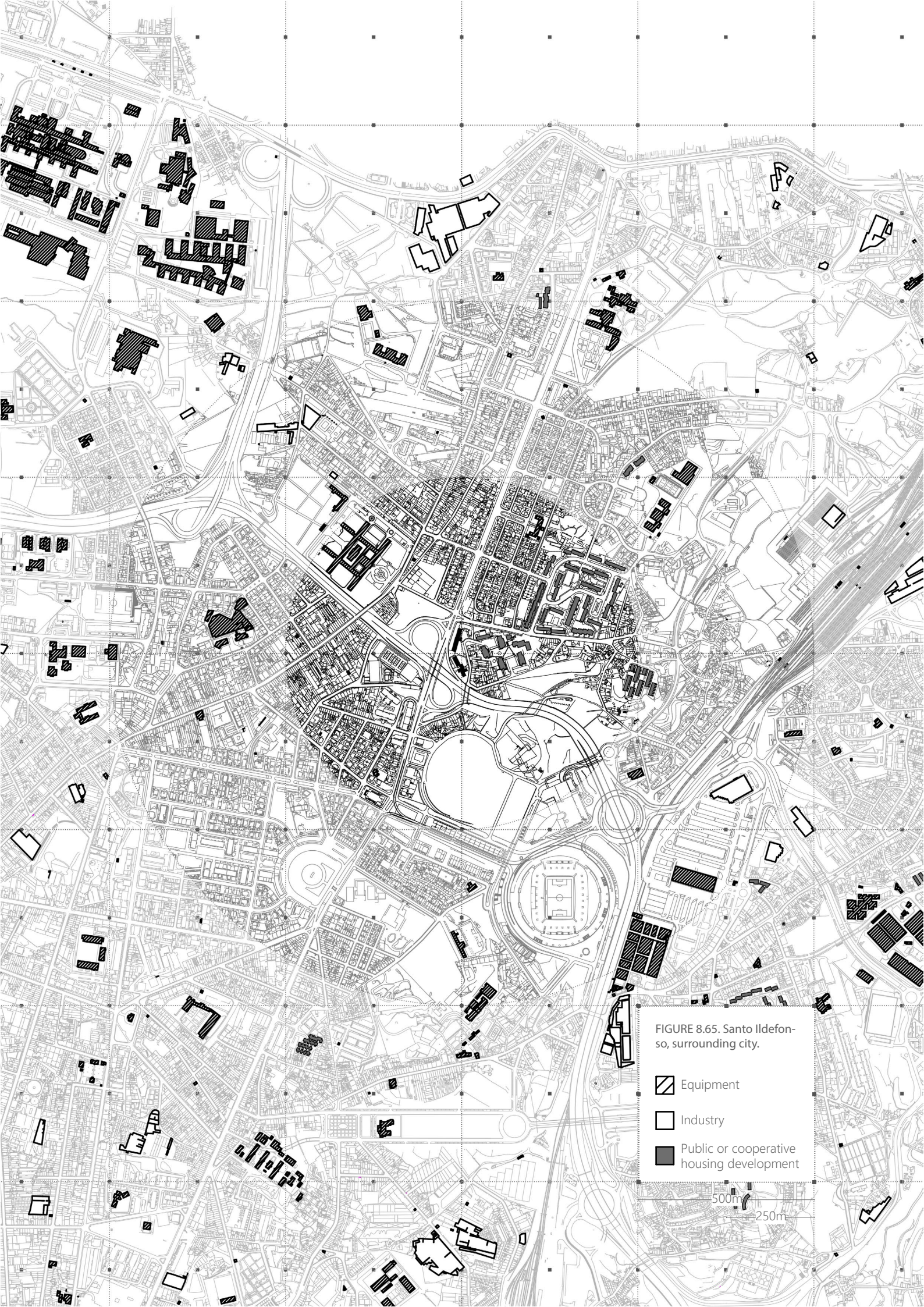


FIGURE 8.65. Santo Ildefonso, surrounding city.

other. The front-doors of ground-floor apartments open directly to the exterior and can be seen, but only in exceptional cases directly accessed, from the spaces of the estate layout. As such, the two constituted spaces open to the main entrances of the buildings, which gives access to two open-air corridors, one at the ground-floor and another on the second-floor. The first, shallower space, connects to one main entrance that then distributes to 48 apartments in two buildings. The second connects to two different main entrances, as well as four front-doors of ground-floor houses, reuniting 48 families.

Systems of redundant sidewalks exist in the layout, serving either the purpose of creating distance between the main street and the entrances to ground-floor apartments, or of creating an alternative pedestrian pathway around the buildings. One of these pathways creates a ring around the residential building, at the back of which is located a hard-landscaped space.

c) Relation to individual houses

Even though ground-floor apartments open directly to the exterior, access to their doors is conditioned by limited-access gardened areas, making it so that the pathways connecting these doors function more as open-air corridors that are a part of the building than as exterior spaces. Most apartment entrances are accessible through a common main entrance, with an average of 4 families sharing the same floor. These main entrances are deep from the surrounding grid, with a large separation index of 2.5 and a mean depth of 4.17.

d) Relationship of the house with the exterior

Two different apartment types were analysed for layout 8, due to apparent significant differences in their plans.

Apartment type A of layout 42 is a two-storey, 86.3m2 house, which results in a density of 21.6m2 per resident when ideally occupied and corresponds to approximately 95% of the minimum area for a three-bedroom apartment. It connects to the exterior through a succession of spaces constituting a relatively open plan collective ground floor, where only the kitchen and balcony are clearly defined as separate spaces. The upper floor is deeper from the exterior, bedrooms are at a depth of 6 steps from the front door. The layout includes a dedicated space for the treatment of clothes, allowing for the individualisation of domestic work, as well as a balcony which, with an area of 3.1m2, allows for the introduction of furniture for exterior permanence.

The four-bedroom apartment type B of layout 42 has a total useful floor area of 96.3, which results in a density of 19.26m2 per resident when ideally occupied by the same number of people as the number of bedrooms plus one. The deepest spaces from the exterior are bedrooms and wash-rooms, at depth 4, and the shallowest functional space is the living-room, at depth 2. The layout includes a dedicated space for the treatment of clothes, allowing for domestic work to be

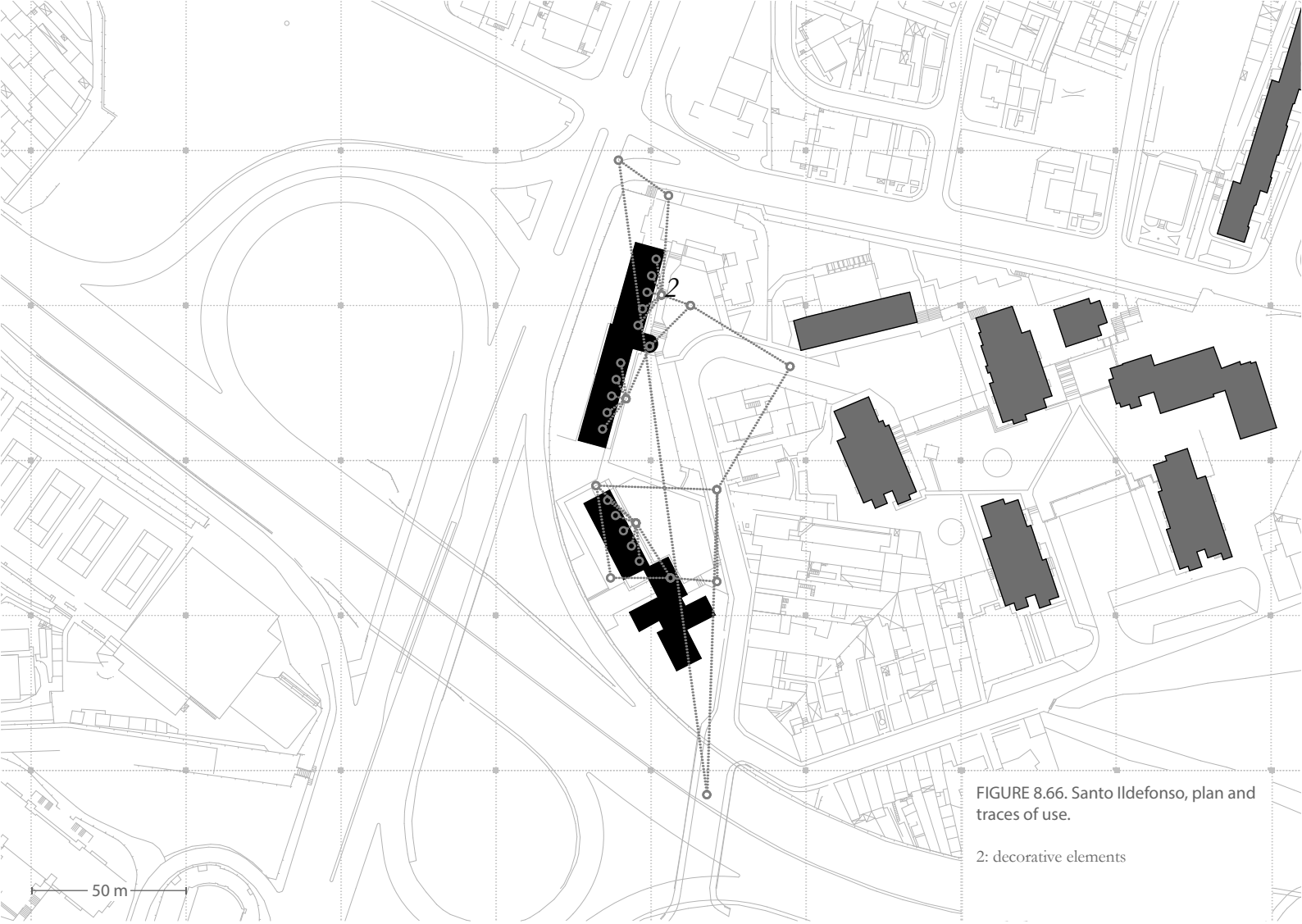


FIGURE 8.66. Santo Ildefonso, plan and traces of use.

2: decorative elements

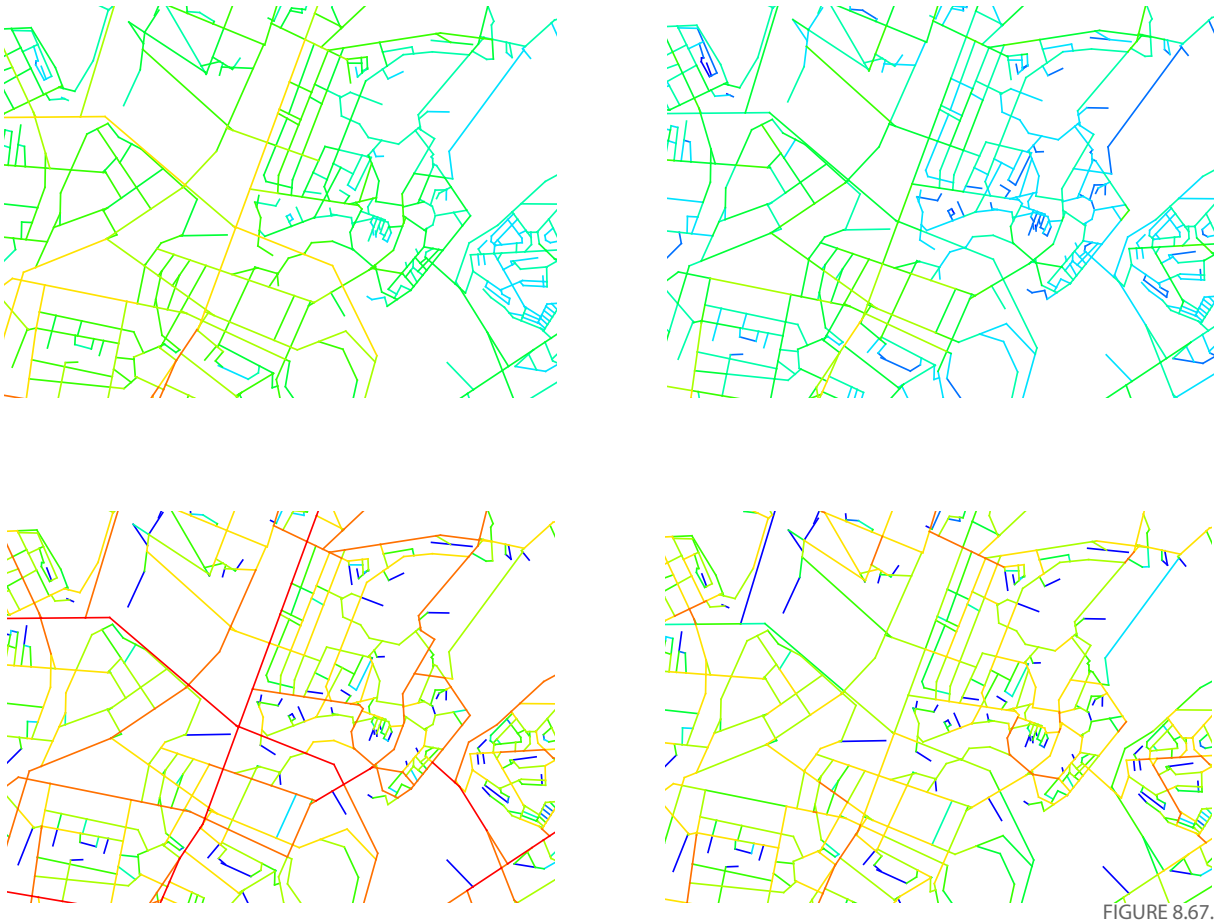


FIGURE 8.67.
Santo Ildefonso, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

conducted inside the home.

e) Collective sector of the house

The collective sector of type A is made up of a living-room and functionally ambiguous space that makes the transition to the exterior, kitchen and staircase. The space clearly defined as a living-room has an area of 20.3m2, above both minimum and ideal areas, and can add up to approximately 26m2 when transition spaces are considered. This area presents the largest value of integration and controls, at least visually, access to the other sectors of the house.

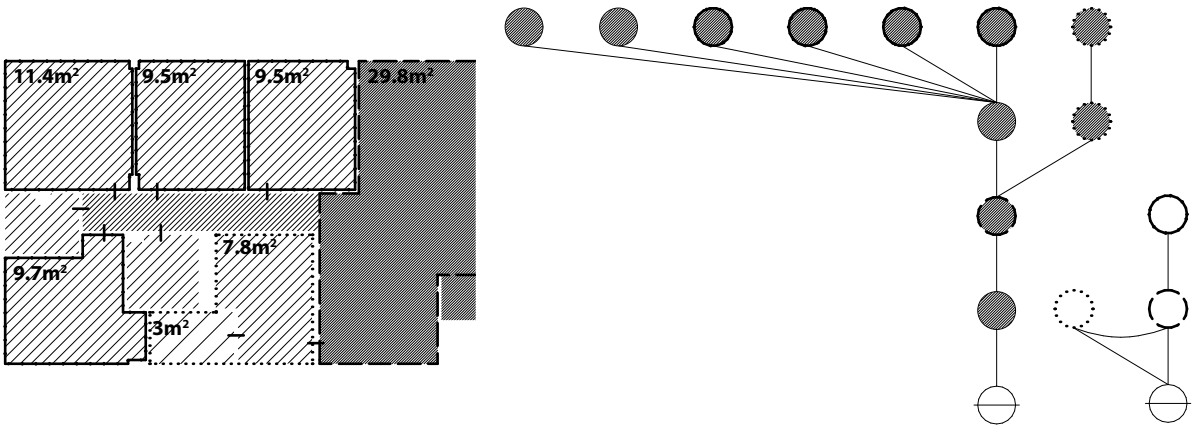
Apartment B has a 29.8m2 living-room, larger than both the minimum and ideal areas, and is the largest space of the house. It is simultaneously the shallowest and the better integrated room. It is the organising centre of the house: separated from the front-door by a small entrance-hall, it opens to the kitchen and connects to the bedrooms' corridor. With a functional b-type living-room that functions as the only connection between the bedrooms and the kitchen, and both private and services sector and the exterior of the house, the layout translates into an A1 simplified accessibility graph.

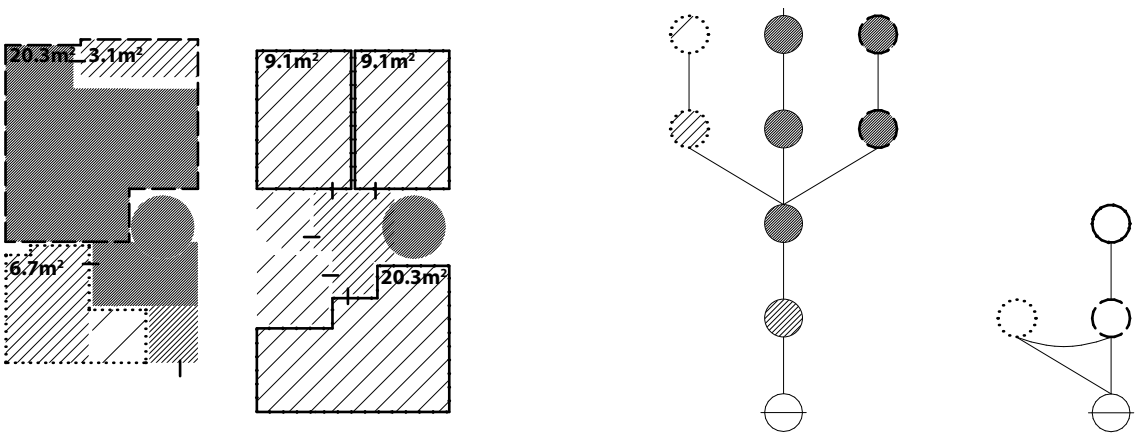
f) Services sector of the house

Type A's kitchen's area is between the minimum and ideal, and is connected to a dedicated space for the treatment of clothes. It has a smaller value of integration than the living-room, slightly larger than that of bedrooms. The services sector iof type B s made up of a kitchen with an area of 7.8m2 and adjacent room for the treatment of clothes with an area of 3m2. While the kitchen connects to the living-room, it does not establish a visual connection with it. It is a less integrated space than the living-room, sharing the same value of integration as bedrooms.

g) Private sector of the house

The bedrooms of apartment A are located on the second floor, which can be accessed through the collective areas of the house. They are the deepest and least integrated spaces of the house. They have an average area of 11.17m2 and two of them round 9m2. In apartment B, bedrooms are larger than the minimum required area but two of them fall short of the ideal. With an average area of 10m2, they are smaller than average for a cooperative development. They are simultaneously the deepest and less integrated spaces of the house.





INTEGRATION

min. value	0.52/0.60
25th percentile	0.61/0.98
50th percentile	0.67/0.98
75th percentile	0.80/11.59
max. value	1.09/1.96

private sector
collective sector
services sector

FIGURE 8.69.
Santo Ildefonso apartment schemes A (bottom) and B (top): plans and accessibility graphs.

h) Relationships between sectors of the house

	transition space >	living-room >	kitchen >	bedrooms =	washroom >	exterior space >	other space =	exterior
integration	1.095	0.981	0.736	0.673	0.673	0.636	0.523	0.523
area	2.6m²	20.3m²	6.7m²	11.17m²	2.8m²	3.1m²	2m²	-
minimum area ratio	-	1.69	1.12	1.29	-	-	-	-
ideal area ratio	-	1.13	0.99	1.14	-	-	-	-
depth exterior	3	3	3	6	6	4	4	0
type-space	b/c	c	b	a	a	a	a	b
functional type-space	fb	fc	ff	fi	ff	fi	fa	fb

TABLE 8.16. Santo Ildefonso, spatial attributes of apartment scheme-A.

A clear distinction is made in apartment scheme A of layout 42 between collective and private sectors of the house, even though the stairs for the bedrooms' floor are visible from the living-room. Due to the indefiniteness of the limits of the living-room, the apartment scheme was categorised as reflected in a B2 simplified accessibility graph. While less deep than average for a two-story scheme, the layout has approximately 33% of transition spaces, presenting functional spaces which are, on average, 3 steps away from each other. The collective sector is the better-integrated of the house, but is surpassed by transition spaces.

	living-room >	transition space >	kitchen >	bedrooms >	washroom >	exterior
integration	1.959	1.795	0.979	0.979	0.979	0.603
area	29.8m²	4m²	7.8m²	10m²	3.4m²	-
minimum area ratio	2.48	-	1.3	1.27	-	-
ideal area ratio	1.66-	-	1.15	1.14	-	-
depth exterior	1.5	2	0	2	2	3.3
type-space	b	b	b	a	a	a
functional type-space	fb	ff	ff	fi	fi	ff

TABLE 8.17. Santo Ildefonso, spatial attributes of apartment scheme-B.

The accessibility graph of this apartment scheme translates into a simplified A1 type. Sectors are more clearly defined than in other A1 apartment types, as the kitchen functions as a clearly separate space from the living-room and bedrooms open to a corridor connecting exclusively to private areas. The collective area is the largest, contrasting with the bedroom's size, and presents a much larger value of integration that other functional spaces.

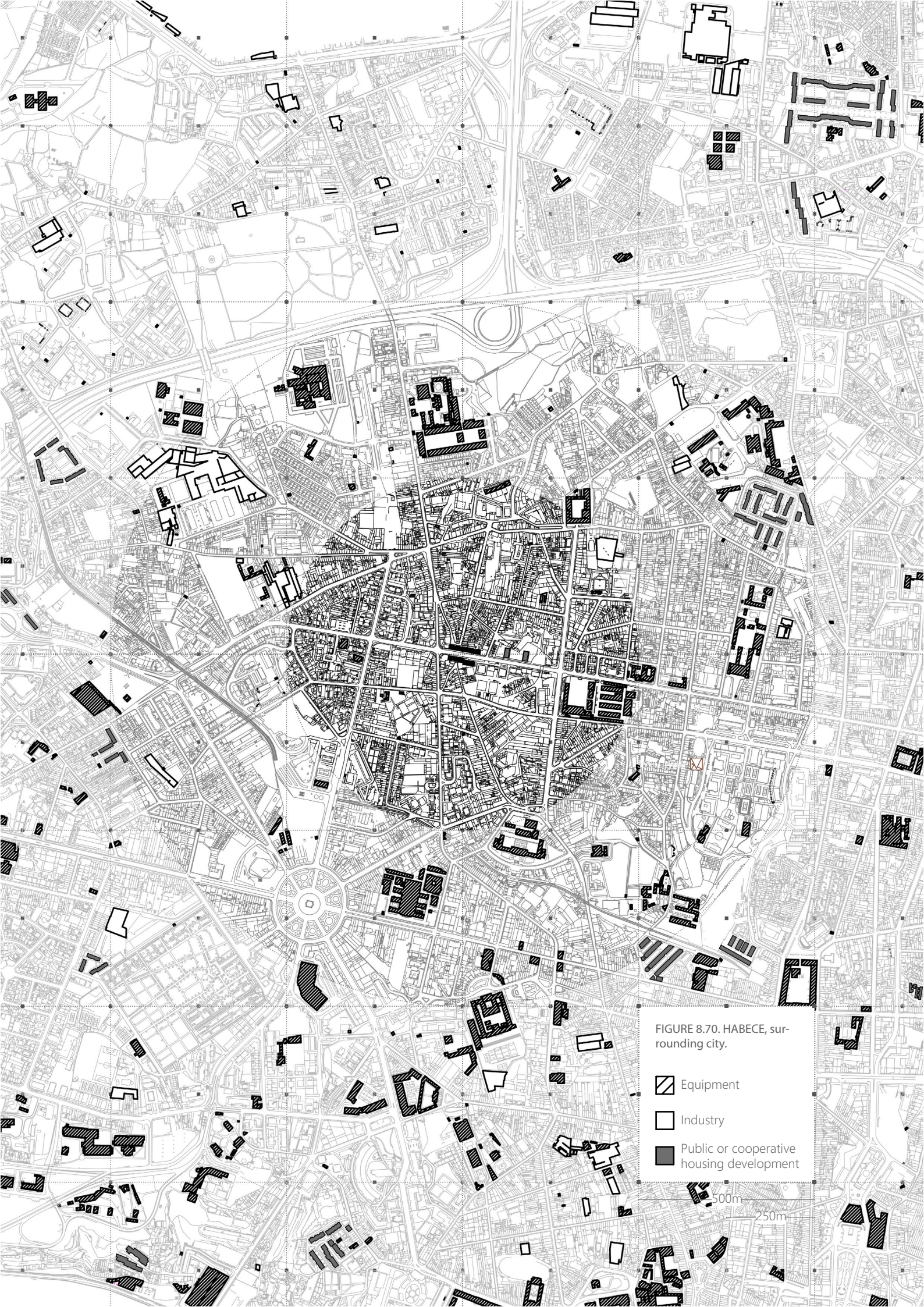


FIGURE 8.70. HABECE, surrounding city.

8.19. LAYOUT 43 - HABECE

a) Relation to the surrounding city

Layout 43 is made of three separate sets of buildings adding up to 240m of street-frontage along the same axis. Located in an important street that makes the connection between the East and West of Porto, this layout stands out as a clear exception in regards to both its large integration and global choice values. It is the better-integrated layout at both the local and global scales, with NaIn(r800m, r5000m) values that are located in the top 10% of the urban model. While global choice values are similarly high, its local potential for through movement is lower, barely placing at the top 50% among other layouts. Located in this well-integrated axis of the city, the layout is within a 500m radius of retail, services and schools, and within a 1000m radius of cultural facilities.

The three sets of buildings encompass 120 apartments and occupy a land area of around 2 800m2. All of its front doors open directly to the street, and there are no exterior spaces within the layout. As such, layout 43 presents relatively small depth values between the street and the interior of the layout of the set of studied cases.

b) Relations between collective spaces

The layout includes no collective spaces. Its front doors open directly to the street, with only small transition spaces with a couple of steps connecting the doors to the sloping street marking the entrances. In front of the buildings' facade, there are well cared for flower beds.

c) Relation to individual houses

Each front-door leads to an entrance hall with a staircase that connects the four floors, providing access to 8 apartments total, 2 per floor.



8.71. HABECE, plan.

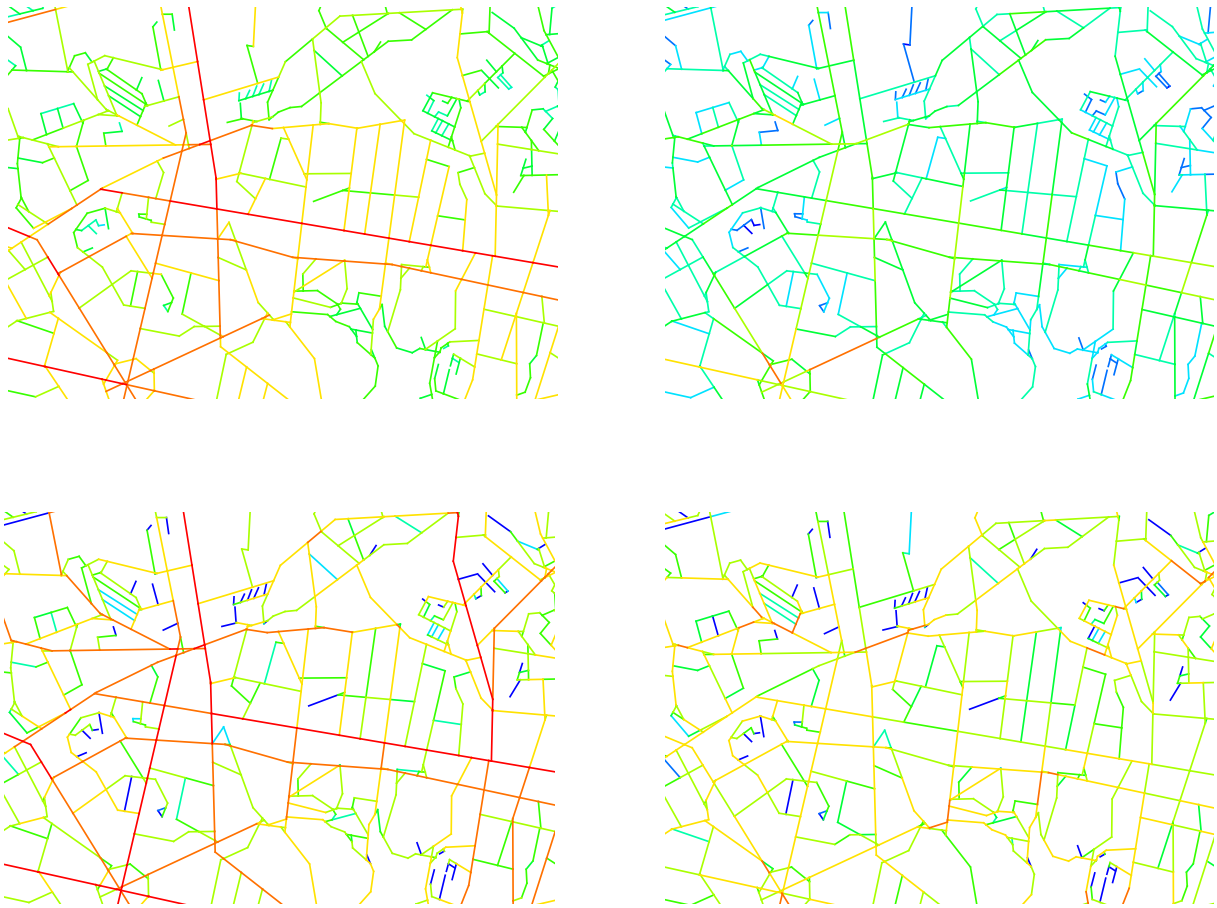


FIGURE 8.72.
HABECE, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.



FIGURE 8.73. Boavista, surrounding city.

5.3.20. LAYOUT 44. BOAVISTA

a) Relation to the surrounding city

Layout 44 is a small estate, housing less than 90 families in a 6 470m2 lot. The housing development was originally intended for a residents' association that was integrated into the SAAL. After the programme's dismantlement in 1976, the project was handed to the council, and the city's toponymy seems to suggest that the residents' association organized into a cooperative. While the head architects from the SAAL brigade were allowed to carry on with the project, the council's regulations resulted in a complete transformation of the original design.

As is common in SAAL layouts, it is located in a central area of the city. Three axial steps from the main axis that connects the seaside to the centre of the city, the layout is within 500m of retail and services and other urban equipment, such as the city's main concert hall. This area is characterized by large values of global integration and choice and encompasses both important accessibility routes and destination points. Consequently, layout 44 is one of the layouts with the larger values of NaIn (r=5000). Inversely, its values of NaCh, both local and global, are bellow average.

Even though the layout is located occupies the front of its lot, creating street-frontage, it presents above-average values in depth measures of its relation to the main city-grid. If these are an inevitable consequence of the lot's depth, they seem to be mostly the result of the conscious design of a system of redundant pathways around the buildings and where their front-doors are located. In this sense, while layout 44 turns its back to the street, it cannot be said that it turns inwards, as its internal street is also faced by the backs of buildings.

b) Relations between collective spaces

Layout 44 presents the largest depth values between spaces of the layout of all the studied AM developments. Fixed-function spaces are separated by an average of 3.7 steps, and convex spaces are an average of 3 steps away from each other. While the layout is ringy, with all spaces being integrated into at least one ring, only one-third of its spaces are constituted by dwellings entrances.

The central, better-integrated space 18 is a cul-de-sac street, faced by the back of residential buildings on both sides and 3 steps away from the dwellings' entrances. Integrated into rings, it does not control access to most of the layout's spaces. While it is the least-effort path between the main city grid and the estate's community centre, residents do not need to cross it in order to reach the only fixed-function collective space of the layout. Space 18 is occupied by a parking lot, which assigns it a fixed-function and may guarantee its role as a space of encounter between neighbours despite its distance from the front doors.

8.74. Boavista, plan.

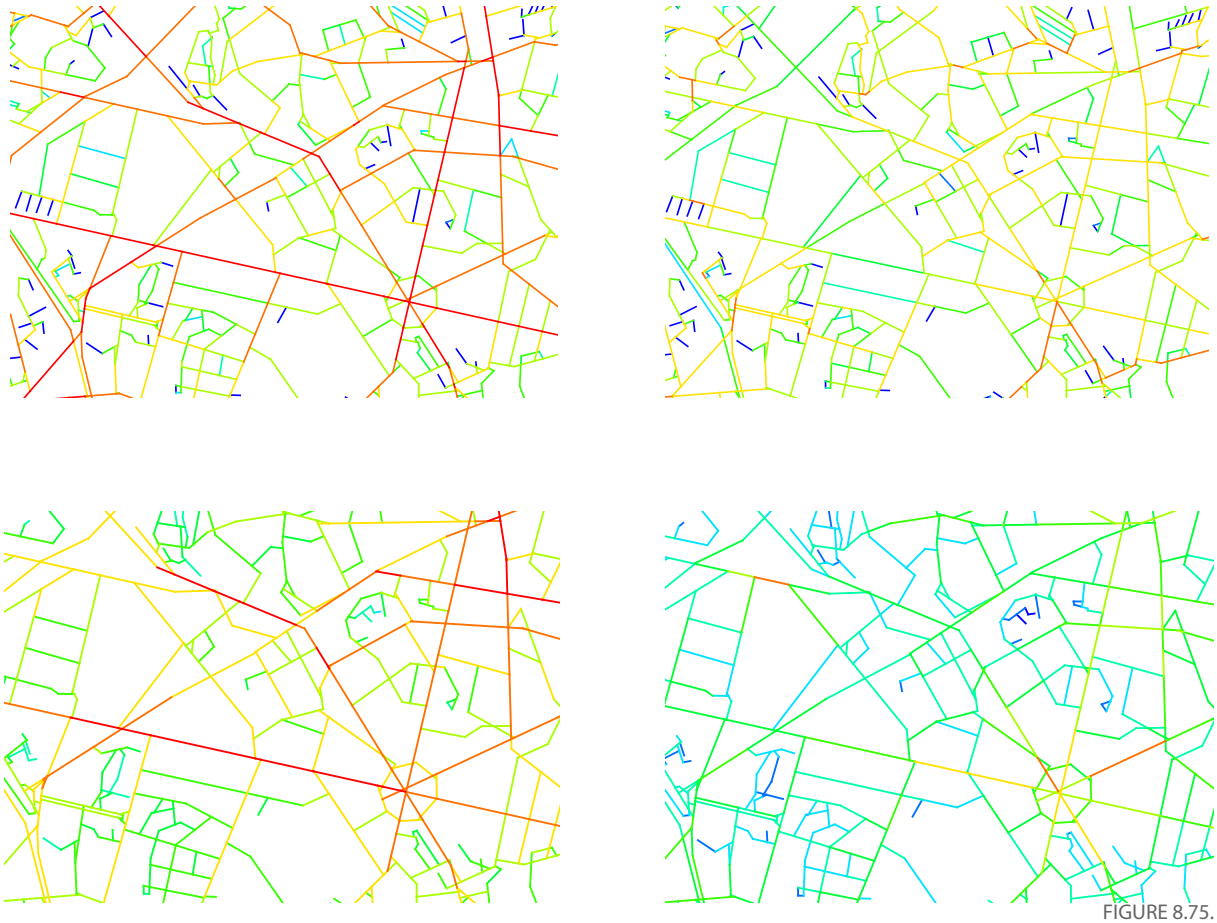


FIGURE 8.75.
Boavista, urban insertion in the surrounding city: normalised integration r=5000, normalised integration r=800, normalised choice r=5000, normalised choice r=800.

No traces of use of exterior spaces were detected in site visits.

c) Relation to individual houses

The placement of front-doors on the back of buildings results in one of the highest values of separation index of all studied cases (only SAAL developments consistently have separation indexes higher than 2.5). The pathways where front-doors are located give access to 16 to 24 apartments each. The pathways are connected two by two and turned to the back of the lot, limiting the number of neighbours that are likely to cross. Each entrance connects to 8 apartments, 2 on each floor.

No apartment scheme was analysed for layout 44.

9. COMPARATIVE ANALYSIS OF THE DIFFERENT PUBLIC AND COOPERATIVE HOUSING PROGRAMMES

Introduction

Forty-one housing estates were analysed at the scale of their urban insertion, estate configuration and house organisation, whenever possible. These comprise the entirety of public and cooperative housing development in Porto between the late ninety-sixties and early ninety-eighties that was possible to be identified throughout the research process conducive to this dissertation. If it is expected that some of the characteristics verified in these cases were similarly applied in other parts of the country, the analysis conducted should be able to provide a global reading of housing development in Porto during this period, and cannot be generalised as representing what was built elsewhere. In this sense, the forty-one housing estates represent the whole population that this dissertation proposes to examine. This did not justify or support a thorough statistical analysis, and the cases were, for that reason, examined individually.

Nevertheless, some statistical analysis was performed on the gathered data in order to inform the understanding of whether and in what ways the different public housing programmes studied constructed housing with different spatial patterns that might relate to different objectives or world-views.

The coefficient of variation (CV, representing the standard deviation of the size of the mean) was calculated for each of the examined variables to assess which of them present enough variation to be useful in finding differences between programmes. The rule of thumb often used (Hanneman et al., 2012) is that the amount of variation should be at least 20%.

Variables regarding urban insertion have low CVs, but all except for normalised choice at a 1500m radius have a variation superior to 20%. Of the variables regarding the interior of the apartment, integration, total depth, all measures of area, functional orientation and depth from the exterior have a variation superior to 20%. Mean depth, links-nodes ratio, and difference factor present a variation below 20%. The coefficient of variation of each variable was then calculated for the different programmes and compared with the global result to verify whether variation is smaller within programmes than across them. If so, it may indicate that domestic and estate layouts are more similar to domestic and estate layouts developed by the same programme than

to those developed by others.

The result showed that, in general, coefficients of variation were smaller within programmes than across them. The least consistencies are found in estes for residents' associations and cooperative housing. However, the latter's developments can be easily divided into two types of urban intervention: small-scale projects integrated into the existing urban fabric and large-scale estates, often forming their own urban blocks. This was taken into account by separating the two types of cooperative housing. When separated, the CV values become smaller and more consistent.

Cohen's d, an effect size used to indicate the standardised difference between two means, was then calculated in order to see which programmes showed stronger differences in the values of the examined variables. Cohen's d is a standardised measure where d=0.2 can be considered a 'small' effect size, 0.5 represents a 'medium' effect size and 0.8 a 'large' effect size. When d is smaller than 1 it means that d is smaller than one standard deviation. This means that if two groups' means do not differ by 0.2 standard deviations or more, the difference is trivial. The average value of d was then calculated for the relationship between each pair of programmes.

The same steps were applied to the different functional spaces of the house (kitchen, living room, bedrooms, transition space), to understand how their spatial attributes vary or remain stable across programmes.

9.1. URBAN INSERTION

TABLE 9.1.
Mean values of global and local integration and choice for each studied housing programme.

	NaIn r800m	NaIn r5000m	NaCh r800m	NaCh r5000m
AM	1.05	0.90	0.90	0.94
CHE	0.97	0.84	0.95	0.96
FFH/council	0.95	0.83	0.80	0.85
PMCP	0.90	0.72	0.89	0.82
SAAL	0.87	0.79	0.84	0.75

TABLE 9.2.
Coefficient of variation for global and local integration and choice.

	CV
NaIn r800m	20.29%
NaIn r1500m	26.06%
NaIn r3000m	26.12%
NaIn r5000m	23.19%
NaCh r800m	20.21%
NaCh r1500m	18.99%
NaCh r3000m	20.38%
NaCh r5000m	23.89%

Residents' associations' (AM) estates have the largest average global values of integration and choice, and large values at the local scales.. Tables 9.4.2 and 9.4.3. show they also have large

internal variation. CVs for integration measures are larger among different AMs than between AMs and other programmes. However, as their weakest values in local measures are often larger than the largest values of other programmes, large variation appears to represent the existence of estates with substantially larger values than average.

Housing cooperatives have a similarly large CV, revealing substantial differences between large and small-scale developments. PMCP and SAAL layouts, with measures of urban insertion lower on average, have more internal consistency. PMCP estates, in particular, show larger consistency in all measures within the programme than when together with other types of developmes. FFH developments have similarly low variation among themselves.

	NaIn r800m	NaIn r1500m	NaIn r3000m	NaIn r5000m	NaCh r800m	NaCh r1500m	NaCh r3000m	NaCh r5000m
AM	22.72%	32.25%	33.69%	33.23%	**6.21%**	**15.83%**	**20.06%**	**22.88%**
CHE	24.95%	26.81%	28.10%	28.49%	**16.52%**	20.45%	22.30%	23.73%
FFH/council	**15.37%**	**18.40%**	**16.57%**	**14.97%**	**18.62%**	21.49%	21.11%	**20.84%**
PMCP	**11.99%**	**15.31%**	**17.16%**	**16.33**	**9.76%**	**8.70%**	6.06%	5.82%
SAAL	**18.68%**	29.97%	27.70%	**12.97%**	30.47%	**13.69%**	**15.03%**	26.61%

TABLE 9.3.
Coefficient of variation for global and local integration and choice for each studied housing programme.

There are no large effect sizes between programmes at this scale (table 9.4.). The smallest effect size is between AM and CHE's developments, the largest between SAAL and CHE's layouts. Regarding individual measures, large effect sizes can be verified in normalised choice at all scales between cooperative developments and FFH, PMCP and SAAL layouts.

	CHE	FFH/ council	PMP	SAAL	AM
CHE	0				
FFH/council	0.57	0			
PMP	0.61	0.39	0		
SAAL	0.71	0.28	0.31	0	
AM	0.23	0.46	0.59	0.60	0

TABLE 9.4.
Cohen's d of local and global integration and choice between pairs of housing programmes.

9.2. CONFIGURATION OF ESTATE LAYOUTS

TABLE 9.5. Coefficient of variation for estate layouts' spatial attributes.

	CV
Mean Depth Exterior	43.71%
Funcional Interface Decomposition	28.14%
No Neighbours Score	22.10%
Mean Convex Depth	24.01%
Maze Index	69.67%
Separation Index	42.31%
Distributed non-distributed ratio	109.59%
Total use density	74.29%
Constitutedness	45.43%

When all programmes are considered, all measures present a large coefficient of variation at the scale of the estate layout. At this scale, contrarily to that of urban insertion, measures reliably show more consistent values locally within programmes than globally across them (figure 9.4.6.). Aditionally, differences between programmes all have medium to large effect sizes (figure 9.4.9.). Due to generally high coefficients of variation of measures at this scale, these were divided between those with lower (inferior to 40%, figure 9.4.6.) and more substantial CVs (ranging from 42% to 110%, figure 9.4.8.).

Variables with a CV above 40%:

TABLE 9.5. Mean values of estate layouts' spatial attributes for each studied housing programme (CV>40%).

	Mean Depth Exterior	Maze Index	Separation Index	Distributed non-distributed ratio	Total use density	Constitutedness
AM	1.75	2.01	1.72	0.9	45.9	0.47
CHE (large)	4.18	2.68	2.5	0.72	30.1	0.45
CHE (small)	1.79	1.58	1.42	0.54	17.1	0.34
FFH/council	2.76	2.21	1.91	0.76	0.80	0.62
PMCP	3.24	2.52	2.84	0.96	31.8	0.61
SAAL	3.71	2.37	1.72	0.97	53.2	0.42

TABLE 9.6. Coefficient of variation for estate layouts' spatial attributes for each studied housing programme (CV>40%).

	Mean Depth Exterior	Maze Index	Separation Index	Distributed non-distributed ratio	Total use density	Constitutedness
AM	**14.70%**	**33.23%**	**28.85%**	**40.02%**	**20.83%**	**33.97%**
CHE (large)	**4.76%**	**47.77%**	**16.33%**	**72.07%**	**72.06%**	**37.67%**
CHE (small)	**21.15%**	**25.11%**	**33.33%**	**66.01%**	110.81%	64.94%
FFH/council	**37.50%**	75.54%	**25.24%**	**106.38%**	**42.03%**	**36.92%**
PMP	**19.09%**	72.02%	51.58%	**84.78%**	**36.34%**	**23.68%**
SAAL	**22.19%**	**19.95%**	**29.72%**	**118.66%**	**51.44%**	47.91%

Small scale cooperative housing has the smallest average **maze index**, followed by residents associations' developments, with some internal consistency and a strong d value. While large scale cooperative housing has a maze index above the mean global value, it registers a low d and a medium CV, hence appearing to encompass estates with high and low maze indexes. The same applies to PMCP developments and FFH housing after the revolutionary period. These present a coefficient of variation that is over 70% of its mean values of 2.52 and 2.21, respectively. With very high CVs and consequently low internal consistency, as well as a weak-to-medium difference from other layouts, the values range from the low to the high. SAAL layouts have consistent maze index values that average at 2.37.

Small scale cooperative housing has a **separation index** of 1.42 with a low CV and a high d. This is the defining characteristic of small scale cooperative housing, where dwelling entrances are in general topologically close to the primary street grid. SAAL housing has the highest separation index, with a CV that sits on the defined threshold (0.30) and a very strong d (1.47). Large scale cooperative housing has the second-highest values of separation index but sits above the threshold defined for local consistency, meaning it has both low and high values. PMCP, FFH and residents associations' developments have lower separation indexes. All programmes have strong d values.

Residents' associations' layouts have the most consistent, and also the smallest, values of **total use density** (m^2/resident) of the studied programmes. Cooperative housing, in particular, present very high variation. SAAL housing has the largest values and, while it encompasses both small and large values, it also presents a strong difference from other programmes.

Values of **mean depth from the exterior**, which present large variation when all programmes are considered together, see, in most cases, a considerable decrease when each programme is considered independently.

Variables with a CV below 40%:

	Funcional Interface Decomposition	No Neighbours Score	Mean Convex Depth
AM	2.87	2.67	2.62
CHE (large)	3.84	3.58	3.42
CHE (small)	2.17	2.19	2.21
FFH/council	3.09	2.85	2.87
PMP	3.72	3.56	3.38
SAAL	3.23	3.06	3.25

TABLE 9.7.
Mean values of estate layouts' spatial attributes for each studied housing programme (CV<40%).

TABLE 9.8. Coefficient of variation for estate layouts' spatial attributes for each studied housing programme (CV<40%).

	Funcional Interface Decomposition	No Neighbours Score	Mean Convex Depth
AM	**18.05%**	**9.46%**	**14.99%**
CHE (large)	**2.51%**	**7.88%**	**1.87%**
CHE (small)	**26.76%**	25.07%	24.40%
FFH/council	**19.97%**	**17.53%**	**18.73%**
PMP	**18.93%**	**18.80%**	**19.76%**
SAAL	**27.67%**	**14.27%**	**19.59%**

Small scale cooperatives have the lowest **functional interface decomposition**, with a very strong difference from other programmes. FFH and residents associations' share low average steps between all dwellings, while large scale cooperatives score high values in this measure. SAAL developments present medium values.

Small scale cooperative housing has the smallest **mean depth** with a strong difference from other programmes, making it a defining characteristic of this type of housing. FFH and residents associations' housing has the lowest values, with medium effect strength. While the global d values of large scale cooperative, PMCP and SAAL housing are high, they seem to be affected by small scale cooperative housing's unusually strong d.

TABLE 9.8. Cohen's d of estate layouts' measures between pairs of housing programmes.

	CHE (small)	CHE (large)	FFH/council	PMP	SAAL	AM
CHE (small)	0					
CHE (large)	**2.29**	0				
FFH/council	**0.99**	**1.01**	0			
PMP	**1.41**	0.60	0.70	0		
SAAL	**1.38**	0.83	0.66	0.68	0	
AM	**1.02**	**1.94**	0.55	**1.30**	**1.00**	0

Residents associations' developments, followed by SAAL housing, have the largest values of convex integration. In the latter, these are articulated with a similarly large average difference factor, reflecting integrated but hierarchised spaces. SAAL developments present a strong difference from other programmes, in particular cooperative housing, which is characterised by low average values of integration. However, large scale cooperative housing has a lower internal CV than the global, which encompasses all layouts.

SAAL developments' most integrated spaces are, in two-thirds of cases, transition spaces. PMCP housing's most commonly better-integrated spaces are hard or soft landscapes, followed by transition spaces. FFH housing's most integrated spaces are most usually hard landscapes, followed by the exterior and transition spaces. Cooperative housing never registers a transition space as its most integrated. Small scale cooperative developments tend to have more integrated exteriors or dwellings, while large scale cooperative developments' integration core lies on their

exterior or in hard landscaped areas.

9.3. CONFIGURATION OF APARTMENT SCHEMES

	Integration	Density (m^2/r)	Functional orientation	TUFA	Difference Factor	Mean depth exterior
AM	0.93	19.01	23.64%	71.88	0.75	2.73
CHE	1.10	26.46	21.11%	96.85	0.69	2.72
FFH/council	0.87	18.09	27.44%	68.73	0.69	2.72
PMCP	1.19	16.01	19.33%	62.02	0.69	2.61
SAAL	0.72	28.01	32.52%	89.46	0.82	3.97

TABLE 9.9.
Mean values of apartment schemes' spatial attributes.

	CV
Integration	26.11%
Density	28.32%
Functional orientation	29.22%
TUFA	28.57%
Difference factor	14.75%
Interconnectedness	8.88%
Mean depth exterior	22.61%

TABLE 9.10.
Coefficient of variation for apartment schemes' spatial attributes.

	Integration	Density	Functional orientation	TUFA	Difference Factor	Mean depth exterior
AM	**5.73%**	**1.23%**	**11.54%**	**1.23%**	**2.42%**	6.25%
CHE	**20.57%**	**16.73%**	**24.45%**	**16.73%**	18.19%	22.11%
FFH/council	**18.82%**	**23.81%**	**29.12%**	23.81%	12.05%	**12.39%**
PMP	**24.40%**	**10.47%**	**22.85%**	**17.31%**	18.52%	14.87%
SAAL	**10.75%**	35.09%	**20.60%**	35.09%	**6.86%**	21.30%

TABLE 9.11.
Coefficient of variation for apartment schemes' spatial attributes for each studid housing programme.

At the scale of the domestic environment, there seem to exist sharp pattern differences between programmes. All programmes have medium-to-large differences from each other. The most significant differences are between SAAL housing and all other programmes, and the least significant is between FFH developments and AM layouts, which share one same apartment scheme across several estates. Only one of the studied AM layouts appears to have a different apartment scheme and, in this sense, AM apartments do not appear to justify their own category.

	CHE	FFH	PMP	SAAL	AM
CHE	0				
FFH/council	0.74	0			
PMP	0.60	0.61	0		
SAAL	**1.49**	**0.95**	**1.74**	0	
AM	**0.82**	0.25	**1.04**	**1.39**	0

TABLE 9.12
Cohen's d of apartment schemes' measures between pairs of housing programmes.

		KT mean	LR mean	BR mean	TS mean		KT mean	LR mean	BR mean	TS mean
AM	Integration	0.69	1.58	0.75	1.27	FFH/Council	0.87	1.14	0.75	1.26
	Mean depth	2.78	1.76	2.67	2.01		2.62	2.25	2.84	2.09
	Relative size	0.09	0.24	0.16	0.03		0.09	0.22	0.14	0.03
	Area	6.68	16.97	11.61	1.83		6.61	15.66	10.51	2.63
	Mean depth exterior	2	2	4.07	2.57		2.29	2.25	3.6	2.14
CHE	Integration	0.94	1	0.86	1.69	PMP	1.22	1.41	0.91	1.85
	Mean depth	2.44	2.38	2.55	1.93		2.1	2.05	2.36	1.79
	Relative size	0.11	0.24	0.13	0.05		0.12	0.17	0.14	0.05
	Area	10.25	20.9	11.42	4.09		7.22	9.51	8.37	3.09
	Mean depth exterior	2.17	2.23	3.73	2.23		2.64	2.6	3.64	2.07
SAAL	Integration	0.68	0.86	0.54	0.92					
	Mean depth	3.15	2.75	3.72	2.71					
	Relative size	0.08	0.18	0.12	0.03					
	Area	6.81	14.67	9.9	2.97					
	Mean depth exterior	3.89	3.5	5.81	3.88					

TABLE 9.13. Average values of apartment schemes' measures for each type of space in each studied housing programme.

		KT CV	LR CV	BR CV	TS CV		KT CV	LR CV	BR CV	TS CV
AM	Integration	**3.23%**	**19.91%**	**14.50%**	**27.11%**	FFH/Council	**31.84%**	**31.36%**	**19.31%**	**31.27%**
	Mean depth	**4.14%**	**8.62%**	**11.48%**	**14.25%**		**19.38%**	**19.97%**	**9.32%**	**17.10%**
	Relative size	**21.94%**	**2.14%**	**11.57%**	**19.65%**		39.57%	**30.63%**	**24.70%**	**59.24%**
	Area	**20.36%**	**0.87%**	**12.15%**	**18.72%**		**36.61%**	**33.98%**	**17.57%**	70.40%
	Mean depth exterior	**0.00%**	**0.00%**	**18.98%**	**48.11%**		**18.18%**	**32.81%**	**22.26%**	**47.13%**
CHE	Integration	**25.16%**	**30.91%**	**19.60%**	**60.32%**	PMP	**33.63%**	57.90%	**18.99%**	64.70%
	Mean depth	**19.89%**	**17.72%**	**18.61%**	**23.48%**		**20.25%**	**21.72%**	**13.74%**	**18.67%**
	Relative size	**29.50%**	**29.07%**	**12.96%**	**54.34%**		40.90%	37.93%	31.07%	**53.52%**
	Area	**44.08%**	**27.05%**	**21.79%**	**54.27%**		52.25%	**32.68%**	**25.60%**	**54.80%**
	Mean depth exterior	**17.20%**	**25.80%**	36.16%	**52.64%**		**27.16%**	**25.97%**	**20.08%**	**48.97%**
SAAL	Integration	**14.29%**	**17.54%**	**13.69%**	**23.90%**					
	Mean depth	**12.87%**	**18.24%**	**14.24%**	**18.94%**					
	Relative size	**32.02%**	**27.40%**	**27.47%**	**73.69%**					
	Area	**47.34%**	**35.89%**	**33.65%**	**66.51%**					
	Mean depth exterior	**39.18%**	**46.51%**	**33.44%**	**43.45%**					

TABLE 9.14. Coefficient of variation for apartment schemes' measures for each type of space in each studied housing programme.

Cooperative housing tends to have significantly larger apartments than other programmes. With a CV of 17% for all area related variables and d values ranging from 0.98 and 1.21, cooperative housing includes the largest housing schemes in the set of studied cases. PMCP estates, which include instances of older designs and is the oldest of the studied programmes, does not include any cases where apartment area conforms to legal requirements. With CV values that range from 10 to 16% and d values ranging from 1.33 to 1.40, this is a defining characteristic of pre-1974 council housing. Similarly, FFH housing also tends to have total useful areas below the legal minimum. With areas averaging at 68.73m2, these apartments tend to be larger than PMCP housing and smaller than all other developments. Conversely, SAAL developments display area-related measures with a local CV of 35% and a global d value of medium strength. This reflects the variety of SAAL apartment schemes, whose area values range from the lowest to the highest. Inconsistent across cases, the average area of these layouts complies with the minimum legal area.

SAAL developments are the most transitional oriented, with almost one-third of transition spaces. Its local CV suggests small variation, and it has a large difference factor from all other programmes. The most functional oriented programme is the PMCP, which presents around one transition space for every five functional spaces, a CV slightly above 20% but a very large difference from other programmes. FFH housing has a slightly larger average functional orientation, with one in each four spaces being transitional or unlabeled. Due to extreme outliers, this set of estates has lower internal consistency.

Associated to large values of functional orientation, SAAL housing also presents the largest values of mean and total depth, as well as depth from the exterior. SAAL housing has the most significant differences to other programmes both globally and locally and high internal consistency. FFH housing also presents relatively large, but less consistent, depth values. PMCP housing presents the lowest average depth values, but not the lowest instances. It has an average mean depth of 2.2 and an average distance from the exterior of 2.6, both with a low CV and large global d. Cooperative housing sits in the median values, usually closer to FFH than to PMCP housing values.

FFH, cooperative and PMCP housing have similar difference factor average values, low CV values and medium strength d values that reflect a strong difference between them and SAAL housing. The latter has the largest values of difference factor, with a very small coefficient of variation and a very large d.

9.4. FUNCTIONAL SPACES IN THE DOMESTIC ENVIRONMENT

Functional spaces were compared in three ways:

1. How the same functional space performs across programmes

2. How functional spaces perform in relation with each other: general genotype

KT	AM	CHE	FFH/ council	PMP	SAAL
AM	0				
CHE	0.39	0			
FFH/Council	0.13	0.30	0		
PMP	0.68	0.52	0.53	0	
SAAL	0.44	0.77	0.47	0.91	0

TS	AM	CHE	FFH/ council	PMP	SAAL
AM	0				
CHE	0.6	0			
FFH/Council	0.32	0.41	0		
PMP	0.56	0.14	0.36	0	
SAAL	0.66	0.60	0.59	0.63	0

LR	RA	CHE	FFH/ Council	PMP	SAAL
AM	0				
CHE	0.62	0			
FFH/Council	0.20	0.28	0		
PMP	0.19	0.62	0.34	0	
SAAL	0.52	0.53	0.42	0.63	0

BR	RA	CHE	FFH/ Council	PMP	SAAL
AM	0				
CHE	0.48	0			
FFH/Council	0.33	0.44	0		
PMP	0.85	0.51	0.72	0	
SAAL	1.31	1.15	1.14	1.60	0

TABLE 9.15. Cohen's d of apartment schemes' measures for each type of space in each studied housing programme.

3. How functional spaces perform in relation with each other within each programme.

	KT CV	LR CV	BR CV	TS CV
Integration	37.06%	47.99%	25.01%	60.34%
Mean depth	22.21%	36.10%	22.19%	25.77%
Relative size	39.06%	33.53%	25.64%	63.77%
Area	48.60%	41.89%	25.95%	64.63%
Mean depth exterior	39.22%	39.70%	35.84%	56.00%

TABLE 9.16. Coefficient of variation of apartment schemes' measures for each type of space.

All types of functional spaces present either low or medium coefficients of variation of integration. This indicates that integration values tend to be similar for the same type of functional space across different programmes. Those with the larger average CV and, as such, the least consistency, are transition spaces and living-rooms. The first shows a wide range of integration values across layouts, but tend to remain among the largest. In SAAL housing, kitchens also present high variation. Bedrooms, exterior spaces, other spaces and the exterior are the types of functional spaces that present the most internal consistency, with CV values often under 20%. The ordering of functional spaces by integration is relatively consistent across programmes. With some exceptions, the collective areas are the best integrated, followed by the services area and then bedrooms. Transition spaces present, on average, the largest integration value in each apartment scheme - a tendency that is countered in FFH apartment schemes, where the living room is often the most integrated space. Cooperative housing presents larger variation in the ordering of functional sectors.

Regarding depth from the exterior, the three primary functional sectors seem to follow a pattern of collective-to-private ordering in all types of layouts. Living-rooms and then kitchens are generally the ones the fewest steps away from the exterior. This depth is of approximately

2.50 steps for FFH housing, 2.12 steps for cooperative housing and 3.18 to 3.27 steps for SAAL layouts. While these values vary between 2 and 4 for the first three types of development, SAAL housing - much deeper on average - has kitchens and living-rooms that vary between being 2 and 7 steps away from the entrance. Transition spaces, with generally high variance, are also relatively shallow. These follow kitchens and living rooms in PMCP and SAAL housing and precede them in cooperatives and FFH housing. This may indicate that other types of spaces are used as transition spaces in the latter programme. These are then followed by bedrooms. In FFH housing these are, on average, around 1 step deeper from the entrance than kitchens and living-rooms. In the case of cooperative housing, bedrooms are relatively deeper, at an average of 2.59 steps, and in the case of SAAL layouts, with bedrooms that range from shallow to the deepest (2 to 8 steps), they average at 5.70 steps. Exterior spaces are usually deep, associated with other types of spaces and one step away from them. In the case of SAAL layouts, where many exterior spaces work as a privacy-enhancer between the exterior and the interior, they are relatively shallow at 2.91 steps from the exterior.

SAAL housing presents the largest mean depth values. The lowest value of mean depth in SAAL apartment schemes is similar to the largest in PMCP housing. As such, while in SAAL apartments living rooms tend to be the shallowest from all other spaces, they present values of mean depth that would be large in other programmes. Transition spaces are particularly shallow in cooperative housing, and a steep decrease of depth between functional spaces cannot be identified. PMCP housing generally presents low mean depth values, with a steep increase from shallow to deep occurring between the living-room kitchen set and bedrooms. In FFH housing, this increase happens between living-rooms and kitchens. In SAAL layouts there is a differentiated shallower sector encompassing living-rooms and kitchens and a deeper area encompassing all other types of spaces.

The relative size of functional spaces is, in general, not internally consistent. The programme with the most consistent values within different types of space is cooperative housing, with CV values that range between 13% for bedrooms, 20% for living-rooms 27% for kitchens and 31% for exterior spaces. It is also the type of housing development with the most consistent layouts in terms of area, which is generally larger for all types of space than in other programmes. On average, one quarter (25%) of the apartment is dedicated to the living-room which, with the average size of 22.7m2, sits well above the legislated minimum and ideal areas. Bedrooms take, on average, 13% of the apartment area each. With an average area of 11.5, it seems that bedrooms would also be around or above the legislated minimum and ideal areas. Kitchens are less internally coherent in terms of relative size, averaging at 11% of the size of the apartment with 10.67m2. While transition spaces are effectively the larger in all programmes (4.36m2), they don't take a larger percentage of space. Exterior spaces and other types are small balconies or rooms for washing and drying clothes. FFH housing, despite often being subject to normalising processes, presents low internal consistency. Its area values round the legislated minimum and ideal areas,

assigning an average of 21% of apartment space to living-rooms (15.1m2), 14% to bedrooms (10.15m2) and 11% to kitchens (7.66m^2). The smallest apartments developed within the PMCP assign more relative space to the kitchen-marquise set of spaces, which averages at almost 13% of the apartment area. Kitchens have an average size of 6.92m^2 and bedrooms take, on average, 14% of the apartment and, with an average area of 8.33m^2, often don't comply with the minimum legal area. In PMCP housing, living-rooms are both smaller and represent a smaller percentage of the apartment. Kitchens are the smallest in SAAL housing schemes, taking 9% of the space of the house. The size relationship between bedrooms and living-rooms is similar to FFH and cooperative housing layouts (11% and 16%), and exterior spaces that take a large amount of space. Front-yards and backyards are an important characteristic of SAAL housing, taking around 13% of the space of the house, and averaging at 13.18m^2.

Types of spaces

Practically all bedrooms are independent of functional spaces, being in their majority a-type spaces, with the most significant exceptions in FFH housing, where 8.7% and 8.6% respectively are c-spaces, located in rings. SAAL housing has the most significant percentage of kitchens located in rings (55.56% are c-spaces), but it also has the largest number of kitchens as a-spaces (33%). FFH housing kitchens are in around 55% of cases either a-spaces or b-spaces connecting to marquises, and 44% are in rings. Cooperative housing has the most significant percentage of kitchens as b-spaces connecting to marquises (64%), with only 36% being in rings.

SAAL housing has the highest percentage of independent living rooms (40%), all of which either connecting to other spaces or being in rings. 10% directly connect functional spaces, and 50% are in rings. FFH housing have a small percentage of independent living-rooms (20% and 17% respectively), with around 20% directly connecting functional spaces and more than 50% being in rings. 8% of municipal housing living-rooms are dependent on functional spaces. Cooperative housing is in between, with 36.36% of living-rooms being independent a-spaces, 18.2% being b-spaces connecting functional spaces, and 45.45% being in rings.

FFH housing has a vast majority (80%) of independent a-type exterior spaces, with 20% in rings not directly connected to functional spaces. Municipal housing has the ringiest exteriors (60%), with 20% being in a ring with kitchens and 40% being independent a-types. Exterior spaces are exclusively a-types in cooperative housing, with half being independent and half dependent on kitchens. SAAL exterior spaces are the second ringiest (55%), around 35% are independent a or b-types and 9% are dependent on kitchens.

The ringiest transition spaces are those of municipal housing (around 35%) with the rest being b-types connecting functional spaces. FFH and SAAL housing have around 15% ringy transition spaces, and cooperatives 20%. SAAL housing is marked by a large percentage of independent transition spaces (21.4%) which are either not common or inexistent in the other programmes.

PART III

CONTEXTUALISATION AND DISCUSSION

10. PAVING THE WAY: PUBLIC HOUSING BEFORE 1974

Introduction

The object of this chapter is the ensemble of housing developments of the second phase of the first large scale public housing programme in Porto, the Improvements Plan for Porto (*Plano de Melhoramentos para a Cidade do Porto,* PMCP). As far as it is necessary in order to interpret and assign social meaning to the developments' spatial properties, the chapter will first look at the context in which they were created. It will provide an overlook of the housing conditions in Porto throughout the 1950s to the late 1960s. It will then propose a contextualisation of the PMCP as appearing both in continuity and rupture with the first housing programme developed by the state by focusing on two points: (i) the role of the state as a housing provider and its role in this specific case; (ii) and the integration of the developed estates in a broader strategy of urban development which was to some extent responsible for the city's current configuration.

Furthermore, this chapter will explore the creation of the conditions throughout the late 1960s and early 1970s that would allow for the transformation of housing policies and development in the country after 1974. While the maintenance of labour through housing development had been an institutional concern since the 1933's regime was established, it was during its socio-economic liberalisation in the late ninety-sixties that the foundations for the development of consistent housing programmes in the country were created. The chapter will go through three different transformations that took place during this period, and that largely affected how the housing question was approached in later years, institutionally and architecturally:

1. The alteration of institutional structures within the regime apparatus, in particular the integration of housing and land policies into the country's economic plans, and the creation of the



FIGURE 10.1.
Plan of Porto in 1932 (top) and plan of Porto in 1960, with PCE's developments (bottom)
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research

FFH as a new institution for housing development, which had the objective of integrating a new national housing policy with urban planning, centralising both in a single organic structure.

2. The consistent body of work developed in the National Laboratory of Civil engineering (LNEC), encompassing a series of different approaches to housing research that spanned from sociological to investigation on constructive processes, which assisted public housing development. It will identify a series of socially concerned principles and objectives. As seen in chapter 4, these were explicitly stated throughout documents spanning research proposals and reports that had to do with an ongoing and foreseeable transformation within intra and inter-family relations, and so deviated from the traditional family values that had been a basis of the regime's rhetoric.

3. The growing discussion of the housing question within the field of Architecture, which suffered a gain in momentum around 1969. In paralel, the undergoing paradigm shift in relation to the previously dominant modernist approach, which was evident, and with greater consequences in Porto's architecture and contribution to public housing development.

10.1. INTRODUCTION TO THE HOUSING QUESTION IN PORTUGAL

Queirós (2013, 2015) characterises Porto in the mid-1960s as being severely overcrowded, with a population of around 300.000 people. As a source of comparison, we can consider that the municipality of Porto had a population of around 237 591 in 2011, according to data provided by the Portuguese statistics institute (*Instituto Nacional de Estatística*, INE). Consequently, a considerably smaller and less dense urbanised area had a resident population that was a total of around more 62 400 people than it is today. Furthermore, the number of inhabitants per square kilometre, which was in average of 7000/km2, reached the double of this value in the two areas that housed the largest part of Porto's most impoverished populations: the historical centre and the housing estates built from 1956 onwards.

As shown in figure 10.1, the city suffered considerate growth during the period that goes from the implementation of the new political regime in 1933, up to 1960. The development of housing estates focused in areas of Porto that were the least urbanised, in particular the vast area to the west of the centre towards the ocean. This had consequences for the historical centre that arose both from a change in urban dynamics and the lack thereof. While residents from disadvantaged areas in the centre, seen by the regime as problematic, were being moved to new peripheral housing, the living conditions of those who stayed remained mostly unchanged, with aggravated social problems.



FIGURE 10.2.
Plan (left) and photograph (right) of a ilha in Porto
Saraiva, 2019, p.114, p.185

Throughout the 20th century, populations from rural areas in the country's interior moved to the city, causing great population growth. By the mid-1960s, Porto's historical centre had suffered from overcrowding for nearly a century. Families - often more than one - shared small and unsanitary houses, bedrooms or other spaces with no access to running water, kitchen or toilets. These were often sublet, rented at highly speculative prices to families that could not access the formal housing market. In adjacent areas to the historical centre, sublets of parts of the old bourgeois houses were less frequent. Instead, *ilhas*, a name that translates to islands, was given to a typology of small houses built in rows in the back of private houses' lots, remnant of the city's industrialization period. Built to take advantage of Porto's deep but narrow lots, these were small in size, accommodating a living space, a sleeping space, a kitchen and an entire family (figure 10.2). The houses were separated from the urban space, hidden behind the façade of bourgeois buildings, and connected to the street only through an exterior corridor which went through the main building. This type of housing sheltered approximately one third of the city's inhabitants at the start of the XXth century (Pereira, 1995), and continued to be constructed up to the 1930s.

While the overcrowded historical centre remained mostly untouched (Queirós, 2013, 2015, Oliveira, 2013) and the problem of *ilhas* was never close to being solved, the living conditions in these areas were worsened by the new urban dynamics brought about by the city's growth. Employment opportunities for these residents decreased substantially as important commercial and industrial activities, namely those connected to the port, moved to outside the city centre (Oliveira Ramos, 1994). Public services and facilities relocated to more accessible areas of a transforming city became mostly inaccessible to these populations. Life conditions became even more precarious. The solutions advanced by the municipality for the problem of inadequatly-housed populations were not only clearly insufficient but sometimes responses to a completely different problem.

10.2. THE ECONOMICAL HOUSING PROGRAMME AND IDEOLOGICAL PRODUCTION

Cardoso (1983, p.69) defines housing crisis as "long-term persistent inadequate provision, which may take the form of quantitative shortages and/or qualitative deficiencies in the level of amenities provided internally and externally to housing and/or too high prices relative to purchasing power." In this definition, a housing crisis is related only to its consumption. The author then identifies two types of housing crises. The first has to do with housing as a necessary element for the reproduction of labour, in the sense that it provides the conditions for its existence. A gap between the conditions of housing provision and that which is necessary for labour productivity and the maintenance of wages has direct economic implications, creating



FIGURE 10.3.
Bairro de Casas Económicas do Amial (EHP)
Photograph by the author

what Cardoso calls a reproduction crisis. The second relates to the reproduction of social relations, which has been seen in chapter 2 to be part of the reproduction of labour. It takes place when "housing provision does not match the historically evolving needs and aspirations of a more or less important sector of the population." (1983, p.72) The author considers this type of crisis is a social crisis and, even though it may have significant political implications, it does not have direct economic consequences.

Finally, Cardoso (1983, p.75) argues that, in Portugal, the crisis never took the dimension of a reproduction crisis, and characterises the Portuguese housing crisis as "a widespread social crisis coupled with a limited reproduction crisis in some areas and in relation to some socio-professional categories (mainly skilled blue and white-collar workers)." This is supported, in the author's view, by housing having not been used as a Keynesian device. It was instead often meant as a means for social and political maintenance, which did not always mean searching for an adequate solution for the mass of ill-housed populations in the city. An example of such a case was the Economical Housing Programme (*Programa das Casas Económicas*, PCE) that was implemented in 1933 along with a series of legislation aimed at strengthening the repressive apparatus of a newly formed corporatist, authoritarian state. The PCE was, Cardoso (1983) argues, only concerned with the reproduction of labour in skilled professions. While it was the first state intervention in housing matters that was more than entirely residual, it only had a real impact in the two largest urban areas in the country, where both industry and the state apparatus were concentrated (Cardoso identified only 15% of developments outside Porto and Lisbon).

Borges Pereira and Queirós (2012, p.26) add that the PCE was also a "powerful tool serving the urbanisation of Portugal's major cities, a landmark of the first large State-led movement for the expansion of these cities beyond their central parishes"[17]. The programme coincided with a period of development of productive forces, in particular in industry, where production tripled between 1933 and 1956 (Gros, 1982). Simultaneously, productivity remained low in agriculture, and so did agricultural jobs, which resulted in the great influx of families from rural areas to urban centres that did not have the conditions to shelter them. In this context, Pereira (1995) indicated that, between 1890 and 1911, approximately half of the city's population originated from outside the council and around 30% from outside the district, from areas that were markedly rural. The development model in place favoured industrial capital, which meant low wages, but still rents remained high and living conditions low - a question which remained unsolved for decades. Nevertheless, it was in this context that the first large-scale public housing programme appeared, in paralel with other state policies and programmes for the consolidation of industrial capital (such as the great enterprise of construction of streets, bridges and dams), taking on forms

17 "[...] poderoso meio ao serviço da urbanização das principais cidades do país, marcando o primeiro grande movimento conduzido pelo Estado de expansão destas urbes para lá das respectivas freguesias centrais." Translated from Portuguese to English by the author.

"The family on its own requires two other institutions: private property and inheritance. First the property of the goods which the family can use and even the property of goods which may yield a return. The intimacy of family life demands protection, isolation, in one word, asks for a house, an independent house, our home. It is impossible, and in many cases even inconvenient, to make the worker the owner of the means of production or to divide the land into minuscule plots, giving everybody a small piece of land to grow their own products. But it is very useful that the instinct of property, which is a feature of human nature, is allowed to express itself in the ownership of the own home. The families who live underneath their own roofs are naturally more economical, more stable and better founded For our independent temperament and our moderate and well-behaved simplicity, we (the Portuguese people -A. C.) prefer the small independent house sheltering the family which owns it in earnest."

António de Oliveira Salazar, 1933 in Cardoso (1983)

"It may be easier to solve the housing question vertically, in immense blocks. But the small house, independent, it is peace, quiet, love, the just sentiment of property, family. The hive is promiscuity, revolution, hatred, simultaneously the individual is the crowd."[18]

António de Oliveira Salazar, 1938 (na imprensa, in Citações de Salazar)

adapted for populations used to rural-living.

Moreover, it was explicitly directed at civil servants, national union members and state and municipalities employees, which formed the support basis of the government in place. While initially entirely financed by the state, the PCE followed a market logic which resulted in the fixation of limits for construction and land costs, as well as in rents which, with no redistributive policies in place, required a steady and adequate wage. The conditions for eviction were strict not only for those who failed payments but also in regards to the moral and political behaviour of tenants. Access to these houses was meant to create feelings of privilege that were explored by the official rhetoric, opposing the "healthy life" of the new neighbourhood to the "promiscuity" of the city centre (Borges Pereira & Queirós, 2012). At the same time that a robust ideological state apparatus used the housing developments as a tool for reinforcing the loyalty of these sectors of the population to the government, a strong repressive system was maintained in these neighbourhoods through the placement of members of the political police in the houses and the generalisation of delations amongst tenant of unfavoured moral and political behaviour.

These mechanisms were reflected in the spatial characteristics of the housing enterprises. As shown in figure 10.1., the developments were located in inexpensive not yet urbanised areas of the city, reinforcing the fragmentation of the city's population and social differentiation between groups and classes. The PCE both imposed a feeling of privilege and superiority over the populations left in *ilhas* and other spaces in the centre (Borges Pereira & Queirós, 2012), and a feeling of insecurity that was due to the strict rules that governed the right of access to a new house and made it extremely easy to lose it. Simultaneously, it was an illustration of the moralising role of the family as one of the ideological bases of national identity.

This type of housing programme was not new or unique to this context, neither in its urban morphology and architectural typology, nor in its strong ideological character. Many industrialising European countries developed low-density single-family housing for the working class, often tied to moralist or hygienist ideals. In Porto and across the country, housing for industrial workers had been built since the late 18th century. In the 1930s Portugal, peripheral neighbourhoods consisting of small single-family houses with backyards were articulated with an aestheticised idea of a Portuguese House (figure 10.3) and tied nationalist values to natalist domestication of social relations that focused on the family.

While all ideological production favoured private property and owner-occupation of houses, materialised in the possibility for tenants of acquiring their houses, Cardoso (1983, p.219) makes the crucial point that no special advantages were given to it over private rental, noting that "the

18 "Seria possivelmente mais fácil resolver o problema da habitação no sentido vertical, no bloco imenso. Mas a casa pequena, independente, é o sossego, a tranquilidade, o amor, o sentimento justo da propriedade, a família. A colmeia é a promiscuidade, a revolução, o ódio, simultaneamente o individuo é a multidão." Translated from Portuguese to English by the author of this dissertation.

comparison of owner-occupation policies pursued by the government before and after 1974 shows that, whatever the ideological importance assigned to this tenure type, at the end of the day economic pressures were the main determinants of State involvement." In the PCE, the part played by the single-family typology in constructing the idea of a Portuguese family at the basis of the regime did not articulate with the creation of material conditions for families to become what they appeared to be.

10.3. THE "PORTUGUESE HOUSE" AND MODERNIST ARCHITECTURE

The developments of the PMCP expressed a logic of spatial segregation and social control but, meant to house a large mass of the population from the *ilhas*, it required negotiation of the ideological role of single-family housing. After the end World War II, as the State started more clearly favouring processes of capitalist urbanisation of which housing was an important part (Borges Pereira & Queirós, 2012), criticism of the single-family typology was generalised both amongst factions of the regime and within the discipline of architecture. The arguments used were veiled, often praising the single-family typology as an ideal yet unfortunately unpractical solution while simultaneously making a case for the economic and technical advantages of collective housing, as well as an idea of community and human solidarity that it may bring. Within the discipline of Architecture, with the growth of an important faction of modernist, generally progressive, architects, the traditionalist aesthetic of the regime was seen as a political question standing in the way of an adequate development both of housing and urban space.

This idea was reflected in the growing focus of architectural theoretical production and publications on modernist urbanism and social housing from 1945 onwards. Architectural magazines translated and made accessible articles on foreign examples of large-scale modernist housing (Hervé, 1951, Costa, 1953) and essential works of theoretical production, such as the Athens Charter (Le Corbusier, 1948) and Neufert's work (Neufert, 1949), and published pieces claiming that the planning of modern cities and housing for all was a duty of the State ("A Construção, pelo Estado, de Vivendas para Empregados e Trabalhadores", 1945, Meli, 1946, "Actas Oficiais do VII C.I.A.M.", 1951) and criticising traditionalist forms of architecture:

> In the countries where war crippled cities, some of which centuries old, a new conception, the combination of science and art, is vigorously, practically and scientifically developed - Urbanism. […] "It is the cities of wrecked France which start emerging from the ruins. But they don't emerge as ruins, rebuilding themselves house by house, street by street,

> they emerge from the rubble as new cities, of an entirely new plan, designed according to modern life. […] And so happens with all old cities, except those whose municipalities annually create a renovation plan.[19] (Costa, 1946, p.145)

> It is clear that it is possible to make ionic anta capitals with concrete; it is always possible to make today's materials mimic old forms; but was this what those who are mimicked in the name of tradition did? They translated their time as well as they could, with the means they had. Who is the better traditionalist in the good sense of the word: the one who copies the letter or the one who copies the spirit? […] Should I cite Hitler's architecture? There is the most monumental example of formal traditionalism's failure: those random and mandatory epistyles and columns masked a complete lack of depth and connection to the past. Force is not subtle; there is no tyrant who doesn't want to be loved, and there is no tyrant who is. […] If we convince ourselves that in order to respect our race and our traditions we must create mantels and rise pinnacles, we are only betraying ourselves: and we lose a proud tradition of explorers, of magnificent creators […][20] (Palla, 1949, p.5)

In 1948, Portuguese architects came together in the first national congress of architecture to address the housing question. The conclusions that came out emphasized the urgency of integrating housing production in modern urban planning, rational as opposed to "economic, moral and other prejudices which crystallised it [housing] in inadequate or non-generalisable forms" and eliminating "although gradually, models that have long been condemned but are still common among us." ("Congresso Nacional de Arquitectura", 1949, p.2) Residential buildings should be "(…) as far as possible determined by scientific rigour and to the least possible extent by individual emotion" ("Congresso Nacional de Arquitectura", 1949, p.14). The single-family house model was deemed unreasonable and impracticable. Following the principles of the 1933 Athens

19 "Nos países em que a guerra mutilou as suas cidades, algumas das quais de existência muitas vezes secular, desenvolve-se vigorosamente, prátiva e cientificamente a nova concepção, mixto de ciencia e arte, que é o Urbanismo. (…) São as cidades da França devastada que começam a surgir das ruínas. Mas não surgem das ruínas, reconstruindo-se casa por casa, rua por ura, surgem dos escombros como novas cidades, de plano inteiramente nove, concebido de acordo com a vida moderna. (…) E sucede assim com todas as velhas cidades, exceptuando-se aquelas em que as suas câmaras vão aualmente realisando um programa de renovação"

20 "Está claro que com o cimento armado também é possível fazer capiteis jónicos; é sempre possível obrigar os materiais de hoje a imitar formas antigas; mas seria isso o que faziam aqueles que em nome da tradição se pretende imitar? Esses traduziram o melhor que puderam, e com os meios ao seu alcance, a sua época. Qual será o melhor tradicionalista no bom sentido da palavra: o que lhes copia a letra, ou o que lhes copia o espírito?"p4 "quereis que vos cite a arquitectura de Hitler? Eis o mais monumental exemplo do fracasso do tradicionalismo formal: aquelas arquitraces e colunas arbitrárias e obrigatórias mascaravam uma absoluta falta de profundidade e de ligação ao passado. A força é pouco subtil; não há tirano que não pretenda ser amado, e não há tirano que o consiga. (…) Se nos convencermos que para respeutar a nossa raça e as nossas tradições teremos de debruçar cornijas e eriçar pináculos, só a nós nos traímos: e lá se vai por água abaixo uma tradição orgulhosa de descobridores, de criadores magníficos (…)" Translated by the author.

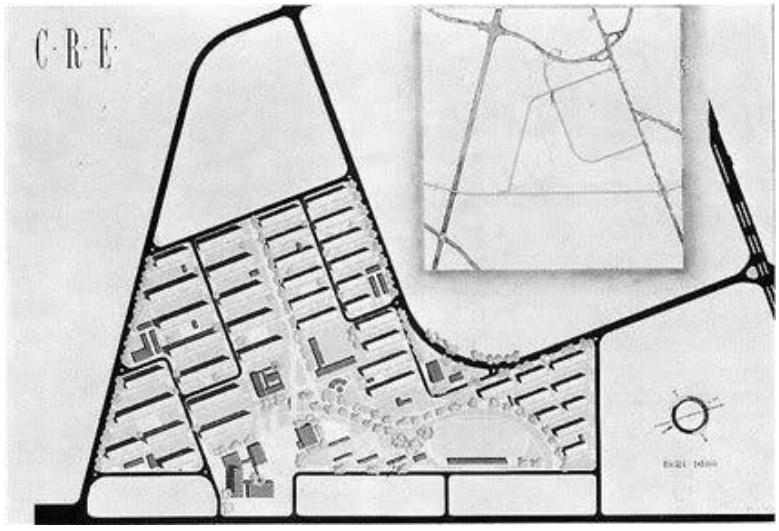




FIGURE 10.4.
Plan (top) and photograph (bottom) of Bairro de Ramalde
Plan in Lebre, 2016, p.41, photograph by the authorof this dissertation.

Charter, residential buildings at least ten storeys high were recommended, grouped in order to form large residential clusters advantageous for the development of retail, services and public spaces, while simultaneously controlling the prejudicial qualities of the sprawl of urban centres. Built on pilotis and freeing the ground level for a system of public spaces, these buildings were to be free from the street grid and oriented according to the sun and winds. Additionally, the conclusions called for the importance of integrating these new housing developments in the city, building them in wealthy areas close to public transportation. They urged for the permanent abolishing of the old models of public housing, both in their morphological and repressive characters.

The realisation of such ambitious propositions for the future of cities and public housing required the development of the productive process. The development of prefabrication and standardisation, as well as the use of new materials and constructive processes, was proposed as a means to create Le Corbusier's "LA MACHINE À HABITER" ("Congresso Nacional de Arquitectura"*,* p.12, capitalised in the original), and as the only way to "accomplish the extraordinary task of giving hygienic, comfortable and economical housing to all those who need it." (" Congresso Nacional de Arquitectura"*,* 1969, p.2) Of equal urgency were considered the development of legislation capable of controlling speculation, and the creation of a centralised institution for the development of social housing and research of related subjects that were capable of planning at a national level.

While the conclusions of the congress were explicitly modernist, modernism was not the sole perspective explicitly critical of the traditionalist models adopted by the regime. Almost in parallel to the creation of the ODAM (*Organização de Arquitectos Modernos,* Organisation of Modernist Architects) in Porto in 1947 and to the 1948 national congress which defended the Athen's Charter (" (…) without ever forgetting that it must be applied in straight connection to national reality"[21] ("Congresso Nacional de Arquitectura", 1949, p.3)), another perspective was materialised in an essay strongly arguing against the idea of the 'Portuguese house' as "a type of house, with certain qualities, a certain nursing and sweetness of its shapes, a great quantity of useless details from which results in an excessive picturesque, a complete absence of dignity and no notion of our world's realities"[22] (Távora, 1945). The primary explicit argument of this second current against the traditionalist aesthetic that had been adopted by the regime was not urban or economical, but that it represented a historically non-existent tradition. This argument materialised, in 1958, in the organisation of a survey on vernacular housing in Portugal (*Inquérito à Arquitectura Popular*

21 "[...] não esquecendo nunca que a sua aplicação se deve fazer em estreito contacto com as realidades nacionais." Translated from Portuguese to English by the author of this dissertation.

22 "[...] um tipo de casa, com certas características próprias, certo amaneiramento e doçura de formas, grande quantidade de pormenores inúteis de que resulta um excessivo pitoresco, uma completa ausência de dignidade e nenhuma noção das realidades do nosso mundo." Translated from Portuguese to English by the author of this dissertation.







FIGURE 10.5.
Demolished ilhas (4 464) and new housing developments (5 453), representing 24 700 rehoused people in March 1965
Original drawing in Porto's Municipal Archive

FIGURE 10.6.
Plan of Porto 1960, with PCE' and PMP (1st phase) developments
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research

FIGURE 10.7.
Plan of Porto 1960, PMP developments (second phase)
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research

em Portugal) by a large number of well-known architects, that concluded that there was not one 'Portuguese house', but a Portuguese architecture of such variety as there were contexts. The survey focused on the formal qualities of architecture, and while it displayed a forgotten reality of the country, it was this aesthetic focus which made it readily accepted by the regime (Portas, in Figueira, 2002). The adaptation of these formal qualities of vernacular constructions into modern architect reflected in the future of architecture, and consequently of social housing, in the country and, specifically, in Porto.

The contradictions between different architectural currents in the country will continue to be clear throughout the next chapters. What both demonstrate in their opposition to the regime's aesthetic is that it was becoming clear that there existed an inherent contradiction between the 'Portuguese house', corresponding to a traditionalist faction of the regime, and the city's development, corresponding to industrial capital's interests.

10.4. COLLECTIVE HOUSING AND CITY GROWTH

Industry continued to develop after World War II, and in particular from the 1950s onwards, dependent on european investment that bridged the gaps in public investment, and centred on military spending in the course of the Portuguese colonial war. Agriculture remained stagnant and urban centres continued to grow. In this context, the discussion between traditional single-family housing schemes and modern collective typologies was not a merely academic debate, but translated the growing necessity for a model of urban development sustained in a transformation of the economic model that could, in turn, sustain the growing industrial capital.

The first steps had been taken. A social housing block had been built in Porto as early as 1940 but, in a central area where *ilhas* pullulated, it was an exceptional example of architecture that was not repeated in the city. In around 1949 a second example was built in the scope of an affordable housing programme by social security institutions for its beneficiaries. The only intervention by this programme in Porto was designed by Távora (figure 10.4.) and was not only the first recognisable social housing estate in the city, as an ambitious (if not fully completed) project for a large scale modernist neighbourhood unit that should reflect the operations carried on in Lisbon and other areas of the country. By the time the Improvements Plan for the City of Porto (*Plano de Melhoramentos da Cidade do Porto,* PMCP, figure 10.5.) was approved by the municipality in 1956 to address the problem of the *ilhas*, examples of collective typologies in social housing had already been built in the city.

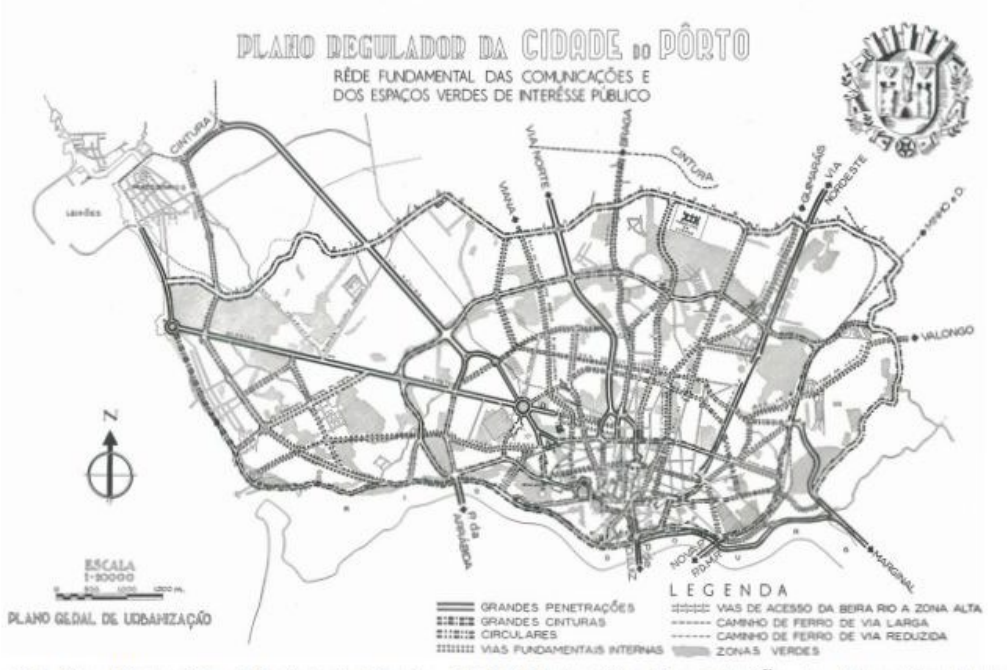




FIGURE 10.8.
Plano Regulador do Porto (PRP) (top) and Plano Director do Porto (PDP) (bottom)
Antão de Almeida Garrett, 1947-52. In José Luís Krug, Quantifying Urban Growth: confronting planned and actual street network in Porto, 2018, p.97, p.100

While the housing problems in the centre remained unaltered, some minor efforts had been made towards bettering the life conditions in *ilhas*. In 1936 the municipality developed a basis for future action by creating a committee for gathering information on the dimension and real conditions of the problem[23], and for proposing possible solutions for its resolution. A report developed in 1938 showed that, up until then, nothing had been done to improve living conditions in the *ilhas*, and proposed a series of punctual, non-systematic measures to counter this situation. Under the plan for the *ilhas* that it originated[24], these ought to be torn down or renovated with the landlord's permission, or bought at market prices by the municipality, with no concern for the re-housing of their inhabitants. This plan touched a minimal number of houses, it was still considered a brutal project. The law that regulated the PMCP critiqued it for effectively rendering people homeless, forcing the *ilhas* inhabitants to find housing nearby, either in already overpopulated houses or by squatting in abandoned buildings, thus "creating situations so painful that they made it humanly impossible to proceed." (decree-law 40 616, 1956)

As an alternative, the PMCP proposed, in 1956, the simultaneous construction of a total minimum of 6 000 affordable houses within ten years, meant exclusively for inhabitants of the unsanitary buildings that should be demolished or renovated, in *ilhas* or otherwise. These could now be torn down without previous expropriation or restitution to landowners, who were then legally prevented from further speculation of either newly vacant land or houses without authorisation from the municipality. While only a few *ilhas* were demolished, and none of them benefited from renovation work (Gros, 1982), the plan was successful in accomplishing the proposed number of houses. The first phase of the plan was concluded in 1966 with the construction of 13 housing developments, with around 25 000 people being moved from the centre and assigned new houses by 1974 (Borges Pereira, 2011).

> The new houses, assembled in small buildings, should constitute clusters well distributed throughout the city (…) It is considered very important that these clusters are integrated into urban areas correctly organised, with all the necessary facilities sufficiently represented, at least in the last phase of their urbanisation.
>
> The concretisation of the housing programme is strictly connected to the resolution of another important problem for the future of the city of Porto, which is addressed in the second part of the plan defined in this law. This problem concerns the creation of expansion areas, to be subordinated to urban plans carefully studied, within the general ideas of the plan already approved by the Government."[25] (decree-law nº40 616: 631)

23 *Comissão para a Salubrização das Ilhas*

24 *Plano para a Salubrização das Ilhas*

25 "As novas casas, reunidas em pequenos prédios, deverão constituir agrupamentos ou núcleos bem dis-

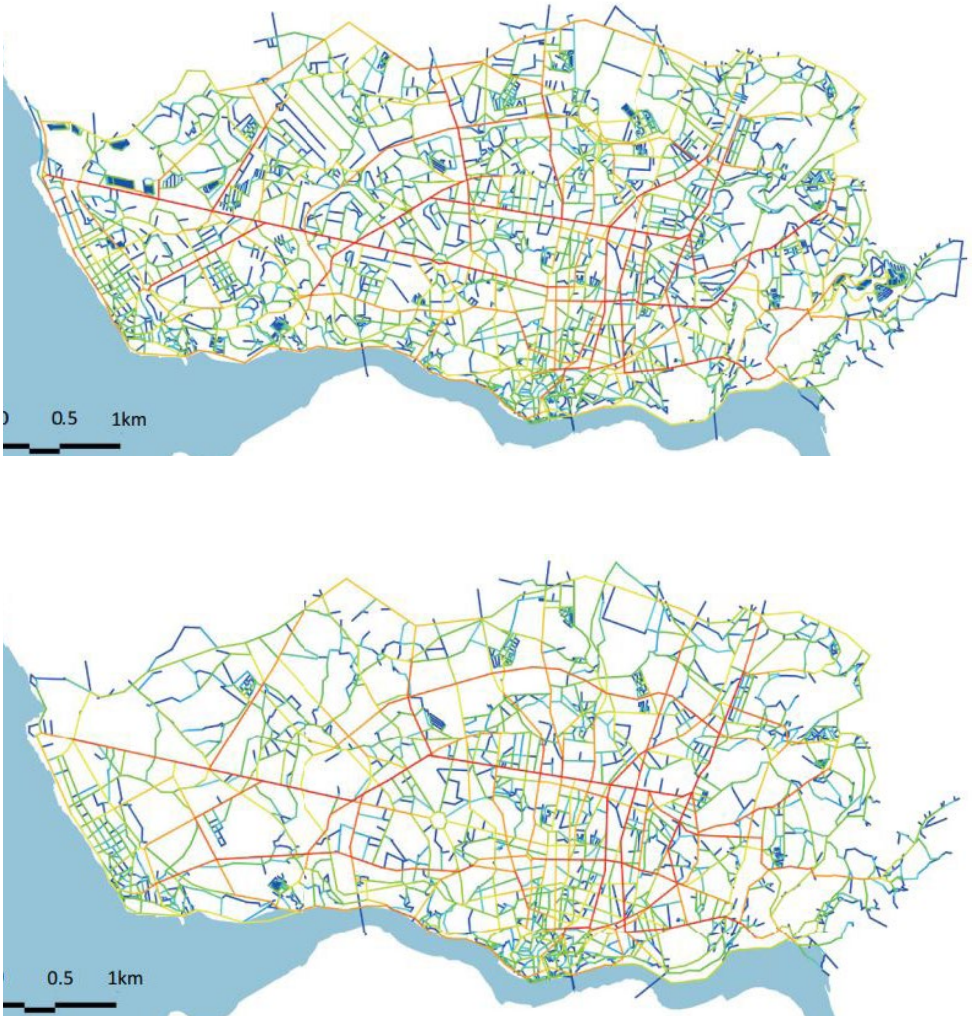


FIGURE 10.9.
PRP (top) and PDP (bottom) Normalised Choice r=7000
José Luís Krug, Quantifying Urban Growth: confronting planned and actual street network in Porto, 2018, p.146,147

The scale of the PMCP required it to be articulated with a larger urban plan for the city. Raising a series of new, specific urban problems which had to be addressed promptly if the 6000 houses were to be built within the desired timeline, the development of the PMCP "within the general ideas of the plan already approved by the government" demanded the elaboration of a new urban plan for the city. This new urban plan that was approved in 1962 (*Plano Diretor da Cidade do Porto* - figure 10.8..), replacing one just eight years its prior (*Plano Regulador da Cidade do Porto* - figure 10.8), was vastly responsible for the growth of the city in the subsequent decades. If the articulation of a large scale social housing programme with a global plan for the city was something new, the localisation of public housing layouts in urban space seemed to follow the same logic it had before. The new housing estates were built in peripheral areas within the city limits, where urban land was cheaper. This was made in compliance with plans that assured a dominance of tertiary activities and consequent removal of most residential functions from the centre.

Moreover, the new plan introduced a series of alterations that impacted the way these housing developments formed relations with the rest of the city. The 1954 PRP plan focused on local networks, considering four progressively larger scales of intervention that ranged from the neighbourhood to the global urban area, that would assure a growth that provided connections between local areas and consequently result in less segregated residential areas and a decrease of urban holes. On the contrary, the new PDP plan privileged global car mobility and was characterised by the introduction of heavy infrastructure in the city's urban grid, which determined the connection of the city to the adjacent municipalities at the expense of more segregated local areas, less connected amongst themselves (Krug, 2018, figure 10.10.).

The resulting city grew close to the adjacent municipalities forming a large metropolitan area,

tribuídos na área da cidade [...]. Considera-se condição muito importante a integração destes núcleos em unidades urbanas corrctamente organizadas, dispondo de todo o equipamento exigido pelas zonas residenciais e em que as diversas classes sociais estejam representadas em doseamento satisfatório, pelo menos na fase final da sua urbanização. A realização do programa de habitações surge assim estreitamento relacionado com a resolução de outro problema também de reconhecida importância para o futuro da cidade do porto, do qual se ocupa a segunda parte do plano definido por este decreto-lei. Diz esse problema respeito à criação de zonas de expansão, a submeter a planos de urbanização de conjunto cuidadosamente estudados, dentro da disciplina geral do plano regulador já aprovado pelo Governo." Translated by the author.

26 "A) Habitações
Construção no prazo de dez anos, a partir de 1 de Janeiro de 1957, de prédios urbanos com a capacidade mínima de alojamentos de 6000 fogos, de rendas módicas, destinadas exclusivamente a habitação de famílias provenientes das construções a demolir ou a beneficiar de harmonia com o disposto no n.º 2 da alínea seguinte.
B) Urbanização
1) criação de zonas de expansão que permitam a realização das construções previstas na alínea A), facilitem o desenvolvimento normal da cidade e atendam às necessidades de descontentamento das suas zonas centrais.
2) Demolição das construções que sejam condenadas nos bairros denominados "*ilhas*" e noutros considerados insalubres, remodelação urbanística das respectivas áreas e beneficiação dos prédios que possam subsistir.
3) Urbanização da zona do Campo Alegre, coordenada com a construção pelo Estado da nova ponte sobre o Rio Douro e das respectivas artérias de acesso a incluir na rede de estradas nacionais." Translated by the author.

but this improved accessibility was assured by a reliance on global routes such as radials and highways that resulted in the deterioration of the local network (Krug, 2018).

Both the 1954 and the 1962 plans depended on the adoption of collective housing typologies in the periphery. Both proposed zoning for the city that, allied with the growth of a public transport network which would allow distances between houses and the workplace to grow larger (Oliveira, 2013), should be able to free the centre for services, commerce, retail, business and administrative activities (Oliveira et al., 2015) while removing masses of the population to suburban areas. However, the new plan adapted to the PMCP forewent local concerns with urban connections, social segregation and social mixity. A new urban plan for Porto started being developed during the 1980s by Porto's Urban Planning Office (*Gabinete de Planeamento Urbanistico*) that only started being put in place by the 1990s (Oliveira Ramos, 1994). The 1962's PDP was determinant for Porto's development during three decades of rapid growth and densification.

10.5. THE DEVELOPMENTS OF THE PMCP

10.5.1. ESTATE LAYOUTS

Between 1956 and 1966, the implementation of the PMCP resulted in the construction of thirteen housing developments (figure 10.6.) and the relocation of 15% to 20% of all *ilhas*' residents to new houses (Queirós, 2013, Borges Pereira, 2016). In most cases, these were developed in areas outside the planned inner radial of the city (VCI) that were mostly non-urbanised at the time. The idea expressed in the legislation that the new estates should be located near the demolished *ilhas* was abandoned in all cases but three, and these were instead located in the vicinities of the areas that had been assigned an industrial function in both urban plans. Because lots should be favourable for the municipality to buy or expropriate and then let at affordable prices to the poor populations of the *ilhas*, the housing schemes developed between 1956 and 1966 were often placed right next to the already existing economic housing layouts. These were often lots that had been previously bought by the municipality (Borges Pereira and Queirós, 2011, p.27). There, the estates could take advantage of already existing streets, infrastructure and transportation, while simultaneously being guaranteed both proximity to work in the industrial complexes and some social mixity.

The strategy of urban integration of these housing estates in the city seems to have followed the same logic of peripherisation as before, although now integrated into an urban plan that

should be able to articulate the then-segregated housing clusters in urban growth. Similarly, the right to be relocated in public housing remained dependent on one's moral and political behaviour, which continued to be heavily monitored within the new neighbourhoods., where the existence of a State overseer was common. The possibility of being evicted for behaviour misconducts meant, for a population used to inhabit an unregulated back of the city that now saw its behaviour strictly controlled, that housing remained a precarious possession. It was, however, a considerably less expensive possession. Rents were lower and could be further lowered or suspended in case of necessity, making it possible for families to have a house of their own.

Mainstream media and architectural publications criticised the policy of displacing populations from the city centre to segregated housing clusters in areas without the necessary urban facilities. Architects' propositions, often stepping outside merely disciplinary concerns, continued to stress the necessity of a centralised administration for social housing that was capable of planning at a national level, of creating anti-speculation legislation to make it possible to acquire more central lots (Teotónio Pereira et al., 1969, Teotónio Pereira 1969a, 1969b), and of encouraging cooperative housing and other non-speculative types of private intervention (Costa Cabral and Portas, 1960, Teotónio Pereira et al., 1969). 1964's national economic plan was an important landmark - integrating for the first time a plan for public housing which included the PMCP, and proposing measures for facilitating expropriation processes - and 1968's plan furthered action for the regulation of speculation and land ownership. However, the housing layouts developed by the municipality from 1966 onward were only marginally more central than before and, no longer profiting from the economic boom that followed World War II, were less numerous and took longer to complete.

> Auspiciously created and begun, claimed all over the country as the example to follow, inclusively earning repeated public praise by the most representative national figures, the PMCP agonises in the shadow of past laurels - after an abrupt fall... It is surprising... that lately it is said or sustained that the paralysis of the city when it comes to fundamental urban questions is justified by the fact that the Administration considers the second phase of the PMCP as a priority, focusing on it all its money![27] ("Vai em queda vertical o Plano de Melhoramentos", 1973, , p.200)

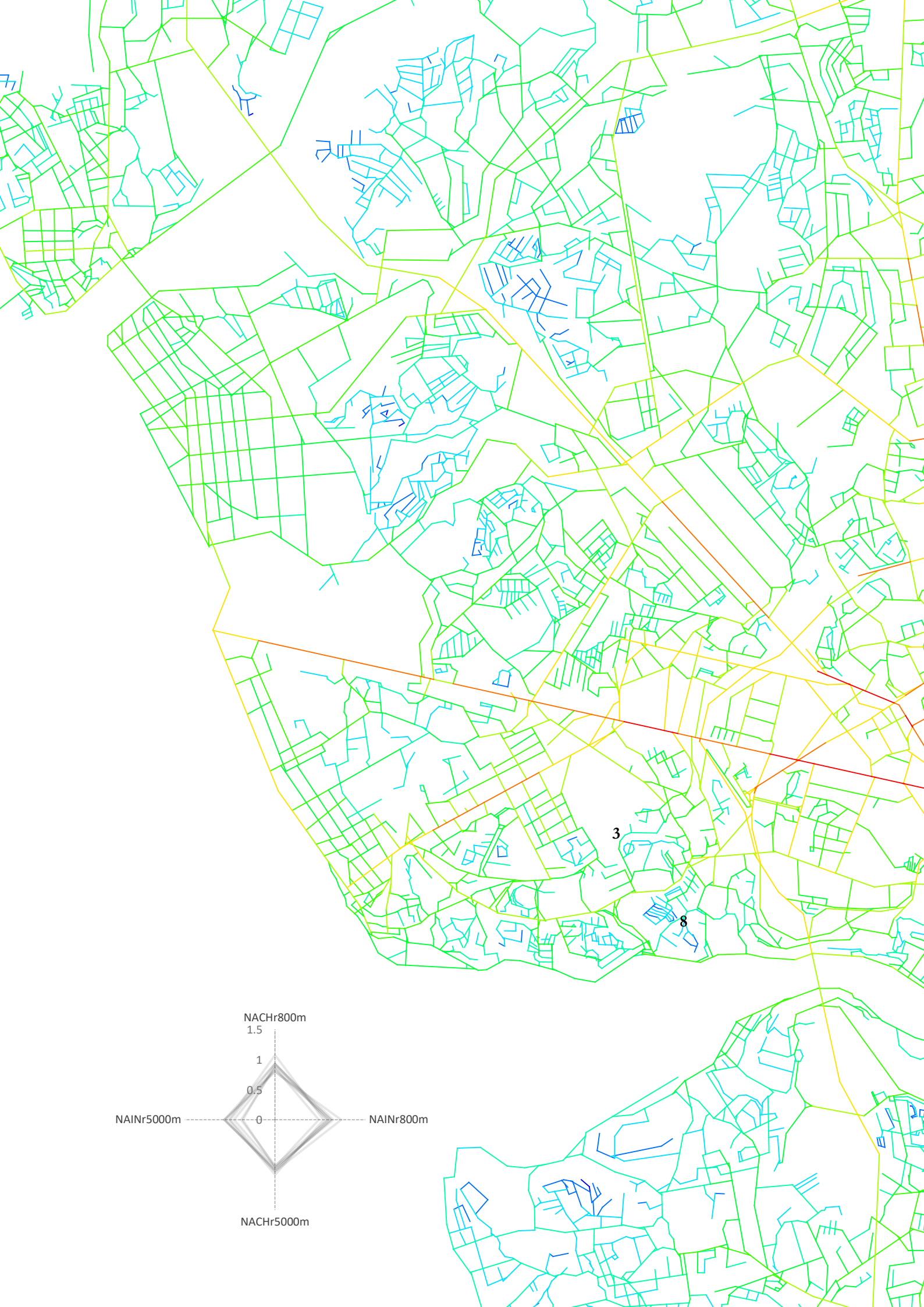
27 "Criado e iniciado tão auspiciosamente, tendo dado brado em todo o país como exemplo a seguir, tendo merecido inclusivamente repetidos louvores públicos das mais representativas figuras da Nação, o Plano de Melhoramentos agoniza à sombra dos louros do passado - após uma queda vertical… Espanta por isso…. Que nestes últimos tempos se venha disendo ou se tente sustentar, que o marasmo no qual a cidade vive no que respeita aos problemas fundamentais de urbanização se justifica pelo facto da Administração considerar o 2º Plano de Melhoramentos como prioritário, fazendo incidir sobre ele todos os seus grandes esforços e todos os seus melhores dinheiros!" Translated by the author.



3. Nuno Pinheiro Torres
4. Monte da Bela
5. Falcão
6. Lagarteiro
7. Bom Pastor
8. Aleixo
9. Contumil



FIGURE 10.10.
Plan of Porto 2003, PMP developments (second phase)
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research


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1
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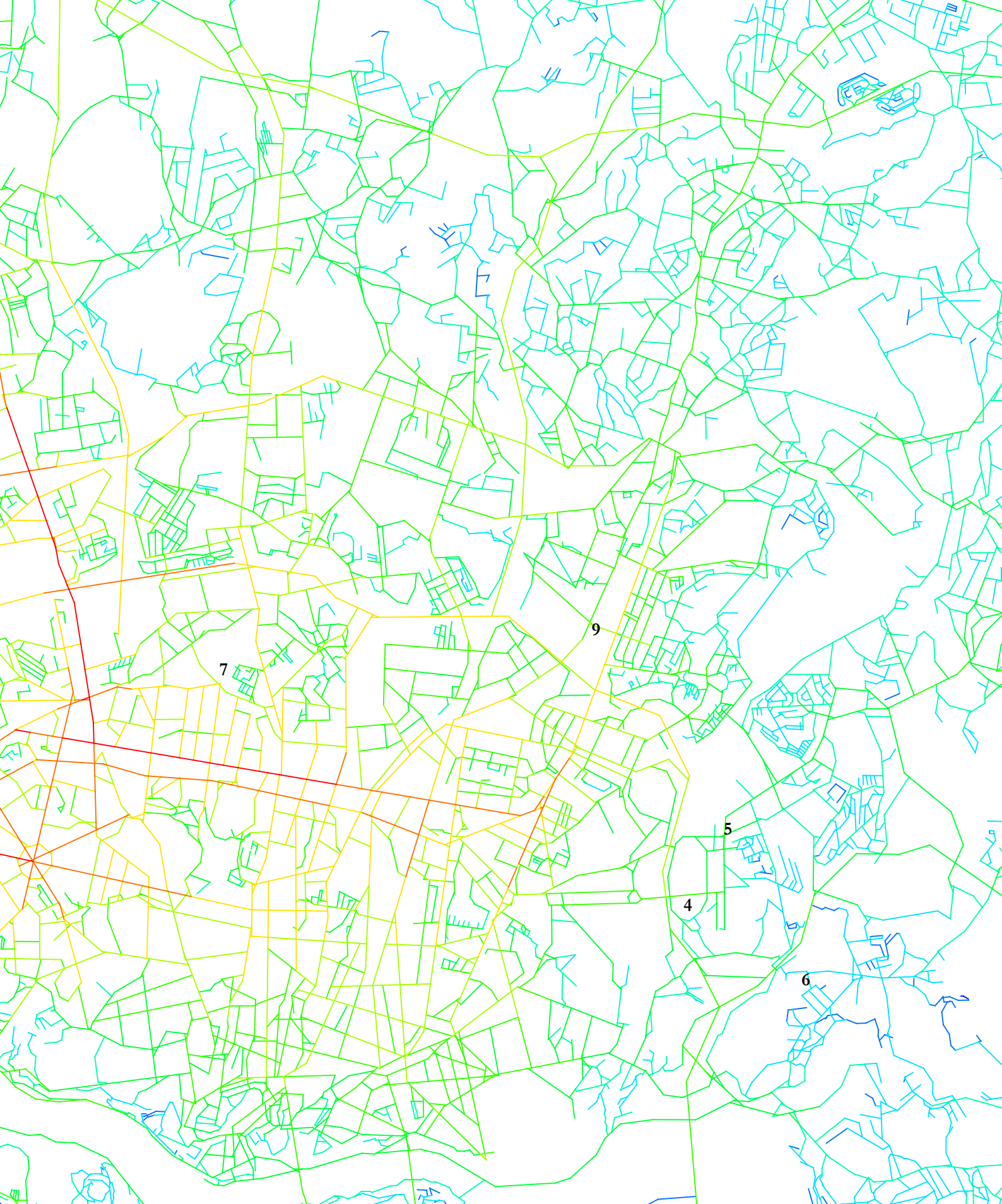
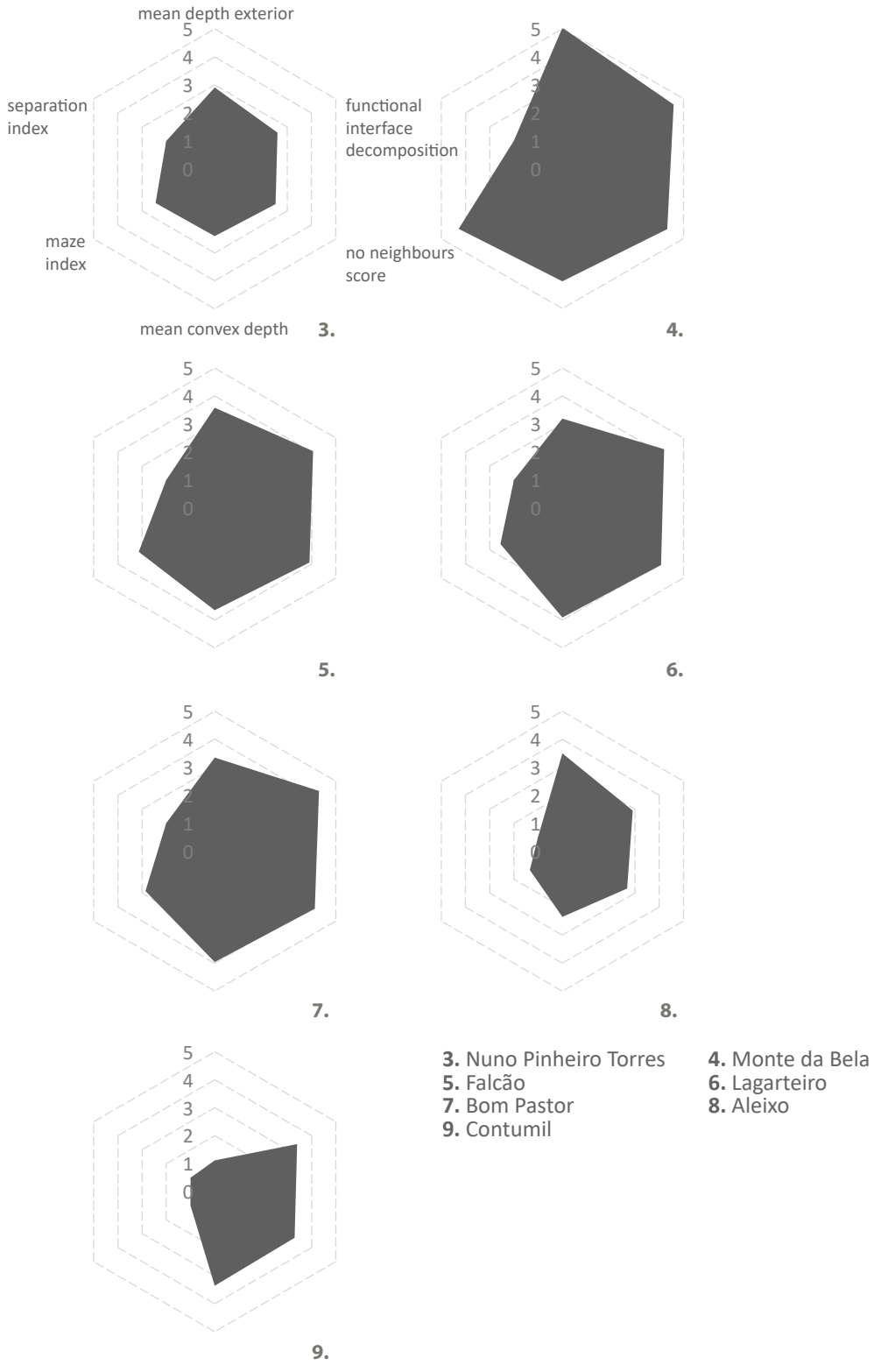


FIGURE 10.11.
Porto, normalised integration r=5000 with PMCP's estates.
PMCP's estates' values of normalised global and local integration and choice (left)



3. Nuno Pinheiro Torres
4. Monte da Bela
5. Falcão
6. Lagarteiro
7. Bom Pastor
8. Aleixo
9. Contumil

FIGURE 10.12.
Depth measures of PMCP layouts

Relation with the surrounding city

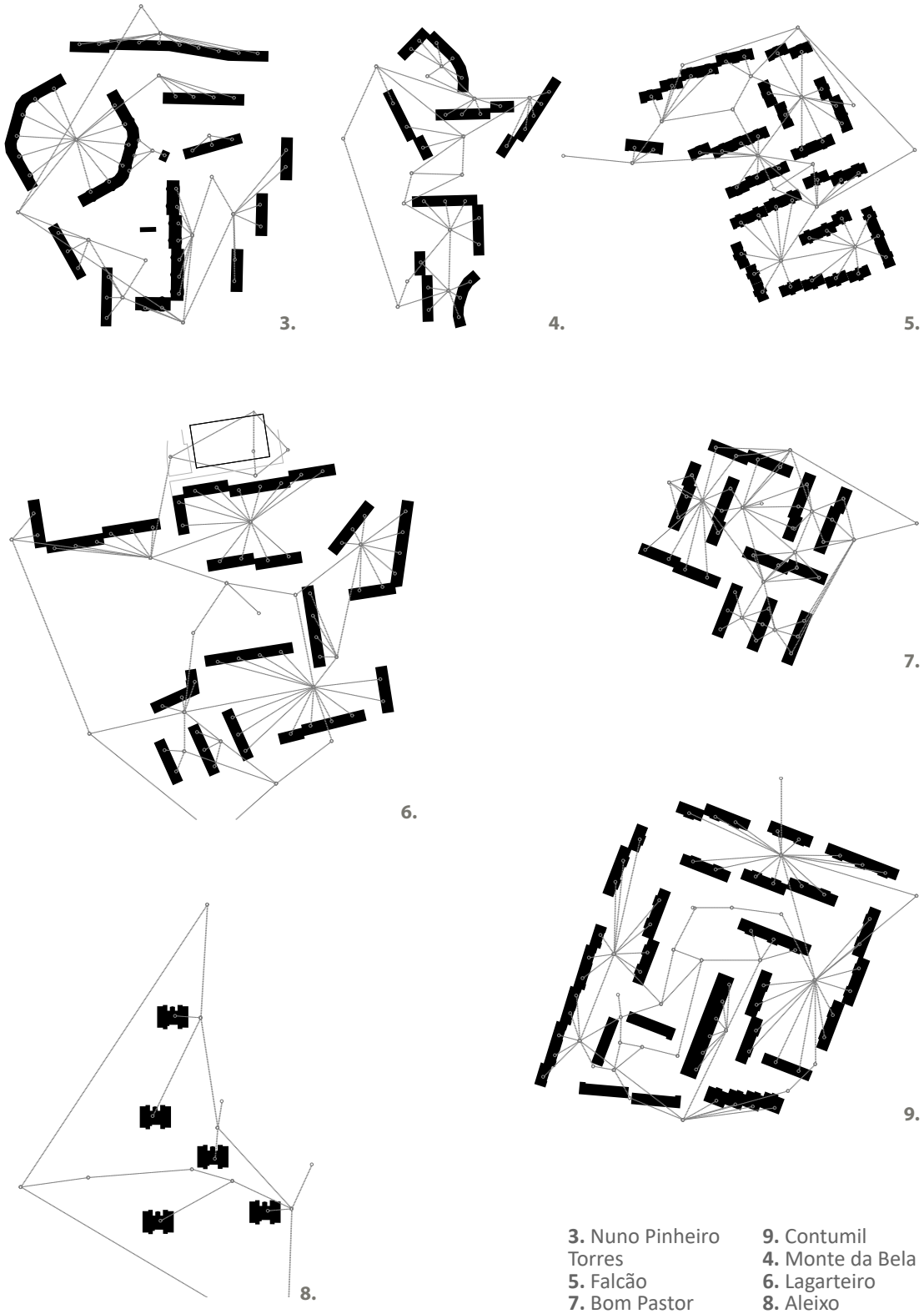
The extension of the PMCP resulted in the construction of 9 new housing developments between 1964 and 1975[28] (figures 10.10 and 10.11.). Of the nine, the first two (S. João de Deus (1), Aldoar (2)) were located in the whereabouts of existing economic housing, following the strategy of urban integration of the first phase of the PMCP. One other (Bom Pastor (7)) was located within the area proposed for the demolishing of *ilhas*. Two (Pinheiro Torres (3), Aleixo (8)) were developed to the west, between the river and Avenida da Boavista (one of the principal axes of the city which, finished in 1915, had been the accessibility basis for urban growth towards the ocean, the development of Porto's public transportation network and the residencialisation of an area that was in the process of de-industrialisation). Three (Monte da Bela (4), Falcão (5), Lagarteiro (6)) were built to the east of the outer radial of the city, in an area that maintains its rural character until today. Finally, the last (9) was located to the northeast, between two of the principal axes that connected Porto to its adjacent cities.

If all these areas suffered transformations as the city grew over the last decades, it was, as expected, the two estates to the southwest that profited the most from urban growth. The low-density area of Monte da Bela (4), Falcão (5) and Lagarteiro (6), enclosed between an industrial complex east of the inner radial (VCI) and a low-density, still rural part of the city in the east, registered a considerably lower growth of the city around them. The better and the worst integrated estates were also the ones in areas of the city that appear to have changed the less. Layout 7, already initially well articulated into the urban tissue, is now located in one of the better-integrated areas of the city. Layouts 1 and 2 have been omitted, as these earlier estates are more representative of urban and morphological models from the first phase of the PMCP.

	#houses	area (m^2)	NaIN5000	NaIN800	NaCH5000	NaCH800
3. Nuno Pinheiro Torres	428	70000	0.68	0.73	0.78	0.86
4. Monte da Bela	179	34395	0.83	1.10	0.86	0.80
5. Falcão	236	46482	0.56	0.88	0.76	0.87
6. Lagarteiro	397	89669	0.53	0.96	0.79	0.92
7. Bom Pastor	446	38189	0.84	0.92	0.84	0.93
8. Aleixo	247	31560	0.77	0.81	0.91	1.08
9. Contumil	329	10841	0.85	0.93	0.81	0.81
	323.14	45876.57	0.72	0.90	0.82	0.89

TABLE 10.1.
Normalised integration and choice values of PMP estate layouts

While over half of these areas are today well integrated into the city, the housing developments are often not. The housing layouts of the second phase of the PMCP were, in most cases, placed to take advantage of vacant lots in the centre of existing blocks. They were distanced from the surrounding city by existing buildings in the front of lots, often with only a few openings connecting the estate to the surrounding city, and so invisible from the primary street grid. This is reflected in high 'maze index' values verified in all but the later PMCP layouts (figure 10.12, table



3. Nuno Pinheiro Torres
4. Monte da Bela
5. Falcão
6. Lagarteiro
7. Bom Pastor
8. Aleixo
9. Contumil

FIGURE 10.13.
Plan and convex breaking of PMCP estate layouts

10.1.), where a shift can be verified not only in the approach to integration in the urban tissue but also to the organisation of spaces within the layout.

Residents of *ilhas* were relocated from small, overcrowded, and insanitary houses hidden in voids in the urban fabric in the city centre, to small but supposedly healthier houses hidden in the inside of wide lots in peripheral areas. Removed from the primary street grid, the new housing developments faced inward. If relatively high maze index values, indicating that non-residents with no local knowledge are unlikely to pass through the layouts, are easily explained by the existence of an extra step between the street and the estates, it is interesting to note that the separation index is low for all layouts. There are not complex systems of transition spaces between the street and the houses, which means people reach inhabited spaces nearly after entering the spatial system. Contrarily, most of these developments' residents do not reach the street shortly after leaving their houses, being on average more than three convex steps away from the primary city grid and reaching five on the most complex layout (Monte da Bela (4)). The later estates (Aleixo (8) and Contumil (9)) again contradict this tendency. Aleixo (8), a clear exception in its morphology, has residential towers along an axis which became integrated into the city's street system. Contumil (9) is the only of these layouts which constitutes street front in a consolidated urban area, as well as the one the most penetrated by external roads, becoming a shallower, more grid-like system.

Relations between collective spaces

Evolution of design paradigms seems to have taken place throughout the period when these seven layouts were developed. Nuno Pinheiro Torres (3) was the first layout to adopt a morphology of different sized blocks placed freely in the lot in order to create differentiated streets and courts between buildings. While not entirely inserted in the urban tissue, it connects directly to the street grid and is a shallower, more grid-like system than those that followed. Monte da Bela (4), Falcão (5) and Lagarteiro (6) have more hierarchical systems of streets and courts, creating a more tree-like structure in the process, with high values in all depth measures and a higher number of cul-de-sacs. Buildings are organised around three court-like spaces which often have soft-landscaped areas or a sports field in the centre of access streets, and are many times separated from sidewalks by gardened areas and from the street by redundant walkways, creating a meticulous system of accessible spaces within one ample visible convex space. If for this comparison only the larger convex spaces were considered, it is interesting to notice that this system of redundant accessibilities is abandoned along with central courts as the layouts transition to a more grid-like street system. In Contumil (9), soft-landscaped spaces lose their roundabout character and become their own convex spaces with the potential to be used rather than seen. In parallel, as the designs become grid-like, the percentage of spaces constituted by entrances to functional spaces seems to grow, and the depth between them seems to decrease. Despite being removed from the primary urban tissue, residents are on average fewer steps away from the primary city grid than from the entirety of the estate.



FIGURE 10.14.
Appropriation of green spaces in layout 4, Monte da Bela (left) and layout 3, Nuno Pinheiro Torres (right)
Photographs by the author.

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
3. Nuno Pinheiro Torres	2.91	2.59	2.52	2.40	2.44	2
4. Monte da Bela	5.04	4.59	4.32	4.03	4.29	2
5. Falcão	3.58	4.06	3.91	3.65	3.14	2
6. Lagarteiro	3.19	4.20	4.07	3.91	2.56	2
7. Bom Pastor	3.34	4.31	4.13	3.96	2.86	2
8. Aleixo	3.5	2.91	2.67	2.35	1.34	1
9. Contumil	1.13	3.40	3.29	3.36	1	1
	3.17	3.62	3.45	3.31	2.43	1.63

TABLE 10.2.
Depth values of PMP estate layouts

The reduced number of equipment built also contributes to lessening the need for people to use the entirety of the estate. Both the PMCP and many original designs included urban equipment and social facilities as essential elements of the estates, "(…) where besides moral and material assistance are established cultural and recreational centres that take ill-prepared youth off the streets or inconvenient spaces" (Decree-law nº40 616, p.631). However, many were only provided after 1974 or were never concretised.

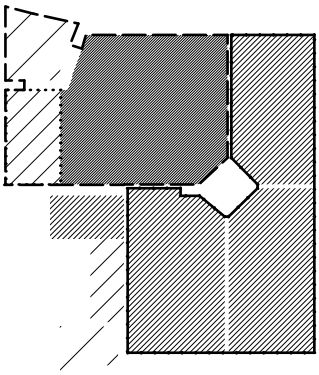
While only a few layouts provided exterior spaces that were well integrated, shallow from buildings and with the a-type qualities that characterise spaces of permanence, it does not mean that others do not have the potential for collective appropriation. As we will see further on, the small apartments were unfit for certain essential domestic functions which then had to find their space outside. An important example of this is the appropriation of the common areas of the buildings or apparently remainder green spaces predominant in earlier layouts for the drying of clothes, there providing the potential for encounter between women.

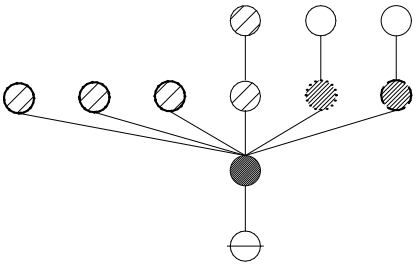
10.5.2. APARTMENT SCHEMES

If the relocation to peripheral housing estates represented a transformation in the lives of the populations from the historical centre that was, to a great extent, the result of the urban and morphological character of these places, part of it was also due to a profound alteration of their domestic environments. Council apartments not only represented a significant increase in space for families that either lived in *ilhas* or shared overcrowded houses in the centre, but also, and consequently, provided an organisation of the domestic space considerably different from what these populations previously experienced.

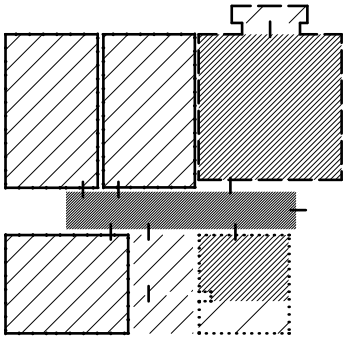
Moreover, the apartments developed by the council office for housing were not only different from *ilhas* or rented rooms but presented a set of defining characteristics that set them apart from housing schemes developed by other programmes after 1974.

It was seen in chapter 4's results that attributes relating to the functional organisation of houses, such as the articulation or lack-thereof of kitchens and living-rooms, the transitional

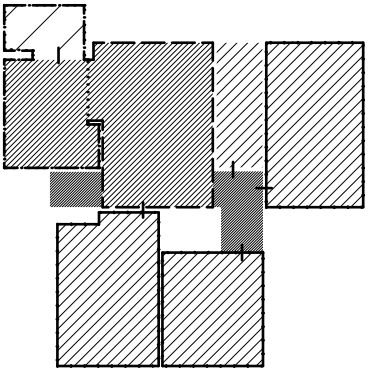


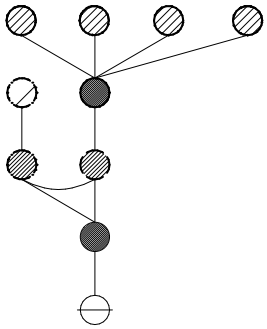


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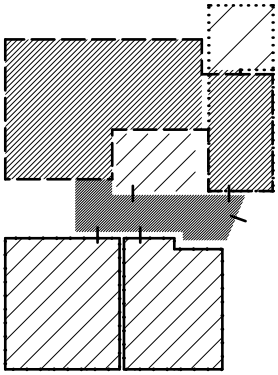


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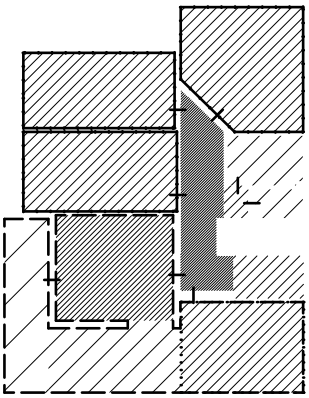


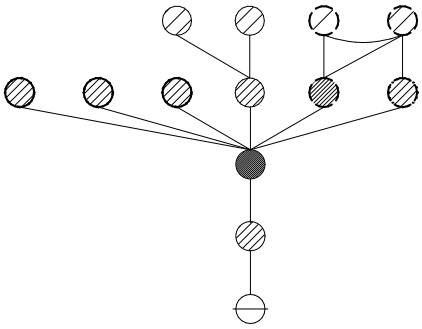


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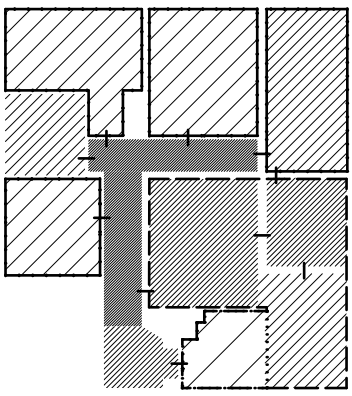


7.

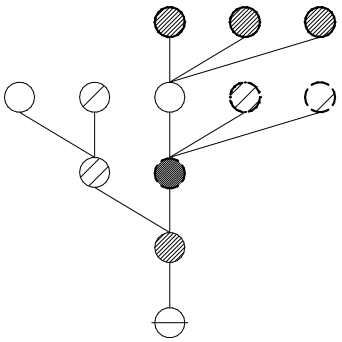


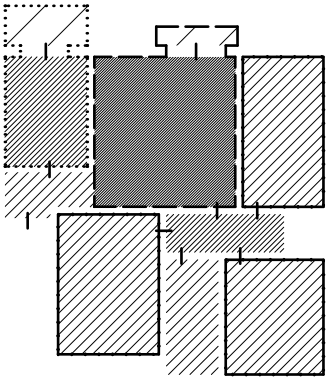


8-A.

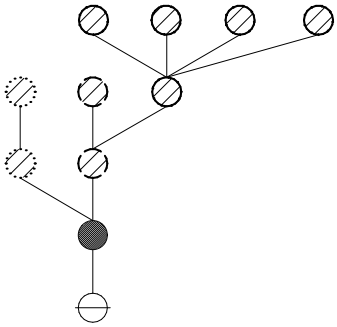


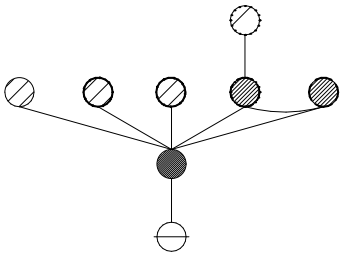
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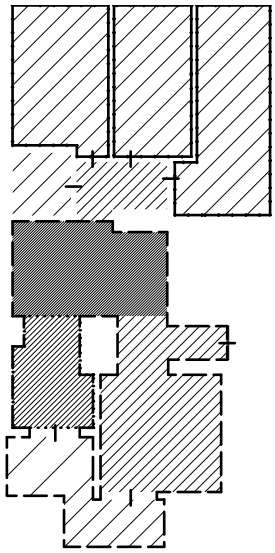




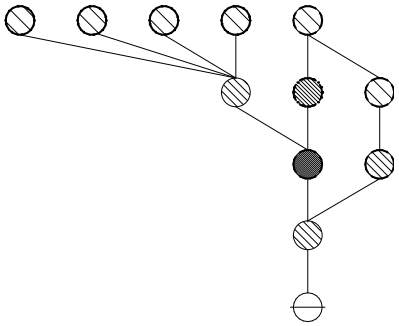
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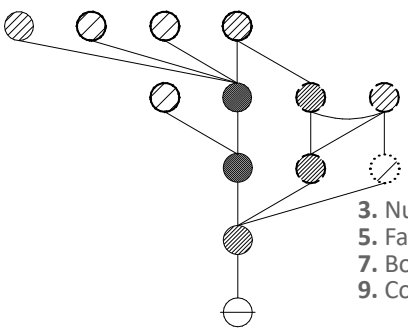






9.





3. Nuno Pinheiro Torres
4. Monte da Bela
5. Falcão
6. Lagarteiro
7. Bom Pastor
8. Aleixo
9. Contumil

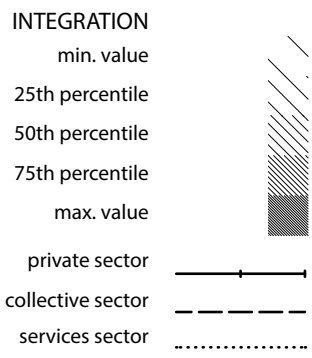


FIGURE 10.15.
Convex breakings and accessibility graphs of PMCP apartment schemes

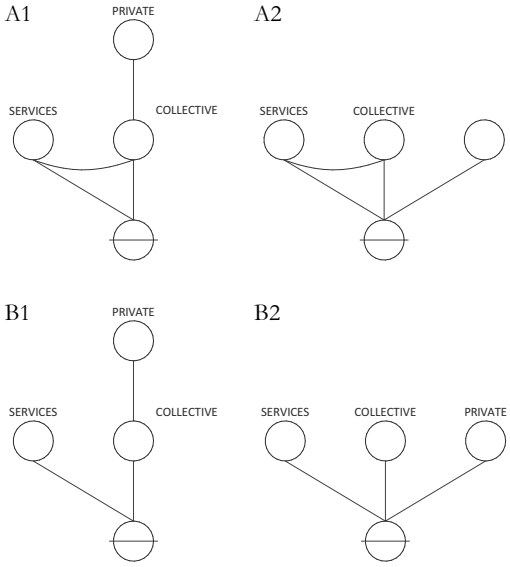


FIGURE 10.16.
Simplified accessibility graphs

character of collective spaces, or the depth of bedrooms, were likely to have some impact in the way families used the space of the house. These are characteristics that are clearly understood through accessibility graphs and further summarised in simplified graphs A and B and their subtypes 1 and 2, as shown in figure 10.15..

In A1, comprising Pinheiro Torres (3), the collective space of the living-room is simultaneously a space of transition, a b-type space controlling access to the private area of the bedrooms. In A2, comprised of cases Bom Pastor (7), Aleixo (8) and Contumil (9), there exists an alternative space of transition between labelled spaces. What all cases have in common, allowing for them to be categorised as subtypes of graph A, is the existence of an articulation between the living-room and the kitchen area, either by both functions being defined in the same convex space, through direct accessibility (often forming rings with other spaces) or through the visual connection between the two. Conversely, while the simplified accessibility graph B shares similarities with A, it is characterised by the separation of the different sectors of the house - service, collective and private. In B1, comprising Falcão (5), the living-room is utilised as a space of transition towards the bedrooms, while in B2, which finds no examples in PMCP layouts, these are clearly defined in three a-type separate areas.

This reveals an ambiguous division of the house in different functional sectors (services, collective and private). A cluster including the living-room and the kitchen exists in most cases, established either through direct accessibility or visual connection. House configurations are ringy, with around 35% of transition spaces in council apartments being c or d types, and as such often connecting functional spaces from different functional sectors. Bedrooms, a-type spaces in most other cases, are found in rings in some council layouts. Ambiguous and ringy functional sectors are likely to be a result of area economy. The result of a plan from the 1950s that was subject to explicit budgetary constraints, PMCP houses are the smallest built during the studied period. With an average total useful area of 62.9m2 for three-bedroom apartments, not one single case developed within the PMCP complies with the minimum area considered in chapter 3.

	TUFA m2	Density m2/r	Integration	Difference factor	Mean depth exterior	functional orientation %
3. Nuno Pinheiro Torres	57.3	14.33	0.85	0.75	2.6	20
4.Monte da Bela	56	14	1.05	0.72	2.27	18
5. Falcão	61.9	20.5	1.45	0.74	2.75	18
6. Lagarteiro	60.8	15.2	1.06	0.76	2.6	20
7. Bom Pastor	39.3	13.1	1.83	0.38	1.75	12.5
8. Aleixo (A)	65.7	16.43	1.28	0.61	2.8	23
8. Aleixo (B)	75.3	15.06	1.15	0.74	3	28.5
9. Contumil (A)	71.5	17.88	1.07	0.72	2.9	18
	62	16	1.19	0.69	2.61	19.3

TABLE 10.3.
Spatial attributes of PMCP apartment layouts

This concern with area economy can be seen in other spatial attributes of both programmes' houses. Transition spaces are often reduced to a minimum, both in area and quantity, resulting in high levels of integration for living-rooms and on highly functional oriented layouts. Apartments developed within the PMCP have, on average, a little more than one transition space for every five functional spaces (mean fo=0.21).

As such, the articulation of kitchens and living-rooms in these cases may also come out of necessity. Kitchens, while occupying 13% of the house, are only on average 6.92m2 large, and due to requirements for their practical functioning, could not be much smaller. Living rooms are also tendentially small, with an average of 9,51m2, but represent a considerable percentage of 17% of the apartments' areas. In this sense, while the collective pole that exists in most PMCP houses represents a large proportion of their total area, the average area of 16.4m^2 is a value that is, for example, very close to post 1974 state's housing's 15m2 on average for just livingrooms. Case 3 (see apartment sheet 1: Nuno Pinheiro Torres) is a particular example of this condition. With a total useful area of 57.3m^2, well below the average for PMCP layouts, it is the case with the largest living-room. In parallel, it is also one of the only cases which integrates a kitchenette within the livingroom, thus allowing space for its area to grow without affecting the global area of the house.

If a clear definition of functional sectors became, after 1974, a characteristic of most of the studied apartment schemes, it cannot be said that functional ambiguity was countered throughout time in PMCP apartments. As it was verified in the previous chapter, the later cases (Bom Pastor (7), Aleixo (8) and Contumil (9)) show marked differences from earlier estates in the configuration of their exterior spaces. The layouts of their apartments, while still conforming to the graph subtype A2 that characterises most of PMCP's domestic interiors, are shallower and ringier than other cases in a way that alters the relationships between sectors of activity to a point where they cannot be separately identified. Conversely, it is earlier apartment schemes of Nuno Pinheiro Torres (3) and Falcão (5) that show a more evident division between collective and private areas of the house.

The absence of defined functional sectors does not appear to mean that the role of different activities is not clearly defined across PMCP apartments. Rather, PMCP layouts have the most consistent genotypical signature of the different programmes. When considering sectors of activity as areas articulating collective spaces (such as living-rooms and connected exterior spaces), services (such as the kitchen and rooms for treating clothes), and private spaces (such as bedrooms and bathrooms), PMCP layouts consistently follow either a collective > services > private > exterior or a [collective = services] > private > exterior (where the collective and services spaces are articulated together) ordering of integration. Kitchens are particularly well integrated in relation to other programmes, being either the most integrated space in the house, in parallel with livingrooms, or only mildly less integrated than the latter. Bedrooms seem to have smaller importance in the house than potentially collective areas. Both the less integrated and deeper spaces

of all apartment schemes, bedrooms are also small, not complying with minimum areas. With an average size of 8.33m^2, bedrooms represent, on average a little bit less than half of the apartment.

10.7. SOCIO-SPATIAL CONSIDERATIONS ON PMCP ESTATE LAYOUTS

10.7.1. SEGREGATION, OTHERING AND HIERARCHIZATION IN PMCP ESTATE LAYOUTS

Even though the PMCP contradicted earlier narratives that refused collective housing and favoured the domesticity associated with single-family houses with small backyards, the housing it developed is no less the product of its context than the PCE had been. The first phase of the PMCP benefited from the economic boom following WWII and reflected a new image of the city, where impoverished populations were removed from a city centre to be reserved for tertiary functions and eventually touristified. Following up on the same strategy, the second phase of the PMCP also resulted in the spatial segregation of these populations, both by relocating them to suburban areas and by hiding them away in the interior of urban blocks.

The abandonment of the first urban plan for Porto from 1947-52 in favour of the PDP represented a similar abandonment of social mixity. Initially connected both to existing public housing layouts and to industry, the developments' residents are distant from the places of origin of the demolished *ilhas* and mostly not central. A significant portion the population of the city centre was fragmented and scattered in peripheral areas often not properly equipped, but at the same time they were leaving a centre where employment and opportunities were then becoming rarer. Today, most of these housing developments have seen the city grow around them, and some are even located in well-integrated areas both spatially and socially. In seven analysed housing layouts, three remain fairly segregated, with limited access to public transportation or urban equipment, and connected mostly to an area of the city that has remained neglected and impoverished. Moreover, it should not be overlooked that, it the estate's integration with a plan of urban growth seems to have resulted in all of them becoming better articulated into the city fabric, they are still less integrated than more recent council layouts. These were constructed in a denser city where vacant land was becoming more expensive, sharing, as such, many of the characteristics of PMCP layouts when it comes to lot-occupation, but are still significantly better integrated than the earlier estates.

Even the better-integrated council layouts step away from the primary urban tissue and face inward, creating a barrier between the housing developments and the urban and social fabric of the city. Often invisible from the exterior, the estates are a clear *other* for non-locals. While this may be in great part a consequence of the constraints inherent to lot acquisition, it is a spatial characteristic very convenient to the strong system of moral control PMCP developments to which residents were subject.

The second phase also reflected a transformation within the discipline, abandoning modernist principles that had guided the previous morphologies. However, the idea of a neighbourhood unit seems to have prevailed. Where concretised, collective equipment and exterior spaces were most often meant for the estates' residents, following a logic of providing for all basic necessities within one's neighbourhood. Accompanied by less favourable economic conditions in the country, the resulting layouts are often invisible and enclosed within themselves while simultaneously lacking urban equipment (that was in some cases eventually provided due to popular mobilisation after 1974). In this sense, if exterior spaces often provided the potential for collective use, the lack of associated social facilities and other necessary equipment (see Portas 1969 in chapter 4), associated with tree-like spatial systems and large depth values within the layout, resulted instead in clusters removed from the city that did not facilitate the establishment of neighbourhood relations.

Nevertheless, as will be explored further on, municipal housing residents were able to organise for reclaiming the bettering of their houses and estates, access to urban equipment, and adequate legislation when, after 1974, the transformation in political conditions made it possible.

Gros (1982, p.196) says that "The late effort conducted between 1956 and 1966 could not erase a deep-rooted "crisis" or prevent a new one - more modern - from appearing."[29] As we have seen, state intervention in housing up to the PMCP was not meant to serve the working class populations of the city centre. As for the PMCP, it must be noted that it acted at a scale that had never been seen before nor was ever again within Porto's municipality, and that it managed to provide around a fifth of *ilhas* residents with a proper house. Meanwhile, overcrowding issues in the historical centre were never addressed. Consequently, when the regime was overthrown in 1974, the city of Porto still suffered from the same long-lasting overcrowding issues and lack of proper housing conditions, *ilhas* were aplenty, and residents of the new housing developments were, over a decade after, still waiting for the construction of necessary infrastructures and equipment.

10.7.2. Domestication and Adaptability in PMCP apartment schemes

The relocation of families to council estates, where these are removed from community bonds while simultaneously delivered their own house, appears to be a clear process of domestication.

Abandoning shared apartments or rooms in the historical centre, or small, low privacy houses in *ilhas*, families had access to their own space, where they could develop familial relationships very different from those allowed for in previous conditions of overcrowding. However, this first process of domestication was associated with a regime of housing precariousness defined by the legal framework that made families' access to houses dependent on their behaviour and controlled by an overseer that was part of the neighbourhood community. In this sense, if the living conditions, regarding area and infrastructure, assured by council apartments should mean a certain domestication of their residents lives, the lack of certainty associated to housing precariousness was likely to counter it.

In parallel, while families were separated from existing communities during the process of relocation, domesticity should be, at least in intention, countered by a communitarian character of council estates. Even as collective equipment often failed to be provided, spaces with collective potential were designed in all PMCP estates and labelled collective spaces were part of the original design of most. Simultaneously, if the feeling of community was encouraged to an extent, it was at the cost of a close relationship with the surrounding urban space, concentrating people's lives in between the estate and their workplace.

The estates were then located in the vicinity of areas where this workplace was supposed to be, and are usually associated with planned industrial areas. Today, these areas are relatively central. In many cases, neighbourhood equipment was constructed after 1974 and, 51 years past since the construction of the first estate of the second phase of the PMCP, families are likely to have created new bonds. In this sense, both domestication, associated to a more stable (if still conditioned) access to council housing, and community relations are more strongly encouraged by the estates themselves - forgoing of essential social and political conditions - today than at the time of their construction.

PMCP apartments are small. They are both the smallest houses identified in the studied sample, and also considerably smaller than the minimum areas considered in chapter 3. However, functional spaces often comply with the latter, and houses represent a considerable increase in area per family and space per resident in relation to its residents' places of origin. In this sense, PMCP housing appears to reflect a shift in social relations that translated into improved living conditions for working-class families.

Furthermore, because there cannot be verified a clear functional definition of spaces in these houses, the spatial configuration of PMCP apartments does not seem to encourage a clear division of the family members who are more likely to perform different activities. Instead, the organisation of domestic functions in space holds a highly permeable character. This is clear in the relationship established between kitchens and living-rooms, where spaces are not functionally separated as services or collective but articulated in a pole that integrates both. Similarly,

bedrooms are in some cases not organised in one clear private pole, but instead, articulated with different areas of the house and, even when a private sector is clear, it often establishes a close relationship with the collective areas. All of these characteristics - the existence of a collective pole, of functionally ambiguous spaces, of a collective area that can simultaneously act as a transition space - were explicitly sustained as beneficial in research conducted at the time. The results of the Survey on Urban Housing also suggest that these spatial attributes may encourage types of relations within the family that were considered to be desirable.

The connection of the kitchen to the living-room was seen to be the most likely mechanism for countering women's segregation in the house, while the placement of the collective areas between other functional spaces was suggested to increase their occupation by all family members.

Where it was not possible to draw conclusions regarding the existence of a relationship between spatial attributes and house use, these spatial characteristics may, at least, reveal a convergence between design intent and its contemporary social concerns and architectural research. A common and stable genotype could be identified across PMCP cases, where collective spaces were always the better integrated and bedrooms the more private, with kitchens often showing large values of integration.

10.8. THE TRANSFORMING INSTITUTIONS OF THE LATE 1960S

If no measures were taken that were capable of effectively solving the prolonged ongoing housing crisis up to 1974, the structures, both institutional and disciplinary, that served as a basis for housing development in the post-revolutionary period were solidified during the late 1960s and early 1970s.

As we have seen, the National Laboratory of Civil Engineering (*Laboratório Nacional de Engenharia Civil*, LNEC) had been researching the subject of housing for at least a decade before the revolution of 1974. By integrating architects who also worked in council cabinets for housing development, this research was applied in various housing designs, as was commonly seen, for example, in the developments of the PMCP.

The LNEC itself had existed for a long time, as it had been created in 1946 to develop applied research in the field of civil engineering. It was organised in three different services concerning the development of constructive processes, structures and materials, and it was only in 1962 that a Division of Construction and Housing was created within the Laboratory. It was handed to a

group of architects who throughout the following decades developed an essential body of work on fields that ranged from sociology to mathematics, following an interdisciplinary approach to social and architectural problems. This was shown in the research examined in chapter 4. While the documents explored in that section of this dissertation focused on a set of particular questions, the variety and scope of the work that was produced within the LNEC throughout the 1960s and early 1970s can be seen in table 10.4.. It shows a selected sample of reports ranging from the exploration of minimal areas, sociological studies on the use of the domestic environment and urban space, the development of new typologies, the rationalization and automation of the design process and legislation analysis:

YEAR	MAIN AUTHOR	STUDY
1964	N. Portas	Standards for Social Housing, Minimal Needs and its Evolution. Report and proposals for discussion
1965	N. Portas	Analytical Study of Housing Projects, "ICESA" projects
1965	N. Portas	Human Requirements in Housing
1966	A. Alves Costa	Rationalisation of Housing Solutions, Part I: analysis and selection of apartment layouts
1967	M. Luz Valente Pereira	Classification, Nomenclature and Minimum Requirements for Social Housing in Urban Centres. Secretariat's report 1966-1977
1967	**M. Luz Valente Pereira**	**Survey on Urban Housing. Preliminary Report: General Objectives**
1968	B. Costa Cabral	Rationalisation of Organisation Solutions for Apartments, Grouping forms in housing. Partial report
1969	**N. Portas**	**Functions and Area Requirements in Housing**
1969	**N. Portas**	**Survey on Urban Housing. Preliminary Report: Data for questionnaire elaboration**
1969	N. Portas	Information on the Current Situation of Estates and Social Housing Needs
1970	A. Alves Costa	Architectural Programming of Buildings. Part I: Functions and interrelations in the apartment. Part II: Evalutation and selection of apartment layouts
1970	M. Luz Valente Pereira	Problematic of the Survey on Urban Housing
1970/1971		Organisation and Quality of the Urban Environment. Inquiry on the use of the city
1970	G. Byrne	Rationalisation of the Design Process I, dimensional modular coordination: principles and application

TABLE 10.4.
Resulting documents from research conducted in the LNEC between 1964 and 1975

19~70	M. Luz Valente Pereira	Model for the Dynamic Analysis of na Urban Area
1971	M. Luz Valente Pereira	Quality and Organisation of Urban Space, Model for the Analysis of Urban Behavious
1971	L. M. Monteiro Pereira	Experience for Evaluation the Application of a Multi-Relational Method of Analysis to Inquiries
1971	F. Dias Silva	Buildings' Typologies. Evolutive Housing: Design principles and criteria
1972	A. Reis Cabrita, N. Portas	Organisation of Buildings' Projects: Method and model from communication to the construction site (several volumes)
1974	**M. Luz Valente Pereira**	**Survey on Urban Housing. Analysis and Interpretation of Housing Activities and its Relation to the House's Spaces**
1974	M. Luís Pereira	Layouts from Adjacency Graphs: a case study in problem-solving by theory building
1974/1975	F. Gonçalves	Portuguese Urban Legislation 1926-1974 (several volumes)

These reports reflect a variety of contemporary influences that placed Portuguese architectural research in line with international experiences, be it in the line of Broadbent and Alexander, March, Chombart de Lauwe (1965, 1969) or of Nelson Ferreira dos Santos and Turner et al. (1969) (Bandeirinha, 2007; Carvalho, 2012; Bandeirinha, 2014) but they also showed a capacity for bringing them together and articulating them within the same project. For example, the functions of housing, defined by Portas (1969) based on the articulation of sociological analysis with Chombart de Lauwe's work, were further explored in Alves Costa's (1966) study and rationalisation of housing design to develop a typological series to optimise spacial relations of use, with the resource to methods of computerised mathematical systematisation close to those of Alexander. Furthermore, as we have seen, an articulation of research, legislation and design could sometimes be verified. A direct example of this is that these typological experiences conducted by Alves Costa were later used in one of Porto's council estates (layout 9, Contumil).

Beyond serving as a basis for public housing development, research regarding the family as "the subject of housing" (Portas 1979, p.19) - exploring the different facets of evolving family life and its connection to the domestic environment, as well as the forms and importance of its interaction with a broader community - was particularly crucial in a moment when the emergence of the first experiences of mass housing production represented a complete transformation of its residents' urban experience.

In this sense, the integration of the problem of housing into the LNEC in 1962 represented

a shift within a public institution that reflected the beginning of a systemic view of housing development and had a definite impact in its research and praxis during several years. However, broader political and economic transformations took place during the 1960s and late 1970s that had ampler and more lasting effects.

The inclusion of housing development in the country's economic plan of 1965-1967 and the strengthening of its objectives in the subsequent plan of 1968-1973 represented a shift in the State's attitude regarding its role in urban planning and housing provision that - even though accompanied by an almost immediate cut in funding that assured little was actually done - has persisted, translating in more and less effective measures, until today. Simultaneously, an increased focus on housing research by the State's Laboratory of civil engineering allowed for the development of constructive processes and standardization, as well as of sociological and typological questions in a way that reflected concerns expressed from within the discipline of architecture, that had the objective of creating new standards for public housing development to be present in posterior layouts.

A reorganisation of the state apparatus followed the death and consequent replacement of the Portuguese *president of the Council of Ministers* in 1968, while remaining within the framework of the dictatorship. The country's state of weak economic development demanded rationalisation of public investment that translated to an attempt at a liberalising reform of the regime, and a series of social and economic measures were created between 1968 and 1970 (Rosas, 1994). Public housing provision was one field which suffered major restructuring during this period, and one which was most affected by contradictions internal to the regime. While State's reforms and the national economic plan integrated social issues such as housing in a way which had not been done before, an economy dependent on foreign markets and a state budget highly dedicated to the ongoing colonial war stumped the policies of economic growth and industrialization that had made possible the process of housing development witnessed from the late 1950s, resulting in only 7 to 8% of all housing production benefiting from public intervention during the later years of the regime.

It was, nevertheless, this reorganisation of the State apparatus - if brief and lacking on immediate consequences - what allowed for the creation of a centralised state institution for housing development (*Fundo Fomento da Habitação*, FFH) in 1969. The FFH integrated all previous State services concerned with housing development - resulting in the immediate dissolution of the PCE -, as well as all their teams and technicians, "centralising in one single organism the pursuit of different habitational measures legally defined and which, some times, were not fully taken advantage of." (decree-law 49033-1969).

The objective was to articulate public housing policies with urban planning by simultaneously managing urban land administration and housing development, and so to lay the basis for

systematically tackling the housing problem in the country. Consequently, it was necessary that a restructuring - one that had also been reclaimed by architects for over two decades - was made to urban land law. In line with the objectives laid out in the plan for 1968-1973, the decree-law approved in 1970 regulated the restitution values for expropriations, allowing the State to acquire lots at non-speculative prices. It also defined that a lot was only fit for construction when it was connected to a public street, when it disposed of urban infrastructure and when it had a maximum depth of fifty meters, regulating to some extent the future integration of estates in the urban grid.

The new law explicitly aimed at guaranteeing the necessary conditions for the development of public housing, criticising "solutions technically and socially inappropriate" (decree-law 576-1970) such as the development of estates in remote areas, the unordered growth of urban infrastructure and social equipment, the decrease of apartment areas, and the steady increase in house rent. However, and while the new legislation allocated additional resources to the FFH, it also implemented a series of measures for maintaining and instigating private developers' interest in economic housing.

If the reorganisation of the State's institutions connected to housing development continued with the creation of the Secretariat of State of Housing and Urbanism for integrating the FFH with the Directorate-General for Urbanization Services (*Direcção Geral dos Serviços de Urbanização*) in 1971, and with an increase in funding and responsibility of the FFH in 1972, housing production did not surpass around 1000 houses a year up to 1974. All of these were finalisations of work previously carried on by the services integrated into the FFH. The absence of local power that was a characteristic of the regime caused the new urban land law to have little effect in the actual acquisition of land by the municipalities, and the liberalisation and openness that took place in the later years of the dictatorship were mostly reflected in the development of the real estate market and favouring of big private developers.

10.9. A DISCIPLINARY SHIFT

LNEC's production within the discipline of architecture has been assigned particular importance for its institutional character, as well as the possibility of its research and principles being broadly applied in housing development. These disciplinary principles and objectives were not exclusive of research, they were also expressed throughout architectural journals, symposia and debates. By the time the centralised institution for the development and administration of housing, which architects had been reclaiming for over twenty years, was finally formalised in the FFH the

profession was not the same it had been in the mid-1940s.

The literature on the first National Architects Meeting (*1º Encontro Nacional de Arquitectos*, ENA) of December of 1969 presents it as particularly representative of the ongoing transformations and conflicts taking place within the discipline of Architecture. Identifying the period of transition lived after the death of the former *president of the Council of Ministers* of the dictatorship, the 1 ENA was organised by a group of architects with the support of the National Architects Trade-Union[30], intending to discuss disciplinary questions within a transforming political context and defining mechanisms for broadening Architecture's reach in the mainstream debate (Bandeirinha, 2010). In this sense, it resembled the first National Congress of Architecture of 1948, discussed in section 10.2., which had similarly emerged from the political, economic and social transformations after the end of the Second World War. However, contrarily to the robust set of propositions that came out in 1948, the 1st ENA is remembered by the absence of consensus or practical conclusions that was registered by the participants in subsequent publications at the time (Teotónio Pereira, 1969c, Fernandez, 1985, Bandeirinha, 2010).

The assumed "absence of conclusions" (Hestnes Ferreira 1969 in Bandeirinha 2010) seems to relate directly to existing conflicts within the profession. Fernandez (1985, p.171) defines the late 1960s as a period marked by schisms between different groups of professionals that "are not divided merely for accepting or refusing modernity", but for either "assuming as their priority to intervene in the wider questions that affect our society" or by opting to offer a response to capital connected to a newly created tourism industry, "feudalising the great monopolies, attempting to create their own similar structures"[31]. With a different take, Bandeirinha (2010) places the conflict on the political left, emphasising the division between architects that searched to solve social problems within their limitations, and those, stuck in an impasse as defined by the same author (2007), who thought that no transformation was possible within a capitalist society. The latter was the result of, according to Bandeirinha (2010, p.12), "one of the fronts of the irreversible fragmentation of the left, intensified internationally by the progress of the Chinese-Soviet schism, by the generalised contestation against the Vietnam war, by the events of May of 1968 and, also by USSR's invasion of Czechoslovakia."[32] Similarly, according to the author, it was a newly-born

30 Trade unions were corporatist institutions, not workers' organizations, during the dictatorship.

31 "No fim dos anos sessenta a clivagem entre profissionais é um facto; não se dividem apenas por aceitar ou recusar a modernidade. De um lado estão os que, politizados, assumem como tarefa prioritária intervir nas questões mais amplas que afectam a nossa sociedade, mesmo que para isso se minimise o campo que se define como estritamente disciplinar; do outro, os que, descomprometidos, se enfeudarão aos grandes monopólios, tentando criar estruturas próprias que a eles se assemelham (…)" Translated from Portuguese to English by the author of this dissertation.

32 "Esta foi, apenas, uma das frentes da já irreversível fragmentação da esquerda, intensificada, no âmbito internacional, pelo avanço do cisma sino-soviético, pela contestação generalizada à Guerra do Vietname, pelos acontecimentos de Maio de 1968 e, também, pela invasão da Checoslováquia pela URSS. Essa fragmentação começava a espalhar já as suas repercussões em todas as circunstâncias onde se manifestava a actuação da intelectualidade portu-

more anti-capitalist perspective within the profession that broke a previous existing anti-fascist disciplinary broader alliance.

The absence of conclusions is then not as interesting as the reasons why it was defined that no conclusions were reached. In the literature available regarding the 1 ENA conflicts can be identified as having to do with the participation of groups with varied and often opposing interests: firstly, the architects who organised the meeting with the apparent objective of further mediatising the discipline, which should be useful for well-established architects identified by Fernandez (1985), who searched to further their clientèle; secondly, less established, more anti-establishment architects who either searched within the discipline for a response to a society they were not agreeable to or argued that all architecture was capitalist architecture and they should, therefore, do none; and lastly, waged workers, increased in number by broader access to education which created new dynamics that progressively resulted in the deepening of the opposition between patronage and workers from which little consensus could come out. Within these differences, two are of particular interest in the scope of this dissertation: 1) The disciplinary shift away from Modernist architecture, and, strictly connected to the first, 2) the different positions regarding the social role of Architecture (or lack thereof).

If there does not seem to have existed an explicit conflict regarding modernist architecture, with the modernist faction that had come out strong twenty years before having apparently dissipated, this conflict is implicit in the new fronts of discussion regarding the role of the architect in society, its action in the grassroots. The question of the role of architecture had been present in the 1948 congress in explicit arguments for the development of constructive processes, for the industrialization of construction, the development of urban and territorial planning, the centralisation of administration, planning and construction of public housing, or the development of legislation for facilitating expropriations. These were associated with a clear urban approach, the modernist principles of the Athens' Charter being the manifesto-materialisation of those claims. These were also, and fundamentally, a series of principles that had been adapted, reduced and institutionalised in the reforms of the 1960s and then, finally, in the creation of the FFH. But they were also the principles underlying the social housing developed by social security institutions and municipalities during the 1950s and 1960s and so their limitations - or limitations to their implementation - could now be criticised, either explicitly or implicitly in the dominant views regarding the role of the architect and housing production.

Within the groups of participants concerned with social issues, a division is made between the two positions. On one side was the stance that the housing crisis was inherent to capitalism and that no systematic solution would be found without altering the economic relations. This was a

guesa." Translated from Portuguese to English by the author of this dissertation.

political rather than an architectural position, and could condemn the produced housing estates for being compliant to capitalist reproduction of social relations, or dismiss them as palliative measures. On another side, the argument was that, agreeing that the produced estates were at better compliant with capitalist social relations, at worst with fascist social relations, believed that architects nevertheless possessed the capacity for contributing to reformist steps which could and should be taken in order to improve the living conditions of the population.

The latter implied conceiving of actual reformist steps that could be taken in order to improve the living conditions of the populations, a timely discussion to have by those who would, now apparently within broader and more favourable legal and infrastructural limits, be responsible for the architectural response to this question. In this sense, it is easily arguable that the most consequential intervention in the meeting was the written communication of Portas (1969, in Bandeirinha 2010) where he argued that, even though architects' autonomy and the scope of their work are limited, it was not viable to "use the radical alibi that 'first one must change the structures' in order to do nothing or very little for changing the structures, or search within the office for the best solutions […]". For Portas, it was up to the architect to propose spatial solutions that could to contribute for better social and cultural results, as was up to architects to propose better transportation and territorial planning solutions. It was not only against architects stuck in an impasse that Portas' argued, but also against the disciplinary discussion in-vacuum, such as that of the 1st ENA. Instead, he argued for architects to take their place in materialising the plan created by the government and the propositions put forth months prior in a colloquy organised by the Ministry of Public Works. "Examples: the alternative of evolutionary housing to finished estates is a typical proposal which viability is up to the architect to demonstrate […]", demonstrate beyond the conducting of inquiries and gathering of data, but still in articulation with research: "The limits of design are obviously huge, but without some essential concepts of the structure of things which demand study, research and design, it is not possible to dialogue with the teams that plan and programme."[33].

In this sense, Portas proposed two possible paths that could come of the ENA. The first was an ideological offensive on the field of mainstream media and in the transformation of architectural publications that was capable of both reaching new concepts of architectural intervention and getting the public opinion on their side. The second, complementary to the first, came from a strategical understanding of existing in a turning point in history, "a moment of transformation, it does not matter right now whether good or bad, of the services in our field of action. And that transformation will go on." As the structures of power were weakened and ridden by internal contradiction, it was the ideal moment for the necessary "occupation, progressive and systematic,

33 "Exemplos: a alternativa de operações de habitat evolutivo aos bairros acabados convencionais é uma típica proposta cuja viabilidade compete ao arquitecto demonstrar [...] Os limites do desenho são obviamente enormes, mas sem alguns conceitos essenciais da estrutura das coisas, que exigem estudo, pesquisa e desenho, não é possível dialogarmos com as equipas que planeiam e programam." Translated from Portuguese to English by the author of this dissertation.

of places in the major decision centres, mainly those of the State, by competent technicians, interested in integrating strategies and in developing tactical plans."[34] (Bandeirinha, 2010).

If it can be said that Portas' was the most consequential intervention in the 1st ENA, it is because it was already in motion. The Colloquy of Housing Policy organised by the Ministry of Public Works that took place four months before had been a clear display of the limited power of architects. Organised after the creation of the FFH and of the transformations it implied, it appeared to be an *a-posteriori*, possibly inconsequential consultation of architects or, as argued by Teotónio Pereira (1969c, p.81) "new way, less brutal and more insidious, of maintaining a passive public opinion, delegating the solution to their problems not in a clique of hermetic politicians, but in an elite of knowing and fresh technicians."[35] This criticism came from an architect who had, for decades, argued for the urgency creation of a national housing policy (Teotónio Pereira, 1969a; p.182):

> Effectively, housing programmes for the largest number necessarily imply a certain dimension - we cannot ignore the quantitative factor - or even a pressing urgency; but it won't be isolated developments, even if large and urgent, that will contribute for the solution of the problem, as it was exposed. Such programmes will always benefit (perhaps precariously) a small percentage of the growing population in need. And it may create the illusion (as it has happened) that something is actually being done to actually counter the problem.[36]

Similarly, Teotónio Pereira, Portas, as well as other architects[37], had proposed measures in specialised publications, symposia and debates, that were in line with the conclusions of the colloquy, notably the integration of evolutionary housing (Teotónio Pereira, 1969b) and cooperative housing (Teotónio Pereira, 1969a) as state programmes. As such, if arguably late, this colloquy, the first organised by the State to discuss national housing policy, accommodated a series

34 **"**A "segunda via", complementar da primeira, seria a da ocupação, progressiva e sistemática, dos lugares nos principais centros de decisão, sobretudo os do Estado, por quadros competentes, interessados em integrar estratégias e em concertar tácticas de actuação." Translated by the author

35 "(...) uma nova forma, menos brutal e mais insidiosa, de manter a opinião pública passiva, delegando a solução dos seus problemas, não já numa clique de políticos herméticos, mas sim num escol de técnicos sabedores e arejados." Translated by the author

36 "Efectivamente, programas habitacionais dirigidos ao maior número implicam necessáriamente uma certa dimensão - o factor quantitativo não pode ser deixado de lado - ou ainda uma pressionante urgência; mas não serão empreendimentos isolados, ainda que vastos ou de emergência, que poderão contribuir para a solução do problema, tal como foi exposto atrás. Tais programas beneficiarãosempre (e talvez de forma precária) uma pequena percentagem de população carecidas em ritmo crescente. E podem criar a ilusão (e isso tem acontecido) de que realmente se está a fazer algo para debelar realmente o mal." Translated by the author.

37 Several articles can be found in Architectural magazines. See, for example, Duarte, 1960; Lobo, 1968; Silva, 1969; Ricou, 1969; Silva, 1969.

of long-lasting concerns that would be reflected in post-1974 housing policies. The published conclusions made it appear consensual that there was no free market solution for housing. It was the State's role to regulate the market and counter speculation through land law and disincentives to speculation, as well as to develop redistribution measures, such as loans, non-refundable investments, incentives to invest in social housing. Furthermore, it was also the State's role to assure articulation between local and central powers, by rethinking municipal structures and creating an intermediate scale between central and local power[38], that would allow for urban planning to be integrated into larger-scale, extra-municipal, planning.

Housing continued to be seen as a question ampler than the limits of the house itself and was now associated with mainly social urban problems integrated into the concept of security in urban life. This security included mostly access to stable life: proximity to work and job security, the possibility of acquiring or building stable housing (that is, not informal, legally and safely constructed), access to school and urban equipment, capacity to pay rent, ability to upgrade housing conditions as life changes, either by buying a new house or transforming the old one. These concerns were explicitly related to the reproduction of labour and the country's economic development throughout the colloquy. They were considered to be impossible unless associated with proper urban planning, but also economic planning, in line with what had been started with the economic plan of 1965-67.

If these principles were similar to those shared in 1948, their proposed architectural manifestations were very different. It was considered essential to "rethink urban and housing typologies to find alternatives to conventional estates, whose extensive application is conditioned by low availability for non-refundable investment and by the existence of a large part of the population that cannot afford current construction."[39] (Bandeirinha 2007, p.73) As such, four alternative legal and architectural layouts were proposed. Condemning the compulsive rehousing of populations to peripheral areas, the first layout, directed at the most impoverished populations, was evolutionary housing allied to a solution of assisted self-construction (Lobo, 1969) where people would successively expand their own homes according to their needs. The second layout, for populations with some financial resources, was cooperative housing, supported by the State. The third layout involved the construction of economical housing by private developers, also supported by the State. Public and semi-public housing, directly promoted by State institutions, was reserved for

38 This was never achieved, the creation of administrative regions in the country has remained a repeated subject of discussion up until today.

39 "Revisão das tipologias urbanas e habitacionais, procurar alternativas ao bairros convencionais, porque estes dependem das reduzidas disponibilidades para investimentos a "fundo perdido", e existia uma enorme faixa de população sem capacidade de amortização de uma construção corrente." Translated from Portuguese to English by the author of this dissertation.

when other initiatives were not capable of substituting it.[40]

If, as it appears in different readings of the late 1960s and in particular of the 1st ENA, there was a schism in the Portuguese architectural left - or among the architects who were concerned with the social role of architecture -, the schism appears to have been resolved in praxis by 1969.

It is of particular interest in the scope of this dissertation how Porto seems to have played a minor role in this discussion. During the late 1960s and early 1970s, Lisbon saw drastic transformations in the social relations of architectural practices: "the 'financial euphoria' of Marcelo Caetano's last years was felt in the creation of large offices with projects connected to large national and international groups; projects destined to speculation, tourism and banks prevailed."[41] (Correia Fernandes, 1980). In Porto, architectural offices remained small and architectural demand remained small-scale, a reality that maintained a certain master-apprentice relationship within offices that were often connected to the National School of Beaux-Arts, where the architectural degree was taught.

10.9.1. PORTO'S SCHOOL OF BEAUX ARTS

It was Porto's lesser weight in the country's economy that, denying it the conditions for the monopolisation of architecture by large construction firms, maintained the old master-apprentice work relationships in architectural offices - or ateliers - and allowed for a display of disciplinary focus at the 1 ENA that appeared untroubled by internal class conflict. Distant from centralised institutional power, and as such from Portas' plea for architects' participation in official institutions and state bodies as "the decisive field where the social future of architecture is decided (…) that of the definition of socio-economic priorities"[42] (Portas, 1969, in Bandeirinha, 2007), the Architecture degree in Porto's School of Beaux-Arts (ESBAP) was also divided in what related to whether or not "from the moment when the problem of materialisation of problems is raised - works strategy, organisation of activities in space, etc. - the competent architect can give decisive contributions to better social and cultural investment returns." (Portas, 1969, in Bandeirinha, 2007).

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40 The published conclusions of the Colloquy can be found in the issues 109, 110 and 111 of the magazine *Arquitectura*, from 1969.

41 "(...) em Lisboa a "euforia financeira" dos ultimos anos de MArcelo Caetano sentia-se na formação de grandes gabinetes de projectos ligados a grandes grupos financeiros nacionais e internacionais; predominavam os projectos destinados à especulação, ao turismo e à banca." Translated from Portuguese to English by the author of this dissertation.

42 "O campo decisivo onde se decide o destino social da arquitectura é o da definição de prioridades socioeconómicas e logo a seguir o das decisões sobre os programas." Translated by the author.

To one side - that found an opening in the repressive control of the regime after 1969, of which the student body and faculty alike were largely objectors - the idea that in an adverse socio-political context all architecture could do was to perpetuate the existing social relations resulted in a refusal by part of students to do any architecture at all. During the years before the revolution, many students chose not to develop architectural designs in the design studios, dedicating their term's work to conducting social surveys, empirical research and developing theoretical work. The period referred to as the "experimental period" of the ESBAP, during which the School was restructured, both at the level of its curriculum but also of its institutional functioning, is representative both of the superstructural space there was in a city with little contact with the central power structures and of the architectural impasse often identified throughout the 1960s. Both characteristics that would have an impact in Porto's architectural approach to social housing development after 1974, and to the historiographical record of this approach (Alves Costa, 1982; Correia Fernandes, 1980; Ramalho, 1980; Fernandez, 1985; Bandeirinha, 2014).

When looking at the ESBAP in the late 1960s and early 1970s as an essential reference of the SAAL in Porto there is something of the 'architectural impasse' and leftist sociological experiments at the programme's core. These were, after all, clearly expressed in the School's practice. Correia Fernandes (1980, p.20-21), an Architecture professor at the ESBAP in the year of 1972-1973, offers an example of the assignments submitted to his class:

> Programme of an Architecture II assignment in 1972/1973 for a students residence:
> 'I. Students and society
> A. Our society: how it is divided; in which classes.
> B. The social group of students: their characteristics, social origin, divorce from production, social group and class.
> C. Relationship students-population.
> II. Students and education
> A. The social function of education.
> B. The structure of education: teaching levels, selection, distribution in the country.
> III. Contradiction and relation of manual work/intellectual work and relation-contradiction urban/rural.
> IV. Students situation in the city.
> Inquiry: why they came, current situation, problems, needs-aspirations, relations with the population, relations with other students.
> V. Project
> A. Scope of the architectural intervention
> B. Localisation and users.

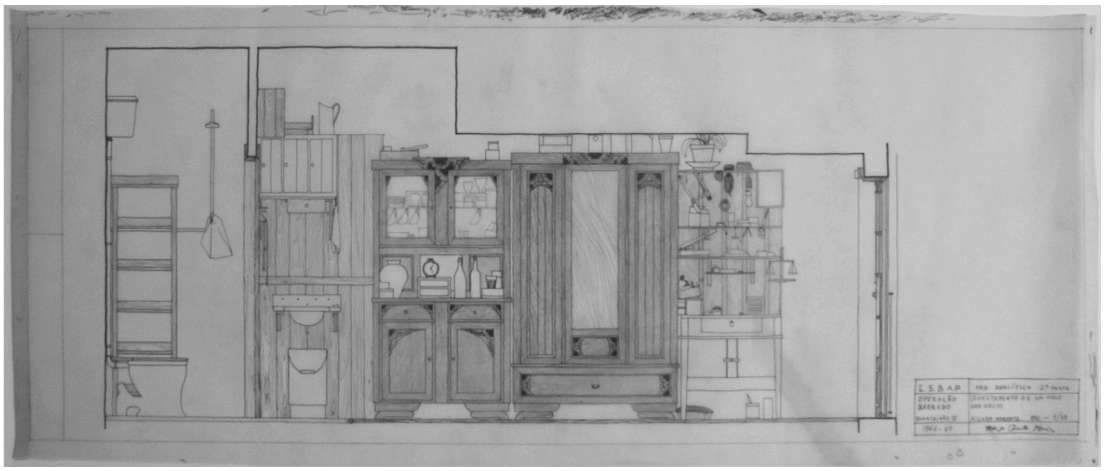


Figure 10.17.
Analitical Architecture I(Arquitectura Analítica I), ESBAP, 1964-65
In Gonçalo Canto Moniz, A formação social do arquitecto: Crise nos cursos de arquitectura, 1968-1969, 2010, Revista Crítica de Ciências Sociais

C. Programme.[43]

Often, this was work conducted outside of the School that implied interaction with the populations. Whether on their initiative (as was the survey of the *ilhas* surrounding the ESBAP developed by groups of students) or as a part of the courses' curricula, students were sent to study social and architectural characteristics of impoverished parts city through photography, drawing and surveys. With a methodology that was inherited from the Survey to Popular Architecture in Portugal (Araújo et al., 1961), these exercises had a focus on the spatial and aesthetic qualities of vernacular architecture. The act of drawing was framed as in itself a way of knowing the world. If surveys were often conducted, it was also through time-consuming, detailed drawings, minute plans and elevations of the houses they visited that students would apprehend something about the way people lived in these spaces (figure 10.17.): "[…] a study of the human-problem-that-lacks-architecture […] through method (integrated into the analysis, into composition and critique) thus objectifying the relations between society and architecture, integrating into the synthesis of form the available knowledge about the man to whom we build."[44] (Portas, 1963, p.6) When architectural interventions were then proposed for these spaces, they were grounded on this preponderant idea of the architect as a technician who, in opposition to the modernists that came before, did not impose their will, but instead worked with the support of socio-territorial knowledge and grounded on the real needs and aspirations of the populations:

> Solving chaos through force is a technique often necessary but never entirely satisfactory,

43 "Programa de trabalho" de um exercicio de Arquitectura II em 1972/1973 para uma residencia de estudantes
"I: Os estudantes e a sociedade
A. A nossa sociedade: como está dividida; em que classes.
B. O grupo social dos estudantes: as suas caracteristicas, origem social, afastamento da produção, grupo social e classe.
C. Relação estudantes-população.

II. Os estudantes e o ensino
A. A função social do ensino.
B. Estrutura do ensino: graus de ensino, selecção, distribuição pelo país.

III. Contradição e relação trabalho manual/trabalho intelectual e relação-contradição cidade/campo.

IV. Situação dos estudantes na cidade.
Inquérito: porque vieram, situação actual, problemas, necessidades-aspirações, relações com a população, relações com outros estudantes.

V. Projecto
A. Âmbito da intervenção arquitectónica
B. Localização e utentes.
C. Programa." Translated by the author.

44 "(...) estudo do problema-humano-que-carece-de-arquitectura (…) pela via do método (integrado na análise, na composição e na crítica) objectivando assim as relações entre sociedade e arquitectura, integrando na síntese da forma o conhecimento disponível sobre o homem para quem se constrói." Translated by the author.

> as it results, usually, in an anti-natural work of imposition and not of expression, of forced unification but not of integration, and the conscience of this reality has lead territorial planning from a personal attitude acing on a poorly-known environment, to an attitude of collaboration and acting on as intimate knowledge as possible on the environment on which we propose to act, thus integrating both parts.[45] (Távora, 1962/2007, p.37)

If the exercises were, even by their supporters, later considered to be "encased in a certain romanticism for, in an adverse political environment and without the necessary scientific rigour, aiming to obtain concrete results, merely through disciplinary action"[46] (Fernandez, 1985), they were not hermetic. On the contrary, they were not only precursors but a foundation of the response offered in Porto to the intervention in urbanised areas for the improvement of housing conditions.

In 1969, as the second phase of the PMCP was slowly starting, the municipality elaborated a plan for a study for the urban renovation of Barredo (*Estudo de Renovação Urbana do Barredo*, ERUB), an area in the city's historical centre which remained mostly untouched by public housing policies. Projects had been proposed for the same area, contemplating the demolition of houses in extremely bad conditions in 1949, and in 1954 one proposed their total dismantlement. While, as we have seen, the city progressed towards the growth of tertiary activities in its historical centre, these plans seemed to be premature and proved to have little impact in the area. The ERUB, headed by a well-known architect and professor at the ESBAP, Fernando Távora, had as a basis both the detailed housing surveys conducted by students and the resulting relationship established over time between the School and the population of the area. It should serve as a "typical and concrete case [to] define the bases on which municipal action might be more widely practised and not only in the *ilhas* but in all sectors of the city which present poor housing conditions."[47] (Távora, 1969/2019, p.1), and presented itself as an alternative - if not opposing - strategy to the PMCP for public intervention in housing:

45 "O resolver o caos pela força é técnica por vezes necessária mas nunca inteiramente satisfatória, pois daí resulta, normalmente, obra anti-natural de imposição e não de expressão, de unificação forçada mas não de integração e a consciencia desta realidade tem conduzido o planeamento do territorio de uma atitude pessoal e agindo sobre meio mal conhecido, a uma atitude de colaboração e agindo sobre conhecimento tão intimo quanto possivel do meio sobre o qual se propoe actuar, integrando-se assim ambas as partes em presença." Translated by the author.

46 "Esta acção, que pressupõe a intervenção directa dos destinatários e o conhecimento, por parte dos técnicos, da realidade concreta em toda a sua dimensão, revestir-se-ia de certo romantismo por visar, em ambiente político adverso e sem o necessário rigor cientifico, a obtenção de resultados concretos, apenas através da acção disciplinar." Translated by the author.

47 "(...) através do Estudo de um caso típico e concreto e utilizando a experiência adquirida, definir as bases em que a acção municipal poderá exercer-se mais amplamente e não apenas nos sectores das *ilhas* mas em todos os outros sectores da Cidade que apresentem condições deficientes de habitação (...)" Translated by the author.

On the other side, for us more important because men are infinitely more valuable than houses, the complete dislocation of the population required by an occupation of that nature [...] appears to us as extremely inhumane; a population, for its acquired rights and for the obligations the city has towards it, cannot be massively dislocated as that hurts not only its interests but also its entire social and psychological structure. (Távora, 1969/2019, p.135)[48]

esolver o caos"Por outro lado ainda, e para nós mais importante porque os homens valem infinitamente mais que as casas, a deslocação total da população que uma ocupação dessas implica [...] parece-nos extremamente desumana; uma população, pelos seus direitos adquiridos e pelas obrigações que a cidade tem para com ela, não é passível de deslocações maciças que ferem não apenas os seus interesses económicos mas toda a sua estrutura social e psicológica." Translated by the author.

11. A CLAIM FOR PROPER HOUSING IN THE REVOLUTIONARY PERIOD

Introduction

This chapter focuses on the revolutionary period (here understood as the period between 1974 and 1976, marked by the 25th of April of 1974, the 25th of November of 1975 and the new Constitution of the Portuguese Republic of the 2nd of April of 1976), specifically on the different forms of residents' organisation and claim to the right to housing, in order to frame the SAAL programme and other housing developments in Porto - its disciplinary framework, its relation to social movements, and its materialisation - as part of a participatory process.

The residents' movement has been thoroughly researched and analysed in its historical, sociological and political nature (Matias Ferreira, 1975; Downs, 1989; Vilaça, 1993; Rodrigues, 1997). The historical account provided in the scope of this dissertation serves two purposes:

1. The extension of focus in chapters 4 and 10 concerning the work of progressive technicians within the regime's institutions might seem to simplistically suggest that it was the articulation of a few competent, well-meaning professionals with a new political freedom that directly resulted in the particular period of public housing production that will be studied from this chapter on. This was not the purpose. As seen in those chapters, in the final years before the revolution the first stone had been set within the state institutions for the development of a national public housing programme, but the economic and political context of that period made it impossible for it to be of any consequence. This chapter intends to provide an overview of a relevant social transformation that had in specific to do with housing, that was intertwined and had an impact on the way housing policies and programmes developed during this period.

2. As we have seen, the SAAL has been occupying a place of great disciplinary importance for the last four decades and a half: this place often distracts the eye from the struggles and work of populations who were not addressed by the programme, and excludes - through its own aggrandising - other spaces, other programmes and other developments from their part in history. By briefly framing the residents' organisation and mobilisation as something which existed outside of the discipline of architecture, often with the council estates as either its battleground or the object of its struggle, it should be possible to see





Ontem, ela esperava a «camioneta-fantasma», a qualquer momento, para lhe levar os ta-
peces despejados. Hoje, a Câmara contabiliza o processo de lhe ajustar uma nova renda,
e dá por liquidada através dos leitores «J N», a conta da renda há três meses em atraso.

VENCERAM A SOLIDARIEDADE E A COMPREENSÃO DA CÂMARA

E NÃO CHEGOU A HAVER DESPEJO
NO BAIRRO DE S. JOÃO DE DEUS

Figure 11.1.
Pasteleira (top)
Original photograph from Porto's Municipal Archive

Figure 11.2.
Newspaper article: "The Council's solidarity and understanding won", 1973 (bottom)
Jornal de Notícias, 1973

at its own scale the disciplinary focus on social questions, the role of architects and other technicians and, in particular, the place of the SAAL in a momentary but strong struggle for a different society.

11.1. POPULAR ORGANIZATION IN THE REVOLUTIONARY PERIOD

As we have seen, while public housing policies had existed in different forms in Porto from the early ninety-thirties, these were not capable of providing a solution for the housing shortage in the city. The transformation of the state apparatus in 1969 that was translated in the restructuring of the institutions of housing development took steps towards the development of a national housing policy that had no material conditions to be of any real consequence. Instead, by the time the dictatorship was overthrown in 1974, only about 7% of legal housing production in the country was public[48]. In addition, the housing gap had risen from 483 000 to 531 000 during the previous eight years ("O Problema da Habitação", 1976). The city of Porto continued to suffer from long-lasting and generalised lack of proper housing conditions: the problem of overcrowded apartments and rooms in the city centre remained unaddressed; the PMCP - in all its scale and ambition - had proved insufficient for the number of existing *ilhas*; the municipal housing estates built throughout the two phases of the programme often remained without the planned equipment and infrastructure, providing small, quickly deteriorating houses to which access was dependent on the families' appropriate moral and political conduct within heavily monitored neighbourhoods.

In this context, the period immediately after the 25th of April military coup was marked by a series of strong social movements reclaiming the right to proper housing. By putting an end to an authoritarian state and its repressive legal apparatus, the revolution effectively freed the population from the political police, censorship and the prohibition of free association. Only then, with the overthrowing of the dictatorship, were the populations free to openly organise and protest, within municipal estates, fundamentally those developed during the first phase of the PMCP. Nevertheless, residents had been for some years conducting an organised struggle against the repressive regulation controlling housing access, and the consequent evictions that it entailed.

As examples, in September of 1973, a collective of residents of the PMCP estate Pasteleira (figure 11.1.) came together in an attempt to avoid an eviction. In November of the same year residents of the PMCP estate S. João de Deus succeeded in keeping a woman and her children from being evicted, as can be read in *Jornal de Notícias* (1973, figure 11.2.), in a news article aptly

1974			
April 25	Revolution		
May 1	May Day demonstration		1st CM constituted in S. João de Deus, Porto Residents' meetings in Porto's estates and participated in the demonstration Residents of S. João de Deus' official claim book Houses occupied as the first RCs were formed in Ribeira-Barredo
May 13	Porto's mayor removed from office		Residents' demonstration for the occupation of empty houses in council estates
May 15	1st Provisional Government		Residents' meeting in Cerco, Porto
May 18			Residents' meeting in Pasteleira results in CMs' union with S. João de Deus
May 19		Past occupations are made legal, but future occupations are forbiden	Residents' meeting in S. Roque e Macha-do Vaz
May 26			Residents' demonstration in front of the City Hall for the revogation of the estates' regulation and occupation's legalization
May 27		Decree-law 217/74, rent freezing	
May 29		New regulation for houses' attribu-tion in estates	Occupations in S. João de Deus
June 12			Barredo residents' occupy estates' houses
June 15			CMs' meeting in Porto
July 5		Nuno Portas is made Secretary of State for Housing and Urbanism (SSHU) SSHU's prioritary actions in FFH included the SAAL's creation SSHU condemned occupations and announced technical brigades for im-proving living conditions in degraded estates	
July 18	2nd Provisional Government		
August 6		SAAL's creation	
September 10	Guinea Bissau's independ-ence		

Table 11.1. Chronology of relevant events 1974-1976, based on: *Queirós (2015), Rodrigues (1997), Bandeirinha (2007), Vilaça (1993), several reports elaborated in the scope of the SAAL programme and neighbourhood papers and magazines consulted in Porto's District Archive, newspapers and neighbourhood papers and magazines consulted in the archive of the Portuguese Communist Party*

titled "The Council's solidarity and understanding won"[49]. It was this same housing development that, as soon as the revolution broke out on the 25th of Abril 1974, was the first to have its residents formally organised. Actively working as a trigger for residents mobilisation in other municipal estates, it was in these spaces that formal residents' committees (*Comissões de Moradores*, CM) were first formed to organise against repressive policies and evictions (table 11.1.).

The first manifestation of the spontaneous residents' movement took place in municipal estates that remained at the time distanced from urban life, not only due to the morphological characteristics observed in chapter 9 but also due to a systematic fall through by the municipality in developing the planned infrastructure and transportation. Queirós (2015, p.101) points out that this organisation was so intense

> [...] despite the small range of economic and cultural resources available to its protagonists, of the traditional stigmatisation and public lessening of these social agents and their supposed 'resistance' and 'mistrust' towards the virtualities of political positions and, finally, towards the possibilities of state action transforming their lives.[50]

This organisation was also the

> [...] (coherent) result of the encounter between, on the one side, local relations and dispositions pervading with specific types of competences and propensity for social and political participation and, on the other side, structures of opportunity that were apt to provide conditions for the enunciation and update of these specific competencies and of this specific propensity for action.[51] (Queirós 2015, p.102).

Spatially, the same conditions that socially segregated and stigmatised these populations provided the focus for this mobilisation. The first demands were focused on the abolishment of the strict regulations and consequent behavioural control exerted by a local overseer which resulted in frequent evictions, and were, as seen in chapter 9, translated in the inwards-facing morphology of the estates. However, residents were also organised to oppose the lack of transportation and

49 "Venceram a solidariedade e compreensão da Câmara." Translated from Portuguese to English by the author of this dissertation.

50 "[…] a grande intensidade deste desenvolvimento teve lugar, em diversos casos - e aqui residirá o paradoxo -, *apesar* do leque relativamente reduzido de recursos económicos e culturais ao dispor dos seus protagonistas, da tradicional estigmatização e menorização pública destes agentes sociais e da sua suposta "má vontade" e "desconfiança" face às virtualidades das tomadas de posíção políticas e, enfim, face às possíbilidades de uma acção estatal transformadora dos seus quadros de vida." Translated from Portuguese to English by the author of this dissertation.

51 "Na verdade, elas correspondem antes ao resultado (coerente) do encontro entre, por um lado, matrizes locais de disposições dotadas de tipos específicos de competências e de propensões para a participação social e política e, por outro lado, estruturas de oportunidades aptas a proporcionar as condições de enunciação e atualização dessas específicas competências e dessas específicas propensões para a ação." Translated from Portuguese to English by the author of this dissertation.

September 12		decree-law 445/74, landlords have 120 days to rent vacant houses	
			An eviction is stopped
September 28	Coup attempt		
October 1	3rd Provisional Government		
October 3		CRUARB's creation	
		SAAL's legislation regarding land expropriation and funding	
October 14		Council hall, SSHU and SAAL/Norte meeting regarding funding	
Novem-ber 7		Decree-law 594/74, right of free association	
November 26		Decree-law 663/74, development contracts for developing social housing	
November 30			Demonstration against sub-letting invaded the city hall
		Decree-law 737-A/74, CHEs are created	first CMs' plenum in Porto
December 20		decree-law 730/74, legal framework of housing cooperatives	
1975		Estates' regulation abolished by the city hall	CMs of Barredo is formed
January 7		decreee-law 6/75, evictions for contract expiry, illegal subleting or similar are suspended	
January 22			Claim book of the movement against subleting
January 25			Residents' demonstration for the right to housing and purge of fascists in the city hall
February 7			Occupation of 32 houses in vacant building in Porto
February 18		decreee-law 56/75 facilitates expropriations	
March 11	Attempted coup		
	MFA's assembly		
	Nationalisation of banks and insurance companies		
March 24	4th Provisional Government		
April 3			SAAL/Norte's meeting at the ESBAP regarding the city hall's failure to accept designs that did not comply with existing urban plans

road infrastructure that distanced them from urban life, and the unrealised schools, daycare and social centres that, worsening life conditions and determining neighbourhood relations, contributed to the stigmatisation of these spaces:

> The residents of council housing want the "situation of pure favour" through which they are housed is transformed in a total and unconditional property title, according to regulations to be defined; and that so-called "rent" is revised and transformed in co-payments of buildings' upkeep, carried on by the State. And, taking into account the characteristics of apartments "built to fall in a few years", they demand their replacement as soon as their conditions deteriorate, as well as school, social, cultural, access equipping, gardens and a public transportation network capable of corresponding to standard necessities.[52] (Council estates: residents want to decide their own lives, 15th of July 1974)[53]

> The economic power of workers in council estates is low, it is not enough to survive and as such women are forced to work outside of the house so they can contribute to their numerous expenses with their own salary. Mothers are forced to leave small children with nannies or with older siblings, subject to all types of dangers. As they grow up, they are raised in the streets with no one to watch them, when they are sick and need medical care their parents are forced to travel considerable distances, and as the Estates have a great concentration of people, it is justified that they have health care installations. In this sense, we demand:
>
> 1º - The construction of social centres in the Estates
>
> 2º - That we are given all aid in the construction of daycare, playgrounds and sports fields
>
> 3º - That healthcare installations are constructed.[54] (CMs' claim book, "Caderno Reivin-

52 "Querem os moradores dos bairros camarários que a "situação de puro favor" em que estão nas casas se transforme num título pleno e incondicional de propriedade, de acordo com regulamento próprio a definir; e que as actualmente chamadas "rendas" sejam revistas e se transformem em meras comparticipações nas despesas de conservação dos edificios, a cargo do Estado. E, atendendo às características das habitações, "feitas para cair em poucos anos", exigem a sua substituição logo que estejam em mau estado, bem como apetrechamento escolar, social, cultural, acessos, jardins, parques e uma rede de transportes públicos capazes de corresponder às necessidades colectivas." Translated from Portuguese to English by the author of this dissertation.

53 "*Bairros camarários: os moradores querem ser quem decide a sua vida*" Unsourced newspaper clipping, Translated from Portuguese to English by the author of this dissertation.

54 Por isso nós moradores dos Bairros exigimos:
(…)
Assistencia social
O poder economico dos trabalhadores dos bairros camarários é muito baixo, com o qual é impossivel sobreviver e como tal as mulheres vêem-se forçadas a trabalahr fora de casa para com o seu salário ajudarem a fazer face às inúmeras despesas. Vêem-se estas mães forçadas a deixar os filhos de tenra idade em amas ou a cargo de irmãos mais

April 5			SAAL/Norte plenum and demonstration for the nationalisation of urban land
			RCs' plenum results in the creation of the Porto's Residents' Revolutionary Committee (CRMP)
April 12			Residents of the historical centre occupy one of Aleixo's (layout 8) towers
April 14		Decree-law 198/75 defines punishement for illegal housing occupation	
April 22	Electricity, fuel, transportation, steel and tobaco industries are nationalised		Demonstration against the decree-law 198/75
April 25	Elections for the Constituent Assembly		
May 8			Constitution of the CRMP
May 13			Demonstration against subletting
May 16		decreee-law 232/75, subletting law	
May 17			CMs' demonstration against the decree-law 198/75, for the reorganisation of the city hall and for the nationalisation of urban land
May 24-26			SAAL seminar in Porto
	New Administrative Commission of the City Hall		
		RCs' recognised as collaboration and participation bodies of the city hall	
June 25	Independence of Mozambique		
July 5	Independence of Cape Vert		
July 12	Independence of São Tomé and Príncipe		
July 25-27			1st SAAL/Norte meeting
August 7	5th Provisional Government		
August 23			occupation of 100 houses in Porto
August 28	demission of the 5th Provisional Government		
September 19	6th Provisional Government	The municipal council is extinct and RCs' are denied access to council representation	
November 11	Angola's independence		
November 24			40 houses vacated by families who moved to Aleixo are occupied by people returning from the old colonies

dicativo", 1977)

Inhabitants of other segregated areas - those who, living in *ilhas* or overcrowded houses, were as Queirós (2015) expresses it, "in the centre, at the margins" - quickly begun organising within their neighbourhoods for a right to proper housing conditions. There, this had a different meaning from that expressed in the struggle of council housing residents. While housing precariousness was felt in those estates due to the repressive set legislation-control, inhabitants of the city centre were subjected to speculative rents and the whims of the market and forced to rent rooms or share houses that were degraded and overcrowded. In the centre, oftentimes the right to proper housing conditions meant the right to a house. Those segments of the population that were not deeply socially rooted in this area - young people, migrant workers and families who were originally from other parts of the country (see Queirós 2015, Chapter 2.1., for a detailed characterisation of this population) - had in themselves reunited the conditions for demanding a juster occupation of the city. These were the protagonists of the subsequent squatting movement which resulted in the eventually successful occupation of vacant houses in several municipal estates, as well of empty buildings in all areas of the city for the creation of social services and equipment.

> But what represents to us, residents of Massarelos, the Fish Fridge? (...) Not more nor less than what was never given to us, and that we want to give to our children. A DAYCARE CENTRE - where they can stay safe. SOCIAL SPACES - where all of us can talk, discuss so that we feel like a true family. REUNION ROOMS - where we can vent and make decisions. ROOMS FOR FILMS AND PLAYS - so that we can acquire culture through films and plays that enlighten us and are for us an example. LIBRARY - so that we can also profit culturally and intellectually. A GYM - where our children can play sports.[55] (Rodrigues 1997, p.72)[56]

velhos sujeitos aos mais diversos perigos. À medida que crescem cão sendo criados na rua sem ninguém que olhe poe eles, quando estão doentes e necessitam de cuidades médicos vêem-se os pais obrigados a percorrer distâncias consideráveis, e como os Bairros têm grande concentração de pessoas, justifica-se terem postos de assistência médica. Por isso exigimos:
1º - A construção de centros sociais nos Bairros
2º - que nos seja dado todo o apoio para a construção de creches, jardins infantis e parques de jogos
3º Que seja construídos postos médicos." Translated from Portuguese to English by the author of this dissertation.

55 "Mas o que representa para nós, moradores de Massarelos, o Frigorífico do Peixe? (. . .) Nem mais nem menos o que nunca nos deram e, que nós queremos dar aos nossos filhos./- UMA CRECHE - onde possam ficar em segurança. I -SALAS DE CONVÍVIO - onde todos nós possamos conversar, dialogar, para que nos sintamos como uma verdadeira família. I -SALAS DE REUNIÃO - onde possamos ventilar e tomar decisões. I - SALAS PARA CINEMA E TEATRO-para adquirirmos maior cultura, através de filmes e peças que nos elucidem e sejam para nós motivo de exemplo. I -BIBLIOTECA-também pra tirarmos lucros culturais e intelectuais. l-UM GINÁSIO -onde os nossos filhos possam praticar desporto. ""118 - Comunicação "f eita por um dos membros da Comissão de Moradores na l a Reunião Geral de Moradores feita na nova sede." Translated from Portuguese to English by the author of this dissertation.

56 Bolletin, Massarelos' Residents' Committee. *BOLETIM: Comissão de Moradores de Massarelos.* Porto: n° 1 (s.d.), p.3.

November 25	Military coup		
December			Residents' assembly in Porto
1976			
January 14			Bomb explosion in Porto's SAAL head-quarters
January 17			RCs' plenum
February		Creation of the Ministry of Housing, Urbanism and Construction	
February 24		Resolution for assignment of credit for houses acquisition by families	
April 2		New Constitution of the Portuguese Republic recognises the right to proper housing	
April 25	Elections for the Republic Assembly		
June 27	Presidential elections		
July 27	1st Constitutional Govern-ment		
October 25		6th SAAL National Council	
October 27		SAAL's extinction	
October 28			Residents' demonstration against the SAAL's extinction

Despite the legalistic side of the residents' mobilisation, if many occupations were successful to the point of persisting until today and were made legal retroactively by consecutive legislation, the squatting movement was never legalised:

> Meanwhile, and from now on, we have to solve the problems raised by the occupations of vacant houses. And if some of them are operated in conditions or with intuits that make it clearly inadmissible to maintain these abusive situations, in many other cases, however, it is important to recognise that, even though through an illegal path that cannot be tolerated in the future, these are included in actions taken for meeting urgent and justifiable needs of extremely disadvantaged strata of the population.
>
> We have decided to admit and promote the legalisation of the latter type of situations. On the other side, it is important to condemn, definitively and firmly, that similar situations are created in the future, as, besides the illegality they represent, they determine irreversibly the paralysation of the construction industry, resulting in serious loss to the entire population.[57] (Decree-law 198-A/1975)

Instead, the popular organisation around the right to proper housing found its legitimisation and institutionalisation in the legal constitution and recognition of Residents Associations (*Associações de Moradores*, AMs) and Committees (*Comissões de Moradores,* CMs).

Residents' representatives were integrated into the Municipal Council in March of 1975 and fully recognised as collaborative and participative bodies in the City Hall in May, at the same time as AMs and CMs were defined by the Armed Forces Movement (*Movimento das Forças Armadas,* MFA)[58] as, along with workers committees (and also village councils, cooperatives, small and medium farmers leagues, collectivities and other popular associations), the basis of popular organisation. Its "active participation […] in a democratic, independent and unitary practice" (MFA, 1975) should be encouraged "in the sense of creating and developing unitary groups, in a perspective of creating real bodies of popular power." (MFA, 1975). The cited document - outcome of an MFA assembly which took place in July of 1975 - further expressed that these should,

57 "Entretanto, e desde já, há que resolver os problemas suscitados pelas ocupações que têm vindo a verificar-se de fogos devolutos. E se algumas delas se operaram em condições ou com intuitos que tornam manifestamente inadmissível a manutenção das situações abusivas assim criadas, em muitos outros casos, porém, importa reconhecer que, embora por via ilegal que se não poderá tolerar no futuro, se trata de actuações inseridas na satisfação de necessidades urgentes e atendíveis de estratos extremamente desfavorecidos da população.
Resolve-se, por isso, admitir e promover a legalização deste último tipo de situações. Por outro lado, impõe-se obstar, de maneira definitiva e muito firme, a que situações semelhantes venham a criar-se no futuro, já que, para além da ilegalidade em que assentam, determinam, de forma irreversível, a paralisação de toda a indústria da construção, redundando, assim, em gravíssimo prejuízo para toda a população." Translated by the author.

58 *Movimento das forças armadas, MFA*, a military movement which was the governance solution in the revolutionary period in articulation with civilian forces in what was called the People-MFA alliance

> (...) besides their specific functions, promote, according to their own characteristics, the following activities:
>
> - Political work, through the information and enlightening of professional or population sectors.
>
> - Social action in the fields of health and social work, culture and sports, alphabetisation, housing and urbanisation, transportation, etc.
>
> - Economic action, through economic battle, control of the means of production in nationalised and private sectors, supply, prices, etc.
>
> - Vigilance, for the defence of facilities and urban areas, through physical control, turns, entrance control, passing of information to competent bodies, etc.
>
> - Reinforcement of the People-MFA alliance, as an always present activity.[59] (MFA, 1975)

The residents' movement took on a social and political character (clear, in truth, from the first assembly's demands for the purge from the City Hall of politicians associated with the old regime and for the abolishment of the municipal's estates authoritarian regulation) that went beyond the immediate questions of housing access and housing conditions. While the action of AMs and CMs was diverse and depended on the specific conditions of each neighbourhood, it was often explicitly anti-capitalistic.

They created health centres in council estates. With limited action and resources, these health centres worked towards educating and informing the population regarding health, prevention and primary medical care, associated with an ongoing struggle for a complete strategic restructuration of healthcare, that would eventually contribute for the creation the National Health Service in 1979, which remains today one of the strongest welfare elements in the country. As such, during a few years, healthcare was integrated into the ongoing process of popular organisation and struggle that was part of the field of action of AMs and CMs:

> 1- struggle for the control of health centres (…) 2 - Struggle for the demand of expropriation of private clinics (…) 3 - struggle for the participation in the management of health structures. Inclusion of health users in the managing committees of health centres,

59 "As Comissões de Trabalhadores, Comissões de Moradores, etc., deverão, além das suas funções específicas, promover, de acordo com as suas características, as seguintes actividades:
- Trabalho político, através de informação e esclarecimento nos sectores profissionais ou populacionais.
- Acção social, nos campos da saúde e assistência, cultura e desportos, alfabetização, habitação e urbanização, transportes, etc.
- Acção económica, pela batalha da economia, controlo sobre os meios de produção dos sectores nacionalizados e privados, abastecimento e preços, etc.
- Vigilância, pela defesa das instalações e zonas urbanas, através de permanência física, por turnos, controlo de entradas, canalização de informações para os órgãos oficiais competentes, etc.
Esta actividade, em casos especiais (pontos estratégicos da economia nacional) por iniciativa do próprio MFA e sob o seu controlo e enquadramento, pode traduzir-se em tarefas de autodefesa.
- Reforço da aliança Povo-MFA, como actividade sempre presente destas organizações." Translated by the author.

hospitals and other public health institutions.[60] (Rodrigues 1999, p.123)[61]

The work of CMs and AMs was straightly connected to housing and, as such, to the particularly ample domestic sphere. While often part of the work force as well[62], with a participation in the labor movement, housing remained the field of struggle of women: "If [working men] acted intensely in their workplaces […] women lead the struggle and demand for decent housing hand-in-hand with architects […]" (Tavares 2013, p.45) This domestic sphere included the right to having a house, but mainly the right to benefiting from social structures at a communitarian scale that was connected to the time spent in house chores after work, to the opportunity of even having a life outside of the house, to the choice of having or not having children. As such, women were the prominent protagonists of the squatting movement, occupying vacant buildings in order to create kindergartens, healthcare and youth centres:

> What is said regarding women being docile, men-dependent, with inferior intelligence and weak actions is the biggest lie and exploration applied against women. However, it must be made clear that women to free themselves don't have to fight men but the capitalist system that oppresses men and oppresses women two times more.[63] (Rodrigues 1999, p.127)[64]

These questions were perpetuated for years after the end of what is called the ongoing revolutionary period. Continuing to work towards the organisation of residents and the necessary improvements in their neighbourhoods, AMs were responsible for the construction of social equipment in council estates - which had frequently been planned for decades - way into the nineties-eighties. Similarly, while participatory housing promoted directly by the State for *ilhas* residents

60 "1 - Luta pelo controle do funcionamento dos Postos de Saúde, das Casas de Saúde, das tabelas dos consultórios médicos particulares, das farmácias. 2 - Luta pela exigência de expropriação das Clínicas particulares (Ordens, etc.) 3 -Luta pela participação na gestão das estruturas de saúde. Inclusão dos utentes nas comissões de gestão dos SMS, hospitais, casas de saúde e outras instituições públicas de Saúde." Translated from Portuguese to English by the author

61 Forms of Intervention in Health, in *Miragaia* in Struggle: Newspaper of the Miragaia's AM. *Formas de Intervenção na Saúde. Miragaia em Luta: Jornal da Associação de Moradores de Miragaia*. Porto: no 6 (Agosto de 1976), p. 5.

62 At the start of the XXth century women's employment in industrial jobs increased substantially, associated to lower wages. One third of industry's workers were women, and these made up only half of working women (Martins Pereira, 1995). If in council estates working women might be rare, as was the case observed in chapter 4, it seems likely that women in less stable socioeconomic conditions continued to work.

63 "O que se diz por aí que as mulheres são seres dóceis, dependentes do homem, que têm inteligência inf erior, que têm proceder fraco é a maior das mentiras e exploração aplicadas contra a mulher. No entanto é preciso que fique bem claro que as mulheres para se libertarem não têm que lutar contra os homens mas sim contra o sistema capitalista que oprime o homem e oprime duas vezes mais a mulher." Translated from Portuguese to English by the author.

64 The liberation of women, in The Voice of Leal: Bolletin of *Leal*'s CM. *A libertação da mulher. In A Voz do Leal: Boletim da Comissão de Moradores do Leal*. Porto.

only lasted a couple of years, cooperative housing maintained a certain character of residents' organisation for another decade.

11.2. NATIONAL HOUSING PROGRAMMES

The different programmes developed by the FFH from 1969 to 1976 are systematised in table 11.2. as found pertinent for this study. More importance is attributed to understanding the overall configuration and strategies of the housing policy that was designed during the revolutionary period than to the minute characterisation of each programme. Exceptions are made regarding the programmes that, for the reasons exposed in chapter 3, constitute the primary object of this dissertation: direct public development, both by the FFH and the SAAL, and cooperative housing.

PROGRAMME	YEAR	DEVELOPER	PROPERTY	URBAN PROJECT	ARCHITECTURAL PROJECT
PI	1969	public - FFH	state/municipal/private*	state	state
RD	1969	public - FFH	state/municipal/private*	state	state
OC	1972	social institutions	private	municipalities	private
CAR	1974	public - FFH/CAR	private*/ municipality	municipalities	state
SAAL	1974	public - FFH/SAAL	private	municipalities	state
CHE	1974	private - housing cooperatives	private*/state**	municipalities	state/ffh
CDH	1974	private	private/state***	municipalities	private
EC	1974	public - municipalities	municipality/ private*	municipalities	municipalities
CH	1974	-	-	-	-
PRIV	1976	private	private	-	private

*residents paid rent only until the cost of the house was covered

**under some conditions, cooperative housing might revert back to the FFH

***a percentage of houses was destined to be bpught by the FFH

Table 11.3. Housing programmes developped during the Portuguese revolutionary period.

The housing policies and programmes that found the conditions to materialise after the revolution of 1974 can all be traced back to the period immediately before and, in some cases, even earlier ideas. Most came in the continuity of earlier programmes or as the execution of ideas long thought out by architects and technicians in state institutions, and some, rooted in the idea

of an active welfare state, had been implemented - if only on paper - from the moment the FFH was established. The programmes developed within the FFH can be categorised along two axes, regarding whether they were formally implemented before or after the 25th of April of 1974 and whether they consisted of direct housing development or the creation of incentives for housing development. In this sense, it should be again noted that neither situation resulted in the creation of programmes that developed houses exclusively as public property. Today's Porto's council and State housing stock implies that the possibility of buying State developed housing was only rarely used by its residents, but it was possible according to the legislation - both before and after 1974 - and realised in some cases.[65]

Direct public housing development by the FFH was divided into Diverse Developments *(Realizações Diversas*, RD) and Integrated Plans for housing development (*Planos Integrados*, PI). Both were supposed to be made possible by the centralisation of institutions and new urban land laws, and both translated the ideas expressed in the 1969 Colloquy on Housing Policy (as well, as we have seen, in institutional research), which regarded housing as a problem that surpassed the limits of the house and necessarily implied access to urban structures and equipment.

This was particularly so in the case of the Integrated Plans. These plans had the objective of countering bureaucratic barriers common in the articulation of different institutions and so be capable of assuring the development of housing allied with the provision of all necessary infrastructure and equipment to new urban areas. Developing a practise where 'habitat' surpassed the walls of the house and followed principles of social, environmental and territorial integration, the FFH was to develop large scale housing enterprises of a necessary urban character and maintain control of the entire process. It was up to the FFH to conduct expropriations, to develop urban and architectural designs, to execute projects and oversee the works, to promote public tenders to the assignment of infrastructures, buildings, exterior spaces, construction and gardening to competent entities, to assign houses to families and to coordinate the execution of programmed retail, social and sports equipment. Often taking advantage of areas that were degraded, weakly urbanised and marginal to urban centres, the FFH assumed a strategy of territorial expansion towards new urbanities that were born of the rehousing of previously precariously-housed families in nearby neighbourhoods.

By 1974 all Integrated Plans were still not more than sketches. Large urban and architecture projects were unfinished, land expropriation processes were still to be started, and only a few smaller-scale enterprises had been developed all over the country. It was after the revolution that

65 In a conversation with IHRU's (Instituto da Habitação e Reabilitação Urbana, today's State institution for public housing maintenance and renewal) technicians in 2018 this was indicated as a lasting obstacle for the estate's maintenance, as the private property of separate houses in estates often made it difficult, or even legally impossible, to refurnish façades.

a focus on the development of the construction sector with the aim of developing the economy and creating employment represented an unequivocal shift on the relevance assigned to the FFH, which allowed for the unblocking of projects that had been sitting for years through the increase in financing the institution was immediately assigned:

> This conjuncture and the role played by the development of capital in jobs creation and the evolution of national product justify the high endowment dedicated by the present Budget to investment expenses, in particular in the housing sector. (Decree-law 809/74- Portuguese State Budget for 1975)

Investment in housing as a means for developing the national economy meant not only direct intervention in construction by the State and municipalities but a series of different strategies, ranging from stimulating housing acquisition through credit benefits, to encouraging the utilisation of national resources. The case of the Housing Commission for Returned Families (*Comissão para o Alojamento de Retornados*, CAR) is an example of the latter. As the long-lasting colonial war ended after 1974 with the liberation of colonised countries, numerous Portuguese citizens moved back to Portugal. The CAR developed some solutions for housing these families through resource to prefabrication, favouring the articulation of the FFH with national companies. The developed houses were first assigned to families in a regime of revocable property and then, in 1978, rented at controlled prices due, as expressed in the implementing act 283/78, to a lack of candidates resultant by the limitations imposed by this regime "in what concerns the age of competitors, distancing from the start the population over 45 years old, as well as the incompatibility between the time-limit for amortisation of houses and their lifespan."

Therefore, if a significant part of the FFH's funds were put into new construction, several of the new programmes implemented during the first years after the revolution had regulatory or redistributive purposes. To a programme developed in 1972 for funding institutions of a social character - such as church institutions, municipalities, and the police social services - that developed housing for rent at limited prices (*Obras Comparticipadas*, OC - decree-law 583/72), it was added in 1974 the offer of tax benefits to private developers that built houses for sale at controlled prices. Housing Development Contracts (*Contratos de Desenvolvimento para a Habitação*, CDH, decrees-law 663/74, 412-A/77) were developed to respond to the housing shortage and increasingly inadequacy of house prices that "have caused a steep rise of prices and rents in the free market and favoured, cumulatively, both the triggering of speculative action and the self-sustained continuity of the market's distortion."[66] (Decree-law 663/74) In that context, the

66 "Para o agravamento de que o mesmo hoje se reveste intervêm não só a acentuada carência numérica de habitações, mas igualmente o preocupante desajustamento, dia a dia mais notório, entre o preço ou a renda dos alojamentos construídos e a efectiva possibilidade de os rendimentos médios lhes fazerem face." Translated from Portuguese to English by the author of this dissertation.

decree-law found it "imperative that the public sector, independently of the predominant action it must perform in the direct development of vast construction programmes, creates the necessary conditions for private initiative to take an interest in social housing. For this purpose, it is necessary to offer it a convenient support and incentive."[67] (Decree-law 663/74) As such, the State or municipality provided the lots for construction, and the FFH defined the exterior design of the new enterprise at a 1/500 scale. The developer was in charge of the rest, under the condition that houses were made available in three different ways: either for sale in the free market, for sale at conditioned prices, or for rent at conditioned prices. Additionally, a part of the developed houses would be bought by the State in order to increase public property (Decree-law 663/74).

Simultaneously, however, the State encouraged the purchase and owner-occupation of houses by families. This type of policy became more prominent over time, and is clear in the introduction of soft loans for housing credit (*Empréstimos a juros bonificados para o crédito à habitação*, EBCH) in 1976, but was present, to an extent, in all programmes for housing development supported by the State through financing, awarding financial benefits or by directly intervening in the process. All of them either developed private housing or allowed the possibility of families acquiring their houses through revocable property (*Regime de propriedade resolúvel*, RPR)[68], being a paradigmatic example that houses developed by the municipalities through a soft loans programme (*Programa de Empréstimos às Câmaras Municipais*, EC, decrees-law 658/74 and 817/76)[69] might either be rented or put on sale at controlled prices. Other programmes, like the CAR and the SAAL (and, in a sense, the PRID)[70], offered the chance of home-ownership to families that would otherwise remain homeless or in poor living conditions.

Acting at a smaller scale, these programmes should provide solutions for the urgent, precarious living conditions of the most insolvent households. The SAAL (Ambulatory Service for Local Aid, *Serviço Ambulatório de Apoio Local*), in specific, was created "in the face of severe housing

67 "Impõe-se ao sector público, independentemente da acção predominante que lhe cabe desempenhar na promoção directa de vastos programas construtivos, criar as condições indispensáveis para que a iniciativa privada se sinta interessada na habitação social. Para o efeito há que oferecer-lhe o conveniente apoio e incentivo." Translated from Portuguese to English by the author of this dissertation.

68 The RPR was first implemented in the Economic Housing Programme of 1933 as a means for encouraging home-ownership by giving property of houses to families to be paid through rent, and which might be revocable if certain conditions were not met. During the dictatorship, these included moral and political conduct. However, after 1974 it was mostly dependent on the total payment of the house in 20 years.

69 The State awarded soft loans to municipalities for the development of small housing schemes of 15 to 50 houses. These were targeted at middle-income families outside large urban centres and should comply with a number of conditions, such as taking advantage of vacant municipal land or of lots that could be acquired at low prices, as well as the re-utilisation of earlier designs developed by the FFH, social security institutions or the municipalities.

70 Programme for the Rehabilitation of Degraded Buildings - Programa para a Recuperação de Imóveis Degradados, decree-law 704/76. A programme awarding loans for the rehabilitation of both public and private property, either by financing the municipalities or the families directly

shortages, namely in the main urban centres, and due to the difficulty of starting programmes of conventional construction in the short term" (Teotónio Pereira in *Livro Branco do SAAL*, 1976, p.61) in the terms expressed in 1974 in an internal order by the Secretary of State for Housing defining a "Programme of Priority Actions to be Considered by the Services of the FFH". These priority actions appeared in line with the four frameworks presented in the Colloquy for Housing Policy of 1969, designed according to the solvency level of the target populations, of which the first concerned "the most insolvent strata but with an internal organisation that allows for their immediate involvement in "self-solutions"" (Internal order 4630, 1974) with the support of the State regarding land, infrastructure, technical assistance and financing.

However, if the SAAL had a clear basis in programmes and institutional research projects that were not new (Portas 1969, Teotónio Pereira, 1969a, 1969c), the importance assigned to the rehabilitation of degraded neighbourhoods in 1974 was explicitly grounded on

> the popular movement triggered in many of those neighbourhoods after the 25th of April, which lead to the internal organisation of populations and to the development of concrete demands of support to the administration, and to actions during which the populations declared to be willing to invest all types of latent or even monetary resources.[71] (Teotónio Pereira, in "Livro Branco do SAAL", 1976, p.61)

It was directed at populations mobilised to demand an institutional response to the extremely precarious conditions in which they lived, often on valuable lots that were in many cases, and particularly in Lisbon, occupied by self-constructed slums, usually occupying public land. Deemed urgent, and so to be carried on immediately without the preparation time of other programmes, the SAAL was to work directly with these more or less small, already organised (or in the process of organising) groups of residents, in order to collaborate in the improvement of their housing conditions in the same places where they were rooted.

Due to the nature of the programme, which was supposed to provide support to groups of residents for the construction of proper housing without displacing them in favour of land speculation, but was also dependent on the resources and objectives of the populations, the type and scale of operations varied considerably across the country. SAAL interventions ranged from improvement operations for transports and accessibility, renovation of public spaces and houses, to the full reconstruction of houses and settlements in place, but also varied greatly in their guiding principles, methodologies, processes, urban strategies and architectural typologies. It is paradigmatic of the adaptation to local conditions how self-construction was vehemently resisted

71 "Esta necessidade decorre dos movimentos populares desencadeados em muitos desses bairros depois do 25 de Abril e que conduziram à organização interna das populações e à formação de concretas exigências de apoio da administração e acções nas quais aquelas se declaeram dispostas a investir toda a classe de recursos latentes e mesmo monetários." Translated from Portuguese to English by the author of this dissertation.

in Porto and Lisbon but fully adopted in southern fishing villages, or how in Lisbon large scale developments - designed to house the vaster populations of semi-peripheral slums - dominated, contrasting with Porto's single-family housing layouts for the accommodation of small communities previously living in the city's *ilhas* or other precarious, overcrowded apartments (Ferreira, 1975, pp.28-30)..

If it was assigned to the populations organised in AMs or cooperatives the overall administration of the developments, it was up to the SAAL, through local brigades, and the municipalities to assure the acquisition of land, to execute the allotment, infrastructure and architectural projects, to act as direct interlocutors in the articulation of the different parties, to assist the execution of the projects, to assist in the organisation of associations or cooperatives, and to guarantee the attribution of loans and financing. The local brigades that worked directly with the residents' associations included qualified professionals such as architects, engineers, social workers, lawyers and others. They were financed by the FFH, but could be chosen by the AMs themselves. Decentralisation was favoured and was expressed both in early arguments against the bureaucracy of institutions and the defense of the brigades' autonomy "in relation to official institutions, so that they may intervene more as interpreters of the organised populations than the other way around" (Teotónio Pereira in "Livro Branco do SAAL", 1976, p.63), and also in the continuous indefiniteness of the functions, competences and hierarchic framework of the FFH in relation to the AMs.

A similar incentive to self-organisation in the revolutionary period was present in the legal restructuring of the cooperative movement and, in particular, of cooperative housing. The new legislation for cooperative housing (decrees-law 730/74 and 737-A/74) assigned certain advantages to cooperatives with social programmes that respected defined area parameters and house costs, such as tax exemptions, subsidies, soft loans and complete financing of 85% to 95% of the total cost of constructions. The FFH provided effective support to housing design, adjudication and execution of projects, and also promoted information and training, propelled inter-cooperative action, conceived and implemented the methodology and parameters for the programme execution. Additionally, to integrate cooperative housing in strategical urban growth, land selection and acquisition was facilitated. In some cases, such as Porto's neighbouring city Matosinhos, cooperative housing was used by the council as a solution for housing shortages, selling vacant lots to cooperatives at llow market prices.

Like the SAAL, cooperative housing depended on residents organisation, defined either geographically, pertaining to a defined and limited area, or by profession, and aimed at creating the necessary measures for residents to develop housing appropriate to their needs:

> In the housing policy programme of the Provisional Government, it has particular relevance the role attributed to cooperatives in the development of unambiguous social utility as a privileged form of organisation of initiation and resource management by

> residents in the development of urban areas that effectively correspond to their needs[72] (decree-law 737-A/74)

However, the associated urban strategy and target populations were not the same. Housing cooperatives required the investment of economic resources by the cooperatives' members that was not accessible for the generality of populations integrated into the SAAL. Additionally, cooperative housing was not private housing. Semi-public, its private use was subject to becoming public property in determined cases. Consequently, it was possible to create anti-speculative measures associated with this type of housing, through norms conditioning use, lease, inheritance and other types of succession and sale. This assured right of preference (based on the price first paid by the house seller) first to the cooperative, then to another already existing member, then to the council, and then finally to the FFH.

All these programmes were gradually abandoned as the country liberalised after 1976. The SAAL was extinct as a centralised service in that same year. The FFH itself was extinct in 1982. Cooperative housing exists today, but was transformed with a new legal framework (decree-law 265/76, 515/77, 269/82) which intensified its role towards the development of housing to the middle classes. Gradually, anti-speculative measures associated with cooperative housing were also abandoned.

Bandeirinha (2018) noted that the policies and programmes that made up this national housing policy did not address rental policies or intervened in the rental market. As such, it remained the role of private investors to develop the vast majority of housing, and the real estate market remained the primary determinant of people's access to decent living conditions. Furthermore, this policy consisted of some direct State intervention, some support of private investment and some incentive for families to buy (and so own) their own houses, and as such acted within the market. Nevertheless, this period represents a clear attempt at creating a systemic housing policy that took into account the diversity of situations in the country and searched for solutions specific to each of them. It will be seen in the following chapters how, even within these limitations, it had the capacity of providing consequent transformations in Porto and the surrounding territory.

72 "No programa de política habitacional do Governo Provisório assume especial relevo o papel que se atribui ao cooperativismo na promoção de alojamento de inequívoca utilidade social como forma privilegiada de organização da iniciativa e da gestão de recursos pelos próprios moradores na realização de conjuntos urbanos que efectivamente correspondam às suas necessidades." Translated by the author.

11.3. PARTICIPATORY ARCHITECTURE IN THE REVOLUTIONARY PROCESS AND THE SAAL IN PORTO

There was an evident transformation of public intervention in housing after the 25th of April 1974. This was, however, a transformation that had been in construction for at least half a decade; in the reorganisation of public institutions, in the development of new housing programmes, in the investment in institutional research that could back up new types of action, in the building up of residents' discontent and their successful organisation, and, to some extent, in the ideological shift within the discipline - and in particular in Porto - that combined the line of thought developed in the Survey to Popular Architecture in Portugal to an international trend that had, since the end of the second world war, moved away from the question of mass housing construction, to the ideas ofa new generation of architects thinkers, as expressed in the 9th CIAM of 1953, as well as sociologists such as Lefebvre or Chombart de Lawe.

If architects were a part of all public housing programmes, those who were the most connected to the ESBAP and were simultaneously the better-known names that would go on to give international recognition to the "School of Porto", were mainly involved in the programmes that, grounded on the organised struggle of the residents of the centre of the city and intervening mostly in these places, took off shortly after the revolution. A direct heir of the ERUB, a Commissariat for the Urban Renovation of the Ribeira-Barredo Area[73] was created in Porto that finally intervened in the historical area near the river that had remained untouched for so long. Similarly, in Porto, the SAAL was deeply connected to the school of architecture. It took advantage of students' interventions in and surveys of the *ilhas* surrounding the ESBAP and integrated both teachers and students (many of which departed from formal education during those years) into its brigades.

The CRUARB and the SAAL were grounded on a similar set of principles - social, urban and architectural. Both arose from the idea that popular participation was desirable throughout the whole process of housing development, albeit with significant differences. While the SAAL was created to "support (…) the initiatives of populations in poor housing conditions in the sense of collaborating in the transformation of their own neighbourhoods, investing their own latent and, possibly, monetary resources"[74] (order DD4630), CRUARB's approach was not dependent

73 *Comissariafo para a Renovação Urbana da Área da Ribeira-Barredo,* CRUARB, now legitimated by the decree-law 8/73.

74 "1. Em face das graves carências habitacionais, designadamente nas principais aglomerações, aliadas às dificuldades em fazer arrancar programas de construção convencional a curto prazo - na medida em que estes programas supõem terrenos preparados, projectos e preparação de concursos e garantia de disponibilidade financeira por parte do Estado ou autarquias locais -, está o Fundo de Fomento da Habitação a organizar um corpo técnico especializa-

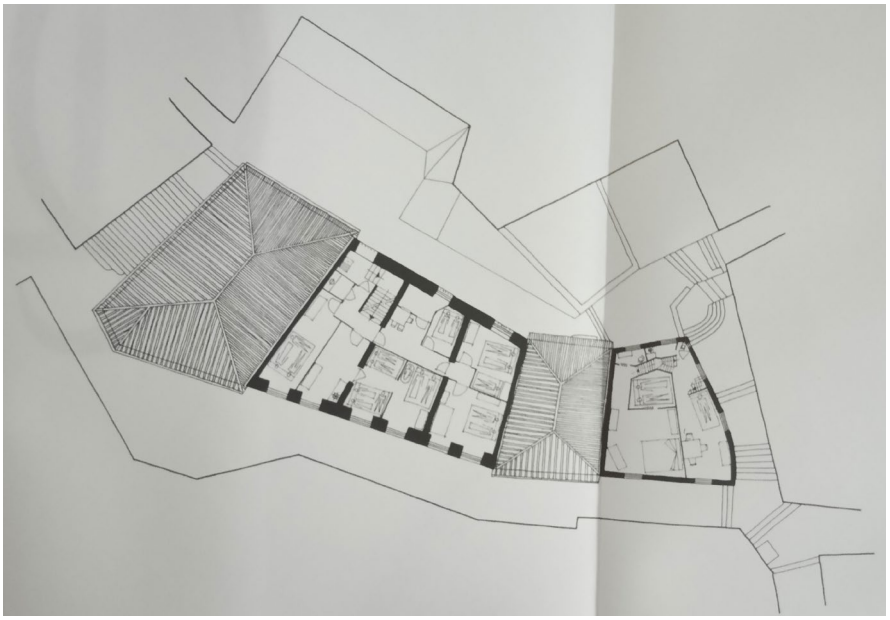


Figure 11.3.
Drawn survey of living conditions in Ribeira-Barredo.
Drawings in Estudo de Renovação Urbana do Barredo, 2019, 0.193

on residents' prior organisation but should aim to involve residents committees. Participation was inevitably a more complex issue in the case of the CRUARB, where residents - in their vast majority - were not the owners of the houses being rehabilitated. Instead, renting rooms in overcrowded apartments, many of them either faced eviction and relocation to new houses in council estates or might see an, if small and subject to determined conditions, increase in rent by the landlord once the houses were renovated. Acting within the urbanised city and with communities that already existed, both were also based on the defence of urban patrimony. A patrimony that, more than "the historical and cultural values that characterise this physical support, does not reside in simple scholarly interest, it is not confused with culturalist thought, with the ambiguities of "environment preservation", it is instead closely connected to the population's experience and to the possibility of realising their social aspirations."[75] (Távora et al., 1976) The rehabilitation of social and urban patrimony was then connected to another point of convergence between the CRUARB and the SAAL, which was the maintenance of populations as much as possible in the areas of the city where they were rooted.

As shown in the drawn survey in figure 11.3. the area of Barredo was severely overcrowded. Having had contact with that reality for almost a decade, the team in charge of the CRUARB noted that it was not possible, through rehabilitation alone, to solve the grave qualitative housing problems of the area. As such, it was attributed to one of the last estates of the PMCP (8. Aleixo), still in development by 1974, the role of housing the majority of the over-population of Ribeira-Barredo. In this case, the rehousing of part of the population did not necessarily mean the displacement of people from the urban life they knew or the dismantling of existing communities. As seen in chapter 9, this area of the centre, historically connected to the river and the city's port, had often been a point of settlement for migrant workers or a stopover for those hoping to cross the ocean towards Brazil. This resulted in a heterogeneous population with a great variety of ties to the area, a part of which - including young families as well - found in municipal housing an opportunity for gaining access to proper living conditions. However, if moving to Aleixo was not a problem for many, the priority of finding housing also took some people to occupying local houses that had previously been freed with the objective of starting the renovation works. There was a clear difficulty in controlling the residents movement and the consequent and frequent occupations by either institutional power or the technicians involved. The former, under constant popular pressure in a extremely unstable period for the state apparatus, while never legalizing the

do, designado por «Serviço de Apoio Ambulatório Local» (SAAL), para apoiar, através das câmaras municipais, as iniciativas de populações mal alojadas no sentido de colaborarem na transformação dos próprios bairros, investindo os próprios recursos latentes e, eventualmente, monetários." Translated by the author.

75 "A importância e a consideração dos valores históricos e culturais que caracterizam este suporte físico não reside no mero interesse erudito, não se confunde com o pensamento culturista, ou seja, com as ambiguidaes da "preservação do ambiente", antes está intimamente ligado à vivência da população e à possibilidade de concretização das suas aspirações sociais." Translated from Portuguese to English by the author of this dissertation.

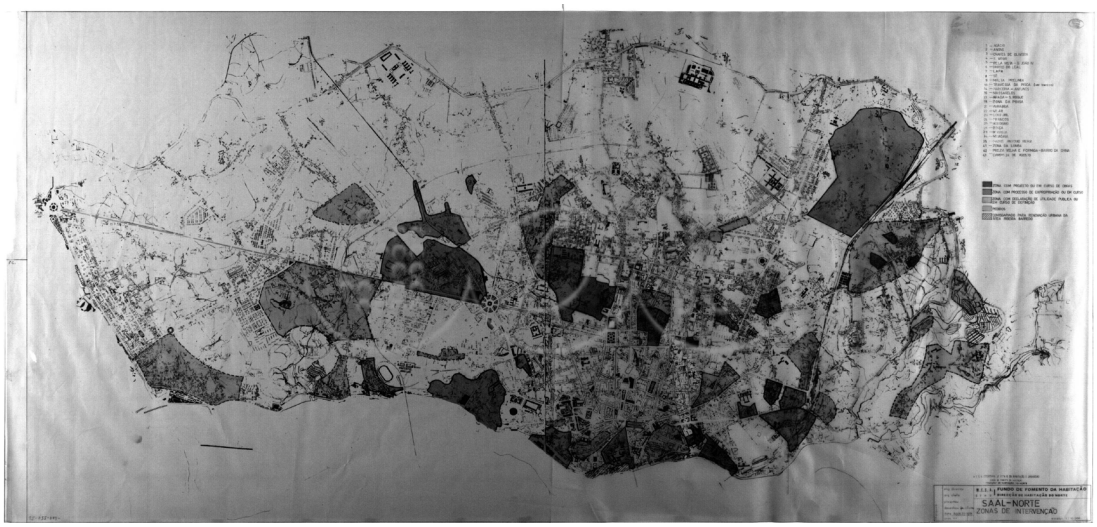


FIGURE 11.4.
"Operational units". Areas of intervention of planned SAAL projects, 1975.
Original drawing in Porto's Municipal Archive.

occupation of vacant houses, successively legalised the occupations that had already taken place. In this way, in a period of social instability, the populations themselves ensured their access to a house, albeit often one in precarious conditions.

Similarly seeking the maintenance of communities, the SAAL in Porto was successful in keeping populations - or parts of communities - in central, highly integrated areas of the city. Inside the municipality of Porto, out of over thirty created Residents Associations and several initiated projects, the SAAL developed only ten new developments, many of which were never fully finished. Half of these (Antas (10), S. Vitor (11), Lapa (14), Leal (15) and Bouça (18)) were established in the core of the city, in the proximity of important city axes located in the first decile of integration. Lapa (14), Leal (15) and Bouça (18) follow one of the main axes of the city (Rua da Boavista), which establishes an important connection between the east and the west. Antas, (10) is located in the back of the main axis in the east of the city, which connects to the adjacent municipalities in the North. S. Vitor (11) is located in an area that, despite representing one of the highest concentration of *ilhas* at the time, was also an area with large values of integration. Three housing schemes (Maceda (12), Contumil (17), Chaves de Oliveira (19)) were developed to the east, outside of the inner radial of the city, in an area we have seen in chapter 9 to be separated from the centre by the highway and adjacent industry, and maintain a mainly rural character. The remaining two (Francos (13) and Massarelos (16)) were located to the west. Francos (13) in a well-integrated area that became the street-front of the highway, and Massarelos (16) in a privileged lot overseeing the river.

	#houses	area (m²)	NaIN5000	NaIN800	NaCH5000	NaCH800
10. Antas	32	6027	0.77	0.84	0.75	0.79
11. S. Vitor	12	1740	0.81	0.80	0.63	0.67
12. Maceda	16	6898	0.65	0.68	0.26	0.26
13. Francos	44	12677	0.91	0.91	0.10	1.11
14. Lapa	68	17959	0.86	0.98	0.80	0.92
15. Leal	16	2415	0.91	1.21	0.87	1.03
16. Massarelos	80	11223	0.69	0.71	0.86	1.14
17. Contumil	62	12107	0.63	0.71	0.72	0.77
18. Bouça	126	18388	0.89	1.01	0.84	0.84
		9108.4	0.79	0.87	0.75	0.84

TABLE 11.4.
Global and local integration and choice of SAAL estate layouts

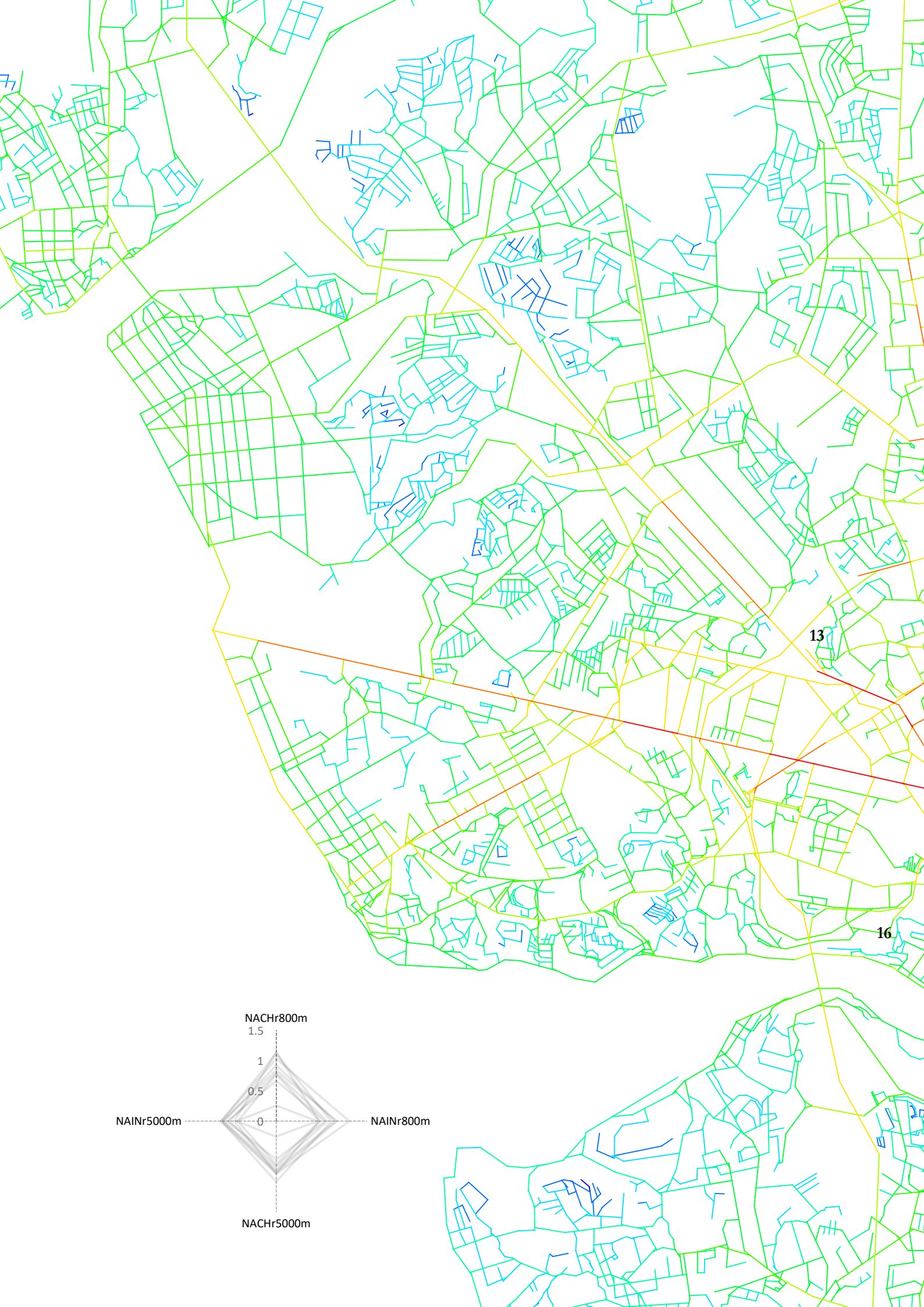
While many estates developed within the PMCP were built in poorly integrated areas that became better articulated with the city as it grew, SAAL developments are preferentially located in areas already stable in the city's process of urbanisation (figure 11.5. and 11.6.). The SAAL in Porto was successful, to some extent, in establishing the right of existing populations to stable, fully-urbanised, central areas of the city. It was also deeply connected to the maintenance of existing communities, both through an attempt not to separate them and displace their parts



10. Antas
11. S. Victor
12. Maceda
13. Francos
14. Lapa
15. Leal
16. Massarelos
17. Contumil
18. Bouça
19. Chaves de Oliveira



FIGURE 11.5.
Plan of Porto 1978 and SAAL developments
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research


13
16
NACHr800m
1.5
1
0.5
0
NAINr5000m
NAINr800m
NACHr5000m

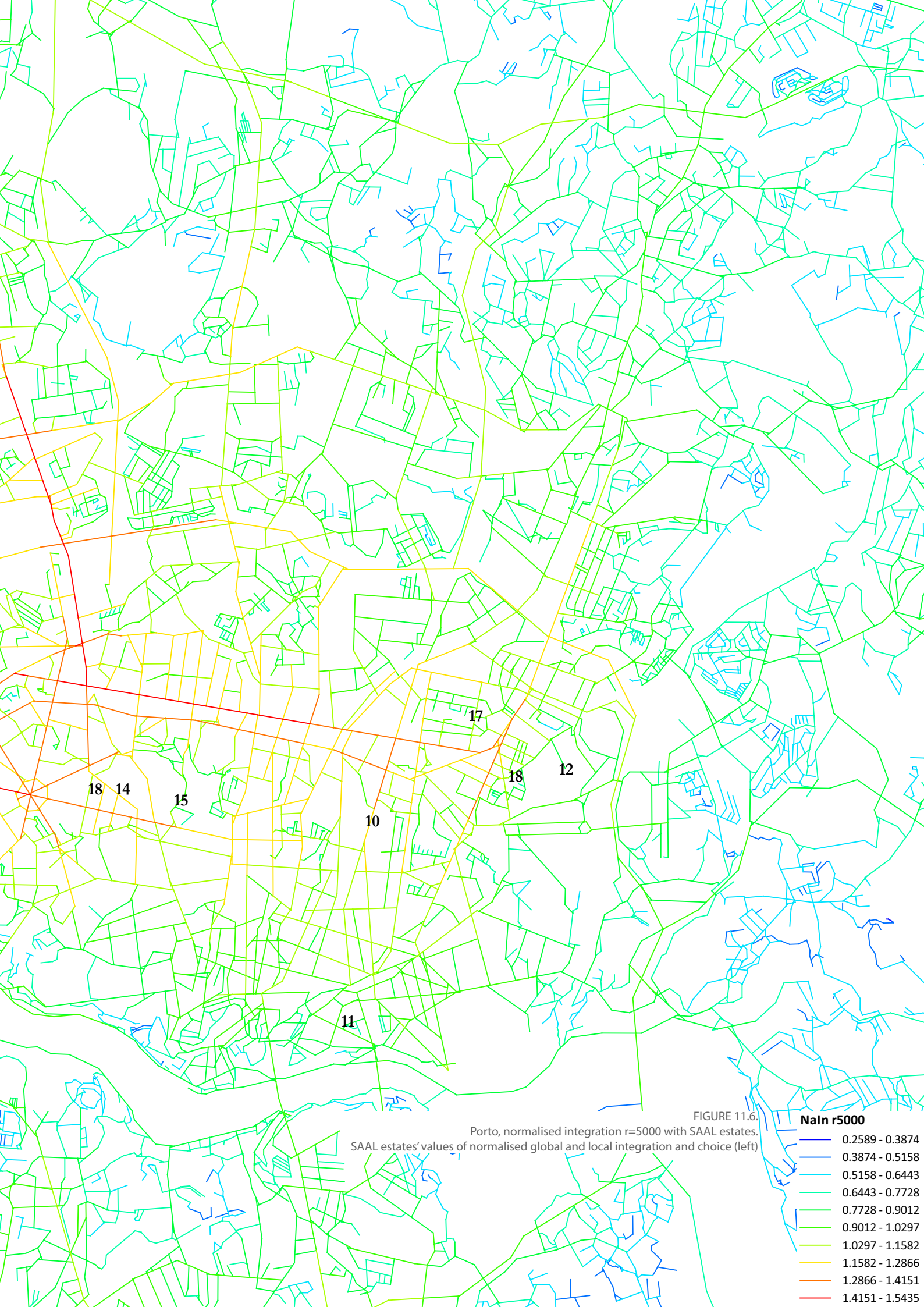


FIGURE 11.6.
Porto, normalised integration r=5000 with SAAL estates.
SAAL estates' values of normalised global and local integration and choice (left)



FIGURE 11.7.
Living conditions in *ilhas*, Porto, 1974. Photographies by A. Alves Costa.
Phorographs by Alves Costa, found in Porto's Municipal Archive.

into the different public housing estates, but also through maintenance of their ways of life that was in some way connected to the spatial characteristics of the spaces they inhabited. This view contrasted with a "moralist miserabilism" identified in Queirós (2015) as the mainstream in the pre-revolution media regarding the population of Ribeira-Barredo, there denounced in an opinion piece published in 1974:

> […] J.G.B. [José Gomes Bandeira, published in Diário de Lisboa, the 27th of January 1974] tries to convince us that what there is in Barredo is a people who isn't even people […] For such it draws a picture of miserabilism. The struggle of life and for life are absent. Social relations are obscured. In their place, fixed pictures of misery and pain.
>
> (…) Where is the life, the will, the fight of Barredo's people who, on the other side, triggers so many anxieties (those powder kegs…) that not everyone dares venture around there? Contradictions? It seems.
>
> […]
>
> Speaking of the population in terms of their lack of culture, their anti-social behaviours, their mental weakness, their delinquency or their sexual promiscuity, they kill two birds with one stone. On the one side, they declare the population incapable of thinking about their own problems and of determining their own solutions. On the other, they technocratize class relations.
>
> […]
>
> (…) Let us continue. In the field of moral. Did the population of Barredo or the *ilhas* give power of attorney to J.G.B. for moral demands? Has anyone heard the popular classes demand of themselves or to themselves other moral than that which they have?[76] (Ana Gonçalves, *Comércio do Funchal,* 1974, in Queirós, 2015, p.99)

76 "J.G.B. [José Gomes Bandeira, publicado no *Diário de Lisboa* de 27 de Janeiro de 1974] tenta convencer-nos de que o que há no Barredo é uma gente que quase não chega a ser gente" (...) "Para tal traça o quadro do miserabilismo. A luta da vida e pela vida estão ausentes. As relações sociais são escamoteadas. Em seu lugar, quadros fixos de miséria e dor.
(...) Onde está a vida, a vontade, a luta, a solidariedade da gente do Barredo que, por outro lado, tantas apreensões provoca (aqueles barris de pólvora...) que nem todos se aventuram por lá? Contradições? Parece."
(...)
"Ao falar da população em termos de ausência de cultura, comportamentos anti-sociais, debilidade mental, marginalidade ou promiscuidade sexual, matam-se dois coelhos duma cajadada. Por um lado, declara-se a população incapaz de de pensar os seus problemas e de determinar as soluções que lhe interessam. Por outro lado, tecnocatrizam-se as relações de classe."
(...)
"(...) Continuemos. No capítulo da **moral**. Terá a população do Barredo ou das *ilhas* passado procuração a J.G.B. (ou aos outros senhores jornalistas aqui referidos, etc.) para reivindicações morais? Alguém ouviu as camadas populares reivindicarem de si ou para si próprias uma outra moral que não a que têm?" Translated by the author.



FIGURE 11.8.
São Victor, 2020.
Photograph by the author.

The concept of the proletarian *ilha*[77] presented itself as the opposite of this moralist miserabilism. The proletarian *ilha* as the basis of a new type of urban tissue sought to maintain all that was good about the *ilhas* - the way the population created bonds and interacted in those spaces, looked at through the view of the working-class ways of life as a resistance against bourgeois values - while getting rid of everything bad:

> The other face of the stimulating common life of the '*ilha*' is - as the word indicates - in the segregation of the population in small isolated units. The image of the *'ilha*' is then something that the population as a whole rejects. But rejecting the image and what it implies of segregation and misery does not necessarily mean rejecting the system of topographic adaptation, and what is positive in that communal life.[78] (Siza, 1976).

If the enclosure and segregation of these communities in the interior of blocks kept them hidden and separated from urban life, then the proletarian *ilha* would be "inside out":

> But the new city will not be born of judgements by old or new codes of competence, nor of scholarly journals, nor of shrouded experience.
>
> The design of the city will be born of the desire of the city, the discovery of what is clear and what is obscure, of what everyone knows by experience and of what only a few know, made collective. (…)
>
> The new city will be born of what exists and belongs to everyone: streets, squares, gardens, houses, houses behind houses, streets and squares and gardens isolated from streets and squares and gardens (…)
>
> All turned inside out.[79] (Siza, 1976)

The idea was turning the *ilhas* outwards towards the city, or the city inwards inside the *ilhas*,

77 The proletarian *ilha* was a concept presented by Siza Vieira and S. Victor's technical brigade in an essay titled The proletarian *ilha* as the base element of the urban tissue in the Italian magazine Lotus Internacional, 14, 1976.

78 "A outra face da estimulante vida comunitária da "ilha" encontra-se - como a palavra indica - na segregação da população em pequenas unidades isoladas.
A imagem da "ilha" é por isso algo que a população em bloco repudia. Mas repudiar tal imagem e o que nela está implícito de segregação e miséria não é necessariamente recusar o sistema de adaptação topográfica, e o que há de positivo naquela vida comunitária." Translated by the author

79 "Mas a nova cidade não vai nascer dos juízos de competência com velhos ou novos códigos, nem das revistas da especialidade, nem da experiência amortalhada.
O desenho da cidade nascerá do desejo da cidade, da descoberta do claro e do oculto, do que todos conhecem por experiência e do que poucos conhecem, tornada colectiva. […]
A nova cidade nascerá do que há e de algum modo pertence a todos: ruas, praças, jardins, casas, casas por trás das casas, ruas e praças e jardins isolados das ruas e das praças e dos jardins […]
Tudo virado ao contrário […]" Translated by the author.

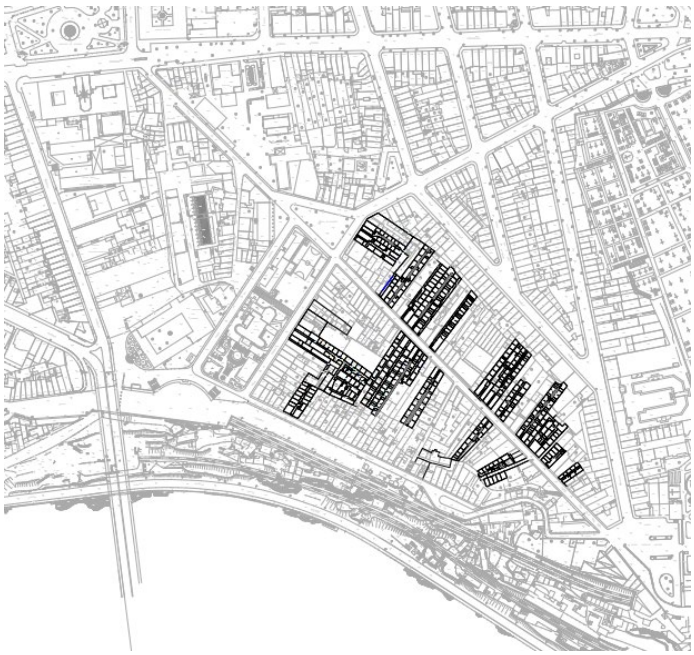




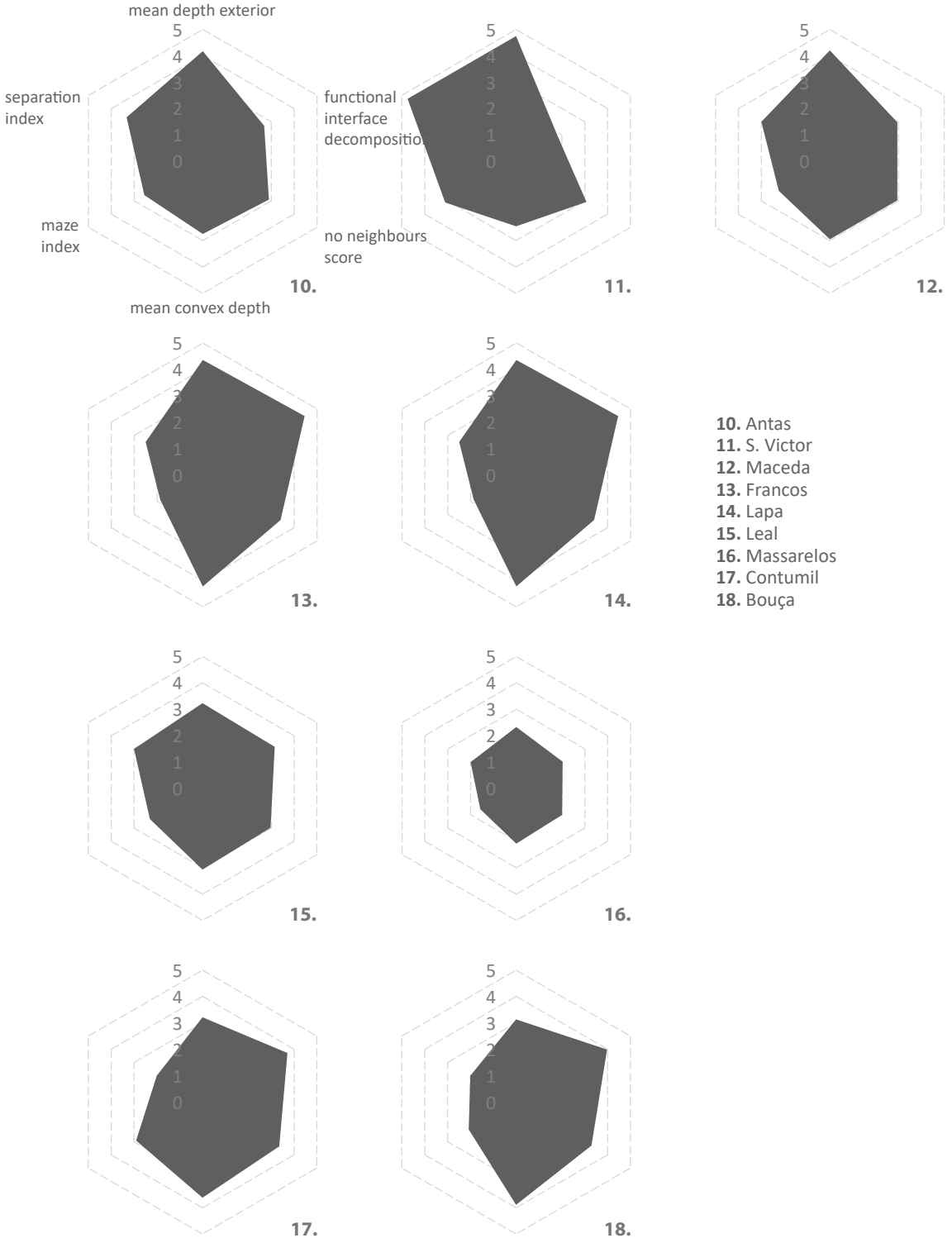
FIGURE 11.9.
Ilhas around S. Victor, Porto (top)
António Pedro Faria, Cidade | Arquitectura | Política, realidade e desenho, FAUP, Porto, 2015
FIGURE 11.10.
Original design of layout 11, São Victor (bottom)
Ana Alves Costa, Ana Catarina Costa, Sergio fernandezm Cidade Participada: Arquitectura e Democracia, S. Victor, FAUP, Porto 2019

while maintaining the same morphological and density logic of construction in the interior of existing blocks. If this strategy was ideologically presented as the emancipation of the popular classes through the maintenance of the city they inhabited and the social relations they established within it, it was in practice sustained by its apparent feasibility: When confronted with different solutions - building completely anew (an option that was often taken in Lisbon, for example), expropriating vacant houses for renovation and future occupation by *ilhas* residents (an idea suggested but never seriously considered within the SAAL), or taking advantage of old structures and lots in order to build improved housing - and following the principles of right to the place, urgency and low resources of the SAAL, the latter seemed to be able to respond more efficiently. It was cheap, freer from municipal bureaucracies, and simplified the rehousing process by corresponding "construction units and urban structure units" (Siza, 1976). As such, it corresponded to the idea of taking advantage of the moment to "build more houses: urban reorientation would have to wait"[80] (Portas, 1991, p.45).

S. Victor (layout 11) was the first experimental field of the proletarian *ilha*, and remains the better-known example of this line of thought. A paradigmatic example of student participation and intesified by the disciplinary importance of its brigade's leader, Álvaro Siza, S. Victor became the symbolic zenith of the SAAL in Porto and its modus operandi both in its international representation at the time and in the future historiography of the city'sarchitecture. The project was originally meant to integrate the entirety of existing *ilhas* in the area (figure 11.9) - encompassing a total of 630 families and 2030 residents - and to develop in three phases of operations, of which not even the first could be completed before the extinction of the central administration of the SAAL in 1976. Of an extensive operation involving around 118 200 m2 of existing city blocks between the ESBAP and the river-top for the construction or renovation of 615 houses, only an area of 11 400 m2, which had previously been expropriated and vacated by the municipality for the creation of a parking lot, was projected for. Of the 32 new houses and 20 renovations proposed in Siza's design for the first phase of the operation, only 12 new houses were built.

In this sense, it is important to be aware that when looking at S. Victor (11) - as in many other enterprises of the SAAL in Porto - we are looking at one unfinished project. The reasons for examining only what was actually achieved by the different public housing programmes that intervened in Porto between 1969 and 1982 have been exposed in chapter 3. Regarding S. Victor (11), Francos (13), Massarelos (16), it should be added that while these do not fully represent the projects as initially designed, they are in all cases exemplary of the urban, morphological and typological strategies and options represented in the projects. As such, if S. Victor (11) has a particularly high 'separation index' and mean depth between the primary urban grid and dwellings

80 "Havia que construir mais casas: a reorientação urbanistica teria que aguardar…" Translated by the author.



10. Antas
11. S. Victor
12. Maceda
13. Francos
14. Lapa
15. Leal
16. Massarelos
17. Contumil
18. Bouça

FIGURE 11.11.
Depth measures of SAAL estate layouts a) Antas, b) S. Vitor, c) Maceda, d) Francos, e) Lapa, f) Leal, g) Massarelos, h) Contumil, i) Bouça

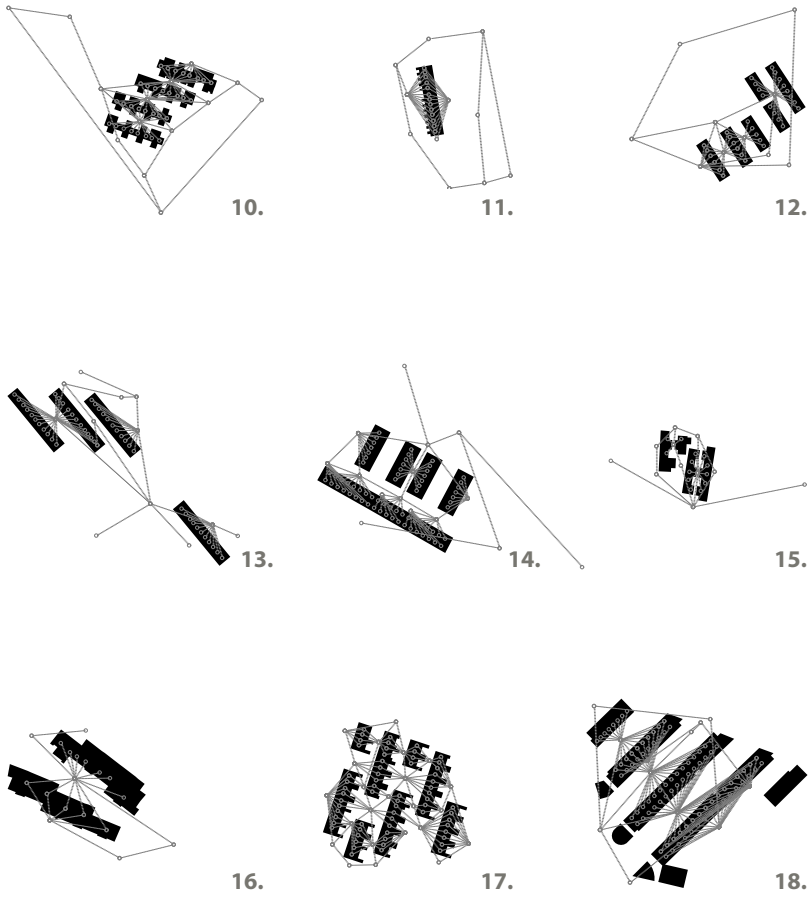
interior would be lowered by the construction of buildings B and C (figure 11.10), it is unlikely that, in its whole, the values registered for SAAL layouts would differ significantly.

Relation with the surrounding city:

While S. Victor (11) may be an outlier in regards to its unusually large depth from the primary urban grid, other layouts can be identified which, following the same approach of the 'proletarian *ilha*', share large values in all measures of its relation to the outside city (figure 11.10. and table 11.4.). Most SAAL layouts in Porto follow the same strategy as PMCP's housing developments, occupying inexpensive urban land in the interior of existing blocks. This is the clearest in Antas (10), Maceda (12) and Leal (15), and seems to have a more significant consequence in the way the layouts' residents relate to the outside, being translated in 'separation index' values that, above average for SAAL developments (md=2.84), are around one step higher than the average for other programmes. In others, this inwardness seems to be a morphological choice. Maceda (12) is such an example - while situated on the edge of its lot, its interior is protected from the adjacent urban artery by vegetation and a difference in height, ensuring that, even while being a street-facing development, it stays 2 axial steps away from the street (maze index=2.23), and its dwelling entrances 3.34 convex steps away. Antas (10) and Leal (15), while sharing some similarities with Maceda (12), seem to have their inwardness depend on the acquisition of the interior of a block which was never fully built, and relate syntactically more to the remaining layouts. These, while associated with lesser integrated streets, are located not in the interior of existing blocks, but in their continuation, thus ensuring a stronger connection to the urban grid. This translates most directly in an inferior 'separation index' than other interventions, but it can be verified that these layouts also display higher values in the measures that have to do with the relations established between spaces that are interior to the project.

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
10. Antas	4.17	2.69	2.9	2.76	2.55	3.33
11. S. Vitor	4.75	1.83	3.08	2.46	3.11	4.75
12. Maceda	4.2	2.95	2.95	2.95	2.23	3
13. Francos	4.36	4.46	3.41	4.23	1.86	2.5
14. Lapa	4.01	4.29	3.6	4.17	2.73	2.67
15. Leal	3.23	3.16	2.97	3.07	2.31	3
16. Massarelos	2.33	2.03	2	2.09	1.57	2
17. Contumil	3.21	3.72	3.35	3.62	2.91	2
18. Bouça	3.13	3.98	3.29	3.90	2.07	2
	3.71	3.23	3.06	3.25	2.37	2.81

TABLE 11.5. Depth measures of SAAL estate layouts, illustrated in figure 11.11.



10. Antas
11. S. Victor
12. Maceda
13. Francos
14. Lapa
15. Leal
16. Massarelos
17. Contumil
18. Bouça

FIGURE 11.12.
Plans and convex breakings of SAAL estate layouts

In fact, large values of 'functional interface decomposition', 'no-neighbours score' and mean depth are present in many of SAAL's layouts in Porto, in particular those whose exterior morphology (such as Antas (10), Maceda (12), Francos (13), Contumil (17)) consists on the placement of parallel blocks of single-family houses throughout the available lot. While creating a grid of parallel streets that are often connected in rings with one another (only two layouts are not 100% constituted by distributed spaces), the constraints imposed by lots without a direct connection to the exterior urban space result in systems which are often deep. With an average of 3 points where permeability is possible between the interior of the lot and the primary urban grid, control over the layout is then concentrated on the few shallower streets that connect to the exterior city. Consequently, constituted spaces are often not likely to be used by others than their inhabitants. In addition, while the morphology adopted in most SAAL enterprises in Porto ensures that a large number of front-doors open directly to the street, most cases present less than 50% of constituted spaces, creating a combination of traditional street layouts - shared access arteries between several families, often connecting to front-yards which are visually permeable - and of transition spaces establishing connections between these.

Relations between collective spaces:

Simultaneously, there is a generalised absence of labelled or fixed-function collective spaces in most of SAAL's layouts. If such is justified by a generalised refusal by the population of typological elements of a collectivist character (Figueira, 2002), it also goes in line with the idea of the proletarian *ilha*, turned inside out. Pre-existing ways of life and types of neighbourhood relations in space are re-interpreted in these layouts - the street as a continuation of the house, living-room, laundry-room, entrance-hall - and opposed, at least in intention, to the idea of a "collectivist *ilha*", as explained regarding Leal (layout 15):

> It is symptomatic that, in an experience such as this one, supported by a collective movement, there is no collective equipment for the preparation of meals, washing of clothes, etc. in the project. Instead, there are potential qualities […] for fostering collective life - but which look like timid sketches next to the collective force of this movement of popular struggle. And it seems important, not to create "collectivist *ilha*s", but to prove (and start to build) the possibility of a superior alternative to contemporary housing. (Brigada Leal, 1975, p.8)[81]

81 "É sintomático que, numa experiência deste tipo, apoiada num movimento colectivo, não haja no projecto a previsão de equipamentos colectivos para preparação de refeições, lavagem de roupas, etc. Há sim, qualidades potenciais […] de fomento da vida colectiva - mas que fazem figura de tímidos esboços ao lado da força colectiva que tem assumido o movimento de luta popular. E parece-nos importante, não crirar "ilhas de colectivismo", mas provar (e começar a construir) a possibilidade de alternativa superior à habitação actual." Translated from Portuguese to English by the author of this dissertation.



FIGURE 11.13.
TOP. Layout 12, Maceda-Acácio, whereront yards face each other (top) and Layout 15, Leal, where there exists a wide and shallow convex space. (bottom)
Photograph by the author.

Spatial mechanisms "for fostering collective life" can indeed be verified not only in Leal (15), but in the majority of SAAL developments. If most layouts found this opportunity for collective life in the spatial relations created between immediate neighbours, and in some cases in the relationship of the street to the private exterior or people's front-yards, it was also present in the form of well-integrated, often shallow from the exterior urban space, wider hard-landscaped spaces that were intertwined in the street-like grid (figure 11.13.).

Along with a public space designed as a morphological and aesthetic interpretation of the *ilhas*, so were the housing typologies adopted reminiscent of the small single-family houses that were to be replaced. Just like shared, collectivist equipment was resisted either by the population, the architects or both, collective housing typologies were also rare in SAAL layouts in Porto. Just like the "image of the *ilha*", the image of collective housing was also rejected by the population due to their own past experiences. Chaves de Oliveira's (19) brigade registered the reasons for resistance:

> It was decided that the maximum number of floors would be 2, in virtue of economy in construction costs and also of the height of surrounding buildings. Many residents were, however, against houses one over the others as would happen in one and two-bedroom typologies. The reasons presented concerned the lack of privacy between houses and to desolation, that is: if the upstairs neighbour stomped his feet on the floor there would be noise downstairs, the downstairs houses were in the shadow and this was summarised in the sentence "I'm tired of living underneath". (Brigada Chaves de Oliveira, 1975)[82]

Subsequently, the brigade exposed how this type of prejudice might be reduced:

> Analysing these residents' experience, we see that they are entirely right to be thus prejudiced: the existing "houses" on the ground-floor face North and their southern wall is a retaining wall […] after discussing this point the brigade clarified how pavements, walls, etc., would be like, and how all houses would be equally sunlit, and people agreed that, in that case, there was no problem […] (Brigada Chaves de Oliveira, 1975)[83]

This resistance to collective housing finds its biggest exception in Massarelos (16) (figure

82 "Foi decidido que o nº máximo de pisos seria 2, em virtude da economia de construção e também da cércea da rua. Muitos moradores eram, no entanto, contra as habitações umas sobre as outras o que aconteceria com os T1 e T2. As razões apresentadas diziam respeito à falta de intimidade entre as habitações e à insolação, quer dizer: se o vizinho de cima batesse com os pés no pavimento, haveria barulho em baixo, as casas de baixo ficavam na sombra e resumiam isto na frase "estou farto de viver por baixo". Translated from Portuguese to English by the author of this dissertation.

83 **"**Analisando a experiência destes moradores, vemos que têm toda a razão de ter este preconceito: as "habitações" no piso térreo são voltadas a Norte, sendo a parede Sul um muro de suporte […] depois da discussão sobre este ponto e de a brigada esclarecer como seriam os pavimentos, paredes, etc, e como as casas ficavam igualmente insoladas, as pessoas concordaram que assim sendo, não havia problema [...]" Translated from Portuguese to English by the author of this dissertation.



FIGURE 11.14.
Layout 16, Massarelos.
Photograph by the author.

11.14.) which, with 80 apartments in a 11.220m2 lot, has a density of 35 square meters per resident, bellow the average for SAAL enterprises (52.6m2/r). As figure 11.10. makes clear, Layout 16 is not only larger than the other SAAL enterprises, but its morphological approach to the problem of density makes it stand out from the others in terms of its spatial properties. Located in a well-integrated area (if one of the lesser integrated SAAL enterprises) overlooking the river, the layout takes full advantage of the lot in the superposition of houses so that the majority of apartments has access to the river-sight. While its connection to the main urban space is hindered by a significant difference in height that is not resolved (today, a narrow staircase built by one of the estate's residents connects the layout to the high-integration street above it), rendering the entire layout a cul-de-sac, this is the layout with the lowest depth values of all SAAL enterprises in Porto. Organised around one single central space with secondary service areas (clothes hangers) in each side of the two housing blocks, this layout appears to favour a franker relationship between its interior and strangers to the system (mi=1.6), as well as franker relationships between its inhabitants (fid=2).

Two-storey typologies with exterior access corridors - as seen in Bouça (18) and Chaves de Oliveira (19) - are a less uncommon exception to single-family houses. However, while layout 19 keeps a low-density, small-rise strategy within the average for SAAL projects in Porto, Bouça (18) represents another clear exception, with the lowest density value (31.1m2/r), bellow average values in depth measures that relate the interior of the layout to the main urban grid and the higher permeability in regards to the exterior city. The exceptional character of Bouça (18) also lays in its methodology. It first started being designed in 1973 as a development of the FFH, and was later integrated in the SAAL and continued within the programme in order to respond to the demands of the Residents Association that organised the area's inhabitants in 1974. If the postulates and pre-conditions supporting the FFH project were different from those of the SAAL, in particular regarding popular self-organisation, self-investment and participation, and may explain the major differences between two SAAL developments by the same architect (the projects of Bouça (18) and S. Victor (11) were both headed by Álvaro Siza), the original design didn't find the conditions to be finished before 2006 (figure 11.15.).

With the exception of Bouça (18), SAAL's developments in Porto are composed of less than 100 houses, with some being much smaller than that. Of the 471 houses built from scratch or rebuilt by the SAAL within the municipality, 80 pertain to Massarelos (16) and 197 to Bouça (18) (the majority of which was only built in 2006), leaving a total of 137 among the remaining 8 enterprises. Had these been finished as intended, the number would rise to around 1000.

The adoption and reinterpretation into the new projects of the spatial qualities of the housing schemes they came to replace was not capable of either addressing the true scale of the housing shortage in the historical centre or of producing the intended result of turning the *ilhas* inside out. While the low-density typologies adopted would have been able to respond to the housing





FIGURE 11.15.
Layout 18, Bouça. First block to be constructed (top).
http://gisaweb.cm-porto.pt/units-of-description/documents/615329/?q=bou%C3%A7
FIGURE 11.16.
Layout 18, Bouça, 2018 (bottom).
Photograph by the author

needs of each corresponding Residents Association had the projects been fully finished, they were frequently associated to a spatial configuration we have seen to produce the opposite outcome. Spreading within the interior limits of established blocks, the housing layouts were kept deep from the exterior urban structure, presenting on average what today are, by far, the largest separation index values of all public housing developed in Porto between 1969 and 1982.

However, today's existing housing schemes cannot be taken to represent the totality of SAAL's plan for the city. The projects developed by the brigades were only in a few cases fully built before the SAAL's State administration was ceased in 1976, thus ensuring that many of the organised residents of the city's *ilhas* were never assigned a new house and that many of those *ilhas* remain as they were until today. Even when fully realised, individual projects, disconnected in an unfulfilled urban plan, could not implement the idea of the proletarian *ilha* as more than a typological choice, but as a proposal for a new way of creating the city: "the ilha as a possible support for the city's evolution." (Siza 1976, p.86)

11.3.2. THE COMPLEX ROLE OF THE BRIGADES

The proletarian *ilha* as the idealisation of a working-class space that was rejected by the working class itself is a paradigmatic example of the often contradictory relationship between the views of SAAL's technicians and the residents' aspirations, revealing the complexities of the participatory character of the SAAL in Porto. Similarly, as the articulation between the population and the brigades was often not straightforward, their relations with the institutions and with the SAAL central administration were not always simple. This is noted by Matias Ferreira who, in 1975 (p.49), reflected on the role of SAAL brigades. While stating that, in general, the brigades were effectively seen as allies by the populations, the author claimed their character was ambiguous,

> In between a structural determination (arising from the development of the capitalist mode of production) that places those technical brigades in the space of power, and a voluntarist position of their members, who refused that political identity [...][84]

An example lies in the question of self-construction. Another institutional principle of the SAAL programme - one that had been proposed in the 1969 Colloquy on Housing Policy as a possible solution for the housing shortage among insolvent populations - was one that found apparent resistance in Porto by the brigades and leftist popular organisations. Even when self-construction ended up being implemented, it was often in resignation to what could be done when no other alternative was presented by institutional power.

84 "Entre uma determinação estrutural (decorrente do desenvolvimento do modo de produção capitalista) que coloca essas brigadas técnicas no espaço do poder, e uma posição voluntarista dos seus membros que recusam uma tal identificação política [...]" Translated by the author.

> […] The acceptance of the self-construction process was more a reflection of conformism than taking advantage of the situation as a way of organising and connecting the population. We must say that they often protested this situation, in some cases because they considered it to be unjust, in others because they did not trust their neighbours' goodwill. One other point that the populations found hard to accept was the need to invest their own money to cover for construction expenses that were not subsidised by the State.
>
> We must ask - is this a reflection of poor guidance by the Brigade, a difficulty brought about by a lack of cultural and political information, of an understanding of the positive aspects of collective work, or a symptom that the populations realise, albeit intuitively, SAAL's reformism, much more interested in "covering gaps" than justly giving the populations what was stolen from them for so many years?[85] (Brigada de Beja, 1975)

The validity of self-construction was far from being straightforward, but a question that went back and forth between the populations and the technicians, and between the technicians themselves, until it became the official position of many brigades. After all, the SAAL programme was created in the context of existing popular pressure for the right to being allowed the necessary economic and technical support for the construction of their own homes, and so this idea that "appeared in the bulletins of some of Lisbon's residents' committees that self-construction is a "punishment" for the popular classes" (Portas, 1975) was viewed as a reflection of tiredness and restlessness. The populations' rejection of the SAAL itself "because the lower classes are punished by having to build their own houses. It is the Government that must build houses and deliver them to us with accessible rents" (Portas, 1975) was a reflection of its very urgency.

Finding more or less resistance across the country, self-construction was never adopted in SAAL developments in Porto. However, brigades held different positions between themselves, as was made clear in the first SAAL-North Encounter in July of 1975. A brigade pointed out as "factors of retraction and resistance (…) [the] difficulties arising from the rooted idea that the solution for questions of this nature is (would be) solved by public organisms exterior to the residents themselves, that they would hand them the definitive solution on a plate", from which arose "an unyielding state of mind towards each one's participation in solving everyone's

85 "[…] A aceitação do processo de auto-construção foi mais um reflexo de conformismo de que do aproveittamento desta situação como forma de organização e união das populações. Devemos dizer que muitas vezes se insurgiram contra essa situação, nalguns casos por a considerarem injusta, noutros, por não acreditaren na boa vontade do pessoal do bairro. Outro ponto que as populações tiveram bastante dificuldade em aceitar, foi a necessidade de investimentos por parte destas para cobrir as despesas de construção não subsidiadas pelo Estado.
Aqui cabe-nos perguntar - será isto um reflexo de má-orientação por parte da Equipe, uma dificuldade por dificiência de informação cultural e política, de descobrir os aspectos positivos do trabalho colectivo, ou o sintoma de que as populações se apercebem, embora de uma forma intuitiva, do reformismo do processo SAAL, muito mais interessado em "cobrir lacunas", do que, de uma forma justa, dar às populações aquilo que durante tantos anos lhes foi roubado?" Translated from Portuguese to English by the author of the dissertation.

problems."[86] (Brigada da Boavista, 1975) In the same meeting, another brigade defended the opposing view, arguing that presenting self-construction as a solution for the housing shortage was as illogical as defending self-sufficiency in education and health (Brigada de Gondomar, 1975). The same intervention carried on by associating self-construction with evolutionary housing and private property, positioning it - in a model of society it considered undesirable - as a mechanism for the individual to "acquire in this way a larger economic capacity and the so desired "social promotion" becoming, finally, a landlord."[87]

Often conflicted, the relationship between the brigades and the residents' associations had necessarily to do with how the brigades saw their role in a participatory process. The idea of the architect as the hand of the people seems to be far from what was predominant in Porto, where there seemed to exist overall confidence in the architect as a qualified technician that held more knowledge, at least in the domain of architecture, than the populations whom it was their role to serve. This position is summarised by Souto de Moura (Bandeirinha, 2014, p.31): "Completely ridiculous… Like going to the dentist and explaining how a tooth should be pulled!", but most eloquently put in a text signed by S. Victor's SAAL Brigade (1975):

> Lines of action of the technicians as technicians:
> On how the Brigade, as a technical group, aims at operating in the scope of today's political context.
> The Brigade does not adopt simplistic positions: to learn with the people or teach the people.
> It intervenes with its actual qualification, accepting and criticising the circumstances of this qualification, and with total focus on one objective: the control of damaged areas by the populations there residing for its appropriation a recuperation, a control that must, from the beginning, necessarily be extended to the city and beyond the city.
> (The overcoming, by the Associations, of the objectives that directly gave birth to the SAAL program is strictly connected to the dynamic of the Portuguese revolutionary process, of which it is simultaneously, the driving force and reflection.)
> The Brigade considers that its qualification and its ideas, within the specific limits of housing reconstruction, in dialectic with the real ideas of the population it works for, will

86 "…factores de retracção e resistência:
(…)
Dificuldades decorrentes da mentalidade enraízada de que a solução de problemas desta natureza são (seriam) resolvidos por organismos públicos exteriores aos próprios moradores, que lhes "serviriam de bandeja" a solução já definitiva; consequentemente existe ainda um esttado de espírito refractário à participação de cada um para a resolução dos problemas de todos." Translated from Portuguese to English by the author of the dissertation.

87 "…e adquirindo desta forma maior capacidade económica e a tão desejaa "promoção" tornando-se, finalmente, senhorio.
Esta é a noção local, mais comum, de casa "evolutiva" (progressiva) ja que como verificamos, o espaço, é a reivindicação mais importante e só depois aquilo que podemos englobar na noção de conforto. É preferida a casa inacabada e grande a uma casa acabada e pequena (mesmo que esta noção tenha apenas a ver com áreas mínimas aceitáveis)." Translated from Portuguese to English by the author of the dissertation.

be the basis for a physical world created for and by a society that is desired to be without classes.
The Brigade refuses the path of mimetism of ambiguity, for it is limited or demagogic.
The Brigade doesn't believe or admits that the urgency of problem hinders quality or poetry.
(Poetry understood as the total application and expression of the ongoing political process, in all its richness and complexity, richness and complexity whose roots are only found in a collective and irreversible popular movement.)
The Brigade searches not to confuse objectives and methods.
It establishes, along with the residents association, the priorities for each moment, correcting them as necessary, and adopting a permanent critical position.
In this sense, every decision must be assumed as part of a dynamic process, and the adoption of an adequate methodology is crucial.
When the bureaucratic and technocratic process are overcome, the concept of the project is different, and it must have nothing to do with improvisation or the baton.
Rigour is not a limit to the process' dynamic.
Rigour must be strictly connected to a real possibility of evolution, to growth, to the capacity of responding to the process, and it must always be present.
Rigour must be directly proportional to this ability to respond.
Rigour is not a limit to the imagination.
Rigour is not a limit to collective creativity.
Rigour is the ability to respond to a dynamic process.
"Quality is the respect for the people." (Che Guevara)"[88]

88 "Linhas de acção dos técnicos enquanto técnicos
Sobre o modo como a Brigada, enquanto grupo técnico, pretende operar no âmbito do actual contexto político.
A Brigada não adopta posições simplistas: aprender com o povo ou ensinar o povo.
Ela intervém com a sua formação real, aceitando e criticando as circunstâncias desta formação, e com foco total num objectivo: o controlo das zonas degradadas pelas populações que nelas habitam, no sentido da sua apropriação e recuperação, controlo esse que, desde o início, deve ser necessariamente alargado à própria cidade e além dela.
(A superação, pelas Associações, dos objectivos que deram directamente origem ao projecto SAAL está estritamente ligado à dinâmica do processo revolucionário português, do qual é, ao mesmo tempo, motor e reflexo.)
A Brigada considera que a sua formação e as suas ideias, dentro dos limites concretos da reconstrução do habitat, em dialéctica com as ideias atuais das populações para as quais trabalha, estarão na base de um mundo físico criado para e por uma sociedade que se deseja sem classes.
A Brigada recusa o caminho do mimetismo ou da ambiguidade, por ser restrito ou demagógico.
A Brigada não considera nem admite que a urgência dos problemas constitua um limite à qualidade e à poesia.
(Poesia entendida como total adesão e expressão do processo político em curso, em toda a sua riqueza e complexidade riqueza e complexidade cujas raízes se encontram tão só num movimento popular colectivo e irreversível.)
A Brigada procura não confundir objectivos e métodos.
Ela estabelece, juntamente com a associação de inquilinos, as prioridades para cada momento, corrigindo-as se necessário, e adoptando uma posição de crítica permanente.
Nesta óptica, cada decisão deverá ser assumida como parte de um processo dinâmico, sendo indispensável a adopção de uma metodologia adequada.
Ultrapassados os processos burocráticos e tecnocráticos, o conceito do projecto é diferente, e nada deve ter a ver com a improvisação ou o cassetete.
O rigor não é um limite à dinâmica do processo.
O rigor deve estar estritamente ligado à possibilidade real de evolução, ao amadurecimento, à capacidade de responder ao processo, e deve estar sempre presente.
O rigor deve ser directamente proporcional a esta capacidade de resposta.
O rigor não é um limite à imaginação.

Respect for the people and technical autonomy are questions reflected in several of the brigades' reports:

> Our propositions must emerge from what the residents think and want, but also from the conditions generating their concepts of life. We know as well that bourgeois ideology penetrates in the popular classes, mainly at its higher level, that is, specialised workers and poor employees. We must, then, analyse what different classes come together in the neighbourhood because to follow what the residents say without detecting and fighting false ideas (that the bourgeoisie has always made look like the best in the world) is resignation and conformism; to try and impose our proposals - no matter how good they seem to us - without a correct understanding of the populations' way of life, their practical solutions, but also their level of collective consciousness, is to be a Know-it-All.[89] (Brigada de Chaves de Oliveira, 1975)

Arguing for an informed type of paternalism that is justified by the need to know the real ways of life of the working class, the same Brigade added, months later, that participation was of little consequence for the outcome, something that might be countered by the brigades' roles as educators:

> According to the residents, there is only one valid model of "decent" housing, that of the bourgeoisie. This model is imposed by bourgeois ideology, strongly infiltrated in the midst of the residents as a universal value, unchangeable, valid in all epochs and societies. Therefore, for the residents, the role of the technicians is only that of adjusting that model for their specific situation (…). Our role was that of simple reproducers of decadent bourgeois ideology, despite our good intentions of serving the people, of fighting by their side for a new society. Technicians, if they want to serve the people, must help it free itself from the repressive bourgeois ideology, they must help it find cultural forms that serve their real aspirations and not those of its class enemies'. They must, in this case, help the people find a model of housing in line with the new society that we want o help build.[90] (Brigada de Chaves de Oliveira, 1975)

O rigor não é um limite à criatividade colectiva.
O rigor é a capacidade de resposta a um processo dinâmico.
"A qualidade é o respeito pelo povo." (Che Guevara)" Translated from Portuguese to English by the author of the dissertation.

89 "Há, pois, que analisar as diferentes classes que estão agregadas no bairro, pois seguir o que dizem os moradores sem detectar e combater as falsas ideias (que a burguesia sempre fez tudo para mostrar serem as melhores do mundo) é demissão e seguidismo; tentar impor as nossas propostas – por melhores que nos pareçam – sem um conhecimento correcto do modo de vida das populações, das suas soluções práticas, mas também do seu nível de consciência colectiva, é ser sr. Doutor." Translated from Portuguese to English by the author of the dissertation.

90 "Porque para os moradores só existe um modelo de casa "decente" válido, o da burguesia. Este modelo é imposto pela ideologia burguesa, fortemente infiltrada no seio dos moradores como um valor universal, inalterável, válido em todas as épocas e sociedades. Portanto, para os moradores o papel dos técnicos não é outro senão o de formalizar esse modelo para a sua situação concreta (…) Disto tudo podemos concluir que o nosso papel foi o de

The outsider character of SAAL's brigades seemed to gain a more intricate moral sternness when the problem stepped inside the limits of the house. While the way of life of the populations was generally accepted as good in its communal dimension - the neighbourly relations established within these urban spaces, the strength and definition of those small urban communities - the life schemes and aspirations of the populations within the domestic environment were in some cases referred as reflecting bourgeois values such as the cult of private property, conservatism and gender. The conflicts registered in the brigades' reports regarding the interior of apartments are, in this sense, an inversion of those registered about the layouts' morphology or buildings' typology. Again, the Brigade of Chaves de Oliveira (19) is exemplary in its thorough detailing of the back and forth process between architects and residents:

> Our idea was to have a living-room for eating, socialising and eventually working or studying, and the kitchen for preparing food and other similar tasks. [The two should be in strict connection,] in order to allow for a great easiness in domestic work, and also avoid that the kitchen became the gynaeceum where the woman works while the man reads the paper and smokes a cigarette in the living-room.[91] (Brigada de Chaves de Oliveira, 1975)

While this example is in line with what we have seen to be the concerns and objectives of housing research and development at the time, and reveals a certain, if mild, imposition of the architects' values and morals in the project, other examples were found of a refusal of the residents' habits and domestic aspirations that were more expressively political and ideological[92]. On

meros reprodutores da decadente ideologia burguesa, apesar das boas intenções de servir o povo, de lutar ao seu lado por uma sociedade nova. Os técnicos, se querem servir o povo, devem ajudá-lo a libertar-se da repressiva ideologia burguesa, devem ajudá-los a encontrar as formas culturais que sirvam as suas reais aspirações e não os seus inimigos de classe. Devem, no caso de que falamos, ajudá-lo a encontrar um modelo de habitação de acordo com a sociedade nova que pretendemos ajudar a construir." Translated by the author.

91 "A nossa ideia era ter a sala para comer, conviver e eventualmente trabalhar ou estudar e a cozinha para preparam os alimentos e outros trabalhos do género (...) para permitir uma grande facilidade no trabalho doméstico e também evitar que a cozinha fosse o gineceu onde a mulher trabalha enquanto o homem lê o jornal e fuma um cigarro na sala." Translated from Portuguese to English by the author of the dissertation.

92 An extreme example was found in the reports of Contumil's SAAL Brigade: "Related to this evolution of ways of life it is the need of searching for spatial formalizations that effectively correspond to this evolution. This creates another problem.
On the one hand this problem is connected to the class position of technicians who, even when well-intentioned, and specially when they try to be well-intentioned, do not completely question their creativity as it is based on schemes which have always served the bourgeoisie, and end up influencing the population's options regarding the spacial organization of the house in the sense of accepting forms that are completely determined by bourgeois or petty-bourgeois moralist conceptions, as are the creation of typologies based in the sexual separation of family elements (absence of promiscuity), that is, in the enclosure of individuals in a casing that resembles more the long skirts that hid our grandmothers' ankles than any of today's real needs or functions.
On the other hand, these same moralist conceptions were imposed to the exploited masses by the repressive ideological apparatus of the bourgeoisie, making it so that it is now difficult for them to find autonomous forms of organization that correspond to their class position.
We easily feel, when contacting with the residents, that when they express the need of more than one bedroom, so that the son can stop sleeping in the same room as his parents, or so that children of different sexes may live in different rooms, that this phrasing betrays an aspiration of "ascending" to bourgeois ways of life, or is even meant to create, through the lenses of bourgeois morals, a non-deprecating view of themselves.

the one side, a great part of SAAL brigades in Porto seemed to defend the existence of an identity of the working class which was practised in the way of life of *ilhas*' inhabitants and so present in the *ilhas*' spatial organisation, which in itself justified the perpetuation of this configuration as an emancipatory gesture. On the other side, and simultaneously, when the same way of life of the working class contrasted with the Brigade's progressive values, it was dismissed as the reflection of decades of dominant bourgeois ideology. The aspirations of the future residents themselves were registered as contradicting: they aspired to the same houses everyone else had, the houses where women worked and that men built[93]: "[...] the dream was translated in something architects considered deeply reactionary. The dream was to build four-storey housing blocks so that each had the right to an apartment"[94] (Tavares, 2012, in Cavalcanti, 2014), but simultaneously the same houses they had before: "[…] the residents wanted new homes, bigger than the old ones but also exactly the same, preferably with the same key." (Fernandez in Davidovici and Montenegro, 2014, p.145)

The frequent opposition between architects views and residents aspirations had consequences in the configuration of space. These are sometimes made clear in the brigades' reports, as we have seen regarding how Chaves de Oliveira's (19) architects sought to understand the reasons why the residents resisted the idea of superposed houses, and were successful in attending to the residents' concerns while maintaining their architectural position, or how the configuration of layout 15's (Leal) exterior spaces is directly connected to the residents' resistance to any type of explicitly collective space, forcing the architects to resort to the design of a few wider spaces to create potential for interaction. If these accounts provide examples of design choices that were the direct result of the negotiation between architects and the population, it is difficult to know what were the different positions, arguments and compromises behind the resulting designs, as it is difficult, regarding other housing programmes, to know the individual motivations behind design decisions. If the existence of abundant and thorough reports regarding SAAL developments adds to the reading of the layouts (as do the available project briefs of other programmes), it is also in space that these contradictions are materialised, and in the actual built environment that they are of any consequence.

11.3.3. THE HOUSING UNIT AND THE PROLETARIAN FAMILY

Resulting from what we have seen to be a participatory process, where each design was adapted

Thus, refusing to accept the populations' phrasing without criticism and at the same time rejecting an authoritarian attitude towards them, we start to collect elements that may spark discussion with the population, in order to provide them with the means that take them to find solutions for the organization of the space of the house that are in accordance to their class perspectives." Translated from Portuguese to English by the author of the dissertation.

93 Paraphrased from João Dias' documentary As Operações SAAL.

94 "[...] o sonho traduzia-se de uma forma que os arquitetos consideraram profundamente reacionária. O sonho era que se construíssem blocos de rés-de-chão e três andares para cada um ter direito a um apartamento (...)"

to a particular urban and social situation, and in some cases shaped by the discussion with future residents, SAAL apartment schemes present strong differences between themselves, in particular when compared to the internal consistency of PMCP layouts. While PMCP apartment schemes were, as we have seen, similarly varied and often complex, but bounded by budget-defined area constraints, the complete non-standardization of SAAL designs seems to be revealed in the lack of internal consistency of area-related measures such as total useful area, minimal area ratio and density. This absence of consistent standards may have been a result of the individualization of the design process in a client-architect relation very different from the form of practice of council architects, but also of the necessary pragmatism for doing the most of an unstable period that was revealed in SAAL's layouts urban integration in open contradiction of the existing urban plan for the city. At the scale of the apartment, a similar resistance was found regarding the General Regulation for Urban Buildings (Regulamento Geral de Edifícios Urbanos, RGEU): "As indicated in the project brief, some proposals of 'interpretation' of the RGEU will be discussed and are important for the project's continuation." (Brigada da Boavista, 1977) While total useful area for SAAL apartment schemes is on average 85.53m2, just bellow the minimal legal area for three-bedroom apartments, apartment areas range from the smallest to the largest apartments in the case study, and larger houses are often the result of large exterior spaces, non-existent in collective typologies.

Simultaneously, SAAL apartment schemes also display spatial characteristics that are the most different from the other programmes, namely the adoption by most of SAAL housing layouts of two-floor typologies and the introduction, in some of them, of a second entrance. As such, if it is more difficult to identify trends in SAAL apartment schemes than in those developed within other programmes, they also present consistent configurational attributes that reveal a different way of understanding domestic relations and the relations between the family and the neighbourhood. These can be expressed in the necessary addition of two categories to the simplified accessibility graphs A and B introduced in chapter 9, as the doubling of entrances makes it so that both collective and service areas may function as transition spaces associated to different types of house-use: category 3 when the kitchen functions as a transition space, and category 4 when both collective and service areas do.

TABLE 11.6.
Spatial attributes of SAAL apartment schemes.

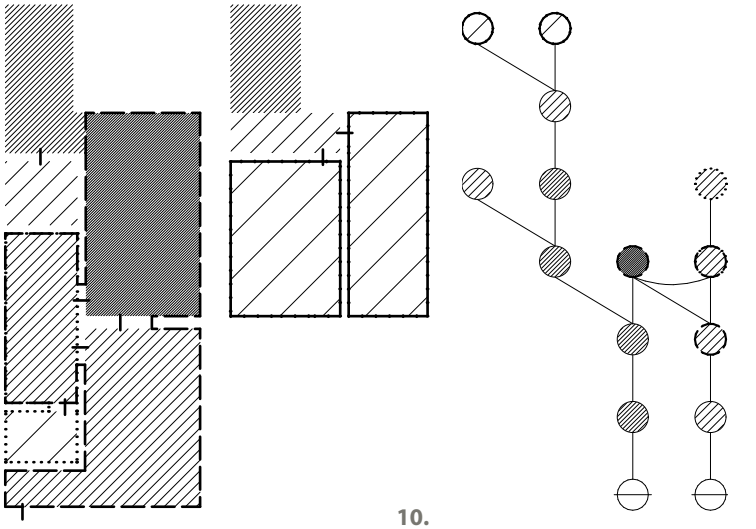
	TUFA m2	Density m2/r	Integration	Difference factor	Mean depth exterior	functional orientation %
10. Antas	90	30	0.66	0.85	3.6	0.31
11. S. Vitor	88.2	22.05	0.79	0.74	3.3	0.27
12. Maceda Acácio	130.3	43.43	0.72	0.87	3.8	0.31
13. Francos	57.2	14.25	0.67	0.88	4.6	0.31
14. Lapa (A)	132	44	0.72	0.82	5	0.44
14. Lapa (B)	113.8	37.93	0.69	0.79	4.2	0.4
15. Leal	57.3	19.1	0.64	0.90	4.5	0.31
16. Massarelos	51.3	13	0.82	0.74	2.5	0.27
18. Bouça	85	28.33	0.77	0.81	3.3	0.31

Even though half of the studied cases have both a front and a back entrance, SAAL apartment schemes display, on average, the larger values of depth. Houses tend to have an average mean depth of 3.1 steps and an average depth from the exterior of 3.6 steps. These values do not increase significantly when only one entrance is considered in cases with two entrances (figure 11.19). Instead, depth seems to be, to an extent, the result of the adoption of two-storey typologies and consequent increase in transition spaces. Staircases are themselves counted as a transition space, to which are usually associated two halls, doubling the number of steps between spaces on different floors. As such, houses have large values of functional orientation, consistently presenting one transition space per two functional rooms. This dispersion of space is reflected on lower average values of integration but also, in particular, in lower average values of integration of the bedrooms, and the kitchen in relation to the living-room. While the values of integration of other programmes' kitchens and living-rooms vary and, for example, PMCP apartments present kitchens with significantly higher levels of integration than FFH housing, bedrooms are consistently around the average value of integration of 0.85, the value identified for the activity of sleeping in the analysis of the Survey to Urban Housing (Pereira and Gago, 1984) and Monteiro (2007). SAAL's bedrooms, usually on a different floor from collective and service spaces, have an average integration value of 0.52.

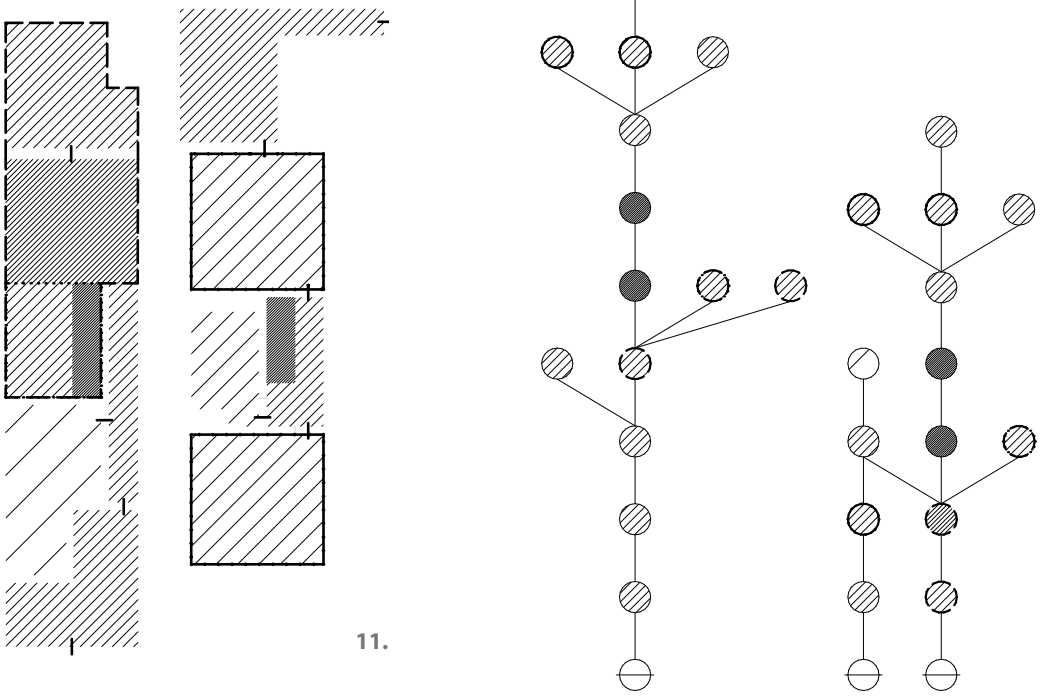
If, in general, integration values for all spaces are low in SAAL apartment schemes, whose ordering of integration is similar to that of other programmes - collective spaces are the most averagely integrated, followed by service areas and then by private spaces - they also present the largest average difference factor, reflecting highly hierarchical spaces that are not common in the other studied apartment schemes. The largest difference, however, is not verified between the integration values of spaces in the two different floors, but between the integration values of living-room and that of the kitchens. It is interesting, at this point, to look back at the reports of Chaves de Oliveira (19), where architects found it important that the kitchen was openly connected to the living-room as to counter the traditional isolation of women, but, through the negotiation process with future residents, ended up creating a closure between those spaces.

Concerning kitchens in SAAL designs, it also interesting to explore its position in cases with two entrances, and its connection to the configuration of exterior spaces. Firstly, while the addition of a second entrance in the houses' design results in a larger proportion of cases where the kitchen is connected to the exterior, the average depth values of kitchens are not lower than in other cases. Secondly, the introduction of a second entrance, often connected to the services area, raises the question of its purpose and the perception of domestic life it is connected to.

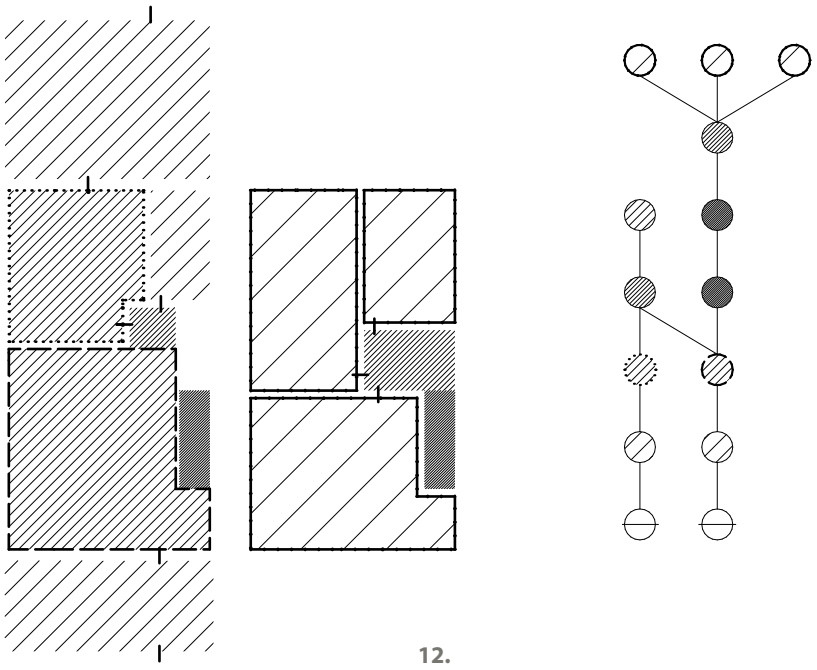
Again, it was not possible to detect a pattern in the configurations of two-entrance houses that might reflect a coherent approach across the programme. A division can be made between layouts regarding the existence, or not, of clear differentiation between the front and the back of the house. Antas (10) and Contumil (17), for example, have houses that all turn in the same direction



10.

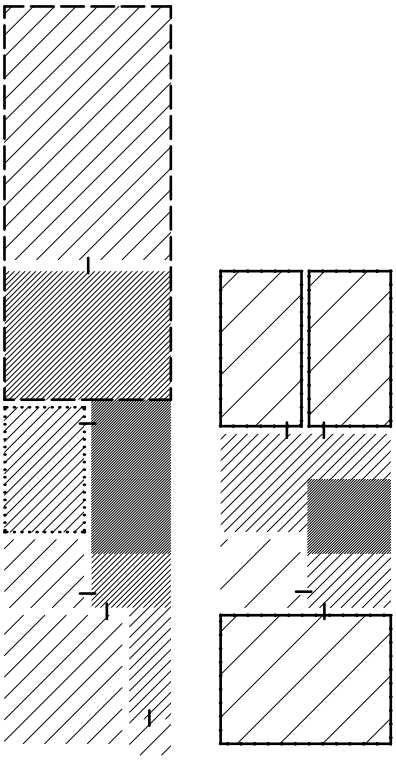


11.

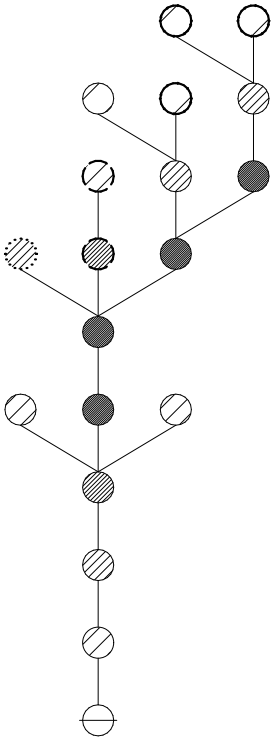


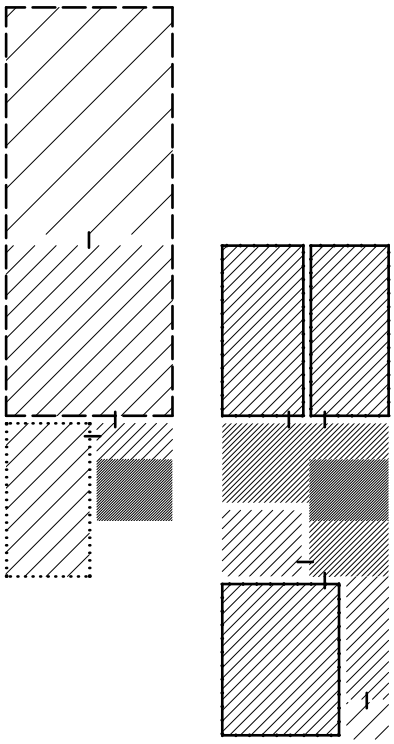
10. Antas
11. S. Victor
12. Maceda
13. Francos

FIGURE 11.17.
Convex breakings and accessibility graphs of SAAL apartment schemes

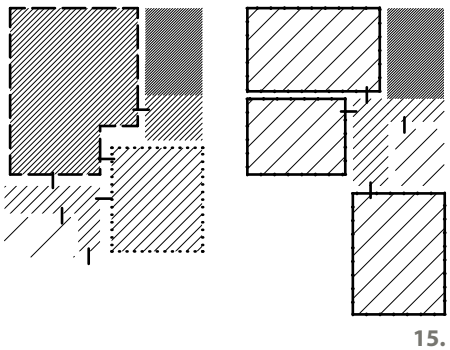


14-A.

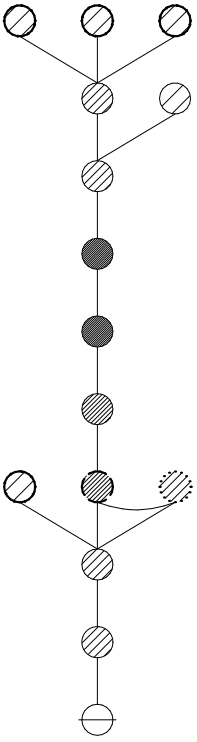


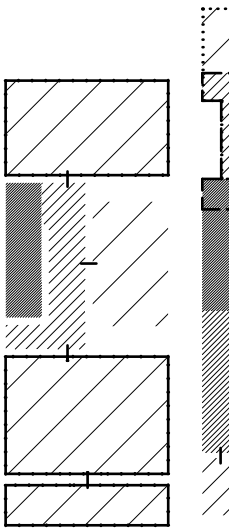


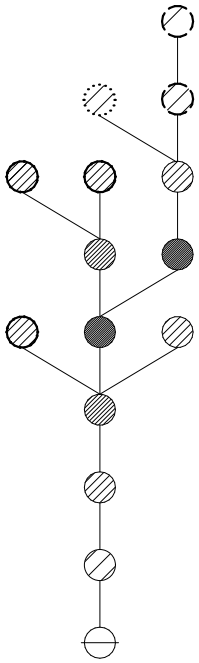
14-B.

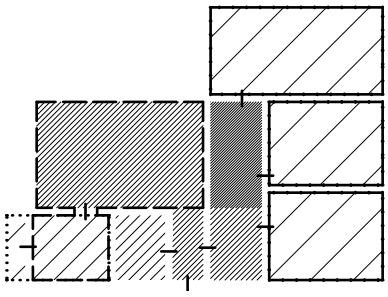


15.

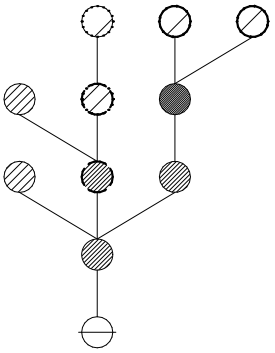


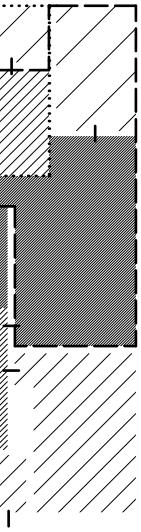




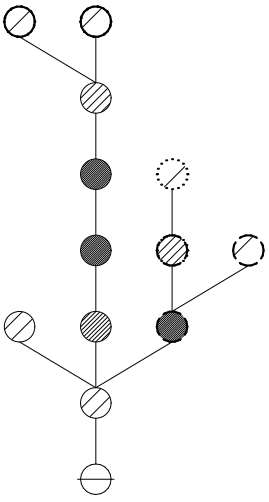


16.





18.



14. Lapa
15. Leal
16. Massarelos
17. Contumil
18. Bouça

INTEGRATION

min. value

25th percentile

50th percentile

75th percentile

max. value



private sector

collective sector

services sector

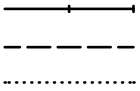


FIGURE 11.18.
Convex breakings and accessibility graphs of SAAL apartment schemes

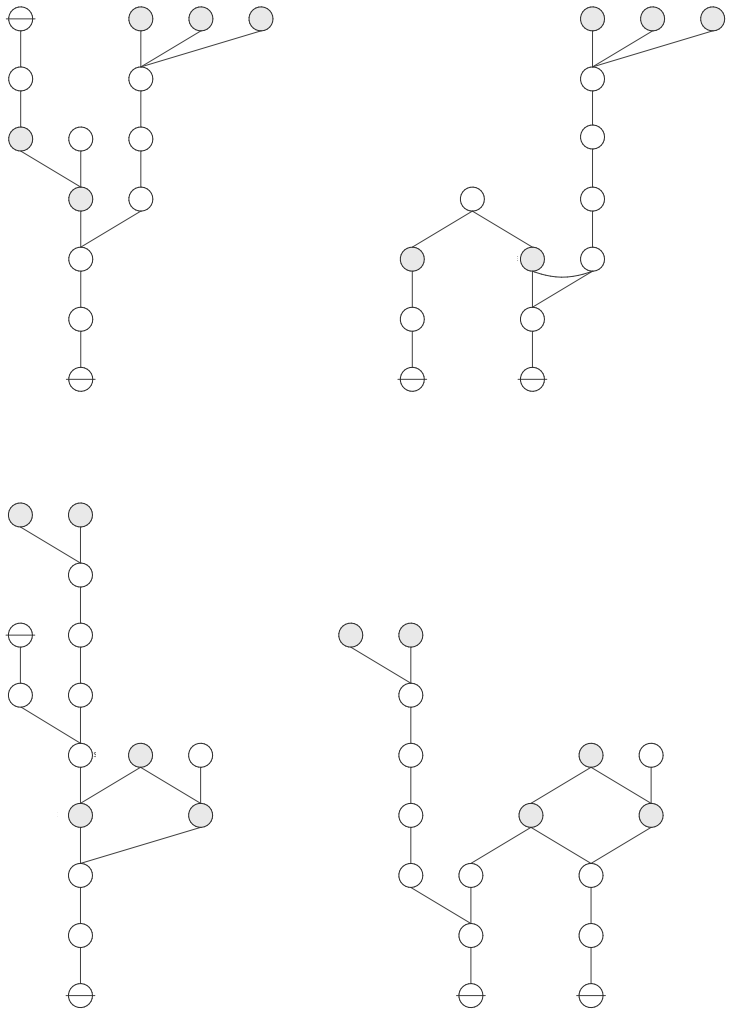


FIGURE 11.19.
Maceda's (layout 12) justified graph with the front door as origin or with both doors (top) and Antas' (layout 10) justified graph with the front door as origin or with both doors (bottom).

and, therefore, "front" and "back" doors connect to the same exterior spaces. In these cases, there does not exist a clear association of each door to a specific sector of the house. In Antas (10), one of the doors is connected to a yard, which then connects both to the kitchen and to the living-room, while the other connects to the staircase which articulates the collective-services sector-set with the private sector. In Contumil (17), there exist two different functional spaces that seem to work as a living-room and dining-room, with the latter opening to the kitchen, and each being connected to a different entrance. Other cases differentiate clearly between the front and the back of the houses, without doing so through similar design mechanisms. It is exemplary of this that while in Maceda (12) the better integrated collective area of the house is located in the front of the house, with its service area opening to a narrow, although not more segregated, pathway, S. Victor (11) opens its less integrated area to the better integrated exterior area while turning its collective and service sector-set to the more segregated back of the estate layout.

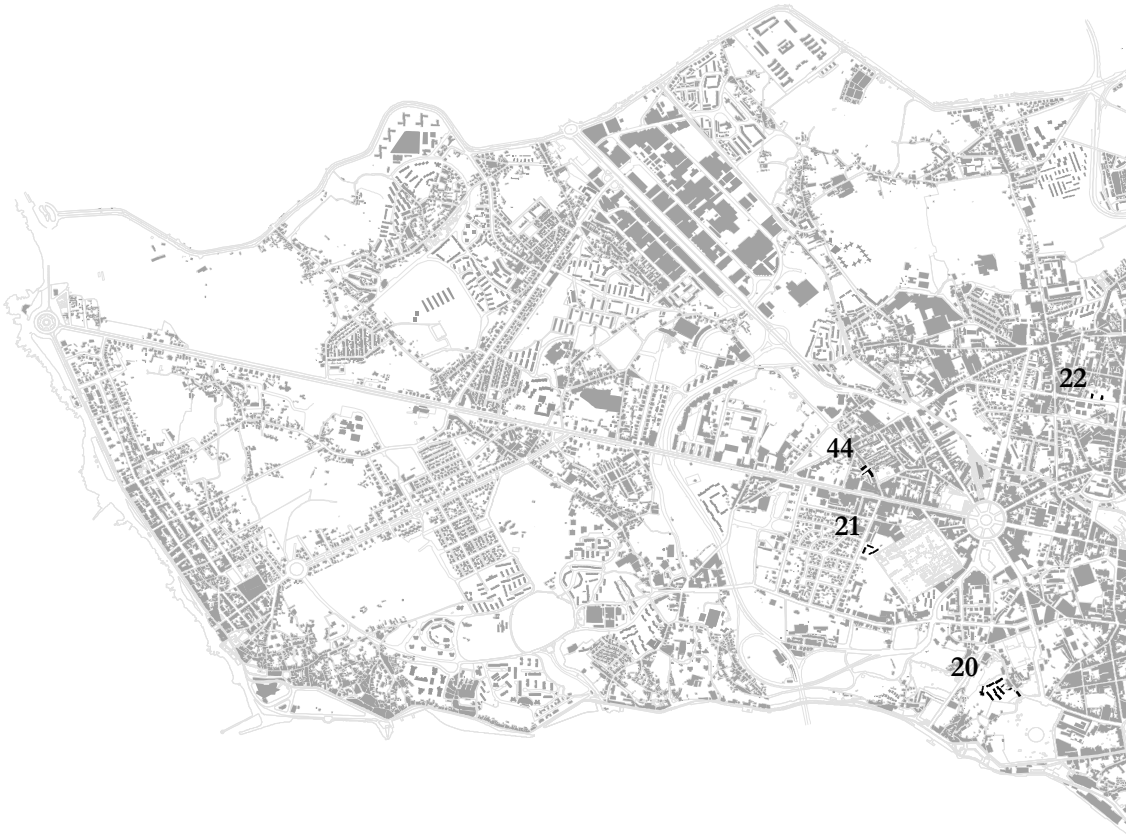
11.3.4. ESTATES FOR RESIDENTS' ASSOCIATIONS (AM)

For a variety of reasons, not all residents associations that organised to develop new houses for families in precarious situations were integrated into the SAAL. Furthermore, the early extinction of the SAAL as a nacional programme caused many of its projects to come to a halt, and depend on other forms of organisation and other legal frameworks in order to be completed. While many of the residents' associations in these situations never saw their projects to completion, some were integrated into different programmes, through, for example, the transfer of projects to the council (as was the case of Boavista (44)), or by becoming housing cooperatives (as was the case of Bouça (18), which was only finalised in 2005).

The housing developments identified as estates intended for residents associations were chosen through three criteria: 1) they were constructed in between 1974 and 1982, 2) they are officially named "Residents' Association Estate" in architectural drawings, 3) they included - and in most cases still do - a space for the associations' headquarters. A conservative estimation of the number of houses developed for AMs outside of the SAAL programme, considering an average number of 100 houses per estate for the two cases that are known to have been built but are not analysed in this thesis, puts the number of affected families at around 800.

	#houses	area (m²)	NaIN5000	NaIN800	NaCH5000	NaCH800
20. Vilar	144	11000	0.69	0.83	0.73	0.81
21. Campo Alegre	56	4800	1.00	1.10	1.05	0.10
22. Carvalhido	32	2900	1.44	1.50	1.36	0.90
34. Tirares	128	9360	0.61	1.04	0.84	0.91
35. Pego Negro	96	5680	0.61	0.76	0.87	0.93
44. Boavista	88	6470	1.02	1.05	0.77	0.87
		6701.67	0.90	1.05	0.94	0.90

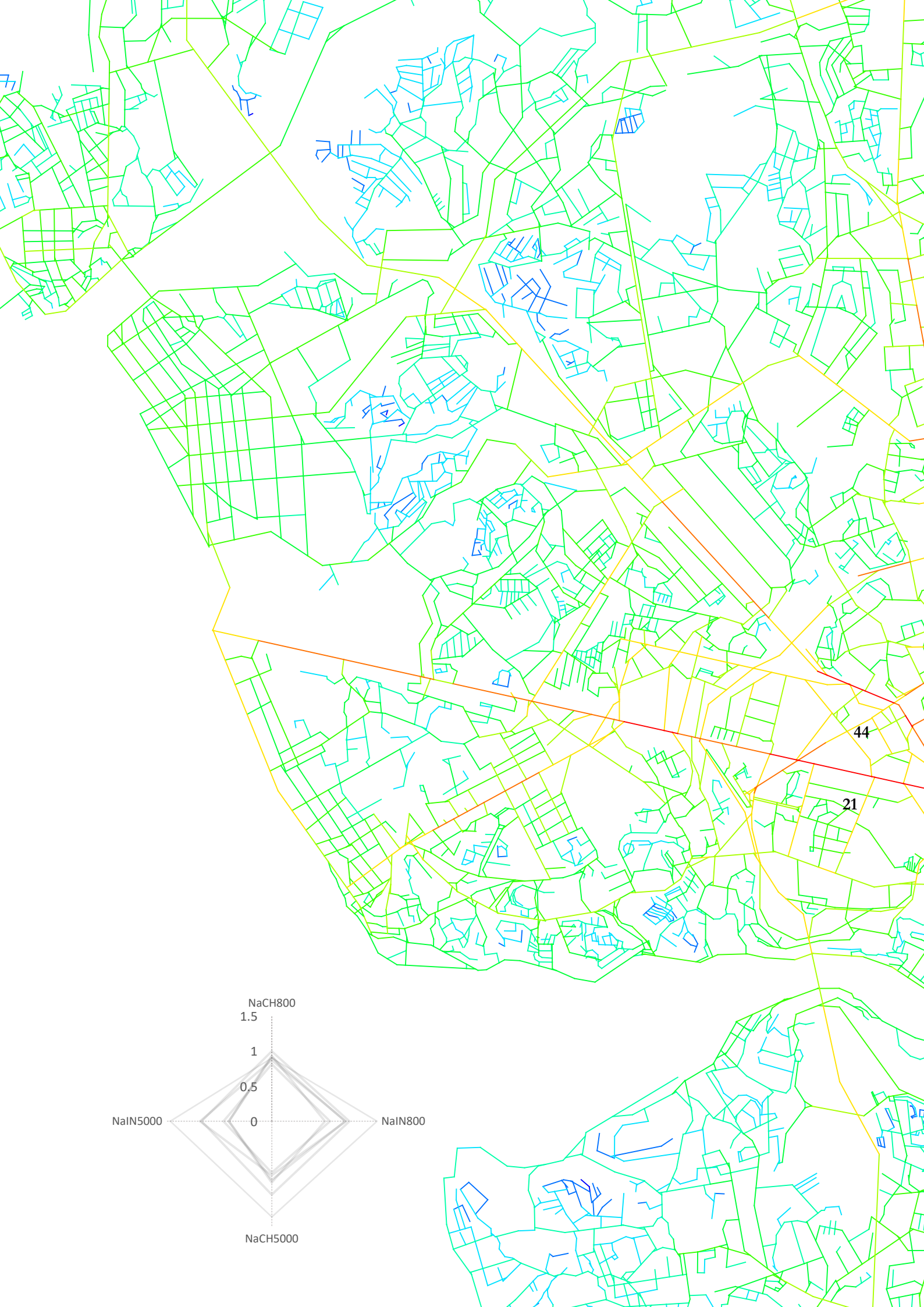
TABLE 11.7. Global and local integration and choice of AMs' estate layouts



20. Vilar
21. Campo Alegre
22. Carvalhido
34. Tirares
35. Pego Negro
44. Boavista



FIGURE 11.20.
Plan of Porto 1978 and SAAL developments
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research


44
21
NaCH800
1.5
1
0.5
0
NaIN800
NaIN5000
NaCH5000

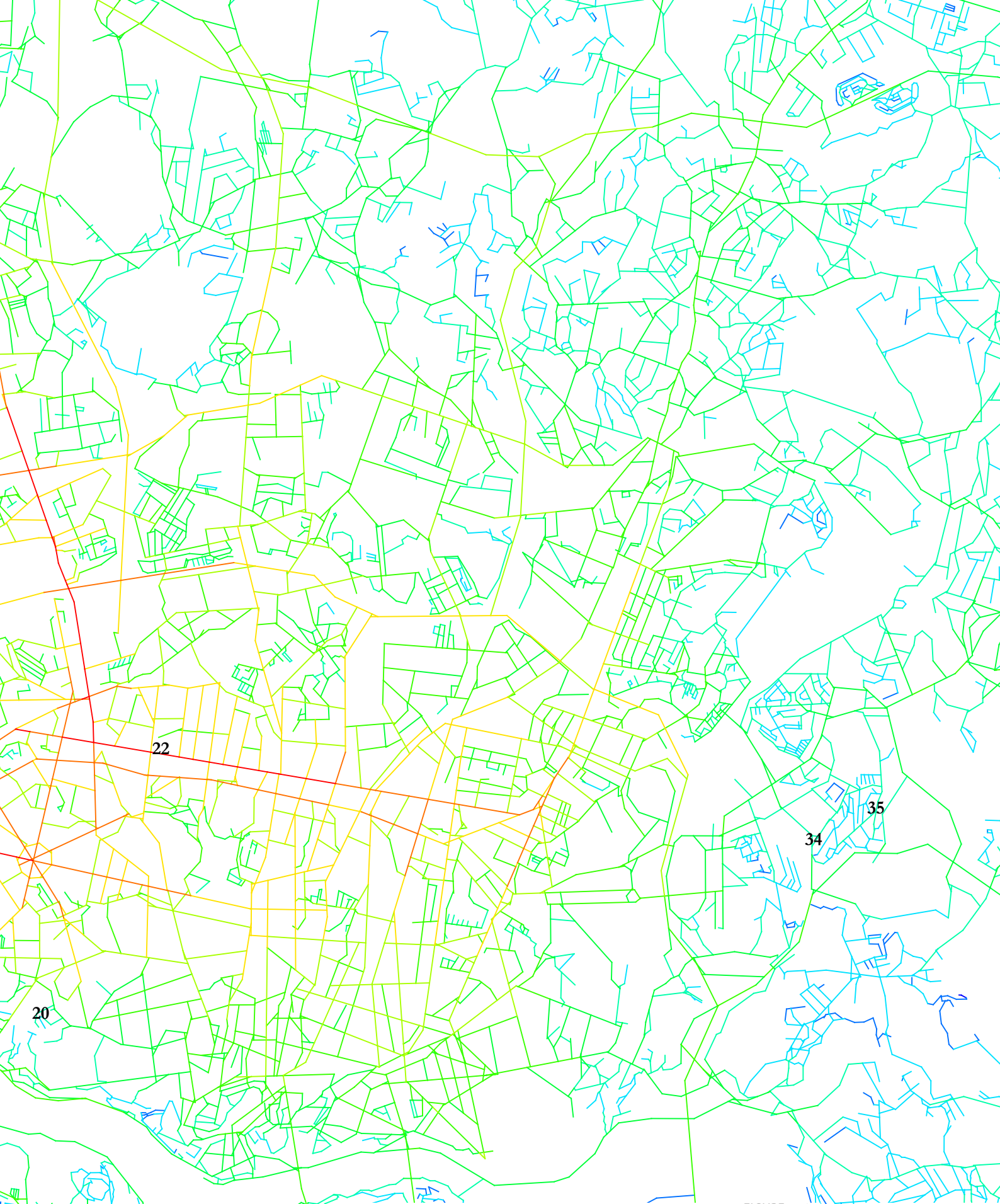
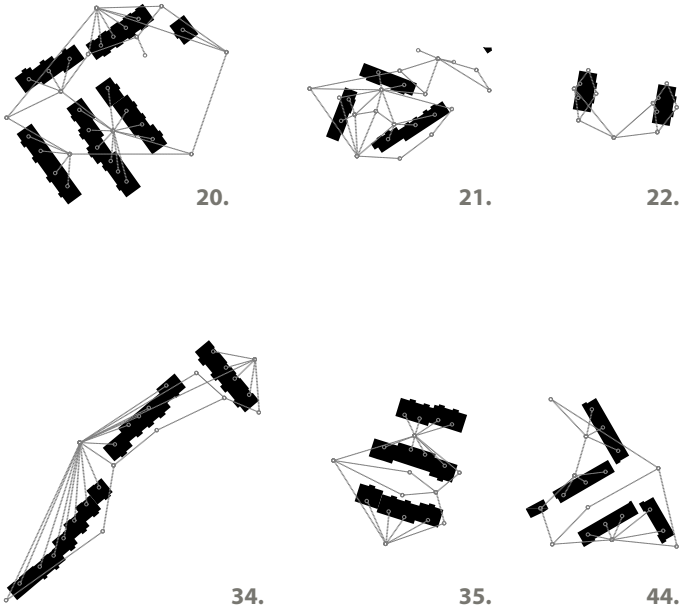


FIGURE 11.21.
Porto, normalised integration r=5000 with AM estates.
AM estates' values of normalised global and local integration and choice (left)



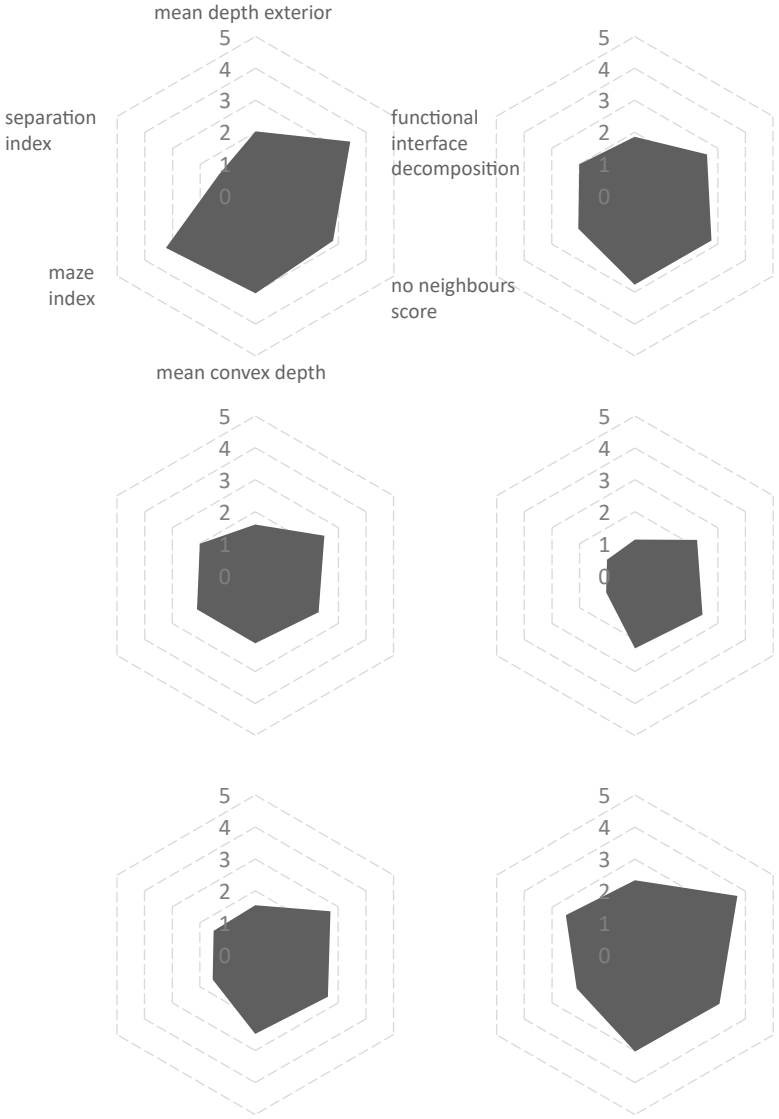
20. Vilar
21. Campo Alegre
22. Carvalhido
34. Tirares
35. Pego Negro
44. Boavista

FIGURE 11.22.
Plans and convex breakings of AM's estate layouts

Developed partially or entirely outside a framework of participatory architecture, if these projects depended on the prior organisation of residents, participation in the design process was either non-existent or cut-short. As such, the developed layouts adopted forms that are largely different from those of SAAL developments, often sharing apartment types among different cases and with FFH's estates. With an average of 100 houses per development, these neighbourhoods are larger and denser, allowing around half the area per inhabitant of other programmes. As such, while borrowing some elements from them, the neighbourhoods created for these AMs also seem to diverge from other state developments, namely in their localisation in the city. While FFH estates follow principal axes connecting to adjacent cities, AM layouts follow a logic that is closer to that of SAAL developments. Located in the proximity of its residents' place of origin, these neighbourhoods either occupy areas inside the inner radial of the city that were fully urbanised at the time when they were built (Vilar (20), Campo Alegre (21), Carvalhido (22) and Boavista (44) in figure 11.10.), or are in close proximity to PMCP and SAAL developments in the lesser integrated East of the city (Tirares (34) and Pego Negro (35)). Consequently, these housing estates present significant disparities in their integration values, encompassing both the better and the worse integrated developments that were built after 1974.

Campo Alegre (21) and Boavista (44) are located in secondary streets to high choice lines. Additionally, both turn away from the main street and create an inner courtyard - one that gathers all front doors in Campo Alegre (21), making of that space one where neighbours might not interact but are likely to be aware of each other, and one in Boavista (44) which takes the opposite approach, relegating doors to pathways on the back of the buildings. This contributes to Boavista (44) having a higher separation index and no neighbours score than is average for AM layouts. Carvalhido (22), on the opposite side of the street to Boavista (44), is on an important axis that makes the connection between the East and West of Porto and appears as a clear exception in regards to both its large integration and global choice values. Its neighbourhood layout, however, maintains the same logic of creating an extra step between the street and front doors (much like most cases seem to do in one measure or another across programmes) by turning the buildings' entrances to gardened areas in front of the buildings.

Similarly to FFH's developments, this stepping back from the street does not seem to have an effective impact on the separation of residents from the exterior city or on strangers' perception of the estate, with maze and separation indexes being relatively low in all but Vilar (20), indicating strong accessibility between the street and the interior of the layout. However, contrarily to the FFH, the courtyards created in between buildings are in some cases not significantly more integrated than other spaces - and as such don't configure a defined integration core - or are not functional spaces. Boavista's (44) option of placing the front-doors in the backs of buildings creates a highly integrated path around the estate that minimises the courtyard's role in the layout. Similarly, with only two pedestrian openings between the street and the interior of the layout, Carvalhido's (22) integration core is its exterior. While maintaining a highly integrated exterior,



20. Vilar
21. Campo Alegre
22. Carvalhido
34. Tirares
35. Pego Negro
44. Boavista

FIGURE 11.23.
Depth measures of AM estate layouts a) Vilar, b) Campo Alegre, c) Carvalhido, d) Tirares, e) Pego Negro, f) Boavista

Campo Alegre (21) has a well-defined integration core in between dwellings that contrast with the deep, poorly integrated sports field.

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
20. Vilar	2.03	3.42	2.80	3.04	3.24	1.33
21. Campo Alegre	1.86	2.61	2.77	2.77	2.04	2.00
22. Carvalhido	1.60	2.50	2.29	2.12	2.11	2.00
34. Tirares	1.13	2.25	2.44	2.28	1.04	1.00
35. Pego Negro	1.56	2.72	2.63	2.48	1.54	1.5
44. Boavista	2.33	3.70	3.06	3.02	2.11	2.5
	1.75	2.87	2.67	2.62	2.01	1.72

TABLE 11.8.
Depth measures of AM estate layouts, illustrated in figure 11.23..

Vilar (20), the remaining housing development located on the inside of the city's inner radial - although in a less integrated area and presenting bellow average values of integration and choice for AM developments at all scales - displays a different set of characteristics. It has no differentiated spaces of collective potential other than a sports field located on one of its two openings between the exterior street and the inside of the layout, shallow but poorly integrated. High integration values are, as in the previous case, split between the exterior of the layout and a system of streets in its centre. Situated between the back of existing houses on one side and a slope towards the river on the other, this layout has a larger maze index (mi=3.24) than other cases. Its separation index and mean distance between the exterior urban grid and the dwellings are among the lowest, reflecting a reasonably grid-like layout when accounting for the exterior, where 75% of spaces are distributed. Simultaneously, however, this layout also follows the logic of turning its entrances inward, with one building in the continuation of the existing fabric opening towards the main street.

On the other side of the city, Tirares (34) and Pego Negro (35) are two of the four cases studied whose values of global integration drop underneath the 0.6 line (table 11.7.). They are located in lots in the continuation of an existing PMCP estate, in an area that is mainly residential and characterised by a high percentage of public housing (figure 11.25.). Tirares (34), in particular, is well integrated in this urban fabric, with above-average values of local integration and choice, while Pego Negro (35) opposes similarly high normalised choice at radius=800 with local values of integration that are also comparatively low. While located in an area less overall connected to the urban system, these two layouts also maintain the same low depth values of other AM developments that are uncommon across the set for multi-building layouts.

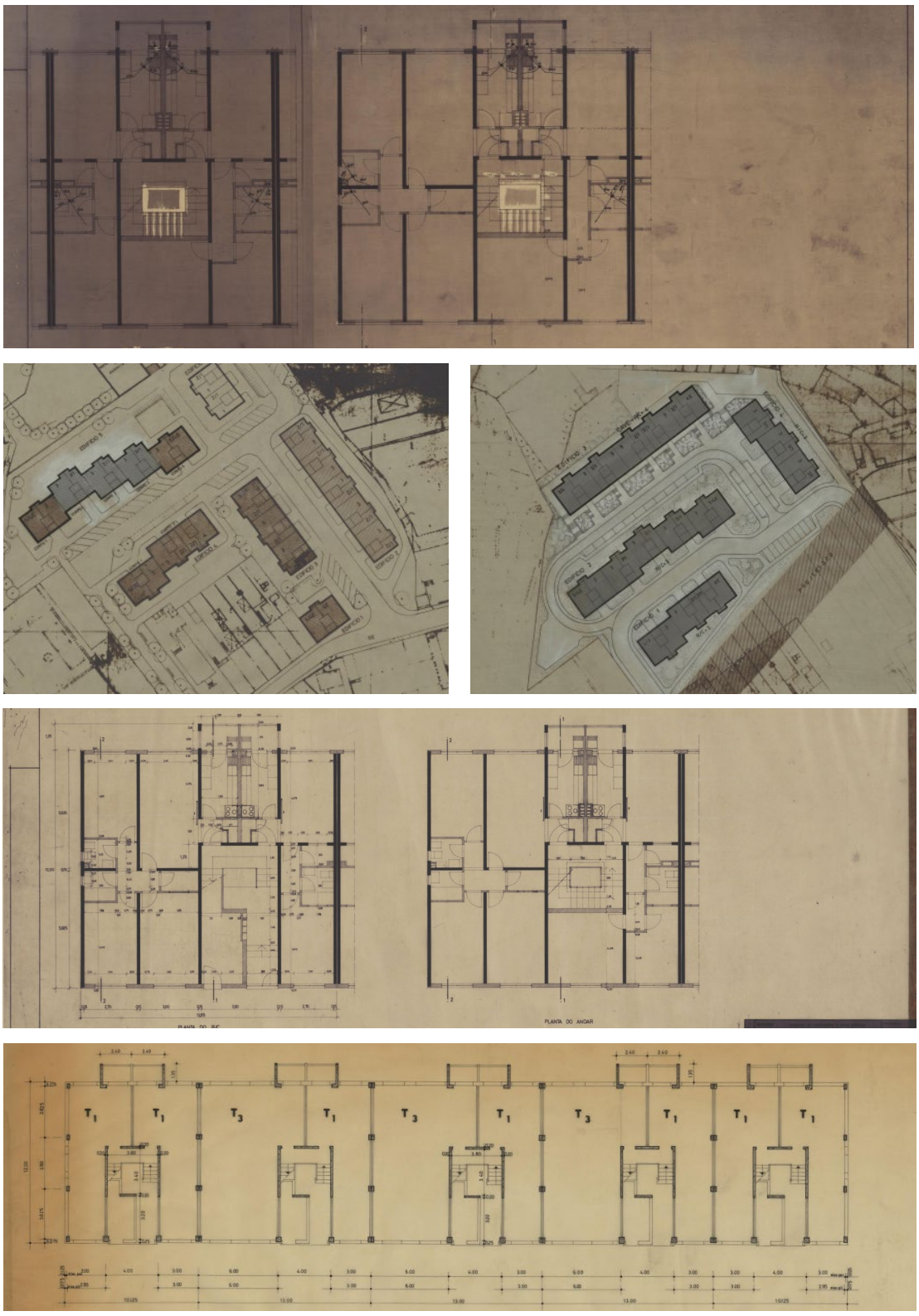


FIGURE 11.24.
Same apartment scheme used in layouts 20 (top) and 22 (middle). Design variations in layout 20 use the same apartment scheme. Layout 34 (bottom) appears to share the same apartment scheme.
Drawings found in http://gisaweb.cm-porto.pt/.



FIGURE 11.25.
State subsidised housing in Porto
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research

AM estate layouts present a set of identifiable characteristics that are significantly different from those developed by other programmes. The prior organisation of residents seems to have been able to maintain the principle of constructing new housing in the areas where these populations already resided and resulted in the combination of FFH's low values in depth measures with SAAL's integration in the existing city. At the domestic scale, however, existing housing schemes seem to have been generally adopted, adapted only insofar as it had to do with the estate's morphology and exterior configuration. Not only do apartment layouts repeat across cases, as the same layouts can be found in FFH estates as well. This indicates that there was, at least, some articulation with the state institution, sharing models that were then assembled as fitted each specific site.

Only two different apartment schemes were identified in the six analysed AM estates. Even though it was not possible to find the apartment plans of some cases, buildings share similar layouts, apartment distribution and dimensions, and it appears to be likely that apartment schemes are the same as well. Pointing to the same direction, when different versions of the same layout could be found, as is exemplified in figure 11.24., they appear as different organisations of the same apartment scheme.

	TUFA m2	Density m2/r	Integration	Difference factor	Mean depth exterior	functional orientation %
35. Vilar	72.32	18	0.90	0.74	3	0.25
36. Campo Alegre	70.11	23.37	1.03	0.79	2.5	0.18
37. Carvalhido	72.32	18	0.90	0.74	3	0.25
38. Tirares	72.32	18	0.90	0.74	3	0.25
39. Pego Negro	72.32	18	0.90	0.74	3	0.25

TABLE 11.9.
Spatial attributes of AM apartment schemes, illustrated in figure 11.26..

Both apartment schemes can be described by the simplified accessibility graph B1: the front door opens to a small entrance that connects to an a-type kitchen and a b-type living-room, which controls access to the bedrooms. Consequently, living-rooms are, by large, the better-integrated

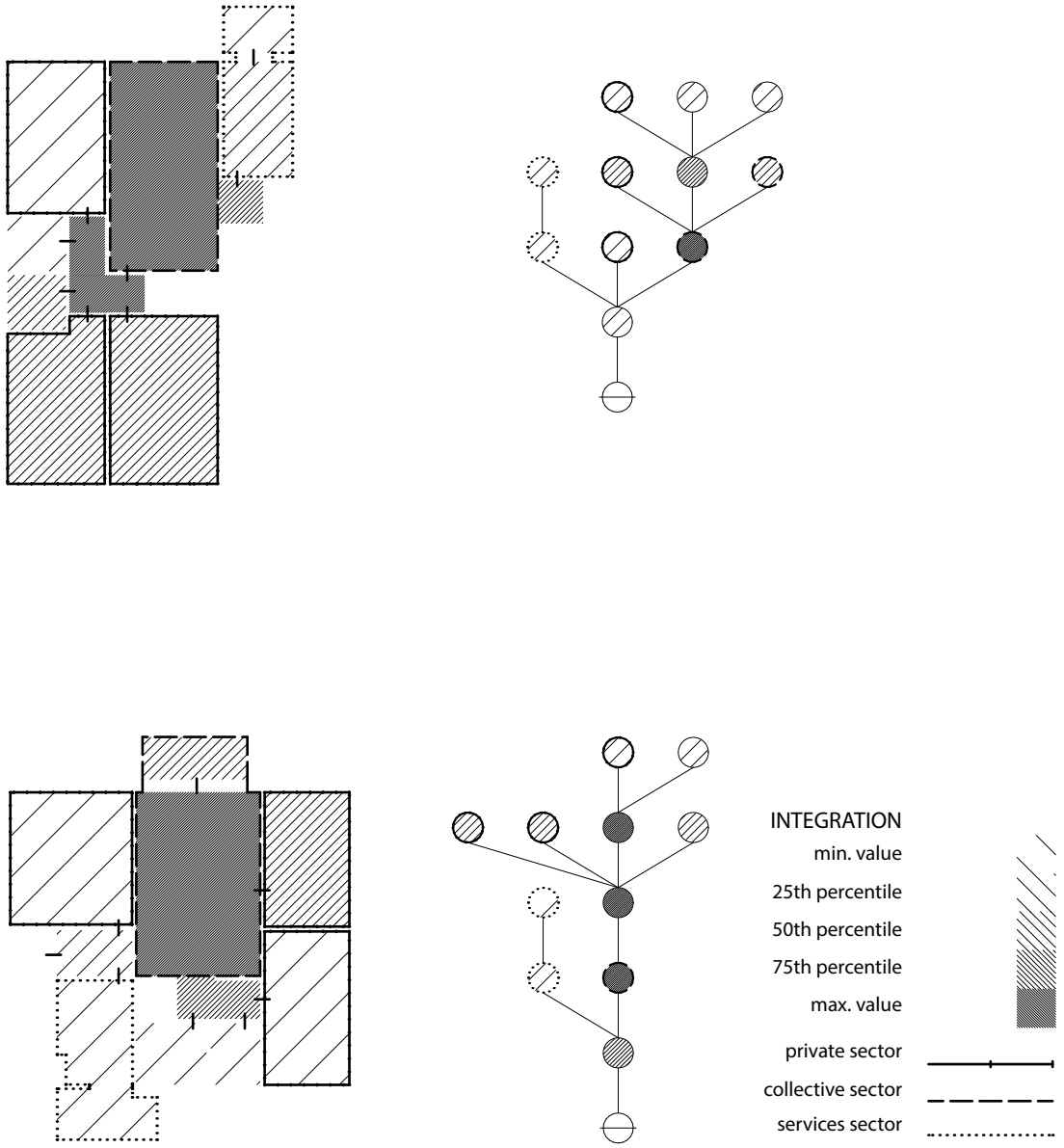


FIGURE 11.26.
Convex breakings and justified graphs of AMs' apartment schemes

spaces of both schemes and there is a steep decrease of integration values between these space and the remaining spaces of the house. Kitchens, shallow from the exterior of the apartment, are also the less integrated spaces of the house. They are disconnected from common areas and relatively large, being in both cases larger than the minimum and close to the ideal area for kitchens. While the houses themselves are smaller than the minimum 90m2 for a three-bedroom apartment, the same applies to all functional spaces. Because the only transition spaces in the two schemes are small entrance halls and a small area distributing the bedrooms, it is possible for all rooms to be above the minimum and close or above to the ideal area, while the apartments remain overall small. The small halls that connect the living-rooms to the bedrooms seem to have the purpose of distancing the private area of the house from the collective space, thus defining more clearly the three functional sectors.

Because only two different apartment schemes were used in the different AM developments located within the limits of Porto's municipality, it is not possible to speak of trends. These two types of apartments will be further examined in chapter 11, where they will be contextualised within the broader production of the FFH.

11.4. SOCIO-SPATIAL CONSIDERATIONS ON PARTICIPATORY LAYOUTS

11.4.1. SEGREGATION, OTHERING AND HIERARCHISATION IN PARTICIPATORY ESTATE LAYOUTS

The maintenance of populations, in central areas of the city where they were rooted is a clear anti-segregation measure. While SAAL layouts do not present, on average, the larger values of global or local integration, half of them are located in the integration core of the city, and four of them present global integration values that sit on the top 25%. Conversely, and indicating that the idea of maintenance of communities in the centre had at is core the defence of the right to maintain a pre-existing life - associated with a determined space and a determined community -, three of SAAL's layouts present global integration values that sit on the bottom 25%. Similarly, organised AMs were able to have new housing developed in the whereabouts of their places of origin, in central, highly integrated areas of the city, both locally and globally, but also in globally segregated parts of the city. Segregation is then countered in a similar way to SAAL layouts. There as well, it is, more than centrality, the right to an existing way of life that is protected.

If contradictions were identified in SAAL developments between the explicit ideal of maintaining the existing populations in integrated areas of the city and integrating them within those areas, these were often resultant of contradictions within the process itself, and conflicts between different entities. This is explicit in the brigades' positioning against the PDP, to which several reports acknowledged as a bourgeois urban plan designed to remove the popular classes from the city-centre, and additionally used by the council as an excuse for failing to conduct the necessary expropriations for the successful implementation of SAAL's projects. Other similar situations - such as the continuous fail-through by the FFH to pay the brigades' wages, which often resulted in bringing their work to a halt, and, more plainly, the early extinction of the SAAL - contributed for its incomplete nature. 'Operational units', a division of the city in areas that should assure the articulation of brigades in the development of equipment, infrastructure and collective spaces that were common to different projects, countering the isolation of populations in the interior of blocks and "guaranteeing the pursuit of the entire neighbourhood unit and not just part of it"[95] (Alves Costa, 2014, p.31), represented an anti-segregation strategy that was never translated into design (figure 11.4., page 508).

It is at this level that housing developments for organised residents outside of the SAAL present a set of identifiable characteristics that set it apart not only from the SAAL but from other public housing programmes. Due type of urban insertion of these layouts, local integration into the surrounding city is guaranteed in these estates and furthered by low values in depth measures, in particular those that have to do with the estates' relationship to its surroundings. Both well locally integrated and, in their majority, located in areas of the city with access to retail, services, transportation and other urban structures, these layouts seem to encourage the establishment of relations between their residents and the exterior of the estates where they live.

When it comes to most of SAAL's enterprises, while they are not only often invisible in the interior of existing blocks, but distanced from the exterior urban space by its convex configuration, the idea that these neighbourhoods should be open towards the city is expressed through other mechanisms. Some of these are directly connected to the SAAL's approach to hierarchisation and potential for community. The absence of local equipment and infrastructure within the layouts - purposeful against the creation of "collectivist *ilha*s" - should be compensated by the layouts' localisation in old, stable areas of the city, where these were often easily accessible. All but one of SAAL's layouts is not localised within 500 meters of existing retail and services, most of them are in the whereabouts of schools and sports facilities, and many have cultural equipment within a 1500 meters radius. Many of them are located in the whereabouts of important public spaces. In this way, the large measures of depth of SAAL layouts do not have the same meaning

95 **"[...]** garantindo a prossecução dos interesses de toda a comunidade vicinal e não apenas de parte dela." Translated from Portuguese to English by the author of this dissertation.

as those of PMCP layouts. Not being necessarily segregating, as the populations are forced to contact with the outside urban space, this depth creates a distinction between the SAAL community and the exterior neighbourhood - an explicit othering of these spaces - but is allied to smaller depth values between the spaces of the layout, creating more opportunities for residents to cross paths, be aware of each other, or interact.

The type of interaction these layouts allow for is also different than that of all other housing programmes. With no collective spaces within the housing scheme, neighbourhood networks are connected to the domain of the domestic, which is seen to have an impact on the design of the layout itself.

If there does not seem to exist a purposefully classification or othering as can be verified, respectively, in SAAL and PMCP layouts, in the estates developed for AMs, they are also not designed as part of the existing city. While averagely shallow and shallow from the exterior, appearing easy to perceive from the exterior and in all cases facing the primary city grid to some extent, this grid does not permeate through them. Local choice values are not above average, and fixed-function spaces that can be used by outsiders are rare within the layouts. In this sense, if these estates are close to the surrounding city and seem to search for an articulation of residents with an area they were already part of, they do not appear to be designed with the intent of adding new spaces to the previously existing neighbourhood.

This same character should impact the relationships established within the estate itself. The pre-existing communities in the origin of these estates are not, in general, given new spaces with collective functions or potential. As such, if co-presence and co-awareness may be facilitated by the existence of well-integrated transition spaces and the overall shallowness of AMs' estates, these layouts do not transpire the intention of creating an identifiable community of their own. Simultaneously, displaying low values in depth measures of the internal spaces of the layout, grid-like configurations with similarly integrated transition spaces, the layouts do not particularly approach Hillier and Hanson's (1984) hard solution model either.

11.4.2. DOMESTICATION AND ADAPTABILITY IN PARTICIPATORY APARTMENT SCHEMES

It is in the sense that domestic life is allowed to overflow into the space of the community that domesticity in most of SAAL housing takes on a different meaning than in the developments of other programmes. We have seen that the design of interior layouts may have an impact on the way exterior spaces are used, depending on the type of spaces with which they are associated. Conversely, the association between interior and exterior spaces must also be taken into account when examining the type of relations and interactions allowed for the configuration and

organisation of functional spaces in SAAL layouts. While the relationships established within the house and those established outside of it can be considered to be mostly hermetic in most collective housing developments, the single-family housing typology of many SAAL developments allows for the interaction of these two levels, so that time spent at home is not necessarily time spent only in the presence of one's family.

If, simultaneously, the SAAL is the only of the studied programmes that developed exclusively private housing - a trait that must be seen in the context of a reaction to the extremely precarious character of public housing before the revolution - the participatory process that was at the origin of each development adds an extra layer of complexity regarding its domesticity. It was the aspiration to one's own house - determined as private in non-participatory legislation - that led some residents associations to organise in what Portas (1991) called collective organisation of demand. This organisation determined an inevitable collectivisation of domesticity and, in a context that allowed for it, often resulted in the collectivisation of other areas of life, as ARs organised social, cultural and health structures.

More than forty years passed since the extinction of the SAAL and of the conditions that assigned specific power to organised residents, this layer of collectivisation has been removed from SAAL developments. It is, however, noteworthy, that even though SAAL houses are private property and as such are not bound by anti-speculation regulations, SAAL developments do not appear to have been the target of speculation[96]. Given their often privileged location in areas of the city centre today highly valued in the real estate market, it would be interesting to understand what characteristics - of the process that created them, of the population that inhabits them, of their morphology and typology, or others - may have contributed for the maintenance of their class character.

The spatial layer of the SAAL's type of domesticity, where windows and yards open directly to the exterior spaces where neighbours circulate, create the possibility for non-purposeful co-presence. Women, in particular, who were shown in chapter 4 to have spent a larger amount of time at home and to have been the ones in charge of most domestic work, may be affected by this franker relationship with the exterior. Kitchens, where the greater part of domestic work was seen to take place, while segregated from the rest of the house, are often connected to entrances or yards. In this sense, women, remaining inside their homes while conducting domestic work, are in contact with their neighbours. In cases where yards are open to each other, this contact is elevated, creating the possibility of neighbours interacting while at home.

96 Layout 18, Bairro da Bouça, finished in 2005, is the exception. Concluded decades later, the original recipients had found other places to live. The architectural quality and prestige of the development has led people from different social classes than first intended to search for a house there, and has facilitated its integration into the Airbnb market in recent years.

The segregation of SAAL's kitchens, then, seems to differ from the segregation of kitchens in AM developments. Kitchens in both types of housing development share similar traits, such as small values of integration - in some cases being the least integrated functional spaces of the house - and larger area and relative size than in other programmes, which, according to the results of the analysis of the Survey on Urban Housing presented in chapter 4, does not seem to relate to the use of this space by more family members but, instead, might relate to an increase in domestic tasks performed there in place of living-rooms. However, if the designs of both reveal the absence of active care in integrating women into the house, the impact of the possible consequent segregation of women might be lessened in SAAL layouts by the possibility of interaction with its exterior.

Conversely, when it comes to family relations within the space of the house, the configuration of AM apartment schemes may be more potentiating of collective life and, consequently, of women's integration in it. If the clear result of area economy, the creation of living-rooms that act as transition spaces between the bedrooms and the kitchen might increase the amount of time spent in the collective area of the house by all family members. In SAAL layouts, where functional sectors are clearly defined and enclosed areas, collective spaces may be more dependent on family members' purposeful utilisation of those spaces. If, in this sense, the developments of both programmes differ, they similarly a way of seeing the domestic space where the activities and associated family members of each sector are clearly separate. Collective, service and private activities are expressed in these house designs with little fluidity, revealing a functionalist approach to house organisation. The further definition of the functional sectors in SAAL layouts through the addition of depth results in the creation of a series of undefined, non-functional spaces. Therefore, even though the sectors themselves are more clearly defined in SAAL houses than in AM apartments, there is a larger amount of undefined space in the first.

In both cases small - presenting areas bellow what was considered the minimum liveable area at the time they were constructed - and with clearly defined functional sectors, the housing schemes developed by the SAAL and for the AMs within other frameworks are, nevertheless, larger than earlier examples and, as such, the result of a negotiation of their time.

12. PUBLIC AND COOPERATIVE HOUSING IN THE POST REVOLUTIONARY PERIOD

Introduction

As we have seen in the previous chapter, the revolutionary period brought a necessary restructuring of existing institutions and public housing policies. The FFH, which had been created five years before the revolution, remained the leading public housing developer, either through direct intervention or funding. Benefiting from an increase in financing and with a practice that was highly connected to the normalisation of constructive processes, development of social studies, data collection and statistical procedures, the FFH developed a series of different solutions in policies, urban morphology and domestic typology which were highly innovative in the national context, and reflected its contemporary housing experiences worldwide.

Both the SAAL and the structures developed for facilitating and supporting the creation of housing cooperatives are examples of this. However, the lesser-known neighbourhoods developed by public institutions during this period were also in great part responsible for the shaping and development of Porto's suburbs and its relation with the adjacent cities, and represent an important example of the role of public housing in urban growth.

Through a very different process, cooperative housing had a similar role. It existed in the country since the late 19th century, functioning mostly as a mechanism for facilitating gradual middle-class access to private housing. In 1974, it was vastly restructured and integrated into the FFH, benefiting for several years from the technical, juridical, social and financial support of the State. As such, even though the programme remained inaccessible to the most impoverished families, cooperative housing could be generalised as a mechanism of housing development and became a framework through which Porto's adjacent municipalities could incentivise it. It was in this sense that, despite not being articulated into urban planning strategies like housing developed by public institutions, and despite the need for cheap terrains, its inability to conduct expropriations and the systematic fall-through of the construction of designed infrastructures, cooperative housing also played an essential role in urban growth in Porto's Metropolitan Area.

This chapter will focus on the estates developed within Porto's municipality, while briefly introducing public and cooperative housing development in Porto's Metropolitan Area. It will examine its role in the city and in urban growth in order to make the point that, while the paradigm of

locating housing for the working class in vacant lots outside the urbanised centre continued to be dominant, this period represented a significant shift in urban planning and social housing strategy from the PMCP (Improvements' Plan for the City of Porto) that was not only present in its theoretical production and explicit social concerns but also the spatial characteristics of these neighbourhoods.

12.1. SHIFTING PARADIGMS IN STATE HOUSING LAYOUTS

Between 1974 and 1982 the FFH was involved in the construction (either through direct development, loans or other types of financial and technical support) of 63 530 houses across the country (table 12.1., Fonseca Ferreira, 2013). If this was far from covering the housing shortage of 531 000 houses in the country, it represents a scale of state intervention that had not been tried before. This number was more pronounced in the years immediately after the revolution[97] as a result of the economic plans of 1965 and 1973, the consequence of the "regime's industrialist and modernising sectors' efforts to reinforce State intervention in housing development and land policy; the pressure of the vigorous popular movement for the improvement of housing conditions that followed the 25th of April of 1974 (…); and the statist nature of provisional governments that translated into the reinforcement of State intervention in housing policy"[98] (Fonseca Ferreira, 2013, pp.113-114).

TABLE 12.1.1. State subsidised housing in Portugal between 1974 and 1982. *Fonseca Ferreira, Anos de 1970-1980: do Fundo de Fomento da Habitação ao Instituto Nacional de Habitação, in Habitação Para o Maior Número. Portugal, os Anos de 1950-1980, 2013*

	1974	1975	1976	1977	1978	1979	1980	1981	1982	
Direct development	278	858	2661	4447	4173	320	6772	2317	237	22063
Reimbursed developments	811	780	1976	934	2067	248	72	362	324	7574
Cooperatives and RAs		1644	2210	1419	3249	1156	6493	4186	918	21275
Self-construction	15	44	125	162	224	162	332	220	1	1285
Loans to councils		3556	830	694	1499	737	883	1075	783	10057
Development contracts		2054	6993	776	256	245	0	499	279	1276
Reabilitation of degraded housing				9438	7148	1836	9557	1176	543	29698
	1104	8936	14795	17870	18616	4704	24109	9835	3085	93228

97 The number of houses initiated per year by the FFH raised from 1 104 in 1974 to 8 936 in 1975 and 13 795 in 1976, and then begun to decrease (Fonseca Ferreira, 2013).

98 "(...) os esforços dos sectores industrialistas e modernizadores do regime para reforçar a intervenção do Estado na promoção habitacional e nas políticas fundiárias; a pressão do vigoroso movimento reivindicativo a favor da melhoria das condições habitacionais das classes populares, que se seguiu ao 25 de Abril de 1974 (…); e a natureza estatizante dos governos provisórios traduzida no reforço da intervenção do Estado nas políticas habitacionais." Translated from English to Portuguese by the author of this dissertation.

Programme	Duration (years)	Number of houses	Houses per year	Number of estates
PMP (1st phase)	11	6000	545.45	13
PMP (2nd phase)	8	2300	287.50	7 (+2)
PMP (total)	19	8300	436.84	20
FFH+CMP	8	2450	306.3	10
SAAL[99]	2	374-394	187-197	11
RA	8	800	100	8
Coop.	8	660	82.50	8

TABLE 12.2.
State subsidised housing in Porto between 1974 and 1982 identified in the scope of this dissertation

In Porto, the FFH and the council (*Câmara Municpal do Porto,* CMP) constructed 11 different estates within the municipality between 1974 and 1982. If these were often smaller than PMCP estates, making the feat of developing 10 estates in eight years not as impactful in number of houses as had been the construction of 9 estates in eleven years and a total of 20 in nineteen years during the development of the two phases of the PMCP, to these must be added the direct development of 20 other estates outside the limits of Porto's municipality but still inside its metropolitan area[100].

Consequently, normalisation and cost-efficiency are present at all scales in many of these developments. There is a certain amount of standardisation of elements and repetition of models at the level of apartment layouts, of the internal organisation of the estates and exterior appearance of the buildings. Furthermore, at the urban scale, the localization of these estates seems to reflect an economy in the acquisition of lots. Eight of these estates are situated in the mostly residential area between the inner and outer radials of the city, further out than any of the programmes presented so far. Viso (24), Ramalde (27), Ramalde do Meio (28), Pereiró (29) are situated in the whereabouts of the industrial area of the city as planned in the PDP (Director Plan for the City of Porto, 1962), but connected to important axes of the city: Pereiró (29) has some of the largest values of NaCh at all radii, and Viso (24) and Ramalde do Meio (28) are near one of the main lines towards an adjacent municipality, connecting the centre to the port and industrial area in Matosinhos (Rua Manuel Pinto de Azevedo, NaCh r5000 = 1.29). Similarly, São Tomé (23), Vale Formoso (32) and Amial (33) are located along an axis that goes from the old centre of Porto towards a new residential centre in Maia (NaCh r5000 = 1.29). In particular, Vale Formoso (32) is one of the better-integrated estates at all radii of the studied period. Two other layouts are situated

99 Alves Costa (2014) indicates that 374 were constructed by the SAAL in Porto, while this dissertation counted 394.

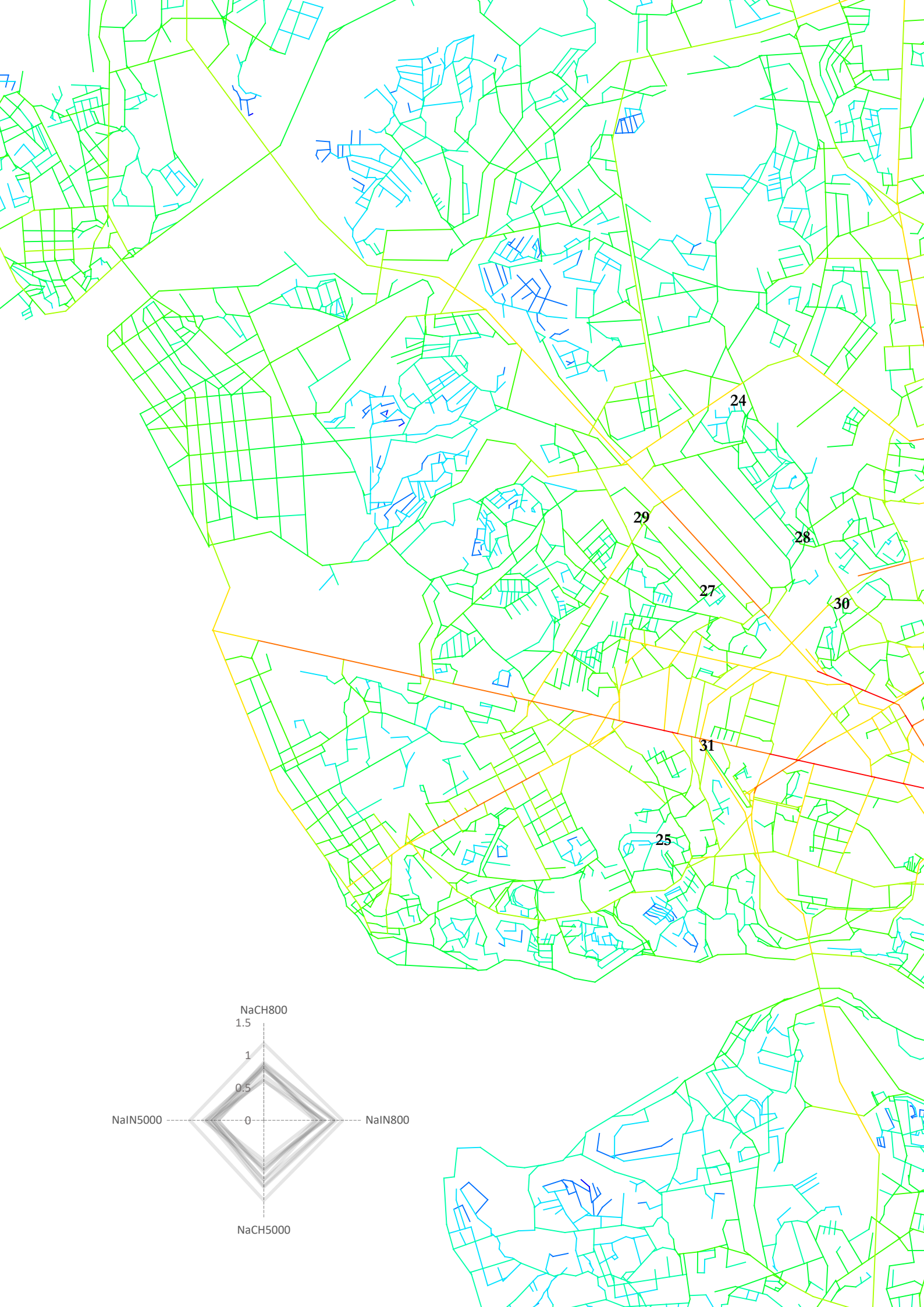
100 No data were found regarding the number of houses developed in the AMP, but if we consider the municipality's average of 238 houses per estate - a conservative number regarding the larger developments - we can safely say that at least another 4 700 houses were constructed by the local and central public institutions in Porto's adjacent cities, making it a total of at least 837 houses a year in the AMP.

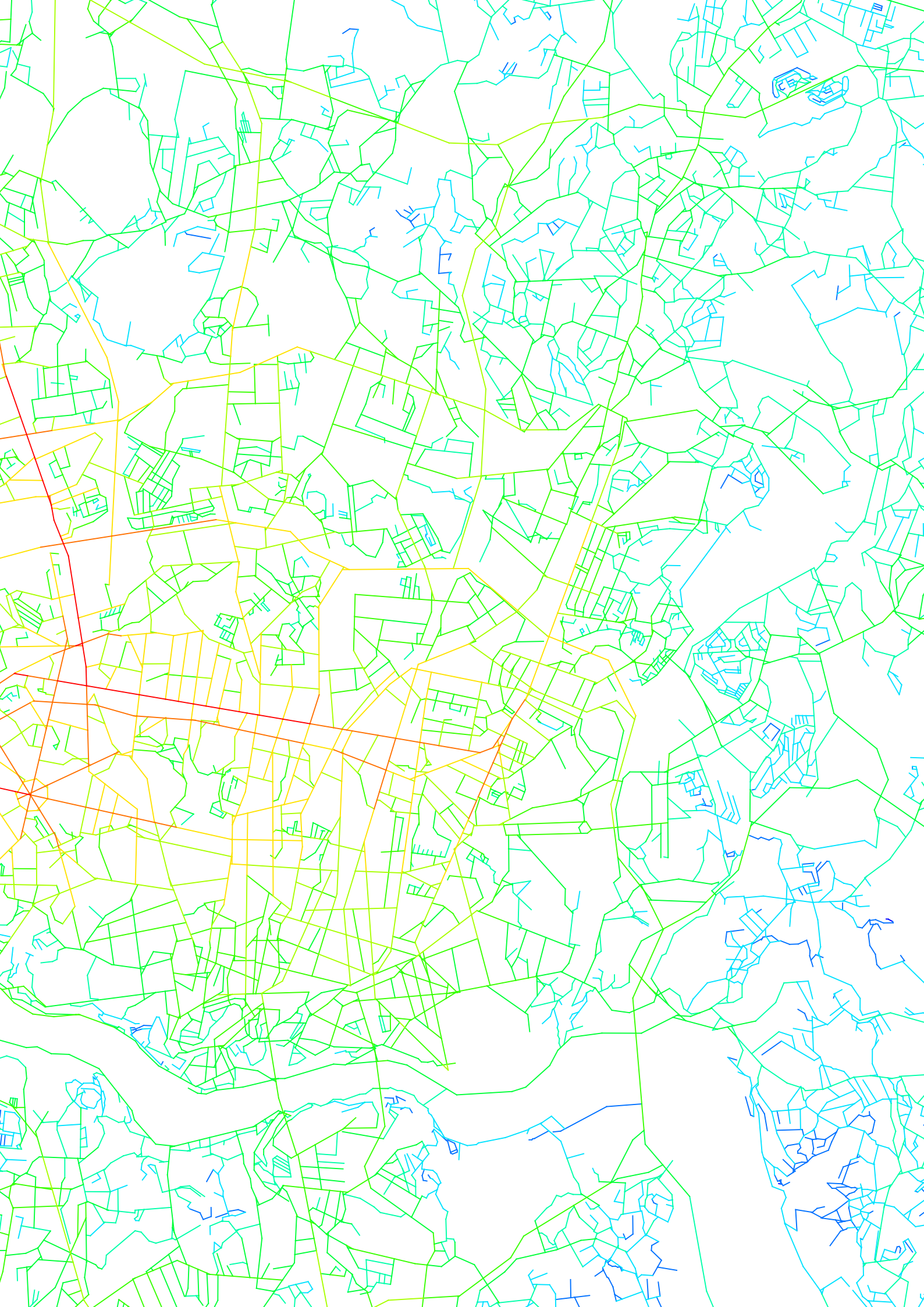


23. S. Tomé
24. Viso
25. Lordelo
26. Paranhos
27. Ramalde
28. Ramalde do Meio
29. Pereiró
30. Central de Francos
31. Bessa Leite
32. Vale Formoso
33. Amial



FIGURE 12.1
Plan of Porto 1978 and FFH developments
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research


24
29
28
27
30
31
25
NaCH800
1.5
1
0.5
0
NaIN5000
NaIN800
NaCH5000



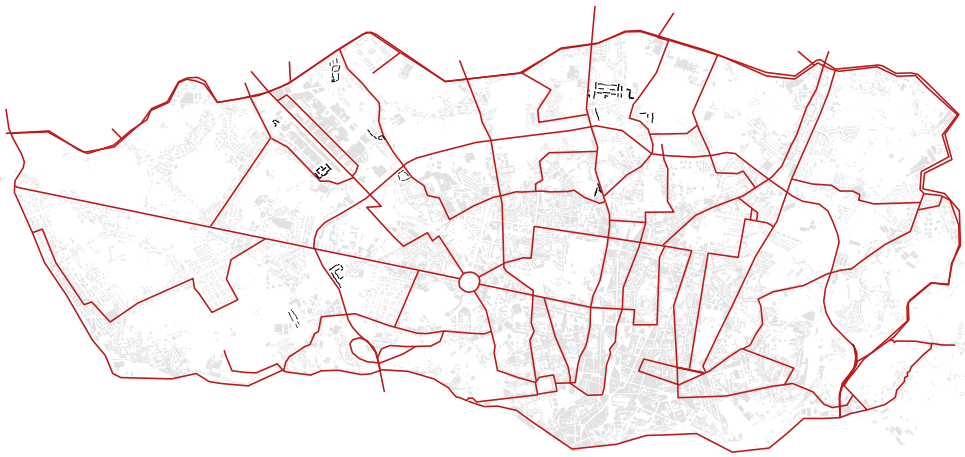


FIGURE 12.3.
Transportation network in 1973 and Porto's radials.
Map based on O espaço urbano do Porto, condições naturais e desenvolvimento, J.M. Pereira de Oliveira, 1973

in the area to the southwest of Porto where PMCP's layout Nuno Pinheiro Torres (3) is located. Like the earlier estates, Lordelo (25) presents below-average values of integration and choice. On the contrary, Bessa Leite (31), located in the interior of Porto's inner radial, presents large values of integration.

While the city had become denser since the second phase of the PMCP was planned in 1967, large vacant lots still existed in more central areas of the city. In this regard, it may be noteworthy that the three layouts situated in the interior of Porto's inner radial are those concerning which the retrieved information suggests were council developments, and no indication of State intervention was found. In other layouts, which nevertheless appear connected to the public transportation network as well as high-choice axes, it appears to be a choice - budgetary or otherwise - to move away from the centre.

	#houses	m²/resident	NaIN5000	NaIN800	NaCH5000	NaCH800
23. S. Tomé	490	58.7	0.88	1.11	1.02	0.86
24. Viso	545	19.7	0.71	0.93	0.76	0.69
25. Lordelo	168	27.9	0.79	0.78	0.61	0.62
26. Paranhos	160	21.6	0.68	0.74	0.69	0.74
27. Ramalde	272	21.1	0.70	0.80	0.79	0.82
28. Ramalde do Meio	170	31.1	0.78	1.07	0.92	0.78
29. Pereiró	80	33.7	0.78	1.07	1.00	0.89
30. Central de Francos	256	13.3	0.87	0.94	0.67	0.61
31. Bessa Leite	328	35.8	0.93	0.90	.0.73	0.79
32. Vale Formoso	64	10.5	1.13	1.21	1.23	1.18
33. Amial	80	31.3	0.84	0.85	0.91	0.83
av.	237.5	27.7	0.83	0.95	0.85	0.80

TABLE 12.3. Normalised integration and choice of post-revolutionary FFH and council housing layouts.

In regards to urban insertion, a collection of FFH's project briefs (FFH, 1977) categorises developments according to problems and design options that have to do with 1) the consolidation of the urban grid, 2) the reproduction of the urban grid, 3) the scale of the development as an urban qualifier, and 4) architectural shape and language. Regarding the first, the briefs refer to the creation of street-frontage, the articulation with the existing city and integration in the urban grid - referring as a priority the occupation of vacant lots and the maintenance of density, - the creation of exterior spaces and connection to urban equipment and infrastructure. Regarding the second, the briefs refer to the new houses as a support for urban growth and as a 'mirror' of the old urban tissue. Regarding the third, the morphology of urban areas and historical and projected city growth are explained throughout the briefs in order to justify design options. The following are examples of each, as found in the document (FFH, 1977):



FIGURE 12.4.
FFH's housing design for Faro, Portugal.
Drawing in FFH, 1977

Consolidation of the urban grid:

> We have then a housing development that strongly assumes weakly-assumed or perverted values of a place; which is established in a design of acceptable urban progress (…)[101]

> FFH's technicians express the lack of need for expanding the urban area given the existence of buildable land in the village and descrived areas.[102]

Reproduction of the urban grid:

> Finally we would like to report the "open" meaning of the development, that is, the open invitation to resume the "construction of the city, in urban continuation of the village.[103]

Qualifying role of large scale developments:

> Agriculture's industrialization in Cuba will undoubtedly produce profound alterations in the relationships between city and countryside, resulting in a new urban image and structure.[104] (FFH, 1977)

> We should seek to counter the construction of residential areas that are identified with 'economical housing' ways of life in which disadvantaged populations are 'granted' the opportunity of living. (…) The isolation of disadvantaged populations in "secondary centres" corresponds to the typical urban intervention that emphasises the creation of central areas in counterpoint to the construction of uncharacterised peripheral places.[105] (FFH, 1977)

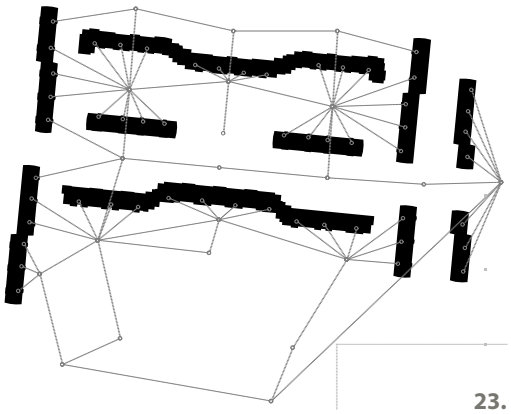
101 "Temos, pois, um conjunto habitacional que assume fortemente os valores mal assumidos ou pervertidos de um local; que se estatui num desenho de progressão urbana aceitável; que encerra, numa afirmação segur de uso e de forma, uma inorganicidade efectuada ou potencial." (…) "Acrescente-se-lhe ainda e como sempre, a preocupação de salvaguardar o essencial de uma configuração viva, chamando para o uso generalizado e em nítida contra-proposta, valores apoderados por uma prática (turística) exclusivista e detestável." Translated from English to Portuguese by the author of this dissertation.

102 "Os técnicos do Fundo de Fomento da Habitação, expressaram a não necessidade de alargamento da área urbana dada a existência de terrenos rápidamente urbanizaveis adentro da vila e nas áreas acima descritas." Translated from English to Portuguese by the author of this dissertation.

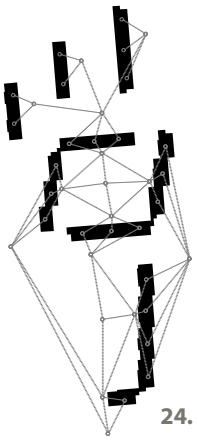
103 "Finalmente queremos referis o significado "aberto" do conjunto isto é, o convite deixado em aberto para que se retome de novo a "edificação da cidade", na continuidade urbana da vila." Translated from English to Portuguese by the author of this dissertation.

104 "A industrialização da Agricultura nas terras de Cuba irá sem dúvida produzir futuras e profundas alterações nas relações cidade-campo dando origem a uma nova imagem e estrutura urbanas." Translated from English to Portuguese by the author of this dissertation.

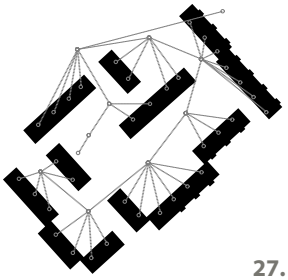
105 "É de contrariar a construção de áreas residenciais que se identifiquem como quadros de vida a 'bairros



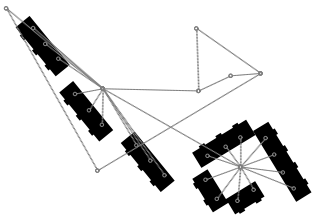
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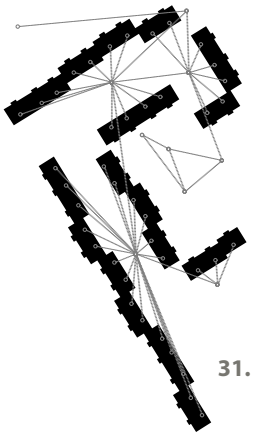
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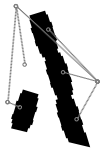
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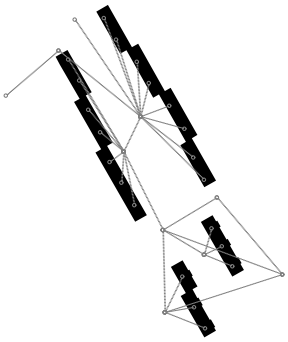
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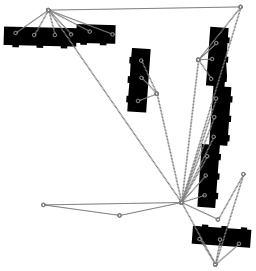
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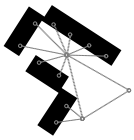
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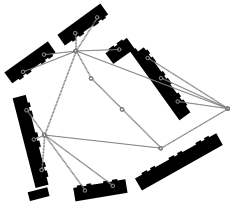
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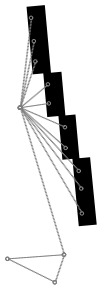
26.



29.



30.



33.

23. S. Tomé
24. Viso
25. Lordelo
26. Paranhos
27. Ramalde
28. Ramalde do Meio
29. Pereiró
30. Central de Francos
31. Bessa Leite
32. Vale Formoso
33. Amial

FIGURE 12.5.
Plans and convex breaking of post-revolutionary FFH and council estates

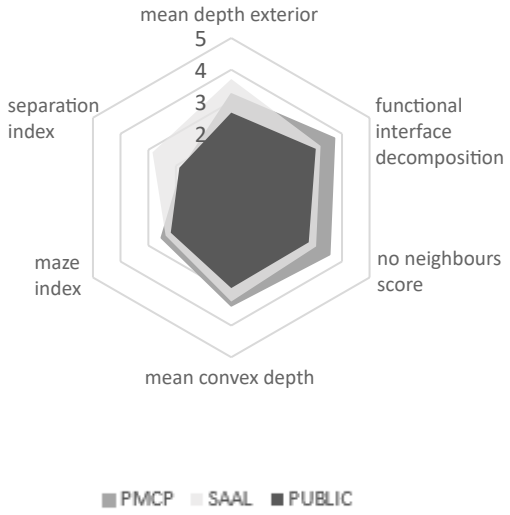


FIGURE 12.6.
Comparison of average depth measures of PMCP, SAAL and FFH/Council estate layouts

Public developments in Porto after 1974 appear to reflect these concerns. If budgetary options are present in these estates as they had been in preceding designs, many of these layouts represent a clear strategical shift from the PMCP. While they remain outside of the city centre, layouts are now not only more clearly integrated into the urban plan, but - and despite the standard normalisation of construction processes and standardisation of architectural elements - reflect a clear intention of adaptation to each specific lot with the objective of connecting to the urban tissue. Contrarily to what was verified in the layouts developed within the PMCP, those of posterior promotion by the FFH tend to turn outward towards the main urban grid, and show a noticeable decrease in all depth values in relation both to previous large scale estates and to its contemporary multi-building housing developments, such as those built by the SAAL and, as we will see further on, by the housing cooperatives.

This can be seen by plotting the average depth values for PMCP and posterior public layouts in a radar chart (figure 12.5.). The shapes of the two types of development are similar, revealing a tendency in both cases for layouts to favour the relationship between dwellings and the exterior street over that between the exterior spaces of the layouts. We have seen that PMCP layouts are characterised by the conjugation of a low separation index (meaning that entrances to dwellings or other functional spaces are shallow in the system) and of a large maze index (caused by a complex system of convex spaces that makes the estate deep from the outside). Reversely, SAAL layouts are in turn characterised by the opposition of a high separation index and mean depth between houses and the primary city grid with a lower maze index (giving the houses privacy without raising the layouts' depth).

In general, FFH layouts from this period score low values on both measures, and these remain low independently of each estate's dimension and the number of houses. Bessa Leite (31), which presents a maze index of 3.8 and a separation index of 2.5, appears to be an exceptional case in the set. This reflects the integration of new houses in the existing city fabric, achieved either by developing smaller scale estates in vacant lots of the consolidated city or by creating ringy, grid-like systems. It is noticeable that these layouts have a consistent distributed-non distributed ratio of 1, indicating that, contrarily to PMCP layouts, these estates do not create cul-de-sacs.

Consequently, post-revolutionary public housing has a relatively consistent low mean depth, no-neighbours score and functional interface decomposition. On average, all spaces of the system are on average less than 3 steps away from each other (md=2.61 nn=2.63, fid=2.89). Here, again. Bessa Leite (31) presents exceptionally large depth measures, as does São Tomé (23), which

económicos' onde as populações mais desfavorecidas têm a oportunidade que lhes é 'concedida' para viver. [...] O isolamento das populações menos favorecida em 'centros secundários' corresponde à típica intervenção na cidade que acentua a formação de áreas centrais em contraponto com a construção de lugares periféricos incaracterísticos." Translated from English to Portuguese by the author of this dissertation.

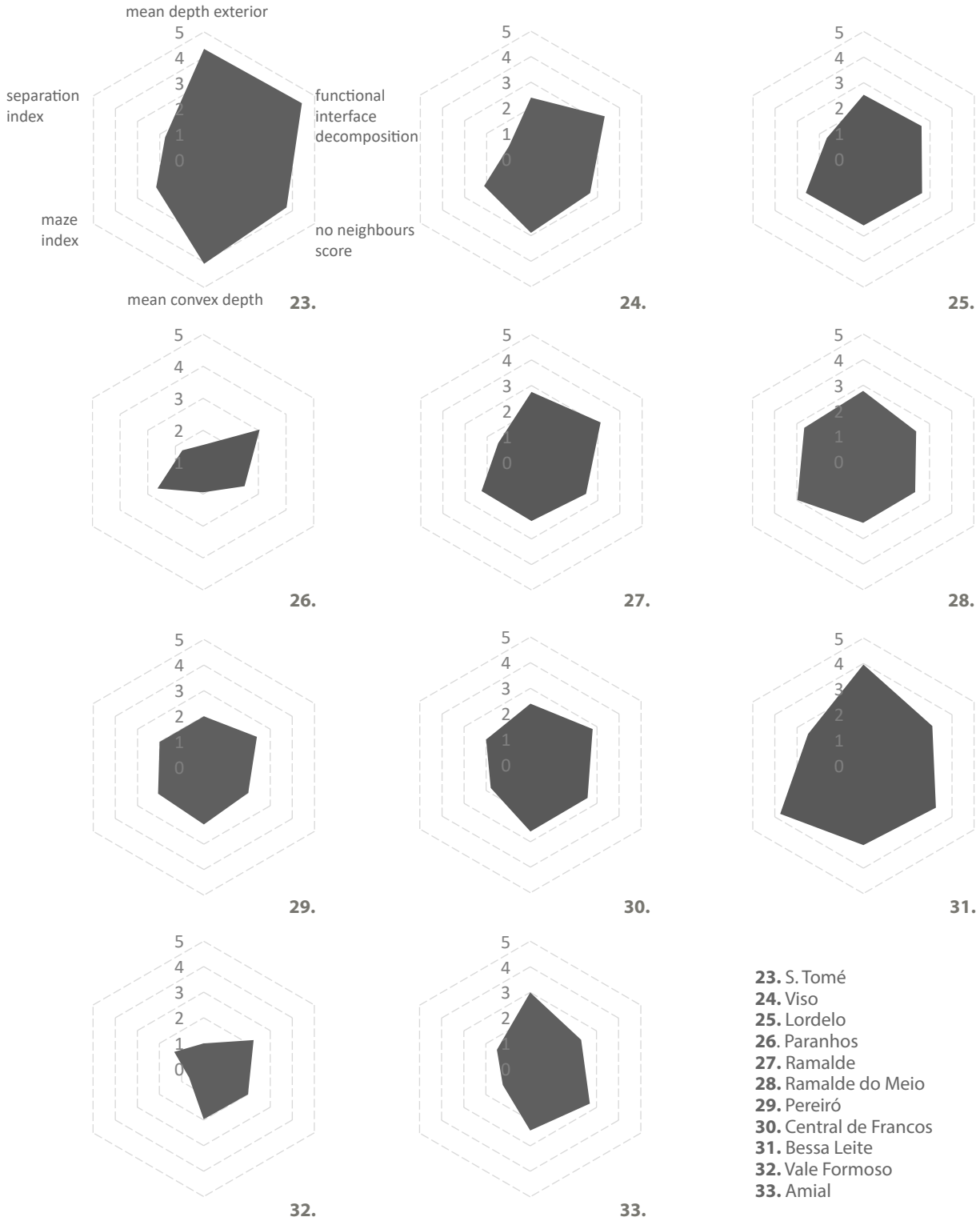


FIGURE 12.7.
Depth measures of post-revolutionary state subsidised housing estates identified in the scope of this dissertation.

combines a certain shallowness from the exterior with large values of depth within the estate.

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
23. S. Tomé	4.34	4.43	3.73	4.07	2.16	1.75
24. Viso	2.40	3.33	2.67	2.89	2.12	1
25. Lordelo	2.53	2.62	2.64	2.58	2.61	1.67
26. Paranhos	1.54	3.05	2.5	1.94	2.65	1.75
27. Ramalde	2.75	3.125	2.47	2.3	2.25	1.5
28. Ramalde do Meio	2.78	2.40	2.35	2.38	2.97	2.67
29. Pereiró	2	2.39	2	2.24	2.07	2
30. Central de Francos	2.4	2.81	2.58	2.6	1.80	2
31. Bessa Leite	3.97	3.11	3.27	3.10	3.77	2.5
32. Vale Formoso	1	2.25	2	1.97	0.67	1.33
33. Amial	3	2.3	2.7	2.40	1.24	1.5
	2.61	2.89	2.62	2.59	2.21	1.79

TABLE 12.4.
Depth measures of post-revolutionary FFH and council estate layouts.

When looking at how these estates articulate with the surrounding street grid, they can, at first sight, be divided into two different approaches.

The first, which groups São Tomé (23), Viso (24), Lordelo (25), Ramalde (27), Central de Francos (30) and Bessa Leite (31), seems to appear in continuity to earlier PMCP layouts. These estates remain characterised by their depth from the primary city grid and by being accessible only through one or two openings between the interior and the exterior of the layout. Additionally, these layouts contain spaces with collective potential, or even urban equipment in the form of sports fields and playgrounds, that seem designed to serve the estate's residents rather than their immediate neighbours. This characteristic disappeared in the remaining layouts.

São Tomé appears to have been the first and the largest estate developed by the FFH in Porto. With an area of around 115.000m2, it is more than three times larger than the average size of the other layouts (28 970m2). Situated in the back of existing houses on one side and the continuation of a municipal estate from the first phase of the PMCP in the other, this layout shares some of the PMCP's attributes, namely limited access to the primary city grid and the conjugation of large areas with low density. It includes a series of spaces not easily accessible from the primary street network, while simultaneously creating obstacles to the entrance of strangers in the estate. An example of this is the sports field adjacent to the central alley. While this may indicate an intention of connecting it to a shallow axis crossing the lot, the sports field opens to one of the courtyards, which puts it 5 steps away from the primary city grid. It seems designed to serve the estate, as seem the nearby highly integrated courtyards that give access to the dwellings, as well as the collective interior spaces in the ground-floor gallery. The school is also simultaneously deep from the outside and the least integrated area in the layout. These attributes are reflected in depth



FIGURE 12.8.
Layout 28, Ramalde do Meio, simultaneously opens to the primary street grid and is enclosed in a courtyard.
Protographs by the author.

values tendentially larger than those of other layouts, reaching high values in all measures that have to do with relations within the system and regarding the mean depth between the exterior streets and the dwellings' entrances, but not in an increase of the separation and maze indexes. This indicates a more significant separation between the system's inhabitants - neighbours - than between the layout as a whole and the exterior city.

Viso (24), while still a larger-than-average estate, presents considerably smaller values of depth. Similarly to São Tomé, while the estate remains large and there is a clear definition of spaces of collective use within its layout, it establishes a stronger connection to the exterior city than earlier PMCP estates. Its two large hard-landscaped areas can be accessed directly from the residential buildings that surround them, and are clearly defined as a part of the estate. However, they are also at depth 1 from the exterior, and most of the buildings' entrances turn outwards towards to the primary city grid. However, simultaneously, three smaller buildings are placed perpendicularly to the main street and are accessible through cul-de-sacs. Central de Francos (30) presents very similar traits.

Lordelo (25) is located between Nuno Pinheiro Torres (3) and an estate from the first phase of the PMCP, in an area which has been seen to be densely populated by public housing developments. Despite occupying a lot with a relevant proportion of street-frontage - some of it on an important, high choice axis of the city, most of it on a secondary, narrow, pre-existing street, and the rest on a secondary axis that encircles an industrial area - the estate itself does not connect directly to the street. Instead, it becomes one large cul-de-sac with one primary and one secondary entrance on one of its edges, and two markedly pedestrian (in the form of staircases) connections to the exterior. Consequently, it shares similar configurational characteristics with PMCP layouts, with depth values that are close to those of the shallower PMCP estates and a shape that resembles that of Nuno Pinheiro Torres (3).

It has been seen that Bessa Leite (31) is an exceptional case of large values of maze and separation indexes. It is located in between the back of existing houses and the inner radial, which effectively functions as a wall, being allotted only a small proportion of street-frontage in the continuation of a motorway exit ramp, to which available buildings do open. Similarly to Lordelo (25), it functions as a large cul-de-sac: while most of its spaces are in rings, its only two connections to the exterior city connect to the same point.

The second approach to estate layouts' configuration in public housing development after the revolutionary period appears as an inversion of the first. Three layouts - Paranhos (26), Vale Formoso (32) and Amial (33) - are built to constitute street-frontage and include no programmed spaces of collective use differentiated from the main network of public space.

The remaining layouts in this group - Ramalde do Meio (28) and Pereiró (29) - open to the main street grid while creating spaces that can be read as belonging to the layout while simultaneously



FIGURE 12.9.
Large-scale internal courtyard of São Tomé (layout 23 - left) and Vale Formoso (layout 32 - right) creation street-frontage.
Photographs by the author.

openly connecting to its exterior. Ramalde do Meio (layout 28, figure 12.1.7.), whose buildings are placed along an existing street, is composed of two inward-facing parts: Three plots located in front of a railway and industrial area, some of which open to the primary street grid and others the inside of the lot; and four plots creating a courtyard where their doors are located. Pereiró (layout 29) follows a similar design strategy: One plot faces the street and other three turn inwards to a courtyard. Again, while occupying a lot that constitutes street, extra steps of depth are added by the creation of transition spaces - in this case, a parking lot - between the main street and the buildings.

While smaller, layouts 26, 28, 29 and 33 present low values of constitutedness (entrances to residential buildings constitute only 40% to 67% of its spaces) due to the secondarisation of spaces that are either occupied by parking lots or connected to soft landscaped areas in the back of buildings.

Despite these differences between the two groups, most layouts seem to share an ambiguous relationship with the street. While the integration of urban equipment, retail and services into estate designs is less common after the PMCP, most posterior layouts seem to maintain the idea of exterior areas of collective use. These are often spaces bounded by the front of residential buildings either in a U or O formation, resulting in a distancing of these buildings from the main street.

In Ramalde do Meio (28) and Pereiró (29) these areas are fb-types. Both 1 step away from the front doors of residential buildings or other functional spaces (and on average less than 3 steps away from all front doors of the system), and 1 step away from the main access street, these spaces control the interface between residents and the urban environment. In Ramalde do Meio (28), the courtyard is by far the most integrated space in the layout. While it connects to most of the dwellings' entrances and the main street, the connection is made through a small opening between buildings that make interior space mostly invisible from the outside. A secondary space in this layout, open to the street and at an average of 3.6 steps from the residential buildings, is the only case of including clearly public space in the estate's design.

The role of courtyards can be seen even in the larger housing estates. For example, São Tomé (23) establishes an ambiguous relationship with the primary street grid. It is split in two by an alley which seems to have the intention of connecting the layout to the main city grid, but which is faced by the backs of residential buildings whose doors open to the smaller courtlike spaces created in between the dwellings and other functional spaces. Simultaneously, where possible, buildings open directly to the main street, and exterior spaces are organised in a grid-like structure. Similarly, Ramalde (27) shares similar configurational patterns, while also approximating those of earlier PMCP layouts Bom Pastor (7) and Contumil (9). While fairly grid-like, it simultaneously opens and closes towards the primary city grid. The backs of its buildings create an effective wall against the industrial area, while the part that is in contact with a residential street opens towards

it. At the same time, sports infrastructure is placed on its back, apparently serving the interior of the estate. In Viso (24), where the same internal courtyard strategy seems to be repeated at a larger scale, these spaces are considerably less integrated. Simultaneously, because they integrate large rings that include the interior of residential buildings, these are not mandatory spaces of transition where opportunities for interaction among neighbours are increased through daily proximity and co-presence.

Nevertheless, the connection of the estate to the main city grid increased, compared to PMCP of SAAL layouts. However, the estates remain the territory of their inhabitants, and differentiation is clear between spaces of collective use controlled by the residents and the public space of the city.

12.2. THE ROLE OF NORMALISATION AND MASSIFICATION IN THE SPACE OF THE HOUSE

The shift in scale that an institution for housing development at the national scale represented in relation to the PMCP can be understood not only in the transformation of urban intervention strategy but also at the level of the domestic environment. If it is clear when looking at council estates from before 1974 that they were defined by budgetary constraints, it also appears in many cases that they were an experimental field for domestic typologies by committed architects who were often connected to the LNEC, the ESBAP, or both. Conversely, while the FFH did seem to invest in the exterior configuration of each development in articulation with a project of city integration and growth, at the domestic scale budgetary constraints may have had a stricter impact. The domestic layouts developed by the FFH were subject to normalisation of constructive processes, to economy of structures and means and to defined project regulations in order to achieve the former, which left little room for experimentation. Layouts, often repeated across developments, display less configurational complexity and appear to forego many of the principles identified both in LNEC's research and PMCP apartment schemes.

	TUFA m2	Density m²/r	Integration	Difference factor	Mean depth exterior	functional orientation %
23. S. Tomé	67.5	16.9	0.91	0.80	2.69	23
24. Viso (A)	92.7	23.17	1.07	0.71	2.73	27
24. Viso (B)	94.9	23.7	0.86	0.79	2.77	33
25. Lordelo	56.8	14.19	0.86	0.60	2.6	0.25
26. Paranhos	71.5	17.88	0.78	0.74	3.25	25
28. Ramalde do Meio	71.4	17.9	0.7	0.75	2.58	37
29. Pereiró (1-bedroom)	32.6	16.3	0.73	0.82	2.37	25
30. Central de Francos	59.7	14.9	1.11	0.71	2.2	0.27
33. Amial	71.5	17.88	0.78	0.74	3.25	25

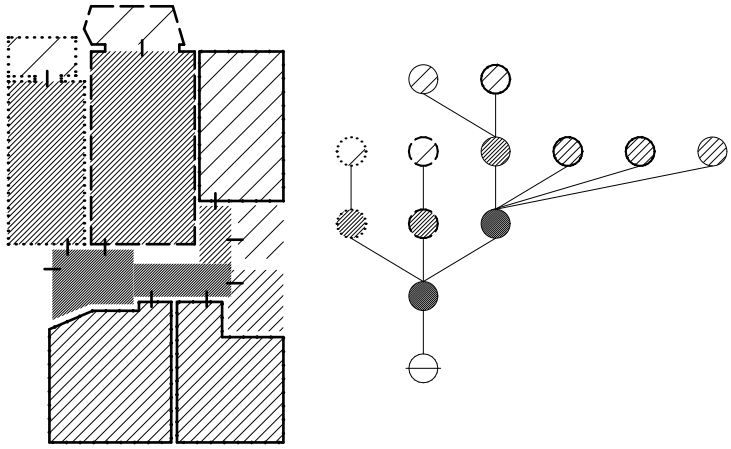
TABLE 12.5.
Spatial attributes of post-revolutionary FFH and council apartment schemes.

At the scale of the apartment building, for example, it was determined that apartments should be accessible through a staircase serving two houses on each floor, which resulted, in most cases, in one staircase connecting a total of eight houses in four floors (Redol, 1985). This configuration, likely to minimise the number of encounters between neighbours likely occur inside the building, had been criticised in regards to earlier council estates (Teotónio Pereira, 1969a; Portas, 1969; Paula, 1969a, 1969b).

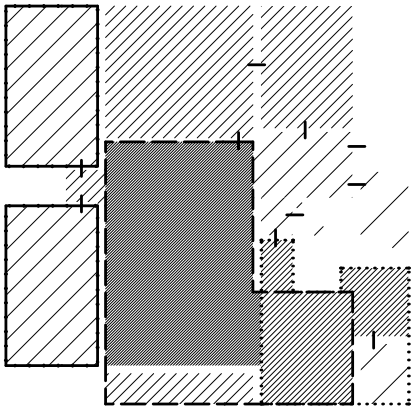
In the eleven state-subsidised estates from the post-revolutionary period examined in this dissertation, eight different layouts were identified. Two of these pertain to Viso (24) and were included for representing two considerably different configurations: 24-A is an exceptional example in a core access building, 24-B is the only example in these cases of an apartment in a tower block. Paranhos (26), Pereiró (29) and Amial (33) share the same apartment scheme, for which the configuration of its one-bedroom variation was also analysed.

The separation of layouts in the two accessibility graph types A and B reveals a fundamental difference regarding the organisation of functional spaces between the PMCP and FFH layouts. As seen in chapter 9, PMCP layouts are in their majority A types. They tend to articulate the living-room with the kitchen, creating a pole of potentially collective labelled spaces often in a ring with the space of the entrance, and with significant variance regarding the definition of a pole encompassing the usually more private areas of the bedrooms and bathrooms. Conversely, the studied FFH layouts are evident in this definition. Among state developments, only Viso (24-A) has a collective pole encompassing the kitchen and living-room. The remaining cases differentiate between a kitchen and a living-room that in the repeated apartment scheme of Paranhos (26), Pereiró (29) and Amial (33) also acts as a transition space towards the private sector.

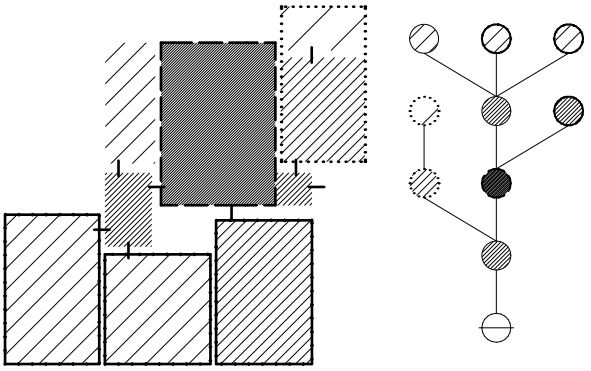
Additionally, all layouts but São Tomé (23) are type 1. If we have seen that the localisation of collective spaces in between bedrooms and kitchens might result in a more intense utilisation of those areas, the use of living-rooms as transition spaces also presents clear advantages regarding area economy. These present only the fewest number of transition spaces possible for distancing



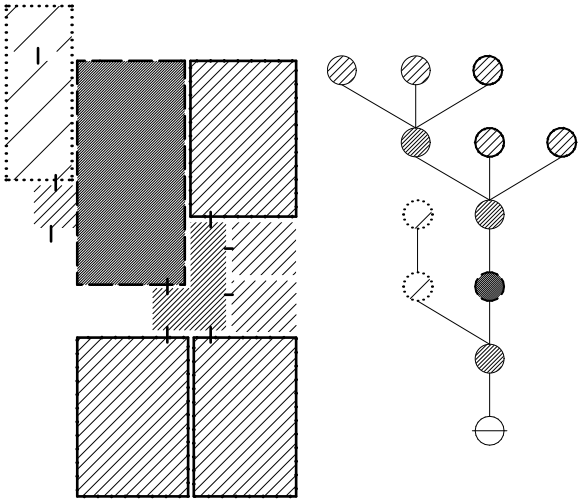
23.



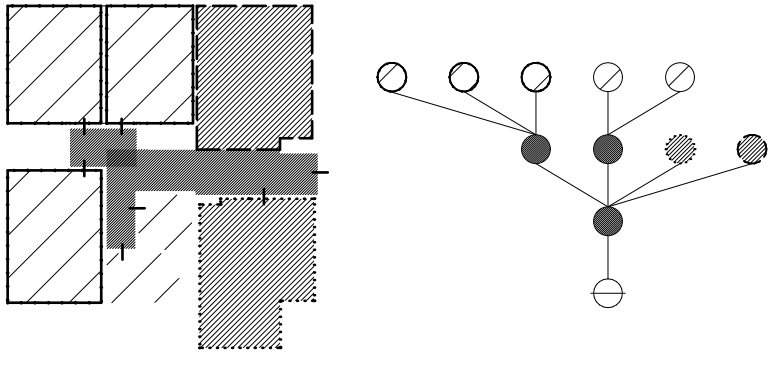
24-A.



25.

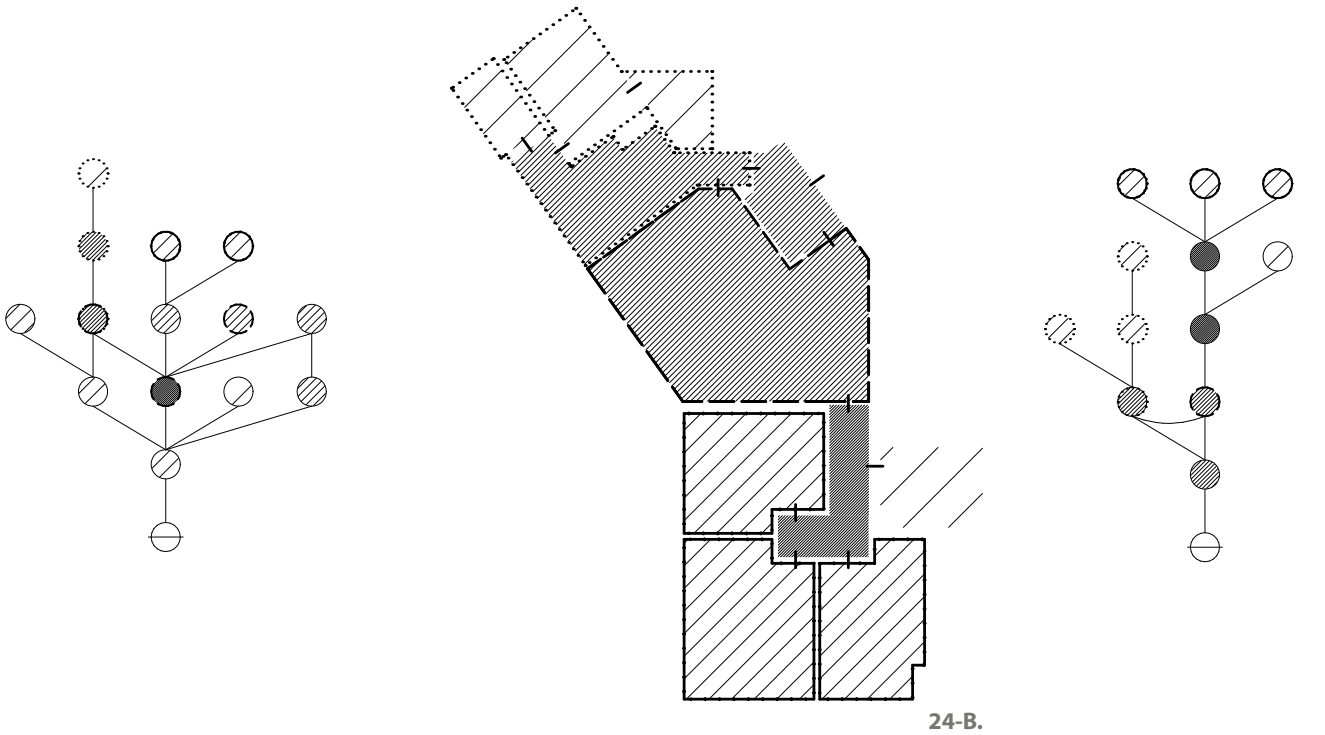


28.

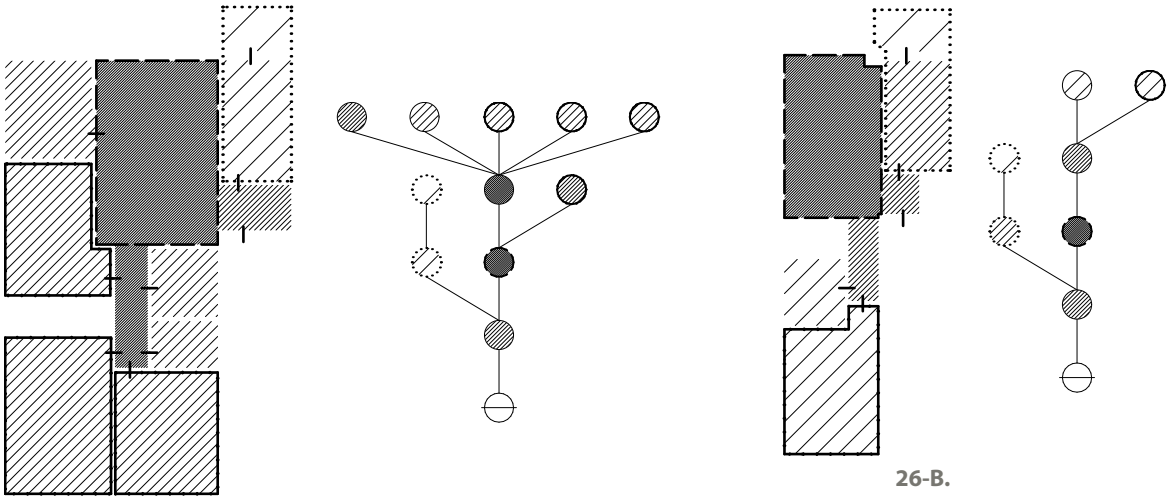


30.

23. S. Tomé
24-A/B. Viso
25. Lordelo
26-A/B. Paranhos/Pereiró/Amial
28. Ramalde do Meio
30. Central de Francos



24-B.



26-A.

26-B.

INTEGRATION

min. value	0.48
25th percentile	0.65
50th percentile	0.68
75th percentile	0.98
max. value	1.57

private sector

collective sector

services sector

FIGURE 12.10.
Convex breakings and justified graphs of post-revolutionary state subsidised housing estates identified in the scope of this dissertation.

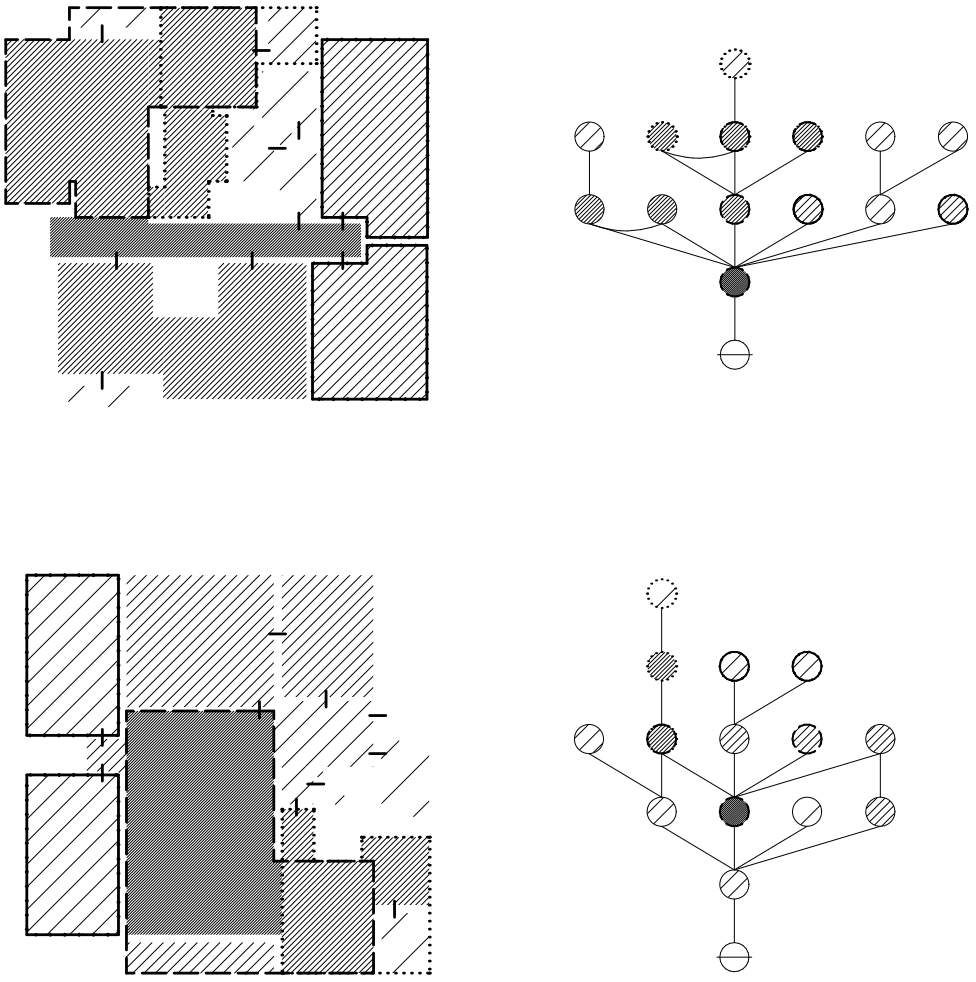


FIGURE 12.11.
Plans and justified graphs of Viso (24-A) (bottom) and an earlier proposal (top)

the living-room from the exterior of the apartment and the bedrooms from the living-room, which results in high levels of integration for living-rooms and highly functional oriented layouts. In these layouts, only one space in each four is transitional or unlabeled. Reducing the amount of area used in the definition of different sectors, this allows for functional spaces to be larger, representing an alternative to PMCP's approach. While the relative size of kitchens in PMP apartments is on average slightly larger than those developed by the FFH, living-rooms are tendentially smaller. Consequently, the collective pole that exists in most PMCP housing schemes has an area of 16.4m2, a value that is very close to FFH's housing's 15m2 on average for just livingrooms.

As such, while still tendentially presenting total useful areas bellow the minimum area considered for domestic interiors, FFH housing is generally larger than PMCP layouts, assigning an average of 21% of apartment space to living-rooms (15.1m2), 11% to kitchens (7.66m2) and 14% to each bedroom (10.15m2).

Viso (24), while an exceptional case in all accounts within the work developed by the FFH, provides an interesting example of how a necessary economy of means is translated in the configuration of the domestic interiors of this programme. Consider figure 12.9.a, the plan and corresponding graph of Viso (24) as it was built in 1977 (see apartment sheet 10: Viso), and figure 12.9.b, the plan and corresponding graph of an earlier proposal from 1972. The two plans are examples of a process of structural normalisation to which all FFH designs were submitted[106]. In layout 24, this process resulted in a larger total useful area of the apartment, which was assigned to collective areas. The living-room grew from 13.5m2 to 21m2, and the kitchen grew from 8m2 to 9.8m2, while the bedrooms maintained the same area or became smaller. Simultaneously, the plan became significantly less complex, as the comparison of the two graphs demonstrates. If layout 24 remains exceptional, and even its normalised version maintains design principles from the original project, such as the rare connection between the living-room and kitchen, a ringy interior and a certain ambiguity regarding the function of some rooms, it also gains characteristics that make it more similar to other FFH's layouts. As it becomes a transition space, the integration of the living-room is higher in the normalised design, becoming the centre of the house which, while a functional-type c space and, as such, presenting a low control value, still connects to most spaces of the house. The kitchen is shifted to its usual place in FFH layouts, one step away from the entrance. While remaining connected to the living-room, the redundant visibility ring between the two spaces is lost. The configuration becomes overall shallower and shallower from the exterior, but bedrooms' depth increases significantly, creating a better defined private sector.

Genotypically, the alterations to which the first design of Viso (24-A) was subjected also resulted in a signature that resembles more that of other FFH developments. The difference factor

106 According to information given by today's state institution for public housing management's engineers, contacted in the scope of this research in 2018 (Instituto da Habitação e Reabilitação Urbana, IHRU)

increases to a value closer to the FFH's mean, and the ordering of the sectors' values of integration is completely inverted from one where the private sector is the better integrated, followed by the services area and then the living-room, to one where, similarly to all other cases, the collective space of the house is also the better integrated. If this is common to all four housing schemes, the ordering of bedrooms and kitchens, as well as the difference between them, is different in each of the layouts. Viso (24A) has a highly integrated living-room, followed by the kitchen and then, at around the 0.8 integration mark, the bedrooms. São Tomé (23) and Viso (24-B) present similarly integrated collective and services areas. The first, organised around a central hall, displays approximate values of integration for all functional spaces, the second displays a steep decrease in the integration of bedrooms in relation to the living-room and kitchen. The living-room is followed by bedrooms in Paranhos (26), Pereiró (29) and Amial (33), which display lower values of integration, in particular in regards to the kitchen which, shallow from the exterior, is deep from the interior of the apartment.

12.3. SOCIO-SPATIAL CONSIDERATIONS ON FFH AND COUNCIL LAY-OUTS

12.3.1. SEGREGATION, OTHERING AND HIERARCHY IN FFH AND COUNCIL HOUSING ESTATES

FFH housing developments within the municipality of Porto are in most cases located outside of the city centre, often in areas close to the outer radial and, as such, to the city's border. This does not always translate into low values of integration: Vale Formoso (32), located within the radial, presents the third-largest values of NaIn (r=5000) and four other estates present above-average integration. However, even though this contributes to a mean NaIn (r=5000) that is large in relation to other programmes, several of FFH layouts are, in fact, located in poorly globally integrated areas of the city. This characteristic is complemented by these estates location not always on high choice axes but in most cases one or two topological steps away from important connections between adjacent municipalities and the city centre.

In this sense, while averagely better integrated into the urban system than PMCP layouts, FFH developments do seem to share characteristics of older council estates. It is at the local level that a clear strategic shift can be verified. What is the most noticeable about FFH layouts are their low values in depth measures when compared to programmes that developed estates with

a similar number of houses. With separation and maze indexes higher only than those of single building cooperative layouts, FFH estates topologically close to the city around them. Additionally, following the option that was the most common after 1974 of not equipping the estates with urban functions of their own, these were inevitably dependent on the equipment and services of the surrounding city. All of them are located within a 500m radius of retail and services, and only one is not within a 500m radius of schools.

In this sense, it can be said that there also exists an idea right to the place in FFH layouts, where a certain global segregation is countered by a defined strategy of local integration. In opposition to the strategy of urban segregation following in council layouts before the revolution, it seems that social-democracy brought with it a sense of right to the city that pervaded even outside of the SAAL programme. Families were still to be removed from the places they originally inhabited, but they became integrated into a systemic view of the city that searched to connect them to peripheral local centralities. We will see more about this in chapter 10.4..

Through these same mechanisms, othering seems to be countered in some of FFH's layouts in a similar way to AM's estates. While some of its larger cases present characteristics similar to PMCP layouts, values of maze index are low even in large layouts. With few exceptions, these estates search shallowness from the closest street, and many can be easily perceived from the exterior. Often located at the edge of their lots, they function as part of the existing city grid. However, most cases are simultaneously a clear separate entity that might or not be used by non-residents. If in most cases there appears to exist a closer relationship between inside and outside, only three of FFH's developments do not present a clear distinction between the existing city and the estate.

These estates represent an alteration in the strategy of urban integration and articulation for public housing than what was constructed before 1974, appearing connected to a larger sistemic plan for urban growth and, while often deep, as a continuation of the city fabric rather than hidden in leftover space. At the same time, the paradigm of the estate as a space for the creation of neighbourhood relations seems to continue present in the layouts' configurations. Five of the estates maintain local equipment, such as sports-fields and playgrounds. These continue the paradigm that can be seen in earlier council estates, which clearly spatially define a community that is in many cases confined to the functional spaces created to foster it. In the remaining six, this paradigm is developed in a similar way to what was observed in SAAL and AM layouts: a community that has the potential to exist in spaces that have the potential to foster it, but which is functionally connected to the city around it.

12.3.2. DOMESTICATION AND ADAPTABILITY IN FFH AND COUNCIL HOUSING SCHEMES

FFH's strategical shift reflected both on the urban insertion and design of its housing developments. The apparent idea of creating public housing as part of an existing, growing urban system, translated into the disarticulation of housing development from the construction of public services and equipment. If on the one side, this should counter the paradigm of public housing as a separate, independent system within the larger urban space, it also often resulted in the separation of housing from these urban - formerly communitarian - structures. In this sense, activities that had the potential of taking place outside of the house in PMP estates, do not have dedicated spaces within the surrounding city in FFH's developments. As such, while the housing schemes developed by the FFH are better integrated, both globally and locally than PMP estates, fostering extra-spatial relations as well as allowing for local encounter and interaction, they forego the communitarian character of some activities, which are then transposed to either inside the limits of the domestic space or other areas of the city.

This applies, for example, to the removal of social centres or sports fields, which might result either in the disappearance of these activities - having as a possible consequence the increase of the time at home - or in their transposition to retirement, youth or sports centres wherever they exist in the city. Similarly, the removal of spaces for planned and unplanned clothes hangers, as well as the creation of a space dedicated to clothes-care associated to kitchens in apartment layouts, or the lack of exterior spaces for children to safely play in, might result in greater domestication of activities traditionally conducted by women.

Budget constraints within the FFH translate not only into area limitations but also in the application of a strict set of regulations for structural simplicity and economy of means.

The first is countered by the reduction of transition and undefined spaces within the house. If this design strategy allows functional spaces to be assigned areas above the minimum, nearing the ideal defined by Portas (1969), it has also been suggested by the same author that the presence of undefined non-functional areas in the house may be beneficial for children's occupation. Similarly, individual and private activities may be tendentially limited to the bedrooms: in addition to the absence of unlabelled areas that may be occupied for studying, working or spending time by one-self, the living-room is in most cases also a transition space. If the results of the Survey to Urban Housing seem to suggest that this attribute may increase the use of the living-room by all members of the family, for the same reasons the same attribute seems likely to result in a space less adequate for individual activities.

The precise definition of the type of activities associated with each space is reinforced by the predominance of B type schemes with clearly separated functional sectors. Living-rooms are large (around 1/5 of the house) and well-integrated, often being the organising centre of the house and

functioning as a connection between the private sectors and the kitchen and exterior. Conversely, kitchens are small and present generally low values of integration. Part of a clearly defined services sector, shallow from the exterior but disconnected from the rest of the house, this reflects an idea of the house that is concerned with function while abandoning social concerns that were present within the institution that produced it and may translate into the segregation of women in the domestic space. It is noteworthy that if kitchens presented similar values of integration to other spaces in two of the studied cases. In one of them, all sectors were similarly integrated. In the other, the kitchen is associated with a functional-type i private sector that is likely to have been intended for a housekeeper.

12.4. HOUSING COOPERATIVES AFTER 1974

Public programmes developed at least 4 832 houses in the municipality of Porto between 1974 and 1982. Of these, approximately half were included in some sort of participatory programme. Roghly 380 houses were built for residents associations within the SAAL, around 600 in its sequence, and 660 by housing cooperatives. Of these, Economical Housing Cooperatives (CHE) were differentiated from other types of resident association by a legal framework that required its members to have minimal disposable resources. If this point in 1974's new legislation for cooperative housing already made it effectively impossible for insolvent populations to organise in cooperatives, later alterations to the law (decrees-law 265/76, 454/80, 349/83) furthered the legal characteristics that made housing cooperatives exclusive to the middle-classes.

As we will see in the next chapter, understanding the role of housing cooperatives, and of Economical Housing Cooperatives (CHE) as a specific legal framework that existed between 1974 and 1978, needs not only a geographical shift in scale but also a temporal one. If 40% of housing cooperatives that exist in the North of the country were created during this period (Lucas, 2012) in light of a particularly favourable framework, their role became the more relevant, the more the state and the municipalities were removed from their role as housing developers. While participation often became more limited and housing cooperatives' work regularly independent of or prior to its membership, this is not only the sole participatory framework that persisted beyond the studied period, but also mostly the only remnant of non-private housing that exists today. This is clearly shown in figure 12.13., where, while always low, the housing cooperatives line is the only that remains steady after the abrupt fall of public housing in the 1980s. However, while cooperative housing still exist today, it is now an isolated programme that becomes more and more similar to private development, rather than one which, inserted in systemic housing policy, focused on the

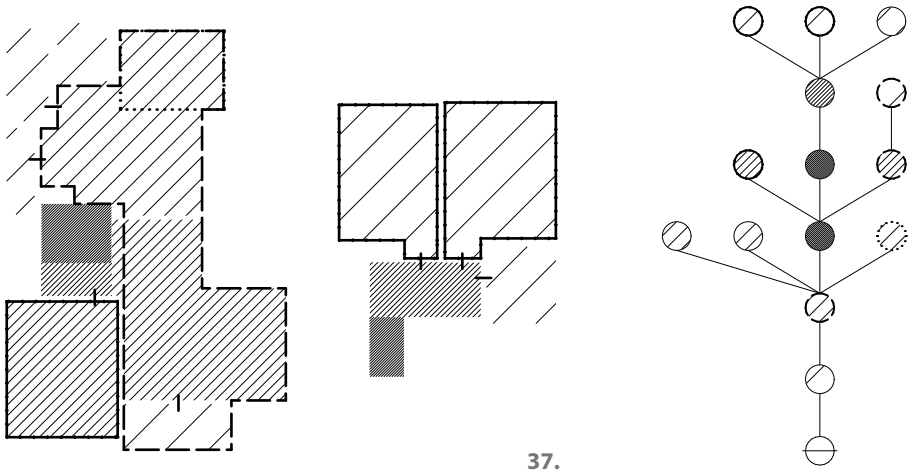


FIGURE 12.12.
Plans and convex breakings of cooperative apartment scheme SACHE (37)

specificities of providing an alternative to the real estate market for facilitating the lower middle class' access to housing.

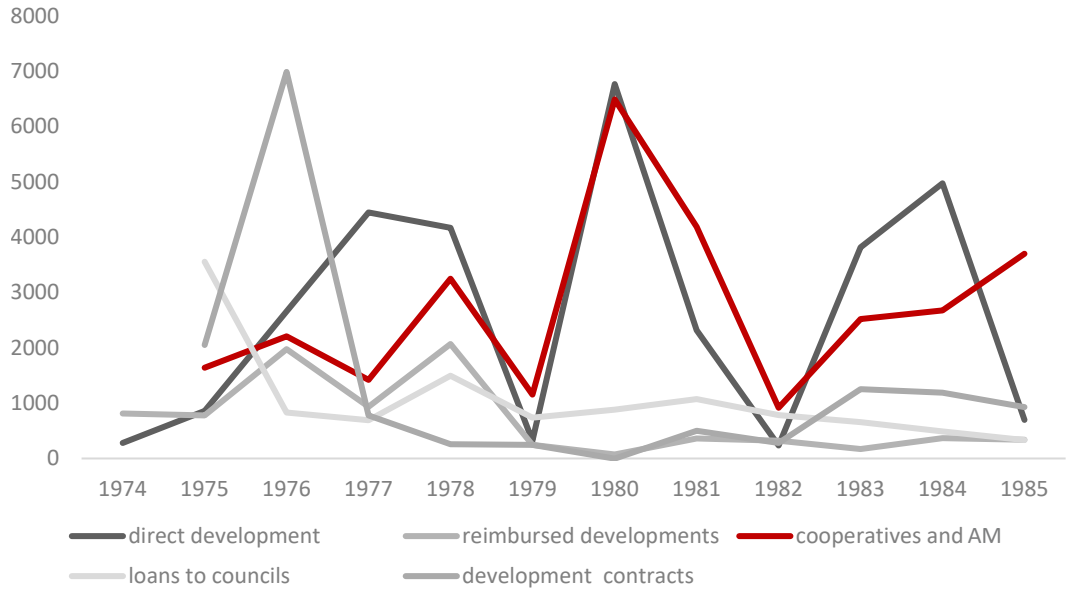


FIGURE 12.13.
Number of state subsidised houses in Portugal between 1974 and 1985 according to the different programmes. *According to: Fonseca Ferreira, Anos de 1970-1980: do Fundo de Fomento da Habitação ao Instituto Nacional de Habitação, in Habitação Para o Maior Número. Portugal, os Anos de 1950-1980, 2013.*

This specific role of cooperative housing is reflected in a series of spatial characteristics that significantly set it apart from other programmes, both at the domestic and urban scales.

	TUFA m2	Density m2/r	Integration	Difference factor	Mean depth exterior	functional orientation %
36. S.A.A. Martim Moniz	105.8	26.45	1.20	0.66	2.3	0.18
37. SACHE	91	27.60	0.81	0.85	3.4	0.19
38. S.A.A. Contumil	121.3	40.43	0.93	0.79	2.75	0.25
39. S.A.A. Duarte Leite	121.3	40.43	0.93	0.79	2.75	0.25
40. Tripeira	83.7	20.9	1.66	0.41	1.9	0.18
40. Tripeira	87.03	21.75	1.18	0.67	2.2	0.18
41. CETA	78.9	19.7	1.19	0.57	2.2	0.17
42. St. Ildefonso	86.3	21.6	0.82	0.84	3.9	0.33
42. St. Ildefonso	96.3	19.26	1.13	0.65	3.1	0.17

TABLE 12.7.
Spatial attributes of housing cooperative's apartment schemes, illustrated in Figure 12.

Apartments developed by housing cooperatives (table 12.7., figures 12.11., 12.14., 12.15.) tend to be significantly larger than council and state apartments. Even though some cooperative housing remains, like FFH houses, under the legislated minimum for the total useful area of apartments, functional spaces within these apartments are often larger than the ideal areas as defined by Portas (1969) and tend to be the largest of each different type of labelled space. On average, one quarter (25%) of the apartment is dedicated to the living-room which, with the average size

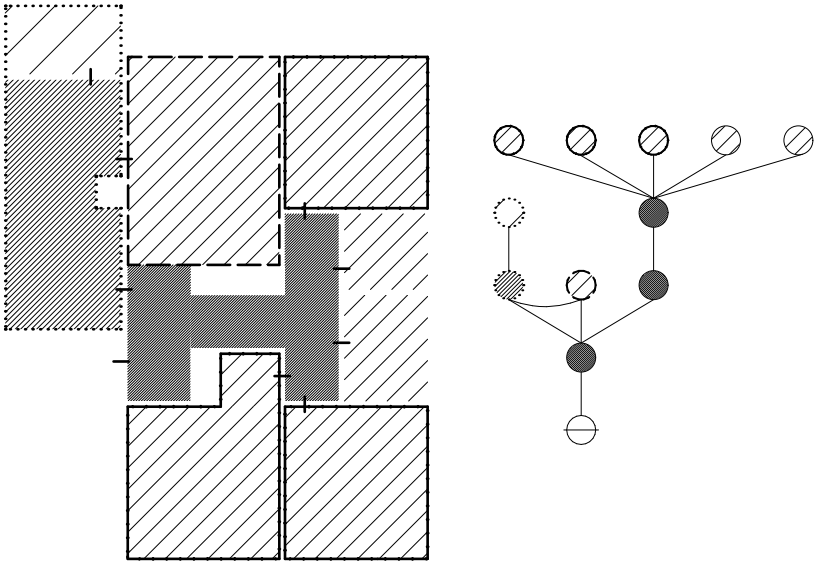


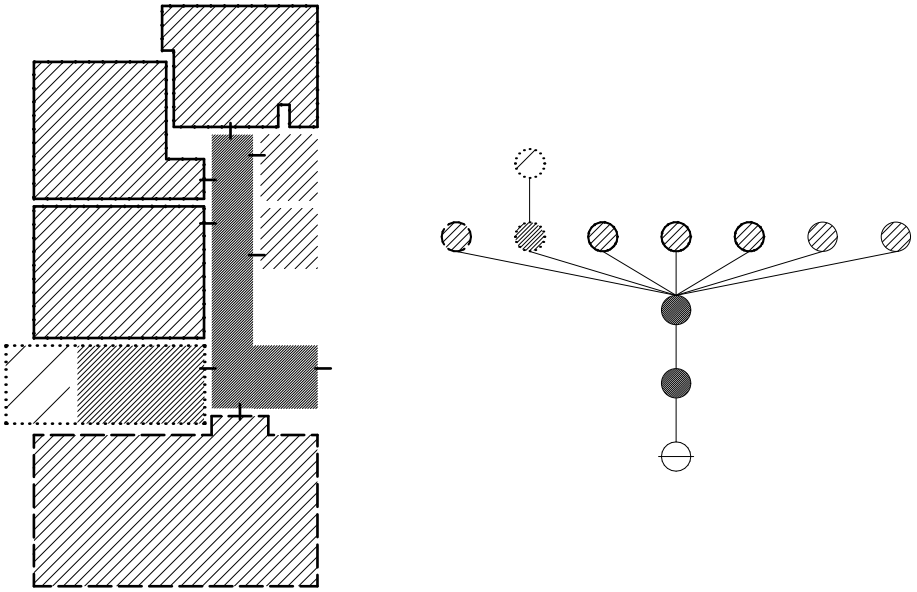
FIGURE 12.14.
Plans and convex breakings of cooperative apartment schemes Martim Moniz (36), Contumil (38), Duarte Leite (39)

of 22.7m2, sits well above the legislated minimum and ideal areas. Bedrooms take, on average, 13% of the apartment area each, with an average area of 11.5m2. Kitchens are less internally coherent in terms of relative size. Even though they occupy, on average, 11% of the apartment with an average area of 10.67m2, their areas vary between 5m2 and 19m2. Transition spaces are effectively the largest of all programmes, but they do not represent a more significant percentage of space of the house.

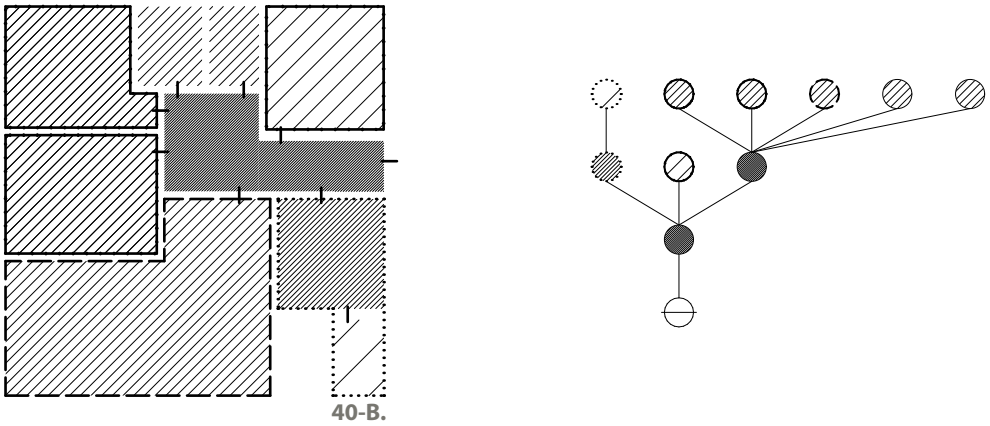
Similarly to FFH apartment schemes, cooperative housing tends to decrease transition spaces to a minimum. With an average functional orientation of 0.22, cooperative apartments have, in general, one transition space for every four or five functional spaces - which in some cases represents only one transition space in the entire layout. As such, transition spaces are often located in proximity to the front door (at an average of 1.84 steps from the exterior), often organising the space of the house into clearly defined functional sectors. The resulting configuration shows, in some cases (layouts Martim Moniz (36), Contumil (38), Duarte Leite (39) and CETA (41)), further similarities with that of FFH's layouts. The same type of modulation for economy of structure can be identified in these cases, but often some configurational complexity is added that results in a greater variation among cooperative layouts than within other programmes.

As a result, a consistent genotypical signature or simplified accessibility graph could not be found across cases. Most apartment schemes are characterised by the low variation of integration values across functional spaces, with transition spaces acting as the accessibility centre of the house and, as a result, presenting much larger values of integration. As such, there rarely is a steep decrease in integration values between the better integrated functional space and the rest. While only the two different apartment schemes of Tripeira (40) present the collective > services > private order of integration usual in state and municipal apartments, which seems to indicate a different way of approaching domestic life from other programmes, the remaining cooperative apartment schemes do not share similar configurational properties. For example, despite sharing similarities with FFH's apartment schemes, type B2 cooperative layouts Tripeira (40) A, B and CETA (41) have a genotypical signature that is not common across programmes, with the kitchen being the better integrated functional space, followed by similarly integrated collective and private sectors. Type A2 layouts of Martim Moniz (36), Contumil (38) and Duarte Leite (39) are similar to the previous examples, displaying accessibility graphs close to that of most FFH's layouts, but introducing a door between the kitchen and the living-room that creates a better-integrated services sector. The three layouts of SACHE (37), Tripeira (40) A and B, where the living-room rather than the kitchen is the better integrated functional space (and, coincidentally, also some of the cases where kitchens are smaller) are also some of the most different from FFH's layouts.

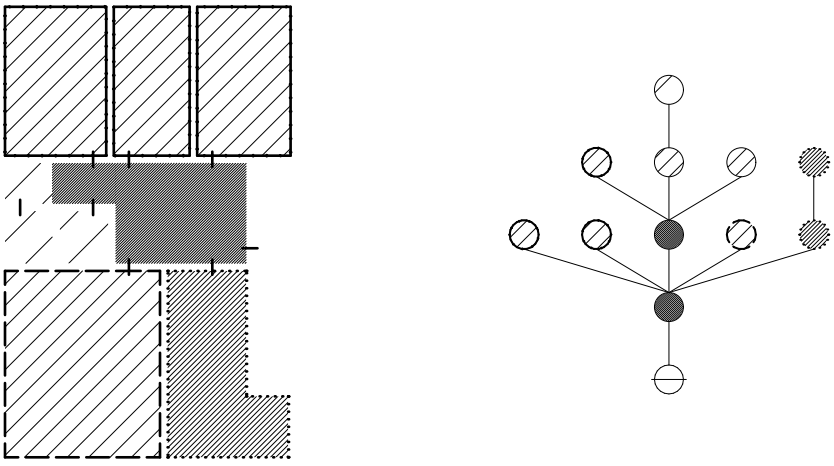
It does not seem farfetched to associate these attributes both with an effectively different type of recipient - that ranges only between the lower and upper-middle classes - and a different type of housing production. Some variation among layouts has also been verified in SAAL housing



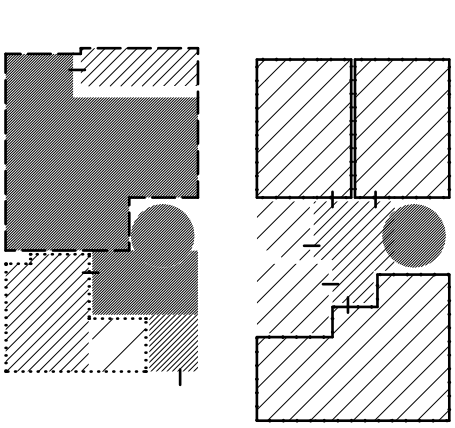
40-A.



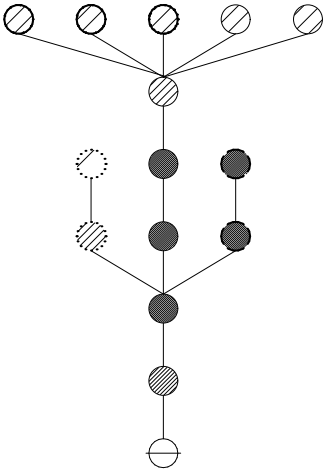
40-B.

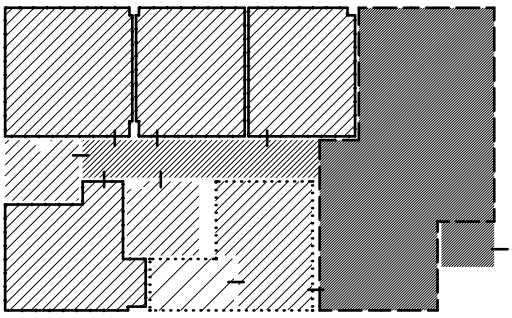


41.

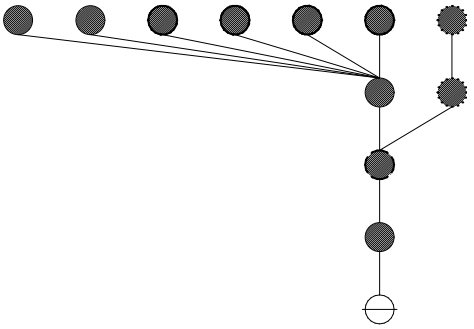


42-A.





42-B.



INTEGRATION

min. value

25th percentile

50th percentile

75th percentile

max. value

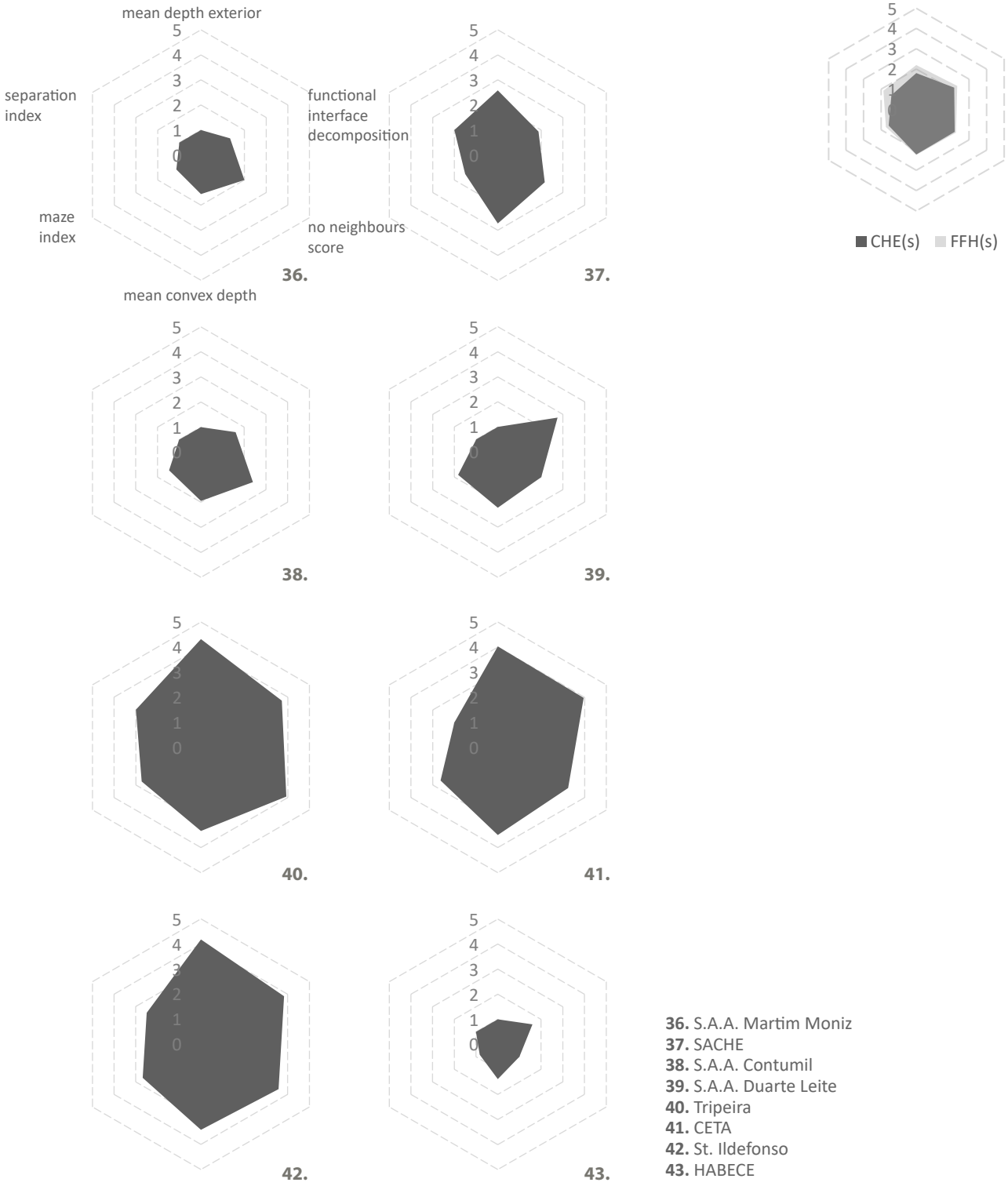
private sector

collective sector

services sector

40. Tripeira
41. CETA
42. St. Ildefonso

FIGURE 12.15.
Plans and convex breakings of cooperative apartment schemes Tripeira (40), CETA (41), St. Ildefonso (42)



36. S.A.A. Martim Moniz
37. SACHE
38. S.A.A. Contumil
39. S.A.A. Duarte Leite
40. Tripeira
41. CETA
42. St. Ildefonso
43. HABECE

FIGURE 12.16.
Depth measures of CHE estate layouts
FIGURE 12.17.
Comparison between small scale FFH and CHE layouts (right)

(however not at a genotypical level) and then to some extent in municipal housing, making it possible to associate a larger diversity of apartment schemes to a higher degree of individualisation of each design process. The fact that apartments developed by the same cooperative or within the same estate share the most similar area and genotypical attributes seems to confirm it. Additionally, larger areas are a safe indicator of greater availability of means, being interesting to notice that the layouts with more apartments are generally the ones with the smaller area. This area goes bellow the ideal for the apartment as a whole but sits around or above it for every type of room.

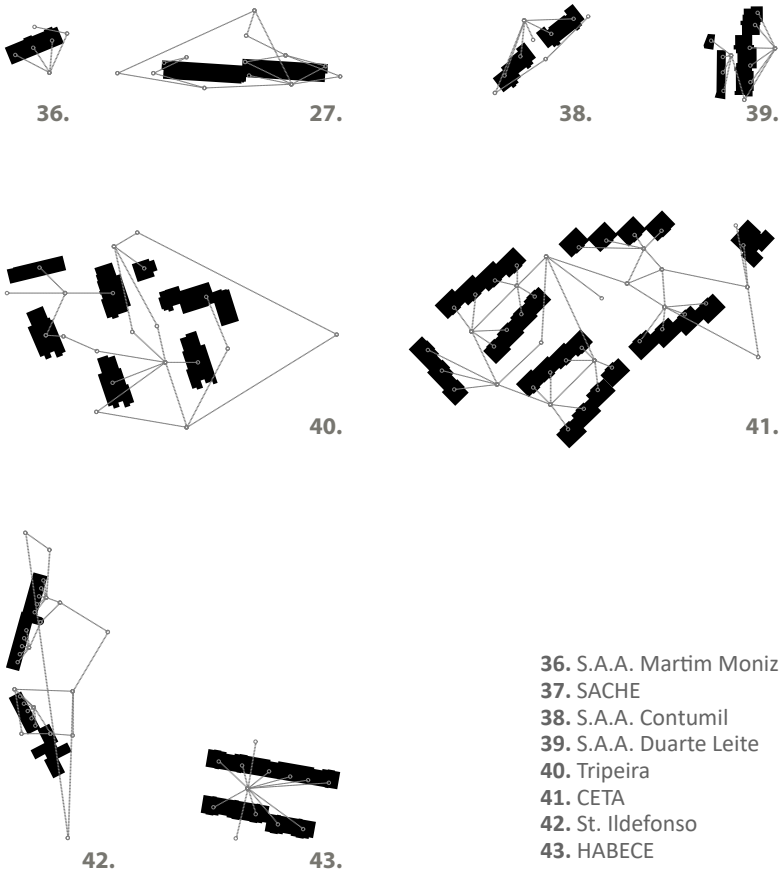
Outside the limits of the apartment, looking at housing cooperatives in their relationship with the surrounding city and with the broader urban context, it seems even more inadequate to categorise these developments as the same type.

There is an apparent split between two scales. Cooperatives are divided into two types of urban intervention: small-scale housing integrated into the existing urban fabric and large-scale developments forming their own neighbourhoods. With few exceptions, cooperative estate layouts are small scale, consisting of one or two buildings that create street frontage and have a lower average number of apartments than either SAAL or AM developments. Five of the cooperative developments in Porto are very small, housing around 30 to 50 families, one houses 78 families and the remaining two have around 200 houses. These small scale cooperative layouts are a clear exception in the studied cases. This is clear in figure 12.16., where they appear as a narrower hexagon in the centre of the chart, and in figure 12.17., where these values are compared to those of the smaller FFH estates (Ramalde do Meio (28), Pereiró (29), Amial (32) and Vale Formoso (33)).

	mean depth exterior	funcional interface decomposition	no neighbours score	mean convex depth	maze index	separation index
36. S.A.A. Martim Moniz	1	1.33	2	1.56	1.14	1
37. SACHE	2.58	1.88	2.17	2.73	1.5	2
38. S.A.A. Contumil	1	1.6	2.4	1.95	1.46	1
39. S.A.A. Duarte Leite	1	2.75	2	2.22	1.83	1
40. Tripeira	4.32	3.72	3.93	3.34	2.73	3
41. CETA	4.03	3.96	3.24	3.50	2.64	2
42. St. Ildefonso	4.18	3.84	3.58	3.42	2.68	2.5
43. HABECE	1	1.6	1	1.39	0.83	1
	2.39	2.58	2.54	2.51	1.85	1.69

TABLE 12.7.
Depth measures of CHE estate layouts, illustrated in figure 9.16.

Contrarily to FFH's estates, in housing cooperatives scale seems to have such a noticeable impact on depth, that developments can be identified as small and or large by looking at the radar charts in figure 12.16.: Martim Moniz (36), Contumil (38) and Duarte Leite (39) are small, generally shallow layouts whose front doors open directly to the primary street grid. Tripeira (40) and CETA (41) are large scale with depth values that approximate those of the estates developed



36. S.A.A. Martim Moniz
37. SACHE
38. S.A.A. Contumil
39. S.A.A. Duarte Leite
40. Tripeira
41. CETA
42. St. Ildefonso
43. HABECE

FIGURE 12.18.
Plans and convez breakings of CHE estate layouts

within the PMCP. Santo Ildefonso (42) is the exception which, while relatively small scale, displays depth values equivalent (and in some measures larger) to the larger, multi-building developments. This is in some measure a result of the adoption of corridors for accessing the apartments, reiterated in SACHE (37), which, even though it consists in only one building, has slightly higher depth values than the other smaller-scale developments.

As it would be expected for small-scale developments often constructed in the continuation of the existing street-frontage, small scale cooperative housing is characterised by low values of maze index (mi=1.58, d=1.05), functional interface decomposition (fid=2.17, d=2.14), mean depth (md=2.21) and a separation index of 1.0 in all four cases (d=1.62). SACHE's (34) largest value of mean depth (2.71) is close to other programmes lower values.

The larger scale two multi-building Tripeira (40) and CETA (41) share more resemblances with PMCP estates than with the largest of FFH's developments and often surpass the depth values of both. CETA (41) occupies the larger part of a block. While only one of its sides is adjacent to other buildings and three of them are connected to the street, the layout turns mainly inwards. Consequently, where it would have been possible for the majority of front doors to open directly to the exterior sidewalk, a clear design option of turning the backs of buildings to the street result in a minimum of 2 topological steps between houses and the main city grid. Similarly, this layout has a maze index that is close to the mid-values of PMCP and SAAL developments, larger than the majority of AM and FFH estates. Non-residents are not likely to walk through the layout in their path to somewhere else, and residents are an average of 4 steps away from the main street, ranking this among the layouts with the largest depth between the dwellings and the outside of the estate.

Both Tripeira (40) and CETA (41) integrate collective spaces in their designs. CETA (41) has a playground that is an average of 3.5 and a minimum of 3 steps away from the outside, and an average of 3.27 steps away from all dwellings entrances and a minimum of 2. It is also a fairly integrated space within the layout but not in the city, further articulated with a well-integrated system of transition and soft-landscaped areas. Simultaneously at the geometrical centre of the layout and in the transversal axis that divides the layout in two, there is a sports field. It is less integrated, deeper from the system and shallower from its exterior, and further away from the dwellings entrances than the playground, establishing, as usual, a franker relationship with the outside of the layout. The coffee shop is the shallowest functional space in the system. At one topological step from an important through-street at the local scale (NaCH r800=1.31), it should serve the nearby housing developments as well.

Similarly to Ceta (41), Tripeira (40) presents large values in depth measures, as well as a clear integration core in the geometrical centre of its composition. In this case, these spaces constitute a gardened area that connects the two large parking spaces from which one can access the buildings.



FIGURE 12.19.
Interiority in large-scale CHE estate layouts. CETA (41) at the left and Tripeira (40) at the right.
Photographs by the author.

So where in CETA (41) it seemed to exist an idea of neighbourhood and neighbourhood equipment in line with what was seen in the PMCP, Tripeira (40) does not have any functional spaces in the interior of the housing scheme. Instead, like the coffee-shop in CETA (41), the functional spaces created by this development are poorly integrated with the layout and are shallow, turning outwards, one step away from the primary street grid and an average of 5 steps away from all residential buildings.

While CETA (41) has one of the larger values of constitutedness, with almost 70% of its spaces being constituted by the front door of buildings or functional spaces, Tripeira (40) scores considerably low for a multi-building layout[107], with only a quarter of its spaces being constituted by the front-doors of buildings.

Nevertheless, these two layouts present similar design approaches to the intra-estate relations as well as relations between the estate and its exterior, both displaying a central integration core, a deep system (where Tripeira (40) is considerably more treelike than CETA 41), commercial spaces designed to serve a mainly residential area surrounding the housing development, and a deliberate turning inwards of the residential buildings.

If, like the two large scale housing Tripeira (40) and CETA (41), the smaller scale layouts developed by CHEs before 1982 share some similar characteristics (such as having front-doors that open directly to the main city grid without resource to redundant spaces such as those we can see in FFH and PMP developments, or creating an accessible secondary space in the back of buildings), some depth is gained in two of the three developments that adopt a single-loaded corridor. Santo Ildefonso (42), in particular, shares depth values similar to those of the larger housing schemes. In this case, however, depth and, in particular, depth from the main street, do not appear as obviously to be a design decision but a design condition resultant from lot-acquisition. Located in a highway interchange, the lot has a small proportion of practicable street-frontage, resulting in buildings that, despite being placed on the edge of the lot, can only be accessed through particular points.

It is at the scale of lot-acquisition that cooperative housing shows the largest internal consistency. Like state developments, housing cooperatives built in Porto between 1974 and 1982 are generally located between the inner and the outer radials of the city. Three (whose construction was initiated between 1979 and 1981) are located to the west, approximately 2km away from the ocean and 600 to 1.20km as the bird flies away from the city park. The ones closer to the park present above-average values of integration, while the larger-scale CETA (41) scores among the lowest integrated layouts of the whole set. Four other layouts are in the east, towards the area

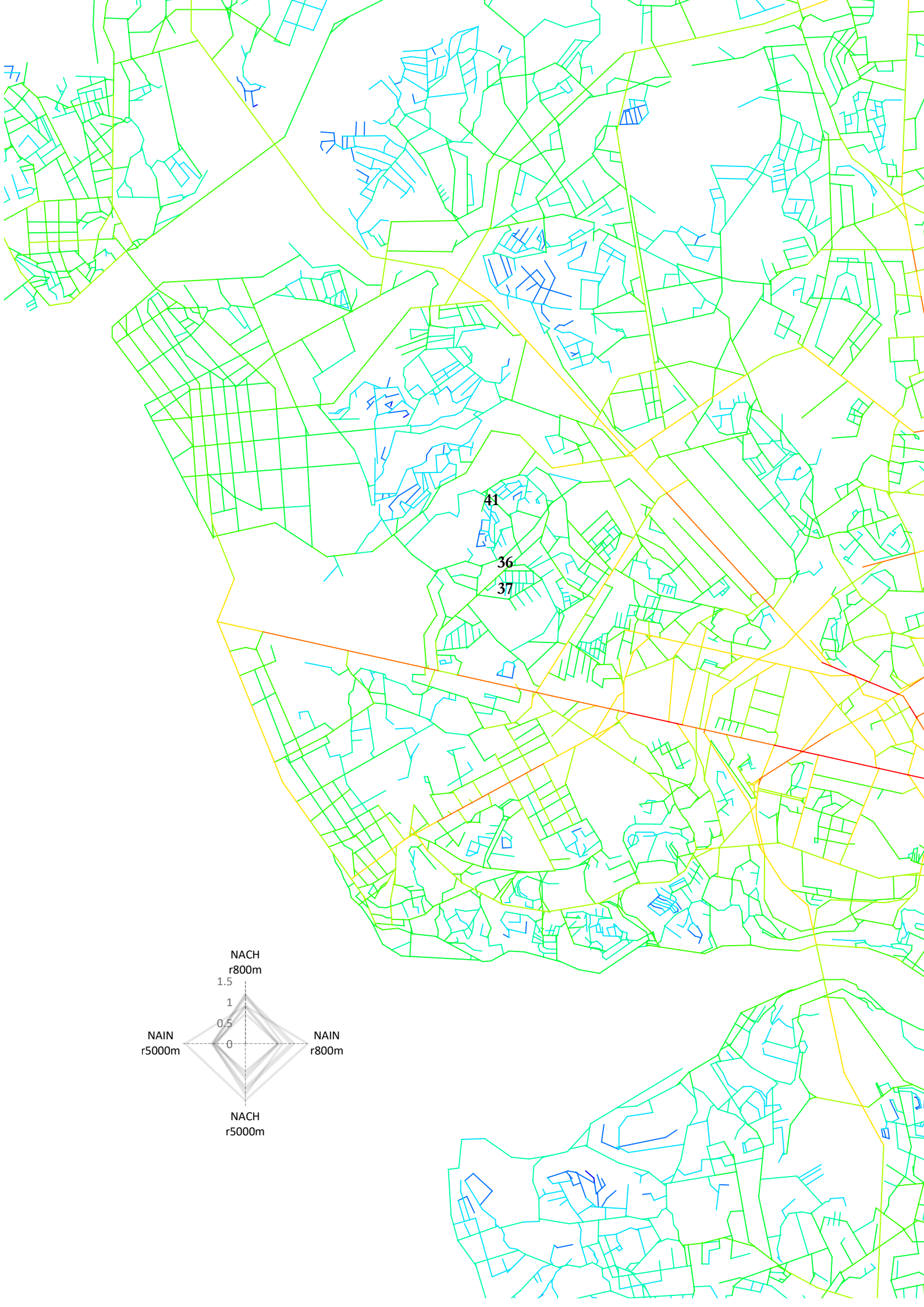
107 Single building layouts often allow access to the back of the building, creating a system of transition spaces not connected to front-doors that gains a greater importance when there are no other spaces in the layout.



36. St. António das Antas - Martim Moniz
37. SACHE
38. St. António das Antas - Contumil
39. St. António das Antas - Duarte Leite
40. Tripeira
41. CETA
42. St. Ildefonso
43. HABECE



FIGURE 12.14.
Plan of Porto 2003 and cooperative developments
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research


41
36
37
NACH
r800m
1.5
1
0.5
0
NAIN
r5000m
NAIN
r800m
NACH
r5000m

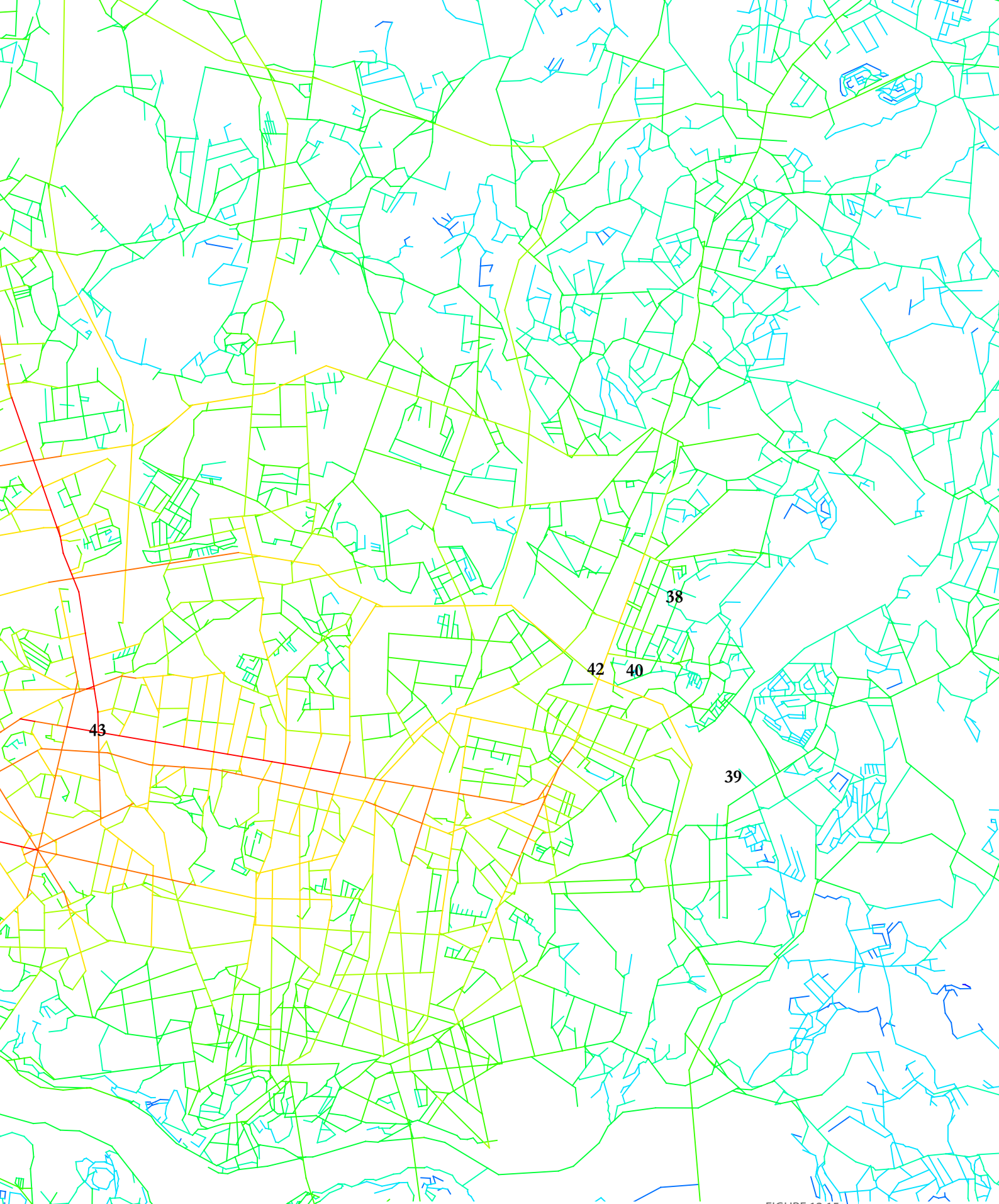


FIGURE 12.15.
Porto, normalised integration r=5000 with CHE estates.
CHE estates' values of normalised global and local integration and choice (left)

where urban density begins to decrease and which remains largely rural in 2003's map in figure 12.13. . The remaining layout, HABECE (43) is located inside of the inner radial, along one of the main global accessibility axes of the city.

	#houses	m²/resident	NaIN5000	NaIN800	NaCH5000	NaCH800
36. S.A.A. Martim Moniz	30	19.7	0.78	0.89	1.22	1.19
37. SACHE	32	38	0.81	1.17	1.12	1.16
38. S.A.A. Contumil	30	24.3	0.77	1.09	1.05	1.10
39. S.A.A. Duarte Leite	20	69.8	0.72	0.77	0.75	0.87
40. Tripeira	196	40.7	0.76	0.78	0.67	0.72
41. CETA	224	51.1	0.70	0.80	0.83	0.92
42. St. Ildefonso	78	17.8	0.76	0.78	0.67	0.72
43. HABECE	50	11.3	1.44	1.50	1.36	0.90
	82.5	34.1	0.84	0.97	0.96	0.95

TABLE 12.8. Syntactic measures of CHE estate layouts, illustrated in figure 12.15.

Cooperative housing is, in general, located on axes with potential for through-movement, with normalised choice values similar to those of FFH developments at all radii. However, while the averages between these two programmes are similar, cooperative housing registers more similar values among developments. Santo Ildefonso (42), which we have seen to be an exception regarding its depth-values in relation to other small scale cooperative developments, is also the one case where all choice values are bellow the 0.7 mark. Duarte Leite (39) has an average NaCh r800 which rises above the 1.0 mark, with the values of other radii sitting between 0.8 and 1.0, other layouts go over 0.8 and consistently have choice values above 1.0, which is rare in the other housing programmes analysed. It is noteworthy because cooperatives were not, like FFH developments, integrated into a larger plan for the AMP but were instead dependent on the market for acquiring lots, that they are associated to large values of choice and so of potential for movement not only at the local scale but also at the scale of the city. It is also interesting to note that, while FFH development maintains larger values (in particular when council developments are not considered) when considering normalised integration at all radii, stressing its relative potential as both spaces people are likely to cross when moving between destinations no matter what the length of the journey and spaces people are likely to visit not only locally but also globally, cooperative housing often articulates large values of NaCH with lower values of NaIN. Located in a main east-west axis that is one of the better integrated and has some of the largest values of choice at all radii, HABECE (43) (like Carvalhido (AM layout 22)) stands out as a clear exception. Other cases range from around average to small values of integration at r800, and remain on the mid-values of integration at r5000.

12.5. SOCIO-SPATIAL CONSIDERATIONS ON COOPERATIVE LAYOUTS

12.5.1. SEGREGATION, OTHERING AND HIERARCHY IN COOPERATIVE HOUSING ESTATES

If cooperative housing was, as will be further explored in the next chapter, seized as a mechanism for housing development that required only small investments by the municipalities, it was not articulated with a programme of urban development in the same way FFH's - or even PMP's - estates were. Rather, cooperative housing depended on individual processes of lot acquisition, which were in some cases aided by or resultant of expropriations conducted by the municipality, which werre then purchased at cost price, and in others subject to the functioning of the market. Furthermore, disarticulated from urban planning, cooperative housing developments were often hindered from developing needed infrastructures.

Arising from individual, non-articulated processes of housing development, it is particularly noteworthy that cooperative housing presents not only broadly consistent spatial attributes of urban insertion but the largest internal consistency of the studied programmes at this scale. A result of common goals, strategies and budgetary constraints conditioned by land prices, cooperative housing is characterised by a consistent and specific type of urban integration. Lots are poorly globally integrated (NaINr5000) but well-articulated with their surroundings - which translates into large values of local integration in small-scale developments - and often associated with high-choice axes connecting Porto's centre to its adjacent municipalities. Moreover, in most cases located in mainly residential areas, many of housing cooperatives' developments are often small scale and devoid of collective spaces and functions. They appear to invest in ease of accessibility over local relations, which is further supported by the existence of parking lots in these smaller-scale developments.

Spatial segregation cannot be read in regards to cooperative housing as regarding other programmes. Where the need for cheap terrains, the inability to conduct expropriations and a systematic fall-through of the construction of infrastructures would result in a discrepancy between the needs of lower-class populations and the resulting developments, the assumption of middle-class residents, with the economic capacity for depending on personal transportation, decreases their segregation when located in poorly integrated but accessible areas of the city.

While cooperative housing developments present similar characteristics in their urban insertion, the estates' relation with the lot's exterior is less consistent across cases. Small-scale developments, in their majority, open to the primary street grid while resourcing to larger or redundant sidewalks that create some depth from it. In this way, even though they are integrated into the main urban fabric, they stand out as individual buildings, fronted by a space that, while in the continuation of

the public system of spaces, belongs to the housing development and its residents.

Larger scale layouts similarly differentiate between interior and exterior spaces, presenting commercial areas that face outwards to the local neighbourhood while keeping community spaces of collective use deep from the exterior but well integrated within the system. However, if a certain articulation with the surrounding city associated with a clear definition of the space of the cooperative can be verified in both small and large scale developments, how these impact the residents relation with non-residents should be significantly different between the two types. While additional depth in small-scale developments marks a differentiation between the layout and the surrounding city that may result in the identification of the layout as something exterior to it, it does not hinder residents relations with the exterior. Inversely, large scale layouts are very deep, with values in all depth measures similar to those of PMCP estates. These attributes may translate in a low probability that non-residents with no local knowledge visit these spaces, or that they are used in pedestrian through-movement. It is relevant, however, that in these cases these characteristics are not the result of an imposed segregation and purposeful othering of their residents within an urban plan whose spatial and social vision of the city removed the working class to suburban areas, and are associated with a different strata of the population.

Similarly to FFH's layouts, cooperative housing is ambiguous in its idea of community. Resulting from a legal framework which encouraged neighbours' organisation and cooperation in the development and management of their houses, housing cooperatives built estates that appear to both search to maintain an idea of community, and to connect with the city around it. Most small-scale developments, while opening directly to the street, maintain spaces on the backs of buildings that, connected to parking lots, may be used by the community. Large scale developments connect to the surrounding city by offering commercial spaces to the primary street grid, while simultaneously turning away from it by placing front-doors and collective spaces deep from the exterior. However, deep and hierarchical, splitting neighbours through the creation of spaces that are likely to be used only by some of them, these spaces reduced the potential for chance encounters and interaction.

12.5.2. DOMESTICATION AND ADAPTABILITY IN COOPERATIVE HOUSING SCHEMES

The majority of cooperative housing developments do not include labelled collective spaces in their layouts, hence assigning domestic and other housing functions either to the interior of the apartment or to other spaces exterior to the estate. In this sense, in the smaller scale layouts, these are often void of a functional role and seem prone to be used as spaces of transition between the urban environment and the space of the house. While only larger scale layouts present fixed-functions as well as spaces with potential for collective use, due to the framework of cooperative housing, all of them have spaces to be collectively managed. The potential for community in economical housing cooperatives was not only spatial - a result of the potential for encounter and

interaction of spaces - but also ingrained into the way they functioned: collective spaces belonged to the cooperatives and hence to each of their members, as did, to an extent, the houses themselves. Apartments were not necessarily the private property of their residents but owned by the cooperative that could, collectively, make decisions regarding future occupants and rent. There is, in this sense, a certain countering of domestication in favour of community-creation intrinsic to cooperative housing that is often not reflected in the layouts themselves.

Even though little internal consistency was registered, the differences between cooperative housing apartments and those developed by other programmes seem to reveal deviations in the way of understanding the domestic environment.

When this space is understood as a reflection of social struggle and power balances between groups or classes, it is revealing that there is a clear distinction in the size of cooperative housing apartments in relation to other programmes. Previously presented characteristics of cooperative housing, such as the need for an initial financial investment by future residents or the assumption that residents own private transportation, make it clear that these developments were intended for stable income families. As such, even as part of a systemic housing programme, house size appears strictly related to one's economic capacity.

The larger area of cooperative housing results in an apparent increase of both the area and relative size of living-rooms, which, occupying on average almost half of cooperative apartments, are substantially larger than in any other programme. If this appears to signify increased importance assigned to the collective sector of the house, connected, in half of the cases, to an often relatively large services sector, it is also a significant difference from other programmes that the first is often poorly integrated, often surpassed by the kitchen to which it is connected. Regarding the integration of living-rooms and increased area of kitchens, it is not possible to identify one stable trend across cases. However, the living-room is substantially larger than in other programmes and in most cases does not function as a transition space, and there is simultaneously a smaller likeliness of it benefiting from accidental use from passers-by, and a more significant possibility of it being used individually. Similarly, bedrooms surpass in many cases the minimum area necessary for installing a bed, allowing for the installation of desks or other objects of individual development.

Kitchens' spatial attributes vary significantly across cases, and it is not possible to identify a clear view of fixed-function domestic work in relation to the rest of the house. Kitchens are, on average, larger than in other programmes. If the results of the Survey on Urban Housing seem to indicate that larger kitchens do not result in a more intense occupation by family members, the increase in size - in some cases tripling the minimal area - does appear to reveal the intention of allowing for their collective use, in particular when large kitchens are openly connected to the living-room. Other cases, however, maintain small kitchens, shallow from the exterior and deep from the interior of the house, clearly separated from the other well-defined functional sectors.

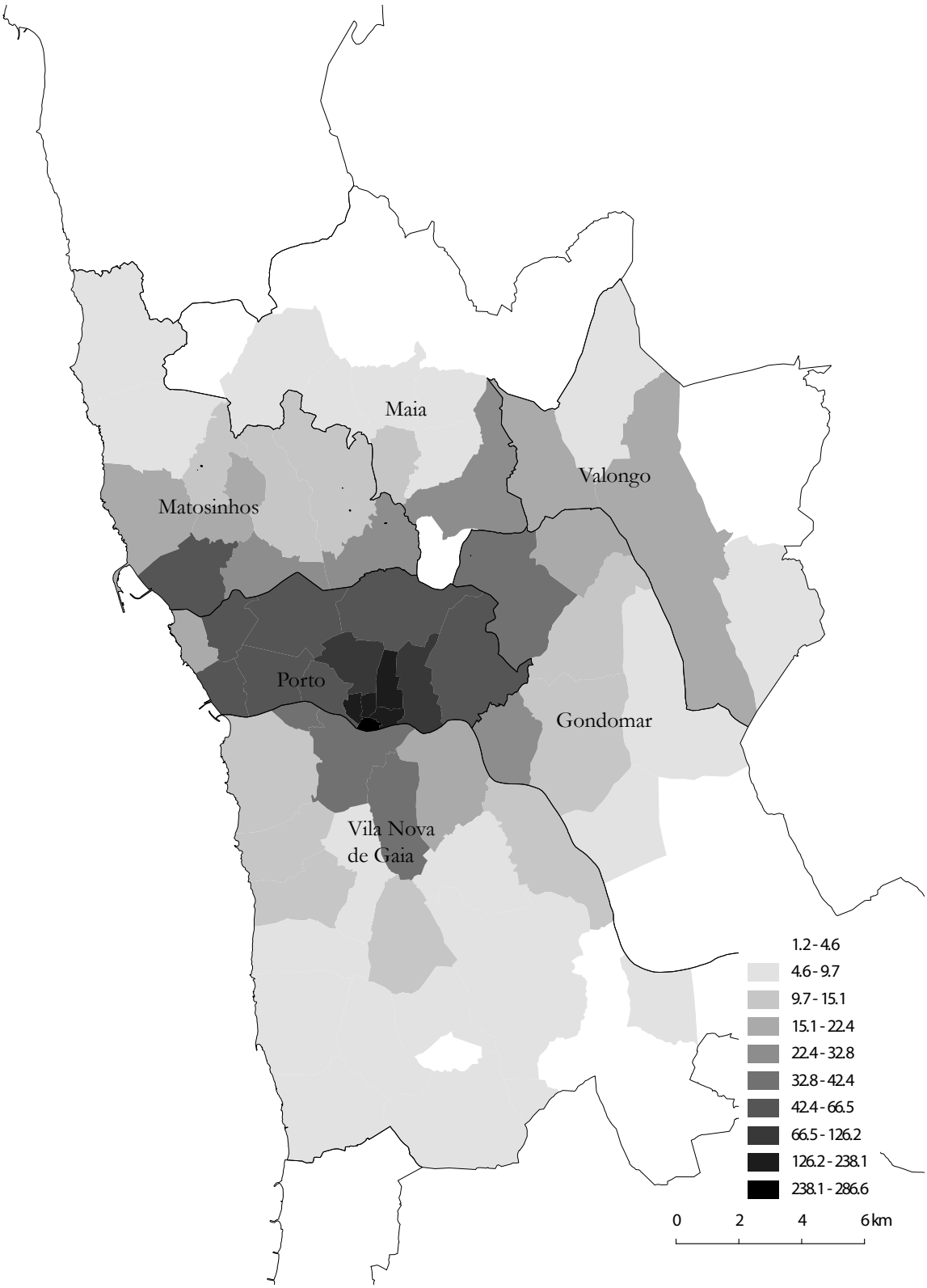


FIGURE 12.16.
Population density in Porto and its adjacent cities in 1970
Map constructed with information from the 1970's census, available at www.ine.pt

12.6. URBAN GROWTH AND NEW LOCALITIES: PUBLIC HOUSING IN PORTO'S METROPOLITAN AREA

According to the census of 1970, the centre of Porto was the most densely populated part of the city, presenting a population per square kilometre that was three times that of the surrounding fringe. The historical centre, specifically, reached over four times the amount of residents per square kilometre of peripheral areas, in particular those to the west, bordering the ocean. As can be seen in figure 12.16., it was in Porto that most of the population of the area was concentrated. With more than half of the population of the considered territory residing within the municipality, its population density was over ten times that of its adjacent cities.

Concentrated in Porto and adjacent areas of the neighbouring cities, housing density followed similar spatial patterning (figure 12.17), where the less densely populated peripheral cities also had a smaller number of houses and vice-versa. In Porto, while parishes with a larger number of houses were also the most populated, differences in house density were less steep than in population density, which translated into housing shortages in densely populated areas. If housing shortage is not solely the result of the existence of fewer houses than there are families and it cannot, therefore, be measured with the data available in the 1970 census, figure 12.17. is illustrative of an overcrowded city centre. Not taking into account vacant or derelict houses, the census registered a total of 2 623 houses less than families in Porto's centre, and a surplus of 2306 in peripheral parishes.

The successive urban plans developed and carried on up to that point sought to densify the peripheral, then mostly non-urbanised areas of the city, and did this, to a great extent, through the construction of public housing. From the ninety-thirties to 1969, a large proportion of the construction in what was defined in 1962's PDP[108] to be the fringe between the two radials of Porto was part of a public housing programme (figure 12.19.). PCE's housing was placed in peripheral areas that, taking advantage of already existing infrastructure, still left broad fringes of vacant urban land between the city's urbanised centre and the new neighbourhoods. Subsequently, the PMCP, now aiming at reducing housing shortage and overcrowding in the centre of the city by tearing down the *ilhas*, remnant housing of XIXth century's industrialisation, and relocating their residents to areas of the municipality that were sparsely constructed and populated, were often coupled to existing public housing. Associated to the development of the PDP, they were purposely located outside the planned inner-radial, maintaining vacant urban land for the development of the city within it. As demonstrated in the 1970's census, the development of public housing distanced from the overcrowded centre was not a sufficient measure to improve the living conditions of the generality of the precariously-housed populations in the city centre.

108 *Plano Director Municipal*, a plan for the city explored in chapter 9..

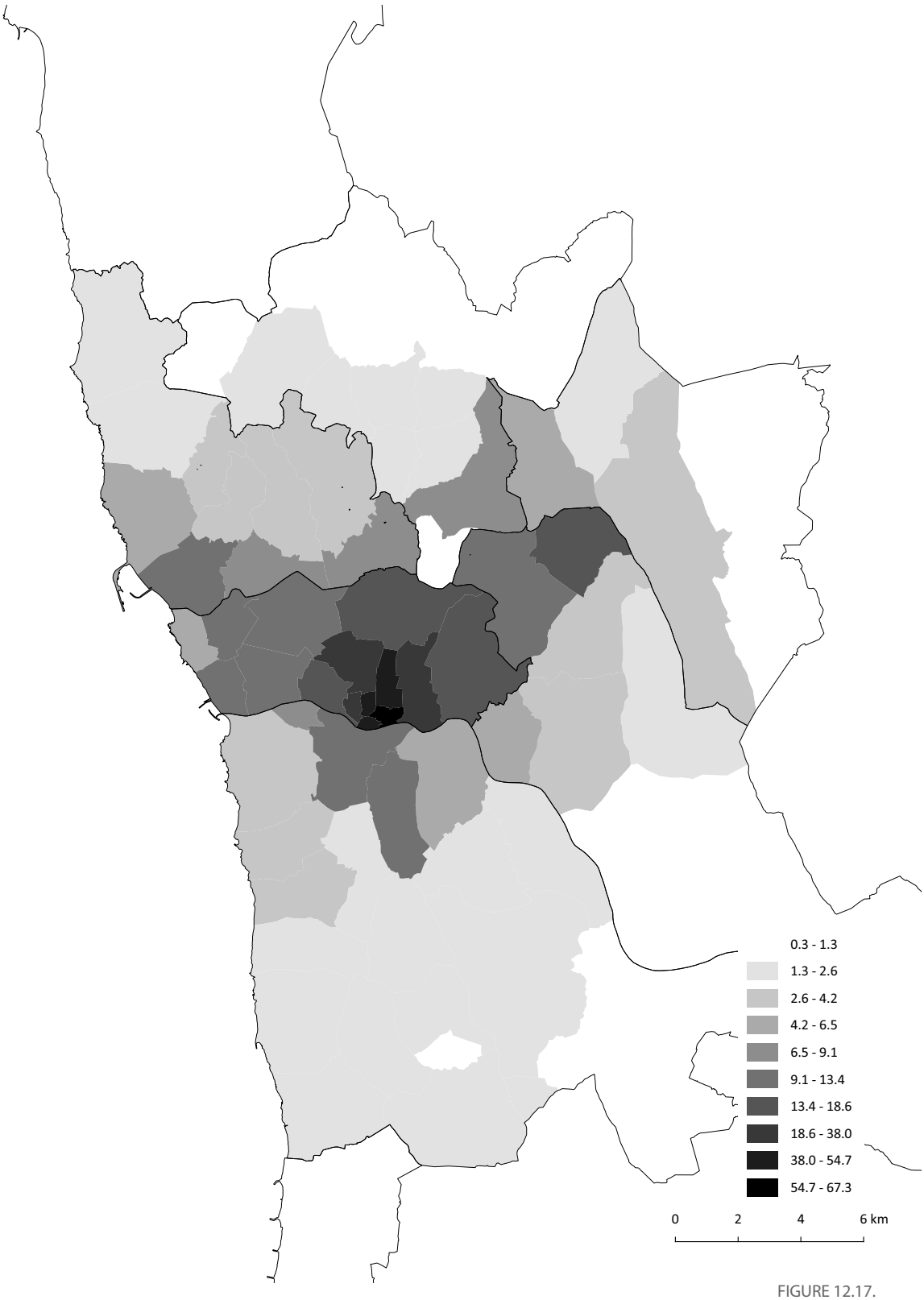
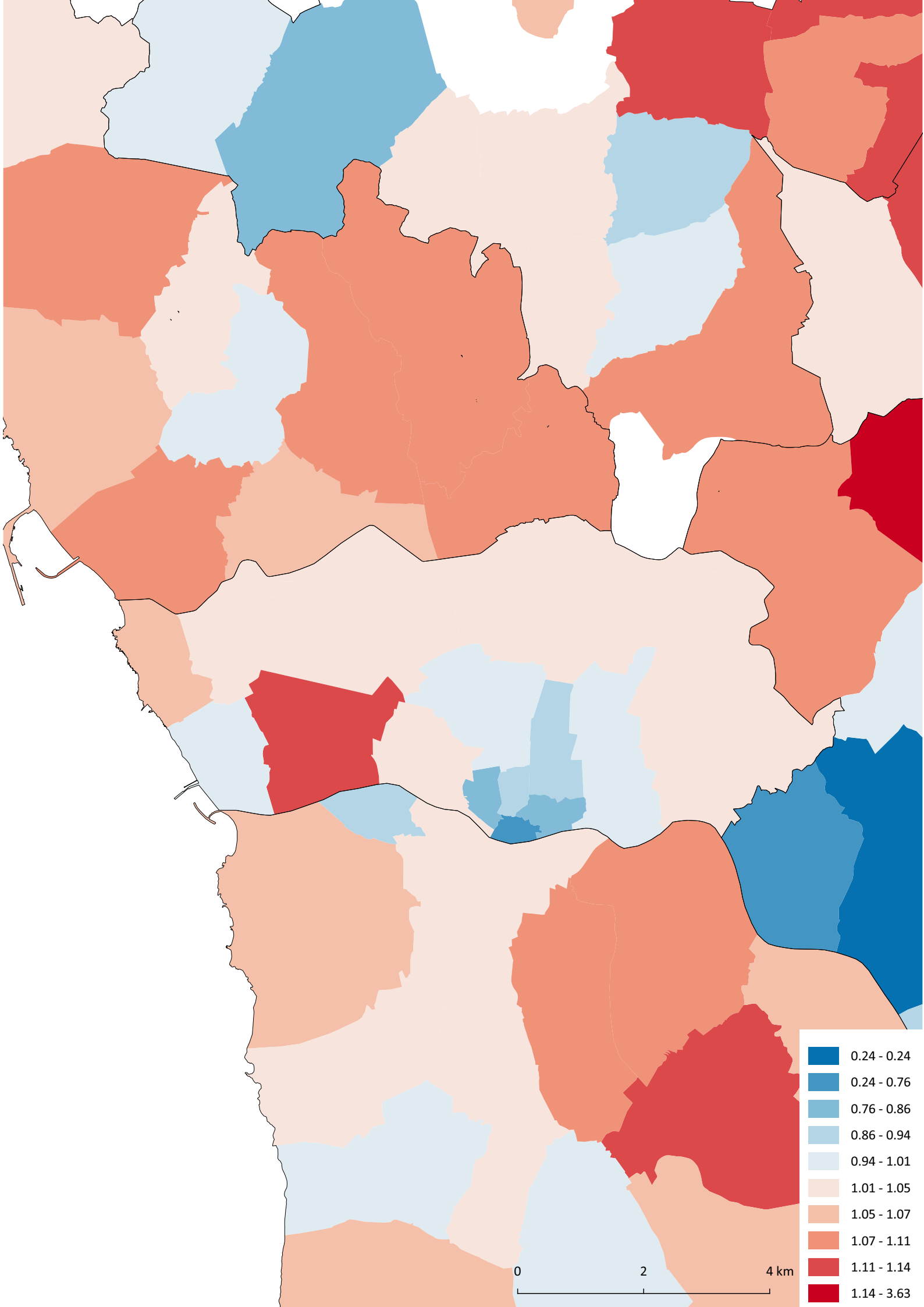


FIGURE 12.17.
Housing density in Porto and its adjacent cities in 1970 (left) and Houses per family in Porto and its adjacent cities in 1970 (right)
Map constructed with information from the 1970's census, available at www.ine.pt


0.24 - 0.24
0.24 - 0.76
0.76 - 0.86
0.86 - 0.94
0.94 - 1.01
1.01 - 1.05
1.05 - 1.07
1.07 - 1.11
1.11 - 1.14
1.14 - 3.63
0
2
4 km

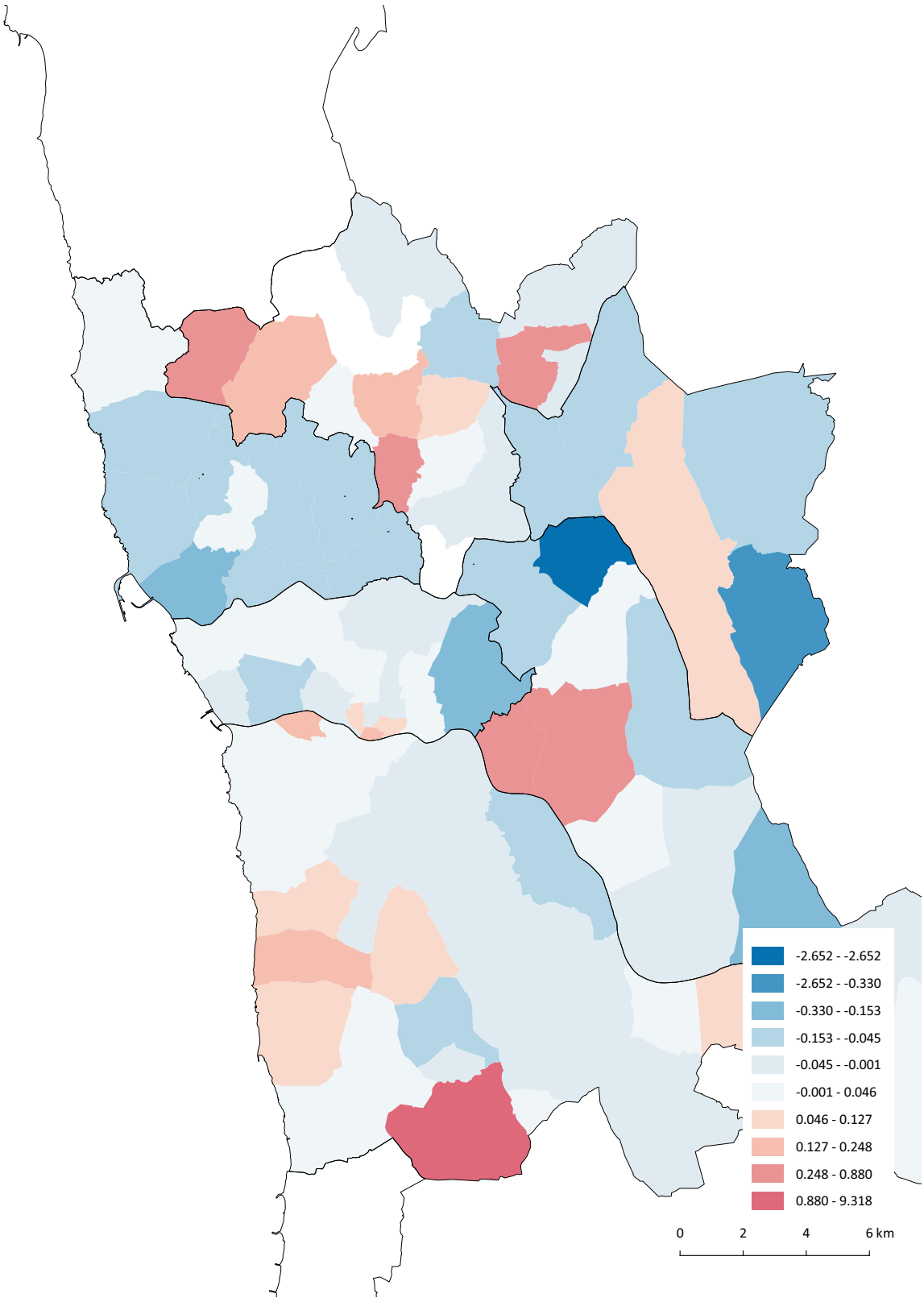


FIGURE 12.18.
Difference in number of houses per family between 1970 and 1980
Map constructed with information from the 1970 and 1981's census, available at www.ine.pt



FIGURE 12.19.
Porto's evolution 1932, 1948, 1960 (light to dark grey) and public housing 1932-1969 (black).
Drawing based on maps available in Oliveira, https://vitoroliveira.fe.up.pt/research

During this period, state-subsidised housing was scarce in adjacent cities. Four estates built between 1949 and 1960 were detected in the city of Matosinhos, in the city of Vila Nova de Gaia some public housing was developed within the PCE and other small scale programmes during the 1950s and early 1960s (Matos, 2001). During the following twelve years, at least 3 SAAL developments, 24 other FFH developed or funded housing schemes, and 14 housing cooperatives were built in these areas, a number likely large enough to counter the housing shortage of at least a total of 4 856 houses. Within the municipality of Porto, at least 43 estates, representing around 7 086 houses, were developed either by public institutions or housing cooperatives, a number that should, similarly, be enough to cover the housing shortage verified in the 1970's census.

	Porto	Adjacent cities	Total
Population 1970	302 335	538 228	840 563
Population 1981	327 368	675 237	1002 605
Population 1991	302 422	688 631	991 053
Population density 1970	7 299	1 014	1 468
Population density 1981	16 302	1 272	1 751
Population density 1991	16 625	1 297	1 731

TABLE 12.9.
Total population and population density in Porto and its adjacent cities in 1970, 1981, 1991
Table constructed with information from the 1970, 1981 and 1991 census, available at www.ine.pt

Eleven years later, the 1981's census reveals an increase of the total population of the considered area (table 12.9.) that was not concentrated in Porto. However, if the municipality's resident population increased in around 25 000 people while the ensemble of adjacent cities saw a population growth of around 150 000 residents, this represented a more significant increase in population density within Porto, which gained 604 residents per square kilometre. This increase was not verified in the more densely populated centre. Rather, the resident population substantially shrunk in the centre during these years, while it grew in peripheral areas of the municipality, in particular those in the west, and in Porto's surrounding municipalities (figure 12.20).

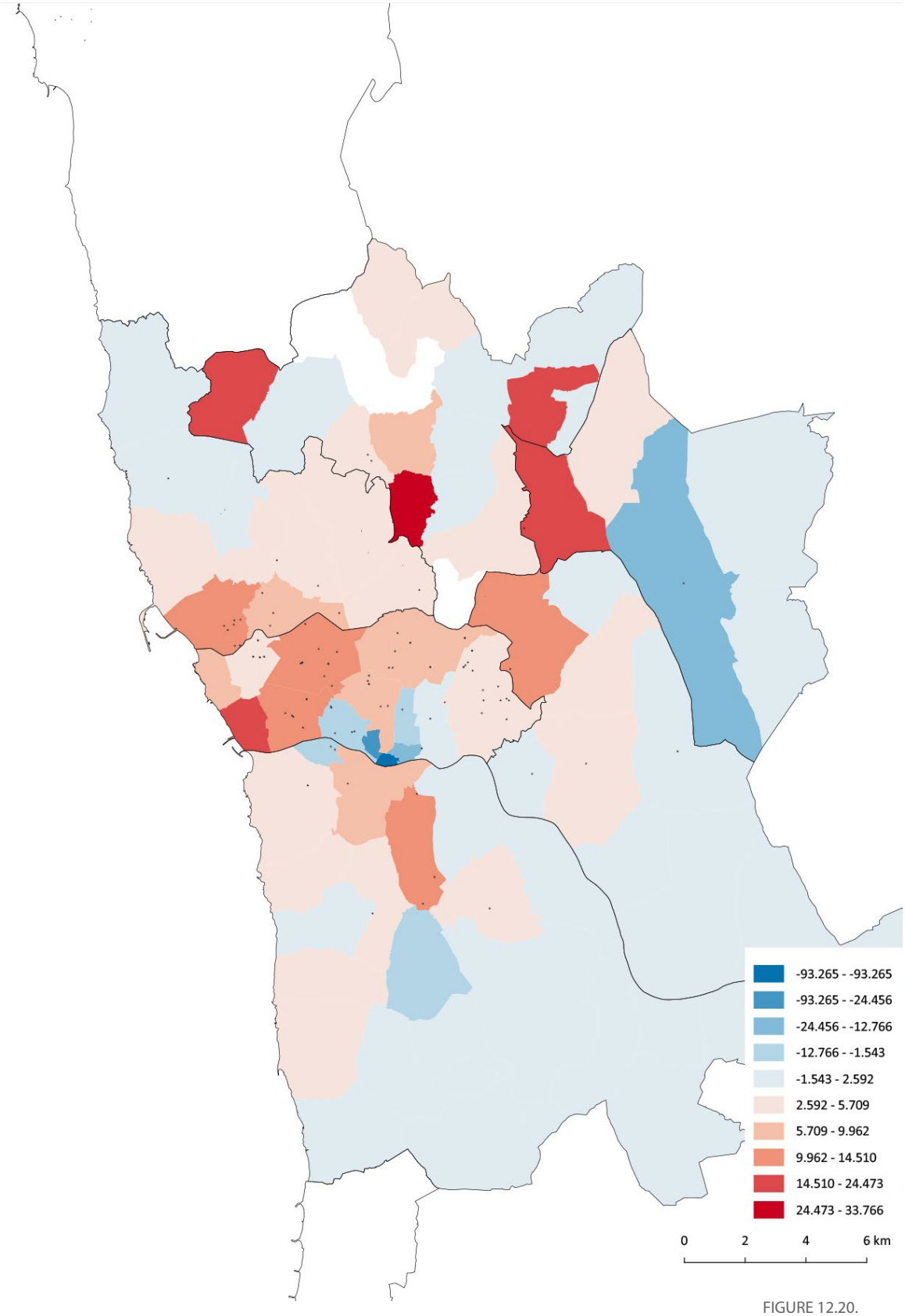


FIGURE 12.20.
Difference in population density between 1970 and 1981 and location of housing estates
Map constructed with information from the 1970 and 1981's census, available at www.ine.pt

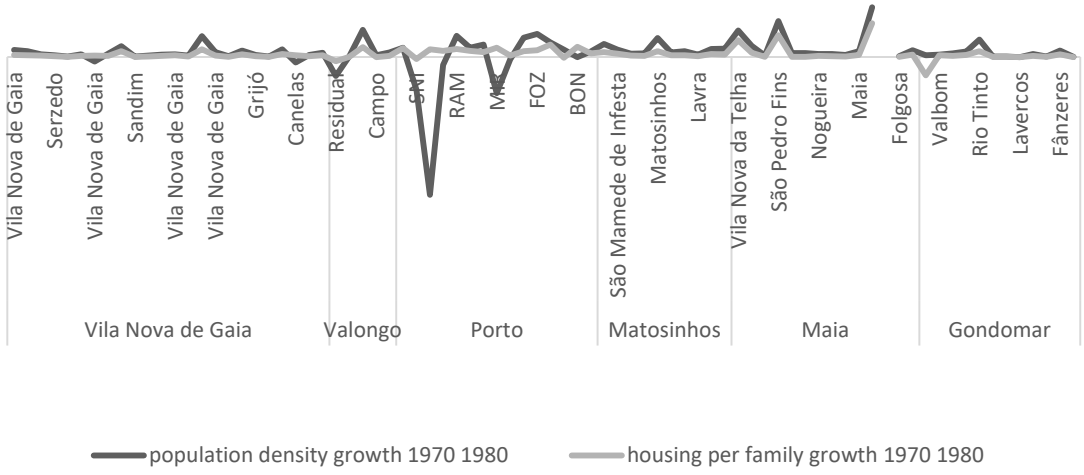


FIGURE 12.21.
Population density and housing per family growth between 1970 and 1980.
Graph constructed with information from the 1970's census, available at www.ine.pt.

This came associated with an increase in housing density, mainly in Porto and its peripheral areas, but also in more distant parts of neighbouring cities. Within Porto, housing construction was not capable of matching the population's growth. If the difference between the number of houses and the number of families decreased by 1 000 houses in the city centre, it grew substantially in other parts of Porto (figure 12.18.). Where it decreased, it does not appear to have been due to the availability of new houses, but to transformations in population density and distribution (figure 12.9. and table 12.10.).

	Porto	Adjacent cities	Total
Housing 1970	81 044	142 852	223 896
Housing 1980	96 300	200 772	297 072
Housing 1990	113 188	236 757	349 945
Housing density 1970	1 956.63	269.01	391.12
Housing density 1981	2 324.95	378.08	518.95
Housing density 1991	2 732.68	445.85	611.32

TABLE 12.10.
Total houses and housing density in Porto and its adjacent cities in 1970, 1981, 1991.
Table constructed with information from the 1970, 1981 and 1991 census, available at www.ine.pt

While it was in the areas in the East of Porto that a new housing shortage was revealed by the 1981's census, it were the parishes around the industrial area going up to the port in the adjacent city of Matosinhos that suffered the most considerable population increase. Within Porto, these are areas that had been largely urbanised through the development of mid-20th century public housing and were again the target of state and cooperative developments throughout the 1970s and early 1980s. Similarly, in the neighbouring parishes of Matosinhos, state and cooperative housing began being developed during this period, a trend that increased in the following decade. Besides this apparent concentration between the industrial area and the port, state and cooperative developments were built punctually in areas of registered population growth in all adjacent cities (figures 12.22, 12.23. and 12.25.), with the exception of the municipality of Maia. In the

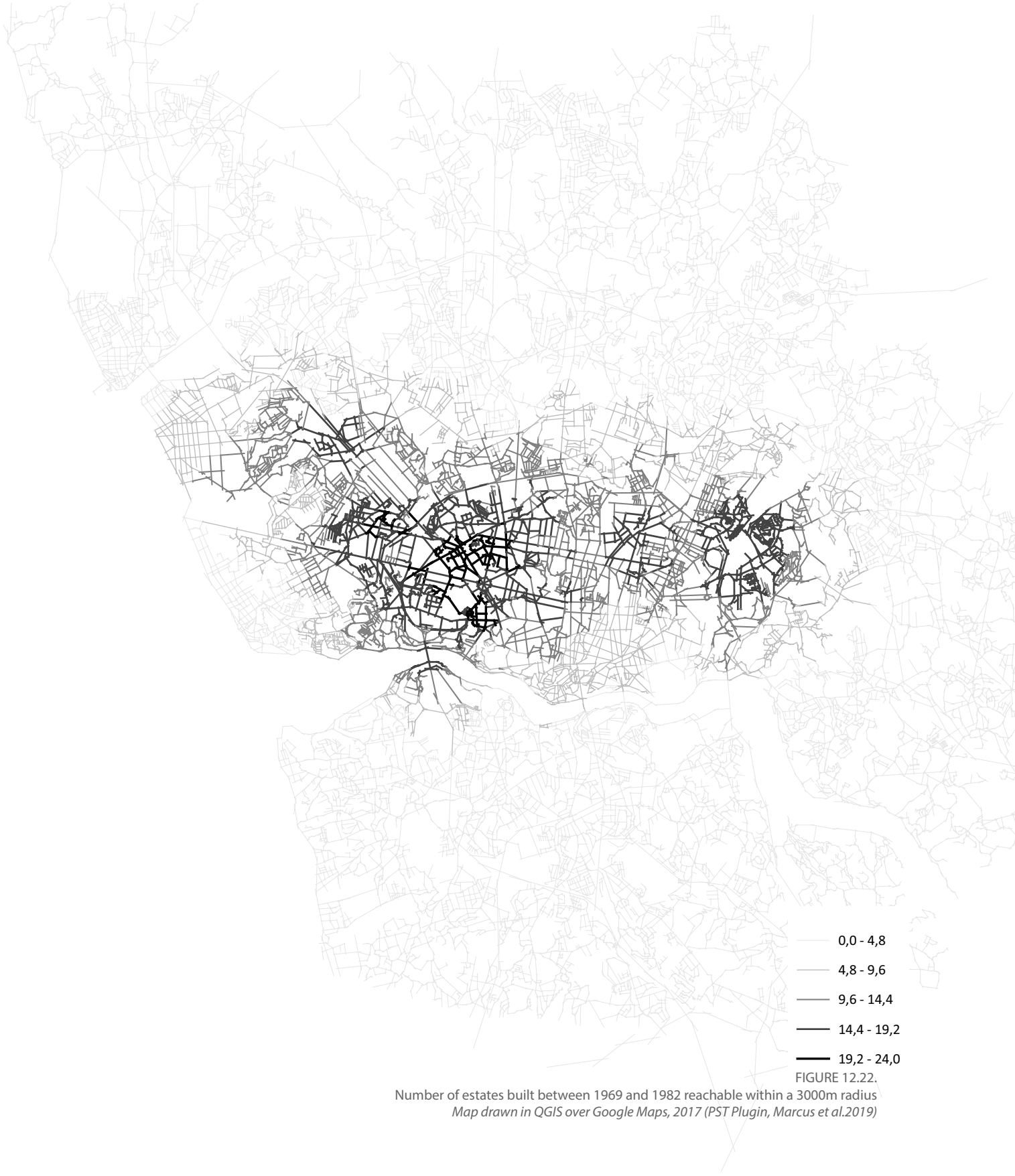


FIGURE 12.22.
Number of estates built between 1969 and 1982 reachable within a 3000m radius
Map drawn in QGIS over Google Maps, 2017 (PST Plugin, Marcus et al.2019)

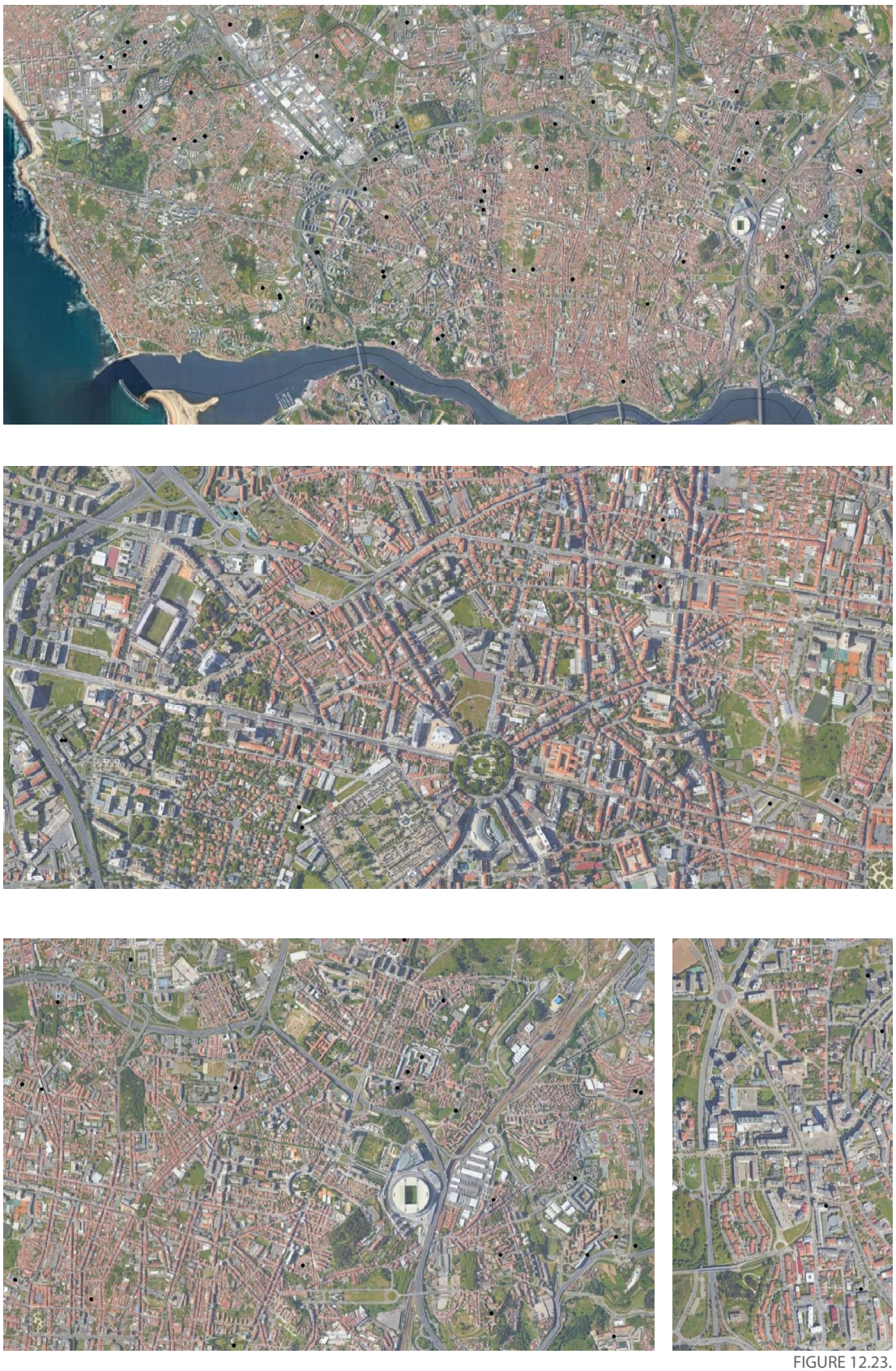


FIGURE 12.23.
Satellite views, a) estates built in Porto between 1969 and 1982, b) concentration in central parishes, c) concentration in eastern, ruralised parishes, d) Maia
Google Maps, 2019.

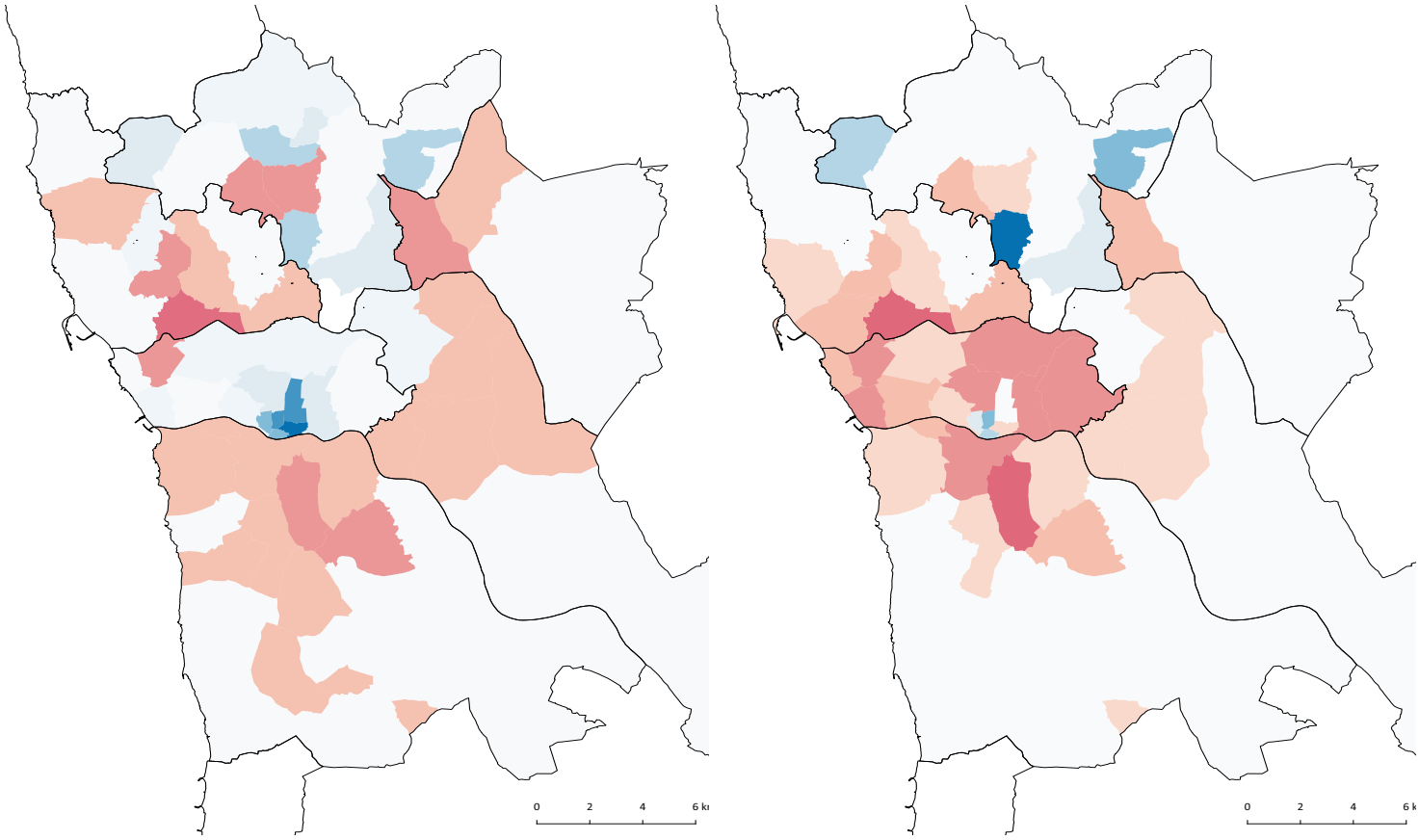


FIGURE 12.24.
Population (left) and housing (right) density growth between 1981 and 1991
Map constructed with information from the 1981 and 1991's census, available at www.ine.pt

latter, state developments were concentrated in the area surrounding the council hall, in what has become the city's centre (figure 12.23.d).

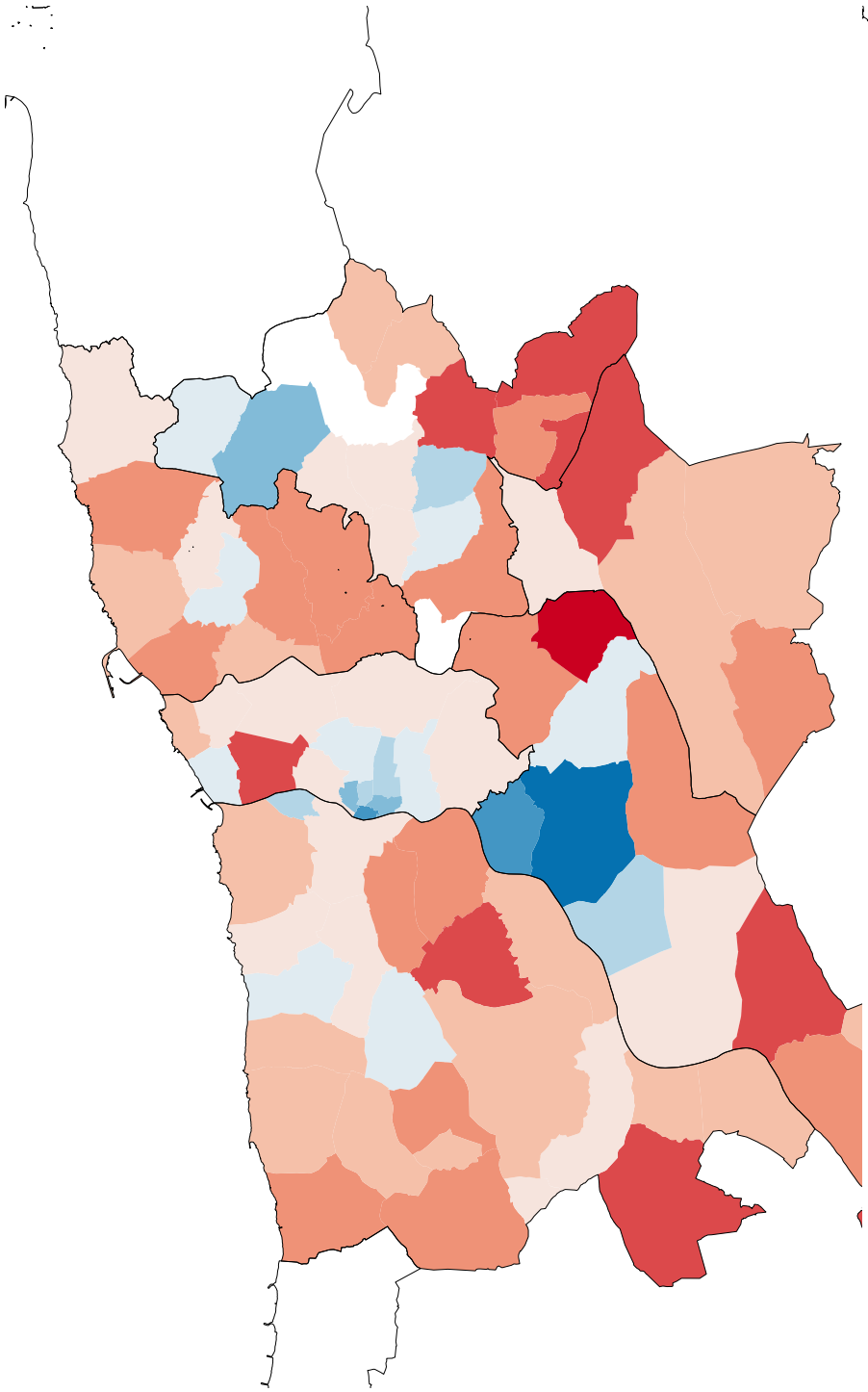


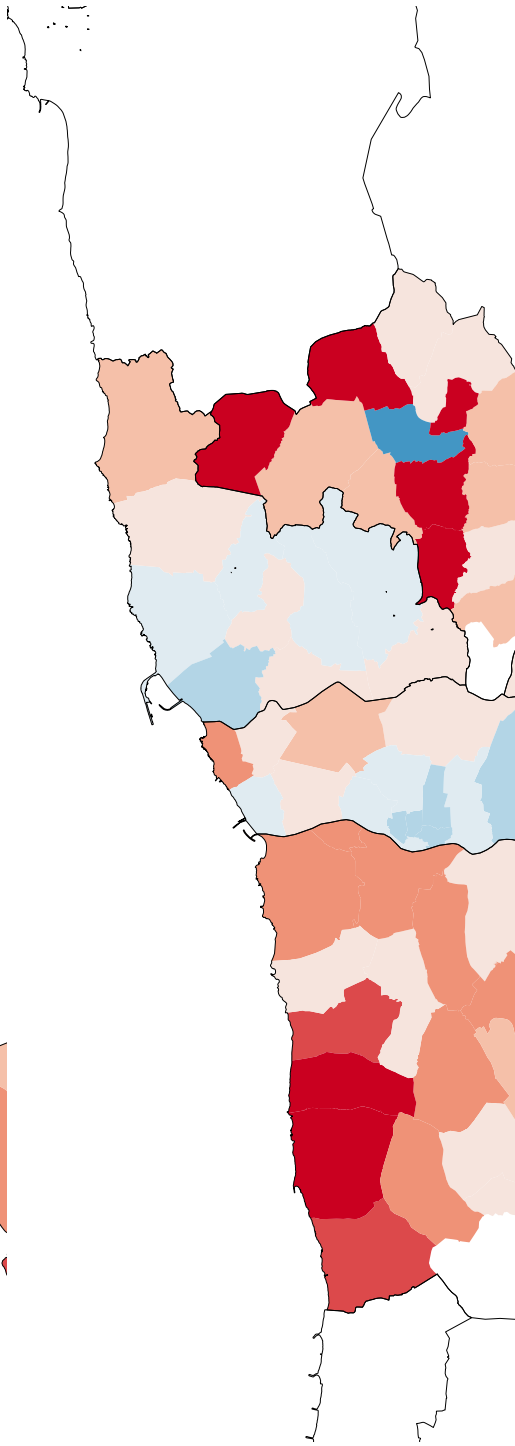
FIGURE 12.25.
Industrial poles in 1973
Map based on O espaço urbano do Porto, condições naturais e desenvolvimento by J.M. Pereira de Oliveira, 1973.

If sparse across the territory, cooperative and public housing development in Porto's neighbouring cities throughout the ninety-seventies and ninety-eighties was not minor. A non-comprehensive survey of housing developments[109] was able to detect 14 public or cooperative housing projects in Vila Nova de Gaia, 4 in Gondomar, 5 in Maia and 15 in Matosinhos, built between 1969 and 1982. After 1982, when the FFH was closed down, the same survey registered 2 cooperative housing developments in Vila Nova de Gaia, 1 housing cooperative in Gondomar, 7 housing cooperatives and council estates in Maia and 14 cooperative housing developments in Matosinhos. This is coerent with what was seen in figure 12.11, which showed that during the first decade after the abolishment of the FFH, there was a steep decrease in public housing development.

During this period, Porto's suffered an overall decrease in the number of residents, with some of its peripheral areas maintaining a constant population, and only one of its parishes registering population growth. However, if population density decreased in the city, the number of resident families decreased significantly in the city centre, while displaying minor growth in peripheral industrial parishes during these years. Similarly, adjacent municipalities continued to show growth, albeit at a slower rate than before. As population growth slowed down, housing density increased in Porto and its surrounding areas (figure 12.24.). Simultaneously, the type of housing shortage that can be detected through censuses appears to have substantially decreased while being progressively pushed away from Porto (figure 12.26.) to areas that, while not registering a considerable population growth, register a decrease of existing housing. Similarly, if the 1991 census registers very few instances of fewer houses than families, with only one of the overcrowded parishes

109 A variety of sources were consulted, mainly the current housing stock of municipalities and the State institution for housing and urban renewal (IHRU), but also information gathered from the reviewed literature. The resulting data can be seen in figure 12.23.. In some cases, the exact location of developments could not be found and the placement of the marker represents an estimation.





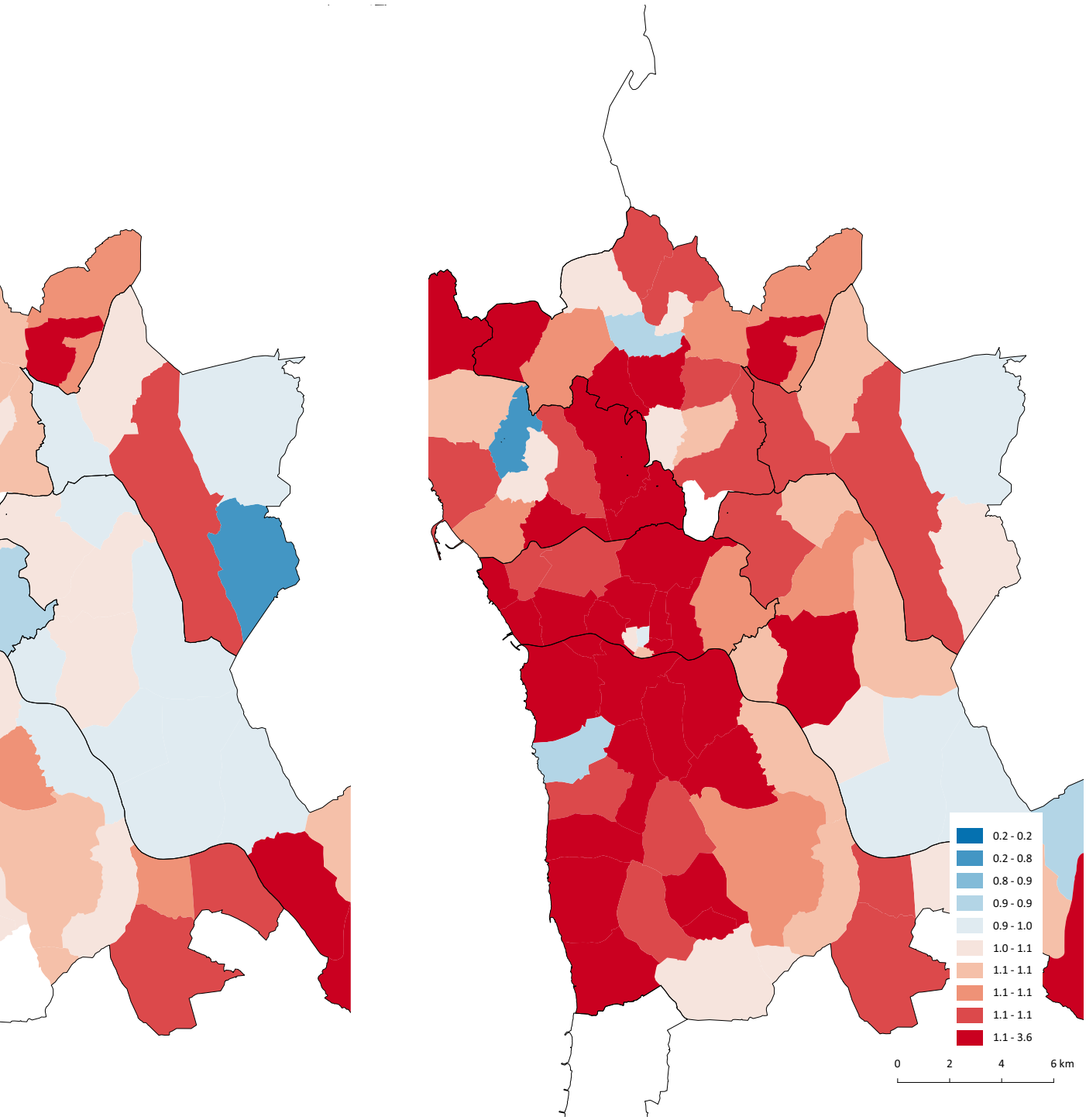


FIGURE 12.26.
Housing per family in 1970 (left), 1981 (middle), and 1991 (right)
Map constructed with information from the 1981 and 1991's census, available at www.ine.pt





FIGURE 12.27.
Bairro SAAL Quinta das Fonsecas, Lisbon (top)
Photograph by Clement Guillaume. https://www.flickr.com/photos/clementguillaume
FIGURE 12.28.
Bairro SAAL da Meia Praia/25 de Abril, Lagos (bottom)
Image from Google street view, 2019. www.maps.google.com

in the city centre maintaining a gap between the number of families and existing housing, this appears to be mostly due to the depopulation of these areas, as the census registers a smaller number of houses than ten years before.

	Porto	Adjacent cities	Total
Houses per family 1970	- 210	- 4 856	- 5 066
Houses per family 1981	- 1 282	18 699	17 417
Houses per family 1991	13 861	25 093	38 954
Population per family 1970	3.72	3.64	3.67
Population per family 19781	3.35	3.71	3.59
Population per family 1991	3.04	3.25	3.19

TABLE 12.11.
Houses and population per family in Porto and its adjacent cities in 1970, 1981, 1991
Table constructed with information from the 1970, 1981 and 1991 census, available at www.ine.pt

However, in 1993, a state rehousing programme for the abolishing of slums in Lisbon and Porto's metropolitan areas (*Programa Especial de Realojamento,* PER) was implemented, which detected 15 000 families living in slums in the AMP. It was through the same programme, as well as through the maintenance of cooperative housing that public and cooperative housing began being developed again from the ninety-nineties onwards. While a national programme, the PER is not centralised but instead consists of the funding of councils for housing development or purchase, and is likely to have a different impact in each different municipality. Simultaneously, cooperative housing has progressively become more targeted to middle-class families, and less articulated with municipal plans. Following a period of scarce public investment, housing development resumed in Porto's adjacent cities with a significant amount of developed or acquired houses.

The short reading of Porto's growth as a part of a broader developing urban system provides an additional layer for the understanding of the programmes studied throughout this dissertation, concerning how these looked and acted at the global scale. When looking at the articulation between the programmes' realisations and urban growth in Porto and its adjacent cities, the divisions that can be drawn do not directly relate to the scope of operation of each particular programme. For example, it has been discussed in chapter 9 how the PMCP, a municipal housing programme connected to a municipal urban plan, was connected to a strategy of urban development that privileged car mobility through the introduction of heavy infrastructure in the street grid, and which propelled urban sprawl towards adjacent municipalities at the expense of the local network. As also seen in relation to the PMCP, these divisions appear to be reflected not only in the way programmes built estates throughout the territory but also in where these are located in Porto itself. The urbanisation of suburban areas connected to an urban plan that neglected local centralities is reflected both in the peripheral location of most PMCP estates, as well as in the deep and poorly integrated character of their configurations.

In opposition, SAAL and other housing developments for residents associations during the mid to late-1970s acted globally at the local scale. As a national policy, its framework admitted

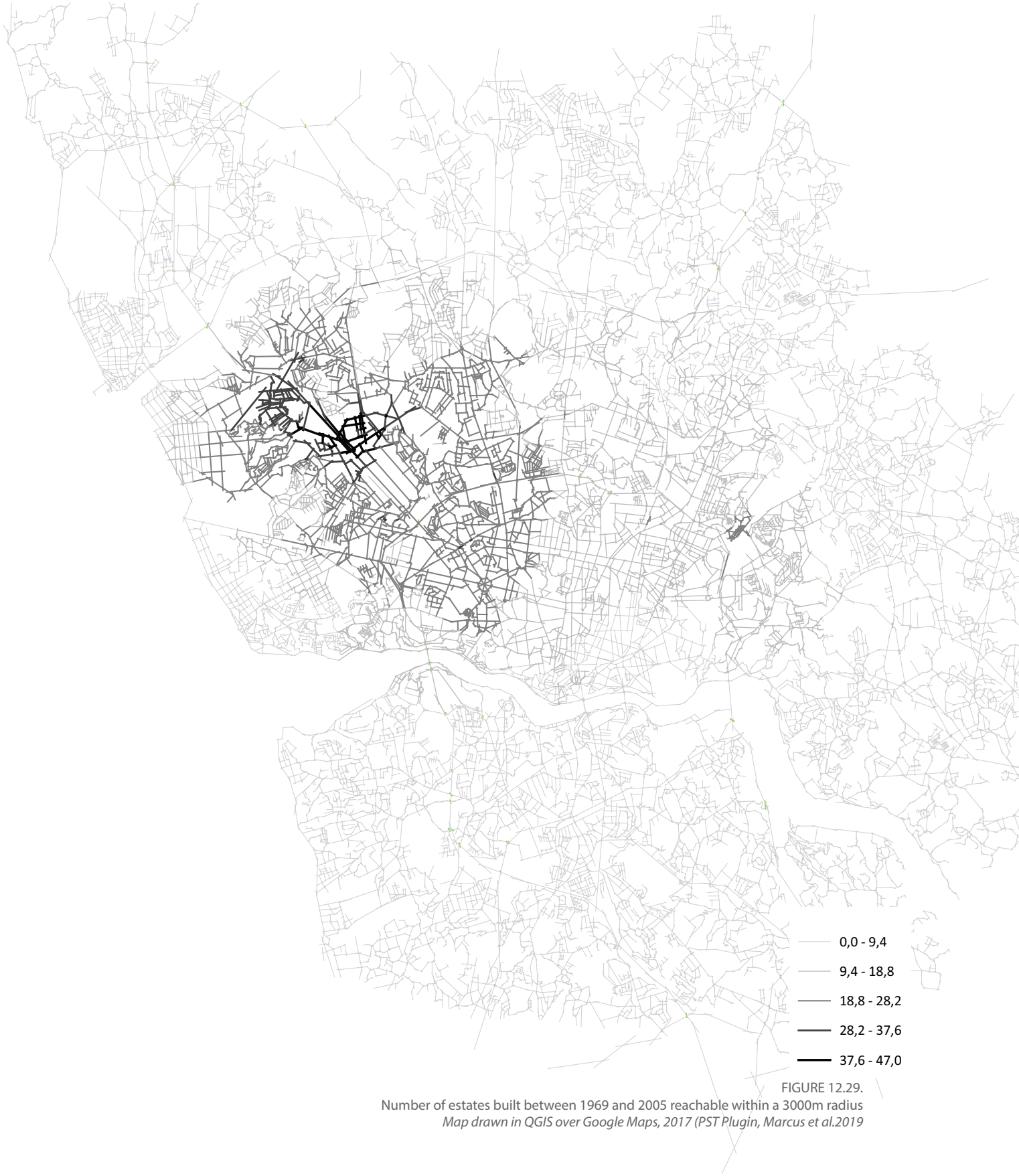


FIGURE 12.29.
Number of estates built between 1969 and 2005 reachable within a 3000m radius
Map drawn in QGIS over Google Maps, 2017 (PST Plugin, Marcus et al.2019



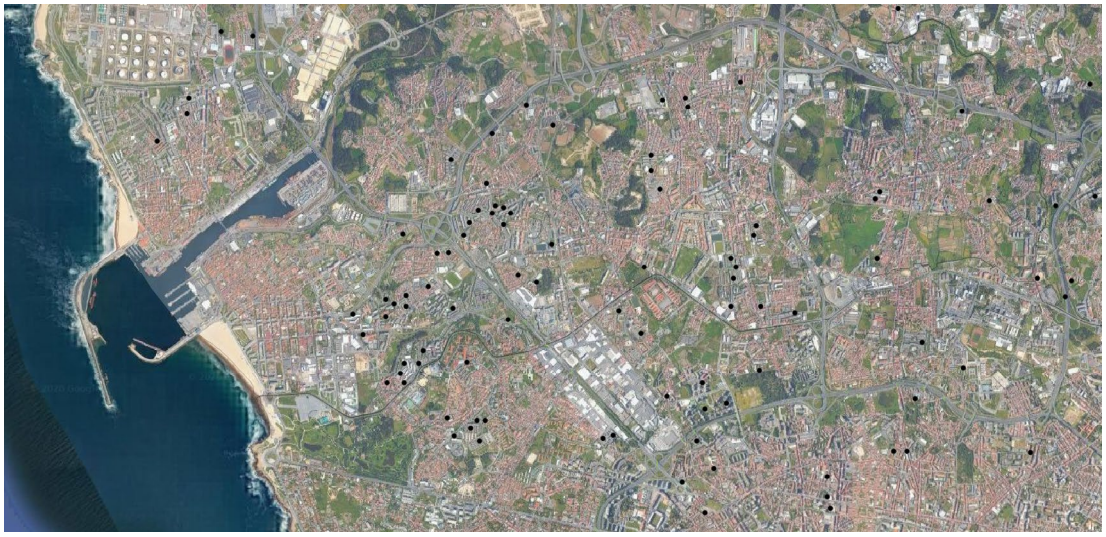




FIGURE 12.30.
NaIN r5000 with estates built between 1969 and 2005 (top)
Figure 12.31.
Satellite views of estates built in Porto between 1969 and 2005 concentrated in industrial areas (bottom)
Images from Google Maps 2019

different strategies for the specific problems of each local situation. This translates both in the location of its developments in areas where housing was often either lacking or degraded and their frequent disarticulation with the street grid, as well as in the diversity of configurations that reflected different problems, conceptions and processes (figures 12.27 and 12.28).

The global character of the SAAL is furthermore inseparable from the systemic approach to housing development that included a series of other programmes such as, of particular importance in the case of Porto and its neighbouring cities, cooperative housing and direct State development. With Porto as the viewpoint, we have seen how these represented a clear shift from PMCP developments. Zooming out, state and cooperative housing developed in this period appear in significant part responsible for the shaping and development of Porto's suburbs and its relation with the adjacent cities, in a way that can be understood only by looking at their developments in neighbouring municipalities, but which can then be seen reflected in the urban insertion and configuration of estates within Porto as well.

Observing figures 12.29. and 12.31., it can be seen that housing development during the late 1970s and early 1980s appears to be concentrated in the extended industrial area that goes from Porto to the port in Matosinhos, which significantly grew between the ninety-seventies and ninety-eighties. While this is an area marked by heavy infrastructure that pierces into the continuity of the urban fabric, the concentration of housing development that can be observed there is not split according to administrative borders, but appears to represent a sole strategy of urban insertion, where the two municipalities developed together. The privilege assigned to glocal connections over local networks appears to be stronger outside the limits of Porto, and the areas left in between highways where these estates were developed present overall small integration values (figure 12.30.), substantially lower than those registered for FHH and cooperative developments within Porto. Nevertheless, this area continued to grow associated with public housing throughout the ninety-nineties and extended towards a further out industrial pole.

This chapter highlights the potential importance of diachronic spatial analysis in furthering the results obtained in this research, as well as of a more extensive study of public and cooperative housing configurational attributes. It would be important, in the future, to explore whether the trends observed in Porto's housing developments across time and across programmes are stable across municipalities, and how they relate to changing urban densities and patterns of local and global integration and choice.

13. Final Considerations

DISMANTLING PUBLIC HOUSING

More or less gradually, the housing programmes developed in the revolutionary period came to an end. Similarly, institutional research for supporting housing development started withering away after the mid-1970s:

> Inexplicably, the line of interdisciplinary research on ways of life started in the LNEC did not continue after the decade of 1970, when cooperative experience, including the SAAL, and other public forms of housing development might offer new empirical data for durable answers, both regarding interior spaces and, especially, regarding private or of collective use exterior spaces. Studies, generally sporadic, about pathologies in the so-called critical neighbourhoods or mobility management in social estates stopped being intersected with design options regarding systems of spaces, domestic or urban. (Portas 2013, p.109) [110]

The SAAL programme had found increasing resistance throughout its short period of existence, in the form of bureaucratic hindrances by the municipalities, difficulties in conducting expropriations and lack of funding or wage payment by the FFH. From 1976, it gradually disappeared after an Executive Order put an end to the SAAL as a service within the FFH[111], and in turn, made it dependent on the willingness of municipalities to carry on the process. After what was called the Ongoing Revolutionary Process (PREC) ended, the then Minister for Housing, Urbanism and Construction Eduardo Pereira made it clear in the French journal Le Monde Diplomatique that:

> The Revolutionary Residents Movement grew to such an extent and virulence that it is not possible to maintain it after the 25th of November. We are not in a revolutionary phase anymore. At present, we are in a state of legality, a democratic state of the country's development. It is consequently necessary to give guarantees to private initiative so that it will once again invest in construction (Eduardo Pereira, in Costa, 2019, p.106).

So while the programme was not extinct but ended as an autonomous technical service provided by the state, its continuation was made progressively impracticable both by direct legislation regulating it, and by the continuous economic liberalisation of the country - where the expropriation of profitable land, legalisation of occupations or any other obstacles to private investment could no longer be acceptable, as there was no longer place within the new economical and political

system for a strong popular movement that effectively participated in decision making[112]. From that point on, as we have seen, some former SAAL projects were built as cooperative housing or handled by the municipalities as they saw fit..

However, if it was the revolutionary character of the residents' movement that was explicitly counterpointed to the "regularisation of Portuguese democracy", it was not just the SAAL that became incompatible with the country's liberalisation. In this sense, Bandeirinha (2018) draws a parallel between the FFH's history and IMF's (International Monetary Fund) intervention in the country: between 1978 and 1979 aids to housing cooperatives are cut as a direct consequence of IMF mandated cuts on public expenses, in 1980 the FFH closed down the Integrated Plans programme while simultaneously increasing incentives for private house acquisition. In 1982, as the country established a second deal with the IMF, the FFH was terminated as a legal entity and, as its responsibilities were transferred to the municipalities and successively other state institutions were created with a less interventionalist strategy, the state effectively removed itself from a systemic role of housing development[113]. Similarly, while cooperative housing still exist and continue to benefit from a specific legal framework, it is today very distant from the initial purposes of Economic Housing Cooperatives.

While it lasted, the structured set of housing programmes studied throughout this dissertation had a direct impact on a significant amount of families in need. Simultaneously, thought out at all scales it could, if for a limited time, intervene to some extent in the way the urban space grew, and organised groups and classes within itself. Purposefully acting from outside the laws of real estate market, it is housing policy that has the capacity to support an architecture that is less determined by it:

112 The right to a participative democracy remains guaranteed in the Constitution of the Portuguese Republic until this day, after in 1982, the same year the FFH was terminated, article 2 of the constitution was altered from "the creation of conditions for the democratic practice of power by the working classes" (*"a criação de condições para o exercício democrático do poder pelas classes trabalhadoras"* (Constituição da República Portuguesa, 1976)) to "the realisation of economical, social and cultural democracy and the deepening of participative democracy" (*"realização da democracia económica, social e cultural e aprofundamento da democracia participativa"* (Diário da República, I série, Nº 227, 1982, Lei Constitucional 1/82 - Primeira revisão da constituição).

113 Since the extinction of the FFH in 1982, the role of State's institutions has been one of funding, managing and selling housing. The INH (*Instituto Nacional da Habitação*, National Institute for Housing), which replaced the FFH in 1984, was not assigned the same competences regarding urban policy and development, and should only manage existing public housing and provide funding to public or private initiative (decree-law 177/84). The IGAPHE (I*nstituto de Gestão e Alienação do Património Habitacional do Estado*, Institute for the Management and Disposal of the States Housing Patrimony), created in 1987, claimed the "the failure of housing policy direct housing development by central administration" and had as its objective the disposal of a great part of the State's housing stock (decre-law 88/87). In 2007, the Institute for Housing and Urban Rehabilitation (IHRU, *Instituto da Habitação e Reabilitação Urbana*) replaced the INH with broader competences at the level of urban and territorial planning, as well as a closer relationship with local institutions. However, it maintains no role in housing development (decree-law 175/2012).

> The architecture we do, for example, is a result of the definition of dominant typologies and these of the processes of production and creation of the city. Typology is, in a way the skeleton, the basic structure in the spatial organisation of an architecture and, at the same time, it has implicit or informs the concept of urban space. That typology is not something that architects can use as they will, but a result of the rules of the game of the economic and property system, and as well of preferences and the dominant taste, be it the taste of promoters, be it the taste of consumers - factors which, therefore, are projected on the production system of architecture, and that end up fixing certain typologies, according to common urban situations, investment capacity, technologies used by enterprises, etc.[114] (Portas, 1979, p.59-60)

It has, in this sense, been the point of this thesis that the role of institutions is not limited to whether public housing gets to be developed or not, and in which conditions it is made available to the families that need it. Understanding their role in the city meant, instead, looking at public housing promotion in Porto from the late 1960s to the early 1980s and searching to understand both through which processes it shaped the city, and in which ways it did so.

CONTRADICTION IN THE PROCESS OF PRODUCTION OF PRE-REVOLUTIONARY ESTATES AND THE ROLE OF TIME IN THEIR APPROPRIATION

The question of whether public housing even exists has much to do with institutional power, its legal and ideological apparatus, in its relation to the power balance of its time - both between different facets of capital and between capital and popular pressure - and to its material constraints.

It is easy to see how the estates produced within the PMCP are a result of a strategy of urban growth and transformation that required the freeing up of the overcrowded and overwhelmingly poor areas of the centre of the city, and which, after decades of social pressure around an ultimately unsustainable situation for the city's development, could not be achieved without the implementation of collective housing typologies that were contrary to a set of ideas put forth during the previous decades by the state's ideological apparatus. The adoption and adaption of these typologies to the state's interests serves as an illustration of how the ideological superstructure adapts to the material basis, as the intense ideological struggle surrounding collective housing stopped being an issue when it was no longer sustainable or necessary to avoid it. Simultaneously, the inevitable period of transition between "the small independent house sheltering the family which owns it in earnest" (Salazar in Cardoso, 1983) and the collective naturalisation of a new form of habitat also served its ideological purpose, by enforcing supposedly natural stigmatisation of the families that lived in council estates, and creating an opposition - or at least a differentiation, in the Harveyan sense, as the process through which capital breaks down the working class into different groups and thus diminishes the risk of unity - between the residents of the new estates and other forms of the working class, from the poor families living in *ilhas* to the white-collar



FIGURE 13.1
PMCP's layouts Dr. Nuno Pinheiro Torres (3) (left and center) and Monte da Bela (4) (right)
Photographs taken by the author between 2016 and 2020

workers of economical housing developments.

The second question requires that one examines the material results of these processes. If the Improvements Plan for Porto may have worked towards the substitution of the new, modern plan of the city with one that fitted better with the regime's need for working-class segregation and the freeing up of the historical centre in what can be understood as the first big step towards its gentrification, it also resulted in the development of 21 estates and around 8 300 houses - an enterprise that was unique in the city's history - and in the rehousing of one-fifth of all *ilhas* residents.

The following question must be in what conditions were these eight thousand families housed.

The location of these new neighbourhoods not only in what were at the time suburban areas but in the backs of large but sparsely urbanised lots, also contributed for council housing to function as a mechanism of classification and differentiation of their residents. With only a few connections to an urban structure they were deep from, these large developments correspond neatly both to Marcuse's definition of segregation, and to Hillier and Hanson's (1984) conception of an estate, as well as of the hard solution for solving the contradictions between the social logic of space and the social requirements of a capitalist society. There is often a strong outer boundary, sometimes doubly formed both by the inwards orientation of buildings and the wall of existing houses between the estate and the main street to which they are connected by a few entrances controlled by an overseer. They are constituted by separate blocks and staircases that function towards separating the large group of people it houses into smaller and smaller units by "using non-distributed syntaxes" that mimic those of capitalist society. If here these attributes are further associated to a highly hierarchic corporatist regime, they have been produced by a variety of political systems and are, for example, also clear in the spatial configuration of *ilhas*.

It is also through these design mechanisms that a feeling of other is created towards these estates, a material concretisation of the ideological othering and stigmatisation of the families in council housing. These spaces - like these families - are not designed to feel like part of the city. These new urban morphologies, displaying a different architectural language than what existed before, are hidden away by fragments of the traditional city. Inside these clusters, there seems to prevail an idea of neighbourhood-unit that was more an aspiration of the architects than a conceived necessity by institutional power. While the estates' designs often included collective spaces, these were rarely built, and frequently only by action of the municipally funded religious institution in charge of social support in council estates. The configuration of the layouts was enough to set them as separate from the city without imposing functional independence that might increase the estates' communitarian character. Consequently, the social equipment that had the potential to ameliorate the lives of these families was often only constructed after years of organised struggle.

In Queirós (2019, p.32) a resident of Aleixo tells of his experience as he first arrived in his new house: "I, for example, got lost! (...) when I opened the door... [laughs] it was all empty inside, there was nothing marking the entrance and exit! I closed the door. Well, inside everything was the same, outside it was still yellow. In the gallery it was yellow and it was recognisable, but there in the bedroom... 'Where is the exit? I never saw a house like this...' And, in this case, I stepped into a room, got out from another room, walked through the same, because there was even a room that had a [partition], had one of those wooden things... 'Woah!'. Then, when people started to see it with their own eyes they said: 'Wow!' And the admiration: "It has a bathroom!'. Just that was really good. Sometimes, [in Ribeira] we washed our faces in a little basin. At the house [in Aleixo], we had a washbasin and a toilet. We had a bathtub for washing... Well, this started to mess with their had and many of them now wanted to come, but they hadn't done the survey."[115]

Simultaneously, however, these estates were the clear product of a strong investment by the municipality. Unlike the mass-produced housing that was later developed by the FFH, these layouts were varied. The time and work dedicated to resolving each situation are revealed in the clear references both to the ideals explicit in the 1948 congress and to the departure from the same modernist tendencies seen in the 1960 and 1969 congresses, as well as in the involvement of LNEC researchers in the design process of carefully designed, often complex, apartment schemes. As such, if these layouts were, by large, the smallest publicly developed houses built between 1969 and 1982, with every apartment scheme failing to comply with the minimal areas defined within the LNEC (Portas, 1969), but were also undoubtedly larger than the standard *ilha*, the investment in architecture that can be seen in the layouts appears to have resulted in making the best of a bad situation. Whether or not a result of area economy constraints, these layouts are characterised by the articulation of kitchen and living-room in almost all layouts, creating a highly integrated, albeit small, social pole, with highly integrated kitchens. These attributes are rare across other programmes and the data of the Survey on Urban Housing's (Pereira & Gago, 1984) suggest they might contribute to the emancipatory potential of the house for women as defined in the context of this dissertation. Although also a likely result of the houses' smallness, these apartments present some of the most architecturally complex schemes, with exceptionally ringy configurations and, in particular, transitions spaces.

Looking just at these earlier housing developments, it does seem clear that whether in shaping the city they shaped the expression of class or gender relations in space, there is at least an underlying intent or view, coherent in its relation to the most obvious variables. But there has been grounded social theory and sociological research to provide the basis for the common criticism made of council housing in Porto in particular and of estate housing in general, that taking chunks of the population from the urbanity and habitat they were rooted in and displacing them into these places represents a brutal removal from the ways of life that have formed their identities. Regarding Porto - as in varied cases across post-war Europe - there is a focus on a lost communal life that had the street as its locus. In the old centre of Ribeira-Barredo, Queirós (2015,

115 "Eu, por exemplo, perdi-me! Sinceramente [quando entrei na casa nova,] perdi-me, porque, parece que já disse - lá na Comissão [de Moradores do Barredo] tinha-se pra todos os que lá estavam, que nem todos vieram, e, então, que fosse feito assim: pelo menos as pessoas que vão da Comissão, que têm trabalhado, têm perdido tempo, têm andado a tratar, (...) como recompensa a estas pessoas que trabalham, podem escolher o andar. O andar! A casa era conforme o agregado familiar. O que era para os outros era para mim. (...) Então eu escolhi o quarto andar e fui lá prà primeira torre e, quando abri a porta... [ri] tudo vazio lá dentro, não havia nada que marcasse qual era a entrada e a saída! Fechei a porta. Ora, por dentro era tudo igual, por fora ainda era amarelo. Na parte da galeria era amarelo e conhecia-se, mas ali pràquele quarto... «Por onde é que eu hei de sair? Nunca vi uma casa assim...». E, neste caso, entrava num quarto, saía do outro, passava pró mesmo, porque até havia um quarto que tinha [divisória], tinha aquelas coisas de madeira e tal... «Ei, pá!». Depois, quando aquela gente começou a ver com os seus próprios olhos, disseram: «Ó pá!». e a admiração: «Tem quarto de banho!». Só isso era muito bom. Por vezes, [na Ribeira] a gente lavava a cara numa baciazita. Na casa [do Bairro do Aleixo], a gente já tinha lavatório e sanita. Tinha banheira para o dito banho... Ora, isto começou logo a mexer-lhes na cabeça e depois muitos já queriam vir, mas não tinham o inquérito feito." Translated by the author.



FIGURE 13.2.
PMCP's layout José Falcão
Photograph taken by the author between 2016 and 2020

p.75) speaks of:

> Contexts of learning, expression, sociability and mutual recognition, these interaction frameworks favoured the deepening of inter-awareness and consolidated feelings of belonging, contributing to reinforcing the degree of local habitus, interaction, and to reinstating some pride and notion of self-worth in social agents used to material and symbolic subordination.[116]

By taking the communal life away from these populations, they were also being stripped of their pride and notion of self-worth. To this is added the stigmatisation of poverty that seems to be spatially concretised in the form of segregated clusters of these new developments. Guerra (1994, p.11), who argues that "The problem with relocation is, first of all, a social problem and not a buildings' problem, because people are not things that you can put in drawers"[117], adds that one of the more significant problems with housing estates is that the way they are seen. "[…] that public image socially devalued"[118] is interiorised by residents, who then project it and attribute it to elements of the neighbourhood or of the estate itself. This idea is also explored in Queirós' (2019) examination of *Aleixo*'s (layout 8) life, where it is shown how the residents' view of themselves as a group characterised by a preponderance of prostitutes and drug dealers did not correspond to reality, but a media-constructed narrative.

This communal-life-in-the-street is strictly connected to the impossibility of a domestic-life-in-the-house. Again regarding the old centre of Porto during the 1960s, Queirós (2015, p.74) explains this bi-directional relation:

> Facing the constricting and often repulsive character of the domestic domain, it is not surprising that public space assumed a significative personal and collective importance. It not only provided access to essential material resources but was also the stage of social and symbolic exchanges of great importance for the generality of those who frequented it.[119]

116 "Contextos de aprendizagem, expressividade, sociabilidade e reconhecimento mútuo, estes quadros de interação faavoreciam o aprofundamento do interconhecimento e consolidavam sentimentos de pertença, contribuindo para reforçar o grau de interação de matriz local de habitus e para reinstituir algum orgulho e autoestima em agentes sociais acostumados a subordinação material e simbólica." Translated by the author.

117 "O problema do realojamento é, antes de mais, um problema social e não um problema de edifícios, tudo isto porque as pessoas não são coisas que se metam em gavetas." Translated by the author.

118 "Os moradores destes bairros […] interiorizam essa imagem pública socialmente desvaloriada, atribuindo-a a determinados elementos do próprio bairro." Translated by the author.

119 "Perante o caráter constritor e o mais das vezes repulsivo do reduto doméstico, não surpreende que o espaço público assumisse aqui uma significativa importância pessoal e colectiva. Ele não só proporcionava acesso a recursos materiais imrescindíveis, como era palco das trocas sociais e simbólicas de grande relevânca para a generalidade dos que o frequentavam; neste sentido, o espaço público era alvo de estratégias de apropriação sui generis. Assumindo



FIGURE 13.3.
PMCP's layout Bom Pastor (7)
Photograph taken by the author between 2016 and 2020

An idea which is reiterated by Freitas (1994) and Costa Pinto (1994), who have noted, in studying displaced families after having been rehoused in public housing estates, that an "(…) overvaluation of the house within the residential space hides the true face of appreciation and estimation of the latter, 'inflating' the levels of satisfaction towards the estate."[120] (Costa Pinto, 1994, p.37). In this sense, it seems to be difficult for families who used to live in overcrowded slums to be unhappy when being assigned a new, habitable, house, even when everything else is amiss. On a side-note for the continuation of this text, that this "inflating" of contentedness seem to be the higher "when access to a house seems to epitomise the life projects of these subjects, in the past, and possible command those of the future", when it is "the reason of multiples economy efforts, the main destiny of material and affective investment"[121] (Costa Pinto, 1994, p.37), is of particular importance when we take in consideration not only those families who were in the way of a new urban plan and were thus displaced without being able to speak a word on the subject but also those who, after 1974, fought avidly for their right to proper housing.

While people being generally happy when they are given access to proper housing seems to be on the whole a good thing, Freitas (1994) makes the argument that it is one of the reasons why relocation often results in a "double-isolation" where, on the one side, houses are better and invite a more intense familiar life, and, on the other side, the type of socialisation-on-the-street that families were used to is no longer possible in the same form. In Freitas (1994, p.29, a resident talks about how she feels about her house:

> I mean, I like it (the street), but I liked the other one more in this sense: if I wanted to do a barbecue, I would and here I can't, and that is what I miss; in the summer we would put a blanket on the street, lay down, and here we are not going to do that! That is what I miss about the street, and I liked the street there.Not the house, I didn't like the house… but the street.[122]

um valor difícil de aferir e compreender pelos que a ele apenas ocasional e brevemente acediam" Translated by the author.

120 "Esta sobrevalorização da casa no quadro do espaço residencial oculta a verdadeira face da apreciação e do gosto dirigidos a este último, fazendo "inflacionar" os níveis de satisfação para com o bairro." Translated by the author.

121 "Este facto é tanto mais importante quanto o acesso a uma casa parece resumir os projectos de vida destes sujeitos, no passado, e comandar, possivelmente, os do futuro. A casa foi e é a razão de múltiplos esforços de poupança, principal destinatária de investimentos materiais e afectivos, tornando-se agora o principal palco da vida quotidiana.
(…) Assim, a satisfação pela casa tem que ser interpretada na forma dupla de projecto/sonho concretizado e de melhoria substantiva das condições de vida." Translated by the author.

122 "Quer dizer, gostar (da rua), gosto, mas gostava mais da outra, neste aspecto: uma pessoa se queria fazer uma sardinhada, fazia e aqui não dá, e é disso que eu tenho saudades; no verão a gente punha um cobertor na rua, deitava-se, e aqui não vamos fazer isso! É nisso que eu tenho saudades da rua, e gostava lá da rua. Não é da casa, que eu da casa não gostava… é da rua!" Translated by the author.



FIGURE 13.4.
PMCP's layout Aleixo (8)
Photograph by Leonel de Castro/Global Imagens, https://www.noticiasmagazine.pt/2018/aleixo-vida-um-bairro-no-corredor-da-morte/historias/233373/

A double isolation that was, of course, tougher on non-working residents, mainly women and the elderly, who were more dependent on spatial relationships over extra spatial ones. This issue is approached by Costa Pinto, who presents, in particular in relation to women, the growing investment in the domestic environment to exist at the expense of disinvestment in the exterior space, and by Freitas, who argues that as the house gains importance, being for the first time the centre of these families' everyday lives, so does the idea of privacy. Parted from a life that was spent outside, families start rearranging living-rooms so that they cannot be seen from the front door. And parted from an overcrowded domestic environment where all space was shared, family members started investing in their own rooms.

So it does seem to be true that there was one sort of double inadequacy of architecture to the ways of life of the people that were displaced to the housing estates, as they were simultaneously assigned a house that facilitated domestic relationships that were either uncommon or disregarded aspects of it that were essential, and a neighbourhood with which contact would have to be established in entirely new forms. Furthermore, in the specific context where they were first implemented, the right to these houses was heavily dependent on a strict moral and political regulation. When this is articulated with a sort of double segregation happening both at the larger urban scale, caused by the peripheral location of the estates and at the scale of their insertion and relationship to the surrounding city, resultant of its introverted character in the inside or urban lots, it seems adequate that these estates and the relocation process they were associated with are seen as having problematic characteristics.

However, as Queirós (2019) points out in his thorough examination of the process which culminated in the demolition of Aleixo (layout 8), by the time the populations of the city centre were removed to peripheral areas, the centre had suffered transformations that were significant to their residents' urbanity. As jobs and equipment were removed from this centre, the process of displacement of its residents started before they were relocated to other parts of the city, through the erasure of the characteristics that supported their daily lives.

If looking back in history to understand through which processes public housing was developed in Porto, and looking at their material, artefactual, concretisation does seem to inform both the understanding of these processes and its consequences, it is also necessary to understand that these processes did not stop. Harvey (1985) contends that urbanisation is not a physical artefact but a process which depends on the circulation of capital, of changes in the spatial organisation of production, in the geopolitical conflicts between territory-based class alliances. Borrowing from this view, to study the urbanisation of publicly funded housing as "as it unfolds through the production of physical and social landscapes and the production of consciousness" (Harvey 1985, p.xvi), the above-listed characteristics cannot be accepted as being frozen in time.

Time, it appears, acts on the artefactual nature of the built environment in a twofold manner.







FIGURE 13.5.
PMCP's layout Contumil (9)
Photographs taken by the author between 2016 and 2020

First, because while the oldest building studied in this dissertation has remained structurally unchanged for, at the time this is being written, fifty-one years, the same is not true for the city around it. In fifty-one years, parts of what was the city's periphery have become urbanised, integrated, and so well connected to the broader urban system that they are now considered to be central. Around the inward-looking estates, local centralities have developed - while the morphology of the estates remains unaltered, and they remain unlikely to be centres of through or to-movement today, its residents are now spatially integrated with an outside world of a local scale that may allow for their social integration in a neighbourhood larger than the estate. Similarly, the places of origin of the displaced populations had also been changed from economic poles characterised by employment opportunities or local economies, and then further changed in their tertiarisation and subsequent touristification.

Secondly, it is not only physical change that alters the meaning of a spatial configuration. It is telling that the inadequacies identified in the new estates in relation to the old ways of life of these populations seem to go in the direction of the transformations in the ways families globally related to their life at home as identified by Portas in the 1950s. If houses were inadequate to how people used to live, they didn't seem to be contrary to how they were tendentially starting to live. Chapter 4 has shown how Portas had identified a tendency for neighbourhood relations to decline and for family life to gain a more collective character, which was independent of spatial transformations. This was characterised by more time spent at home by families that started to depend on extra spatial over spatial relations. All tendencies which he, through legislation, and architects through their action in space, made attempts to counter in the first years after 1974.

Similarly, the hierarchical character of PMCP estates, with its small number of connections to the exterior city, would have a different meaning in the lives of its residents after the demise of overseers in estates and the extinction of the authoritarian municipal housing regulation. If both spatial configuration and a repressive state and legal apparatus were not enough to prevent residents' organisation and collective struggle in some of these estates even during the dictatorship, after these constraints were gone, it were the same spatial - functional and configurational - conditions that socially segregated PMCP estates that were the focus of their residents' mobilisation. If it was a fascist regime that determined the spatial configuration of municipal estates in Porto, it has been examined before in this dissertation that as "institutional power, its legal and ideological apparatus, in its relation to the social power balance of its time - both between different facets of capital and between capital and popular pressure - and to its material constraints" changed, it seems that it was this same spatial configuration that provided the conditions for some of the most immediate and stronger displays of popular organisation. Because space is the product and support of society, as social consciousness changes, so does the social meaning of space.



FIGURE 13.6.
SAAL's layout Antas (10)
Photographs taken by the author between 2016 and 2020

THE GENOTYPE OF PARTICIPATION AS AN ARCHITECTURAL PROCESS

In this sense, the shift in social forces and the political apparatus after 1974 could have consequences in the meaning of something as static as the housing estates, and have a larger impact in the way policies and ideas that had been brewing for at least half a decade were implemented from that moment on. Chapter 5 has shown that, like the residents' manifestation on May Day, the programmes that were transformed, introduced and implemented after 1974 did not appear from thin air. The role of the state as a house developer rather than simply an organiser of public funding had been established with the creation of the FFH seven years before housing was determined to be a universal right in the Constitution of 1976. A role that, even after 1974, materialised in housing programmes which, as Bandeirinha (2018, p.277) points out, did not "[...] articulate social housing development with a transformation of the renting market. It is, in fact, possible to argue that all programmes contribute to the state promotion of urban 'private housing' […]"[123]. The incentive to credit, private property and private initiative became more prevalent in later years but could not be avoided in the earlier years after 1974. Moreover, FFH's directly developed estates could be acquired, and even the SAAL, the first programme to come out of the revolution, gave impoverished populations access to private housing.

However, there was a paradigm shift in the way of looking at and approaching the development of public housing that took place after 1974 and which was clearly expressed in successive programmes and legislation. The PMCP had offered one specific response to one specific problem, both, if nothing else due to its nature as a municipal strategy, artificially approached as if contained within the limits of the city. An artificiality whose limitations were empirically detected and exposed by the team in charge of the ERUB:

> And a global view of the city implies, naturally, a regional view, mainly in what regards the nearest municipalities. By demolishing the Bairro de Xangai, in the periphery, Porto's City Hall rehoused a great percentage of residents who work in Matosinhos [Porto's adjacent municipality]; the execution of the Improvements Plan has entailed known consequences in neighbouring cities to which Porto's residents move to, victims of the demolishing of their houses, who do not accept council relocation and who can't ding in the City housing conditions according to their possibilities. Two problems of the complex housing phenomenon that isn't compatible with administrative limits and which only an efficient Municipalities' Federation, supported on an essential Regional Plan, could solve in their totality.[124] (Távora, 1969/2019, p.140-141)

123 "É aliás possível argumentar que todos os programas contribuem para o fomento estatal da «casa própria» urbana, privilegiando a propriedade em relação ao arrendamento, e — tendo em conta a longa duração — intensificando a implementação de uma ambição do regime desde os anos 30: a harmonia social através da generalização da propriedade habitacional." Translated from Portuguese to English by the author of this dissertation.

124 **"**E uma visão global da Cidade implica, naturalmente, uma visão regional da mesma, sobretudo no que respeita aos municípios mais próximos. Ao demolir o Bairro de Xangai, na periferia, a Câmara Municipal do

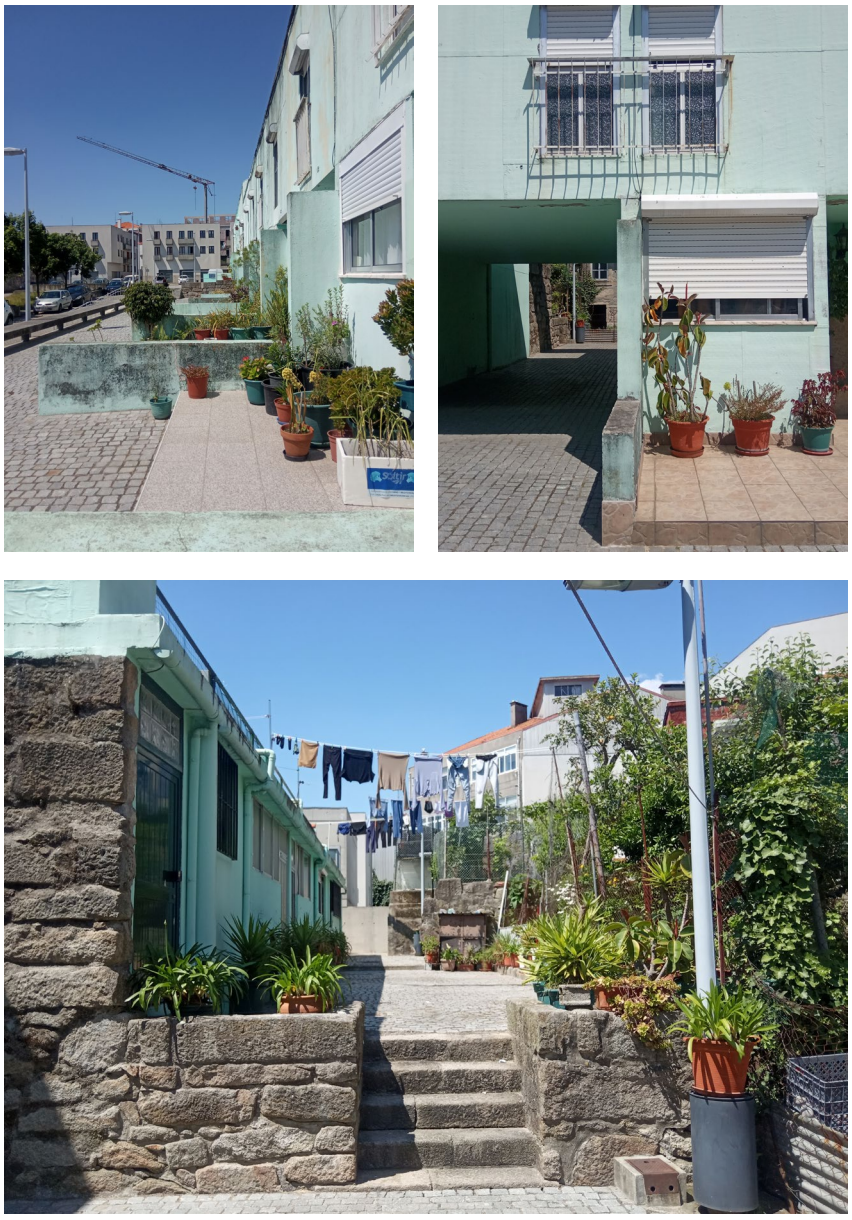


FIGURE 13.7
SAAL's layout São Victor (11)
Photographs taken by the author between 2016 and 2020

In opposition, direct development of public housing by central state institutions as existed before 1974 would also not be able to respond adequately to the housing shortage in the city. The innovation of the FFH after the revolution laid in its systemic character as a solution for a systemic problem; a problem which, in Porto, encompassed not only the residents of ilhas but also the mass of the population living in overcrowded rooms and apartments in the old centre, as well as the families integrated into a process of relocation that had lasted for almost 20 years and who had been rehoused in municipal estates for which the construction of urban equipment, services and infrastructures had often been neglected. Because its importance laid in the specificity of each of its programmes, this research focused on identifying patterns that allowed to understand each in its own particularities.

The way these programmes were created and the moments in which they appeared, as well as the relation demonstrated by Bandeirinha (2014) between FFH's action and the country's economic situation, show that the fact that the set of housing policies that existed in different shapes during the first decade after the revolution arose from previous experiences and research, and was a direct descendant, if not the continuation, of the transformations in the approach to housing and urbanism by a liberalising state apparatus after the late 1960s, does not mean that it was not a product of the conditions of its time.

In particular, in regards to the SAAL, it is an ongoing discussion whether the programme was created as a response to popular organisation - either as a means to pacify the growing occupations of vacant but private housing (Byrne in Bandeirinha, 2007), or as a way to support and guide this organisation - or if, as Portas (1986, p.636) argued

> Contrarily to what was said, it was not a response to the squatting movement that took us to search new forms, I don't believe there was, not even subjectively, a direct relation between the occupations and the launching of new programmes as the SAAL, or the rehabilitation of Barredo in Porto, or the creation of new conditions for housing cooperatives - all of which measures from the first six months after the 25th of April.
>
> In fact, it is documented how the master ideas of the SAAL had been enunciated for a long time.[125]

Porto realojou grande percentagem de moradores que trabalham no concelho de Matosinhos; a execução do Plano de Melhoramentos tem acarretado conhecidas consequências nos concelhos limítrofes para os quais se deslocam habitantes do porto, vítimas da demolição das suas casas, que não aceitam a alternativa de realojamento municipal e que na Cidade não encontram condições de habitação de acordo com as suas possibilidades. Dois problemas apenas do complexo fenómeno da habitação que não se compadece com limites administrativos e que apenas uma eficiente Federação de Municípios apoiada num indispensável Planeamento Regional poderiam atender no seu conjunto (…)". Translated from Portuguese to English by the author of this dissertation.

125 "Portanto, e ao contrário do que se afirmou, não foi uma resposta às ocupações, que levou a procurar novas formas, não creio que tenha havido, nem subjectivamente, uma relação directa entre as ocupações e lançamento dos



FIGURE 13.8.
SAAL 's layout Maceda-Acácio (12)
Photographs taken by the author between 2016 and 2020

In any case, it is clear that there was a shift after 1974 that allowed for the SAAL, new housing cooperatives and the rehabilitation of Barredo to exist as programmes, and which had consequences in the way public-funded housing shaped the city from then on. What is interesting, and a subject often left untouched, is how a transformation in the way social housing acted on the city could be verified even in processes that had no direct intervention from the residents' movement, as is demonstrated by the differences between the older FFH's models that were in construction up to 1977, and those estates that were built afterwards. And how those processes such as the SAAL and housing cooperatives, which were, if nothing else, in undebatable relation to the popular organisation that emerged in 1974, resulted in a multitude of configurational arrangements that, due to the small scale in which they operated, can often be related to specific characteristics of specific cases, but across which patterns can also be identified that must relate to something else.

Similarly to how the construction of municipal estates in then peripheral areas outside the city centre was easy to understand in its relation to a larger plan for the city's development, it is also clear that it was in a period marked by strong popular struggle and an unstable state apparatus that some organised populations claimed the right to proper housing in the same central areas where they were rooted.

It cannot be said that SAAL housing avoided the classificatory character of mostly all forms of housing and in particular publicly funded developments for the lower classes - nor was this an objective of the programme. On the contrary, it was the central location of the developments that should subvert a classification that could not be avoided, as the SAAL in Porto claimed the right to the place as a class-right, the right of the working classes to the stable, fully-urbanised, central areas of the city from which they were progressively being evicted. It did so explicitly, not only in its programme, the brigades' reports, or in the written production of its actors but also in the materialised configuration of its developments.

Like PMCP estates, SAAL housing in Porto was not, by design, meant to be read as a part of the bourgeois city. Whether because of financial and time constraints and making a virtue out of necessity, due to the firm and genuine idealisation by the actors of the process of a solution that opposed the old bourgeois city to a new one that should be born of the ways of life of the existing working-class, or, more likely, due to a necessary articulation of both, the truth is that they are not. The SAAL in Porto, dealing with the problem of *ilhas* and seeking to maintain communities in the places where they had been rooted by industrial capital, was limited to the cheaper lots - or

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novos programas como foi o caso do SAAL, ou da recuperação do Barredo, no Porto, ou da criação de condições ao cooperativismo habitacional - tudo medidas dos primeiros seis meses após o 25 de Abril.
De facto, pode documentar-se como as ideias mestras do programa SAAL estavam enunciados há muito tempo."
Translated from Portuguese to English by the author of this dissertation.





FIGURE 13.9.
SAAL's layout Francos (13)
Photographs taken by the author between 2016 and 2020

those the council was willing to make available - within existing blocks, and as such repeated one of the main attributes of PMCP estates: the separation of their residents from the surrounding city. These developments turn inwards, and houses are often hidden away in the backs of existing lots like the *ilhas* they came to replace, or purposeful design choices are made to increase the distance between the primary street grid and the residential cluster. Often, a few openings control all accessibility between the housing developments and the urban fabric from which they are effectively removed. As such, the possible concretisation of the proletarian *ilha* appropriate some of the spatial mechanisms that characterise PMCP's othering of social housing - these clusters are distinct and should be distinct from the bourgeois fabric surrounding them - while acting against their segregation through the refusal of other two attributes of PMCP housing: its removal from the centre and its collectivist intent.

Without social equipment or urban infrastructure in the developments, the residents of SAAL housing were pulled towards the outer city and encouraged to use spaces outside their proletarian cluster, thus countering the a priori segregating character of their housing morphologies. Their social relations should then work at two levels. The first translated the ways of life of the *ilhas* and their neighbourhood relations of proximity and frequent encounter, as well as of the creation of a collective identity dependent on the emphasising of spatial attributes that distinguished this working-class community from the surrounding city. The second denied the communal character assigned to these estates in their configurational character through the absence of collective spaces - functional and not - within the space of the designed neighbourhood.

The scale that the SAAL achieved in Porto makes the question of how these ideas resulted in practice less consequent than when it comes to council estates. However, some of the points raised above regarding the latter can be raised again in light of the considerable configurational similarities of these two opposing approaches to housing development. It is worth raising the question of whether the communal-life-in-the-street - which we have seen to have decreased potential when better houses make a domestic-life-in-the-house possible - would remain the same because the neighbourhood remained in its depth removed from the main city fabric, access routes to houses remained narrow and either non-constituted or constituted by many different front-doors, and because houses were in small numbers, low density and single-family, when, in fact, similarities to the *ilhas* configuration ended here.

In particular, the interior of houses, designed while in contact with the populations and taking into account their ideas and aspirations, could not resemble those of the *ilhas*. The significant increase of interior areas to an average of 72m^2, to which were often added ample exterior spaces, forcibly represented not only an increase of square meters per family but a transformation of the configurational attributes of the house and of the ways families could experience it. Similarly, it represented a transformation of the relationship established between the house and the exterior, not only in terms of density and practicability - the house was no longer so dense and



FIGURE 13.10.
SAAL's layout Lapa
Photographs taken by the author between 2016 and 2020

dysfunctional that the street would be the most inviting space - but also a configurational transformation that had much to do with a design strategy that started from the small scale to tackle the large, and with the resultant impact of the interior design of the house on the exterior arrangement of the estate.

It is noteworthy that participation in the design process, while resulting in housing typologies that both present significant differences among themselves and characteristics that make them distinguishable from those produced in top-down approaches, did not seem to have the same genotypical impact as, for example, the one verified in the inversion of the integration values of functional clusters in cooperative housing. With few exceptions, SAAL apartment layouts maintain the same order of integration values for its functional clusters as municipal and state layouts: collective spaces are generally the better integrated, followed by service areas and, finally, the private cluster of bedrooms and bathrooms lies on the lower values of integration.

If apartment layouts do not present genotypical differences that would translate a different way of looking at the domestic environment and domestic life from those reproduced in top-down approaches, SAAL housing does present some major differences from all other programmes that are not inconsequential to the configurational relationships established between spaces and, as such, between people. While these attributes are not verified equally across cases, they are pervasive enough that it is possible to say that SAAL housing is characterised by large values of depth from the exterior at all scales, by lower values of integration in the apartment and by the introduction of two-storey housing typologies with a second entrance that is often connected to a service cluster independent from the house's collective pole.

Consequently, and contrarily to PMCP layouts where area constraints facilitated the creation of poles of social potential in including the kitchen and therefore the women in a family life that was becoming more collective and developing more extra spatial relations, the SAAL favoured local relationships, building for women who could be in contact with their neighbours throughout the day, but who were often disconnected from the centre of family life. It's the reverse shift from a more traditional family to modern values - the ongoing transformation of the family as presented in institutional research - by seeking to conserve an identity of the working class that was thoroughly related to the conditions that produced it. Furthermore, in some cases where a second entrance is introduced in the back of the houses, this results in an extension of this separation of collective and service areas to the space of the neighbourhood. Outhouses, clothes hangers and washing sinks can frequently be found in backyards, which mark these areas as functional spaces for domestic chores. However, only in a minority of cases do these create a differentiated collective and symbolic front and a services, secondary back.

When a clear differentiation exists between the front and back yards, the former are more often appropriated by decorative elements than display traces of daily use. It is noteworthy how



FIGURE 13.11.
SAAL's layout Massarelos (16)
Photographs taken by the author between 2016 and 2020

this appropriation of a private space of the house resembles the ways small gardened areas are decorated in PMCP estates, apparently revealing a desire for individualisation and customisation of space that is present in both, but also a feeling of possession of collective spaces in council housing.

The disciplinary importance assigned to SAAL projects in Porto has as one of its foundations the more experimental character of the designs or their exceptional architectural attributes[126], and so accords at least part of its disciplinary relevance to the procedural and design options of its architects. If the question of architectural style has been outside the scope of this dissertation, it is relevant that SAAL designs were the product of a process that articulated future residents whose wishes often lay on the reproduction of the models they knew (the houses where they used to live and the houses of those they worked for) and architects tightly connected to a school that was starting to assert one unified identity whose influence on SAAL projects in Porto is widely accepted:

> A second approach makes it possible to identify [architectural] language with the cultural background of the brigade's head, that is, the ESBAP's teacher. The 'Survey', Aaltian empiricism and the social housing of European rationalism are the most used models in the generality of designs.[127](Souto de Moura, 1980, p.105)

In this sense, SAAL designs, which are the most different among themselves of the studied programmes while maintaining identifiable characteristics that also make them, as a whole, different from all others, seem to be the result of a generally common cultural genotype of means across residents' associations and a more or less stable - as varied but respecting a defined set of rules that comprises the architectural language of the ESBAP - genotype of ends.

In the developments of the SAAL in Porto, it is made clear that the sociotype and the stylotype (Bafna, 2012) are not two opposing forces, but a coherent expression of the same thing. If the reading of the brigades' reports make it clear that there existed a certain cultural clash between architects' idealised view of working-class values and the actual values and aspirations of the populations they served, the first was not only social but embedded in a determined stylotype. One that, articulated with the contradiction between residents social conception of what a house should be and architects' positioning, reflected the series of sociotypical characteristics of the SAAL in Porto: the greater separation of different functional poles, in particular the depth of the private pole from the collective areas of the house - something that had more to do with

126 Both ideas were explored in the internationalisation of the SAAL in the ninety-seventies, but are, for example, still common in the papers presented in Bandeirinha et al., 2016.

127 "Uma segunda aproximação permite identificar a linguagem empregue com a formação cultural do responsável da brigada, isto é, com o docente da ESBAP. O 'Inquérito', o empirismo aaltiano e a habitação social do racionalismo europeu são so modelos mais utilizados na generalidade dos projectos"



FIGURE 13.12.
SAAL's layout Bouça (18)
Photographs taken by the author between 2016 and 2020

aspired-to houses than with experienced working-class domestic life - and the division of service and collective poles in a way that was felt not only in the domestic environment but also in the design, in some cases, of the collective space of the neighbourhood. The process of participation should then result in the stylotypisation of a sociotype, where the stylotype then has embedded in itself the architects' own sociotypes and stylotypes and the additional rationalisation of residents' sociotypes.

At the urban scale, the SAAL appears as the counterpoint council estates: it values the ways of life of the working class, the living-in-the-street and the proximity of relations of the *ilhas* that are negated in PMCP estates; it refuses the collective typologies that denied this experience, the top-down approaches where populations had no control over the places where they lived - a condition of the greater part of the middle classes; and to break down communities and displace them from the city they knew. However, while, in its project, the SAAL in Porto was meant to create a new type of city, the SAAL that was possible remains somewhere in between the soft and hard solutions for housing in capitalism as defined by Hillier and Hanson (1984). With clear outer boundaries and a logic of spatial correspondence, the hierarchical, non-distributed character of SAAL developments is minimised by how the predominance of single-family housing removes one level from its distribution tree. Simultaneously, the increase in likely encounters is countered by the small size of each neighbourhood, generating disperse, separated communities. It can be argued, then, that the estate as "a discrete, probably closed local domain with some degree of segregation from surrounding estates" (Hiller and Hanson 1984, p.263) was never entirely abandoned as a design strategy, its configurational properties remaining present across distinct housing programmes.

LOCAL COMMUNITIES IN THE URBAN FABRIC, A GLIMPSE OF AN ALTERNATIVE PARADIGM

However, the development of an outline of what could be a national housing policy that started being put forth in 1969 but only became consequent after 1974, which included a variety of solutions for different problems, reveals that there was a transformation in the institutional approach to the housing questions. This paradigm shift is not only present in the SAAL's understanding of the city and the house, but can also be observed in the spatial attributes of FFH's housing developments. While design mechanisms of spatial differentiation can be identified in all but, possibly, Vale Formoso (layout 31), there is also a clear shift in the conception of public housing estates after 1974 that can be identified most completely in state-developed housing within the municipality of Porto, but that is also present in the developments for Residents Associations not integrated into the SAAL. Both were characterised by normalisation and repetition of models that revealed the scale, and in the latter the urgency, of the operation, without, in turn, reusing the estate model developed before 1974.







FIGURE 13.12.
FFH's layout São Tomé (23) (left) and Viso (24) (right)
Photographs taken by the author between 2016 and 2020



FIGURE 13.13.
FFH's layouts Paranhos (26) (top two) and Ramalde do meio (28) (bottom three)
Photographs taken by the author between 2016 and 2020

The result of a completely different process, state housing could not act within the municipality of Porto as a repetition of the PMCP. While earlier council estates are separated from their immediate surroundings, following designs for functional autonomy that were very rarely built to completion, a significant part of FFH's developments create street-frontage and, not abandoning the creation of collective neighbourhood spaces, are integrated with urban-scale planning to an extent, remaining subject to land prices. It is, however, the alteration of the scale of the process that makes it so that, if like municipal estates, state developments were built in peripheral and segregated areas of the city that have lost that character throughout time, it were the latter that were articulated with the appearance of new localities outside of Porto. It was the same alteration in scale, the mass construction throughout a larger territory than each municipality, that allowed the FFH to impact the creation of these new localities, as well as much of the growth of Porto and its adjacent municipalities.

As such, while direct state housing does not seem to oppose earlier strategies of housing development, sharing with them the adoption of collective housing typologies and budget-reduction through the construction in peripheral areas of the city, its primary concern with the larger scale results in a first instance of distancing from the hard solution for housing in capitalism (Hillier and Hanson, 1984), and in a decrease of the othering character of public housing and - if not as a necessary consequence of the first, at least in relation to it - of its most communitarian aspects as well. Functional autonomy in the form of urban equipment and infrastructure designed to serve each housing estate is absent in many housing developments posterior to 1974. Accessing the same services and equipment as their neighbouring market housing, this resulted in certain activities disappearing as pertaining to communal life: without controlled collective spaces, playgrounds or sports equipment, children and youth occupation of free time seem to become - or at least be seen as - either an individual problem for each family to deal with, or something that must be taken care of outside the realm of the habitat. Similarly, the absence of utilitarian facilities such as communal clothes hangers seems to individualise household chores. And simultaneously, the removal from retail, social centres or other functional spaces of reunion from housing estates in parallel with the assurance of its existence in the surrounding area (all State developments within the municipality are located within 500m of retail and services) seems to work, as in the SAAL, towards the reduction of othering and segregation by making necessary the everyday interaction of housing estate residents with the city outside.

At the same time, in PMCP developments where the estate's configuration and the composition of the urban tissue made this impossible, the residents' struggle for the construction of never realised local equipment and services continued for over a decade. It gradually resulted in the finishing of original designs and the construction or adaptation of communal spaces within these housing developments.

Different approaches to domestic, communitarian and urban life, as to the primacy assigned



FIGURE 13.14.
FFH's layouts Amial (33) (left), Pereiró (29) (centre) and Vilar Formoso (32) (right)
Photographs taken by the author between 2016 and 2020

to each, seem to be mirrored in the material artefacts that are housing estates. Working at the local scale, SAAL estates reveal an approach that went from the house to the city. PMCP housing, while a project of a massive scale in the city, worked with the human and technical resources that allowed it to think the house and the neighbourhood as spaces for creating a - if imposed upon residents - communal life, while relating to the city in the active negation of this relation. FFH housing, thought at the spatial-temporal scale of urban growth, resulted in a higher urban insertion of its communities, while consequently individualising some activities and simultaneously simplifying the problem of the domestic environment.

The design of the house was framed within strict rules and guidelines that guaranteed larger areas and lower costs, at the apparent expense of the articulation of spaces, and forewent some of the sociological and typological research conducted in the LNEC.

Within these apartments, domestic chores are once again removed from collective life. Contrarily to PMCP estates, kitchens in State-developed layouts are usually poorly integrated a-type spaces, distanced from the social pole of the house and connecting, instead, more directly to the exterior. In most cases, they are connected to one other space, further segregated, where clothes-related fixed-functions are located. Additionally, while kitchens in FFH developments are larger, they are not large enough to easily accommodate additional, non-fixed-function activities. This created an isolated area that was likely to represent a large percentage of the time women spent at home according to research conducted before the development of these housing typologies. If created for the evolving family as explored in Portas' (1969) research - a family for whom neighbourhood relations were losing importance as it grew more integrated with urban life and extra spatial relations became more common, and a family where household chores were starting to be both automatised and shared - we today know this evolution has been slow. Women are still responsible for 74% of domestic chores, which represents around two and a half hours a day (Sagnier et al., 2019). As such, it is likely that an important part of those hours was and still is mostly spent by women alone in segregated kitchens. However, we have also seen in chapter 4 how an FFH B2-type layout, where living rooms are a necessary transition space both between the exterior of the house and bedrooms, and between the kitchen and bedrooms, has an additional potential to be a reunion space within the house. In this sense, it is not only the likeliness of the family spending time together that increases, but also the potential for the remainder of women's time at home - including other responsibilities such as taking care of children, as well as free time - to be spent collectively.

These same apartment models are used in estates developed for Residents Associations. When the SAAL was dismantled, the still existing legal framework and practised pragmatism allowed, to some extent, for the maintenance of participatory processes. Economic housing cooperatives continued to be formed and to build new developments in the city and, for a few more years, some organised residents found ways to bring their projects to completion.



FIGURE 13.16.
AMs' layoutVilar (20)
Photographs taken by the author between 2016 and 2020

In their adoption of collective housing typologies and multi-building configurations that are variations of organisation of FFH's apartment schemes, the resulting estates from this process resemble those developed by the central state institution. The underlying principles of spatial organisation appear to be similar in most cases. Many estate layouts developed for AMs share FFH's open relationship with the exterior city, often creating street-frontage or being completely perceivable from exterior streets, and in this sense counter the idea of public housing estates as clusters segregated from their immediate surroundings where a clear differentiation exists between those that inhabit them and those that do not. Articulating these with the SAAL's ideal of right to the place, associated to the construction for a known and organised population whose aggregating characteristic is its place of residence and whose objective is to remain in the area of the city where it has built communitarian roots, the developments built for Ams are in many cases in central, highly integrated areas of the city. Where the FFH developed estates that searched to articulate with their surroundings in areas of the city or of adjacent municipalities that were not yet wholly urbanised, AMs remain in the areas they know and where, even in the most segregated examples, they have already formed local communities that may surpass the estate. Where the SAAL assumes the difference between its working-class residents and the bourgeois city around them in the configuration of its layouts, many of other AMs' developments appear as part of the same urban fabric of those that do not inhabit them.

Simultaneously, AMs' estates include collective functions. If in most cases, these appear, like in SAAL developments, connected to the residents' association's headquarters as community or recreational centres, there are instances where layouts include a sports field, and spaces with potential for collective use are also common across cases.

These spaces appear to have been, at least to some extent, appropriated and managed by the associations and their members. In what regards the estate solely as a spatial and social entity, ignoring global social and political conditions of each time, it seems that institutional structures have a double impact on the potential for community creation. If legislation and regulations concerning housing and urban policies, as well as the institutional organisation and capacity to implement them, have been seen to impact significantly the configuration of housing developments - a configuration which, in itself, can encourage or hinder the creation of neighbourhood relations - these also dictate the processes through which housing is developed and maintained - a process that, similarly, can involve the initial or continuous organisation of residents - and the type of property it produces - one that is either public responsibility, privately owned and managed, or collectively owned or managed.



FIGURE 13.17.
AM's layout Campo Alegre (21)
Photographs taken by the author between 2016 and 2020

DISJOINTED PROCESSES IN COOPERATIVE HOUSING

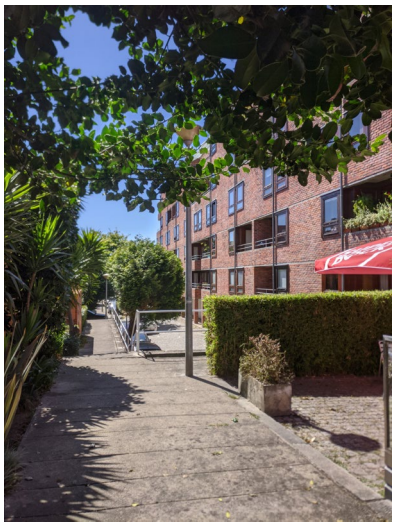
Three types of housing development were studied in this dissertation that presuppose some type of residents' organisation. AMs' housing developments, either developed by the SAAL or not, were dependent on the prior organisation of ill-housed populations. In the SAAL, this organisation was furthered during a process of housing development that, while supported by the institution, was the responsibility of future residents. However, SAAL houses were developed to provide residents with access to their own houses, hence embedding a certain domesticity and individualisation in the process of "social organisation of demand" (Portas, in Bandeirinha, 2007) and the maintenance of its socialised character after the developments' completion. Denied a participative role in the development of their estates, AMs outside of the SAAL maintained a socialised process of demand, were given layouts with some potential from community creation in their configurations and, in some cases, were assigned the collective property and management of the entire estate.

It was mainly through the latter characteristic that neighbourhood relationships were encouraged by the legal framework of economic housing cooperatives.

Cooperative housing implied some prior organisation, depending, like the SAAL, of collective housing demand. However, cooperatives were often larger than residents' associations, requiring at least 200 members to be formally constituted, and worked within wider limits than the SAAL, being delimited by geographic regions or professional fields. Additionally, requiring members who had the financial capacity to invest in their future houses, and as such managing the development of new estates independently of state institutions, the participation of future residents in the design process depended on the internal organisation of cooperatives and was that of the relationship between client and architect. In this sense, if cooperative members could play a role in decision making, the relationships created between future neighbours would necessarily be of a different character of those established within residents' associations of populations that lived nearby and, without the financial capacity for hiring services, had to invest a more substantial amount of time in the development of new houses.

In this sense, while personal investment might be lower in cooperative housing, economical housing cooperatives' legislation also included collective ownership of houses and collective spaces. Its encouragement through tax exemptions and other legal benefits meant the encouragement of continued collective management of residential space, enabled the attribution of a collective dimension to the house, besides its domestic character as the domain of the individual or the family.

This idea of housing as a collective good does not always seem to be translated into the spatial configuration of cooperatively developed estates. Only half of the studied cases present labelled







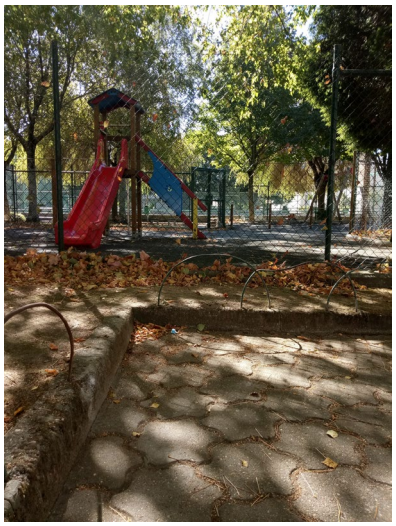




FIGURE 13.18.
CHEs' layouts in order: SACHE (37), Tripeira (40), CETA (41), Santo Ildefonso (43)
Photographs taken by the author between 2016 and 2020

functional spaces, and only in two of them are these collective functions. Similarly, most cases do not present spaces with spatial attributes that may encourage collective use. If all cases reveal in their spatial characteristics a differentiation from the surrounding city, in most of them, this is not a differentiation of collective from public use but a shallow distancing from the primary urban grid that simply clarifies the difference between residents and strangers. As such, in all but two cases, cooperative housing resembles state developments in that domestic functions are either individualised or urbanised, but differ from them in two fundamental ways. Firstly, these individualised functions take place in larger apartments with significantly distinct configurations. If it has been seen in FFH's layouts that domestic work, which in PMCP estates was sometimes collectivised and which in SAAL developments could often be carried out in the company of neighbours, was limited to the space of the house - and likely to small, segregated kitchens - in cooperative housing schemes this same work would be associated with larger kitchens often connected to collective areas of the house. Secondly, where domestication of functions may happen, this is articulated with necessary collective management, if more or less important depending on the type of property and on the amount and type of collective areas.

The cooperative housing developments that abounded in the early years of Portugal's liberal democracy are, to a great extent, the delayed product of post-revolutionary cooperative legislation (Fleming & Magano, 1992). If in 1978 the legislation regulating cooperative housing began to be progressively altered in the sense of articulating it with the real estate market and further intensifying its role as developers of middle-class housing, due to the amount of time needed for formalising cooperatives, negotiating for and acquiring lots, or designing houses, much of the housing developed by cooperatives during the late ninety-seventies and early ninety-eighties is likely to be the outcome of earlier legislation.

Even as its character was progressively altered, the fundamental importance of cooperative housing seems to have laid on its capacity for filling in gaps. During the 1970s and 1980s, cooperative housing was seized by municipalities in order to promote housing development at a smaller cost. The allocation of municipal lots and funding to housing cooperatives was essential for the success of the programme. It provided a tool for Porto's neighbouring councils to develop, while simultaneously assigning cooperative housing an urban character that was not inherent to its framework, but a result of this bilateral relationship. Exterior to council or FFH housing and urbanism offices, cooperative housing was not a priori articulated with urban planning. However, often used as a palliative for the municipalities lack of capacity for providing housing, they could be integrated into their ideas for city's growth and development and, if they were not, the scale cooperative housing achieved in Porto's neighbouring cities makes them a definite element of urban organisation.

This role was long-lasting. If by the ninety-nineties housing cooperatives were less targeted for low-income families, they were the one alternative to private developers that continued to have

any real impact in Porto and its metropolitan area. If, inevitably, the role and spatial meaning of earlier cooperative developments were altered by changes in cooperative legislation that withdrew incentives for anti-speculation measures or collective ownership and management, the process that first produced them remains ingrained in the urban configuration of these areas.

The outcome of their context, all housing programmes that acted on the city of Porto reveal in the spatial configuration of their developments the conditions that produced them. Part III of this dissertation has shown that this relationship is not always simple, straightforward, or the direct reflection of the explicit consciousness of relevant actors - architectural or institutional. Moreover, it revealed that the social meaning of these housing developments - as of all man-designed space - is not permanently defined at the moment of its production nor staticly determined at each moment of its use. Rather, it can only be read within a process, urban and social, in permanent transformation.

CONCLUSION

"It is because subjects do not, strictly speaking, know what they are doing that what they do has more meaning than they know." (Bourdieu, 1972, p.79)

The dissertation had as its motivation and primary objective to offer a counterpoint to the dominant historiography of large-scale public housing, which has historically been used to sustain both the dismantling of public housing policies and the tearing down of existing housing estates, by simplistically associating a critique of social issues to a critique of architecture and, as a consequence, to a model of socio-economic development (as identified by Till, 2009 and Boughton, 2018). In Portugal, this narrative has been pervasive at the political level (as seen, for example, in Cardoso, 2001 and Rio, 2003) but has rarely been subject to examination in architectural research. Instead, in this discipline, local approaches are predominant in the investigation of public housing, in particular in Porto, where it is focused on the SAAL or individual author pieces. As these often produce narrow views of the role of public housing in the construction of social and urban space, this has been identified as the main gap to which this dissertation intends to contribute.

It was established as the research's guiding axiom that space has some impact on how people live and interact as a society. Housing, in particular, has characteristics that make it prone to being used as a mechanism of differentiation and classification in each given society (Harvey, 1985a, 1985b, 1989; Marcuse, 2001, 2002; Bourdieu, 1972/1995, 1980) and assumes forms that are inseparable from the context that produced it (Lefebvre 1973, 1974; Bourdieu, 1972/1995, 1980). Because housing holds these attributes, it is essential to study how it is produced and how its production has an impact on the forms it takes, and how the forms it takes are related to social patterns. In this sense, a reading of a complex historical period can unveil answers to these questions that can inform the understanding of the same processes in contemporary society.

Starting to explore the production of housing in its spatial and historical facets implied asking one first set of questions that, while not expected to be fully answered by this or any dissertation, defined the broader field to which the research aimed at contributing: What is the nature of the relationship between space and society? Through which mechanisms is it established? How does this apply to the particular case of housing? The dissertation offered some hypotheses to answer

these questions through the historical analysis of built-space and, in a first moment, through the examination of existing literature and theoretical models of relevant authors. This built on the guiding axiom of the thesis and allowed for an argument to be put forth regarding the mechanisms through which space and society interact: 1) The built environment is the product of the social relations of each given society (Lefebvre, 1973, 1974). 2) It has the capacity of organising socially defined human activities and as such impacting social relations (Rapoport, 1969; Hillier and Hanson, 1984). 3) Because the fiormeris true, socio-economic and political models will tend towards producing space that tendentially reproduces the ways of life that sustain them (Bourdieu, 1972/1995). In this formulation, the relationship is necessarily recursive. The ways of life supported in space act back on a society that is never stagnant.

The specific role of housing lies in its capacity to play a direct role in the reproduction of the social relations of production (Harvey, 1985a, 1985b, 1989; Gros, 1982). Public housing carries in itself the class interests expressed in state intervention and the form of social relations it seeks to maintain. It does so not only as a set of more or less intense welfare policies in the context of a capitalist society, but also in the organisation of groups and classes in the city, and in the organisation of the way these groups and classes relate to the city around them. Furthermore, in its architectural aspects, it tends to reflect dominant views on domestic and community life. Simultaneously, because the relationship is recursive, housing is also the product of social struggle. Its existence, its quantitative and qualitative characteristics, reflect different contradictions: that between industrial and land capital, or that between capital and people struggling for the improvement of their living conditions.

In the process of answering the first set of questions posed in this dissertation, one additional question was asked, which is of particular pertinence in the context of the study of a historical period of societal transformation marked by an intense revolutionary period where housing stood out as a central point of popular organisation: when does architecture, if ever, turn its back to the Tsar?

Eisenstein's Ivan the Terrible introduced chapter 2. It was seen that, in the film, doors are built as part of an oppressive apparatus and materialise, through their attributes as part of a spatial system, this oppression by enhancing its practice. Their oppressive character then ends when oppression is not expressed in practice. When it is possible for muscovites to enter the throne room with their backs turned to the Tsar, the same spatial attributes of the same door have changed social meaning. The turning of one's back to the Tsar is an expression of transformed social relations, of a shift in power balance that removes - or challenges - the doors' oppressive character.

In this way, space, even unaltered, suffers continuous transformations in its relations with society.

In housing, it can be seen how the material conditions impacting people's lives reflect on the social meaning of space. The same house, with the same area and the same number of rooms, provides very different living conditions when used by the number of inhabitants it was built for or when several families have to share its space. When the former is common, it also becomes expected. Once a certain living standard - a bedroom per family member, private bathrooms in houses - is achieved in a society, anterior living conditions that were once common are no longer socially acceptable. Similarly, as social consciousness transforms, spatial characteristics that were once likely to act in specific ways on how people live will now act differently. For example, as domestic relations change and men become more likely to participate in domestic work, segregated kitchens may eventually become more a nuisance than an active mechanism of woman's segregation at home. For the time being, as the process is underway, the clear functional differentiation between services and collective space in the house may remain a hindrance to that change.

In this sense, unchanging spatial artefacts have social meanings that change with the material conditions of society as well as with the system of perceptions, the social consciousness, that accompanies it. But each stagnant spatial part is also integrated into a transforming spatial system, created and recreated by transforming social relations. Housing developments that remained unchanged for decades are part of a growing urban fabric where previously segregated spaces become integrated, or new localities are created.

It is because time has an impact on the meaning of artefactual space that is caused by transformations in material conditions, in the social consciousness that arises from these material conditions, and in the spatial system it is a part of, that Ivan the Terrible's doors can, maintaining the same spatial characteristics, have its social consequences change.

In this sense, another meaning can be assigned to configuration. As we have seen, it is a relation between at least two elements that changes when another element is altered (Hillier and Hanson). Spatial configuration can, in this way, detect the action of time on static space by taking into account other transformations in the system of which it is a part. However, it seems that an analysis of space can only be truly configurational when it takes into account these other elements that, when changed, change the meaning of spatial relations.

The first hypotheses of this dissertation had to do with the two aspects of this configurational recursiveness. Hypothesis 1 originated from a theoretical systematisation that suggested that different processes and contexts of housing production should develop housing layouts with apparent differences between each other and clear "genotypical" themes (Hillier and Leaman, 1978; Hillier et al., 1986) among themselves that can be traced back to historical context, to different societal concerns and projects regarding social class, family life and gender. If this hypothesis was seen to be true and underlying design paradigms were verified to change according to the socio-economic and political context, it would confirm that space can tell us something

about society. The second hypothesis suggests that, according to the same theoretical framework, it should also mean that these design paradigms act in different ways on society.

The latter hypothesis could not be adequately confirmed in the scope of this dissertation. The preliminary results from the empirical test conducted on the Survey on Urban Housing's data were promising. However, the same empirical validation was not undertaken for the studied housing developments in Porto. This hypothesis requires future sociological validation in order to verify whether different configurations, the product of different contexts, are related to varying social patterns.

Nevertheless, these results appear to support the 3rd hypothesis of this dissertation: that, to a certain extent, social and historical processes can be examined with tools inherent to the discipline of architecture (different from those of history or sociology, but articulated with them). To examine this hypothesis, Space Syntax was studied as a particular theory of the relationship between space and society that provides a series of tools to describe spatial attributes and detect patterns that can be compared with and related to patterns of social practice. These tools were used in order to retrieve patterns of use of the domestic space by families, through the examination of the survey conducted in 1971 by the LNEC. This analysis produced data on the ways of life of families that, while not directly generalisable to the residents of public and cooperative housing developments in Porto, appeared stable enough to be used as a reference, in articulation with the conclusions of other research conducted throughout the third quarter of the 20th century. Understanding patterns of use provides, to a certain extent, information on how space may affect social patterns. The kitchen serves as a clear example again. Knowing that women were the main responsible for domestic tasks led to researchers suggesting that kitchens should be integrated into the collective areas of the house in order to counter women's isolation in the household. A preliminary effort was also made towards examining how patterns of use vary according to differences in the spatial attributes of houses. If this shed some light on how non-fixed-function rooms are likely to be used according to their position in the house's configuration and how this can affect patterns of collective life at home, it also stressed the importance of non-results. It was seen, for example, that regardless of kitchens' area, relative size, integration or relative position to other spaces, its use by family members besides women was rare: a non-result which, in revealing the strength of this cultural pattern, also revealed the importance of spatial mechanisms in its transformation.

The validity of the method was further explored with the second set of questions that was posed: What are the spatial characteristics of housing developments in Porto? Do these differ from programme to programme? How do they reflect different contexts, objectives or ideologies? In regards to these, answers could be found. The analysis of public and cooperative housing developments in Porto was capable of retrieving design patterns that, compared across programmes, suggested shifting or contradicting design paradigms.

Furthermore, Space Syntax, as a field of architectural study which has been in development for nearly half a century, has produced consistent knowledge on the relationship between spatial patterns and patterns of movement and permanence in the urban space, as well as of use and perception in architectural environments, which can be used to inform other analyses of space. With resource to this knowledge and the theoretical premises it has validated throughout the years, estimations could be made on the potential of the studied spaces to encourage or hinder patterns of co-presence among neighbours, or of inclusion or exclusion in the surrounding urban space. As this knowledge was further articulated with the results obtained in the analysis of the Survey on Urban housing and the theoretical models previously examined, it was possible to develop a set of socio-spatial concepts to assign social meaning to the spatial attributes of housing developments. The concepts of segregation, othering, hierarchisation, domestication and adaptability used in this research sought to combine theoretical notions of the social role of space in a capitalist society with spatial concepts that were seen to have been specifically developed to explore this relation: the social logic of space.

These socio-spatial characteristics of the studied housing developments were seen to suffer transformations, more or less consistent, with changes in the contexts that produced them. The most evident aspects of segregation, othering and hierarchisation were verified in pre-1974 housing developments, while articulated with a view of the house deeply informed by experimentation and clear societal concerns, connected to properties of adaptability in the domestic space. A shift was detected immediately after 1974, when a certain in domestication of housing form was thwarted by the collective character of housing demand and construction. Anti-segregation strategies were clear during the revolutionary period, while one particular programme, the SAAL, expressly sought to maintain some aspect of othering in the housing it produced. Then, as the revolutionary period ended, a transformation appeared to be occurring in the approach to public housing: if it remained removed from the existing centre and connected to industrial areas, design strategies could also be identified that started to attempt to counter segregation and othering in some of these developments. As the country continued to move towards liberalisation, it was not only the form of these developments that changed, but their very existence. In Porto, public development of housing virtually disappeared after the dismantling of the FFH, while new policies for selling public housing stock were created in the 1980s.

Looking at space to identify patterns, connecting them to societal transformations and seeking to understand the role of the former in the latter, this research aimed not only to contextualise spatial knowledge historically, but at using this spatial knowledge as a means to inform the understanding of historical processes further. Approaching the problem of housing as global, not local, this research aimed at providing a reading that looked at public housing as part of a system, if at times made of conflict and rupture - that is social as well as urban, with consequences at all scales of life. The focus of the dissertation and what intended to be its original contribution should lie in some part in the comprehensive spatial analysis of public and cooperative housing in Porto

and the systematisation of this information, but this analysis would have little meaning outside its contextualisation in a place and time and the evolution of both.

If without thorough sociological work, this dissertation could not offer an answer to how the policies or forms adopted in large-scale housing have affected the lives of their residents, it was capable of providing preliminary empirical clues that suggest housing form has an impact on how people live. Notably, it could deliver a global historical reading of how public housing has been produced and what contexts have generated what forms. The purpose of work such as this one has been put to words by Julienne Hanson (2000, p.97) as she explored the transformations caused by social housing in Somers' Town, London:

> […] it is essential for architects and urban designers to understand how social ideas about inequalities in power and control get built into our frameworks and assumptions, and why, in the final analysis, architecture cannot be divorced from politics. […] Most architects prefer not to think about how their design ideas have come into being, but in the case of social housing there would seem to be a duty to do so, for it is quite possible that our thinking has been polluted along the way by attitudes and values that discriminate against people on the grounds of social class, gender and ethnic identity. As these are the three basic `facts' of the human condition upon which people's social identities are constructed, it is important to understand the role that ideology has had in the evolving public debate about space and society, and in perpetuating social inequalities whilst appearing to resolve them.

The research has shown how, in an act as simple as that of designing a kitchen and its relation to a living-room, architects can potentiate or hinder the isolation of women at home. It has also been seen that the decisions made by each individual architect exist only in relation to society, and that spatial patterns that can be identified as design paradigms will arise that are the product of socio-economic contexts, political conditions, the resulting aesthetic and ideological trends. Often, when a kitchen is integrated into a living-room, it may not so much represent the purposely reflection by architects of the social impact of their works and a certain view of domestic life, but a consequence of area economy and budgetary constraints imposed by the market. Urban social processes are more complex, and understanding design's role within it often not straightforward.

In this sense, it appears essential to develop more work on the role of designed space in these processes, to confront architectural decisions with empirical data on how people live in space. This research did so only to a tiny extent, but the results obtained suggest that surveys such as those conducted in the 1970s, backed by contemporary tools, should provide many layers of essential knowledge: On how families and communities behave and interact in space; on how these social and spatial patterns change in different environments; on how design choices made in the past affect the people that now inhabit those spaces, in order to fully understand the historical role of

pattern differences between the spaces occupied by different social groups of classes, between the spaces purposefully created for each.

However, if throughout this dissertation it has been seen that spatial attributes and configuration impact, to an extent, the way people use and behave in space, it has also been argued that, more importantly, it is society that shapes space, and that shapes its practice within it. In this way, if social inequalities are reflected in designed space, they are not determined by it. As social relations transform in time, so does the meaning of the role of their impression in space. As such, more important than informing architects on the immediate consequences of their actions is, as Hanson claimed, to think about how design ideas have come into being.

There is evident importance in architects having the tools to make purposeful decisions, informed of the likely consequences of their action on the people for whom they are designing. It is essential also to study the complexities of the social processes they integrate.

This dissertation could identify more or less stable design paradigms that revealed differences in the ways of approaching domestic life and its relation to its surroundings. Admitting that the spatial organisation of relations between individuals, groups and classes may impact their social organisation as well, these different design paradigms appear likely to have different roles in the creation and development of urban and social fabric. Segregated housing estates, designed to be read not as part of the city fabric but as other, developed the city not as a continuous social tissue, but as a set of discrete, controllable, units. Distanced from the city centre but less hierarchised estates, connected to an urban fabric that should grow with them, remained integrated into a strategy of urban sprawl that nevertheless did not appear to seek to isolate their populations. That the former represent the norm for council housing during a fascist dictatorship and the other the design paradigm of most post-revolutionary estates does not seem surprising. The fact that direct public housing development has been absent from the city for the greater part of this democracy shows that these processes are complex, and that the last twenty years of it were staunch in tearing down existing estates demonstrates the urgency of studying them.

It is in this duality, the dissertation argues, that lays the global character of housing.

AFTERWORD: PERSONAL STATEMENT

Broughton's (2018) Municipal Dreams starts with a recollection of the recent fire on the Grenfell Tower in London, exposing a series of arguments regarding the social repercussions of architecture that have been repeated across contexts:

> The fire at Grenfell was, above all, a personal tragedy to its residents and their friends and families. But to many more it symbolised in devastating fashion, a crisis in social housing. It stood as an awful culmination to deeply damaging policies pursued towards council housing, and the public sector more widely, since 1979 (p.1)
>
> […] To some, the 'lesson from Grenfell [was] simple: stop building residential towers'; they were 'antisocial, high-maintenance, disempowering, unnecessary, mostly ugly, and they [could] never be truly safe.' (p.252)

I will finish my dissertation by shifting the lens to a different devastating symbol of a crisis in social housing. In Aleixo, an estate torn down between 2011 and 2019, there was not a fire. It was over three decades of mismanagement by the council that gradually resulted in the deterioration of buildings and exterior areas, to the point where a narrative could arise where the problems to be addressed in Aleixo were no longer so much the degrading living conditions of its residents, as a stated social problem affecting the entire city. There, as well, the buildings' high-rise model was repeatedly stated as explanatory evidence to justify demolishing and relocating its population. When the idea was first presented, Nuno Cardoso, then mayor of Porto, claimed that high rise housing does not work, he had always thought so, and in particular, it does not work for social housing. (O Fim do Aleixo Começa Hoje, 2011; Queirós, 2019, p.78) This idea, which continued to be put forth during the process, was not new or unique to him. It was seen as an error "[…] for those people because they were not used to living in collective buildings (Unnamed CRUARB engineer)"[110] (Queirós, 2019, p.51) and were not used to the "complicated administration" that they demanded.

110 "[...] Para aquelas pessoas, porque elas não estavam habituadas a viver em prédios, em torres, com tantos andares, com um condomínio tão complicado." Translated from Portuguese to English by the author of this dissertation.

This dissertation has touched on the transformation in ways of life that the relocation from ilhas or other types of precarious housing to housing estates did cause in the affected populations. However, it also showed how these estates often worked as a stage for popular organisation. In Aleixo, like in other council estates in the city, the populations that are described as unable to deal with condominium management are the same who organised and achieved not only houses, but public equipment, and, for a while, accompanying social policies. Simultaneously, the populations that were to be removed from the estate were the same demanding the right to stay.

Porto's architects, in general, rallied against this project. Bandeira (2009) argued that "Neither urbanism nor architecture will solve a complex and vast social problem"[111], an opinion shared by Siza (Amaral, 2016), and Alves Costa (2009). The latter criticised the minutiae of the narrative: "High rise buildings are not adequate for social housing, they say. Four storey buildings are fit for the poor because they avoid lifts […] Turns out typologies 'belong to a class'"[112]. But some from within the discipline supported the mediatised idea that there was something wrong with the estate's architecture. MAVAA arquitectos associados (2011) stated that Aleixo "[…] following the best principles of the Athen Charters,"[113] like many others, had failed. Moreira (2005), while not providing a personal opinion on the extent to which architecture was to blame, assumed his role as architect as one of mediating between the populations and decision-makers. Mediating, he proposed tearing down just half of the buildings - the top half.

As it is now known that the ample lot with a view over the river where Aleixo used to be located is to become luxury housing, this process recalls the one which was studied throughout this dissertation. As the houses of the working class become incoherent with the city's development and the social structures that guide it, ways are found to remove them. During the studied period, populations who endured decades of precarious housing conditions were relocated to new houses and as such vacated the city centre, only in the context of a new plan for the city where the centre was not compatible with housing for the working class. Had the residents of Aleixo been given other, better houses, it would seem history was repeating itself. Instead, the following mayor made it clear that the last of Aleixo's blocks could not be torn down while the council was held to the obligation of providing its residents with housing in the city. Otherwise, they would, he argued, "continue drug trafficking elsewhere (Rio, 2003)[114]" (Queirós, 2019, p.15). Unlike Grenfell, there

111 "[...] nem o urbanismo, nem a arquitectura resolverão um problema social vasto e complexo." Translated from Portuguese to English by the author of this dissertation.

112 "As habitações em altura, tipo torre, não são apropriadas para a habitação social, dizem. O próprio para pobres é o "r/c 3" porque evita od elevadores [...] Afinal as tipologias são 'de classe'." Translated from Portuguese to English by the author of this dissertation.

113 "[...] segundo os melhores princípios da Carta de Atenas [...]" Translated from Portuguese to English by the author of this dissertation.

114 "[...] iria para outro lado dar continuidade ao tráfico de droga." Translated by the author of this dissertation.

was no fire in Aleixo. Instead, one had to be socially manufactured. When Nuno Cardoso stated that "Either we take care of these estates, or they take care of us"[115] (Queirós, 2019, p.79), architectural arguments were being used as an ideological tool to sustain this narrative. Architecture was, metaphorically, one of the matches.

However, architecture also has disciplinary tools to put this narrative to the test. Aleixo, like São João de Deus or the other estates that have been torn down in Porto, did not present significant spatial differences from those that remain standing, nor from high-rise developments for the middle class whose existence was never questioned and whose architectural properties are often praised. When high-rise is deemed unfit for the working class because lifts need maintenance, this is a political decision, not an architectural failure. When high-rise with a view over the river is understood as needing "taking care of", it might be more that, as Fernandes (2010) has argued, "It was necessary to remove the poor from a place with natural conditions to be enjoyed by the rich […]"[116].

If looking back on the studied period makes something clear, it is that architecture, as a discipline, cannot overcome the underlying constraints of society and provide solutions for structural problems. Progressive and committed populations, architects and legislators could, for a moment, only provide a glimpse of what could be a systemic solution for housing, one which integrated different solutions for the variety of different problems housing always represents. What was accomplished was of the utmost importance for the city, both in that thousands of families saw their living conditions improved, and in that the way housing was developed in the city had a lasting impact on its growth. Simultaneously, and perhaps consequently, it was also lacking: bounded by the constraints of the market, land speculation, and even pervasive values - social and aesthetic, reflected in each individual decision - estates remained estates, discrete urban elements translating in space the social hierarchies and asymmetries of the society that created them, as did the city to whose growth they contributed. Understanding the processes that created these estates, the social relations they were meant to produce and reproduce, we can look back at what was done and, according to each of ours (socially constructed) set of objectives and concerns, take lessons for the future. It is not up to architecture to decide what this future will be, but in a discipline that presents itself so often now concerned with social inequalities and the imbalance in power that comes with it, there must be some to whom what happened in Aleixo (and continues to happen everywhere) should represent, if nothing else, a call for research.

115 "Ou nõs tratamos destes bairros, ou eles tratam de nós." Translated from Portuguese to English by the author of this dissertation.

116 "Era preciso tirar os pobres de um sítio que tem condições naturais para ser usufruido por ricos [...]" Translated from Portuguese to English by the author of this dissertation.

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